A VISION FOR SALMON AND STEELHEAD

Goals to Restore Thriving Salmon and Steelhead to the Columbia River Basin

Phase 1 Report of the

Columbia Basin Partnership Task Force

to the

NOAA Fisheries Marine Fisheries Advisory Committee

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Executive Summary

This report presents a unique voice for the future of the salmon and steelhead of the Columbia River basin. These fish are an integral feature of the Columbia River landscape, culture, and economy. The fish represent the lifeblood of the Columbia Basin, and preserving the fish for future generations is one of the greatest challenges we face today.

Over the past two years, the 28 members of the Columbia Basin Partnership Task Force (Task Force), representing a diversity of managers and stakeholders across the Columbia Basin, have worked diligently and sincerely to develop a shared vision and goals for Columbia Basin salmon and steelhead. The Task Force is now forwarding recommendations on these goals to the Marine Fisheries Advisory Committee (MAFAC) for their consideration and to further recommend them to the NOAA Fisheries Administrator.

Great runs of salmon and steelhead historically returned to the Columbia River basin. Estimated at between five and 16 million fish, they returned each year like clockwork to spawn across the vast Columbia landscape.[1] Numbers began to decline in the late 1800s with the advancement of European settlement and continued to drop into the late 1900s. Today, the annual runs average just over two million fish, of which only 40 percent are naturally produced. The rest come from hatchery programs developed as natural production declined. Since 1992, more than half of Columbia River salmon and steelhead species have been listed under the U.S. Endangered Species Act (ESA). Tremendous effort and hundreds of millions of dollars have been invested in the basin over the last 50 years to stem the decline and attempt to rebuild the runs to healthy levels. Results to date are mixed. Many runs remain at low levels; none have been delisted.

Considering the continuing challenges in sustaining the fish, NOAA Fisheries commissioned an independent, impartial assessment in 2010 to gain advice on how best to approach comprehensive, long-term salmon and steelhead recovery in the region. The Situation Assessment, completed in 2012, reflected the views of more than 200 stakeholders, including federal, state, and tribal managers and other parties interested in salmon and steelhead recovery. Several important recommendations came from this assessment: getting to recovery will require creative, bold, and effective actions at multiple levels; it will also demand attention to interdependent legal, regulatory, ecological, social, cultural, and economic elements. In particular, the Situation Assessment highlighted the lack of common goals in multiple overlapping federal, state, and tribal recovery and management plans; and that effective recovery processes need to include a shared regional definition of success.

The Task Force grew out of these recommendations. Convened by NOAA Fisheries in 2017, the Task Force represents an unprecedented collaboration of parties representing environmental,

[1] Sources: Council's 1987 Fish and Wildlife Program https://www.nwcouncil.org/fish-and-wildlife/previous-programs/1987-columbia-river-basin-fishwildlife-program and Appendix D of the program "Compilation of Salmon and Steelhead Losses in the Columbia River Basin, March 1986": https://www.nwcouncil.org/sites/default/files/AppendixDLosses.pdf; and ISAB report 2015-1: https://www.nwcouncil.org/sites/default/files/isab2015-1_0.pdf

fishing, agricultural, utility, and river-user interests, local recovery groups, the states of Idaho, Montana, Washington, and Oregon, and federally recognized tribes in the region. These parties share overlapping and sometimes conflicting values and views about the Columbia River and its salmon and steelhead. In the past, many of the parties faced each other from opposite sides of a courtroom. The Task Force brought these representatives together at one table for the first time in recent history in an attempt to find common ground and foster a collaborative approach to ensure the long-term persistence of our salmon and steelhead.

Through the Task Force process, these interests have arrived at a shared purpose — a desire that future generations will enjoy healthy and abundant salmon and steelhead runs across the Columbia Basin landscape. This purpose is evident in an overarching vision statement and set of shared qualitative and quantitative goals that the Task Force created for the future of our region.

The shared Vision statement is for:

> *A healthy Columbia River basin ecosystem with thriving salmon and steelhead that are indicators of clean and abundant water, reliable and clean energy, a robust regional economy, and vibrant cultural and spiritual traditions, all interdependent and existing in harmony.*

The Task Force developed Qualitative Goals to integrate and balance sometimes competing values and purposes. Four overarching Qualitative Goals were identified:

1. Restore salmon and steelhead in the Columbia Basin to healthy and harvestable/fishable levels.
2. Provide diverse, productive, and dependable tribal and non-tribal harvest and fishing opportunities for Columbia Basin salmon and steelhead in fresh and marine waters.
3. Produce hatchery salmon and steelhead to support conservation, mitigate for lost natural production, and support fisheries, in a manner that strategically aligns hatchery production with natural production recovery goals.
4. Make decisions within a broader context that reflects and considers effects to the full range of social, cultural, economic, and ecosystem values and diversity in the Columbia Basin.

The Task Force sees both the need and opportunity to act today while at the same time envisioning salmon and steelhead runs 100 years from now. The Task Force recognizes the sense of urgency to help Columbia Basin salmon and steelhead, the people and communities that rely on them, and the wildlife, such as Southern Resident killer whales, that depend on them for survival.

The Task Force's Quantitative Goals describe a range of abundance numbers for salmon and steelhead that indicate whether a Qualitative Goal has been achieved. Quantitative Goals are identified for natural production of all ESA-listed and non-listed salmon and steelhead in the U.S. portion of the Columbia River basin and its tributaries, including some historical production

areas that are currently blocked. The goals are based, wherever possible, on existing goals and take into account a number of factors, including ESA delisting requirements, habitat constraints and production potential, density dependence, cultural needs of tribes, fishing interests and sustainability, and mitigation responsibilities. The Task Force also quantified current and anticipated hatchery production consistent with the goals for natural production, and current and potential harvest and fisheries in order to provide a complete accounting of future needs and desires for Columbia Basin salmon and steelhead.

The Quantitative Goals translate into a total increase of naturally produced salmon and steelhead from the current average of 400,000 to as high as 3.6 million adults. This represents an eightfold improvement from current levels, but is considerably less than the number of salmon and steelhead that the basin produced historically. The goals also reflect available information on habitat production potential. The corresponding average total Columbia River run (natural- plus hatchery-origin fish) would be projected to increase from 2.3 million to approximately 11.4 million fish.

The Task Force recommends these Quantitative Goals as provisional, meaning that members agree to them in principle, and support further exploration in the next phase of this effort. These recommendations provide critical direction to help guide future discussions during the next phase of this effort. For instance, additional work will be required to strategically align harvest and fishing aspirations and hatchery production with the natural production goals.

The work of the Task Force represents an opportunity to define a clear measure of success and a shared future for Columbia Basin salmon and steelhead. Achieving healthy and harvestable levels of salmon and steelhead will take all regional interests working together in an integrated and efficient manner. The Task Force's long-term goals will help to align the efforts of federal, state, and tribal managers and other stakeholders on a common path to recovering salmon and steelhead in the Columbia Basin.

In June 2018, the MAFAC approved continuation of this effort, providing the Task Force with the opportunity to further test and refine the provisional goals. The Task Force anticipates that the next phase of work will address many of the questions around how the goals might be achieved. The common foundation developed through this initial phase provides Task Force members with the tools, respect, and inspiration to move forward.

Definitions of Key Terms Used by the Task Force	
Escapement	Escapement typically refers to the number of adult salmon or steelhead surviving harvest and other mortality factors to reach a particular point in their return to freshwater.
Harvestable	Species, stocks, or populations of salmon and steelhead that are sufficiently viable, abundant, and productive to sustain significant levels of exploitation and harvest. Harvestable stocks are typically managed to produce optimum or maximum sustained yield. Harvest ability can encompass both numbers of fish harvested and qualities of fisheries, including opportunity and success. Harvestable can be broadly defined to include "fishable," which refers to fishery opportunities that may not include direct harvest (e.g., catch and release recreational fisheries).
Hatchery-origin fish	Fish that were spawned and/or reared during a portion of their life cycle in an artificial production facility.
Healthy	Salmon or steelhead populations, ESUs, DPSs, or stocks that are abundant, productive, widely distributed, diverse, and resilient to environmental perturbations including climate change; can sustain significant levels of harvest; and support a full range of ecological benefits including the needs of dependent species. Generally, healthy refers to a point substantially above ESA delisting on the spectrum from threatened/endangered to extremely low extinction risk.
Mitigation hatchery production	Hatchery fish production used for conservation or harvest purposes that is funded through legislation or legal agreement to compensate for natural production lost due to a specific action, such as construction and operation of a dam.
Natural production	Natural production, or naturally produced fish, refers to the progeny of fish that spawn in the wild, regardless of parental origin (wild, natural, or hatchery). This term is interchangeable with the term natural-origin fish. It is important to distinguish natural production from natural productivity, which refers to the rate at which natural origin fish are able to produce offspring.
Recovery	Recovery in general refers to improvement in the biological status of a depleted, weak, or at-risk species to a high level of viability and function. NOAA Fisheries uses the term *ESA recovery* to refer to reducing threats and improving a species status to a point where it is no longer threatened or endangered and can be removed from ESA protection. For salmon and steelhead, this involves improving the species' abundance, productivity, spatial structure, and diversity to levels which provide a high likelihood of long-term persistence (i.e., viable with a low risk of extinction). NOAA Fisheries uses the term *broad sense recovery* to define further improvements in a species' status. Broad sense recovery goals, generally defined by state and tribal entities or stakeholders, go beyond the requirements for ESA delisting to achieve even lower extinction risk and/or to address other legislative mandates or social, cultural, economic, or ecological values.
Stock	A group of fish of the same species that spawns in a particular lake or stream (or portion thereof) at a particular season and which, to a substantial degree, does not interbreed with fish from any other group spawning in a different place or in the same place in a different season. For the purposes of the Columbia Basin Partnership Task Force, a stock is defined for Columbia Basin salmon and steelhead based on species (Chinook salmon, coho salmon, sockeye salmon, chum salmon, steelhead), region of origin (e.g., Lower Columbia, Middle Columbia, Upper Columbia, Snake, or Willamette) and run type (e.g. spring, summer, fall, late fall).

1. The Context for Shared Goals for Columbia Basin Salmon and Steelhead

All of us who call the Columbia Basin home have high expectations for the future of our salmon and steelhead. While we may value the fish for different reasons, they tie us with a common bond — to each other, our past, and our future. Today, many of these salmon and steelhead runs are struggling. While great runs of salmon and steelhead historically returned to the Columbia Basin (Figure 1), the runs are now considerably smaller and many are at risk of extinction.

Why Shared Goals?

Significant effort is underway in the Columbia Basin to address the problems that hamper the fish, but these different actions lack a common endpoint. A variety of federal, state, and tribal management plans identify goals for various aspects of salmon and steelhead management and recovery. However, these plans are focused on specific areas or purposes and do not provide a comprehensive suite of complementary goals for Columbia Basin salmon and steelhead. For example, plans for salmon and steelhead listed under the Endangered Species Act (ESA) provide goals for the recovery of these listed species. Other plans address specific factors for decline, including habitat degradation and the adverse effects of hydropower, hatcheries, and harvest, or aim to achieve different federal mandates or broader social, cultural, economic, and ecological values. All of these plans and goals provide important guidance. Yet each measures success through its own yardstick, leaving open the questions: *Where are we, and our salmon and steelhead, headed? What unifying goals should lead us there?* What is missing is a coordinated basinwide, multi-partner long-term vision, and a common set of goals.

The Columbia Basin Partnership Task Force (Task Force) was created to provide a comprehensive approach. The Task Force provides a forum for parties with overlapping values and missions for the Columbia River to collaborate on *shared* goals. Task Force recommendations reflect shared social, cultural, economic, and ecological values. They define a comprehensive vision of what we want for the fish, and what we want from them. They aspire to "healthy and harvestable" levels of salmon and steelhead — well above levels requiring protection under the ESA, where more than half of the Columbia Basin species now stand.[2] (See Figure 2.) At the same time, the goals reflect current realities, and recognize that in today's significantly altered landscape, the goals are below historical levels.

[2] Of the 19 Columbia Basin salmon and steelhead species (defined as evolutionarily significant units or distinct population segments), 13 are listed and protected under the Endangered Species Act: Lower Columbia River, Upper Columbia River, Upper Willamette River, and Snake River (spring/summer and fall runs) Chinook; Columbia River Chum; Snake River Sockeye; Lower Columbia River Coho; and Upper Columbia River, Middle Columbia River, Lower Columbia River, Upper Willamette River, and Snake River steelhead.

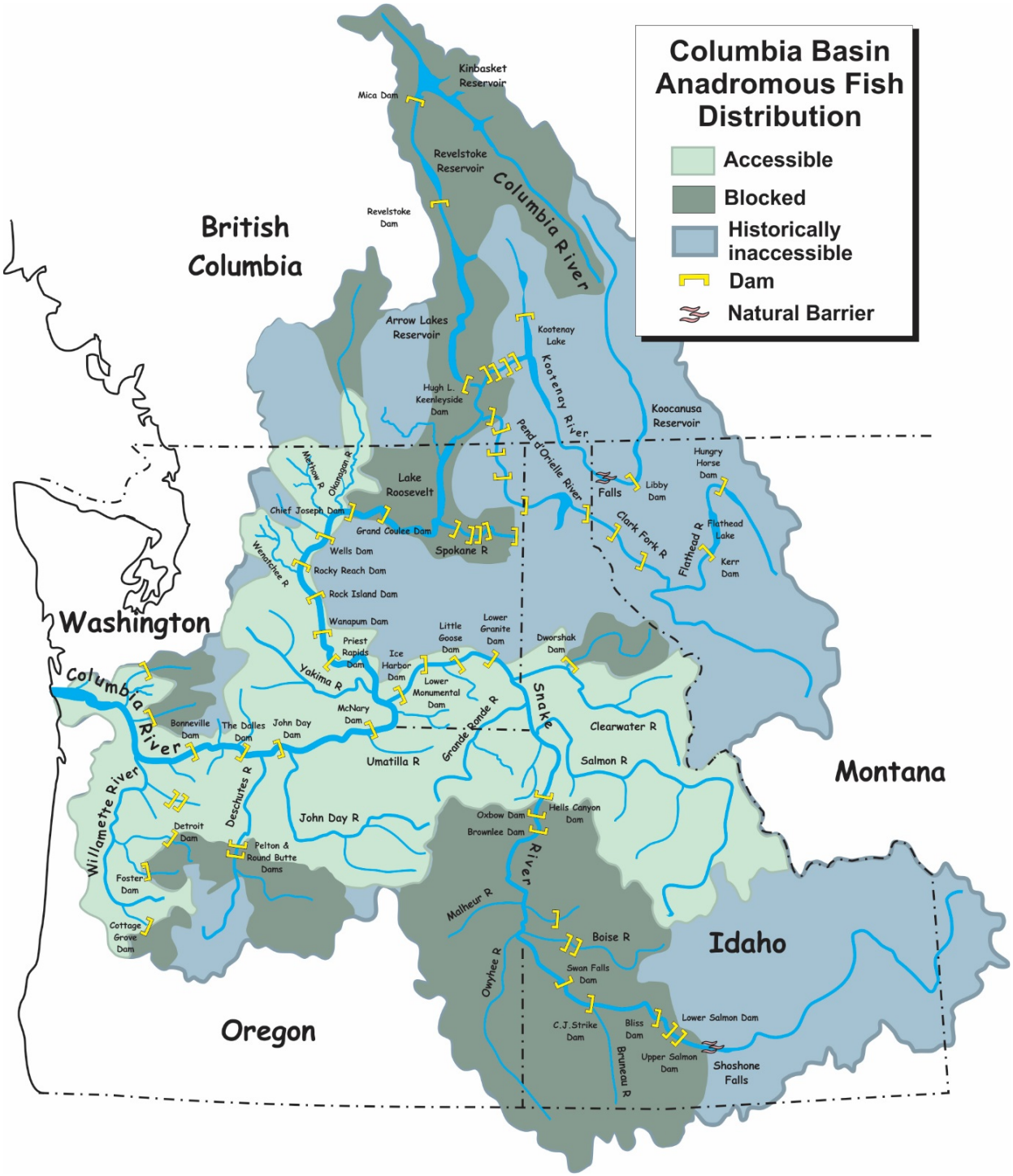


Figure 1. Map of salmon and steelhead distribution across the Columbia Basin.

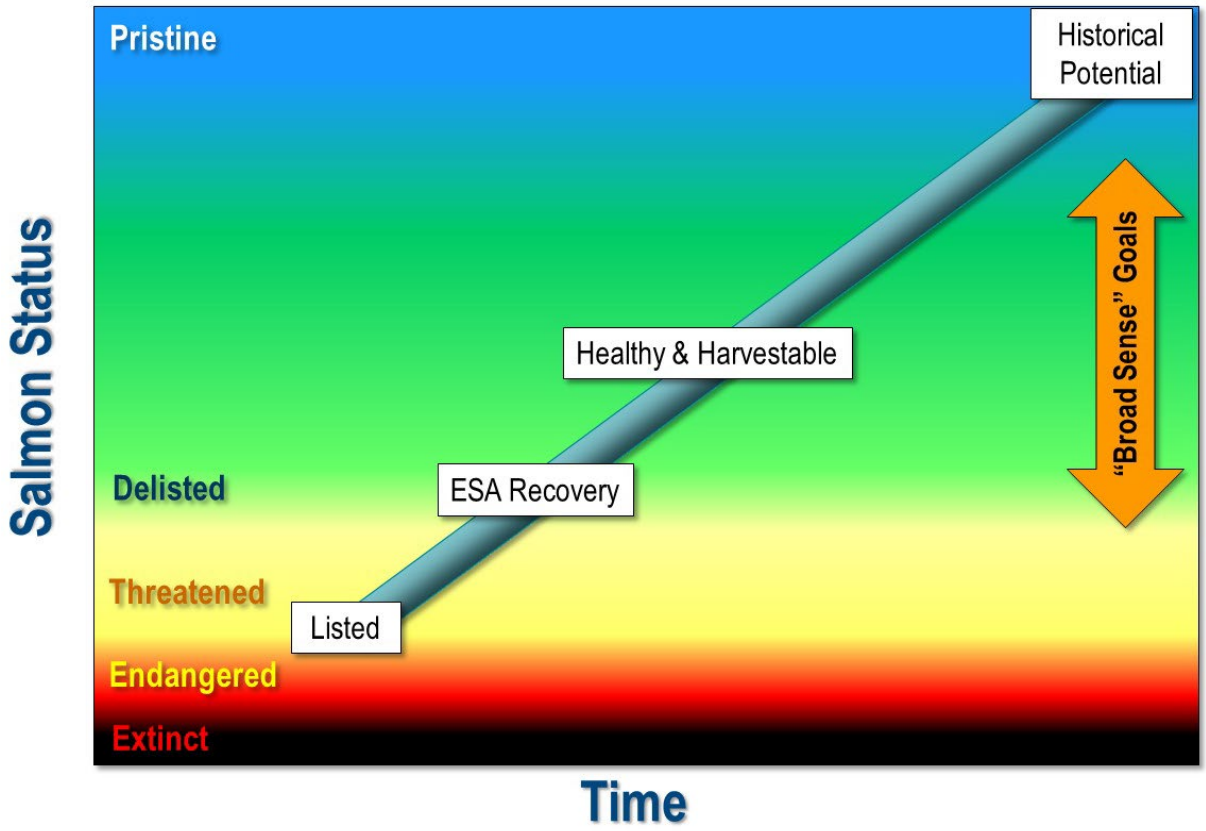


Figure 2. Relationship of types of goals relative to a continuum of fish status ranging from extinct to pristine.

Long-term, shared goals will help align federal, state, and tribal managers, and stakeholder interests, on a common path toward recovering salmon and steelhead in the Columbia Basin. While NOAA Fisheries convened the Task Force, the goals are not just for NOAA Fisheries to oversee and implement. NOAA Fisheries' regulatory role is primarily limited to the ESA, and achieving ESA recovery for listed species represents the low-end of our recommended goals. Once the listed salmon and steelhead species reach a status in the healthy and harvestable range, above ESA listings, NOAA Fisheries no longer has a formal ESA regulatory role. Instead, NOAA Fisheries will continue to work as a partner with state and tribal managers, and others, to achieve other goals that provide other cultural, economic, and ecological values beyond the ESA, such as supporting sustainable fisheries. Therefore, having shared goals among managers and stakeholders allows the region to align on a longer-term common path, and also provides a means to measure progress and maintain accountability.

Salmon Recovery under the ESA

Thirteen salmon species in the Columbia Basin are listed under the Endangered Species Act (ESA). Recovery plans developed for these ESA-listed species — often through locally led, science-driven processes that included federal, state, tribal, and county representatives and other stakeholders — provide recovery direction that meets the needs of salmon and people. ESA recovery plans are a roadmap to rebuilding the natural populations and ecosystems upon which they depend so the species are self-sustaining in the wild for the long term and, thus, no longer need ESA protection.

For these ESA-listed salmon, the regional priority remains achieving ESA delisting, which represents the low end of the CBP Task Force's recommended goals. Numerous partners are currently engaged in implementing hundreds of recovery actions across the Columbia Basin. In Washington State, for example, recovery boards, directed by county, city, tribal and citizen representatives, and advised by federal, state and tribal scientists, are engaged in aggressive recovery efforts. The CBP Task Force goals build on this critical recovery work, embracing the momentum and commitment of the many partners recovering ESA-listed salmon across the Columbia landscape.

Many of these ESA recovery plans also identify broad sense goals, which describe other social, cultural, economic, and ecological values beyond ESA. These broad sense goals are the basis of the CBP Task Force healthy and harvestable goals for those species, further described in Chapter 9.

Attaining ESA recovery and delisting for listed species and then achieving the healthy and harvestable levels of salmon and steelhead — beyond mere ESA delisting levels — will take all regional interests working together in an integrated and efficient manner. The Task Force represents an opportunity to define a clear measure of success and a shared future for Columbia Basin salmon and steelhead.

1.1 Concept of a Regional Partnership

In 2012, NOAA Fisheries commissioned two neutral, university-based institutions to assess the views of states, tribes, federal agencies, and other stakeholders as to how the region should pursue long-term salmon and steelhead recovery goals. Through an interview-based process, the Oregon Consensus Program at Portland State University and the William D. Ruckelshaus Center at the University of Washington consulted more than 200 stakeholders, federal, state, and tribal government representatives and managers for their insights on past, current, and future approaches to salmon and steelhead recovery.

The Oregon Consensus Program and Ruckelshaus Center issued their final report of that work, the *Columbia River Basin Salmon and Steelhead Long-Term Recovery Situation Assessment*[3] (Situation Assessment), in December 2013. In the report, many respondents voiced support for addressing salmon and steelhead recovery in a more coherent, integrated, and efficient way. Many participants also expressed the desire for bold leadership, noting their frustration with two decades of institutional gridlock and the absence of common goals.

[3] https://s3.wp.wsu.edu/uploads/sites/2180/2013/06/ColumbiaRiverBasinSalmonandSteelheadLong-TermRecoverySituationAssessment-FinalReport_000.pdf.

The Task Force grew out of these findings. NOAA Fisheries' convened the Task Force to bring together people from across the salmon and steelhead landscape. For the first time in recent history, managers, stakeholders, and representatives of many different interests came together to consider the full range of salmon and steelhead needs, impacts, and perspectives — scientific, biological, social, cultural, and economic. The recommendations of the Task Force are intended to establish a vision of what we want for our salmon and steelhead, and what we want from them, in a set of shared goals for these iconic fish.

1.2 Recommendations to the Marine Fisheries Advisory Committee

Over the past two years, the 28 members of this Task Force, representing a diversity of managers and stakeholders across the Columbia Basin, have worked diligently and sincerely to develop shared long-term goals for Columbia Basin salmon and steelhead. This report presents the work of the Task Force to describe those shared goals, expressed as value statements (qualitative goals) and as the range of potential abundance levels for the 24 distinct stocks of salmon and steelhead in the Columbia Basin (quantitative goals). The Task Force adopted these goals as provisional in November 2018, meaning that Task Force members agree to them in principle, and to support these goals being further explored in the next phase of this effort. The Marine Fisheries Advisory Committee (MAFAC) has extended the term of the Task Force to conduct the phase II work including discussing and considering options and recommendations for how the goals could be achieved.

The Task Force is forwarding these recommendations on provisional goals to the MAFAC for their consideration and to further recommend these goals to the NOAA Fisheries Administrator.

1.3 Moving Forward with a Sense of Urgency

The Columbia River and its tributaries, including its largest tributary the Snake River, drain a watershed of 258,500 square miles (669,500 square kilometers) that reaches across seven states (Oregon, Washington, Idaho, Montana, Nevada, Wyoming, and Utah) and into British Columbia.

The vast river system once supported massive runs of salmon and steelhead, which traversed its estuary and traveled hundreds of miles inland to populate the majority of its tributaries (Figure 1). Historical abundance is uncertain, but estimates of adult fish per year (~mid 1800s) range from 5−9 million (ISAB 2015), to 7.5−8.9 million (Chapman 1986), to 8.3 million (PFMC 1979), and to 10−16 million (NPCC 1986).

Current salmon and steelhead runs of the Columbia Basin number only about 2.3 million fish (2008−17), with the majority of these from hatchery production. Thirteen of the Columbia Basin species are listed under the ESA. Numerous factors have contributed to the species' decline, and it will take a concerted effort across the salmon and steelhead life cycle to recover them to healthy and harvestable levels (Figure 3). Some salmon and steelhead runs have improved from what they were in the 1990s, in large part due to numerous partners who are currently engaged in

implementing hundreds of recovery actions across the Columbia Basin. Still, we have a long way to go to address the many challenges facing these treasured species.

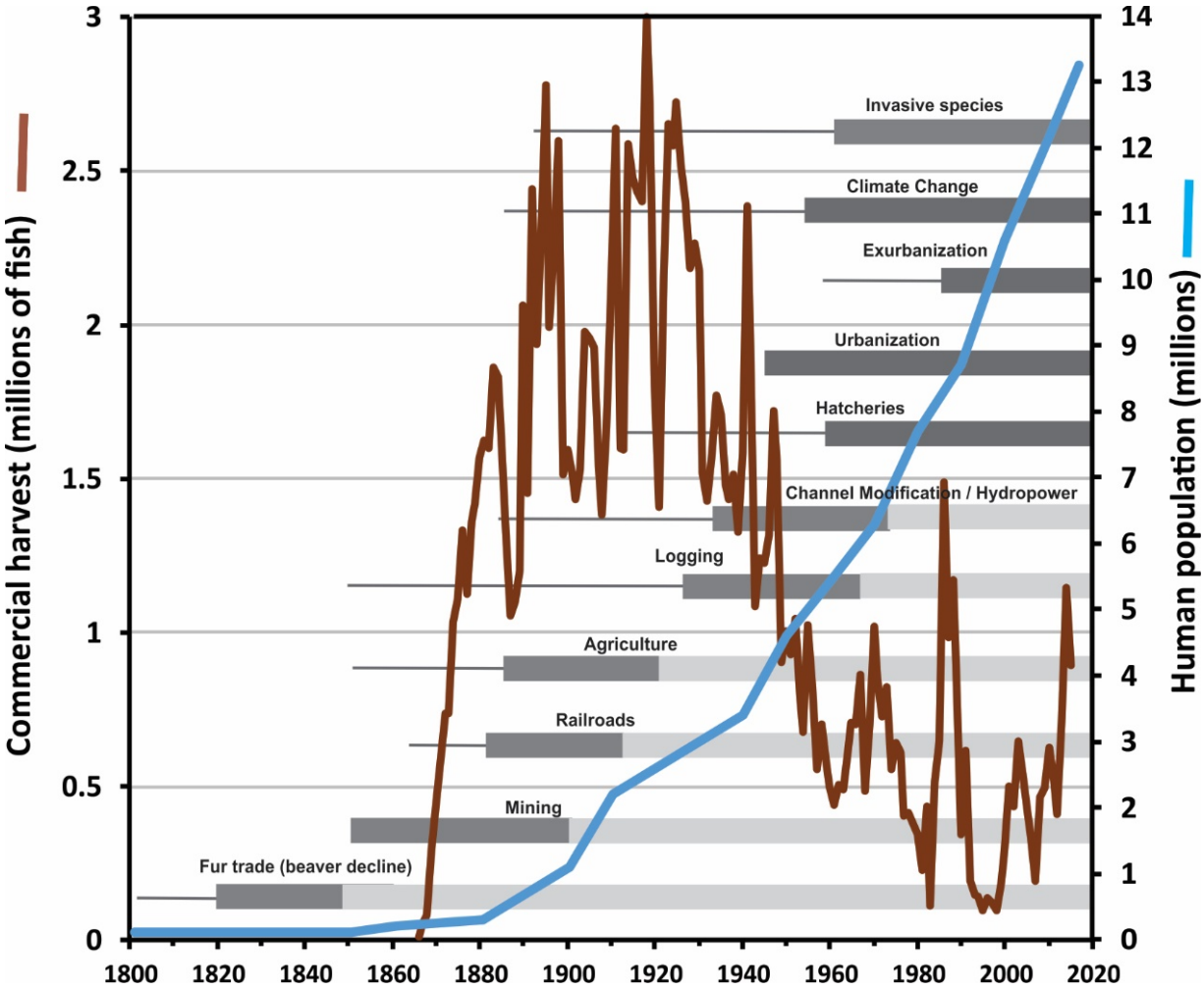


Figure 3. Human population growth and activities in Columbia Basin compared to commercial landings of salmon and steelhead (adapted from Penaluna et al. 2016). Data sources: Columbia River commercial harvest numbers from ODFW, WDFW, and ISAB (2015); human population growth from U.S. Census data for Oregon, Washington, and Idaho; and hatchery timeframe from National Research Council (1998). Records of commercial landings do not completely reflect historical abundance but are used here because historical numbers for salmon and steelhead abundance do not exist.

While the work of the Task Force looks ahead to envision salmon and steelhead runs 100 years from now, members also recognize that there is both an urgent need as well as an *opportunity* to act today. The work of the Task Force highlights the potential — and challenge — before us to ensure that salmon and steelhead can persist long into the future. Starting now on a common path toward achieving healthy and harvestable levels of salmon and steelhead will enrich the lives of many people, including tribes, recreational and commercial fishers, and rural business owners and employees dependent on salmon and steelhead fishing. The longer that "fish" potential goes unrealized, so too will the opportunity to revitalize salmon and steelhead-dependent communities in the Columbia Basin be delayed.

This urgency is not just for the benefit of people of the Columbia Basin. Salmon and steelhead are a critical component of a complex ecosystem and food web for many species. Critically endangered Southern Resident killer whales, as one urgent example, depend upon a diversity and abundance of salmon stocks up and down the West Coast, including many from the Columbia Basin, to provide the food they need at certain times of the year. Consequently, efforts now underway to save the endangered killer whales include working with salmon management partners in the Columbia Basin.

The Task Force recognizes the many interdependencies of salmon and steelhead in the fabric of our landscape and culture. It embraces the need to work collectively and decisively on a common path towards shared goals and a better future.

