FINAL ENVIRONMENTAL ASSESSMENT
for

New Regulations to Protect Killer Whales from Vessel Effects in Inland Waters of Washington

National Marine Fisheries Service
Northwest Region

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COVER SHEET

Title of Environmental Review: FINAL ENVIRONMENTAL ASSESSMENT
New Regulations to Protect Killer Whales from Vessel Effects in Inland Waters of Washington

Listed Species (ESA):
Southern Resident killer whale DPS (endangered)

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Cooperating Agencies:
U.S. Coast Guard
Washington Department of Fish and Wildlife
Department of Fisheries and Oceans, Canada

Legal Mandates:
Endangered Species Act of 1973 (ESA, 16 U.S.C. 1531 et seq.)
Marine Mammal Protection Act (MMPA, 16 U.S.C. 1361 et seq.)
National Environmental Policy Act (NEPA, 42 U.S.C. 4321 et seq.)

Location of Proposed Action:
Inland waters of Washington State

Proposed Action:
Adopting regulations to protect killer whales from vessel impacts, which will support recovery of Southern Resident killer whales.

Cover photos: Land-based viewing of killer whale; Jeff Hogan, killer whales and whale watch vessel; Dawn Noren, and kayak with killer whales; Jeff Hogan.

LIST OF ACRONYMNS

ANPR	Advance Notice of Proposed Rulemaking
CCG	Canadian Coast Guard
CEQ	Council on Environmental Quality
CTC	Pacific Salmon Commission Joint Chinook Technical Committee
CVTS	Cooperative Vessel Traffic Services
DPS	Distinct Population Segment
Ecology	Washington State Department of Ecology
EO	Executive Order
EPA	Environmental Protection Agency
ESA	Endangered Species Act
ESU	Evolutionarily Significant Unit
FEIS	Final Environmental Impact Statement
IEC	Industrial Economics, Incorporated
ISAB	Independent Scientific Advisory Board
KELP	Kayak Education and Leadership Program
MMPA	Marine Mammal Protection Act
MRC	Marine Resources Committee
NEPA	National Environmental Policy Act
NOAA	National Oceanic and Atmospheric Administration
NMFS	National Marine Fisheries Service
NMPAC	National Marine Protected Areas Center
OMB	Office of Management and Budget
OSP	Optimum Sustainable Population
PTS	Permanent Threshold Shift
RCW	Revised Code of Washington
RIR/RIA	Regulatory Impact Review/Regulatory Impact Assessment
TSS	Traffic Separation Scheme
TTS	Temporary Threshold Shift
USCG	United States Coast Guard
WDFW	Washington Department of Fish and Wildlife
WSDOT	Washington State Department of Transportation
WWOANW	Whale Watch Operators Association Northwest

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EXECUTIVE SUMMARY

Introduction

The final Environmental Assessment (EA) reflects changes from the draft EA in response to public comments and new information collected since the draft was published. The final EA also includes an Executive Summary, a Preface where public comments and NMFS' responses are presented, and a Finding of No Significant Impact (FONSI).

Preferred Alternative

After review of the public comments on the proposed rule and draft EA, NMFS developed a Preferred Alternative. The Preferred Alternative (Subsection 2.2.9, Alternative 9: Preferred Alternative) is a combination of two previously analyzed alternatives in the draft EA, Alternative 3 and Alternative 7 (Section 2.0, Alternatives). Because each alternative was analyzed in the draft EA, and since the Preferred Alternative is a combination of each, NMFS did not prepare a separate analysis of the Preferred Alternative because no additional information would be revealed by conducting such a review. However, the cumulative effects analysis (Section 5.0) does include updated information on the cumulative impact of a combined alternative as the Preferred Alternative.

Background

Southern Resident killer whales were listed as endangered under the Endangered Species Act in November 2005. NMFS identified vessel effects as a risk factor in the decision to list the Southern Residents and in the *Recovery Plan for Southern Resident Killer Whales* (*Orcinus orca*) (NMFS 2008a). NMFS is concerned that the level of disturbance caused by vessels surrounding these popular whales may have harmful effects on individuals and the population. NMFS completed a recovery plan that includes a variety of management actions to recover Southern Resident killer whales, and one goal of the plan is to minimize disturbance of Southern Residents from vessels (NMFS 2008a).

To begin implementing the actions identified in the recovery plan to minimize vessel effects on Southern Resident killer whales, NMFS published an Advance Notice of Proposed Rulemaking (ANPR) in March 2007. The ANPR initiated a public comment period to gather information on whether regulations were needed and, if so, what type of regulations might be appropriate. Based on comments in response to the ANPR, scientific information on vessel activities and impacts to the whales, and an economic analysis and review under NEPA, NMFS developed proposed vessel regulations to protect killer whales from vessel impacts in inland waters of Washington, which were published in July 2009 (Proposed Action). The proposed regulations would have prohibited motorized, non-motorized, self-propelled, and human-powered vessels in navigable inland waters of Washington from 1) causing a vessel to approach within 200 yards of any killer whale, 2) entering a restricted zone along the west coast of San Juan Island during a specified season, and 3) intercepting the path of any killer whale in inland waters of Washington. Certain vessels were proposed for exemptions to the prohibitions.

NMFS received considerable input on the proposed regulations at public meetings and during the public comment period. After considering the substantive comments and new information, NMFS developed a final regulation (Preferred Alternative) that would prohibit motorized, non-motorized, and self-propelled vessels in navigable inland waters of Washington from 1) causing a vessel to approach within 200 yards of any killer whale and 2) intercepting the path of any killer whale in inland waters of Washington. Certain vessels would be exempt from the final regulations. The proposed rule included a seasonal no-go zone for vessels along the west side of San Juan Island. The no-go zone is not included in this final rule and will be considered further with additional input from the public and after new information is collected.

NMFS relied on the public comments, the Recovery Plan (NMFS 2008a), Soundwatch data, and other scientific information to develop a range of alternative individual regulations, including the alternative of not adopting regulations, the Proposed Action (proposed regulations), and the Preferred Alternative (final regulations). Based on alternative selection criteria, nine alternatives were fully analyzed in this EA. NMFS analyzed the environmental effects of these alternatives and considered options for mitigating effects. Eight resources were identified during the draft EA scoping that could be affected by alternatives, including the Preferred Alternative: Marine Mammals, Listed and Non-listed Salmonids, Socioeconomics, Recreation, Environmental Justice, Noise, Aesthetics, and Transportation. A description for each resource appears in Section 3.0, Affected Environment and provides the context for understanding potential effects of each alternative, which are analyzed in corresponding sections in Section 4.0, Environmental Consequences. NMFS also considered cumulative impacts in Section 5.0.

The final Environmental Assessment includes a Regulatory Impact Review (RIR) and a cost/benefit analysis of each of the alternatives (Section 6.0). The RIR focuses on the benefits to the whales from each alternative and the costs to commercial and recreational whale watching. Vessel regulations would address one of the three main threats identified in the listing of Southern Resident killer whales as endangered under the ESA, and implement an action identified in the recovery plan. The Preferred Alternative is a combination of two alternatives analyzed in the draft EA (Alternative 3 and Alternative 7) each with high benefits to the whales, and therefore will provide greater benefit than implementation of any individual alternative analyzed. These benefits cannot be quantified in terms of the number of whales saved or increased chance of recovery. Thus, it is not possible to translate the biological benefits to whales into a monetary value. Nevertheless, NMFS concludes that the benefit of the final regulation (Alternative 9: Preferred Alternative) is high in terms of reducing threats to the population, increasing fitness of individuals, and increasing the probability of achieving recovery.

Any economic burden resulting from the final regulation will likely be greatest for the commercial whale watch industry as a result of increased viewing distance as compared to current conditions. However, as described in the EA, there is information that commercial whale watching experiences will continue, and regulations may provide benefits for land-based whale watching activities. Studies have found that whale watching participants valued viewing whales in a respectful, protective manner more than they valued being within a specific proximity to the whales. This suggests any negative effects caused by regulations that increase the viewing distance may be minimized if participants are educated on the reasons for the regulations. The result is likely a small impact on the participants and a small or no economic impact to the commercial whale watching companies.

If the quality of a whale watching trip is compromised by an increased viewing distance (200-yard regulation compared to current 100-yard guideline) or changes in methods (i.e., no parking in the path), the amount participants are willing to pay for a whale watch experience may decrease. In this case, they may travel to another area or choose different ways to spend their leisure time which would reduce the consumer surplus (IEC 2010). The overall level of expenditures on leisure activities in the action area, however, is likely to remain constant for a particular individual. The local area or set of businesses that benefit from

those expenditures may vary. Even if all participants in recreational and commercial whale watching are affected, the impact itself (based on an increased viewing distance) is small.

In conclusion, the Preferred Alternative will have a high benefit to whales and small costs to the whale watch industry, providing a net benefit. NMFS concludes that while there may be some economic cost to various industry groups under the Preferred Alternative, particularly commercial whale watching, overall this cost is likely to be minimal and outweighed by the conservation benefits of regulations.

The Preferred Alternative does not include a no-go zone, which could provide higher benefits to the whales by reducing vessel impacts in a core foraging area. NMFS will develop additional information and seek public input to further evaluate the costs and benefits of a no-go zone and may propose a rule revision in the future. NMFS believes, however, that it would be unwise to delay all protection for the whales from vessel impacts until the merits of a no-go zone can be fully evaluated.

PREFACE

P.1 Introduction

NMFS published proposed regulations to protect killer whales on July 29, 2009 (74 Fed. Reg. 37674) along with a Notice of Availability of a draft Environmental Assessment (EA). The proposed rule announced two public meetings. In response to requests, NMFS added a third public meeting (74 Fed. Reg. 47779, September 17, 2009) and extended the comment period to January 15, 2010 (74 Fed. Reg. 53454, October 19, 2009). The public meetings were well attended; over 160 people provided recorded oral comments on the proposed rule. During the public comment period, 704 unique written comments were submitted via letter, e-mail, and the Federal e-rulemaking portal. Comments were submitted by citizens; whale watch operators and naturalists; research, conservation, and education groups; Federal, state, and local government entities; and various industry and other associations. NMFS posted all written comments received during the comment period on the NMFS Northwest Regional web page: http://www.nwr.noaa.gov/Marine-Mammals/Whales-Dolphins-Porpoise/Killer-Whales/ESA-Status/Orca-Vessel-Regs.cfm. In addition to unique comments, over 2,400 form letters were submitted. There were 15 different form letters with the number of copies for each ranging from four to over 1,500. Additionally, NMFS received five petitions that ranged from 100 to 740 signatures each and totaled over 1,300 names and signatures.

Many of the oral and written comments from individual members of the public were short, general statements that 1) supported the proposed regulations and killer whale conservation in general, 2) disagreed with the proposed regulations, or 3) disagreed only with the proposed no-go zone. Other individual public comments and comments from organizations and government agencies included substantive information, such as specific suggestions to alter the proposed regulations, new information, or additional alternatives to consider. The following is a summary of the comments received on the proposed rule and the draft EA. We have grouped and summarized similar comments, recommendations, and issues raised that directly relate to this rulemaking. The proposed rule included almost all of the information in the draft EA. Most commenters directed their comments toward the proposed rule. Where the comments are also applicable to the draft EA, NMFS responded to them in this final EA. Responses to the comments also include descriptions of changes made to the proposed regulations.

P.2 Specific Comments and Responses

Comment 1: Mandatory regulations versus voluntary guidelines. Several commenters supported adoption of mandatory regulations, while other commenters stated that voluntary guidelines are adequate to protect the whales.

Response: Monitoring of vessel activity around the whales reveals that many vessels violate the current voluntary guidelines, the number of violations appears to be increasing, and one of the most serious violations—parking in the path of the whales—was committed primarily by commercial whale watch operators, with a recent increase in parking in the path by recreational boaters. Approaching within 100 yards of the whales is primarily committed by recreational boaters. In the EA, NMFS examined the

available evidence and concluded that mandatory regulations are likely to reduce the number of incidents of vessels disturbing and potentially harming the whales and that this reduction would improve the whales' chances for recovery. NMFS expects both commercial and recreational whale watchers to increase compliance with mandatory regulations compared to the current voluntary guidelines. Commercial whale watchers, in particular, will be aware of the new regulations and can serve as an example of lawful viewing for other boaters. Accordingly, NMFS is adopting mandatory regulations governing vessel activity around the whales.

Comment 2: Enforce state law and maintain current guidelines. Several commenters suggested the current state law, prohibiting approach within 300 feet, should be enforced to increase compliance and that with the current state law and Be Whale Wise guidelines in place, no additional Federal regulations were necessary. One commenter suggested making it unlawful to fail to disengage the transmission of a vessel when within 300 feet of a Southern Resident killer whale similar to the state law.

Response: A state law requiring vessels to stay 300 feet (100 yards) from Southern Resident killer whales went into effect in June 2008. The Washington Department of Fish and Wildlife (WDFW) has enforced this law since 2008, issuing several violations and many warnings. While NMFS agrees that enforcement of state law has likely improved conditions for the endangered whales, our analysis revealed that vessels at 100 yards can have harmful effects on whales (see Comment 3: Approach regulation). This final regulation prohibits approaches closer than 200 yards, providing greater protection than the state's 100-yard law. WDFW supported the 200-yard approach rule in its comments on NMFS's proposed regulations. NMFS has not included a requirement to disengage the transmission of the vessel when within a certain distance of the whales. The Be Whale Wise guidelines include a recommendation to place engines in neutral and allow whales to pass if your vessel in not in compliance with the 100-yard approach guideline. NMFS will continue to work with the Be Whale Wise partners to discuss maintaining this recommendation in the guidelines and evaluate the effectiveness of the final regulations to determine if any modifications are needed.

Comment 3: Approach regulation. Some commenters supported an approach limit of 100 yards (current guideline and state law), and others suggested that an approach limit of 150, 200, 200-400, 1,000 yards or several miles would better protect the whales. Commenters noted that an approach regulation could limit the potential for vessels to disturb or collide with whales and for vessel noise to mask the whales' auditory signals, interfering with their ability to communicate and forage. Several whale watch operators raised concerns about how viewing from a distance of 200 yards would impact their businesses. In addition, they provided comments that viewing from 200 yards would reduce their ability to educate customers and affect the example they set for other boaters.

Response: In the final EA NMFS fully analyzed the effects of both a 100- and 200-yard approach regulation. Based on the best available information NMFS concluded that a 100-yard approach regulation is not sufficient to protect the whales. Researchers have documented behavioral disturbance and estimated the considerable potential for masking from vessels at 100 yards and as far away as 400 yards. Researchers have modeled the potential for vessel noise to mask the whales' auditory signals and concluded that at 100 yards there is likely to be up to 100 percent masking, while at 400 yards the masking has substantially decreased. Even at 200 yards the models show auditory masking of 75 to 95 percent. NMFS expects the 200-yard approach limit in the final regulation to significantly reduce the risk of vessel strikes, the degree of behavioral disruption, and the amount of noise that masks echolocation and communication, compared to a 100-yard approach regulation. An approach regulation greater than 200 yards would reduce vessel effects even more, but could diminish both the experience of whale watching and opportunities to participate in whale watching. NMFS recognizes that whale watching educates the public about whales and fosters stewardship. While it is difficult to quantify the conservation benefits of public education, the

Recovery Plan for Southern Resident Killer Whales identifies education and outreach actions as an essential part of the overall conservation program for the whales (NMFS 2008). NMFS believes that a 200-yard limit strikes an appropriate balance between the need to reduce vessel interactions with Southern Residents and the public interest in whale watching and observation.

Many whale watch operators expressed concern that their business will decrease if they are required to stay 200 yards away from whales. Several operators conducted informal surveys of their customers to support their assertion that a 200-yard approach regulation would diminish the experience and make customers less likely to go on whale watching tours. The best available information, however, supports our conclusion that a 200-yard approach regulation is unlikely to affect the numbers of people who go on whale watching tours or the price they are willing to pay for the experience (see Comment 11: Economic Analysis).

First, observational data from third-party observers reveals that many operators already regularly view whales from 200 yards or greater. In 2007-2008 a new research program collected detailed information on the distance of vessels from the whales using an integrated range finder, GPS, and compass. This study measured the distance between all vessels and the nearest whale and reported that for all vessels within 400 yards of the whale (likely engaged in whale watching), 74 percent were greater than 200 yards from the whales. For all vessels within 800 yards (likely includes both whale-oriented and transiting vessels), 88 percent of vessels were greater than 200 yards from the whales (Giles and Cendak 2010).

In addition, the EA accompanying the final rule describes peer-reviewed studies of customer attitudes that identify the features of the whale watching experience that are most valuable to customers. Several studies focused on killer whales in the Pacific Northwest have assessed the value that whale watching participants have for wildlife viewing, and provide data on the factors that lead to an enjoyable or memorable whale watching trip and how satisfied participants are with various aspects of their trip (Duffus and Deardon 1993; Andersen 2004; Andersen and Miller 2006; Malcolm 2004). Survey results of whale watch participants indicate that proximity to the whales is not the most important part of the whale watchers' experience and that seeing whales and whale behavior was much more important (Andersen 2004; Malcolm 2004). In addition, Malcolm (2004) found participants were most satisfied with the respect their vessels gave the whales. The number of whales, whale behavior, and learning also received higher satisfaction than the distance from which whales were observed. The participants also strongly agreed with statements related to protection of the whales. Economic research also indicates that the general public places a high value on the continued existence of species such as the Southern Residents, such that actions necessary for the species' recovery have broad and lasting economic benefits. The Endangered Species Act protects species that are in danger of or threatened with extinction and states that "these species are of esthetic, ecological, educational, historical, recreational, and scientific value to the Nation and its people." Independent research also demonstrates the value that the public places on protection and recovery of endangered species including marine mammals (Loomis and Larson 1994).

While many whale watch operators referenced informal surveys of their customers, these surveys were not scientifically designed and there was no control in their administration. In addition to the evidence described above, NMFS received comments from the public that support the conclusion that a 200-yard approach regulation will not reduce the public education value of whale watching. These comments highlight the value and effectiveness of educational programs that take place at great distances from the whales, even off the water away from whales, such as in classroom programs.

For the reasons described above and in contrast to the public comments submitted by the commercial whale watching industry, NMFS does not anticipate a reduction in the willingness of customers to participate in commercial whale watch trips or the ability of the whale watching industry to provide an educational and meaningful experience for their customers viewing whales at a distance of 200 yards. In adopting a 200-

yard approach regulation, NMFS evaluated all of the available information on the potential costs to whale watch business. In addition, NMFS balanced the competing conservation benefits to killer whales of reduced vessel interference against continued public education through on-water whale watching opportunities. We consider the viability of the whale watch business to be an integral part of public education. NMFS will continue to study the impact of both motorized and non-motorized vessel distance limits on whale behavior, and the impact of the newly established regulations on the viability of the whale watch business. NMFS will conduct this analysis alongside the additional consideration of a no-go area discussed in more detail below. If subsequent analysis suggests either a disproportionate impact on segments of the business, or that certain kinds of whale watching, such as the non-motorized business, has less of an effect on whale behavior, NMFS will consider modifying or relaxing restrictions. NMFS will conduct such analysis as the new rulemaking requirements are being implemented over the next two whale watching seasons.

Comment 4: No-go zone. There were a large number of oral and written comments from the public, recreational fishing community, whale watch operators, and kayakers in opposition to the proposed no-go zone. Some reasons expressed for opposition to the no-go zone included concerns about setting a precedent for closing additional areas to fishing, impacts to commercial and recreational fishing, elimination of kayaking opportunities, and safety concerns. A number of comments suggested creation of a go-slow zone in the place of a proposed no-go zone. NMFS also received comments supporting the proposed seasonal no-go zone (May- September), as well as suggestions to create a larger no-go zone along the west side of San Juan Island, to include other shoreline areas, and to identify the no-go zone based on feeding “hot spots.”

Additional comments on the proposed no-go zone included support for more or fewer exceptions. Several commenters opposed the proposed exception for treaty fishing. Suggestions for additional exceptions were for recreational and commercial fishing, and a corridor near shore in the zone to allow for kayakers, and property owners using the zone for recreational purposes.

Both oral and written commenters expressed concern that NMFS underestimated the economic impacts in the assessment of the proposed no-go zone. One specific concern was that the economic analysis did not adequately address impacts to the recreational and commercial fishing communities and impacts would be greater than what was considered in the EA.

Several commenters suggested creating a public process to receive additional feedback on the concept of the no-go zone and engage the community in developing an appropriate protected area. Others commented that NMFS should select the site based on the best available science and should consider use of areas by the three separate pods of Southern Resident killer whales.

NMFS received several comments specific to the status of the boat launch at the San Juan County Park (within the proposed no-go zone) as a resource supported by grants from the Washington Recreation and Conservation Office and whether it would be “converted” to uses other than those for which it was funded if the no-go zone was implemented.

Response: Public comments on the no-go zone raised several suggested alternatives that were not fully analyzed in the draft EA. In addition, NMFS recognizes that to be effective, regulations must be understood by the public and have a degree of public acceptance. Because of the many alternatives suggested by the public, and because of the degree of public opposition, NMFS has decided to gather additional information and conduct further analysis and public outreach on the concept of a no-go zone. Therefore, the final rule does not adopt a no-go zone. NMFS will pursue this additional work expeditiously because the best

available information indicates there would be a significant conservation benefit to the whales if they were free of all vessel disturbance in their core foraging area.

Comment 5: Park in the path. Some commenters supported adoption of a regulation that all vessels must keep clear of the whales' path. Others commented that a prohibition on parking in the path of the whales would be difficult to enforce and raised questions about situations where whales approach vessels. Commenters also suggested that a single approach distance would be easier for boaters to understand compared to a combination of a 200-yard approach distance and a parking in the path prohibition out to 400 yards.

Response: The risks of both vessel strikes and acoustic masking are both most severe when vessels are directly in front of the whales. In addition, researchers have reported behavioral responses from vessels out to 400 yards and beyond and have expressed concern about impacts to important behaviors, such as prey sharing and nursing that occur as the whales move forward. The final regulations include a prohibition on parking in the path because it provides the best management tool for reducing these risks. Increasing the overall approach distance to mitigate for the specific impacts that can occur from vessels in the whales' path (i.e., a 300- or 400-yard approach rule) would increase the viewing distance for all whale watchers and could impact the experience of whale watchers and potentially the whale watch businesses (see Comment 3: Approach Regulation). NMFS believes that a 200-yard approach distance in combination with a prohibition on parking in the path of the whales within 400 yards provides for meaningful and economically viable whale watching and provides additional protection from vessels out in front of the whales. NMFS acknowledges that enforcement of the prohibition on parking in the path of the whales will be challenging and recognize that whales can be unpredictable and can approach vessels unexpectedly. A regulation prohibiting parking in the path of killer whales will be clear to whale watch operators and is consistent with the current guidelines. These operators would likely know about such a regulation and would have some experience in judging the travel path of the whales and estimating a 400 yard distance. Under certain conditions, however, whale movements can be unpredictable (i.e., foraging whale pod spread out over a large area) even for experienced whale watchers. The prohibition on parking in the path is intended to address specific situations observed by monitoring groups where operators repeatedly position themselves to intercept the whales and do not get out of the way, rather than unexpected situations where whales are moving erratically and boaters find themselves in the path unexpectedly.

Comment 6: Speed restriction. There were comments in support of codifying the current guideline, which suggests a speed of less than 7 knots when within 400 yards of the nearest whale. There was also support for go-slow zones in combination with or instead of the proposed no-go zone.

Response: The draft EA concluded that risks of vessel strikes and acoustic masking would be reduced if vessels traveled at a slow speed within 400 yards of the whales, consistent with the current guidelines. NMFS has not included such a provision in the final regulation because it would be difficult to enforce. NMFS will continue to work with partners on the Be Whale Wise campaign to promote a speed guideline and encourage voluntary compliance to reduce impacts from fast moving vessels in close proximity to the whales. NMFS will also consider go-slow zones when NMFS further evaluates a no-go zone as described above under Comment 4: No-go zone.

Comment 7: Other suggested alternatives. Similar to comments NMFS received in response to the ANPR, comments on the proposed rule included a variety of alternatives to the proposed regulations and the alternatives analyzed in the EA. The suggested alternatives included: permit programs, stand-by zones, time limits for whale watching, time off from whale watching (days of the week or hours of the day), and a prohibition on whale watching during unsafe weather conditions. Comments suggesting variations on the alternatives fully analyzed have been addressed in Comments 3 through 6.

Response: Some of the alternatives suggested during the public comment period on the proposed rule were similar to alternatives suggested in response to the ANPR and these were considered, but not fully analyzed in the draft EA. The comments on stand-by zones and prohibiting whale watching under certain weather conditions were two new suggestions which were not included in the draft EA. The two new alternatives have been included in the alternatives considered but not analyzed in detail in the final EA. There were several reasons why NMFS did not fully analyze or further consider a number of the alternatives suggested in public comments including, difficulties in enforcing them, changes to infrastructure needed to implement them, or a lack of sufficient science to support them. Alternatives considered but not analyzed in detail in the final EA include:

(l) Permit or certification program. A permit or certification program, including stand-by zones, was not fully analyzed because it would require a large infrastructure to administer, monitor and enforce. There would also be equity issues in determining who is permitted or certified and who is not.

(2) Moratorium on vessel-based whale watching. A moratorium on all vessel-based whale watching, or protected areas along all shorelines, would be challenging to enforce and are not supported by available scientific information. Both commercial and recreational vessels engage in a variety of wildlife and scenic viewing and other activities on the water and it would be difficult to determine at what point they were engaged in prohibited whale watching.

(3) Shipping lane or vessel noise regulations. Regulatory options, such as rerouting shipping lanes or imposing noise level standards would have large economic impacts and unnecessarily restrict some types of vessels rarely in close proximity to the whales.

(4) Time limits. It would be difficult to determine when vessels were engaged in whale watching to enforce limits on viewing time, such as the 30 minute limit suggested in the Be Whale Wise guidelines or a time of day restriction on whale watching.

(5) Aircraft regulations. Aircraft regulations are beyond the scope of minimizing impacts from vessels as identified in the EA.

(6) No whale watching during poor weather conditions. It would be difficult to educate recreational boaters regarding specific weather conditions and when they could or could not watch whales and what vessel activities constitute “whale watching.” There is currently no infrastructure to monitor weather conditions with respect to whale watching and to broadcast the information to alert boaters that particular weather conditions in a certain area trigger a prohibition on whale watching.

Comment 8: Scope and applicability. NMFS received a variety of comments on the scope and applicability of the regulations including the geographic area, the species covered by the regulation, and the types of vessels subject to the regulations. Several commenters suggested applying the proposed regulations throughout the range of the Southern Resident killer whales, rather than limiting the scope to inland waters of Washington. Other comments supported regulations that would apply to other species of whales and marine mammals in addition to killer whales. NMFS received many comments on the types of vessels to which the regulations should apply. Commenters suggested that the regulations should only apply to whale watching vessels and that the regulations should not apply to kayaks. Commenters also identified additional exceptions for certain vessels and these are addressed below under Comment 9: Exceptions.

Response: Establishing regulations in coastal waters is an alternative that was considered, but not fully analyzed in the final EA. Most whale watching occurs in inland waters of Washington, with whale watching vessels originating from nearby ports in the United States and Canada. The presence of Southern Residents and other killer whales in inland waters is predictable and reliable, which is the basis for the success of the local commercial whale watch industry. The presence of the whales and proximity of the whale watching industry in inland waters of Washington concentrates whale watch activity in particular areas. Monitoring groups report a high number of incidents of vessels not following the current viewing guidelines in these waters, particularly along the west side of San Juan Island. There are no monitoring groups observing whale watching activities with killer whales in coastal waters, nor does there appear to be extensive whale watching activity in coastal waters, as there are limited sightings of the whales along the coast, and their presence is not reliable enough to support an active killer whale watching industry. If new information in the future indicates that whale watching poses a threat to the whales in coastal waters, NMFS will consider the need for additional protections.

The final vessel regulation applies to all killer whales. It would be difficult for boaters, especially recreational boaters without expertise and experience with killer whales, to identify Southern Residents or even to identify killer whales to ecotype (resident, transient, offshore). Requiring boaters to know which killer whales they are observing is not feasible. In addition, providing protection to all killer whales in inland waters of Washington is appropriate under the MMPA. Including other whale or marine mammal species is outside the scope of this regulation, which is focused on protecting killer whales and, in particular, supporting recovery of endangered Southern Resident killer whales. Wildlife viewing in inland waters of Washington targets Southern Resident killer whales and while other marine mammal species are the subject of opportunistic viewing, particularly when killer whales are not present, vessel impacts have not been identified as a major threat for other marine mammals in inland waters of Washington. While the regulations do not apply to other marine species, NMFS anticipates that other species may benefit as boaters aware of the regulations may be more likely to know about their potential impacts and keep their distance from all wildlife.

The regulations are designed to reduce the impact from vessels including the risk of vessel strikes, behavioral disturbance, and acoustic masking. Available data on vessel activities indicates that private and commercial whale watch vessels are most often in close proximity to the whales, and that other vessels such as government vessels, commercial and tribal fishing boats, cargo ships, tankers, tug boats, and ferries represent a small proportion (typically 5 to 7 percent in most years) of the vessels that are within one-quarter mile of the whales. Although not the primary focus of the regulations, vessels conducting activities other than whale watching (i.e., transport, fishing, etc.) can impact the whales and are also subject to the regulations with some exceptions (i.e., shipping lanes, safety). Because these vessels do not target the whales and are not often in close proximity, NMFS expects the impacts from adjusting course to avoid getting within 200 yards of the whales or to stay out of their path will be minimal. NMFS has not included exemptions for Washington State Ferries or vessels associated with oil spill preparedness or training based on the expectation that the vessels will rarely have to adjust their course to comply with the regulations and that the adjustments will be relatively easy to achieve, short-term, and minimal. For example, Washington State Ferries already adhere to the 100-yard guideline and should similarly be able to adhere to a 200-yard regulation.

Several commenters stated that kayaks do not disturb whales and should be exempt from the regulations. While kayaks are small and quiet, they have the potential to disturb whales as obstacles on the surface. In both 2009 and 2010, 4 percent of incidents observed were committed by kayaks. Of the 1,067 incidents in 2010, 41 incidents (22 commercial and 19 private kayakers) specific to kayaks were observed including parking in the path (20 percent of kayak incidents in 2010). Soundwatch has reported that they likely underestimate kayak incidents because the Soundwatch observation vessel remains outside of the current

voluntary no-go zone where considerable kayak activity takes place (Dismukes 2010). New information collected and analyzed in 2010 provides a better assessment of the potential for kayak disturbance and the cumulative effects of large numbers of kayaks in the vicinity of the whales.

For the summer of 2010, Soundwatch's Kayak Education and Leadership Program (KELP), San Juan County Parks, and the San Juan Island Kayak Association worked together to update and refine a Kayaker Code of Conduct as part of KELP. In 2010, the San Juan County Park implemented a required launch permit for boaters using the park boat launch. Before boaters could obtain a permit, they had to attend a required Code of Conduct Training conducted by KELP educators. Commercial operators were required to have all their guides trained by KELP educators and have their guests sign statements acknowledging that they had been trained on the Code of Conduct by their guides. The code of conduct includes information about the Washington State law prohibiting approach within 100 yards of Southern Resident killer whales, the Be Whale Wise guidelines, and additional guidelines such as staying close together (rafting) when whales approach, avoiding stopping at headlands to remain out of the whales' path, stopping paddling if whales are within 100 yards, and suggestions for assessing their position and remaining outside of the path of the whales by moving offshore or inshore.

In addition to providing the guidelines and training for kayakers through the KELP education program, Soundwatch also monitored kayak activity and compliance of kayakers with the recommendations in the code of conduct to augment the Soundwatch vessel monitoring program. From June through September 2010, 594 total incidents were observed (66 percent commercial and 28 percent private) when kayakers did not follow all guidelines, with 171 incidents when kayaks were within 100 yards of the whales. The most common incidents were kayaks not rafted, parked on headland or within kelp bed, parked in the path of whales and stopped within 100 yards of whales (Koski 2010b).

Williams et al. (2010) analyzed impacts of kayaks on Northern Resident killer whales and reported that kayaks can have a significant impact on killer whale behavior. Killer whales exhibited increased probability of traveling behavior, which indicates an avoidance tactic, and decreased feeding activities when kayaks were present (Williams et al. 2010). For additional information on the scientific assessment of kayak impacts on killer whales see Comment 10: Scientific basis for regulations. Based on the best available information, the final regulations will apply to all vessels including kayaks to reduce impacts to the whales.

Comment 9: Exceptions. Commenters provided a range of suggestions for additional exceptions (i.e., kayaks and sail boats, Washington State Ferries, all vessels except whale watching) and expressed disagreement with some of the exceptions in the proposed rule (vessels actively engaged in fishing). Almost all of these comments were specific to the proposed no-go zone. An exception for kayaks to all regulations is discussed under Comment 8: Scope and applicability. Several commenters suggested wording changes regarding the exception for ships in the shipping lanes and their support vessels, and the exception for vessels actively engaged in fishing activities, and others suggested exempting ferries and vessels engaged in oil spill preparedness and training.

Response: Almost all of the suggestions for additional exceptions or fewer exceptions to the rule were specific to the no-go zone. While the no-go zone is not part of this final rule, NMFS will consider the information on exceptions and other aspects of a no-go zone (see Comment 4: No-go zone) and respond at a later date. NMFS has made changes to the description of the exception for vessels in the established shipping lanes, known as the Traffic Separation Scheme, to clarify when and how it applies to certain vessels. NMFS has also amended the language regarding exceptions for vessels actively engaged in fishing to include transfer of catch; however, vessels transiting to or from or scouting fishing areas are not exempt from the regulations. NMFS expects impacts to these activities associated with fishing to occur in close

proximity to whales only rarely and expect any impacts from changing course to maintain 200 yards or to stay out of the whales' path to be minimal (IEC 2010).

Ferries and vessels associated with oil spill preparedness and training do not target the whales and are not often in close proximity, therefore, NMFS expects the impacts from adjusting course to avoid getting within 200 yards of the whales and to stay out of their path on rare occasions will be minimal. NMFS has not included exemptions for Washington State Ferries or vessels associated with oil spill preparedness or training based on the expectation that these vessels will rarely have to adjust their course to comply with the regulations and that the adjustments will be relatively easy to achieve, minimal and short-term. For example, Washington State Ferries already adhere to the 100-yard guideline and should similarly be able to adhere to a 200-yard regulation. Support vessels associated with booming activities required for fuel transfer or emergency pollution response would be exempt from the regulations based on the exemption for safe operation; NMFS amended the safety exception to include these vessels.

Comment 10: Scientific basis for regulations. Commenters raised questions about the scientific information used to support the vessel regulations. Scientific information on the vessel impacts to whales was called biased, inconclusive, questionable, or wrong. Commenters placed a higher value on their personal observations than on the results from published studies and asserted that they have not seen the whales changing their behavior in response to vessels. Commenters raised concerns that scientists conducting scientific studies on killer whales were biased against the whale watch industry. Some commenters highlighted that results were not conclusive and challenged the interpretation of specific research results, questioning that increased energy expenditure form avoiding vessels or engaging in high energy surface active behaviors, like breaching and tail slapping, would result in a negative impact on the whales. Other commenters questioned the use of models to estimate the potential impact of vessel sound on the whales' ability to use echolocation to find prey in their habitat. Several commenters questioned the science used to demonstrate the potential for kayaks to impact killer whales primarily because it referred to studies on species other than killer whales in other geographic locations.

Response: NMFS relied on the best available data to develop the proposed and final regulations. The majority of the information came from peer-reviewed, scientific publications. To a lesser extent, unpublished data, personal accounts, and other anecdotal information also informed development of the regulations. NMFS gave greater weight to sound peer-reviewed studies published in scientific journals than to personal observation and interpretation. These scientific studies use established scientific methods, test hypotheses, employ statistical analysis, and have been peer-reviewed and published in scientific journals. These steps in the scientific process reduce the potential for bias in results. NMFS reviewed all of the best available information from multiple independent scientists which also limits the concerns about potential bias related to one individual researcher.

Several independent scientists have reported behavioral changes in whale swimming patterns, changes in respiratory patterns, reduced time spent foraging/feeding, and increased surface active behaviors in the presence of vessels. These studies provide multiple lines of evidence regarding the nature and degree of vessel impacts on the behavior of killer whales. The data from these studies have been rigorously analyzed and the results are statistically significant. Some of the reported behavioral changes may not be obvious to casual observers.

NMFS acknowledges that there is some uncertainty involved in interpretation of the results in the peer-reviewed published papers. While NMFS evaluated the quality, applicability, and uncertainty in the scientific information, NMFS also relied on a conservative approach in weighing the severity and likelihood of impacts from vessels in light of the whales' status as an endangered species. The Noren et al. (2009) study reported increased energetically expensive surface active behaviors in the presence of vessels,

and NMFS considered the uncertainty regarding the conclusions. For example, the function of surface active behaviors is not known for certain. Noren et al. (2009) suggest these behaviors may serve a role in communication to promote group coordination, while several commenters speculated that it was play or that the whales enjoyed showing off for whale watch boats. Noren et al. (2009) also acknowledged uncertainty based on the limits of the study to provide details on all of the variables that determine whether vessel presence elicits a response in the whales. Even with the uncertainty about the function of the behaviors and some of the conclusions, NMFS did consider the increased energy expenditure as an important result. We were conservative in assuming that increased energy expenditure likely has a negative impact on the whales, particularly in light of the concerns regarding reduced prey for the whales and other studies that found short-term behavioral responses can have long-term consequences for individuals and populations (Lusseau and Bejder 2007).

With field studies of wild animals there will always be some uncertainties because it is not possible to control for all of the variables. In addition, there are some hypotheses that cannot be tested with wild animals in the field. NMFS routinely uses models with inherent assumptions to help fill these data gaps and inform our decisions. For example, there is no direct data to measure a reduction in the efficiency of echolocation in the presence of vessel sound. Instead, NMFS relied on a model created to estimate the vessel sound under varying conditions and calculate a reduction in echolocation efficiency. This model is based on data collected on the whales' hearing capabilities, sound recordings of vessels, sound propagation models, and some assumptions about the whales' ability to detect a salmon in the water column. NMFS believes these assumptions are justified by the available information.

In the case of assessing the impact of kayaks on killer whales, NMFS relied on studies done on similar species in other locations and research results that indicated trends, but were not conclusive. Several commenters questioned our reliance on studies of the effects of kayaks on dolphins to support a conclusion that kayaks have the potential to disturb killer whales. Although NMFS believes the dolphin studies give insight into effects on killer whales (the largest member of the dolphin family), in response to these comments, NMFS secured additional analysis of available data on Northern Resident killer whales. Williams et al. (2010) assessed the effects of kayak presence on Northern Resident killer whales and reported that kayaks can have a significant impact on killer whale behavior. In previous studies, Williams et al. (2006) reported changes to killer whale behavior from boat presence, pooling kayaks and motorized vessels together. In their recent study, the presence of both types of vessels was analyzed separately for data from 1995-2004. In the presence of only kayaks, the probability that the whales will shift to travel behavior from other behavior states (including feeding) significantly increased compared to situations with no vessels present, which indicates an avoidance tactic. As a result, the whales spent significantly more time traveling when in the presence of kayaks than they did under no-boat conditions (11 percent increase in time spent traveling). Consistent with previous studies, killer whales significantly reduced overall time spent feeding in the presence of kayaks and powerboats compared to no-boat conditions (30 percent decrease in time spent feeding). With respect to both kayaks and motorized vessels, the duration of feeding decreased and the overall proportion of time spent feeding decreased when vessels were present, regardless of the type of vessel. One model suggested that the effect of kayaks on feeding activity was perhaps less pronounced than the effect of powerboats on feeding activity. The types of effects vessels have on foraging activities seem to be similar whether the boats involved are kayaks or other types of vessels, but the whales may use different avoidance tactics to deal with the two types of vessels (Williams et al. 2010).

Comment 11: Economic analysis. Comments from individuals, commercial whale watch and other industry associations focused on the economic analysis and disagreed with some conclusions in the EA. Commenters believed that NMFS did not adequately evaluate potential economic impacts from new vessel regulations to whale watching businesses, kayak companies, recreational and commercial fishing communities, and the local economy in the San Juan Islands. In addition, several people providing oral

comments were concerned that the economic analysis was conducted by a contractor outside of the Puget Sound area. Other commenters suggested that the proposed regulations would have a positive economic impact by protecting the whales, which draw large numbers of people to the area.

Response: In comments on the ANPR and on the proposed rule, whale watch operators expressed concerns regarding the economic impacts to their business from reduced participation in commercial whale watch trips conducted at 200 yards from the whales. In the Pacific Whale Watch Association comments on the proposed rule, they suggested that at least one company would go out of business and estimated a 30 percent reduction in the number of companies participating in the industry over three years and a drop in revenue for the remaining 70 percent. No commenters provided data to support this assertion. The comments summarized information from informal surveys of customers indicating that they would not book a trip if they would be watching from 200 yards. The whale watch association also asserted that one of their most frequently asked questions is "How close can we get?" and 5 percent of bookings are lost when they answer "100 yards." In the comments, the whale watch association acknowledged that their informal communications with customers were admittedly not "scientifically accurate surveys." The information from the informal customer surveys also contradicts information from published, peer-reviewed, scientifically conducted surveys about the important features of trips for customers. Our analysis of the likely impacts to the whale watch industry relied on the published, peer-reviewed, and scientifically conducted surveys using accepted statistical methods rather than the anecdotal information provided by the industry. As part of implementation of new regulations, NMFS will monitor to evaluate effectiveness of the regulations, as well as identify any unanticipated impacts in order to inform adaptive changes to the regulation.

To analyze economic impacts of alternative regulations, NMFS contracted with Industrial Economics, Incorporated (IEC), which has its headquarters in Massachusetts. IEC also has employees located in the Pacific Northwest. IEC has extensive expertise conducting economic analyses regarding actions taking place in Washington State waters, including Puget Sound. IEC has gathered data and worked on multiple projects in the area, including salmon and killer whale critical habitat designations. In response to concerns raised in public comments about IEC's lack of local knowledge, IEC identified local economics experts from the University of Washington to review the draft economics analysis, help identify additional data, and contribute to the final economic analysis. The local economics experts reviewed the data sources, analysis methods, and assumptions about the study area. They supported the data and methods used. The local experts provided suggestions for clarifications of some assumptions, more detailed descriptions of data sources and methods, and inclusion of additional information on the positive impacts of protecting the whales (i.e., existence values). They did not identify any additional data sources to inform the analysis. IEC incorporated the results of this additional local review into the final economic analysis.

The economic analysis considers the potential that the Southern Resident killer whales could go extinct without regulatory protection and, therefore, reduce the value of the whale watching industry and contributions to the local economy. The economic analysis also indicates that the continued existence of rare species, including marine mammals, has a broad-based economic benefit separate from the viability of the whale-watching industry. The Endangered Species Act protects species that are in danger of or threatened with extinction and states that "these species are of esthetic, ecological, educational, historical, recreational and scientific value to the Nation and its people." Independent research also demonstrates the value that the public places on protection and recovery of endangered species including marine mammals (Loomis and Larson 1994).

Comment 12: Legal issues. Several comments included concerns regarding the legality of NMFS regulating vessel traffic in the transboundary area of Haro Strait with respect to the Treaty of 1846 between the United States and the United Kingdom [Canada] regarding maritime boundaries and rights of

navigation. There were also comments suggesting that all whale watching activity is illegal because it involves "pursuit," which is prohibited under the Endangered Species Act. Some comments also questioned our compliance with Executive Order 12866 and the Regulatory Flexibility Act.

Response: Neither the proposed nor the final regulations violate the 1846 Treaty. NMFS has the authority to establish vessel regulations (including the proposed no-go zone) to protect killer whales from vessels in United States waters and related activities under various domestic laws including the Endangered Species Act (ESA) and the Marine Mammal Protection Act (MMPA). Both the proposed and the final vessel regulations are reasonable and consistent with a coastal nation's ability to regulate the navigation of vessels in its territorial seas and internal waters under international law.

The ESA prohibits the "take" of endangered species, which it defines to mean "harass, harm, pursue, hunt, shoot, wound, kill, trap, capture or collect, or to attempt to engage in any such conduct." The statute does not define the term "pursue" nor has NMFS adopted regulations defining pursuit. Under both the ESA and MMPA, there are no exceptions to the take prohibition for whale watching; therefore, wildlife viewing must be conducted in a manner that does not cause take. To promote responsible and sustainable marine animal viewing that avoids take, NMFS has worked with a variety of whale watch industries in multiple regions to develop numerous education programs, viewing guidelines and regulations. The agency believes that whale watching enhances marine mammal conservation by increasing education and fostering stewardship. The *Recovery Plan for Southern Resident Killer Whales* describes the educational benefits of whale watching and identifies actions such as supporting naturalist trainings (NMFS 2008a). This is also the case for other species. The Recovery Plan for North Atlantic Right Whales includes a section on whale watching and includes actions regarding educating vessel operators about regulations and guidelines as well as training whale watch naturalists and including conservation messages to whale watchers (NMFS 2005). For this reason, NMFS has not sought to curtail responsible viewing by applying an expansive interpretation to the prohibition on "pursuit." For additional information on NMFS' nationwide efforts to promote responsible wildlife viewing, please visit http://www.nmfs.noaa.gov/pr/education/viewing.htm.

NMFS conducted a Regulatory Impact Review/Regulatory Impact Assessment (RIR/RIA) in accordance with Executive Order 12866 and the Regulatory Flexibility Act. NMFS incorporated this assessment and the Final Regulatory Flexibility Analysis into the final EA as Chapter 6. The RIR/RIA summarizes the costs and benefits of alternative regulations, including the No-action Alternative of not promulgating regulations. The final EA, including RIR/RIA analysis, and separate economic analysis (IEC 2010) contain all the elements required of a RIR/RIA. The RIR/RIA also serves as a basis for our determination on whether the proposed action is a "significant regulatory action" under the criteria provided in Executive Order 12866.

Comment 13: NMFS should address other threats. Many oral and public comments cited the threats of pollution and contamination and insufficient salmon prey for the whales. A small number of comments raised concerns about use of Navy sonar. Some commenters suggested NMFS should focus on these threats rather than vessel regulations, while other commenters supported the regulations and encouraged NMFS to also address the other threats.

Response: Promulgation of vessel regulations to protect Southern Resident killer whales is just one part of a comprehensive recovery program to address all of the major threats to the whales. The *Recovery Plan for Southern Resident Killer Whales* includes actions to address each of the threats and there are many ongoing efforts in the region to restore depleted salmon populations, clean up the Puget Sound ecosystem, develop a response plan for oil spills, use existing MMPA and ESA mechanisms to address sounds like Navy sonar, conduct education and outreach activities, and implement other actions in the plan (NMFS 2008a). For more information on implementation of the recovery plan, please visit http://www.nwr.noaa.gov/Marine-

Mammals/Whales-Dolphins-Porpoise/Killer-Whales/Recovery-Implement/index.cfm. For specific information on salmon recovery, please visit www.salmonrecovery.gov and for more information on efforts to address pollution and contaminants, please visit http://www.psp.wa.gov/. To the extent that actions authorized, funded, or carried out by a Federal agency may affect species listed under the ESA, the agency is required to consult with NMFS pursuant to ESA Section 7, 16 U.S.C. § 1536, and its implementing regulations.

Comment 14: Education about regulations. A number of commenters suggested that for new regulations to be effective it was essential to have a strong educational component.

Response: NMFS agrees that educating the public and industry is essential to promote compliance with any new regulations and achieve a reduction in vessel impacts to the whales. NMFS recognizes that adopting regulations that are different from the current voluntary guidelines and Washington State law may present some challenges. The new regulations, however, are largely extensions or expansions of the existing guidelines and Washington law. Additionally, the current infrastructure includes enforcement, monitoring, and stewardship groups, who will be available to assist with an education campaign to inform boaters about the new regulations and the scientific information on which they are based. NMFS has developed an implementation plan for the new regulations that includes an active education program with our many partners including WDFW, the U.S. Coast Guard, Soundwatch, Straitwatch, and the Department of Fisheries and Oceans Canada. As part of an education program NMFS will continue to work with partners on guidelines for safe operating procedures in the vicinity of whales.

Comment 15: Enforcement. Many commenters stressed the importance of enforcement for any new regulations to be effective. While some comments suggested that enforcing current guidelines and the state law would be sufficient to protect the whales, others supported the proposed regulations if there were sufficient resources to enforce new regulations.

Response: NMFS agrees that enforcement is essential to promote compliance with any new regulations and achieve a reduction in vessel impacts to the whales. Vessel operators are more likely to adhere to mandatory specific regulations than to the current voluntary guidelines. This likelihood for any particular rule would be affected by the clarity of the rules, motivations to comply, and the level of monitoring and enforcement. It is reasonable to assume that commercial operators would know about mandatory regulations, for the same reasons that they are familiar with the current specific voluntary guidelines, and would have strong incentives to comply to protect their business reputation. Recreational boaters are also more likely to comply with mandatory regulations, although they may be less likely to know the details of mandatory regulations than are commercial operators. Regulations with specific distances to the whales provide new tools for enforcement, so that cases are more straightforward and based on objective criteria, like distance, rather than demonstrating changes in the behavior of the whales with respect to a specific action. Distance regulations are in place for other marine mammals and the NOAA Office for Law Enforcement has experience enforcing this type of regulation. In general, promulgation of specific mandatory regulations is likely to increase enforcement capability and compliance, which will result in fewer incidents between vessels and whales than occurs under the current regime. NMFS has developed an implementation plan for the new regulations that includes an active education program with our many partners including WDFW, the U.S. Coast Guard, Soundwatch, Straitwatch, and the Department of Fisheries and Oceans Canada. See above Comment 1: Mandatory regulations versus voluntary guidelines and Comment 2: Enforce state law and maintain current guidelines, for additional information describing the current guidelines and regulations and our determination regarding the need for these new Federal regulations to protect the whales.

Comment 16: Monitoring effectiveness of regulations. Several commenters who supported the vessel regulations suggested that monitoring the effectiveness of regulations would be an important step to assess compliance and the benefit to the whales and identify any needed changes in the future. Several commenters expressed concern about the regulations, but were more supportive if there was a periodic review in place to evaluate the regulations.

Response: NMFS agrees that monitoring effectiveness of the regulations is an important part of an adaptive management process to ensure the regulations are effective in protecting the whales and to identify any unforeseen impacts to local communities. The success of a regulatory program to address vessel impacts is vital to recovery of the Southern Resident killer whales. Therefore, NMFS will monitor the effectiveness of the final regulations and consider altering the measures or implementing additional measures if appropriate. NMFS will continue to collect data on vessel activities in the vicinity of the whales to assess the anticipated increase in compliance with mandatory regulations and reduction in impacts to the whales. As described above (see Comment 3: Approach regulation, Comment 4: No-go zone, and Comment 11: Economic analysis) NMFS will also continue to gather information and further consider the proposed no-go zone as an additional measure to protect the whales.

Comment 17: Consistent regulations in the United States and Canada. Several commenters supported consistent regulations in both United States and Canadian waters to assist with educating boaters and provide adequate protection for the whales.

Response: Southern and Northern Resident killer whales are listed as endangered and threatened, respectively, under the Species at Risk Act in Canada. NMFS has coordinated for several years with the Canadian Department of Fisheries and Oceans to develop consistent guidelines for boaters operating in the waters of both countries. NMFS will continue coordinating on guidelines and provide support for any efforts in Canada to also consider 200-yard approach guidelines or regulations to maintain consistency and provide a benefit to the whales. Even without similar regulations in Canada, this rulemaking will provide substantial benefits to the Southern Residents because the whales spend considerable time in United States waters.

Comment 18: Technical changes. Several commenters, including the U.S. Coast Guard, suggested technical wording changes to ensure accuracy with other regulations or improve clarity of the rule.

Response: NMFS agreed with a number of the suggestions for small technical changes and made appropriate changes to the final rule and EA to ensure accuracy and improve clarity. In some cases NMFS eliminated wording to simplify the regulations, such as removing the second sentence describing the 200-yard approach prohibition.

1.0 PURPOSE AND NEED FOR ACTION

1.1 Introduction

The National Marine Fisheries Service (NMFS) has prepared this environmental assessment in accordance with the National Environmental Policy Act (NEPA). The document considers the environmental consequences of alternative actions to protect killer whales from vessel effects in inland waters of Washington State. The analysis of alternatives and consequences will inform NMFS' decisions on actions to reduce the impact of vessels on endangered Southern Residents and other protected killer whales under the Endangered Species Act (ESA) and Marine Mammal Protection Act (MMPA). The Southern Resident killer whale Distinct Population Segment (DPS) was listed as endangered in November 2005 and the recovery plan includes actions to reduce the impact from vessels.

1.2 Background

Killer whales (*Orcinus orca*) in the eastern North Pacific have been classified into three forms, or ecotypes, termed residents, transients, and offshore whales. Resident killer whales live in family groups, eat salmon, and include the Southern Resident and Northern Resident communities of killer whales. Transient killer whales have a different social structure, are found in smaller groups, and eat marine mammals. Offshore killer whales are found in large groups and their diet is largely unknown. The Southern Resident killer whale population contains three pods – J pod, K pod, and L pod – and frequently visits inland waters of the Pacific Northwest. During the spring, summer, and fall, the Southern Residents' range includes the inland waterways of Puget Sound, Strait of Juan de Fuca, and Southern Strait of Georgia. Little is known about the winter movements and range of Southern Residents. Their occurrence in coastal waters extends from the coast of central California to the Queen Charlotte Islands in British Columbia. The home ranges of transients, offshore whales, and Northern Residents also include inland waters of Washington and overlap with the Southern Residents.

Viewing wild marine mammals is a popular recreational activity for both tourists and local residents. In Washington, killer whales are the principal target species for the commercial whale watch industry (Hoyt 2001; O'Connor et al. 2009). NMFS listed the Southern Resident killer whale DPS as endangered under the ESA on November 18, 2005 (70 Fed. Reg. 69903). In the final rule announcing the listing, NMFS identified vessel effects, including direct interference and sound, as a potential contributing factor in the recent decline of this population. NMFS is concerned that some whale watching activities may cause harassment, harm killer whales, or cause detrimental individual and population level impacts.

There is a growing body of evidence documenting effects from vessels on small cetaceans and other marine mammals. The variety of whale responses include stopping feeding, resting, or social interaction (Baker et al. 1983; Bauer and Herman 1986; Hall 1982; Krieger and Wing 1984; Lusseau 2003a; Constantine et al. 2004); abandoning feeding, resting, and nursing areas (Jurasz and Jurasz 1979; Dean et al. 1985; Glockner-Ferrari and Ferrari 1985, 1990; Lusseau 2005; Norris et al. 1985; Salden 1988; Forest 2001; Morton and Symonds 2002; Courbis 2004; Bejder 2006a, 2006b); altering travel patterns to avoid vessels (Constantine 2001; Nowacek et al. 2001; Lusseau 2003b, 2006); relocating to other areas (Allen and Read 2000); effects on acoustic behavior (Van Parijs and Corkeron 2001); or not reacting to vessels (Watkins 1986; Nowacek et al. 2003). One study found that marine mammals exposed to human-generated noise released increased stress hormones with the potential to negatively affect their nervous and immune systems (Romano et al. 2004).

Several scientific studies have documented human disturbance of resident killer whales by vessels engaged in whale watching in the Pacific Northwest. Short-term behavioral changes in Northern and Southern Residents have been observed and studied by several researchers (Kruse 1991; Kriete 2002; Williams et al. 2002a, 2002b, 2006, 2009; Foote et al. 2004; Bain et al. 2006; Noren et al. 2007, 2009; Lusseau et al. 2009; Wieland et al. 2010), although it is not well understood whether it is the presence and activity of the vessel, the sounds the vessel makes, or a combination of these factors that disturbs the animals. Individual animals can react in a variety of ways to whale watching, including swimming faster, adopting less predictable travel paths, making shorter or longer dive times, moving into open water, and altering normal patterns of behavior at the surface (Kruse 1991; Williams et al. 2002a, 2009; Bain et al. 2006; Noren et al. 2007, 2009). High frequency sound generated from recreational and commercial vessels moving at high speed in the vicinity of whales may mask echolocation (signals sent by the whales that bounce off objects in the water and provide information to the whales) and other signals the species rely on for foraging (Erbe 2002; Holt 2008), communication (Foote et al. 2004; Holt et al. 2009, Wieland et al. 2010), and navigation.

In rare instances, killer whales are injured or killed by collisions with passing ships and powerboats, primarily from being struck by the hull or turning propeller blades (Visser 1999; Ford et al. 2000; Visser and Fertl 2000; Baird 2001; Carretta et al. 2001, 2004). Some injuries are minor while others are severe and may result in death. Some animals with severe injuries eventually make full recoveries, such as a female described by Ford et al. (2000) that showed healed wounds extending almost to her backbone; however, several mortalities of resident killer whales in British Columbia in recent years have been attributed to vessel collisions (Gaydos and Raverty 2007).

As human populations in coastal areas of Washington grow, increases in vessel traffic are also expected in the future (Interagency Committee for Outdoor Recreation 2003), and current protections under the MMPA and ESA may not be sufficient to address the threat of vessels to killer whales.

1.3 Current MMPA and ESA Prohibitions, Regulations, and NMFS Guidelines

The Marine Mammal Protection Act (MMPA), 16 U.S.C. 1361 et seq., generally prohibits take of marine mammals. Section 3(13) of the MMPA defines the term take as “to harass, hunt, capture, or kill, or attempt to harass, hunt, capture, or kill any marine mammal.” Except with respect to military readiness activities and certain scientific research activities, the MMPA defines the term harassment as “any act of pursuit, torment, or annoyance which: (i) has the potential to injure a marine mammal or marine mammal stock in the wild, [Level A harassment]; or (ii) has the potential to disturb a marine mammal or marine mammal stock in the wild by causing disruption of behavioral patterns, including, but not limited to, migration, breathing, nursing, breeding, feeding, or sheltering [Level B harassment].”

In addition, NMFS’ regulations implementing the MMPA further describe the term take to include: “the negligent or intentional operation of an aircraft or vessel, or the doing of any other negligent or intentional act which results in disturbing or molesting a marine mammal; and feeding or attempting to feed a marine mammal in the wild” (50 CFR 216.3). The MMPA provides limited exceptions to the prohibition on take for activities such as scientific research, public display, and incidental take in commercial fisheries. Such activities require a permit or authorization, which may be issued only after a thorough agency review. Similar to the MMPA, the ESA generally prohibits the taking of endangered species. The ESA defines take to mean “harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, or collect, or to attempt to engage in any such conduct.”

Both the ESA and MMPA require wildlife viewing to be conducted in a manner that does not cause take. For particular species in specific locations, NMFS has promulgated regulations to provide additional

protection to marine mammals that are the subject of wildlife viewing activities. NMFS has regulated close vessel approaches to large whales in Hawaii, Alaska, and the North Atlantic. In 1995, NMFS published a final rule to establish a 100-yard (91.4 meters) approach limit for humpback whales in Hawaii (60 Fed. Reg. 3775, January 19, 1995). In 2001, NMFS published a final rule (66 Fed. Reg. 29502, May 31, 2001) to establish a 100-yard (91.4 meters) approach limit for humpback whales in Alaska that included a speed limit when a vessel is near a whale. In 1997, a final rule was published to prohibit approaching critically endangered North Atlantic right whales closer than 500 yards (457.2 meters) (62 Fed. Reg. 6729, February 13, 1997). To reduce impacts to North Atlantic right whales from collisions with ships, a final rule was recently published to implement speed restrictions of no more than 10 knots applying to all vessels 65 feet (19.8 meters) or greater in overall length in certain locations and at certain times of the year along the east coast of the U.S. Atlantic seaboard (73 Fed. Reg. 60173, October 10, 2008).

In September 2007, the San Juan County Council enacted a local ordinance (No. 35-2007) designed to prevent boaters from harassing Southern Resident killer whales that frequent county waters. The ordinance makes it unlawful to feed killer whales or "knowingly" approach within 100 yards of a killer whale within San Juan County. In addition, a state law with similar language to current guidelines (described below) to protect killer whales in Washington State waters was approved March 28, 2008 and became effective June 12, 2008 (RCW 77.15.740). The county ordinance provided for its expiration when the Washington State Department of Fish and Wildlife established regulations regarding the operation of vessels in proximity to Southern Resident killer whales. Starting in 2008, Washington Department of Fish and Wildlife has issued dozens of verbal and written warnings each summer. In addition, three state citations were issued for violations in 2008, three in 2009, and six in 2010 (Mullins 2010).

NMFS has also provided general guidance on how to conduct wildlife viewing that does not cause take under the MMPA and ESA. This is consistent with the philosophy of responsible wildlife viewing advocated by many agencies and national advocacy groups to unobtrusively observe the natural behavior of wild animals in their habitats without causing disturbance (see http://www.watchablewildlife.org/ and http://www.watchablewildlife.org/publications/marine_wildlife_viewing_guidelines.htm). Each of the six NMFS Regions has developed recommended viewing guidelines to educate the general public on how to responsibly view marine mammals in the wild and avoid causing a take. These guidelines are available online at:
http://www.nmfs.noaa.gov/prot_res/MMWatch/MMViewing.html

The "Be Whale Wise" guidelines developed for marine mammals by the NMFS Northwest Regional Office and partners are also available at:
http://www.nwr.noaa.gov/Marine Mammals/upload/BeWhaleWise.pdf

Be Whale Wise is a transboundary effort to develop and periodically revise guidelines for viewing marine wildlife. NMFS has partnered with the Soundwatch boater education program, Straitwatch, commercial operators, whale advocacy groups, and United States and Canadian government agencies and enforcement divisions over the past several years to promote safe and responsible wildlife viewing practices through the development of outreach materials, training workshops, on-water education, and public service announcements. The 2006 version of the Be Whale Wise guidelines recommends that boaters parallel whales no closer than 100 yards (about 100 meters), approach animals slowly from the side rather than from the front or rear, and avoid putting the vessel within 400 yards (400 meters) in front of or behind the whales. The Be Whale Wise guidelines are used in U.S. and Canadian waters and use meters and yards interchangeably. Reference to distances in the guidelines and alternatives in this document will appear in yards. Vessels are also recommended to reduce their speed to less than 7 knots (13 km/h) within 400 yards (400 meters) of the whales, and to remain on the outer side of the whales near shore. Two voluntary no-go zones off San Juan Island are recognized by San Juan County, although this is separate from the Be Whale

Wise guidelines. The first is a 1 mile (800 meter)-wide zone along a 2 mile (3 kilometer) stretch of shore centered on the Lime Kiln lighthouse. The second is a 1/4 mile (400 meter)-wide zone along much of the west coast of San Juan Island from Eagle Point to Mitchell Point. These areas were established to facilitate shore-based viewing and to reduce vessel presence in an area used by the whales for feeding, traveling, and resting.

NMFS supports the Soundwatch program, an on-water stewardship and monitoring group, to promote the Be Whale Wise guidelines and to monitor vessel activities in the vicinity of whales. Soundwatch reports (Koski 2004, 2006, 2007, 2008, 2009, 2010a, 2010b) characterize trends in incidents when the guidelines are not followed and when there is the potential for disturbance of the whales. Incidents are frequently observed involving both recreational and commercial whale watching vessels. The Soundwatch staff also educate boaters, providing information on viewing guidelines as boats are approaching areas with whales. In addition to Soundwatch, there is a Canadian program, Straitwatch, which also collects information on vessels and educates boaters.

In other regions, the effectiveness of voluntary conservation agreements has been evaluated and some voluntary guidelines may be insufficient to protect marine mammals. In the northeast, Wiley et al. (2008) found that there was a high level of noncompliance for whale watch companies (mean 78 percent, company range 74 to 88 percent) with voluntary speed-zone buffers for endangered whales. Despite conditions that seemed supportive of the use of voluntary measures, Wiley et al. (2008) concluded that the low level of compliance probably failed to achieve the desired conservation goals.

Southern and Northern Resident killer whales are listed as endangered and threatened, respectively, under the Species at Risk Act in Canada, and the Be Whale Wise guidelines for viewing have been coordinated to ensure consistency on both sides of the border. Recovery planning and implementation of management actions, such as protective regulations, will continue to be coordinated with Canada to achieve consistency whenever possible.

1.4 Purpose and Need for Action

Despite the regulations, guidelines, and outreach efforts currently in place, NMFS is concerned that the level of disturbance caused by vessels surrounding these popular whales may have harmful effects on individuals and the population. NMFS has identified vessel effects as a risk factor in the decision to list the Southern Residents and in the *Recovery Plan for Southern Resident Killer Whales* (*Orcinus orca*) (NMFS 2008a). The recovery plan includes a variety of management actions to recover Southern Resident killer whales. One goal of the plan is to minimize disturbance of Southern Residents from vessels. To achieve this goal, the recovery plan recommends the following actions:

1. Continue to evaluate and improve voluntary whale-watching guidelines,
2. Evaluate the need to establish regulations regarding vessel activity in the vicinity of killer whales, and
3. Evaluate the need to establish areas with restrictions on vessel traffic.

During the listing and recovery planning processes, NMFS received a number of complaints from the public alleging that killer whales are routinely being disturbed by people attempting to closely approach and interact with the whales by vessel (motor powered, non-motorized, or self-propelled) particularly along the west side of San Juan Island. Additional reports from Soundwatch (Koski 2004, 2006, 2007) and researchers (Bain 2007; Noren et al. 2007, 2009) indicate that vessels do not always follow the guidelines and may impact the behavior of whales. Despite the current ESA and MMPA regulations prohibiting take,

and the guidelines and outreach efforts currently in place, interactions between vessels and killer whales continue to occur in Puget Sound and Georgia Basin. Advertisements for whale watch tours appear on the Internet and in local media in the Pacific Northwest depicting or appearing to promise activities that are inconsistent with what is recommended in the Be Whale Wise guidelines. NMFS has received letters from the Marine Mammal Commission, members of the scientific research community, environmental groups, and members of the general public expressing the view that some types of interactions with wild marine mammals have the potential to harass and/or disturb the animals by causing injury or disruption of normal behavior patterns. Soundwatch reports continue to include high numbers of incidents where guidelines to avoid harassment are not being followed. The Canadian Straitwatch program also collects information on incidents where the guidelines are not being followed. Violations of current ESA and MMPA prohibitions are routinely reported to NOAA's Office for Law Enforcement; however, the current prohibitions are difficult to enforce.

Based on internal scoping, external scoping through an Advance Notice of Proposed Rulemaking, monitoring reports, and scientific information, NMFS has determined that existing prohibitions, regulations, and guidelines do not provide sufficient protection of killer whales from vessel impacts. Vessel effects may limit the ability of the endangered Southern Resident killer whales to recover and may impact other killer whales in inland waters of Washington. NMFS therefore deems it necessary and advisable to adopt regulations to protect killer whales from vessel impacts, which will support recovery of Southern Resident killer whales. NMFS is adopting regulations pursuant to rulemaking authority under MMPA section 112(a) (16 U.S.C.1382(a)), and ESA section 11(f) (16 U.S.C.1540(f)). These regulations also are consistent with the purpose of the ESA "to provide a program for the conservation of [...] endangered species" and "the policy of Congress that all Federal departments and agencies shall seek to conserve endangered species [...] and shall utilize their authorities in furtherance of the purposes of [the ESA]" (16 U.S.C. 1531(b), (c)).

1.5 Advance Notice of Proposed Rulemaking

To begin implementing the actions identified in the recovery plan to minimize vessel effects on Southern Resident killer whales, NMFS published an Advance Notice of Proposed Rulemaking (ANPR) on March 22, 2007. The ANPR initiated a public comment period to gather information on whether regulations were needed and, if so, what type of regulations might be appropriate (72 Fed. Reg. 13464) (Appendix A). NMFS also received input on potential measures to address vessel impacts during the ESA listing and throughout the recovery planning process. Based on previous comments received and regulations implemented for other marine mammals, NMFS developed a preliminary list of options for consideration and comment. Five potential preliminary alternatives were provided in the ANPR:

1. Codify the current guidelines
2. Establish an approach rule
3. Prohibit particular vessel activities of concern
4. Establish time-area closures
5. Create a permit or certification program for whale watching

The ANPR invited information from the public on the advisability of regulations, on the preliminary list of options, and on other possible measures that will help the agency decide what type of regulations, if any, would be most appropriate to consider for protecting killer whales in the Pacific Northwest. In particular, information and comments were solicited on the following issues:

- The advisability of and need for regulations;

- The geographic scope of regulations;
- Management options for regulating vessel interactions with killer whales, including but not limited to the options listed in the notice;
- Scientific and commercial information regarding the effects of vessels on killer whales and their habitat;
- Information regarding potential economic effects of regulating vessel interactions; and
- Any additional relevant information that NMFS should consider should it undertake rulemaking.

Comments were submitted by e-mail and by mail. The comment period closed on June 20, 2007. Two public meetings were held during the public comment period, which included a presentation providing an overview of the information in the ANPR. Additionally, NMFS answered questions, accepted written comments, and provided the opportunity for individuals to record oral statements. A total of 84 letters and e-mails were received during the comment period. Comments were submitted by concerned citizens; whale watch operators; research, conservation, and education groups; Federal, state, and local government entities; and various industry associations. All comments received during the comment period were posted on the NMFS Northwest Regional web page http://www.nwr.noaa.gov/Marine-Mammals/Whales-Dolphins-Porpoise/Killer-Whales/ESA-Status/Orca-Vessel-Regs.cfm.

The majority of comments explicitly stated that regulations were needed to protect killer whales from vessel effects. Most other comments generally supported protection of the whales. Six comments explicitly stated that no regulations were needed. There was support for each of the options in the preliminary list of alternatives published in the ANPR, and many comments supported multiple approaches. Some additional alternatives were also suggested. Suggestions for the geographic scope included the entire United States range of the Southern Residents (including coastal waters of Washington, Oregon, and California) and a more limited application in inland waters of Washington. NMFS also received comments supporting regulations that apply to all whales, to all killer whales, and to only the listed Southern Resident killer whales. Comments on what type of vessels should be regulated varied, and some suggested that regulations should apply to all types of vessels (motorized and non-motorized) from both the United States and Canada. Other commenters supported regulation of only certain types of vessels, such as commercial whale watchers, or requested exemptions for certain classes of vessels (tankers and shipping, over a certain size, in the course of official duties). In addition, comments were also received supporting regulations to address aircraft.

Public comments were used to identify a range of actions, alternatives, environmental effects, methods of assessment, and mitigation measures to be analyzed in-depth, and assisted in eliminating issues that were not important. The ANPR process also provided an opportunity for active participation from a variety of audiences, including proponents and opponents of vessel regulations.

1.6 Description and Scope of the Proposed Action

In July 2009, NMFS proposed to adopt regulations that would prohibit motorized, non-motorized, and self-propelled vessels in navigable inland waters of Washington from:

- Causing a vessel to approach within 200 yards of any killer whale
- Entering a restricted zone along the west coast of San Juan Island during a specified season
- Intercepting the path of any killer whale in inland waters of Washington

The proposed regulations (Appendix B) were published in the Federal Register for public comment along with a draft Environmental Assessment and supporting documents, such as the Draft Regulatory Impact Review (IEC 2008). NMFS held three public meetings on the proposed regulations and extended the comment period to January 15, 2010.

1.7 Description and Scope of the Preferred Alternative

NMFS developed a final rule after considering comments submitted in response to the ANPR, proposed rule, and the draft EA. The final rule constitutes the Preferred Alternative analyzed in this final EA (Subsection 2.2.9, Alternative 9: Preferred Alternative). Under the Preferred Alternative, NMFS will adopt regulations that prohibit motorized, non-motorized, and self-propelled vessels in navigable inland waters of Washington from:

- Causing a vessel to approach within 200 yards of any killer whale
- Intercepting the path of any killer whale in inland waters of Washington

The proposed rule included a seasonal no-go zone for vessels along the west side of San Juan Island. The no-go zone is not included in the final rule and will be considered further with additional input from the public and as new information is collected. The final regulations will be published in the Federal Register along with this final EA and supporting documents, such as the Final Regulatory Impact Review (IEC 2010). The following discussion describes the basis for the scope of the final regulations.

1.7.1 Inland Waters of Washington

The action area for this analysis is limited to navigable inland waters of Washington under United States jurisdiction. Inland waters include a core summer area around the San Juan Islands, as well as a fall foraging area in Puget Sound and transit corridor along the Strait of Juan de Fuca. These three areas make up over 2,500 square miles and were designated as critical habitat for Southern Resident killer whales (71 Fed. Reg. 69054, November 29, 2006). Most whale watching occurs in the action area, with whale watching vessels originating from nearby inland water ports in the United States and Canada (Hauser 2006). The presence of Southern Residents and other killer whales in inland waters is predictable and reliable, which is the basis for the success of the local commercial whale watch industry. In addition to the whale watching activity, all vessel monitoring and most whale research also takes place in the action area. There is active enforcement in inland waters as well, with enforcement vessels originating from similar ports. Based on the distribution of commercial and recreational whale watching and enforcement effort, NMFS has determined that vessel regulations would have the largest effect in inland waters, and have accordingly limited the geographic scope of this analysis. In addition, limiting regulations to the inland waters would also allow for continued and consistent monitoring to assess the effectiveness of the regulations in comparison to previous years.

1.7.2 Application to All Killer Whales

Under the MMPA and ESA the proposed regulations would apply to all killer whales. Although killer whales are individually identifiable through photo-identification, individual identification requires scientific expertise and resources (i.e., use of a catalog) and cannot always be done immediately at the time of the sighting. It would be difficult for boaters, especially recreational boaters without expertise and experience with killer whales, to identify the individuals in the ESA-listed Southern Resident DPS or even to identify killer whales to ecotype (resident, transient, offshore). Requiring boaters to know which killer

whales they are observing is not feasible. Section 11(f) of the ESA provides NMFS with broad rulemaking authority to enforce the provisions of the ESA. In addition, providing protection of all killer whales in inland waters of Washington is appropriate under the MMPA. Section 112(a) of the MMPA provides NMFS with broad authority to prescribe regulations that are necessary to carry out the purposes of the statute.

1.7.3 Application to Motorized and Non-motorized Vessels

Commercial and recreational whale watch vessels include motorized, non-motorized, self-propelled, and human-powered (i.e., motor boats, sail boats, and kayaks), which can all cause disturbances to whales. While kayaks are small and quiet, they have the potential to disturb whales as obstacles on the surface, and they may startle marine mammals by approaching them without being heard (Mathews 2000). Some kayakers may be less likely to follow rules (Jelinski et al. 2002) and in a study of sea lions, Mathews (2000) found that kayakers were significantly more likely to approach wildlife closely. Kayakers may approach wildlife more closely because they may be more apt to overestimate distance because of their low aspect on the water, and assume they are less likely to disturb wildlife than other vessels (Mathews 2000). In studies comparing effects of motorized and non-motorized vessels on dolphins, the type of vessel did not matter as much as the manner in which the boat moved with respect to the dolphins (Lusseau 2003b). Some dolphins' behavioral responses to vessels (e.g., avoidance, increased dive times, changes in social cohesion) were specific to kayaks or occurred more often when kayaks were present compared to motorized vessels (Lusseau 2006; Gregory and Rowden 2001; Duran and Valiente 2008). Several studies that have documented changes in behavior of dolphins and killer whales in the presence of vessels include both motorized and non-motorized vessels in their analysis (Lusseau 2003b; Nichols et al. 2001; Trites et al. 2007; Noren et al. 2007, 2009).

