DRAFT PROCEEDINGS

KLAMATH FISHERY MANAGEMENT COUNCIL
ARCATA, CA

10-11 JANUARY 1991

January 10, 1991.

The meeting was convened at 10:35 by Chairman Fullerton, with a quorum present (see roster, Attachment 1).

REVIEW AND APPROVAL OF MINUTES AND AGENDA.

The minutes of the previous meeting were discussed and approved.

The agenda (Attachment 2) was discussed. Since the Representative from Congressman Riggs' office had not arrived, the "Report on legislation" item was postponed. Other people who were supposed to be speaking were also not present, which resulted in several agenda items being rescheduled.

REPORT ON LONG-RANGE PLAN OF THE KLAMATH FISHERY RESTORATION PROGRAM (Bingham)

The Task Force met on Dec 4-6, 1990 in Yreka. The goal of the meeting was to look at the draft plan after the subcommittees had met to discuss public comments.

The issue of consistency between the two plans was discussed at length. A committee was formed to review the two plans (Rice, Bingham, Pierce (Lara), Odemar, McInnis). Nat suggests that the Management Council form a similar committee. The Task Force also needs to look at carrying capacity, because of the Management Council requests.

As part of the re-write process, the goals have been rewritten. In light of this, the Management Council may want to rewrite its goals.

Other revisions to the plan were done by the entire TF at the meeting. The revised plan is expected to be finalized at the February 5-6 TF meeting.

Chairman Fullerton asked for volunteers to be on a "consistency" subcommittee. This subcommittee will help the TF and MC move toward consistency by looking at the same items (e.g. the MC should be reviewing habitat and the TF should be reviewing harvest). Wilkinson, Bingham and Masten volunteered to serve on this committee.

REVIEW OF 1990 HARVESTS AND ESCAPEMENT.

Fall chinook escapement estimates (Odemar).

Odemar referred to the draft plan for CDFG (Attachment 3).

The returns for 1990 were very bleak, less than 30% of what was projected. When you look at the tables in the report you can see that the postseason estimates were very different from the preseason projections. In 1990 the in-river run was below the natural floor, we only saw 25% of the natural floor.

There was a similar poor situation in the Sacramento River. The total adult escapement for the Sacramento was 88,000, the floor should be 122,000.

No estimates have been made for next year because the CWT data will not be available until Feb, 1991.

McIssac: The situation in Oregon is similar. The runs are low, as predicted. Generalized forecasts were made in December, the forecasts are similar as for last year (poor). I haven't heard any positive reports.

The report on monitoring of the Karuk fishery will be given by Leaf Hillman tomorrow.

DEVELOPMENT OF A REVIEW DRAFT HARVEST MANAGEMENT PLAN (Iverson for Mackett).

The draft harvest management plan was mailed to the council on January 2, 1991.

This plan document was prepared in response to a request from the council to clarify this report prior to it going out to the public. Dave Mackett had trouble with a few option definitions and has asked the Council to provide clarification.

Masten: I understood that non-adopted options would not be included in the plan that goes out to the public. Why are they included in this draft of the plan that has been prepared to go out to the public?

Iverson: I've spoken with Mackett about this issue. These non-adopted options will be sent out to the public because they are still part of the package that the public can review.

Bingham: The important part is for the public to have a chance to review the options that we have considered.

Masten: I want to note that #18 did not have consensus, because I abstained.

Bingham: The definition of consensus is that if one person abstains, it is still a consensus.

Masten: The draft plan also needs definitions for such terms as escapement and MSY (maximum sustainable yield).

Fullerton: The public will review this draft plan. Eventually they will provide more options for us to consider. I'm concerned that if the non-adopted options go out to the public, then we'll have to re-hash a lot of options that we have already considered. We don't want to confuse the public.

Bingham: Shouldn't we inform the public of the options that we considered? Usually when I read environmental documents, I see the options that weren't adopted as well as seeing the options that were adopted.

McIssac: I recall that the council had decided not to distribute the non-adopted options, other than the option proposed by the Hoopa tribe (HVT alternative to option #18, attachment 4a to the November notes).

Iverson: We could study the notes, but if we look at the plan itself, as Mackett suggests, we need to consider more alternatives than just the preferred alternative.

Fullerton: The non-adopted options could be in an appendix, except for the Hoopa Valley Tribe's alternative to option #18. This alternative option #18 will be displayed in the draft plan for review by the public, with a clear note explaining that it is not an option that has been adopted by the council. Does the council agree on this?

Yes. Consensus.

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Fullerton: Does Mackett's question regarding options that need particular scrutiny produce any comments from the council? Hearing none, we will keep the draft plan options as they are.

McIssac: I would like to review this draft plan more and get back to Mackett (within the next 2 weeks) with my comments.

Reed: Does the council want to provide some background information in an Introduction or Finding of Facts at the beginning of the plan? I feel that the public would be better informed if this was included.

Iverson: Yes, we need some information on the history and the present reality of fish stocks, including stocks, concept of stock size, concept of stock productivity, concept of how ocean stock size is determined (concept, not the actual method). The technical team could provide this information.

Bingham: The public does not yet understand how harvest works. We need to provide information such as spawning escapement tables, and the history of ocean fishing. We need to flesh out our draft plan so that people can understand.

Baracco: I feel that Ron may be better able to write this up than the Technical Team. The Technical Team could write it up, but it would be very brief.

Fullerton: I'll ask Ron to head this up, then bring it back to the council to review and comment.

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Iverson: Besides having the technicians write this down, there needs to be a step by the council to confirm that this write-up of an Introduction/Finding of Fact addresses their need.

Fullerton: Well, the council has decided to have option definitions for all options included in the draft plan. The appendix will contain definitions for options that were not selected. The alternative option for #18 (proposed by the Hoopa tribe) will be noted as a proposal that was not reached by council consensus. Public hearings will be held. Nothing else needs to be done.

Bingham: I hope to get the public meetings completed by mid April in order to hear from trollers before they go out to sea.

Reed: I see 6 weeks of work, prior to this draft plan going out to the public. This would put us at March 1 and give the public 30 days to review and comment.

Masten: We will need to adopt this to go out at our February meeting.

Proposed public involvement process (Whitehouse).

Following are public involvement steps recommended by USFWS/Yreka. These would meet Interior Department guidelines.

- Announce plan availability 15-30 days in advance of public meetings, through newspaper and Post Office public notices.

- Mail the plan to our interested parties list -- about 200 names. Some groups may need several copies.

- Hold public meetings. We understand the Council would like to meet in Fort Bragg, Eureka, Coos Bay, and Yreka or Weaverville, all prior to 5/15/91. We need to decide specific dates, and who will chair each meeting. Enough additional Council members should attend each meeting to show interest.

- A comment period of at least 30 days. This would be preceded by a Federal Register notice, which takes about two weeks from submittal

to publication. The notice would have information about meetings, end date of the comment period, where to obtain the harvest plan, and where to send comments.

Council discussion:

(Reed): Sounds like our process will be to revise the present plan draft, get revisions to the Council for discussion at the next meeting, get the review draft out about 1 March, and keep the comment period open until mid-May.

(Fullerton): Public meetings could be in mid-March. Public comment should be cut off by the end of March. We should also give the public 30 days to look over the final plan -- that is, the version incorporating public and agency comments -- before we formally adopt.

Further Council discussion:

Length of the initial comment period -- whether to shorten to the 30 day minimum to get the whole process done before fishing season, or to allow 60 days or so, attempting only to get public meetings held before fishing season.

When to get the review draft out -- March, or earlier.

Where to hold an inland meeting. With arguments put forward for both Weaverville and Yreka, it was determined to meet in both locations.
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Cost of the public involvement effort will be considerable, and must be taken from the Klamath Fishery Restoration Program.

Incorporating comments may be a lot of work. The Council should consider using subcommittees for this task.

The public involvement schedule agreed to was:

1 February -- Staff mail plan revisions to Council for review.

14-15 February -- Council meeting. Agenda to include plan review and a decision on whether to distribute the review draft.

1 March -- Start public/agency comment period.

19 March -- Public meeting in Weaverville. Chair: Marshall

20 March -- Public meeting, Yreka. Chair: Fullerton

26 March -- Public meeting, Coos Bay. Chair: Wilkinson

27 March -- Public meeting, Eureka. Chair: Masten

28 March -- Public meeting, Fort Bragg. Chair: Bingham

30 April -- Close of comment period.

April - June -- Incorporate comments, revise plan.

June -- Council meet to consider plan adoption.

REPORT OF THE TECHNICAL ADVISORY TEAM (Barnes, Baracco) (see Attachment 4).

Genetic stock identification (GSI).

The Team reported on their review of a proposal from CDFG to invest in GSI capability, principally by building a laboratory for tissue analysis. Points discussed included:

The principal use of GSI data would be to refine estimates of contribution rates of various stocks to fisheries. Stock identification data would not be useful in predicting abundance. The Tech Team has not made a judgement on whether GSI would be useful for midseason adjustments in the ocean fishery.

There are options to CDFG constructing its own lab, including contracting out sample processing to private labs, or other state fishery departments. One motive for developing in-house capability is that shipping large numbers of samples outside is cumbersome.

Q: Could some funding for the lab be sought from the Klamath Restoration Program? (Iverson): CDFG could submit a proposal for FY92 funding.

Q: How fast could large numbers of samples be processed by a contractor? A: (Baracco): We have experience with small, experimental lots of samples only.