2. Building a Regional Partnership

Creation of the Columbia Basin Partnership Task Force addressed one of the key recommendations from the Oregon Consensus Program and the Ruckelshaus Center Situation Assessment — the need to make sure those in the Columbia Basin whose lives and futures are affected by decisions have an authentic role in developing the long-term goals for salmon and steelhead recovery. NOAA Fisheries, the Northwest Power and Conservation Council (representing the four Columbia Basin states), and other regional partners held informal discussions about the best way to address this finding. NOAA Fisheries was highlighted for its leadership role and agreed to pursue a comprehensive, collaborative effort to move forward.

Several steps ensued that led to the formation of the Task Force. In February 2015, the Northwest Power and Conservation Council (Council) agreed to align the objectives of the salmon and steelhead elements of its Fish and Wildlife Program with NOAA Fisheries' efforts to follow up on the Situation Assessment. Recognizing the importance of a shared vision among parties with overlapping and complementary missions, the Council tasked staff with compiling existing Columbia River basin salmon and steelhead goals and objectives, beginning with goals for naturally produced salmon and steelhead. The information generated through this effort provided a foundation for the work of the Task Force.

NOAA Fisheries then began to address several important process considerations related to forming a group, including the need to comply with the Federal Advisory Committee Act (FACA). This Act formalizes processes for how agencies can receive objective advice from stakeholders. NOAA Fisheries presented the opportunity to its existing federal advisory group, the MAFAC, which agreed to support this goal-setting effort. The MAFAC determined that the best approach was to form a task force of experts and stakeholders from across the region under its existing FACA authorities. In the spring of 2016, the MAFAC officially approved the creation of the Columbia Basin Partnership Task Force and developed Terms of Reference to define its purpose and parameters (See Appendix C).

In the summer of 2016, NOAA Fisheries initiated a formal nominations process and identified criteria for Task Force members through a *Federal Register* notice (81 FR 47776) and other public announcements. Individuals and stakeholder organizations were asked to submit nominees who met the criteria and represented the broad array of interests in the region, particularly:

- NGO and environmental,
- Commercial fishing,
- Recreational fishing,
- Utilities,
- River industries,
- Agricultural/irrigation, and

- Local salmon and steelhead recovery groups from each state.

On behalf of the MAFAC, NOAA Fisheries also invited the governors of Idaho, Montana, Washington, and Oregon and the chairs of federally recognized tribes in the Columbia Basin to submit the names of individuals they wished to represent them as sovereign entities.

Task Force selection criteria:

- Are broadly representative of interests and constituents affected by salmon and steelhead management in the Columbia River basin;
- Have organizational and/or subject matter expertise regarding salmon and steelhead management in the Columbia River basin;
- Have the authority to represent and speak on behalf of their interests/constituents;
- Have demonstrated a willingness and ability to work with and respect other stakeholders to find solutions; and
- Together represent the geographic diversity of the Columbia Basin.

Twenty-eight individuals were selected from across the Columbia Basin region by MAFAC to serve on the Task Force for two years, according to the above criteria, and approved by the NOAA Fisheries' Assistant Administrator. The Task Force's in-depth work and recommendations provide necessary input for MAFAC to formalize its advice for NOAA consideration, per the FACA processes.

3. Creating a Common Foundation

Salmon and steelhead contribute much to the identity of the Columbia Basin. They form the backbone of coastal communities, support jobs, and provide recreational opportunities for many people across social classes and geographic origins. As described in Chapter 4, salmon and steelhead and the Columbia Basin ecosystem that supports them are central to tribal culture, ceremony, and subsistence, and integral to their economy as the first fishers of the Columbia Basin. The Task Force members often reflected upon the importance of the fish for future generations and landscape, and considered a broad array of values in developing work products. All of these interconnections to salmon and steelhead require that long-term, stable solutions consider the full range of interests and impacts. The range of interests represented at the Task Force embraced the many values of salmon and steelhead to our society, culture, economy, and ecosystem.

3.1 Recognizing the Many Values of Salmon and Steelhead and the Columbia River

Although our current landscape is significantly altered from pre-European settlement, salmon and steelhead continue to be an integral part of the fabric and identity of the Pacific Northwest. Writer Tim Egan once defined the Pacific Northwest as "*Wherever salmon can get to.*" Our salmon and steelhead are a major cultural icon for the entire region, and are woven into the lives and cultures of many communities throughout the Columbia River basin. Unfortunately, the fish are now struggling. Recovering salmon and steelhead to healthy and harvestable levels is essential for multiple social, cultural, and ecological reasons. Because the Columbia River's runs are highly migratory, their value is disbursed over a wide geographical region, south from central California to far north in the Gulf of Alaska, where salmon and steelhead harvests provide food, jobs, and economic value to many communities, and support multiple food chains and ecosystems (Figure 4). The values of the river system impact the entire West Coast, including areas where salmon and steelhead no longer swim due to dams and blockages, such as in the Upper Columbia and Upper Snake Basins. They also include areas that never supported salmon and steelhead but now reap the benefits from the river's uses, including hydropower, transportation, and irrigation.

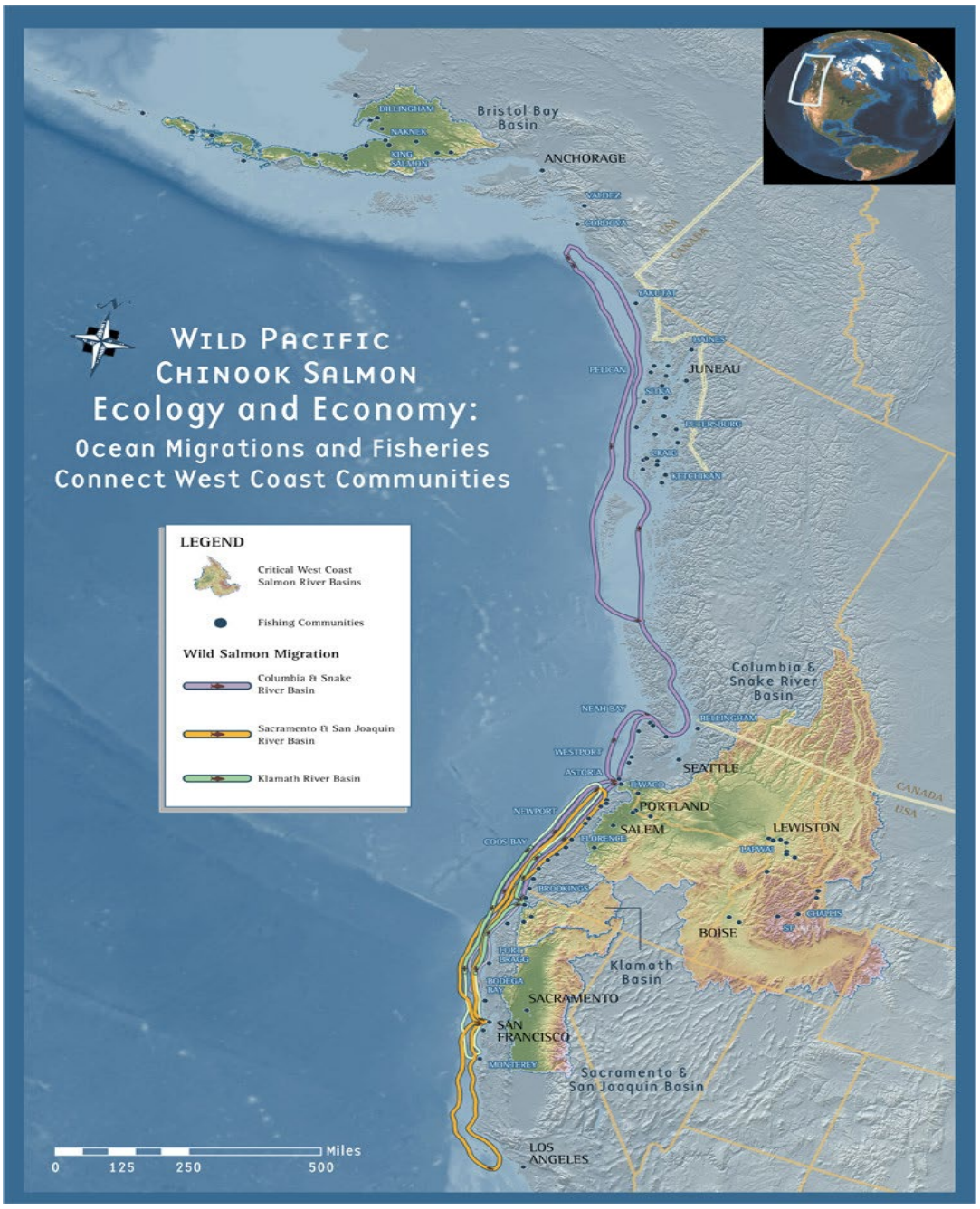


Figure 4. Ocean migration routes of west coast Chinook salmon runs. (From Save Our Wild Salmon, used with permission.)

Fishery Values

Columbia River salmon and steelhead support long-standing and valuable fisheries throughout the Columbia Basin and in the ocean. Direct and indirect economic values of commercial, recreational, and subsistence fisheries are significant for many communities:

Commercial Fishing. Columbia River stocks of Chinook and coho salmon contribute to commercial fisheries in the Pacific Ocean off the coasts of Oregon, Washington, British Columbia, and Alaska. About 32 percent of the Chinook salmon in non-tribal commercial fisheries and 22 percent of the Chinook salmon harvested in tribal commercial fisheries north of Cape Falcon on the Oregon coast consist of Columbia River stocks. Columbia River stocks of Chinook salmon are a primary target of commercial fisheries in the Astoria area of northern Oregon and along the Washington coast. Columbia River stocks also account for about 28 percent of Chinook salmon harvested in the Southeast Alaska commercial fishery and about 7 percent of the commercial harvest of Chinook salmon harvested in British Columbia marine waters.

Commercial fisheries are tremendously important to tribal communities. For many tribal members, fishing is still the preferred livelihood, and Columbia River salmon and steelhead support essential commercial, ceremonial, and subsistence fisheries.

Based on annual data from 2008 to 2011, commercial fisheries (tribal and non-tribal) harvested 327,493 salmon and steelhead per year, worth $5,591,040 (ex-vessel value) annually within the Columbia Basin.[4] Washington and Oregon coastal commercial fisheries, where the contribution of Columbia River stocks is substantial, harvested another 129,208 fish with an estimated value of $2,635,952. These figures represent the income and employment from the harvester and processor stages only and do not include additional benefits resulting from sales associated with retail or restaurant markets.

From boat builders to seafood processors, commercial salmon and steelhead fishing generates an estimated 1,244 jobs, worth $57,457,390 in personal income to the Columbia Basin economy. Many of these jobs are indirectly generated by the salmon and steelhead fishing industry and occur in smaller coastal communities whose economies are heavily dependent on the fishery. For example, the Astoria, Oregon, and Ilwaco, Washington port areas were important salmon and steelhead processing centers and declining harvests in the Columbia River have led to major declines in these industries.[5]

Recreational Fishing. Recreational fishing is also a major economic driver in the Pacific Northwest, especially in smaller rural communities. Most of this activity is inland, but significant ocean recreational salmon fisheries also exist in several smaller coastal ports. Economic benefits are shared across communities, from fishing guides to small bait-and-tackle store owners, boat dealers to local hotel proprietors, authors of fishing guides to local restaurants, and charter boat operators to outfitters. Steelhead account for about 45 percent

[4] Mitchell Act EIS, p. 4-178-179. For commercial harvesters (including both tribal and non- tribal), the ex-vessel value (i.e., the price received for the product at the dock) of salmon and steelhead provides a measure of its gross economic value. Ex-vessel value represents the direct benefits to the harvester and does not include additional economic benefits resulting from processing and sales associated with retail or restaurant markets. If the cost of fishing (e.g., equipment, fuel, boats, insurance, etc.) that commercial harvesters incur is considered, the resulting net income (ex-vessel value minus costs) provides a measure of net economic value.
[5] Mitchell Act EIS p. 3-84.

(139,507 fish) of all salmon and steelhead caught in recreational fisheries in the Columbia River basin (311,252 fish). A little more than half (161,313 fish) of the annual average recreational harvest of salmon and steelhead in the Columbia River basin (305,168 fish) occurs in the lower Columbia River and tributaries. Along the West Coast (including Southeast Alaska), coho and Chinook salmon contribute fairly evenly to recreational salmon fisheries, with an estimated 224,023 coho salmon and 224,058 Chinook salmon caught annually.[6]

The estimated recreational catch of salmon and steelhead in the Columbia River basin, based on data from 2008 to 2011, reflects an estimated 1,515,038 trips resulting in 305,705 fish, and about $125,136,636 in trip-related expenditures.[7] Recreational catch and associated trips and expenditures tend to be highest in the lower Columbia River and next highest in the lower Snake River where steelhead is the primary target species. About 18 percent of the recreational catch and expenditures are from the mid and upper Columbia River basin. These trip expenditures contributed to $160,815,403 in personal income and 4,035 jobs. In addition to these trip expenditures, other expenditures for equipment (e.g., boats, rods and reels, tackle, etc.) also contribute to the economy. Sales of these durable goods are a primary source of income for many Oregon, Washington, and Idaho businesses. It is not known how such expenses on fishing-related equipment amortizes into trip-related expenditures.

Subsistence Fishing. As the primary food source for the Columbia Basin tribes for thousands of years, salmon and steelhead continue to provide an essential component of their nutritional health.[8] Many tribal members living within the Columbia Basin engage in subsistence fisheries as a foundation of their diets, at fish consumption rates far greater than non-native populations.[9] As discussed above, there are also important tribal commercial fisheries that provide livelihoods to tribal members.

The net economic benefit derived from Columbia Basin-origin salmon and steelhead is only one part of the total regional economic impact related to the health (or lack of health) of these stocks. Most coastal ocean salmon commercial and recreational fisheries are governed by "weak stock management" rules, under which the weakest stock becomes the limiting factor in all other intermingling ocean fisheries. Under these "weak stock management rules" severely depressed, but intermingling, Columbia Basin-origin salmon and steelhead stocks can trigger widespread coastal fisheries closures to protect these weakest stocks. In other words, access for harvest of

[6] Mitchell Act EIS p. 3-85. Based on data from 2002 through 2009.
[7] Mitchell Act EIS, p. 179-180. Recreational fishers' willingness to pay for their recreational fishing experience represents a measure of gross economic value associated with fishing for salmon or steelhead. Because recreational anglers also incur costs to fish (e.g., bait, tackle, lodging, guide fees, boat-related expenses, travel expenses, etc.), subtracting out these costs provides a measure of net economic value (i.e., net willingness to pay) for fishing opportunities.
[8] See *Wy-Kan-Ush-Mi Wa-Kish-Wit,* CRITFC's Spirit of the Salmon Plan.
[9] A survey by CRITFC concluded that the average fish consumption rate for members of Native American Tribes in the Columbia Basin was about 58.7 grams/day. *A Fish Consumption Survey of the Umatilla, Nez Perce, Yakama, and Warm Springs Tribes in the Columbia Basin,* CRITFC Technical Report 94-3 (Oct. 1994), available at: http://www.critfc.org/wp-content/uploads/2015/06/94-3report.pdf.

other far more abundant stocks can be severely restricted whenever intermingling weak stocks from the Columbia Basin are too depressed to safely allow even accidental harvest in what would otherwise be more abundant fisheries. Such weak stock management closures can cause major economic losses as a result of lost harvest opportunities. These lost opportunities affect ocean coastal fisheries as far south as Central California and as far north as Southeast Alaska, as well as freshwater fisheries in the mainstem Columbia River and tributaries.

The overall trend in commercial salmon and steelhead landings has been downward since the late 1930s (although short-term increases were seen in the late 1980s and between 2001 and 2004.[10] The good news is that much of what has been lost over the past decades in salmon and steelhead economic contributions could be recaptured if efforts to improve abundance prove successful. One estimate is that restored salmon fisheries in the Columbia Basin could generate up to $500 million/year in additional regional personal income benefits and support up to 25,000 new family wage jobs.[11]

Other Resource Values

Today salmon and steelhead share much of their remaining habitat with cities, towns, farms, ranches, managed forests, and other land uses across the resource-rich Columbia Basin. The fish share a river migration corridor with a vast network of Northwest hydropower projects that serve many purposes including commercial navigation, electricity generation, recreation, irrigation, and municipal and industrial water supply. These developments have significantly impacted salmon and steelhead survival and habitat quality. They also make significant contributions to local communities and the Pacific Northwest economy, including:

> Hydropower and Flood Control. Federal agencies have built 31 major multipurpose dams on the Columbia River and its tributaries. The hydropower generated from the federal projects, sold on the wholesale power market by the Bonneville Power Administration to public utility districts, rural electric cooperatives and municipal utility departments, and investor-owned utilities, provides about 28 percent of the electric power used in the Pacific Northwest. The federal dams also provide a critical function in flood control protecting homes, businesses, and livelihoods. More than 30 privately owned dams have also been built in the basin and serve a variety of purposes.
>
> Transportation. Over 50 million tons of cargo worth over $21 billion passes each year through the waterway, including over 9 million tons of cargo moving through the mainstem Columbia and Snake River dams and their federal navigation locks. The Columbia and Snake River system is the nation's top wheat export gateway, second in the nation for soy, and tops on the west coast for forest products and minerals exports. Over 50 percent of the nation's wheat moves out of the lower Columbia River. Of all U.S. wheat exports, 17 percent travels

[10] Mitchell Act EIS p 3-83.

[11] *The Cost of Doing Nothing: The Economic Burden of Salmon Declines in the Columbia River Basin*, Institute for Fisheries Resources (Oct. 1996), available at: http://pcffa.org/wp-content/uploads/2016/10/CDNReport-Columbia.pdf.

through the dams on the Columbia River, and nearly 10 percent moves through the four lower Snake River dams, destined for oversea markets.[12]

Agriculture. Water storage and irrigation networks have helped transform arid portions of the Columbia Basin into rich agricultural areas. Many of these projects also have recreational, flood control, and power generation benefits. The Yakima Project, for example, has been a driving force in the economic status of the Yakima Valley since its inception in 1902. Today over 60 different irrigated crops, such as apples, mint, and hops, are valued at $1.3 billion annually in this subbasin alone.[13] The Columbia Basin Project in northeastern Washington produces over $1.27 billion worth of potatoes, sweet corn, and onions, as well as specialty crops like grapes, hops, fruit trees, and alfalfa.[14] In Idaho, over 300 irrigation districts and canal companies contribute water supplies for more than two million acres of irrigated Idaho farmland, which produce potatoes, vegetables, and dairy products valued at $6−7 billion annually.[15]

Ecological Values

The historic salmon and steelhead runs of the Columbia Basin did not exist in isolation; they were an integral part of a vast and intricate food web supporting many other species, spanning an area throughout the west coast from San Diego to Southeast Alaska. Of note:

A Source of Food. Salmon and steelhead are a major or important food source not just for humans, but for at least 138 species of birds, mammals, amphibians, and reptiles native to the Pacific Northwest that have been identified by scientists as predators or scavengers of salmon and steelhead at one or more stages of the salmonid life cycle. Of this group of 138 species, nine have a strong, consistent relationship with salmon and steelhead, and another 58 have a recurrent relationship with the fish. Yet another 25 species have indirect relationships that depend upon healthy salmon and steelhead runs to support their direct prey base.[16]

[12] Statistics sources: Waterborne Commerce of the United States (U.S. Army Corps of Engineers' Institute for Water Resources), U.S. Department of Agriculture. U.S. Census Foreign Trade Statistics. https://www.census.gov/foreign-trade/guide/index.html

[13] Source: https://www.usbr.gov/pn/project/brochures/fullyak.pdf.

[14] Source: https://www.usbr.gov/pn/project/brochures/columbiabasinproject.pdf.

[15] Source: Pacific Northwest Project 2015. *The Economic Importance of Western Irrigated Agriculture, Family Farm Alliance Review.* Figure 4. Baseline Production Data from National Agricultural Statistics Service (NASS), USDA, Annual Bulletins and NASS Census Data for 2012 (2013, 2014); and irrigation production estimates from Appendix tables 1 and 2, and methodology described in Pacific Northwest Project water resources-white paper. *The Economic Importance of Western Irrigated Agriculture,* Family Farm Alliance Review, 2015.

[16] Species numbers from introductory Abstract in Cederholm, C. J., D. H. Johnson, R. E. Bilby, L. G. Dominguez, A. M. Garrett, W. H. Graeber, E. L. Greda, M. D. Kunze, B. G. Marcot, J. F. Palmisano, R. W. Plotnikoff, W. G. Pearcy, C. A. Simenstad, and P. C. Trotter. 2000. *Pacific Salmon and Wildlife – Ecological Contexts, Relationship, and Implications for Management. Special Edition Technical Report*, Prepared for D. H. Johnson and T. A. O'Neil (Managing directors), Wildlife-Habitat Relationships in Oregon and Washington. WA Dept. of Fish & Wildlife, Olympia, WA. (Hereinafter "Pacific Salmon and Wildlife.)

Southern Resident killer whales depend almost exclusively on salmon, with various species comprising over 98 percent of their diet.[17] Of that, roughly 80 percent of their diet is Chinook salmon. A lack of prey, principally Chinook, is among the greatest threats to Southern Resident killer whale recovery and survival. The science shows they are feeding on salmon off the outer coast of Washington, Oregon, and California between January and June, but that the orcas concentrate near the mouth of the Columbia River at times that coincide with the return of spring Chinook.[18]

The 2008 NOAA Fisheries *Southern Resident Killer Whale Recovery Plan* states, "Perhaps the single greatest change in food availability for resident killer whales since the late 1800s has been the decline of salmon in the Columbia River basin."[19] Given the potential for substantial salmon recovery in the Columbia River basin, conservation efforts to rebuild natural Chinook populations, along with Chinook produced from Columbia Basin hatcheries, can contribute significantly to adequate and abundant prey for Southern Resident killer whales. Hatchery-produced Chinook are particularly important to supply prey in the near term while natural populations are rebuilding.

A Source of Nutrients. When they return to spawn, salmon and steelhead become a unique biological conveyor belt for nutrients from the ocean back to land. For example, an adult chum salmon returning to spawn contains an average of 130 grams of nitrogen, 20 grams of phosphorus, and more than 20,000 kilojoules of energy in the form of protein and fat. A 250-meter reach of salmon stream in southeast Alaska receives more than 80 kilograms of nitrogen and 11 kilograms of phosphorous in the form of chum salmon tissue in just over one month.[20]

As the bodies of spawning salmon and steelhead break down, nitrogen, phosphorus, and other nutrients become available to streamside vegetation. According to Robert Naiman of the University of Washington, annual spawning migrations of salmon transport substantial quantities of marine-derived nutrients from the fertile North Pacific Ocean to freshwater and terrestrial ecosystems.[21] One study concludes that trees on the banks of salmonid-stocked

[17] Ford MJ, Hempelmann J, Hanson MB, Ayres KL, Baird RW, Emmons CK, et al. (2016) Estimation of a Killer Whale (*Orcinus orca*) Population's Diet Using Sequencing Analysis of DNA from Feces. PLoS ONE 11(1): e0144956.doi:10.1371/journal.pone.0144956.

[18] Haneson MB, Emmons CK, Ward EJ (2013) Assessing the coastal occurrence of endangered killer whales using autonomous passive acoustic recorders. J. Acoustic Soc. Am. 134(5) 3486-3495.

[19] National Marine Fisheries Service (2008) Recovery Plan for Southern Resident Killer Whales (*Orcinus orca*). National Marine Fisheries Service, Northwest Region, Seattle, Washington. At: II-82.

[20] Scott M Gende, Thomas P. Quinn, Mary F. Wilson, Ron Heintz & Thomas M Scott (2004). Magnitude and Fate of Salmon-Derived Nutrients and Energy in a Coastal Stream Ecosystem, *Journal of Freshwater Ecology*, 19:1 (149-160), DOI:10.1080/02705060.2004.9664522; see also Bilby, Robert E; Beach, Eric W.; Fransen, Brian R.; Walter, Jason K.; Bisson, Peter A. Transfer of Nutrients from Spawning Salmon to Riparian Vegetation in Western Washington. *Transactions of American Fisheries Society*, July 2003, Vol.132(4), pp. 733-745.

[21] Naiman, R. J., J. M. Helfield, K. K. Bartz, D. C. Drake, J. M. Honea. 2009. Pacific Salmon, Marine-Derived Nutrients and the Characteristics of Aquatic and Riparian Ecosystems. Challenges for diadromous fishes in a global environment. Pages 395-425 in American Fisheries Society Symposium 69.

rivers grow more than three times faster than their counterparts along salmonid-free rivers and, growing side by side with the fish, Sitka spruce take only 86 years, rather the usual 300 years, to reach 50 cm thick.[22] However, a century of widespread salmon declines has brought this important natural nutrient recycling system down to an estimated 6 to 7 percent of historic marine nutrient recycling loads.[23]

3.2 Understanding the Challenges of Salmon and Steelhead Recovery

Given the complexity of salmon and steelhead management, a critical aspect of the process was to provide a common foundation of knowledge about fish management and needs across the complex life cycle. NOAA Fisheries held two public workshops to develop this common understanding of salmon and steelhead status, management approaches and tribal treaty and trust responsibilities. During the workshops, regional experts provided background presentations on harvest, hatchery, hydrosystem, and habitat management, as well as on recent species status and related scientific research, to over 100 attendees. These presentations are posted on the Task Force webpage: https://www.westcoast.fisheries.noaa.gov/columbia_river/index.html.

In addition, the Task Force identified major factors that influence salmon and steelhead recovery. These factors are associated with hydropower, habitat, hatcheries, harvest, and reintroduction of salmon and steelhead into blocked areas. Task Force members also discussed ecosystem benefits from recovery. Members brought their experience and expertise to the discussions, providing informative presentations on each issue. NOAA Fisheries staff also brought extensive expertise to these discussions. This breadth and depth of Task Force members' participation, and their interactions with NOAA staff, allowed the Task Force members to consider the Columbia Basin comprehensively and inclusively, including visualizing desired future conditions for salmon and steelhead within several future timeframes.

3.3 Developing Shared Interests

From the outset, the Task Force made a commitment to foster the effort as a "collaborative and science-based forum to provide a shared definition of success for salmon and steelhead recovery." For many members, the Task Force process is their first time working directly with each other. In the past, many of the members have faced each other in the court room on opposing sides. In the Columbia Basin, never before has there been one table with all of these interests working with a shared purpose. And the investment each has in the outcome is significant. The commitment to work together established a common bond and sense of community around the table. Given a history of contention in the Columbia River basin on a

[22] Helfield, James M., "Effects of Salmon-Derived Nitrogen on Riparian Forest Growth and Implications for Stream Productivity"(2001). *Environmental Sciences Faculty Publications. 19.* https://cedar.wwu.edu/esci_facpubs/19; Reimchen, T., *et al.* 2003. Isotopic evidence for enrichment of salmon-derived nutrients in vegetation, soil and insects in riparian zones in coastal British Columbia. *American Fisheries Society Symposium* 34:59–69.

[23] Gresh, Ted; Jim Lichatowich; Peter Schoonmaker. An Estimation of Historical and Current Levels of Salmon Production in the Northwest Pacific Ecosystem: Evidence of a Nutrient Deficit in Freshwater Systems of the Pacific Northwest. *Fisheries*, Vol. 25(1) (2000), pp. 15-21.

variety of salmon and steelhead-related issues, this level of commitment provides a unique opportunity for long-term salmon and steelhead recovery.

To foster a cooperative atmosphere and build trust and respect, NOAA Fisheries engaged neutral facilitation expertise to promote interest-based discussions. The Task Force facilitators encouraged Task Force members to listen, inquire, and understand each other's interests. Each meeting included time for several Task Force members to share their interests and hopes, addressing two questions:

- *How do people in your community view salmon and steelhead recovery efforts?*
- *How would you describe the key challenges, priorities, and opportunities you see for salmon and steelhead recovery?*

Over the course of six Task Force meetings, all Task Force members shared personal stories and experiences in response to these prompts. This process encouraged members to step into one another's shoes and more deeply understand the wide range of interests, values, and concerns shared by members. In addition, the Task Force meetings were structured to allow participants time to thoroughly express their points of view, ask questions to explore varied interests and understand the root of differences, and seek to develop creative solutions to meet all interests. As a result, members fostered greater respect and understanding for the multitude of interests and values of those who care about the future of the Columbia Basin, and found ways to positively move forward.

Samples of declared hopes and expectations from the first meeting of the Task Force:

- Educate task force members on the cultural and spiritual role salmon and steelhead have on people's lives, including treaty/trust responsibility, and that the basin provides direct food resources to hundreds of communities.
- Salmon is an icon of magic, hope, and renewal in the Pacific Northwest; this aspect should be integrated to sustain cultural significance.
- This process can be used to establish and build relationships based on transparency, trust, and accountability to move forward together.
- The hope is that this process will help increase communication amongst members to avoid unnecessary litigation in the future.
- Success is working together to support, explain, and argue passionately to defend the outcomes of this process in any venue, friendly or unfriendly, public or private.
- This process provides the opportunity to listen, learn, and offer expertise as well as ask to approach issues from each other's perspectives to meet all interests.
- Identify a solution that works towards long-term, lasting, and sustainable change for all interests at the table.

This open and forthright atmosphere highlighted the commitment, experience, and collective wisdom among members. Members regularly expressed appreciation for respectful discussions about difficult challenges. Many members acknowledged the Task Force as an opportunity to look honestly and openly at the current landscape and towards a future for the Columbia Basin with healthy and abundant salmon and steelhead, and a forum that recognized everyone's interests. As the Task Force continued to meet, the approach allowed members to seek common interests and develop a shared vision. With the fish as a common bond, Task Force members fostered the trust and respect essential to finding solutions and synergies**.**

4. The First People of the Columbia Basin: A Tribal Perspective on Developing Shared Goals

This chapter was provided by the tribal members of the Task Force to share their perspective on the development of salmon and steelhead recovery goals for the Columbia River basin.

4.1 More Than a Tradition

The tribal delegates to the Columbia Basin Partnership Task Force represent a contingent of diverse sovereign nations that have existed in the Columbia Basin since time immemorial. The rivers and tributaries of the Columbia and Snake Basins have always provided for our people's needs. We are of this land, and as sovereign tribal nations, we are distinct in our connection to it. Anadromous and native fish, including the five species of Pacific salmon, steelhead, Pacific lamprey, white sturgeon, and eulachon, are part of our identity. They are our relatives, and we participate on this task force as part of our sacred responsibility to speak for those who cannot. These fish and the Columbia Basin ecosystem are central to tribal culture, ceremony, and subsistence. They have always been a fundamental component of our tribal economies and trade. The rivers and the fish have taught us many lessons. We are honored and take seriously the opportunity to share our ways and to teach these lessons to those who will listen. We accept that compromise is necessary to bring about a better environment and a better future for the fish, but we will not compromise our identity, and we will never cease to be tribal members.

