



DRAFT: IPHC 5-year Biological and Ecosystem Science Research Program

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PURPOSE

To provide the Commission with a description of the new and continuing research projects proposed by IPHC staff and with an overview of the 5-year research program.

BACKGROUND

Since its inception, the IPHC has had a long history of research activities devoted to describe and understand the biology of the Pacific halibut (*Hippoglossus stenolepis*). At the present time, the main objectives of the Biological and Ecosystem Science Research Program at IPHC are to:

- 1) to identify and assess critical knowledge gaps in the biology of the Pacific halibut;
- 2) to understand the influence of environmental conditions; and
- 3) to apply the resulting knowledge to reduce uncertainty in current stock assessment models.

Traditionally, IPHC staff propose annually new projects designed to address key biological issues as well as the continuation of certain projects initiated the previous year, based on their own input as well as input from the Commissioners, stakeholders and specific advisory bodies to IPHC such as the Scientific Review Board (SRB) and the Research Advisory Board (RAB). Proposed research projects are evaluated internally by IPHC staff and presented to the Commissioners for feed-back and subsequent approval. Importantly, biological research activities at IPHC are guided by a Five-Year Research Plan that is put forward by the Program Head and that identifies key research areas that follow Commission objectives. In this document, we present an outline of the projects proposed by IPHC staff and a new Five-Year Research Plan for the period 2017-21.

DISCUSSION

For 2017, seven new projects are proposed that cover specific research needs related to reproduction (Projects 2017-01, 2017-02), migration (Projects 2017-02, 2017-03, 2017-04), growth (Project 2017-05), viability assessment and survival post-capture (Projects 2017-04, 2017-06) and genetics (Project 2017-07) ([Appendix I](#)). Project 2017-01 ("Full characterization of the annual reproductive cycle in adult female Pacific halibut") proposes to study the annual reproductive cycle of Pacific halibut females in order to further our understanding of sexual maturation in this species and to improve maturity assessments and maturity-at-age estimates. Project 2017-02 ("Investigation of halibut dispersal on Bowers Ridge via Pop-up Archival Transmitting (PAT) tags") proposes to study the migratory behavior of females prior to the spawning season in order to identify potential spawning areas in Regulatory Area 4B. Project 2017-03 ("Tail pattern recognition analysis in Pacific halibut") is a pilot study that proposes to

identify individual fish by ways of photographic recognition of tail patterns to complement migratory studies. Project 2017-04 ("Condition Factors for Tagged U32 Fish") proposes to study the relationship between the physiological condition of fish and migratory performance as assessed by tagging in U32 fish in order to better understand the potential use of quantitative physiological indicators in predicting migratory (as well as other types of) performance. Project 2017-05 ("Identification and validation of markers for growth in Pacific halibut") proposes to identify and validate molecular and biochemical profiles that are characteristic of specific growth patterns and that will be instrumental to describe different growth trajectories in the Pacific halibut population and evaluate potential effects of environmental influences. Project 2017-06 ("Discard mortality rates and injury classification profile by release method") proposes to study the relationship between hook release methods in the longline fishery and associated injuries with the physiological condition of fish in order to improve our understanding of factors influencing survival post-release in the directed fishery. Project 2017-07 ("Sequencing of the Pacific halibut genome") proposes to characterize for the first time the genome of the Pacific halibut and provide genomic resolution to genetic markers for sex, reproduction and growth that are currently being investigated.

In addition to the new projects, eight continuing projects are proposed, including two projects dealing with sex identification (621.15, 621.16), two projects monitoring the Pacific halibut population for mercury and *Ichthyophonus* contamination (642.00, 661.11), three projects continuing migration-related research with the use of wire and satellite tagging (650.18, 650.20, 670.11) and one project finalizing work conducted on the reevaluation of the weight-length relationship (669.11).

The new proposed Five-Year Research Plan for the period 2017-21 includes extensive studies covering five major research areas:

- 1) Reproduction (i.e. sex identification, maturity estimates),
- 2) Growth (i.e. decrease in size-at-age, temperature effects),
- 3) Discard mortality rates (i.e. physiological condition and survival post-release of bycatch),
- 4) Migration (i.e. larval dispersal, adult and reproductive migrations) and
- 5) Genetics and Genomics (i.e. genetic population structure, genome characterization).

These studies are intended to provide information on factors that influence the biomass of the Pacific halibut population (e.g. distribution and movement of fish among regulatory areas, growth patterns and environmental influences on growth in larval, juvenile and adult fish) and, specifically, of the spawning (female) population (e.g. reproductive maturity, skipped spawning, reproductive migrations). Furthermore, these studies are also intended to provide information on the survival of bycatch and wastage fish and eventually refine current estimates of discard mortality rates. An overarching objective of the Five-Year Research Plan is to promote integration and synergies among the various research activities led by IPHC in order to significantly improve our knowledge of key biological inputs that are introduced into the stock assessment.

RECOMMENDATION/S

That the Commission:

- 1) **NOTE** paper IPHC-2016-IM092-11 which outlined the research projects proposed by IPHC staff and provided an overview of the 5-year research program.
- 2) **ENDORSE** the proposed new and continuing projects as well as of the 5-year research program.

APPENDICES**Appendix I:** Summary of research projects proposed for 2017**APPENDIX I****Summary of research projects proposed for 2017**

Project #	Project Name	Priority	Budget (US\$)	PI
<i>New Projects</i>				
2017-01	Full characterization of the annual reproductive cycle in adult male and female Pacific halibut	High	91,098	Planas
2017-02	Investigation of halibut dispersal on Bowers Ridge via Pop-up Archival Transmitting (PAT) tags	High-Medium	124,527	Loher
2017-03	Tail pattern recognition analysis in Pacific halibut	High	2,370	Dykstra
2017-04	Condition Factors for Tagged U32 Fish	High	13,000	Dykstra
2017-05	Identification and validation of markers for growth in Pacific halibut	High	27,900	Planas
2017-06	Discard mortality rates and injury classification profile by release method	High-Medium	16,123	Dykstra
2017-07	Sequencing the Pacific halibut genome	High	22,500	Planas
<i>Continuing Projects</i>				
621.15	Voluntary at-sea sex marking and portside sampling of commercial longline vessels	High	18,120	Loher
669.11	At-sea Collection of Halibut Weight to Reevaluate Conversion Factors Project	High	1,500	Soderlund
621.16	Development of production-scale genetic sexing techniques for routine catch sampling of Pacific halibut	High	146,107	Loher
650.2	Investigation of halibut dispersal on the far northern 4D Shelf Edge via Pop-up Archival Transmitting (PAT)	High	5,500	Loher
650.18	Archival tags: tag attachment protocols	High	2,800	Loher
670.11	Wire tagging of halibut on NMFS trawl and setline surveys	High	12,000	Forsberg
642	Assessment of Mercury and other contaminants in Pacific Halibut	Medium	8,400	Dykstra
661.11	<i>Ichthyophonus</i> Incidence Monitoring	Medium	8,055	Dykstra
Total - New Projects			297,518	
Total - Continuing Projects			202,482	
Overall Total (all projects)			500,000	