In response to public comments regarding our reliance on studies of kayak impacts involving other species, NMFS secured additional analysis of available data on Northern Resident killer whales and behavioral responses to kayaks since the draft EA was published. Williams et al. (2010) analyzed the effects of kayak presence on Northern Resident killer whales and reported that kayaks can have a significant impact on killer whale behavior. In previous studies, Williams et al. (2006) reported changes to killer whale behavior from boat presence, pooling kayaks and motorized vessels together. In their recent study, the presence of both types of vessels was analyzed separately. In the presence of only kayaks, the probability that the whales will shift to travel behavior from other behavior states (including feeding) significantly increased, which indicates an avoidance tactic. As a result, the whales spent significantly more time traveling when in the presence of kayaks than they did under no-boat conditions (11 percent increase in time spent traveling). Consistent with previous studies, killer whales significantly reduced overall time spent feeding in the presence of kayaks and powerboats compared to no-boat conditions (30 percent decrease in time spent feeding). With respect to both kayaks and motorized vessels, the duration of feeding decreased and the overall proportion of time spent feeding decreased when vessels were present, regardless of the type of vessel. One model suggested that the effect of kayaks on feeding activity was perhaps less pronounced than the effect of powerboats on feeding activity. The types of effects vessels have on foraging activities seem to be similar whether the boats involved are kayaks or other types of vessels, but the whales may use different avoidance tactics to deal with the two types of vessels (Williams et al. 2010). Based on all of the information available, it is appropriate to protect killer whales from both motorized and non-motorized vessels. Effects of vessels on marine mammals and killer whales are discussed in Subsection 3.2.1.5, Vessel Interactions.

1.7.4 Exceptions

NMFS considered specific categories of vessels that should be exempted from any vessel regulation. The exceptions for the final rule are based on the likelihood of certain categories of vessel having impacts on the whales and the potential adverse effects involved in regulating certain vessels or activities. Five categories are excepted: (1) government vessels, (2) cargo vessels transiting in the shipping lanes, (3) research vessels, (4) fishing vessels actively engaged in fishing, and (5) vessels limited in their ability to maneuver safely.

Available data on vessel effects on whales from Soundwatch (Koski 2007) and Bain (2007) indicate that commercial and recreational whale watch vessels have the greatest potential to affect killer whales. This is because operators of whale watching vessels are focused on the whales, track the whales' movements, spend extended time with the whales, and are therefore most often in close proximity to the whales. Other vessels such as government vessels, commercial and treaty fishing boats, cargo ships, tankers, tug boats, and ferries do not target whales in their normal course of business. Soundwatch (Koski 2007, 2008, 2009, 2010a) and Bain (2007) report that these types of vessels combined comprised only 6 percent or less of vessels within 1/2 mile of the whales from 2006-2009. In 2010, there was a higher percentage of commercial fishing vessels observed within 1/2 mile of the whales, which was likely because of increased fishery openings coinciding with presence of whales (Koski 2010b). In 2007-2008, Giles and Cendak (2010) recorded the distance of vessels from the whales using an integrated GPS, range finder, and compass and reported only 21 ferries and 22 shipping vessels out of 11,710 observations within 1,000 yards of the whales (0.4 percent). In addition, these vessels generally move slowly and in usually predictable straight paths, which reduces the risk of strikes to whales. While NMFS recognizes that sound from large vessels has the potential to affect whales even at great distances, the primary concern at this time is the sound from small, fast moving vessels moving in close proximity to the whales.

Vessels engaged in scientific research do closely approach killer whales to obtain photographs, collect a variety of samples, and observe behavior. Takes from these activities are authorized in research permits under section 10 of the ESA and their effects are evaluated in section 7 consultations on issuance of permits. Because researcher expertise, operating procedures, and permit terms and conditions reduce the potential impacts to whales, specific research activities authorized by NMFS would be exempt from the vessel regulations.

In addition, regulating these categories of vessels could cause adverse impacts. Government vessels are often critical to safety missions, such as search and rescue operations, enforcement, pollution response, and activities critical to national security. A small number of Navy vessels operate specific sonar that has been reported to disturb killer whales (NMFS 2004a) and there are current processes under the MMPA and ESA to address potential impacts of sonar to Southern Resident killer whales. Based on the exemption for government vessels there will be no change from any of the Alternatives to military operations and Navy sonar issues are not discussed further in this document. Large cargo ships transiting in the navigation lanes have limited maneuverability. These ships generally follow well-defined navigation lanes established by the International Maritime Organization (IMO), known as Traffic Separation Schemes (TSS) (rules for vessel conduct is established by U.S. Coast Guard Navigation Rule 10). If large ships following traffic lanes or on their way to or from traffic lanes were required to make sudden or unpredictable movements to avoid close approaches to whales, it could increase the risk of collisions and pose safety hazards. For the safety of vessel navigation, large ships are sometimes escorted or assisted by smaller vessels such as tug boats, which sometimes navigate just outside the designated lanes. Sudden or unpredictable movements by these escort vessels in order to avoid close approaches to whales could also increase the risk of collisions and pose safety hazards. If fishing vessels were required to follow regulations while actively engaged in fishing, it could compromise gear or catch. Exempting treaty fishing vessels is consistent with treaty fishing rights and use of Usual and Accustomed fishing areas. Research vessels, of necessity, will often closely approach the whales. NMFS considers ongoing research essential to its efforts to recover the whales.

NMFS will also exempt vessels from any regulations if the exemption is required for safe operation of the vessel to avoid adverse effects to public safety.

The Proposed Action included a no-go zone. There are private landowners with property adjacent to the no-go zone. NMFS proposed to exempt the personal use of privately owned vessels for access to their shoreline by landowners adjacent to the no-go zone. Since the final rule does not include a no-go zone, this exception is not part of the final rule and will be considered further along with additional information on the no-go zone.

Based on these considerations, NMFS's final rule includes the following exceptions to regulations. The burden would be on the vessel operator to prove the exemption applies. These exceptions would not exempt any vessel operators from harassment or take prohibitions under the MMPA or ESA. Federal government vessels would not be exempt from consultation requirements under section 7 of the ESA. The following exceptions would apply to any regulations. Additional exceptions considered for individual alternatives are presented under each alternative in Subsection 2.2, Alternatives.

1. The regulations would not apply to Federal, state, and local government vessels operating in the course of official duty.

2. The regulations would not apply to vessels participating with a Vessel Tracking Service and following a Traffic Separation Scheme or complying with a Vessel Traffic Service Measure of Direction. This also includes boats escorting vessels in the traffic lanes, such as tug boats.

3. The regulations would not apply to activities, such as scientific research, authorized under permit by the National Marine Fisheries Service.

4. The regulations would not apply to commercial or treaty Indian fishing vessels lawfully engaged in actively setting, retrieving, or closely tending fishing gear, or transferring catch.

5. The regulations would not apply to vessel operations necessary to avoid an imminent and serious threat to a person or vessel, including when necessary for overall safety of navigation, to comply with the Navigation Rules, or in direct support of environmental protection.

1.8 Relationship to Other Plans and Policies

The proposed action and alternatives analyzed in this environmental assessment relate to other Federal, state, tribal, and local plans and policies addressing conservation in inland waters of Washington. Development of vessel regulations is in the context of a comprehensive program for recovery of Southern Resident killer whales (NMFS 2008a). The final rule listing Southern Resident killer whales as endangered identified several potential factors that may have caused their decline or may be limiting recovery (70 Fed. Reg. 69903, November 18, 2005). These are: quantity and quality of prey, toxic chemicals that accumulate in top predators, and disturbance from sound and vessel traffic. The rule also identified oil spills as a potential risk factor for this species. The *Recovery Plan for Southern Resident Killer Whales* (NMFS 2008a) includes management actions to address each of these potential threats.

NMFS, along with many diverse partners, is involved in an ongoing effort to implement the actions in the recovery plan. For example, in addition to vessel regulations, NMFS is currently working on salmon recovery through recovery planning with local communities (i.e., Shared Strategy programs) and through clean up of Puget Sound through efforts like the Puget Sound Partnership. NMFS has also worked on a draft oil spill response protocol for inclusion in the Northwest Area Contingency Plan. The ESA also provides protections for endangered Southern Resident killer whales through ESA section 7 consultations to ensure that Federal actions do not jeopardize listed species or adversely modify or destroy critical habitat. Through the consultation process, Federal agencies or applicants may change their proposed actions to avoid harming listed marine mammals, fish, and other wildlife.

In addition, killer whales and other marine mammals in the region are protected under the MMPA, and policies and programs to promote protection of marine mammals include all killer whales. Education and outreach programs, such as the Be Whale Wise campaign are comprehensive, transboundary, and address wildlife viewing of a variety of marine species.

2.0 ALTERNATIVES

2.1 Introduction

In the ANPR, NMFS provided a preliminary list of alternative regulations to protect killer whales from vessel impacts (Subsection 1.5, Advance Notice of Proposed Rulemaking). The notice requested public comment on the preliminary list of alternatives, as well as any other reasonable alternatives. NMFS received information on a number of potential alternatives, including suggestions for new alternatives, exceptions, potential resource impacts, and enforcement and education issues associated with alternatives. To select alternatives for analysis, NMFS developed 11 decision criteria from issues raised from public comments, internal scoping, and applicable law. NMFS and its cooperating agencies met to evaluate the extent to which each potential regulation would meet the decision criteria as a reasonable alternative. There were two tiers of criteria: 1) criteria that must be met by the proposed alternative and 2) criteria that should, if possible, be met by the proposed alternative.

Alternative Selection Criteria
Regulations must:

1. Meet the Purpose and Need: Protect killer whales from vessel impacts, which will support recovery of Southern Resident killer whales
2. Be administratively feasible
3. Be enforceable (violations can be easily identified)
4. Be consistent with existing statutes and regulations (MMPA, ESA, Inland Navigation Rules, and International Regulations for Preventing Collisions at Sea 1972)
5. Be consistent with Indian treaty fishing rights
6. Have scientific support

Regulations should if possible:

7. Be easily understood and implemented by those being regulated
8. Provide opportunities to evaluate their effectiveness
9. Minimize impacts to resources (economic, transportation)
10. Minimize impacts to tribes, consistent with trust responsibilities
11. Be compatible with regulations across the United States/Canadian border

The alternatives analyzed here are individual components of possible regulations, which for the most part could be promulgated singly or in combination with one another. The components selected for analysis are those that meet all or most of the selection criteria. In addition to the No-action Alternative, this environmental assessment considers eight action alternatives. Alternatives that did not meet all or most of the criteria are also discussed briefly in Subsection 2.3, Alternatives Considered but Not Analyzed in Detail.

2.1.1 Elements Common to All Alternatives

The regulations considered in the eight action alternatives all include certain elements in common. As described in Subsection 1.6, Description and Scope of the Proposed Action, NMFS has identified the geographic location, application of regulations, and categories of vessels that would be exempt from the vessel regulations. The following nine elements are common to all alternatives, and will, therefore, be included in the analysis of each alternative in Section 4.0, Environmental Consequences:

1. All regulations would apply to activities in the navigable inland waters of Washington State. The specific protected areas within inland waters are identified.

2. The regulations would apply to all killer whales, not just endangered Southern Residents.

3. The regulations would not exempt any vessel operators from the harassment or take prohibitions under the MMPA or ESA.

4. The regulations would apply to motorized, non-motorized, and self-propelled vessels.

5. The regulations would not apply to Federal government vessels operating in the course of their official duties or to state and local government vessels when engaged in official duties involving law enforcement, search and rescue, or public safety.

6. The regulations would not apply to vessels participating in the Vessel Tracking Service and operating within the defined Traffic Separation Scheme shipping lanes.

7. The regulations would not apply to activities, such as scientific research, authorized under permit by NMFS.

8. The regulations would not apply to treaty fishing vessels lawfully engaged in actively setting, retrieving, or closely tending fishing gear.

9. The regulations would not apply to any vessel where the operator could prove the vessel maneuver resulting in a violation was required for safety.

Additional exceptions considered for individual alternatives are presented under each alternative in Subsection 2.2, Alternatives.

2.2 Alternatives

2.2.1 Alternative 1: No-action

The MMPA prohibits take of all marine mammals, including killer whales, and the ESA prohibits the take of listed marine mammals, including endangered Southern Resident killer whales. NMFS promotes responsible viewing through a “Be Whale Wise” education campaign that includes a set of voluntary guidelines designed to help boaters avoid harassment. Under the No-action Alternative, NMFS would not promulgate any new regulations but would continue the education and outreach program with all of the partners involved in Be Whale Wise. The elements common to all alternatives above are specific to regulations and would not apply to the No-action Alternative.

2.2.2 Alternative 2: 100-Yard Approach Regulation

The Be Whale Wise guidelines described in Subsection 1.3, Current MMPA and ESA Prohibitions, Regulations, and NMFS Guidelines, advise boaters to stay 100 yards (100 meters) away from killer whales. The Be Whale Wise guidelines are used in United States and Canadian waters and use meters and yards interchangeably. Reference to distances in the guidelines and alternatives in this document will appear in yards. NMFS received comments supporting the current 100-yard distance in the guidelines as well as

comments suggesting greater distances. Under this alternative, NMFS would promulgate a regulation prohibiting vessels from approaching any killer whale closer than 100 yards. This would include approaching by any means, including by interception (i.e., placing a vessel in the oncoming path of a killer whale, so that the whale surfaces within 100 yards of the vessel, or positioning a vessel so that wind or currents carries the vessel to within 100 yards). In addition to the exceptions listed in Subsection 2.1.1, Elements Common to All Alternatives described above, this regulation would not apply to commercial fishing vessels (non-treaty) lawfully engaged in actively setting, retrieving, or closely tending fishing gear.

2.2.3 Alternative 3: 200-Yard Approach Regulation

This alternative is the same as Alternative 2, but the rule would prohibit vessel approaches within 200 yards of all killer whales.

2.2.4 Alternative 4: Protected Area – Current Voluntary No-go Zone

Under this alternative, NMFS would formalize the current voluntary no-go zone along the west side of San Juan Island. This includes a 1/2 mile (800 meter)-wide zone centered on the Lime Kiln lighthouse and a 1/4 mile (400 meter)-wide zone from Eagle Point to Mitchell Point (Figure 2-1). No vessels would be permitted inside the protected area from May 1 through September 30. This area would not overlap with shipping lanes or ferry routes and would not be directly adjacent to the Canadian border.

2.2.5 Alternative 5: Protected Area – Expanded No-go Zone

Under this alternative, NMFS would formalize a no-go zone along the west side of San Juan Island. The area would extend 1/2 mile (800 meter) offshore from Eagle Point to Mitchell Point (Figure 2-2). This is a larger, but simplified area compared to the no-go zone described under Alternative 4 (Figure 2-1). No vessels would be permitted inside the protected area from May 1 through September 30. This area would not overlap with shipping lanes or ferry routes and would not be directly adjacent to the Canadian border.

Figure 2-1. Current voluntary no-go zone, a 1/2 mile (800 meter)-wide zone centered on the Lime Kiln lighthouse and a 1/4 mile (400 meter)-wide zone from Eagle Point to Mitchell Point (approximately 3.8 square miles).

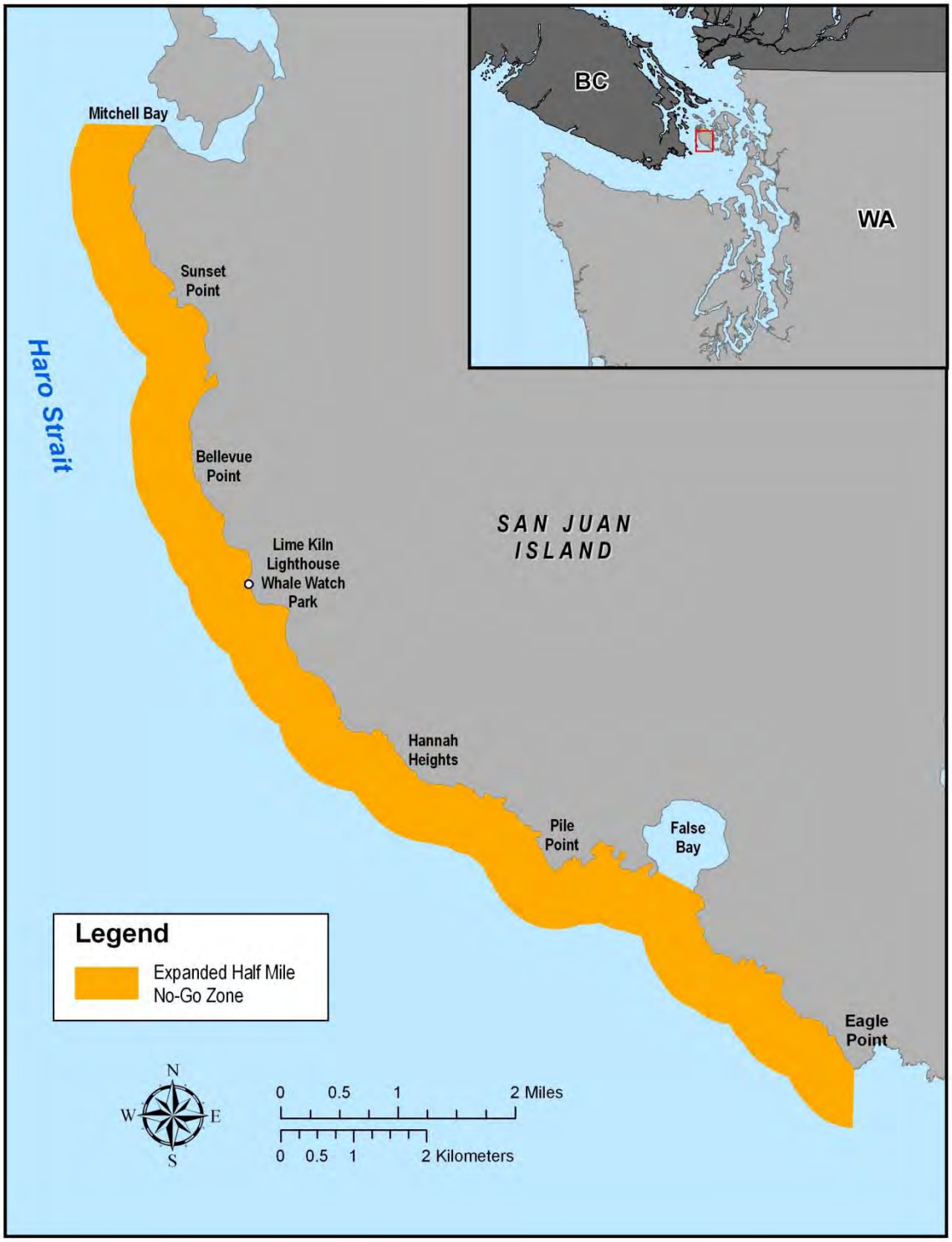


Figure 2-2. Expanded no-go zone 1/2 mile (800 meters) offshore from Eagle Point to Mitchell Point (approximately 6.2 square miles) not including False Bay.

2.2.6 Alternative 6: Speed Limit of 7 Knots Within 400 Yards of Killer Whales

The current guidelines recommend that vessels limit speed to 7 knots when within 400 yards of the whales. Under this alternative, NMFS would promulgate a regulation prohibiting vessels from operating at speeds over 7 knots when within 400 yards of killer whales. In addition to the exceptions listed in Subsection 2.1.1, Elements Common to All Alternatives described above, this regulation would not apply to commercial fishing vessels lawfully engaged in actively setting, retrieving, or closely tending fishing gear.

2.2.7 Alternative 7: Keep Clear of the Whales' Path

The current guidelines recommend that vessels keep clear of the whales' path and cautiously move out of the way if whales are approaching within 400 yards. There is also a Washington State law that includes a prohibition against intercepting the path of the whales. Under this alternative, NMFS would promulgate a regulation requiring vessels to keep clear of the whales' path. Violations of this regulation would include intercepting or placing a vessel in the oncoming path of a killer whale or positioning a vessel so that wind or currents carry the vessel into the path of the whales. In addition to the exceptions listed in Subsection 2.1.1, Elements Common to All Alternatives described above, this regulation would not apply to commercial fishing vessels lawfully engaged in actively setting, retrieving, or closely tending fishing gear.

2.2.8 Alternative 8: Proposed Action

In July 2009, NMFS proposed a package of regulations incorporating Alternatives 3 (Subsection 2.2.3, Alternative 3: 200-Yard Approach Regulation), 5 (Subsection 2.2.5, Alternative 5: Protected Area – Expanded No-go Zone), and 7 (Subsection 2.2.7, Alternative 7: Keep Clear of the Whales' Path) (Appendix B). The proposed regulation package would have:

1. Prohibited vessels from approaching any killer whale closer than 200 yards. This would include approaching by any means, including by interception (i.e., placing a vessel in the oncoming path of a killer whale, so that the whale surfaces within 200 yards of the vessel, or positioning a vessel so that wind or currents carries the vessel to within 200 yards). In addition to the exceptions listed in Subsection 2.1.1, Elements Common to All Alternatives, this regulation would not apply to commercial fishing vessels (non-treaty) lawfully engaged in actively setting, retrieving, or closely tending fishing gear.

2. Formalized a no-go zone along the west side of San Juan Island. The area would extend 1/2 mile (800 meters) offshore from Eagle Point to Mitchell Point (Figure 2-2). This is a larger, but simplified area compared to the no-go zone described under Alternative 4 (Figure 2-1). No vessels would be permitted inside the protected area from May 1 through September 30.

3. Required vessels to keep clear of the whales' path. Violations of this regulation would include intercepting or placing a vessel in the oncoming path of a killer whale or positioning a vessel so that wind or currents carry the vessel into the path of the whales. In addition to the exceptions listed in Subsection 2.1.1, Elements Common to All Alternatives, this regulation would not apply to commercial fishing vessels lawfully engaged in actively setting, retrieving, or closely tending fishing gear.

2.2.9 Alternative 9: Preferred Alternative

Under this alternative, NMFS would promulgate a package of final regulations incorporating Alternative 3 (Subsection 2.2.3, Alternative 3: 200-Yard Approach Regulation) and Alternative 7 (Subsection 2.2.7, Alternative 7: Keep Clear of the Whales' Path). The final regulation would:

1. Prohibit vessels from approaching any killer whale closer than 200 yards. This would include approaching by any means, including by interception (i.e., placing a vessel in the oncoming path of a killer whale, so that the whale surfaces within 200 yards of the vessel, or positioning a vessel so that wind or currents carries the vessel to within 200 yards). In addition to the exceptions listed in Subsection 2.1.1, Elements Common to All Alternatives, this regulation would not apply to commercial fishing vessels (non-treaty) lawfully engaged in actively setting, retrieving, or closely tending fishing gear.

2. Require vessels to keep clear of the whales' path. Violations of this regulation would include intercepting or placing a vessel in the oncoming path of a killer whale or positioning a vessel so that wind or currents carry the vessel into the path of the whales. In addition to the exceptions listed in Subsection 2.1.1, Elements Common to All Alternatives, this regulation would not apply to commercial fishing vessels lawfully engaged in actively setting, retrieving, or closely tending fishing gear.

2.3 Alternatives Considered but Not Analyzed in Detail

Several alternatives that were suggested in the ANPR, in public comments, or during internal scoping did not meet all or most of the selection criteria. For example, some of the alternatives have no scientific support to show they would actually protect the whales, and some would have substantial economic impacts. Other alternatives would not be feasible to administer. These additional alternatives are described below with brief explanations of why they did not meet the selection criteria and were not considered for further analysis in this environmental assessment.

2.3.1 Moratorium on All Vessel-based Whale Watching

A whale watching moratorium would be difficult to enforce against both commercial and recreational vessels. Commercial operators could still conduct tours focusing on other species, which would make it difficult to prove they were engaged in prohibited activity. Similarly, recreational boaters could be engaged in a variety of activities in the vicinity of killer whales, making it difficult to determine at what point they are engaged in prohibited whale watching. Such a moratorium would also be overly broad, as there is information indicating that some vessel operations around killer whales can occur without affecting the whales. This alternative could also have a substantial economic impact on commercial whale watch operators.

2.3.2 Reroute Shipping

There are well-defined traffic lanes within the Strait of Juan de Fuca and Haro Strait that make up the Traffic Separation Scheme. This alternative would require large ships that are part of the Vessel Tracking Service to deviate from the established Traffic Separation Scheme or find alternate routes to ports. Shipping vessels are rarely within 1/2 mile of the whales, and very few incidents are reported in the shipping lanes (Koski 2006, 2007). The Traffic Separation Scheme is specifically designed to identify an efficient route and reduce impacts to public safety from vessel collisions. Restricting the shipping lanes or rerouting shipping away from Haro Strait would have substantial economic and public safety impacts.

2.3.3 Establish Routes to Fishing Areas

This alternative would direct fishing vessels to take specific routes to reach fishing areas. Information collected by Soundwatch (Koski 2006, 2007), including the types of vessels that are in close proximity to whales, indicates that fishing vessels make up a very small percentage of vessels within 1/2 mile of the whales and are rarely involved in incidents where the whales may be closely approached. Therefore, because there is a low likelihood of fishing vessels affecting whales, requiring fishing vessels to adhere to specific routes would not provide additional protection for the whales.

2.3.4 Establish a Quota System for Takes and Allocate to Different User Groups

This alternative would allocate a certain quota for "takes" of whales to different user groups that may be impacting the whales such as research, whale watching, and fishing groups. The takes would include close approaches as well as other harmful activities. There is no scientific information to identify how many takes from different activities would be acceptable. Consequently, an allocation process for different activities would be arbitrary and not administratively feasible. The MMPA and ESA prohibit takes and do not include exceptions of this prohibition for viewing activities.

2.3.5 Certification or Permit Program

Under this alternative, NMFS would issue certificates or permits to commercial whale watch boats that meet certain requirements. Trained and permitted operators would be allowed to approach whales closer than non-permitted boaters. NMFS could also place a limit on the number of permitted vessels allowed to be within a certain range of the whales and have other vessels stand by at a greater distance until another vessel departs. Recreational boaters often follow the example of commercial operators, and it would be confusing to have two sets of rules for different vessels. A certification program is also not feasible because there is currently no infrastructure to administer, monitor, or enforce a certificate or permit program or stand-by zones for whale watching activities. In addition, the MMPA and ESA do not provide exemptions to the take prohibition for viewing activities. Therefore, permits could not be issued to whale watch operators if viewing activities result in take.

2.3.6 Prohibit Whale Watching One Day Each Week

Under this alternative, whale watching would be prohibited one day each week to reduce harmful impacts to whales for this 24 hour period. It would be difficult to educate recreational boaters regarding when they could or could not watch whales and what vessel activities constitute "whale watching" prohibited on certain days. As described under Subsection 2.3.1, Moratorium on All Vessel-based Whale Watching, it would be difficult to enforce this type of regulation.

2.3.7 Time of Day Restrictions on Whale Watching

Similar to the alternative described above, this alternative would prohibit whale watching during certain times of each day. It would be difficult to educate recreational boaters regarding what times they could or could not watch whales and what vessel activities constitute "whale watching" prohibited at certain times. As described under Subsection 2.3.1, Moratorium on All Vessel-based Whale Watching, it would be difficult to enforce this type of regulation.

2.3.8 Noise Level Standards for Vessels

There are currently noise level standards for vessels (RCW 88.12.040); however, under this alternative, these standards would become more restrictive. While it might be possible to implement more restrictive noise level standards for commercial whale watching vessels that are used only for observing whales, there would likely be a substantial economic cost to retrofitting vessels to meet the new standards. It would not be feasible to regulate recreational vessels that are used for multiple activities, such as fishing, in addition to viewing wildlife. New noise standards targeting whale impacts would also be difficult to enforce and could have substantial economic impacts on vessel manufacturers and owners if they were required to design new engines, purchase specific engines, or retrofit current vessels.

2.3.9 Killer Whale Sanctuary

Under this alternative, a killer whale sanctuary would be established. It is not administratively feasible at this time to create a sanctuary for killer whales. Only the Secretary of the Department of Commerce and the United States Congress have the authority to designate National Marine Sanctuaries. A National Marine Sanctuary was considered for northern Washington State waters in the 1980s and 1990s, but was not designated (Hoyt 2005). Additionally, the protected areas described under Subsections 2.2.4, Protected Area – Current Voluntary No-go Zone and 2.2.5, Alternative 5: Protected Area – Expanded No-go Zone, would provide some of the protection of a sanctuary.

2.3.10 Protected Areas - No-go Zones All Year

This alternative would prohibit vessels from entering no-go zones, but doing so when the whales are not likely to be present (i.e., seasonal periods of the year) would not protect the whales. Although it would simplify the implementation and education of boaters to have an area identified on maps and charts as closed all the time, there would likely be increased resource impacts without providing any additional benefit to the whales. The whales may be present in a protected area during any month of the year, but the sighting data show strong seasonal patterns indicating when a protected area would provide the most benefit to the whales. Along the west side of San Juan Island there are four sighting quadrants. Unique sightings of Southern Residents in those quadrants from May to September (total of 4,767) range from 723 to 1,254 days per month for the 1990 through 2008 data. Sightings in October to April (total of 694) range from 28 to 272 days per month for the 1990 through 2008 data. In addition, there are seasonal patterns of vessel presence along the west side of San Juan Island. The largest numbers of vessels were observed from June to August (1,233 to 2,262), with fewer vessels observed in May and September (398 and 822, respectively).

2.3.11 Protected Area - No-go Zones Only When Whales are Present

Under this alternative, vessels would be prohibited from entering an area only when whales were present in that area. It is not feasible at this time to notify boaters in real time when whales are present in a protected area and when they are not. There is currently no infrastructure to monitor an area for presence of whales or to broadcast the information to alert boaters that a protected area is in effect. Enforcement would be dependent on boaters being aware of the whales' presence, which would not provide efficient and maximum protection of whales.

2.3.12 Protected Areas Along All Shorelines

This alternative would establish all shoreline areas in inland waters of Washington as protected areas for Southern Resident killer whales. Killer whales use shoreline habitat for traveling, foraging, and socializing; however, not all shoreline areas are equally as important to the whales. Of the total 20,304 sightings in inland waters from 1990 through 2008, 5,461 (27 percent) were recorded in the four quadrants along the west side of San Juan Island. Protecting all shoreline areas in inland waters of Washington would adversely affect vessels that often stay close to the shoreline, mainly recreational vessels and paddle craft, by restricting these areas to use. There would also likely be economic impacts to marinas and boat launch areas that are adjacent to shoreline areas. Because of the many miles of coastal areas, it would be difficult to enforce protection of all shorelines without considerable increases in enforcement resources.

2.3.13 Requirement to Operate at a "Slow, Safe Speed" in the Vicinity of Whales

This alternative would require vessels to operate at a "slow, safe speed" in the vicinity of whales. Boaters are familiar with the concept of slow, safe speed as described by the United States Coast Guard regarding presence of other vessels and avoiding collisions. A "slow, safe speed" restriction would be subjective and would be dependent on the capabilities and operating conditions of each vessel. Implementing a subjective speed regulation would not improve the ability of enforcement to clearly identify violations. The current Be Whale Wise guidelines include a recommendation to reduce speed to less than 7 knots when within 400 yards of the nearest whale. Monitoring groups such as Soundwatch have collected several years of data on incidents when vessels are not following the speed guideline and are "fast within 400 yards of whales." This has largely been a subjective measure, and Soundwatch has not had equipment such as radar to quantify speed of other vessels. Monitoring adherence to a slow, safe speed would continue to be subjective, and it would be difficult to assess effectiveness of this regulation.

2.3.14 Establish a Specific Zone with a Speed Limit

This alternative would include a designated area with a specific speed limit zone. A speed zone would provide some protection for foraging whales close to shore from the sound of vessels passing by at high speed, although it would not be as protective as a no-go zone, which is analyzed as Alternatives 4 and 5. Analyzing this alternative would not provide any additional information than the specific speed limit (Subsection 2.2.6, Alternative 6: Speed Limit of 7 Knots Within 400 Yards of Killer Whales) or the no-go protected area alternatives (Subsection 2.2.4, Alternative 4: Protected Area – Current Voluntary No-go Zone and Subsection 2.2.5, Alternative 5: Protected Area – Expanded No-go Zone).

2.3.15 Codify All Be Whale Wise Guidelines

This alternative would codify the Be Whale Wise guidelines in their entirety into regulations. The current Be Whale Wise guidelines include recommendations for a variety of activities. Some of the guidelines are general (be cautious and courteous) and do not lend themselves to regulations. Others would be difficult to interpret or to enforce. For example, the guideline to stay on the offshore side of whales when they are traveling close to shore does not specify what "close to shore" means, and it would be difficult to determine when vessels were engaged in whale watching to enforce limits on viewing time. Those aspects of the guidelines that are enforceable, measurable, and objective are included in the alternatives being analyzed.

2.3.16 Establish Regulations in Coastal Waters

Under this alternative, protective vessel regulations would be established in the coastal waters of Washington, Oregon, and California where the whales spend time, particularly in winter months. Most whale watching occurs in inland waters of Washington (as described in Subsection 1.6.1, Inland Waters of

Washington), with whale watching vessels originating from nearby inland water ports in the United States and Canada. The presence of Southern Residents and other killer whales in inland waters is predictable and reliable, which is the basis for the success of the local commercial whale watch industry. In addition to the whale watching activity, all vessel monitoring and most whale research also takes place in inland waters. There is active enforcement in inland waters as well, with enforcement vessels originating from similar ports. Based on the distribution of commercial and recreational whale watching and enforcement effort, regulating vessel activities in coastal waters would not provide additional protection for the whales or increase enforcement opportunities.

2.3.17 Aircraft Approach Regulations

This alternative would prohibit aircraft from closely approaching whales. Aircraft regulations would be beyond the scope of minimizing impacts from vessels as identified in Subsection 1.4, Purpose and Need for Action.

2.3.18 No Whale Watching During Poor Weather Conditions

Under this alternative, vessels would be prohibited from whale watching when weather conditions would make it difficult for vessel operators to see the whales. It would be difficult to educate recreational boaters regarding specific weather conditions and when they could or could not watch whales, and what vessel activities constitute “whale watching.” There is currently no infrastructure to monitor weather conditions with respect to whale watching and to broadcast the information so as to alert boaters that particular weather conditions in a certain area trigger a prohibition on whale watching.

2.4 Comparison of Alternatives

Table 2.4-1 summarizes the comparison of the No-action and action alternatives. The alternatives compared here are individual components of possible regulations, which for the most part could be promulgated singly or in combination with one another.

Table 2.4-1 Comparison of Alternatives

Alternative	1 (No Action)	2	3	4	5	6	7	8	9
Approach Restriction	N/A, 100-yard approach guideline remains in place	100 yards	200 yards	N/A	N/A	N/A	N/A	200 yards	200 yards
Protected Area	N/A, Voluntary 3.8 square mile no-go zone remains in place	N/A	N/A	3.8 square mile no-go zone	6.2 square mile no-go zone	N/A	N/A	6.2 square mile no-go zone	N/A
Prohibited Activity	N/A, guidelines remain in place	N/A	N/A	N/A	N/A	7 knot speed limit within 400 yards	Parking in the path prohibited	Parking in the path prohibited	Parking in the path prohibited

N/A = Not Applicable

3.0 AFFECTED ENVIRONMENT

3.1 Introduction

Carved by glaciers and fed by 10,000 rivers and streams, the Puget Sound basin, with its varied terrestrial, freshwater, and marine habitats, is a highly productive and diverse ecosystem. Puget Sound's waters support numerous residential and migratory marine species, including over 150 species of marine birds, 230 species of fish, 20 mammal species, over a thousand species of plants and algae, and numerous unclassified invertebrates and microbes (Puget Sound Partnership 2006). Puget Sound is part of the natural environment that attracts people to the region. The inland waters of Washington, including Puget Sound, are home to approximately 4.1 million people who live in the 12 counties bordering Puget Sound (Figure 3-1). This figure includes about 1.6 million who live in the 90 cities and towns that directly border the Sound (Washington Department of Ecology 2008). The Sound provides the basis for $20 billion in economic activities.

This section describes those resources that may be affected by the proposed action and its alternatives, to the extent necessary to understand potential impacts. NMFS identified eight resources that could be affected by the proposed action or alternatives: Marine Mammals, Listed and Non-listed Salmonids, Socioeconomics, Recreation, Environmental Justice, Noise, Aesthetics, and Transportation. A description for each resource follows and provides the context for understanding potential effects of each alternative, which are analyzed in corresponding sections in Section 4.0, Environmental Consequences.

3.2 Marine Mammals

There are several species of marine mammals that occupy the inland waters of Washington. The description of killer whales below focuses on the endangered Southern Resident killer whales. The information presented in Subsection 3.2.1, Killer Whales, provides an overview of killer whale natural history, the status of Southern Residents and other types of killer whales, information on foraging behavior and habitat use. The status section includes information on population trends and threats to the whales. The section on foraging reviews what the whales eat, where important foraging areas are located, and how they use sound to find prey. The description of foraging provides background information to understand how this behavior is vulnerable to interference from vessels, which is analyzed in Section 4.0, Environmental Consequences. The discussion of distribution and habitat use identifies where and when the whales may be most vulnerable to vessel effects. The sections on status, foraging, and habitat use provide background information that sets the stage for the discussion on vessel effects.

The vessel effects section in this chapter covers several types of existing effects on killer whales. There is a description of vessel activities around the whales and the known effects are grouped into vessel strikes, behavioral disturbance, and acoustic impacts. In addition, the known physiological effects of the different types of impacts are introduced to provide a context for understanding potential effects of each alternative.

Figure 3-1. Map of inland waters of Washington and surrounding counties.

Killer whales other than Southern Residents occasionally visit the inland waters of Washington and they are described generally to provide a context for potential effects of each alternative. While vessels engaged in whale watching focus on the Southern Residents, other types of killer whales are viewed opportunistically, particularly when Southern Residents are not present. This is also the case for other marine mammals. While many boaters seek out the Southern Residents, there are tours that incorporate other marine wildlife into their programs including whales, porpoises, seals, and sea lions. Recreational boaters also view marine mammals opportunistically as they come across them out on the water. The scope of this analysis is on impacts to Southern Resident killer whales. However, because other killer whales and marine mammals may be indirectly affected by the alternatives, they are addressed below, although not at the same level of detail as for Southern Resident killer whales.

3.2.1 Killer Whales

In January 2008 NMFS released a *Recovery Plan for Southern Resident Killer Whales* (*Orcinus orca*) (NMFS 2008a), which contains a full description of killer whale natural history with a focus on Southern Residents. Below is a summary of information from the recovery plan including information particularly relevant to this analysis.

3.2.1.1 Description and Natural History

Killer whales are the largest cetacean in the dolphin family, delphinidae. There are three identified ecotypes of killer whales in the northeastern Pacific Ocean: residents, transients, and offshores. While there is considerable overlap in their geographic range, these ecotypes are genetically distinct and do not appear to interbreed. The differences between ecotypes also extend to their morphology, foraging ecology, behavior, and acoustic repertoire. For example, residents are generally fish-eaters while transients are generally mammal-eaters (Ford et al. 2000). Residents tend to live in larger, more stable groups consisting of multigenerational, matrilineal-related kin while transients live in smaller, less stable groups usually consisting of females and a few offspring (Ford et al. 2000). Residents tend to be more vocal, particularly when foraging and socializing, while transients are quiet, presumably because their prey can hear within the frequency range of their sound emissions (Barrett-Lennard et al.1996; Deecke et al. 2005; Deecke et al. 2002).

Along the U.S. and Canadian west coast, there are currently four communities of resident killer whales that have been identified: Northern, Southern, Southern Alaska, and Western Alaska Residents (Krahn et al. 2004). The Southern Resident killer whale population consists of three pods, J, K, and L pods, and during the spring, summer, and fall, their range includes the inland waterways of Puget Sound, Strait of Juan de Fuca, and Southern Strait of Georgia. Little is known about the winter movements and range of Southern Residents. Their occurrence in coastal waters extends from the coast of central California to the Queen Charlotte Islands in British Columbia. The home ranges of West Coast Transients, offshore whales, and Northern Residents also include inland waters of Washington and overlap with the Southern Residents.

Members are individually identified based on natural markings from photo-identification records allowing for population counts of some populations. Like all marine mammals, they are long-lived and slow to mature. Both male and female resident killer whales of the area do not become sexually mature until the average age of 15 years and females produce an average of 5.5 surviving offspring (Olesiuk et al. 1990).

3.2.1.2 Status

Southern Resident Killer Whales. The Southern Residents experienced a population decline in the mid- to late 1990s. NMFS listed the Southern Resident killer whale distinct population segment (DPS) as endangered under the ESA on November 18, 2005 (70 Fed. Reg. 69903). The final rule identified several potential factors that may have resulted in the decline or may be limiting recovery of Southern Resident killer whales including: quantity and quality of prey, toxic chemicals which accumulate in top predators, and disturbance from sound and vessel traffic. The rule further identified oil spills as a potential risk factor for the small population of Southern Resident killer whales. It is unknown which of the threats may have caused the population decline or may have the most significant impact on recovery. A combination of threats or cumulative effects is likely contributing to risk factors for Southern Resident killer whales. For example, poor nutrition resulting from insufficient prey base or vessel interference with foraging could lead to mobilization of fat stores, which can introduce stored contaminants into the whales' systems and affect reproduction or immune function (NMFS 2008a).

At present, the Southern Resident population has declined to essentially the same size that was estimated during the early 1960s, when it was considered as likely depleted (Olesiuk et al. 1990) (Figure 3-2). Since censuses began in 1974, J and K pods have increased their sizes by 60 percent (mean of 1.9 percent per year) and 38 percent (mean of 1.2 percent per year), respectively. The largest pod, L pod, has grown 28.6 percent (mean of 0.9 percent per year) during this period, but more importantly, experienced a 10-year decline from 1994 through 2003 that threatened to reduce the pod's size below any previously recorded level. At the end of 2010, there were 86 Southern Resident killer whales (Figure 3-2).

Northern Resident Killer Whales. As with the Southern Residents, this population was also in a depleted condition when researchers recorded 132 whales during an initial census in 1975. Although count data are not available before this date, modeling by Olesiuk et al. (1990) suggests that the community expanded from about 97 to 120 whales between 1960 and 1968, then declined by an estimated 10 percent to about 108 whales by 1970 due to removals of whales for display at zoos and aquaria (Figure 3-3). Causes of declines before 1960 probably resembled those for Southern Residents, with indiscriminate shooting and other human-related factors most likely involved (Olesiuk et al. 1990).

Annual censuses of the Northern Residents have been conducted since 1975 (Bigg et al. 1990; Ford et al. 2000). These censuses documented fairly steady growth in the population at a mean rate of 3.0 percent per year from 1975 through 1997, when numbers expanded from 132 to 220 whales (Figure 3-3) (Ford et al. 2000; J. K. B. Ford, unpubl. data). This rate of growth was similar to the predicted intrinsic rate of the population and was substantially higher than the observed rate of the Southern Residents during the same time (Olesiuk et al. 1990; Brault and Caswell 1993). Several factors were presented as possible reasons for the relatively stable growth of the Northern Residents through 1997, including 1) the population's larger size in comparison to the Southern Residents, which made it less sensitive to random environmental changes; 2) the smaller number of removals from live-captures for display at zoos and aquaria (Olesiuk et al. 1990); and 3) possibly fewer threats in the Northern Residents' geographic range compared to Southern Residents (e.g., fewer vessels, less pollution). The population experienced an 8.6 percent decline in numbers from 1997 through 2001, falling to 201 whales. Possible explanations for this decrease are similar to those put forth for the Southern Residents (Killer Whale Recovery Team 2008). Abundance has rebounded since then, with 219 whales counted in 2004 (Olesiuk et al. 2005) and 252 in 2008 (Ford et al. 2010).

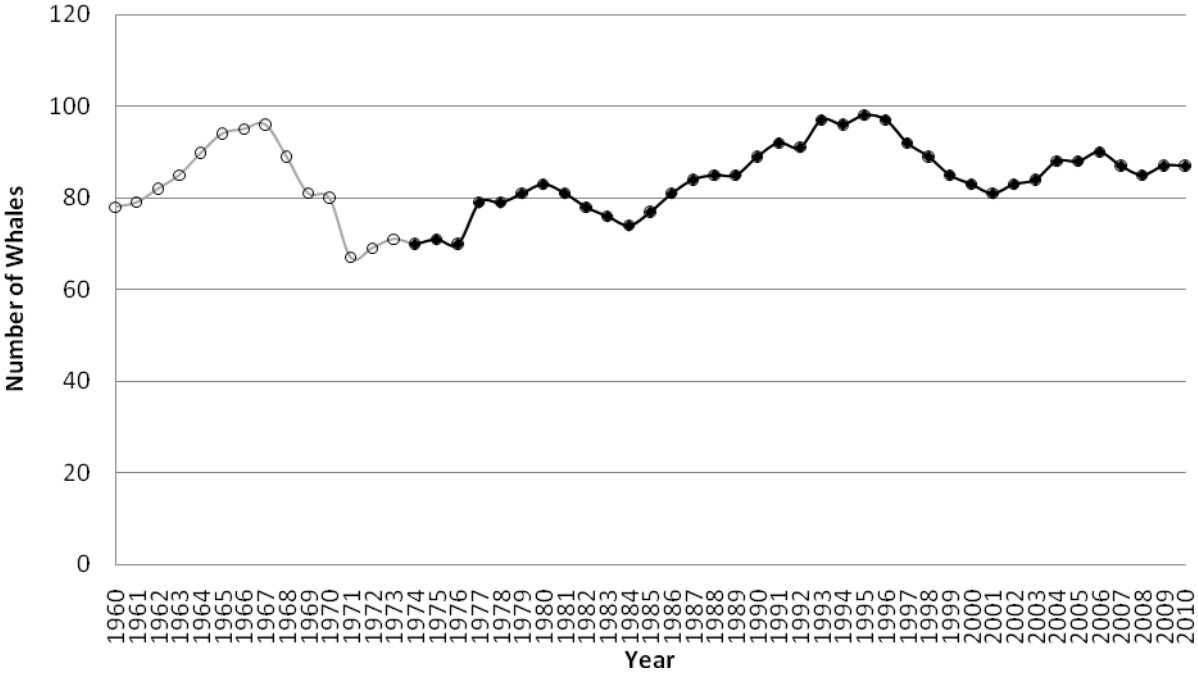


Figure 3-2. Population size and trend of Southern Resident killer whales, 1960-2010. Data from 1960 to 1973 (open circles, gray line) are number projections from the matrix model of Olesiuk et al. (1990). Data from 1974 through 2010 (diamonds, black line) were obtained through photo-identification surveys of the three pods (J, K, and L) in this community and were provided by the Center for Whale Research (unpubl. data in NMFS 2008a and from Center for Whale Research). Data for these years represent the number of whales present at the end of each calendar year.

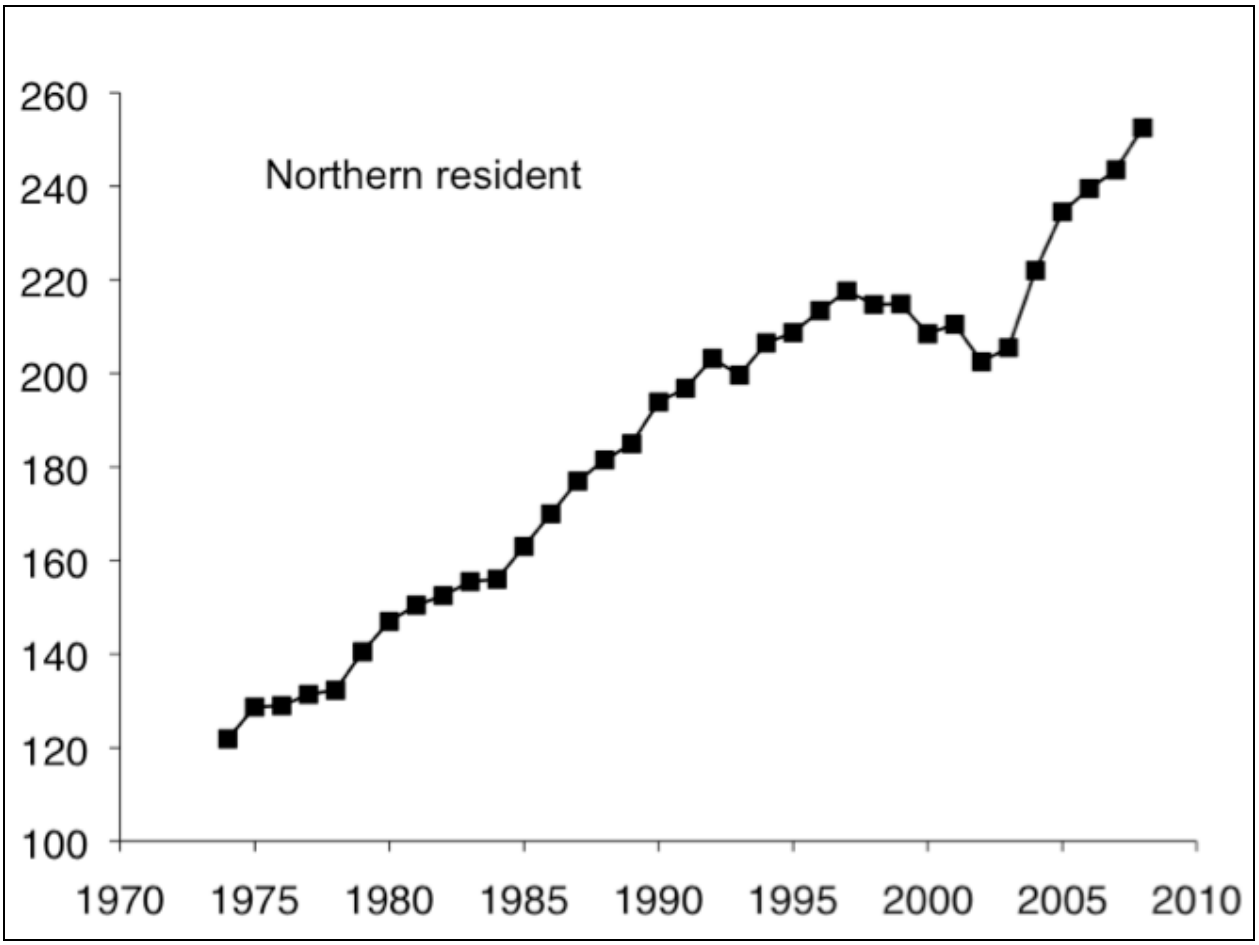


Figure 3-3. Population size and trend of Northern Resident killer whales, 1974-2008. (From Ford et al. 2010.)

West Coast Transient Killer Whales. This community of mammal-eating transient killer whales suffered serious prey losses between the late 1800s and late 1960s, and very likely experienced a sizable decrease in population size as a result (Ford and Ellis 1999; Springer et al. 2003). During this period, overhunting caused dramatic declines or extirpations in pinniped (seals and sea lions) and large whale populations along much of western North America. With the recovery of some pinniped populations in the last several decades, Ford et al. (2000) believe that transient whales no longer face a scarcity of prey.

Cumulative numbers of photographically identified West Coast transients expanded throughout the 1980s and 1990s as efforts to document the population continued (Bigg et al. 1987; Black et al. 1997; Ford and Ellis 1999). To date, about 320 individuals have been identified in the population, which includes about 225 transients in Washington, British Columbia, and southeastern Alaska (Ford and Ellis 1999; J. K. B. Ford, unpubl. data) and 105 animals off California (Black et al. 1997). At least 10 whales have been seen in both regions. Efforts to determine population size are complicated by the lack of a complete registry of individuals and the difficulty in establishing deaths over time (Ford and Ellis 1999; Baird 2001; Angliss and Outlaw 2005). Based on current information, the population probably totals about 300 to 400 whales.

Trend information is lacking for the population because accurate assessments of abundance have not been made.

Offshore Whales. Two partial population estimates are available for offshore killer whales, but are not directly comparable because of differences in methodology and geographic coverage. Carretta et al. (2008) calculated a minimum estimate of 278 offshore whales along the coasts of Washington, Oregon, and California, as determined from shipboard line-transect surveys conducted in 2001-2005 and the percentage of offshore animals among all killer whales photographed off California (Black et al. 1997). This figure is considered a minimum estimate of total numbers due to the continued detection of new individuals over time. Difficulties in substantiating mortalities and recognizing previously identified individuals not seen for long periods further complicate efforts to determine the size of this community using this technique. Trend information is lacking for the population because accurate assessments of abundance have not been made.

3.2.1.3 Foraging

Southern and Northern Resident Killer Whales. Fish are the major dietary component of resident killer whales in the northeastern Pacific, with 22 species of fish and one species of squid (*Gonatopsis borealis*) known to be eaten (Scheffer and Slipp 1948; Ford et al. 1998, 2000; Saulitis et al. 2000; Ford and Ellis 2006). Observations from this region indicate that salmon are preferred as prey for resident killer whales. Ford and Ellis (2006) found that salmon represent at least 96 percent of the prey consumed during the spring, summer, and fall. Chinook salmon were selected over other species, comprising 71.5 percent of the identified salmonids taken. This preference occurred despite the much lower abundance of Chinook in the study area in comparison to other salmonids and is probably related to the species' large size, high fat and energy content, and year-round occurrence in the area (Ford and Ellis 2006). Killer whales also captured older (i.e., larger) than average Chinook. Other salmonids eaten in smaller amounts include chum (23 percent of the diet), and pink, coho, sockeye, and steelhead (less than 6 percent combined) (Ford and Ellis 2006). This work suggested an overall preference of these whales for Chinook salmon during the summer and fall, but also revealed extensive feeding on chum salmon in the fall. Additional studies also provide support for the whales' salmon preference, including a contaminant analysis by Krahn et al. (2004, 2007) and a prey sampling study focusing on Southern Residents conducted by the Northwest Fisheries Science Center (Hanson et al. 2005; Hanson et al. 2010).

Southern Resident killer whales are the subject of ongoing research, including direct observation, scale and tissue sampling of prey remains, and fecal sampling. Results to date were recently published by Hanson et al. (2010). Hanson et al. (2010) provide the best available scientific information on (1) the percentage of Chinook salmon in the whales' diet, and (2) the predominant river of origin of those Chinook salmon. Other research and analyses provide additional information on the age of prey consumed (Hanson, unpubl. data, as summarized in Ward et al. 2010), confirming a preference for larger/older Chinook salmon by Southern Resident killer whales.

In inland waters from May to September, Southern Residents' diet consists of a high percentage of Chinook salmon, with an overall average of 82 percent Chinook salmon across the timeframe and monthly proportions as high as 90 percent Chinook salmon (i.e., 96 percent in July and 91 percent in August) (Hanson et al. 2010). Genetic analyses of these samples indicate that when Southern Residents are in inland waters from May to September, they consume Chinook salmon stocks that originate from regions including the Fraser River (including Upper Fraser, Mid Fraser, Lower Fraser, N. Thompson, S. Thompson, and Lower Thompson Rivers), Puget Sound (North and South Puget Sound), the Central British Columbia Coast, West and East Vancouver Island, and Central Valley California (Hanson et al. 2010). Ongoing studies also confirm a shift to chum salmon in fall (Ford et al. 2010).

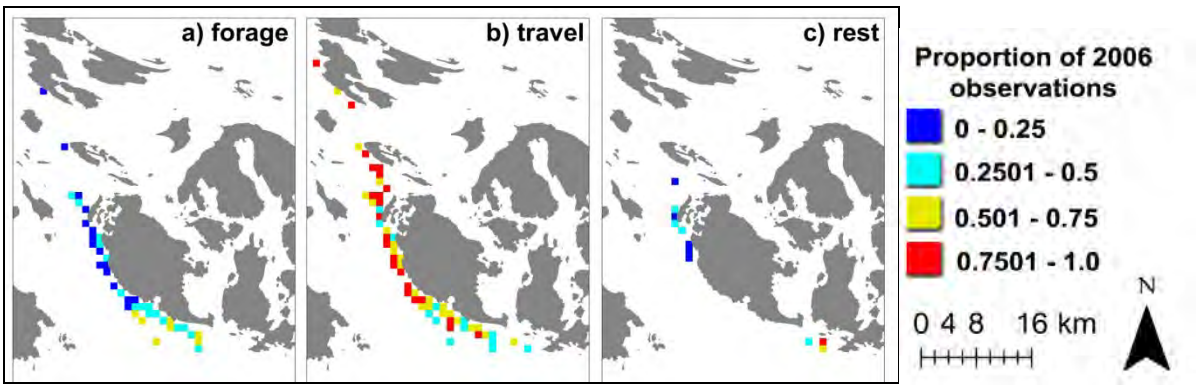


Figure 3-4. Proportion of observations of (a) forage, (b) travel, (c) rest behavior states for 2006 scan samples.

A fine-scale analysis of geographic distribution of foraging behavior in 2006 found localized regions of foraging concentrated along the west side of San Juan Island, particularly in the southwest portion (Noren and Hauser in prep.) (Figure 3-4). Scientists have also made many direct observations of the whales feeding on salmon along the west side of San Juan Island (Figure 3-5). The whales are often seen feeding along the steep shoreline and may be using this topography to assist in capturing prey because fish aggregate along the steep shorelines as they swim through the Strait of Juan de Fuca and into Haro Strait.

Resident whales spend about 50 to 67 percent of their time foraging (Heimlich-Boran 1988; Ford 1989; Morton 1990; Felleman et al. 1991). Groups of animals often disperse over several square miles while searching for salmon, with members moving at roughly the same speed (range of 3 to 10 km/hr, mean = 6 km/hr) and direction (Ford 1989, 2002; Ford et al. 1998). Daily foraging episodes usually cover areas of 3 to 10 square kilometers and last 2 to 3 hours, but may extend up to 7 hours. Most information on time spent foraging is from studies conducted during summer months.

Prey are detected through a combination of echolocation and passive listening (Barrett-Lennard et al. 1996), whereas vision and echolocation are probably used during prey capture. Echolocation signals emitted by the whales bounce off objects in the environment and provide information to the whales about size, location, direction, and speed of prey. The signals are described in detail in Holt (2008). Using echolocation, whales can detect salmon out to distances of about 100 yards (Au et al. 2004) and echolocation signals are directional and focused in a forward direction (Bain and Dahlheim 1994). Foraging animals produce rapid series of evenly spaced echolocation clicks, but whistles and pulsed calls are also emitted during this activity (Ford 1989).

Foraging by resident killer whales often involves cooperation among kin-related group members. Whales often spread out over large areas and coordinate their movements when searching for prey. Northern Resident killer whales frequently share prey items at the surface after a capture. Ford and Ellis (2006) observed or strongly suspected sharing in 76 percent of 235 feeding events. Adult males shared prey much less often than females and juveniles. Prey sharing was unrelated to prey size (Ford and Ellis 2005). The occurrence of prey sharing in Southern Residents is also strongly suspected and research is underway to learn more about cooperation and coordination during foraging (NWFSC, unpubl. data; Cascadia Research, unpubl. data).

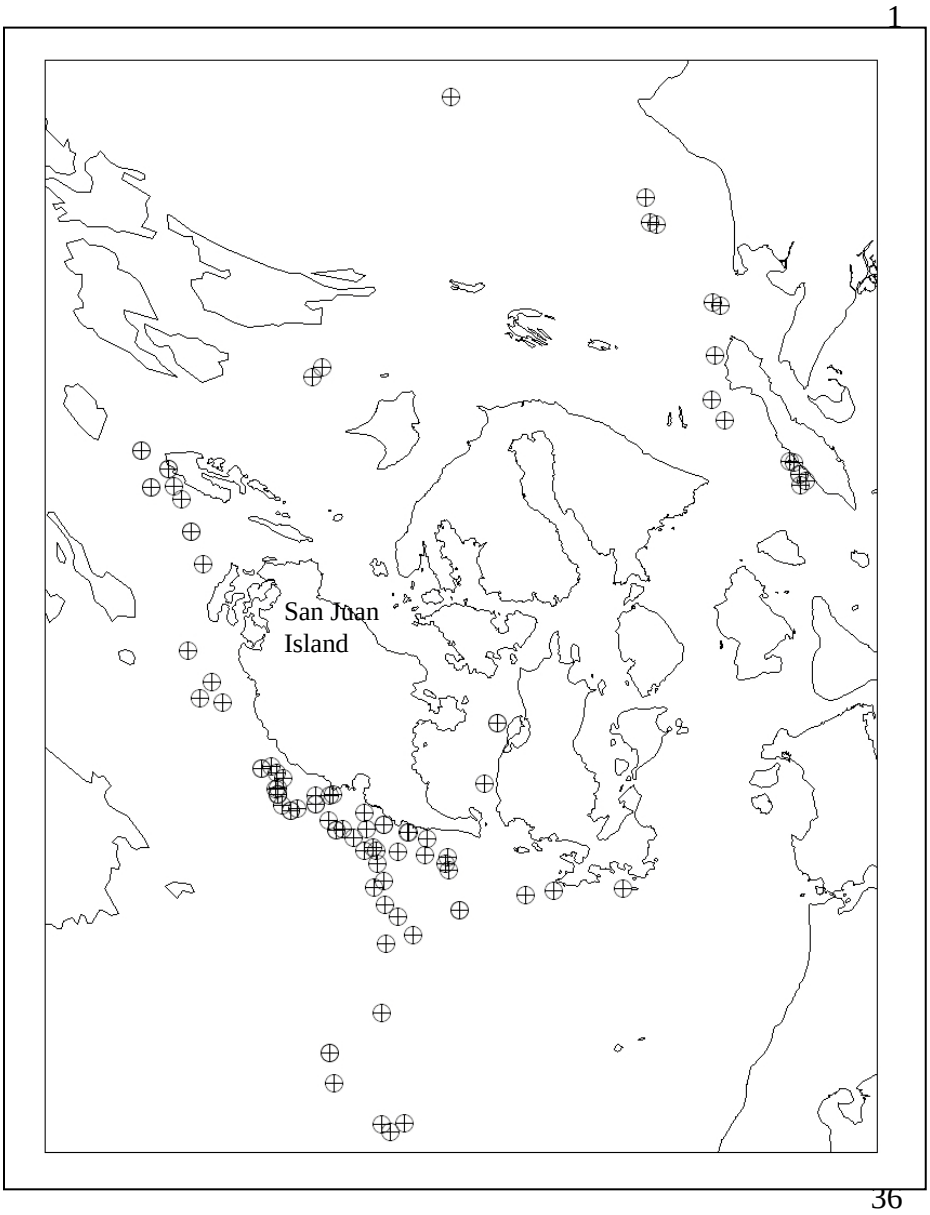


Figure 3-5. Locations of predation event observations for Southern Resident killer whales in the San Juan Islands area, 2006-2007. (NWFSC, unpubl. data.)

West Coast Transient Killer Whales. Unlike resident whales, transients feed almost entirely on marine mammals. Harbor seals (*Phoca vitulina*) are the most important prey item in much of the northeastern Pacific, but other species are regularly taken as well, including Dall's porpoises (*Phocenoides dalli*), harbor porpoises, Steller's sea lions (*Eumetopias jubatus*), and California sea lions (*Zalophus californianus*) (Matkin and Saulitis 1994; Baird and Dill 1996; Ford et al. 1998; Saulitis et al. 2000; Heise et al. 2003). Transients spend 60 to 90 percent of daylight hours foraging and commonly hunt in both nearshore and open-water habitats (Heimlich-Boran 1988; Morton 1990; Baird and Dill 1995; Ford and Ellis 1999). Transients usually forage in smaller groups than residents, with mean group size numbering from three to five whales depending on the prey species (Baird and Dill 1996; Ford et al. 1998, 2005a). Transients are stealthy hunters and often rely on surprise to capture unsuspecting prey. Unlike residents, they are much quieter while foraging, which probably allows them to avoid acoustical detection by their mammalian prey

(Morton 1990; Felleman et al. 1991; Barrett-Lennard et al. 1996; Ford and Ellis 1999). Transients may instead rely heavily on passive listening to detect the sounds of swimming prey (Barrett-Lennard et al. 1996).

Offshore Killer Whales. Little is known about the diets of offshore killer whales. They are suspected to feed primarily on fish and squid, based on their frequent use of echolocation, large group sizes, the stomach contents of a few animals, a single feeding observation, and very limited testing of fatty acid concentrations (Ford et al. 2000; Heise et al. 2003; Herman et al. 2005; Jones 2006). Prey may include sharks, halibut, and migratory fish (Krahn et al. 2004a; Jones 2006). However, preliminary analyses of chemical signatures in the skin and blubber of offshore whales suggest the possibility that marine mammals are also eaten (Herman et al. 2005).

3.2.1.4 Distribution and Habitat Use

Southern Resident Killer Whales. The Whale Museum in Friday Harbor, Washington has maintained a database since the 1970s that includes sightings from researchers as well as opportunistic observations from a variety of sources, such as the public, the commercial whale watching industry pager system, the Soundwatch Boater Education Program, and land-based sighting from Lime Kiln Point State Park (The Whale Museum 2003, 2005, 2008). The Whale Museum data set is the most comprehensive long-term data set available on broad-scale whale distribution in inland waters and NMFS has mapped all the sightings of Southern Residents (Figure 3-6). In late spring to early autumn, all three Southern Resident pods are regularly present in the Georgia Basin (defined as the Georgia Strait, San Juan Islands, and Strait of Juan de Fuca) (Heimlich-Boran 1988; Felleman et al. 1991; Olson 1998; Osborne 1999; Hauser 2006, 2007), typically arriving in April or May and spending most of their time there until departing in October or November. In recent years the whales increased the amount of time in inland waters during the fall (NWFSC, unpubl. data). While in inland waters during warmer months, all of the pods concentrate their activity from the south side of the San Juan Islands through Haro Strait northward to North and South Pender Islands and Boundary Passage (Hauser 2006) (Figure 3-6). The four sighting quadrants along the west side of San Juan Island have the highest numbers of sightings (note red dots on Figure 3-6) that make up 27 percent of the total 20,304 unique sightings in the 1990 through 2008 data set. Less time is generally spent elsewhere, including other sections of the Georgia Strait, Strait of Juan de Fuca, and San Juan Islands and the Southern Gulf Islands, Rosario Strait, Admiralty Inlet west of Whidbey Island, and Puget Sound.

During early autumn, Southern Resident pods, especially J pod, expand their routine movements into Puget Sound to likely take advantage of chum and Chinook salmon runs (Osborne 1999). During the late fall, winter, and early spring, the ranges and movements of the Southern Residents are less well known. J pod continues to occur intermittently in the Georgia Basin and Puget Sound throughout this time.

In 2006 NMFS designated critical habitat for Southern Resident killer whales (71 Fed. Reg. 69054, November 29, 2006). NMFS designated three specific areas, (1) the Summer Core Area in Haro Strait and waters around the San Juan Islands; (2) Puget Sound; and (3) the Strait of Juan de Fuca, which comprise approximately 2,560 square miles of marine habitat within the area occupied by Southern Resident killer whales in Washington (Figure 3-7). There was insufficient information to consider Hood Canal as occupied at the time of listing and insufficient data to designate critical habitat in the Pacific Ocean. Critical habitat includes all waters relative to a contiguous shoreline delimited by the line at a depth of 20 feet relative to extreme high water. Some of these areas overlap with military sites, which are not designated as critical habitat because they were determined to have national security impacts that outweigh the benefit of designation and were therefore excluded.

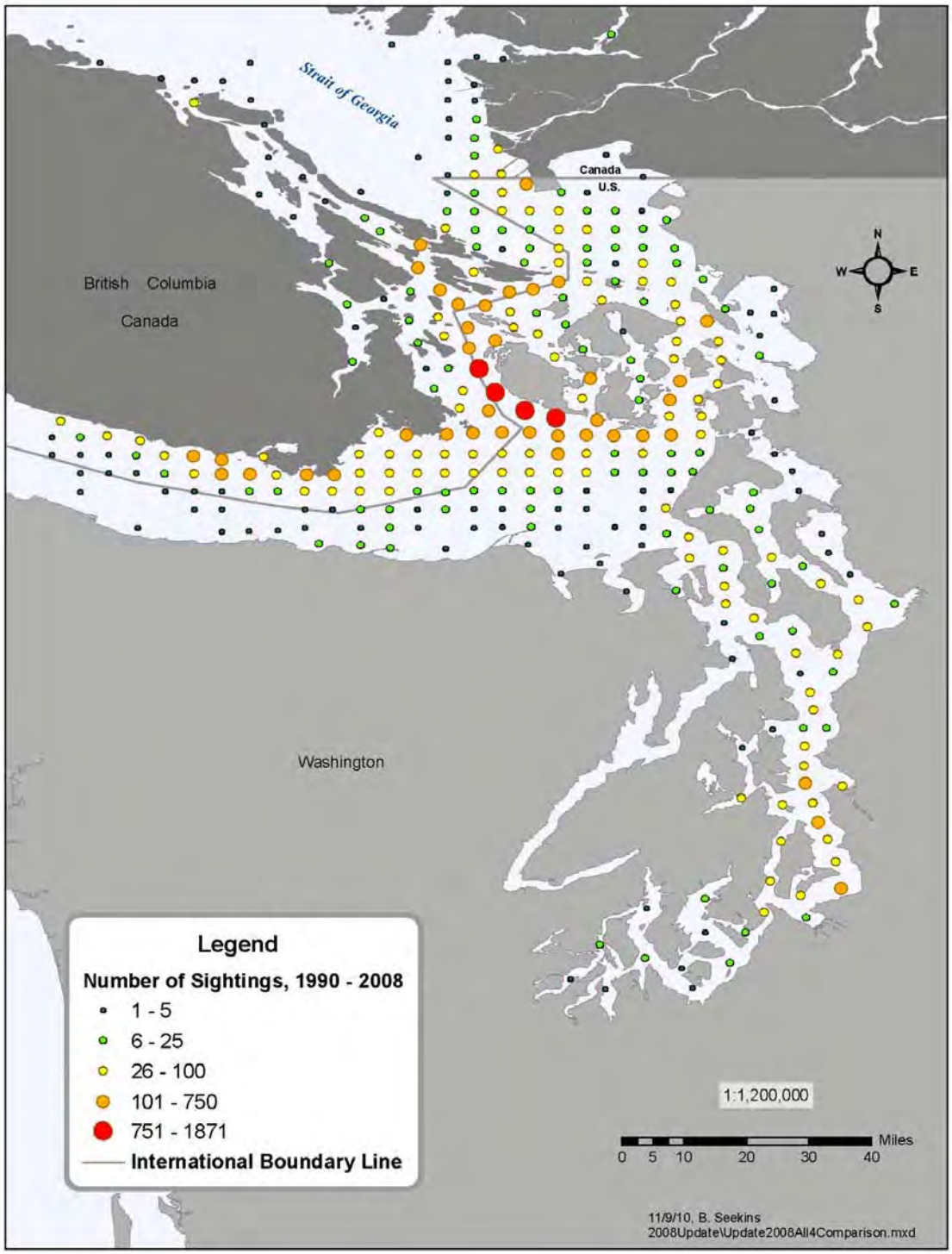


Figure 3-6. Distribution of Southern Resident killer whale sightings from 1990-2008 (The Whale Museum 2008). Multiple sightings of whales in the same location on the same day were eliminated to reduce bias and resulted in 20,304 unique sightings.

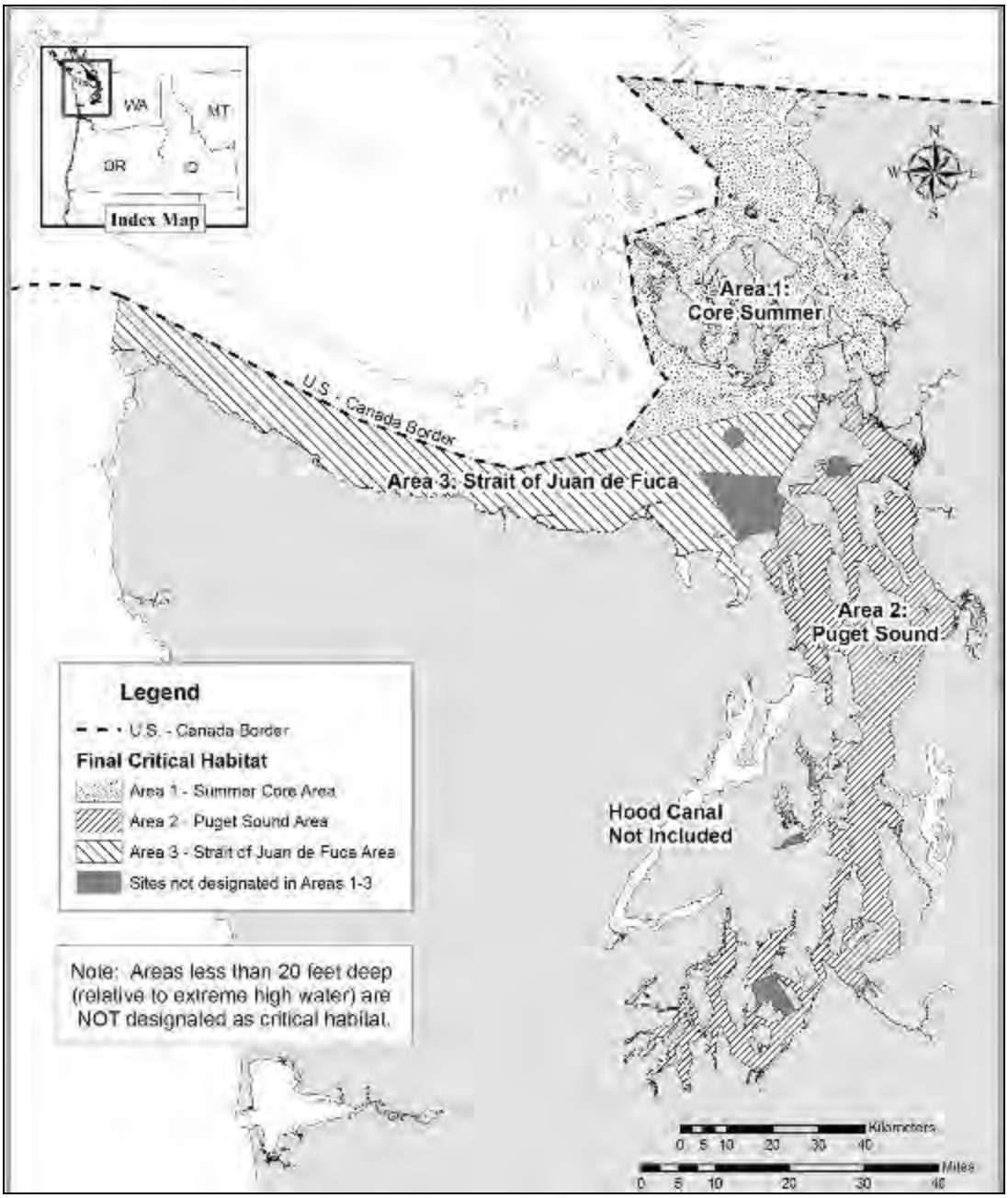


Figure 3-7. Designated critical habitat for Southern Resident killer whales.

Northern Resident, West Coast Transient, and Offshore Killer Whales. Northern Residents are occasionally seen in inland waters of Washington although the timing of these visits does not overlap with the presence of Southern Residents. Most transient sightings in Washington and around Vancouver Island occur in the summer and early fall, when viewing effort is greatest and harbor seals pup (Morton 1990; Baird and Dill 1995; Olson 1998; Ford and Ellis 1999). Observations in the Georgia Basin and Puget Sound are concentrated around southeastern Vancouver Island, the San Juan Islands, and the southern edge of the Gulf Islands (Olson 1998; K. C. Balcomb, unpubl. data). Transient and offshore sightings are also tracked through the Whale Museum and other sighting networks. Offshore killer whales primarily inhabit offshore locations, but are also seen in nearshore coastal waters and occasionally in inland waters (Wiles 2004).

