



Reproductive assessment of the Pacific halibut population

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PURPOSE

To provide the RAB with a description of the studies designed to improve our knowledge on reproductive development in female and male Pacific halibut.

BACKGROUND

Each year, the fishery-independent setline survey (FISS) collects biological data on the maturity of female Pacific halibut that are used in the stock assessment. In particular, the female maturity schedule is used to estimate spawning stock biomass. Currently-used estimates of maturity-at-age indicate that the age at which 50% of female Pacific halibut are sexually mature is 11.6 years on average. However, maturity is estimated with the use of macroscopic visual criteria, implying a relative level of uncertainty associated with the employed semi-quantitative assessment, but the maturity schedules for both sexes have not been revised in recent years and may be outdated. For this reason, research efforts are needed to improve our understanding of reproductive maturity in female Pacific halibut. Unfortunately, relatively little is known regarding the physiological changes that take place in the ovary during reproductive development leading to spawning in this species. The objective of this study is to understand and report the progression of reproductive development in both female and male Pacific halibut during an entire annual reproductive cycle.

DISCUSSION

Biological samples and biological information from female and male Pacific halibut have been successfully collected on a monthly basis for an entire year, from September 2017 through August 2018, in the Portlock region in the Central Gulf of Alaska ([Appendix I](#)). The period of sample collection covers an entire annual reproductive cycle in female and male Pacific halibut and will therefore include all maturity stages from post-spawning and early gonadal growth and development until spawning. Biological information and biological samples include: maturity stage (classified according to current maturity scales), forklength, otoliths for aging, round weight, gonad weight, liver weight, photographic images of gonads, ovarian and testicular samples for histology, ovarian, testicular and pituitary samples for gene expression, blood samples, fin clips and fat content.

Photographic images of all staged gonads will be contrasted with gonadosomatic index (GSI; gonad weight/round weight X 100) determinations and histological examination of ovarian and testicular staging. This will allow us to revise the morphological criteria currently used for staging the maturity status of the gonads (ovary and testis). Blood samples were collected on all fish in order to conduct a thorough endocrinological assessment of reproductive status and development in order to correlate levels of reproductive hormones and reproductive genetic markers with morphological and histological assessment of the gonads. Finally, the collected data on fat content will provide functional data on the energy stored in the fish in order to relate energy storage to sexual maturity. Energy storage will be determined by the hepatosomatic

index (HSI; liver weight/round weight X 100) and the muscle fat content as measured with the Fatmeter device.

The completed collection of morphological, histological, endocrine, and functional data from female and male Pacific halibut throughout an entire annual meeting will provide us with a better understanding of the temporal and spatial progression of sexual maturation in Pacific halibut, and will allow for a better estimation of maturity for stock assessment purposes.

RECOMMENDATION/S

That the RAB:

- 1) **NOTE** paper IPhC-2019-RAB020-07 which outlined the research project describing studies designed to improve our knowledge on reproductive development in female and male Pacific halibut.

APPENDICES

[Appendix I](#): Geographical location of the sample collection efforts (2017-2018): the Portlock region in the Central Gulf of Alaska.

APPENDIX I

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