RC: 265

Submitted by Richard and Joseph Person

In regards to proposal 252 and topics discussed in Committee C involving in-river predation on chinook smolts by rainbow trout and dolly varden we present some suggestions supported by new information in the form of research and subsequent report released by Vince Patrick. The report is titled "Kenai River Wild Salmon Fisheries: Sustained, Secure Production Performance". The first two pages of this report containing the abstract and some summaries are included in this RC.

As has been the general focus of this meeting chinook stocks in the Kenai River are low and every reasonable effort should be made to assist in the rebounding of their numbers. (proposal 209 etc.) One of the factors effecting this goal is in river juvenile and smolt survival. Predation on juvenile chinook is reported as a substantial concern by a reputable area fisheries scientist in the report previously mentioned. Item 2 in the summary of findings states:

> "The population of two distinct rainbow trout populations have both increased by about a factor of 8 since the late 1980's. These were used with assessment values to construct a first approximation of the coupled processes of fry growth, zooplankton constraints, first-winter losses, holdover, and smolt losses from mass-dependent satiated trout predation."

I pose the question: Is it possible to not only maintain, but in fact encourage both a trophy trout and chinook fishery in the same river system? Certainly it is an interspecies relationship of the predator-prey type that exists at the expense of the feed species. Anecdotally, there is no question that trout populations are at strong levels while chinook numbers are struggling. Item 8 in the summary of findings states:

> "Responsible management of the coupled trout and chinook systems demands determination of the effect of the 8-fold increase in predation. Trout-chinook predation assessments are inescapable. **Because of neglect, the responsible, precautionary course is the reduction of trout abundance by half now rather than wait for research results.**"

While this suggestion is rather extreme, we propose in light of this new information that in addition to the changes sought in proposal 252 that the bag limit be raised to 2 a day with 1 rainbow over 24" allowed to be retained per year which would be recorded on the back of the harvesters sport fishing license. It is worth noting that this merely puts the Kenai River closer to parity with other watersheds on the peninsula as opposed to sheltering and protecting these predators.

Thank you for considering this information, and taking measures to protect these valuable chinook stocks as has been the focus of this meeting.

Kenai River Wild Salmon Fisheries: Sustained, Secure Production Performance

Are timely answers to questions on production performance available through targeted application of advances by ADF&G Soldotna Commercial Fisheries Research?

Vince Patrick

ABSTRACT: This note responds to two related but different sets of questions, one posed by the Executive Director of Upper Cook Inlet Drift Association and the other by the Special Projects Coordinator of Kenai Peninsula Fishermen's Association.

In the first set, a core issue is whether there are results from the decades-long development by ADF&G Commercial Fisheries research for Kenai River sockeye management which could help resolve open policy questions at forums with proposal deadlines in early 2013. The context is the too familiar dilemma of two incompatible valuations of sockeye and chinook salmon in the Kenai River—value as entertainment versus value as food. Three specific topics illustrate the core issue:

- *The pre-season forecast of run-strength for Kenai River sockeye.*
- *The response of Kenai River sockeye to escapements that differ from past practice.*
- *The prospects for an escapement defined in terms of production-relevant quantities and annually adapted to an observed system state in the context of a well-understood system dynamics.*

For the second set, the core issue is the dilemma of a single office, the Sport Fish Division, with management responsibility and accountability for pairs of Kenai River species with defining predator-prey relationships. The Division applies a single-species, abundance-based management plan. It does not recognize responsibility and accountability for (a) ecosystem functions; (b) dual-health for a predator-prey pair; (c) health during all in-river life-stages; (d) consequences for paired-species from "stock health" defined as stable or increasing (preferred) abundance of exploited stages. This high-risk plan is implemented without precautionary risk management. It is used to manage Kenai River chinook and coho salmon. The salmon plans detect failure by and at escapement; they respond to failure by overescapment of co-located, well-managed sockeye salmon stocks.

Cohort histories for Kenai River sockeye salmon were constructed and manually fitted to substage abundance estimates (brood years 1997–2011). The histories are a status review of the ADF&G Comm Fish program for substage, subsystem, per-stock assessments. The review finds

a the program components from fall fry (lakes) through in-river smolt (rm 19) can contribute;
b by 2011 upgrade, the smolt-assessment-based run forecast is 1.5 sockeye generations away.