(McIsaac): I would like the Team to estimate how many samples would have to processed for adequate data on stock contribution rates, and how much contract processing would cost. If in-house CDFG capability looks more cost-effective, I would like to see us seek Klamath Act funds for perhaps 10-20% of the cost of developing that in-house capability, to be added to State funds.

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Estimating age composition of Klamath fall chinook by scale analysis.

Last meeting, McIsaac asked whether scale analysis could be used to augment or supplant the present method of estimating age composition of the run, which is to extrapolate data from hatchery cwtag returns. The present method makes the unvalidated assumption that age composition of hatchery and natural stocks is the same. The Team concludes that age analysis using scales would be feasible, with additional labor for sampling and analysis, and asked the Council for direction in proceeding further. Discussion included:

Q: Would age composition estimates be more accurate?
A: Theoretically, yes, because wild fish would be included in the sample.

The sample size needed to achieve desired confidence intervals is not known, but there would have to be increased sampling, even at hatcheries.

(Odemar): CDFG is planning to reduce field monitoring of fall chinook returns, on account of funding constraints. This means handling fewer carcasses, rather than more.

(McIsaac): I request the Tech Team to estimate the labor needed for sufficient sampling of fall chinook scales to estimate age composition of wild and hatchery fish. I will inquire as to whether ODFW can help in scale analysis. Second, I request that CDFG consult with the Council before making any decision on reducing field sampling.

(Fullerton): Hearing no objections, this is our guidance to the Team and CDFG.

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Q:Would volunteer labor, under CDFG supervision, be useful? Seems like this would be a good way to get local people interested and involved.
(Baracco): We would need a stratified random sample to have useful data. This would have to be considered in using volunteers.

Fin-clipping production lots of hatchery fish.

Estimates of cost, expected mortality, and projected effects of releasing fin-clipped fish in the ocean fisheries are provided in Part C of Attachment 4. Expected reduction in fish survival is quite high -- 30% for a single ventral fin clip. This is postrelease mortality, estimated by comparing survival of clipped and unclipped sample lots. Discussion included:

Clipping mortality for adipose-clipped, cwtagged hatchery fish is not figured into your predictive model. If it were, how would the projections be affected?

(Baracco): We would then assume that unmarked hatchery fish survive better than marked, ad-clipped fish, which would decrease our estimate of the natural component of the run. Clipping mortality is, theoretically, causing us to overestimate the natural component. Differential clipping mortality does not, however, add to inaccuracy of our estimate of ocean harvest of Klamath chinook.

Explain again how the tagged/untagged ratio works.

(Baracco): If we know that 10% of hatchery juveniles are marked, and we get 100 adults returning of which 10 are marked, the model says that the returns are all hatchery fish. If 1000 adults returned of which 10 were

marked, the number of hatchery fish in the run, as estimated by the model, would be 10 x 1/.1 = 100 and the number of natural fish estimated would be 1000 - 100 = 900.

Q: How does this relate to contribution rate?

(Baracco): If we recovered 5 tagged fish, with Klamath codes, from the ocean fishery, and 5 tagged fish from the river, the model would estimate the ocean harvest rate at 50%. If those 5 tags were recovered from 100 fish returning to the river, the ocean harvest of Klamath chinook would be estimated at 100 fish. This is a simplified example, ignoring shaker mortality and some other factors.

Fishery strategy to utilize fin-clipping of production lots of hatchery fall chinook (Baracco).

Results of modeling a fishery strategy of releasing marked Klamath fall chinook caught in ocean fisheries, while retaining them in river fisheries, are summarized on page 6 of Attachment 4. For numbers, see Table B.1 (on page B-7 of Attachment 4). Following are projected results for medium fish abundance. First, ocean troll landings would increase, because the troll fishery would be released from the constraint of limiting harvest rate for Klamath fall chinook to .375. The rate would probably rise to .6 or .7. Second, the sport catch would decrease because some fish would have to be released. Third, shaker mortality would increase because of increased numbers of fish released from the hook. Fourth, river harvest would decrease because of the shift of harvest of natural fish (about 2/3 of the run) to the ocean fishery.

Discussion:

Q: What shaker death rate was assumed? A: 27%, both sport and troll.

Harvest strategy for marked spring chinook, Trinity Hatchery (Polos).

Joe modeled marking Trinity spring chinook with an adipose clip. Marking would have helped identify surplus adults available in 2 of the 5 years examined, but would have decreased numbers of adults in all years, because of marking mortality.

Potential uses of increased marking.

The Team report (Page 7 of Attachment 4) identifies six possible uses of universal marking of hatchery salmon production. Team analysis did not extend to recommending for or against any of these.

Discussion:

Regarding issue #1 (straying) -- is this necessarily bad?
(Barnes): There are concerns about hatchery gene pools being more restricted than in natural stocks.

(Baracco): Does the Council wish the Team to expand work on any of these production marking issues?

(Fullerton): Hearing no response, you have no further assignment on this item.

Analysis of goals for natural fall chinook escapement, Trinity basin (Barnes).

Pre-dam escapement estimates above Lewiston were quite variable, year-to-year. A hatchery mitigation goal of 9,000 fall chinook was set, although upper watershed chinook were mostly springs. Rationale for the 9,000 figure is unknown. Pre-dam returns below Lewiston were also quite variable, with considerable natural spawning by hatchery-origin fish in some years, and habitat conditions have changed greatly in the post-dam period. These factors tend to make old escapement numbers less meaningful in setting a natural escapement goal. The best-supported goal for Trinity natural escapement seems to be the 62,000 of the Trinity Restoration Program EIS, because that factors in habitat restoration. For current conditions, CDFG biologists in 1985 estimated a natural spawning carrying capacity of 19-25,000.

Discussion:

(McIsaac): I had asked for analysis of the 50,000 fish goal used by the Hoopas in their case for water rights. Is that included in Attachment 4? A: Yes. The 1980 flow EIS used an escapement goal of 41,000 natural spawners, and 9,000 hatchery.

Q: How does the 35,000 fish floor for natural escapement relate here? (Barnes): That figure doesn't have a strong basis. The Tech Team felt there could be rebuilding of natural stocks if escapements stayed above the floor, but not if they fall below. The PFMC Salmon Tech Team has suggested a floor of 40,000, as that is the low end of the range of capacity estimates collected by Hubbell and Boydstun.

PUBLIC COMMENT ON PLAN DEVELOPMENT.

Paula Yoon (Manager of Del Norte Marketers Association):

My husband Jeff and I own a boat and depend on commercial fishing for our living. We have been fishing for 16 years.

I question the river gillnet method of fishing. A November 1, 1990 report stated that the "selectivity of gillnets makes the 4-5 yr chinook vulnerable to capture". This means that gillnets catch fish during the fish's most vulnerable time to reproduce. In reality this is the destruction of the fishery because we are selecting for the best stock. I suggest marking as a method to give hope to ocean fishing communities.

Rich McCovey (representing Yurok fishers Association):

We need to maintain fish for the aboriginal fishery of the KRB, and support subsistence and commercial fishery for the Yurok tribe. In

response to Paula's allegations... this is our **right** to fish. We intend to follow all legal recourses to maintain this right. The numbers speak for themselves. We intend to maintain our aboriginal rights. Sport fishers also take many fish. We don't have a choice for who we sell our fish to, we don't have a choice for how much money we make when we sell the fish. We are up against the wall, we are going to fight. This is a well orchestrated sham -- just for greed.

Mike Morford, Technical Advisory Team (TAT):

I recently became aware of the marking program for Trinity River steelhead (through involvement with TAT). I'm concerned about the possible 50-80% mortality that may be occurring as a result of marking.

Chairman called on Mel to report.

Odemar: Marking of Trinity River fish is called for by the Trinity Coordinating Committee, supported by the FWS in Weaverville, and funded with money from the Bureau of Reclamation.

Concerned citizen:

I was born and raised on the Klamath River, a few years back (several years back!). My great great grandfather told stories about when the white men came. The Indians used to fish with their gillnets and catch enough fish. Indians hid from white men, later Indians were put on reservations. I lived off the reservation (while attending government school) for awhile, now, when I return there aren't any fish. I went to work for the BIA to try and make the fish come back. But the river flows are much lower than they used to be and gravel bars block passage up tributaries. I clear the gravel (with other indian people). I don't see commercial fishing interests helping the fish.

Valle Mc Covey (president of Yurok Fishery Association):

When formulating any plan for fisheries management, this council needs to consider tribal rights. Our fishers do not accept responsibility for the depletion of this resource. The non-Indian influence has greatly impacted the resource. Our fishery has held to the allocation of the 5-year plan. Our fishery has borne the brunt of this for too long.

Randy Mattson:

In my opinion it is more of a water problem than anything. It's time that we address the real problem -- the lack of water. Look at it now, its mid winter and there is no water, what is it going to look like this summer?

Council discussion.

Chairman Fullerton asked the council if they would like to continue meeting today or wait til tomorrow.

The Council decided to continue the meeting tomorrow. The council responded to Sue's concern about starting the meeting at 8:30 am to allow enough time for people who live in outlying areas to attend.

Meeting adjourned for the day.

January 11, 1991

The Council reconvened at 8:45 am.

Chairman Fullerton: The meeting will most likely finish by noon today, therefore the public comment period will be held at that time.

Lyle Reed: I need to depart early, Karole Overberg will serve as my alternate. Karole administers BIA plans so his comments will be valuable. In reality this council overviews all the interested plans and serves a vital role of balancing them. Lyle departed, Karole took his place.

PRESENTATION OF 1991 HARVEST MANAGEMENT PLANS.