3.2.1.5 Vessel Interactions

Monitoring groups have reported that the mean number of vessels following a given group of whales increased from five boats in 1990 to an average of about 15 to 20 boats within 1/2 mile of the whales during May through September, for the years 1998 through 2010 (Osborne et al. 1999; Baird 2001; Erbe 2002; Marine Mammal Monitoring Project 2002; Koski 2004, 2006, 2007, 2008, 2009, 2010a, 2010b) (Figure 3-8a), with a peak of 22 vessels around the whales in 1998 and 2003 and a steady decline from 22 vessels in 2003 to an average of 14 vessels in 2010. Potential reasons for the decline in average number of boats may be due to economic conditions and fewer opportunities for fishing as well as a pattern of groups of whales that are spread out in the action area so that vessels are also spread out. Soundwatch remains with one group of whales and records vessel counts around the group (Koski 2010b). In 2010, Soundwatch collected new information regarding kayaks from land-based observation points. In 45 percent of their 10 minute scans (N=413), kayaks were observed within 1/2 mile of the whales (Koski 2010b). At any one time, the observed numbers of commercial and recreational whale watch boats around killer whales can be much higher than the average (Figure 3-8b). For example, sources other than Soundwatch have reported that 107 vessels followed one Southern Resident pod (Lien 2000); 76 boats simultaneously positioned around a group of 18 whales from K pod (Baird 2002); and up to 500 vessels came out on the weekends to view a group of whales from L pod in Dyes Inlet during the fall of 1997. Although the average number of whale watch vessels within 1/2 mile is lower than what was observed in these three cases, the extreme nature of these events illustrates the degree to which killer whales can captivate the public's interest in the Pacific Northwest and the level of vessel effects that may occur.

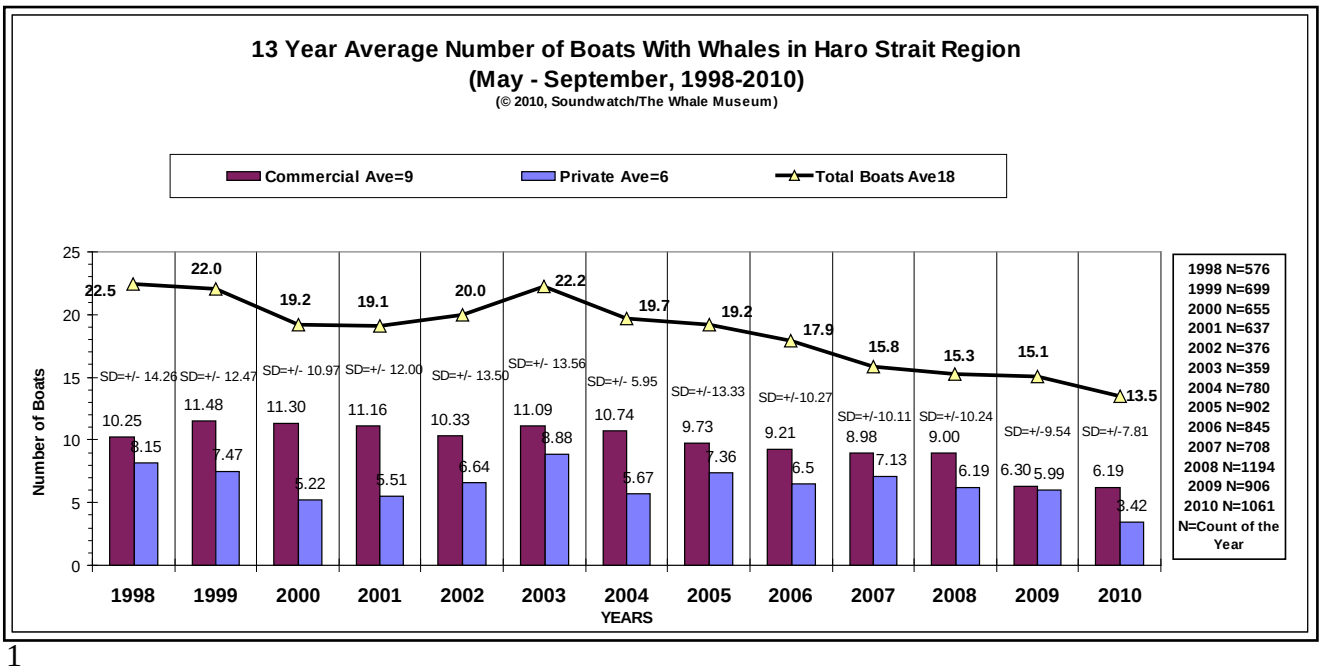


Figure 3-8a. Average number of vessels accompanying whales reported by the Soundwatch vessel monitoring program (Koski 2010b).

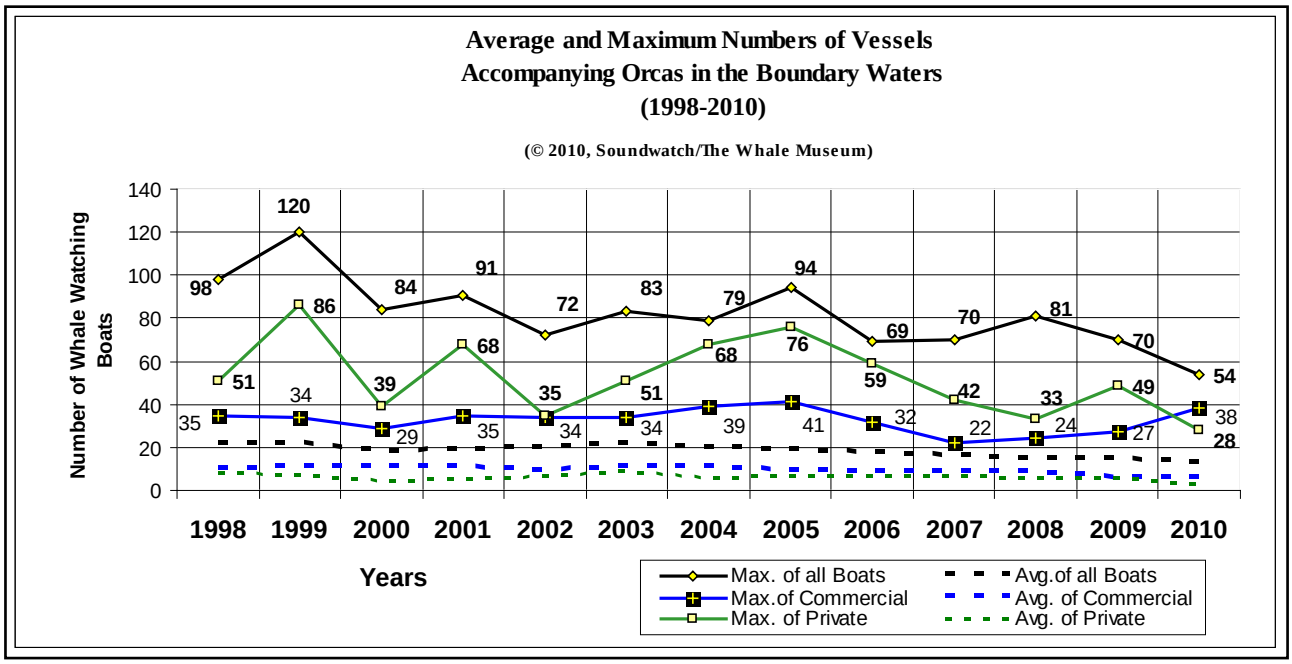


Figure 3-8b. Average and maximum numbers of vessels accompanying the whales reported by the Soundwatch monitoring program (Koski 2010b).

Over the last several years, the whale watch season has extended in length, with vessels accompanying whales for more hours of the day and more days of the year. It is not uncommon for Southern Residents or transient killer whales to be accompanied by many boats throughout much or all of the day with peak numbers of attending vessels in late morning and mid-afternoon during the busiest whale watching months of July and August (Koski 2007). In recent years, U.S. and Canadian commercial whale watch vessels have made up from 24 percent (2010) to over 50 percent (2004) of the vessels observed within a 1/2-mile radius of the whales (Koski 2006, 2007, 2010b). In addition to the commercial and recreational whale watch vessels, other vessel types including kayaks, private and commercial fishing, research and shipping vessels, and aircraft are also monitored in the vicinity of the whales.

Because of concerns over the growing number of vessels around the whales, and the potential for them to disrupt the whales' essential behaviors, government agencies, whale-watch operators, and conservation organizations collaborated to develop guidelines for viewing the whales, known as the Be Whale Wise guidelines. Two common methods of approaching and viewing killer whales in accordance with the guidelines are paralleling and repositioning. Paralleling is a viewing method that involves slowly bringing the boat alongside the whales at least 100 yards away. The Be Whale Wise guidelines recommend this parallel approach and the 100-yard approach limit to avoid harassment of the animals, while allowing passengers to see the whales and their behavior. Commercial whale watch vessels engaging in paralleling are generally able to maintain a distance greater than 100 yards and set an example that private vessels often follow.

Repositioning is another technique applicable to viewing after whales pass the vessel by at least 800 yards. The vessel then slowly engages its engines and travels at 5 to 7 knots until it is well behind and outside of the whales by about 1,500 yards. The vessel then speeds up and makes an arc outside of the whales, traveling about a mile ahead whereupon it moves back towards the whales' anticipated route. About 1,500 yards from the whales' path, the vessel slows to 5 to 7 knots and travels forward to position itself about 100 yards outside of their expected path. The vessel then waits for the whales to arrive, but continues to adjust its position, as necessary, to stay at least 100 yards from their route. Sometimes, vessels either intentionally or unintentionally end up in the path of the whales, which is not consistent with the Be Whale Wise guidelines. Parking in the path of the whales involves intentionally positioning a vessel in the path of whales and/or not moving out of the path of whales when there is time and space to do so, so that whales pass closer than 100 yards when whales are traveling in a relatively predictable pattern (Koski 2004).

A third viewing method, known as "leapfrogging," was commonly used until about 1999, when its use was discouraged because of the potential for adverse impacts to the whales. "Leapfrogging" involves a vessel that moves ahead of the whales by paralleling them for some distance at a speed faster than the whales (Williams et al. 2002b). After speeding ahead of the whales, the vessel makes a 90 degree turn to put itself directly in the whales' anticipated travel path and waits for the whales to approach while sitting in a stationary position with the engines idle or turned off. If the whales maintain their approximate travel course, they often swim closely past the awaiting vessel or even underneath it, providing the passengers with a close-up viewing opportunity.

Leapfrogging is not consistent with the recommended viewing guidelines because of the potential for disturbing the animals. For example, vessels speeding up to leapfrog emit greater sound levels at a higher frequency, which have a greater potential to mask the whales' communication than slower paralleling vessels (Bain 2002; Bain et al. 2006). In addition, masking is more likely to occur from vessels in front of the whales than vessels paralleling the whales (Bain and Dahlheim 1994; Bain 2002; Bain et al. 2006). Although paralleling and leapfrogging maneuvers have the potential to induce similar evasive responses from the whales, leapfrogging appears to cause more path deviation than paralleling (Williams et al. 2002a). Leapfrogging also increases the risk of direct contact with killer whales, which although rare,

resulted in a collision between a Southern Resident and a whale watch vessel off the San Juan Islands in July 2005.

Monitoring groups such as Soundwatch have collected several years of data, including information on incidents when vessels are not adhering to the guidelines (Table 3-1 and Table 3-2). Incidents were committed by commercial and recreational vessels, kayaks, and aircraft in the act of whale watching, as well as research vessels.

Table 3-1. Types and relative occurrence of incidents of voluntary whale-watching guidelines not being followed as witnessed by the Soundwatch Boater Education Program in Washington and southern British Columbia, 1998-2010 (from Koski 2004, 2006, 2007, 2008, 2009, 2010a, 2010b).

Soundwatch Observed All Vessel Behaviors Contrary to Guidelines and/or Regulations 1998-2010													
Behavior Category	Yearly Incident Percentages												
-Notes Categories Not Used During All Years	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
•Leapfrogging	37%	31%	23%	1%	NA	NA	NA	NA	NA	NA	NA	NA	NA
Under power within 100 yards of whales	6%	4%	5%	4%	5%	12%	9%	10%	12%	15%	12%	13%	12%
Within 440 yards of SJI No-Boat Zone	39%	26%	17%	17%	7%	13%	4%	8%	4%	5%	6%	8%	10%
Within 880 yards of Lime Kiln	2%	2%	2%	1%	2%	5%	1%	2%	1%	3%	1%	3%	4%
Crossing path of whales	4%	3%	5%	2%	4%	7%	6%	4%	5%	8%	4%	5%	5%
Chasing/pursuing whales	3%	1%	3%	2%	<1%	4%	3%	1%	2%	3%	3%	3%	3%
Inshore of whales	5%	29%	24%	25%	19%	16%	22%	18%	17%	16%	21%	24%	17%
Airplane within 1000 feet	4%	2%	4%	7%	14%	6%	6%	4%	6%	8%	8%	6%	4%
Within 200 yards of National Wildlife Refuge	0%	1%	3%	1%	2%	2%	1%	0%	<1%	1%	1%	<1%	1%
•Other		1%	3%	3%	14%	5%	15%	11%	10%	3%	2%	1%	1%
•Within 220 yards of shore; whales present			4%	4%	2%	<1%	4%	1%	2%	2%	<1%	<1%	1%
•Repositioning within 100 yards			7%	7%	NA	NA	NA	NA	NA	NA	NA	NA	NA
•Parked in the path of whales				26%	24%	17%	19%	27%	26%	17%	25%	19%	23%
•Fast within 1/4 mile					3%	4%	9%	10%	11%	16%	11%	13%	13%
•1st Approach head on, behind, or on shore					4%	2%	1%	<1%	1%	2%	3%	2%	3%
•Kayaks spread out					<1%	3%	0%	<1%	1%	1%	1%	1%	1%
•Kayaks with whales outside 1/4 SJI Zone					<1%	1%	0%	<1%	1%	<1%	1%	1%	1%
•Kayaks paddling w/in 100 yds						3%	0%	<1%	1%	<1%	1%	<1%	1%
Total %	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Total Observed Incidents	398	791	653	533	259	373	761	957	1,281	1,085	1,419	2,527	1,067
Estimated Annual Observation Hours	426hr	510hr	462hr	486hr	378hr	312hr	486hr	564hr	516hr	420hr	540hr	420hr	442hr

Table 3-2: 2009 and 2010 Summaries of vessel incidents by incident and vessel type (from Koski 2010a, 2010b).

Soundwatch Observed Incidents Summary **June 15 - September 27, 2009** *420 Observation Hours*

	Eco Can	Eco US	Private	Eco Kayak	Priv Kayak	Aircraft	Monitor	*Research	*Gov't	*Marine Fishery	*Marine Other	Total
Aircraft												
aircraft - low circling						54			3			57
aircraft - low flying						83			3			86
Aircraft						137			6			143
Approach												
non-compliant approach		3										3
non-compliant approach - head on	4	1	46		1					2	1	55
non-compliant approach - perpendicular to			6									6
non-compliant approach from behind	3	3	58							4		68
Approach	7	7	110		1					6	1	132
Area Restriction												
area restriction - Lime Kiln	4	2	74				4			5		89
area restriction - NWR	1	2										3
area restriction - SJIVNBZ (1/4mi)	1	2	193		1		2	1		18	2	220
Area restriction - SJIVNBZ (1/8mi)	1		18							1		20
Area Restriction	7	6	285		1		6	1		24	2	332
Haulout												
100m/yd - haulout			2									2
Haulout			2									2
In Path												
Parked in Path (Failed to Adjust; W/in 100 yds)	87	24	218	3	15				2	2	3	354
vessel crossed the path of whales	9	7	89		2		7			1	3	118
vessel in path & adjusting to maintain	3											3
vessel in path & failure to move	4		5									9
vessel in path but adjusting to move out	3	1	2									6
vessel in path of known travel corridor	1											1
In Path	107	32	314	3	17		7		2	3	6	491
Inshore												
vessel inshore of whales	24	13	518		2		7	2	2	36	3	607
Inshore	24	13	518		2		7	2	2	36	3	607
Interaction												
interaction – Hands in the water			1									1
Interaction			1									1
Kayak Specific												
kayak - 100m/yds				2	7							9
kayak - launching				1	1							2
kayak - offshore 1/4mile				6	16							22
kayak - spread out when whales present				6	29							35
Kayak Specific				15	53							68

Soundwatch Observed Incidents Summary June 15 - September 27, 2009 continued

	Eco Can	Eco US	Private	Eco Kayak	Priv Kayak	Aircraft	Monitor	*Research	*Gov't	*Marine Fishery	*Marine Other	Total
Other												
Other: W/in 200 yds. of Transients	4		1				1					6
Other: Unsafe speed departing scene w/ whales spread	1											1
Other: Zigzagging through boats & whales- Unsafe given conditions			1									1
Other: Swung boat for better viewing then Turned off engines	1											1
Other: Calling the whales? Using a penny whistle or flute		1										1
Other: Unsafe motoring in heavy fog/Inoperable VHF	1											1
Other: Bad set-up in fog w/ whales	2											2
Other: Too fast for conditions w/ whales	1											1
Other: Military target practice within acoustic range of whales									1			1
Other: Use more caution during "Greeting Ceremony"		2	1									3
Other	**10**	**3**	**3**				**1**		**1**			**18**
Speed												
speed > 7knts w/in 400m	9	1	211			2	6	4	1	6	7	247
speed > 7knts w/in 400m (coming on scene)	5	2	59						1		1	68
speed > 7knts w/in 400m (departing scene)	3	1	11									15
Speed	**17**	**4**	**281**			**2**	**6**	**4**	**2**	**6**	**8**	**330**
Within 100 m/yds												
vessel within 100m - approaching whales			1									1
vessel within 100m - fishing			84							14	1	99
vessel within 100m - stopped	20	12	52	1	1		15				4	105
vessel within 100m - under power	11	3	204				7		1	7	8	241
vessel within 100m of whales			2									2
Within 100 m/yds	**31**	**15**	**343**	**1**	**1**		**22**		**1**	**21**	**13**	**448**

	Eco Can	Eco US	Private	Eco Kayak	Priv Kayak	Aircraft	Monitor	*Research	*Gov't	*Marine Fishery	*Marine Other	Total
Grand Total	**203**	**80**	**1857**	**19**	**75**	**139**	**49**	**7**	**14**	**96**	**33**	**2572**

**Marine Other = Marine Charter, Marine Cargo/Shipping, Marine Ferry, Marine Tug w/Tow*

**Gov't = US or CAN Military, US or CAN Coastguard, Enforcement Agencies, US Homeland Security (includes aircraft and sea-going vessels)*

**Research = Whale and non-whale research vessels*

**Marine Fishery = Commercial Fishing (target species include: salmon, shrimp and crab)*

Soundwatch Observed All Vessel Incident Summary May 15 - September 7, 2010 442 Hours

	EcoTour Can	EcoTour US	Private Motor/Sail	EcoTour Kayak	Private Kayak	All Aircraft	Marine Monitoring	Research	Gov't	Maritime Fishing	Maritime Industry	Total
Aircraft												
aircraft - low circling						18			2			20
aircraft - low flying						24			2			26
Aircraft						**42**			**4**			**46**
Approach												
non-compliant approach - head on	1		26				1			3		31
non-compliant approach from behind	4	1	25	1	1		2					34
Approach	**5**	**1**	**51**	**1**	**1**		**3**			**3**		**65**
Area Restriction												
area restriction - Lime Kiln	2	3	30	1			4			1		41
area restriction - NWR	2	4		1	1							8
area restriction - SJIVNBZ (1/4mi)	4		90				4			12		110
Area restriction - SJIVNBZ (1/8mi)	1		8									9
Area Restriction	**9**	**7**	**128**	**2**	**1**		**8**			**13**		**168**
In Path												
Parked in Path (Failed to Adjust;W/in 100yds)	28	8	90	6	2						1	135
vessel crossed the path of whales	9	2	32	1	1		2		2	1	1	51
vessel in path & adjusting to maintain w/in 100m			4									4
vessel in path & failure to move			1									1
In Path	**37**	**10**	**127**	**7**	**3**		**2**		**2**	**1**	**2**	**191**
Inshore												
vessel inshore of whales	14	6	139				4	1		19	2	185
Inshore	**14**	**6**	**139**				**4**	**1**		**19**	**2**	**185**
Kayak Specific												
kayak - 100m/yds				1	4							5
kayak - offshore 1/4mile				6	2							8
kayak - spread out when whales present				4	5							9
Kayak Specific				**11**	**11**							**22**
Other												
Other: DEFINE	5	4	4		1	1					1	16
Other	**5**	**4**	**4**		**1**	**1**					**1**	**16**
Speed												
speed > 7knts w/in 400m	3	3	73				11			5	1	96
speed > 7knts w/in 400m (coming on scene)	3	1	26							4	2	36
speed > 7knts w/in 400m (departing scene)	1		4									5
Speed	**7**	**4**	**103**				**11**			**9**	**3**	**137**
Within 100 m/yds												
vessel within 100m - fishing			20							2		22
vessel within 100m - stopped	26	12	37	1	2		28			2	2	110
vessel within 100m - under power	5	4	73				14		1	6	1	104
vessel within 100m of whales			1									1
Within 100 m/yds	**31**	**16**	**131**	**1**	**2**		**42**		**1**	**10**	**3**	**237**
Grand Total	**108**	**48**	**683**	**22**	**19**	**43**	**70**	**1**	**7**	**55**	**11**	**1067**

From 2006 through 2010, there were between 1,085 (2007) and 2,527 (2009) incidents per year of vessels not following the guidelines reported during the time the observers were present. Observers were not present during all days and all hours, thus it is likely there were more incidents than those reported. Soundwatch effort (estimated observation time) has fluctuated in recent years and trends in incident data can be difficult to interpret. There was an increasing trend in the number of incidents from 1998 to 2006, which is not based only on increasing hours of observation time (IEC 2008). An average of 1.2 incidents were observed per hour in 2003, while an average of 6.02 incidents were observed per hour in 2009.

As in the past several years, the top Soundwatch observed vessel incident percentage categories in 2010 were:

1. vessels parking in the path of whales (Parked in path) at 23 percent of all incidents,

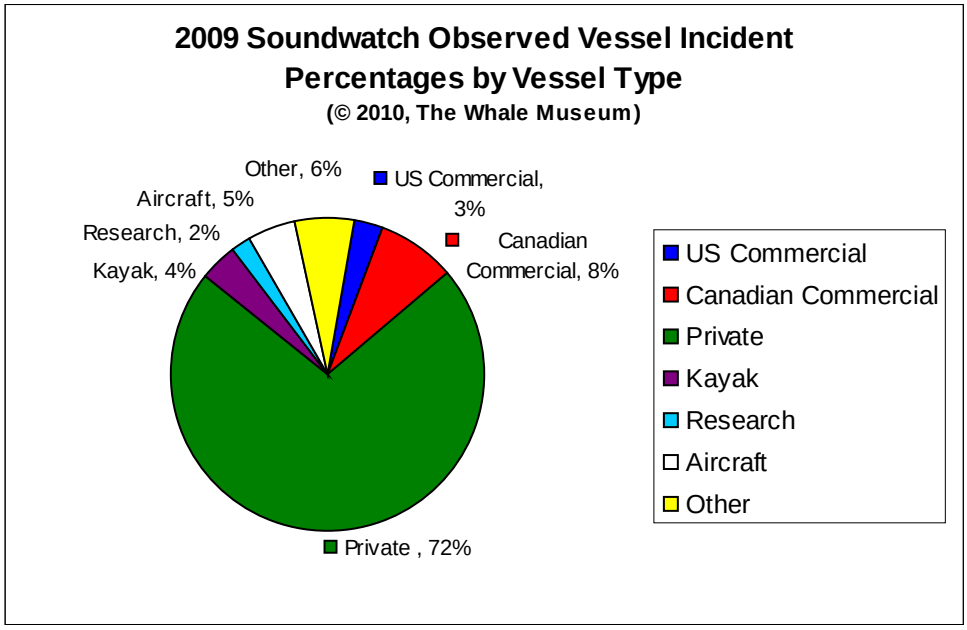
2. vessels motoring inshore of whales (Inshore of whales) at 17 percent,

3. vessels motoring within 100 yards of whales (Under power within 100 yards of whales) at 12 percent, and

4. vessels motoring fast within 400 yards of whales (Fast within 1/4 mile of whales) at 13 percent of all incidents.

In 2009 there were 2,527 incidents; the majority of these were committed by private boaters (72 percent) and Canadian commercial operators (8 percent). Of the 1,067 incidents in 2010, the majority were committed by private boaters (64 percent) and Canadian commercial operators (10 percent) (Figure 3-9). The top incidents also reflect this pattern and are most often committed by private boaters and Canadian commercial whale watch vessels (Figure 3-10).

Straitwatch, the Canadian counterpart to Soundwatch, also collects information on incidents when boaters are not following the guidelines. While NMFS cannot at this time directly compare or combine the data from the two programs, Straitwatch reports similar patterns to Soundwatch data, including 1) most incidents observed for private vessels and 2) similar top observed incidents to 1 through 4 listed above. For 2007-2009, Straitwatch estimated rates of incidents and found an average of 2.8 incidents of disturbance every 20 minutes (Straitwatch 2010). In addition, Straitwatch analyzed their vessel data and the scientific literature on vessel disturbance and estimated that an “average” Southern Resident killer whale will experience some disturbance caused by vessels 100 times per 12 hour period between June and September.



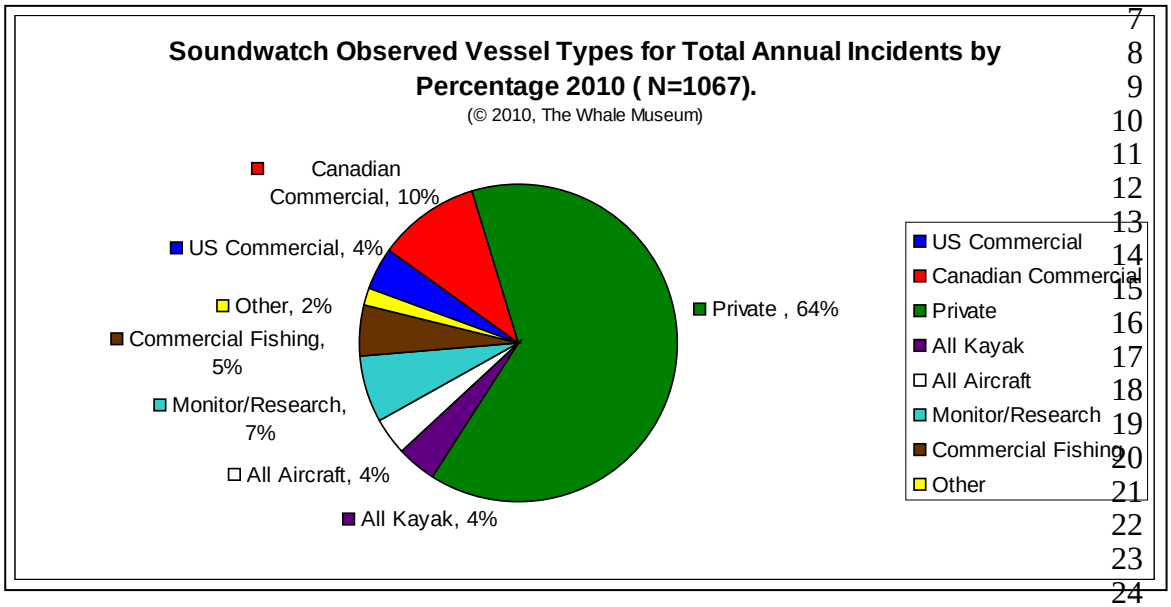


Figure 3-9. Percentage of incidents by vessel type observed in 2009 and 2010 (from Koski 2010b).

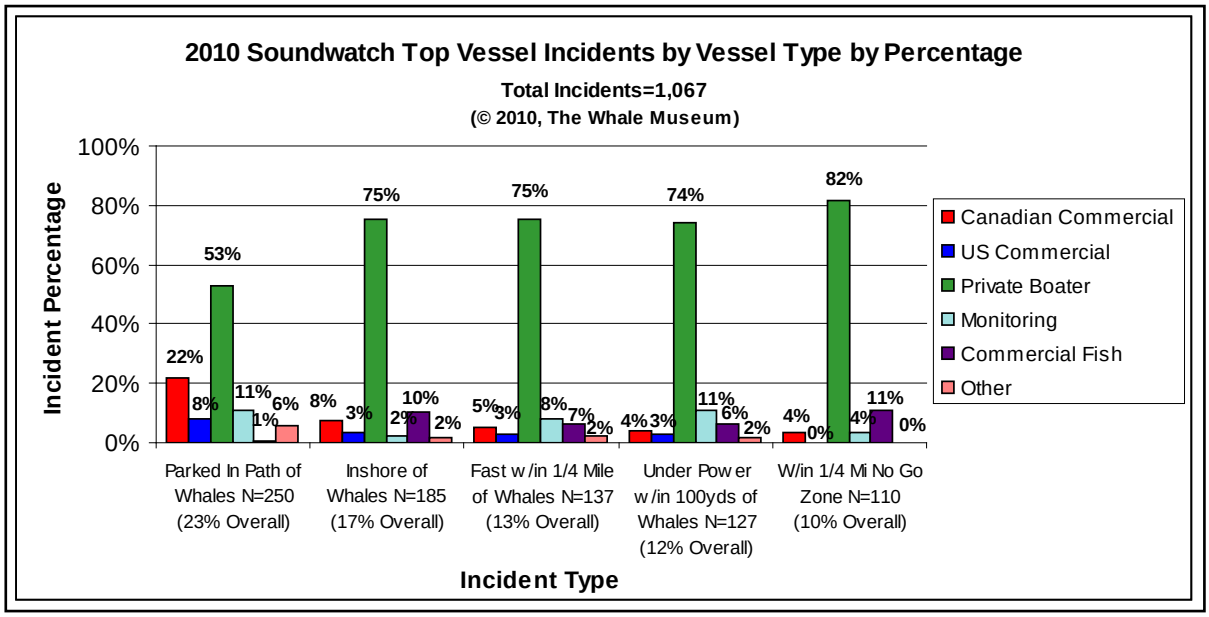


Figure 3-10. Top vessel incidents by vessel type for 2010 (from Koski 2010b).

In addition to the specific guidelines in the Be Whale Wise materials, Soundwatch records incidents when vessels are within a voluntary no-go zone. There is currently a voluntary no-go zone along the west side of San Juan Island, which is recognized by San Juan County and described as part of the San Juan County Marine Stewardship Areas (Figure 2-1). Whale watching vessels complying with the voluntary no-go zone often park or travel along the edge of the zone to view whales when they are within the zone (Giles 2008). The west side of San Juan Island has the highest number of Southern Resident killer whale sightings (Figure 3-11) and likely because of this the west side of San Juan Island is the location of the highest number of vessel incidents recorded by Soundwatch (Koski 2010b) (Figure 3-11).

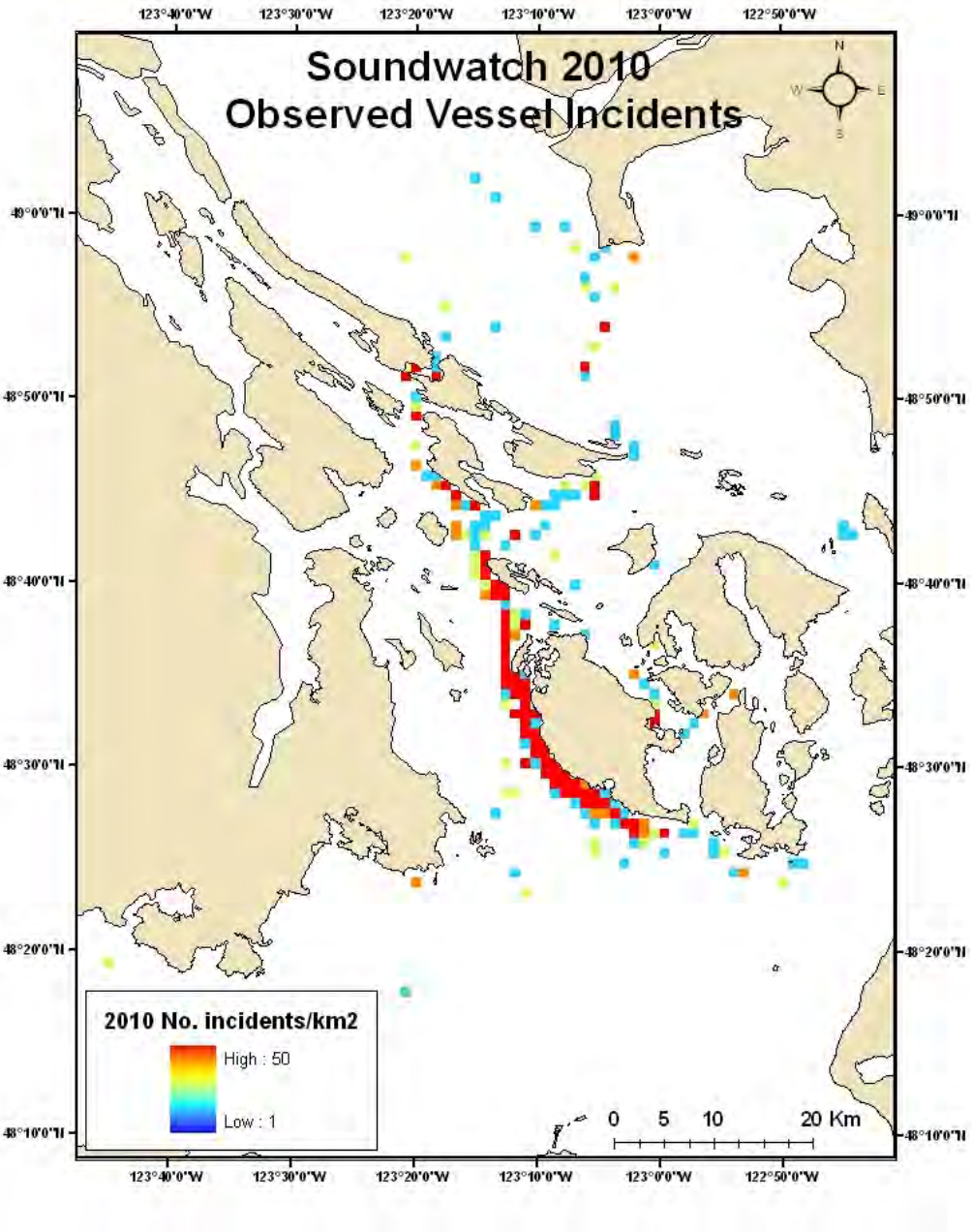


Figure 3-11. Vessel incident density for 2010 (from Koski 2010b).

In both 2009 and 2010, 4 percent of incidents observed from the Soundwatch vessel were committed by kayaks. Of the 1,067 incidents in 2010, 41 incidents specific to kayaks (22 commercial and 19 private kayakers) were observed (Table 3-2), including parking in the path (20 percent of kayak incidents in 2010). Soundwatch has reported that they likely underestimate kayak incidents because the Soundwatch observers remain outside of the current voluntary no-go zone where considerable kayak activity takes place (Dismukes et al. 2010). For the summer of 2010, Soundwatch's Kayak Education and Leadership Program (KELP), San Juan County Parks, and the San Juan Island Kayak Association worked together to update and refine a Kayaker Code of Conduct as part of KELP. In 2010, the San Juan County Park implemented a required launch permit for boaters using the boat launch. Before boaters could obtain a permit, they had to attend a required Code of Conduct training conducted by KELP. Commercial operators were required to have all their guides trained by KELP educators, and their guests had to sign waivers acknowledging that they had been trained on the Code of Conduct by their guide. The Code of Conduct includes information about the Washington State law prohibiting approach within 100 yards of Southern Resident killer whales, the Be Whale Wise guidelines, and additional guidelines such as staying close together (rafting) when whales approach, avoiding stopping at headlands to remain out of the whales' path, stopping paddling if whales are within 100 yards, and suggestions for assessing their kayak position and remaining outside of the path of the whales by moving offshore or inshore.

In addition to providing the guidelines and training for kayakers through the KELP education program, Soundwatch also monitored kayak activity and compliance of kayakers with the recommendations in the code of conduct to augment the Soundwatch vessel monitoring program. From June through September 2010, 594 total incidents were observed (66 percent commercial and 28 percent private) with 171 incidents (29 percent) when kayakers were within 100 yards of the whales (Koski 2010b). Top incidents were kayaks not rafted, parked on headlands or within kelp beds, parked in the path of whales, and stopped within 100 yards of whales. In addition, observers also recorded the level of effort made by kayakers to comply with the guidelines to help determine the feasibility of kayakers complying with the guidelines. In other words, they assessed if kayakers made a high level of effort to comply and were unable to avoid getting too close to whales or if they made low or no effort to comply and, therefore, got too close to the whales. Soundwatch observed that in a small number of situations (14 percent), kayakers made a high level of effort, but were unable to follow the guidelines (Koski 2010b).

The ESA and MMPA prohibit take and harassment of Southern Resident killer whales. While vessel incidents are recorded and reflect vessel behavior that has the potential to harass and take the whales, translating this information into enforcement cases and successful prosecutions under the MMPA and ESA can be difficult. In addition to Soundwatch incident information, the Office for Law Enforcement receives numerous reports from the public regarding potential violations. In recent years a small number of cases where negligent operation of a vessel resulted in harassment have been successfully pursued. In 2005 (prior to the ESA listing) one case of harassment of killer whales under the MMPA through the negligent operation of a vessel resulted in a $1,000 fine. Following the ESA listing in 2005, NMFS assessed an additional violation for negligent operation of a vessel in 2006, which resulted in settlement and imposition of a higher fine based on the endangered status of the whales and was settled for $2,000. Both cases were settled in 2007. Whether incidents are reported by Soundwatch or become enforcement cases, vessels can affect the whales by increasing the risk of vessel strikes and causing behavioral disturbance and auditory masking, which are described below.

Known Vessel Strike Effects. A subset of the total number of incidents including 1) parking in the path, 2) head on approaches, 3) crossing the path of whales, and 4) chasing/pursuing whales are risky vessel behaviors that have the highest likelihood of resulting in vessel strikes. In 2010 there were 256 incidents involving these types of activities out of the total 1,067 monitored incidents (Table 3-2). Vessel strikes can

result in direct injury or mortality, and even small injuries can be a path for infections (Dierauf and Gulland 2001). Killer whales have been injured or killed by collisions with vessels, primarily from being struck by propeller blades (Visser 1999; Ford et al. 2000; Visser and Fertl 2000; Baird 2001; Carretta et al. 2001, 2004; Van Waerebeek et al. 2007). Some killer whales that have sustained severe injuries from collision with vessels eventually made full recoveries. For example, a female killer whale observed by Ford et al. (2000) healed from wounds extending almost to her backbone. One of the violations described above resulted in a vessel collision and a minor injury to one Southern Resident whale, which subsequently healed. Only one killer whale mortality was caused by a vessel strike from the 1960s through the 1990s in the region (Baird 2002). However, several additional mortalities since then have been reported. In March of 2006, a lone Southern Resident killer whale (L98) residing in Nootka Sound, British Columbia for several years, was killed by the engine of a tug boat. Although L98 exhibited unusual behavior and often interacted with vessels, his death demonstrates the risk of vessel accidents. In July 2006, the death of a stranded Northern Resident female was attributed to blunt trauma, likely caused by a vessel strike (Gaydos and Raverty 2007).

Known Behavioral Disturbance. Killer whales in the Pacific Northwest are well documented to respond to vessels engaged in whale watching with short-term behavioral changes (Kruse 1991; Kriete 2002; Williams et al. 2002a, 2002b, 2006, 2009; Noren et al. 2007, 2009; Foote et al. 2004; Bain et al. 2006; Lusseau et al. 2009; Wieland et al. 2010). Examples of short-term behavioral responses of Northern and Southern Resident killer whales in the Pacific Northwest include faster swimming speed (Williams et al. 2002a) and a less direct swimming path (Williams et al. 2002a; Bain et al. 2006; Williams et al. 2009). Northern Resident killer whales in the presence of vessels spent more time resting, traveling, and socializing and less time feeding and rubbing their bodies on smooth pebble beaches than in the absence of vessels (Williams et al. 2006) and were more likely to leave a protected reserve area when vessels were present (Trites et al. 2007). Southern Residents also spent less time foraging in the presence of vessels (Bain et al. 2006; Lusseau et al. 2009; Giles and Cendak 2010).

Vessels in the path of the whales can interfere with important social behaviors such as prey sharing (Ford and Ellis 2006) or with behaviors that generally occur in a forward path as the whales are moving, such as nursing (Kriete 2007). A subset of the total number of incidents from 2006, listed in Table 3-2, involve 1) approaching closer than 100 yards, 2) operating at high speeds (less than 7 knots) within 400 yards of the whales, 3) parking in the path, 4) crossing the path, 4) chasing or pursuing whales, and 5) approaching head-on. In 2006, there were 731 of these specific types of incidents.

Some studies have looked at the effects on behavior at specific vessel distances. In those studies, vessels were underway during active approaches or may have been parked in the path or stopped close to the whales as part of a leapfrogging sequence as described above.

Approaches within 100 yards: Research results indicate that killer whale behavior changes from vessel approaches within 100 yards include changes in swimming patterns, changes in respiratory patterns, reduced time spent foraging, and increased surface active behaviors such as tail slaps (Bain et al. 2006, Noren et al. 2007, 2009; Williams et al. 2002a, Lusseau et al. 2009). Noren et al. (2007, 2009) reported the highest frequency of surface active behaviors when the nearest vessel was within 75 to 99 meters in 2005. Bain (2006) reported a significant decrease in the time spent foraging when vessels were present within 100 yards. Williams et al. (2002a) found that experimental vessel approaches at 100 meters (about 100 yards) resulted in whales covering 13 percent more distance along a less direct route than before the vessel approached. Female whales swam 25 percent faster and changed direction more often when approached by the experimental boat.

Approaches within 200 to 400 yards: Research results also indicate that killer whale behavior can be affected by approaches at distances greater than 100 yards (Bain et al. 2006; Noren et al. 2007, 2009; Williams et al. 2009). One study reported similar types of effects (i.e., increased direction changes, increased respiratory intervals and transitions between activity states) from vessels within 400 yards of whales as compared to vessels within 100 yards, although to a lesser degree. This study did not report if these effects were from vessels close to the 100-yard distance, at a 200-yard distance, or further away (Bain et al. 2006). Bain et al. (2006) and Lusseau et al. (2009) also reported a reduction in time spent foraging when vessels were within 400 yards. Noren et al. (2007, 2009) reported the highest frequency of surface active behaviors when vessels were within 100 yards in 2005 and the highest frequency of surface active behaviors when the closest vessel was within 125 to 149 yards in 2006.

The average viewing distance of vessels is greater than the 100-yard guideline. In 2007-2008 a new research program collected detailed information on the distance of vessels from the whales using an integrated range finder, GPS, and compass and found that the average point of closest approach for all vessels is over 200 meters (Giles and Cendak 2010). This study measured the distance between all vessels and the nearest whale and reported that for private and commercial whale watch vessels within 400 yards of the whale (likely engaged in whale watching), 74 percent were greater than 200 yards from the whales. For private and commercial whale watch vessels within 800 yards (likely includes both whale-oriented and transiting vessels), 88 percent of vessels were greater than 200 yards from the whales. Bain (2007) reported that commercial vessels remained more than 300 meters in some areas. This may reflect a cautious approach by vessel operators who do not want to get too close to the recommended viewing distance. Recreational vessels tended to approach more closely than the commercial vessels, which is consistent with the higher level of incidents for these vessels (Giles 2008) (Table 3-2). Noren et al. (2007, 2009) also reported that the distance of closest approach to the whales was closer for private than for commercial vessels although this difference was not significant.

Some studies have looked at the behavioral effects from different types of vessels as presented in Subsection 1.6.3., Application to Motorized and Non-motorized Vessels. In studies comparing effects of motorized and non-motorized effects on dolphins, the type of vessel did not matter as much as the manner in which the boat moved with respect to the dolphins (Lusseau 2003b). Some dolphins' responses to vessels were specific to kayaks or were greater for kayaks than for motorized vessels (Lusseau 2006; Gregory and Rowden 2001; Duran and Valiente 2008). Several studies that have documented changes in behavior of dolphins and killer whales in the presence of vessels include both motorized and non-motorized vessels in their analysis (Lusseau 2003b; Nichols et al. 2001; Trites et al. 2007; Noren et al. 2007, 2009).

Williams et al. (2010) analyzed the effects of kayak presence on Northern Resident killer whales and reported that kayaks can have a significant impact on killer whale behavior. In previous studies, Williams et al. (2006) reported changes to killer whale behavior from boat presence, pooling kayaks and motorized vessels together. In their recent study, the presence of both types of vessels was analyzed separately for data from 1995-2004. In the presence of only kayaks, the probability that the whales will shift to travel behavior from other behavior states (including foraging) significantly increased, which indicates an avoidance tactic. This was also the case for other types of vessels and is consistent with previous results (Williams et al. 2006). With respect to both kayaks and motorized vessels, the duration of foraging decreased and the overall proportion of time spent foraging decreased when vessels were present, regardless of the type of vessel. These relationships were stronger and significant for motorized vessels. In conclusion, the type of effect of vessels on foraging activities seems to be similar whether the boats involved are kayaks or other types of vessels (Williams et al. 2010). Based on all of the information available, it is appropriate to protect killer whales from both motorized and non-motorized vessels.

The long term effects of these behavioral responses are less well known (Williams et al. 2006), although researchers have estimated the physiological consequences of behavioral responses by calculating the energetic costs of the behaviors observed when vessels are present. Williams et al. (2006) estimated that killer whales expended slightly more energy in the presence of vessels. The behavior exhibited in the presence of vessels would require approximately 3 percent more energy than behavior in the absence of vessels. The increased energy expenditure may be less important than the reduced time spent feeding and the resulting likely reduction in prey consumption. From their observations, Williams et al. (2006) calculated that killer whales spent 18 percent less time foraging in the presence of vessels than when vessels are absent.

In addition, researchers have also looked at the number of boats and how smaller or larger numbers of boats present affects the behavioral responses of killer whales (Williams and Ashe 2007; Giles and Cendak 2010). Giles and Cendak (2010) analyzed killer whale behavior in high and low boat density conditions. Based on the distribution of the number of vessels within 1,000 yards of the focal group, low boat density was defined as five or fewer vessels within 1,000 yards and high density was greater than five vessels. Whales spent significantly less time foraging in high boat density conditions. Whales were also significantly more likely to remain foraging in low boat density conditions, indicating that the whales discontinued foraging when boat density was high. The effect of boat density was significant only when the whales were foraging, which may be the behavior state most susceptible to disturbance by high numbers of vessels.

Increased energetic costs from behavioral disturbance and reduced foraging can decrease the fitness of individuals (Lusseau and Bejder 2007). Increased energy expenditure or disruption of foraging could result in poor nutrition. Poor nutrition could lead to reproductive or immune effects or, if severe enough, to mortality (Dierauf and Gulland 2001; Trites and Donnelly 2003). Interference with foraging and nutritional stress can affect growth and development, which in turn can affect the age at which animals reach reproductive maturity, fecundity, and annual or lifetime reproductive success (Trites and Donnelly 2003). Interference with behaviors including prey sharing and communication could also change social cohesion and foraging efficiency and therefore the growth, reproduction, and fitness of individuals.

Other responses to vessel presence and activity can also result in population level effects. Past studies indicate that repeated short-term avoidance behaviors by whales can cause habitat displacement leading to reduced fitness of a whale population (review in Williams et al. 2006). Abandonment of preferred habitat because of high disturbance levels has been demonstrated in other locations with other species (Bejder 2006a, 2006b; Forest 2001; Courbis 2007; Norris et al. 1985). Northern and Southern Resident killer whales continue to show strong site fidelity to their traditional summer ranges despite the more than 25 years of whale watching and increasing vessel traffic in the Pacific Northwest. Thus, the current level of vessel traffic, including whale watching, does not appear to cause habitat displacement for killer whales in this region.

The extent to which killer whales inhale diesel fumes or ingest oil is unknown, as is whether they suffer harmful effects from these sources. Lachmuth (2008) estimated potential impacts to the whales from air pollutant emissions from vessel traffic and concluded that in certain situations the Southern Resident killer whales may be inhaling concentrations of air pollutants that have the potential to cause serious health effects. These conclusions resulted in several recommendations for future research.

Known Acoustic Effects. Vessel sound has the potential to interfere with important biological functions for killer whales. The 731 incidents described above under *Behavioral Disturbance* that result in changes to the whales' behavior also likely create sound levels that interfere with the whales' communication and foraging by masking their acoustic signals. Killer whales generally have a range of hearing from 1 to 100 kHz

(Szymanski et al. 1999) and this wide frequency range of hearing makes killer whales susceptible to effects from a wide range of sounds, including sound produced by vessels. Sound modeling has been used to estimate distances at which vessel sound would cause behavioral responses for killer whales (Erbe 2002). Erbe (2002) predicted that the sounds of fast boats (greater than 50 km/h [31 miles/hour]) would be audible to killer whales at distances of up to 16 kilometers (10 miles) and cause behavioral responses within 200 meters (0.12 miles or 219 yards). For boats moving at slow speeds (10 km/h [6.2 miles/hour]), sound would be audible within 1 kilometer (0.62 miles or 1,094 yards) and cause behavioral changes within 50 meters (55 yards).

Human-generated sounds may mask or compete with and effectively drown out clicks, calls, and whistles made by killer whales, including echolocation used to locate prey and other signals the whales rely upon for communication and navigation. Masking of echolocation would reduce foraging efficiency (Holt 2008), which may be particularly problematic if prey resources are limited. Additionally, prey sharing has recently been identified as an important feature of Northern Resident killer whale foraging (Ford and Ellis 2005). Masking sound from vessels could affect the ability of whales to coordinate their feeding activities, including searching for prey and prey sharing. A study conducted by Foote et al. (2004) with Southern Resident killer whales in the San Juan Islands identified that all three pods increased the duration of their primary communication call when vessels were present. This appears to be a recent development, which Foote et al. (2004) attributed to increased vessel traffic and subsequent engine noise reaching a threshold above which whales compensated with longer duration of calls to overcome the vessel noise (Foote et al. 2004). Wieland et al. (2010) also reported increased call durations, but for a larger number of call types (16 out of 21 calls) in a similar comparison. Holt et al. (2008) found that killer whales increase their call amplitude in response to vessel noise.

In addition to the potential for vessel sound to mask calls of killer whales, sound can also damage killer whale hearing. For example, if exposed to a sound intensity within the frequency range of hearing for a long enough duration, hair cells that affect sensitivity of hearing in mammalian ears may fatigue and take time to return to their normal shape. As long as the sound level is below a threshold or critical level of energy, the hair cell will return to normal shape, and any loss of hearing sensitivity will return to normal. The temporary loss of hearing sensitivity is called temporary threshold shift (TTS) and in the event that the loss of hearing sensitivity is not recovered (for sound levels above a critical level) permanent hearing loss can occur (or a permanent threshold shift (PTS)). Although direct study of auditory damage to killer whales has not been conducted, sound modeling predicted that the sounds of fast boats (greater than 50 km/h [31 miles/hour]) would mask killer whale calls up to 14 kilometers away, and cause TTS after 30 to 50 minutes of exposure within 450 meters (0.28 miles or 492 yards) (Erbe 2002). For boats moving at slow speeds (10 km/h [6.2 miles/hour), the estimated ranges fall to 1 kilometer (0.62 miles or 1,094 yards) for masking and 20 meters (22 yards) for TTS. It is unlikely that one animal would remain within these distances of moving vessels for the extended periods (30 to 50 minutes) that would result in temporary effects on hearing, and it is difficult to estimate cumulative effects of multiple vessels and different distances. Erbe (2002) and Hildebrand (2006) recorded boat source levels of 110 to 169 dB that would not reach the estimated threshold for injury to the whales and their hearing (approximately 180 dB). Where whales do not respond to vessel noise, the lack of response does not necessarily indicate the animal is not affected; animals may be habituated to the vessels or have decreased hearing sensitivity from TTS or PTS damage from a variety of potential sources (Erbe 2002).

Holt (2008) reviewed the current knowledge and data gaps regarding sound exposure in Southern Resident killer whales. The review provides an overview of acoustic concepts, killer whale sound production, ambient sound levels in Haro Strait (Veirs and Veirs 2006), sound propagation in killer whale habitats, effects of sound exposure, and assessment of likely acoustic impacts on the Southern Residents. Holt used data on ambient sound and characteristics and sound levels of several different types of vessels (Hildebrand

et al. 2006) to analyze impacts on the effective range of killer whale echolocation in detecting a salmon. The vessel sounds were recorded at idle, when powering up, and at cruise speeds (17 to 31 knots). The review concluded that vessel noise was predicted to significantly reduce the range at which echolocating killer whales could detect salmon in the water column. Holt (2008) reported that the detection range for a killer whale echolocating on a Chinook salmon could be reduced 88 to 100 percent by the presence of a moving vessel within 100 yards of the whale. The detection range was reduced 38 to 90 percent when different vessels were operating at different speeds 200 and 400 yards from the whales. Reduction in detection ranges decreased with greater distance from the whales and this was the case for both fast (cruise) and slower (powering up) vessels. Reduced foraging efficiency could have physiological effects, such as poor nutrition, and affect fitness of individuals as described above under *Behavioral Disturbance*.

Commercial and recreational boaters also target transient killer whales when they are present in Georgia Basin and Puget Sound (Baird 2001). No studies have focused on their behavioral responses to whale-watching vessels to determine whether they resemble those of residents. Because transients may depend heavily on passive listening for sounds made by their marine mammal prey (Barrett-Lennard et al. 1996), their foraging success is likely affected to a greater degree by vessel presence than with residents (Ford and Ellis 1999; Baird 2001).

3.2.2 Other Marine Mammals

In addition to killer whales, there are a variety of other cetacean and pinniped species commonly found in inland waters of Washington (Table 3-3). Some species are abundant and commonly found, such as harbor porpoise and harbor seals, whereas others are listed under the ESA or only visit inland waters rarely (humpback whales). Killer whales remain the focus of the whale watch industry in the region; however, when killer whales are not present or when viewing of killer whales has been completed, commercial and recreational boaters often seek out other marine species. The Be Whale Wise campaign includes information on responsible viewing of all whales, porpoises and dolphins, seals, sea lions, and birds. The monitoring groups, however, do not record incidents of vessels not following the guidelines in regard to marine mammal species other than killer whales.

In addition to the Be Whale Wise guidelines there are several National Wildlife Refuges in inland waters of Washington where boaters are advised to stay 200 yards away to avoid disturbing all marine mammals and birds.

Table 3-3. Common marine mammals in inland waters of Washington.

Cetaceans	Population Status
Harbor Porpoise, *Phocoena phocoena*	Not listed, trends unknown
Dall's Porpoise, *Phocoenoides dalli*	Not listed, trends unknown
Gray Whale, *Eschrictius robustus*	Not listed, at carrying capacity
Humpback Whale, *Megaptera Novaeangliae*	Endangered under ESA
Minke Whale, *Balaenoptera acutorostrata*	Not listed, trends unknown
Pinnipeds	
Harbor Seal, *Phoca vitulina*	Not listed, at carrying capacity
California Sea Lion, *Zolophus californianus*	Not listed, at carrying capacity
Steller Sea Lion, *Eumetopias jubatus*	Threatened under ESA

3.2.2.1 Cetaceans

Cetaceans include porpoises, whales, and dolphins. Harbor porpoise, Dall's porpoise, gray whales, humpback whales, and minke whales are found in inland waters of Washington (Table 3-3). Harbor porpoises are small, dark gray, shy animals. In the eastern North Pacific Ocean, harbor porpoise are found in coastal and inland waters from Point Barrow, along the Alaskan coast, and down the west coast of North America. Harbor porpoise are known to occur year-round in the inland transboundary waters of Washington and British Columbia, Canada (Osborne et al. 1988), and the estimated abundance for the Washington Inland Waters stock of harbor porpoise is 10,682 animals. This is an increase in the population estimate for 1996 (Carretta et al. 2004). The status of this stock relative to its Optimum Sustainable Population (OSP) level and population trends is unknown. They are not listed as "threatened" or "endangered" under the Endangered Species Act nor as "depleted" under the MMPA.

Dall's porpoises are black with a striking white patch on the belly and flank. Dall's porpoises only live in the North Pacific Ocean from Japan to Southern California and as far north as the Bering Sea. Their distribution and abundance in this region varies seasonally (Carretta et al. 2003). The population estimate for the outer coast of California, Oregon, and Washington and inland Washington waters is 75,915 Dall's porpoise. There is no information available regarding trends in abundance of Dall's porpoise in California, Oregon, and Washington and their status relative to OSP is not known. They are not listed as "threatened" or "endangered" under the Endangered Species Act nor as "depleted" under the MMPA.

Gray whales are the only bottom feeding baleen whales. Each fall, the North American gray whales migrate south to Baja California, in Mexico, most of them starting in November or December. They winter mainly along the west coast of Baja California, where calves are born in lagoons and bays from early January to mid-February. The northbound migration generally begins in mid-February and continues through May, with cows and newborn calves migrating northward primarily between March and June. Most of the North American whales spend the summer feeding in the northern Bering and Chukchi Seas. However, some are observed in the summer, feeding in waters off of Southeast Alaska, British Columbia, Washington, Oregon, and California. A small number of gray whales enter inland waters of Washington primarily in spring. In 1994 this gray whale stock was removed from the List of Endangered and Threatened Wildlife, as it was no longer considered endangered or threatened under the ESA. The Eastern North Pacific stock of gray whales has been increasing in recent years. The minimum population estimate for this stock is 17,752 (Angliss and Outlaw 2005) and it is considered to be at carrying capacity.

Humpback whales are moderately large baleen whales that feed on krill and small schooling fishes in the summer in productive, high-latitude waters. In winter, most humpback whales occur in the subtropical and tropical waters of the Northern and Southern Hemispheres. Detailed studies of humpback populations in the North Pacific began in the mid-seventies, and from these it appears that this population is slowly recovering from impacts of whaling, although likely remains below pre-whaling numbers (Calambokidis and Barlow 2004). The North Pacific total may now exceed 6,000 humpback whales (Carretta et al. 2005). With this recovery, humpbacks are returning to areas from which they were historically reported but have not been seen for decades. The inland waters of Washington State and Southern British Columbia is one such region, and reports of humpback whales there have increased dramatically in recent years after a long absence (Falcone et al. 2005).

Minke whales are the smallest species of baleen whale in the North Pacific. Minke whales feed by side-lunging into schools of prey and opportunistically feed on krill, plankton, and small schooling fish. Minke whales in Alaskan waters are migratory, but animals in waters off central California and in inland waters of

Washington are considered "residents" because they establish home ranges. Minke whales are regularly seen around the San Juan Islands. The number of minke whale off California, Oregon, and Washington (including inland waters) is estimated at 898 (Carretta et al. 2007). No abundance estimate for inland waters is available. There is no information available regarding trends in abundance of minke whales in California, Oregon, and Washington. They are not listed as "threatened" or "endangered" under the Endangered Species Act nor as "depleted" under the MMPA.

3.2.2.2 Pinnipeds

Pinnipeds include seals and sea lions and are marine mammals that spend some time out of the water on shore. Common pinnipeds in inland waters of Washington include harbor seals, California sea lions, and Steller sea lions (Table 3-3). Harbor seals, members of the family phocidae, inhabit coastal and estuarine waters and shoreline areas from Baja California to western Alaska. They haul out on rocks, reefs, and beaches, and feed in marine, estuarine, and occasionally fresh waters. Harbor seals generally are non-migratory, with local movements associated with such factors as tides, weather, season, food availability, and reproduction. The current population estimate for the inland waters of Washington State (including Hood Canal, Puget Sound, and the Strait of Juan de Fuca out to Cape Flattery) is 14,612 (Carretta et al. 2003). The Washington inland harbor seal population is stable and very close to carrying capacity (Jeffries et al. 2003).

California sea lions, members of the family otariidae, are found from southern Mexico to southwestern Canada. The breeding areas of the California sea lion are on islands located in southern California in the United States, and in western Baja California and the Gulf of California in Mexico. In Puget Sound, California sea lions feed principally on Pacific whiting, spiny dogfish, Pacific herring, and Pacific cod (Schmitt et al. 1995). The current population estimate for the United States stock of California sea lions is 238,000 (Carretta et al. 2007) and has now reached carrying capacity.

Steller sea lions, the largest members of the family otariidae, are found around the Pacific Rim from California to Japan. The breeding range of the eastern United States stock of Steller sea lions extends from southeast Alaska through British Columbia and Oregon to northern California. There are no rookeries in Washington. Steller sea lions were listed as threatened under the ESA on November 26, 1990 (55 Fed. Reg. 49204) across their entire range. Continued declines in the western portion of the population led to a listing of the western stock as endangered on May 5, 1997 (62 Fed. Reg. 24345); however, the eastern stock remained listed as threatened. Steller sea lions in Washington are from the eastern stock. The eastern DPS was estimated to number between 46,000 and 58,000 animals in 2002, and has been increasing at approximately 3 percent per year since the late 1970s (Pitcher et al. 2007). The current population estimate for the eastern United States stock of Steller sea lions is 47,885 (Angliss and Outlaw 2007). The 2008 *Recovery Plan for Steller Sea Lions* (NMFS 2008b) reported that no threats to recovery have been identified and the population has been increasing for over 25 years, new rookeries have been created, and the population is at historically high levels. The plan recommends that NMFS should initiate a status review and determine whether the eastern DPS has met the recovery criteria found in the plan and should be removed from the list of threatened species.

3.3 Listed and Non-listed Salmonids

As described in Subsection 3.2.1.3, Killer Whales, Foraging, the best available information indicates Chinook salmon are the preferred prey of killer whales while in Puget Sound during the summer months, with chum salmon predation increasing during the fall. The whales may also feed on other salmon such as chum, pink, coho, sockeye, and steelhead and other marine species to a more limited extent.

Comprehensive reviews of the status of wild salmonid populations in Washington, Oregon, Idaho, and California have resulted in the listing of 26 evolutionarily significant units (ESU) of Pacific salmon and steelhead as endangered or threatened under the ESA since the 1990s.

Wild salmon have declined due to a variety of human-induced causes (generally grouped by habitat, hatchery, hydropower, and harvest activities) and as a result of periods of poor ocean conditions. While wild stocks have declined in many areas, hatchery production has been generally strong. Trends in salmon stocks have been mixed although collectively the abundance of salmon moving through the Georgia Basin remains in the millions. Wild Chinook and chum escapement has been generally stable, averaging approximately 300,000 and 2.4 million respectively for the 2000 through 2005 period (CTC 2005, 2007, unpubl. data). Wild coho escapements have declined in recent years. The total abundance of salmon in Puget Sound has been roughly stable or increasing for the past several decades, due largely to the strong performance of wild pink salmon populations, and robust adult returns of natural- and hatchery-origin fall-run chum salmon. The total return of adult salmonids to the Puget Sound region based on recent year run size estimates is at least 5,142,005 salmonids, of which at least 25 percent are hatchery-origin fish (steelhead abundance is currently unknown; Table 3-4).

Abundance of the whales' preferred prey, Chinook salmon, has varied in abundance in the last several decades. Using information from 1990 to 2006, the abundance of all ages of Puget Sound and Canadian stocks of Chinook available in inland waters ranged from 2 to 4 million Chinook depending on the season and whether it was a good or poor year for Chinook (Table 3-5). Not all ages of Chinook may be equally selected by the whales. The best available information indicates that Southern Residents prefer adult-sized Chinook (Ford and Ellis 2006) and immature fish may not be selected by the whales. The abundance of age four and five Chinook range from approximately 350,000 to 675,000 depending on the season and whether it is a good or poor year for Chinook. In coastal waters the abundance of all ages of a variety of U.S and Canadian Chinook stocks available ranged from over 5 to over 12 million Chinook depending on the season and whether it was a good or poor year for Chinook (Table 3-6). The abundance of age four and five Chinook in coastal waters range from approximately 1 to 1.8 million depending on the season and whether it is a good or poor year for Chinook. These estimates include seasonal reductions in prey available from fisheries harvest and some degree of natural mortality. Harvest levels are managed on an annual basis, and can fluctuate depending on forecast methods and in-season indicators of run-strength.

NMFS has recently adopted a recovery plan for the listed Puget Sound Chinook salmon ESU (Shared Strategy 2007) and has proposed a recovery plan for the Hood Canal summer-run chum salmon ESU (Hood Canal Coordinating Council 2006). Both of these documents provide detailed information on limiting factors for individual watersheds, including proposed recovery actions. NMFS has also completed status reviews, which contain detailed information on coho, pink, sockeye and steelhead populations found in the area (Wietkamp et al. 1995; Gustafson et al. 1997; Johnson et al. 1997; Goode et al. 2005).

Table 3-4. Recent year average total adult salmon run size estimates and the proportion of total adult run sizes resulting from hatchery production in the Puget Sound region[1].

Species	Average Adult Return to Puget Sound (PS catch plus escapement)	Hatchery-Origin Adult Return to Puget Sound	Hatchery-origin Adult Percent of Total Return
Chinook salmon[2]	221,649	163,496	74%
Coho salmon[3]	960,006	447,285	47%
Chum salmon[4]	1,866,594	534,145	29%
Sockeye salmon[5]	337,767	101,330	30%
Pink salmon[6]	1,755,989	24,255	1.4%
Steelhead[7]	Unavailable	Unavailable	Unavailable

[1] Table source: T. Tynan, NMFS, Northwest Region, Propagation and Tributary Fisheries Branch, unpubl. data.
[2] Data for 2000 through 2004 from WDFW 2005 Stock Strength Summaries (B. Sanford, pers. comm., WDFW, June, 2005).
[3] Puget Sound coho salmon run reconstruction data for 1999 through 2004 from J. Haymes, pers. comm., WDFW, July, 2005.
[4] Data for Puget Sound summer, fall, and winter chum salmon for 1998 through 2002 from WDFW chum salmon web-site, http://wdfw.wa.gov/fish/chum/chum-5e.htm
[5] Estimated percent contribution of hatchery-origin sockeye to the total Puget Sound return (Cedar River and Baker River) provided by Kyle Adicks, pers. comm., WDFW, October, 2005. Total adult return data from Baker Lake sockeye trap counts and Ballard Lock fish counts for 2000 through 2004 accessed from WDFW sockeye salmon website, http://wdfw.wa.gov/fish/sockeye/index.htm.
[6] Data for Puget Sound pink salmon for 1989 through 2003 from K. Adicks, pers. comm., WDFW, October 17, 2005.
[7] Complete data for Puget Sound steelhead populations, in particular for summer steelhead and most hatchery populations that contribute to natural spawning, is unavailable.

Table 3-5. Estimated annual range in Chinook abundance in inland waters (Georgia Strait, Strait of Juan de Fuca, and Puget Sound), after preterminal fishing and natural mortality.

Year[1]	Chinook[2]	Abundance[3]		
		October-April	May-June	July-September
Good Chinook year (2002)	Age 2	2,247,281	2,057,867	1,793,906
	Age 3	1,424,868	1,317,362	1,142,409
	Age 4	**610,112**	**556,483**	**483,556**
	Age 5	**76,333**	**69,330**	**59,183**
	Age 2-5	4,358,594	4,001,041	3,479,055
Poor Chinook year (1994)	Age 2	1,811,633	1,655,595	1,436,465
	Age 3	772,359	713,320	597,179
	Age 4	**393,705**	**360,968**	**310,235**
	Age 5	**49,303**	**44,201**	**37,691**
	Age 2-5	3,027,000	2,774,084	2,381,569

[1] Based on the range in past Chinook abundance years from 1990 to 2006, where 1994 (low) and 2002 (high) represent the range in past variability (CTC 2008).
[2] Abundance estimates are presented by cohort, as well as the sum of all cohorts per time period.
[3] Abundance estimates are based on likely levels of fishing modeled in FRAM, incorporating fishery management constraints of the Pacific Salmon Treaty and more stringent constraints for ESA compliance, based on harvest levels in the recent past (NMFS 2008c). Abundances are not additive across time periods.

Table 3-6. Estimated annual range in Chinook abundance in coastal waters (from California to Southeast Alaska), after preterminal fishing and natural mortality.

Year[1]	Chinook[2]	Abundance[3]		
		October-April	May-June	July-September
Good Chinook year (2002)	Age 2	5,921,314	5,393,737	4,665,461
	Age 3	5,087,025	4,407,465	3,468,790
	Age 4	**1,613,186**	**1,343,474**	**1,140,275**
	Age 5	**254,280**	**206,917**	**166,076**
	Age 2-5	12,875,805	11,351,594	9,440,601
Poor Chinook year (1994)	Age 2	4,333,019	3,943,355	3,412,785
	Age 3	1,663,671	1,448,265	1,139,228
	Age 4	**1,062,804**	**933,319**	**794,053**
	Age 5	**331,376**	**278,856**	**235,111**
	Age 2-5	7,390,871	6,603,795	5,581,177

[1] Based on the range in past Chinook abundance years from 1990 to 2006, where 1994 (low) and 2002 (high) represent the range in past variability (CTC 2008).
[2] Abundance estimates are presented by cohort, as well as the sum of all cohorts per time period.
[3] Abundance estimates are based on likely levels of fishing modeled in FRAM, which reflect fishery management constraints of the Pacific Salmon Treaty and more stringent constraints for ESA compliance, based on harvest levels in the recent past (NMFS 2008c). Abundances are not additive across time periods.

3.4 Socioeconomics

3.4.1 Overview of Puget Sound Economy

The Washington Department of Ecology (2008), TCW Economics (2008), and Cleveland (2007) have described the Puget Sound economy including a number of Puget Sound Facts:

Puget Sound is part of the natural environment that attracts people to the region. The Sound helps drive $20 billion in economic activities annually.

Population – Approximately 4.3 million people live in the 12 counties bordering Puget Sound. This figure includes about 1.6 million who live in the 90 cities and towns that directly border the Sound.

Fishing – The recreational fishery in Puget Sound is valued conservatively at $57 million a year and up to $424 million a year including net economic values. Output from commercial fishing has been estimated at over $900 million annually in Washington with $646 million from inland waters.[1]

Tourism – The Puget Sound area provides $9.5 billion in tourism revenue, including 68,000 tourism-related jobs and $3 billion in income each year. The Puget Sound area generates approximately 80 percent of statewide tourism revenues.

[1] Commercial fishing numbers were estimated for 2000 (NMFS 2004, FEIS on Puget Sound Chinook Harvest Management Plan)

In addition to the Ports of Seattle and Tacoma, the Port of Vancouver, situated to the north of the greater Puget Sound area, ranks number one on the west coast of North America in terms of total cargo volume. Thus, the Puget Sound waterways are some of the busiest in the world. The major types of vessels that operate in the Puget Sound region include tankers, cargo/freighters, government, fishing, tug boats, ferries, and other passenger vessels including recreational vessels and commercial whale watchers. Additional information on the number of vessels operating in Puget Sound is provided below under Subsection 3.9, Transportation. The commercial whale watch industry is the only industry focused on the whales and economically dependent on them. The whale watch industry is described in detail in this section, but also mentioned in Subsections 3.5, Recreation and 3.9, Transportation. Commercial fishing in inland waters is described under Subsection 3.4, Socioeconomics, and recreational fishing is discussed under Subsection 3.5, Recreation.

3.4.2 Whale Watch Industry in Puget Sound

Since the early 1980s, whale watching has developed into a popular and economically viable tourist industry in many localities around the world, and the whale watching industry in the Pacific Northwest has been recognized as one of the fastest growing (Hoyt 2001, 2002). In Washington and British Columbia, killer whales are the principle target species for the commercial whale watching industry, easily surpassing other species such as gray whales, porpoises, and pinnipeds (Hoyt 2001; O'Connor et al. 2009). The popularity and demand for whale watching activities gradually increased in the inland waters of Washington from 1976 to 1991, followed by a period of rapid growth through 1997 (Bain 2002; Koski 2004). The commercial whale watch fleet peaked in 2001 with over 80 vessels before a slight reduction in fleet size, and appears to have leveled off in recent years (Figure 3-12). In 2010, 76 active commercial whale watch vessels (23 U.S. and 53 Canadian) from 35 active companies (16 U.S. and 19 Canadian) were operating in Haro Strait (Koski 2010b). Data available from 2005 for U.S. companies (17 companies and 19 vessels in 2005) was used to estimate the number of trips operated by the U.S. fleet (Russell and Schneidler, In Press). Based on the number of trips offered per day (37), the number of days in three seasons (peak 42 days, low 10 days, and off season 165 days) and the estimated occupancy during those seasons (approximately 70 percent in high season, approximately 50 percent in low season, and approximately 30 percent in off season), NMFS estimated the number of U.S. commercial whale watch trips at approximately 6,264 per year. Based on capacity of U.S. vessels, Russell and Schneidler (In Press) also estimated that each trip had an average of 55 passengers.

Killer whale watching became a multi-million dollar industry over a relatively short period of time. Ticket sales for vessel-based whale watching first broke the million dollar mark in 1991, and were approaching $5.7 million by the end of 1997 (Koski 2006). Hoyt (2001) estimated that 52,000 (boat-based) participants in commercial whale watching tours in Washington State spent a total of $9.59 million in 1998; $3.31million in tickets for whale watching, and the remainder on indirect expenditures such as food, travel, lodging, and souvenirs. Approximately 80 percent of this is estimated to be spent in Puget Sound and Georgia Basin. Approximately 30 percent of the participants were from Washington, while 70 percent were from out of state. An update in 2009 (O'Connor et al. 2009) estimated 425,000 whale watchers in Washington State spending nearly $11 million in direct expenditures and a total of $61 million including indirect expenditures in 2008. Using IMPLAN, a regional economic model, IEC (2010) estimated that the current whale watching industry in Puget Sound contributes approximately $22 million annually and 196 jobs to the 19 counties adjacent to the whales' habitat area through direct, indirect, and induced expenditures related to the industry.

As the industry grew, concerns surfaced about the constant presence of vessels around the whales. In 1994, a collection of commercial whale watch companies in Washington and British Columbia organized to create a trade association called the Whale Watch Operators Association Northwest or Pacific Whale Watch Association (association). As one of their first official duties, the association established an additional set of voluntary guidelines to instruct commercial operators on appropriate viewing practices. The association's set of guidelines is consistent with Be Whale Wise and includes additional detailed guidelines for particular whale watching situations. For example, the association guidelines include information on viewing distances for transient killer whales. The guidelines have been regularly reviewed and updated since 1994, and the association now develops annual guidelines and best practices for commercial whale watching operators posted on their website: www.pacificwhalewatch.org/guidelines. They have also developed a system to internally track incidents by member organizations and notify U.S. and Canadian enforcement agencies of repeated incidents by particular individuals. The association along with a number of other organizations are partners in the Be Whale Wise campaign. In addition, other vessels such as the Washington State ferries also follow the guidelines (Washington State Department of Transportation 2007).