While the participating tribes of the Task Force share different relationships and agreements with the United States federal government and one another, we are aligned in the perspective that salmon and steelhead are more than a vibrant cultural or spiritual tradition. The participating tribes of the task force agree that we have a sacred duty to salmon and steelhead — indeed all the natural resources in the Columbia Basin. We believe that if you take care of the resources, the resources will take care of you. A common tribal perspective is that we are borrowing these resources from future generations.

Our participation on the Task Force is contingent on honoring of tribal treaty and trust responsibilities/obligations and the Task Force's continued engagement to help restore and care for what has been diminished, conceded, or lost. To this end, the participating tribal delegates want to be forthright in our perspective of how the Columbia Basin moves forward to achieve the provisional qualitative and quantitative goals presented in this document.

4.2 No False Equivalencies in Achieving Recovery

Participants on the Task Force have developed provisional "broad sense" recovery goals to address long-term conservation, harvest, and mitigation needs for Columbia Basin salmon and steelhead. It has been clear to us that no members of the Task Force want to see Columbia Basin salmon and steelhead go extinct or live in an endless cycle of adversarial litigation.

To accomplish the broad sense goals presented in this document, we must identify the factors that are within our control to improve salmon and steelhead survival. This requires change and compromise. For tribal nations, the inherent challenge with being in a working group like the Task Force is the overarching principle of fair play and compromise. All members of the Task Force need to be open minded and willing to compromise. The tribal perspective is unique, in that our history has been one of a continuous and unabated loss of resources. Conversely, other sovereign and stakeholder participants' histories show significant, measurable resource gains, even if they can identify a period of decline in their recent histories or if their constituents are frustrated or fatigued by salmon and steelhead mitigation that is perceived to have demonstrated little in the way of recovery.

Over the last 200 years, tribal resource losses, including reduced availability of salmon and steelhead, are a direct consequence of the resource gains of others in the Columbia Basin. It is a false equivalency to propose that all parties on the Task Force should be willing to give up equally, because historical gain/loss balances weigh heavily against tribes. This is especially true for the many tribal nations that no longer have anadromous fish returning to their homelands.

As we move toward testing these provisional broad sense goals, we are looking for zero-loss compromises and win-win solutions. The tribal nations are not willing to accept the normalization of the *status quo* and do not concede our long-term tribal goals for salmon and steelhead restoration, including restoring passage to blocked regions of the Columbia River basin that historically supported anadromous fish. We will continue to look for the shared responsibility and accountability for this resource into the future.

4.3 Moving Baselines and the Future

The pristine potential of the Columbia Basin is the basis for long-term tribal goals for salmon and steelhead restoration; however, it is important to articulate that the tribes are looking to the future, not striving to return the Columbia Basin to 19th century conditions. We now live in a society that relies heavily on hydropower production and economies associated with it, but the salmon and steelhead are showing us that the balance of this relationship is skewed. The people of the Pacific Northwest, including British Columbia and Alaska, ask a lot of these fish. In some places, we have already asked too much. The Task Force can change this conversation and determine what we can do to help these fish recover.

The participating tribes of the Task Force have been sensitive to the establishment of provisional quantitative goals with concern that some escapement objectives may reset baselines to levels of already degraded conditions. However, for tribal nations that no longer have returning salmon and steelhead, they have everything to gain from this process. We view the Task Force provisional goals as a step in the right direction and in-line with long-term tribal recovery goals.

4.4 Moving Forward

We are encouraged by the relationships that have been built, and the respectful dialogue that has ensued between the sovereigns and stakeholders of this Task Force. It is promising that the members of the Task Force are not just focused on the *status quo* or merely achieving ESA-delisting goals, but rather focused on the future potential of the entirety of the Columbia Basin.

With or without the Task Force, the tribes will continue their work to return fish to rivers and heal the Columbia Basin ecosystem. Achieving the goals set forth in this document however, will require coordinated long-term commitment and investment by sovereigns and stakeholders alike. With respect to salmon and steelhead recovery, we recognize that there are many things outside of our control, including ocean conditions and climate change. However, there are undoubtedly many things on the landscape that are within our control, and we must evaluate and implement the critical actions that can move us toward achieving these broad sense provisional goals.

As has been our agreement since the beginning, we will continue to speak on behalf of the fish and the ecosystem we have always been in partnership with. We offer this perspective to invite readers of this document to view the Columbia Basin from the tribal lens. Like the salmon and steelhead, the tribes have adapted to the challenges of the last 200 years and have persisted. As measures are implemented to achieve provisional goals, we are sensitive to the reality that Task Force members and their constituents will experience similar challenges to the ones that tribes have faced. We respect and honor your willingness to face those challenges. We look forward to continued collaboration and partnership with the Task Force.

5. Building a Collaborative Approach

The Task Force employed a collaborative approach to ensure that all of the different interests represented around the table — and across the Columbia Basin — were fully heard and considered during group discussions.

5.1 Task Force Organization

NOAA Fisheries formally convened the Task Force on January 24−25, 2017. Among the first efforts of the Task Force was developing and agreeing to a set of Operating Principles that outlined how the group would conduct its work (See Appendix D). In addition, the Task Force developed and agreed to work plans that identified products and timeframes, and established various teams to work on specific aspects of the work plan. Various teams developed draft work products, which were then considered and discussed by the full Task Force at meetings.

Task Force teams included:

- A Coordinating Committee, which addressed agenda topics and approaches for the Task Force meetings;
- A Vision Team, which worked on honing the vision statement for review and discussion by the Task Force;
- A Qualitative Goals team, which worked to refine the qualitative goals between Task Force meetings;
- An Integration Team, which worked on ways to consider the goals across species;
- Regional technical teams, which were geographically based and developed quantitative goals for each region; and
- A Drafting Team which worked on developing this report to reflect the work of the Task Force.

5.2 Major Work Products

The Task Force developed several major products: Guiding Principles, a Vision Statement, Qualitative Goals, and Provisional Quantitative Goals. These products address all salmon and steelhead species in the United States portion of the Columbia River basin, including all its tributaries, ESA-listed and non-listed salmon and steelhead, and historical anadromous production areas that are currently blocked by dams.

The Guiding Principles, Vision Statement, and Qualitative Goals together form the policy framework of the Task Force. The policy framework was intended to inform the analytical work of the Task Force, including the development of Quantitative Goals. All of these products together form the final recommendations of the Task Force (Figure 5).

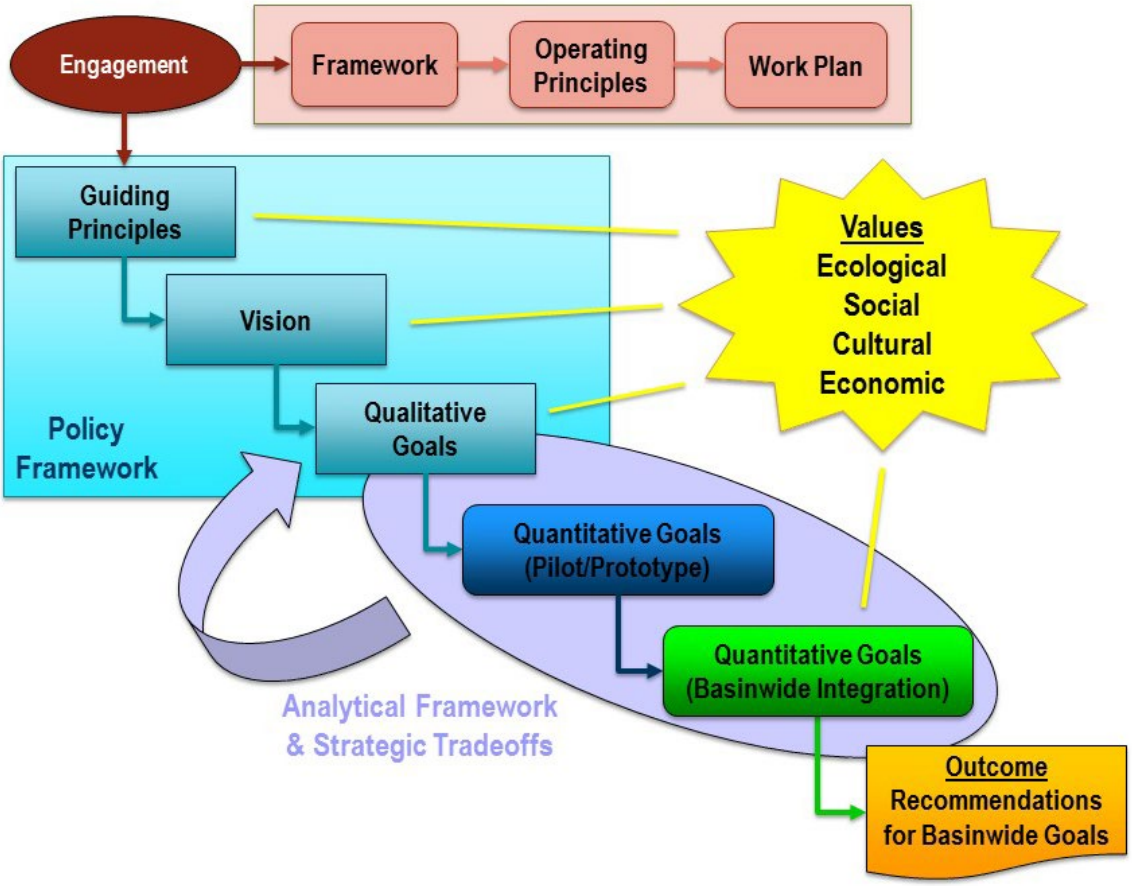


Figure 5. The major work products that form the Task Force recommendations.

Qualitative goals reflect statements of purpose or outcomes consistent with the overarching vision for Columbia Basin salmon and steelhead. They describe our ecological, social, cultural and economic values, and reflect desired outcomes in terms of human experience, opportunity, and biological status of the Columbia Basin environment. The Qualitative Goals reflect the Guiding Principles and Vision, and serve as a foundation for development of Quantitative Goals. The Qualitative Goals team worked to write and refine the Qualitative Goals over multiple iterations, with many opportunities for Task Force members to provide feedback. The Qualitative Goals can be found in Chapter 8 of the report.

Quantitative goals are measurable and specific conditions that would indicate whether a qualitative goal has been achieved. Quantitative goals translate qualitative outcomes into numerical values.

The Task Force originally intended to develop Quantitative Goals for naturally produced salmon and steelhead, for hatchery production, and for harvest and fisheries. As the work of the Task Force proceeded, the group determined that additional time, evaluation, and integration among the goal categories was needed to complete Quantitative Goals for hatchery production and for harvest and fisheries. Therefore, this report reflects Provisional Quantitative Goals for natural

production for salmon and steelhead in the U.S. portion of the Columbia River basin and its tributaries, including listed and non-listed salmon and steelhead, and some historical production areas that are currently blocked. For hatchery production this report reflects information on current and anticipated hatchery production, and for harvest and fisheries, it reflects potential harvest under several scenarios. Additional work to refine, integrate, and align the goals for hatchery production and for harvest and fisheries with the natural production goals will occur in the next phase of the Task Force process. In this report, we use the term Quantitative Goals, to refer to the quantitative natural production goals, the quantified anticipated hatchery production, and quantified potential harvest.

To develop Quantitative Goals and access the abundance of available data, NOAA Fisheries convened regional technical teams with significant experience in the subject area to support the Task Force effort. Each team addressed salmon and steelhead stocks in a particular region of the Columbia Basin: Upper Columbia, Snake, Middle Columbia, Lower Columbia, and Willamette River basins. Team members generally included staff from states, tribes, NOAA Fisheries, and local experts. Each regional team operated under the guiding principles set by the Task Force, including the principle that recommendations be firmly grounded in sound science.

Early in the effort to develop Quantitative Goals, regional technical teams conducted pilot studies to identify goals for particular salmon and steelhead stocks. These pilot efforts for five prototype stocks were then presented to the entire Task Force, to determine which approach would be most appropriate as the basis for goal-setting for all Columbia Basin runs.

Teams identified provisional quantitative goals in several categories (natural production, harvest, hatchery production, and total number of adults returning to the mouth and to specific regions of the Columbia River, called the 'run' size) for each stock. For each category, they also developed goals in low, medium, and high ranges that reflect a continuum of aspiration for progressive improvements to be achieved over an extended time period.

The teams developed the Quantitative Goals to consider a number of factors, including ESA delisting requirements, habitat constraints and natural production potential, tribal treaty obligations and cultural needs, fishing interests and sustainability, and mitigation responsibilities, including in currently blocked historical anadromous production areas. Additionally, teams were careful to make use of goals already identified in the variety of recovery, management, and mitigation plans that exist in the Basin. Chapter 9 discusses the approach and method used to develop the Provisional Quantitative Goals and provides summaries. Appendix A presents the Provisional Quantitative Goals details by stock. These goals will be refined in the next phase of this effort.

6. Guiding Principles

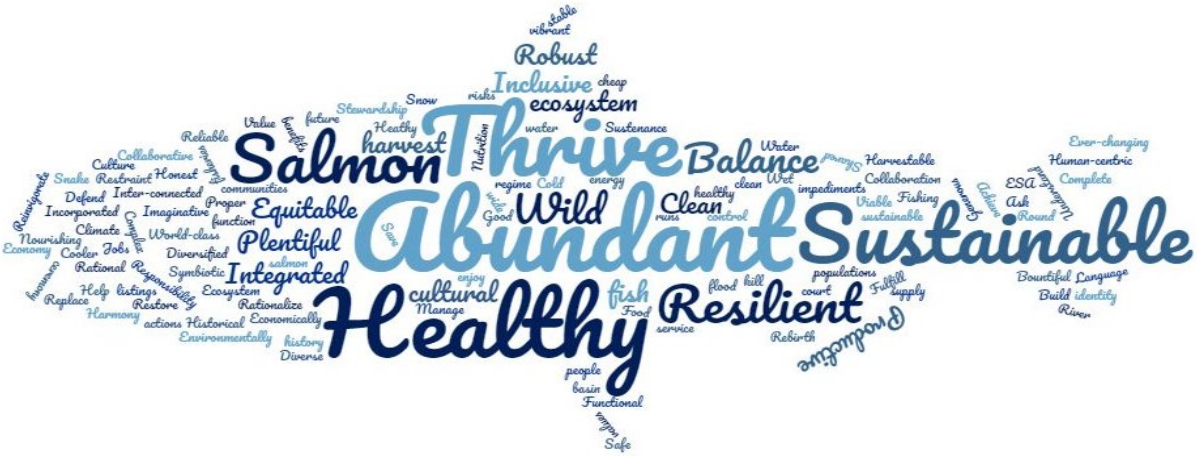
The Task Force developed Guiding Principles early on in the process to capture the spirit of openness, fairness, transparency, and respect among the members. These Guiding Principles were unanimously adopted at the June 2018 meeting of the Task Force.

The Guiding Principles are:

1. FAIRNESS: Foster a culture of respect, equity and generosity and be accountable for our interests.
2. OPENNESS & TRANSPARENCY: Everything is on the table — recognize yours and others' needs, acknowledge fears, threats and limitations to success, and be willing to re-evaluate them together.
3. OBLIGATIONS & RESPONSIBILITIES: Honor legal, statutory, treaty/trust and regulatory obligations, rights, and responsibilities.
4. CLARITY: Collaboratively arrive at solutions that improve regulatory and legal certainty.
5. SUSTAINABILITY: Strive for durable and practical outcomes, seeking clarity while acknowledging a dynamic social/cultural, economic and natural landscape.
6. KNOWLEDGE & WISDOM: Ground decisions and recommendations in science, while accepting that science may not be definitive.
7. INNOVATION & ADAPTIVENESS: Plan for the long term, act in the short term and be bold in the face of uncertainty and change.
8. INTERCONNECTION & COMPLEXITY: Envision a healthy and resilient ecosystem. Assume there are multiple solutions to resolving Basin issues.

7. Vision

The Task Force devoted significant time and care to the creation of an overarching Vision statement to capture the many views and uses of the Columbia River basin represented by the group, as well as the hopes of each Task Force member for the future of our region. For over one year, each Task Force meeting included an opportunity to review the draft Vision statement, such that Task Force members could reflect on the importance of each word and suggest ways for the group to reach consensus. The word cloud below reflects the nature of the discussions leading up to the Vision statement.



The final Vision statement was unanimously adopted at the June 2018 meeting.

Vision for the Columbia Basin

A healthy Columbia River basin ecosystem with thriving salmon and steelhead that are indicators of clean and abundant water, reliable and clean energy, a robust regional economy, and vibrant cultural and spiritual traditions, all interdependent and existing in harmony.

8. Qualitative Goals

Qualitative Goals capture our different ecological, social, cultural, and economic values, and reflect desired outcomes in terms of human experience, opportunity, and the biological status of the Columbia Basin environment. They describe changes over time that support the larger Vision statement, and provide context for the Quantitative Goals, which are linked to the Qualitative Goals and provide numeric measures of success.

8.1 Overview

The Task Force identified several Qualitative Goals to clarify an approach to achieve their Vision for the Columbia Basin. These Qualitative Goals recognize the need to integrate and balance sometimes competing values and purposes.

Four overarching Qualitative Goals were identified:

1. Restore salmon and steelhead in the Columbia Basin to healthy and harvestable/fishable levels.
2. Provide diverse, productive, and dependable tribal and non-tribal harvest and fishing opportunities for Columbia Basin salmon and steelhead in fresh and marine waters.
3. Produce hatchery salmon and steelhead to support conservation, mitigate for lost natural production, and support fisheries, in a manner that strategically aligns hatchery production with natural production recovery goals.
4. Make decisions within a broader context that reflects and considers effects to the full range of social, cultural, economic, and ecosystem values and diversity in the Columbia Basin.

In establishing its goals, the Task Force recognized both the need and opportunity to act today, while at the same time envisioning salmon and steelhead runs 100 years from now. The Task Force often reflected upon the sense of urgency to help the Columbia Basin runs, the people and communities that rely on them, and the wildlife, such as Southern Resident killer whales, that depend on them for survival.

The first three goals have a subset of goals that anticipates progress in 25 years, 50 years, and 100 years. These timeframes provide a general sense of how we might anticipate steady progress over time. However, they are not intended to reflect a starting or ending point for any particular action. Nor should long timelines ever be an excuse for postponing necessary measures. Actions should be taken as soon as practicable, wherever practical, and sustained for as long as necessary to achieve these goals. For some salmon and steelhead stocks, some subgoals may be attainable on a more rapid timeline, depending on opportunity to take corrective actions to address them. Others will, by their very nature, take much longer to achieve. Overall, achieving our shared visions of the desired future conditions for salmon and steelhead in the Columbia Basin will take

a multitude of actions, starting immediately and in an orderly sequence. The sequence of actions will be better defined during the next phase of this effort.

The fourth goal does not include a timeframe because the values it describes are constant. Over time, the decisions that reflect those values may change, but the values themselves will not.

Together, the Qualitative Goals represent important values that need to be realized throughout the Columbia Basin for this effort to be successful. While each of these goals stands by itself, this does not mean that they are mutually exclusive. Success will depend on the ability and willingness of the region to balance these goals.

As the Task Force moves into further exploring provisional goals in the next phase of this effort, discussions will focus on how to balance achievement of the Qualitative Goals on a stock-specific basis. Different Qualitative Goals may be prioritized for individual stocks. Ultimately, the stock-specific strategies will be combined and evaluated to determine if they will achieve benefits to the natural resource and people interacting with that resource, in harmony, as contemplated by the Task Force Vision.

8.2 Goal 1: Natural Production

The natural production goal is to restore both listed and non-listed salmon and steelhead to "healthy and harvestable levels" (Table 1).

Table 1. Natural production goal and subgoals for Columbia Basin salmon and steelhead.

Goal 1. Restore salmon and steelhead in the Columbia Basin to healthy and harvestable levels.			
Subgoals	*Within 25 years*	*Within 50 years*	*Within 100 years*
1-A. Prevent Declines: Reverse and prevent declines of both listed and unlisted salmon and steelhead.	a. Reverse and prevent declines of both listed and unlisted salmon and steelhead.		
1-B. Achieve ESA Delisting: Recover ESA-listed salmon and steelhead to a point where they are no longer threatened or endangered.	a. Achieve ESA delisting for at least some salmon ESUs and steelhead DPSs.	b. Achieve ESA delisting for additional salmon ESUs and steelhead DPSs.	c. Achieve ESA delisting for all listed salmon and steelhead.
1-C. Achieve Broad Sense Recovery: Restore listed and unlisted salmon and steelhead to healthy and harvestable levels.	a. Make significant, measurable progress toward broad sense recovery of all salmon and steelhead.	b. Achieve healthy and harvestable levels for some salmon and steelhead.	c. Achieve healthy and harvestable levels for all salmon and steelhead.
1–D. Expand Spatial and Temporal Range: Rebuild spatial distribution and run timing of salmon and steelhead at local and basinwide scales, including in currently inaccessible areas within the historical range.	a. Make significant, measurable progress toward rebuilding spatial distribution and run timing of salmon and steelhead at local and basinwide scales, including beginning to study, develop, and implement plans for restoring salmon and steelhead to currently inaccessible areas within their historical range.	b. Continue rebuilding spatial distribution and run timing of salmon and steelhead at local and basinwide scales, including in currently inaccessible areas within their historical range.	c. Complete rebuilding of spatial distribution and run timing of salmon and steelhead at local and basinwide scales, including in currently inaccessible areas within their historical range.
1-E. Expand Diversity and Resiliency: Rebuild salmon and steelhead runs that are adaptive and resilient to climate change and other environmental perturbations.	a. Rebuild salmon and steelhead runs that are adaptive and resilient to climate change and other environmental perturbations.	b. Continue rebuilding adaptive and resilient salmon and steelhead runs and proactively and adaptively manage for a changing climate.	c. Ensure continued resiliency of salmon and steelhead runs and continue to adaptively manage for a changing climate.

Within the natural production goal are five subgoals with corresponding temporal achievements. For ESA-listed fish, the first three subgoals reflect a progression from current

population status to delisting to broad sense recovery. For non-listed fish, the progression is from current population status to broad sense recovery. The last two subgoals address spatial distribution and run timing, and diversity and resiliency, which are ongoing concerns as fish populations, both listed and non-listed, increase under the first three subgoals.

SubGoal 1A: Prevent Declines

Subgoal 1A is to reverse and prevent declines of listed and non-listed stocks within 25 years. It is assumed that under current conditions, some stocks are doing well while others are not. At a minimum, the first subgoal is to protect all stocks (listed and unlisted) from further decline and to reverse the trend for depleted stocks.

SubGoal 1B: Achieve ESA Delisting

For ESA-listed fish, it is assumed that progress on Subgoal 1A will lead to Subgoal 1B, which is to achieve ESA delisting, or recovering the species to a point where they are no longer threatened or endangered. ESA recovery includes addressing all Viable Salmonid Parameters (VSPs) including abundance, productivity, spatial structure, and diversity, as well as addressing the species' major threats to survival. The timeframes associated with this subgoal reflect the idea that not all stocks can be recovered at once. Thus, within 25 years, it is anticipated that some salmon and steelhead stocks will be delisted, followed by additional stocks within 50 years, and ESA delisting for all listed salmon and steelhead within 100 years. These goals are intended to build upon existing efforts towards ESA delisting and not to reset any specific timeline proposed in ESA Recovery or other plans. Progress will take a concerted and comprehensive effort over many years. To date, progress has not been sufficient to delist any Columba Basin salmon or steelhead.

As ESA delisting occurs and ESA regulatory oversight is no longer a legal requirement for some stocks, NOAA Fisheries will continue to be an integral partner in the Columbia Basin, working with state, tribal, and federal co-managers to provide sustainable fishery management for salmon and steelhead under the Magnuson−Stevens Fishery Conservation and Management Act, including ongoing protections for salmon and steelhead habitat.

SubGoal 1C: Achieve Broad Sense Recovery

Subgoal 1C is to achieve broad sense recovery beyond ESA delisting to restore listed and unlisted salmon and steelhead to healthy and harvestable levels. Broad sense recovery typically involves long-term goals developed by stakeholders through ESA recovery plans that go beyond the requirements for delisting under the ESA. Broad sense recovery efforts can address other legislative mandates or social, economic, and ecological values of having healthy, diverse salmon and steelhead populations.

SubGoal 1D: Expand Spatial and Temporal Range

Subgoal 1D is to expand spatial and temporal range, e.g., rebuild historical spatial distribution and run timing of salmon and steelhead at local and basinwide scales, including in currently inaccessible areas within the historical range. The objectives of this subgoal are (1) to minimize the risk of extinction and maximize survival by ensuring that fish are broadly distributed and that their migration patterns are varied, thus providing the greatest security against environmental disaster or change; and (2) to return fish into areas from which they have been blocked due to anthropogenic impacts. Goals were not considered or identified in areas that have historically been blocked by natural barriers (e.g., above Shoshone Falls in Idaho and Kootenai Falls in Montana).

In the Upper Columbia, studies to reintroduce salmon and steelhead are already underway. Within the next 25 years, it is assumed that those studies will continue and that, over time, significant, measurable progress will be made toward rebuilding historical spatial distribution and run timing.

In the Upper Snake River, the Upper Snake River Tribes have developed a long-term, phased approach to restoring anadromous fish to several major tributaries above the Hells Canyon Complex of hydropower projects in the Upper Snake River.[28] NOAA Fisheries' recovery plans for Snake River fall Chinook, spring/summer Chinook, and steelhead recommend exploring the feasibility of reintroduction above blocked areas to support broad sense recovery goals and, in the case of Snake River fall Chinook salmon, in the event it is necessary for ESA recovery.[29] However, the Task Force is advised that reintroduction of ESA-listed fish to historical habitat upstream of the Hells Canyon Complex needs to be consistent with Idaho state statute, which requires state consultation and approval. Consideration of restoring natural reproduction of anadromous fish throughout their historical distribution in the Upper Snake Basin, consistent with Subgoal 1D, will require broad regional discussions, and development of plans, guiding principles, and agreements, among state and treaty tribe fishery co-managers, the Upper Snake River Tribes, and others (e.g., Idaho Power Company). The Task Force is committed to continuing discussion on this topic during the next phase of work.

Within 100 years, consistent with Subgoal 1D, it is anticipated that there will be a complete rebuilding of spatial distribution and run timing in all areas of the basin that historically have been home to anadromous fish.

[28] *http://www.uppersnakerivertribes.org/frg-usrtsproposedfisheriesresourcemanagementprogram_april-2018-2-2/*

[29] The ESA recovery plan for Snake River fall Chinook salmon identified three potential pathways to ESA recovery: two via the single, extant population and one that would involve reestablishing the historical population above the Hells Canyon Complex. It identified one of the single-population scenarios as the most likely pathway to recovery but recommended pursuing opportunities for reestablishing natural production of fall Chinook salmon above the Hells Canyon Complex to contribute to broad-sense recovery and in the event that achieving a single-population scenario consistent with ESA delisting proves infeasible or unsuccessful.

As natural production increases, and spatial and temporal ranges become more diverse, harvest and fishing opportunities may expand.

SubGoal 1E: Expand Diversity and Resiliency

Subgoal 1E is to expand biological diversity, including genetic and phenotypic (life history, behavioral, and morphological) diversity, so that salmon and steelhead populations are more adaptive and resilient to climate change and other environmental perturbations. Increasing and maintaining biological diversity is critical to enable populations to adapt to major environmental changes, such as the warming climate and new hydrologic regimes. This subgoal further ensures that hatchery and harvest and fishing opportunity goals are aligned with natural production goals.

8.3 Goal 2: Harvest and Fishing Opportunity

The harvest and fishing opportunity goal is to provide diverse, productive, and dependable tribal treaty, other tribal, and non-tribal harvest and fishing opportunities for Columbia Basin salmon and steelhead in fresh and marine waters. Three subgoals are associated with harvest: (1) ensure sustainability, (2) optimize harvest and fishery opportunity, and (3) share benefits among citizens (Table 2).

Table 2. Harvest and fishing opportunity goal and subgoals for Columbia Basin salmon and steelhead.

Goal 2. Provide diverse, productive, and dependable tribal and non-tribal harvest and fishing opportunities for Columbia Basin salmon and steelhead in fresh and marine waters.			
Subgoals	*Within 25 years*	*Within 50 years*	*Within 100 years*
2-A. Ensure Sustainability: Manage harvest and fisheries at levels consistent with conserving natural salmon and steelhead populations	a. Ensure that fishery impacts on weak and listed stocks allow rebuilding of natural stocks and do not impede recovery.	b. Manage fisheries based on annual abundance to promote rebuilding of natural production and share the recovery burden.	c. Manage for optimum sustainable harvest and fishing opportunity as healthy stocks are restored.
2-B. Optimize Harvest and Fishery Opportunity: Optimize fishery opportunity and harvest of healthy natural and hatchery stocks based on availability.	a. Optimize fishery opportunity and access to harvestable surpluses of unlisted and hatchery stocks consistent with conservation.	b. Expand fishery opportunity concurrent with progress toward ESA delisting and broad sense recovery.	c. Fully realize harvest potential with increasing opportunity throughout the range of salmon and steelhead stocks.
2-C. Share Benefits: Realize all fishery obligations and share benefits among users.	a. Meet fishery obligations and share available harvest within the constraints imposed by conservation.	b. As constraints are reduced, move into focusing fisheries on sharing the benefits of increasing numbers of harvestable stocks.	c. Realize all fishery obligations and share benefits among users.

In-river and ocean harvest is currently regulated and constrained by various state, federal, and tribal entities based on *U.S. v. Oregon, U.S. v. Washington,* and corresponding agreements; the Magnuson−Stevens Fishery Conservation and Management Act; the Pacific Fishery Management Council process; the Pacific Salmon Treaty; the Marine Mammal Protection Act; the Endangered Species Act; and state statutes, regulations, and policies. Fisheries data shows that harvest rates have been reduced as wild stocks have declined. Moving forward in recovery, the presumption is that increased natural production will result in fewer legal constraints, which then would result in increased and more consistent harvest and fishing opportunities for both hatchery and natural stocks. The overriding theme of Goal 2 is to align harvest and fishing with the need to restore natural production consistent with the Task Force's Vision for thriving future salmon and steelhead populations throughout most of the Columbia Basin.

SubGoal 2A: Ensure Sustainability

Subgoal 2A is to manage harvest and fisheries at levels consistent with species status. Fishing levels are limited to low levels on weak or depleted stocks. Higher fishing levels can be allowed as status improves. The current management regime is to adjust harvest numbers up or down depending on numbers of returns (annual abundance). As natural populations increase, it is anticipated that fisheries will continue to be managed based on annual abundance to promote natural production and to share the burden of recovery. This will presumably result in gradually increased harvest and fishing opportunities as healthy stocks are restored, with the long-term goal of optimal sustainable harvest and fishing opportunity.

