

## NONRETENTION MORTALITY IN OCEAN SALMON FISHERIES

A thorough review of recent hooking mortality studies is likely to result in recommendations by the Salmon Technical Team (STT) and the Scientific and Statistical Committee (SSC) to revise the rates currently employed by the Council. We anticipate that fishery-specific rates will be suggested by gear/method fleet profiles coupled with average distributions of hooking location by gear/method combinations and release mortality by hooking location. The STT recommends the states modify their monitoring programs as soon as possible to develop fishery-specific profiles of (1) terminal gear (i.e., bait or lure type, number, and size of hooks, etc.), (2) ancillary gear (i.e., downrigger, sinker, diver, flasher, etc.), (3) fishing methods (i.e., troll, California-style mooching, motor mooching, etc.), and (4) encounter rates.

In addition, the collection of hook location frequencies by terminal gear should be conducted by the states through direct observations. A direct observation program could provide additional data such as encounter rates of sublegals, unretained fish, drop offs, and depredation rates. The commitment of sampling time would be small if only a single gear and method are used in the state, but larger for those states with more complicated fisheries such as California. Depending on catch rates, these observations may require less than one person-month to collect. However, sample size requirements, along with time-area effects on catch rates should be considered when designing the sampling program.

It appears available data are sufficient to estimate immediate and long-term mortality associated with commercial troll gear. For recreational fisheries, sufficient data to estimate immediate and short-term mortality in relation to hooking location are probably available, but it is not clear if an adequate basis exists to estimate long-term hooking mortality rates.

Several hooking mortality studies have become available since the STT's last review. The California Department of Fish and Game has estimated hooking mortality associated with various terminal gear and fishing methods for recreational fisheries. Natural Resources Consultants (NRC) has conducted studies for commercial and recreational fisheries off Oregon. The Canadian Department of Fisheries and Oceans has recently prepared a draft working paper on recreational hooking mortality rates of chinook and coho in recreational fisheries (Cox-Rogers et al. 1999). The Pacific Salmon Commission's Chinook Technical Committee completed a review of noncatch fishing mortality in commercial and recreational chinook fisheries in 1997. Finally, a draft summary of recent hooking mortality studies has been prepared by NRC for the Pacific States Marine Fisheries Commission (NRC 1999).

Though the STT has not yet thoroughly reviewed these recent summaries, a cursory examination shows hooking release mortality rates vary by hook location, and hook location varies substantially with terminal gear and fishing techniques. (In addition, release mortality rates may be influenced by local environmental conditions, such as water temperature.) Consequently, the most promising means of generating useful assumptions regarding hooking mortality associated with a particular fishery appears to depend upon improving estimates of the number of fish released (encounters) and applying mortality rates associated with hook location to fleet profiles of fishing gear/methods. It is not feasible to attempt to directly estimate hooking mortality in each fishery or to determine the distribution of hooking location for each fishery through fishery monitoring programs. However, it may be possible to develop profiles of terminal gear and fishing methods and to obtain estimates of encounters by collecting additional information through catch monitoring programs.

## References

Chinook Technical Committee. 1997. Incidental fishing mortality of chinook salmon: mortality rates applicable to Pacific Salmon Commission fisheries. Report TCCHINOOK (97)-1, 44.

Cox-Rogers, S., T. Gjernes, and E. Fast. 1999. A review of hooking mortality rates for marine recreational coho and chinook salmon fisheries in British Columbia. *DRAFT* Pacific Scientific Review Committee Working Paper S99-11, 14 p.

Natural Resources Consultants. 1999. Review of recent hooking mortality studies for the PFMC STT, Draft version. Technical Memorandum to the Pacific States Marine Fisheries Commission, 38 p.

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