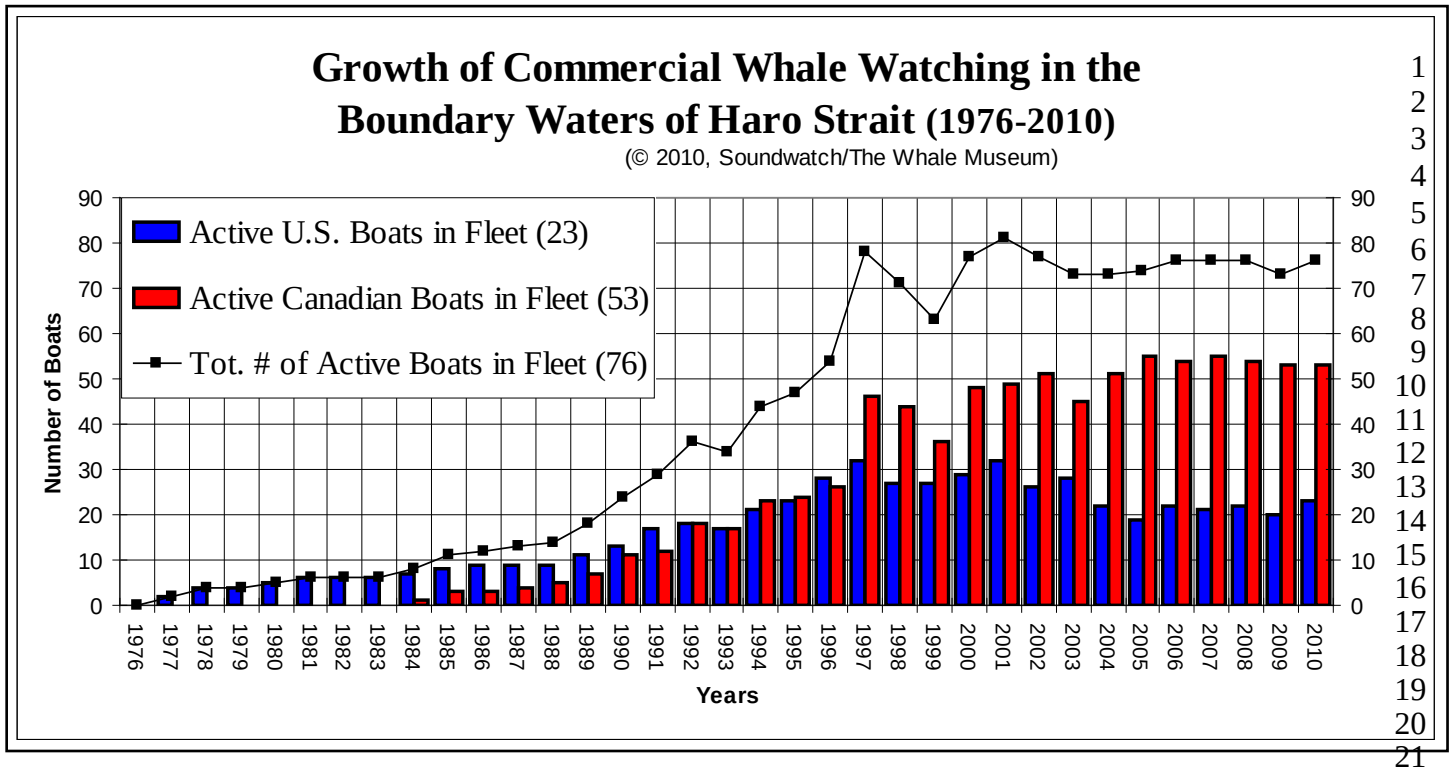


Figure 3-12. Growth of commercial whale watching 1976-2010 (from Koski 2010b).

Commercial whale watch companies have identified the potential benefits of whale watching. Whale watching is a form of ecotourism that results in firsthand encounters with killer whales in their natural habitat, and educates and inspires passengers by enhancing awareness about the species, the threats impeding recovery, and the actions being taken to address these threats. To facilitate these benefits, many whale watch companies have naturalists on board to educate passengers and answer questions.

Several studies focused on killer whales in the Pacific Northwest have assessed the value that whale watching participants have for wildlife viewing and provide data on the factors that lead to an enjoyable or memorable whale watching trip, and how satisfied participants are with various aspects of their trip (Duffus and Deardon 1993; Andersen 2004; Andersen and Miller 2006; Malcolm 2004). Survey results of whale watch participants indicate that proximity to the whales is not the most important part of the whale watchers' experience and that seeing whales and whale behavior was much more important (Andersen 2004; Malcolm 2004). In addition, Malcolm (2004) found participants were most satisfied with the respect their vessels gave the whales. The number of whales, whale behavior, and learning also received higher satisfaction than the distance from which whales were observed. The participants also strongly agreed with statements related to protection of the whales.

Additional studies have been conducted on whale watching participants viewing other species (humpback whales, dolphins, seals, and sea birds) in other locations (e.g., Hawaii, Wales, Australia) (Orams 2000; Shapiro 2006; Airey 2007; Stamation 2009). These studies also ranked the importance of different aspects of the whale watch experience in determining satisfaction with the trip. Aspects ranked by participants included "seeing wildlife," "seeing whales behaving naturally," "boat operator behavior is wildlife friendly," "educational information about wildlife," and "degree to which their expectations were met." Each of these aspects ranked higher than proximity to wildlife. Seeing whales up close and being close to wildlife were in the top five features important for satisfaction in some studies (Airey 2007; Stamation 2009); however, the "educational information provided" and "responsible boater behavior to not disturb the wildlife" were also important factors affecting trip satisfaction.

3.4.3 Recreational Boating in Washington

In addition to commercial whale watching, many recreational boaters also engage in wildlife viewing. It is estimated that recreational boaters contribute nearly $100 million each year directly to the economy of the State of Washington through vessel registration fees, watercraft excise taxes, vessel sales taxes, gas taxes, fishing licenses, grants and assistance from the Federal government, and other miscellaneous fees (Northwest Marine Trade Association 2007) and $489 million in combined boat, motor, trailer, and accessory purchases (Washington Department of Ecology 2008). The most common activity for recreational boaters is fishing; however, viewing wildlife is also a popular activity for boaters (Subsection 3.5, Recreation). No data are available on the total expenditure from recreational boaters derived specifically from whale watching.

3.4.4 Commercial Fisheries in Inland Waters of Washington

Commercial fisheries in Puget Sound include troll, set net, drift gill, purse/roundhaul seines, beach seines, and reef net gear and occur in both marine and terminal freshwater areas. Major fisheries in summer months (July through August) occur in Fishing Areas 7 and 7A (Figure 3-13) when sockeye and pink salmon fisheries are open. The commercial fishing fleet has been greatly reduced in recent years due to factors such as decreased number of fishing days allowed and high costs of fuel, and currently has about 150 vessels participating (NMFS 2007). During aerial surveys of vessels in all San Juan County waters,

observers counted 50 to 60 commercial fishing vessels per day (Table 3-12). Some of the fleet uses areas along the west side of San Juan Island and Salmon Bank, while most of the commercial fishing fleet utilizes other areas congregating near Point Roberts, Cherry Point, and in Rosario Strait (Figure 3-13).

Estimates of the total output of commercial fisheries in inland waters of Washington were analyzed in the Final Environmental Impact Statement for the Puget Sound Chinook Harvest Resource Management Plan (NMFS 2004b). For the Strait of Juan de Fuca/North Hood Canal, Northern Puget Sound, and Southern Puget Sound/South Hood Canal the output of commercial fisheries was over $646 million for the year 2000 (NMFS 2004b). This did not include additional value from fish/seafood processing in the region. Estimates of the value of all commercial fisheries in Washington in 2000 were estimated at over $900 million per year (NMFS 2004b). This estimate followed a declining trend in fisheries catch for the previous decade.

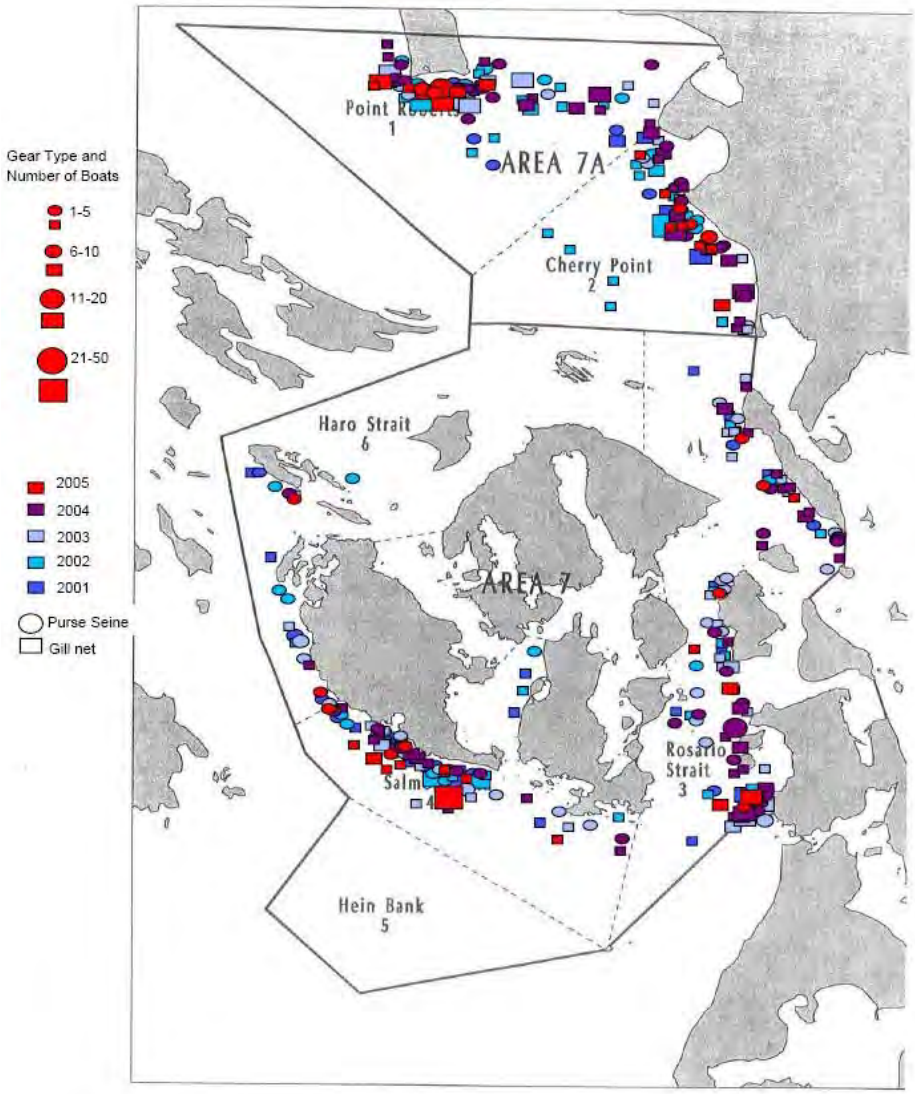


Figure 3-13. Distribution and number of non-tribal fishing boats during U.S. Fraser Panel fisheries in the San Juan Islands in 2001-2005 time periods (WDFW, unpublished data presented in NMFS 2007).

3.5 Recreation

About 390,000 people participate in recreation activities in the waters or on the beaches of Puget Sound at least once a year (Washington Department of Ecology 2008). These activities include fishing, swimming, boating, rafting, kayaking, and other water sports. Puget Sound has:

- 2,800 square miles of inland marine waters
- 2,500 miles of shoreline
- 2.1 million acres of state-owned submerged saltwater lands

There are 68 state parks and 8 national parks, wildlife refuges, forests and other uses that border Puget Sound. Local governments provide another 16 regional parks along the Sound (Washington Department of Ecology 2008).

As described in Subsection 3.4, Socioeconomics, the commercial whale watch industry is the predominant tourism activity focused on the whales. In 2006, 76 active commercial whale watch vessels (23 U.S. and 53 Canadian) from 35 active companies (16 U.S. and 19 Canadian) were operating in Haro Strait and approximately 425,000 to 500,000 people participate in commercial whale watching each year (O'Connor et al. 2009; Koski 2010b). In addition to commercial whale watching there is considerable recreational whale watching. One study has estimated that between 350,000 and 400,000 Washington residents of all ages boat for recreation, either owning a boat directly, renting or chartering a boat, or accompanying friends and family on a boat (Beckwith Associates 2002).

There are approximately 280,000 registered boats in Washington (only boats 16 feet or more in length or with 10 or more horsepower are required to be registered). Eighty percent of recreational boats registered in Washington are registered in Western Washington. Most boaters in Western Washington focus on cruising Puget Sound, thus, of the maximum of 400,000 boaters in Washington, up to 320,000 likely boat in inland waters of Washington. Koski (2007) estimated that the recreational vessels encountered during Soundwatch activities carried an average of 3.42 individuals per vessel. Kayaks are estimated to carry two individuals.

In Puget Sound there are 256 marinas with 39,400 moorage slips and another 331 launch sites for smaller boats (Washington Department of Ecology 2008). San Juan County Park operates a public boat launch used by recreational boaters, and both recreational and commercial kayakers. The launch is a free public launch for motorized vessels and kayaks; however, the park does not currently track use by recreational boaters. The park does track the use of the campground, and in 2007 the State collected fees for approximately 26,000 camper nights. Both campers and local residents likely use the boat launch.

A recent study by Responsive Management (2007) for the Washington State Recreation and Conservation Office consisted of focus groups of boating services providers, a telephone survey of boating services providers, a telephone survey of the general public in Washington, and a telephone survey of registered boaters in Washington. The assessment included information on the types of boats used most often, motivations for boating and preferred locations for boating. The majority of boaters (64 percent) used vessels 16 to 25 feet in length, 10 percent used vessels 26 feet or more, 24 percent used vessels 0 to 15 feet and others did not know the length of their vessels (Responsive Management 2007). Motor boat was, by far, the type of boat used most often (68 percent), the next nearest was kayak with 8 percent.

Fishing was the most common activity in which boaters participated while boating in Washington (53 percent of boaters fished). Other common activities included sight-seeing/fish and wildlife viewing (34 percent), water skiing (19 percent), relaxing or entertaining friends (17 percent), being with family and

friends (17 percent), and water tubing (15 percent). When asked to say what motivates them to boat, boaters most commonly answered for relaxation (49 percent), followed by fishing (29 percent), to be with friends and family (26 percent), for general recreation (14 percent), and to be close to nature (11 percent). To be close to nature as a motivation to boat was higher among paddlers than among the other types of boaters.

In addition to vessel-based opportunities for tourism related to killer whales, there are several land-based whale watching locations adjacent to inland waters of Washington (Subsection 3.8, Aesthetics). The most popular site is Lime Kiln Point State Park/Whale Watch State Park on San Juan Island which has approximately 200,000 visitors annually and has an interpretive center with information about killer whales (Koski 2006). The Whale Museum conducts shore-based wildlife tours that include whale watching and stops at Lime Kiln Point State Park.

3.6 Environmental Justice

This section was prepared in compliance with Presidential Executive Order 12898, Federal Actions to Address Environmental Justice in Minority Populations and Low Income Populations (Executive Order 12898), dated February 11, 1994, and Title VI of the Civil Rights Act of 1964. Both Executive Order 12898 and Title VI address persons belonging to the following target populations:

- Minority – all people of the following origins: Black, Asian, American Indian and Alaskan Native, Native Hawaiian or Other Pacific Islander, and Hispanic.

- Low income – persons whose household income is at or below the U.S. Department of Health and Human Services poverty guidelines.

Definitions of minority and low income areas were established on the basis of the Council on Environmental Quality (CEQ) document, Environmental Justice Guidance under the Environmental Policy Act of December 10, 1997. CEQ's guidance states that "minority populations should be identified where either (a) the minority population of the affected area exceeds 50 percent or (b) the population percentage of the affected area is meaningfully greater than the minority population percentage in the general population or other appropriate unit of geographical analysis." The CEQ further adds that "The selection of the appropriate unit of geographical analysis may be a governing body's jurisdiction, a neighborhood, a census tract, or other similar unit that is chosen so as not to artificially dilute or inflate the affected minority population." The CEQ guidelines do not specifically state the percentage considered meaningful in the case of low income populations. For this environmental analysis, the assumptions set forth in the CEQ guidelines for identifying and evaluating impacts on minority populations are used to identify and evaluate impacts on low income populations. More specifically, potential environmental justice impacts are assumed to occur in an area if the percentage of minority, Hispanic, and low income populations are meaningfully greater than the percentage of minority, Hispanic, and low income populations in the general population.

In addition, U.S. Environmental Protection Agency guidance specifically addresses environmental justice effects on Indian tribes:

> Federal duties under the Environmental Justice E.O., the Presidential directive on government-to-government relations, and the trust responsibility to Indian tribes may merge when the action proposed by a Federal agency or EPA potentially affects the natural or physical environment of a tribe. The natural or physical environment of a tribe may include resources reserved by treaty or lands held in trust; sites of special cultural,

> religious, or archeological importance, such as sites protected under the National Historic Preservation Act or the Native American Graves Protection and Repatriation Act; other areas reserved for hunting, fishing, and gathering (usual and accustomed), which may include "ceded" lands that are not within reservation boundaries. Potential effects of concern…may include ecological, cultural, human health, economic, or social impacts when those impacts are interrelated to impacts on the natural or physical environment.

Through the NEPA process, NMFS will ensure that the requirements of Executive Order 12898 regarding environmental justice are implemented, including all appropriate tribal consultation activities.

Minority data used for this Environmental Assessment analysis were derived from the 2000 U.S. Census (www.census.gov,) and income data are 2004 estimates from the Annual Social and Economic Supplements of the Current Population Survey (www.census.gov). Of the overall total population within the 12 counties that border the inland waters of Washington (Table 3-7), a county average of 13.63 percent are minority, a county average of 4.85 percent are of Hispanic origin, and county average of 10.6 percent are low income (Table 3-8). The distribution of minority, Hispanic, and low income populations for several surrounding counties and the state, are also shown in the two tables. These values were used to determine if the presence of these populations in the affected counties are meaningfully greater than those in the general populations. Using the CEQ guidelines, the percentage of minority, Hispanic, and low income populations in the affected counties is not meaningfully greater than the proportion of these populations in several surrounding counties or in the State.

Table 3-7. Minority and Hispanic populations in counties bordering inland waters of Washington from the 2000 U.S. Census (www.census.gov).

	Total	White	Black or African American	American Indian and Alaska Native	Asian	Hawaiian and Other Pacific Islander	Some other Race	Two or more races	Hispanic or Latino (of any race)	Percent Hispanic (%)	Percent minority (%)
Counties Bordering inland Waters of Washington											
Clallam County	64,525	57,505	545	3,303	731	104	761	1,576	2,203	3.41	10.88
Island County	71,558	62,374	1,691	693	3,001	314	1,025	2,460	2,843	3.97	12.83
Jefferson County	25,953	23,920	110	599	309	34	197	784	535	2.06	7.83
King County	1,737,034	1,315,507	93,875	15,922	187,745	9,013	44,473	70,499	95,242	5.48	24.27
Kitsap County	231,969	195,481	6,648	3,760	10,192	1,805	3,309	10,774	9,609	4.14	15.73
Mason County	49,405	43,705	587	1,840	519	221	1,036	1,497	2,361	4.78	11.54
Pierce County	700,820	549,369	48,730	9,963	35,583	5,922	15,410	35,843	38,621	5.51	21.61
San Juan County	14,077	13,372	36	117	125	12	128	287	338	2.40	5.01
Skagit County	102,979	89,070	450	1,909	1,538	163	7,381	2,468	11,536	11.20	13.51
Snohomish County	606,024	518,948	10,113	8,250	35,030	1,705	11,629	20,349	28,590	4.72	14.37
Thurston County	207,355	177,617	4,881	3,143	9,145	1,078	3,506	7,985	9,392	4.53	14.34
Whatcom County	166,814	147,485	1,150	4,709	4,637	235	4,159	4,439	8,687	5.21	11.59
County Average										4.79	13.62
Other Counties											
Gray's Harbor County	67,194	59,335	226	3,132	818	73	1,527	2,083	3,258	4.85	11.70
Yakima County	222,581	146,005	2,157	9,966	2,124	203	54,375	7,751	79,905	35.90	34.40
State											
Washington	5,894,121	4,821,823	190,267	93,301	322,335	23,953	228,923	213,519	441,509	7.49	18.19

Table 3-8. Low income information for Washington counties from 2004 estimates from the Annual Social and Economic Supplements of the Current Population Survey (www.census.gov).

Counties Bordering Inland Waters of Washington	2004 Population Estimate	Number in Poverty	Percent in Poverty (%)
Clallam County	67,867	8,446	12.3
Island County	79,293	6,442	8.3
Jefferson County	28,110	3,076	10.9
Mason County	1,777,143	6,429	12.2
King County	239,138	176,928	10
Kitsap County	53,637	21,616	9.3
Pierce County	745,411	87,131	11.8
San Juan County	15,190	1,279	8.4
Skagit County	111,064	13,660	12.2
Snohomish County	644,274	61,500	9.5
Thurston County	224,673	21,309	9.4
Whatcom County	180,167	23,742	13.2
County Average	347,163	35,963	10.6
Surrounding Counties			
Gray's Harbor	70,338	10,807	15.8
Yakima	229,094	42,704	18.6
State			
Washington	6,203,788	715,271	11.6

3.7 Noise

3.7.1 Underwater Noise

Several sources of sound contribute to underwater noise in the ocean and coastal marine environments (Richardson et al. 1995). Natural sounds include those produced from activities related to weather, such as wind, waves, and rain, seismic activity, underwater slides, currents, and animals like shrimp and marine mammals that make sounds. Some of these sources can substantially increase ambient noise levels, such as heavy precipitation (Wenz 1962; Nystuen et al. 1993). Human sources of underwater sound include oil drilling, construction, and vessel traffic as well as military sonar, seismic surveys, fisheries, and oceanographic research. The intensity (dB) and frequency (Hz) of sound as well as the environmental conditions (e.g., water depth, bottom type) influence the propagation of sound through the water.

Current underwater noise levels in Haro Strait range from 95 to 130 dB with overall average sound pressure level of 115 dB in broad frequency band 0.1 to 15 kHz (Veirs and Veirs 2006). Veirs and Veirs (2006) conclude that vessel noise is the main anthropogenic contribution to sound in Haro Strait. The contribution of natural and anthropogenic sound to current conditions can vary, particularly due to weather conditions. For example, at passive aquatic listeners off of Cape Flattery, Washington, shipping noise dominated the sound field approximately 10 to 30 percent of the time, depending on weather—that is, when the weather was poor, shipping noise was a smaller percentage of the total (Nystuen 2006).

A variety of vessel types pass through Haro Strait, and the noise they make varies depending on the vessel size, engine type, and speed. Individual passing, large vessels (i.e., commercial ships) generate between 20 to 25 dB for 10 to 30 minutes, whereas smaller vessels (motorboats) generate 15 to 20 dB (Veirs and Veirs 2006). In summer months during whale watch operations, these smaller vessels contributed more to the overall ambient levels during the day, raising average ambient sound conditions in Haro Strait by 3 dB compared to non-summer daytime hours. Hildebrand et al. (2006) reported source level measurements for a variety of vessels and also concluded that during cruise and power acceleration operating conditions, whale watch vessels were capable of increasing ambient sound levels by 20 dB at about 200 yards.

Underwater sound levels generally increase with speed (Bain 2002; Erbe 2002). Idling whale watch vessels at 200 meters produce sound levels that are comparable to ambient levels (Hildebrand et al. 2006). Outboard motorboats operating at full speed produce sound levels of about 160 to 175 dB (Bain 2002; Erbe 2002). Additionally, sound produced by inflatables with outboard engines is more intense or louder than rigid-hull powerboats with inboard or stern-drive engines (Erbe 2002).

The frequency content of sound exposure is important to consider given that killer whales have peak hearing sensitivity between 18 to 42 kHz and the most relevant frequency range for communication and echolocation is 1 to 100 kHz. Ambient noise levels expressed as sound pressure spectrum levels gives the sound level per one Hz band as a way to describe the distribution of sound levels across frequency (Richardson et al. 1995). Spectrum levels in Haro Strait illustrated that the greatest increases in sound levels at higher frequencies (greater than 1 kHz) occurred in July and in the middle of the day which coincide with larger numbers of small recreational and commercial whale watching vessels (Veirs and Veirs 2006). Large commercial container ships have higher source levels at low frequency (below peak hearing sensitivity); however, they still produce significant levels of noise at high frequencies (greater than 2 kHz).

3.7.2 Atmospheric Noise

Atmospheric noise is generated in the action area by wind, waves, vessels, and aircraft and is heard by people in boats as well as on land. In-air noise (which commonly is frequency-weighted to approximate human hearing) is measured on an A-weighted scale, denoted as dBA. The A-weighted decibel scale begins at zero, which represents the faintest noise that humans can hear. Decibels are measured on a logarithmic scale; thus, a noise level of 70 dBA is twice as loud to the listener as a noise of 60 dBA (USDOT 1995). Noise conditions vary depending on site conditions which vary greatly throughout Puget Sound. Urban areas have the highest baseline noise levels, with daytime levels of approximately 60 to 65 dBA, suburban or residential areas have baseline levels around 45 to 50 dBA, and rural areas are the quietest with noise levels of 35 to 40 dBA (EPA 1978 in WSDOT 2008). For example, a WSDOT noise assessment on the San Juan Islands identified a baseline of about 35 dBA at a bald eagle nest site, with regular noise intrusions from traffic and aircraft overflights ranging from 45 to 72 dBA (WSDOT 1994).

Atmospheric sound from vessels is regulated in Washington State waters. Under RCW 79A.60.130 all motorized vessels must have an effective muffler that limits sound levels to 90 dBA or 88 dBA depending on the year the engine was manufactured. In addition, no person may operate a vessel on waters of the state in such a manner as to exceed a noise level of 75 dBA measured from any point on the shoreline of the body of water. Small motor boat engine noise levels are generally in the 65 to 75 dBA range when stationary, and full throttle pass-by sound levels generally are in the range of 75 to 85 dBA when measured at a distance of 50 feet (Lanpheer 2000). Moving vessels are considered line sources of noise and the standard reduction for line source noise is 3 dB per doubling of distance from the source. Some vessels

operating at high speeds may need to be further than 50 feet from shore to reduce sound levels for individuals on shore (such as visitors to Lime Kiln Point State Park) and to comply with regulations.

3.8 Aesthetics

In addition to vessel-based opportunities to view killer whales in the inland waters of Washington, there are several land-based locations valued by local residents and tourists (www.thewhaletrail.org). The most reliable areas to view killer whales from land are located in the San Juan Islands where the whales spend considerable time, particularly in summer months. There are five main locations on San Juan Island to view killer whales and other wildlife (San Juan Island County Park, Lime Kiln Point State Park, San Juan National Historic Park American Camp, and Cattle Point), and the most popular place is Lime Kiln Point State Park, also called Whale Watch State Park. Just 9 miles from Friday Harbor, this 36-acre day-use park is surrounded by approximately 200 acres of county land that is available to the public and supported by local transit.

A goal of the park is to preserve and interpret the natural and cultural resources of the area. In 1985, the lighthouse and surrounding sea were dedicated as a whale sanctuary and research station for marine mammal scientists. Under the direction of the Whale Museum in Friday Harbor, scientists based in the lighthouse track the movements and behavior of local killer whales. Three webcams and a hydrophone are located at the lighthouse to facilitate remote tracking of the whales. An Interpretive Center was officially opened in August of 2006 to offer information on the natural history of the whales. The Interpretive Center was created in partnership with The Whale Museum, the Center for Whale Research, and researchers like Dr. Bob Otis of Ripon College. There are interpretive programs and representatives from the Whale Museum on hand during the summer months to provide information to visitors, and the Whale Museum conducts wildlife tours incorporating land-based whale watching. The Coast Guard still maintains the lighthouse as an active aid to navigation in Haro Strait, but the building is used for killer whale research, interpretation and lighthouse tours.

Shore-based whale watching at Lime Kiln Point State Park/Whale Watch State Park steadily increased from the park dedication in 1985 through 1996. Since then, visitors to the park have maintained steady at nearly 200,000 visitors annually (Koski 2006). In part to preserve the land-based viewing at Lime Kiln Point, a voluntary no-go zone was established along the west side of San Juan Island. Whale watching from shore is enhanced by having fewer vessels around the whales or in between land-based viewers and the whales. Malcolm (2004) surveyed commercial whale watch participants and they ranked “see marine wildlife in an uncrowded setting” as having high importance in their expectations. This is consistent with reports of land-based viewers raising concerns about the presence of boats disturbing the whales and also their own experiences. The noise and maneuvering of the whale watch boats were specifically identified as concerns for land-based viewers (Finkler and Higham 2004). In addition to visitors to Lime Kiln Point State Park and other land-based sites, approximately 425,000 to 500,000 people view killer whales from commercial whale watch vessels, and a large number of people view them from recreational vessels.

3.9 Transportation

The two largest and busiest ports in Puget Sound are the Ports of Seattle and Tacoma, which, combined, represent the second largest port in terms of volume of container traffic in North America, after Los Angeles/Long Beach (IEC 2008). Moreover, the Port of Vancouver, British Columbia, situated to the north of the greater Puget Sound area, ranks number one on the west coast of North America in terms of total cargo volume (IEC 2008). Thus, the Puget Sound waterways are some of the busiest in the world. The

major types of vessels that operate in the Puget Sound region include tankers, cargo/freighters, government, fishing, tug boats, ferries and other passenger vessels including recreational vessels.

Oil tankers serve major oil terminals located in the northern section of Puget Sound, which receive shipments from Alaska and elsewhere. Vessels transporting containerized cargo and loose and other bulk goods are the most frequent large vessel types in the region. In addition, the Puget Sound region is also home to a large deep-sea and local fishing fleet, a substantial coastal freighter fleet, and several major U.S. Navy installations.

As indicated by the large number of ferry transits in Table 3-9, many passenger and car ferries operate throughout the region. While ferry systems in the Sound are both publicly and privately owned, the largest is the Washington State Ferry system, which is the third largest system in the world, serving eight counties in the Puget Sound and San Juan Islands area in Washington, as well as the Province of British Columbia in Canada. Washington State Ferries maintains a fleet of 28 vessels, making 500 trips per day to serve 20 terminal points along ten ferry routes. Depending on their design, the ferries may carry between 100 to 200 vehicles, and between 1,000 to 2,500 passengers.

Puget Sound is popular for recreational boating, and whale watching is popular, especially near the western shores of San Juan Islands, where most whale sightings are known to occur (Figure 3-6). Recreational and commercial whale watching vessels are most active between May and September in Haro Strait near the San Juan Islands, with the highest densities occurring June through August (Koski 2004, 2006, 2007, 2008, 2009, 2010a, 2010b). Commercial whale watching is described in detail above (Subsection 3.4, Socioeconomics). Recreational vessels also engage in fishing, sightseeing, transport, and other activities (Subsection 3.5, Recreation).

Because Puget Sound is a water system that is important to the economies of both the United States and Canada, which share ownership of Puget Sound waters, vessel traffic is monitored at all times by the U.S. Coast Guard (USCG) and the Canadian Coast Guard (CCG). In 1979, the USCG and CCG established the Cooperative Vessel Traffic Services (CVTS) by formal agreement to manage the movement of vessels in the shared waters of the two countries. The purpose of the CVTS is to manage vessel movements efficiently, to promote the safety of vessels, and to minimize the risk of marine pollution. The commercial vessels that participate in the system generally follow a series of well-defined navigation lanes called the Traffic Separation Scheme (TSS). The TSS comprises two traffic lanes with a separation zone in between.

U.S. and Canadian regulations mandate that a) all powered vessels that are more than 40 meters in length, b) tug boats that are more than eight meters in length, or c) vessels carrying 50 or more passengers, participate in the monitoring and reporting system set in place by the CVTS. The vessel tracking databases are a useful source of information on the types of vessels and the number of vessel transits through the region.

Estimated transits through Haro Strait, Boundary Pass, and the Strait of Georgia waterways are presented in Table 3-9 and Table 3-10 and average over 165,000 per year. The ratio of the number of transits per vessel is considerably smaller for tankers and cargo ships when compared to the number of transits made by the smaller vessels such as tug boats and ferries. Tug boats are servicing vessels that make many more transits to assist the primary vessels transporting goods. Ferries are engaged in shipping of daily passengers to and from the metropolitan areas of Vancouver and Seattle. Given the nature of service provided by tug boats and ferries, the number of transits made by each tug boat and ferry will be substantially higher than the number of transits made by other vessel types.

Although data on the actual number of vessels by type that operate in the area are not available, the Victoria Vessel Traffic Center has recently started tracking the number of vessels in addition to the number of transits. Total vessel counts are available beginning in April 2007. Table 3-11 lists the monthly vessel counts for April to December 2007 for the areas managed by the Victoria center.

Table 3-9. Estimated transits through Haro Strait, Boundary Pass, and Strait of Georgia Waterways (April through September).

Vessel Type	2007–2008	2006-2007	2005-2006	2004-2005	2003-2004	Average
Tanker	306	363	405	321	321	**343**
Cargo	3,125	4,037	4,190	4,549	4,523	**4,085**
Government	2,126	2,689	2,728	2,474	2,351	**2,474**
Fishing	875	1,301	1,571	1,865	1,418	**1,406**
Passenger Vessels	1,065	1,416	1,600	1,492	2,461	**1,607**
Other Vessels[1]	3,841	3,981	4,182	4,163	3,672	**3,968**
Subtotal Movements	**11,338**	**13,787**	**14,676**	**14,864**	**14,746**	**13,882**
Tug	22,858	29,525	29,773	28,877	25,876	**27,382**
Ferry	48,968	50,211	51,447	51,201	49,570	**50,279**
Grand Total Movements	**83,164**	**93,523**	**95,896**	**94,942**	**90,192**	**91,543**

[1]"Other vessels" includes all vessels that participate in the VTS System in addition to vessel types defined in this table, including charter vessels, whale watching vessels, or other kinds of recreation or private vessels. These vessel types are not tracked uniquely and this analysis cannot further break down this category.
Source: Ian Wade, Regional Program Specialist Marine Communications and Traffic Services (MCTS), Canadian Coast Guard, Pacific Region.

Table 3-10. Estimated Transits Through Haro Strait, Boundary Pass, and Strait of Georgia Waterways (October through March).

Vessel Type	2007–2008[1]	2006-2007	2005-2006	2004-2005	2003-2004	Average
Tanker	136	316	287	290	266	259
Cargo	1,536	3,615	4,177	4,178	4,347	3,571
Government	902	2,174	2,261	2,092	1,939	1,874
Fishing	323	935	1,146	1,523	1,731	1,132
Passenger Vessels	91	95	121	158	306	154
Other Vessels[2]	1,816	3,471	3,454	3,722	3,782	3,249
Subtotal Movements	4,804	10,606	11,446	11,963	12,371	10,238
Tug	10,528	25,348	28,934	27,130	24,775	23,343
Ferry	22,412	44,111	45,664	45,846	45,314	40,669
Grand Total Movements	37,744	80,065	86,044	84,939	82,460	74,250

[1] For 2007-2008 data were only available on vessel counts for October, November, and December 2007.
[2] "Other vessels" includes all vessels that participate in the VTS System in addition to vessel types defined in this table, including charter vessels, whale watching vessels, or other kinds of recreation or private vessels. These vessel types are not tracked uniquely and this analysis cannot further break down this category.
Source: Ian Wade, Regional Program Specialist Marine Communications and Traffic Services (MCTS), Canadian Coast Guard, Pacific Region.

No information is available on the extent to which any of these vessel types currently adjust course or speed to comply with the Be Whale Wise guidelines. It is likely, however, that adjustments by these vessels is low given the fact that they make up less than 3 percent of vessels observed violating the guidelines (Figure 3-9).

Table 3-11. Daily average number of vessels participating in CVTS for Haro Strait, Boundary Pass, and the Strait of Georgia waterways.

Month	Daily Average Number of Participating Vessels
April	143
May	153
June	158
July	159
August	159
September	151
October	140
November	132
December	115
AVERAGE	**146**

San Juan County conducted a pilot vessel study August through September 2006 to quantify peak season marine vessel traffic in the San Juan Islands (Dismukes/MRC 2007) and a follow up was conducted in May through September of 2010 (Dismukes et al. 2010). These studies include information on many smaller vessels not participating in CVTS. Aerial surveys in 2006 documented different categories of vessels that were underway, at anchor, or moored, excluding all vessels which were at dock or in marina slips, under 16 feet in length, or paddle-powered. In 2010, additional vessels, including paddle-powered vessels, were also counted, and ferries were not included.

There was an average total of 963 vessels on water at any given daylight time for weekend/holiday days and 667 for weekdays during the peak season (August-September) in 2006 (Table 3-12). Vessel numbers increased during weekend/holiday periods of peak summer season due to increased recreational use. Commercial use remained relatively constant throughout the week. There was an average total of 1,130 vessels on the water at any given daylight time for weekend/holiday days and 818 for weekdays during the peak season (Table 3-13). During 2010, additional data were collected starting in May and June, and all vessel types were counted. For the entire study there was an average of 1,118 vessels of all types for weekends and 893 on weekdays (Table 3-14).

The reports include maps of vessel locations and distributions. These maps reveal patterns such as whale watching vessels and kayaks in a typical spot along the western coast of San Juan Island, and obvious salmon fishing clusters off the southwestern shores of Cattle Point. In addition, bays and harbors appear to be dominated by sailing vessels while the open waters appear to be somewhat more populated with power vessels.

Table 3-12. Average vessel compositions for peak season (August-September) between 9 a.m. and 6 p.m. for 2006.

2006 Peak Season (August-September) Weekday Sea Vessel Composition
9 A.M. – 6 P.M.

	Power	Sail	Commercial Fishing	Ferry	Cargo	TOTAL
Average	**351**	**260**	**50**	**3**	**3**	**667**
Standard Error	+/- **29.68**	+/- **7.17**	+/- **5.42**	+/- **.56**	+/- **.56**	+/- **32.43**

2006 Peak Season (August-September) Weekend/Holiday Sea Vessel Composition
9 A.M. – 6 P.M.

	Power	Sail	Commercial Fishing	Ferry	Cargo	TOTAL
Average	**554**	**343**	**59**	**4**	**4**	**963**
Standard Error	+/- **33.88**	+/- **17.94**	+/- **9.37**	+/- **.44**	+/- **.53**	+/- **54**

Note: From Dismukes/MRC 2007 Figure 4.

Table 3-13. Average vessel compositions for peak season (August-September) between 9 a.m. and 6 p.m. for 2010.

2010 Peak Season (August-September) Weekday Sea Vessel Composition
9 A.M. – 6 P.M.

	Power	Sail	Commercial Fishing	Cargo	TOTAL
Average	**404**	**358**	**54**	**3**	**818**
Standard Error	+/- **29.08**	+/- **21.95**	+/- **6.22**	+/- **0.65**	+/- **41.12**

2010 Peak Season (August-September) Weekend/Holiday Sea Vessel Composition
9 A.M. – 6 P.M.

	Power	Sail	Commercial Fishing	Cargo	TOTAL
Average	**646**	**448**	**33**	**3**	**1130**
Standard Error	+/- **31.03**	+/- **13.91**	+/- **3.87**	+/- **.54**	+/- **40.84**

Table 3-14. Average vessel compositions for entire study (May-September) including all vessel types for 2010.

2010 Weekday Average Vessel Composition

	Power	Sail	Paddle	Commercial Fishing	Recreational Fishing	Reef Net	Skiff	Tour	Cargo	TOTAL
Average	**386**	**334**	**48**	**16**	**23**	**9**	**71**	**5**	**3**	**893**
Standard Error	+/- **37.7**	+/- **24.0**	+/- **7.62**	+/- **4.92**	+/- **10.51**	+/- **2.57**	+/- **7.61**	+/- **1.09**	+/- **.45**	+/- **71.76**

2010 Weekend/Holiday Average Vessel Composition

	Power	Sail	Paddle	Commercial Fishing	Recreational Fishing	Reef Net	Skiff	Tour	Cargo	TOTAL
Average	**562**	**401**	**53**	**11**	**22**	**9**	**55**	**4**	**3**	**1118**
Standard Error	+/- **39.29**	+/- **19.31**	+/- **5.46**	+/- **2.55**	+/- **5.02**	+/- **1.82**	+/- **3.74**	+/- **.91**	+/- **.37**	+/- **67.9**

Table 3-15. Average vessel compositions in the proposed no-go zone (May- September) including all vessel types in 2010.

2010 Proposed No-Go Zone Average Weekday Vessel Composition

	Power	Sail	Paddle	Commercial Fishing	Recreational Fishing	Skiff	Tour	Cargo	TOTAL
Average	**4**	**.25**	**14**	**3**	**1**	**.08**	**1**	**.08**	
Standard Error	+/- **1.12**	+/- **.18**	+/- **2.65**	+/- **1.32**	+/- **.72**	+/- **.08**	+/- **.29**	+/- **.08**	+/-

2010 Proposed No-Go Zone Average Weekend/Holiday Vessel Composition

	Power	Sail	Paddle	Commercial Fishing	Recreational Fishing	Skiff	Tour	Cargo	TOTAL
Average	**4**	**1**	**14**	**2**	**2**	**0**	**0**	**0**	
Standard Error	+/- **.79**	+/- **.34**	+/- **1.96**	+/- **.97**	+/- **.83**	+/- **.07**	+/- **.05**	+/- **0**	+/-

4.0 ENVIRONMENTAL CONSEQUENCES

4.1 Introduction

The following analyses address the eight resources identified as having a potential to be impacted by the alternatives: Marine Mammals, Listed and Non-listed Salmonids, Socioeconomics, Recreation, Environmental Justice, Noise, Aesthetics, and Transportation. The analyses describe expected conditions under the various alternatives when compared to the existing conditions described in Section 3.0, Affected Environment. Resource impacts are summarized in Table 4-1. Impacts to some resources have been avoided or reduced by exempting certain classes of vessels or activities under all of the alternatives. A description of the exceptions and the resource impacts that are reduced or avoided are included in Subsection 1.6.4, Exceptions.

The terms “effect” and “impact” are used synonymously under NEPA, consequently both terms may be used in the following analyses. Impacts include effects on the environment that are direct, indirect, or cumulative. Direct effects are caused by the action itself and occur at the same time and place. Indirect effects are caused by the action and are later in time or farther removed in distance, but are still reasonably foreseeable. Cumulative impacts are those impacts on the environment that result from the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions, regardless of what agency (Federal or non-Federal) or person undertakes such other actions. Cumulative impacts can result from individually minor but collectively significant actions taking place over a period of time. Cumulative effects are analyzed in Section 5.0.

4.1.1 Nature of the Alternative Analysis

Under the No-action Alternative, NMFS would continue to promote boater education through the voluntary guidelines designed to protect killer whales from vessel effects. Under all of the action alternatives, NMFS would promulgate enforceable regulations. Some of the alternative regulations analyzed here are mutually exclusive, but others could be adopted in combination. For example, Alternatives 2 and 3 consider 100-yard and 200-yard approach limits, respectively, which are mutually exclusive regulatory provisions. Similarly, Alternatives 4 and 5 consider two different no-go zones. In comparison, either Alternatives 2 or 3 could be promulgated in combination with either Alternatives 4 or 5. To inform the decision about what combination of provisions to include in regulations, if any, the following analysis examines each potential regulatory provision separately. Each provision is compared to the No-action Alternative, to describe the effect of adopting that provision by itself. The analysis also discusses how the various provisions compare with each other where that comparison is relevant and informs decision-making.

To assist in the analysis of effects under each alternative, Subsections 4.1.2 and 4.1.3 provide general information on compliance with regulations and protected areas. Subsection 4.1.2, Effects of Enforceable Regulations Compared to Voluntary Guidelines, explains how and why the number of vessel incidents might change if NMFS adopts specific mandatory rules compared to the current voluntary guidelines. This informs the analysis of impacts under each of the action alternatives (Subsections 4.2.2 through 4.2.9). Subsection 4.1.3, Protected Areas, reviews information on the effectiveness of protected areas for marine mammals and elements of successful protected areas. This information provides a basis for the effects analyzed under Alternatives 4 and 5. The analysis of each of the eight resources potentially impacted by the alternatives follows this overall information relevant to the analysis.

4.1.2 General Effects of Enforceable Regulations Compared to Voluntary Guidelines

Under the No-action Alternative, existing general prohibitions under the MMPA and ESA would continue, and NMFS would continue promoting specific voluntary guidelines. Alternatives 2 through 7 each consider an individual mandatory regulation. Some of these mandatory regulations are mutually exclusive and some could be adopted in combination. Alternative 8, the Proposed Action, and Alternative 9, Preferred Alternative, consider a combination of regulations. The observed levels of compliance by commercial and recreational boaters under the current program are described in Subsection 3.2.1.5, Vessel Interactions, and reflected in Table 3-1 and Table 3-2 and Figure 3-11. For the reasons described in that subsection, the monitoring data represents a minimum number of incidents between vessels and whales.

To estimate how the number of incidents might change if NMFS adopts specific mandatory rules, this analysis considers those elements that might influence the level of compliance with such rules as compared with the current program. The analysis considers both the ability and willingness of individuals to comply with mandatory rules. The ability of individuals to comply with rules depends on their awareness of the rules' existence and whether the rules are clear and easy to follow. Information on clarity of the different alternatives is described in Subsection 4.2, Marine Mammals, for each alternative. Once aware of rules (and assuming they are clear and easy to follow), citizens may be willing to comply with them out of a sense of civic duty or obligation, social influences, fear of sanctions, or economic consequences associated with non-compliance (Keane et al. 2008; May 2005; National Marine Protected Areas Center 2005). These factors may affect compliance differently for commercial and recreational vessel operators as discussed below.

A sense of civic duty and social influences can motivate compliance with both voluntary guidelines and mandatory rules. Both voluntary and mandatory programs can create a sense of duty particularly when education emphasizing the importance of the rules is part of the program. May (2005) studied compliance of boatyard and marina operators with water quality rules and found no significant difference between voluntary and mandatory rules in the operators' sense of duty to address the problem. Good public relations, market differentiation, and other social influences can also motivate compliance with both voluntary and mandatory programs (Keane et al. 2008; May 2005; National Marine Protected Areas Center 2005). Maintaining reputation among peers is one example of social influences that can positively influence compliance.

Fear of sanctions is a stronger motivation for compliance with mandatory rules rather than voluntary guidelines, which generally do not have sanctions associated with non-compliance. For example, May (2005) found that traditional regulations were more effective than the voluntary approach alone in achieving compliance with water quality rules. May (2005) found deterrent fears were more strongly activated by mandatory regulations, which is consistent with a criminal law model, in which compliance is based on fear of the consequences of a violation. Inspections and enforcement actions, as well as publicizing or "showcasing" enforcement actions, which may cause embarrassment, can contribute to effective deterrence.

Economic consequences of non-compliance aside from sanctions can also motivate citizens to comply with or disregard rules. Because these are primarily associated with commercial whale watch operators, they are discussed further below.

Commercial Whale Watch Operators. The ESA and implementing regulations prohibit take, and the MMPA and implementing regulations prohibit harassment (Subsection 1.3, Current MMPA and ESA Prohibitions, Regulations, and NMFS Guidelines). These general prohibitions apply to all endangered

species and marine mammals, respectively, and do not include detailed descriptions of what specific activities constitute take or harassment. NMFS officials have provided some general guidance about what types of activities may constitute take or harassment (67 Fed. Reg. 4379, January 30, 2002); however, this guidance does not identify specific actions or circumstances that cause take or harassment. Commercial operators know about and understand the purpose of the general prohibitions on take and harassment, but the lack of clarity of the general prohibitions led whale watch operators, governments, and whale advocates to develop the more specific, voluntary Be Whale Wise guidelines to provide specific advice on how to operate vessels in order to avoid causing harassment or take. The Pacific Whale Watch Association (association) has described its commitment to responsible wildlife viewing and created its own set of best practices guidelines. These best practices complement the Be Whale Wise guidelines for all boaters, and contain specific direction for commercial operators.

Data from Soundwatch indicate a high level of noncompliance with the current voluntary Be Whale Wise guidelines with over 1,000 incidents each year. In other regions, reviews of the effectiveness of voluntary conservation agreements have also indicated that voluntary guidelines may be insufficient to protect marine mammals. In the Northeast, Wiley et al. (2008) found that for whale watch companies there was a high level of noncompliance (mean 78 percent, company range 74 to 88 percent) with voluntary speed-zone buffers for endangered whales. Despite conditions that seemed supportive of the use of voluntary measures, Wiley et al. (2008) concluded that the low level of compliance probably failed to achieve the desired conservation goals. Their recommendation was that for either voluntary guidelines or mandatory regulations, a goal of high compliance with protective measures should be set to achieve conservation, rather than dropping standards to achieve high levels of compliance.

The first element of compliance – ability to comply – depends on knowledge of the regulations and how easy it is to follow them. Commercial whale watch operators would likely be aware of any new mandatory regulations. The association provides a ready mechanism for educating the operators. NMFS and Soundwatch both communicate regularly with the association members. The commercial operators are well informed about the potential for new mandatory regulations, commented on the ANPR, and participated in the scoping sessions preceding development of this Environmental Assessment (Subsection 1.5, Advanced Notice of Proposed Rulemaking). NMFS is confident that the commercial operators, particularly members of the association, would be aware of the existence of any new regulations and their details. While commercial operators have expertise and experience (as compared to many recreational boaters) that would enable them to follow regulations, the clarity and ease of following any particular specific regulation is discussed under each alternative.

Commercial operators would have strong motivation to comply with new mandatory regulations based on their stated sense of obligation to protect the whales and social influences, similar to their motivations under the current voluntary guidelines. Social pressures within an association, as well as within a close-knit community such as the San Juan County area, can also contribute to compliance (NMPAC 2005). Maintaining reputation among peers is a social influence that can motivate compliance. Groups concerned with reputation, such as trade associations, have a greater likelihood of compliance than individuals (May 2005).

Commercial operators would also have a business motivation to comply with new mandatory regulations, again just as they do with the voluntary guidelines. Association members use their membership in the association as a market differentiation tool and have a “Look Before You Book” program to identify member companies as safe, professional, and respectful of wildlife. They use the association logo as an indication of assurance of adherence to responsible practices to attract customers. Violation of mandatory regulations or voluntary guidelines may harm a commercial operator’s reputation, and therefore harm their ability to attract customers. The current specific, voluntary guidelines do not result in fines or

imprisonment, nor are there cases of members being publicly embarrassed or excluded from the association because of guideline incidents. In contrast to violations of voluntary guidelines, violations of a mandatory regulation would likely be publicized and therefore cause more severe harm to reputation and therefore to business success. This element of motivation for commercial operators is the primary one that is different for specific mandatory regulations than for specific voluntary guidelines.

Commercial operators would also be motivated to avoid monetary impacts on their economic status from penalties charged for violations of regulations. There may, however, also be economic incentives for commercial whale watch operators not to comply with mandatory regulations. They may believe they will attract more customers or that customers would be willing to pay more if their tours result in close contact with the whales, closer than is allowed by guidelines or rules. This belief is suggested by the pictures and text included in the websites and other advertising by commercial whale watch operators showing close approaches to killer whales and guaranteeing customers encounters with killer whales. It is also suggested by incidents committed by commercial operators, which are designed to get customers close to the whales.

Recreational Boaters. Like commercial operators, recreational boaters are subject to the mandatory ESA and MMPA rules and penalties, and are a target of the Be Whale Wise education campaign. Of all incidents between the whales and vessels, about 57 percent are committed by recreational vessels, compared with 30 percent by commercial whale watch operators (Figure 3-9). This may be because recreational boaters are less likely to know about the current general mandatory prohibitions or the specific voluntary guidelines – they do not belong to associations whose members all make a business of watching whales, are likely to be on the water less frequently than commercial operators, and are likely to have less contact with whale advocates and government regulators. Recreational boaters may also not be aware that whales are nearby and/or may be less able to judge distance from the whales than the more experienced whale-watch operators.

Motivation for compliance by recreational boaters who are aware of voluntary or mandatory programs may be driven by a sense of obligation to help killer whales and a fear of penalties, and less by social influences, such as reputation among peers or embarrassment from a publicized violation. Fear of the consequences of violation of mandatory rules, such as fines, would likely be a motivating factor for recreational boaters. This motivation, however, would not be as strong for recreational boaters compared to commercial operators who would fear additional consequences, such as damage to reputation and potential economic losses. Recreational boaters do not have business incentives to comply with rules, such as market differentiation, as compared to commercial operators.

General Conclusions. From this information NMFS concludes that in general, vessel operators are more likely to adhere to mandatory specific regulations than to the current voluntary guidelines. This likelihood for any particular rule would be affected by the clarity of the rules, motivations to comply, and the level of monitoring and enforcement. It is reasonable to assume that commercial operators would know about mandatory regulations, for the same reasons that they are familiar with the current specific voluntary guidelines (discussed above). Recreational boaters are also more likely to comply with mandatory regulations, although they may be less likely to know the details of mandatory regulations than are commercial operators. Thus in general, promulgation of specific mandatory regulations is likely to result in fewer incidents between vessels and whales than occurs under the current regime. For each of the potential mandatory rules examined under each of the action alternatives, this analysis considers both the ability to comply (awareness of rules and if they are easy to follow) and motivations likely to influence compliance (civic duty, social influences, fear of sanctions). Because it is not possible to predict the extent to which either commercial or recreational vessel operators would comply with mandatory regulations, the following discussion describes the current observed minimum number of incidents associated with each potential rule, and evaluates potential changes in the number of incidents between whales and vessels qualitatively.

4.1.3 Protected Areas

Protected areas for marine species including marine mammals have rarely been evaluated for effectiveness and have received mixed reviews (Reeves 2000; Hoyt 2005). In protecting a specific population, the optimal protected area would encompass the population's year-round distribution; however, this is often not practical for wide ranging and transboundary marine mammals. Small protected areas, however, can still help conserve species. Several models for fishery reserves have included migration and movement of animals and show benefits of small protected areas even to highly mobile species (Apostolaki et al. 2002; Roberts and Sargant 2002). A history of protected sites in nearby waters improves compliance rates for newly established protected areas (NMPAC 2005). Protected areas that are identified with coordinates on navigation charts are easy to understand, and education regarding the location and reasons for protection can increase compliance (NMPAC 2005). Formal recognition of protected areas can also aid in achieving compliance. Vanderlaan and Taggart (2009) reviewed the efficacy of a voluntary area to be avoided to reduce risk of lethal vessel strikes to endangered whales. They concluded that recognition of the voluntary conservation initiative by the International Maritime Organization contributed to a high level of compliance (71 percent within 5 months) and achieved the conservation goal of reducing the risk of lethal ship strikes.

Some protected areas have been criticized for failure to engage the community, reluctance to regulate activities like fisheries or vessel traffic, and lack of coordination with local jurisdictions (Reeves 2000). Regardless of the regulatory impact of a protected area, they all have some value in education and outreach. Protected areas for marine mammals have been effective in raising awareness of important areas for species, encouraging coordination and funding of research, and other non-regulatory activities (Reeves 2002).

The basis for setting and designating sites should rest on an evaluation of the needs of the population at risk, its distribution, sensitive activities (i.e., breeding, feeding), and threats. Ashe et al. (2009) recommend identifying areas as candidates for marine protected areas by prioritizing habitats that animals use primarily for the activity in which they are most responsive to anthropogenic disturbance. Where spatial components of threats can be identified, establishment of marine protected areas can be useful for conservation (Reeves 2000; Hooker and Gerber 2004). Even if an animal only uses the protected area for part of the time, protected areas reduce the frequency of exposure to certain threats and diminish the overall cumulative impact of other threats (Hooker and Gerber 2004). A review of threats to marine predators suggests they may be most at risk during foraging activities (Hooker and Gerber 2004) and this has been suggested specifically for killer whales (Williams et al. 2006; Ashe et al. 2009). This review of information on protected areas for marine mammals provides background information to help evaluate individual alternatives, particularly Alternatives 4 and 5.

4.1.4 Effects on Southern Resident Killer Whale Critical Habitat

While the alternatives evaluated in this analysis might affect the distribution of vessels in the action area, none would affect the number of vessels in the action area, for reasons explained under each alternative below (all of the alternatives consider the behavior of vessels around whales—such as proximity, speed, and direction—rather than numbers of vessels). For this reason, none of the alternatives is expected to affect designated critical habitat of Southern Resident killer whales. Features of killer whale critical habitat include water quality, prey availability, and passage. Some of these features could be affected by the number of vessels present in the action area, but would not be affected by changes in vessel distribution.

4.2 Marine Mammals

Similar to the discussion of the affected environment presented in Subsection 3.2.1, Killer Whales, the analysis in this section focuses on Southern Resident killer whales and, secondarily, on other killer whales. It also mentions other marine mammals where indirect effects would occur. The information on marine mammals in Subsection 3.2, Marine Mammals, begins with information on the status of the killer whale populations (3.2.1.2). There was also specific information on foraging behavior (3.2.1.3), habitat use (3.2.1.4), and vessel interactions (3.2.1.5) presented in the discussion of the affected environment for killer whales. The analysis of environmental consequences for marine mammals in Subsection 4.2 is presented in a different order to aid the reader in understanding the effects on each of these aspects of killer whales. For each alternative, the discussion begins with information on vessel activities and those changes in vessel interactions or incidents that would be expected under each alternative. The changes in vessel interactions or incidents are then discussed in terms of the three types of impacts to the whales—vessel strikes, behavioral disturbance, and acoustic masking—as presented in Subsection 3.2.1.5, Vessel Interactions. The discussion of impacts incorporates specific effects on foraging behavior as described in Subsection 3.2.1.3, Foraging. Subsection 4.2, Marine Mammals, also provides a description of expected effects under each alternative, which is presented in the context of the whales' habitat use as described in Subsection 3.2.1.4, Distribution and Habitat Use. Following the information on impacts from vessels, there is a discussion of how those impacts are expected to affect the fitness of the whales and their population status.

Affected Environment information on the status of other killer whales and marine mammals is presented in Subsection 3.2, Marine Mammals. Less detail is provided on killer whale populations other than Southern Residents (Northern Residents, transients, and offshore whales) in both Chapters 3 and 4 as they are only occasionally found in inland waters. There is less detail for other marine mammals, which are much more numerous than the endangered Southern Resident killer whales and less often the subject of vessel viewing activities.

4.2.1 Alternative 1 (No Action)

Under the No-action Alternative, NMFS would not promulgate specific vessel regulations. NMFS would continue the education and outreach program with all of the partners involved in the Be Whale Wise campaign. Existing laws under the ESA and MMPA would continue to prohibit take and harassment, and NMFS would continue to enforce those prohibitions. It is likely that uncertainty over whether certain vessel activities constitute take or harassment would continue to result in levels of prosecution under these statutes that are similar to current levels (Subsection 3.2.1.5, Vessel Interactions). The average and maximum numbers of vessels within 1/2 mile of the whales has remained stable in recent years and would likely continue at current levels under the No-action Alternative. The structure of the commercial whale watch industry (numbers of boats, length of season, viewing hours per day) would also likely continue at current levels.

In the absence of specific regulations, it is likely that incidents (when vessels do not adhere to recommended guidelines and could be harming or harassing the whales) would continue at least at the level shown for recent years (Table 3-1 and Table 3-2) and could continue to increase based on recent trends. As discussed in Subsection 3.2.1.5, Vessel Interactions, the observed 1,067 to 2,527 annual incidents in 2006-2010 represent minimum estimates because monitoring does not occur during all hours on all days and the monitoring groups are not able to record all incidents, particularly when there are multiple groups of whales and vessels in different locations.

Vessel Strikes. A subset of the total number of incidents including 1) parking in the path, 2) head on approaches, 3) crossing the path of whales, and 4) chasing/pursuing whales are risky vessel behaviors that have the highest likelihood of resulting in vessel strikes. In 2010 there were 256 incidents involving these

types of activities out of the total 1,067 monitored incidents (Table 3-2). In 2005, a vessel operator who repeatedly positioned his vessel in the path of the whales (i.e., leapfrogging or repositioning) caused a collision with, and injury to, a whale (Subsection 3.2.1.5, Vessel Interactions). The operator was cited for negligent operation of a vessel under the MMPA in 2005.

Under the No-action Alternative, it is reasonable to expect incidents that would result in vessel strikes would occur at the same level, and may continue to increase based on recent trends. While it is not possible to predict the number of vessel strikes in future years under the No-action Alternative, it is likely they would occur. It is also not possible to quantify the level of risk associated with a vessel strike. Major injuries can be lethal and even minor injuries can be a path for infection and result in immune system impacts. Any injury to a member of the Southern Resident killer whale population is serious because of the small population size. An injury or mortality to a single individual could have population level impacts, particularly for reproductive females.

Behavioral Disturbance. Under the No-action Alternative, the continued and potentially increasing level of vessel incidents is expected to continue to disturb Southern Resident killer whales. During these incidents the whales respond to vessels by changing course and direction, altering breathing patterns, increasing energetically expensive surface active behaviors and decreasing foraging behavior (Subsection 3.2.1.5, Vessel Interactions). The physiological effects of these responses and potential effects on the status of the whales are discussed below. A subset of the total number of incidents from 2006 listed in Table 3.2 involve 1) approaches closer than 100 yards, 2) operating at high speeds (greater than 7 knots) within 400 yards of the whales, 3) parking in the path, 4) crossing the path, 4) chasing or pursuing whales, and 5) approaching head-on are expected to continue causing the same level of behavioral response currently experienced by the whales. In 2010, there were 630 of these specific types of incidents observed by observers on the Soundwatch vessel. In addition, there were 72 incidents observed from shore of kayaks within 100 yards and 88 incidents of kayaks parked in the path of the whales. As described in Subsection 3.2.1.5, Vessel Interactions, kayaks can also impact the behavior of whales (Williams et al. 2010).

It is not possible to estimate the total amount of energy expended or the amount of foraging behavior disrupted by these 790 incidents (under current conditions and expected under the No-action Alternative) because the monitoring groups recording these incidents do not identify the individual whales involved. Thus, it is not possible to track the total incidents for each individual whale or the population as a whole. Although it is also not possible to estimate the current total level of disruption for individual whales or the population as a whole under the No-action Alternative, available data on behavior and foraging disruption provide information on the level of effects for each whale per incident. For example, Williams (2006) predicted a 3 percent increase in energy expenditure and an 18 percent decrease in time spent foraging when vessels are within 100 meters (about 100 yards). Physiological effects of energy shifts are analyzed below (*Overall Physiological Effects on Individuals and Effects on the Status of the Population*).

Acoustic Masking. The 790 incidents described above under *Behavioral Disturbance* that currently result in behavioral disturbance also would likely continue under the No-action Alternative and would create sound levels that interfere with the whales' communication and foraging by masking their acoustic signals. They do not likely rise to a level that would damage the whales' hearing. Parking in the path, particularly if part of a leapfrogging sequence, and head-on approaches may have the largest effect due to the directional nature of echolocation. In addition, as vessel speed increases (high speed vessels within 400 yards), so does the sound level. Holt (2008) concluded that some fast moving vessels within 100 yards of the whales can decrease the distance at which whales can detect salmon by 88 to 100 percent. Physiological effects of acoustic masking are related to foraging, and are analyzed below (*Overall Physiological Effects on Individuals and Effects on the Status of the Population*).

Transient killer whales use passive listening when foraging and sounds from their marine mammal prey may be masked during opportunistic whale watching when Southern Residents are not present. There is no information available on the current level of foraging disturbance from vessels for transient or other types of killer whales, other than the Southern Residents as described above. Any interference from vessels with transient foraging is likely to be short-term and intermittent based on the limited time transients spend in inland waters and the opportunistic nature of whale watching.

Habitat Use. The effects described above (risk of vessel strike, vessel disturbance, and acoustic masking) would occur throughout the Puget Sound area under the No-action Alternative. In particular, vessel presence and noise would continue to interfere with the whales' ability to forage along the steep shoreline along the west side of San Juan Island, the area with the highest number of whale sightings (Figure 3-6). In 2010 there were a minimum of 353 incidents of vessels inshore of the whales or in the current voluntary no-go zone along the west side of San Juan Island when whales were present (Table 3-2). It is reasonable to anticipate that, at a minimum, the current levels of vessel traffic and resulting levels of incidents would also occur under the No-action Alternative; traffic and incident levels may also increase based on past trends. However, it is not possible to estimate the potential effect on use of important feeding habitats that would result from the expected levels of vessel activity in these shoreline areas for several reasons. Researchers have not estimated energy expenditure or foraging efficiency impacts associated with vessel presence in the no-go zone. Southern Resident killer whales continue to show strong site fidelity to their traditional summer ranges despite greater than 25 years of whale watching and increasing vessel traffic in the Pacific Northwest. Thus, the level of vessel traffic, including whale watching, under the No-action Alternative would not likely cause habitat displacement for killer whales in this region.

Overall Physiological Effects on Individuals and Effects on the Status of the Population. Because it is not possible to quantify the physiological effects on individual whales under the current level of vessel incidents (which are likely to continue at least at the same level under the No-action Alternative), the above discussion qualitatively describes the responses of whales to specific types of vessel incidents, and the general consequences (energy expended and disruption of foraging) as a result of those responses. These responses and consequences can, in turn, have physiological effects on Southern Resident killer whales. For example, energy expenditure or disruption of foraging could result in poor nutrition (Subsection 3.2.1.5, Vessel Interactions). Poor nutrition could lead to reproductive or immune effects or, if severe enough, to mortality. Interference with foraging can affect growth and development, which in turn can affect the age at which animals reach reproductive maturity, fecundity, and annual or lifetime reproductive success. Interference of behaviors including prey sharing and communication could also impact social cohesion and foraging efficiency for Southern Resident killer whales, and, therefore, the growth, reproduction, and fitness of individuals. Some of these effects would occur in important habitats of the whales and where they are frequently sighted, but based on past trends, it is not likely that these effects would cause habitat displacement for Southern Resident whales.

It is not possible to estimate the point at which vessel impacts could trigger effects on reproduction or survival of individuals. Vessel impacts could also work in concert with other threats to produce an effect. For example, poor nutrition resulting from vessel interference with foraging could lead to mobilization of fat stores, which can introduce stored contaminants into the whales' systems and affect reproduction or immune function.

Concern about behavioral and physiological effects from the current level of vessel incidents led NMFS to identify vessel incidents as a potential threat to Southern Resident killer whales in the ESA listing and in the *Recovery Plan for Southern Resident Killer Whales* (NMFS 2008a). Because the Southern Residents are such a small population, physiological effects on even a small number of individual whales could lead to population level effects, changing their status. The Southern Residents have had a variable growth trend in

recent years, and continued vessel effects under the No-action Alternative would likely have a negative impact on the status of Southern Resident killer whales. Both Southern and Northern Residents are listed as endangered and threatened, respectively, in Canada based on similar threats, including vessel disturbance. Northern Resident killer whales rarely visit inland waters of Washington and experience low levels of vessel effects further north in Canadian waters. Under the No-action Alternative, Northern Residents would experience a similar low level of intermittent vessel disturbance during their rare visits to inland waters and these effects would not be likely to affect their stable population status.

Little is known about the current population trends for other killer whales, and there are no data on vessel incidents for other killer whales, so it is not possible to estimate impacts on their status under the No-action Alternative.

Other Marine Mammals. For other marine mammals, it is reasonable to expect that vessel incidents would continue at present levels. Under the No-action Alternative, it is likely that whale watch operators would continue to target killer whales, focusing on other species only when killer whales are absent. The Be Whale Wise campaign, which includes information on responsible viewing of all marine mammals, would continue under the No-action Alternative. Most other marine mammals that are opportunistically viewed from vessels have increasing or stable population levels, including the threatened population of Steller sea lions and endangered humpback whales (Subsection 3.2, Marine Mammals). Monitoring groups are not currently recording vessel incidents for other marine mammal species, so current levels of disturbance have not been quantified. Continued disturbance at current levels under the No-action Alternative has not been identified as a limiting factor for other marine mammals in inland waters and would not be likely to affect their status.

4.2.2 Alternative 2: 100-Yard Approach Regulation

Under this alternative, NMFS would promulgate a regulation prohibiting approach closer than 100 yards. The current Be Whale Wise guidelines include a recommendation to keep vessels at least 100 yards from killer whales, and Table 3-1 reports that there were a minimum of 448 to 237 incidents in 2009 and 2010, respectively, where vessels were closer than 100 yards to the whales. This represents 17 and 22 percent of all incidents in those years. Most incidents of vessels within 100 yards of Southern Resident killer whales involved recreational vessels (343 in 2009 and 131 in 2010), compared to commercial whale-watch vessels (46 observed in 2009 and 47 in 2010) (Table 3-2 and Figure 3-9). Using different methods than Soundwatch, Giles and Cendak (2010) recorded the distances of vessels from the whales; out of a total of 9,431 vessel positions (not including researchers) 167 vessels were within 100 yards of the whales. In addition, Soundwatch collected new data on kayakers in 2010 and reported an additional 171 incidents where kayaks were closer than 100 yards from the whales (Koski 2010b).

A 100-yard mandatory approach regulation would not likely change the average and maximum numbers of vessels within 1/2 mile of killer whales. These numbers have declined in recent years with the 100-yard voluntary guideline promoted through Be Whale Wise. These numbers would not be expected to change as a result of a 100-yard mandatory regulation under Alternative 2 because most boats are already following the guidelines and maintaining a distance of 100 yards. Commercial whale watch vessels adhere particularly well to this guideline (Table 3-2). For the same reasons, the structure of the commercial whale watch industry (numbers of boats, length of season, viewing hours per day) would also likely continue at current levels.

A regulation prohibiting approaches closer than 100 yards would be clear to whale watch operators. These operators would likely know about such a regulation and be able to accurately judge the distance of their

vessels from whales (as indicated by their current high levels of compliance with this guideline). Recreational boaters would be less likely to know about such a regulation, though over time it is reasonable to expect that familiarity with the regulation would increase, particularly with education and if any prosecutions are well-publicized. Recreational boaters are less likely to know when whales are present and are less likely to be able to judge distance from whales on the water. Some recreational boaters may also follow the example of commercial operators to determine the proper viewing distance.

As described in Subsection 4.1.2, General Effects of Enforceable Regulations Compared to Voluntary Guidelines, fear of penalties would likely deter whale watch operators and recreational boaters (including kayakers) from violating the regulation. This incentive would be stronger for commercial operators than for recreational boaters as violations could also result in loss of reputation and associated loss of business. For these reasons, it is likely that a 100-yard approach regulation would reduce the number of incidents in which commercial whale-watch vessels approach within 100 yards of the whales, compared to the No-action Alternative. Such a regulation is also likely to reduce the number of approaches within 100 yards by recreational boaters, though probably to a lesser extent than for whale watch operators as described in Subsection 4.1.2, General Effects of Enforceable Regulations Compared to Voluntary Guidelines. Based on an assessment of kayaker behavior, there may be a small number of situations where kayakers make an effort to comply with the guidelines, but are unsuccessful at maintaining 100 yards from the whales (Koski 2010b). Other vessel incidents (e.g., parking in the path, in the no-go zone, fast within 400 yards of whales) would likely continue at levels similar to those described under the No-action Alternative.

Vessel Strikes. The reduction in incidents of vessels approaching closer than 100 yards would reduce the risk of vessel strikes, compared to the No-action Alternative. Vessel operators remaining 100 yards or further from the whales would be able to see the location of whales and their movements, have more room to maneuver and, therefore, more room to avoid collisions. A reduction in close approaches would in turn reduce the risk of a killer whale being injured or killed by collision with a vessel compared to incident results expected under the No-action Alternative.

Any injury to a member of the Southern Resident killer whale population is serious because of the small population size. As under the No-action Alternative, an injury or mortality to a single individual could have population-level impacts, particularly for reproductive females.

Behavioral Disturbance. The reduction in incidents of vessels approaching closer than 100 yards would reduce the amount of behavioral disturbance of killer whales, compared to the No-action Alternative. This in turn would decrease energy expended and increase time spent foraging, compared to the No-action Alternative. Subsection 3.2.1.5, Vessel Interactions, describes one researcher's estimate that vessel presence within 100 yards increases an individual energy expenditure by 3 percent and decreases foraging time by 18 percent (compared to no vessels being present within 100 yards). Because monitoring groups do not record which whales are currently exposed to vessel incidents, it is not possible to quantify the total number of behavioral responses, either of individual whales or the population as a whole, and therefore not possible to quantify the change from the No-action Alternative.

Nevertheless, the data on whale behavior and energetic costs support a conclusion that a reduction in the number of incidents of behavioral disturbance would decrease the energy expended by whales, compared to the No-action Alternative. The behavior budgets of the whales (that is, time allocated to various activities) would more closely resemble an undisturbed state, which would include more time spent foraging when compared to conditions without 100-yard approach regulations. Thus, compared to the No-action Alternative, in which close approaches would continue at current levels and may increase, adoption of a mandatory 100-yard approach prohibition would likely reduce the whales' energetic costs and increase the time and energy available for foraging, resting, and other important functions.

Acoustic Masking. Similar to the No-action Alternative, vessel sound is not expected to damage the hearing of Southern Resident killer whales. Available information suggests that sound generated by vessels can mask the echolocation and communication of the whales (Subsection 3.2.1.5, Vessel Interactions). The closer a moving vessel is to a whale, the louder the sound received by the whale. Holt (2008) concluded that some fast moving vessels within 100 yards of the whales can decrease the distance at which whales can detect salmon by 88 to 100 percent. Because a mandatory 100-yard approach regulation is likely to reduce the number of vessels coming within 100 yards of the whales, it is also likely to reduce the level of vessel-generated noise received by the whales, compared to the No-action Alternative where there would be no mandatory 100-yard approach regulation. This reduction, in turn, is likely to increase the Southern Resident killer whales' ability to communicate and to forage as compared to the No-action Alternative. Transient killer whales use passive listening when foraging and sounds from their marine mammal prey may be masked by vessel sounds. The reduction of vessel sound would also reduce any short-term or intermittent interference from vessels with transient killer whale foraging compared to the No-action Alternative.

Habitat Use. Because an approach regulation would apply wherever Southern Resident killer whales are found, the protection would occur throughout the entire inland waters area (including along the west coast of San Juan Island) and at all times of year. As under the No-action Alternative, no changes to habitat use would be expected for killer whales in this region under Alternative 2 because the overall number of vessels in the action area would not be expected to change from implementing a 100-yard approach regulation. As described under the No-action Alternative, there is insufficient information to estimate the effect of the current level of vessel traffic on use of particular feeding habitats. Although under Alternative 2 there would be fewer approaches within 100 yards, there would be no changes in total vessel traffic expected under Alternative 2 as compared to the No-action Alternative, or changes to use of important foraging areas.

Overall Physiological Effects on Individuals and Effects on the Status of the Population. As described above, a mandatory 100-yard approach regulation under Alternative 2 is likely to reduce behavioral responses associated with vessel disturbance and acoustic masking, compared to the No-action Alternative. Also as described under the No-action Alternative and in Subsection 3.2.1.5, Vessel Interactions, vessel disturbance and acoustic masking can have physiological effects on individual whales and the population as a whole (e.g., reproductive rates). However, it is not possible to quantify the physiological effects of the current level of disturbance and acoustic masking, for the reasons described under the No-action Alternative. For the same reasons, it is not possible to quantify the reduction in physiological effects, and associated improvement in individual and population fitness, that would result from a reduction in the number of close approaches by vessels. Nevertheless, the reduction in behavioral disturbance and acoustic masking is likely to have physiological effects that increase the fitness of individual whales and the population as a whole when compared to conditions under the No-action Alternative that would not include an approach regulation. Some behavioral disturbance and acoustic masking would likely continue from other vessel incidents (e.g., parking in the path, in the no-go zone, fast within 400 yards of whales) that would likely continue at levels similar to those described under the No-action Alternative.

Because Southern Residents are such a small population, improvements to the fitness of even a small number of individual whales could lead to population level effects, improving their status compared to the No-action Alternative. The Southern Residents have had a variable growth trend in recent years and reduced vessel effects under Alternative 2 as compared to the No-action Alternative would likely have a positive impact on the status of Southern Resident killer whales. Such benefits to the status of Southern Resident whales would begin to address concerns that led NMFS to list this DPS as endangered under the ESA (Subsection 3.2.1.2, Status).

Other Marine Mammals. A 100-yard approach regulation for killer whales would apply to all killer whales, including transient and off-shore killer whales, because the regulation would not distinguish among the different types. Thus, all killer whales would experience some reduction in close vessel approaches. A 100-yard approach regulation may also result in vessel operators avoiding close approaches to other marine mammals, because the regulation might create awareness about vessel effects on marine mammals generally. The Be Whale Wise campaign, which includes information on responsible viewing of all marine mammals, would continue similar to the No-action Alternative. The vessel monitoring groups do not collect information on when the guidelines are not followed for other marine mammals. Compared to the No-action Alternative, a 100-yard approach regulation for killer whales could reduce the number of close approaches to other marine mammals and reduce the risk of vessel strikes and the number of behavioral responses associated with close approaches. This reduction cannot be quantified.

Most other marine mammals that are opportunistically viewed from vessels have increasing or stable population levels, including the threatened population of Steller sea lions and endangered humpback whales. Reduced vessel impacts to other killer whales and marine mammals would likely have a positive but small impact on their population status, which would remain similar to their status under the No-action Alternative.