State of California (Odemar):

The 1991 harvest management plan (Attachment 3) is the same as last year, with the addition of data sets that were not in last year's plan. This plan outlines the regulations set forth by the Fish and Game Commission. For fall chinook an annual harvest limit is set. Seasons and open areas include the entire KRB, and everything up to Irongate for anadromous fish. Regulations provide maximum opportunity for anglers while providing protection to insure enough spawners escape.

Information for fall chinook will be coming out in the preseason stock estimates (provided by the Technical Advisory Team), and the spring chinook estimate will come from FWS.

Fish counting weirs operated in Klamath and Trinity Rivers. Angler harvest of fall chinook is managed by monitorying the harvest in the estuary . Forty-three days after 1/3 of the allowable sport catch has been harvested, then the rest of the basin is closed to salmon over 22". (See page 3 of Attachment 3).

Three areas on the Trinity had a very high catch rate that accounted for 40% of the total catch. These areas have been closed to stay within the limits set by the PFMC.

The sport fishery was not monitored downstream from Junction City because the harvest rate in this section is inversely related to flow conditions. Tagging of fish at the weir was discontinued because it was not deemed as useful as spending time and money on monitoring the sport catch near Johnson's. Additional monitoring of the sport fishing will occur at other key areas.

A key change in the report this year is the addition of datatables. The tables show a late year increase in summer steelhead and spring chinook although the numbers are still not high. One change is that there is more protection for spring chinook in the South Fork Trinity. Upper portions of the Trinity River have a high harvest of hatchery fish.

Fullerton: Is any work being done on the sturgeon population? Or the lamprey take?

Odemar: FWS has some data on the sturgeon population. There is no data on the lamprey take.

Masten: I am concerned about which programs are being cut back.

Odemar: The seining operation in the lower river has produced information that really isn't that usable. This money could be better used for a creel census in the upper river.

Masten: When will the ocean harvest plan for state waters become available?

Odemar: The options for ocean harvest regulations will be developed at the March 11-15 PFMC meeting, selected regulations will be settled at the April 8-12 PFMC meeting. State regulations will be consistent with Federal ocean regulations.

McIssac: How are estimations of the sport catch made?

Odemar: Creel censuses are used to estimate sport catch in the three main sportfishing areas on the lower Klamath River. Each area accounts for about one-third of the catch.

McIssac: Why doesn't the megatable have numbers for the ocean catch?

Odemar: The megatable covers the in-river catch. The PFMC's technical team will do the total catch.

McIssac: Will the numbers from the Karuk catch be included in the table?

Odemar: Yes, when they become available.

Naylor: Can you elaborate on the preparation of environmental documents that the California Department of Fish and Game is in the process of preparing?

Odemar: We are preparing environmental documentation for all sport fisheries through the CEQA process. It is not yet known if a separate environmental document will be prepared for each basin. The documents will address long-term impacts on the resources, and the long term productivity of the stocks. Other CDFG people will be compiling info from many sources to get a better picture of the situation in the basin.

Fullerton: The act calls for us to review other agencies harvest management plans and make recommendations. In this light, are there any aspects of the CDFG report that the council would like to comment on?

Odemar: The commission holds a special meeting at the beginning of the year on ocean harvest for the PFMC, if there are any changes that the KFMC would like to discuss, we could use the same meeting.

Iverson: KRFRO will make travel arrangements for some council members to attend the ocean harvesters meeting.

Masten: Is DFG using the boat and law enforcement agent that were recently funded for the Klamath River?

As far as we know.

Bostwick: The public will want to know about CDFG disbanding seining operations.

Odemar: Disbanding the seining operation is still tentative. (CDFG will prepare a press release if the seining operation is disbanded.)

Bingham: The sport fishing regulations seem good, lets not change them. In the past their have been misunderstandings on the lower river, maybe we should get together to help increase understanding. An educational effort in this area would be time well spent. Later, we should decide on a date or location for this educational effort.

Fullerton: At this point the council has no recommendations for changes in the CDFG regulations.

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Bureau of Indian Affairs (Overberg).

Overberg referred to the BIA report (Attachment 5).

So far, this report is conceptual, when the numbers are processed, they'll be used to come up with a plan for the 1991 season. The Yurok Fishers Association will be used in the consultation process this year. There is potential for a fall chinook and spring chinook fishery. This plan will be submitted to the council for recommendations similar to the process that happened last year.

25 Code of Federal Regulations (25 CFR) will be used as the basis for procedures. In addition, we will work with the State of California. Law enforcement will be a similar as in the past. Nine to ten officers will provide for 24 hour coverage for the fall fishery.

Fullerton: In your opinion is this law enforcement adequate?

Yes. It is a small area, that is well covered by officers. In the past, the commercial fishery was held in the lower river area, now the spring fishery will be occurring with drift nets in the upper area. Last year we did studies to see if drift nets or set nets worked better. The numbers of fish caught in drift nets was considerably better for spring chinook. Net sizes have not been changed, Indian fishermen have decided to still use standard net size.

McIsaac: Can you tell me a little about what 25 CFR is?

25 CFR governs the Bureau of Indian Affairs. All services are regulated by this code. Two years ago when the Yurok Settlement Act split the reservation into two reservations, it caused the need to update the code. The draft of Code revisions will be open for public comment soon.

Warrens: I have a question about "a" on the last page of this report. Is this in the CFR?

Overberg: All of these items, except for "c" are provided for in the CFR. USFWS performs "c" under contract.

Overberg: In the past, we've looked at the amount of fish that were taken from a subsistence standpoint. We make sure that subsistence needs are covered first. This number can be adjusted, as the management areas are harvested and re-estimated.

Bostwick: The thought of a 24 hour net fishery causes extreme distress. When will these regulations be drafted so that we can start discussing them? We can't wait until August again.

Bingham: Has there ever been consideration of non-lethal take methods above the 101 bridge?

Overberg: No, that would need to be an idea generated by the tribe. Then we would need to make adjustments to the harvest plan.

Odemar: Last year the Technical Team had questions about adjusting the timing of the fishery to increase stocks.

Overberg: I am willing to have the Technical Team provide information up front before we start. This needs to occur far enough prior to the season to allow it to happen. Del Robinson is an integral part of putting the plan together from a technical standpoint.

Masten: One of the concerns of the net fishery is that the quota was caught in August, hitting Klamath stocks harder than Trinity stocks.

Bostwick: Will there be a spring fishery this year?

Overberg: We don't know yet.

Report on monitoring of Karuk fishery.

Fullerton: Is the representative of the Karuk tribe here yet?

No, he still hasn't arrived to report on monitoring the Karuk fishery.

Mel, do you know they are going to harvest their fish?

Odemar: They have not indicated to CDFG how they are going to proceed with their harvest.

There were no questions or comments.

Fullerton: This finishes the review of harvest plans that are being reviewed by the council.

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Fullerton asked about the Hoopa tribe's weir.

Marshall: The weir was used because it was the first year that the tribe had a commercial fishery, so this method was traditional in tribal concept, but gillnets were still used for subsistence. The weir was a good idea -- in the wrong year. We only caught 48 fish. The fish that we caught were taken to the icehouse, smoked, and are now being marketed at $20 per pound. We see a great economic potential to the tribe, but we are starting out very slowly.

OTHER BUSINESS.

Water situation on the upper Klamath River:

On January 4 we received a call from the chief engineer for the Bureau of Reclamation (BOR). Klamath lake is at the lowest level that it has been at in 40 years. BOR is proposing to cut the flow back to 700 cfs on Jan 8. Up to now, the flow has been 1000 cfs. This is not the first the flow has had to be reduced.

On January 15, 1991 there will be a water users meeting in Klamath Falls, FWS will attend (Alcorn), CDFG Redding will attend. This will be a meeting to describe what the situation will be in 1991. CDFG is concerned about insuring that sufficient cold water is available for migration to Irongate, hopefully an arrangement with BOR will allow us to meet this need. No decisions have been made other than the lowering of discharge. This lowering should not be too bad because there has not been much spawning in the main stem that would be affected by low water flows.

Newsletter update (Whitehouse):

The proposed Fish and Wildlife Service Klamath newsletter would address all the purposes of the Klamath Act -- harvest management as well as the Klamath Fishery Restoration Program.

First issue will treat background, purposes and memberships of the Klamath Council and Task Force. Later issues may have guest contributions from advisory committee members, or others.

Frequency will be approximately quarterly.

The newsletter proposal was disapproved once by the Interior Department, then resubmitted in October...no word back yet.

Council discussion:

(Wilkinson): I move we send a Council letter to Interior, urging approval. Seconded and passed by consensus.
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Q: Is approval good indefinitely, or does every issue need approval?
A: Approval would be long-term.

**** NOTE **** Since the Council meeting, the newsletter has been approved by Interior.

Hoopa Tribe position on fishing rights (Attachment 6).

(Fullerton): This paper has been submitted as an argument in support of alternative Option 7.2 for harvest allocation, which was submitted at the November meeting for inclusion in the long-range harvest plan. The Hoopa Tribe suggests the position paper be reviewed by NOAA attorneys. What is your wish?

(Marshall): I so move.

The motion was seconded and approved, Bingham abstaining.
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Exchange of letters on harvest allocation (Attachment 7).

(Masten): Let the record show that the attached correspondence between myself and Secretary Lujan was provided to the Council.

Agenda items for next meeting:

(Baracco): See the last item of our handout, Attachment 4, page 13. We will provide estimates of fall chinook ocean stock size, allowable harvest, possible allocations (ocean/inriver harvest rate combinations), and updates to the KOHModel.