SubGoal 2B: Optimize Harvest and Fishing Opportunity

Subgoal 2B is to optimize fishery opportunity and harvest of healthy natural and hatchery stocks based on availability. In the short term, this means access to harvestable surpluses of unlisted and hatchery stocks. As natural production increases, harvest and fishing opportunities may expand.

SubGoal 2C: Share Benefits

Subgoal 2C is to realize all fishery obligations and share benefits among users in a manner consistent with the natural production goal and other constraints imposed by conservation needs. As natural production increases, the focus becomes sharing the benefits of harvestable stocks among tribal, non-tribal, commercial, and sport fishing users from across the Columbia Basin and elsewhere.

8.4 Goal 3: Hatchery/Mitigation

The hatchery/mitigation goal is to produce hatchery salmon and steelhead to support conservation, mitigate for lost natural production, and support fisheries, all in a manner that strategically aligns hatchery production with natural production recovery goals and is consistent with best available science.

Table 3. Hatchery/mitigation goal and subgoals for Columbia Basin salmon and steelhead.

Goal 3. Produce hatchery salmon and steelhead to support conservation, mitigate for lost natural production, and support fisheries, in a manner that strategically aligns hatchery production with natural production recovery goals.			
Subgoals	*Within 25 years*	*Within 50 years*	*Within 100 years*
3-A. Support Natural Production: Utilize hatcheries to maintain, support and restore natural production where appropriate.	a. As appropriate, continue to utilize hatcheries to maintain, support and restore at-risk populations, including those affected by climate change.	b. Use conservation hatchery strategies as needed to proactively address future threats, including climate change.	c. Achieve a future where conservation hatcheries are not necessary unless unforeseen natural events require an emergency response.
3-B. Mitigate for Lost Production and Support Fisheries: Produce hatchery fish to support tribal treaty/trust responsibilities and meaningful fishery opportunities to mitigate for historical losses due to development and to enhance fisheries.	a. Make progress in reducing reliance on hatchery production for mitigation consistent with improvements in natural production.	b. Consider changes in hatchery objectives and production levels as overall fishery opportunities are maintained through increased fish abundance.	c. Achieve a future where we rely less on hatchery production for mitigation and fishery enhancement only when natural production has increased.
3-C. Fish Protection: Strategically align hatchery production with natural production recovery goals, consistent with tribal treaty/trust responsibilities, and with other legal and mitigation requirements.	a. Continue to implement changes in hatchery practices and programs based on best available science (including, in some cases, changes in stocks or species produced) to minimize adverse effects of hatchery-origin salmon and steelhead on naturally produced salmon and steelhead.	b. Continue to refine hatchery production, strategies and practices based on assessments of effectiveness and technology advances to minimize hatchery impacts on natural salmon and steelhead.	c. Reduce long-term hatchery impacts by rebuilding abundance, productivity, diversity, and distribution of natural salmon and steelhead.

Artificial production is an important tool for supporting conservation and providing fish for harvest. Each hatchery subgoal requires consistency with natural production goals, and it is presumed that hatchery managers will use best management practices to achieve conservation needs.

SubGoal 3A: Support Natural Production

Subgoal 3A recognizes that hatcheries may be utilized to maintain, support, and restore abundance of natural populations. Hatchery fish can provide support for natural populations. For example, one common use is to release hatchery adults or juveniles in order to increase abundance of depressed natural populations (commonly referred to as supplementation).

SubGoal 3B: Mitigate for Lost Production and Support Fisheries

Subgoal 3B recognizes that hatchery fish are a tool to replace lost natural production and/or lost harvest and fishing opportunity, and contemplates that this tool will be important into the future until naturally reproducing fish recover. Some Columbia Basin hatchery production is mandated by law to mitigate for losses caused by dam construction and operation, while in other situations hatchery production is determined by agreement of the co-managers (states and tribes) to supply fisheries. These hatchery programs will be aligned with natural production goals on a stock-specific basis.

SubGoal 3C: Fish Protection

Subgoal 3C contemplates changes in hatchery management practices and programs over time based on best available science to minimize adverse impacts on natural salmon and steelhead. The intent of this subgoal is to contemplate a time when conservation hatcheries are not necessary.

8.5 Goal 4: Social, Cultural, Economic, and Ecosystem

Society today places a high value on protecting and preserving salmon and steelhead runs and their watersheds. The role that salmon and steelhead play in the overall health of Pacific Northwest ecosystems, and the economic and other non-monetary benefits, are better understood than in the past.

Goal 4 recommends making decisions within a broader context that reflects, and considers effects to, the full range of social, cultural, economic, and ecosystem values and diversity in the Columbia Basin (Table 4). These considerations are ongoing and, therefore, do not have any particular timeframe.

Table 4. Social, cultural, economic, and ecosystem goal and subgoals for Columbia Basin salmon and steelhead.

Goal 4. Make decisions within a broader context that reflects, and considers effects to, the full range of social, cultural, economic, and ecosystem values and diversity in the Columbia Basin.
4-A. Social Goal: Make decisions that reflect the social importance of salmon and steelhead to people throughout the Columbia Basin, recognizing the full range of social diversity and values that are present.
4-B. Cultural Goal: Make decisions that reflect the cultural importance of salmon and steelhead to people throughout the Columbia Basin, recognizing the full range of cultural values that are present.
4-C. Economic Goal: Make decisions that are based on the principle of equitable sharing of costs and benefits across economic sectors. Also, make decisions that recognize the great economic value of the Columbia River and its tributaries, and the importance of this natural capital as a major driver of the present and future economy for all in the Pacific Northwest.
4-D. Ecosystem Goal: Make decisions that consider the role of salmon and steelhead in the ecosystem and that support a full range of ecological benefits, including the needs of dependent wildlife.

Most past development decisions were made without regard to their impacts on salmon and steelhead. Goal 4 takes a broader look at other salmon and steelhead social values. It stresses the importance of approaching decision-making in a holistic fashion, including but not limited to traditional economics. Goal 4 recognizes that many important social and cultural values, as well as major ecological values, represent important benefits to society as a whole. Although these values may be difficult to monetize, they are essential to the identity of the Columbia Basin.

Goal 4 recognizes that all of these values and benefits are interconnected, entwined, and to the extent that one suffers, they all suffer. Salmon and steelhead are the common denominator, an indicator, creating an important bond between humans, animals, and the ecosystem. Goal 4 asks decision makers to acknowledge and respect this interconnection.

SubGoal 4A: Consider Social Values

Social values are often underrepresented in decision-making. These are the criteria or general guidelines we use to assess our lives, set our priorities, and measure successes. They provide guidance to individuals and communities in assessing alternative courses of action and making decisions that will affect them and their futures. Subgoal 4-A requires us to make salmon and steelhead restoration decisions that reflect a range of social values in all their diversity, including consideration of future generations.

SubGoal 4B: Consider Cultural Values

Salmon and steelhead are a major cultural icon for the entire region and are woven into the lives and cultures of many communities throughout the Columbia River basin. Cultural values are the core principles shared by a community, and they may be customs, religion, practices, a set of beliefs, or shared values.

Nowhere is the connection between salmon, steelhead, and culture more direct than within the various tribal communities in the Pacific Northwest and Alaska. As described in Chapter 4, salmon, steelhead, and other native fish are an integral part of the tribal identity.

SubGoal 4C: Consider Economic Values

As noted in Section 3.1 above, salmon and/or steelhead fisheries dependent on the Columbia River basin drive a vast, multi-million-dollar fishing-based economy extending all the way south to central California, and north well into the Gulf of Alaska. Salmon and steelhead are a major source of high-quality food on America's tables and for export.

There are also a multitude of other economic impacts and benefits derived from the past industrial development of the Columbia Basin, including the generation of hydropower, irrigation in the upper basin, river transportation to and from the Port of Portland all the way to Lewiston, ID, and the supporting infrastructure for international shipping from Portland.

Subgoal 4C calls for future decisions about river management to recognize sharing of costs and benefits across economic sectors. It recognizes the great economic value of the Columbia River and its tributaries for other purposes, and the importance of this natural capital as a major driver of the present and future economy.

The Task Force acknowledges that many things will change in the Columbia Basin over the next 100 years. One of the values of this process is that fostering ongoing collaboration among different Columbia Basin partners will facilitate change for all interests over time.

SubGoal 4D: Consider Ecosystem Values

Subgoal 4D calls us to make future decisions that consider the role of salmon and steelhead in the whole ecosystem, and that support a full range of ecological benefits from restored runs, including the needs of dependent wildlife.

As noted in Section 3.1, the historic salmon and steelhead runs of the Columbia Basin did not exist in isolation; they were an integral part of (and a major support for) a vast and intricate food web supporting many other species. Spanning an area throughout the west coast from San Diego to the Gulf of Alaska, salmon and steelhead are a major or important food source not just for humans, but for at least 138 other species of birds, mammals, amphibians and reptiles native to the Pacific Northwest. For example, endangered Southern Resident killer whales are declining, in part due to lack of salmon coming from west coast rivers, including the Columbia River. As also noted in Section 3.1, salmon and steelhead are likewise an important driver of the forest nutrient cycle that supports forest health and are important to the health of the region's saltwater estuaries.

9. Provisional Quantitative Goals

Quantitative goals are measurable and specific conditions that would indicate whether a qualitative goal (described in Chapter 8) has been achieved. Quantitative goals translate qualitative outcomes into numerical values.

The Task Force originally intended to develop quantitative goals for naturally produced salmon and steelhead, for hatchery production, and for harvest and fisheries. As the work of the Task Force proceeded, the group determined that additional time, evaluation, and integration among the goal categories was needed to complete quantitative goals for hatchery production, and for harvest and fisheries. Therefore, this report reflects Provisional Quantitative Goals for natural production for all salmon and steelhead in the U.S. portion of the Columbia River basin and its tributaries, including listed and non-listed salmon and steelhead, and some historical production areas that are currently blocked. For hatchery production, this report reflects information on current and anticipated hatchery production; for harvest and fisheries, it reflects potential harvest under several scenarios. Additional work to refine, integrate, and align the goals for hatchery production and for harvest and fisheries with the Provisional Quantitative Goals for natural production will occur in the next phase of the Task Force process. In this report, we use the term "Quantitative Goals" to refer to the Provisional Quantitative Goals for natural production, the quantified anticipated hatchery production, and quantified potential harvest. Below we describe the approach and methods used to develop these quantitative goals and summarize the Quantitative Goals identified by the Task Force. Detailed summaries of the goals by stock are provided in Appendix A.

9.1 Overview

To develop the Quantitative Goals and access numerous data sources, NOAA Fisheries convened regional technical teams with subject matter and geographic expertise. A NOAA Fisheries project team provided technical guidance to the Task Force and the regional teams. Regional technical team members generally included staff from state and tribal entities and other Task Force member organizations. These regional teams operated under the Guiding Principles adopted by the Task Force, including the principle that all products be grounded in sound science. Where possible, the Quantitative Goals are based on existing goals established by state, federal, and tribal entities. All products developed by the technical teams and NOAA Fisheries project team were provided for Task Force consideration.

The goals are identified at the scale of 24 "stocks" defined for the purposes of the Task Force's goal-setting effort.[30] For each stock, regional technical teams worked with the NOAA Fisheries project team to identify Provisional Quantitative Goals for natural production, expressed in terms of adult abundance, and to identify current and anticipated hatchery

[30] For the purposes of the CBP Task Force, a stock is defined based on species (Chinook salmon, coho salmon, sockeye salmon, chum salmon, steelhead), region of origin (e.g., Lower Columbia, Middle Columbia, Upper Columbia, Snake, or Willamette) and run type (e.g. spring, summer, fall, late fall).

production, potential harvest, and total run size.[31] Provisional Quantitative Goals for natural production and numbers for potential harvest were identified in a series of ranges — low, medium, and high — that represent a continuum of decreased extinction risk and increased ecological and societal benefits. The Task Force recognizes that Provisional Quantitative Goals do not diminish the long-term desire and intent of some fish and wildlife managers to achieve even higher levels of abundance (see Section 9.2.1 for additional details).

Provisional Quantitative Goals for Natural Production. Provisional Quantitative Goals, referred to here as "Quantitative Goals" for natural production are expressed at the population level and in terms of numbers of natural-origin spawners.[32] For listed salmon and steelhead, the low-range natural production goals are, in most cases, consistent with ESA delisting goals. Generally, this is defined as the abundance number consistent with a viable population (i.e., a population with a 5 percent risk of extinction over a 100-year timeframe). In some cases, however, ESA recovery plans identified an abundance target consistent with an ESA "recovery scenario." Under these scenarios, the abundance goal for a specific population might be higher or lower than the abundance number consistent with a viable population.[33] In these cases, the Task Force adopted the specific recovery plan abundance target for that population. For non-listed species, low-range goals were based on application of the same technical guidance used in ESA recovery plans to identify abundance levels consistent with a viable population. In some cases, non-listed populations are already meeting these low-range goals, and in these cases, the low-range goal serves as a reference point rather than a management goal.

High-range goals reflect "healthy and harvestable" levels that are consistent with the potential (i.e., restored) capacity of habitat. They are typically about three times greater than low-range goals, but generally are still 50 percent or less than historical average abundance estimates. Mid-range goals are approximately halfway between the low-range goals and the high-range goals for listed stocks. For unlisted stocks, mid-range goals are generally defined as the number of natural-origin spawners that could effectively use available habitat and sustain high levels of harvest.

[31] Total *run-size goals* are aggregate numbers of salmon and steelhead that would be needed to meet natural production goals, provide for identified levels of harvest and fisheries, and meet anticipated hatchery production levels. They are identified at basin, species, and stock scales and used for evaluating status and goals relative to a variety of needs across the basin.

[32] Natural-origin spawners are adult fish returning to spawn that were spawned and reared in the wild, regardless of parental origin (natural or hatchery). Goals are intended to be measured as 10-year geometric means. The geometric mean is defined as the nth root of n products. Geometric means are considered to be a better measure of central tendency for data such as fish abundance, which is typically highly skewed. The geometric mean smooths the contribution of periodic large run sizes which can inflate simple averages relative to typical population values. The 10-year period was selected because it represents an interval of sustained abundance across multiple generational cycle and is consistent with how NOAA Fisheries evaluates abundance.

[33] To achieve ESA recovery, not all populations are required to achieve "viability." Instead, a sufficient number of populations, identified based on spatial distribution, historical population size, historical productivity, diversity, and other factors must achieve viability, a few populations must achieve highly viable status, and others can be maintained at lower levels of viability.

For Provisional Quantitative Goals for natural production in historically accessible areas that are currently blocked, this report includes goals for the Upper Columbia Basin. For the Upper Snake Basin, Provisional Quantitative Goals are not included at this time, as the Task Force did not reach agreement on numerical goals and those considerations will require continued discussion by the Task Force during the next phase of work as well as a broad regional discussion, and development of plans, guiding principles, and agreements, among state and treaty tribe fishery co-managers, the Upper Snake River Tribes, and others (e.g., Idaho Power Company). For areas above tributary dams where plans for passage have been identified or are starting to be implemented through some other process (e.g., Cowlitz River, Lewis River, Willamette River tributaries, and Deschutes River), Provisional Quantitative Goals are included in this report. They are not included for areas above tributary dams where no formal plans for passage have been agreed to or where no goals have been identified through some other process (e.g., North Fork Clearwater River). Provisional Quantitative Goals were not considered or identified in areas that have been historically blocked by natural barriers (e.g., above Shoshone Falls in Idaho and Kootenai Falls in Montana).

Potential Harvest and Fisheries. Potential harvest and fishery levels are expressed in terms of numbers of fish harvested and harvest rates (the proportion of total adult salmon and steelhead that die as a result of fishing activity in a given year) by species and run type. To identify these numbers, regional technical teams used the abundance-based management plans that are currently in place under existing harvest management processes to project harvest levels and exploitation rates that would result if natural production increased consistent with the Task Force Quantitative Goals for natural production. The technical teams also identified aspirational harvest and fishery numbers and rates based on harvest that would be sustainable by healthy salmon and steelhead stocks. Healthy stocks would likely support higher harvest rates than those currently in place to protect weak or listed stocks. As noted above, additional work to refine, integrate, and align the goals for hatchery production and for harvest and fisheries with the Quantitative Goals for natural production will occur in the next phase of the Task Force process.

Anticipated Hatchery/Mitigation Production. Anticipated hatchery production is expressed as juvenile production levels and corresponding adult returns under existing conservation and mitigation programs throughout the basin. Regional technical teams also identified anticipated additional hatchery production levels where they were defined in existing processes and plans (e.g., the John Day Mitigation Program) or where they were proposed by Task Force members to address specific purposes (e.g., currently blocked historical anadromous production areas). As noted above, additional work to refine, integrate, and align the goals for hatchery production and for harvest and fisheries with the Quantitative Goals for natural production will occur in the next phase of the Task Force process.

Run-Size Goals. Run-size goals are aggregate numbers of salmon and steelhead that would be needed to meet the identified levels of natural production, potential harvest, and anticipated hatchery production. They are identified at basin, species, and stock scales and used for

evaluating status and goals at regional and local spatial scales relative to a variety of needs across the basin.

9.2 Approach

The Task Force's Quantitative Goals are intended to complement goals identified by other entities throughout the region. This section describes the approach used to develop these goals.

9.2.1 Basis of Quantitative Goals: Existing Plans

The Provisional Quantitative Goals are based on the various conservation, recovery, management, and mitigation plans developed throughout the region to address various purposes and programs. In some cases, these plans contain different numerical goals identified by different entities for different purposes. The Task Force considered these different goals and integrated or reconciled them based on input from its regional technical teams. There were also instances where quantitative goals had not yet been identified for specific stocks or outcomes. In these cases, the Task Force identified appropriate values consistent with qualitative goals based on input from its regional technical teams.

Key sources of existing goals include:

ESA Recovery Plans. NOAA Fisheries has adopted ESA recovery plans for all listed salmon and steelhead in the Columbia River basin (UCRSB 2007; NMFS 2013, 2015, 2017a, 2017b; ODFW and NMFS 2011). These plans were developed with local partners. The plans include objective, measurable criteria for delisting of threatened or endangered salmon ESUs and steelhead DPSs. Delisting criteria include both biological criteria (for evaluating a species' demographic risk status) and threats criteria (for evaluating whether the threats to a species have been addressed). The biological criteria include criteria at the ESU/DPS, major population group,[34] and population levels. Population-level criteria include specific numerical goals for abundance, as well as goals for productivity, spatial structure, and diversity. Task Force Quantitative Goals for natural production are consistent with ESA delisting goals (with a few noted exceptions). In some cases, ESA recovery plans also include "broad sense recovery goals." These goals are generally defined by co-managers (state and tribal entities) or stakeholders and go beyond the requirements for ESA delisting to achieve even lower extinction risk and/or to address, for example, other legislative mandates or social, economic, and ecological values.[35]

[34] Major population groups are aggregates of independent populations within an ESU or DPS that share similar genetic and spatial characteristic and are important components of ESA delisting criteria and species status.
[35] In ESA recovery plans, NOAA Fisheries has stated our support for these broad sense goals, and our commitment, upon delisting, to work with co-managers and local stakeholders, using our non-ESA authorities, to pursue broad sense recovery goals while continuing to maintain robust natural populations. In some situations, is also appropriate to consider broad sense goals in designing ESA recovery strategies and scenarios.

Northwest Power and Conservation Council Fish and Wildlife Program. The Northwest Power and Conservation Council (Council) was established pursuant to the Pacific Northwest Electric Power Planning and Conservation Act of 1980. The Act authorized the Council to serve as a comprehensive planning agency for energy, fish and wildlife policy, and citizen involvement in the Columbia River basin. Council members include the states of Idaho, Montana, Oregon, and Washington. The Council's Fish and Wildlife Program is intended to protect, mitigate, and enhance fish and wildlife affected by the development and operation of the hydroelectric dams in the Columbia River basin. The majority of the program is funded by the Bonneville Power Administration.

The program includes qualitative goal statements and quantitative objectives. The quantitative objectives include increasing total adult salmon and steelhead abundance to an average of 5 million fish annually by 2025 in a manner that emphasizes the populations that originate above Bonneville Dam. More-specific objectives are identified for some populations in subbasin plans prepared by local groups for the Fish and Wildlife Program. The Council is currently considering adopting a comprehensive suite of quantitative objectives into the program. In support of this consideration, Council staff have compiled a comprehensive inventory of existing abundance goals at the population and aggregate levels, which is available in a web-accessible database https://www.nwcouncil.org/ext/maps/AFObjPrograms/ This database was a key reference for goals incorporated into the Task Force recommendations.

Tribal Plans. Tribal plans include the Spirit of the Salmon Plan *(Wy-Kan-Ush-Mi Wa-Kish-Wit)* as well as local plans developed by individual tribes. *Wy-Kan-Ush-Mi Wa-Kish-Wit* is a regional fish restoration plan adopted in 1995 and updated in 2014 by the Nez Perce, Umatilla, Warm Springs, and Yakama tribes (CRITFC 2014). The plan includes several goals and objectives, including an objective to increase the total adult salmon and steelhead returns above Bonneville Dam to four million annually (by 2020), and in a manner that sustains natural production to support tribal commercial as well as ceremonial and subsistence harvests. In addition, the plan establishes a long-term objective to "restore anadromous fish to historical abundance in perpetuity."

A *Nez Perce Tribal Fisheries Management Plan* (NPT 2014)[36] identifies specific abundance objectives and thresholds at the species and population levels for salmon and steelhead within Nez Perce tribal usual and accustomed fishing areas of the Snake River basin, and corresponding hatchery and harvest strategies. The plan identifies viable, sustainable, and ecological escapement objectives for salmon and steelhead populations in the Snake River basin. The viable abundance objectives are considered the minimum size at which a population maintains essential genetic diversity. They generally align with NOAA Fisheries' minimum abundance thresholds (and with the Task Force low-range Provisional Quantitative Goals for natural production). Sustainable escapement objectives describe the numbers of

[36] The NPT Tribal Fisheries Management Plan can be accessed at the following web location: http://www.nptfisheries.org/portals/0/images/dfrm/home/fisheries-management-plan-final-sm.pdf.

returning adults that would annually sustain spawning, as well as harvest for tribal and non-tribal fisheries. Sustainable objectives generally align with the Task Force high-range Provisional Quantitative Goals for natural production. Ecological escapement objectives refer to the escapement level at which sustainable spawning abundance for a population is maximized, the full utilization of available spawning and rearing habitat is promoted, and ecosystem-level processes (e.g., nutrient redistribution) for multiple species are fostered. Ecological escapement objectives describe a future desired condition that extends beyond the planning timeline used by the Task Force to develop provisional quantitative goals. Ecological escapement objectives are referenced in this report for contextual purposes only.

The Upper Snake River Tribes (USRT), comprised of the Burns Paiute Tribe, Fort McDermitt Paiute and Shoshone Tribe, Shoshone–Bannock Tribes of the Fort Hall Reservation, and the Shoshone-Paiute Tribes of the Duck Valley Reservation, developed the *Hells Canyon Complex Fisheries Resource Management Plan* (USRT 2018).[37] This plan seeks to restore fishing opportunities through anadromous and resident fish management programs conducted in a phased approach in the Snake River and in significant tributaries (including the Bruneau/Jarbidge, Owyhee, Malheur, Boise, Payette, and Weiser Rivers). Restoration of these conservation and subsistence fisheries would be accomplished in a manner intended to complement the ongoing recovery efforts of anadromous and resident fish in the Upper Salmon River basin.

The USRT Plan's tribal goals for numbers of adult fish, including Snake River spring/summer Chinook salmon, steelhead, and, eventually, fall Chinook salmon, anticipated in the watersheds above the Hells Canyon Complex (HCC), are long-term goals. In some instances, these tribal goals extend beyond the planning timeline used by the Task Force to develop the provisional quantitative goals contained in this report. Although other co-managers in the Upper Snake River, including the states of Oregon and Idaho and the Nez Perce and Umatilla Tribes, are aware of these USRT tribal goals, they have not formally come to agreement on these goals at this time. USRT anticipates further discussion about these goals in the near future with the state and tribal co-managers within Oregon and Idaho, as well as with the Task Force during the next phase of this effort.

The Task Force Quantitative Goals for natural abundance also include goals for salmon and steelhead returning to the Columbia River upstream of Chief Joseph and Grand Coulee Dams, which currently block access to portions of the historical range of anadromous fish. The intent of these goals is to restore meaningful fishing opportunities in areas of historical use by the Colville and Spokane tribes. The goals were developed by the Upper Columbia regional technical team, including staff from the Colville and Spokane tribes. The goals were informed by estimates of numbers of fish historically available to tribal fisheries, including fish originating in both U.S. and Canadian waters. However, the goals do not apportion production into specific populations or geographic areas, nor do they make any assumptions, either

[37] The USRT Plan can be accessed at the following web location: http://www.uppersnakerivertribes.org/frg-usrtsproposedfisheriesresourcemanagementprogram_april-2018-2-2/

explicit or implicit, regarding any future salmon or steelhead production in the Canadian portion of the Columbia River basin. The goals represent only a fraction of the estimated historical production, and additional analysis would be needed to apportion production to different populations or geographic areas. As with all Task Force Quantitative Goals, these provisional numbers will be further explored and evaluated in the next phase of this Task Force effort.

State Plans. The states of Washington, Oregon, and Idaho have identified salmon and steelhead goals and related policies in a variety of forums. Task Force goals were intended to be consistent with related guidance in state plans and policies.

Washington established a series of regional salmon recovery boards that worked as partners to develop regional recovery plans in the Columbia Basin in conjunction with the Northwest Power and Conservation Council's subbasin planning process. These plans have also been incorporated into NOAA Fisheries' ESA recovery plans. Guidance is also available in other state programs, plans, and policies. For instance, statewide policies have been developed by the Washington Department of Fish and Wildlife for some species, such as steelhead, and for hatchery operations and fisheries.

In Oregon, the Oregon Department of Fish and Wildlife led development of an overarching statewide conservation strategy to provide priorities for fish and wildlife. Oregon has also developed a number of conservation and recovery plans for specific regions. All of these plans have been incorporated into NOAA Fisheries' ESA recovery plans. Oregon's efforts are guided by statewide policies that have been adopted into regulation (e.g., the Native Fish Conservation Policy, OAR 635-007-0502, and the Fish Hatchery Management Policy, OAR 635-007-0542). Oregon is supporting recovery with a variety of related activities. The Oregon Watershed Enhancement Board is the state agency charged with directing funds for habitat activities supporting recovery.

Although Oregon's statewide goals and strategies call for recovery across species ranges — and NOAA Fisheries' recovery plans for Snake River fall Chinook, spring/summer Chinook and steelhead recommend exploring the feasibility of reintroduction above blocked areas to minimize extinction risk and support broad sense recovery goals — a consensus between co-managers in the Snake River on specific quantitative goals for basins and areas upstream of Hells Canyon has not yet been reached in this phase. Oregon expects continued and robust discussions leading to the ultimate setting of these quantitative goals in the next phase of this Task Force effort.

Idaho participated with NOAA Fisheries and other federal agencies; the states of Washington and Oregon; the Nez Perce, Shoshone–Bannock, and Shoshone-Paiute tribes; and other entities in the development of the ESA recovery plans for Snake River spring Chinook salmon, fall Chinook salmon, and steelhead. Idaho and other partners also worked with NOAA Fisheries to develop the ESA recovery plan for Snake River Sockeye salmon. Policy and strategic guidance regarding state management of fish and fisheries is also provided in

multi-year management plans prepared by the Idaho Department of Fish and Game. In addition, the Idaho Legislature has created an Office of Species Conservation within the Office of the Governor to provide coordination, cooperation, and consultation among the state and federal agencies with ESA responsibilities in Idaho.

Hatchery/Mitigation Plans and Policies. A variety of plans and policies define goals and govern operation of the more than 80 hatchery facilities operated by federal and state agencies, tribes, and private interests to produce salmon and steelhead in the Columbia River basin. While some hatcheries are operated for conservation purposes, others are operated for fisheries enhancement and many have dual purposes. Most hatcheries in the Columbia River basin were initiated as mitigation to offset natural production losses caused by human development and activities. Major hatchery programs in the Columbia Basin have been developed under the Mitchell Act (1938); the Lower Snake River Compensation Plan (1976); the John Day Mitigation Program (1978); the Mid-Columbia Public Utility Districts (PUD) Habitat Conservation Plans, Settlement Agreements, and Biological Opinions; and the Northwest Power and Conservation Council Fish and Wildlife Program.

Fishery Management Plans. Fisheries for Columbia River salmon and steelhead are generally managed under four governmental/jurisdictional authorities, each of which provides some policy and planning guidance related to fishery goal setting. States and tribes are responsible for fishery management in waters under their specific jurisdictions. Columbia River mainstem fisheries are co-managed by the states, tribes, and the federal government, according to a management plan developed under U.S. District Federal Court direction in the *U.S. v. Oregon* Court case. Fisheries in marine waters under the jurisdiction of the United States (from 3 miles to 200 nautical miles offshore) are managed under the Pacific Fisheries Management Council (PFMC) process, according to guidance in the Federal Magnuson-Stevens Fisheries Conservation and Management Act. The Pacific Salmon Treaty governs harvest of salmon that swim across United States–Canada international borders.

9.2.2 Regional Technical Teams

NOAA Fisheries convened regional technical teams for the Upper Columbia, Snake, Middle Columbia, Lower Columbia, and Willamette River basins to assist the Task Force in developing Provisional Quantitative Goals and provide other technical input (Figure 6). Initially, the technical teams focused on one stock per region, which served as prototypes to test concepts and better define information needs. The teams then expanded their efforts to address all stocks occurring in each region.