For a preview of ***a***, a second review applied basic principles (predator-prey, biomass, physiology) to stock-specific versions of ***a*** with Sport Fish and USFWS estimates of abundance and distribution of sockeye predators (rainbow trout, Dolly Varden). The review finds evidence supporting

i a defacto predator enhancement policy, rainbow trout up 3-fold 1988 to 2000 (9-fold today?);
ii Skilak Lake sockeye production is regulated by lake secondary production; onset of fry holdover is useful as an upper bound in a function-based specification of escapement;
iii Kenai Lake changed in 2000 from higher, Skilak-following, zooplankton constrained production to lower, near-constant production set by predator-determined lake-to-river smolt survival.

The size of the Kenai Lake sockeye stock is comparable to the size of the Kenai River chinook stock. The former provides a managed, monitored indicator of the unmonitored latter. This review, the lateness of the hour, and unknown state argue for the immediate precautionary abatement of chinook predators (by half or more). The conjectured predator control of Kenai Lake sockeye is non-responsive to escapement but stable. An escapement response for chinook is contra-indicated.

In May, ADF&G approved funds to begin completion of transformation of observed distribution of age-0 physiological state in fall (by stock) to the distribution of time-of-fasting-induced mortality.

Summaries of findings with relevance to the questions

1 The development assessments for sockeye fry in Kenai Lake and Skilak Lake and the mid-river sockeye smolt assessments at this time are sufficient to characterize the production of the lake substage for two distinctly different subsystems. The significance is described using results from preliminary analyses.

2 The populations of the two distinct rainbow trout populations have both increased by about a factor of 8 since the late 1980s. These were used with assessment values to construct a first approximation of the coupled processes of fry growth, zooplankton constraints, first-winter losses, holdover, and smolt losses from mass-dependent satiated trout predation.

3 The preliminary representation is used to show that the effect of holdover is always a net reduction in smolt outmigration.

4 The Kenai Lake sockeye substock is predator determined. The effect is that the run is reduced to a smaller size and the run size is nearly constant. Since the run size for Kenai Lake stock is not directly monitored, reference here to run size is actually to run size inferred from the fall fry surveys. There was a clearly visible change in the fry surveys for Kenai Lake in 2000. The change is consistent with predator determination of freshwater production in that the fry abundance since 2000 is nearly constant. Prior to that, the fry abundance mirrored the fry abundance of Skilak Lake, just smaller.

5 The Skilak Lake subgroup is sufficiently large to be only minimally effected by satiated rainbow trout predation even with overescapement-reduced individual fry mass. The primary source of loss for Skilak Lake sockeye from overescapement is through first winter mortality.

6 The assessments provide the values for egg-to-fry outcomes; they do not provide the mechanisms. Past work with zooplankton and fry development has accounted for much of the outcomes for fry size. However, the outcomes for egg-to-fry mortality is not directly due to zooplankton. The mechanisms for the loss of 90% of the spawning biomass within a month or two remain unknown. There is an apparent effect of overescapement indicated by the assessments, but it remains inaccessible without identification of the mechanisms whereby this biomass transfer happens.

7 Kenai Lake sockeye are comparable in abundance to Kenai River chinook. The findings for Kenai Lake are a useful clue to the unassessed early live stages and systems for chinook.

8 Responsible management of the coupled trout and chinook systems demands determination of the effect of the 8-fold increase in predation. Trout-chinook predation assessments are inescapable. Because of neglect, the responsible, precautionary course is the reduction of trout abundance by half now rather than wait for research results.

9 There is a very high number of co-resident managed species in the Kenai River system. There is also a remarkably high number of these managed species which are strongly coupled, e.g., predator and prey pairing. This makes this system an ideal candidate for incorporation of the Board-approved template for requirements to be met by any new management plan brought before the Board of Fisheries. The template was originally developed by Gordon Kruse for use with depleted shellfish fisheries; that first use was approved in 1999. The same regulation, almost verbatim, was adapted for three depleted herring fisheries in Lower Cook Inlet by Ted Otis; this second version, 5 AAC 27.463, was approved in 2002. See Appendix 1