Q: Any similar information for spring chinook? A: This will come from the Arcata office of USFWS -- an update of the spring chinook report they prepared last spring.

Q: Will you report on use of the Fort Bragg CPUE as an abundance indicator? (Baracco): We reported in November. We will add 1990 data and report again, in February, on potential use in the 1991 season.

Q: Will the Team provide an update on 1990 harvests? (Barnes): Yes -- a refinement of figures provided in November.

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(Wilkinson): Following up on my comments about volunteers as scale collectors, I would ask the Team to look into ways to increase the scale sample size.

(Barnes) Mike Maahs, how effective was the volunteer spawner survey in the Fort Bragg area? (Maahs): We found few fish.

(Barnes): You asked for a sampling design for GSI, and an estimate of feasibility and cost for scale sampling. We will pursue these tasks at our next Team meeting, February 5 in Sacramento, and report on our progress.

(Fullerton): Do we have an idea of what laboratory capacity there is to do GSI analyses, on the West Coast? I understand USFWS has some.
(Grover): I will find out.

**********

(Masten): I advise you I am now a member of the Yurok Fisher's Association.

(Fullerton): Let's set a date for the ocean harvesters' meeting.
February 13, in Eureka.

**********

Inriver harvesters' meeting, if needed, will be set later.

PUBLIC COMMENT:

Dave Bitts, Humboldt Fishermen's Marketing Association.

The 1990 fall chinook return illustrates the inadequacy of the run size predictors, and the lack of correlation between number of spawners and resulting recruitment. The Tech Team should be assigned to examine other variables that may affect production.

The return was below the 35,000 fish floor, but the small 1984 run had good productivity, and the 1977 drought year run produced a good return in 1979. The 1990 return was produced by large parent stocks. The Council should reflect on whether our management is helping or hindering restoration.

Rich McCovey:

We don't yet know the 1990 ocean catch of Klamath chinook, but we know the return to the river was far too small. Let's consider reducing the ocean catch, to provide needed escapement.

Yurok tribal member:

Charley Fullerton, why did you say, on television, that the river commercial fishery is secondary to the ocean fishery? I have this on tape. Do you represent trollers? The ocean fishery got a commercial harvest, but we did not.

Fullerton: I represent the general public, and my goal is to conserve fishery resources. I believe I said that subsistence has priority over commercial fisheries, which are allowable only if abundance permits. If you show me that I made the statement you allege, I will apologize.

Bill Duncan:

Our Shelter Cove chinook landings were 10,000 in 1990, down from 22,000 and 46,000 in the previous two years. Inriver people shouldn't think we had a big year.

Bingham: I agree. Our troll chinook harvest is typically about 70% Sacramento stock. Don't equate troll catch numbers with Klamath impacts. We don't have those estimates for 1990 yet, but when we get them in February, I expect small numbers.

Rich McCovey:

Can stocks be distinguished in the ocean harvest? What about stocks that might be listed as threatened, like spring chinook -- will ocean harvest be reduced, or just the Indian harvest?

(Baracco): Yes. We can estimate the contribution of different stocks to ocean harvest by expansion of coded-wire tag recoveries, or by use of genetic stock identification (GSI). We know the ocean fishery takes springs... I don't know how ocean regulations would be changed by a listing.

(Fullerton): To protect winter chinook, timing of fisheries is being regulated.

(Private fish culturist):

I would like assistance in getting salmon eggs to rear and release in a Humboldt Bay tributary.

Other new business.

Hayden: I am concerned that the issue of 100% marking of hatchery fish has been set aside. Listing of natural stocks is a real possibility we need to prepare for, in advance. When we get through our busy time, I would like the Tech Team to pursue this further, and not just for Klamath stocks.

Bostwick: I would like to see this analysis go beyond just the feasibility of marking, to include management implications. I am wondering whether it implies catch and release, for example.

Bitts: We would like to see every Klamath fish marked, so we could release them.

Wilkinson: I share Hayden's concern, but we have been told of serious problems in marking technology.

Bingham: For that reason, we need work on better techniques for identifying individual fish in the harvest, by stock. (Fullerton): Our long-range plan calls for this.

Meeting adjourned.

ATTACHMENT 1

KLAMATH FISHERY MANAGEMENT COUNCIL
Attendance Roster
January 10-11, 1991
Eureka, California

Management Council Members

| | |
|---|---|
| Nat Bingham | California Commercial Salmon Fishing Industry |
| Virginia Bostwick | Klamath In-River Sport Fishery |
| E. C. Fullerton (Chair) | National Marine Fisheries Service |
| Robert Hayden | California Ocean Sport Fishery |
| C.L. Marshall | Hoopa Valley Tribal Council |
| Donald McIsaac | Oregon Department of Fish & Wildlife |
| Susan Masten | Non-Hoopa Indians Residing in Klamath Area |
| A.E. Naylor | California Department of Fish & Game |
| Lisle Reed | U.S. Department of the Interior |
| Frank Warrens | Pacific Fishery Management Council |
| Keith Wilkinson | Oregon Commercial Salmon Fishing Industry |

Others Attending

David Allen
Les Ammon
Wesley Ammon
Alan Baracco
Jerry Barnes
Serge Birk
Dave Bitts
Scott Boley
Clarence Bray
Earl Brown
Edgar Bush
Harleigh Calame
Ralph Carpenter
Brian Cates
R. Choate
Roger Curtice
Bob Dearth
Bev Drake
W. L. Duncan
Robert Franklin
Sam L. Gensaw, Jr.
Lloyd Gillham, III
Frank Gist
Ron Iverson
Sam Jones
Fred Jurick
Mike Maahs
Ardith McConnell
Richard McCovey
Vlayn McCovey
Bill Mendenhill
Mike Morford
Mel Odemar
David O'Neill
Raymond Patton
Dennis Pecaut
Ronnie Pierce
Kenneth Roberts
Mollie Ruud
Robley Schwenk
William John Scott
Tricia Whitehouse
Lee Wilson
Paula Yoon
Yurok Fishers Association

ATTACHMENT 2

KLAMATH FISHERY MANAGEMENT COUNCIL
MEETING AGENDA
Arcata, CA

January 10, 1990

10:30 Convene. Review and approval of minutes and agenda.

10:45 Report on legislation (Representative of Congressman Riggs).

11:15 Report on long-range plan of the Klamath Fishery Restoration Program (Bingham).

11:45 Development of a review draft harvest management plan.

- o Presentation of the edited plan (Dave Mackett, NMFS).

12:30 Lunch

1:30 Reconvene. Development of plan (continued).

- o Discussion of the edited plan.
  - oo The "findings of fact" issue (Iverson).
  - oo Consistency with Restoration Program plan (Bingham).
  - oo Other issues.
- o Proposed public involvement process (Whitehouse).

3:30 Break

3:45 Reconvene. Public comment on plan development.

4:15 Council discussion and decisionmaking.

- o Discussion and approval of draft plan for distribution to public.
- o Discussion and approval of public review process, including locations and dates of public meetings.

5:00 Adjourn

January 11, 1990

8:00 Convene. Review of 1990 harvests and escapement.

- o Update on harvests (Barnes).
- o Report on monitoring of Karuk fishery (Karuk Tribe rep.)
- o Fall chinook escapement estimates (Odemar).

9:00 Presentation of 1991 harvest management plans.

10:00 Break

10:15 Reconvene. Council discussion of harvest management plans.

11:00 Report of the Technical Advisory Team (Barnes).

- o Marking spring chinook, Trinity Hatchery.
- o Proposal for more intensive scale sampling.
- o Proposal to implement genetic stock identification (GSI) in the Klamath Management Zone and adjacent chinook fisheries.

Noon Lunch

1:00 Reconvene. Technical Advisory Team report (continued).

- o Analysis of the 50,000-fish goal for Trinity River fall chinook escapement.
- o Council discussion.
- o Council assignments to Technical Advisory Team.

2:00 Public comment.

2:30 Other business.

- o Newsletter update (Whitehouse).
- o Other

2:45 Discussion of next meeting.

3:00 Adjourn

ATTACHMENT 3

State of California
The Resources Agency
DEPARTMENT OF FISH AND GAME

DRAFT

# 1991 HARVEST MANAGEMENT PLAN FOR IN-RIVER ANGLER HARVEST OF SALMON AND STEELHEAD TROUT IN THE KLAMATH RIVER BASIN, CALIFORNIA

Inland Fisheries Division

January 1991

DRAFT

# 1991
# HARVEST MANAGEMENT PLAN FOR IN-RIVER ANGLER HARVEST OF SALMON AND STEELHEAD TROUT IN THE KLAMATH RIVER BASIN, CALIFORNIA

## I. INTRODUCTION

Two runs of chinook salmon (spring run and fall run), coho salmon, and the summer and winter runs of steelhead trout are the target species managed under this harvest management plan. This fishery is conducted in conformance with California sport fishing regulations as adopted by the California Fish and Game Commission, and published in Title 14, CCR. These regulations define methods of take, open areas and seasons, bag and possession limits, and annual harvest limits. Participation in the sport fishery is open to all properly licensed anglers using approved sport fishing methods and gear.

This plan was prepared by fishery biologists of the California Department of Fish and Game (Department). The plan and attachments are on file at the Department's headquarters at 1416 9th Street, Sacramento, California 95814.