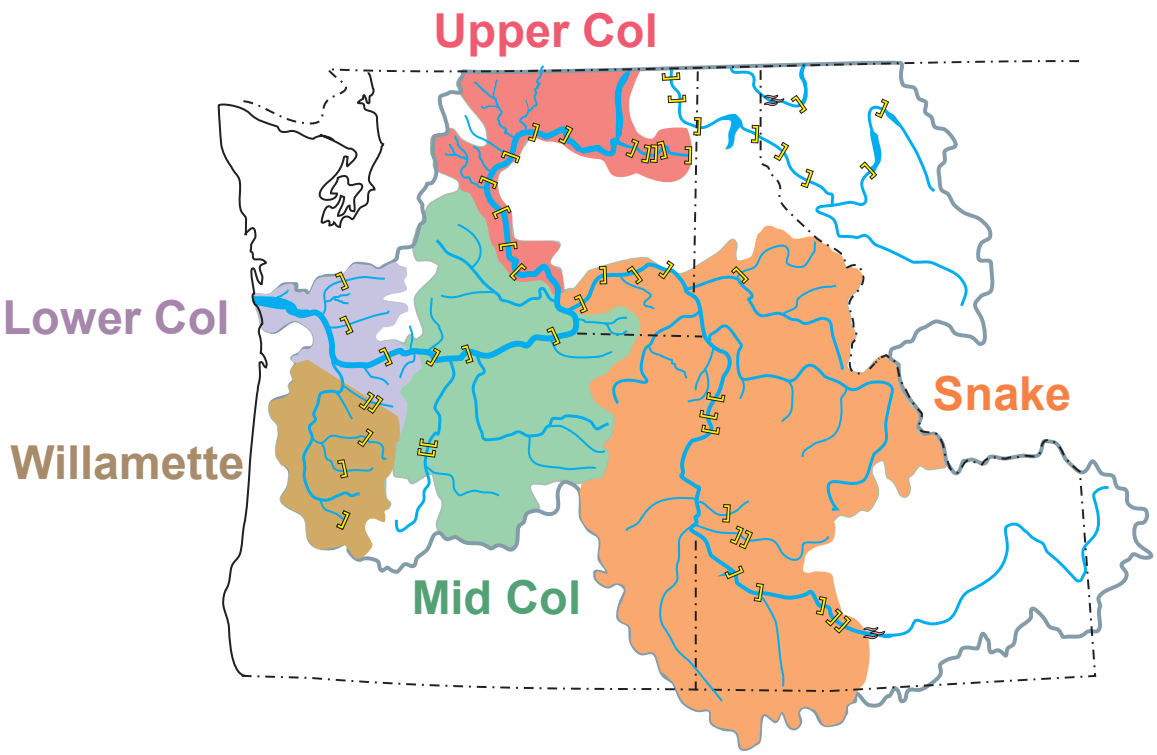


Figure 6. Areas addressed by regional technical teams.

NOAA Fisheries and the Task Force asked the regional technical teams to:

1. Review and refine stock definitions, including subject populations, hatchery production programs, and fisheries.
2. Summarize reference information for each stock including current spawning escapements, historical production potential, numbers of hatchery fish produced, harvest rates, and run-size estimates.
3. Review and summarize existing natural escapement goals, hatchery production levels, harvest rates, and run sizes.
4. Develop options for integrating differing goals identified by various entities or for identifying additional quantitative goals where they had not been otherwise identified.
5. Provide technical documentation for the sources of existing goals and the basis of any new goals identified.

The technical teams operated under the Guiding Principles set by the Task Force, including the requirement to rely on best available science. The teams also considered consistency between Quantitative Goals and the Qualitative Goals identified by the Task Force. All technical team products were developed for consideration by the Task Force.

9.2.3 Scale of Goals: Defining Stocks

Quantitative Goals are identified for *stocks*, which regional technical teams and the NOAA Fisheries project team defined, for the purposes of the Task Force, based on species (i.e., Chinook, coho, sockeye, and chum salmon, and steelhead), region of origin (i.e., Lower Columbia, Middle Columbia, Upper Columbia, Snake, or Willamette), and run timing (i.e., spring, summer, fall, or late-fall). Stocks include both listed and unlisted salmon and steelhead. Twenty-four stocks including 331 historical populations, some of which are extirpated, were identified (see Table 5).

Stocks are generally the same as the ESUs or DPSs that NOAA Fisheries defines for ESA listing purposes.[38] One exception is in cases where an ESU or DPS contained multiple run-timings. In these cases, the ESUs were split by run type into separate stocks so that abundance numbers could be more easily aggregated by run type (i.e., by stock) in a basinwide accounting and aligned more closely to fishery management units. For instance, the lower Columbia River Chinook salmon ESU was split into three stocks: Lower Columbia spring Chinook, Lower Columbia fall Chinook, and Lower Columbia late-fall Chinook. Similar splits were made for the Lower Columbia River steelhead DPS (stocks separated into winter and summer runs) and Upper Columbia River summer/fall Chinook ESU (stocks separated into summer and fall runs).

In addition, NOAA Fisheries has not identified ESUs or DPSs for some unlisted or extirpated stocks, including in blocked areas within the historical range where salmon and steelhead no longer have access. In these cases, the regional technical teams and NOAA Fisheries project team identified stocks based on the available scientific information.

Each stock (and each ESU or DPS) contains a number of independent populations. An independent population is defined as a group of fish of the same species that spawns in a particular locality at a particular season and does not interbreed substantially with fish from any other group. Independent populations spawning naturally, and groups of such populations (major population groups), are the essential building blocks of an ESU or DPS (Figure 7). For listed ESUs or DPSs, NOAA Fisheries' technical recovery teams (TRTs) — teams of scientists convened to provide guidance for recovery planning — used this concept to define independent populations and those definitions were incorporated into ESA recovery plans. For unlisted stocks, population delineations are sometimes less formal, particularly where they have been extirpated (e.g., coho upstream from Bonneville Dam). Where NOAA

[38] The ESA allows listing decisions at the level of a species, subspecies, or distinct population segment. For salmon, NMFS applies its ESU policy and treats ESUs as distinct population segments. An ESU is a group of Pacific salmon that is (1) substantially reproductively isolated from other conspecific units and (2) represents an important component of the evolutionary legacy of the species. For steelhead, NMFS applies the DPS policy. A DPS is a population or group of populations that is discrete from and significant to the remainder of its species based on factors such as physical, behavioral, or genetic characteristics, because it occupies an unusual or unique ecological setting, or because its loss would represent a significant gap in the species' range. A DPS is defined based on discreteness in behavioral, physiological, and morphological characteristics, whereas the definition of an ESU emphasizes genetic and reproductive isolation.

Fisheries had not identified populations, the regional technical teams and NOAA Fisheries project team identified provisional populations for each stock based on the best available information. Populations were identified for every stock regardless of whether they were listed, unlisted, extant, or extirpated.

Fishery Management Units. Fishery Management Units (FMUs) are stocks or groups of stocks that are subject to similar management strategies and objectives. FMUs are primarily determined by run type and return timing in relation to Columbia River mainstem fisheries, which account for the largest share of salmon and steelhead harvest. One fishery management unit may include several listing units of similar run type (Figure 7). For example, fishery managers identify an Upriver Spring Chinook management unit, which includes all spring Chinook destined for areas upstream from Bonneville Dam (Mid-Columbia, Upper Columbia, and Snake ESUs). Listing units may sometimes be split among different fishery management units when the listing units include different run types.

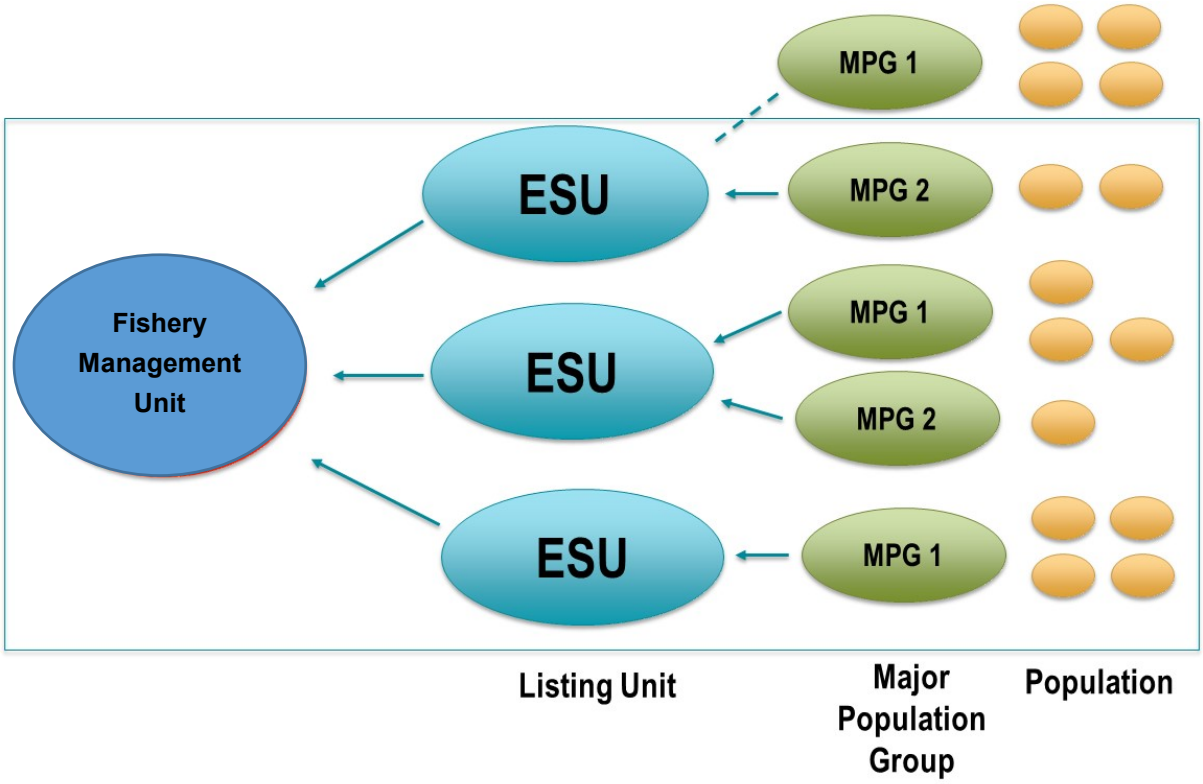


Figure 7. Relationship of fishery management units to hierarchy of listing units, major population groups, and populations. A fishery management unit and an ESU/DPS can include one or more Columbia Basin Partnership stocks.

Table 5. Columbia Basin salmon and steelhead stocks defined for Columbia Basin Partnership Task Force based on listing unit and run type.

Region	Species	Run type	ESA?		CBP Stock	Evolutionarily Significant Unit or Distinct Population Segment	Fishery Management Unit	Major Pop Gr	# of pop. total	# of pop. extant	# of pop. extirpated	# of pop. re/introduced
Lower Columbia	Chinook	Spring	Yes	1	L Col R Spring Chinook	L Columbia R Chinook	Lower River Spring	2	9	9		
	Chinook	Fall (tules)	Yes	2	L Col R Fall (tule) Chinook	"	Lower River Hatchery (LRH)	3	21	21		
	Chinook	Fall (late brights)	Yes	3	L Col R Late Fall (bright) Chinook	"	Lower River Wild (LRW)	1	2	2		
	Chum	Late Fall	Yes	4	Columbia R Chum	Columbia R Chum	Columbia R Chum	4	18	17	1	
	Steelhead	Winter	No	5	L Columbia R Winter Steelhead	SW Washington Steelhead	Winter run	1	7	7	0	
	Steelhead	Winter	Yes	6	"	L Columbia R Steelhead	Winter run	2	17	17	0	
	Steelhead	Summer	Yes	7	L Columbia R Summer Steelhead	"	L Columbia R Summer	2	6	6		
	Coho	Fall (early & late)	Yes	8	L Columbia R Coho	L Columbia R Coho	Columbia R Coho	4	25	25	0	1
UR	Coho	Fall	Extinct	9	Upriver Coho	--	Columbia R Coho	3	15	0	15	7
Mid-Col	Chinook	Spring	No	10	M Columbia R Spr Chinook	M Columbia R Spr Chinook	Upriver Spring	4	14	7	7	7
	Chinook	Summer/Fall	No	11	M Columbia R Sum/Fall Chinook	M Columbia R Sum/Fall Chinook	Upriver Bright (URB)	1	1	1	0	
	Sockeye	Summer	Extinct	12	MCR Sockeye	--	--	1	1	0	1	1
	Steelhead	Summer	Yes	13	Mid Columbia R Steelhead	Mid Columbia R Steelhead	Upriver Summer	4	20	17	3	2
Snake	Chinook	Spring/Summer	Yes	14	Snake R Spr/Sum Chinook	Snake R Spr/Sum Chinook	Upriver Spring	12	68	28	40	
	Chinook	Fall (brights)	Yes	15	Snake R Fall Chinook	Snake R Fall Chinook	Upriver Bright / Snake R Bright	1	2	1	1	
	Sockeye	Summer	Yes	16	Snake R Sockeye	Snake R Sockeye	Snake R Sockeye	4	9	1	8	
	Steelhead	Summer	Yes	17	Snake R Steelhead	Snake R Steelhead	Upriver Summer (A & B runs)	9	40	25	15	
Upper Col	Chinook	Spring	Yes	18	U Columbia R Spr Chinook	U Columbia R Spr Chinook	Upriver Spring	4	10	3	7	1
	Chinook	Summer	No	19	U Columbia R Summer Chinook	U Columbia R Sum/Fall Chinook	Upper Columbia Summer	3	13	6	7	2
	Chinook	Fall	No	20	U Columbia R Fall Chinook	"	Upriver Bright Fall Chinook (URB)	1	5	4	1	
	Sockeye	Summer	No	21	U Columbia R Sockeye	Wenatchee, Okanogan Sockeye	U Columbia R Sockeye	4	6	2	4	1
	Steelhead	Summer	Yes	22	U Columbia R Summer Steelhead	U Columbia R Steelhead	Upriver Summer	3	11	4	7	
Will	Chinook	Spring	Yes	23	U Willamette R Spring Chinook	U Willamette R Spring Chinook	Willamette Spring	1	7	7	0	
	Steelhead	Winter	Yes	24	U Willamette R Winter Steelhead	U Willamette R Steelhead	Winter run	1	4	4	0	
All	*Total*	*including extinct*		*24*				*75*	*331*	*214*	*117*	*22*
	Listed			*16*				*37*	*241*	*186*		

9.2.4 Quantitative Goal Categories

The scope of the Task Force as originally defined included both conservation (natural production) and harvest goals, so the Task Force products needed to address both of those categories. Hatchery production also needed to be addressed because of the essential role of hatcheries in conservation, fisheries, and mitigation for Columbia Basin salmon and steelhead. Natural production, harvest/fishery, and hatchery/mitigation goals are often defined at a population or stock scale. These numbers can also be aggregated into run-size estimates, which identify aggregate numbers of salmon and steelhead needed to meet natural production, fisheries, and hatchery production goals. Run-size estimates are identified at basin, species, and stock scales and used for evaluating status and goals relative to a variety of needs across the basin.

Figure 8 shows the categories and relationships of Quantitative Goals identified by the Task Force. Goals for each of these categories are needed to address specific purposes and to provide a comprehensive accounting of how many salmon and steelhead are needed to meet goals in the Columbia Basin consistent with the Vision and Qualitative Goals identified by the Task Force.

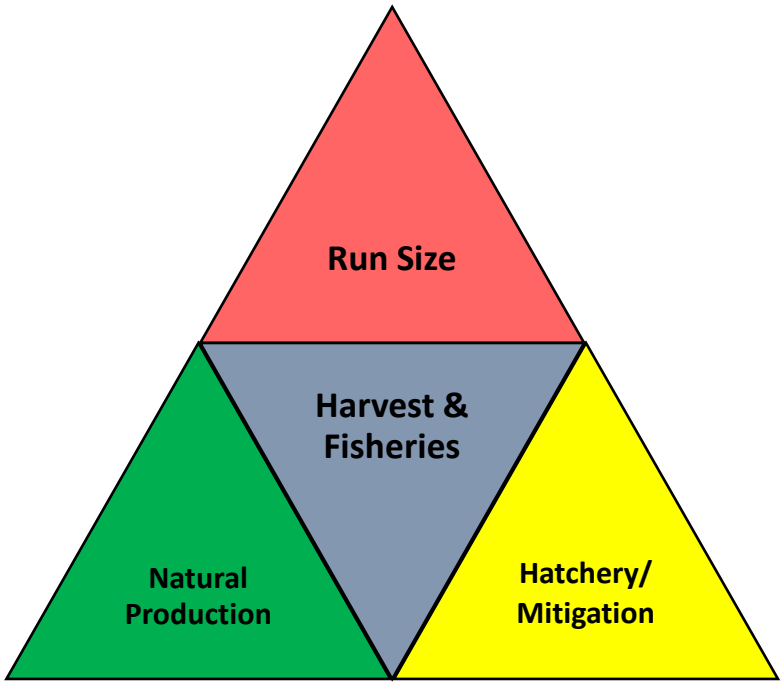


Figure 8. Categories of goals addressed by the Columbia Basin Partnership Task Force.

Natural Production. Natural production goals are defined in terms of abundance of natural-origin spawners for each salmon and steelhead population. Natural-origin fish are those that were spawned and reared in the wild, regardless of parental origin (natural or hatchery). Abundance is one of the four parameters (along with productivity, spatial structure, and diversity) commonly used to evaluate the biological health of salmon and steelhead, and upon

which the long-term viability of salmon and steelhead depends. Abundance goals are intended to be evaluated based on 10-year geometric means.[39]

Hatchery/Mitigation. Current and anticipated hatchery production and mitigation levels are expressed in terms of numbers of juveniles released and the corresponding return of adult salmon and steelhead. Hatchery-origin salmon and steelhead play important roles in supporting harvest and fishery opportunities, and in contributing to conservation of natural populations across the basin. Large-scale hatchery programs are operated throughout the Columbia River basin to provide fish as mitigation for historical losses of natural production as a result of development and other human activities. In some cases, these hatchery programs are tied to specific mitigation programs (e.g., the Lower Snake River Compensation Plan). In other cases, hatchery production is more loosely related to a general need to mitigate for production lost as a result of human impacts. In addition to providing fish to enhance fisheries, hatchery production also serves conservation purposes — for example through the use of hatchery programs to supplement abundance of naturally spawning fish, to reintroduce fish into areas where fish have been extirpated, to avoid extinction (through measures such as captive broodstock programs), and to provide ecological benefits to wildlife including endangered Southern Resident killer whales.

Harvest and Fishery Opportunity. Columbia River salmon and steelhead are harvested in tribal and nontribal commercial, sport, subsistence, and ceremonial fisheries in the ocean as far north as Canada and Alaska, in the Columbia River mainstem, and in some tributaries. These fisheries provide important economic, social, and cultural values. Related metrics can include quantity (number of fish harvested), quality or opportunity (e.g., fishing effort, catch per effort, fish size and condition, open seasons, etc.), or related economic values. In this report, the Task Force has identified potential harvest and fishery opportunity under several scenarios (see Section 9.3.2) and in terms of both numbers of fish harvested and exploitation rates (which are defined as the percentage of total abundance harvested in one or more fishery).

Run Size. Run-size goals are aggregations of area and species-specific goals at a local, regional, or basinwide scale. They include numbers of hatchery- and natural-origin fish returning to basin streams and harvested in fisheries. Run sizes may be calculated for specific stocks, but also may be calculated across wider regions and multiple species, for instance for the entire Columbia River return. Run-size estimates are useful for evaluating status and goals relative to a variety of regional needs.

[39] The geometric mean is defined as the nth root of n products. Geometric means are considered to be a better measure of central tendency for data such as fish abundance which is typically highly skewed. The geometric mean smooths the contribution of periodic large run sizes which can inflate simple averages relative to typical population values. The 10-year period was selected to represent an interval of sustained abundance across multiple generational cycles.

9.2.5 Quantitative Goal Metrics

The Task Force Quantitative Goals are defined in terms of abundance of adult salmon and steelhead.[40] Numbers of adult fish are an essential measure of conservation status, fishery value, and mitigation. Abundance also provides an objective measure applicable to each of these purposes identified in the Qualitative Goals.

Abundance is not the sole measure of conservation status, but it is strongly associated with a variety of other metrics of interest. For instance, long-term biological viability and long-term resilience of salmon and steelhead populations has been related to abundance, productivity, spatial structure, and diversity (McElhany et al. 2000). Population-level biological viability criteria identified in ESA recovery plans are typically based on a combination of these parameters. Therefore, the Task Force abundance goals should be considered in the context of the other parameters related to long-term viability. In practice, abundance is positively correlated with and strongly influenced by productivity, spatial structure, and diversity. Because of this relationship, it is difficult to achieve high levels of abundance without simultaneous increases in other parameters (although there are exceptions).

Other metrics related to population life-cycle dynamics are also considered in some contexts. For instance, smolt-to-adult survival rates (SAR) describe a portion of the life cycle encompassing outmigration from natal streams to the point of freshwater return at adulthood. The Council included SAR goals in its 2014 Fish and Wildlife Program. SARs are a measure of population productivity over a portion of the life cycle outside of the freshwater spawning and rearing stages. They can be used to distinguish the influences of local freshwater habitat and environmental conditions in natal streams from nonlocal influences in the migration corridor and ocean. However, SARs are also influenced by survival in marine waters, which varies considerably from year to year.

9.2.6 Quantitative Goal Ranges

In each category, the Task Force Quantitative Goals are identified as ranges rather than single-point estimates. Ranges reflect a continuum of aspiration for progressive improvements. Goal ranges also reflect the increasing benefits that more fish will provide, including higher viability of fish species, increased fishing opportunities, and enhanced social, cultural, economic, and ecological benefits. In many cases, goal ranges incorporate values identified in other plans and processes to address a variety of purposes. For instance, goals to meet ESA delisting requirements are identified as increments to achieving higher numbers that support higher viability, fishery opportunity, and ecological benefits.

[40] For consistency with NOAA Fisheries' technical recovery team guidance and fishery stock assessment convention, abundance goals do not include jacks. Jacks are generally males returning to freshwater one year earlier than most mature fish of a particular species. They typically comprise a small proportion (<10%) of the total return of natural-origin fish (although hatchery programs may produce higher percentages).

9.2.7 Quantitative Goal Templates

To facilitate review of existing information and development of quantitative goals for each stock, NOAA Fisheries developed a three-page template for use by the work groups (Appendix A). The template includes bulleted text describing key information about the stock; a map showing the geographic distribution of the stock; graphs summarizing current trends in abundance; pie charts showing the distribution of harvest among various fisheries and the distribution of hatchery releases among various programs; and a table summarizing aggregate run sizes at the mouth of the Columbia River, at Bonneville Dam, at the point of tributary entry, and the numbers of fish harvested in the Columbia River mainstem. The template also includes tables showing existing natural-origin production, hatchery production, fishery exploitation and harvest, and run sizes. For each stock, a notes page summarizes the basis for specific numbers. Additional details and documentation on numbers are also available on MS EXCEL worksheets for each stock.

9.3 Methods for Developing Quantitative Goals

This section describes the methods used by the Task Force to develop Quantitative Goals for natural production and to identify potential harvest and fishery opportunity and anticipated hatchery production.

9.3.1 Quantitative Goals for Natural Production

Task Force Qualitative Goal 1 calls for restoration of Columbia Basin salmon and steelhead to healthy and harvestable/fishable levels. Achieving this goal will require substantial improvements in natural production of these species. Natural production goals are expressed in terms of natural-origin adults spawning naturally and identified in three ranges — low, medium, and high (Figure 9). These ranges represent a continuum of decreased extinction risk and increased ecological and societal benefits.

Table 6 summarizes how the regional technical teams and NOAA Fisheries project team identified the low-, medium-, and high-range Provisional Quantitative Goals for natural production. To place the goals into context, estimates of current and historical abundance were also developed. More detailed discussion of the derivation of the goals and the estimates of historical and current abundance follows.

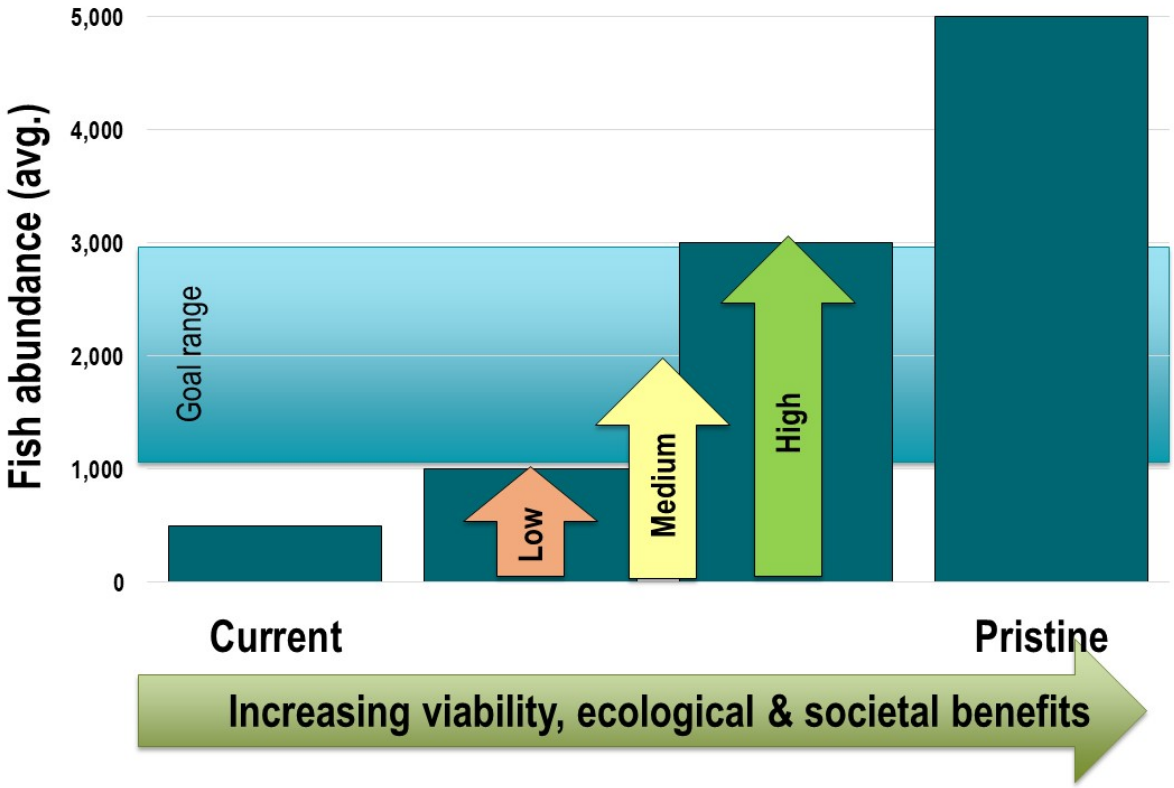


Figure 9. Concepts for defining natural production goals.

Table 6. Rule set for quantifying low-, medium-, and high-range goals for natural production. Rules are numbered in priority of application.

	Rule set for quantifying range goals for natural production.
Low range	1. Delisting abundance goal consistent with recovery scenario as specified in ESA recovery plan. (Not every population required to achieve high level of viability.) 2. Minimum abundance threshold (equivalent to a viable population with ≤5% risk of extinction in 100 years) inferred from rule set developed and applied by the Technical Recovery Teams to similar populations by species. (Applicable where population-specific viability goals were not otherwise identified.)
Medium range	1. From existing plans, where identified. 2. Mid-way between low- and high-range goals for listed populations where not otherwise identified in existing plans. 3. Yield-based escapement goals where defined for unlisted populations based on stock-recruitment analyses. 4. Based on current abundance where yield-based goals have not been identified for unlisted populations.
High range	1. Based on broad sense goals identified in existing plans where consistent with qualitative goals identified by the Columbia Basin Partnership. 2. Equivalent to empirical estimates of abundance under conditions when populations were previously considered to be reasonably healthy. 3. Based on habitat-model inferences of abundance that would result from reasonably feasible habitat restoration actions and/or favorable habitat conditions. 4. Default value (generally three times the low-range value) were used where historical or model-derived values were not available (not to exceed the estimated pre-development habitat potential).

Estimates of the current abundance of natural-origin spawners for each extant salmon and steelhead population provided a point of reference for identifying natural production goals. For consistency with metrics that NOAA Fisheries uses in ESA status assessments and delisting goals, abundance of natural-origin adults in each population was expressed using a 10-year geometric mean. The geometric mean values are based on the most recent 10 years of data available. Because of a one- to two-year lag time in derivation and reporting of abundance numbers for some populations, year ranges vary slightly among populations.

Historical abundance estimates for salmon and steelhead were also compiled wherever possible to place goals in the context of the production that could be realized under historical, or pristine, conditions. Historical is defined as pre-development, and corresponding numbers were estimated by various means. Many of these estimates are based on Ecosystem Diagnosis

and Treatment (EDT) modelling. EDT modeling can be used to evaluate and compare salmon and steelhead production under current conditions, historical/pristine conditions, and various habitat restoration scenarios. Most of the EDT results used by the Task Force were developed during the 2005 subbasin planning process overseen by the Northwest Power and Conservation Council. The regional technical teams reviewed these results, and the NOAA Fisheries project team compared the EDT-based historical estimates to pre-development run sizes identified by the Council (1986) and recently reviewed by the ISAB (2015). Regional technical teams sometimes also considered other habitat models. Habitat restoration assumptions embedded in these models took a variety of forms. Some were based on a specific suite of improvements determined by recovery and subbasin planners to be reasonably feasible. Others were based on more general assumptions regarding restoration of habitat conditions favorable for salmonids (e.g., Properly Functioning Conditions: NMFS 1996).

Low-range goals for natural production for listed populations were defined as the natural-origin adult spawner abundance consistent with ESA delisting goals in NOAA Fisheries' recovery plans. These goals are based on recommendations developed by the TRTs to provide guidance for recovery planning. The goals generally represent a viable population, which would be considered a population not threatened with a risk of extinction (i.e., a population with a 5 percent risk of extinction over a 100-year timeframe).

The TRTs generally derived these abundance goals from population viability analyses using stochastic life-cycle models. These models project the probability of abundance falling to critically low levels (i.e., a quasi-extinction threshold) based on population productivity and normal variation in abundance due to environmental factors. Viability curves used by TRTs to identify abundance goals for delisting also sometimes incorporated minimum abundance thresholds (MATs) to address genetic and spatial structure components in general abundance and productivity objectives.[41] In cases where recovery plans targeted populations for high levels of viability, delisting goals were often equivalent to the MAT.

In addition, for ESA delisting, not every population is required to achieve viable status. The TRTs noted that as long as a sufficient number of populations representing the historical productivity, diversity, and spatial distributions of the species are restored to viable levels, other populations could be maintained at lower levels of viability. In some recovery plans, abundance goals consistent with these lower levels of viability are identified, consistent with TRT guidance on how many and which populations need to be at various levels of viability of an ESU or DPS to be considered viable. In these cases, the Task Force recommendations for low-range Provisional Quantitative Goals for natural production are generally consistent with those lower numbers.[42] Similarly, recovery plans sometimes identify quantitative goals for

[41] For more information on ESA delisting goals and their derivation, see ICTRT 2007; UCRSB 2007; NMFS 2013, 2015, 2017a, 2017b; ODFW & NMFS 2011; WLCTRT & ODFW 2006.

[42] One exception is in the ESA recovery plan for Lower Columbia River salmon and steelhead. In that plan, the recovery scenario did not identify abundance goals for all populations designated as "stabilizing." The stabilizing designation signifies that under the recovery scenario, the goal is to maintain these populations at their current

some populations to be restored to levels of very high viability. In these cases, the Task Force generally incorporated these goals as the low-range Provisional Quantitative Goals for natural production. Exceptions are noted in specific stock summaries.

For unlisted stocks, there are no ESA recovery plans or delisting goals. For these stocks, the regional technical teams used MATs as the low-range natural production abundance goals. Both the Interior Columbia and Willamette/Lower Columbia TRTs identified species-specific MATs based on the size and spatial complexity of the historical population distribution (ICTRT 2007; McElhany et al. 2007; LCFRB 2010). Current abundance in unlisted populations typically far exceeds these minimum abundance thresholds. Since the low-range goals have been achieved in these cases, management efforts will now focus on the medium-range and high-range goals, and the low-range goals will represent a biological reference point rather than a future goal.

