Exempted Fishing Permit Application

Biological sampling of Pacific halibut (*Hippoglossus stenolepis*) bycatch during the winter hook-and-line fishery for Pacific cod (*Gadus macrocephalus*) in the Western Aleutian Islands

31 August, 2017

Applicant:

Timothy Loher, PhD
Research Scientist
International Pacific Halibut Commission
2320 West Commodore Way, Suite 300
Seattle, WA 98199

Phone: 206-552-7674
Fax: 206-632-2983
Email: tim@iphc.int

Statement of purpose and research goals:

The International Pacific Halibut Commission (IPHC) has a long history of studying population structure in Pacific halibut, including a population genetics research program that was initiated in the late 1990s. Population genetics research is conducted in order to resolve stock components from one another and to identify barriers to gene flow that may limit the mixing of halibut among regions, warrant different management actions or strategies among regions, or suggest changes in the spatial structure of the numerical stock assessment model. In 2016, a population genetic analysis was completed (Drinan et al., *Journal of Fish Biology* **89**:2571-2594) using tissue samples that had been collected from 10 sampling locations across the eastern Pacific Ocean: from British Columbia in the south; to Pribilof Canyon in the north; and westward into the Aleutian Islands region at Adak Island, Petrel Bank, and Attu Island. The study employed a combination of anonymous (i.e., not under direct natural selection) microsatellite markers (n = 23) as well as expressed sequence-tag linked microsatellites (i.e., potentially under directional selection; n = 38 markers), making it the most extensive population genetic analysis of this stock to-date. The results suggest that significant stock structure exists within the managed range; in particular, that Pacific halibut residing in the western Aleutian Islands are genetically distinct from the remainder of the eastern Pacific population. Of greatest potential importance to management is the implication that a boundary of significant stock segregation may bisect a single IPHC regulatory area: i.e., Area 4B, with significantly-different population components residing on either side of Amchitka Pass.

However, these results may be called into question due to a weakness in the underlying sampling design: whereas the majority of study locations were surveyed in mid-winter, Attu Island and Petrel Bank (i.e., the two sites found to be genetically distinct) were sampled during the IPHC's summer setline survey. Ultimately, genetic population structure is established via the formation

and maintenance of spatially-segregated spawning populations. In the case of Pacific halibut, spawning occurs in midwinter following the migration of spawners from their summer feeding grounds to potentially-distant spawning grounds. As such, summer-collected samples from any given location may be composed of individuals from multiple spawning groups that co-mingle on common feeding grounds. Although it is highly unlikely that such a process could result in the generation of spuriously-significant genetic stock structure where none exists – as opposed to masking the existence of stock structure due to seasonal "smudging" and wrongly concluding that the stock is homogeneous – Best Practices mandate that our results be re-tested using samples from the Western Aleutians that are collected during the winter spawning period.

We wish to use the 2018 winter hook-and-line fishery for Pacific cod (*Gadus macrocephalus*) as a platform of opportunity to collect Pacific halibut length data and accompanying tissue samples from the Western Aleutian Islands. This fishery encounters small numbers of halibut that are returned to the sea upon capture. Sampling of such halibut would be conducted by the vessel's fishing crew so as to place minimize burden on their assigned Fisheries Observer(s). The sampling would be rapid, non-lethal, and should not reduce the probability of survivorship (i.e., alter vitality classifications) of the sampled halibut. Our goal is to ultimately collect samples from up to (100) halibut; understanding that the total number of halibut encountered incidental to the Pacific cod fishery in 2018 is likely to be far fewer, and that the collection of additional samples in future years – and potentially from additional platforms – may be required before genetic re-analysis can be accomplished.

Technical details and sampling protocols:

(i) *Required sample size and disposition of sampled fish*

Re-analysis of the validity of the current population genetic results for the Western Aleutians using new, winter-collected samples could likely be accomplished using as few as (40) fish. However, the use of reproductively mature individuals produces the most robust results and the larger the sample size the greater will be the power to detect genetic differentiation (e.g., the original analysis contained a total of (92) adult halibut from the Western Aleutians). As maturity cannot be assessed in a rapid and non-lethal manner at sea, individual maturity will be inferred from length and sex relative to regional maturity-at-length observed in IPHC setline survey data; wherein sex will be determined *post hoc* using genetic techniques (Drinan et al., *IPHC Report of Assessment and Research Activities* **2017**:511-526). Ultimately, we seek up to (100) length-tissue samples with hopes of ultimately obtaining 50-60 likely-mature Pacific halibut. However, considering that adult Pacific halibut in the Aleutian Islands region have been shown to migrate offshore during November and reside from December through March at greater depths on average (300-500m; Loher, unpublished data) than those at which the Pacific cod hook-and-line fishery is typically prosecuted (100-200m; Neidetcher at al., *Deep Sea Research II* **109**:204-214) we expect that this fishery's encounter rate with Pacific halibut will be relatively low and potentially composed to a considerable degree of relatively small, immature individuals. As such, our expectation for 2018 sampling is that 20-30 samples might be obtained; and that sampling will need to be repeated in subsequent years in order to obtain a robust sample for genetic analysis.