## II. ESTABLISHMENT OF SEASONS AND OPEN AREAS,

All streams within the California portion of the Klamath River system that are accessible to anadromous salmon and steelhead are managed by the Department primarily for those species, and, secondarily, for other anadromous species. Those streams in the Klamath basin within California lying upstream of Iron Gate, Lewiston and Dwinnell dams are managed primarily for resident fish species.

Those sport fishing regulations promulgated for anadromous waters in the Klamath system are designed to afford anglers maximum fishing opportunities for salmon and steelhead, while at the same time providing needed instream protection to the various freshwater life stages of these species.

To effectively achieve these goals in the Klamath River basin, a variety of area and time closures, quotas, and bag, possession, and size limits have been promulgated by the Fish and Game Commission (See Attachment 1).

## III. BIOLOGICAL AND TECHNICAL BASIS FOR PLAN

In-river run size, angler harvest, and hatchery and natural spawning escapement figures for fall chinook salmon populations in the Klamath River basin have been generated annually since 1978 by the Department. Estimates of annual Indian subsistence and commercial gill net harvests on the Hoopa and Yurok Indian reservations have been similarly generated by the Hoopa Tribe and the U.S. Fish and Wildlife Service (See Attachment 2).

Additionally, the Department has coded-wire tagged fractions of the annual production of fall chinook salmon at both Trinity River and Iron Gate hatcheries, beginning in 1977. Through recovery and analysis of such tags, the Department has determined the contributions to the ocean and in-river fisheries and to spawning escapements made by fingerling and yearling fall chinook salmon released from the two facilities.

Data regarding spring chinook and coho salmon and steelhead stocks in the Klamath River system are less complete than those for fall chinook. Data for these runs consist, in large part, of estimates generated by the Department of run size, angler harvest and spawner escapements for the Trinity River basin in some, but not all, years since 1977 (See Attachments 3-6).

Additional information concerning groups of marked fish released from the two basin hatcheries has also been collected in various years. Data are also available from various State and federal agencies. These describe to varying degrees juvenile and adult distributions and various life history aspects for these stocks.

## IV. STOCK STATUS, RUN FORECAST AND HARVEST IMPACTS

For fall chinook salmon, please refer to the Pacific Fishery Management Council (PFMC), Salmon Technical Team's February 1990 report titled, "Preseason Report I, Stock Abundance Analysis for 1990 Ocean Salmon Fisheries." For spring chinook salmon, please see the report titled, "Klamath-Trinity River Basin Spring Chinook Salmon Stock Evaluation and Run Size Forecast", prepared by the U.S. Fish and Wildlife Service, Fisheries Assistance Office, Arcata, California, dated March 1990. These two documents provide comprehensive and up-to-date compilations and analyses of available biological and technical data for Klamath River basin fall and spring chinook stocks. At present, there are no 1991 preseason abundance projections available for Klamath River system chinook salmon stocks.

Data regarding coho salmon and steelhead stocks in the Klamath system are more fragmented, consisting mainly of counts made at the two basin fish hatcheries. Combined coho salmon and fall steelhead returns to Trinity River and Iron Gate hatcheries during the 1989-90 season amounted to about 40% and 122%, respectively of the 5-year (1984-88) average returns. At present, there are no preseason abundance projections available for Klamath River system coho salmon and steelhead stocks.

## V. MANAGEMENT OF THE FISHERY

The sport fishery for chinook and coho salmon is conducted only in those portions of the main stems of the Klamath, Trinity, and South Fork Trinity rivers, and at those times, defined as open in the Commission-adopted regulations. The sport fishery for steelhead is conducted in those areas, plus most portions of the Klamath's tributary systems at those times defined as open in the Commission-adopted regulations. Regulations applicable to the 1991 sport fisheries for salmon and steelhead in the Klamath basin are presented in Attachment 1.

The limits of angler harvest of fall chinook salmon in the Klamath River basin are predicated on a system of allocations developed by the Klamath Fishery Management Council and the PFMC. The sport harvest allocation has been 9-12% of the in-river run size, as determined by the PFMC. The sport fishery is managed, based on the harvest downstream of the Highway 101 bridge, to achieve an equitable share of harvest in the Klamath River downstream of the Highway 101 bridge, upstream from the Highway 101 bridge to Hornbrook, and in the Trinity River upstream of Weitchpec.

Commencing 43 days after one-third of the allowable Klamath River basin fall chinook salmon sport catch is taken below the Highway 101 bridge, retention of any chinook salmon over 22 inches in length is prohibited in the remainder of the basin. After the basin-wide sport take below the Highway 101 bridge equals or exceeds 40% of the basin-wide allowable sport catch of fall chinook, that fishery is closed to the retention of chinook salmon over 22 inches.

Projected 1991 angler harvest of adult spring chinook salmon in the Klamath River system will be based, in part, on the earlier referenced U.S. Fish and Wildlife Service's March 1990 report titled, "Klamath-Trinity River Basin Spring Chinook Salmon Stock Evaluation and Run-size Forecast".

At this time, 1991 Season run-size, harvest and spawner escapements for the various salmon and steelhead stocks have not been developed.

The Department does not monitor the sport harvest of spring chinook salmon downstream of Junction City. However, based on information from Department personnel familiar with the Klamath system, it is estimated that the sport harvest in the Trinity River downstream of Junction City is approximately one-half the sport harvest upstream. The harvest rate in this portion of the river is inversely correlated to flow conditions; the lower the flow, the higher the catch rate. It is expected that the greatest portion of these harvested fish will be taken at three locations: Grays Falls, (River Mile [RM. 42]), Burnt Ranch Falls, (RM.44), and Hell Hole, (RM. 68). It is projected that angler harvest of adult spring chinook in the main stem Klamath and main stem South Fork Trinity rivers will be negligible.

VI. CONTROL AND MONITORING OF THE SPORT FISHERY

Day to day enforcement of established angling regulations will be carried out by Department enforcement officers. Monitoring of the sport fishery will be accomplished primarily by professional and technical personnel assigned to the Department's ongoing Klamath-Trinity Program. To the extent such are developed, estimates of angler harvest will be developed following completion of the 1991 season.

The Department will determine the 1991 angler harvest of fall chinook salmon in the entire Klamath River basin by means of the same system of creel census and fish tagging operations employed in recent years.

The Department will determine the 1991 angler harvest of adult spring chinook upstream of its Junction City Weir through the use of reward tags placed on a portion of the run at that site. At present, there are no plans to monitor angler harvest of spring chinook salmon in other parts of the Klamath system in 1991.

The Department will determine the angler harvest of fall steelhead in the Trinity River basin through the use of reward tags placed on portions of the run passing the Willow Creek, Junction City, and Sandy Bar (lower South Fork Trinity River) weirs. Efforts to monitor angler harvest of fall steelhead in remaining portions of the Klamath basin in 1991 will be limited to the collection of creel census and tag return data obtained incidentally to efforts directed at fall chinook salmon. Similarly,

Department efforts to monitor the harvest of coho salmon in the Klamath system in 1991 will also be limited to data collection efforts done incidental to work directed at fall chinook salmon.

ATTACHMENT 1
(to ATTACHMENT 3)

# EXCERPTS FROM PUBLISHED CALIFORNIA SPORT FISHING REGULATIONS, 1990-1991

**All laws or regulations hereunder are either reproduced verbatim from the Fish and Game Code or from Title 14 of the California Code of Regulations (CCR), as adopted by the Fish and Game Commission under authority of the Fish and Game Code.**

## PART 1
### FISH, AMPHIBIANS AND REPTILES
## CHAPTER 1
### GENERAL PROVISIONS AND DEFINITIONS

**1.05. Angling:** To take fish by hook and line with the line held in the hand, or with the line attached to a pole or rod held in the hand or closely attended in such manner that the fish voluntarily takes the bait or lure in its mouth.

**1.08. Artificial Fly:** Any fly constructed by the method known as fly tying.

**1.11. Artificial Lures:** Any man made lure or fly that imitates or substitutes for natural bait.

**1.14. Authorization for Taking Fish:** Fish, amphibians, reptiles, mollusks and crustaceans may be taken only in the amounts, only during the open season and only with the gear authorized and shall not be taken otherwise.

**1.17. Bag and Possession Limit:** No more than one daily bag limit of each kind of fish, amphibian, reptile, mollusk or crustacean named in these regulations may be taken or possessed by any one person unless otherwise authorized, regardless of whether they are fresh, frozen, or otherwise preserved. (EXCEPTIONS: See Sections 7.00 and 7.50(a))

**1.19. Barbless Hook:** A fish hook from which the barb or barbs have been removed or completely bent closed, or which is manufactured without barbs.

**1.23. Bow and Arrow Fishing Tackle:** Such tackle must have the arrow shaft or the point, or both, attached by a line to the bow or to a fishing reel (includes crossbow).

**1.32. Chumming:** Placing any material in the water, other than on a hook while angling, for the purpose of attracting fish to a particular area in order that they may be taken.

**1.35. Closed or Closure:** Refers to waters or areas closed to all fishing unless otherwise authorized.

**1.38. Closed Season:** That period during which the taking of fish, amphibians, reptiles, mollusks or crustaceans is prohibited.

**1.41. Dates:** Dates of seasons and closures are inclusive.

**1.42. Dip Net:** Webbing supported by a frame, and hand held, not more than six feet in greatest dimension, excluding handle.

**1.44. Dividing Line Between Lake and Stream:** The mouth of the stream at the existing level of the lake surface. Stream regulations apply to parts of streams in the exposed beds of partially empty lakes.