Medium-range goals define an intermediate step between low-range goals and high-range goals. For some stocks, ESA recovery, subbasin, or other management plans have previously identified a range of goals including values intermediate between delisting and higher, longer-term values. Medium-range goals identified in other plans were used where consistent with other low- and high-range goals developed by the Task Force.

For populations in listed ESUs or DPSs where medium-range goals were not identified in other plans, the regional technical teams and NOAA Fisheries project team simply derived medium-range goals as the midpoint between low-range and high-range goal values.

For unlisted populations, where current abundance is substantially greater than the low-range goal, the regional technical teams and NOAA Fisheries project team applied one of two rules to derive medium-range goals. Medium-range goals were equal to yield-based goals where identified from stock-recruit analyses for relatively healthy populations (e.g., Hanford bright fall Chinook, Lewis River wild fall Chinook). Where yield-based goals have not been derived for relatively healthy populations, medium-range goals were simply defined as equivalent to current abundance.

High-range goals are intended to represent "healthy and harvestable" abundance levels that would sustain very high levels of species viability, significant fishery opportunities and harvest, and a fuller range of ecological values. These goals reflect potential future habitat conditions (i.e., restored habitats) but are still typically just a fraction of historical numbers before development.

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risk status and not to improve their status. Where more recent monitoring information is available regarding current abundance of such populations than was available during recovery plan development, the current abundance estimates are incorporated into the CBP Task Force recommendations as the low-range natural production abundance goal. Those targets are not included in the ESA recovery plan, and do not represent delisting abundance targets. We have noted this and other specific instances where the low-range goals differ from this general rule in the methodology summaries that accompany the stock summaries included in Appendix A of this report.

Regional technical teams and NOAA Fisheries' project team identified high-range goals based on the information available for each stock. In some cases, existing plans identified goals or reference values consistent with the high-range definition. In these cases, the existing goals were incorporated into the Task Force goals. For instance, ESA recovery plans (and the locally developed plans they were based on) sometimes quantified "broad sense" goals in addition to delisting goals.[43] In other cases, these plans identified qualitative broad sense goals and reported modeling results consistent with those goals, but did not adopt actual quantitative broad sense goals. Other management plans also occasionally identified goals with broad sense purposes. For most stocks, however, numbers consistent with the high-range category were not available. Thus, most high-range quantitative goals were derived by the regional technical teams and NOAA Fisheries project team.

Where possible, high-range goals were identified in reference to empirical estimates of historical salmon or steelhead abundance. These historical empirical estimates provide a sound measure of what might meaningfully be expected with reductions in more recent constraints. For instance, the state of Idaho surveyed spring Chinook salmon in many natural production areas during the 1950s and 1960s, when fish numbers were substantially higher. In other cases, historical dam counts provide solid reference points upon which to base high-range goals.

Where such empirical data were lacking, high-range goals were generally based on inferences from modeling of habitat productive potential. A variety of models relate fish abundance and other population parameters to habitat conditions (i.e., stream size, gradient, morphology, substrate, riparian conditions, etc.). These models can be used to project changes in abundance based on improvement in habitat conditions and other life-cycle limitations. Estimates based on these habitat models of fish abundance under scenarios with significant habitat restoration were documented in many subbasin plans or ESA recovery plans. For instance, many subbasin plans incorporated EDT-based estimates of fish numbers that might be expected with habitat improvements that subbasin planners deemed to be realistically feasible or otherwise desirable.[44] These were the source of many of the high-range goals identified by the Task Force for populations where empirical historical estimates were not available.

In some cases, neither empirical nor model-based numbers were available for use in deriving high-range goals. In this event, regional working teams identified high-range goals that were three times the abundance identified in the low-range goal for the population. The threefold difference was generally similar to the interval observed for populations where both low- and high-range goals were otherwise documented. High-range values were limited to estimated

[43] Broad sense recovery is defined outside of the ESA recovery planning process, generally by fisheries managers (state and tribal entities) or stakeholders, and goes beyond the requirements for ESA delisting to achieve even lower extinction risk and/or to address, for example, other legislative mandates or social, economic, and ecological values.

[44] For additional discussion of EDT modeling, see above, under Section 9.3.1. Examples of goals based on restoration scenarios may be found in YBFWRB (2009), ODFW (2010), and ODFW and NMFS (2011).

levels of pre-development habitat potential when three times the low-range value exceeded that value.

Natural-origin spawning escapement was estimated independent of numbers of hatchery-origin fish returning to natural spawning areas. Thus, total spawning escapement was greater than natural-origin spawning escapement when hatchery fish were also present. Spawning escapements were also estimated independent of any harvest that might occur locally or downstream. Thus, total production of natural-origin fish would include both spawning escapement and downstream harvest.

Natural production goals take into account density dependence and carrying capacity of the existing spawning and rearing habitats for salmon and steelhead. The ISAB (2015) reviewed the status of Columbia River salmonid populations in the context of density dependence, which they defined as changes in one or more vital rates (birth, death, immigration, or emigration) in response to changing population density. Most common is compensatory density dependence (also termed compensation) in which a population's growth rate is highest at low density and decreases as density increases. Compensation is typically caused by competition for limited resources, such as food or habitat. The ISAB found that understanding density dependence in salmon and steelhead populations is important in evaluating responses to recovery actions and for setting spawning escapement goals that will be sustainable.

9.3.2 Potential Harvest & Fishery Opportunity

The Task Force Qualitative Goals call for providing "diverse, productive, and dependable tribal and non-tribal harvest and fishing opportunities for Columbia Basin salmon and steelhead." Achieving this goal would reflect a substantial improvement from the current state of these fisheries.

To provide baseline information, the NOAA Fisheries project team documented current harvest rates for all Columbia Basin salmon and steelhead. Current fisheries are generally managed under harvest rate limits prescribed through a complex of management plans, agreements, and processes (e.g., *U.S. v. Oregon*, the Pacific Fishery Management Council process, and the Pacific Salmon Treaty), and include a combination of abundance-based, escapement-based, and harvest-rate-based goals for specific stocks. These current harvest rates do not represent fishery goals per se but rather allowable harvest under frameworks designed to protect weak and listed stocks. The weak stock constraints in these existing frameworks also limit access to harvestable surpluses of strong natural and hatchery stocks in many fisheries.

Many stocks are currently managed under abundance-based management frameworks. These frameworks were developed to guide fisheries in response to annual variability in run size. They allow higher harvest rates in years of greater abundance and reduce harvest rates to protect escapements in years of lower abundance. One practical effect is that, for recovering stocks whose average abundance improves over time, harvest rates in general are also higher

on average. This means that, as an outcome of the existing fishery management structure, benefits of higher abundance are shared between increased numbers of natural-origin spawners and increased harvest. For reference purposes, the regional technical teams and NOAA Fisheries project team estimated approximate increases in harvest rates that would occur under existing management frameworks if abundance increased consistent with the Task Force natural production goals.

Healthy stocks can typically support substantially higher harvest rates than are currently identified in existing management frameworks, which are designed to protect weak and listed stocks. Therefore, the Task Force also identified potential harvest rates and numbers that would be sustainable by abundant and productive salmon and steelhead stocks. These potential harvest rates and numbers are identified in conjunction with the low-, medium-, and high-range natural production goals. As described in Table 7, the low-range potential harvest is based on the assumption that existing management frameworks (designed to protect weak stocks) would still be in place; therefore, there is no change from the estimated harvest rates under existing frameworks for low-range natural production goals. The high-range potential harvest rates are based on existing management frameworks for currently healthy stocks (i.e., Upper Columbia River (UCR) spring Chinook, UCR fall Chinook, Deschutes fall Chinook, and Lower Columbia River (LCR) bright fall Chinook). For currently weak or depleted stocks, the high-range potential rates were identified by the NOAA Fisheries project team, in consultation with regional technical team members, and based on their professional judgement and knowledge of harvest rates typically sustained by healthy stocks, depending on life-history type (i.e., spring, fall, or late-fall) and species. The high-range potential harvest rates were also calibrated down slightly for stocks that would be harvested in mixed-stock fisheries, due to the need to protect weaker stocks in such fisheries. These potential harvest levels are generally conservative relative to historical harvest rates and those sustained by salmon and steelhead stocks in more pristine areas of the North Pacific.

Potential harvest rate estimates do not attempt to allocate fishery opportunities among specific fisheries. It is assumed that opportunities for additional harvest will be distributed among fisheries through existing management authorities and processes, and that harvest managers will continue to constrain harvest (or set harvest rates) consistent with achieving escapement goals for naturally produced fish. Mid- to high-range fishing levels are assumed to occur at the same time that mid- to high-range natural production goals for spawning escapement are achieved, although the Task Force may want to explore tradeoffs among various goal scenarios in the next phase of the process.

Table 7. Approach used to identify potential harvest and fishery opportunity consistent with Provisional Quantitative Goals for natural production identified by the Columbia Basin Partnership Task Force.

Approach used to identify harvest and fishing opportunities.	
Harvest under Existing Management Plans	1. Harvests by stock are projected with increased natural-origin abundance and incremental increases according to existing abundance-based harvest management frameworks. 2. If there is currently no abundance-based management framework, current harvest rate limits were used for all natural production goal ranges.
Low-range potential harvest	1. For weak stocks, assume that existing management frameworks remain in place. 2. For currently healthy stocks (i.e., UCR spring Chinook, UCR fall Chinook, Deschutes fall Chinook, and LCR bright fall Chinook), based on existing management frameworks. 3. Ranges reflect annual variation in harvest rates based on abundance in order to meet natural-origin spawning escapement goals and access higher numbers during large run years.
Mid-range potential harvest	1. Based on existing management frameworks for currently healthy stocks (i.e., UCR spring Chinook, UCR fall Chinook, Deschutes fall Chinook, and LCR bright fall Chinook). 2. Intermediate between low- and high-range goals for currently weak or depleted stocks.
High-range potential harvest	1. Based on existing management frameworks for currently healthy stocks (i.e., UCR spring Chinook, UCR fall Chinook, Deschutes fall Chinook, and LCR bright fall Chinook). 2. For currently weak or depleted stocks, based on reasonably realistic harvest rates expected to be sustainable by healthy natural-origin stocks. 3. Prescribed rates were also consistent with needs to provide significant access to wild and hatchery fish in mixed-stock fisheries across the range of harvest including ocean, Columbia River mainstem, and tributary fisheries.

9.3.3 Current and Anticipated Hatchery Production

The Task Force Qualitative Goals call for producing hatchery salmon and steelhead to support conservation, mitigate for lost natural production, and support fisheries.

Existing hatchery production levels are defined in different ways for programs throughout the basin. Some programs define production levels in terms of adult returns, but many programs focus solely on juvenile production. For Task Force purposes, the NOAA Fisheries project team and regional technical teams documented current hatchery production levels (i.e., juvenile production) for each stock by hatchery program, and estimated corresponding numbers of adults by stock. Adult return expectations were identified where available. Table 8 shows the rule set for quantifying current and anticipated hatchery production.

Table 8. Rule set for quantifying current and anticipated hatchery production.

Rule set for quantifying hatchery production.		
Current		1. Juvenile production levels of existing programs. (Juveniles provide a common currency for all programs including those where adult return goals are not specifically identified.) 2. Adult returns from current programs to the Columbia River and regional production areas (Lower Columbia, Willamette, Middle Columbia, Upper Columbia, and Snake) are identified by stock based on recent average numbers.
Future production	Status quo	1. Juvenile production continues at current levels (barring refinements of programs based on performance or new information). 2. Corresponding adult returns as defined or inferred from current program return rates.
	Planned adjustments	3. Identify additional juvenile production in development where defined in existing processes and plans (e.g., John Day Mitigation). 4. Corresponding adult returns as defined or inferred from current program return rates.
	Additional needs	5. Identify any additional or reduced juvenile production needs to address specific purposes identified by Columbia Basin Partnership (e.g., reintroduction of extirpated populations or production for currently blocked historical anadromous production areas). 6. Corresponding to adult returns as defined or inferred from current program return rates.

Anticipated future hatchery production is identified based on available information. In most cases, future production was anticipated to be similar to current production (*status quo*). In some cases, planned changes or additions were identified. For instance, existing programs may be undergoing modifications based on new information or direction (e.g., Mitchell Act program revisions). Several new hatchery programs are also currently under development and likely to be implemented (e.g., John Day Mitigation, Yakama Coho Hatchery, Walla Walla Spring Chinook Hatchery). Mid-Columbia PUD hatchery mitigation production requirements change with periodic survival studies, and are recalculated every 10 years to adjust for changes in fish abundance and survival. It should not be expected that future recalculated numbers for PUD programs will be the same as current mitigation numbers; however, because it is not clear what the future numbers will be, current numbers are used as interim estimates. Finally, some Task Force members highlighted a desire for additional new programs to support other needs, for example to reintroduce salmon and steelhead into blocked areas within their historical range, and to increase Chinook salmon prey for Southern Resident killer whales.

Specific hatchery programs are inevitably subject to continuing refinements under the authority and auspices of oversight, funding, and implementing entities. Anticipated future hatchery production identified by the Task Force is intended to describe expectations based on current information. They are not intended to supersede or undermine specific management authorities governing implementation of any particular program, or to preclude future changes based on new information, conditions, or requirements. For example, hatchery mitigation production requirements for the Mid-Columbia PUDs will change following scheduled project survival-verification studies, and every 10 years with scheduled recalculations as described above, and these changes will be developed and approved by hatchery oversight committees authorized and required as part of each PUD's federal operating license issued by the Federal Energy Regulatory Commission (FERC).

9.3.4 Columbia River Run Sizes

The regional technical teams and NOAA Fisheries project team also developed aggregate abundance numbers for natural production, fisheries, and hatchery production at basin and species scales. These total run-size goals represent total numbers of salmon and steelhead that would be needed to meet natural production, fisheries, and anticipated hatchery production levels. They are identified at basin, species, and stock scales and used for evaluating status and goals relative to a variety of needs across the basin. Numbers are reported for total adult returns at the mouth of the Columbia River, and for numbers of fish returning to different regions of the basin. These numbers are useful references for comparison with various goals that have been established across the basin, and are also the basis for many fishery or mitigation-related goals.

Spawning escapement is less than the total number of fish returning to the Columbia River mouth because fish are lost to harvest, other causes of mortality (e.g., dam passage mortality, high temperature effects, marine mammal predation, etc.), and straying between the river mouth and the spawning grounds. Therefore, spawning escapement and river mouth return numbers are related but not directly comparable.

9.4 Quantitative Goal Summaries

This section summarizes the Quantitative Goals identified by the Task Force. Detailed goals by stock and population are provided in Appendix A.

9.4.1 Provisional Quantitative Goals for Natural Production

The Task Force's Quantitative Goals for natural production identify natural-origin escapements under low, medium, and high goal ranges. Figure 10 shows low- and high-goal ranges in aggregate by stock in relation to current abundance. Corresponding numbers are identified in Table 9. Values are normalized so that ranges for more or less abundant stocks can be illustrated on the same graph. The gap between current abundance (value of 1) and the low end of the goal range shows the proportional increase in abundance needed to reach the minimum goal. Current values overlap the goal range for stocks that are relatively healthy in terms of abundance.

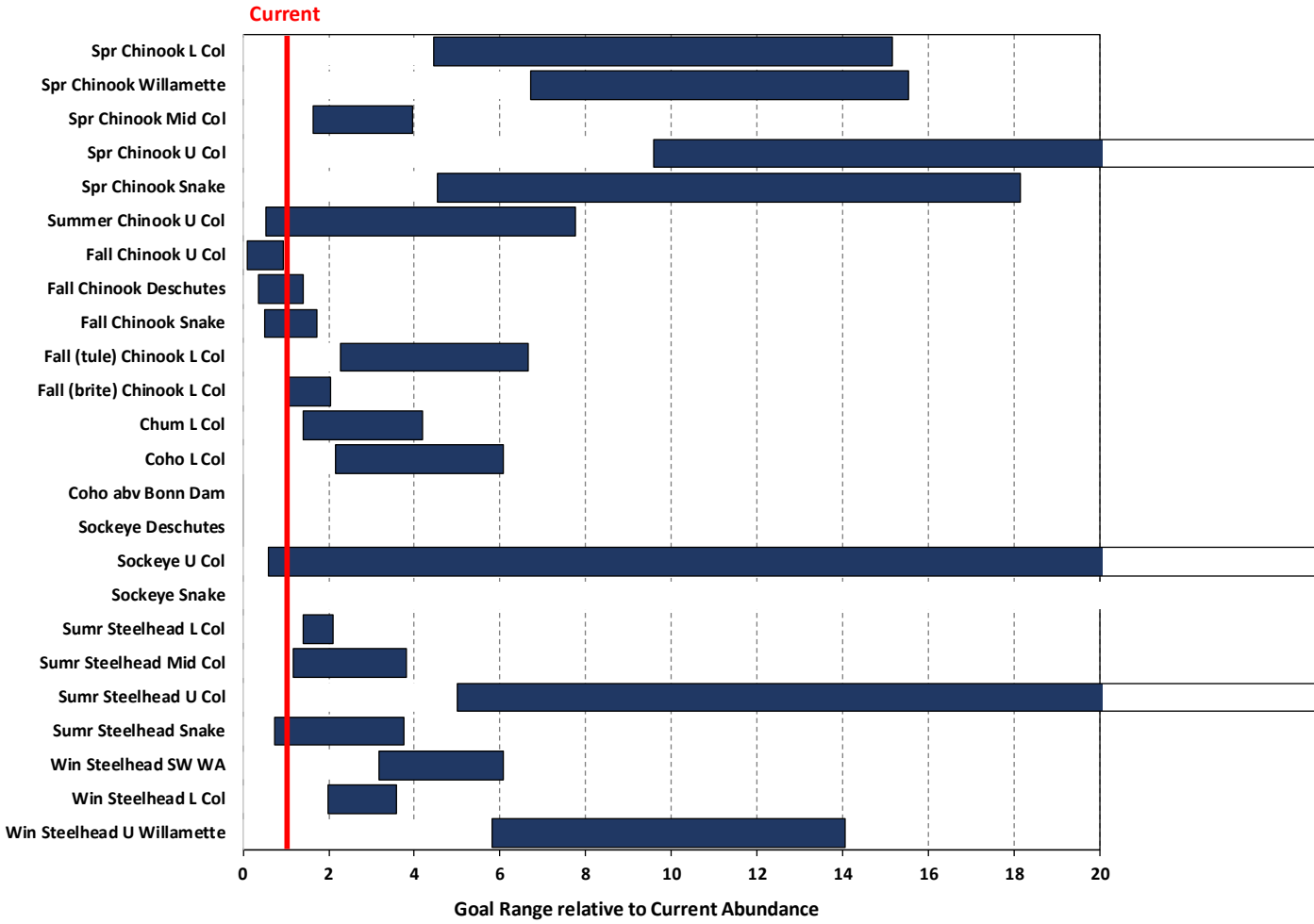

Figure 10. Aggregate abundance values for natural-origin escapements under current, historical (pre-development), and low, medium and high escapement goal ranges. The reference line for current mean number depicts the stock-specific reference value in relation to the goal range. Relative goal ranges are calculated by dividing the goal by the current abundance.

Current mean numbers for most stocks fall below target goal ranges (Figure 10). This is particularly true for depleted and listed stocks whose numbers are typically much less than low-range goals consistent with minimum viability levels or ESA recovery goals. For healthy stocks, current mean numbers generally fall within the target goal range but are less than the high goal range which is indicative of additional scope for improvement. Current mean numbers are sometimes greater than the target goal range – that is the case for Upper Columbia Fall Chinook where recent returns have benefited from a period of favorable marine environmental conditions which are not likely to be representative of a long-term average future condition.

High goals are typically less than historical numbers believed to be present prior to development (Table 9). These cases would be consistent with an implicit assumption that historical numbers would be difficult to approach without restoration of pristine conditions. In some cases, goals are but a small fraction of the historical number. For instance, the aggregate high-range goal for chum salmon is just 4 percent of the historical abundance. This low percentage reflects the severely depleted status of chum salmon and the ambitious nature of the CBP goals which will require successful reintroduction into numerous areas where current habitat conditions do not support significant natural production of this species. In the case of sockeye, the high-range goal exceeds the estimated historical abundance. This high value reflects goals identified for the upper Columbia where impoundment has created more current sockeye rearing habitat in reservoirs than historically existed.

Table 9. Aggregate abundance values for natural-origin escapements under current, historical, and low, medium and high escapement goal ranges. Numbers reflect current progress by work groups and may be revised based on new information.

Evolutionarily Significant Unit or Distinct Population Segment		Run Type	ESA	Current	Historical	Low goal	Med goal	High goal	High as % of historical
Chinook	L Columbia	Spring	X	2,200	101,700	9,800	21,550	33,300	33%
Chinook	U Willamette	Spring	X	4,300	312,200	28,900	47,800	66,800	21%
Chinook	M Columbia Spr	Spring		9,600	103,700	15,800	26,900	38,000	37%
Chinook	U Columbia Spr	Spring	X	1,200	259,000	11,500	19,800	30,100	12%
Chinook	Snake Spr/Sum	Spring/Summer	X	7,000	671,000	31,800	79,400	127,000	19%
Chinook	U Columbia Sum/Fall	Summer		16,900	694,000	9,000	78,400	131,300	19%
Chinook	U Columbia Sum/Fall	Fall		92,400	680,000	9,200	62,200	87,800	13%
Chinook	Deschutes Sum/Fall	Summer/Fall		11,500	17,000	4,000	13,000	16,000	94%
Chinook	Snake Fall	Fall (brights)	X	8,360	500,000	4,200	9,300	14,360	3%
Chinook	L Columbia	Fall (tules)	X	12,300	169,700	28,000	54,100	82,000	48%
Chinook	L Columbia	Fall (late brights)	X	10,800	33,000	11,100	16,700	22,200	67%
Chum	Columbia	Late Fall	X	11,800	461,300	16,500	33,000	49,500	11%
Coho	L Columbia	Fall (early & late)	X	31,500	301,900	67,900	129,500	191,400	63%
Coho	(Columbia upriver)	Fall		10,000	320,000	24,000	57,800	96,900	30%
Sockeye	(Mid Columbia)	Summer		30	30,000	2,500	5,000	7,500	25%
Sockeye	(U Columbia)	Summer		80,800	2,000,000	49,000	620,000	2,235,000	112%
Sockeye	Snake	Summer	X	100	84,000	2,500	5,800	9,000	11%
Steelhead	L Columbia	Summer	X	3,300	19,100	4,600	5,850	6,950	36%
Steelhead	Mid Columbia	Summer	X	18,200	132,800	21,200	43,400	69,200	52%
Steelhead	U Columbia	Summer	X	1,500	1,121,400	7,500	31,000	47,000	4%
Steelhead	Snake	Summer	X	28,000	600,000	21,000	63,000	105,000	18%
Steelhead	SW Washington	Winter		6,000	41,900	19,000	27,900	36,400	87%
Steelhead	L Columbia	Winter	X	10,600	61,200	21,100	29,800	38,100	62%
Steelhead	U Willamette	Winter	X	2,800	220,000	16,300	27,800	39,300	18%
				381,190	***8,934,900***	***436,400***	***1,509,000***	***3,580,110***	40%

9.4.2 Potential Harvest and Fishery Opportunity

Incremental increases in average harvest rates likely to occur with increasing natural production in relation to current levels are shown in Figure 11. Corresponding numbers are identified in Table 10. Increases occur only for stocks where the harvest is regulated according to an abundance-based framework. For stocks currently managed under a fixed harvest rate, it is assumed for the purposes of this exercise that future harvest rates would be the same as current (although harvest numbers would be expected to increase due to a higher abundance of fish available to the fishery). These projections make no assumptions at this point regarding the ability to access allowable rates due to other stock limits in mixed-stock fisheries. Figure shows abundance-based harvest/impact rates that reflect aspirational fishery objectives beyond incremental increases projected under existing management frameworks consistent with increases in fish abundance identified in Provisional Quantitative Goals for natural production.

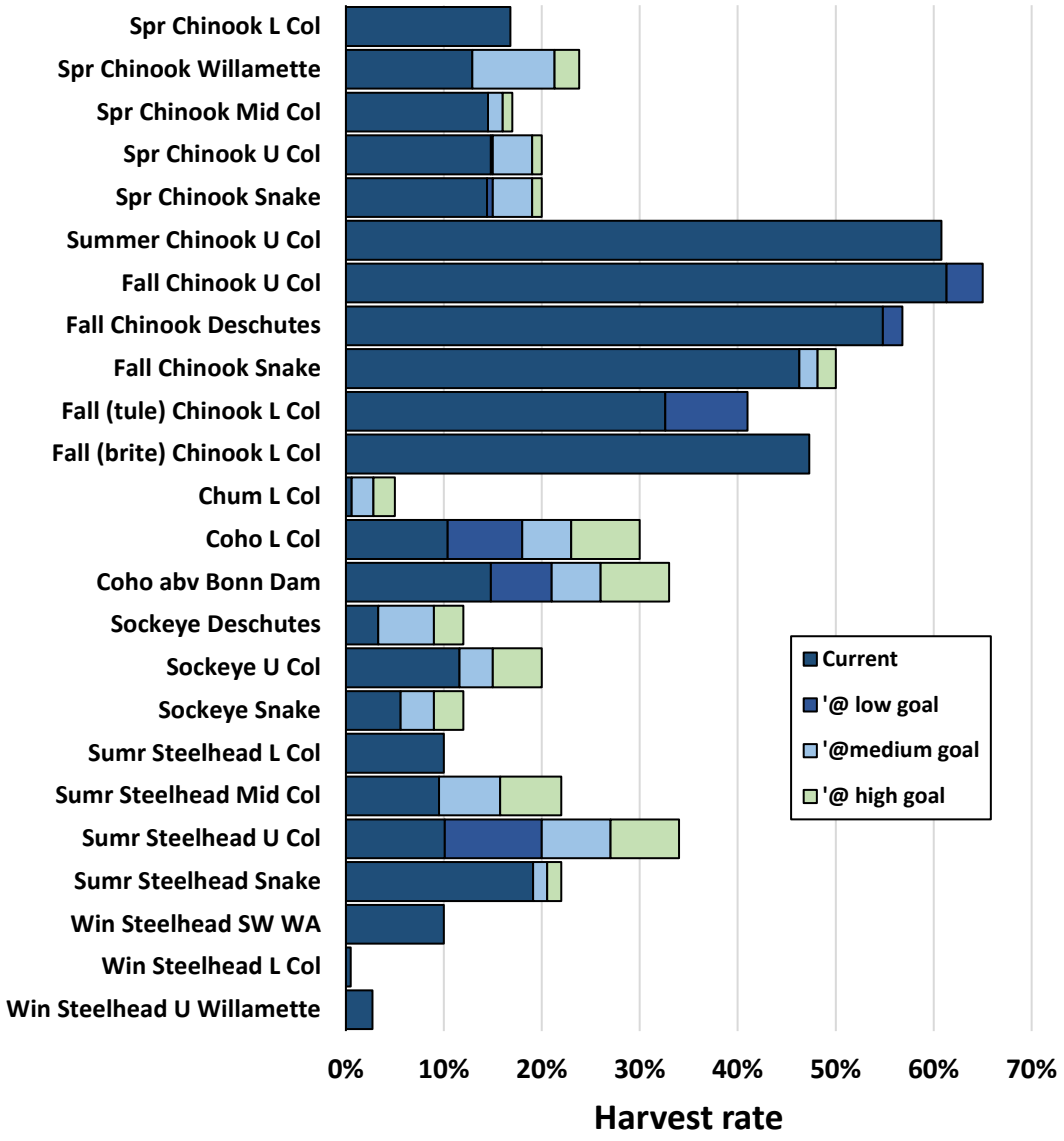

Figure 11. Current average fishery harvest/impact rates of natural-origin fish and range of increases consistent with Task Force Provisional Quantitative Goals for natural production under current management frameworks in combined marine and freshwater fisheries for Columbia Basin salmon and steelhead stocks.

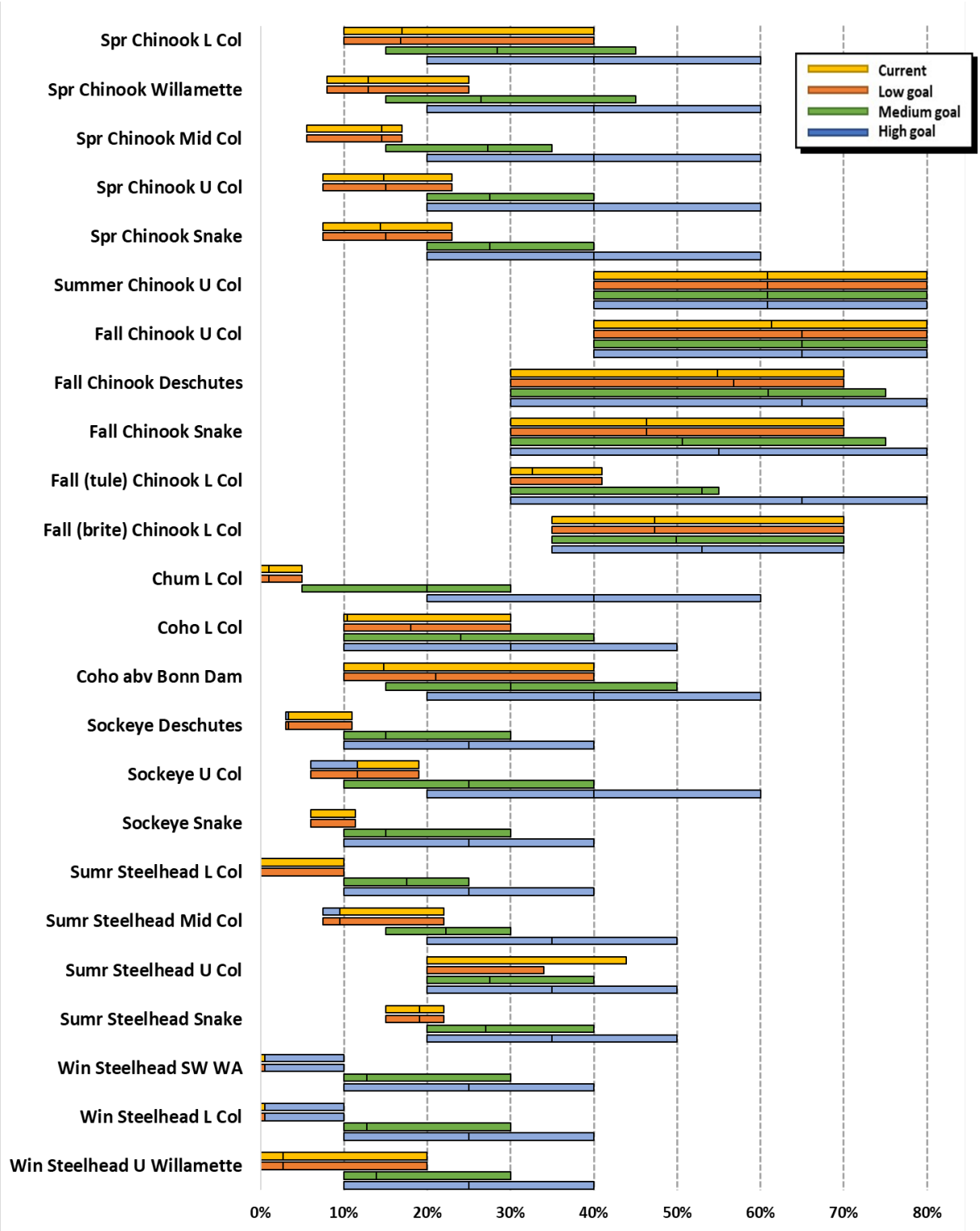

Figure 12. Potential harvest/impact rates under abundance-based management frameworks at low, medium, and high natural production (assuming corresponding changes in fishery management frameworks). Average values are depicted by vertical lines within colored bars.