No Pacific halibut sampled under the auspices of this research will be killed or retained; all sampled halibut will be returned to the sea with a minimum of harm.

(ii) *Area and timing of sampling*

Sampling will occur at fishing grounds located along the Aleutian Island Chain west of 180° W longitude (i.e., in NMFS Statistical Areas 542 and 543), between 1 January 2018 and 31 March 2018.

(iii) *Vessels and gear*

Incidentally-captured Pacific halibut will be sampled during the course of the hook-and-line catcher/processor gear sector of the "A" Season Fishery for Pacific cod in the Aleutian Islands subarea (i.e., US National Marine Fisheries Service Statistical Areas 541-543).

(iv) *Individual vessel selection*

A single vessel operating under the auspices of Aleutian Spray Fisheries (2157 North Northlake Way Suite 210, Seattle, Washington 98103) will be selected to conduct the proposed sampling. The vessel will be selected on a volunteer basis as facilitated by Mr. Craig Cross (Aleutian Spray Fisheries: 206-784-5000; craigc@starboats.com). Once selected, vessel contact information (i.e., names, addresses, telephone numbers, and email addresses for the vessel's owner and master), vessel specifications (vessel name, State registration number, physical description (hull construction and color), length, and tonnage), home port, and intended port(s) of departure for the relevant fishing trips will be furnished to NMFS. Equivalent information and a copy of the EFP will be furnished to NMFS Enforcement Alaska Division (Nathan Lagerway, Deputy Special Agent in Charge, Anchorage) and to NMFS Fisheries Monitoring and Analysis Division (Chris Rilling, Director, Seattle).

(v) *Experimental design*

The sampling protocol will consist of:

a) bringing the incidentally-caught halibut aboard the vessel to be sampled;

b) releasing the halibut from the hook using an approved Careful Release technique (i.e., either by hook twisting or cutting the gangion near the hook);

c) measuring and recording the halibut's forklength;

d) collecting a small (~¼" by ¼") tissue sample from the caudal fin;

e) assigning the halibut to a viability category as per existing IPHC/NMFS protocols;

f) returning the halibut to the water without further delay.

All stages of the process with the exception of (e) will be conducted by a member of the fishing vessel's crew; viability assignments will be conducted by the vessel's NMFS-trained Fishery Observer.

The entire sampling process is expected to require less than 2 minutes and have no impact on the probability of survival of the sampled fish. The sampling protocol outlined above is quicker and less obtrusive than any of the protocols used by the IPHC for halibut tag-and-release that have been shown to yield excellent survival of the handled individuals.

(vi) *Public release of information*

The number of halibut sampled and the demographic characteristics of the sampled fish (length, sex, viability upon release) will be publically available and may be obtained by any party that desires that information by contacting the Applicant or the IPHC. A collecting report that details the number of Pacific halibut that were sampled and their length distribution and viabilities will be provided to NMFS within 30 days of the receipt of the samples and associated data by the IPHC. Sex data will also be made available to NMFS if desired; but, as this will require *post hoc* laboratory analysis the timing of which is presently uncertain, we are unable to state at this juncture when those data will become available. Sampling details of a proprietary nature (e.g., specific fishing locations) will remain the possession of the vessel owner and master and will not be divulged to the public by the Applicant or any agent of the IPHC.

Involvement of the NMFS Observer Program:

As a member of the hook-and-line catcher/processor gear sector of the "A" Season Fishery for Pacific cod, the vessel selected for this sampling will have a NMFS-trained Fishery Observer aboard. We will work directly with NMFS Fisheries Monitoring and Analysis Division (Chris Rilling, Director, Seattle) to apprise the Observer Program of the work that is to be conducted and, the vessel details, the EFP under which the sampling will be conducted, and to verify that the Observer will be able to conduct viability assessments of sampled halibut as they are returned to the sea. Following consultation with NMFS-FMA (Chris Rilling) and Aleutian Spray Fisheries (Craig Cross), we have chosen to place the remaining sampling responsibilities on the vessel crew so as to minimize any additional work required of the Observer.

Requested regulatory exemption

Conducting the proposed sampling will require an Exempted Fishing Permit because regulations prohibit any vessel that does not hold Pacific halibut IFQ from bringing Pacific halibut aboard the vessel: "All halibut that are caught and not retained shall be immediately released outboard of the roller and returned to the sea with a minimum of injury…" {50 CFR part 679.21(b)(2)(ii)}. Fish sampled under the requested EFP would be brought inboard of the vessel's roller before being sampled and returned to the sea with a minimum of delay and injury.

31 August 2017

Applicant (Timothy Loher) Date