**1.53. Inland Waters:** All the fresh, brackish and inland saline waters of the state, excluding the waters of San Francisco and San Pablo bays downstream from Carquinez Bridge and the waters of Elkhorn Slough, west of Elkhorn Road between Castroville and Watsonville. Inland waters include lagoons and tidewaters upstream from the mouths of coastal rivers and streams.

**1.56. Lake:** Includes natural lakes or man-made reservoirs.

**1.59. Limit:** Refers to daily bag limit and possession limit per person.

**1.62. Minimum Size:** No fish, mollusks or crustaceans less than the legal minimum size (total, fork or alternate) may be possessed, except as otherwise provided. Total length is the longest straight-line measurement from the tip of the head to the end of the longest lobe of the tail. Fork length is the straight-line distance from the tip of the head to the center of the tail fin. Tip of the head shall be the most anterior point on the fish with the mouth closed and the fish lying flat on its side. Alternate length is the straight-line distance from the base of the foremost spine of the first dorsal fin to the end of the longest lobe of the tail. Unless otherwise provided, all fish, mollusks or crustaceans less than the legal minimum size must be returned immediately to the water from which they were taken.

**1.63. Movement of Live Fish.** Except as provided in Sections 4.00 through 4.30, live fish taken under the authority of a sport fishing license may not be transported alive from the water where taken.

**1.65. Multiple Hook:** A hook with two or more points.

**1.68. Open Season:** That period of time during which the taking of fish, amphibians, reptiles, mollusks and crustaceans is authorized.

**1.71. Opening Date and Bag Limit for Boundary Waters:** Waters, exclusive of their tributaries, on the boundary between areas or districts with different opening dates or limits shall open on the earlier date and have the larger limit unless otherwise specified.

**1.72. A stream (includes creeks and rivers):** A stream is a body of water that flows at least periodically or intermittently through a bed or channel having banks and supports fish or other aquatic life. This includes watercourses having a surface or subsurface flow that supports or has supported riparian vegetation.

**1.73. Salmon:** Includes chinook, coho, pink, chum and sockeye salmon.

**1.74. Salmon Punch Card Requirement:** Anglers must have a nontransferable punch card issued by the department in their possession while fishing for salmon in ocean waters north of Point Delgada or in waters of the Klamath River system. Anglers must immediately upon taking an adult salmon over 20 inches in length in ocean waters and over 22 inches in length in the river system make a hole in the punch card in one of the designated locations and record the month, day, area of catch and species of salmon in the spaces provided adjacent to the punch.

A punch card shall be valid for the calendar year. No person may purchase or possess more than one punch card or any punch card other than his own. Upon purchase of the punch card, the card number shall be entered in ink on the back of the angler's sport fishing license. The sport fishing license number shall be entered on the punch card in the appropriate box.

Anglers must return punch cards to the department within 30 days of the close of the calendar year. The department may charge a fee for each punch card issued to defray printing and related administrative costs. The amount of said fee shall be $1.00. Pursuant to Section 1055 of the Fish and Game Code, an additional $0.50 will be charged by vendors authorized by the Department.

**1.75. Salmon Spawning Areas:** No salmon may be taken or possessed on any salmon spawning area when it is closed to salmon fishing.

**1.76. Spearfishing:** The taking of fish by spear or hand by persons who are in the water and may be using underwater goggles, face plates, breathing tubes, SCUBA or other artificial underwater breathing device.

**1.80. Take:** Hunt, pursue, catch, capture or kill fish, amphibians, reptiles, mollusks, crustaceans or invertebrates or attempting to do so.

**1.84. Titles and Section Numbers:** All titles and headings used in these regulations are a part thereof. All section numbers cited refer to these regulations unless otherwise specified.

**1.96. Trout:** Includes all trouts, chars, steelhead, kokanee salmon and grayling.

**1.97. Waste of Fish:** It is unlawful to cause or permit any deterioration or waste of any fish taken in the waters of this state.

# CHAPTER 2

## STATEWIDE REGULATIONS FOR FISHING AND FROGGING IN INLAND WATERS

### Article 1

### FISHING METHODS AND GEAR RESTRICTIONS

2.05. Fishing Methods—General: All fish may be taken only by angling with one closely attended rod and line or one hand line with not more than three hooks nor more than three artificial lures (each lure may have three hooks attached) attached thereto. Hooks and lures shall be so used that the fish voluntarily take them or attempt to take them in their mouths. See exceptions described in this Chapter and Chapter 3.

2.10. Fishing Methods—Exceptions:

(a) It is unlawful to use any multiple hook with the shank longer than two inches or with a distance between its points of more than 1¼ inches.

(b) It is unlawful to use gear in which any multiple hook is directly or indirectly attached closer than 18 inches to any weight exceeding one-half ounce.

(c) In the North Coast District (except the Klamath River), all weight if not part of a manufactured or conventional lure, must be attached above the hook and no hook may be directly or indirectly attached closer than 18 inches to any weight exceeding one-half ounce.

(d) In addition to the provisions of subsections (a), (b) and (c) of this section, no person shall use any multiple hook with a distance greater than ¼ inch measured from the hook point to the shank, or any single hook larger than ⅛ inch measured from the hook point to the shank or any hook with a weight attached directly or indirectly to the hook or line within 18 inches of the hook in the following waters:

(1) All year in rivers and streams in the North Coast District (except the Klamath River below the Highway 101 Bridge and the Smith River below the mouth of Rowdy Creek), Mendocino, Sonoma and Marin counties, (except the Russian River) and the Sacramento River between Kerwick Dam and the Deschutes Road Bridge and all tributaries to the Sacramento River below Shasta Dam in Shasta and Tehama counties.

2.15. Use of Lights: Lights may be used when fishing at night when and where such fishing is permitted. Lights may be used on or as part of any fishing tackle (this supersedes Section 2005 of the Fish and Game Code).

2.20. Fishing Beneath Ice: Fish may be taken beneath the ice during the open season for that water (this supersedes Section 5506 of the Fish and Game Code).

2.25. Bow and Arrow Fishing: Bow and arrow fishing is permitted only for the take of carp, goldfish, western sucker, Sacramento blackfish, hardhead, Sacramento squawfish and lamprey, all year, except in: (a) Designated salmon spawning areas.

2.30. Spearfishing: Spearfishing is permitted only in: (a) The Colorado River District for carp, goldfish and mullet, all year. (b) The Valley District for carp, goldfish, western sucker, Sacramento blackfish, hardhead, Sacramento squawfish and lamprey, from May 1 through September 15, except that no spearfishing is permitted in: (1) Shasta and Tehama counties (see Section 2.12). (2) Butte Creek (Butte Co.). (3) Feather River below Oroville Dam (Butte Co.). (4) Designated salmon spawning areas. (c) See bullfrogs (Section 5.05).

2.35. Taking Fish Near Dams, Fishways, Screens and Egg-Taking Stations: No fish may be taken within 250 feet of: (a) Any fishway or any egg-taking station. (b) Any dam or any weir or rack which has a fishway or an egg-taking station. (c) The upstream side of any fish screen. Fish may be taken upstream or downstream from any dam that does not have a fishway or egg-taking station (this supersedes Section 5502 of the Fish and Game Code).

2.40. Chumming: Chumming is permitted only in: (a) The Colorado River District, but only the approved bait fishes for this District may be used as chum (see Section 4.15) except in the Salton Sea where corn may also be used. (b) Carquinez Strait and Suisun Bay and their tributaries and saltwater tributaries. (c) Sacramento River and tidewater of tributaries downstream from Interstate 80 bridge. (d) San Joaquin River and tidewater of tributaries downstream from Interstate 5 bridge.

### Article 2. FISHING HOURS

3.00. Fishing Hours:

(a) Daylight Hours Defined: One hour before sunrise to one hour after sunset. Remaining hours are night hours.

(b) All fish may be taken day and night except as follows:

(5) Trout and salmon may be taken only during daylight hours in the following areas:

(A) North Coast District, North Central District, except Berryessa Lake (Napa Co.) and Mendocino Lake (Mendocino Co.) where all fish may be taken day or night, South Central District except Coyote Lake (Santa Clara Co.) where all fish may be taken day or night, and Valley District north of Interstate 80 except Camp Far West Lake (Nevada, Placer and Yuba Cos.), Collins Lake (Yuba Co.), Oroville Lake (Butte Co.) and Wildwood Lake (Nevada Co.) where all fish may be taken day or night.

(B) Shasta, Siskiyou, Lassen and Modoc counties.

### Article 3. BAIT REGULATIONS FOR INLAND WATERS

4.00. Bait—General: Legally acquired and possessed invertebrates, mollusks, crustaceans, amphibians (see Chapter 5 for protected amphibians), fish eggs and treated and processed foods may be used for bait (this supersedes Section 5504 of the Fish and Game Code), except (a) see Section 5.35 for restrictions on crayfish; (b) see Section 7.50(b)(74) for restriction on bait collecting on Hat Creek; (c) no trout may be maintained or possessed in a live condition in any container on or attached to any boat; (d) except for restrictions listed under special regulations, dead ocean fish may be used as bait statewide. This section supersedes the provisions of Sections 4.10, 4.15, 4.20, 4.25 and 4.30 of Title 14, CCR; and (e) no salamander may be used as bait, except for waterdogs (exotic subspecies of the tiger salamander, *Ambystoma tigrinum* ssp.) obtained from licensed bait dealers within the approved areas of use. No waterdog 3 inches or less in length may be used as bait. See Sections 4.10, 4.15, 4.20, 4.25 and 4.30 for restrictions on the use of waterdogs.