4.2.3 Alternative 3: 200-Yard Approach Regulation

Under this alternative, NMFS would promulgate a regulation prohibiting approach closer than 200 yards. In recent years there has been on average about 20 vessels within 1/2 mile of the whales during daylight hours from May through October (Subsection 3.2.1, Killer Whales). The majority of these are whale watch operators, who largely observe the current 100-yard approach limit guideline (Table 3-2). Incidents of vessels approaching within 100 yards are mostly committed by recreational vessels and make up 17 to 22 percent of all incidents in recent years. Because a 200-yard approach limit is not part of the current guidelines, Soundwatch does not collect data on vessel incidents at this distance. Although there are incidents of close approaches, the average viewing distance of vessels is greater than the 100-yard guideline. Giles and Cendak (2010) measured the distance between all vessels and the nearest whale and reported that for private and commercial whale watch vessels within 400 yards of the whale (likely engaged in whale watching), 74 percent were greater than 200 yards from the whales. For private and commercial whale watch vessels within 800 yards (likely includes both whale-oriented and transiting vessels), 88 percent of vessels were greater than 200 yards from the whales. Recreational vessels tended to approach more closely than the commercial vessels, which is consistent with the higher level of incidents for these vessels (Table 3-2 and Figure 3-9).

The average and maximum numbers of vessels within 1/2 mile of the whales have declined in recent years and would likely continue at levels within the recent range under Alternative 3, for the reasons described under Alternative 2. The structure of the commercial whale watch industry (numbers of boats, length of season, viewing hours per day) would also likely continue at current levels also for the reasons described under Alternative 2. However, most whale watching would occur from a greater distance (at least the mandatory 200 yards) as compared to the No-action Alternative (at least 100 yards, as contained in the voluntary guidelines, which most commercial and recreational whale watch operators observe). Additional information on potential changes to the whale watch industry from viewing from 200 yards is discussed under Subsection 4.4.3, Alternative 3: 200-Yard Approach Regulation.

Based on the ability of most vessel operators to maintain a distance greater than 100 yards to view whales, it is reasonable to assume that there would be a similar or even greater level of compliance with a 200-yard regulation compared to what is currently observed for the 100-yard guideline. Based on an assessment of

kayaker behavior, there may be a small number of situations where kayakers make an effort to comply with the guidelines, but are unsuccessful at maintaining 200 yards from the whales. Compared to the No-action Alternative, an enforceable 200-yard regulation would result in some vessels moving from a perimeter greater than 100 yards around the whales to a perimeter greater than 200 yards around the whales. It is likely that some proportion of recreational boaters would be familiar with the approach regulation and observe it or follow the example of the commercial fleet.

For those vessel operators not currently observing the 100-yard guideline, NMFS anticipates that they would be more likely to observe specific mandatory regulations than the current voluntary guidelines, for the reasons described under Alternative 2, and as described in Subsection 4.1.2, General Effects of Enforceable Regulations Compared to Voluntary Guidelines. Thus, it is likely that adoption of a 200-yard approach regulation would reduce the number of vessels within 200 yards of the whales, compared to the No-action Alternative (just as it is likely that adoption of a 100-yard mandatory approach regulation under Alternative 2 would result in greater compliance than the current voluntary guidelines under the No-action Alternative). As described above, Soundwatch does not record the current number of approaches within 200 yards, so it is not possible to quantify the number of approaches within 200 yards under the No-action Alternative versus a reduced number under Alternative 3. Using different methods than Soundwatch, Giles and Cendak (2010) recorded 9,431 vessel position distances from the whales (not including research vessels), and 840 (less than 10 percent) of the vessel positions were within 200 yards of the whales. Other vessel incidents (e.g., parking in the path, in the no-go zone, fast within 400 yards of whales) would likely continue at levels similar to those described under the No-action Alternative.

Vessel Strikes. As a result of the majority of vessels staying at least 200 yards away from the whales, Alternative 3 would reduce the risk of vessel strikes compared to the No-action Alternative. Assuming that both a 100- and 200-yard approach limit would enjoy similar rates of compliance, Alternative 3 would have similar effects as Alternative 2 regarding the risk of vessel strikes. As under Alternative 2, a reduction in close approaches would in turn reduce the risk of a killer whale being injured or killed by collision with a vessel compared to incident results expected under the No-action Alternative. Any injury to a member of the Southern Resident killer whale population is serious because of the small population size. As under the No-action Alternative, an injury or mortality to a single individual could have population level impacts, particularly for reproductive females.

Behavioral Disturbance. The reduction in incidents of vessels approaching closer than 200 yards would reduce the incidents of behavioral disturbance of killer whales, compared to the No-action Alternative. This in turn would decrease energy expended and increase time spent foraging, compared to the No-action Alternative. Subsection 3.2.1.5, Vessel Interactions, describes one researcher's estimate that vessel presence within 100 yards increases an individual whale's energy expenditure by 3 percent and decreases foraging time by 18 percent (compared to no vessels being present within 100 yards). Other researchers have reported behavioral disturbance at distances greater than 100 yards. Because monitoring groups do not record which whales are currently exposed to vessel incidents, it is not possible to quantify the total number of behavioral responses, either of individual whales or the population as a whole. In addition, current monitoring records only vessels within 100 yards of the whales. For these reasons it is not possible to quantify the change from the No-action Alternative.

Nevertheless, the data on whale behavior and energetic costs support a conclusion that a reduction in the number of incidents of behavioral disturbance would decrease the energy expended by whales, compared to the No-action Alternative. The behavior budgets of the whales (that is, time allocated to various activities) would more closely resemble an undisturbed state, which would include more time spent foraging. Thus, compared to the No-action Alternative, in which close approaches would continue at current levels and may increase, adoption of a mandatory 200-yard approach prohibition would likely reduce the whales'

energetic costs and increase the time and energy available for foraging, resting, and other important functions.

Compared to Alternative 2 (100-yard approach regulation), it is likely that Alternative 3 would result in fewer instances of behavioral responses, based on research indicating that whale response to vessels is greater the closer vessels approach (Subsection 3.2.1.5, Vessel Interactions).

Acoustic Masking. Similar to the No-action alternative, vessel sound is not expected to damage the hearing of Southern Resident killer whales. Available information suggests that sound generated by vessels can mask the echolocation and communication of the whales (Subsection 3.2.1.5, Vessel Interactions). The closer a vessel is to a whale, the louder the sound received by the whale. Holt (2008) concluded that some fast moving vessels within 200 yards of the whales can decrease the distance at which whales can detect salmon by 75 to 95 percent. Because a mandatory 200-yard approach regulation is likely to reduce the number of vessels coming within 200 yards of the whales, it is also likely to reduce the level of vessel-generated noise received by the whales, compared to the No-action Alternative where there would be no 200-yard approach regulation. This reduction, in turn, is likely to increase the Southern Resident killer whales' ability to communicate and to forage as compared to the No-action Alternative. Transient killer whales use passive listening when foraging and sounds from their marine mammal prey may be masked by vessel sounds. The reduction of vessel sound would also reduce any short-term or intermittent interference from vessels with transient killer whale foraging compared to the No-action Alternative.

Compared to Alternative 2 (100-yard approach regulation), Alternative 3 is likely to result in less acoustic masking, because vessel noise decreases as distance from the whale increases. This reduction in noise, in turn, is likely to increase the Southern Resident and transient killer whales' ability to communicate and to forage, compared to Alternative 2.

Habitat Use. Because an approach limit would apply wherever Southern Resident killer whales are found, the protection would occur throughout the entire inland waters area (including along the west coast of San Juan Island) and at all times of year. As under the No-action Alternative, no changes to habitat use would be expected for killer whales in the action area under Alternative 3 because the overall number of vessels would not be expected to change from implementing a 200-yard approach regulation. As described under the No-action Alternative, there is insufficient information to estimate the effect of the current level of vessel traffic on use of particular feeding habitats. Although under Alternative 3 there would be fewer approaches within 200 yards, there would be no changes in total vessel traffic expected under Alternative 3 as compared to the No-action Alternative, or changes to use of important foraging areas.

Overall Physiological Effects on Individuals and Effects on the Status of the Population. As described above, a mandatory 200-yard approach regulation under Alternative 3 is likely to reduce behavioral responses associated with vessel disturbance and acoustic masking, compared to the No-action Alternative. Also as described under the No-action Alternative and in Subsection 3.2.1.5, Vessel Interactions, vessel disturbance and acoustic masking can have physiological effects on individual whales and the population as a whole (e.g., reproductive rates). However, it is not possible to quantify the physiological effects of the current level of disturbance and acoustic masking, for the reasons described under the No-action Alternative. For the same reasons, it is not possible to quantify the reduction in physiological effects, and associated improvement in individual and population fitness, that would result from a reduction in the number of close approaches by vessels. Nevertheless, the reduction in behavioral disturbance and acoustic masking is likely to have physiological effects that increase the fitness of individual whales and the population as a whole, compared to the No-action Alternative that would not include an approach regulation. Some behavioral disturbance and acoustic masking from other vessel incidents (e.g., parking in

the path, in the no-go zone, fast within 400 yards of whales) would likely continue at levels similar to those described under the No-action Alternative.

As described above, Alternative 3 (200-yard approach prohibition) is likely to result in less behavioral disturbance and acoustic masking when compared to Alternative 2 (100-yard approach prohibition), and therefore a 200-yard approach regulation would result in increased fitness of individual whales and the population as a whole compared to a 100-yard approach regulation.

Because the Southern Residents are such a small population, improvements to the fitness of even a small number of individual whales could lead to population level effects, improving their status. The Southern Residents have had a variable growth trend in recent years and reduced vessel effects under Alternative 3 as compared to the No-action Alternative would likely have a positive impact on the status of Southern Resident killer whales. Such benefits to the status of Southern Resident whales would begin to address concerns that led NMFS to list this DPS as endangered under the ESA (Subsection 3.2.1.2, Status).

Other Marine Mammals. A 200-yard approach regulation for killer whales would apply to all killer whales, including transient and off-shore killer whales, because the regulation would not distinguish among the different types. Thus, all killer whales would experience some reduction in close vessel approaches. A 200-yard approach regulation may also result in vessel operators avoiding close approaches to other marine mammals, because the regulation might create awareness about vessel effects on marine mammals generally. The Be Whale Wise campaign, which includes information on responsible viewing of all marine mammals, would continue similar to the No-action Alternative. The vessel monitoring groups do not collect information on when the guidelines are not followed for other marine mammals. Compared to the No-action Alternative, a 200-yard approach regulation could reduce the number of close approaches to other marine mammals and reduce the risk of vessel strikes and the number of behavioral responses associated with close approaches. This reduction cannot be quantified.

Most other marine mammals that are opportunistically viewed from vessels have increasing or stable population levels, including the threatened population of Steller sea lions and endangered humpback whales. Reduced vessel impacts to other killer whales and marine mammals would likely have a positive but small impact on their population status, which would remain similar to their status under the No-action Alternative.

4.2.4 Alternative 4: Protected Area – Current Voluntary No-go Zone

Under this alternative, NMFS would formalize the current voluntary no-go zone along the west side of San Juan Island and prohibit vessels from entering the area from May through September. There is currently a 3.8 square mile voluntary no-go zone along the west side of San Juan Island (Figure 2-1). The west side of San Juan Island has the highest number of Southern Resident killer whale sightings (Figure 3-6) and likely because of this the west side of San Juan Island is the location of the highest number of vessel incidents recorded by Soundwatch (Figure 3-11).

As shown in Table 3-1, incidents involving vessels within the no-go zone decreased from 1998 to 2006, representing 41 percent of all incidents in 1998, 18 percent in 2003, and 5 percent in 2006. However, in recent years incidents have increased, with 8 percent in 2007, 7 percent in 2008, 11 percent in 2009, and 14 percent of all incidents in 2010. This pattern includes an overall decrease in commercial whale watch operators being present in the no-go zone. Recreational vessel incidents in the no-go zone, however, have increased in recent years along with an increase in overall private vessel counts in the surrounding area

(Koski 2007, 2010a, 2010b; IEC 2008). In 2010 there were 16 incidents of commercial whale watch vessels and 128 incidents of recreational vessels observed in the no-go zone (Table 3-2 and Figure 3-9).

A mandatory no-go zone that is similar to the current voluntary no-go zone would probably not change the average and maximum numbers of vessels recorded within 1/2 mile of killer whales wherever they go, compared to the No-action Alternative. These numbers have remained stable in recent years when a voluntary no-go zone has been promoted in conjunction with Be Whale Wise. This would not be expected to change as a result of a mandatory no-go zone under Alternative 4 because most boats are already following the guidelines and staying outside the voluntary no-go zone. Commercial whale watch vessels adhere particularly well to this guideline (Table 3-2), especially in recent years, and could still be counted within 1/2 mile radius even when adhering to the zone. For the same reasons, the structure of the commercial whale watch industry (numbers of boats, length of season, viewing hours per day) would also likely continue at current levels.

A no-go zone is clear and could be readily avoided by both commercial and recreational boaters. The area would be identified using latitude and longitude coordinates and landmarks on maps and charts making the regulation widely identifiable and compliance and enforcement straightforward. Commercial whale watch operators already largely observe the current voluntary no-go zone, and can serve as an example of proper viewing areas for recreational boaters. Ease of enforcement and fear of penalties would likely further deter whale watch operators from violating the regulation, as would fear of loss of reputation and associated loss of business. A history of protected sites in nearby waters also makes it likely that a newly established no-go zone would be observed (NMPAC 2005) by vessel operators who know about the regulation. For these reasons, and as described in Subsection 4.1.2, General Effects of Enforceable Regulations Compared to Voluntary Guidelines, it is likely that adoption of a regulation creating a seasonal mandatory no-go zone would reduce the number of vessels in the current (voluntary) no-go zone, compared to the No-action Alternative (191 total incidents observed in 2010). Other vessel incidents (e.g., approach within 100 yards, parking in the path, fast within 400 yards of whales) outside the no-go zone would likely continue at levels similar to those described under the No-action Alternative.

Vessel Strikes, Behavioral Disturbance, Acoustic Masking, and Overall Physiological Effects on Individuals and Effects on the Status of the Population. With a decreased number of vessels in the area, there would be a decrease in the likelihood of a vessel strike in the area. A reduction in close approaches would in turn reduce the risk of a killer whale being injured or killed by collision with a vessel compared to incident results expected under the No-action Alternative. Any injury to a member of the Southern Resident killer whale population is serious because of the small population size. As under the No-action Alternative, an injury or mortality to a single individual could have population level impacts, particularly for reproductive females.

There would also be a reduction in the number of behavioral responses and an increase in time spent foraging compared to the No-action Alternative, although there could continue to be some disturbance along the edge of the no-go zone, as vessels engaged in whale watching currently park or travel along the edge of the zone to view whales (Subsection 3.2.1.5, Vessel Interactions). Fewer vessels in the no-go zone would also reduce the amount of acoustic masking that would occur under the No-action Alternative. The combined effect of reduced vessel disturbance and reduced acoustic masking in an area heavily used by the Southern Resident killer whales is likely to result in increased fitness of individuals and the population as a whole, for the reasons described under Alternatives 2 and 3. Some level of acoustic disturbance and acoustic masking from other vessel incidents (e.g., approach within 100 yards, parking in the path, fast within 400 yards of whales) outside the no-go zone would likely continue at levels similar to those described in the No-action Alternative.

Because the Southern Residents are such a small population, improvements to the fitness of even a small number of individual whales could lead to population level effects, improving their status. The Southern Residents have had a variable growth trend in recent years and reduced vessel effects under Alternative 4 as compared to the No-action Alternative would likely have a positive impact on the status of Southern Resident killer whales. Such benefits to the status of Southern Resident killer whales would begin to address concerns that led NMFS to list this DPS as endangered under the ESA (Subsection 3.2.1.2, Status).

Habitat Use. The effects described above would occur only in the no-go zone. The no-go zone along the west side of San Juan Island meets the criteria for a successful marine protected area as described in Subsection 4.1.3, Marine Protected Areas. The west side of San Juan Island has the highest number of whale sightings, is an important feeding habitat, and has high levels of vessel traffic and potentially harmful incidents (Figure 3-6 and Figure 3-11). A no-go zone for Southern Residents that reduces vessel impacts and improves foraging opportunities addresses two of the main threats to the whales (i.e., vessel effects and prey availability). Prohibiting vessels from portions of the whales' habitat along the west side of San Juan Island would protect the whales 1) from multiple threats; 2) in an area the local community already recognizes; and 3) provides opportunities to evaluate the effectiveness of the area. Although there is insufficient information to estimate the current level of impact from vessels on use of foraging habitat under the No-action Alternative, creating a no-go zone could increase use of the protected area by the whales, particularly for foraging, under Alternative 4 as compared to the No-action Alternative.

Other Marine Mammals. By reducing the number of vessels in the no-go zone, Alternative 4 would also reduce the number of interactions between vessels and other marine mammals in the no-go zone, compared to the No-action Alternative. Several other marine mammals occur in the current no-go zone intermittently. Transient killer whales do not frequent the no-go zone and would rarely experience reduced vessels in the no-go zone under Alternative 4 as compared to the No-action Alternative. The current no-go zone overlaps with National Wildlife Refuges, where boaters are advised to stay 200 yards away to avoid disturbing marine mammals and birds.

The Be Whale Wise campaign, which includes information on responsible viewing of all marine mammals, would continue under Alternative 4 similar to the No-action Alternative. The vessel monitoring groups do not collect information on when the guidelines are not followed for other marine mammals. Compared to the No-action Alternative, the no-go zone could reduce the number of close approaches to other marine mammals and reduce the risk of vessel strikes and associated behavioral responses and acoustic masking within a small area of the inland waters. This reduction cannot be quantified.

Other marine mammals that may be present intermittently in the no-go zone have increasing or stable population levels, including the threatened population of Steller sea lions. Endangered humpback whales are not likely to be in the no-go zone as it is very close to shore. Reduced vessel impacts to other marine mammals in the no-go zone would likely have a positive but small impact on their population status, which would remain similar to their status under the No-action Alternative.

4.2.5 Alternative 5: Protected Area – Expanded No-go Zone

Under this alternative, NMFS would formalize an expanded no-go zone along the west side of San Juan Island and prohibit vessels from entering the area from May through September. The expanded area would prohibit vessels 1/2 mile from shore from Eagle Point to Mitchell Point. Alternative 5 would create a no-go zone that is 6.2 square miles (Figure 2-2). The Soundwatch program promotes the current zone, although it is not specifically recognized in the Be Whale Wise guidelines. Soundwatch collects incident data on the current zone as described in Subsection 4.2.4, Alternative 4: Protected Area – Current Voluntary No-go

Zone, but does not record incident data for the expanded zone. The west side of San Juan Island has the highest number of Southern Resident killer whale sightings (Figure 3-6) and likely because of this the west side of San Juan Island is the location of the highest number of vessel incidents recorded by Soundwatch (Koski 2010b) (Figure 3-11).

A mandatory no-go zone that is larger than the current voluntary no-go zone would probably not change the average and maximum numbers of vessels recorded within 1/2 mile of killer whales wherever they go, compared to the No-action Alternative. These numbers have remained stable in recent years when a voluntary no-go zone has been promoted through Be Whale Wise. This would not be expected to change as a result of an expanded mandatory no-go zone under Alternative 5 because most boats are already following the guidelines and staying outside the voluntary no-go zone. Commercial whale watch vessels adhere particularly well to this guideline (Table 3-2) and could still be counted within 1/2 mile radius even when adhering to the expanded zone. For similar reasons, the structure of the commercial whale watch industry (numbers of boats, length of season, viewing hours per day) would also likely continue at current levels.

A no-go zone is clear and could be readily avoided by both commercial and recreational boaters. The area would be identified using latitude and longitude coordinates and landmarks on maps and charts making compliance and enforcement straightforward. Commercial whale watch operators already largely observe the current voluntary no-go zone, with only two observed incidents of vessels in the zone during 2006 and can set an example for recreational boaters. Ease of enforcement and fear of penalties would likely further deter whale watch operators from violating the regulation, as would fear of loss of reputation and associated loss of business. A history of protected sites in nearby waters also makes it likely that a newly established no-go zone would be observed (NMPAC 2005) by vessel operators who know about the regulation.

For these reasons, and as described in Subsection 4.1.2, General Effects of Enforceable Regulations Compared to Voluntary Guidelines, it is likely that adoption of a regulation creating a seasonal mandatory no-go zone would reduce the number of vessels in the current (voluntary) no-go zone and 1/4 mile beyond, compared to the No-action Alternative (191 observed in 2010). Other vessel incidents (e.g., approach within 100 yards, parking in the path, fast within 400 yards of whales) outside the no-go zone would likely continue at levels similar to those described in the No-action Alternative.

Vessel Strikes, Behavioral Disturbance, Acoustic Masking, and Overall Physiological Effects on Individuals and Effects on the Status of the Population. With a decreased number of vessels in the area, there would be a decrease in the likelihood of vessel strikes in the area. As described under Alternative 4, a reduction in close approaches would in turn reduce the risk of a killer whale being injured or killed by collision with a vessel compared to incident results expected under the No-action Alternative. Any injury to a member of the Southern Resident killer whale population is serious because of the small population size. As under the No-action Alternative, an injury or mortality to a single individual could have population level impacts, particularly for reproductive females.

There would also be a reduction in the number of behavioral responses and an increase in time spent foraging compared to the No-action Alternative, although there could continue to be some disturbance along the edge of the zone, as vessels engaged in whale watching currently park or travel along the edge of the zone to view whales. Fewer vessels in the no-go zone would also reduce the amount of acoustic masking that would occur under the No-action Alternative. The combined effect of reduced vessel disturbance and reduced acoustic masking in an area heavily used by the Southern Resident killer whales is likely to result in increased fitness of individuals and the population as a whole, for the reasons described under Alternatives 2 and 3. Some level of acoustic disturbance and acoustic masking from other vessel

incidents (e.g., approach within 100 yards, parking in the path, fast within 400 yards of whales) outside the no-go zone would likely continue at levels similar to those described under the No-action Alternative.

Because the Southern Residents are such a small population, improvements to the fitness of even a small number of individual whales could lead to population level effects, improving their status. The Southern Residents have had a variable growth trend in recent years and reduced vessel effects under Alternative 5 as compared to the No-action Alternative would likely have a positive impact on the status of Southern Resident killer whales.

Alternative 5 (expanded no-go zone) would establish a larger protected area and would, therefore, result in less behavioral disturbance and acoustic masking when compared to Alternative 4 (current no-go zone). A larger no-go zone would result in increased fitness of individual whales and the population as a whole compared to a smaller no-go zone.

Habitat Use. The effects described above would occur only in the no-go zone. The no-go zone along the west side of San Juan Island meets the criteria for a successful marine protected area as described in Subsection 4.1.3, Marine Protected Areas. The west side of San Juan Island has the highest number of whale sightings, is an important feeding habitat, and has high levels of vessel traffic and potentially harmful incidents. A no-go zone for Southern Residents that reduces vessel impacts and improves foraging opportunities addresses two of the main threats to the whales. Prohibiting vessels from portions of the whales' habitat along the west side of San Juan Island would 1) protect the whales from multiple threats; 2) in an area the local community already recognizes; and 3) provide opportunities to evaluate the effectiveness of the area. Although there is insufficient information to estimate the current level of impact from vessels on use of foraging habitat under the No-action Alternative, creating a no-go zone could increase use of the protected area by the whales under Alternative 5 as compared to the No-action Alternative.

The no-go zone under Alternative 5 would create a no-go zone along the west side of San Juan Island that is 6.2 square miles, which is larger than the current voluntary no-go zone (Alternative 4), which encompasses 3.8 square miles. The reduction of vessel impacts and improvement in foraging opportunities would be greater under Alternative 5 as compared to Alternative 4.

Other Marine Mammals. In addition to overlaps in National Wildlife Refuge guidelines, reducing the number of vessels in the no-go zone under Alternative 5 would also reduce the number of interactions between vessels and other marine mammals in the no-go zone, compared to the No-action Alternative. Transient killer whales do not frequent the no-go zone and would rarely experience reduced vessel traffic in the no-go zone under Alternative 5 as compared to the No-action Alternative.

The Be Whale Wise campaign, which includes information on responsible viewing of all marine mammals, would continue similar to the No-action Alternative. The vessel monitoring groups do not collect information on when the guidelines are not followed for other marine mammals. Compared to the No-action Alternative, the no-go zone could reduce the number of close approaches to other marine mammals and reduce the risk of vessel strikes and the number of behavioral responses associated with close approaches. This reduction cannot be quantified.

Other marine mammals that may be present intermittently in the no-go zone have increasing or stable population levels, including the threatened population of Steller sea lions. Endangered humpback whales are not likely to be in the no-go zone as it is very close to shore. Reduced vessel impacts to other marine mammals in the no-go zone would likely have a positive but small impact on their population status, which would remain similar to their status under the No-action Alternative.

Because the no-go zone would be larger than under Alternative 4, there would also be fewer vessel interactions under Alternative 5 than under Alternative 4.

4.2.6 Alternative 6: Speed Limit of 7 Knots Within 400 Yards of Killer Whales

Under this alternative, NMFS would promulgate a regulation prohibiting vessels from operating at speeds over 7 knots when within 400 yards of killer whales. The current Be Whale Wise guidelines include a recommendation to reduce speed to less than 7 knots when within 400 yards of the nearest whale, which is the current condition under the No-action Alternative. Monitoring groups such as Soundwatch have collected several years of data including incidents when vessels are not following the speed guideline and are "fast within 400 yards of whales" (Table 3-1 and Table 3-2). There is a variable number of speed incidents (139 to 330) in recent years (2006 through 2010) with more incidents associated with private vessels compared to commercial operators in all years (Table 3-2 and Figure 3-9).

A mandatory speed regulation under Alternative 6, which is similar to the current voluntary speed regulation under the No-action Alternative, would probably not change the average and maximum numbers of vessels within 1/2 mile of killer whales, compared to the No-action Alternative because speed regulations have no relationship to the proximity of vessels to whales. For similar reasons, the structure of the commercial whale watch industry (numbers of boats, length of season, viewing hours per day) would also likely continue at current levels.

A regulation governing vessel speed within 400 yards of whales would be clear to whale watch operators. These operators would likely know about such a regulation and be able to accurately judge their speed and the distance of their vessels from the whales. Recreational boaters would be less likely to know about such a regulation, though over time it is reasonable to expect that familiarity with the regulation would increase, particularly with education and if any prosecutions are well-publicized. Recreational boaters are less likely to know when whales are present and are less likely to be able to judge distance from whales on the water.

As described in Subsection 4.1.2, General Effects of Enforceable Regulations Compared to Voluntary Guidelines, fear of penalties would likely deter whale watch operators and recreational boaters from violating the regulation. This incentive would be stronger for commercial operators as violations could also result in loss of reputation and associated loss of business. For these reasons, it is likely that a mandatory speed limit within 400 yards of the whales under Alternative 6 would reduce the number of incidents in which vessels approach at a speed of over 7 knots within 400 yards of the whales, compared to the number occurring with the current voluntary guidelines under the No-action Alternative. Other vessel incidents (e.g., approach within 100 yards, parking in the path, in the no-go zone) would likely continue at levels similar to those described under the No-action Alternative.

Vessel Strikes. Predicting the movements of killer whales can be difficult, particularly for boaters with little or no experience operating around whales. Boaters operating at slow speeds could be more aware of the position of whales and would have more time to avoid getting too close, impacting their behavior or colliding with whales. Operating at slower speeds in the vicinity of whales would reduce the potential for vessel strikes or serious injuries from strikes, compared to the No-action Alternative (Laist et al. 2001). Any injury to a member of the Southern Resident killer whale population is serious because of the small population size. As under the No-action Alternative, an injury or mortality to a single individual could have population level impacts, particularly for reproductive females.

Acoustic Masking. Similar to the No-action Alternative, vessel sound is not expected to damage the hearing of Southern Resident killer whales. Promulgation of a mandatory speed limit within 400 yards of whales would reduce the amount of interference with the whales' communication and echolocation, compared to the current level of compliance with voluntary guidelines under the No-action Alternative. Operating at slow speeds near the whales would reduce sound emissions, which are highly dependent on the speed of a vessel (Erbe 2002; Hildebrand 2006), compared to the No-action Alternative. The data on the whales' reliance on acoustic signals to communicate and forage, the range in which their hearing sensitivity is greatest, and the sounds generated by vessels traveling over 7 knots or more, as presented in Subsection 3.2.1.5, Vessel Interactions, support a conclusion that a reduction in the number of annual speed incidents would decrease the level of acoustic masking associated with fast boats within 400 yards of Southern Resident killer whales compared to the No-action Alternative. Transient killer whales use passive listening when foraging and sounds from their marine mammal prey may be masked by vessel sounds. The reduction of vessel sound under Alternative 6 would reduce any short-term or intermittent interference from vessels with transient killer whale foraging compared to the No-action Alternative.

Habitat Use. Because a speed limit would apply wherever the whales are found, the protection would occur throughout the entire inland waters area (including along the west coast of San Juan Island) and at all times of year. As under the No-action Alternative, no changes to habitat use would be expected for killer whales in this region under Alternative 6 because the overall number of vessels would not be expected to change from implementing a speed regulation. As described under the No-action Alternative, there is insufficient information to estimate the effect of the current level of vessel traffic on use of particular feeding habitats. Although under Alternative 6 there would be fewer fast moving vessels within 400 yards, there would be no changes in total vessel traffic expected under Alternative 6 as compared to the No-action Alternative, or changes to use of important foraging areas.

Overall Physiological Effects on Individuals and Effects on the Status of the Population. As described above, a mandatory speed regulation under Alternative 6 is likely to reduce acoustic masking, compared to the No-action Alternative. As described under the No-action Alternative and in Subsection 3.2.1.5, Vessel Interactions, acoustic masking can have physiological effects on individual whales and the population as a whole. It is not possible to quantify the physiological effects of the current level of acoustic masking, for the reasons described under the No-action Alternative. For the same reasons, it is not possible to quantify the reduction in physiological effects, and associated improvement in individual and population fitness, that would result from a reduction in the number of vessels operating over 7 knots within 400 yards of the whales. Nevertheless, the reduction in acoustic masking is likely to have physiological effects that increase the fitness of individual whales and the population as a whole. Some level of behavioral disturbance and acoustic masking from other vessel incidents (e.g., approach within 100 yards, parking in the path, in the no-go zone) would likely continue at levels similar to those described under the No-action Alternative.

Because the Southern Residents are such a small population, improvements to the fitness of even a small number of individual whales could lead to population level effects, improving their status. The Southern Residents have had a variable growth trend in recent years and reduced vessel effects under Alternative 6 as compared to the No-action Alternative would likely have a positive impact on the status of Southern Resident killer whales.

Other Marine Mammals. A speed limit for vessels observing killer whales would apply to all killer whales, including transient and off-shore killer whales, because the regulation would not distinguish among the different types. Thus, all killer whales would experience benefits from some reduction in fast moving vessels within 400 yards. A speed limit near killer whales may also result in vessel operators slowing down around other marine mammals, because such a regulation might create awareness about vessel effects on marine mammals generally. The Be Whale Wise campaign, which includes information on responsible

viewing of all marine mammals, would continue similar to the No-action Alternative. The vessel monitoring groups do not collect information on when the guidelines are not followed for other marine mammals.

Compared to the No-action Alternative, a speed regulation for killer whales could reduce the number of fast moving vessels near other marine mammals and reduce the risk of vessel strikes and acoustic masking associated with fast vessels. This reduction cannot be quantified.

Most other marine mammals that are opportunistically viewed from vessels have increasing or stable population levels, including the threatened population of Steller sea lions and endangered humpback whales. Reduced vessel impacts to other killer whales and marine mammals would likely have a positive but small impact on their population status, which would remain similar to their status under the No-action Alternative.

4.2.7 Alternative 7: Keep Clear of the Whales' Path

Under this alternative, NMFS would promulgate a regulation requiring vessels to keep clear of the whales' path. The current Be Whale Wise guidelines include a recommendation to keep vessels clear of the whales' path. Monitoring groups such as Soundwatch have collected several years of data, including incidents of parking in the path or crossing the path of whales. Parking in the path is often the top reported incident for commercial and recreational whale watching vessels (Table 3-1 and Table 3-2). There is a decreasing number of parking in the path incidents (330 to 191) in recent years (2006 through 2010). In 2006 and earlier years, parking in the path was primarily associated with Canadian commercial whale watch vessels (43 percent in 2006) followed by recreational boaters (37 percent in 2006) (Koski 2007). In 2007 and 2008, the parking in the path incidents were similar for Canadian commercial whale watch and recreational boaters, and in 2009 and 2010 most of the reported incidents were recreational boaters (in 2009, 314 incidents for recreational boaters and 107 for Canadian whale watch vessels; in 2010, 127 incidents for recreational boaters and 37 for Canadian whale watch vessels) (Koski 2010a) (Table 3-2 and Figure 3-10). In 2010, land-based Soundwatch observers recorded 88 additional incidents of kayaks parked in the path of the whales (Koski 2010b). While all reported incidents represent minimum numbers of interactions of whales and vessels, reports of parking in the path may be the most under-reported incident because observers must view a sequence of vessel and whale movements rather than an instantaneous event like most other incidents.

A mandatory regulation under Alternative 7 that prohibits parking in the path of whales would probably not change the average and maximum numbers of vessels within 1/2 mile of killer whales compared to the No-action Alternative, because the vessels primarily parking in the path under the No-action Alternative are commercial whale watch vessels. While these vessels may not park in the whales' path under Alternative 7, they are unlikely to stop following whales and are, therefore, likely to still be in the vicinity of whales to the same degree as under the No-action Alternative. For similar reasons, the structure of the commercial whale watch industry (numbers of boats, length of season, viewing hours per day) would also likely continue at current levels.

A regulation prohibiting parking in the path of killer whales would be clear to whale watch operators and is consistent with the current guidelines. These operators would likely know about such a regulation and would have some experience in judging the travel path of the whales. Under certain conditions, however, whale movements can be unpredictable (i.e., foraging whale pod spread out over a large area) even for experienced whale watchers. Recreational boaters would be less likely to know about such a regulation, though over time it is reasonable to expect that familiarity with the regulation would increase, particularly

with education and if any prosecutions are well-publicized. Recreational boaters are less likely to know when whales are present and are less likely to be able to judge the travel path of the whales. Similar to monitoring, enforcement actions would require information on a sequence of vessel and whale movements to establish a violation.

As described in Subsection 4.1.2, General Effects of Enforceable Regulations Compared to Voluntary Guidelines, fear of penalties would likely deter whale watch operators and recreational boaters from violating the regulation. This incentive would be stronger for commercial operators as violations could also result in loss of reputation and associated loss of business. For these reasons, implementation of Alternative 7 is likely to reduce total numbers of parking in the path incidents annually, compared to the No-action Alternative. Because most parking in the path incidents are committed by commercial operators and increased compliance is more likely among commercial operators, Alternative 7 may result in a greater reduction in the number of vessel incidents than Alternatives 2 through 6, which address incidents that are mostly committed by recreational vessel operators. Other vessel incidents (e.g., approach within 100 yards, fast within 400 yards, in the no-go zone) would likely continue at levels similar to those described in the No-action Alternative.

Vessel Strikes. In July of 2005 in the waters off San Juan Island, a commercial whale watch vessel repeatedly parked in the path of whales resulting in a whale hitting the vessel and sustaining minor injuries. The vessel owner and operators were charged with a violation of the MMPA and settled by paying a $1,000 fine. A reduction in incidents of vessels parking in the whales' path would reduce the risk of vessel strikes, compared to the No-action Alternative. This would in turn reduce the risk of a killer whale being injured or killed by collision with a vessel. Any injury to a member of the Southern Resident killer whale population is serious because of the small population size. As under the No-action Alternative, an injury or mortality to a single individual could have population level impacts, particularly for reproductive females.

Behavioral Disturbance. The reduction in the numbers of vessels parking in the path would also reduce the amount of behavioral disturbance compared to the No-action Alternative. The behavioral responses of killer whales to vessels parked in the whales' path are described in Subsection 3.2.1.5, Vessel Interactions. Vessels in the path of the whales can interfere with important social behaviors such as prey sharing (Ford and Ellis 2006) or with behaviors that generally occur in a forward path as the whales are moving, such as nursing (Kriete 2007). Because monitoring groups do not record which whales are currently exposed to vessel incidents, it is not possible to quantify the total number of behavioral responses, either of individual whales or the population as a whole, and therefore not possible to quantify the change from the No-action Alternative.

Nevertheless, the data on whale behavior and energetic costs support a conclusion that a reduction in the number of incidents of behavioral disturbance would decrease the energy expended by whales, compared to the No-action Alternative. The behavior budgets of the whales (that is, time allocated to various activities) would more closely resemble an undisturbed state, which would include more time spent foraging. Thus, compared to the No-action Alternative, in which parking in the path would continue at current levels and may increase, adoption of a mandatory prohibition of this activity would likely reduce the whales' energetic costs and increase the time and energy available for foraging, resting, and other important functions.

Acoustic Masking. While some vessels may park in the path and turn off their engines while quietly waiting for the whales to closely approach, others engage in more traditional leapfrogging behavior as described in Subsection 3.2.1.5, Vessel Interactions. Available information suggests that sound generated by fast moving vessels leapfrogging the whales in order to park in their path masks the echolocation and communication of the whales. The masking effects of vessel noise on killer whale echolocation and

communication is described in Subsection 3.2.1.5, Vessel Interactions. While distance and speed of the vessels determine potential impacts to the whales, the direction of the vessels in relation to the whales can also affect the impact. Sound from vessels has the greatest potential to mask echolocation directly in front of the whales (Bain and Dahlheim 1994). The data on the whales' reliance on acoustic signals to communicate and forage, particularly in front of the whales, and on the range in which their hearing sensitivity is greatest, support a conclusion that a reduction in the number of parking in the path incidents annually would decrease the level of acoustic masking compared to the No-action Alternative.

Similar to the No-action Alternative, vessel sound is not expected to damage the hearing of Southern Resident killer whales.

Transient killer whales use passive listening when foraging and sounds from their marine mammal prey may be masked by vessel sounds. The reduction of vessel sound under Alternative 7 would also reduce any short-term or intermittent interference from vessels with transient killer whale foraging compared to the No-action Alternative.

Habitat Use. A prohibition on parking in the path would apply wherever the whales are found; thus, the protection would occur throughout the entire inland waters area and at all times of year. In addition, these effects would apply to all killer whales, including transient and off-shore killer whales, because the regulation would not distinguish among the different types.

As under the No-action Alternative, no changes to habitat use would be expected for killer whales in the action area under Alternative 7 because the overall number of vessels would not be expected to change from implementing a regulation prohibiting parking in the path. As described under the No-action Alternative, there is insufficient information to estimate the effect of the current level of vessel traffic on use of particular feeding habitats. Although under Alternative 7 there would be fewer parking in the path incidents, there would be no changes in total vessel traffic expected under Alternative 7 as compared to the No-action Alternative, or changes to use of important foraging areas.

Overall Physiological Effects on Individuals and Effects on the Status of the Population. As described above, a mandatory prohibition on parking in the path under Alternative 7 is likely to reduce behavioral responses associated with vessel disturbance and acoustic masking, compared to the No-action Alternative. Also as described under the No-action Alternative and in Subsection 3.2.1.5, Vessel Interactions, vessel disturbance and acoustic masking can have physiological effects on individual whales and the population as a whole. It is not possible to quantify the physiological effects of the current level of disturbance and acoustic masking, for the reasons described under the No-action Alternative. For the same reasons, it is not possible to quantify the reduction in physiological effects, and associated improvement in individual and population fitness, that would result from a reduction in the number of parking in the path incidents. Nevertheless, the reduction in behavioral disturbance and acoustic masking is likely to have physiological effects that increase the fitness of individual whales and the population as a whole, compared to the No-action Alternative. Some level of behavioral disturbance and acoustic masking from other vessel incidents (e.g., approach within 100 yards, fast within 400 yards, in the no-go zone) would likely continue at levels similar to those described in the No-action Alternative.

Because the Southern Residents are such a small population, improvements to the fitness of even a small number of individual whales could lead to population level effects, improving their status. The Southern Residents have had a variable growth trend in recent years and reduced vessel effects under Alternative 7 as compared to the No-action Alternative would likely have a positive impact on the status of Southern Resident killer whales.

Other Marine Mammals. Soundwatch does not record incidents of vessels parking in the path of marine mammals other than Southern Resident killer whales; thus, it is not possible to quantify the extent to which vessels currently engage in this behavior with other marine mammals. A parking in the path prohibition for killer whales would apply to all killer whales, including transient and off-shore killer whales, because the regulation would not distinguish among the different types. Thus, to the extent vessels engage in this behavior around other killer whales, they would experience some reduction in parking in the path incidents. It is unclear whether Alternative 7 would have any effect on other marine mammals, since it is a vessel behavior that may be particular to killer whales and to commercial whale watch operators. Such operators are likely to know if a regulation applies to a particular species, and if they are inclined to engage in this behavior, it is likely that a regulation regarding killer whales would not cause them to avoid this behavior around other marine mammals. Therefore, impacts would continue to occur at some unquantified level, similar to the No-action Alternative. Most other marine mammals that are opportunistically viewed from vessels have increasing or stable population levels, including the threatened population of Steller sea lions and endangered humpback whales. Reduced vessel impacts to other killer whales and marine mammals would likely have a positive but small impact on their population status, which would remain similar to their status under the No-action Alternative. The Be Whale Wise campaign, which includes information on responsible viewing of all marine mammals, would continue as under the No-action Alternative.

4.2.8 Alternative 8: Proposed Action

Under this alternative, NMFS would promulgate a package of regulations incorporating Alternatives 3, 5, and 7 as described in Subsection 2.2.8, Alternative 8: Proposed Action. The regulation package would prohibit vessels from approaching any killer whale closer than 200 yards, formalize a no-go zone along the west side of San Juan Island extending 1/2 mile (800 meters) offshore from Eagle Point to Mitchell Point (Figure 2-2), and require vessels to keep clear of the whales' path. The effects of the proposed action package on marine mammals would be a combination of the impacts described under Subsections 4.2.3, Alternative 3: 200-Yard Approach Regulation; 4.2.5, Alternative 5: Protected Area–Expanded No-go Zone; and 4.2.7, Alternative 7: Keep Clear of the Whales' Path; they are summarized in Table 4-2.

4.2.9 Alternative 9: Preferred Alternative

Under this alternative, NMFS would promulgate a package of final regulations incorporating Alternatives 3 and 7 as described in Subsection 2.2.9, Alternative 9: Preferred Alternative. The regulation package would prohibit vessels from approaching any killer whale closer than 200 yards and require vessels to keep clear of the whales' path. The effects of the Preferred Alternative on marine mammals would be a combination of the impacts described under Subsections 4.2.3, Alternative 3: 200-Yard Approach Regulation and 4.2.7, Alternative 7: Keep Clear of the Whales' Path; they are summarized in Table 4-2.

4.3 Listed and Non-listed Salmonids

4.3.1 Alternative 1 (No Action)

Under the No-action Alternative, current specific voluntary guidelines would remain in place to educate boaters on how to view marine wildlife without causing disturbance or harassment. Current general mandatory regulations would also remain in place under the MMPA and ESA, with enforcement levels likely continuing as in the past.

Without additional specific regulations, boaters would likely continue to closely approach, approach at high speeds, and park in the path of the whales, interfering with the whales' ability to echolocate and efficiently locate prey (Subsection 4.2.1, Alternative 1 (No Action)). With vessels impairing foraging behavior, whales would continue to consume salmon at current levels, and would consume the same species that currently make up their diets (Subsection 3.3, Listed and Non-listed Salmonids). Southern Resident killer whales might continue to persist at their current small population level or could decline as described in Subsection 4.2, Marine Mammals, under the No-action Alternative.

The ESA-listed Puget Sound Chinook ESU is approximately 64 percent of all Puget Sound Chinook stocks combined, and this ESU is composed of a combination of natural-origin and hatchery-origin fish. Under the No-action Alternative, harvest and hatchery production as well as recovery efforts are expected to continue under current management plans. With the final recovery plan for Puget Sound in place, many actions are managed to increase population abundance and productivity of listed salmon ESUs and achieve a trend to recovery and this would continue under the No-action Alternative. Federal harvest, hatchery, habitat, and hydropower actions are subject to section 7 consultation under the ESA to analyze effects and to ensure that actions will not jeopardize the continued existence of both listed salmon ESUs and Southern Resident killer whales. Under the No-action Alternative, there would be no change to these processes.

Thus, under the No-action Alternative, killer whale predation would likely continue to have the same level of impact, or possibly a reduced impact, on listed and non-listed salmonid populations, including listed Puget Sound Chinook salmon and Hood Canal summer-run chum salmon, two primary prey species for Southern Resident killer whales (Subsection 3.3, Listed and Non-listed Salmonids).

4.3.2 Action Alternatives 2 through 9

Each of the action alternatives may have the potential for effects on listed and non-listed salmonids that are the primary prey for killer whales. A reduction in vessel effects would be expected to reduce interference with foraging activity. The action alternatives would increase the amount of time the Southern Resident killer whales spend foraging and improve their foraging effectiveness, which would allow them to locate and catch fish more easily. This could result in an increase in the number of listed and non-listed salmon eaten by the whales, particularly Chinook salmon, which is their primary diet (Subsection 3.3, Listed and Non-listed Salmonids).

Over the long-term, better foraging conditions could contribute to an increase in the Southern Resident killer whale population compared to the No-action Alternative. An increase in the number of killer whales could result in increased consumption of salmonids as compared to the No-action Alternative. At the end of 2010, there were 86 Southern Resident killer whales, and any significant population increases would occur gradually over many years.

Because of data limitations it is not possible at this time to quantify potential impacts of increased killer whale foraging efficiency or population growth on the numbers of Chinook present in inland waters (Subsection 3.3, Listed and Non-listed Salmonids) or of other listed and non-listed salmonids.

The ESA-listed Puget Sound Chinook ESU is approximately 64 percent of all Puget Sound Chinook stocks combined, and this ESU is composed of a combination of natural-origin and hatchery-origin fish. Under Alternatives 2 through 9, harvest and hatchery production as well as recovery efforts are expected to continue under current management plans, similar to the No-action Alternative. With the final recovery plan for Puget Sound in place, many actions are managed to increase population abundance and productivity of listed salmon ESUs and to achieve a trend to recovery, and this would continue under each

alternative similar to the No-action Alternative. Federal harvest, hatchery, habitat, and hydropower actions are subject to section 7 consultation under the ESA to analyze effects and to ensure that actions will not jeopardize the continued existence of both listed salmon ESUs and Southern Resident killer whales. Under Alternatives 2 through 9, there would be no change to these processes.

As information on potential increases in the Southern Resident killer whale population becomes available over the long term, this information can be included in ESA section 7 consultations. With more specific data in the future, it may be possible to quantify predation on specific listed salmon ESUs and to evaluate whether predation is a limiting factor.

4.4 Socioeconomics

As described in Subsection 3.4, Socioeconomics, commercial whale watching is the only industry targeting Southern Resident killer whales. While other commercial vessels including fishing, ferries, tug boats, cargo, and tanker vessels do not target or follow the Southern Residents, they do operate in the same waters used by the whales. As described in Subsection 1.6.4, Exceptions, vessels in shipping lanes and treaty fishing vessels engaged in fishing would be exempt from any of the regulations under the action alternatives. With these exceptions in place there would be only negligible economic impacts to these sectors under each of the alternatives. This section therefore focuses on impacts to the commercial whale watch industry and includes information on commercial fishing, shipping, and ferries as appropriate. Commercial shipping impacts, other than socioeconomic, are addressed under transportation analyses (Subsection 4.9, Transportation). Private whale watching vessels and recreational fishing impacts are addressed under Subsection 4.5, Recreation.

For the analysis of socioeconomic effects, Industrial Economics, Incorporated (IEC) (2010) relied on recent data regarding violations that occur under the existing voluntary guidelines (Table 3-1 and Table 3-2) to estimate, on average, the number of potential violations of the various regulations that would occur under the No-action Alternative. For each of the action alternatives, IEC assumed that the effect would be that those vessel operators would have to either change their behavior and adhere to the mandatory regulation, or face penalties. For those choosing to violate the regulations and face penalties, it is possible that passengers on those trips will be exposed to law enforcement actions, including possibly having a trip suspended. The economic effect of that exposure is discussed in this subsection, while the recreational effect is discussed below under Subsection 4.5, Recreation.

Data were only available to estimate a total number of commercial whale watching trips for U.S.-based commercial whale watch companies for comparison between the No-action and action alternatives. This is an underestimate of total number of whale watch trips, which also includes Canadian commercial whale watch trips. As discussed under Subsection 4.2, Marine Mammals, it is not possible to estimate what proportion of those expected to violate voluntary guidelines under the No-action Alternative would adhere to mandatory regulations under the action alternatives, but it is reasonable to expect that mandatory regulations would result in greater compliance, particularly from commercial whale watch operators, for the reasons described in Subsection 4.1.2, General Effects of Enforceable Regulations Compared to Voluntary Guidelines.

4.4.1 Alternative 1 (No Action)

Under the No-action Alternative, current specific voluntary guidelines would remain in place to educate boaters on how to view marine wildlife without causing disturbance or harassment. Current general mandatory regulations would also remain in place under the MMPA and ESA, with enforcement levels

likely continuing as in the past. Subsection 4.2.1, Alternative 1 (No Action), describes the patterns of expected future compliance by different types of vessels if the current specific guidelines are continued into the future. Specific estimates of future non-compliance under the No-action Alternative are based on an average of this pattern by vessel type, and contained in IEC (2010).

The commercial whale watching industry grew rapidly in the 1970s to 1990s and has leveled off in recent years (Subsection 3.4.2, Whale Watch Industry in Puget Sound). The stability of the industry observed in recent years is consistent with market saturation, so increased demand for whale watching and further growth would not be expected. Under the No-action Alternative the number of companies and vessels would likely continue at the current stable level with the same number of jobs (196) and same economic contribution to the Puget Sound economy ($22 million dollars) (Subsection 3.4.2, Whale Watch Industry in Puget Sound). Based on data from 2006 (Russell and Schneidler, In Press), in the U.S. the 19 companies operating 22 vessels were estimated to offer approximately 6,264 trips per year.

Southern Resident killer whales might continue to persist at their current small population level or, with continued vessel disturbance, they could decline as described in Subsection 4.2, Marine Mammals, under the No-action Alternative. In the long term, opportunities for commercial whale watching could be reduced if there were fewer whales. This would likely occur over a long period of time and adjustments by the industry would be gradual. Commercial tours could continue with less of a focus on the Southern Resident whales and more focus on other more abundant marine species and the scenic aspects of the inland waters of Washington. There is no information available to quantify what proportion of the commercial whale watching industry would be affected by a long-term decline in the number of Southern Resident killer whales.

Commercial fishing occurs throughout the inland waters of Washington (Subsection 3.4.4, Commercial Fisheries in Inland Waters of Washington), including along the west side of San Juan Island and occasionally within the current voluntary no-go zone (Dismukes et al. 2010). Under the No-action Alternative, commercial fishing would continue at current levels, in the same locations and with the same economic value ($646 million in inland waters) (Subsection 3.4.1, Overview of Puget Sound Economy).

Under the No-action Alternative recreational boating and fishing would continue at current levels (Subsection 3.4.1, Overview of Puget Sound Economy) and no reductions in the overall number of boats on the water would be expected. The economic value to the local economy from recreational boating and fishing would not be expected to change under the No-action Alternative (Subsection 3.4.1, Overview of Puget Sound Economy). Effects on non-economic recreational opportunities and experience are discussed further below under Subsection 4.5, Recreation.

4.4.2 Alternative 2: 100-Yard Approach Regulation

Under Alternative 2, NMFS would adopt a mandatory regulation prohibiting all vessels from approaching within 100 yards of killer whales, except vessels in shipping lanes and commercial and treaty fishing vessels actively engaged in fishing. Those operating non-exempt vessels would need to stay 100 yards away from killer whales or be subject to fines and other penalties. IEC (2010) relied on recent incidents to estimate that there would be about 11 commercial whale watch trips each year, out of a total of 6,264 U.S. trips per year, where the operator would face this choice, compared to the No-action Alternative.

For those operators who choose to adhere to the mandatory regulation, the impact would be negligible. The vast majority of whale watch trips under the No-action Alternative would comply with a voluntary 100-yard approach guideline. Given that the whale watch industry has continued to grow and presumably reach

a saturation point with voluntary guidelines in place (including a 100-yard approach guideline) and largely observed, it is reasonable to expect that adopting a mandatory approach regulation would not affect demand for whale watch trips or revenues of the whale watch industry.

Based on an expected 11.2 violations under the No-action Alternative, and 55 passengers per trip, approximately 619 passengers (out of a total of 425,000 passengers per year) could be exposed to an enforcement action. For those operators who choose to violate the mandatory regulations, the economic impacts could include fines associated with violating mandatory regulations, and loss of business, if the violations are publicized. Although the individual companies committing the violations could have reduced revenue from fewer customers, these customers would probably choose an alternate operator, so no impacts to the industry as a whole would be expected. Even if exposure to an enforcement action deterred some customers entirely, with only 0.15 percent of all passengers potentially being exposed to an enforcement action, that exposure is likely to have minimal effects on commercial whale watch operator revenues. Moreover, since respect for wildlife is a likely motivator for customers to seek whale watching experiences (Subsection 3.4.2, Whale Watch Industry in Puget Sound), publicity about a small number of enforcement actions is not a likely deterrent to customers.

These impacts to trips and passengers would be extremely small and would not be expected to impact the demand for whale watching, the number of companies or vessels, the jobs associated with the industry, or the overall value on the local economy of the commercial whale watch industry or local tourism in the Puget Sound area as described under the No-action Alternative. As described in Subsection 4.2.2, Alternative 2: 100-Yard Approach Regulation, Alternative 2 could reduce vessel impacts and increase the fitness of Southern Resident killer whales. An increase in the Southern Resident killer whale population would support the commercial whale watch industry in the long term and allow for continued stability in the industry.

Commercial cargo ships in shipping lanes and commercial and treaty fishing vessels actively engaged in setting, tending, or retrieving fishing gear would be exempt from an approach regulation; however, fishing vessels transiting to and from fishing areas would be subject to the 100-yard approach regulation. Bain (2007) found that of the vessels he observed within 100 yards, none of them were commercial, tribal fishing, or freight vessels. His study areas were not located within ferry routes. In 2007-2008, Giles and Cendak (2010) observed 21 ferries and 22 shipping vessels within 1,000 yards of the whales; however, none were observed within 100 yards of the whales.

Based on the small numbers of approach incidents by other commercial vessels reported by Soundwatch, IEC (2010) estimated that in only nine trips per year would commercial shipping operators (if outside of the shipping lane) or fishing vessel operators (if not tending gear) be required to alter course or face penalties as a result of a 100-yard approach regulation under Alternative 2, as compared to the No-action Alternative. Average annual transits through Haro Strait, Boundary Pass, and the Strait of Georgia waterways are over 165,000 each year (Table 3-9 and Table 3-10). Slight course changes to remain at least 100 yards from whales for approximately nine vessel trips per year would be negligible and would not impact shipping or commercial fishing fleets for these multi-million dollar industries as compared to the No-action Alternative. Alternatively, if vessel operators instead choose to violate a mandatory 100-yard approach regulation, associated fines and penalties for nine incidents would be a negligible fraction of the current economic value of these industries.

Under Alternative 2 a small number of recreational boaters and fishers could be inconvenienced as described under Subsection 4.5, Recreation. The overall number of boats on the water (as described in Subsection 4.1.4, Effects on Southern Resident Killer Whale Critical Habitat) and the economic value to

the local economy from recreational boating and fishing would not be expected to change in comparison to the No-action Alternative.

4.4.3 Alternative 3: 200-Yard Approach Regulation

Under Alternative 3, NMFS would promulgate a mandatory 200-yard approach regulation with the same exceptions as under Alternative 2. There are little data available to evaluate how many vessels currently approach within 200 yards, because it is acceptable under current guidelines and incidents are not reported. Thus, it was not possible to estimate under the No-action Alternative how many commercial whale watch operators would likely operate within 200 yards of whales. For this reason, and because the current guideline is only 100 yards, NMFS assumed that all commercial whale watch operators would need to change their procedures to accommodate a new 200-yard approach rule. This is likely overestimated in light of the data from Giles and Cendak (2010) indicating that of all commercial whale watching vessels within 800 yards of the whales in 2007-2008, 88 percent of them were observed greater than 200 yards from the whales. Using data from Giles and Cendak (2010), IEC (2010) estimated that 51 commercial whale watch trips with 2,811 individuals would be affected by a 200-yard approach regulation; however, NMFS conservatively assumed that all commercial trips could be affected. The 16 U.S. companies and 19 Canadian companies that make up the active whale watching fleet of 76 vessels (Subsection 3.4.2, Whale Watch Industry in Puget Sound) would have to train their personnel to remain 200 yards from the whales. Some slight costs may be associated with such training.

It is likely that whale watch operators would adhere to a 200-yard approach regulation in a similar fashion to the 100-yard guideline, while a small number may get closer by design or by accident, as they would with a voluntary guideline under the No-action Alternative. It is possible that a viewing distance greater than 100 yards would hurt the economic viability of the commercial whale watch industry. Viewing whales from a distance of 200 yards may be less attractive to some individuals interested in participating in commercial whale watch trips. There are anecdotal reports that informal interviews with whale watch customers indicated low satisfaction with viewing from distances greater than 200 yards. No scientific studies have been provided to support this possibility. There is evidence, however, that the economic viability of the industry would not be affected by an increased viewing distance.

Several studies have assessed the value that whale watching participants have for wildlife viewing and provide data on the factors that lead to an enjoyable or memorable whale watching trip, and how satisfied participants are with various aspects of their trip (Subsection 3.5, Whale Watch Industry in Puget Sound). Survey results of whale watch participants indicate that proximity to the whales is not the most important part of the whale watchers' experience and that seeing whales and whale behavior was much more important (Subsection 3.5, Whale Watch Industry in Puget Sound). In addition, one study found participants were most satisfied with the respect their vessel operators gave the whales; the number of whales, whale behavior, and learning also received higher satisfaction than the distance from which whales were observed; and the participants strongly agreed with statements related to protection of the whales (Subsection 3.5, Whale Watch Industry in Puget Sound).

Thus, while it is possible that a mandatory 200-yard regulation could reduce whale watch revenues compared to the No-action Alternative, these reductions may be minimized by educating whale watch participants regarding the protective nature of a 200-yard viewing distance. In addition, whale watch companies have a number of options to increase satisfaction from viewing whales at 200 yards rather than 100 yards, such as providing binoculars, encouraging the use of telephoto lenses for photography, and using platforms that provide a better vantage point higher from the surface of the water.

Any impacts to the whale watch industry would be small, and based on the information above would not be expected to impact the demand for whale watching, the number of companies or vessels, the jobs associated with the industry, or the overall value on the local economy of the commercial whale watch industry or local tourism in the Puget Sound area, compared to the No-action Alternative. As described in Subsection 4.2.3, Alternative 3: 200-Yard Approach Regulation, Alternative 3 could reduce vessel impacts and increase the fitness of Southern Resident killer whales. An increase in the Southern Resident killer whale population would support the commercial whale watch industry in the long term and allow for continued stability in the industry.

Commercial cargo ships in the shipping lanes and commercial and treaty fishing vessels actively engaged in setting, tending, or retrieving fishing gear would be exempt from an approach regulation; however, fishing vessels transiting to and from fishing areas would be subject to the 200-yard approach regulation. While IEC (2010) was not able to estimate specific numbers of commercial fishing, tug boat, ferry, or shipping trips that would be affected each year because Soundwatch does not record approaches at 200 yards, Bain (2007) found that of the vessels he observed within 200 yards, none of them were commercial, tribal fishing, or freight vessels. His study areas were not located within ferry routes. In 2007-2008, Giles and Cendak (2010) reported that of the 21 ferries observed within 1,000 yards of the whales, only two were within 200 yards of the whales and for shipping vessels, only one of the 22 observed were within 200 yards.

IEC estimated that only nine trips per year of commercial shipping or fishing vessels would be affected by a 100-yard approach regulation compared to the No-action Alternative and it is likely that similarly low numbers of commercial trips would be affected by a 200-yard rule based on the information above. Average annual transits through Haro Strait, Boundary Pass, and the Strait of Georgia waterways are over 165,000 each year (Table 3-9 and Table 3-10). The nine slight course changes IEC estimated would be necessary compared to the No-action Alternative would not impact economic conditions related to shipping, ferries, or commercial fishing fleets for these multi-million dollar industries and transportation services. Alternatively, if vessel operators instead choose to violate a mandatory 200-yard approach regulation, associated fines and penalties for nine incidents would be a negligible fraction of the current economic value of these industries.

Under Alternative 3, a small number of recreational boaters and fishers could be inconvenienced as described under Subsection 4.5, Recreation. The overall number of boats on the water (as described in Subsection 4.1.4, Effects on Southern Resident Killer Whale Critical Habitat) and the economic value to the local economy from recreational boating and fishing would not be expected to change in comparison to the No-action Alternative.

4.4.4 Alternative 4: Protected Area – Current Voluntary No-go Zone

Under Alternative 4, NMFS would promulgate a mandatory regulation prohibiting vessels from entering the current voluntary no-go zone from May through September, except treaty fishing vessels actively engaged in fishing. Those operating non-exempt vessels would need to stay outside the no-go zone or be subject to fines and other penalties. IEC (2010) relied on recent incidents (Table 3-1 and Table 3-2) to estimate that there would be about 45 commercial whale watch trips each year, out of a total of 6,264 U.S. trips per year, where the operator would face this choice, compared to the No-action Alternative (Table 3-1 and Table 3-2).

For those operators who choose to adhere to the mandatory regulation, the impact would be negligible. The vast majority of whale watch trips under the No-action Alternative would comply with a voluntary no-go

zone, and there is no evidence that such compliance affects revenue. Given that the whale watch industry has continued to grow and presumably reach a saturation point with voluntary guidelines in place (including a voluntary no-go zone) and largely observed, it is reasonable to expect that adopting a mandatory approach regulation would not affect demand for whale watch trips or revenues of the whale watch industry.

Based on an expected 45 violations under the No-action Alternative, and 55 passengers per trip, approximately 2,458 passengers (out of a total of 425,000 passengers per year) could be exposed to an enforcement action. For those operators who choose to violate the mandatory regulations, the economic impacts could include fines associated with violating mandatory regulations, and loss of business, if the violations are publicized. Although the individual companies committing the violations could have reduced revenue from fewer customers, these customers would probably choose an alternate operator, so no impacts to the industry as a whole would be expected. Even if exposure to an enforcement action deterred some customers entirely, with only 0.58 percent of all passengers potentially being exposed to an enforcement action, that exposure is likely to have minimal effects on commercial whale watch operator revenues. Moreover, since respect for wildlife is a likely motivator for customers to seek whale watching experiences (Subsection 3.4.2, Whale Watch Industry in Puget Sound), publicity about a small number of enforcement actions is not a likely deterrent to customers.

Any impacts to the whale watch industry would be small and would not be expected to impact the demand for whale watching, the number of companies or vessels, the jobs associated with the industry or the overall value to the local economy of the commercial whale watch industry or local tourism in the Puget Sound area as described under the No-action Alternative. As described in Subsection 4.2.4, Alternative 4: Protected Area – Current Voluntary No-go Zone, Alternative 4 could reduce vessel impacts and increase the fitness of Southern Resident killer whales. An increase in the Southern Resident killer whale population would support the commercial whale watch industry in the long-term and allow for continued stability in the industry.

The current no-go zone overlaps with a boat launch in Small Pox Bay located within the San Juan County Park. The launch is a free public launch for motorized vessels and kayaks. Several commercial kayak companies launch at the San Juan County Park and in 2007 the park tracked approximately 5,000 individual kayak company guests using the launch (San Juan County Economic Development Council 2008). In 2010, the San Juan County Park initiated a permit system and an education and monitoring program. Based on commercial kayak usage of the boat launch, a total of 6,900 people participated in trips originating at the launch. Many of the kayak companies advertise whale watching as part of their kayak tours. Commercial kayak trips would have to relocate to other launches, some of which may charge fees. If whale watching is the primary objective for commercial kayakers, they would likely be launching from sites that are greater distances from core whale areas and their opportunities for seeing whales would likely be reduced. The companies pay fees to the park for use of the launch area. In 2007 the park collected $38,500 from the commercial kayak companies and this revenue could be affected under Alternative 4. In 2010, San Juan County Park collected about $5,000 in permit fees to support the education and monitoring program (Koski 2010b).

The current no-go zone overlaps with commercial fishing areas, particularly in summer months (July through August) when sockeye and pink salmon fisheries are open. Commercial fishing vessels (non-treaty) would not be exempt from the protected area. This commercial fishing fleet has been greatly reduced in recent years due to factors such as decreased number of fishing days allowed and high costs of fuel and has about 150 vessels participating. During aerial surveys of vessels in all San Juan County waters, observers counted 50 to 60 commercial fishing vessels per day in peak months in 2006 and about 30 to 50 in peak months during 2010 (Table 3-12 and Table 3-13). Averages of two (weekends) and three

(weekdays) commercial fishing vessels were observed within the expanded zone (Subsection 4.4.5, Alternative 5: Protected Area – Expanded No-go Zone) during aerial surveys from May through September 2010; however, these were not separated out with respect to the current no-go zone (Dismukes et al. 2010). The no-go zone under Alternative 4 would be a relatively small part of fishing area 7 (3.8 square miles out of over 1,000 square miles).

While some fishing vessels fish within the current voluntary no-go zone, there are numerous other areas available to fishing vessels just outside the protected area or in other locations. Most of the commercial fishing fleet already utilizes other areas congregating near Point Roberts and in Rosario Strait (Figure 3-13) and an area just south of the current no-go zone (Dismukes et al. 2010). A small number of commercial fishing vessels would be inconvenienced by having to relocate to areas outside the protected area and could incur small economic costs for fuel and time to reach an alternate destination depending on their home port, compared to the No-action Alternative. In addition, it might be inconvenient for some vessels to travel around the no-go zone to reach certain fishing areas, although the diversion would be minimal. Thus, while a small number of commercial fishing vessels could be displaced from the protected area when compared to the No-action Alternative, fishing quotas and the economic value of the fishery in Puget Sound would not be impacted. Alternatively, if vessel operators instead choose to violate a mandatory no-go zone, associated fines and penalties would be a negligible fraction of the current economic value of commercial fishing.

The no-go zone under Alternative 4 would not overlap with shipping lanes or any ferry routes (IEC 2010) and would therefore have no impact on these economic sectors. The no-go zone would be in U.S. waters and would not be immediately adjacent to Canadian waters and would not affect vessels in Canadian waters or crossing the border into U.S. waters.

Under Alternative 4, a small number of recreational boaters and fishers could be inconvenienced as described under Subsection 4.5, Recreation. The overall number of boats on the water (as described in Subsection 4.1.4, Effects on Southern Resident Killer Whale Critical Habitat) and the economic value to the local economy from recreational boating and fishing would not be expected to change in comparison to the No-action Alternative.

4.4.5 Alternative 5: Protected Area – Expanded No-go Zone

Under Alternative 5, NMFS would promulgate a regulation requiring vessels to remain outside of a no-go zone 1/2 mile wide from Mitchell Bay to Eagle point, from May through September, except treaty fishing vessels actively engaged in fishing. The voluntary no-go zone under the No-action Alternative extends 1/4 mile from shore, from Mitchell Bay to Eagle Point, with a 1/2 mile zone around Lime Kiln Point, and encompasses 3.8 square miles. In comparison, the expanded mandatory no-go zone would extend 1/2 mile from shore, from Mitchell Bay to Eagle Point and encompass 6.2 square miles. There are little data available to evaluate how many vessels currently operate between 1/4 mile and 1/2 mile in this area. Thus, it was not possible to estimate under the No-action Alternative how many commercial whale watch operators would likely operate within an expanded no-go zone. IEC (2010) relied on recent incidents of vessels inshore of whales to estimate that there would be about 53 commercial whale watch trips each year, out of a total of 6,264 U.S. trips per year, where the operator would need to change their operations to remain outside of the expanded no-go zone or be subject to fines and other penalties. If these trips are added to the number of trips affected under Alternative 4, 98 trips would face this choice. Based on an expected 98 violations under the No-action Alternative, and 55 passengers per trip, approximately 5,382 passengers (out of a total of 425,000 passengers per year) could be exposed to an enforcement action.

Because the current guideline is for a smaller no-go zone, all commercial whale watch operators may need to change their procedures to accommodate the expanded no-go zone. The 16 U.S. companies and 19 Canadian companies that make up the whale watching fleet of about 76 vessels (Subsection 3.4.2, Whale Watch Industry in Puget Sound) would have to train their personnel to remain outside the new zone. Some slight costs may be associated with such training.

It is likely that whale watch operators would adhere to a 1/2 mile no-go zone in a similar fashion to the 1/4 mile no-go zone, while a small number may enter the zone by design or by accident, as they would with a voluntary zone under the No-action Alternative. It is possible that potential customers may be less interested in participating in commercial whale watch trips if vessels must remain outside the expanded no-go zone, compared to the interest in viewing whales outside the voluntary no-go zone under the No-action Alternative. There is evidence, however, that the economic viability of the industry would not be affected by an increased viewing distance, for the same reasons as described above under Subsection 4.4.3., Alternative 3: 200-Yard Approach Regulation. Potential impacts on customer satisfaction could be minimized in the same fashion as described under Alternative 3.

Any impacts to the whale watch industry would be small and, based on the information above, impacts would not be expected on the demand for whale watching, the number of companies or vessels, the jobs associated with the industry, or the overall value to the local economy of the commercial whale watch industry or local tourism in the Puget Sound area, compared to the No-action Alternative. As described in Subsection 4.2.5, Alternative 5: Expanded No-go Zone, Alternative 5 could reduce vessel impacts and increase the fitness of Southern Resident killer whales. An increase in the Southern Resident killer whale population would support the commercial whale watch industry in the long term and allow for continued stability in the industry.

Similar to Alternative 4, commercial kayak companies would have to relocate to boat launches outside of the no-go zone. In 2010, 6,900 people participated in commercial kayak trips originating from the boat launch at the San Juan County Park.

Commercial fishing vessels (non-treaty) would not be exempt from the protected area. Expected impacts would be the same or slightly greater than those described under Alternative 4, compared to the No-action Alternative. This is because the 40 percent larger protected area under Alternative 5 compared to the no-go zone area under Alternative 4 would result in a slightly greater number of fishing vessels displaced. Averages of two (weekends) and three (weekdays) commercial fishing vessels were observed within the expanded zone during aerial surveys from May through September 2010 (Dismukes et al. 2010). Using the aerial survey data, IEC (2010) estimated a total of 212 commercial vessels would potentially be impacted each year. While commercial fishing vessels could be displaced from the protected area when compared to the No-action Alternative, fishing quotas and the economic value of the fishery in Puget Sound would not be impacted. As described under Alternative 4, socioeconomic impacts to commercial fishing vessels would be greater than under the No-action Alternative because a small number of commercial fishing vessels would be inconvenienced by having to relocate to areas outside the protected area and could incur small economic costs for fuel and time to reach an alternate destination depending on their home port, compared to the No-action Alternative. In addition, it might be inconvenient for some vessels to travel around the no-go zone to reach certain fishing areas, although the diversion would be minimal. Alternatively, if vessel operators instead choose to violate a mandatory no-go zone, associated fines and penalties would be a negligible fraction of the current economic value of the fishing industry.

As under Alternative 4, the 1/2 mile no-go zone under Alternative 5 would not overlap with shipping lanes or any ferry routes (IEC 2008) and would therefore have no impact on these economic sectors, or vessels in Canadian waters.

Under Alternative 5 a small number of recreational boaters and fishers could be inconvenienced as described under Subsection 4.5, Recreation. The overall number of boats on the water (as described in Subsection 4.1.4, Effects on Southern Resident Killer Whale Critical Habitat), and the economic value to the local economy from recreational boating and fishing, would not be expected to change in comparison to the No-action Alternative.

4.4.6 Alternative 6: Speed Limit of 7 Knots Within 400 Yards of Killer Whales

Under Alternative 6, NMFS would adopt a mandatory regulation requiring all vessels to reduce their speed to 7 knots within 400 yards of killer whales, except vessels in shipping lanes and commercial and treaty fishing vessels actively engaged in fishing. Those operating non-exempt vessels would need to reduce speed to below 7 knots within 400 yards of killer whales or be subject to fines and other penalties. IEC (2008) relied on recent incidents to estimate that there would be about 15 commercial whale watch trips each year, out of a total of 6,264 U.S. trips per year, where the operator would face this choice, compared to the No-action Alternative.

For those operators who choose to adhere to the mandatory regulation, the impact would be negligible. The vast majority of whale watch trips under the No-action Alternative would comply with a voluntary speed guideline, and there is no evidence that such compliance affects revenue. Given that the whale watch industry has continued to grow and presumably reach a saturation point with voluntary guidelines in place (including a speed guideline) and largely observed, it is reasonable to expect that adopting a mandatory approach regulation would not affect demand for whale watch trips or revenues of the whale watch industry.

Based on an expected 16 violations under the No-action Alternative, and 55 passengers per trip, approximately 853 passengers (out of a total of 425,000 passengers per year) could be exposed to an enforcement action annually. For those operators who choose to violate the mandatory regulations, the economic impacts could include fines associated with violating mandatory regulations, and loss of business, if the violations are well-publicized. Although the individual companies committing the violations could have reduced revenue from fewer customers, these customers would probably choose an alternate operator, so no impacts to the industry as a whole would be expected. Even if exposure to an enforcement action deterred some customers entirely, with only 0.2 percent of all passengers potentially being exposed to an enforcement action, that exposure is likely to have minimal effects on commercial whale watch operator revenues. Moreover, since respect for wildlife is a likely motivator for customers to seek whale watching experiences (Subsection 3.4.2, Whale Watch Industry in Puget Sound), publicity about a small number of enforcement actions is not a likely deterrent to customers.

Any impacts to the whale watch industry would be small and would not be expected to impact the demand for whale watching, the number of companies or vessels, the jobs associated with the industry or the overall value to the local economy of the commercial whale watch industry or local tourism in the Puget Sound area as described under the No-action Alternative. As described in Subsection 4.2.6, Alternative 6: Speed Limit of 7 Knots Within 400 Yards of Killer Whales, Alternative 6 could reduce vessel impacts and increase the fitness of Southern Resident killer whales. An increase in the Southern Resident killer whale population would support the commercial whale watch industry in the long-term and allow for continued stability in the industry.

Commercial and treaty fishing vessels actively engaged in setting, tending, or retrieving fishing gear would be exempt from a speed regulation and would likely be moving slowly during these operations. Fishing vessels transiting to and from fishing areas would, however, be subject to the speed regulation.

Bain (2007) found that of the vessels he observed within 400 yards of the whales, none of them were freight vessels and only two were commercial fishing vessels. Counts of vessels in San Juan County from aerial surveys (Dismukes/MRC 2007) were low for ferry and cargo ships (three to four), but higher for commercial fishing vessels (50 to 60) (Table 3-12). In 2010, Dismukes et al. (2010) reported similar counts for cargo ships (ferries were not included in the 2010 counts) and about 30 to 50 commercial fishing vessels on average during peak months of August and September. In 2007-2008, Giles and Cendak (2010) observed 22 ferries within 1,000 yards of the whales and of those, seven were within 400 yards of the whales. Out of 22 cargo ships, two were observed within 400 yards. Based on the small numbers of incidents of exceeding 7 knots within 400 yards of whales by these types of commercial vessels under the No-action Alternative, IEC (2010) estimated that only nine trips per year of commercial shipping or fishing vessels would be affected by a speed regulation compared to the No-action Alternative. Average annual transits through Haro Strait, Boundary Pass, and the Strait of Georgia waterways are over 165,000 each year (Table 3-9 and Table 3-10). If safe to do so, slight speed reductions to remain under 7 knots when within 400 yards of the whales for approximately nine vessel trips per year would be minimal and would not impact economic conditions related to shipping or commercial fishing fleets for these multi-million dollar industries. Alternatively, if vessel operators instead choose to violate a mandatory speed regulation, associated fines and penalties for nine incidents would be a negligible fraction of the current economic value of these industries.