Table 10. Current fishery harvest/impact rates, range of increases under current management frameworks, and low, medium, and high goals for natural-origin fish in combined marine and freshwater fisheries for Columbia Basin salmon and steelhead stocks.

Stock	Current Exploitation Rates (wild/natural)							Rates under existing plans			Potential rates with production improvements					
		Fresh	Total		Related		Guidance	@ low	@ med	@ high	@ Low goal		@ Medium goal		@ High goal	
	Ocean	water	(avg)	Range	guidance		includes	natl	natl	natl	Avg.	Range	Avg.	Range	Avg.	Range
Spr Chinook L Col	9%	8%	17%	10-40%				17%	17%	17%	17%	10-40%	28%	15-45%	40%	20-60%
Spr Chinook Willamette	9%	4%	13%	8-25%	<15%/<12%	/a	Fresh/Ocean	13%	21%	24%	13%	8-25%	26%	15-45%	40%	20-60%
Spr Chinook Mid Col	--	14.5%	14.5%	5.5-17%	5.5-17%	/a	Freshwater	15%	16%	17%	15%	5.5-17%	27%	20-35%	40%	20-60%
Spr Chinook U Col	--	14.8%	14.8%	7.5-23%	7.5-23%	/a	Freshwater	15%	19%	20%	15%	7.5-23%	28%	20-40%	40%	20-60%
Spr Chinook Snake	--	14.4%	14.4%	7.5-23%	7.5-23%	/a	Freshwater	15%	19%	20%	15%	7.5-23%	28%	20-40%	40%	20-60%
Summer Chinook U Col	36%	25%	61%	40-80%	5.2-50%	/a	Freshwater	61%	61%	61%	61%	40-80%	61%	40-80%	61%	40-80%
Fall Chinook U Col	36%	26%	61%	40-80%	21.5-45%	/a	Freshwater	65%	65%	65%	65%	40-80%	65%	40-80%	65%	40-80%
Fall Chinook Deschutes	36%	19%	55%	30-70%	21.5-45%	/a	Freshwater	57%	57%	57%	57%	30-70%	61%	30-70%	65%	30-80%
Fall Chinook Snake	20%	27%	46%	30-70%	21.5-45%	/a	Freshwater	46%	48%	50%	46%	30-70%	51%	30-75%	55%	30-80%
Fall (tule) Chinook L Col	21%	12%	33%	30-41%	30-41%	/a	All	41%	41%	41%	41%	30-41%	53%	30-55%	65%	30-80%
Fall (brite) Chinook L Col	34%	13%	47%	35-70%		/a		47%	47%	47%	47%	35-70%	50%	35-70%	53%	35-70%
Chum L Col	--	1%	1%	<5%	<5%		Freshwater	1%	2.8%	5%	1%	<5%	20%	5-30%	40%	20-60%
Coho L Col	5%	5%	10%	<10-30%	<10-30%	/a	All	18%	23%	30%	18%	<10-30%	24%	10-40%	30%	10-50%
Coho abv Bonn Dam	5%	10%	15%	<10-35%	<10-30%	/a	All < BON	21%	26%	33%	21%	<10-40%	30%	10-50%	40%	20-60%
Sockeye Deschutes	--	3.3%	3.3%	3-11%	6-8+%	/a	Freshwater	3%	9%	12%	3%	3-11%	15%	10-30%	25%	10-40%
Sockeye U Col	--	11.6%	11.6%	6-19%	6-26+%	/a	Freshwater	12%	15%	20%	12%	6-19%	25%	10-40%	40%	20-60%
Sockeye Snake	--	5.6%	5.6%	6-11%	6-8+%	/a	Freshwater	6%	9%	12%	6%	6-11%	15%	10-30%	25%	10-40%
Sumr Steelhead L Col	--	<10%	10%	<10%	<10%		Freshwater	10%	10%	10%	10%	<10%	18%	10-25%	25%	10-40%
Sumr Steelhead Mid Col	--	9.5%	9.5%	8-22%	15-22%	/a	Freshwater	10%	15.8%	22%	10%	8-22%	22%	15-30%	35%	20-50%
Sumr Steelhead U Col	--	10.1%	10.1%	20-34%	20-34%	/a	Freshwater	20%	27%	34%	20%	20-34%	28%	20-40%	35%	20-50%
Sumr Steelhead Snake	--	19.1%	19.1%	15-22%	15-22%	/a	Freshwater	19%	20.6%	22%	19%	15-22%	27%	20-40%	35%	20-50%
Win Steelhead SW WA	--	1%	1%	<10%	<10%		Freshwater	1%	1%	1%	1%	<10%	13%	10-30%	25%	10-40%
Win Steelhead L Col	--	1%	1%	<10%	<10%		Freshwater	1%	1%	1%	1%	<10%	13%	10-30%	25%	10-40%
Win Steelhead U Willamette	--	3%	3%	<20%	<20%		Freshwater	3%	3%	3%	3%	<20%	14%	10-30%	25%	10-40%

/a Abundance-based management frameworkfor Columbia River fisheries

Notes:

- *Task Force Stocks defined based on the combination of conservation (ESU or DPS) and fishery management units.*
- *Goal ranges reflect abundance-based annual harvest strategies as well as normal annual variation in fisheries.*
- *Related guidance is for reference purposes – typically these are abundance-based ranges identified in U.S. v. Oregon or other NOAA Fisheries consultations for Columbia Basin fisheries. In a few cases, may also include marine harvest in OR/WA Ocean (e.g., Lower River Hatchery Fall Chinook, Columbia River Coho).*
- *Potential future harvest rates not specifically identified for hatchery fish at this time. Sustainable rates will typically be substantially higher than for natural-origin fish.*

9.4.3 Current and Anticipated Hatchery Production

Current hatchery production by stock is shown Figure 13. Table 11 summaries releases and corresponding adult returns. Adult returns are rough approximations at this time.

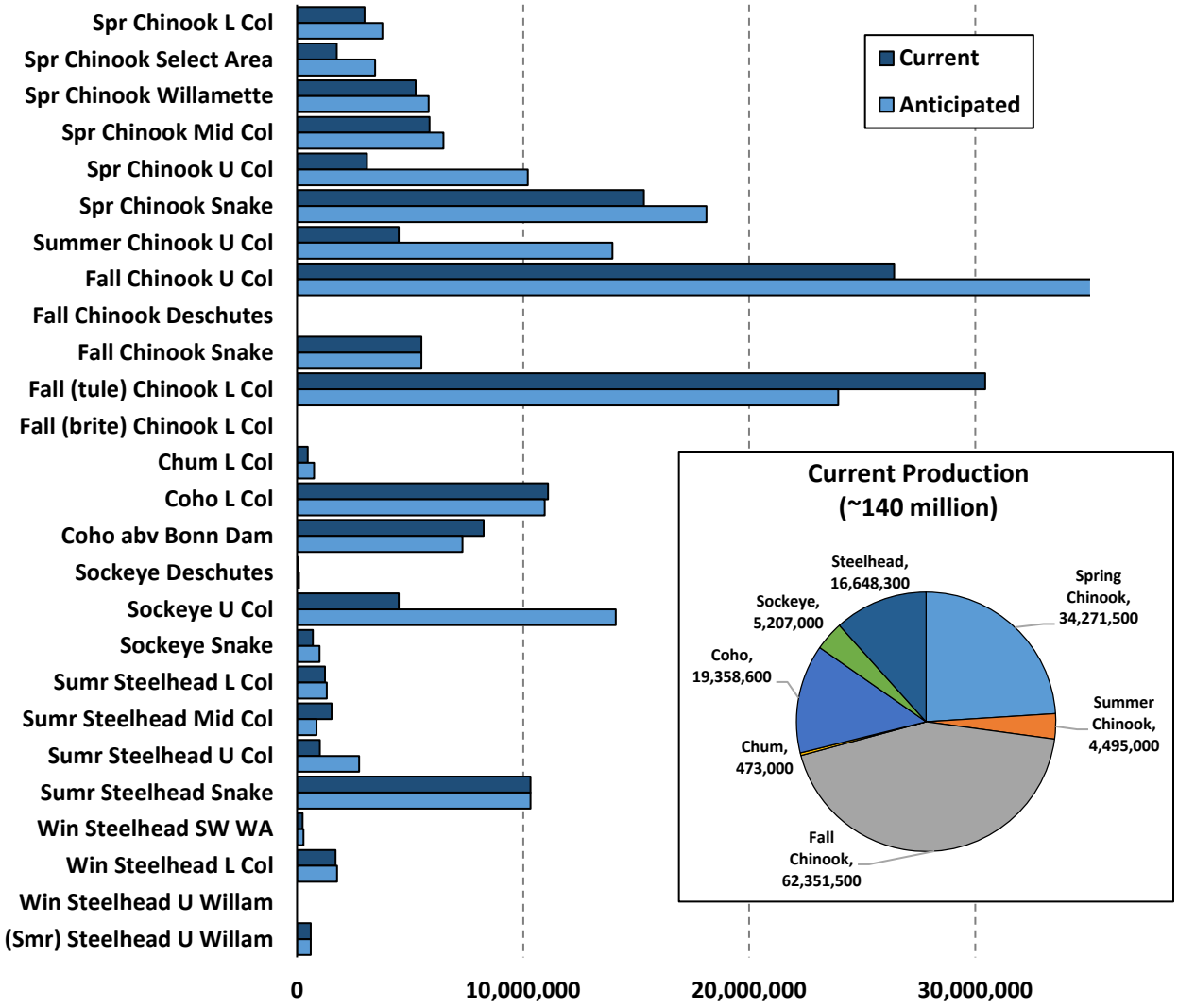

Figure 13. Current hatchery production for Columbia Basin salmon and steelhead stocks.

Table 11. Current and anticipated hatchery production and approximate adult returns to the Columbia River mouth for Columbia Basin salmon and steelhead stocks.

Stock	Current production (avg.)				Anticipated production	
	Yearlings	Other	Total	Col R adults	Total	Col R adults
Spr Chinook L Col	2,570,000	416,000	2,986,000	17,000	3,780,000	25,000
Spr Chinook Select Area	1,750,000	0	1,750,000		3,450,000	
Spr Chinook Willamette	5,241,000	0	5,241,000	48,000	5,817,000	53,000
Spr Chinook Mid Col	5,400,000	460,000	5,860,000	47,200	6,480,000	52,200
Spr Chinook U Col	3,094,000	0	3,094,000	19,400	10,200,000	104,300
Spr Chinook Snake	14,115,500	1,225,000	15,340,500	85,500	18,115,500	110,000
Summer Chinook U Col	3,311,000	1,184,000	4,495,000	46,800	13,950,000	146,000
Fall Chinook U Col	210,000	26,200,000	26,410,000	233,400	43,750,000	357,100
Fall Chinook Deschutes	0	0	0	0	0	0
Fall Chinook Snake	0	5,500,000	5,500,000	49,200	5,500,000	49,200
Fall (tule) Chinook L Col	0	30,441,500	30,441,500	163,000	23,941,500	139,000
Fall (brite) Chinook L Col	0	0	0	0	0	0
Chum L Col	0	473,000	473,000	300	750,000	500
Coho L Col	11,100,000	8,600	11,108,600	246,000	10,960,000	246,000
Coho abv Bonn Dam	8,250,000	0	8,250,000	128,000	7,325,000	128,000
Sockeye Deschutes	0	7,000	7,000	80	80,000	1,000
Sockeye U Col	0	4,500,000	4,500,000	32,700	14,100,000	141,000
Sockeye Snake	0	700,000	700,000	1,170	1,000,000	1,700
Sumr Steelhead L Col	1,241,000	0	1,241,000	44,000	1,316,000	44,000
Sumr Steelhead Mid Col	865,000	670,000	1,535,000	58,000	865,000	32,700
Sumr Steelhead U Col	1,005,300	0	1,005,300	21,300	2,750,000	58,000
Sumr Steelhead Snake	9,328,000	1,000,000	10,328,000	203,400	10,328,000	203,400
Win Steelhead SW WA	243,000	0	243,000	4,100	290,000	4,100
Win Steelhead L Col	1,696,000	0	1,696,000	28,900	1,765,000	28,900
Win Steelhead U Willam	0	0	0	0	0	0
(Smr) Steelhead U Willam	600,000	0	600,000	17,000	600,000	17,000
	70,019,800	**72,785,100**	**142,804,900**	**1,494,450**	**187,113,000**	**1,942,100**

9.4.4 Columbia River Run Sizes

Total Columbia River salmon and steelhead run size averaged 2.3 million for 2008−2017 (Figure and 15). Annual numbers have varied between 1.2 million and 3.6 million over the same time period. Chinook salmon (spring, summer and fall) typically comprise about half of the total return with the rest about evenly distributed among sockeye salmon, coho salmon, and steelhead. Chum salmon typically comprise less than 1 percent of the total return. Naturally produced fish comprise about 40 percent of the run on average, with percentages varying among species and life-history types (Figure). Approximately 60 percent of the total average run originates from hatchery production. About 35 percent of the Columbia River run is harvested in freshwater fisheries. Additional harvest occurs in marine waters as far north as Alaska.

Estimates of historical abundance were used as a point of reference for current abundance. Historical abundance is uncertain, and various estimates have been developed over time. Total annual abundance of adult salmon and steelhead in the Columbia River basin during the pre-development period (~mid 1800s) has been estimated to be 8.3 million (PFMC 1979), 7.5 to 8.9 million (Chapman 1986), 10 to 16 million (NPPC 1986), and 5 to 9 million (ISAB 2015).

Stock-specific estimates of historical (pre-development) natural production were identified by the Columbia Basin Partnership regional technical teams. The total of all stock-specific estimates of historical natural production is 9 million (Table 13). This estimate is within the range of the various historical Columbia River run-size estimates documented in Table 12, although greater than estimates by the ISAB (2015) and Chapman (1986).[41]

High-end Quantitative Goals for natural production identified by the Task Force on the spawning grounds for all stocks totaled 3.6 million salmon and steelhead (Figure 16). This would be nine times higher than current numbers. Species and run-specific improvement increments range from 1.6 for fall Chinook to 27.8 for sockeye.

Task Force Quantitative Goals for natural production were translated into equivalent Columbia River mouth numbers by accounting for harvest and other mortality (natural or human-caused) between the mouth and the spawning grounds. Columbia River mouth estimates corresponding to Task Force high-range Quantitative Goals for natural production and assuming high potential fishing rates on healthy stocks are approximately 11.4 million (4.7 million excluding sockeye). This includes natural-origin and hatchery-origin fish as well as projected harvest in freshwater.

[41] Comparisons of historical (pre-development) numbers and CBP Task Force Provisional Quantitative Goals for natural production make no correction for mortality between the mouth and spawning grounds. Historical harvest and migration mortalities were unknown and the magnitude is dwarfed by inherent uncertainties in historical run-size estimates.

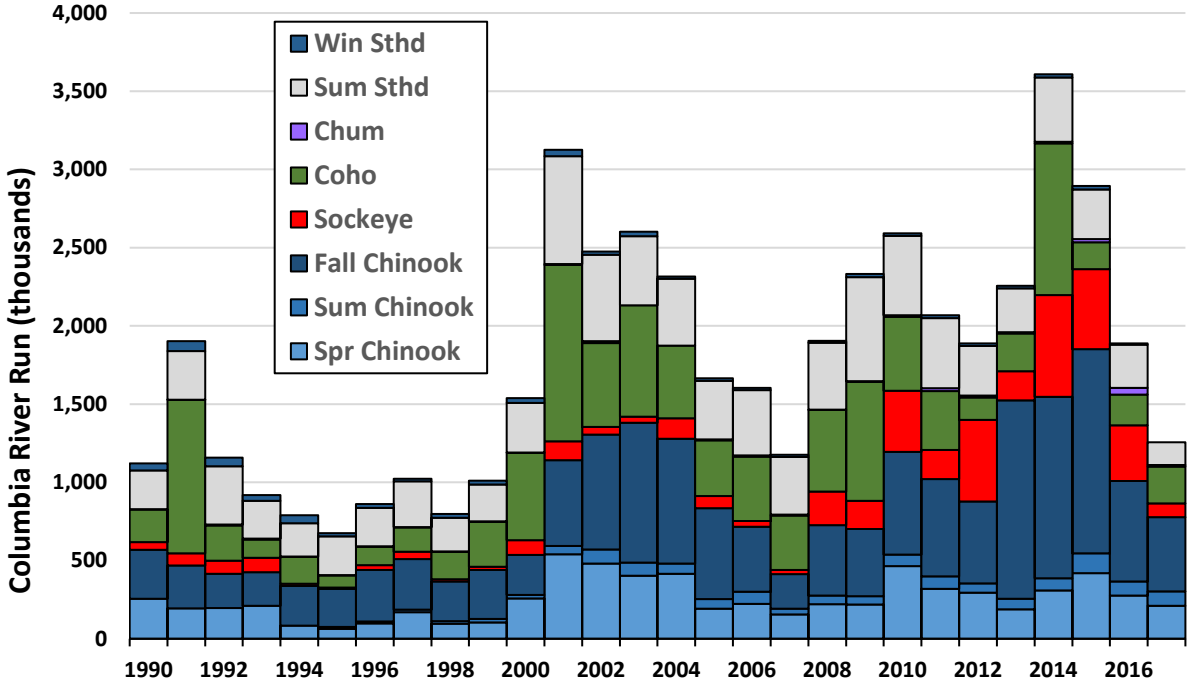

Figure 14. Annual salmon and steelhead run size to the Columbia River by stock. 1990-2017.

Table 12. Historical run-size estimates, current run sizes, and harvest of salmon and steelhead in the Columbia River.

Species	Historical Col R Run (millions)					Current Col R Run (2008-2017 averages)				Current Harvest (10-year average)			
	NPPC 1986	Chapman 1986	PFMC 1979	ISAB 2015	CBP 2019[a]	Natural origin	Hatchery origin	Total	% Hat	Col basin	Ocean	Total	% of run
Chinook	***5.4-9.2***	***3.75-4.34***	***3.44***	***--***	***3.54***	***383,000***	***710,000***	***1,093,000***	***58%***	***419,400***	***427,500***	***846,900***	***56%***
Spring	1.4-2.3	0.5-0.6	--	--	1.45	56,000	217,000	273,000	79%	88,500	7,400	95,900	34%
Summer	2.7-4.6	2.0-2.5	--	--	0.69	31,000	47,000	78,000	60%	31,100	43,300	74,400	61%
Fall	1.3-2.3	1.25	--	--	1.40	296,000	446,000	742,000	60%	299,800	376,800	676,600	60%
Chum	***0.8-1.0***	***0.45-0.75***	***0.95***	***--***	***0.46***	***15,000***	***0***	***15,000***	***2%***	***100***	***0***	***100***	***1%***
Coho	***1.0-1.8***	***0.56-0.62***	***1.20***	***--***	***0.62***	***34,000***	***374,000***	***408,000***	***90%***	***145,000***	***85,000***	***230,000***	***47%***
Sockeye	***1.5-2.6***	***2.25-2.62***	***0.65***	***--***	***2.11***	***295,000***	***34,000***	***329,000***	***10%***	***41,900***	***0***	***41,900***	***13%***
Steelhead	***0.8-1.4***	***0.45-0.55***	***2.04***	***--***	***2.20***	***104,000***	***377,000***	***481,000***	***79%***	***222,800***	***0***	***222,800***	***46%***
Winter	--	--	--	--	1.87	14,000	33,000	47,000	50%	19,700	0	19,700	42%
Summer	--	--	--	--	0.32	90,000	344,000	434,000	80%	203,100	0	203,100	47%
Total	**9.6-16.3**	**7.5-8.9**	**8.28**	**5.0-9.0**	**8.93**	**831,000**	**1,495,000**	**2,326,000**	**64%**	**829,200**	**512,500**	**1,341,700**	***37%***

[a] *Based on population-specific inferences for natural-origin spawners prior to development.*

Table 13. Columbia Basin Partnership Task Force high-range goals for natural-origin spawners in relation to historical and current numbers, and corresponding totals for the Columbia River mouth run size and harvest.

	Natural-origin Spawners				Columbia River Run @ high goals				Harvest @ high goals			
Species	**Current**	**High goal**	**% of historical**	**Goal / current**	**Natural origin**	**Hatchery origin**	**Total**	**% Hat**	**Col basin**	**Ocean**	**Total**	**% of run**
Chinook	***176,000***	***648,000***	**18%**	***3.7***	***1,494,900***	***1,035,800***	***2,530,700***	***41%***	*1,154,500*	*711,600*	*1,866,100*	***58%***
Spring	24,000	295,000	20%	12.3	777,100	344,500	1,121,600	31%	515,000	30,000	545,000	47%
Summer	17,000	131,000	19%	7.7	241,000	146,000	387,000	38%	154,000	215,000	369,000	61%
Fall	135,000	222,000	16%	1.6	476,800	545,300	1,022,100	53%	485,500	466,600	952,100	64%
Chum	***12,000***	***49,500***	***11%***	***4.1***	***102,000***	***500***	***102,500***	***0%***	***41,000***	***0***	***41,000***	***40%***
Coho	***42,000***	***288,300***	***46%***	***6.9***	***432,000***	***374,000***	***806,000***	***46%***	***499,000***	***109,000***	***608,000***	***66%***
Sockeye	***81,000***	***2,251,500***	***107%***	***27.8***	***6,560,400***	***143,700***	***6,704,100***	***2%***	***3,006,200***	***0***	***3,006,200***	***45%***
Steelhead	***70,000***	***342,000***	16%	***4.9***	***899,200***	***388,100***	***1,287,300***	***30%***	***520,300***	***0***	***520,300***	***40%***
Winter	51,000	228,200	12%	4.5	163,000	33,000	196,000	17%	63,000	0	63,000	32%
Summer	19,000	113,800	35%	6.0	736,200	355,100	1,091,300	33%	457,300	0	457,300	42%
Total	**381,000**	**3,579,300**	**40%**	**9.4**	**9,488,500**	**1,942,100**	**11,430,600**	**17%**	**5,221,000**	**820,600**	**6,041,600**	***35%***

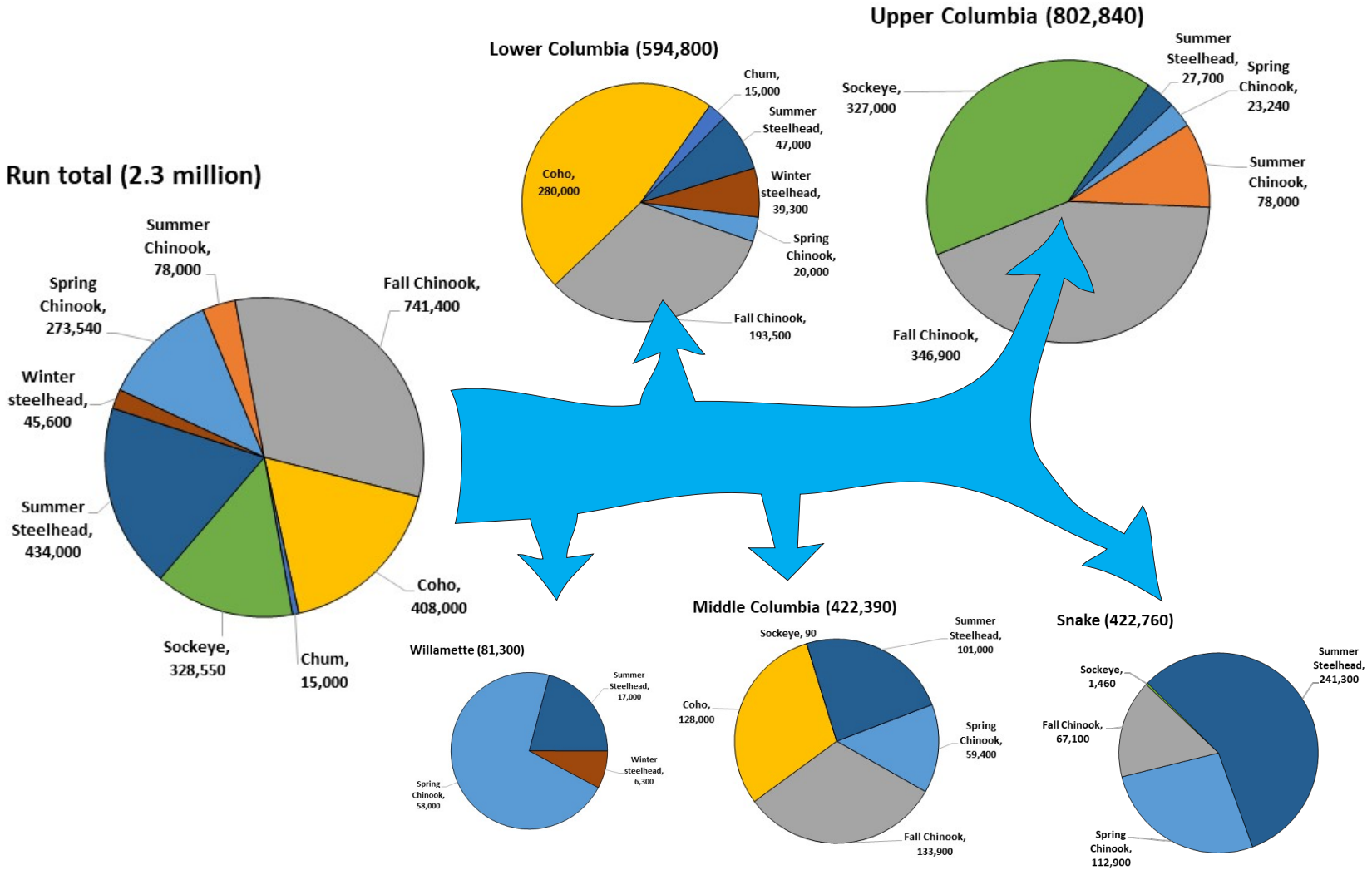

Figure 15. Composition of recent 10-year average salmon and steelhead run to the Columbia River. Area-specific numbers are as measured at the Columbia River mouth.

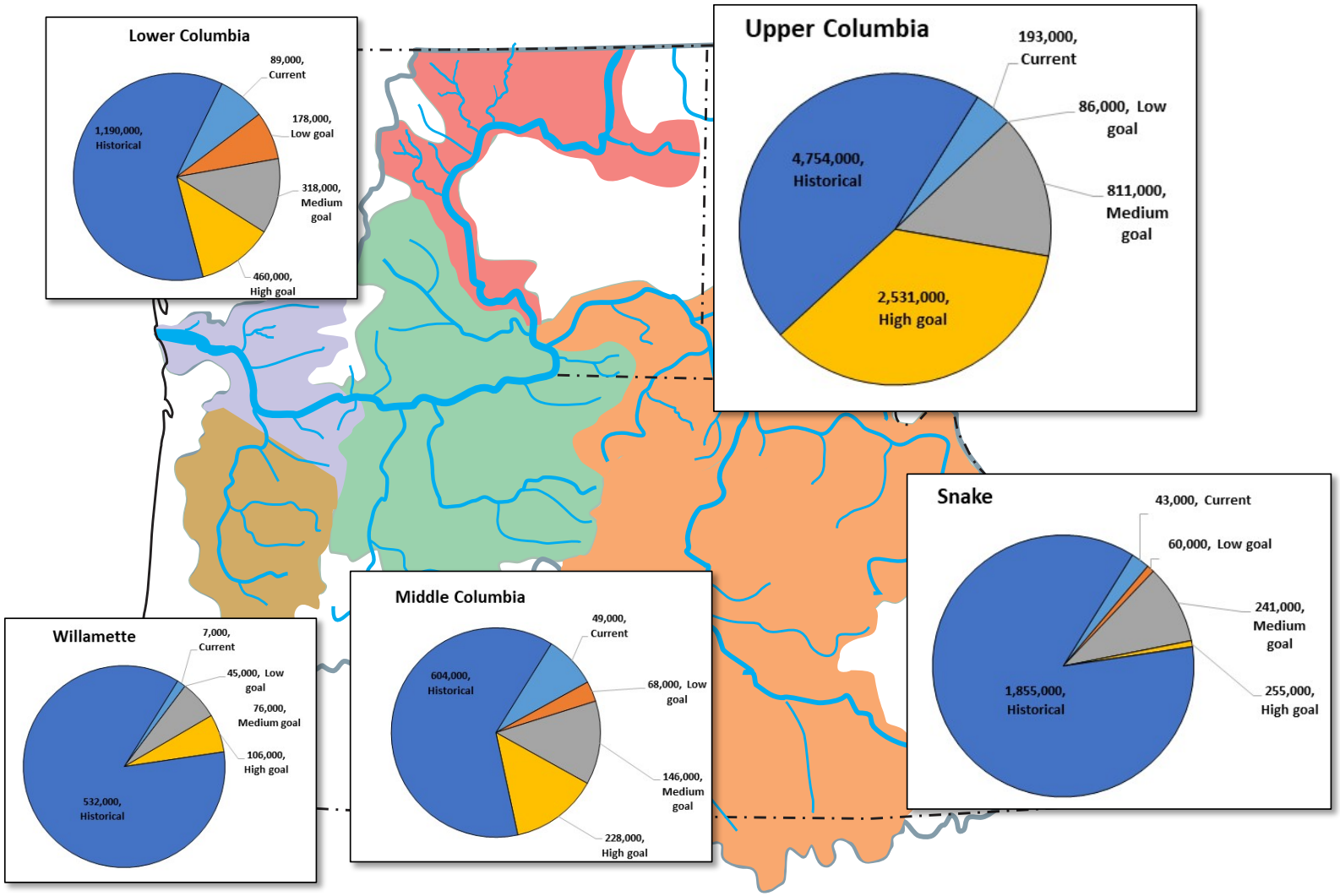

Figure 16. Natural production goals for spawning escapement relative to current and historical values. Current, low goal, medium goal and high goal pie slices are incremental relative to lower values (e.g., low goal total = current + additional increment needed to reach the total identified for the low goal.