4.05. Bait Fish Capture Methods: Approved bait fish may be taken only by hand, with a dip net, or with traps not over three feet in greatest dimension. Such bait fish may not be purchased, bartered, sold, transferred or traded; or transported alive from the location where taken. Any other species taken shall be returned to the water immediately. Traps need not be closely attended. Dip net use: A dip net must be hand held, and the motion of a dip net shall be caused only by the physical effort of the operator. A dip net may not be moved through the water by a mechanical force or motorized device.

4.20. Bait Fish Use in the Sierra and North Coast Districts: (a) Only the following fin fish may be used or possessed for use as bait: (1) In Donner, Fallen Leaf and Tahoe lakes Lahontan redside, tui chub, Tahoe sucker, Lahontan speckled dace, mountain sucker and Paiute sculpin may be used only in the same lake where taken. (2) In Shasta Lake only golden shiner, red shiner, fathead minnows, mosquitofish and threadfin shad may be used or possessed for use as bait. (b) Waterdogs (as defined in subsection 4.00 (e)) may not be used or possessed for bait.

### Article 4. SPECIES REGULATIONS

5.35. Trout and Salmon: See Chapter 3, Trout, Salmon and Special Regulations.

5.37. Marking Requirements for Salmon Taken by Other Than Commercial Means: Except as provided in Section 5.36, it is unlawful for any person to possess or transport any salmon which have not been taken under the provisions of a valid commercial fishing license and salmon permit unless such fish are clearly marked by cutting or clipping off either the top or bottom half of the tail fin.

It shall be unlawful to sell or possess for sale any salmon marked pursuant to this section.

# CHAPTER 3. DISTRICT TROUT, SALMON AND SPECIAL REGULATIONS

## Article 1. District Definitions

6.31. North Coast District Definition: The North Coast District consists of the inland waters of all of Trinity, Humboldt and Del Norte counties and the portion of Siskiyou County northwest of a line drawn between Mt. Eddy and the Black Butte Summit railroad crossing of Interstate 5 and west of Interstate 5 between the railroad crossing and Weed and west of Highway 97 between Weed and the Oregon border.

## Article 2. District General Regulations

7.00. District General Regulations: It is unlawful to take fish, amphibians, reptiles, mollusks, crustaceans, or kelp, except as provided by these regulations. Daily bag and possession limits, unless otherwise provided, mean the total number of trout and salmon in combination. Unless otherwise provided, no more than one daily bag limit may be possessed.

The table below covers seasons, opening and closing dates, daily bag limits, possession limits, and certain special regulations consistent throughout a District. For other special regulations, see:

Article 1. FISHING METHODS AND GEAR RESTRICTIONS
Article 2. FISHING HOURS
Article 3. BAIT REGULATIONS FOR INLAND WATERS

| *DISTRICT/WATER* | *OPEN SEASON* | *DAILY BAG AND POSSESSION LIMIT* |
|---|---|---|
| (a) North Coast District | | |
| (1) No salmon may be taken in the North Coast District except as provided in the Alphabetical List of Waters with Special Regulations. | | |
| (2) All lakes and reservoirs except those listed by name in the Special Regulations. | All year | 5 per day<br>10 in possession |
| (3) All streams except those listed by name in the Special Regulations. | Last Saturday in Apr. through Nov. 15 | 2 trout<br>0 salmon |

## Article 3. Alphabetical List of Waters with Special Fishing Regulations

Section 7.50. Alphabetical List of Waters with Special Fishing Regulations.

(a) General Provisions:

(1) It is unlawful to take fish, amphibians, reptiles, mollusks, crustaceans or kelp, except as provided by these regulations.
(2) Every body of water listed below is closed to all fishing except as shown.
(3) Daily bag and possession limits, unless otherwise provided, mean the total number of trout and salmon in combination.
(4) Unless otherwise provided, it is unlawful to possess more than one daily bag limit.
(5) The following special regulations deal primarily with seasons, size limits, and bag and possession limits. Please be aware that these waters may also be subject to restrictions on fishing methods and gear (Sections 2.05 through 2.40), fishing hours (Section 3.00), and the use of bait (Sections 4.00 through 4.30).

| *(b) BODY OF WATER* | *OPEN SEASON AND SPECIAL REGULATIONS* | *DAILY BAG AND POSSESSION LIMIT* |
|---|---|---|
| (91) Klamath River Regulations. (See Section 1.74 for salmon punch card requirements.) | | |
| (A) Klamath River main stem and all tributaries above Iron Gate Dam except Shovel Creek and tributaries. The Klamath River main stem within 250 feet of the mouth of Shovel Creek is closed to all fishing November 16 through June 15. | Last Saturday in Apr. through Nov. 15 | 5 per day<br>10 in possession |
| (B) Shovel Creek and tributaries above mouth of Panther Creek. | Saturday preceding Memorial Day through Nov. 15 | 5 |
| (C) Shovel Creek and tributaries up to and including Panther Creek. | Closed to all fishing all year | |
| (D) Bogus Creek and tributaries. | Last Saturday in Apr. through Aug. 31 | 2 |
| (E) Klamath River main stem from Iron Gate Dam to 3,500 feet downstream. | Closed to all fishing all year | |
| (F) Klamath River main stem from 3,500 feet below Iron Gate Dam to mouth.<br><br>NO FISHING IS ALLOWED WITHIN 400 FEET OF ANY U.S. FISH AND WILDLIFE OR DEPARTMENT OF FISH AND GAME SEINING OPERATION. AND FROM THE ISHI PISHI FALLS ROAD BRIDGE UPSTREAM TO AND INCLUDING ISHI PISHI FALLS FROM AUGUST 15 THROUGH NOVEMBER 1. | All year | 3 trout and 5 salmon per day, only 2 salmon more than 22 inches total length per day.<br>No more than 6 salmon over 22 inches in any 7 consecutive days.<br>No more than 8 salmon may be possessed, of which no more than 6 may be over 22 inches total length |
| (G) Salmon River main stem, main stem of North Fork, and main stem of South Fork. | Last Saturday in Apr. through Feb. 28 | 2 trout<br>0 salmon |
| (H) Scott River main stem from mouth to Fort Jones-Greenview bridge. | Last Saturday in Apr. through Feb. 28 | 2 trout<br>0 salmon |

| (b) BODY OF WATER | OPEN SEASON AND SPECIAL REGULATIONS | DAILY BAG AND POSSESSION LIMIT |
|---|---|---|
| (I) Shasta River and tributaries (Siskiyou Co.). | | |
| 1 Shasta River and tributaries above Dwinnell Dam. | Last Saturday in Apr. through Nov. 15 | 5 per day<br>10 in possession |
| 2 Shasta River and all tributaries between Interstate 5 and Dwinnell Dam. | Last Saturday in Apr. through Nov. 15 | 2 trout<br>0 salmon |
| 3 Shasta River from Highway 5 to 250 feet above the Department of Fish and Game counting weir. | Last Saturday in Apr. through Feb. 28 | 2 trout<br>0 salmon |
| 4 Shasta River from 250 feet above the Department of Fish and Game counting weir to mouth. | Last Saturday in Apr. through Aug. 31 | 2 trout<br>0 salmon |
| | Nov. 16 through Feb. 28 | 2 trout<br>0 salmon |
| (J) All tributaries of the main stem Klamath, Salmon, Scott and Shasta rivers and parts of the main stems not listed above. | Last Saturday in Apr. through Nov. 15<br>Maximum size limit: 14 inches total length. | 2 trout<br>0 salmon |
| (K) Trinity River. | | |
| 1 Trinity River and tributaries above Lewiston Dam. | Last Saturday in Apr. through Nov. 15 | 5 per day<br>10 in possession |
| 2 Lewiston Dam to 250 feet downstream from Lewiston Dam. | Closed to all fishing all year | |
| 3 From 250 feet below Lewiston Dam to Old Lewiston bridge. | Last Saturday in Apr. through Sept. 15<br>Only artificial flies with barbless hooks may be used. | 2 trout<br>0 salmon |
| 4 From Old Lewiston bridge to the Highway 299 West bridge at Cedar Flat. | Last Saturday in Apr. through Mar. 14 | 3 trout and 3 salmon per day, only 2 salmon more than 22 inches total length per day.<br>No more than 6 salmon over 22 inches in any 7 consecutive days.<br>No more than 8 salmon may be possessed, of which no more than 6 may be over 22 inches total length. |
| 5 From the Highway 299 West bridge at Cedar Flat downstream to the Hawkins Bar Bridge (Road to Denney). | Last Saturday in Apr. through Aug. 31<br>Nov. 16 through Mar. 14 | " |
| 6 From Hawkins Bar Bridge (Road to Denney) to the mouth of the South Fork Trinity. | Last Saturday in Apr. through Mar. 14 | " |
| 7 The main stem Trinity River from the mouth of the South Fork Trinity to the mouth of the Trinity and the South Fork Trinity downstream from the South Fork Trinity River bridge near Hyampom.* | All year | " |
| 8 All tributaries of the Trinity River not listed above. | Last Saturday in Apr. through Nov. 15<br>Maximum size limit: 14 inches total length | 2 trout<br>0 salmon |

*NOTE: The regulation shown here for the South Fork Trinity River reflects the emergency regulation change approved by the California Fish and Game Commission and put into effect September 19, 1989, to protect spring chinook salmon and summer steelhead in the South Fork Trinity River basin.