Under Alternative 6, a small number of recreational boaters and fishers could be inconvenienced as described under Subsection 4.5, Recreation. The overall number of boats on the water (as described in Subsection 4.1.4, Effects on Southern Resident Killer Whale Critical Habitat) and the economic value to the local economy from recreational boating and fishing would not be expected to change in comparison to the No-action Alternative.

4.4.7 Alternative 7: Keep Clear of the Whales' Path

Under Alternative 7, NMFS would adopt a mandatory regulation requiring all vessels to avoid parking in the path of killer whales, except vessels in shipping lanes and commercial and treaty fishing vessels actively engaged in fishing. Those operating non-exempt vessels would need to avoid parking in the whales' path or be subject to fines and other penalties. IEC (2010) relied on recent incidents to estimate that there would be about 131 commercial whale watch trips each year, out of a total of 6,264 U.S. trips per year, where the operator would face this choice, compared to the No-action Alternative. In addition to this data, Soundwatch collected information on kayaker compliance behavior in 2010 and reported 88 incidents of kayaks parking in the path of the whales (56 of which were commercial kayaks) (Koski 2010b).

For those operators who choose to adhere to the mandatory regulation, the impact would be negligible. The vast majority of whale watch trips under the No-action Alternative would comply with a voluntary guideline to stay clear of the whales' path, and there is no evidence that such compliance affects revenue. Given that the whale watch industry has continued to grow and presumably reach a saturation point with voluntary guidelines in place (including a keep clear of the whales' path guideline) and largely observed, it is reasonable to expect that adopting a mandatory approach regulation would not affect demand for whale watch trips or revenues of the whale watch industry.

Based on an expected 131 violations under the No-action Alternative, and 55 passengers per trip, approximately 7,205 passengers (out of a total of 425,000 passengers per year) could be exposed to an enforcement action. For those operators who choose to violate the mandatory regulations, the economic impacts could include fines associated with violating mandatory regulations, and loss of business, if the violations are publicized. Although the individual companies committing the violations could have reduced revenue from fewer customers, these customers would probably choose an alternate operator, so no impacts to the industry as a whole would be expected. Even if exposure to an enforcement action deterred some customers entirely, with only 1.7 percent of all passengers potentially being exposed to an enforcement action, that exposure is likely to have minimal effects on commercial whale watch operator revenues. Moreover, since respect for wildlife is a likely motivator for customers to seek whale watching experiences (Subsection 3.4.2, Whale Watch Industry in Puget Sound), publicity about enforcement actions is not a likely deterrent to customers.

Any impacts to the whale watch industry would be small and would not be expected to impact the demand for whale watching, the number of companies or vessels, the jobs associated with the industry or the overall value to the local economy of the commercial whale watch industry or local tourism in the Puget Sound area as described under the No-action Alternative. As described in Subsection 4.2.7, Alternative 7: Keep Clear of the Whales' Path, Alternative 7 could reduce vessel impacts and increase the fitness of Southern Resident killer whales. An increase in the Southern Resident killer whale population would support the commercial whale watch industry in the long term and allow for continued stability in the industry.

Other commercial vessels, such as large cargo ships and tankers, and fishing vessels, move in predictable paths themselves, do not engage in stopping to watch whales and do not reposition or park in the path of the whales; therefore, this regulation would have very little impact on these commercial sectors compared to the No-action Alternative. Bain (2007) found that of the vessels he observed within 400 yards of the whales, none of them were freight vessels and only two were commercial fishing vessels. In 2007-2008, Giles and Cendak (2010) observed 22 cargo ships within 1,000 yards of the whales. Based on the small numbers of parking in the path incidents by other commercial vessels reported by Soundwatch, IEC (2010) estimated that only three trips per year of commercial shipping or fishing vessels would be affected by a parking in the path regulation compared to the No-action Alternative. Average annual transits through Haro Strait, Boundary Pass, and the Strait of Georgia waterways are over 165,000 each year (Table 3-9 and Table 3-10). Slight course adjustments to remain out of the whales' path for approximately three vessel trips per year would be minimal and would not impact economic conditions related to shipping or commercial fishing fleets for these multi-million dollar industries. Alternatively, if vessel operators instead choose to violate a mandatory regulation to keep clear of the whales' path, associated fines and penalties for three incidents would be a negligible fraction of the current economic value of these industries.

Under Alternative 7 a small number of recreational boaters and fishers could be inconvenienced as described under Subsection 4.5, Recreation. The overall number of boats on the water (Subsection 4.1.4, Effects on Southern Resident Killer Whale Critical Habitat) and the economic value to the local economy from recreational boating and fishing would not be expected to change in comparison to the No-action Alternative.

4.4.8 Alternative 8: Proposed Action

Under this alternative, NMFS would promulgate a package of regulations incorporating Alternatives 3, 5, and 7 as described in Subsection 2.2.8, Alternative 8: Proposed Action. The regulation package would prohibit vessels from approaching any killer whale closer than 200 yards, formalize a no-go zone along the west side of San Juan Island extending 1/2 mile (800 meters) offshore from Eagle Point to Mitchell Point

(Figure 2-2), and require vessels to keep clear of the whales' path. The effects of the proposed action package on socioeconomics would be a combination of the impacts described under Subsections 4.4.3, Alternative 3: 200-Yard Approach Regulation; 4.4.5, Alternative 5: Protected Area–Expanded No-go Zone; and 4.4.7, Alternative 7: Keep Clear of the Whales' Path; they are summarized in Table 4-2. The number of commercial whale watch participants affected would be between 15,398 (on 280 trips) and the total number of whale watch participants, which is approximately 425,000 per year.

4.4.9 Alternative 9: Preferred Alternative

Under this alternative, NMFS would promulgate a package of final regulations incorporating Alternatives 3 and 7 as described in Subsection 2.2.9, Alternative 9: Preferred Alternative. The regulation package would prohibit vessels from approaching any killer whale closer than 200 yards and require vessels to keep clear of the whales' path. The effects of the Preferred Alternative on socioeconomics would be a combination of the impacts described under Subsections 4.4.3, Alternative 3: 200-Yard Approach Regulation and 4.4.7 and Alternative 7: Keep Clear of the Whales' Path; they are summarized in Table 4-2. The number of commercial whale watch participants affected would be between 10,016 (on 182 trips) and the total number of whale watch participants, which is approximately 425,000 per year.

4.5 Recreation

As described in Subsection 3.5, Recreation, about 390,000 people participate in recreation activities in the waters or on the beaches of Puget Sound at least once a year. Many of these people enjoy watching killer whales as part of the recreational experience. Recreational whale watching occurs from land-based viewing locations, private recreational vessels, and commercial whale watching vessels. Others who do not specifically engage in whale watching share the waters of Puget Sound with killer whales and their recreational experience could be affected by the action alternatives. Some of these recreational boaters are engaged in recreational fishing.

There are 38 state parks and eight national parks that border Puget Sound, all of which could offer the opportunity for land-based whale watching (Subsection 3.5, Recreation). The most popular site is Lime Kiln Point State Park/Whale Watch State Park on San Juan Island, which has approximately 200,000 visitors annually and has an interpretive center with information about killer whales. The Whale Museum also provides information on the whales and conducts shore-based wildlife tours that include whale watching and stops at Lime Kiln Point State Park. There would likely be no impact on land-based viewing opportunities from any of the vessel regulations or on any of these parks because they are land-based; however, there may be impacts on the recreational experience because of noise or aesthetics. These impacts are discussed under Subsections 4.7, Noise and 4.8, Aesthetics, respectively. No impacts to land-based facilities are expected under any alternative (e.g., museum or park visitor numbers). Thus, there is no further discussion to recreational impacts on land-based whale watching in this subsection.

Between 350,000 and 400,000 Washington residents of all ages boat for recreation, either owning a boat directly, renting or chartering a boat, or accompanying friends and family on a boat (Subsection 3.5, Recreation), with about 80 percent (up to 320,000) of these boaters operating on Puget Sound annually. An estimated 34 percent of boaters also participate in wildlife viewing (Subsection 3.5, Recreation). If all wildlife viewers were assumed to participate in whale watching then up to 108,800 recreational boaters may be watching whales each year. In 2010, Soundwatch collected new information about recreational kayakers along the west side of San Juan Island (Koski 2010b). From these data on a new permit program

and numbers of vessel launches at the San Juan County Park, IEC (2010) estimated that between 1,131 and 2,722 people participated in recreational kayaking in this area.

For the analysis of effects on recreational boaters, IEC assumed that under the No-action Alternative the number of violations of the voluntary guidelines by recreational vessels would be the same as the recent averages that have occurred under existing voluntary guidelines (Table 3-1 and Table 3-2). For each of the action alternatives, IEC assumed that the effect would be that those vessel operators would have to either change their behavior and adhere to the mandatory regulation, or face penalties.

As described in Subsection 3.4.2, Whale Watch Industry in Puget Sound, approximately 425,000 passengers participate in commercial whale watch trips in Puget Sound. For the analysis of effects on recreational whale watch participants who view whales from commercial whale watching vessels, IEC assumed that under the No-action Alternative, the number of violations of the voluntary guidelines by commercial whale watch operators would be the same as the recent averages that have occurred under existing voluntary guidelines (IEC 2010) (Table 3-1 and Table 3-2). For each of the action alternatives, IEC assumed that the effect would be that those passengers could have a changed recreational experience from their experience under the No-action Alternative either because the vessel operators would change their behavior and adhere to the mandatory regulations, or the vessel operators would violate the regulations and passengers could be exposed to law enforcement actions, including possibly having a trip suspended. The economic effect of that exposure was discussed in Subsection 4.4, Socioeconomics, while the recreational effects are discussed in this subsection. As discussed under Subsection 4.2, Marine Mammals, it is not possible to estimate what proportion of those expected to violate voluntary guidelines under the No-action Alternative would adhere to mandatory regulations under the action alternatives, but it is reasonable to expect that mandatory regulations would result in greater compliance, particularly from commercial whale watch operators, for the reasons described in Subsection 4.1.2, General Effects of Enforceable Regulations Compared to Voluntary Guidelines.

Finally, an estimated 53 percent of all boaters in Puget Sound also participate in recreational fishing, (Subsection 3.5, Recreation). For the analysis of effects on recreational fishers, NMFS relied on information from Soundwatch regarding the number of violations of the current voluntary guidelines to estimate the numbers of recreational fishers who might have to either change their vessel operations to comply with mandatory regulations or face fines or other penalties.

4.5.1 Alternative 1 (No Action)

Under the No-action Alternative, current specific voluntary guidelines would remain in place to educate boaters on how to view marine wildlife without causing disturbance or harassment. Current general mandatory regulations would also remain in place under the MMPA and ESA, with enforcement levels likely continuing as in the past. Because the No-action Alternative would continue the current condition, there would be no impact to the recreational opportunities or experience described above under Subsection 4.5, Recreation.

4.5.2 Alternative 2: 100-Yard Approach Regulation

Under Alternative 2, NMFS would adopt a mandatory regulation prohibiting all vessels from approaching within 100 yards of killer whales, except vessels in shipping lanes and commercial and treaty fishing vessels actively engaged in fishing. Recreational vessel operators and commercial whale watch operators would need to stay 100 yards away from killer whales or be subject to fines and other penalties. Adoption of a mandatory 100-yard approach regulation would not affect the opportunity for any type of recreational

vessel activity in Puget Sound, compared to the No-action Alternative, because the limited nature of the prohibition would not discourage boating generally. It also would not change the recreational experience for the vast majority of whale watchers on recreational or commercial vessels that would stay outside 100 yards of whales under a voluntary 100-yard approach guideline in the No-action Alternative. It could, however, affect the recreational experience for those whale watchers on vessels whose operators either 1) would change their behavior under Alternative 2 from what it would have been under the No-action Alternative (to comply with a mandatory 100-yard approach regulation) or 2) would violate the mandatory 100-yard approach regulation and potentially be subjected to law enforcement actions. Alternative 2 would be unlikely to change the recreational experience of those who are not whale watching but are simply boating or fishing.

For private whale watching vessels, there would be about 86 private whale watch trips and eight kayak trips each year in which the vessel operator would be required to either choose adherence to the mandatory regulation or face possible fines or other penalties (IEC 2010) (Table 3-1 and Table 3-2), as compared to the No-action Alternative. Koski (2007) estimates the number of individuals participating in these private vessel trips at 3.42 individuals and most kayaks carry up to two individuals. The 296 individuals (86.46 trips x 3.42 individuals per trip) on those private whale watch trips and eight kayak trips faced with the choice constitute a very small percent (0.03) of the total maximum of 320,000 people engaged in recreational boating in inland waters each year.

Those on private whale watching vessels whose operators choose to follow a mandatory 100-yard regulation would still have a wildlife viewing experience comparable to that under the No-action Alternative. Survey results of participants in commercial whale watch trips indicate that proximity to the whales is not the most important part of the whale watchers' experience and that seeing whales and whale behavior was much more important (Subsection 3.5, Recreation). This is likely true for recreational whale watchers as well. In addition, boaters can use binoculars and telephoto lenses to increase the enjoyment from viewing whales from distances of 100 yards or greater.

Those on private whale watching vessels whose operators choose not to comply with a mandatory regulation, either knowingly or because they are unaware of the regulation or of the presence of whales, could have a less satisfying recreational experience than under the No-action Alternative if the operator is subjected to law enforcement activities. As described above, no more boaters would be expected to violate a mandatory regulation than a voluntary regulation under the No-action Alternative (about 86 private whale watch trips and eight kayak trips each year), and probably fewer boaters would violate a mandatory regulation, so only a small percentage of the maximum 320,000 boaters in Puget Sound would be affected.

For commercial whale watch vessels, IEC estimated that 619 individuals would be affected by Alternative 2 as compared to the No-action Alternative (IEC 2010), out of a total of approximately 425,000 whale watch passengers annually. For these passengers, there would be no change in whale watching opportunities compared to the No-action Alternative because there would likely be no change in the number of commercial whale watch vessels or the number of trips as a result of implementing Alternative 2 (Subsection 4.4, Socioeconomics, under Alternative 2: 100-Yard Approach Regulation). For the vast majority of passengers on commercial whale watch vessels, there would also be no change in the recreational experience because almost all commercial whale watch operators would comply with the voluntary 100-yard approach guideline under the No-action Alternative.

For those 619 individuals who could be affected annually, effects could include either viewing whales from a greater distance, if the operators change their behavior to avoid approaching within 100 yards, or being exposed to law enforcement actions, if the operators choose to violate the regulation. Those on vessels whose operators choose to adhere to the mandatory regulation would likely have a wildlife viewing

experience comparable to that under the No-action Alternative, for the reasons described above for whale watchers on private recreational vessels. Regardless of the proportion of passengers on vessels in compliance or not, the 619 passengers potentially affected is a negligible percent (0.15) of the total 425,000 whale watchers each year.

Private vessels not engaged in whale watching, either simply boating or fishing, would experience minimal effects as a result of repositioning to adhere to Alternative 2, compared to the No-action Alternative, with only 29 fishing trips estimated to be affected each year (IEC 2010).

4.5.3 Alternative 3: 200-Yard Approach Regulation

Under Alternative 3, NMFS would promulgate a mandatory 200-yard approach regulation, with the same exceptions as under Alternative 2. There are little data available to evaluate how many vessels currently approach within 200 yards, because it is acceptable under current guidelines so incidents are not reported. Thus, it is not possible to estimate under the No-action Alternative the number of private recreational vessel trips or commercial whale watching trips for which the operator would need to choose either to adhere to the mandatory regulation or face fines or penalties. For this reason, and because the current guideline is only 100 yards, NMFS assumes that all recreational and commercial whale watch operators would need to change their procedures compared to the No-action Alternative to accommodate a new 200-yard approach rule. This is likely overestimated based on observations from 2007-2008 that 88 percent of private vessels within 400 yards of the whales were greater than 200 yards from the whales (Giles and Cendak 2010). Using data from Giles and Cendak (2010), IEC (2010) estimated that about 408 private vessel trips (with 1,395 individuals) engaged in private whale watching, cruising or recreational fishing would potentially be affected.

The change to a 200-yard mandatory regulation under Alternative 3 from a 100-yard voluntary guideline under the No-action Alternative would not affect the opportunity for any type of recreational vessel activity in Puget Sound, compared to the No-action Alternative, because the limited nature of the prohibition would not discourage boating generally. It also would not discourage whale watching, because viewing still could occur outside 200 yards. There could be effects on the recreational experience for all recreational boaters involved in whale watching and all passengers on whale watching vessels because all of these individuals (except the few who would violate the 200-yard approach regulation) would have to view killer whales at a distance of 200 yards compared with the ability to view whales from 100 yards or even closer under the No-action Alternative. There may also be minor effects of repositioning to remain 200 yards from whales to other recreational boaters and recreational fishers if they encounter whales during their other activities.

As described above under Subsection 3.5, Recreation, a maximum of 320,000 individuals enjoy recreational boating in Puget Sound and approximately 34 percent of these engage in wildlife viewing. NMFS cannot quantify what proportion of this 34 percent engages in viewing killer whales. Conservatively assuming all do, then the recreational experience of 108,800 individuals in private vessels could be affected by having to view killer whales from 200 yards rather than 100 yards. In addition, all 425,000 passengers on commercial whale watch trips could be similarly affected. This effect would likely be small. Survey results of participants in commercial whale watch trips indicate that proximity to the whales is not the most important part of the whale watchers' experience and that seeing whales and whale behavior was much more important (Subsection 3.5, Recreation). This may be true for recreational whale watchers as well. Whale watchers can also use binoculars and telephoto lenses to increase the enjoyment from viewing whales from distances greater than 100 yards. By following a 200-yard approach regulation the recreational boaters would have to change their behavior (i.e., view from greater distance) in order to comply, but would still have a valuable wildlife viewing experience.

As described above, it is uncertain how many private or commercial whale watch operators would violate a mandatory 200-yard approach regulation, but those who do would be subject to law enforcement actions, including fines and other penalties. Assuming that violations of a 200-yard approach regulation would be similar to the expected violations of a voluntary 100-yard approach regulation under Alternative 2, the effects of law enforcement actions on the recreational experiences of private vessel operators and passengers on commercial whale watch vessels would thus be similar to those described under Alternative 2, when compared to the No-action Alternative.

For vessels simply engaged in recreational boating, or recreational boating and fishing, repositioning to avoid 200-yard approaches to killer whales would have a very minor effect on the recreational experience, as compared to the No-action Alternative.

4.5.4 Alternative 4: Protected Area – Current Voluntary No-go Zone

Under Alternative 4, NMFS would promulgate a mandatory regulation prohibiting all vessels from entering the current voluntary no-go zone from May through September, except treaty fishing vessels. Those operating recreational vessels would need to stay outside the no-go zone or be subject to fines and other penalties. Adoption of a mandatory no-go zone would not affect the opportunity for any type of recreational vessel activity in Puget Sound, compared to the No-action Alternative, because the limited nature of the prohibition would not discourage boating generally. It also would not change the recreational experience for the vast majority of whale watchers who would be on vessels staying outside the voluntary no-go zone under the No-action Alternative. It could, however, affect the recreational experience for those whale watchers on vessels whose operators either 1) would change their behavior under Alternative 4 from what it would have been under the No-action Alternative (to comply with the mandatory no-go zone) or 2) would violate the mandatory no-go zone and potentially be subjected to law enforcement actions. It would be unlikely to change the recreational experience of those who are simply boating and can easily avoid the no-go zone. Alternative 4 may affect recreational fishers who would have fished inside a voluntary no-go zone under the No-action Alternative.

IEC (2010) relied on recent incidents to estimate that approximately 55 private whale watch trips, private fishing trips, and kayak trips combined each year would be affected as described above compared to the No-action Alternative. Koski (2007) estimates the number of individuals participating in these private vessel trips at 3.42 individuals and most kayaks carry up to two individuals. The 187 individuals (55 trips x 3.42 individuals per trip) affected constitute a very small percent (0.06) of the maximum 320,000 people engaged in recreational boating or the 108,800 recreational boaters engaged in viewing whales each year.

Those on private whale watching vessels whose operators choose to follow a mandatory no-go zone would still have a wildlife viewing experience comparable to that under the No-action Alternative. Survey results of participants in commercial whale watch trips indicate that proximity to the whales is not the most important part of the whale watchers' experience and that seeing whales and whale behavior was much more important (Subsection 3.5, Recreation). This is likely true for recreational whale watchers as well. In addition, boaters can use binoculars and telephoto lenses to increase the enjoyment from viewing whales at greater distances when the whales are inside the no-go zone.

Those on private whale watching vessels whose operators choose not to comply with a mandatory regulation, either knowingly or because they are unaware of the regulation or of the presence of whales, could have a less satisfying recreational experience than under the No-action Alternative if the operator is subjected to law enforcement activities. As described above, no more boaters would be expected to violate

a mandatory regulation than a voluntary regulation under the No-action Alternative (19 private whale watch trips, fishing and kayak trips combined each year), and probably fewer boaters would violate a mandatory regulation, so only a small percentage of the maximum 320,000 boaters or 108,800 recreational whale watchers in inland waters would be affected.

For passengers on commercial whale watch vessels whose operators choose to comply with the mandatory regulation, the impact would be negligible, compared to the No-action Alternative, because the vast majority of whale watch trips under the No-action Alternative comply with a voluntary no-go zone. IEC estimated that 2,458 passengers would be affected by Alternative 4 as compared to the No-action Alternative (IEC 2010). Effects could include either viewing whales from a greater distance (that is, from outside the no-go zone), if the operators change their behavior to avoid the no-go zone, or being exposed to law enforcement actions, if the operators choose to violate the regulation. Regardless of the proportion of passengers on vessels in compliance or not, this would be a negligible percent (0.5) of the total 425,000 whale watchers each year.

IEC (2010) did not separately estimate the number of recreational fishing vessels that would enter the no-go zone under the No-action Alternative, but it would be fewer than 55 (the total of private whale watching, fishing, and kayaking combined). Under Alternative 4, with a mandatory no-go zone, the vessel operators on these fishing trips would need to choose to follow the mandatory regulation or face fines or other penalties. For the former group, there are many alternative fishing areas in Puget Sound (Subsection 3.5, Recreation). If 53 percent of the maximum 320,000 recreational boaters in Puget Sound are engaged in recreational fishing, that would be 169,600 recreational fishers in Puget Sound annually. Having to change fishing locations, or face law enforcement actions, under Alternative 4 would affect a small fraction of these fishers (less than 0.03 percent). Impacts to recreational fishing in Puget Sound would thus be negligible.

The current no-go zone overlaps with a boat launch in Small Pox Bay located within the San Juan County Park. The launch is a free public launch for motorized vessels and kayaks; however, the park does not currently track use by recreational boaters. There is an estimate of 5,000 recreational kayakers launching from the park (San Juan County Economic Development Council 2008). The park tracked the use of the campground and in 2007 they collected fees for approximately 26,000 camper nights. Both campers and local residents use the boat launch. In 2010, the San Juan County Park instituted a permit system and education and monitoring program. IEC (2010) used information on permits and use of the boat launch from San Juan County Park to estimate that between 1,131 and 2,722 kayakers and other human-powered vessel operators may be affected by the no-go zone. In addition, 120 recreational motorized and sail boat users may also be affected (IEC 2010). Recreational kayakers would have to relocate to other launches from May 1 through September 30, some of which also charge small fees. If whale watching is the primary objective for recreational kayakers, they would likely be launching from sites that are greater distances from core whale areas, and their opportunities for seeing whales would likely be reduced.

4.5.5 Alternative 5: Protected Area – Expanded No-go Zone

Under Alternative 5, NMFS would promulgate a regulation requiring vessels to remain outside of a no-go zone 1/2 mile wide from Mitchell Bay to Eagle point, from May through September, except treaty fishing vessels. The voluntary no-go zone under the No-action Alternative extends 1/4 mile from shore, from Mitchell Bay to Eagle Point, with a 1/2 mile zone around Lime Kiln Point, and encompasses 3.8 square miles. In comparison, the expanded mandatory no-go zone would extend 1/2 mile from shore, from Mitchell Bay to Eagle Point and encompass 6.2 square miles. There are few data available to evaluate how many vessels currently operate between 1/4 mile and 1/2 mile in this area. Thus, it was difficult to estimate

under the No-action Alternative how many recreational or commercial whale watch operators, fishing vessels, and kayaks would likely operate within an expanded no-go zone. IEC (2010) estimated that 149 private vessel trips (with 509 individuals) would be potentially affected by the expanded no-go zone. NMFS, however, assumes that all commercial whale watch operators would need to change their procedures to accommodate the expanded no-go zone, thus changing the recreational experience of all passengers on commercial whale watch vessels. An expanded no-go zone under Alternative 5 would also have minor effects on other recreational vessels and recreational fishing vessels. However, adoption of a mandatory expanded zone would not affect the opportunity for any type of recreational vessel activity in Puget Sound, compared to the No-action Alternative, because the prohibition would not discourage boating generally.

As described above under Subsection 4.5, Recreation, a maximum of 320,000 individuals enjoy recreational boating in Puget Sound and approximately 34 percent of these engage in wildlife viewing. NMFS cannot quantify what proportion of this 34 percent engages in viewing killer whales. Conservatively assuming all do, then the recreational experience of 108,800 individuals in private vessels could be affected by having to view killer whales outside an expanded no-go zone under Alternative 5 compared to the voluntary no-go zone under the No-action Alternative. In addition, all 425,000 passengers on commercial whale watch trips could be similarly affected. Effects would include either having to view whales from a greater distance, compared to the No-action Alternative, or being exposed to law enforcement actions.

Effects of an increased viewing distance would likely be small. It is likely that the preceding numbers overestimate the number of whale watchers affected, since they are based on the percentage of boaters engaged in all types of wildlife viewing. In addition, survey results of participants in commercial whale watch trips indicate that proximity to the whales is not the most important part of the whale watchers' experience and that seeing whales and whale behavior was much more important (Subsection 3.5, Recreation). This may be true for recreational whale watchers as well. Whale watchers can also use binoculars and telephoto lenses to increase the enjoyment from viewing whales from greater distances. By staying outside the expanded no-go zone the recreational boaters may have to view whales from a greater distance than under the No-action Alternative when the whales are inside the no-go zone, but would still have a valuable wildlife viewing experience.

As described above, it is uncertain how many private or commercial whale watch operators would violate a mandatory no-go zone, but those who do would be subject to law enforcement actions, including fines and other penalties. Assuming that violations of a mandatory no-go zone under Alternative 5 would be similar to the expected violations of a voluntary no-go zone under the No-action Alternative, the effects of law enforcement actions on the recreational experiences of private vessel operators and passengers on commercial whale watch vessels would be similar to those described under Alternative 4, when compared to the No-action Alternative.

The adoption of an expanded mandatory no-go zone under Alternative 5 would have similar effects to a mandatory no-go zone under Alternative 4 with respect to recreational boaters and fishers not engaged in wildlife viewing. In addition, it is possible that inexperienced kayakers may avoid the expanded zone because of potential safety issues with remaining 1/2 mile from shore.

Similar to the current no-go zone, the expanded no-go zone overlaps with a boat launch in Small Pox Bay located within the San Juan County Park. The launch is a free public launch for motorized vessels and kayaks, however the park does not currently track use by recreational boaters. There is an estimate of 5,000 recreational kayakers launching from the park (San Juan County Economic Development Council 2008). The park tracked the use of the campground and in 2007 they collected fees for approximately 26,000 camper nights. Both campers and local residents use the boat launch. In 2010, the San Juan County Park

instituted a permit system and education and monitoring program. IEC (2010) used information on permits and use of the boat launch from the San Juan County Park to estimate that between 1,131 and 2,722 kayakers and other human-powered vessel operators may be affected by the no-go zone. In addition, 120 recreational motorized and sail boat users may also be affected (IEC 2010). Recreational kayakers would have to relocate to other launches from May 1 through September 30, some of which may charge small fees. If whale watching is the primary objective for recreational kayakers, they would likely be launching from sites that are greater distances from core whale areas and their opportunities for seeing whales would likely be reduced.

4.5.6 Alternative 6: Speed Limit of 7 Knots Within 400 Yards of Killer Whales

Under Alternative 6, NMFS would adopt a mandatory regulation requiring all vessels to reduce their speed to 7 knots within 400 yards of killer whales, except vessels in shipping lanes and commercial and treaty fishing vessels actively engaged in fishing. Those operating non-exempt vessels would need to maintain a speed of 7 knots within 400 yards of killer whales or be subject to fines and other penalties. Adoption of a mandatory speed limit would not affect the opportunity for any type of recreational vessel activity in Puget Sound, compared to the No-action Alternative, because the limited nature of the prohibition would not discourage boating generally. It also would not change the recreational experience for the vast majority of whale watchers on recreational or commercial vessels that would not exceed 7 knots near the whales under the No-action Alternative. It could, however, affect the recreational experience for those whale watchers on vessels whose operators either 1) would change their behavior under Alternative 6 from what it would have been under the No-action Alternative (to comply with a mandatory speed limit) or 2) would violate the mandatory speed limit and potentially be subjected to law enforcement actions. It may also affect those non-whale-watching recreational boaters and fishers who would not observe a voluntary speed limit under the No-action Alternative.

There would be approximately 86 private whale watch trips in which the vessel operator would be required to either choose adherence to the mandatory regulation or face possible fines or other penalties (IEC 2010) compared to the No-action Alternative. Slow moving human powered kayaks would not be affected by a speed restriction. Koski (2007) estimates the number of individuals participating in these private vessel trips at 3.42 individuals. The 294 individuals faced with the choice constitute a very small percent (0.09) of the total maximum of 320,000 people engaged in recreational boating in inland waters each year.

Those on private whale watching vessels whose operators choose to follow a mandatory speed limit would likely still have a wildlife viewing experience comparable to that under the No-action Alternative, as there is no information to suggest that speeding near the whales enhances the recreational experience. Assuming the purpose of speeding might be to get closer to the whales, survey results of participants in commercial whale watch trips indicate that proximity to the whales is not the most important part of the whale watchers' experience and that seeing whales and whale behavior was much more important (Subsection 3.5, Recreation). This is likely true for recreational whale watchers as well.

Those on private whale watching vessels whose operators choose not to comply with a mandatory regulation, either knowingly or because they are unaware of the regulation or of the presence of whales, could have a less satisfying recreational experience than under the No-action Alternative if the operator is subjected to law enforcement activities. As described above, no more boaters would be expected to violate a mandatory regulation than a voluntary regulation under the No-action Alternative (86 private vessel trips), and probably fewer boaters would violate a mandatory regulation, so only a small percentage of the maximum 320,000 boaters in Puget Sound would be affected.

For commercial whale watch vessels, IEC estimated that 853 individuals would be affected by Alternative 6 as compared to the No-action Alternative (IEC 2010), out of a total of approximately 425,000 whale watch passengers annually. For these passengers, there would be no change in whale watching opportunities compared to the No-action Alternative because there would likely be no change in the number of commercial whale watch vessels or the number of trips as a result of implementing Alternative 6 (Subsection 4.4, Socioeconomics, under Alternative 6: Speed Limit of 7 Knots Within 400 Yards of Killer Whales). For the vast majority of passengers on commercial whale watch vessels, there would also be no change in the recreational experience because almost all commercial whale watch operators would comply with the voluntary speed guideline under the No-action Alternative.

For those 853 individuals whose recreational experience could be affected annually, effects could include either viewing whales from a greater distance, if the operators change their behavior to avoid speeding near the whales, or being exposed to law enforcement actions if the operators choose to violate the regulation. Those on vessels whose operators choose to adhere to the mandatory regulation would likely have a wildlife viewing experience comparable to that under the No-action Alternative, for the reasons described above for whale watchers on private recreational vessels. Regardless of the proportion of passengers on vessels in compliance or not, the 853 passengers potentially affected is a negligible percent (0.2) of the total 425,000 whale watchers each year.

Private vessels not engaged in whale watching, either simply boating or fishing, would experience minimal effects of adjusting their speed as a result of implementing Alternative 6, compared to the No-action Alternative, with only 28 fishing trips affected each year (IEC 2010).

4.5.7 Alternative 7: Keep Clear of the Whales' Path

Under Alternative 7, NMFS would adopt a mandatory regulation requiring all vessels to avoid parking in the path of killer whales, except vessels in shipping lanes and commercial and treaty fishing vessels actively engaged in fishing. Those operating non-exempt vessels would need to avoid parking in the whales' path or be subject to fines and other penalties. Adoption of a mandatory requirement to keep clear of the whales' path would not affect the opportunity for any type of recreational vessel activity in Puget Sound, compared to the No-action Alternative, because the limited nature of the prohibition would not discourage boating generally. It would also not change the recreational experience for the vast majority of whale watchers on recreational or commercial vessels that would keep clear of the whales' path under a voluntary guideline in the No-action Alternative. It could, however, affect the recreational experience for those whale watchers on vessels whose operators either 1) would change their behavior under Alternative 7 from what it would have been under the No-action Alternative (to comply with a mandatory keep clear of the whales' path regulation), or 2) would violate the mandatory keep clear of the whales' path regulation and potentially be subjected to law enforcement actions. It would be unlikely to change the recreational experience of those who are not whale watching but are simply boating or fishing.

For private whale watching vessels, there would be about 85 private whale watch trips, and nine kayak trips each year in which the vessel operator would be required to either choose adherence to the mandatory regulation or face possible fines or other penalties (IEC 2010), as compared to the No-action Alternative. Koski (2007) estimates the number of individuals participating in these private vessel trips at 3.42 individuals and most kayaks carry up to two individuals. The 291 individuals (85.13 trips x 3.42 individuals per trip) plus 17 kayakers (for a total of 308) faced with the choice constitute a very small percent (0.09) of the total maximum of 320,000 people engaged in recreational boating in inland waters each year.

Those on private whale watching vessels whose operators choose to follow a mandatory keep clear regulation would still have a wildlife viewing experience comparable to that under the No-action Alternative. Assuming the purpose of being in the whales' path might be to get closer to the whales, survey results of participants in commercial whale watch trips indicate that proximity to the whales is not the most important part of the whale watchers' experience and that seeing whales and whale behavior was much more important (Subsection 3.5, Recreation). This is likely true for recreational whale watchers as well. In addition, boaters can use binoculars and telephoto lenses to increase the enjoyment from viewing whales from greater distances.

Those on private whale watching vessels whose operators choose not to comply with a mandatory regulation, either knowingly or because they are unaware of the regulation or of the presence of whales, could have a less satisfying recreational experience than under the No-action Alternative if the operator is subjected to law enforcement activities. As described above, no more boaters would be expected to violate a mandatory regulation than a voluntary regulation under the No-action Alternative (85 private whale watch trips and nine kayak trips each year), and probably fewer boaters would violate a mandatory regulation, so only a small percentage of the maximum 320,000 boaters in Puget Sound would be affected.

For commercial whale watch vessels, IEC estimated that 7,205 individuals would be affected by Alternative 7 as compared to the No-action Alternative (IEC 2010), out of a total of approximately 425,000 whale watch passengers annually. For these passengers, there would be no change in whale watching opportunities compared to the No-action Alternative because there would likely be no change in the number of commercial whale watch vessels or the number of trips as a result of implementing Alternative 7 (Subsection 4.4, Socioeconomics, under Alternative 7: Keep Clear of the Whales' Path). For the vast majority of passengers on commercial whale watch vessels, there would also be no change in the recreational experience because many commercial whale watch operators would comply with the voluntary keep clear guideline under the No-action Alternative.

For those 7,205 individuals who could be affected annually, effects could include either viewing whales from a greater distance, if the operators change their behavior to keep clear of the whales' path, or being exposed to law enforcement actions, if the operators choose to violate the regulation. Those on vessels whose operators choose to adhere to the mandatory regulation would likely have a wildlife viewing experience comparable to that under the No-action Alternative, for the reasons described above for whale watchers on private recreational vessels. Regardless of the proportion of passengers on vessels in compliance or not, the 7,205 passengers potentially affected is a small percent (1.7) of the total 425,000 whale watchers each year.

Private vessels not engaged in whale watching, either simply boating or fishing, would experience minimal effects from avoiding the whales' path as a result of implementing Alternative 7, compared to the No-action Alternative, with only 26 fishing trips estimated to be affected each year (IEC 2010).

4.5.8 Alternative 8: Proposed Action

Under this alternative, NMFS would promulgate a package of regulations incorporating Alternatives 3, 5, and 7 as described in Subsection 2.2.8, Alternative 8: Proposed Action. The regulation package would prohibit vessels from approaching any killer whale closer than 200 yards, formalize a no-go zone along the west side of San Juan Island extending 1/2 mile (800 meters) offshore from Eagle Point to Mitchell Point (Figure 2-2), and require vessels to keep clear of the whales' path. The effects of the proposed action package on recreation would be a combination of the impacts described under Subsections 4.5.3, Alternative 3: 200-Yard Approach Regulation; 4.5.5, Alternative 5: Protected Area–Expanded No-go Zone;

and 4.5.7, Alternative 7: Keep Clear of the Whales' Path; they are summarized in Table 4-2. The number of recreational whale watchers affected would be between 2,195 (on 642 trips) and up to all 108,800 potential recreational wildlife viewers.

4.5.9 Alternative 9: Preferred Alternative

Under this alternative, NMFS would promulgate a package of final regulations incorporating Alternatives 3 and 7 as described in Subsection 2.2.9, Alternative 9: Preferred Alternative. The regulation package would prohibit vessels from approaching any killer whale closer than 200 yards and require vessels to keep clear of the whales' path. The effects of the Preferred Alternative on recreation would be a combination of the impacts described under Subsections 4.5.3, Alternative 3: 200-Yard Approach Regulation and 4.5.7 and Alternative 7: Keep Clear of the Whales' Path; they are summarized in Table 4-2. The number of recreational whale watchers affected would be between 1,686 (on 493 trips) and up to all 108,800 potential recreational wildlife viewers.

4.6 Environmental Justice

4.6.1 All Alternatives

Of the overall total population within the 12 counties that border the inland waters of Washington (Table 3-7) and that would be affected by vessel regulations, a county average of 13.63 percent are minority, a county average of 4.79 percent are of Hispanic origin, and a county average of 10.6 percent are low income. These values were used to determine if these populations in the affected counties are meaningfully greater than those in the general populations. Using the CEQ guidelines, the percentage of minority, Hispanic, and low income populations in the affected counties is not meaningfully greater than the proportion of these populations in several surrounding counties or in the state. Consequently, any economic or social impacts realized by those who benefit from whale watching activities would not be disproportionate to minority, Hispanic, or low income populations under any alternative since the affected counties do not support a larger portion of these population groups than the state-wide average. In addition, the exemption for treaty fishing vessels described in Subsection 3.6, Environmental Justice, would eliminate any potential disproportionate impacts to tribes.

4.7 Noise

4.7.1 Alternative 1 (No Action)

Under the No-action Alternative, current specific voluntary guidelines would remain in place to educate boaters on how to view marine wildlife without causing disturbance or harassment. Current general mandatory regulations would also remain in place under the MMPA and ESA, with enforcement levels likely continuing as in the past. There would be no change in the overall number of boats, types of boats, seasonal use of boats, or boat speed generating underwater or atmospheric sound under the No-action Alternative. Therefore, there would be no change in the overall ambient levels of noise in the action area.

Vessel use in the action area would continue to interact with weather and other atmospheric noise conditions to create underwater and atmospheric background noise levels, but this would not differ from current conditions. Additionally, continued compliance with state atmospheric noise regulations for vessels would be required under the No-action Alternative.

The peak hearing sensitivity range for killer whales is 18 to 42 kHz and the most relevant frequency range for communication and echolocation is 1 to100 kHz. In Haro Strait the greatest increases in these high frequencies occur in July and in the middle of the day, which coincide with larger numbers of small recreational and commercial whale watching vessels. Continued sound levels from vessels within the hearing sensitivity of whales would continue to cause auditory masking and interfere with communication and echolocation as described in Subsection 4.2, Marine Mammals, under the No-action Alternative.

4.7.2 Alternative 2: 100-Yard Approach Regulation

A 100-yard approach regulation would not change the overall number of boats, types of boats, seasonal use of boats, or boat speed generating underwater or atmospheric sound, compared to the No-action Alternative, which currently has a similar 100-yard approach guideline that many boaters follow. Thus, there would be no change in the overall ambient sound. Vessels might be distributed differently spatially, according to the approach restriction, but this would not change the frequency ranges of vessels or the level of noise in the environment compared to the No-action Alternative.

Vessel use in the action area would continue to interact with weather and other atmospheric noise conditions to create underwater and atmospheric background noise levels, but this would not differ from conditions under the No-action Alternative. Additionally, continued compliance with state atmospheric noise regulations for vessels would be required under Alternative 2.

Sound levels within the hearing sensitivity range of the whales, which cause auditory masking, would likely be reduced as described under Subsection 4.2, Marine Mammals, under Alternative 2: 100-Yard Approach Regulation, and the effects of changes in sound levels on the whales are presented in Subsection 4.2.2, Alternative 2: 100-Yard Approach Regulation (*Acoustic Masking*).

4.7.3 Alternative 3: 200-Yard Approach Regulation

A 200-yard approach regulation would not change the overall number of boats, types of boats, seasonal use of boats, or boat speed generating underwater or atmospheric sound, compared to the No-action Alternative for the reasons described in Subsection 4.2, Marine Mammals, under Alternative 3: 200-Yard Approach Regulation. Thus, there would be no change in the overall ambient sound conditions. Vessels might be distributed differently spatially, according to the approach restriction, but this would not change the frequency ranges of vessels or the level of noise in the environment compared to the No-action Alternative.

Vessel use in the action area would continue to interact with weather and other atmospheric noise conditions to create underwater and atmospheric background noise levels, but this would not differ from conditions under the No-action Alternative. Additionally, continued compliance with state atmospheric noise regulations for vessels would be required under Alternative 3.

Sound levels within the hearing sensitivity range of the whales would likely be reduced as described under Subsection 4.2, Marine Mammals, under Alternative 3: 200-Yard Approach Regulation, and the effects of changes in sound levels on the whales are presented in Subsection 4.2.3, Alternative 3: 200-Yard Approach Regulation (*Acoustic Masking*).

4.7.4 Alternative 4: Protected Area – Current Voluntary No-go Zone

A protected area would not change the number of boats, types of boats, seasonal use of boats, or boat speed generating underwater or atmospheric sound in the environment, compared to the No-action Alternative,

which currently has a voluntary no-go zone that many boaters follow. The distribution of vessels would be affected by a protected area, with more boats remaining outside of the no-go zone than under the No-action Alternative. The majority of vessels affected by a protected area would be commercial whale watch, recreational whale watching, and fishing vessels. Both underwater and atmospheric sound levels within the protected area would be reduced in the absence of these vessels during summer months and would likely be similar to the winter ambient sound levels, which are dominated by lower frequency noise from shipping. The effects of such a noise reduction on killer whales and other marine mammals are described in Subsection 4.2, Marine Mammals, under Alternative 4: Protected Area – Current Voluntary No-go Zone. People visiting Lime Kiln Point to view killer whales could also experience a reduction in atmospheric noise under Alternative 4, compared to the No-action Alternative.

Vessel use in the action area would continue to interact with weather and other atmospheric noise conditions to create underwater and atmospheric background noise levels, but this would not differ from conditions under the No-action Alternative. Additionally, continued compliance with state atmospheric noise regulations for vessels would be required under Alternative 4.

4.7.5 Alternative 5: Protected Area – Expanded No-go Zone

Noise effects from the expanded no-go zone would be the same as Alternative 4, and thus would compare similarly to the No-action Alternative, except there would be a larger area with reduced sound levels.

4.7.6 Alternative 6: Speed Limit of 7 Knots Within 400 Yards of Killer Whales

A 7-knot speed regulation would not change the overall number of boats, types of boats, or seasonal use of boats generating underwater or atmospheric sound, compared to the No-action Alternative, for the reasons described in Subsection 4.2, Marine Mammals, under Alternative 6: Speed Limit of 7 Knots Within 400 Yards of Killer Whales. Thus, there would be no change in the overall ambient sound conditions. Some vessels might generate less noise if they slowed down within 400 yards of the whales; however, vessels could also remain at the same speed and adjust their path to remain further than 400 yards from the whales, resulting in sound levels similar to those under the No-action Alternative.

Vessel use in the action area would continue to interact with weather and other atmospheric noise conditions to create underwater and atmospheric background noise levels, but this would not differ from conditions under the No-action Alternative. Additionally, continued compliance with state atmospheric noise regulations for vessels would be required under Alternative 6.

Sound levels within the hearing sensitivity range of the whales would likely be reduced as described under Subsection 4.2, Marine Mammals, under Alternative 6: Speed Limit of 7 Knots Within 400 Yards of Killer Whales. The effects of changes in sound levels on the whales are presented in Subsection 4.2.6, Alternative 6: Speed Limit of 7 Knots Within 400 Yards of Killer Whales (*Acoustic Masking*).

4.7.7 Alternative 7: Keep Clear of the Whales' Path

A regulation to keep the whales' path clear would not change the overall number of boats, types of boats, seasonal use of boats, or boat speed generating underwater or atmospheric sound, compared to the No-action Alternative, for the reasons described in Subsection 4.2.7, Alternative 7: Keep Clear of the Whales' Path. Thus, there would be no change in the overall ambient sound conditions. Vessels might be distributed differently to stay out of the whales' path, but this would not change the frequency ranges or level of noise in the environment, which would be similar to sound levels under the No-action Alternative.

Sound levels within the hearing sensitivity range of the whales would likely be reduced as described under, 4.2, Marine Mammals, under Alternative 7: Keep Clear of the Whales' Path. The effects of changes in sound levels on the whales are presented in Subsection 4.2.7, Alternative 7: Keep Clear of the Whales' Path (*Acoustic Masking*).

4.7.8 Alternative 8: Proposed Action

Under this alternative, NMFS would promulgate a package of regulations incorporating Alternatives 3, 5, and 7 as described in Subsection 2.2.8, Alternative 8: Proposed Action. The regulation package would prohibit vessels from approaching any killer whale closer than 200 yards, formalize a no-go zone along the west side of San Juan Island extending 1/2 mile (800 meters) offshore from Eagle Point to Mitchell Point (Figure 2-2), and require vessels to keep clear of the whales' path. The effects of the proposed action package on noise would be a combination of the impacts described under Subsections 4.7.3, Alternative 3: 200-Yard Approach Regulation; 4.7.5, Alternative 5: Protected Area–Expanded No-go Zone; and 4.7.7, Alternative 7: Keep Clear of the Whales' Path; they are summarized in Table 4-2.

4.7.9 Alternative 9: Preferred Alternative

Under this alternative, NMFS would promulgate a package of final regulations incorporating Alternatives 3 and 7 as described in Subsection 2.2.9, Alternative 9: Preferred Alternative. The regulation package would prohibit vessels from approaching any killer whale closer than 200 yards and require vessels to keep clear of the whales' path. The effects of the Preferred Alternative on noise would be a combination of the impacts described under Subsections 4.7.3, Alternative 3: 200-Yard Approach Regulation and 4.7.7 and Alternative 7: Keep Clear of the Whales' Path; they are summarized in Table 4-2.

4.8 Aesthetics

4.8.1 Alternative 1 (No Action)

Under the No-action Alternative, current voluntary guidelines would remain in place to educate boaters on how to view marine wildlife without causing disturbance or harassment. In addition to those who view whales from vessels, there are land-based viewing locations in the action area, with Lime Kiln Point State Park/Whale Watch State Park being the primary viewing area. Visitors to Lime Kiln Point State Park/Whale Watch State Park observe whales, primarily in summer months, with most commercial and recreational vessels remaining 1/2 mile from the park to comply with the voluntary no-go zone. A goal of the park is to preserve and interpret the natural and cultural resources of the area and the current voluntary no-go zone was established in part to preserve the land-based viewing. A small number of vessels do however, enter the no-go zone (Table 3-2) and these vessels may interfere with the viewing experience from the park. Other aspects of the current voluntary guidelines, such as maintaining a 100-yard distance from the whales, are intended to protect whales rather than to enhance viewing, but they may have ancillary benefits to viewing. For example, it may be easier for viewers to see the whales if vessels are further from them.

Under the No-action Alternative, the same number of commercial and recreational boats would likely be visible from Lime Kiln Point State Park/Whale Watch State Park and from other vessels on the water as under current conditions, with the same aesthetic impact on the 200,000 annual park visitors. Other land-

based viewing sites where there is no adjacent voluntary no-go zone are not visited by the whales as often and also have less aesthetic viewing experiences because of the lack of a voluntary no-go zone.

4.8.2 Alternative 2: 100-Yard Approach Regulation

A 100-yard approach regulation would not change the overall number of commercial or recreational boats visible to land-based or boat-based whale watchers, which would result in similar aesthetic conditions regarding boats in the viewshed as under the No-action Alternative. Compared to the No-action Alternative, a 100-yard approach regulation would likely result in more boaters staying at least 100 yards from the whales, which would reduce the number of vessels in close proximity to the whales. This increased distance of vessels from the whales would increase the aesthetic enjoyment of the 200,000 annual visitors to Lime Kiln Point State Park/Whale Watch State Park, visitors to other land-based viewing sites, and over 425,000 individuals on commercial whale watching vessels annually, compared to the No-action Alternative, because the experience viewing whales would be increased by removing boats from a portion of the viewshed (i.e., the 100 yards between boats and whales).

4.8.3 Alternative 3: 200-Yard Approach Regulation

A 200-yard approach regulation would not change the overall number of commercial and recreational boats visible to land-based or boat-based whale watchers, which would result in similar aesthetic conditions regarding boats in the viewshed as under the No-action Alternative. Under current voluntary guidelines (represented by the No-action Alternative), most commercial whale watching vessels remain at least 100 yards away from the whales most of the time (Table 3.2), and it is likely that most of these vessels would observe a 200-yard approach regulation most of the time. Commercial whale watch vessels represent slightly more than half of the boats in proximity to the whales (Figure 3.8). The remaining vessels are recreational vessels. It is also likely that many of these recreational vessels would observe a 200-yard regulation some of the time. Thus, adoption of a 200-yard regulation would double the distance between the whales and most vessels, compared to the No-action Alternative. This increased distance of vessels from the whales would benefit the aesthetic value to individuals engaged in land-based and boat-based whale watching because the experience of viewing whales would be increased by removing boats from a portion of the viewshed (i.e., the 200 yards between boats and whales).

Malcolm (2004) surveyed commercial whale watch participants and they ranked “see marine wildlife in an uncrowded setting” as having high importance in their expectations. After their whale watch trip, participants were dissatisfied with the lack of respect some boaters gave the whales (Subsection 3.8, Aesthetics). A 200-yard approach regulation could, therefore, increase the aesthetic enjoyment of the 200,000 annual visitors to Lime Kiln Point State Park/Whale Watch State Park, visitors to other land-based viewing sites, and over 425,000 individuals on commercial whale watching vessels annually, compared to the No-action Alternative and compared to Alternative 2 (100-yard approach regulation) because the experience of viewing whales would be improved by removing boats from a portion of the viewshed (i.e., the 200 yards between boats and whales).

4.8.4 Alternative 4: Protected Area – Current Voluntary No-go Zone

Prohibiting vessels from entering the current voluntary no-go zone would not change the overall number of commercial and recreational boats visible to land-based or boat-based whale watchers, which would result in similar aesthetic conditions regarding boats in the viewshed as under the No-action Alternative. As a regulation, more boaters would be inclined to stay out of the no-go zone, which would reduce the number of vessels in the zone and their proximity to whales. This increased distance of vessels from the whales

would increase the aesthetic value to individuals engaged in vessel and land-based whale watching compared to the No-action Alternative because fewer vessels would be present in a portion of the viewshed (i.e., within the mandatory no-go zone). As under the No-action Alternative, this would be a particular benefit to the 200,000 visitors to Lime Kiln Point State Park/Whale Watch State Park, which is adjacent to the protected area and one of the most popular land-based whale watching sites which was established to preserve and interpret the natural and cultural resources of the area.

4.8.5 Alternative 5: Protected Area – Expanded No-go Zone

Prohibiting vessels from entering the expanded no-go zone would not change the overall number of commercial and recreational boats visible on the water, which would result in similar aesthetic conditions regarding boats in the viewshed as under the No-action Alternative. Protecting a larger zone would reduce the number of boaters in the no-go zone and the proximity of vessels to the whales when in the protected area. This increased distance of vessels from the whales would increase the aesthetic value to individuals engaged in vessel and land-based whale watching, compared to the No-action Alternative. It would also likely increase the aesthetic value more than under Alternative 4 because it would expand a portion of the viewshed where vessels could not enter (i.e., expanding the distance between boats and whales beyond the distance under Alternative 4). An expanded no-go zone would be a particular benefit to the 200,000 visitors to Lime Kiln Point State Park/Whale Watch State Park, as described under Alternative 4.

4.8.6 Alternative 6: Speed Limit of 7 Knots Within 400 Yards of Killer Whales

A speed regulation would not change the overall number of commercial and recreational boats visible on the water or their proximity to whales, which would result in similar aesthetic conditions regarding boats in the viewshed as under the No-action Alternative. The aesthetic experience of vessel and land-based whale watchers might be improved by seeing vessels near the whales moving more slowly because viewers could more easily see whales without the distraction of fast-moving boats. However, this viewshed change would likely be a minor benefit compared to the No-action Alternative where a small number of boats violate the current speed guideline.

4.8.7 Alternative 7: Keep Clear of the Whales' Path

A regulation to keep the whales' path clear would not change the overall number of boats visible on the water, which would result in similar aesthetic conditions regarding boats in the viewshed as under the No-action Alternative. As a regulation, more boaters would be inclined to stay out of the whales' path, which would reduce the number of vessels in close proximity to the whales. This increased distance of vessels from the whales would benefit the aesthetic value to individuals engaged in vessel and land-based whale watching in the same manner as described under both Alternatives 3 and 4.

4.8.8 Alternative 8: Proposed Action

Under this alternative, NMFS would promulgate a package of regulations incorporating Alternatives 3, 5, and 7 as described in Subsection 2.2.8, Alternative 8: Proposed Action. The regulation package would prohibit vessels from approaching any killer whale closer than 200 yards, formalize a no-go zone along the west side of San Juan Island extending 1/2 mile (800 meters) offshore from Eagle Point to Mitchell Point (Figure 2-2), and require vessels to keep clear of the whales' path. The effects of the proposed action package on aesthetics would be a combination of the impacts described under Subsections 4.8.3,

Alternative 3: 200-Yard Approach Regulation; 4.8.5, Alternative 5: Protected Area–Expanded No-go Zone; and 4.8.7, Alternative 7: Keep Clear of the Whales' Path; they are summarized in Table 4-2.

4.8.9 Alternative 9: Preferred Alternative

Under this alternative, NMFS would promulgate a package of final regulations incorporating Alternatives 3 and 7 as described in Subsection 2.2.9, Alternative 9: Preferred Alternative. The regulation package would prohibit vessels from approaching any killer whale closer than 200 yards and require vessels to keep clear of the whales' path. The effects of the Preferred Alternative on aesthetics would be a combination of the impacts described under Subsections 4.8.3, Alternative 3: 200-Yard Approach Regulation and 4.8.7 and Alternative 7: Keep Clear of the Whales' Path; they are summarized in Table 4-2.

4.9 Transportation

Cargo ships, ferries, and recreational vessels can all be considered types of transportation. Ships using the shipping lane (Subsection 3.9, Transportation) would be exempt from all of the alternatives and therefore there would be no impacts to vessels using the shipping lane. Large vessels traveling outside of the shipping lanes and smaller vessels that are not part of the Vessel Tracking Service, including recreational vessels, would be subject to each of the alternatives. Recreational vessels were addressed under Subsection 4.5, Recreation, and commercial fishing vessels were addressed under Subsection 4.4, Socioeconomics. This analysis of transportation focuses on large vessels such as tankers, cargo/freighters, government, vessels, tug boats, and ferries.

All Coast Guard regulations governing transportation would remain in place under the No-action Alternative as well as Alternatives 2 through 9.

4.9.1 Alternative 1 (No Action)

Under the No-action Alternative, current voluntary guidelines would remain in place to educate boaters on how to view marine wildlife without causing disturbance or harassment. There is no information available on the number of times that vessels involved in transportation adjust course or speed to comply with current guidelines, but it is likely that very few make such adjustments (Subsection 3.9, Transportation). These current small numbers of adjustments would likely continue under the No-action Alternative and would not affect their ability to fulfill their transportation missions. The overall number of transits (165,000 per year) and seasonal patterns would continue at current levels or, if growing trends in shipping continue, transit numbers could increase in the future.

4.9.2 Alternative 2: 100-Yard Approach Regulation

As described in Subsections 4.4, Socioeconomics and 4.5, Recreation, under Alternative 2: 100-Yard Approach Regulation, commercial shipping or ferry transportation vessels are rarely in close proximity to the whales based on the small numbers of approach incidents by these vessels reported by Soundwatch. IEC (2010) estimated that only nine trips per year of commercial shipping or fishing vessels would be affected by a 100-yard approach regulation compared to the No-action Alternative. Average annual transits through Haro Strait, Boundary Pass, and the Strait of Georgia waterways are over 165,000 each year (Table 3-9 and Table 3-10) and number of transits and seasonal patterns would continue as described under the No-action Alternative. Slight course changes to remain at least 100 yards from whales for approximately

nine vessel trips per year would be minimal and would be a very small impact on transportation. This small number of vessel operators may be inconvenienced by deviating from their path, but, as under the No-action Alternative, this would not affect their ability to fulfill their transportation missions.

4.9.3 Alternative 3: 200-Yard Approach Regulation

As described in Subsections 4.4, Socioeconomics and 4.5, Recreation, under Alternative 3: 200-Yard Approach Regulation, commercial shipping or ferry transportation vessels are rarely in close proximity to the whales and the total number of large transportation vessels would be a very small percentage of the over 165,000 annual transits through Haro Strait, Boundary Pass, and the Strait of Georgia waterways (Table 3-9 and Table 3-10), and number of transits and seasonal patterns would continue as described under the No-action Alternative. Slight course changes to remain at least 200 yards from whales for a small number of vessel trips per year would be minimal and would be a very small impact on transportation. This small number of vessel operators may be inconvenienced by deviating from their path, but, as under the No-action Alternative, this would not affect their ability to fulfill their transportation missions.

4.9.4 Alternative 4: Protected Area – Current Voluntary No-go Zone

As described in Subsections 4.4, Socioeconomics and 4.5, Recreation, under Alternative 4: Protected Area – Current Voluntary No-go Zone, the current no-go zone does not overlap with shipping lanes or any ferry routes and prohibiting vessels from entering the area would have no impacts on vessels that do not pass through the area. The no-go zone would be in U.S. waters and would not be immediately adjacent to Canadian waters and would not affect vessels in Canadian waters or crossing the border into U.S. waters. Transportation under Alternative 4 would be the same as under the No-action Alternative.

4.9.5 Alternative 5: Protected Area – Expanded No-go Zone

The effects described under Alternative 4, would also be expected to occur under Alternative 5 because the expanded no-go zone does not overlap with shipping lanes or any ferry routes and prohibiting vessels from entering the area would have no impacts on vessels that do not pass through the area. Transportation under Alternative 5 would be the same as under the No-action Alternative.

4.9.6 Alternative 6: Speed Limit of 7 Knots Within 400 Yards of Killer Whales

As described in Subsections 4.4, Socioeconomics and 4.5, Recreation, under Alternative 6: Speed Limit of 7 Knots Within 400 Yards of Killer Whales, commercial shipping or ferry transportation vessels are rarely in close proximity to the whales. Based on the number of approach incidents by these vessels reported by Soundwatch, and assuming that in response to mandatory regulations all these types of vessels would adjust behavior to avoid such incidents, IEC (2010) estimated that only nine trips per year of commercial shipping or fishing vessels would be affected by a speed regulation within 400 yards of the whales. Average annual transits through Haro Strait, Boundary Pass, and the Strait of Georgia waterways are over 165,000 each year (Table 3-9 and Table 3-10) and annual transits and seasonal patterns would continue as described under the No-action Alternative. When safe to do so, slight reductions in speed within 400 yards from whales for approximately nine vessel trips per year would be minimal and would be a very small impact on transportation. This small number of vessel operators may be inconvenienced by slowing down for short periods of time in the rare instances they are within 400 yards of the whales, but, as under the No-action Alternative, this would not affect their ability to fulfill their transportation missions.

4.9.7 Alternative 7: Keep Clear of the Whales' Path

As described in Subsections 4.4, Socioeconomics and 4.5, Recreation, under Alternative 7: Keep Clear of the Whales' Path, vessels such as the Washington State ferries, large cargo ships, and tankers move in predictable paths, are not engaged in stopping to watch whales, and do not reposition or park in the path of the whales. Based on the small numbers of parking in the path incidents by commercial (non-whale watching) vessels reported by Soundwatch, IEC (2010) estimated that only three trips per year of commercial shipping or fishing vessels would be affected by a parking in the path regulation. Average annual transits through Haro Strait, Boundary Pass, and the Strait of Georgia waterways are over 165,000 each year (Table 3-9 and Table 3-10). Slight course adjustments to remain out of the whales' path for approximately three vessel trips per year would be minimal and would have a very small impact on transportation compared to the current 165,000 annual transits. This small number of vessel operators may be inconvenienced by adjusting their course in the rare instances they are in the path of the whales, but, as under the No-action Alternative, this would not affect their ability to fulfill their transportation missions.

4.9.8 Alternative 8: Proposed Action

Under this alternative, NMFS would promulgate a package of regulations incorporating Alternatives 3, 5, and 7 as described in Subsection 2.2.8, Alternative 8: Proposed Action. The regulation package would prohibit vessels from approaching any killer whale closer than 200 yards, formalize a no-go zone along the west side of San Juan Island extending 1/2 mile (800 meters) offshore from Eagle Point to Mitchell Point (Figure 2-2), and require vessels to keep clear of the whales' path. The effects of the proposed action package on transportation would be a combination of the impacts described under Subsections 4.9.3, Alternative 3: 200-Yard Approach Regulation; 4.9.5, Alternative 5: Protected Area–Expanded No-go Zone; and 4.9.7, Alternative 7: Keep Clear of the Whales' Path; they are summarized in Table 4-2.

4.9.9 Alternative 9: Preferred Alternative

Under this alternative, NMFS would promulgate a package of final regulations incorporating Alternatives 3 and 7 as described in Subsection 2.2.9, Alternative 9: Preferred Alternative. The regulation package would prohibit vessels from approaching any killer whale closer than 200 yards and require vessels to keep clear of the whales' path. The effects of the Preferred Alternative on transportation would be a combination of the impacts described under Subsections 4.9.3, Alternative 3: 200-Yard Approach Regulation and 4.9.7, Alternative 7: Keep Clear of the Whales' Path; they are summarized in Table 4-2.

Table 4-1. Summary of Effects of the Individual Alternatives. Alternative 8 is the combination of effects described under Alternatives 3, 5, and 7, and Alternative 9 is the combination of effects described under Alternatives 3 and 7; they are summarized in Table 4-2.

Resources Impacted	Alternative 1: No Action	Alternative 2: Approach distance 100 yards	Alternative 3: Approach distance 200 yards	Alternative 4: Current no-go zone	Alternative 5: Expanded no-go zone	Alternative 6: 7 knots within 400m	Alternative 7: Prohibit park in path
Marine Mammals	Current level of vessel incidents and disturbance continues or increases, negative effect on status of Southern Residents.	·Reduction in vessel incidents and decreased risk of strikes, behavioral disturbance, and auditory masking throughout Puget Sound. ·Compared to No-action Alternative, increased fitness of individuals and Southern Resident population improving status.	·Similar to Alternative 2, but greater reduction in risk of strikes, behavioral disturbance, and auditory masking throughout Puget Sound. ·Compared to No-action Alternative, increased fitness of individuals and Southern Resident population improving status.	·Decreased risk of strikes, reduced behavioral disturbance, and reduced auditory masking in protected area (3.8 sq miles). ·Compared to No-action Alternative, increased fitness of individuals and Southern Resident population improving status.	·Similar to Alternative 4, but with decreased risk of strikes, reduced behavioral disturbance, and reduced auditory masking in larger area (6.2 sq miles). ·Compared to No-action Alternative, increased fitness of individuals and Southern Resident population improving status.	·Reduction in vessel incidents and decreased risk of strikes and auditory masking throughout Puget Sound. ·Compared to No-action Alternative, increased fitness of individuals and Southern Resident population improving status.	·Reduction in vessel incidents and decreased risk of strikes, behavioral disturbance and auditory masking throughout Puget Sound. ·Greater reductions than Alternatives 2, 4, and 6 based on higher numbers of commercial operator incidents and increased compliance expected for commercial operators. ·Compared to No-action Alternative, increased fitness of individuals and Southern Resident population improving status.

Resources Impacted	**Alternative 1: No Action**	**Alternative 2: Approach distance 100 yards**	**Alternative 3: Approach distance 200 yards**	**Alternative 4: Current no-go zone**	**Alternative 5: Expanded no-go zone**	**Alternative 6: 7 knots within 400m**	**Alternative 7: Prohibit park in path**
Listed/ Non-listed Salmonids	No effect	Long-term increase in whale population and increase in number of salmonids consumed.	Same as Alternative 2	Same as Alternative 2	Same as Alternative 2	Same as Alternative 2	Same as Alternative 2

Resources Impacted	Alternative 1: No Action	Alternative 2: Approach distance 100 yards	Alternative 3: Approach distance 200 yards	Alternative 4: Current no-go zone	Alternative 5: Expanded no-go zone	Alternative 6: 7 knots within 400m	Alternative 7: Prohibit park in path
Socio-economics* 1. Commercial Whale Watching, 2. Shipping, Ferries, and Commercial Fishing	No effect	1. 11 commercial whale watch trips affected per year (only those not currently following guidelines). 2. Negligible impact on nine commercial shipping, ferries, or commercial fishing vessel trips per year.	1. Between 51 commercial whale watch trips affected per year (large portion of fleet currently views from greater distance) and up to all whale watch participants (425,000 per year). 2. Slightly larger number of commercial shipping and commercial fishing vessels affected per year than Alternative 2.	1. 45 commercial whale watch trips affected per year (only those not currently following guidelines). Up to 6,900 commercial kayak participants displaced from San Juan County boat launch. 2. No overlap with shipping or ferry routes, small number of commercial fishing vessels displaced.	1. Between 98 commercial whale watch trips with 5,382 participants and total number of whale watchers (425,000 per year) affected per year. Up to 6,900 commercial kayak participants displaced from San Juan County boat launch. 2. No overlap with shipping or ferry routes, slightly larger number of fishing vessels displaced than Alternative 4.	1. 16 commercial whale watch trips affected per year (only those not currently following guidelines). 2. Negligible impact on commercial shipping, ferries or commercial fishing vessels.	1. 131 commercial whale watch trips affected per year (only those not currently following guidelines). 2. Negligible impact on commercial shipping, ferries or commercial fishing vessels.

Resources Impacted	Alternative 1: No Action	Alternative 2: Approach distance 100 yards	Alternative 3: Approach distance 200 yards	Alternative 4: Current no-go zone	Alternative 5: Expanded no-go zone	Alternative 6: 7 knots within 400m	Alternative 7: Prohibit park in path
Recreation* **1. Recreational boating/private whale watch, 2. Participants in commercial whale watch 3. Recreational fishing** Affects to all types of boaters consist of either changing behavior to comply with a mandatory regulation or facing enforcement action	No effect	1. 86 private whale watch trips affected per year (those not currently following guidelines would have to change behavior to comply or face enforcement actions). 2. 619 individuals participating in commercial whale watch trips affected per year. 3. Negligible impact on 29 recreational fishing vessel trips per year.	1. From 408 private whale watch trips up to all recreational whale watchers (108,800) affected per year by greater distance 2. From 2,811 up to all 425,000 individuals participating in commercial whale watch trips affected per year. 3. Slightly larger number of recreational fishing vessel trips affected per year than Alternative 2.	1. 55 private whale watch trips affected per year (those not currently following guidelines would have to change behavior to comply or face enforcement actions). From 1,131to 2,722 private kayakers displaced from San Juan County boat launch. 2. 2,458 individuals participating in commercial whale watch trips affected per year. 3. Small number of recreational fishing vessels displaced.	1. Between 149 private whale watch trips with 509 passengers and all recreational whale watchers (108,800) affected per year. From 1,131 to 2,722 private kayakers displaced from San Juan County boat launch. 2. 5,382 individuals participating in commercial whale watch trips affected per year. 3. Slightly larger number of recreational fishing vessels displaced than Alternative 4.	1. 86 private whale watch trips affected per year (those not currently following guidelines would have to change behavior to comply or face enforcement actions). 2. 853 individuals participating in commercial whale watch trips affected per year. 3. Negligible impact on 28 recreational fishing vessel trips per year.	1. 85 private whale watch trips affecter per year (those not currently following guidelines would have to change behavior to comply or face enforcement actions). 2. 7,205 individuals participating in commercial whale watch trips affected per year 3. Negligible impact on 26 recreational fishing vessel trips per year.

Resources Impacted	Alternative 1: No Action	Alternative 2: Approach distance 100 yards	Alternative 3: Approach distance 200 yards	Alternative 4: Current no-go zone	Alternative 5: Expanded no-go zone	Alternative 6: 7 knots within 400m	Alternative 7: Prohibit park in path
Environmental Justice	No effect	No effect	Same as Alternative 2	Same as Alternative 2	Same as Alternative 2	Same as Alternative 2	Same as Alternative 2
Noise	No effect	No effect	Same as Alternative 2	Small decrease in ambient sound levels inside protected area.	Small decrease in sound levels inside expanded area (larger area than Alternative 4).	Same as Alternative 2	Same as Alternative 2
Aesthetics	No effect	No effect	Same as Alternative 2	Increase in quality of viewing experience from land-based areas.	Increase in quality of viewing experience from land-based areas (greater increase than Alternative 4, vessels further away from land-based viewing area).	Same as Alternative 2	Same as Alternative 2

Resources Impacted	Alternative 1: No Action	Alternative 2: Approach distance 100 yards	Alternative 3: Approach distance 200 yards	Alternative 4: Current no-go zone	Alternative 5: Expanded no-go zone	Alternative 6: 7 knots within 400m	Alternative 7: Prohibit park in path
Transportation* **1. Shipping, ferries** **2. Commercial fishing and recreational boats**	No effect	1. Negligible impact on commercial shipping and ferries. 2. Negligible impact on commercial fishing and recreational vessels.	1. Slightly larger number of commercial shipping and ferries affected than Alternative 2. 2. Slightly larger number of commercial fishing and recreational vessels than Alternative 2.	1. No overlap with shipping or ferry routes. 2. Small number of commercial fishing and recreational vessels displaced.	1. No overlap with shipping or ferry routes. 2. Larger number of commercial fishing and recreational vessels displaced than for Alternative 4.	1. Negligible impact on commercial shipping and ferries. 2. Negligible impact on commercial fishing and recreational vessels.	1. Negligible impact on commercial shipping and ferries. 2. Negligible impact on commercial fishing and recreational vessels.

*Affects to all types of boaters consist of either changing behavior (slight course changes) to comply with a mandatory regulation or facing enforcement action. Affects to whale watch participants consist of increased viewing distances.

Table 4-2. Summary of Effects of the Proposed Action (Alternative 8) and Preferred Alternative (Alternative 9).

Resources Impacted	Alternative 8: Proposed Action: Approach distance 200m (Alternative 3), expanded no-go zone (Alternative 5), and prohibit park in path (Alternative 7)	Alternative 9: Preferred Alternative: Approach distance 200m (Alternative 3) and prohibit park in path (Alternative 7)
Marine Mammals	·Reduction in vessel incidents and decreased risk of strikes, behavioral disturbance and auditory masking throughout Puget Sound and in 6.2 square mile no-go zone (greater reduction than Alternatives 2 and 4 (see Table 4-1)). ·Greater reductions in park in path incidents than reduction in other incidents under Alternatives 2, 4, and 6 (see Table 4-1) based on higher numbers of commercial operator incidents and increased compliance expected for commercial operators. ·Compared to No-action Alternative, increased fitness of individuals and Southern Resident population improving status.	·Reduction in vessel incidents and decreased risk of strikes, behavioral disturbance and auditory masking throughout Puget Sound (greater reduction than Alternatives 2 and 4 (Table 4-1)). ·Greater reductions in park in path incidents than reduction in other incidents under Alternatives 2, 4, and 6 (Table 4-1) based on higher numbers of commercial operator incidents and increased compliance expected for commercial operators. ·Compared to No-action Alternative, increased fitness of individuals and Southern Resident population improving status.
Listed/ Non-listed Salmonids	Long-term increase in whale population and increase in number of salmonids consumed.	Long-term increase in whale population and increase in number of salmonids consumed.
Socioeconomics* 1. Commercial Whale Watching, 2. Shipping, Ferries, and Commercial Fishing	1. Between 15,398 individuals (280 commercial trips) and total number of whale watch participants, which is approximately 425,000 each year. Up to 6,900 commercial kayak participants displaced from San Juan County boat launch. 2. Slightly larger number of commercial shipping and 212 commercial fishing vessels affected per year than Alternative 2 (see Table 4-1). No overlap with shipping or ferry routes, slightly larger number of fishing vessels displaced than Alternative 4 (see Table 4-1).	1. Between 10,016 individuals (182 commercial trips) and total number of whale watch participants, which is approximately 425,000 each year. 2. Slightly larger number of commercial shipping and commercial fishing vessels affected per year than Alternative 2 (Table 4-1). No overlap with shipping or ferry routes, slightly larger number of fishing vessels displaced than Alternative 4 (Table 4-1).

Recreation* 1. Recreational boating/private whale watch, 2. Participants in commercial whale watch 3. Recreational fishing	1. Between 2,195 individuals (on 642 trips) and up to all 108,800 potential recreational wildlife viewers. Small # recreational boaters displaced from San Juan County boat launch and from 1,131 to 2,722 private kayakers displaced from San Juan County boat launch. 2. Between 15,398 individuals (280 commercial trips) and total number of whale watch participants, which is approximately 425,000 each year. 3. 26 private fishing trips with 91 passengers.	1. Between 1,686 individuals (on 493 trips) and up to all 108,800 potential recreational wildlife viewers. 2. Between 10,016 individuals (182 commercial trips) and total number of whale watch participants, which is approximately 425,000 each year. 3. 26 private fishing trips with 91 passengers.
Environmental Justice	No effect	No effect
Noise	Small decrease in sound levels inside expanded area (larger area than under Alternative 4).	No effect
Aesthetics	Increase in quality of viewing experience from land-based areas (greater increase than under Alternative 4, vessels further away from land-based viewing area).	Increase in quality of viewing experience from land-based areas
Transportation* 1. Shipping, ferries 2. Commercial fishing and recreational boats	1. Negligible impact on commercial shipping and ferries. 2. Small number of commercial fishing and recreational vessels displaced.	1. Negligible impact on commercial shipping and ferries. 2. Small number of commercial fishing and recreational vessels displaced.

*Affects to all types of boaters consist of either changing behavior (slight course changes) to comply with a mandatory regulation or facing enforcement action. Affects to whale watch participants consist of increased viewing distances.