10. Continuing the Work of the Task Force

The efforts of the Task Force focused first and foremost on setting goals for salmon and steelhead recovery in the Columbia Basin. These goals are reflected in both qualitative goal statements and provisional quantitative abundance numbers for each of the 24 stocks. These goals reflect values for our collective future — for example, the aspiration to have heathy and harvestable levels of salmon and steelhead, and the intent to have management decisions about salmon and steelhead include social, cultural, ecological, and economic considerations.

Frequently, however, Task Force discussions included questions about how the goals would be realized, what actions would be necessary to achieve the goals, and what implications those actions might have for diverse interests in the Columbia Basin. Task Force members held back on resolving those questions because of the importance of first setting goals. Members frequently reminded each other of the saying that *"If you don't know where you are going, any road will take you there."*

The MAFAC approved continuation of this effort in late June 2018, providing the group with the opportunity to further test and refine the provisional goals. The Task Force anticipates the next phase of work to address many of the questions around how the goals might be achieved. The Task Force has had many preliminary discussions about what the next phase would cover. Potential topics for further exploration and evaluation include:

1. How to balance achievement of the qualitative goals on a stock-specific basis, considering that different qualitative goals may be prioritized for individual stocks.
2. How to strategically align harvest aspirations and future hatchery production with natural production goals.
3. How to refine goals for salmon and steelhead in blocked areas in the Columbia and Snake River basins.
4. Identifying potential opportunities and multiple benefits among all of the species and actions.
5. Developing alternative scenarios with strategies and action to achieve the goals.

At the same time, Task Force members fostered the trust and respect essential to finding solutions and synergies. The common foundation developed through this initial phase provides the Task Force members with the tools, confidence, and inspiration to move forward.

11. References

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Appendices

Appendix A. Provisional Quantitative Goal Summaries by Stock

Appendix B. Glossary

Appendix C. Terms of Reference

Appendix D. Operating Principles

Appendix A. Provisional Quantitative Goal Summaries by Stock

To be added

Appendix B. Glossary

Abundance	In the context of the Task Force, abundance refers to the number of natural- or hatchery-origin adult salmon and steelhead (excluding jacks) measured at various points (e.g., spawning grounds, returning to hatcheries, returning to a local area, available for harvest, returning to the Columbia River mouth). In the context of ESA delisting, abundance refers to the number of natural-origin adult fish (excluding jacks) reaching spawning grounds.
Broad sense recovery goals	Recovery goals, generally defined by state and tribal entities or stakeholders that go beyond the requirements for ESA delisting to achieve even lower extinction risk and/or to address other legislative mandates or social, cultural, economic, and ecological values.
Carrying capacity	An upper limit to population growth as density increases which determines a maximum equilibrium population size. Population size is expected to fluctuate around the maximum equilibrium population size because of variability that is unrelated to density. Moreover, the carrying capacity parameter itself may change over time, tracking changes in habitat conditions. [ISAB 2015]
Conversion rate	For Columbia River salmon and steelhead, the conversion rate is defined as fishery-independent survival between points in freshwater migration. It is typically estimated between dams based on counts or tag recovery rates.
Conservation	Used generally, the act or instance of conserving or keeping fish resources from change, loss, or injury, and leading to their protection and preservation. The Endangered Species Act (ESA) defines conservation as the use of all methods and procedures necessary to bring any endangered species or threatened species to the point at which the measures provided pursuant to the ESA are no longer necessary.
Delisting criteria	Criteria incorporated into ESA recovery plans that define both biological criteria and threats criteria based on the five listing factors in ESA section 4[a][1]), and related to alleviating the causes for decline that, when met, would result in a determination that a species is no longer threatened or endangered and can be proposed for removal from the Federal list of threatened and endangered species.
Density dependence	Density dependence occurs when a population's density affects its growth rate by changing one or more vital rates — birth, death, immigration, or emigration.

Distinct population segment (DPS)	The ESA allows listing decisions at the level of a species, subspecies, or distinct population segment (DPS). For **steelhead**, NOAA Fisheries applies a joint policy with the U.S. Fish and Wildlife Service policy that defines a DPS as a population or group of populations that is discrete from and significant to the remainder of its species based on factors such as physical, behavioral, or genetic characteristics, because it occupies an unusual or unique ecological setting, or because its loss would represent a significant gap in the species' range. Also see *evolutionarily significant unit* (ESU).
Diversity	The genetic and phenotypic (life history, behavioral, and morphological) variation within a population. Variation could include anadromous or resident life histories, fecundity, run timing, spawn timing, juvenile behavior, age at smoltification, age at maturity, egg size, developmental rate, ocean distribution patterns, male and female spawning behavior, physiology, molecular genetic characteristics, etc. Abundance, productivity and resilience are strongly related to diversity which allows fish to succeed under conditions that may vary substantially in time and space.
***De Minimis* exploitation rates**	Low rates of fishery exploitation determined to pose negligible risk to the long-term viability of endangered, threatened, depleted, or weak fish stocks.
Ecosystem	A community of organisms, including humans, in conjunction with their nonliving environment. Ecosystems involve complex interactions between organisms, their environment, and the processes that drive the system. Ecosystems are complex and continuously changing. Humans and human institutions, beliefs and practices are integral parts of the ecosystem.
Endangered Species Act (ESA)	Federal law passed in 1973 (16 U.S.C. § 1531 et seq.) that aims to prevent the extinction of invertebrates, vertebrates, and plants listed as threatened or endangered. A species must be listed if it is threatened or endangered due to any of the following five factors: (1) present or threatened destruction, modification, or curtailment of its habitat or range; (2) overutilization for commercial, recreational, scientific, or educational purposes; (3) disease or predation; (4) inadequacy of existing regulatory mechanisms; and (5) other natural or manmade factors affecting its continued existence. After being listed, a recovery plan must be created that aims to recovery the species The Act also requires federal agencies or their non-federal permit applicants to determine whether their proposed action may impact a listed species.
ESA recovery plan	A plan to recover a species listed as threatened or endangered under the U.S. Endangered Species Act (ESA). The ESA requires that recovery

	plans, to the extent practicable, incorporate (1) objective, measurable criteria that, when met, would result in a determination that the species is no longer threatened or endangered; (2) site-specific management actions that may be necessary to achieve the plan's goals; and (3) estimates of the time required and costs to implement recovery actions. The ESA requires NOAA Fisheries to develop and implement recovery plans for ESA-listed salmon and steelhead species. Recovery plans are guidance, not regulatory documents.
Escapement	Escapement typically refers to the number of adult salmon or steelhead surviving harvest and other mortality factors to reach a particular point in their return to freshwater.
Evolutionarily significant unit (ESU)	The ESA allows listing decisions at the level of a species, subspecies, or distinct population segment (DPS). For **salmon**, NOAA Fisheries applies its 1991 ESU policy and treats ESUs as DPSs. An ESU is a group of Pacific salmon that is (1) substantially reproductively isolated from other conspecific units and (2) represents an important component of the evolutionary legacy of the species. Also see *distinct population segment* (DPS).
Exploitation rate	The proportion of a total run that is harvested in one or more fisheries. Exploitation rates may be calculated relative to ocean abundance, freshwater return or local return depending on the distribution of fisheries and the management application. For the purposes of the Task Force, exploitation rate is defined broadly to include all fish harvested and any incidental mortalities that may result from fishing activities.
Fishery management unit (FMU)	Fishery management units (FMUs) are stocks or groups of stocks that are subject to similar management strategies and objectives. FMUs are primarily determined by run type and return timing in relation to Columbia River mainstem fisheries, which account for a large share of salmon and steelhead harvest. One fishery management unit may include several ESA listing units of similar run type.
Harvestable	Species, stocks or populations of salmon and steelhead that are sufficiently viable, abundant, and productive to sustain significant levels of exploitation and harvest. Harvestable stocks are typically managed to produce optimum or maximum sustained yield. Harvest ability can encompass both numbers of fish harvested and qualities of fisheries including opportunity and success. Harvestable can be broadly defined to include "fishable," which refers to fishery opportunities that may not include direct harvest (e.g., catch and release recreational fisheries).

Hatchery-origin fish	Fish that were spawned and/or reared during a portion of their life cycle in an artificial production facility.
Healthy	Salmon or steelhead populations, ESUs, DPSs, or stocks that are abundant, productive, widely distributed, diverse, and resilient to environmental perturbations including climate change; can sustain significant levels of harvest; and support a full range of ecological benefits including the needs of dependent species. Generally, healthy refers to a point substantially above ESA delisting on the spectrum from threatened/endangered to extremely low extinction risk.
Jacks	Jacks are sexually mature salmon, generally males, returning to freshwater one year earlier than most mature salmon. They typically comprise a small proportion of the total return of natural-origin fish, but many hatchery programs produce higher percentages of jacks. Numbers of jacks returning in one year are frequently used as predictors of the number of fully mature fish likely to return in the following year.
Listing unit	A grouping of salmon or steelhead (see *evolutionarily significant unit* for salmon or *distinct population segment* for steelhead) that is listable under the ESA.
Minimum abundance threshold (MAT)	A minimum population abundance level corresponding with a viable population (i.e., a population with a low risk of extinction [<5 percent] over a 100-year timeframe. Incorporates spatial structure and diversity considerations into population viability curves based on abundance and productivity.
Mitigation hatchery production	Hatchery fish production used for conservation or harvest purposes that is funded through legislation or legal agreement to compensate for natural production lost due to a specific action, such as construction and operation of a dam.
Major population group (MPG)	An aggregate of independent populations within an ESU or DPS that share similar genetic and spatial characteristics.
Metrics	Something that quantifies a characteristic of a situation or process; for example, the number of natural-origin salmon returning to spawn to a specific location is a metric for population abundance.

Natural production	Natural production, or naturally produced fish, refers to the progeny of fish that spawn in the wild, regardless of parental origin (wild, natural, or hatchery). This term is interchangeable with the term natural-origin fish. It is important to distinguish natural production from natural productivity, which refers to the rate at which natural origin fish are able to produce offspring
Natural-origin fish	Fish that spawned and reared in the wild, regardless of parental origin (wild, natural or hatchery).
Population	A group of fish of the same species that spawns in a particular locality at a particular season and does not interbreed substantially with fish from any other group.
Productivity	The rate at which a population is able to produce offspring. Productivity is used as an indicator of a population's ability to sustain itself or its ability to rebound from low numbers. The terms "population growth rate" and "population productivity" are interchangeable when referring to measures of population productivity over an entire life cycle. The indicator for productivity is the average number of surviving offspring per parent, which can be expressed as the number of recruits (adults) per spawner or the number of smolts per spawner.
Rebuilding exploitation rates (RERs)	A harvest exploitation rate consistent with a population's survival and recovery requirements under the Endangered Species Act according to quantitative risk assessment.
Recovery	Recovery in general refers to improvement in the biological status of a depleted, weak, or at-risk species to a high level of viability and function. Recovery can be viewed as a spectrum — for example, from improving a species likelihood of persistence to a point where it is no longer threatened or endangered and can be removed from ESA protection to improving a species to a point where it has an extremely low risk of extinction. NOAA Fisheries uses the term ESA recovery to refer to reducing threats and improving a species status to a point where it is no longer threatened or endangered and can be removed from ESA protection. For salmon and steelhead, this involves improving the species' abundance, productivity, spatial structure, and diversity to levels which provide a high likelihood of long-term persistence (i.e., viable with a low risk of extinction).
Recovery goals	Recovery goals may include both ESA recovery (delisting) goals and broad sense recovery goals that go beyond the requirements of ESA delisting by

	addressing other legislative mandates or social, cultural, economic, and ecological values.
Recovery scenario	Scenario that describes a target status for each population included in an ESU or DPS, generally consistent with ICTRT recommendations for ESU/DPS viability.
Run	The migration of salmon or steelhead from the ocean to freshwater to spawn. Defined by the season, they return as adults to the mouths of their home rivers.
Run size	The total number of adult salmon or steelhead (i.e., number of fish harvested plus escapement from fisheries) returning to their systems of origin.
Self-sustaining	A self-sustaining viable population has a negligible risk of extinction due to reasonably foreseeable changes in circumstances affecting its abundance, productivity, spatial structure, and diversity characteristics over a 100-year period, and achieves these characteristics without dependence upon artificial propagation. Artificial propagation may be used to benefit threatened and endangered species, and a self-sustaining population may include artificially propagated fish, but a self-sustaining population must not be dependent upon propagation measures to achieve its viable characteristics. Artificial propagation may contribute to recovery, but is not a substitute for addressing the underlying factors (threats) causing or contributing to a species' decline.
Smolt-to-adult return ratio (SAR)	Smolt-to-adult return ratio (SAR) is the survival from a beginning point as a smolt to an ending point as an adult. SARs are influenced by both natural environmental conditions and human factors in the freshwater migration corridor, estuary and marine waters. In the Columbia Basin, SARs are typically calculated from measurement points at dams (Lower Granite Dam to Lower Granite Dam, Bonneville Dam to Bonneville Dam, Bonneville to Lower Granite Dam, or below Bonneville to Bonneville Dam).
Spatial structure	The geographic distribution and organization of a population or groups of populations.
Stock	A group of fish of the same species that spawns in a particular lake or stream (or portion thereof) at a particular season and which, to a substantial

	degree, does not interbreed with fish from any other group spawning in a different place or in the same place in a different season. For the purposes of the Columbia Basin Partnership Task Force, a stock is defined for Columbia Basin salmon and steelhead based on species (Chinook salmon, coho salmon, sockeye salmon, chum salmon, steelhead), region of origin (e.g., Lower Columbia, Middle Columbia, Upper Columbia, Snake, or Willamette) and run type (e.g. spring, summer, fall, late fall).
Stock-recruitment	The relationship between parent spawners (stock) and the subsequent returns of progeny as maturing adults (recruitment). Stock-recruitment models are commonly used to describe and quantify compensation in a managed fish population, to develop biologically based spawning and harvest rate goals, and to estimate the maximum equilibrium abundance that the habitat can support (ISAB 2015).
Technical recovery team	Teams of scientists convened by NOAA Fisheries to develop technical products and recommendations related to ESA recovery planning. Technical recovery teams were complemented by planning forums unique to specific states, tribes, or regions, which used TRT and other technical products to develop ESA recovery plans.
Viable salmonid population (VSP)	An independent population of Pacific salmon or steelhead that has a negligible risk of extinction due to threats from demographic variation (random or directional), local environmental variation, and genetic diversity changes (random or directional) over a 100-year timeframe.
VSP parameters	Abundance, productivity, spatial structure, and diversity. These parameters describe characteristics of salmon and steelhead populations that are useful in evaluating population viability. See NOAA Technical Memorandum NMFS-NWFSC-42, Viable salmonid populations and the recovery of evolutionarily significant units (McElhany et al. 2000).
Wild fish	Fish that spawned and reared in the wild and originated from parents and a lineage that does not include significant numbers of hatchery-origin fish. Distinguished in some applications from natural-origin fish, whose parents might include hatchery-origin fish spawning in the wild.

Appendix C. Terms of Reference

Marine Fisheries Advisory Committee
Columbia Basin Partnership (CBP) Task Force
Terms of Reference

July 2016, and
Amended by Addendum, June 2018

Purpose

The purpose is to establish a task force under the authority of the Marine Fisheries Advisory Committee (MAFAC) to provide expert advice and create a communication conduit for geographically focused stakeholder input to MAFAC, and subsequently from MAFAC to NOAA's National Marine Fisheries Service (NOAA Fisheries) Leadership, on Endangered Species Act (ESA) listed and non-listed salmon and steelhead issues and goals that integrate long-term conservation and harvest/fishing and support regional and local efforts amongst Columbia Basin partners. This advice and related information will contribute to fulfilling NOAA Fisheries mission activities.

Objective

This Task Force is being established to expand the expertise of MAFAC and to help MAFAC provide advice and input to NOAA Fisheries Leadership on the Columbia Basin Partnership (CBP) and its future activities. By reporting to MAFAC, the Task Force will assist NOAA Fisheries in fulfilling its central role in ensuring that ESA, tribal trust, and sustainable fishing responsibilities integrate conservation and harvest through an inclusive approach in the Columbia Basin. The Task Force will be science-based, results driven, transparent, and publicly embraced.

The initial actions for consideration of the Task Force include:

- Provide a framework for developing quantitative goals for salmon and steelhead at the species, stock, and major population group (MPG).
- Collaboratively develop goals to meet conservation needs while also providing harvest, including that necessary to satisfy treaty rights, and fishing opportunities. Goals will be developed in light of habitat capacity, climate change, and other ecosystem conditions that affect natural production.
- Foster a strong foundation of collaborative relationships to address multiple management decisions in coming years.

Background/Scope

The Columbia Basin is home to one of the richest arrays of salmon and steelhead in the world, and this wealth of anadromous species holds great ecological, cultural, spiritual, and economic value. Protecting, restoring, and effectively managing these valuable species is one of the

region's greatest responsibilities, and one of NOAA Fisheries' greatest challenges. The Task Force's work will depend on wide, candid, and honest participation by all who care about salmon and steelhead.

The scope of this effort covers:

- All ESA-listed and non-listed salmon and steelhead in the Columbia Basin, above and below Bonneville Dam;
- Ocean, main stem, and tributary fisheries that harvest Columbia Basin stocks, including commercial, recreational, and tribal fisheries;
- Multiple scales (basinwide, species, and major population group);
- All impacts across salmon and steelhead life-cycles (e.g. habitat, harvest, hatchery, and hydro); and
- Consideration of ecological conditions and current and future habitat capacity.

NOAA Fisheries West Coast Region and the Northwest Power and Conservation Council will serve as e*x-officio* members of the Task Force.

Terms and Composition

This Task Force will consist of 25 to 35 individuals. The individuals will be made up of regional sovereigns and stakeholders. Given the long history of sovereign collaboration in the Columbia Basin as well an obligation for Government-to-Government relations with Tribes, up to 10 member seats will be allocated to sovereigns and the remainder (up to 25) for stakeholders. This Task Force creates an important opportunity for stakeholders to engage in meaningful collaboration along with regional sovereigns.

The Task Force members will strive to work together to seek support for common goals over the long-term by integrating local and regional efforts, improving efficiency, considering existing information on goals, the full salmon life-cycle, the four Hs (habitat, hydropower, hatcheries, and harvest), species' status, and current environmental conditions.

Members of the Task Force will serve to reflect the broader constituency that they represent. The Task Force will be made up of representatives from the four Northwest states (Oregon, Washington, Idaho, and Montana), regional tribes, state agencies, and local recovery groups, as well as members that represent the following interests:

- Environment
- Commercial fishing
- Recreational fishing
- Utilities
- River industries
- Agriculture

It is intended that the Task Force members represent the diverse constituent groups and partners that interact with NOAA Fisheries from the states of Oregon, Washington, Idaho, and Montana. Task Force members will be appointed for a term up to two (2) years.

Organization and Reporting

The Task Force may meet in person at the discretion of MAFAC with the concurrence of the members. Other meetings may be conducted by telephone or using other meeting technology. The Task Force will report to the MAFAC's Ecosystem Approach Subcommittee, which will report on its activities, findings, recommendations, reports, and other deliverables at regular meetings of MAFAC. Individual members of the Task Force are not prohibited from providing individual input to NOAA Fisheries on topics which do not concern MAFAC upon NOAA Fisheries' request.

Funding

Funding would be provided by NOAA Fisheries West Coast Region. Members of the Task Force are not compensated for their services, but will upon request be allowed to travel and per diem expenses as authorized by 5 U.S.C. § 5701 *et seq*.

Duration

The Task Force will be established for an initial period of two (2) years with a possibility of extending that term if deemed necessary by NOAA Fisheries and MAFAC.

ADDENDUM - June 2018

The term for the initial two-year period for the Columbia Basin Partnership Task Force began in January 2017, when its members were brought together for its first meeting. The initial two year period ends at the end of January 2019.

The Marine Fisheries Advisory Committee (MAFAC) held its spring 2018 meeting in June in Portland, Oregon, with the specific purpose of receiving an extensive update on the progress of the Task Force. On June 27, members of the Task Force presented on their progress to date and discussed their operating principles, the overarching vision that has been guiding their work, and the development of qualitative and technical quantitative goals. The members presented their timeline and confirmed that a report on the provisional qualitative and quantitative goals under consideration was due for completion by the end of January 2019.

MAFAC members were extremely pleased with the progress and work completed to date. MAFAC agreed that a second phase of work, comprised of scenario planning and related efforts, would help establish integrated goals for long-term conservation and harvest/fishing of salmon and steelhead and would support collaborative regional and local efforts amongst Columbia Basin partners.

Based on this assessment, MAFAC members unanimously approved extending the term of the Task Force for an additional two-year period, from the end of January 2019 through the end of January 2021.

Appendix D. Operating Principles

MARINE FISHERIES FEDERAL ADVISORY COMMITTEE
(MAFAC)

COLUMBIA BASIN PARTNERSHIP TASK FORCE
(CBP TASK FORCE)

OPERATING PRINCIPLES
(adopted on 06-27-2017)

For any collaborative process to operate smoothly, it is necessary for those involved to agree on the purpose for the process and the procedures by which the group will conduct its business. These operating principles are intended to support a constructive and productive process.

I. INTRODUCTION AND PURPOSE OF THE COLUMBIA BASIN PARTNERSHIP TASK FORCE

Introduction. NOAA Fisheries has Endangered Species Act (ESA), tribal treaty/trust responsibilities, and sustainable fishing responsibilities that require integrating conservation and harvest needs. The discussions and products of the Columbia Basin Partnership Task Force (CBP Task Force) will help advise the Marine Fisheries Advisory Committee (MAFAC) and, through MAFAC, NOAA Fisheries on ways to integrate those responsibilities to help inform future management decisions.

The CBP Task Force is a subcommittee of the MAFAC, formed at the request of NOAA Fisheries pursuant to the MAFAC Charter (Section 13(b) and the Federal Advisory Committee Act (FACA)), subject to procedures according to FACA. MAFAC and its subcommittees are managed by a Designated Federal Officer (DFO).

Purpose

The purpose of the CBP Task Force, as tasked by MAFAC, is to provide for a science-based, results-driven, transparent, and publicly embraced process to recommend broad-sense recovery goals for Columbia Basin salmon and steelhead, listed and non-listed, that incorporate long-term conservation and provide harvest/fishing opportunities, while also satisfying tribal treaty/trust responsibilities. This task is a living marine resource matter that is a responsibility of the Department of Commerce, and falls within the scope of MAFAC per its charter.

Scope

The scope of this effort covers:

- All Columbia Basin listed and non-listed salmon and steelhead, including some extirpated populations, above and below Bonneville Dam; and including the upper, middle, and lower basins, and the estuary.

- Ocean, mainstem, and tributary fisheries that harvest Columbia Basin stocks, including commercial, recreational, and tribal fisheries.
- Multiple geographic scales (basin, subbasin, evolutionarily significant unit (ESU), and major population group (MPG)).
- Multiple temporal scales (e.g., 100-, 50-, or 25-year goals).
- All impacts across the salmon and steelhead life-cycle (e.g., habitat (mainstem, tributary, estuary, and ocean), harvest, hatchery, and hydro).
- Ecological functions, conditions, and current and future habitat capacity.

Products

MAFAC has tasked the CBP Task Force to provide advice and recommendations for quantitative goals for salmon and steelhead at the ESU, stock, and MPG levels for Pacific salmon and steelhead in the Columbia Basin. The CBP Task Force will consider the best available science including information on habitat capacity, climate change, impacts to resident fish and other species, and other ecosystem conditions. The Task Force will also consider restoration potential of the currently blocked historical salmon and steelhead habitat.

In addition to enhanced engagement and understanding among CBP Task Force members, the outcome of its advice may be a concise, common definition of success. Numerical adult return goals may allow a means to measure progress and a clear way to maintain public support for regional recovery efforts and investments. Additionally, chances of achieving broad-sense salmon recovery may be enhanced through better coordination and effective use of resources.

The recommendations of the CBP Task Force will not obligate any CBP Task Force member to undertake certain activities or diminish tribal treaty/trust responsibilities. It is the sincere hope of the Task Force that recommendations for common, long-term goals for salmon and steelhead will inspire our many partners to integrate efforts to achieve the final recommendations.

II. STRUCTURE OF THE CBP TASK FORCE

CBP Task Force Members. The CBP Task Force will consist of stakeholders, tribes, and states. The CBP Task Force members are voluntarily working together to achieve a mutually acceptable outcome that satisfies, to the greatest degree possible, the interests of all members. It is essential that the CBP Task Force members reflect the range of views from across the Columbia Basin.

Members of the CBP Task Force will serve to reflect the broader constituency that they represent. The CBP Task Force will include:

- Four Northwest states: Oregon, Washington, Idaho, and Montana;
- Columbia River Tribes: Confederated Tribes of the Colville Reservation, Spokane Tribe of Indians, Columbia River Inter-Tribal Fish Commission (representing the Nez Perce Tribe, Confederated Tribes of the Umatilla Indian Reservation, Confederated Tribes of the Warm Springs Reservation of Oregon, and the Confederated Tribes and Bands of the Yakama Nation), Upper Snake River Tribes Foundation (representing the Burns Paiute

Tribe, Shoshone–Bannock Tribes of the Fort Hall Reservation, Shoshone–Paiute Tribes of the Duck Valley Indian Reservation, and Fort McDermitt Paiute and Shoshone Tribe), Confederated Salish and Kootenai Tribes of the Flathead Nation, and Kootenai Tribe of Idaho;

- NGO/environmental representative(s);
- Commercial fishing representative(s);
- Recreational fishing representative(s);
- Utilities representative(s);
- River industries representative(s);
- Agricultural/irrigation representative(s);
- A local recovery group representative from each state;
- MAFAC member(s); and
- A representative from the Northwest Power and Conservation Council (ex-officio).

Membership Criteria. Members of the CBP Task Force have been appointed by the NOAA Fisheries Administrator, based on the recommendations of MAFAC using the following criteria:

- Are broadly representative of their interests and constituents affected by salmon and steelhead management in the Columbia River Basin.
- Have organizational and/or subject matter expertise regarding salmon and steelhead management in the Columbia River Basin.
- Together represent the geographic diversity of the Columbia River Basin.

Working Teams. As needed, with the approval of NOAA Fisheries and pursuant to the MAFAC Charter, the CBP Task Force may organize teams comprised of CBP Task Force members to inform the CBP Task Force.

Coordinating Team. The CBP Task Force may decide to designate a balanced, representative group of members as a Coordinating Team with specified process-related roles and responsibilities in between meetings. This group may assist the MAFAC DFO and the DFO's Fisheries staff in preparing proposed agenda topics for CBP Task Force meetings.

III. MEETINGS AND PUBLIC INTERACTIONS

Meeting Principles.

- Members of the CBP Task Force will be open, transparent, inclusive, and accountable in all of their actions. They will adhere to the highest ethical standards in their work and deliberations and are committed to using informed judgment and thoughtfulness in decision-making.
- Members of the CBP Task Force will listen and understand broad stakeholder interests and diversity within the Columbia Basin.
- Members of the CBP Task Force will provide input to each other and MAFAC that is strategic and science-based and will reflect a basinwide perspective and long-term view.

- While the work of the CBP Task Force will be accomplished cooperatively whenever possible, when individual CBP Task Force members decline to support a recommendation, they may explain their decisions to the CBP Task Force, and all views will be shared with MAFAC.

Meeting Coordination. NOAA Fisheries and the MAFAC DFO may hire facilitators or consultants to assist in ensuring CBP Task Force meetings run smoothly and efficiently. The MAFAC DFO will approve all meeting schedules. The DFO and DFO's Fisheries staff and consultants will:

- Develop draft agendas, distribute meeting materials, facilitate meetings, work to resolve any process issues or impasse that may arise, prepare action items, and other tasks as requested.
- Provide a process that supports constructive and productive dialogue and stays focused on the agreed-upon scope of work for CBP Task Force meetings.
- Offer process skills to support open, balanced, respectful dialogue and interest-based CBP Task Force problem-solving.
- Track areas of alignment and divergence, recommendations, and next steps.
- Send draft documents to CBP Task Force members for review.

Meeting Attendance. Each member will make a good faith effort to attend each CBP Task Force meeting. It is the responsibility of the member to stay fully briefed on all CBP Task Force meeting discussions and deliberations. If a member misses more than half the meetings in a year or is not engaged in the between-meeting work, or for any other reason at NOAA's discretion, NOAA Fisheries and MAFAC may terminate the term of that member and seek and appoint a new representative to fill the responsibility.

Public Input and Public Outreach. The public may attend CBP Task Force meetings as audience members. Meeting materials will be available on the MAFAC and NOAA Fisheries West Coast Region website. There will be an opportunity for public input during meetings of the CBP Task Force. Comments from the public will be limited in time to allow sufficient opportunity to conduct other portions of the agenda. The MAFAC DFO may engage the CBP Task Force in a "town hall" or other type of public meeting or forum on Columbia Basin topics to provide the public with opportunity for providing input and feedback.

IV. RECOMMENDATIONS

It is understood that CBP Task Force members are representing the interests of their agency, organization, and/or constituents and providing input based on those interests. CBP Task Force members will engage in dialogue to seek common ground, support interests, and address differences to develop recommended goals.

The CBP Task Force shall report all advice, recommendations, and reports to MAFAC for its feedback and consideration and must not provide advice or work products directly to NOAA or NOAA Fisheries. MAFAC will present its own final recommendations to NOAA Fisheries, and

will meet and discuss its draft recommendations with the CBP Task Force to seek feedback prior to finalizing its recommendations.

V. RELATIONSHIP OF THE CBP TASK FORCE TO OTHER PROCEEDINGS

The CBP Task Force is a task force of the MAFAC. Participation in the CBP Task Force will not limit any member from taking whatever actions or asserting positions that the member determined was in its best interest and, for sovereigns, is consistent with its legal and/or regulatory obligations.

VI. GROUND RULES

- Learn from and understand each other's perspective.
- Be respectful, candid, and constructive.
- Provide balance of speaking time.
- Test assumptions by asking questions.
- Resolve differences and reach consensus.
- Personal attacks and prejudicial statements are not acceptable.
- Explore innovative solutions based upon common interests.
- Discuss topics together rather than in isolation.
- Avoid surprises.
- Limit side conversations.
- Turn off cell phones or place in the non-ring mode during meeting sessions.

VII. SAFEGUARDS

Right to Withdraw. Any member may temporarily or permanently withdraw from the CBP Task Force at any time after discussing the reasons for withdrawal with the DFO or meeting facilitator. A CBP Task Force member wishing to resign from the CBP Task Force should submit a letter of resignation to the NOAA Fisheries Administrator with a copy to the MAFAC DFO.

VIII. AGREEMENT AND ADOPTION

The CBP Task Force members agree to abide by the preceding CBP Task Force Operating Principles.