

## **Agenda Item 4b. Improving estimates of discard mortalities and DMRs in the directed halibut and other fisheries. (Leaman/Merrill)**

### **Discard Mortality Rates**

Existing estimates of discard mortalities in most fisheries are derived by domestic agencies, generally as estimated through dedicated at-sea observer programs. These estimates are transmitted to the IPHC and reported annually (e.g., Williams 2015). Observers estimate discard mortality rates (DMRs) in these fisheries through the application of standardised keys for viability based on a suite of condition factors (trawl-caught) or injury codes (fixed-gear caught) (Williams et al. 1998). In turn, these viabilities are related to survival of captive fish and recoveries from tagging studies of fish released from trawl and longline capture (Clark et al. 1992). The North Pacific Fishery Management Council has a well-established process for assigning DMRs in the groundfish fisheries by gear, area, and fishery target, using a rolling 10-year average of observer-estimated DMRs, updated every three years (Williams 2009). While the mechanics of this process function well, the basis for the DMRs themselves have been the subject of recent discourse.

IPHC staff has reviewed the historical basis for the DMR and while we are satisfied with the rates derived from the underlying research, we believe that it is appropriate to re-visit this estimation. In particular, the advent of tagging technology that will potentially allow direct estimation of survival offers a powerful new capability. These tags employ accelerometer-based data to be directly transmitted to orbiting satellites, when the tags release from the fish at programmed intervals after tagging. Extended periods of no movement in the accelerometry data can be interpreted to indicate lack of survival of tagged fish; likewise, continued movements indicate survival. This direct estimation of survival could offer improved estimates of DMRs for any category of released fish, from any fishery. The tags are relatively expensive (~\$2000/tag) and require a well-designed experiment to optimize costs.

This research has been identified as a priority item within the IPHC research program and will be initiated in 2015. Use of this tagging technology is also being pursued by industry through research grant applications to the North Pacific Research Board and the National Fish and Wildlife Foundation, with letters of support from the IPHC staff. IPHC staff has also assisted in the development of these research grant applications.

### **Estimates of discard mortality in the directed halibut fisheries**

Discard mortality in the directed halibut fisheries is currently estimated by the IPHC and termed wastage (Gilroy and Stewart 2015). The methodology for this estimation is based on length frequencies of sublegal fish from IPHC survey data, as an analogue to encounters of sublegal fish by the commercial fishery. A discard mortality rate (DMR) of 16% is applied to estimated number of released fish (note the foregoing section on re-estimation of DMRs). The 16% DMR for the commercial fishery was established in 1995. Changes in fishery behavior and size-at-age since 1995 may affect the distribution of injuries and the potential magnitude of discard mortality of halibut in the commercial fishery. Historically, there have been few direct estimates of the discard mortality and number or sizes of released fish in the commercial fishery. Additional research on discard mortality in the commercial halibut fishery has also been identified as a priority.

In the Area 2B fishery, all directed longline fishing is monitored by cameras. For this area we have conducted a direct comparison of estimated proportion of sublegal fish in the catch from the IPHC survey in this area, to the directly observed proportion from the cameras (Gilroy and Stewart 2015). This comparison shows an extremely close match of the camera-based data with the IPHC estimates, lending support to the current estimation method. In other regulatory areas, there are not comprehensive data allowing such a comprehensive comparison.

The recently revised observer program for Alaskan waters may eventually provide estimates of value in estimating wastage and DMR's for the fixed-gear fisheries, including the halibut fishery. However, the IPHC has not yet evaluated these data and there are some concerns about the representativeness of the data from small vessels. For 2013 (the last year of full reporting), on vessels > 57.5 ft LOA, the trip selection stratum was able to achieve target levels of coverage (11-14% of trips). However, the coverage of the halibut fleet was not comprehensive and for vessels less than 57.5 ft LOA the coverage was at relatively low levels and non-random (NMFS 2014). Vessels under 40 ft LOA were not subject to coverage (representing approximately 47% of the halibut fleet and 45% of trips in the GOA/BSAI regions). For vessels between 40-57.5 ft LOA, the coverage targets were not achieved (~4-14.9%) and approximately 50% of vessels were given releases from coverage, due to primarily to accommodation or life raft capacity issues.. The Council and NMFS have worked to address these issues and anticipate significant improvements in hitting deployment targets and reducing the bias introduced by conditional releases from coverage in 2015. The commercial halibut fishery has not historically been observed and there are unique challenges with placing observers on this fleet. Data collection issues are not unexpected in a maturing program. Bias-inducing problems with the vessel-selection deployment methodology were identified during the first year of the program, resulting in changes in deployment methodology for the 2014 and 2015 fisheries. The impact on data quality associated with these changes will be evaluated in 2016. This information could help improve the estimates of the number and weight of discards in the commercial halibut fishery.

## References

- Clark, W.G., Hoag, S.H., Trumble, R.J., and Williams, G.H. 1993. Re-estimation of survival of trawl-caught halibut released in different condition factors. *Int. Pac. Halibut Comm., Report of Assessment and Research Activities 1992*: 197-206.
- Gilroy, H.L. and Stewart, I.S. 2015. Incidental mortality in the commercial halibut fishery (wastage). *Int. Pac. Halibut Comm., Report of Assessment and Research Activities 2014*: 47-54.
- NMFS 2014. North Pacific Groundfish and Halibut Observer Program 2013 Annual Report. National Oceanic and Atmospheric Administration, 709 West 9<sup>th</sup> Street, Juneau AK 99802
- Williams, G.H. 2009. Pacific halibut discard mortality rates in the 2007 open access and CDQ fisheries, and recommendations for 2009. *Int. Pac. Halibut Comm., Report of Assessment and Research Activities 2005*: 313-324
- Williams, G.H. 2015. Incidental catch and mortality of Pacific halibut, 1962-2014. *Int. Pac. Halibut Comm., Report of Assessment and Research Activities 2014*: 313-336.
- Williams, G.H., Kaimmer, S., and Sadorus, L.L. 1998. Halibut discard condition criteria: new revisions for 1998. *Int. Pac. Halibut Comm., Report of Assessment and Research Activities 1997*: 307-310.