5.0 CUMULATIVE EFFECTS

5.1 Context for Analysis

NEPA defines cumulative effects as "the impact on the environment which results from the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions, regardless of what agency (Federal or non-Federal) or person undertakes such other actions" (40 CFR 1508.7). Section 3.0, Affected Environment, described the current status of each resource, which reflects the effects of past and current actions. The preceding subsections in Section 4.0, Environmental Consequences, evaluated the effects of no action and eight action alternatives on the current status of each resource. This section now considers the cumulative effects of the alternatives on two resources – Southern Resident killer whales and socioeconomics – where such effects might occur, in the context of the effects of past actions, current conditions, and reasonably foreseeable future actions and conditions. Cumulative effects to other resources would likely be minor and are not discussed further.

5.2 Southern Resident Killer Whales

An important past action that could have cumulative effects on killer whales is the introduction of persistent organic pollutants into the whales' food web. Southern Resident killer whales are among the most contaminated mammals tested. Contaminants can affect fitness and reproductive success. The contamination levels and effects of contaminant accumulation are discussed generally in Subsection 3.2.1, Killer Whales. Even though some of these contaminants are no longer produced, they remain in the whales' fat stores and can be mobilized when food is scarce. The continued or increased introduction of current or emerging contaminants into the whales' food web would have cumulative effects when added to the effects of the contaminants already stored in the whales' blubber.

Several reasonably foreseeable future actions or conditions also have the potential to result in cumulative effects to killer whales. One is the expected human population growth in the Puget Sound region, which was around 3.5 million people in 2000, and is expected to grow to nearly 5 million people by 2030 (Washington Office of Financial Management 2007).

Human population growth in the Puget Sound area is likely to increase the amount of existing and newly emerging contaminants into Puget Sound, as increased population leads to increased effluent, impervious surface, and stormwater runoff, all of which are sources of contamination (Subsection 3.2.1, Killer Whales). In particular, NMFS has identified flame retardants as a persistent organic pollutant that could have effects on killer whale fitness and reproduction. This pollutant has increased dramatically in the recent past (Subsection 3.2.1, Killer Whales) (NMFS 2007) and it is reasonably foreseeable that it will increase further with additional population growth. In 2007, the State of Washington established the Puget Sound Partnership, a new agency consisting of an executive director, an ecosystem coordination board, and a Puget Sound science panel (RCW 90.21.210). The Partnership was created to oversee the restoration of the environmental health of Puget Sound by 2020, and has created a long-term plan called the 2020 Action Agenda (Puget Sound Partnership, 2008). The Partnership does not presently have a sufficient track record to support a conclusion that the control or reduction of pollutants into Puget Sound is reasonably foreseeable, and therefore, it is not possible to draw conclusions about Partnership efforts and how they may affect pollution and contamination or whale populations.

Population growth is also likely to result in increased commercial and recreational vessel traffic in the action area. The recreational boating registration figures for Washington state show that the number of

boats on the water is gradually increasing over time and this trend is expected to continue (Washington Commission 2004). More recreational vessels in the area could lead to increased interactions between vessels and killer whales, increasing the amount of energy whales spend avoiding vessels, decreasing the time spent foraging because they are reacting to vessels, and decreasing their foraging efficiency because of physical disruption and auditory masking (Subsection 3.2.1, Killer Whales, *Status*). Increased energy expenditure and decreased foraging efficiency are likely to require whales to draw on fat stores, mobilizing the existing contaminants that are a legacy of past pollution.

In addition to recreational boating, The Washington Ports Association projects a 4 percent annual growth rate of container shipping into Puget Sound through 2025 (Washington Public Ports Association and Washington Department of Transportation 2004). Increased vessel traffic increases the risk of oil spills in Puget Sound. In its recovery plan for killer whales, NMFS identifies a large oil spill occurring in an area where all pods are present as the greatest single threat to their persistence (NMFS 2008a).

The growth of human populations in Puget Sound is also likely to have negative effects on the abundance of salmon, the whales' preferred prey. Population growth and urbanization with the accompanying conversion of land from farm or forest to residential results in the direct loss of habitat areas, a loss of vegetation, and an increase in impervious surface and traffic, with accompanying increase of pollutants in streams and changes in the natural watersheds. These conditions in turn degrade stream channel conditions, by increasing peak flows that wash out gravels and reduce bank stability, increasing stream temperatures, increasing sediment, and loss of stream complexity and riparian vegetation (NMFS 2007). These habitat alterations may continue to degrade the conservation value for recovering salmon. Salmon recovery plans call for a combination of habitat protection and restoration actions as well as integrated harvest, hatchery, and habitat management approaches.

Another future trend that may indirectly affect Southern Residents is continued global climate change, which will affect Puget Sound freshwater and marine habitats. As reviewed in ISAB (2007), the current status of salmon and steelhead species and their critical habitat in the Pacific Northwest has been influenced by climate change over the past 50 to 100 years and this change is expected to continue into the future. Average annual Northwest air temperatures have increased by approximately 1°C since 1900, which is nearly twice that for the last 100 years, indicating an increasing rate of change. The latest climate models project a warming of 0.1 to 0.6°C per decade over the next century. This change in surface temperature has already modified, and is likely to continue to modify, freshwater, estuarine, and marine habitats of salmon and steelhead, including designated critical habitat. Consequently, abundance, productivity, spatial distribution, and diversity of salmonid life stages occupying each type of affected habitat is likely to be further modified, generally in a detrimental manner. There is still a great deal of uncertainty associated with predicting specific changes in timing, location, and magnitude of future climate change. It is also likely that the intensity of climate change effects on salmon and steelhead will vary by geographic area. It is uncertain how these changes may directly affect killer whales, but it is reasonably foreseeable that they will decrease the abundance of salmon, the whales' preferred prey (Battin et al. 2007). Any future reduction in prey availability for killer whales would work in concert with increased contaminants and increased vessel disturbance to further diminish the fitness of the killer whale population.

In Puget Sound and elsewhere along the west coast, governments and non-governmental organizations are working to restore depressed salmon stocks. Efforts to protect and restore habitat, reduce harvest impacts, and improve hatchery management practices can all be expected to improve the status of salmon and steelhead coast-wide. At this point it is not clear whether the magnitude of these efforts is sufficient to support an inference that improved abundance of salmon stocks is reasonably foreseeable, particularly given the trends mentioned above of population growth and global climate change. Consequently, since it is

difficult to predict salmon abundance within the Puget Sound, it is also difficult to estimate the effect of their abundance on marine mammal populations dependent on this prey species.

There are also local efforts underway to identify and protect important habitats. In 2004, the San Juan County Board of Commissioners designated the entire marine waters of the county as a Marine Stewardship Area. Under the Marine Stewardship Area designation, the County is working with other government agencies and using public input from Indian Tribes, county residents, non-resident landowners, visitors, and others with an interest in the county's marine ecosystems to closely look at adopted goals, develop specific objectives, and determine what additional protections are necessary to achieve those objectives. The results of this work will be the designation of specific areas within the marine stewardship area where different levels of voluntary or regulatory protection could be established in a coordinated effort by marine site managers of the County waters to meet the goals. A new mandatory no-go zone could be recognized and promoted as part of the Marine Stewardship Area, which could increase compliance by vessel operators and thereby provide a benefit to Southern Resident killer whales by decreasing potential vessel disturbances in the zone location.

Under the No-action Alternative, NMFS would continue to promote the Be Whale Wise guidelines and enforce mandatory ESA and MMPA prohibitions, but would not adopt mandatory regulations regarding vessel activities around killer whales. As a result, the current levels of disturbance, described in Subsection 3.2, Marine Mammals, would continue and could increase. These levels of disturbance may interact with the factors described above (contaminant levels, increased vessel use, and prey availability) to harm the fitness of individual killer whales and the population as a whole. Continuation of these risks, in combination with negative effects of population growth and climate change, could have negative cumulative effects on killer whales.

Under the action alternatives, NMFS would regulate vessel activity in an effort to reduce vessel incidents that can harm killer whales. Benefits to killer whales may help offset the potential cumulative negative effects described above. The Preferred Alternative is a combination of Alternative 3: 200-Yard Approach Regulation and Alternative 7: Keep Clear of the Whales' Path, as described in Subsection 2.2.9, Alternative 9: Preferred Alternative. The effects of the Preferred Alternative would be a combination of the impacts to each resource as described for each individual alternative. The effects are additive, and NMFS does not anticipate any additional cumulative impacts from combining two alternatives into a Preferred Alternative package.

5.3 Socioeconomics

Under all of the action alternatives, NMFS would impose mandatory restrictions on vessels, including commercial whale watch vessels. Alternatives 2, 4, 6, and 7 would not impose mandatory regulations beyond the voluntary guidelines that the whale watch industry largely already observes. Under Alternatives 3 and 5, NMFS would promulgate regulations that are more restrictive than the current voluntary guidelines. While the analysis presented in Section 4.0, Environmental Consequences, suggests that any economic impacts of these regulations would be minor, they could have cumulative effects when considered with other current and potential future events affecting the whale watch industry. This result would also be realized under the Preferred Alternative. In particular, Washington gasoline prices almost tripled between 2002 and 2007 (Leffler 2007). Some whale watch companies have begun charging fuel surcharges to their customers. Any long-term projection of world oil prices and effects on fuel costs is highly uncertain, but for a number of scenarios forecasters have projected oil prices may remain at high levels or could continue to rise (Energy Information Administration 2008). Under any alternative, including the Preferred Alternative, if whale watch operators either have to raise prices to cover fuel costs or operate

with smaller profit margins, it is possible that small decreases in the number of passengers could have cumulative effects on whale watch profits.

6.0 REGULATORY IMPACT REVIEW

6.1 Introduction

This Regulatory Impact Review/Regulatory Impact Assessment (RIR/RIA) describes the costs and benefits of the proposed action and other alternatives in accordance with Executive Order (EO) 12866 and its guidelines established in OMB Circular A-4 and the Regulatory Flexibility Act, and EO 13422. This assessment is separate from the NEPA analysis but is included here for convenient reference. EO 12866 states:

> Federal agencies should promulgate only such regulations as are required by law, are necessary to interpret the law, or are made necessary by compelling public need, such as material failures of private markets to protect or improve the health and safety of the public, the environment, or the well-being of the American people. In deciding whether and how to regulate, agencies should assess all costs and benefits of available regulatory alternatives, including the alternative of not regulating. Costs and benefits shall be understood to include both quantifiable measures (to the fullest extent that these can be usefully estimated) and qualitative measures of costs and benefits that are difficult to quantify, but nevertheless essential to consider. Further, in choosing among alternative regulatory approaches, agencies should select those approaches that maximize net benefits (including potential economic, environmental, public health and safety, and other advantages; distributive impacts; and equity), unless a statute requires another regulatory approach.

EO 12866 was amended by EO 13422 (September 7, 2007), which requires Federal agencies to describe in writing the market failure that gives rise to the need for regulations. Executive branch guidance from the Office of Management and Budget describes one type of market failure as follows:

> 1. Externality, common property resource and public good
> An externality occurs when one party's actions impose uncompensated benefits or costs on another party. Environmental problems are a classic case of externality. For example, the smoke from a factory may adversely affect the health of local residents while soiling the property in nearby neighborhoods. If bargaining were costless and all property rights were well defined, people would eliminate externalities through bargaining without the need for government regulation. From this perspective, externalities arise from high transaction costs and/or poorly defined property rights that prevent people from reaching efficient outcomes through market transactions (OMB 2003).

As described in Subsection 1.4, Purpose and Need for Action, the statement of purpose and need for the proposed action is as follows:

> The purpose of the proposed action is to protect killer whales from vessel impacts, which will support recovery of Southern Resident killer whales.

Both the ESA and MMPA prohibit the take of Southern Resident killer whales, and give NMFS authority to adopt such other regulations as are appropriate to carry out the purposes of the respective statutes (ESA section 11(f), MMPA section 112(a)). Specific voluntary guidelines (described in Subsection 1.3, Current MMPA and ESA Prohibitions, Regulations, and NMFS Guidelines) currently assist vessel operators by describing vessel operations that protect the whales. In spite of the current

general take prohibitions and specific voluntary guidelines, there continue to be many incidents where vessel activities disturb the whales and create the risk of collisions. Without specific mandatory regulations (that is, under the No-action Alternative) continued and possibly increasing levels of vessel incidents are likely (Subsection 4.2.1, Alternative 1 (No Action)). Vessel effects were identified as a risk factor in the listing of Southern Resident killer whales and the recovery plan identifies actions such as minimizing disturbance from vessels (NMFS 2008a). In other words, a continuation of the status quo is likely to inhibit the recovery of this endangered population. Existing market forces have proven incapable of limiting the number of vessel incidents to the point that they are not a threat to the whales' continued existence. Available information supports a conclusion that the number of vessel incidents will decrease with specific mandatory regulations in place. Accordingly, NMFS is proposing to reduce the threat vessels pose to the whales, and increase their chances of recovery, by promulgating specific mandatory regulations.

The Preferred Alternative – a combination of a 200-yard approach regulation and prohibition on parking in the path – would likely reduce the number and severity of vessel incidents and promote population growth and recovery. The approach regulation and parking in the path prohibition would protect the whales throughout inland waters of Washington. This regulatory approach would meet the purpose and need identified in this EA and implement an action called for in the recovery plan, providing protection for the whales. The rationale for the individual elements chosen as part of the Preferred Alternative is described in Subsection 6.2, Alternatives. The benefits of the Preferred Alternative are evaluated in detail in Section 4.0, Environmental Consequences, and summarized below in Subsection 6.3.1, Description of Benefits. The costs of the Preferred Alternative are also evaluated in detail in Section 4.0, Environmental Consequences, and summarized below in Subsection 6.3.2, Description of Affected Parties and Types of Costs.

The discussion that follows summarizes the costs and benefits of alternative regulations, including the No-action Alternative of not promulgating regulations. The No-action Alternative represents the status quo and is the baseline used to estimate costs and benefits of the alternative regulations (Alternatives 2 through 9). This final EA, including RIR/RIA analysis, and separate economic analysis (IEC 2010) contain all the elements of the RIR/RIA. The RIR/RIA also serves as a basis for NMFS' determination on whether the proposed action is a "significant regulatory action" under the criteria provided in EO 12866. This determination is discussed in Subsection 6.4, Determination of Significant Regulatory Action. Moreover, NMFS concludes that the Preferred Alternative would not impose undue economic burdens on industries or individuals.

6.2 Alternatives Considered

Subsection 2.1, Introduction, lists the criteria by which alternatives were selected for full analysis. Subsection 2.2, Alternatives, describes each alternative in detail. The list of alternatives analyzed is as follows:

- Alternative 1: No-action
- Alternative 2: 100-Yard Approach Regulation
- Alternative 3: 200-Yard Approach Regulation
- Alternative 4: Protected Area – Current Voluntary No-go Zone
- Alternative 5: Protected Area – Expanded No-go Zone
- Alternative 6: Speed Limit of 7 Knots Within 400 Yards of Killer Whales
- Alternative 7: Keep Clear of the Whales' Path
- Alternative 8: Proposed Action (Package of Alternatives 3, 5, and 7)
- Alternative 9: Preferred Alternative (Package of Alternatives 3 and 7)

6.3 Costs and Benefits of the Proposed Action and Alternatives

6.3.1 Description of Benefits

Under the No-action Alternative, which is the baseline for this assessment, the number of interactions between vessels and whales is expected to continue at the same level and possibly increase. All of the action alternatives are likely to reduce the number of interactions compared to the baseline, because vessel operators are more likely to observe mandatory regulations than the current voluntary guidelines. As described in Subsection 3.2.1.5, Vessel Interactions, and summarized below, vessel interactions are a major threat to the health and fitness of individual Southern Resident killer whales. A reduction in the number of interactions would improve the fitness of individual whales, which in turn would increase the chances of the population recovering. For any of the alternatives, information does not currently exist that would allow for a quantitative estimate of 1) the reduction in the numbers of each type of vessel interaction, 2) the percent increase in the fitness of individual whales, 3) the increase in the number of whales, 4) the decrease in the chance of extinction, or 4) the increase in the chance of recovery. The following discussion therefore describes qualitatively the expected biological benefits of each alternative to individual whales, compared to the baseline and, where applicable, to one another.

The full range of values of Southern Resident killer whale recovery includes use values and non-use values. Use values include those values associated with whale watching trips, or other viewing opportunities. Non-use values include those values placed on knowing that killer whales remain for future generations (bequest value) and values placed on knowing that Southern Resident killer whales will continue to survive (existence value). For use values, we have an estimated economic contribution of the entire whale watch industry. The current whale watching industry in Puget Sound is estimated to contribute approximately $22 million annually and 196 jobs to the 19 counties adjacent to the whales' habitat area through direct, indirect, and induced expenditures related to the industry (IEC 2010). Non-use values are more difficult to quantify. If information were available to quantify the biological benefits to individual whales, and the resulting increased chance of recovery (or decreased chance of extinction), it might then be possible to translate those benefits into a monetary benefit to society. For example, it might be possible to evaluate what society would be willing to pay for the whales' continued existence, and from that derive the value of an increased chance that the whales would continue to exist. Because it is not possible to estimate the increased chance of recovery as a result of implementing any of the alternatives, and because the ESA provides a basis that recovery of endangered species has value, NMFS has not sought to develop new information to estimate the public's willingness to pay for the continued existence of the whales.

The biological benefit of each of the action alternatives—Alternatives 2 through 9—will be described briefly in this RIR/RIA. Tables 4-1 and 4-2, Summary of Effects of the Alternatives, and Subsection 4.2, Marine Mammals, describe the benefits to Southern Resident killer whales of adopting each of the alternatives in greater detail and relative benefits of the alternatives are presented in Table 6-1. This Environmental Assessment analyzes two approach distances and two no-go zones. Below is a comparison of the two approach regulations and no-go zones and the biological benefits they would provide to the whales, followed by a brief discussion of biological benefits provided by the speed limit, park in the path prohibition, and the regulations package in the proposed regulation. The summary compares the alternatives to each other where applicable.

Approach Regulation (Alternative 2: 100-Yard Approach Regulation, Alternative 3: 200-Yard Approach Regulation)
Recent research suggests that the current 100-yard guideline, which was also adopted as a state regulation in 2008, is not sufficient to protect the whales from vessel interactions that can cause behavioral disturbance, mask echolocation and communication, and result in risk of vessel strikes. Because boaters are more likely to observe a mandatory regulation than a voluntary guideline (Subsection 4.1.2, General Effects of Enforceable Regulations Compared to Voluntary Guidelines), adopting a 100-yard approach regulation would reduce the number of incidents compared to the baseline. Adopting a 200-yard approach regulation would not only reduce the number of incidents but would increase the distance between the whales and vessels compared to the baseline and to Alternative 2.

Several studies have demonstrated changes in whale behavior when vessels approach (Subsection 4.2, Marine Mammals). These changes can increase energy expenditure and reduce time spent foraging, both of which can result in harmful physiological impacts (Subsection 4.2, Marine Mammals). For example, the presence of some fast moving vessels within 100 yards of the whales can decrease the distance at which whales can detect salmon by 88 to 100 percent and within 200 yards the distance is decreased by 75 to 95 percent. Both behavioral disturbance and masking decrease as vessel distance increases.

Reducing behavioral disturbance and acoustic masking is likely to have physiological effects that increase the fitness of individual whales. While a small increase in fitness from a 100-yard approach regulation would provide some moderate benefit to the whales, impacts from vessels at 100 yards would still occur. A 200-yard regulation would provide high benefit to the whales' fitness by limiting the effects from vessels at 100 yards. In addition to reducing behavioral disturbance and acoustic masking, reducing the number of incidents in which vessels closely approach whales would reduce the risk of vessel strike. Because the Southern Residents are such a small population, injury or mortality from a vessel strike could have population level impacts, particularly for reproductive females. Reducing risk of vessel strikes and improving the fitness of even a small number of individual whales could substantially reduce the entire population's risk of extinction. There is currently a decreasing population trend and an increase in fitness could slow or reverse this trend by reducing the number of mortalities and/or increasing the number of births.

A 200-yard approach regulation in U.S. waters would also provide an opportunity for continued coordination regarding protections of killer whales in Canadian waters. Considerable efforts have been made to coordinate the guidelines on both sides of the border for clarity to boaters operating in the waters of both countries. We will continue coordination and provide support for any efforts in Canada to also consider increased approach guidelines or regulations to maintain consistency and provide a benefit to the whales.

No-go Zone (Alternative 4: Current No-go Zone and Alternative 5: Expanded No-go Zone)
Eliminating vessels from an area reduces the risk of vessel strikes, behavioral disturbance and auditory masking. The no-go zones along the west side of San Juan Island are important foraging areas for the whales (Subsection 3.2.1.3, Foraging) and reducing behavioral disturbance and auditory masking in the area increases the opportunities for the whales to forage and to locate prey without interference with echolocation. Some effects may still occur from vessels just outside the no-go zone or watching whales from the border of the no-go zone. As discussed above under Approach Regulations, behavioral disturbance and acoustic masking are both reduced the further the vessels are from the whales. While the current no-go zone would provide a moderate benefit to the whales, the larger expanded no-go zone

would provide a bigger buffer from vessels and result in greater reductions of vessel effects and high benefits to the whales.

Reducing behavioral disturbance and acoustic masking is likely to have physiological effects that increase the fitness of individual whales. In addition to reducing behavioral disturbance and acoustic masking, prohibiting vessels from an area used regularly by the whales would greatly reduce the risk of vessel strike in that area. Because the Southern Residents are such a small population, injury or mortality from a vessel strike could have population level impacts, particularly for reproductive females. Reducing risk of vessel strikes and improving the fitness of even a small number of individual whales could substantially reduce the entire population's risk of extinction. There is currently a decreasing population trend and an increase in fitness could slow or reverse this trend by reducing the number of mortalities and/or increasing the number of births.

In addition to the benefits to the whales, the no-go zones would benefit individuals participating in land-based viewing at locations adjacent to the no-go zones, including Lime Kiln Point State Park. The benefits to land-based viewing would be greater for the expanded no-go zone because fewer vessels would be in the viewshed compared to the current no-go zone.

Speed Limit of 7 Knots Within 400 Yards of Killer Whales Regulation (Alternative 6)
Because boaters are more likely to observe a mandatory regulation than a voluntary guideline (Subsection 4.1.2, General Effects of Enforceable Regulations Compared to Voluntary Guidelines), adopting a speed regulation would reduce the number of incidents compared to the baseline. As described in Subsection 4.2.6, Alternative 6: Speed Limit of 7 Knots Within 400 Yards of Killer Whales, fast moving vessels near the whales can interfere with echolocation and put the whales at risk for vessel strikes. There is currently only a small number of speed incidents observed and the reduction in incidents would be difficult to achieve through enforcement. A speed limit within 400 yards of the whales would be difficult to enforce because it would require measuring both speed and distance from whales. Enforcement techniques for estimating speed are limited (i.e., pacing vessels) and speed over ground vs. over water would also need to be specified, making interpretation of the speed limit challenging for boaters. The challenges of enforcing a speed regulation would result in only small reductions in incidents that result in risk of vessel strikes or auditory masking. The speed regulation would therefore likely provide low biological benefits to the whales over the baseline. In addition, the proposed regulation, which includes a 200-yard approach regulation (Alternative 3) in combination with a keep clear of the whales' path regulation (Alternative 7), would address some of the same sound impacts as a speed limit.

Keep Clear of the Whales' Path Regulation (Alternative 7)
Because boaters are more likely to observe a mandatory regulation than a voluntary guideline (Subsection 4.1.2, General Effects of Enforceable Regulations Compared to Voluntary Guidelines), adopting a parking in the path regulation would reduce the number of incidents compared to the baseline. Parking in the path is the most common incident for commercial operators and as discussed in Subsection 4.1.2, General Effects of Enforceable Regulations Compared to Voluntary Guidelines, a large increase in compliance with a mandatory regulation would be expected for commercial operators. As described in Subsection 4.2.7, Alternative 7: Keep Clear of the Whales' Path, parking in the path can interfere with important social behaviors and sound from vessels has the greatest potential to mask echolocation directly in front of the whales.

Reducing behavioral disturbance and acoustic masking is likely to have physiological effects that increase the fitness of individual whales. A parking in the path regulation would provide high benefit to the whales' fitness by limiting these effects particularly when whales are engaging in important social

activities and foraging. In addition to reducing behavioral disturbance and acoustic masking, reducing the number of incidents in which vessels are in the path of whales would reduce the risk of a vessel strike. Because the Southern Residents are such a small population, injury or mortality from a vessel strike could have population level impacts, particularly for reproductive females. Reducing the risk of vessel strikes and improving the fitness of even a small number of individual whales could substantially reduce the entire population's risk of extinction. There is currently a decreasing population trend and an increase in fitness could slow or reverse this trend by reducing the number of mortalities and/or increasing the number of births.

Proposed Regulations (Alternative 8)

The proposed regulation, a combination of regulations contained in Alternatives 3, 5, and 7, would provide all of the benefits described above under each of those Alternatives. This combination provides higher biological benefits to the whales than any single alternative. The proposed regulation provides biological benefits throughout inland waters and even greater benefits in specific habitat important to the whales. Having both an approach regulation and a keep clear of the whales' path regulation would address some of the same impacts that a speed limit would address, and an approach regulation and keep clear of the whales' path regulation would be easier to enforce than a speed limit within 400 yards of whales. The combination of regulations would reduce behavioral disturbance and acoustic masking from closely approaching vessels and vessels in the path of the whales, and reduce the risk of vessel strikes and impacts. These effects would be reduced even more within the no-go zone.

Reducing the risk of vessel strikes, behavioral disturbance and acoustic masking and, therefore, improving the fitness of even a small number of individual whales could substantially reduce the entire population's risk of extinction. There is currently a decreasing population trend and an increase in fitness could slow or reverse this trend by reducing the number of mortalities and/or increasing the number of births. Such benefits to the status of Southern Resident killer whales would begin to address concerns that led NMFS to list this DPS as endangered under the ESA (Subsection 3.2.1.2, Status).

Preferred Alternative (Alternative 9)

The Preferred Alternative, a combination of regulations contained in Alternatives 3 and 7, would provide all of the benefits described above under each of those Alternatives. This combination provides higher biological benefits to the whales than any single alternative. The Preferred Alternative provides biological benefits throughout inland waters. Having both an approach regulation and a keep clear of the whales' path regulation would address some of the same impacts that a speed limit would address, and an approach regulation and keep clear of the whales' path regulation would be easier to enforce than a speed limit within 400 yards of whales. The combination of regulations would reduce behavioral disturbance and acoustic masking from closely approaching vessels and vessels in the path of the whales, and reduce the risk of vessel strikes and impacts.

Reducing the risk of vessel strikes, behavioral disturbance, and acoustic masking would improve the fitness of individual whales. This improved fitness could substantially reduce the entire population's risk of extinction. There is currently a decreasing population trend, and an increase in fitness could slow or reverse this trend by reducing the number of mortalities and/or increasing the number of births. Such benefits to the status of Southern Resident killer whales would begin to address concerns that led NMFS to list this DPS as endangered under the ESA (Subsection 3.2.1.2, Status).

Summary

The No-action Alternative, Alternative 1, would not provide any benefits to the Southern Resident killer whale population over the baseline because no additional measures would be taken to reduce vessel incidents or disturbance from vessels and current levels of disturbance would continue to inhibit

recovery. Alternatives 2 through 9 would have positive effects on the Southern Resident population since they would reduce the number of vessel incidents and decrease the risk of strikes, behavioral disturbance, and auditory masking. These reductions are expected to increase the fitness of individual whales and the population. Alternative 3 is expected to have a greater reduction than Alternative 2 because risk of strikes, behavioral disturbance, and auditory masking would all be lower for vessels viewing whales at 200 yards than for vessels at 100 yards. Alternative 5 is expected to have a greater reduction to impacts than Alternative 4 because risk of strikes, behavioral disturbance, and auditory masking would all be lower throughout a larger no-go zone. Alternative 7 is expected to have greater reductions in vessel incidents compared to Alternatives 2, 4, and 6 based on higher numbers of parking in the path incidents for commercial operators and the greater level of compliance expected for commercial operators as compared to recreational boaters. The combination of Alternatives 3, 5, and 7 in Alternative 8 is expected to have the greatest contribution to the likelihood of survival of endangered Southern Resident killer whales. The combination of Alternatives 3 and 7 in Alternative 9 (Preferred Alternative) is expected to have a greater contribution than the individual alternatives. While Alternative 9 is not as protective as Alternative 8, NMFS will collect additional information and public input and further consider the no-go zone because the best available information indicates there would be a significant conservation benefit to the whales if they were free of all vessel disturbance in their core foraging area.

Section 4.2, Marine Mammals, also describes benefits to other protected marine mammals under each alternative. These benefits are indirect and we are not able to quantify reductions in impacts to or improvements for other marine mammals at this time.

In addition to benefits to the whales and other marine mammals, Alternatives 4 and 5 also benefit tourism and recreation by increasing the quality of land-based viewing opportunities along the west side of San Juan Island including Lime Kiln Point State Park, one of the most popular land-based viewing sites. Approximately 200,000 visitors go to Lime Kiln Point State Park each year and they would experience enhanced viewing opportunities under Alternatives 4 and 5.

6.3.2 Description of Costs

There is a cost of the No-action Alternative to society. As described above, the No-action Alternative would not benefit the whales. A failure to reduce the threat from vessel effects could lead to increased probability of extinction for Southern Resident killer whales. This would affect all of the values discussed in Subsection 6.3.1, Description of Benefits.

Subsections 4.4, Socioeconomics and 4.5, Recreation report the results of the economic analysis which estimated effects of the alternatives on specific parties (IEC 2010). The economic analysis provides greater detail on the methodology used to produce the estimates. The analysis uses the most recently available data on vessel activities to predict impacts to various parties under each alternative. Vessel operations that focus on the whales including both commercial whale watching tours and recreational boating are expected to be affected the most by each of the action alternatives. Commercial shipping vessels, ferries, and commercial fishing vessels that are not on the water to view the whales would be affected to a lesser extent. When possible, the impacts were quantified by identifying the numbers of individuals or vessel trips potentially affected by each alternative (Table 6-1). The number of individuals or trips affected provides information on relative size of impacts, however, dollar estimates or costs associated with those impacts are not available. The primary effect is an increased viewing distance from the whales and these effects are described in both Subsections 4.4 Socioeconomics and 4.5 Recreation, but are not monetized.

Alternatives 2, 4, 6, and 7 are consistent with what is recommended under the current voluntary Be Whale Wise guidelines. The parties affected by making these guidelines mandatory are the individuals who are currently not following the recommended guidelines. Recreational boaters are currently less likely to comply with the guidelines that would be codified in Alternatives 2, 4, and 6, while commercial whale watchers are less likely to comply with the guideline that would be codified in Alternative 7.

Table 6-1. Benefits and costs of alternatives.

Alternative		Benefits to whales	Costs	
			Socioeconomics	Recreation
1	No Action	None	• Increased risk of extinction of whales and potential loss of whale watch industry	• Increased risk of extinction of whales and potential loss of recreational whale watch opportunities
2	100-Yard Approach Regulation	Moderate, throughout inland waters of Washington	• 11 commercial trips and 619 individuals on commercial whale watch trips • 9 commercial shipping/fishing trips	• 86 private whale watching trips with 296 passengers • 29 private fishing trips with approximately 99 passengers • 8 kayak trips with 16 passengers
3	200-Yard Approach Regulation	High, throughout inland waters and potentially in Canadian waters with continued coordination	• Between 51 commercial trips and 2,811 individuals on commercial whale watch trips and total number of whale watch participants (425,000) • Greater than 9 commercial shipping/fishing trips	• Potentially all recreational whale watchers (up to 108,800) • Minor effects on private fishing trips
4	Protected Area-Current No-go Zone	Moderate, within zone (also some benefits to land-based viewing)	• 45 commercial trips and 2,458 individuals on commercial whale watch trips • Small number of fishing vessels displaced • Up to 6,900 commercial kayakers displaced from San Juan County boat launch	• 55 private vessel trips with approximately 187 passengers • 120 recreational motorized/sail boat users displaced from San Juan County boat launch and up to 2,722 private kayakers and other human powered craft operators displaced from San Juan County boat launch
5	Protected Area-Expanded No-go Zone	High, within zone	• Between 98 commercial trips and 5,382 individuals on commercial whale watch trips and total number of whale watch participants (425,000) • 212 commercial fishing	• Potentially all recreational whale watchers (up to 108,800) • 120 recreational motorized/sail boat users displaced from San Juan County boat launch and

		(also some benefits to land-based viewing)	vessels displaced (larger number than Alternative 4) • Up to 6,900 commercial kayakers displaced from San Juan County boat launch	up to 2,722 private kayakers and other human powered craft operators displaced from San Juan County boat launch
6	7 knots Within 400m	Low, throughout inland waters of Washington	• 16 commercial trips with approximately 853 individuals on commercial whale watch trips	• 86 private whale watching trips with approximately 294 passengers • 28 private fishing trips with approximately 97 passengers
7	Keep Clear of the Whales' Path	High, throughout inland waters of Washington	• 131 commercial trips with 7,205 individuals on commercial whale watch trips	• 85 private whale watching trips with 291 passengers • 26 private fishing trips with 91 passengers • 9 kayak trips with 17 passengers
8	200-Yard Approach Regulation, Expanded No-go Zone, and Keep Clear of the Whales' Path	High, throughout inland waters of Washington, in expanded zone and potentially in Canadian waters with continued coordination	• Between 280 trips with 15,398 individuals and total number of whale watch participants (425,000) • Small number of fishing vessels displaced • Up to 6,900 commercial kayakers displaced from San Juan County boat launch	• Between 642 private vessel trips with 2,195 passengers and all recreational whale watchers (up to 108,800) • 120 recreational motorized/sail boat users displaced from San Juan County boat launch and from 1,131 to 2,722 private kayakers displaced from San Juan County boat launch • 26 private fishing trips with 91 passengers
9	200-Yard Approach Regulation and Keep Clear of the Whales' Path	High, throughout inland waters of Washington and potentially in Canadian waters with continued coordination	• Between 182 trips with 10,016 individuals and total number of whale watch participants (425,000)	• Between 493 private vessel trips with 1,686 passengers and all recreational whale watchers (up to 108,800) • 26 private fishing trips with 91 passengers

More individuals participating in commercial whale watch tours may be affected than the number of private boaters for each of the alternatives. Based on different occupancy throughout the year there are approximately 6,264 commercial whale watch trips per year, with most trips concentrated in May through September (Russell and Schneidler, In Press). Commercial whale watch trips are estimated to have an average of 55 individuals (NWFSC data), while recreational vessels including kayaks have an

average of 3.42 individuals participating (Koski 2007). Even though more private vessels may not follow some guidelines, the number of people on each whale watch tour (approximately 55) increases the impacts in terms of individuals for commercial whale watching.

Commercial Whale Watching

Alternatives 2, 4, 6, and 7 are consistent with current Be Whale Wise guidelines, so only operators who are not following the guidelines would be affected by making the guidelines mandatory. For the most part, commercial whale watch operators comply with the 100-yard viewing guideline, current voluntary no-go zone, and the speed guideline. The small number of operators not complying with these guidelines would have to adjust their behavior to comply with mandatory regulations or face enforcement actions and potential fines. There are a larger number of commercial operators that currently do not follow the guideline asking to keep clear of the whales' path that would face a similar choice between adjusting their operations or facing enforcement actions. For Alternatives 2, 4, 6, and 7, it is likely that commercial operators would adjust their behavior to comply with new regulations rather than face enforcement actions that could result not only in fines, but also in loss of reputation and, potentially, future customers.

Alternatives 3 (200-Yard Approach Regulation) and 5 (Expanded No-go Zone) have the largest uncertainty regarding potential economic impacts. Both of these alternatives could result in a large portion of the commercial whale watch industry viewing whales from a greater distance than they currently do when operating by the current Be Whale Wise Guidelines. The entire fleet would need to adjust their approach to viewing the whales to comply with these new regulations. While members of the commercial whale watching industry have suggested that viewing from a greater distance could reduce interest in whale watching and result in fewer customers, there is evidence that proximity to whales is not the most important feature of a whale watch experience. An increased viewing distance may not have any economic impact on commercial whale watch trips particularly if the reasons for the increased viewing distance are explained to customers. This is consistent with the importance of responsible viewing and respect to the whales valued by whale watch participants. In addition, other methods can be employed to increase the viewing experience from a greater distance including use of larger viewing platforms, binoculars, and telephoto lenses. If an increased viewing distance did affect the willingness to pay of individuals participating in commercial whale watch trips or value, this would have an effect on the consumer surplus rather than the net expenditures for these types of leisure activities (IEC 2010).

Alternatives 4 and 5 (no-go zones) also have the potential to affect a number of commercial kayak operations that launch from the San Juan County Park boat ramp. These operations would need to find alternate launch locations which could increase the current cost of their operations.

Alternative 8 (which combines Alternatives 3, 5, and 7) has the largest estimated impact to the commercial whale watch industry in terms of the number of trips and individuals that would be affected. The combination of trips and individuals affected by Alternative 8 is still a small percentage of the total direct, indirect, and induced expenditures related to the industry, which is estimated at $22 million annually. While not the most likely scenario, if all of the individuals affected by Alternative 8 decided not to participate in commercial whale watching the impacts could be up to $1.3 million (approximately 3 to 6 percent of $22 million). The higher end of this estimate includes the 6,900 commercial kayak participants affected by not being able use the San Juan County Park boat ramp for several months of the year.

Alternative 9 (which combines Alternatives 3 and 7) would have less of an impact than Alternative 8. The combination of trips and individuals affected by Alternative 9 is a small percentage of the total

direct, indirect, and induced expenditures related to the industry, which is estimated at $22 million annually. While not the most likely scenario, if all of the individuals affected by Alternative 9 decided not to participate in commercial whale watching the impacts could be up to $1.3 million (up to 6 percent of $22 million).

Recreation

Alternatives 2, 4, 6, and 7 are consistent with current Be Whale Wise guidelines, so only recreational boaters who are not following the guidelines would be affected by making the guidelines mandatory. Recreational boaters may not be aware of the guidelines and some fail to comply with the 100-yard viewing guideline, current voluntary no-go zone, and speed guideline. The recreational boaters not complying with these guidelines would have to adjust their behavior to comply with mandatory regulations or face enforcement actions and potential fines. There are also a number of recreational boaters who do not comply with the guideline asking to keep clear of the whales' path; however, non-compliance with this guideline is a bigger issue for commercial operators. All recreational boaters not following current guidelines would face the choice between adjusting their operations or risking enforcement actions. It is likely that recreational boaters who are aware of new regulations would adjust their behavior to comply with new regulations rather than face enforcement actions and associated fines. Complying with new regulations, particularly Alternatives 3 and 5, would increase the viewing distance for most recreational boaters. Proximity to the whales is not the most important aspect of whale watching for participants in commercial trips and this is likely the case for recreational boaters as well. No economic impacts have been identified for increasing the viewing distance for recreational boaters.

Alternatives 4 and 5 (no-go zones) also have the potential to affect a number of recreational kayak and motorized vessel operations that launch from the public San Juan County Park boat ramp. These kayakers and other boaters would need to find alternate launch locations, some of which charge small launch fees.

While some recreational boaters are targeting the killer whales and participating in whale watching activities, this is not the primary activity for most recreational boaters. Even if recreational boaters adjusted their behavior to follow new regulations and viewed the whales at greater distances, this is not likely to discourage people from participating in boating. None of the alternatives would be expected to reduce the number of recreational boaters on the water or affect the economic value of recreational boating.

Other Commercial Operations

A small number of commercial ships, ferries, and commercial fishing vessels would need to alter their course to follow new regulations or face enforcement action and fines. Commercial vessel operators aware of the new regulations and presence of whales would likely alter their course if safe to do so. Small course changes would be inconvenient but would not have a monetary impact. Although diverting around whales and no-go zones could potentially result in delays, increased distance traveled, and fuel consumed, these impacts would be very short-term in nature and affect such a small number of trips that it would be negligible in the context of the value of commercial shipping, fishing, or ferry operation.

6.3.3 Cost/Benefit Conclusions

Vessel regulations would address one of the three main threats identified in the listing of Southern Resident killer whales as endangered under the ESA, and implement an action identified in the

recovery plan. Alternatives 2 through 7 each provide some benefit to the whales, some more than others (Table 6-1). Alternative 8 is made up of three alternatives, each with high benefits to the whales, and therefore provides the greatest benefit to the whales in terms of reducing risk of vessel strikes, behavioral disturbance, and acoustic masking that can all affect the fitness of individual whales and the population of endangered Southern Resident killer whales. Alternative 9 is made up of two alternatives, each with high benefits to the whales, and therefore provides greater benefit than individual alternatives, but less benefit than Alternative 8. These benefits cannot be quantified in terms of the number of whales saved or increased chance of recovery. Thus, it is not possible to translate the biological benefits to whales into a dollar value. Nevertheless, NMFS concludes that the benefit of the Preferred Alternative (Alternative 9: Preferred Alternative) is high in terms of reducing threats to the population, increasing fitness of individuals, and increasing the probability of achieving recovery. The ESA provides a basis for the conclusion that recovery of endangered species has value.

Any economic burden resulting from the proposed regulation will likely be greatest for the commercial whale watch industry as a result of increased viewing distance; however, as described, there is information that commercial whale watching will continue and regulations could even provide benefits for land-based whale watching activities. Studies have found that it is more important to whale watching participants that they view whales in a respectful, protective manner than that they get within a specific distance. This suggests any negative effects caused by regulations that increase the viewing distance may be minimized if the participants are educated on the reasons for the regulations. The result is likely a small impact borne by the participants and not necessarily an economic impact borne by the commercial whale watching companies.

If the quality of a whale watching trip is compromised by an increased viewing distance, lack of access to a particular area, or changes in methods (i.e., no parking in the path) the amount participants are willing to pay may decrease. In this case, they may travel to another area or choose different ways to spend their leisure time which would reduce the consumer surplus (IEC 2010). The overall level of expenditures on leisure activities in the action area, however, is likely to remain constant for a particular individual. The local area or set of businesses that benefit from those expenditures may vary.

The benefits of two alternatives (Alternatives 3 and 7) are high and Alternative 9 combines these individual regulations into an action with high benefit. The expected costs are minimal for each alternative. For Alternatives 2 through 9 costs, as estimated by the number of commercial and recreational trips and passengers affected, vary and in some cases the overall number of trips and passengers affected are small (Alternatives 2, 4, 6, and 7). For other alternatives (Alternatives 3, 5, 8 and 9) there is some uncertainty as to the number of trips and passengers affected. Even if all participants in recreational and commercial whale watching are affected, the impact itself (based on an increased viewing distance) is small. Therefore, Alternative 8 with the highest benefit and small costs provides the highest net benefit. Alternative 9 also has a high benefit and small costs, providing a net benefit. Alternative 9 does not include Alternative 5 (expanded no-go zone). However, NMFS recognizes the increased benefit to the whales of reducing vessel impacts in a core foraging area and will collect additional information and seek public input to further evaluate the concept of a no-go zone. While there may be some economic cost to various industry groups under Alternative 9, particularly commercial whale watching, overall, this cost is likely to be minimal and outweighed by the conservation benefits of regulations.

6.4 Determination of Significant Regulatory Action

EO 12866 defines a “significant regulatory action” as one that is likely to result in a rule that could:

1. Have an annual effect on the economy of $100 million or more or adversely affect in a material way the economy, a sector of the economy, productivity, competition, jobs, the environment, public health or safety, or state, local, or tribal governments or communities.
2. Create a serious inconsistency or otherwise interfere with an action taken or planned by another agency.
3. Materially alter the budgetary impact of entitlements, grants, user fees, or loan programs or the rights and obligations of recipients thereof.
4. Raise novel legal or policy issues arising out of legal mandates, the President's priorities, or the principles set forth in the EO.

None of the alternatives are expected to have a substantial economic impact on the commercial whale watch industry or other parties. Under Alternative 9, if individuals discontinued participation in trips because of new regulations and increased viewing distance, a portion of the whale watch industry would be affected. Alternative 9 includes Alternative 3, which has uncertain economic impacts. Although not anticipated, even if a large portion of the commercial fleet suffered negative economic impacts, the entire estimated value of the industry is $22 million, which is below the $100 million level considered significant under EO 12866. While this proposed rule does not meet the economic criteria, the Advance Notice of Proposed Rulemaking and this proposed rule are considered significant regulatory action for the purposes of EO 12866.

6.5 Final Regulatory Flexibility Analysis

When a Federal agency proposes regulations, the Regulatory Flexibility Act requires the agency to prepare an analysis that describes the effect of the rule on small entities (i.e., small businesses, small organizations, and small government jurisdictions). As described by IEC (2010) most of the businesses operating in the commercial whale watch industry are small entities for purposes of the Regulatory Flexibility Act. Commercial fishing industries that could be affected to a lesser degree are also considered small entities. It is therefore likely that the potentially affected entities are small businesses. While operations of the whale watch industry may be affected by the final regulation, it is the customers and not necessarily the whale watching operators who may bear impacts. The economic analysis (IEC 2010) projects no change in revenue for whale watching operations under any of the alternatives analyzed in this EA, but rather the potential diminished value of the customers' experience as a result of greater viewing distances. Such losses to individuals engaged in whale watching are not borne by small entities. NMFS does not expect any small entity to cease operation as a result of any of the alternatives.

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8.0 FINDING OF NO SIGNIFICANT IMPACT FOR NEW REGULATIONS TO PROTECT KILLER WHALES FROM VESSEL EFFECTS IN INLAND WATERS OF WASHINGTON

National Marine Fisheries Service

National Oceanic and Atmospheric Administration Administrative Order 216-6 (NAO 216-6) (May 20, 1999) contains criteria for determining the significance of the impacts of a proposed action. In addition, the Council on Environmental Quality regulations at 40 C.F.R. 1508.27 state that the significance of an action should be analyzed both in terms of "context" and "intensity." Each criterion listed below is relevant in making a finding of no significant impact and has been considered individually, as well as in combination with the others. The proposed action, which NMFS has determined is the agency's preferred alternative, is the issuance of new regulations to protect killer whales from vessel effects in inland waters of Washington. The significance of this action is analyzed based on the NAO 216-6 criteria and CEQ's context and intensity criteria. These include:

1) **Can the proposed action reasonably be expected to cause substantial damage to the ocean and coast habitats and/or essential fish habitat as defined under the Magnuson-Stevens Act and identified in FMPs?**

Response: NMFS does not expect any physical impact or damage to ocean or coastal habitats or essential fish habitat from the preferred alternative. Vessel regulations to protect killer whales are expected to alter vessel movement in the vicinity of killer whales in inland waters of Washington. The number of vessels operating in the action area, however, is not expected to change and any habitat impacts resulting from general vessel activities (grounding, anchoring, emissions, etc.) would not be attributed to the proposed action.

2) **Can the proposed action be expected to have a substantial impact on biodiversity and/or ecosystem function within the affected area (e.g., benthic productivity, predator-prey relationships, etc.)?**

Response: The inland waters of Washington, including Puget Sound, are heavily impacted by human activities, which impact ecosystem function. The purpose of protective vessel regulations is to support recovery of endangered Southern Resident killer whales and restore their role as a top predator in the ecosystem to a more natural state by reducing threats from human activities, such as boating. NMFS

expects vessel regulations to alter vessel movement in the vicinity of killer whales in inland waters of Washington, but any changes in vessel activity are not expected to impact ecosystem functions.

3) Can the proposed action be reasonably expected to have a substantial adverse impact on public health or safety?

Response: The proposed action will not have a substantial adverse impact on public health or safety. There are specific exceptions to the vessel regulations to ensure continued safe operation of all vessels.

4) Can the proposed action reasonably be expected to adversely affect endangered or threatened species, their critical habitat, marine mammals, or other non-target species?

Response: The proposed action is expected to benefit endangered Southern Resident killer whales, as well as other types of killer whales. The 200-yard approach regulation for killer whales would apply to all killer whales, including transient and off-shore killer whales, because the regulation would not distinguish among the different types. Thus, all killer whales would be expected to experience some reduction in close vessel approaches. A 200-yard approach regulation may also result in vessel operators avoiding close approaches to other marine mammals, because the regulation might create awareness about vessel effects on marine mammals generally. The 200-yard approach regulation could reduce the number of close approaches to other marine mammals and reduce the risk of vessel strikes and the number of behavioral responses associated with close approaches.

Features of killer whale critical habitat include water quality, prey availability, and passage. Some of these features (i.e., water quality) could be affected by the presence of vessels in the action area. The number of vessels operating in the action area is not expected to change, however, and any habitat impacts resulting from general vessel activities (emissions, etc.) would not be attributed to the proposed action. The vessel regulations are designed to improve conditions for killer whale passage and foraging.

Over the long-term, better foraging conditions could contribute to an increase in the Southern Resident killer whale population. An increase in the number of killer whales could result in increased consumption of ESA-listed or non-listed salmonids, their primary prey. Any significant population increases would occur gradually over many years and it is not possible at this time to quantify impacts of a potential long-term increase in predation. Coincident with recovery efforts for Southern Resident killer whales, many actions are underway to increase population abundance and productivity of listed salmonids and to achieve a trend to recovery. If progress toward recovery of both species can be achieved concurrently, a gradual

increase in the killer whale population would not be expected to have an adverse impact on increasing salmon populations.

5) Are significant social or economic impacts interrelated with natural or physical environmental effects?

Response: It is possible that increasing the viewing distance to 200 yards would impact the economic condition of the commercial whale watch industry. Viewing whales from a distance of 200 yards may be less attractive to some individuals interested in participating in commercial whale watch trips. In comments on the Advance Notice of Proposed Rulemaking and on the Proposed Regulations, whale watch operators expressed concerns regarding the economic impacts to their business from reduced participation in commercial whale watch trips. No commenters provided data to support this assertion. There is evidence, however, that the economic viability of the industry would not be significantly impacted by an increased viewing distance.

Several studies have assessed the value that whale watching participants have for wildlife viewing and provide data on the factors that lead to an enjoyable or memorable whale watching trip, and how satisfied participants are with various aspects of their trip. Survey results of whale watch participants indicate that proximity to the whales is not the most important part of the whale watchers' experience and that seeing whales and whale behavior was much more important. In addition, one study found that participants were most satisfied with the respect their vessel operators gave the whales; the number of whales, whale behavior, and learning also received higher satisfaction than the distance from which whales were observed; and the participants strongly agreed with statements related to protection of the whales (Subsection 3.5, Whale Watch Industry in Puget Sound). Thus, while it is possible that a mandatory 200-yard regulation could reduce whale watch revenues, these reductions may be minimized by educating whale watch participants regarding the protective nature of a 200 yard viewing distance.

NMFS expects any impacts to the whale watch industry to be small, and based on the information above, impacts would not be expected to reduce the demand for whale watching, the number of companies or vessels, the jobs associated with the industry, or the overall value of the commercial whale watch industry to the local economy or local tourism in the Puget Sound area. In addition, whale watch companies have a number of options to mitigate impacts and increase satisfaction from viewing whales at 200 yards rather than 100 yards, such as providing binoculars, encouraging the use of telephoto lenses for photography, and using platforms that provide a better vantage point higher from the surface of the water. Although not anticipated, even if a large portion of the commercial fleet suffered negative economic impacts, the entire

estimated value of the industry is $22 million, which is below the $100 million level considered significant under EO 12866.

The 200-yard regulation and prohibition on parking in the whales' path would not affect the opportunity for any type of recreational vessel activity in Puget Sound. The limited nature of the prohibition would not discourage boating generally. It also would not discourage whale watching, because viewing still could occur outside 200 yards. There could be effects on the recreational experience for all recreational boaters involved in whale watching and all passengers on whale watching vessels because all of these individuals would have to view killer whales at a distance of 200 yards compared with the ability to view whales from 100 yards under the current guidelines and state law (RCW 77.15.74). There may also be minor effects from repositioning to remain 200 yards from whales or out of the whales' path for other recreational boaters and recreational fishers if they encounter whales during their other activities.

6) Are the effects on the quality of the human environment likely to be highly controversial?

Response: There is a high level of public interest in killer whales and a variety of stakeholders have provided public comments on the ESA listing, critical habitat designation, and recovery planning and implementation. The public meetings on the proposed rule were well attended, and many people voiced concerns about the proposal, particularly on the proposed seasonal no-go zone along the west side of San Juan Island. There were a large number of oral and written comments from the public, including the recreational fishing community, whale watch operators, and kayakers in opposition to the proposed no-go zone. Some reasons expressed for opposition to the no-go zone included concerns about setting a precedent for closing additional areas to fishing, impacts to commercial and recreational fishing, elimination of kayaking opportunities, and safety concerns. As a result of public input, the preferred alternative does not include the no-go zone. NMFS will take additional time to consider the no-go zone and will continue to gather information on suggested alternatives, economic impacts, and habitat use of the whales, to continue evaluating a no-go zone.

The small effects on the quality of the human environment from the 200 yard approach rule and prohibition on parking in the whales' path are not likely to be highly controversial. There remain, however, concerns from the public regarding the science on which NMFS relied and disagreement regarding some potential impacts of the vessel regulations. With respect to the science, NMFS relied on the best available data to develop the proposed and final regulations. The majority of the information came from peer reviewed scientific publications. To a lesser extent, unpublished data, personal accounts and other anecdotal information also informed development of the regulations. NMFS routinely evaluates a body of scientific

or technical knowledge, which typically synthesizes multiple factual inputs, data, models, assumptions, and/or applies best professional judgment to bridge uncertainties in the available information. In some cases, NMFS relied on studies done on similar species in other locations, models, and research results that indicated trends, but were not conclusive. In addition to evaluating the quality, applicability, and uncertainty in the scientific information, NMFS also relied on a conservative approach in weighing the severity and likelihood of some impacts from vessels. For example, there are no direct data to measure a reduction in the efficiency of echolocation in the presence of vessel sound. Instead, NMFS relied on a model created to estimate the vessel sound under varying conditions and calculate a reduction in echolocation efficiency, and made conservative assumptions about the impact of vessel sound on killer whale foraging based on the results generated by this model.

In comments on the Advance Notice of Proposed Rulemaking and on the Proposed Regulations, whale watch operators expressed concerns regarding the economic impacts to their business from reduced participation in commercial whale watch trips conducted at 200 yards from the whales. In the Pacific Whale Watch Association comments on the proposed rule, they suggested that at least one company would go out of business and estimated a 30 percent reduction in the number of companies participating in the industry over three years and a drop in revenue for the remaining 70 percent. No commenters provided data to support this assertion. The comments summarized information from informal surveys of customers indicating that they would not book a trip if they would be watching from 200 yards. The whale watch association also asserted that one of their most frequently asked questions is “How close can we get?,” and 5 percent of bookings are lost when they answer “100 yards.” In the comments, the whale watch association acknowledged that their informal communications with customers were admittedly not “scientifically accurate surveys.” The information from the informal customer surveys also contradict information from published, peer reviewed scientifically conducted surveys about the important features of trips for customers. The analysis of likely impacts to the whale watch industry relied on the published, peer reviewed and scientifically conducted surveys rather than the anecdotal information provided by the industry. As part of implementation of new regulations, NMFS will monitor to evaluate effectiveness of the regulations, as well as identify any unanticipated impacts in order to inform adaptive changes to the regulation.

7) Can the proposed action reasonably be expected to result in substantial impacts to unique areas, such as historic or cultural resources, park land, prime farmlands, wetlands, wild and scenic rivers or ecologically critical areas?

Response: There are 38 state parks and eight national parks that border Puget Sound, all of which could offer the opportunity for land-based whale watching (Subsection 3.5, Recreation). The most popular site is Lime Kiln Point State Park/Whale Watch State Park on San Juan Island, which has approximately 200,000 visitors annually and has an interpretive center with information about killer whales. There would likely be no impact on land-based viewing opportunities from vessel regulations or on any of these parks because they are land-based. There may be an improvement to the recreational experiences at these parks because an increased distance of vessels from the whales would benefit the aesthetic value to individuals engaged in land-based whale watching because the experience of viewing whales would be improved by removing boats from a portion of the viewshed (i.e., the 200 yards between boats and whales).

8) Are the effects on the human environment likely to be highly uncertain or involve unique or unknown risks?

Response: As described above under #6, NMFS relied on the best available information to evaluate effects on the human environment, including economic impacts. While there is some disagreement regarding the anticipated economic impacts to the whale watch industry, NMFS considered the available scientific and commercial data to inform the analysis. The analysis of effects of the vessel regulations was informed by a variety of sources of information including scientific peer reviewed journal articles. Based on the range of information considered, the degree of effects involves some uncertainty. There are, however, no unique or unknown risks.

9) Is the proposed action related to other actions with individually insignificant, but cumulatively significant impacts?

Response: The inland waters of Washington, including Puget Sound, is an urban area with many human impacts. Several reasonably foreseeable future actions or conditions have the potential to result in cumulative effects to killer whales. Human populations are predicted to grow in the Puget Sound region, which is likely to affect all of the threats to killer whales including contaminants, vessel traffic, and salmon abundance. (Section 5.0, Cumulative Effects). The vessel regulations are intended to reduce one source of human impact on the whales. With implementation and increased compliance with new regulations, the goal is for a reduction in vessel impacts which will offset other impacts that will take longer to address.

10) Is the proposed action likely to adversely affect districts, sites, highways, structures, or objects listed or eligible for listing in the National Register of Historic Places or may cause loss or destruction of significant scientific, cultural, or historical resources?

Response: The proposed action will have no adverse effects on districts, sites, highways, structures, or objects listed or eligible for listing in the National Register of Historic Places or cause loss or destruction of significant scientific, cultural, or historical resources, because vessel regulations will not alter the physical environment. Killer whales are considered a cultural resource by people in the Pacific Northwest, particularly Indian Tribes. The proposed action will have beneficial effects on killer whales and will help conserve this resource.

11) Can the proposed action reasonably be expected to result in the introduction or spread of non-indigenous species?

Response: The proposed action is not expected to import, introduce, or contribute to the spread of non-indigenous species because vessels are already in use. Vessel regulations to protect killer whales are expected to alter vessel movement in the vicinity of killer whales in inland waters of Washington. The number of vessels operating in the action area, however, is not expected to change and any associated risk of introduction or spread of non-indigenous species would not be affected by the proposed action.

12) Is the proposed action likely to establish a precedent for future actions with significant effects or represent a decision in principle about a future consideration?

Response: The proposed action does not establish a precedent for future actions or represent a decision in principle because the proposed action is similar to previous protective regulations to protect other marine mammals. NMFS has developed specific regulations for certain species in particular locations. Each regulation was based on the biology of the marine mammals and available information on the nature of the threats. NMFS has regulated close vessel approaches to large whales in Hawaii (100-yard approach rule), Alaska (100-yard approach rule), and the North Atlantic (500-yard approach rule and speed restrictions). Buffer zones prohibiting vessels from operating within 3 nautical miles around the principal rookeries in the Gulf of Alaska and the Aleutian Islands were also created to protect Steller sea lions. There are exceptions to each of these rules.

13) Can the proposed action reasonably be expected to threaten a violation of Federal, state, or local law or requirements imposed for the protection of the environment?

Response: The proposed action will be conducted in a manner complementary to other Federal, state, tribal, and local plans that support Southern Resident killer whale recovery. In 2008 a Washington State law prohibiting vessels from approaching closer than 100 yards to a killer whale went into effect. The 200-yard approach regulation is more protective than the state law, but it is not contradictory. In their comments on the proposed rule, the Washington Department of Fish and Wildlife supported a Federal 200-yard regulation, and presumably the Department would recommend revision of the law at a later date to reflect support for a 200-yard regulation. NMFS will continue to coordinate with the Department of Fisheries and Oceans, Canada to coordinate regulations on both sides of the border wherever possible.

14) Can the proposed action reasonably be expected to result in cumulative adverse effects that could have a substantial effect on the target species or non-target species?

Response: The proposed action will result in benefits to the target species (killer whales), as well as other marine mammal species, as described above under #4. The intent of the regulations is to reduce adverse effects from vessels. Also described above under #4, a long-term gradual increase in killer whale populations could result in increased predation on salmonids. Although NMFS cannot quantify adverse effects to salmon at this time, NMFS does not anticipate substantial impacts to salmonids, particularly if salmon recovery efforts occur concurrently with killer whale recovery measures, such as vessel regulations.

8.1 List of Reviewers

- Kathe Hawe, NWR NEPA Coordinator
- Donna Darm, NWR Protected Resources ARA
- Barry Thom, NWR Deputy Administrator
- Melanie Rowland, General Counsel Northwest
- Brian Corrigan, U.S. Coast Guard
- Russ Mullins, Washington Department of Fish and Wildlife
- Paul Cottrell, Fisheries and Oceans Canada

8.2 Determination

In view of the information presented in the EA and analysis prepared for the action titled "New Regulations to Protect Killer Whales from Vessel Effects in Inland Waters of Washington," it is hereby determined that issuance of regulations by NMFS will not significantly impact the quality of the human environment as described above and in the EA. In addition, all beneficial and adverse impacts of the proposed action have been addressed to reach the conclusion of no significant impacts. Accordingly, preparation of an Environmental Impact Statement is not necessary.

William W. Stelle Jr., Regional Administrator — 11/18/2010 Date

Appendix A. Advance Notice of Proposed Rulemaking

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authorized to operate under the program and possesses the appropriate State or Tribal permits, when required. Moreover, this section does not authorize the killing of any migratory bird species or destruction of their nest or eggs other than resident Canada geese.

(8) Registrants may not undertake any actions under this section if the activities adversely affect species designated as endangered or threatened under the authority of the Endangered Species Act. Persons operating under this order must immediately report the take of any species protected under the Endangered Species Act to the Service. Further, to protect certain species from being adversely affected by management actions, registrants must:

* * * * *

(e) *Can the depredation order be suspended?* We reserve the right to suspend or revoke this authorization for a particular landowner, homeowners' association, or local government if we find that the registrant has not adhered to the terms and conditions specified in the depredation order. Final decisions to revoke authority will be made by the appropriate Regional Director. The criteria and procedures for suspension, revocation, reconsideration, and appeal are outlined in §§ 13.27 through 13.29 of this subchapter. For the purposes of this section, "issuing officer" means the Regional Director and "permit" means the authority to act under this depredation order. For purposes of § 13.29(e), appeals must be made to the Director. Additionally, at such time that we determine that resident Canada goose populations no longer need to be reduced in order to resolve or prevent injury to people, property, agricultural crops, or other interests, we may choose to terminate part or all of the depredation order by subsequent regulation. In all cases, we will annually review the necessity and effectiveness of the depredation order.

* * * * *

8. In subpart E, amend § 21.61 by revising paragraph (d)(2) to read as follows:

§ 21.61 Population control of resident Canada geese.

* * * * *

(d) * * *

(2) Control activities may be conducted under this section only between August 1 and August 31.

* * * * *

Dated: March 6, 2007.

David M. Verhey,

Assistant Secretary for Fish and Wildlife and Parks.

[FR Doc. E7–5199 Filed 3–21–07; 8:45 am]

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DEPARTMENT OF COMMERCE

National Oceanic and Atmospheric Administration

50 CFR Part 216

[Docket No. 070125020–7020–01; I.D. 010907A]

RIN 0648–AV15

Protective Regulations for Killer Whales in the Northwest Region under the Endangered Species Act and Marine Mammal Protection Act

AGENCY: National Marine Fisheries Service (NMFS), National Oceanic and Atmospheric Administration (NOAA), Commerce.

ACTION: Advance notice of proposed rulemaking.

SUMMARY: We, the National Marine Fisheries Service (NMFS), listed the Southern Resident killer whale distinct population segment (DPS) as endangered under the Endangered Species Act (ESA) on November 18, 2005. In the final rule announcing the listing, we identified vessel effects, including direct interference and sound, as a potential contributing factor in the recent decline of this population. Both the Marine Mammal Protection Act (MMPA) and the ESA prohibit take, including harassment, of killer whales, but these statutes do not prohibit specified acts. We are considering whether to propose regulations that would prohibit certain acts, under our general authorities under the ESA and MMPA and their implementing regulations. The Proposed Recovery Plan for Southern Resident killer whales (published November 29, 2006) includes as a management action the evaluation of current guidelines and the need for regulations and/or protected areas. The scope of this advance notice of proposed rulemaking (ANPR) encompasses the activities of any person or conveyance that may result in the unauthorized taking of killer whales and/or that may cause detrimental individual-level and population-level impacts. NMFS requests comments on whether—and if so, what type of—conservation measures, regulations, or other measures would be appropriate to protect killer whales from the effects of these activities.

DATES: Comments must be received at the appropriate address (see **ADDRESSES**) no later than June 20, 2007. Public meetings have been scheduled for April 18, 2007, 2–4 p.m. in The Grange Hall, Friday Harbor, WA and April 19, 2007, 7–9 p.m. at the Seattle Aquarium, Seattle, WA. Requests for additional public meetings must be made in writing by April 23, 2007.

ADDRESSES: You may submit comments by any of the following methods:

- E-mail: *orca.plan@noaa.gov.*
- Federal e-rulemaking Portal: *http://www.regulations.gov.*
- Mail: Assistant Regional Administrator, Protected Resources Division, Northwest Regional Office, National Marine Fisheries Service, 7600 Sand Point Way NE, Seattle, WA 98115.

FOR FURTHER INFORMATION CONTACT: Lynne Barre, Northwest Regional Office, 206–526–4745; or Trevor Spradlin, Office of Protected Resources, 301–713–2322.

SUPPLEMENTARY INFORMATION:

Background

Viewing wild marine mammals is a popular recreational activity for both tourists and locals. In Washington, killer whales (*Orcinus orca*) are the principal target species for the commercial whale watch industry—easily surpassing other species, such as gray whales (*Eschrichtius robustus*), porpoises, and pinnipeds (Hoyt, 2001). NMFS is concerned that some whale watch activities may cause unauthorized taking of killer whales or cause detrimental individual-level and population-level impacts.

Killer whales in the eastern North Pacific have been classified into three forms, or ecotypes, termed residents, transients, and offshore whales. Resident killer whales in the North Pacific consist of the following groups: Southern, Northern, Southern Alaska (includes Southeast Alaska and Prince William Sound whales), Western Alaska, and Western North Pacific Residents. The Southern Resident killer whale population contains three pods—J pod, K pod, and L pod and was designated as a depleted stock under the MMPA and listed as endangered under the ESA.

During the spring, summer, and fall, the Southern Residents' range includes the inland waterways of Puget Sound, Strait of Juan de Fuca, and Southern Strait of Georgia. Their occurrence in the coastal waters off Oregon, Washington, Vancouver Island, and more recently off the coast of central California in the south and off the Queen Charlotte Islands to the north has

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been documented. Little is known about the winter movements and range of Southern Residents.

Scientific studies have documented human disturbance of Southern Resident killer whales by vessels engaged in whale watching in the inland waters of Washington. Short-term behavioral changes in Northern and Southern Residents have been observed and studied by several researchers (Kruse, 1991; Kriete, 2002; Williams *et al.*, 2002a, 2002b, 2006; Foote *et al.*, 2004; Bain *et al.*, 2006), although it is not well understood whether it is the presence and activity of the vessel, the sounds the vessel makes, or a combination of these factors that disturbs the animals. Individual animals can react in a variety of different ways to whale watching, including swimming faster, adopting less predictable travel paths, making shorter or longer dive times, moving into open water, and altering normal patterns of behavior at the surface (Kruse, 1991; Williams *et al.*, 2002a; Bain *et al.*, 2006). High frequency sound generated from recreational and commercial vessels moving at high speed in the vicinity of whales may mask echolocation and other signals the species rely on for foraging, communication (Foote *et al.*, 2004) and navigation.

In rare instances, killer whales are injured or killed by collisions with passing ships and powerboats, primarily from being struck by the turning propeller blades (Visser, 1999c; Ford *et al.*, 2000; Visser and Fertl, 2000; Baird, 2001; Carretta *et al.*, 2001, 2004). Some animals with severe injuries eventually make full recoveries, such as a female described by Ford *et al.* (2000) that showed healed wounds extending almost to her backbone. One resident whale mortality from a vessel collision was previously reported for Washington and British Columbia from the 1960s to 1990s (Baird, 2002). However, two additional mortalities have recently been reported. In March of 2006 the lone Southern Resident killer whale, L98, residing in Nootka Sound for several years was killed by a tug boat. While L98 exhibited unusual behavior and often interacted with vessels, his death demonstrates the risk of vessel accidents. In July 2006, the death of a stranded Northern Resident female was attributed to blunt trauma, probably from a vessel strike (M. Joyce, pers. comm.) Five additional accidents between vessels and killer whales have been documented in the region since the 1990s (Baird, 2001; DFO, unpubl. data, NMFS, unpubl. data). One took place on the Washington side of Haro Strait in 1998 and involved a slow moving boat that apparently did not injure the whale. In 1995, a Northern Resident was struck by a speedboat, causing a wound to the dorsal fin that quickly healed. Another Northern Resident was injured by a high-speed boat in 2003, but also recovered. A 2005 collision of a Southern Resident with a commercial whale watch vessel resulted in a minor injury to the whale, which subsequently healed. An additional Northern Resident calf was struck by a vessel in July 2006.

We are concerned about the potential for individual-level and population-level effects because of vessel activities. Vessel effects were identified as a factor in the ESA listing of the Southern Residents and are addressed in the recovery plan which is available on our web page at *http://www.nwr.noaa.gov/*. NMFS has received an increasing number of complaints from the public alleging that killer whales in the core summer area along the west side of San Juan Island are routinely being disturbed by people attempting to closely approach and interact with the whales by vessel (motor powered or kayak). Concerns have been expressed by the U.S. Marine Mammal Commission, as well as members of the scientific community, researchers, wildlife conservation organizations, and some commercial tour operators.

Current MMPA and ESA Prohibitions and NMFS Guidelines and Regulations

The Marine Mammal Protection Act, 16 U.S.C. 1361 *et seq.*, contains a general prohibition on take of marine mammals. Section 3(13) of the MMPA defines the term take as "to harass, hunt, capture, or kill, or attempt to harass, hunt, capture, or kill any marine mammal." Except with respect to military readiness activities and certain scientific research activities, the MMPA defines the term harassment as "any act of pursuit, torment, or annoyance which—(i) has the potential to injure a marine mammal or marine mammal stock in the wild, [Level A harassment]; or (ii) has the potential to disturb a marine mammal or marine mammal stock in the wild by causing disruption of behavioral patterns, including, but not limited to, migration, breathing, nursing, breeding, feeding, or sheltering [Level B harassment]."

In addition, NMFS regulations implementing the MMPA further describe the term take to include: "the negligent or intentional operation of an aircraft or vessel, or the doing of any other negligent or intentional act which results in disturbing or molesting a marine mammal; and feeding or attempting to feed a marine mammal in the wild" (50 CFR 216.3).

The MMPA provides limited exceptions to the prohibition on take for activities such as scientific research, public display, and incidental take in commercial fisheries. Such activities require a permit or authorization, which may be issued only after a thorough agency review.

The ESA generally prohibits the taking of endangered species. The ESA defines take to mean "harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, or collect, or to attempt to engage in any such conduct." Both the ESA and MMPA require wildlife viewing to be conducted in a manner that does not cause take.

NMFS has regulated close vessel approaches to large whales in Hawaii, Alaska, and the North Atlantic. In 1995, NMFS published a final rule to establish a 100–yard (91.4–m) approach limit for humpback whales in Hawaii (60 FR 3775, January 19, 1995). In 2001, NMFS published a final rule (66 FR 29502, May 31, 2001) to establish a 100–yard (91.4–m) approach limit for humpback whales in Alaska that included a speed limit for when a vessel is near a whale. In 1997, an interim final rule was published to prohibit approaching critically endangered North Atlantic right whales closer than 500 yards (457.2 m) (62 FR 6729, February 13, 1997).

In addition to these specific regulations, NMFS has provided general guidance for wildlife viewing that does not cause take. This is consistent with the philosophy of responsible wildlife viewing advocated by many federal and state agencies to unobtrusively observe the natural behavior of wild animals in their habitats without causing disturbance (see *http://www.watchablewildlife.org/*.

Each of the six NMFS Regions has developed recommended viewing guidelines to educate the general public on how to responsibly view marine mammals in the wild and avoid causing a take. These guidelines are available on line at: *http://www.nmfs.noaa.gov/prot_res/MMWatch/MMViewing.html*

The "Be Whale Wise" guidelines developed for marine mammals by the NMFS Northwest Regional Office and partners are also available at: *http://www.nwr.noaa.gov/Marine-Mammals/upload/BeWhaleWise.pdf*

Be Whale Wise is a transboundary effort to develop and revise guidelines for viewing marine wildlife. NMFS has partnered with commercial operators, whale advocacy groups, U.S. and Canadian government agencies and enforcement divisions over the past

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several years to promote safe and responsible wildlife viewing practices through the development of outreach materials, training workshops, on-water education and public service announcements. The 2006 version of the Be Whale Wise guidelines recommends that boaters parallel whales no closer than 100 yards (91.4 m), approach animals slowly from the side rather than from the front or rear, and avoid putting the vessel within 400 yards (365 m) in front of or behind the whales. Vessels are also recommended to reduce their speed to less than 7 knots (13 km/h) within 400 meters of the whales, and to remain on the outer side of the whales near shore. Two voluntary no-boat areas off San Juan Island are recognized by San Juan County although this is separate from the Be Whale Wise guidelines. The first is a ½–mile (800 m)–wide zone along a 3–km stretch of shore centered on the Lime Kiln lighthouse. The second is a 1/4–mile (400 m)–wide zone along much of the west coast of San Juan Island from Eagle Point to Mitchell Point. These areas were established to facilitate shore-based viewing and to reduce vessel presence in an area used by the whales for feeding, traveling, and resting.

NMFS supports the Soundwatch program, an on-water stewardship and monitoring group, to promote the Be Whale Wise guidelines and monitor vessel activities in the vicinity of whales. Soundwatch reports (Koski, 2004, 2006) characterize trends in incidents when the guidelines are not followed and there is the potential for disturbance of the whales. Incidents are frequently observed involving both recreational and commercial whale watching vessels. Soundwatch also serves as a crucial education component, providing information on the viewing guidelines to boaters that are approaching areas with whales.

Despite the regulations, guidelines and outreach efforts, interactions between vessels and killer whales continue to occur in the waters of Puget Sound and the Georgia Basin. Advertisements on the Internet and in local media in the Pacific Northwest promote activities that appear inconsistent with what is recommended in the NMFS guidelines. NMFS has received letters from the Marine Mammal Commission, members of the scientific research community, environmental groups, and members of the general public expressing the view that some types of interactions with wild marine mammals have the potential to harass and/or disturb the animals by causing injury or disruption of normal behavior patterns. NMFS has also received inquiries from members of the public and commercial tour operators requesting clarification of NMFS' policy on these matters.

In 2002, NMFS published an ANPR requesting comments from the public on what types of regulations and other measures would be appropriate to prevent harassment of marine mammals in the wild caused by human activities directed at the animals (67 FR 4379, January 30, 2002). The 2002 ANPR was national in scope and covered all species of marine mammals under NMFS' jurisdiction (whales, dolphins, porpoises, seals and sea lions), and requested comments on ways to address concerns about the public and commercial operators closely approaching, swimming with, touching or otherwise interacting with marine mammals in the wild. Several potential options were proposed for consideration and comment, including: (1) codifying the current NMFS Regional marine mammal viewing guidelines into regulations; (2) codifying the guidelines into regulations with additional improvements; (3) establishing minimum approach regulations similar to the ones for humpback whales in Hawaii and Alaska and North Atlantic right whales; and (4) restricting activities of concern similar to the MMPA regulation prohibiting the public from feeding or attempting to feed wild marine mammals. The 2002 ANPR specifically mentioned the complaints received from researchers and members of the public concerning close vessel approaches to killer whales in the Northwest. Over 500 comments were received on the 2002 ANPR regarding human interactions with wild marine mammals in United States waters and along the nation's coastlines.

Request for Information and Comments

NMFS is requesting information and comments on whether — and if so, what type of — conservation measures, regulations, or other measures would be appropriate to protect killer whales in inland waters of Washington from human activities that result in the unauthorized taking of killer whales and/or that may cause detrimental individual-level and population-level impacts.

NMFS has received input on potential measures to address vessel impacts during the ESA listing and recovery planning process. Suggestions included regulations governing all vessels (including aircraft) or only commercial whale watch vessels. Suggestions included a moratorium on all whale watching, prohibiting whale watching for one or more days per week, developing a permit program for commercial operators, and requiring whale watch vessels to purchase and install Vessel Monitoring System (VMS) equipment to allow for monitoring their activities. Based on the comments received, and the regulations implemented for other marine mammals, NMFS has developed a preliminary list of options for consideration and comment:

Codify the current Be Whale Wise marine mammal viewing guidelines – Codifying the guidelines, in whole or in part, as regulations would make them requirements rather than recommendations, and would allow enforcement of these provisions and penalties for violations.

Establish minimum approach rule – Similar to the minimum approach rules for humpback whales in Hawaii and Alaska, and right whales in the North Atlantic (50 CFR 224.103; 66 FR 29502, May 31, 2001), a limit could be established by regulation to accommodate killer whale viewing opportunities while minimizing the potential detrimental impacts from humans. If establishing a minimum approach rule is appropriate, then we would have to consider whether the current guideline of 100 yards (approximately 100 m) is appropriate for this regulation. We would consider exceptions for situations in which marine mammals approach vessels as well as other situations in which approach is not reasonably avoidable.

Prohibit vessel activities of concern – The current guidelines address specific activities of concern. A regulation could prohibit vessel operators from engaging in these activities or others of concern. Activities of concern include using vessels to herd whales, surrounding whales or otherwise preventing a reasonable means of escape, leapfrogging whales or positioning a vessel in their predictable path, separating calves from attending adults, approaching whales at or above specified speeds, or running a vessel through a group of whales.

Establish time-area closures – Similar to the prohibitions used to protect fish stocks or habitat, we could establish a regulation restricting human access to specific areas. These restrictions could restrict all human entry to the area or restrict only specified acts within an area; they could be full-time or limited to certain seasons when killer whales are likely to be present; or a closure could be any combination of the above.

Operator permit or certification program – We could adopt approach rules or establish closed areas that applied to all vessels except those

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operated under a whale watching permit or certification. Issuance of a permit or certification could be based on the operator's knowledge of whale behavior and proper procedures for operating vessels around whales. A permit or certification could allow the whale watch operator to get closer to the whales than those who do not have one. For example, a general approach limit of 200 m could be implemented for all non-permitted or uncertified operators, and only operators who are permitted or certified would be allowed to approach to 100 m of the whales. Sanctions, up to and including loss of permit or certification for noncompliance with applicable regulations, would be possible. The issuance of permits or certifications could be directly related to an assessment of the appropriate level of whale watching in Puget Sound. This would require us to evaluate the current level of whale watching effort and limit the maximum number of vessels that can be engaged in whale watching activity. The limit could be adjusted based on monitoring and ongoing evaluation of what is appropriate to protect the whales.

We recognize that the most appropriate regulations may be some combination of the above measures, or that additional possibilities may exist.

Regulations adopted under the MMPA could apply to all three killer whale ecotypes - residents, transients, and offshores. To the average wildlife viewer, these whales are difficult to differentiate between visually, and all three could potentially be found in the inland waters of Washington State where whale watching occurs.

The geographic scope of regulations, if proposed, would likely be the inland waters of the State of Washington, since this is where vessel interactions are concentrated. The coastal waters off Washington and Oregon do not currently have a significant level of documented vessel interactions, and the small number of killer whale sightings in these areas makes it unlikely that they will develop whale watching operations at significant levels in the future.

NMFS invites information and comment from the public on the advisability of regulations, on the above options, and on other possible measures that will help the agency decide what type of regulations, if any, would be most appropriate to consider for protecting killer whales in the Pacific Northwest. In particular, we are seeking information and comments concerning:

(1) The advisability of and need for regulations;

(2) The geographic scope of regulations;

(3) Management options for regulating vessel interactions with killer whales, including but not limited to the options listed in this notice;

(4) Scientific and commercial information regarding the effects of vessels on killer whales and their habitat;

(5) Information regarding potential economic effects of regulating vessel interactions; and

(6) Any additional relevant information that NMFS should consider should it undertake rulemaking.

You may submit information and comments concerning this ANPR by any one of several methods (see **ADDRESSES**). Materials related to this notice can be found on the NMFS Northwest Region Web site at *http://www.nwr.noaa.gov/*. We will consider all comments and information received during the comment period in preparing a proposed rule.

References Cited

A complete list of all references cited in this advanced notice of proposed rulemaking can be found on our Web site at *http://www.nwr.noaa.gov/* and is available upon request from the NMFS office in Seattle, Washington (see **ADDRESSES**).

Public Hearings

Based on the level of interest in killer whales and whale watching, public meetings have been scheduled for April 18, 2007, 2–4 p.m. in The Grange Hall, Friday Harbor, WA and April 19, 2007, 7–9 p.m. at the Seattle Aquarium, Seattle, WA. Requests for additional public hearings or special accommodations must be made in writing (see **ADDRESSES**) by April 23, 2007.

Classification

This ANPR was determined to be significant for purposes of E.O. 12866.

Dated: March 15, 2007.

Samuel D. Rauch III,

Deputy Assistant Administrator for Regulatory Programs, National Marine Fisheries Service.

[FR Doc. E7–5262 Filed 3–21–07; 8:45 am]

BILLING CODE 3510–22–S

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Appendix B. Proposed Rule

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information indicating the petitioned action may be warranted with respect to the species throughout its entire range. In accordance with section 4(b)(3)(B) of the ESA and NMFS' implementing regulations (50 CFR 424.14(b)(2)), we will commence a review of the status of the species and make a determination within 12 months of receiving the petition (i.e., April 24, 2010) as to whether the petitioned action is warranted. If warranted, we will publish a proposed rule and solicit public comments before developing and publishing a final rule.

Information Solicited

To ensure the status review is based on the best available scientific and commercial data, we are soliciting information on whether largetooth sawfish are endangered or threatened. Specifically, we are soliciting information in the following areas: (1) historical and current distribution and abundance of this species throughout its range; (2) historical and current population trends; (3) information on life history in marine environments, (4) curio, meat, "shark" fin or other trade data; (5) information related to taxonomy of the species and closely related forms (e.g., P. microdon); (6) information on any current or planned activities that may adversely impact the species; (7) ongoing efforts to protect and restore the species and its habitat; and (8) information identifying a North American Distinct Population Segment. We request that all information be accompanied by: (1) supporting documentation such as maps, bibliographic references, or reprints of pertinent publications; and (2) the submitter's name, address, and any association, institution, or business that the person represents.

Critical Habitat

The petitioner also requested that we designate critical habitat concurrently with listing the species as threatened or endangered. Under our regulations for designating critical habitat, we are only able to designate critical habitat within areas of U.S. jurisdiction (50 CFR 424.12). Critical habitat is defined in the ESA (16 U.S.C. 1531 *et seq.*) as:

"(i) the specific areas within the geographical area currently occupied by the species, at the time it is listed... on which are found those physical or biological features (I) essential to the conservation of the species and (II) which may require special management considerations or protection; and (ii) specific areas outside the geographical area occupied by the species at the time it is listed upon a determination by the Secretary that such areas are essential for the conservation of the species."

Our implementing regulations (50 CFR 424.12) describe those essential physical and biological features to include: (1) space for individual and population growth, and normal behavior; (2) food, water, air, light, minerals, or other nutritional or physiological requirements; (3) cover or shelter; (4) sites for breeding, reproduction, rearing of offspring; and (5) habitats that are protected from disturbance or are representative of the historic geographical and ecological distribution of a species. We are required to focus on the primary constituent elements (PCEs) which best represent the principal biological or physical features. PCEs may include: spawning sites, feeding sites, water quality and quantity. Our implementing regulations (50 CFR 424.02) define "special management considerations or protection" as "any methods or procedures useful in protecting physical and biological features of the environment for the conservation of listed species."

Section 4(b)(2) of the ESA requires us to designate critical habitat for listed species based on the best scientific data available and after taking into consideration the economic impact, the impact on national security, and any other relevant impact, of specifying any particular area as critical habitat. The Secretary may exclude any particular area from critical habitat if he determines that the benefits of such exclusion outweigh the benefits of specifying such area as part of the critical habitat, unless he determines that the failure to designate such area as critical habitat will result in the extinction of the species concerned.

To ensure that our review of critical habitat is complete and based on the best available data, we solicit information and comments on whether the petitioned area in U.S. waters including the Exclusive Economic Zone, or some subset thereof, qualifies as critical habitat. Areas that include the physical and biological features essential to the conservation of the species and that may require special management considerations or protection should be identified. Essential features include, but are not limited to, space for individual growth and for normal behavior, food, water, air, light, minerals, or other nutritional or physiological requirements, cover or shelter, sites for reproduction and development of offspring, and habitats that are protected from disturbance or are representative of the historical, geographical, and ecological distributions of the species (50 CFR 424.12).

Peer Review

On July 1, 1994, NMFS, jointly with the U.S. Fish and Wildlife Service, published a series of policies regarding listings under the ESA, including a policy for peer review of scientific data (59 FR 34270). The intent of the peer review policy is to ensure listings are based on the best scientific and commercial data available. We are soliciting the names of recognized experts in the field who could take part in the peer review process for this status review.

Independent peer reviewers will be selected from the academic and scientific community, tribal and other Native American groups, Federal and state agencies, the private sector, and public interest groups.

Authority: 16 U.S.C. 1531 *et seq.*

Dated: July 24, 2009.

James W. Balsiger,

Acting Assistant Administrator for Fisheries, National Marine Fisheries Service.

[FR Doc. E9–18079 Filed 7–28–09; 8:45 am]

BILLING CODE 3510–22–S

DEPARTMENT OF COMMERCE

National Oceanic and Atmospheric Administration

50 CFR Part 224

[Docket No. 070821475–81493–01]

RIN 0648–AV15

Protective Regulations for Killer Whales in the Northwest Region Under the Endangered Species Act and Marine Mammal Protection Act

AGENCY: National Marine Fisheries Service (NMFS), National Oceanic and Atmospheric Administration (NOAA), Commerce.

ACTION: Proposed rule; request for comments, and availability of Draft Environmental Assessment on regulations to protect killer whales from vessel effects.

SUMMARY: We, the National Marine Fisheries Service (NMFS), propose regulations under the Endangered Species Act and Marine Mammal Protection Act to prohibit vessels from approaching killer whales within 200 yards and from parking in the path of whales for vessels in inland waters of Washington State. The proposed regulations would also prohibit vessels from entering a conservation area during a defined season. Certain vessels would

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be exempt from the prohibitions. The purpose of this action is to protect killer whales from interference and noise associated with vessels. In the final rule announcing the endangered listing of Southern Resident killer whales we identified disturbance and sound associated with vessels as a potential contributing factor in the recent decline of this population. The Recovery Plan for Southern Resident killer whales calls for evaluating current guidelines and assessing the need for regulations and/or protected areas. We developed this proposed rule after considering comments submitted in response to an Advance Notice of Proposed Rulemaking (ANPR) and preparing a draft environmental assessment (EA). We are requesting comments on the proposed regulations and the draft EA.

DATES: Comments must be received at the appropriate address (see **ADDRESSES**) no later than October 27, 2009. Public meetings have been scheduled for September 30, 2009, 7–9 p.m. at the Seattle Aquarium, Seattle, WA and October 5, 2009, 7–9 p.m. in The Grange Hall, Friday Harbor, WA. Requests for additional public meetings must be made in writing by August 28, 2009.

ADDRESSES: You may submit comments on the proposed rule, draft EA and any of the supporting documents by any of the following methods:

- *E-mail: orca.plan@noaa.gov.*
- *Federal e-rulemaking Portal: http://www.regulations.gov.*
- *Mail:* Assistant Regional Administrator, Protected Resources Division, Northwest Regional Office, National Marine Fisheries Service, 7600 Sand Point Way, NE., Seattle, WA 98115.

The draft EA and other supporting documents will be available on Regulations.gov and the NMFS Northwest Region Web site at *http://www.nwr.noaa.gov/.*

FOR FURTHER INFORMATION CONTACT: Lynne Barre, Northwest Regional Office, 206–526–4745; or Trevor Spradlin, Office of Protected Resources, 301–713–2322.

SUPPLEMENTARY INFORMATION:

Background

Viewing wild marine mammals is a popular recreational activity for both tourists and local residents. In Washington State, killer whales (*Orcinus orca*) are the principal target species for the commercial whale watch industry (Hoyt 2001). NMFS listed the Southern Resident killer whale distinct population segment (DPS) as endangered under the ESA on November 18, 2005 (70 FR 69903). In the final rule announcing the listing, NMFS identified vessel effects, including direct interference and sound, as a potential contributing factor in the recent decline of this population. NMFS is concerned that some whale watching activities may harm individual killer whales, potentially reducing their fitness and increasing the population's risk of extinction.

Killer whales in the eastern North Pacific have been classified into three forms, or ecotypes, termed residents, transients, and offshore whales. Resident killer whales live in family groups, eat salmon, and include the Southern Resident and Northern Resident communities. Transient killer whales have a different social structure, are found in smaller groups and eat marine mammals. Offshore killer whales are found in large groups and their diet is largely unknown. The Southern Resident killer whale population contains three pods—J, K, and L pods—and frequents inland waters of the Pacific Northwest. During the spring, summer, and fall, the Southern Residents' range includes the inland waterways of Puget Sound, Strait of Juan de Fuca, and Southern Strait of Georgia. Little is known about the winter movements and range of Southern Residents. Their occurrence in coastal waters extends from the coast of central California to the Queen Charlotte Islands in British Columbia. The home ranges of transients, offshore whales, and Northern Residents also include inland waters of Washington and overlap with the Southern Residents.

There is a growing body of evidence documenting effects from vessels on small cetaceans and other marine mammals. The variety of whale responses include stopping feeding, resting, and social interaction (Baker *et al.* 1983; Bauer and Herman 1986; Hall 1982; Krieger and Wing 1984; Lusseau 2003a; Constantine *et al.* 2004); abandoning feeding, resting, and nursing areas (Jurasz and Jurasz 1979; Dean *et al.* 1985; Glockner-Ferrari and Ferrari 1985, 1990; Lusseau 2005; Norris *et al.* 1985; Salden 1988; Forest 2001; Morton and Symonds 2002; Courbis 2004; Bejder 2006); altering travel patterns to avoid vessels (Constantine 2001; Nowacek *et al.* 2001; Lusseau 2003b, 2006); relocating to other areas (Allen and Read 2000); and changes in acoustic behavior (Van Parijs and Corkeron 2001). In some studies marine mammals display no reaction to vessels (Watkins 1986; Nowacek *et al.* 2003). One study found that marine mammals exposed to human-generated noise released increased amounts of stress hormones that have the potential to harm their nervous and immune systems (Romano *et al.* 2004).

Several scientific studies in the Pacific Northwest have documented disturbance of resident killer whales by vessels engaged in whale watching. Short-term behavioral changes in Northern and Southern Residents have been observed and studied by several researchers (Kruse 1991; Kriete 2002; Williams *et al.* 2002a, 2002b, 2006, In Press; Foote *et al.* 2004; Bain *et al.* 2006, Lusseau *et al.* In Press), although it is not always understood whether it is the presence and activity of the vessel, the sounds the vessel makes, or a combination of these factors that disturbs the animals. Individual animals can react in a variety of ways to nearby vessels, including swimming faster, adopting less predictable travel paths, making shorter or longer dives, moving into open water, and altering normal patterns of behavior (Kruse 1991; Williams *et al.* 2002a, In Press; Bain *et al.* 2006; Noren *et al.* 2007, In Press; Lusseau *et al.* In Press). High frequency sound generated from recreational and commercial vessels moving at high speed in the vicinity of whales may mask echolocation (signals sent by the whales that bounce off objects in the water and provide information to the whales) and other signals the species rely on for foraging (Erbe 2002; Holt 2008), communication (Foote *et al.* 2004), and navigation.

Killer whales may also be injured or killed by collisions with passing ships and powerboats, primarily from being struck by the turning propeller blades (Visser 1999, Ford *et al.* 2000, Visser and Fertl 2000, Baird 2001, Carretta *et al.* 2001, 2004). Some animals with severe injuries eventually make full recoveries, such as a female described by Ford *et al.* (2000) that showed healed wounds extending almost to her backbone. A 2005 collision of a Southern Resident with a commercial whale watch vessel in Haro Strait resulted in a minor injury to the whale, which subsequently healed. From the 1960s to 1990s (Baird 2002) only one resident whale mortality from a vessel collision was reported for Washington and British Columbia. However, additional mortalities since then have been reported. In March of 2006 the lone Southern Resident killer whale, L98, residing in Nootka Sound for several years, was killed by a tug boat. While L98 exhibited unusual behavior and often interacted with vessels, his death demonstrates the risk of vessel accidents. Several mortalities of resident killer whales in British Columbia in recent years have been attributed to

vessel collisions (Gaydos and Raverty 2007).

Vessel effects were identified as a factor in the ESA listing of the Southern Residents (70 FR 69903; November 18, 2005) and are addressed in the recovery plan (73 FR 4176; January 24, 2008) which is available on our Web page at *http://www.nwr.noaa.gov/*.

Current MMPA and ESA Prohibitions and NMFS Guidelines and Regulations

The Marine Mammal Protection Act, 16 U.S.C. 1361 *et seq.*, contains a general prohibition on take of marine mammals. Section 3(13) of the MMPA defines the term take as "to harass, hunt, capture, or kill, or attempt to harass, hunt, capture, or kill any marine mammal." Except with respect to military readiness activities and certain scientific research activities, the MMPA defines the term harassment as "any act of pursuit, torment, or annoyance which—(i) has the potential to injure a marine mammal or marine mammal stock in the wild, [Level A harassment]; or (ii) has the potential to disturb a marine mammal or marine mammal stock in the wild by causing disruption of behavioral patterns, including, but not limited to, migration, breathing, nursing, breeding, feeding, or sheltering [Level B harassment]."

In addition, NMFS regulations implementing the MMPA further define the term take to include: "the negligent or intentional operation of an aircraft or vessel, or the doing of any other negligent or intentional act which results in disturbing or molesting a marine mammal; and feeding or attempting to feed a marine mammal in the wild" (50 CFR 216.3).

The MMPA provides limited exceptions to the prohibition on take for activities such as scientific research, public display, and incidental take in commercial fisheries. Such activities require a permit or authorization, which may be issued only after agency review.

The ESA prohibits the take of endangered species. The ESA defines take to mean "harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, or collect, or to attempt to engage in any such conduct." Both the ESA and MMPA require wildlife viewing to be conducted in a manner that does not cause take.

NMFS has developed specific regulations for certain species in particular locations. Each rule was based on the biology of the marine mammals, and available information on the nature of the threats. NMFS has regulated close vessel approaches to large whales in Hawaii, Alaska, and the North Atlantic. Buffer zones were also created to protect Steller sea lions. There are exceptions to each of these rules.

In 1995, NMFS published a final rule to establish a 100 yard (91.4 m) approach limit for endangered humpback whales in Hawaii (60 FR 3775, January 19, 1995). While available scientific information on the effects of vessel traffic and whale watching did not provide precise guidance on proximity limits for approaching whales, NMFS established the 100 yard approach regulation based on its experience enforcing the prohibition of harassment (i.e., activities that were initiated or occurred within 100 yards of a whale had a high probability of causing harassment). In 2001, NMFS published a final rule (66 FR 29502, May 31, 2001) to establish a 100 yard (91.4 m) approach limit for endangered humpback whales in Alaska that included a speed limit for when a vessel is near a whale. Again limited information on vessel impacts was available for humpback whales, however, the risk of harm to the species from a possible delay in detecting a long-term negative response to increased vessel pressure provided the impetus to implement vessel measures in waters off Alaska. NMFS decided to implement a 100 yard distance to maintain consistency with the published guidelines and with the regulations that existed for viewing humpback whales in Hawaii. Some form of speed restrictions was considered to reduce the likelihood of mortality or injury to a whale in the event of a vessel/whale collision. For practical and enforcement reasons, a slow safe speed standard, rather than a strict nautical mile-per-hour standard, was included in the rule.

In 1997, an interim final rule was published to prohibit vessels from approaching endangered North Atlantic right whales closer than 500 yards (457.2 m) (62 FR 6729, February 13, 1997). The purpose of the 500 yard approach regulation was to reduce the current level of disturbance and the potential for vessel interaction and to reduce the risk of collisions. In addition to collision injuries or mortalities, other vessel impacts were identified, including displacing cow/calf pairs from nearshore waters, whales expending increased energy when feeding is disrupted or migratory paths rerouted, and turbulence associated with vessel traffic which may indirectly affect right whales by breaking up the dense surface zooplankton patches in certain whale feeding areas. To further reduce impacts to North Atlantic right whales from collisions with ships, a final rule was recently published to implement speed restrictions of no more than 10 knots applying to all vessels 65 ft (19.8m) or greater in overall length in certain locations and at certain times of the year along the east coast of the U.S. Atlantic seaboard (73 FR 60173; October 10, 2008).

On November 26, 1990 (55 FR 49204) Steller sea lions were listed as "threatened" under the ESA and the listing included regulations prohibiting vessels from operating within buffer zones 3 nautical miles around the principal Steller sea lion rookeries in the Gulf of Alaska and the Aleutian Islands. Vessels are prohibited from operating within the 3-mile buffer zones, with certain exceptions. Similarly, people are prohibited from approaching on land closer than ½ mile or within sight of a listed Steller sea lion rookery. The buffer zones were created to (1) restrict the opportunities for individuals to shoot at sea lions and facilitate enforcement of this restriction; (2) reduce the likelihood of interactions with sea lions, such as accidents or incidental takings in these areas where concentrations of the animals are expected to be high; (3) minimize disturbances and interference with sea lion behavior, especially at pupping and breeding sites; and, (4) avoid or minimize other related adverse effects.

In addition to these specific regulations, NMFS has provided general guidance for wildlife viewing that does not cause take. This is consistent with the philosophy of responsible wildlife viewing advocated by many Federal and State agencies to unobtrusively observe the natural behavior of wild animals in their habitats without causing disturbance (see *http://www.watchablewildlife.org/* and *http://www.watchablewildlife.org/publications/marine_wildlife_viewing_guidelines.htm*).

Each of the six NMFS Regions has developed recommended viewing guidelines to educate the public on how to responsibly view marine mammals in the wild and avoid causing a take. These guidelines are available on line at: *http://www.nmfs.noaa.gov/prot_res/MMWatch/MMViewing.html*. The "Be Whale Wise" guidelines developed for marine mammals by the NMFS Northwest Regional Office and partners are also available at *http://www.nwr.noaa.gov/Marine-Mammals/upload/BeWhaleWise.pdf*.

Be Whale Wise is a transboundary effort to develop and revise guidelines for viewing marine wildlife. NMFS has partnered with monitoring groups, commercial operators, whale advocacy groups, U.S. and Canadian government

agencies and enforcement divisions over the past several years to promote safe and responsible wildlife viewing practices through the development of outreach materials, training workshops, on-water education and public service announcements. The 2006 version of the Be Whale Wise guidelines recommends that boaters parallel whales no closer than 100 yards (100 meters), approach animals slowly from the side rather than from the front or rear, and avoid putting the vessel within 400 yards (400 meters) in front of or behind the whales. The Be Whale Wise guidelines are used in U.S. and Canadian waters and use meters and yards interchangeably in the guideline materials. Vessels are also recommended to reduce their speed to less than 7 knots (13 km/h) within 400 meters of the whales, and to remain on the outer side of the whales near shore. In 2008 a State bill with similar language to the current approach and "park in the path" guidelines (HB 2514) was approved to protect Southern Resident killer whales in Washington State waters.

Two voluntary no-boat areas off San Juan Island are recognized by San Juan County, although this is separate from the Be Whale Wise guidelines. The first is a 2 mile (~800 m)—wide zone along a 1.8 mile (3 km) stretch of shore centered on the Lime Kiln lighthouse. The second is a ¼ mile (~400 m)—wide zone along much of the west coast of San Juan Island from Eagle Point to Mitchell Point. These areas, totaling approximately 3.8 square miles, were established to facilitate shore-based viewing and to reduce vessel presence in an area used by the whales for feeding, traveling, and resting.

NMFS supports the Soundwatch boater education program, an on-water stewardship and monitoring group, to help develop and promote the Be Whale Wise guidelines and monitor vessel activities in the vicinity of whales. Soundwatch reports incidents when the guidelines are not followed and there is the potential for disturbance of the whales (Koski 2004, 2006). Incidents are frequently observed involving both recreational and commercial whale watching vessels. Soundwatch also serves as a crucial education component, providing information on the viewing guidelines to boaters that are approaching areas with whales.

Despite the regulations, guidelines and outreach efforts, interactions between vessels and killer whales continue to occur in the waters of Puget Sound and the Georgia Basin. Advertisements on the Internet and in local media in the Pacific Northwest promote activities that appear inconsistent with what is recommended in the NMFS guidelines. NMFS has received letters from the Marine Mammal Commission, members of the scientific research community, environmental groups, and members of the general public expressing the view that some types of interactions with wild marine mammals have the potential to harass and/or disturb the animals by causing injury or disruption of normal behavior patterns. Soundwatch reports continue to include high numbers of incidents where guidelines to avoid harassment are not being followed (Koski 2004, 2006). Violations of current ESA and MMPA take prohibitions are routinely reported to NOAA's Office for Law Enforcement; however, the current prohibitions are difficult to enforce. NMFS has also received inquiries from members of the public and commercial tour operators requesting clarification of NMFS' policy on these matters.

In 2002, NMFS published an ANPR requesting comments from the public on what types of regulations and other measures would be appropriate to prevent harassment of marine mammals in the wild caused by human activities directed at the animals (67 FR 4379, January 30, 2002). The 2002 ANPR was national in scope and covered all species of marine mammals under NMFS' jurisdiction (whales, dolphins, porpoises, seals and sea lions), and requested comments on ways to address concerns about the public and commercial operators closely approaching, swimming with, touching or otherwise interacting with marine mammals in the wild. Several potential options were presented for consideration and comment, including: (1) Codifying the current NMFS Regional marine mammal viewing guidelines into regulations; (2) codifying the guidelines into regulations with additional improvements; (3) establishing minimum approach regulations similar to the ones for humpback whales in Hawaii and Alaska and North Atlantic right whales; and (4) restricting activities of concern similar to the MMPA regulation prohibiting the public from feeding or attempting to feed wild marine mammals. The 2002 ANPR specifically mentioned the complaints received from researchers and members of the public concerning close vessel approaches to killer whales in the Northwest. Over 500 comments were received on the 2002 ANPR regarding human interactions with wild marine mammals in United States waters and along the nation's coastlines.

NMFS has determined that existing prohibitions, regulations, and guidelines described above do not provide sufficient protection of killer whales from vessel impacts. We considered information developed through internal scoping, public and agency comments on the 2002 nation-wide ANPR and a 2007 killer whale-specific ANPR (described below), monitoring reports, and scientific information. Monitoring groups continue to report high numbers of vessels around the whales and increasing numbers of vessel incidents that may disturb or harm the whales. Vessel effects may limit the ability of the endangered Southern Resident killer whales to recover and may impact other killer whales in inland waters of Washington. We therefore deem it necessary and advisable to adopt regulations to protect killer whales from vessel impacts, which will support recovery of Southern Resident killer whales.

Development of Proposed Regulations

In March 2007, we published an ANPR (72 FR 13464; March 22, 2007) to gather public input on whether and what type of regulation might be necessary to reduce vessel effects on Southern Residents. The ANPR requested comments on a preliminary list of potential regulations including codifying the Be Whale Wise guidelines, establishing a minimum approach rule, prohibiting particular vessel activities of concern, establishing time-area closures, and creating operator permit or certification programs.

We relied on the public comments on the ANPR, the Recovery Plan, Soundwatch data, and other scientific information to develop a range of alternative individual regulations, including the alternative of not adopting regulations. We analyzed the environmental effects of these alternative regulations and considered options for mitigating effects. After a preliminary analysis of individual regulations, we developed an alternative that combined three of the individual regulations into a single package and analyzed the effects of that package. The results of our analysis are contained in a draft EA under the National Environmental Policy Act (NEPA). The EA is available for review and comment in association with this rulemaking (see ADDRESSES).

Comments and Responses to Comments on the ANPR

During the ANPR public comment period, we received a total of 84 comments via letter, e-mail and on the Federal e-rulemaking portal. Comments were submitted by concerned citizens, whale watch operators, research,

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conservation and education groups, Federal, State and local government entities, and various industry associations. The majority of comments explicitly stated that regulations were needed to protect killer whales from vessels. Most other comments generally supported protection of the whales. Six comments explicitly stated that no regulations were needed. All comments received during the comment period were posted on the NMFS Northwest Regional Web page *http://www.nwr.noaa.gov/Marine-Mammals/Whales-Dolphins-Porpoise/Killer-Whales/ESA-Status/Orca-Vessel-Regs.cfm and Regulations.gov* (as supporting documents to this proposed rule). The ANPR requested comments on a preliminary list of potential regulations including codifying the Be Whale Wise guidelines, establishing a minimum approach rule, prohibiting particular vessel activities of concern, establishing time-area closures, and creating operator permit or certification programs. There was support for each of the options in the preliminary list of alternatives published in the ANPR, and many comments supported multiple approaches. Some additional alternatives were also suggested. Here we summarize comments and our responses that directly relate to the measures in this proposed rule. Additional information is provided in the Rationale for Regulations section of this notice.

Mandatory Regulations versus Voluntary Guidelines. Several commenters supported adoption of mandatory regulations, while other commenters stated that voluntary guidelines are adequate to protect the whales. Monitoring of vessel activity around the whales reveals that many vessels violate the current voluntary guidelines, the number of violations appears to be increasing, and the most serious violation—parking in the path of the whales—is committed primarily by commercial whale watch operators. In the draft EA, we examined the available evidence and concluded that mandatory regulations would reduce the number of incidents of vessels disturbing and potentially harming the whales and that this reduction would improve the whales' chances for recovery. Accordingly, we are proposing mandatory regulations governing vessel activity around the whales.

Approach regulation. Some commenters supported an approach limit of 100 yards (current guideline), and others suggested that an approach limit of 200 yards or 200–400 yards would better protect the whales. Commenters noted that an approach regulation could limit the potential for vessels to disturb or collide with whales and could limit the potential for vessel noise to mask the whale's auditory signals, interfering with their ability to communicate and forage. In the draft EA we fully analyzed the effects of both a 100 and 200 yard approach regulation. Researchers have documented behavioral disturbance and considerable potential for masking from vessels at 100 yards and as far away as 400 yards. Researchers have also modeled the potential for vessel noise to mask the whales' auditory signals and concluded that at 100 yards there is likely to be almost 100 percent masking, while at 400 yards the masking has substantially decreased. The 200 yard approach regulation proposed here is intended to limit the risk of vessel strikes, the degree of behavioral disruption, and the amount of noise that masks echolocation and communication. While an approach regulation at a distance greater than 200 yards would further reduce vessel effects, this could diminish both the experience of whale watching and opportunities to participate in whale watching. We recognize that whale watching educates the public about whales and fosters stewardship. We balanced the benefits to killer whales of a greater approach distance regulation and continued whale watching opportunities to arrive at the 200 yard approach regulation we are proposing.

No-go zone. We received comments supporting a mandatory no-go zone similar to the current voluntary no-go zones on the west side of San Juan Island, as well as suggestions to create no-go zones that included larger areas, other shoreline areas, and feeding "hot spots". In the draft EA we fully analyzed the effects of a mandatory no-go zone similar to the current voluntary zone, as well as a larger no-go zone on the west side of San Juan Island. A no-go zone provides protection in an area where researchers have observed high levels of foraging. Keeping vessels out of the zone is intended to eliminate the chance of a vessel strike, create foraging opportunities in the absence of vessels, and provide a buffer that limits the potential for acoustic masking. The proposed regulations include a no-go zone out 880 yards from shore, twice the distance of most of the current no-go zone.

Park in the path. Some commenters supported codifying the guideline to keep clear of the whales' path. The risk of vessel strikes and masking are both most severe when vessels are directly in front of the whales. The draft EA evaluated an alternative that included a mandatory prohibition on parking in the whales' path. The proposed regulations include a prohibition on parking in the path because it provides the best management tool for improving compliance and reducing the risk of vessel strikes and masking from vessels directly in front of the whales.

Other suggested alternatives. We did not propose some of the regulatory options suggested in the ANPR and in public comments for several reasons, including, difficulties in enforcing them, changes to infrastructure needed to implement them, or a lack of sufficient science to support them. For example, a speed limit within a certain distance of the whales (*i.e.*, less than 7 knots within 400 yards of the whales) would be difficult to implement and enforce without vessel tracking technology. A speed limit of 7 knots within 400 yards of the whales was fully analyzed as an alternative in the draft EA. Several other alternatives were suggested during the ANPR comment period and were addressed in the draft EA as alternatives considered but not analyzed in detail. These included:

(1) A permit or certification program which would require a large infrastructure to implement. There would also be equity issues in determining who is permitted or certified and who is not.

(2) A moratorium on all vessel-based whale watching, or protected areas along all shorelines, which would be challenging to enforce and are not supported by available scientific information.

(3) Regulatory options, such as rerouting shipping lanes or imposing noise level standards, which would unnecessarily restrict some types of vessels rarely in close proximity to the whales.

Proposed Rule

Current efforts to reduce vessel impacts have not been sufficient to address vessel interactions that have the potential to harass and/or disturb killer whales by causing injury or disruption of normal behavior patterns. The regulatory measures proposed here are designed to protect killer whales from vessel impacts and will support recovery of Southern Resident killer whales. We are proposing these regulations pursuant to our rulemaking authority under MMPA section 112(a) (16 U.S.C. 1382(a)), and ESA 11(f) (16 U.S.C. 1540(f)). These proposed regulations also are consistent with the purpose of the ESA "to provide a program for the conservation of [* * *] endangered species" and "the policy of Congress that all Federal departments

and agencies shall seek to conserve endangered species [* * *] and shall utilize their authorities in furtherance of the purposes of [the ESA]." 16 U.S.C. 1531(b), (c).

Scope and Applicability

Application to All Killer Whales: Under the MMPA and ESA the proposed regulations would apply to all killer whales. Although killer whales are individually identifiable through photo-identification, individual identification requires scientific expertise and resources (*i.e.*, use of a catalog) and cannot always be done immediately at the time of the sighting. It would be difficult for boaters, especially recreational boaters without expertise and experience with killer whales, to identify the individuals in the ESA-listed Southern Resident DPS or even to identify killer whales to ecotype (resident, transient, offshore). Requiring boaters to know which killer whales they are observing is not feasible. In addition, providing protection of all killer whales in inland waters of Washington is appropriate under the MMPA. Section 11(f) of the ESA provides NMFS with broad rulemaking authority to enforce the provisions of the ESA. In addition, section 112(a) of the MMPA provides NMFS with broad authority to prescribe regulations that are necessary to carry out the purposes of the statute.

Geographic Area: Regulations would apply to vessels in navigable inland waters of Washington under United States jurisdiction. Inland waters include a core summer area for the whales around the San Juan Islands, as well as a fall foraging area in Puget Sound and transit corridor along the Strait of Juan de Fuca. These three areas make up over 2,500 square miles and were designated as critical habitat for Southern Resident killer whales (71 FR 69054; November 29, 2006). This regulation will apply to an area similar to designated critical habitat including all U.S. marine waters in Jefferson, King, Kitsap, Island, Mason, Pierce, San Juan, Skagit, Snohomish, Thurston, Whatcom, and Clallam counties east of a line connecting Cape Flattery, Washington (48°23 10" N./124°43 32" W.), Tatoosh Island, Washington (48°23 30" N./124°44 12" W.), and Bonilla Point, British Columbia (48°35 30" N./124°43 00" W.) and south of the border delineating U.S. and Canadian waters. Marine waters include all waters relative to a contiguous shoreline relative to the mean high water line and cutting across the mouths of all rivers and streams.

Vessels Subject to Proposed Rule: Commercial and recreational whale watch vessels include motorized, non-motorized and self-propelled vessels (*i.e.*, motor boats, sail boats and kayaks), all of which can cause disturbance to whales. While kayaks are small and quiet, they have the potential to disturb whales as obstacles on the surface, and they may startle whales by approaching them without being heard (Mathews 2000). Some kayakers may be less likely to follow rules (Jelinski *et al.* 2002) and more likely to approach wildlife closely because they may be more apt to over-estimate distance because of their low aspect on the water, and to assume they are less likely to disturb wildlife than other vessels (Mathews 2000). In studies comparing effects of motorized and non-motorized vessels on dolphins, the type of vessel did not matter as much as the manner in which the boat moved with respect to the dolphins (Lusseau 2003b). Some dolphins' responses to vessels were specific to kayaks or were greater for kayaks than for motorized vessels (Lusseau 2006, Gregory and Rowden 2001, Duran and Valiente 2008). Several studies that have documented changes in behavior of dolphins and killer whales in the presence of vessels include both motorized and non-motorized vessels in their analysis (Lusseau 2003b, Nichols *et al.* 2001, Trites *et al.* 2007, Noren *et al.* 2007, In Press). Based on this information, it is appropriate to protect killer whales from different types of vessels.

Exceptions: We considered six specific categories of vessels that should be exempted from the vessel regulations: (1) Government vessels, (2) cargo vessels transiting in the shipping lanes, (3) research vessels, (4) fishing vessels actively engaged in fishing, (5) vessels limited in their ability to maneuver safely, and (6) vessels owned by individuals who own shoreline property located immediately adjacent to the no-go zone when such vessels are transiting to or from the property for personal, non-commercial purposes. These exceptions are based on the likelihood of certain categories of vessels having impacts on the whales and the potential adverse effects involved in regulating certain vessels or activities.

Available data on vessel effects on whales from Soundwatch (Koski 2007) and Bain (2007) indicate that commercial and recreational whale watch vessels have the greatest potential to affect killer whales. This is because operators of whale watching vessels are focused on the whales, track the whales' movements, spend extended time with the whales, and are therefore most often in close proximity to the whales. Other vessels such as government vessels, commercial and tribal fishing boats, cargo ships, tankers, tug boats, and ferries do not target whales in their normal course of business. Soundwatch (Koski 2007) and Bain (2007) report that these types of vessels combined comprise only 6 percent or less of vessels within ½ mile of the whales. In addition, these vessels generally move slowly and in usually predictable straight paths, which reduces the risk of strikes to whales. While NMFS recognizes that sound from large vessels has the potential to affect whales even at great distances, the primary concern at this time is the sound from small, fast moving vessels moving in close proximity to the whales.

Vessels engaged in scientific research do closely approach killer whales to obtain photographs, collect a variety of samples, and observe behavior. NMFS considers ongoing research essential to its efforts to recover the whales. Potential effects of these activities are evaluated under section 7 and takes are authorized under section 10 of the ESA for Southern Resident killer whales. Expertise of researchers, operating procedures, and permit terms and conditions reduce the potential impacts to whales, therefore specific research activities authorized by NMFS would be exempt from the vessel regulations.

Regulating some categories of vessels could cause adverse impacts. Government vessels are often critical to safety missions, such as search and rescue operations, enforcement, and activities critical to national security. Washington State ferries would not be considered government vessels operating in the course of their official duties. U.S. and Canadian regulations require power vessels more than 40 meters in length, tugs that are more than eight meters in length, and vessels carrying 50 or more passengers all participate in the monitoring and reporting system set in place by the Co-operative Vessel Traffic Service which is designed to efficiently and safely manage vessel movements in the shared waters of the two countries (Navigation and Navigable Waters, 33 CFR part 161). These ships generally follow the well-defined navigation lanes called the Traffic Separation Scheme under Rule 10, as amended, of the International Regulations for Preventing Collisions at Sea, 1972 (COLREGS), Oct. 20, 1972, 28 U.S.T. 3459, T.I.A.S. 8587, adopted by statute at 33 U.S.C. 1602; 57 FR 29218, July 1, 1992. If they were required to make sudden or unpredictable movements to avoid close approaches to whales, it could increase the risk of

collisions and pose safety hazards. If fishing vessels were required to follow regulations while actively engaged in fishing, it could compromise gear or catch. Exempting treaty Indian fishing vessels is consistent with treaty fishing rights and use of Usual and Accustomed fishing areas. NMFS is also proposing to exempt vessels from any regulations if the exemption is required for safe operation of the vessel to avoid adverse effects to public safety. There are private landowners with property adjacent to the no-go zone. NMFS is proposing to exempt the personal use of privately owned vessels for access to their shoreline by landowners adjacent to the no-go zone.

Based on these considerations, NMFS is proposing exceptions to the regulations. The burden would be on the vessel operator to prove the exception applies, and vessel operators would not be exempt from the take prohibitions under the MMPA or ESA. The following exceptions would apply to all regulations:

(1) The regulations would not apply to Federal, State, and local government vessels operating in the course of official duty.

(2) The regulations would not apply to vessels participating in the Vessel Tracking System and operating within the defined Traffic Separation Scheme shipping lanes.

(3) The regulations would not apply to activities, such as scientific research, authorized through a permit issued by the National Marine Fisheries Service under part 222, subpart C, of this chapter (General Permit Procedures) or through a similar authorization.

(4) The regulations would not apply to treaty Indian fishing vessels lawfully engaged in actively setting, retrieving, or closely tending fishing gear.

(5) The regulations would not apply to vessel operations necessary for safety to avoid an imminent and serious threat to a person or vessel.

(6) The no-go zone regulation would not apply to personal use of private vessels owned by land owners for access to private property they own located adjacent to the no-go zone.

In addition to these exceptions, the prohibition against approaching within 200 yards and parking in the whales' path would not apply to commercial (non-treaty) fishing vessels lawfully engaged in actively setting, retrieving, or closely tending fishing gear. Non-treaty commercial fishing vessels would be prohibited from entering the no-go zone. The regulations would apply to all fishing vessels, including treaty Indian and non-treaty vessels, transiting to or from fishing areas.

Requirements

Approach Restrictions: The proposed regulations would prohibit vessels from approaching any killer whale in the inland waters of Washington closer than 200 yards. This would include approaching by any means, including by interception (*i.e.*, placing a vessel in the oncoming path of a killer whale, so that the whale surfaces within 200 yards of the vessel, or positioning a vessel so that wind or currents carry the vessel to within 200 yards).

No-go zone: The proposed regulations would prohibit vessels from entering a no-go zone along the west side of San Juan Island. The area would extend seaward from the mean high water line to a line approximating ½ mile (800 m) offshore, from Eagle Point to Mitchell Point, and include an area totaling approximately 6.2 square miles (Figure 1). With certain exceptions as described above, no vessels would be permitted inside the no-go zone during the period from May 1 through September 30 of each year.

Prohibition against parking in the whales' path: The proposed regulations would require vessels to keep clear of the whales' path within 400 yards of the whales. Similar to the approach regulation, parking in the path includes interception (positioning a vessel so that whales surface within 200 yards of the vessel, or so that wind or currents carry the vessel into the path of the whales).

Rationale for Regulations

The endangered Southern Resident killer whales are a small population with only 85 whales as of the 2008 summer census. Based on ongoing observations to monitor the population, two whales have disappeared since the census count. The Southern Residents underwent an almost 20 percent decline from 1996 to 2001, and while there were several years of population increases following 2001, as of this year the population is once again in decline.

Our listing decision and the Recovery Plan for Southern Resident killer whales identified three major threats to their continued existence, all of which likely act in concert—prey availability, contaminants, and vessel effects and sound. While we and others in the region are working to restore salmon runs and minimize contamination in Puget Sound, these efforts will likely take many years to provide benefits for killer whales. In contrast, the threats posed by vessels can be reduced quickly by regulating vessel activities. The primary objective of promulgating these regulations is to manage the threats to killer whales from vessels, in support of the recovery of Southern Residents.

Monitoring groups such as Soundwatch have reported that the mean number of vessels following a given group of whales within ½ mile increased from five boats in 1990 to an average of about 20 boats during May through September, for the years 1998 through 2006 (Osborne *et al.* 1999; Baird 2001; Erbe 2002; Marine Mammal Monitoring Project 2002; Koski 2004, 2006). At any one time, the observed numbers of commercial and recreational whale watch boats around killer whales can be much higher. Monitoring groups have collected several years of data on incidents when vessels are not adhering to the guidelines and the whales may be disturbed. In 2006, there were 1,281 incidents of vessels not following the guidelines reported during the time the observers were present (Koski 2007). There was an increasing trend in the number of incidents from 1998 to 2006. Since observers were not present during all days and all hours, it is likely that there were more incidents than those reported. Of the 1,281 incidents in 2006, the majority were committed by private boaters (53 percent), Canadian commercial operators (21 percent), and U.S. commercial operators (9 percent) (Koski 2007). The top incidents also reflect this pattern and are most often committed by private boaters, Canadian commercial whale watch vessels, and U.S. commercial whale watch vessels, respectively. The top four observed incidents were parking in the path, vessels motoring inshore of whales, vessels motoring within 100 yards of whales, and vessels motoring fast within 400 yards of the whales (Koski 2007).

The specific threats from these vessel incidents include (1) risk of strikes, which can result in injury or mortality, (2) behavioral disturbance, which increases energy expenditure and reduces foraging opportunities, and (3) acoustic masking, which interferes with echolocation and foraging, as well as communication. Southern and Northern Resident killer whales have been injured or killed by collisions with vessels. Some whales have sustained injuries from propeller blades and have eventually recovered, one was instantly killed, and several mortalities of stranded animals have been attributed to vessel strikes in recent years (Visser 1999; Ford *et al.* 2000; Visser and Fertl 2000; Baird 2001; Carretta *et al.* 2001, 2004, Gaydos and Raverty 2007).

As described in the background section of this proposed rule and in the EA, it is well documented that killer whales in the Pacific Northwest respond to vessels engaged in whale watching

with short-term behavioral changes. Examples of short-term behavioral responses include increases in direction changes, respiratory intervals, and surface active behaviors, all of which can increase energy expenditure (Bain *et al.* 2006; Noren *et al.* 2007, In Press; Williams *et al.* In Press). Southern Residents also spend less time foraging in the presence of vessels (Bain *et al.* 2006, Lusseau *et al.* In Press). Williams *et al.* (2006) estimated that increased energy expenditure may be less important than the reduced time spent feeding and the resulting likely reduction in prey consumption in the presence of vessels. Vessels in the path of the whales can interfere with important social behaviors such as prey sharing (Ford and Ellis 2006) or with behaviors that generally occur in a forward path as the whales are moving, such as nursing (Kriete 2007).

Vessel sounds may mask or compete with and effectively drown out calls made by killer whales, including echolocation used to locate prey and other signals the whales rely upon for communication and navigation. Masking of echolocation reduces foraging efficiency (Holt 2008), which may be particularly problematic if prey resources are limited. Vessel noise was predicted to significantly reduce the range at which echolocating killer whales could detect salmon in the water column. Holt (2008) reported that the detection range for a killer whale echolocating on a Chinook salmon could be reduced 88 to 100 percent by the presence of a moving vessel within 100 yards of the whale. Masking sound from vessels could affect the ability of whales to coordinate their feeding activities, including searching for prey and prey sharing. Foote *et al.* (2004) attributed increased duration of primary communication calls to increased vessel traffic.

Energetic costs from increased behavioral disturbance and reduced foraging can decrease the fitness of individuals (Lusseau and Bejder 2007). Energy expenditure or disruption of foraging could result in poor nutrition. Poor nutrition could lead to reproductive or immune effects, or, if severe enough, to mortality. Interference with foraging can affect growth and development, which in turn can affect the age at which animals reach reproductive maturity, fecundity, and annual or lifetime reproductive success. Interference with essential behaviors, including prey sharing and communication, could also reduce social cohesion and foraging efficiency for Southern Resident killer whales, and, therefore, the growth, reproduction, and fitness of individuals. Injuries from vessel strikes could also affect the health and fitness of individuals. Any injury to or reduction in fitness of a single member of the Southern Resident killer whale population is serious because of the small population size.

To reduce the risk of vessel strikes, behavioral disturbance, and acoustic masking, and to manage effectively the threat from vessels, regulations must reduce the current number of harmful vessel incidents. Monitoring demonstrates that there are numerous incidents in which the current voluntary guidelines are not observed. Research suggests that vessel operators are more likely to comply with mandatory regulations than with voluntary guidelines (May 2005). In addition, level of compliance is likely to depend on how easy the regulations are to understand, follow and enforce. We therefore expect that clear mandatory regulations will reduce the number of incidents, compared to the current voluntary guidelines.

After analyzing a range of alternative regulations, we concluded that the most appropriate measures to protect the whales are a combination of an approach regulation, a no-go zone, and a prohibition on parking in the path. We recognize that adopting regulations that are different from the current voluntary guidelines and State regulation may present some challenges. The current infrastructure, however, includes enforcement, monitoring, and stewardship groups, who will be available to assist with an education campaign to inform boaters about the new regulations and the scientific information on which they are based. The combination of three measures as part of the regulation package provides multiple tools for enforcement that are measurable, easy for the public to understand, and based on the best available science regarding vessel impacts. The draft EA contains a full analysis of a No-action alternative, six individual alternatives, and the combined approach we are proposing, described below.

200 yard approach regulation. A regulation prohibiting approaches closer than 200 yards would be clear to whale watch operators. These operators would likely know about such a regulation and be able to accurately judge the distance of their vessels from whales, as indicated by their current high levels of compliance with the current 100 yard guideline. Recreational boaters would be less likely to know about such a regulation, though over time it is reasonable to expect that familiarity with the regulation would increase, particularly with education and publicity about any prosecutions. Some recreational boaters may also follow the example of commercial operators to determine the proper viewing distance.

The 200 yard approach regulation is intended to reduce the risk of vessel strikes, the degree of behavioral disruption, and the amount of noise that masks echolocation and communication. Current research results have documented behavioral disturbance and considerable potential for masking from vessels at 100 yards. These effects are reduced at 200 yards and greater distances. Some effects are observed up to 400 yards from the whales. While an approach regulation at a distance greater than 200 yards would further reduce vessel effects, this could diminish both the experience of whale watching and opportunities to participate in whale watching. We recognize that whale watching educates the public about whales and fosters stewardship. We balanced the benefits to killer whales of a greater approach distance regulation and continued whale watching opportunities, and we arrived at the 200 yard approach regulation we are proposing.

No-go zone. A no-go zone is clear and could be readily avoided by both commercial and recreational boaters. The area would be identified using latitude and longitude coordinates and landmarks on maps and charts, making the regulation widely identifiable and compliance and enforcement straightforward. The no-go zone provides special protection in an area where researchers have observed high levels of foraging. Keeping vessels out of the zone is intended to eliminate the chance of a vessel strike, allow for increased foraging opportunities in the absence of vessels, and provide a buffer that greatly reduces the potential for acoustic masking. The potential for masking declines as vessels are kept further away from the whales. Holt (2008) concluded that some fast moving vessels within 200 yards of the whales can decrease the distance at which whales can detect salmon by 75 to 95 percent, while those same vessels at 400 yards reduce the distance at which they can detect salmon by 38 to 90 percent. The expanded no-go zone creates a maximum buffer of over 880 yards from vessels, twice that of the current no-go zone. This large buffer is particularly important for reducing the masking effects on echolocation signals and impacts to foraging from vessel sound.

Parking in the path prohibition. As described above, this is the most common violation of the current

guidelines by commercial whale watch operators. It also carries one of the greatest risks, since it increases the chance of vessel strike. This regulation is consistent with the current guidelines and is therefore already understood by commercial whale watch operators. A prohibition on parking in the path complements the approach regulation, which prohibits approaching within 200 yards of the whales, including by interception. The path regulation provides the best management tool for improving compliance and reducing the risk of vessel strikes and masking from vessels directly in front of the whales. The risk of vessel strikes and masking are both most severe when vessels are directly in front of the whales. By instituting a mandatory regulation in place of a voluntary guideline, we expect increased compliance, particularly by the commercial operators who are most often in the path of the whales.

The proposed regulations for killer whales differ from protective regulations promulgated to protect other marine mammal species in other locations. In each case the development of regulations was based on the biology of the marine mammal species and available information on the nature of the threats. For the Southern Resident killer whales, we have detailed information on killer whale biology, vessel activities around the whales, and vessel effects on the whales' behavior and acoustic foraging activities that informed the selection of the proposed rule.

We did not propose some of the regulatory options suggested in the ANPR and in public comments for several reasons, including, difficulties in enforcing them, changes to infrastructure needed to implement them, or a lack of sufficient science to support them. For example, a speed limit within a certain distance of the whales (*i.e.*, less than 7 knots within 400 yards of the whales) would be difficult to implement and enforce without vessel tracking technology. A permit or certification program would require a large infrastructure to implement. There would also be equity issues in determining who is permitted or certified and who is not. A moratorium on all vessel-based whale watching, or protected areas along all shorelines, would be challenging to enforce and is not supported by available scientific information. Some comments suggested regulatory options such as rerouting shipping lanes or imposing noise level standards, which would unnecessarily restrict some types of vessels rarely in close proximity to the whales.

We considered both benefits and costs in selecting the proposed regulation. The reduction in threats for each element of the regulation package as described above provides a benefit to the whales, as well as to the public who value the whales. Reducing threats to the whales also supports the long-term sustainability of the whale watching industry. The regulations also provide benefits to land-based viewing and may provide benefits to other marine species. In addition to the benefits, we also considered the potential costs of the proposed regulations. To limit some potential costs to vessels or industries rarely in close proximity to the whales, we have proposed several exemptions to the regulations (*i.e.*, ships in shipping lanes, fishing vessels). The exemptions also prevent other potential costs by protecting public safety, allowing for critical government and permitted activities to continue, allowing us to fulfill our treaty trust responsibilities, and avoiding infringement on the use of private land.

The costs of implementing vessel regulations to protect the whales will be borne primarily by the commercial whale watch industry and recreational whale watchers. One cost of the proposed regulations is to increase viewing distance, which may affect the quality of whale watching experiences. An increased viewing distance affects the experience of the whale watch participants and not necessarily the revenue of the industry or companies. While some commercial whale watch operators have suggested that increased viewing distance will affect their revenue, there is information indicating that proximity to the whales is not the most important aspect of whale watching, and that participants value viewing in a manner that respects the whales. We do not anticipate any loss of business or reduction in the number of opportunities for participating in whale watching activities. Another cost is that some commercial and recreational kayakers may need to relocate to alternate launch sites where they are farther from core whale areas. Other impacts to boaters are expected to be minor and include slight deviations of a vessel's path, or relocating to a nearby fishing area in order to comply with proposed regulations.

In developing these regulations, we have determined that current regulations and guidelines are not sufficient to protect endangered Southern Resident killer whales and that additional regulations are necessary to reduce the risk of extinction. While we cannot quantify the reduction in risk of extinction, the perilous status of the Southern Residents compels us to take all reasonable actions to improve their chances of survival and recovery. We proposed the most appropriate regulations to reduce threats posed by vessels, limit costs, and maintain opportunities for the public to participate in whale watching. Of the alternatives considered, we chose a combination of the three with the greatest benefits. All of the options have relatively low socioeconomic and recreation costs. In contrast, the cost of extinction of Southern Residents is incalculable. The proposed regulations maximize net benefits to the whales and the public who value the whales.

Evaluation of the Effectiveness of the Measures

The success of this program is vital to the recovery of the species. Therefore, NMFS will monitor the effectiveness of the final regulations and consider altering the measures or implementing additional measures if appropriate.

References Cited

A complete list of all references cited in this proposed rule can be found on our Web site at *http://www.nwr.noaa.gov/* and is available upon request from the NMFS office in Seattle, Washington (see ADDRESSES).

National Environmental Policy Act (NEPA), Regulatory Flexibility Act, and Regulatory Impact Review

NMFS has prepared a draft EA/RIR, pursuant to NEPA (42 U.S.C. 4321 *et seq.*), Executive Order 12866, and an Initial Regulatory Flexibility Analysis, pursuant to the Regulatory Flexibility Act (5 U.S.C. 601 *et seq.*), to support this proposed rule. NMFS was the lead agency for the analysis and the U.S. Coast Guard, Washington Department of Fish and Wildlife, and the Department of Fisheries and Oceans, Canada were cooperating agencies. The draft EA/RIR and IRFA contain a full analysis of a No-action alternative, six individual alternatives, and the combined approach we are proposing. There are a number of elements that were common to all of the alternatives analyzed, including the action proposed in this notice. NMFS identified the geographic location, application of regulations and exemptions, as described in the Proposed Rule section of this notice. The elements common to all alternatives are as follows. All regulations would apply to activities in the inland waters of Washington State. The specific protected areas within inland waters are identified. The regulations would apply to all killer whales, not just endangered Southern Residents. The regulations

would not exempt any vessel operators from the harassment or take prohibitions under the MMPA or ESA. The regulations would apply to motorized and non-motorized vessels.

The following exceptions would apply to all regulations:

(1) The regulations would not apply to Federal, State, and local government vessels operating in the course of official duty.

(2) The regulations would not apply to vessels participating in the Vessel Tracking System and operating within the defined Traffic Separation Scheme shipping lanes.

(3) The regulations would not apply to activities, such as scientific research, authorized through a permit issued by the National Marine Fisheries Service or through a similar authorization.

(4) The regulations would not apply to treaty Indian fishing vessels lawfully engaged in actively setting, retrieving, or closely tending fishing gear.

(5) The regulations would not apply to vessel operations necessary for safety to avoid an imminent and serious threat to a person or vessel.

(6) The no-go zone regulation would not apply to personal use of private vessels owned by land owners for access to private property they own located adjacent to the no-go zone.

Additional exceptions considered for individual alternatives are presented under each alternative below.

(1) *Alternative 1:* No Action.The MMPA prohibits take of all marine mammals, including killer whales, and the ESA prohibits the take of listed marine mammals, including endangered Southern Resident killer whales. NMFS promotes responsible viewing through a "Be Whale Wise" education campaign that includes a set of voluntary guidelines designed to help boaters avoid harassment. Under the No-action Alternative, NMFS would not promulgate any new regulations but would continue the education and outreach program with all of the partners involved in Be Whale Wise. The elements common to all alternatives above are specific to regulations and would not apply to the No-action Alternative.

(2) *Alternative 2:* 100 Yard Approach Regulation. Under this alternative, NMFS would promulgate a regulation prohibiting vessels from approaching any killer whale closer than 100 yards. This would include approaching by any means, including by interception (*i.e.*, placing a vessel in the oncoming path of a killer whale, so that the whale surfaces within 100 yards of the vessel, or positioning a vessel so that wind or currents carries the vessel to within 100 yards). In addition to the exceptions listed above, this regulation would not apply to commercial fishing vessels (non-treaty) lawfully engaged in actively setting, retrieving, or closely tending fishing gear.

(3) *Alternative 3:* 200 Yard Approach Regulation. This alternative is the same as Alternative 2, but the rule would prohibit vessel approaches within 200 yards of all killer whales.

(4) *Alternative 4:* Protected Area—Current Voluntary No-go Zone. Under this alternative, NMFS would formalize the current voluntary no-go zone along the west side of San Juan Island. This includes a ½ mile (800 meter)-wide zone centered on the Lime Kiln lighthouse and a ¼ mile (400 meter)-wide zone from Eagle Point to Mitchell Point. No vessels would be permitted inside the protected area from May 1 through September 30. This area would not overlap with shipping lanes or ferry routes and would not be directly adjacent to the Canadian border.

(5) *Alternative 5:* Protected Area—Expanded No-go Zone. Under this alternative, NMFS would formalize a no-go zone along the west side of San Juan Island. The area would extend ½ mile (800 meter) offshore from Eagle Point to Mitchell Point. This is a larger, but simplified area compared to the no-go zone described under Alternative 4. No vessels would be permitted inside the protected area from May 1 through September 30. This area would not overlap with shipping lanes or ferry routes and would not be directly adjacent to the Canadian border.

(6) *Alternative 6:* Speed Limit of 7 Knots Within 400 Yards of Killer Whales. Under this alternative, NMFS would promulgate a regulation prohibiting vessels from operating at speeds over 7 knots when within 400 yards of killer whales. In addition to the exceptions listed above, this regulation would not apply to commercial fishing vessels lawfully engaged in actively setting, retrieving, or closely tending fishing gear.

(7) *Alternative 7:* Keep Clear of the Whales' Path. Under this alternative, NMFS would promulgate a regulation requiring vessels to keep clear of the whales' path. Violations of this regulation would include intercepting or placing a vessel in the oncoming path of a killer whale or positioning a vessel so that wind or currents carry the vessel into the path of the whales. In addition to the exceptions listed above, this regulation would not apply to commercial fishing vessels lawfully engaged in actively setting, retrieving, or closely tending fishing gear.

(8) *Proposed Action.* Under this alternative, NMFS would promulgate a package of regulations incorporating Alternatives 3, 5, and 7 as described in the Proposed Rule section of this notice.

The Draft EA/RIR addresses impacts to the eight resources that could be affected by the proposed action or alternatives: Marine Mammals, Listed and Non-listed Salmonids, Socioeconomics, Recreation, Environmental Justice, Noise, Aesthetics, and Transportation. Impacts to some resources were avoided or reduced by exempting certain classes of vessels or activities under all of the alternatives.

The draft EA/RIR/IRFA, and supporting documents are available for review and comment and can be found on the NMFS Northwest Region Web site at *http://www.nwr.noaa.gov/*.

Clarity of This Proposed Rule

We are required by Executive Orders 12866 and 12988 and by the Presidential Memorandum of June 1, 1998, to write all rules in plain language. This means that each rule we publish must:

(1) Be logically organized;

(2) Use the active voice to address readers directly;

(3) Use clear language rather than jargon;

(4) Be divided into short sections and sentences; and

(5) Use lists and tables wherever possible.

If you feel that we have not met these requirements, send us comments by any of the methods listed in the ADDRESSES section. To better help us revise the rule, your comments should be as specific as possible.

Public Comments

You may submit information and comments concerning this Proposed Rule, the draft EA, or any of the supporting documents by any one of several methods (see ADDRESSES). Materials related to this notice can be found on the NMFS Northwest Region Web site at *http://www.nwr.noaa.gov/*. We will consider all comments and information received during the comment period in preparing a final rule.

Public Availability of Comments

Before including your address, phone number, e-mail address, or other personal identifying information in your comment, you should be aware that your entire comment—including your personal identifying information—may be made publicly available at any time. While you can ask us in your comment

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to withhold your personal identifying information from public review, we cannot guarantee that we will be able to do so.

Public Hearings

Based on the level of interest in killer whales and whale watching, public meetings have been scheduled for September 30, 2009, 7–9 p.m. at the Seattle Aquarium, Seattle, WA and October 5, 2009, 7–9 p.m. in The Grange Hall, Friday Harbor, WA. Requests for additional public hearings must be made in writing (see **ADDRESSES**) by August 28, 2009.

Required Determinations

Paperwork Reduction Act

This proposed rule will not impose any new requirements for collection of information that requires approval by the OMB under the Paperwork Reduction Act (44 U.S.C. 3501 *et seq.*) This proposed rule will not impose new recordkeeping or reporting requirements on State or local governments, individuals, businesses, or organizations.

Executive Order (E.O.) 12866 Regulatory Planning and Review

This Proposed Rule was determined to be significant for purposes of E.O. 12866. It was reviewed by the Office of Management and Budget and other interested Federal agencies.

E.O. 12988 Civil Justice Reform

We have determined that this rule does not unduly burden the judicial system and meets the requirements of sections 3(a) and 3(b)(2) of E.O. 12988. We issue protective regulations pursuant to provisions in the ESA and MMPA using an existing approach that improves the clarity of the regulations and minimizes the regulatory burden of managing ESA listings while retaining necessary and advisable protections to provide for the conservation of threatened and endangered species.

E.O. 13175 Consultation and Coordination With Indian Tribal Governments

The longstanding and distinctive relationship between the Federal and tribal governments is defined by treaties, statutes, executive orders, judicial decisions, and co-management agreements. These differentiate tribal governments from the other entities that deal with, or are affected by, the Federal Government. This relationship has given rise to a special Federal trust responsibility involving the legal responsibilities and obligations of the United States toward Indian Tribes and the application of fiduciary standards of due care with respect to Indian lands, tribal trust resources, and the exercise of tribal rights. E.O. 13175 outlines the responsibilities of the Federal Government in matters affecting tribal interests. During our scoping process we provided the opportunity for all interested tribes to comment on the need for regulations and discuss any concerns they may have. We will continue to coordinate with the tribes on management and conservation actions related to this species.

E.O. 13132 Federalism

E.O. 13132 requires agencies to take into account any federalism impacts of regulations under development. It includes specific consultation directives for situations where a regulation will preempt State law, or impose substantial direct compliance costs on State and local governments (unless required by statute). The Washington Department of Fish and Wildlife was a cooperating agency on the NEPA analysis to support development of proposed regulations. A Federal regulation under the MMPA and ESA prohibiting approach within 200 yards of killer whales is more protective than the State regulation HB 2514 prohibiting approach within 100 yards of Southern Resident killer whales and therefore may preempt the State regulation. Inclusion of the Washington Department of Fish and Wildlife as a cooperating agency satisfies the consultation requirements of E.O. 13132.

E.O. 13211 Energy Supply, Distribution, or Use

E.O. 13211 requires agencies to prepare a statement of energy effects when undertaking certain actions. According to E.O. 13211, "significant energy action" means any action by an agency that is expected to lead to the promulgation of a final rule or regulation that is a significant regulatory action under E.O. 12866 and is likely to have a significant adverse effect on the supply, distribution, or use of energy. We have determined that the energy effects of this final rule are unlikely to exceed the energy impact thresholds identified in E.O. 13211 and that this rulemaking is, therefore, not a significant energy action. No statement of energy effects is required.

List of Subjects in 50 CFR Part 224

Endangered marine and anadromous species.

Dated: July 21, 2009.

James W. Balsiger,

Acting Assistant Administrator for Fisheries, National Marine Fisheries Service.

For the reasons set out in the preamble, 50 CFR part 224 is proposed to be amended as follows:

PART 224—ENDANGERED MARINE AND ANADROMOUS SPECIES

1. The authority citation for 50 CFR part 224 continues to read as follows:

Authority: 16 U.S.C. 1531–1543 and 16 U.S.C 1361 *et seq.*

2. A new § 224.103(e) is added to read as follows:

§ 224.103 Special prohibitions for endangered marine mammals.

* * * * *

(e) *Protective regulations for killer whales in Washington*—(1) *Prohibitions.* The following restrictions apply to all motorized, non-motorized, and self-propelled vessels, regardless of size, transiting the navigable waters of Washington State and subject to the jurisdiction of the United States, which includes all U.S. marine waters in Clallam, Jefferson, King, Kitsap, Island, Mason, Pierce, San Juan, Skagit, Snohomish, Thurston, and Whatcom counties east of a line connecting Cape Flattery, Washington (48°23 10" N./124°43 32" W.), Tatoosh Island, Washington (48°23 30" N./124°44 12" W.), and Bonilla Point, British Columbia (48°35 30" N./124°43 00" W.) and south of the U.S. Canadian border. Marine waters include all waters relative to a contiguous shoreline relative to the mean high water line and cutting across the mouths of all rivers and streams. Except as noted in paragraph (e)(2) of this section it is unlawful to:

(i) Cause a vessel to approach within 200 yards (182.8 m) of any killer whale. This includes approaching a killer whale by any means, including by interception (i.e., by placing a vessel in the path of an oncoming killer whale, so that the whale surfaces within 200 yards (182.8 m) of the vessel, or by positioning a vessel so that the prevailing wind or currents carries the vessel to within 200 yards (182.8 m), or being towed by another vessel).

(ii) Enter the no-go zone located along the west side of San Juan Island extending ½ mile (805 m) offshore from Mitchell Point south to Eagle Point (Figure 1) at any time during the period May 1 through September 30 each year. The boundary of the no-go zone consists of straight lines connecting all of the following points in the order stated:

Beginning at 123°10'120.19" W, 48°34'20.67" N;

123°11′6.71″ W, 48°34′20.67″ N;
123°11′13.99″ W, 48°34′8.12″ N;
123°11′15.83″ W, 48°33′56.15″ N;
123°11′13.14″ W, 48°33′38.80″ N;
123°11′2.91″ W, 48°33′22.97″ N;
123°10′55.44″ W, 48°33′7.97″ N;
123°10′40.63″ W, 48°32′51.10″ N;
123°10′21.06″ W, 48°32′37.62″ N;
123°10′21.38″ W, 48°32′28.70″ N;
123°10′30.04″ W, 48°32′12.73″ N;
123°10′29.69″ W, 48°32′2.48″ N;
123°10′26.63″ W, 48°31′45.92″ N;
123°10′18.54″ W, 48°31′29.48″ N;
123°10′5.34″ W, 48°31′16.07″ N;
123°09′48.51″ W, 48°30′55.15″ N;
123°09′45.22″ W, 48°30′46.38″ N;
123°09′31.91″ W, 48°30′32.53″ N;
123°09′19.56″ W, 48°30′20.03″ N;
123°09′13.97″ W, 48°30′16.86″ N;
123°09′0.19″ W, 48°30′3.30″ N;
123°08′44.56″ W, 48°29′55.15″ N;
123°08′40.54″ W, 48°29′46.62″ N;
123°08′20.43″ W, 48°29′31.99″ N;
123°07′54.54″ W, 48°29′26.65″ N;
123°07′40.69″ W, 48°29′16.29″ N;
123°07′24.74″ W, 48°29′8.36″ N;
123°06′50.12″ W, 48°29′3.18″ N;
123°06′34.81″ W, 48°28′59.48″ N;
123°06′25.50″ W, 48°28′54.57″ N;
123°06′11.47″ W, 48°28′39.55″ N;
123°05′56.57″ W, 48°28′31.18″ N;
123°05′39.99″ W, 48°28′27.84″ N;
123°05′6.86″ W, 48°28′31.27″ N;
123°04′38.40″ W, 48°28′25.94″ N;
123°04′32.58″ W, 48°28′15.11″ N;
123°04′18.39″ W, 48°28′1.25″ N;
123°04′1.07″ W, 48°27′54.14″ N;
123°03′37.56″ W, 48°27′47.83″ N;
123°03′18.18″ W, 48°27′32.24″ N;
123°02′58.60″ W, 48°27′25.48″ N;
123°02′53.75″ W, 48°27′21.01″ N;
123°02′34.37″ W, 48°27′7.24″ N;
123°05′13.06″ W, 48°27′3.05″ N;

and connecting back to 123°10′120.19″ W, 48°34′20.67″ N along the shoreline of San Juan Island, following the mean high water line, with the exception of the opening to False Bay, where the shoreward boundary is defined by a straight line connecting 123°04′28.33″ W, 48°28′54.84″ N and 123°04′4.01″ W, 48°28′46.89″ N.

(iii) Position a vessel in the path of any killer whale at any point located within 400 yards of the whale. This includes intercepting a killer whale by positioning a vessel so that the prevailing wind or currents carry the vessel into the path of the whale.

(2) *Exceptions.* The following exceptions apply to this section:

(i) The prohibitions of paragraph (e)(1) of this section do not apply to:

(A) Federal, State, or local government vessels operating in the course of official duty;

(B) Vessels participating in the U.S. Coast Guard and Canadian Coast Guard Co-operative Vessel Traffic Service and constrained to Traffic Separation Scheme shipping lanes;

(C) Vessels engaged in an activity, such as scientific research, authorized through a permit issued by the National Marine Fisheries Service under part 222, subpart C, of this chapter (General Permit Procedures) or through a similar authorization;

(D) Vessels lawfully engaged in treaty Indian fishing that are actively setting, retrieving, or closely tending fishing gear; or

(E) Vessel operations necessary to avoid an imminent and serious threat to a person.

(ii) The prohibition of paragraph (e)(1)(ii) of this section does not apply to privately owned vessels that transit the no-go zone for the sole purpose of gaining access to privately owned shoreline property located immediately adjacent to the no-go zone. For purposes of this section, "transit" means that a vessel crosses the no-go zone by the shortest possible safe route, on a straight line course as consistent with International Regulations for Preventing Collisions at Sea, 1972 (COLREGS), while making way by means of a source of power at all times, other than drifting by means of the prevailing water current or weather conditions.

(iii) The prohibitions of paragraphs (e)(1)(i) and (e)(1)(iii) of this section do not apply to non-treaty commercial fishing vessels lawfully engaged in actively setting, retrieving, or closely tending fishing gear.

(3) *Affirmative defense.* In connection with any action alleging a violation of the prohibitions of paragraph (e)(1) of this section, any person claiming the benefit of any exception listed in paragraph (e)(2) of this section shall have a defense where the person can demonstrate that the exception is applicable and was in force, and that the person fully complied with the exception at the time of the alleged violation. This defense is an affirmative defense that must be raised, pleaded, and proven by the proponent.

3. In Part 224, Figure 1 is added to read as follows.

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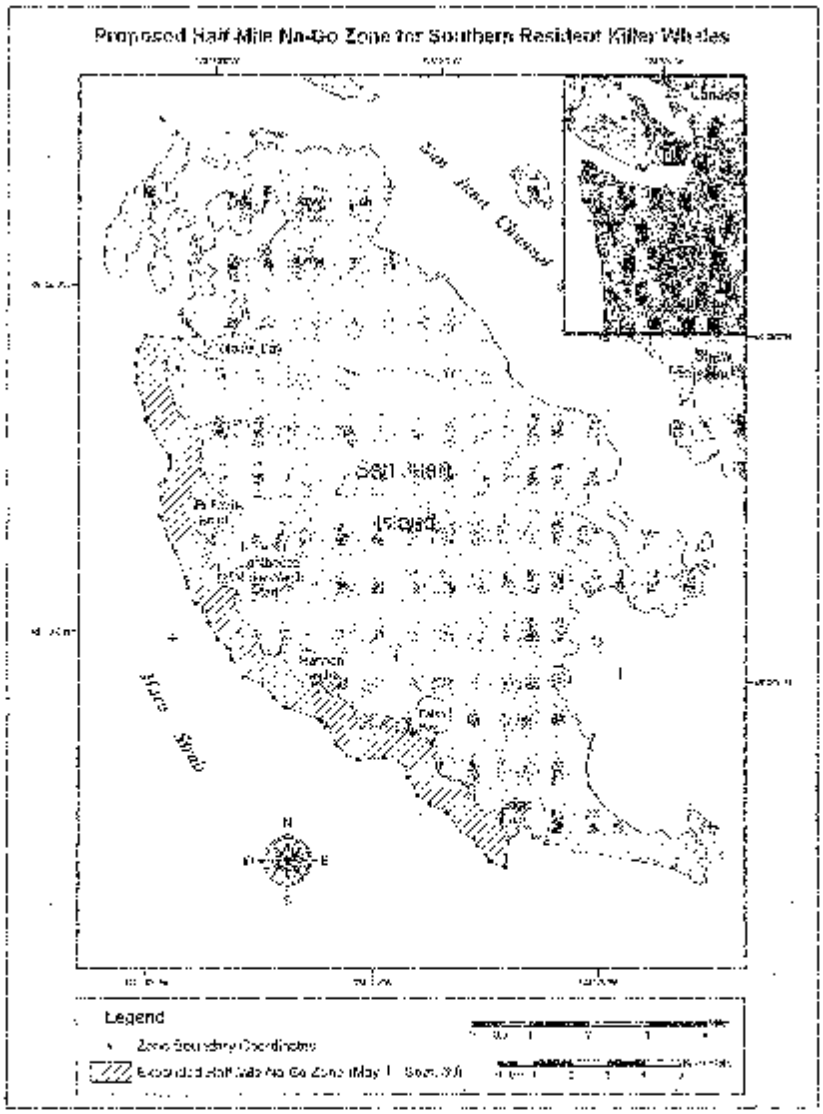
Figure 1 of Part 224 -- Proposed No-go Zone.



[FR Doc. E9–18075 Filed 7–28–09; 8:45 am]
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