# KLAMATH RIVER BASIN FALL CHINOOK SALMON RUN-SIZE, HARVEST AND SPAWNER ESCAPEMENT--1990 SEASON 1/

The 1990 fall chinook salmon run into the Klamath River system has turned out to be significantly smaller than that projected preseason. It is the smallest run recorded since 1978, when the California Department of Fish and Game began generating annual, basin-wide figures.

Earlier this year, as part of efforts to formulate 1990 season fishing regulations, fisheries scientists projected that 95,800 adult fall chinook salmon would return to the Klamath River this fall. Based on this projection, 31,000 adults were allocated for harvest by the in-river fisheries, with the remaining 64,800 dedicated to natural and hatchery spawning escapements. The following table presents, in abbreviated form, 1990 preseason adult harvest and spawner escapement projections, along with corresponding postseason estimates.

| | | Preseason projection/ allocation | Postseason estimate (*) |
|---|---|---|---|
| Harvest | | | |
| Indian net | | 24,500 | 7,794(31.8) |
| Angler | | 6,500 | 3,151(48.5) |
| | Subtotals | 31,000 | 10,945(35.3) |
| Spawner escapement | | | |
| Natural | | 49,200 | 12,430(25.3) |
| Hatchery | | 15,600 | 8,067(51.7) |
| | Subtotals | 64,800 | 20,497(31.6) |
| | TOTALS | 95,800 | 31,442(32.8) |

* Percent of projected/allocated figures in parentheses.

Complete run-size, harvest and spawner escapement figures for both adults and grilse for years 1978-1990 are presented in the accompanying table.

1/ Prepared December 13, 1990, by California Department of Fish and Game, Klamath-Trinity Program.

# Klamath River Basin Fall Chinook Salmon Spawner Escapement, In-river Harvest and Run-size Estimates 1978-1990 [a]



## SPAWNER ESCAPEMENT

| | 1978 | | | 1979 | | | 1980 | | |
|---|---|---|---|---|---|---|---|---|---|
| Hatchery Spawners | Grilse | Adults | Totals | Grilse | Adults | Totals | Grilse | Adults | Totals |
| Iron Gate Hatchery (IGH) | 915 | 6,925 | 7,840 | 257 | 2,301 | 2,558 | 451 | 2,412 | 2,863 |
| Trinity River Hatchery (TRH) | 1,325 | 6,034 | 7,359 | 964 | 1,335 | 2,299 | 2,256 | 4,099 | 6,355 |
| Subtotals | 2,240 | 12,959 | 15,199 | 1,221 | 3,636 | 4,857 | 2,707 | 6,511 | 9,218 |
| Natural Spawners | | | | | | | | | |
| Trinity River basin (above Willow Creek, excluding TRH) | 4,712 | 31,052 | 35,764 | 3,936 | 8,028 | 11,964 | 16,837 | 7,700 | 24,537 |
| Salmon River basin | 1,400 | 2,600 | 4,000 | 150 | 1,000 | 1,150 | 200 | 800 | 1,000 |
| Scott River basin | 1,909 | 3,423 | 5,332 | 428 | 3,396 | 3,824 | 2,245 | 2,032 | 4,277 |
| Shasta River basin | 6,707 | 12,024 | 18,731 | 1,040 | 7,111 | 8,151 | 4,334 | 3,762 | 8,096 |
| Bogus Creek basin | 651 | 4,928 | 5,579 | 494 | 5,444 | 5,938 | 1,749 | 3,321 | 5,070 |
| Main Stem Klamath River (excluding IGH) | 300 | 1,700 | 2,000 | 466 | 4,190 | 4,656 | 867 | 2,468 | 3,335 |
| Misc. Klamath tributaries (above Hoopa and Yurok Reservations) | 735 | 2,765 | 3,500 | 147 | 1,068 | 1,215 | 500 | 1,000 | 1,500 |
| Hoopa and Yurok Reservation tribs. | -- b | -- b | -- b | 100 c | 400 c | 500 c | 250 c | 400 c | 650 c |
| Subtotals | 16,414 | 58,492 | 74,906 | 6,761 | 30,637 | 37,398 | 26,982 | 21,483 | 48,465 |
| Total Spawner Escapement | 18,654 | 71,451 | 90,105 | 7,982 | 34,273 | 42,255 | 29,689 | 27,994 | 57,683 |

## IN-RIVER HARVEST

| | 1978 | | | 1979 | | | 1980 | | |
|---|---|---|---|---|---|---|---|---|---|
| Angler Harvest | Grilse | Adults | Totals | Grilse | Adults | Totals | Grilse | Adults | Totals |
| Klamath River (below Hwy 101 bridge) | 122 | 854 | 976 | 216 | 484 | 700 | 835 | 727 | 1,562 |
| Trinity River basin (above Willow Creek) | -- d | -- d | -- d | 765 | 1,157 | 1,922 | 2,456 | 998 | 3,454 |
| Balance of Klamath system | 1,960 | 840 | 2,800 | 1,200 | 500 | 1,700 | 2,600 | 2,771 | 5,371 |
| Subtotals | 2,082 | 1,694 | 3,776 | 2,181 | 2,141 | 4,322 | 5,891 | 4,496 | 10,387 |
| Indian Net Harvest [e] | | | | | | | | | |
| Klamath River (below Hwy 101 bridge) | -- | -- | -- | -- | -- | -- | 495 | 9,605 | 10,100 |
| Klamath River (Hwy 101 to Trinity mouth) | -- | -- | -- | -- | -- | -- | 272 | 1,528 | 1,800 |
| Trinity River (Hoopa Reservation) | -- | -- | -- | -- | -- | -- | 220 | 880 | 1,100 |
| Subtotals | 1,800 | 18,200 | 20,000 | 1,350 | 13,650 | 15,000 | 987 | 12,013 | 13,000 |
| Total In-river Harvest | 3,882 | 19,894 | 23,776 | 3,531 | 15,791 | 19,322 | 6,878 | 16,509 | 23,387 |

## IN-RIVER RUN

| | 1978 | | | 1979 | | | 1980 | | |
|---|---|---|---|---|---|---|---|---|---|
| Totals | Grilse | Adults | Totals | Grilse | Adults | Totals | Grilse | Adults | Totals |
| In-river Harvest and Escapement | 22,536 | 91,345 | 113,881 | 11,513 | 50,064 | 61,577 | 36,567 | 44,503 | 81,070 |
| Angling Mortality (2% of harvest) f | 42 | 34 | 76 | 44 | 43 | 87 | 118 | 90 | 208 |
| Net Mortality (8% of harvest) f | 144 | 1,456 | 1,600 | 108 | 1,092 | 1,200 | 79 | 961 | 1,040 |
| Total In-river Run | 22,722 | 92,835 | 115,557 | 11,665 | 51,199 | 62,864 | 36,764 | 45,554 | 82,318 |

Prepared 12/13/90

(continued on next pag

# Klamath River Basin Fall Chinook Salmon Spawner Escapement, In-river Harvest and Run-size Estimates, 1978-1990 [a]



## SPAWNER ESCAPEMENT

| | 1981 | | | 1982 | | | 1983 | | |
|---|---|---|---|---|---|---|---|---|---|
| | Grilse | Adults | Totals | Grilse | Adults | Totals | Grilse | Adults | Totals |
| Hatchery Spawners | | | | | | | | | |
| Iron Gate Hatchery (IGH) | 540 | 2,055 | 2,595 | 1,833 | 8,353 | 10,186 | 514 | 8,371 | 8,885 |
| Trinity River Hatchery (TRH) | 1,004 | 2,370 | 3,374 | 4,235 | 2,058 | 6,293 | 271 | 5,494 | 5,765 |
| Subtotals | 1,544 | 4,425 | 5,969 | 6,068 | 10,411 | 16,479 | 785 | 13,865 | 14,650 |
| Natural Spawners | | | | | | | | | |
| Trinity River basin (above Willow Creek, excluding TRH) | 5,906 | 15,340 | 21,246 | 8,149 | 9,274 | 17,423 | 853 | 17,284 | 18,137 |
| Salmon River basin | 450 | 750 | 1,200 | 300 | 1,000 | 1,300 | 75 | 1,200 | 1,275 |
| Scott River basin | 3,409 | 3,147 | 6,556 | 4,350 | 5,826 | 10,176 | 170 | 3,398 | 3,568 |
| Shasta River basin | 4,330 | 7,890 | 12,220 | 1,922 | 6,533 | 8,455 | 753 | 3,119 | 3,872 |
| Bogus Creek basin | 912 | 2,730 | 3,642 | 2,325 | 4,818 | 7,143 | 335 | 2,713 | 3,048 |
| Main Stem Klamath River (excluding IGH) | 1,000 | 3,000 | 4,000 | 1,000 | 3,000 | 4,000 | 200 | 1,800 | 2,000 |
| Misc. Klamath tributaries (above Hoopa and Yurok Reservations) | 500 | 1,000 | 1,500 | 600 | 1,500 | 2,100 | 140 | 1,270 | 1,410 |
| Hoopa and Yurok Reservation tribs. | -- [b] | -- [b] | -- [b] | -- [b] | -- [b] | -- [b] | -- [b] | -- [b] | -- [b] |
| Subtotals | 16,507 | 33,857 | 50,364 | 18,646 | 31,951 | 50,597 | 2,526 | 30,784 | 33,310 |
| Total Spawner Escapement | 18,051 | 38,282 | 56,333 | 24,714 | 42,362 | 67,076 | 3,311 | 44,649 | 47,960 |

## IN-RIVER HARVEST

| | 1981 | | | 1982 | | | 1983 | | |
|---|---|---|---|---|---|---|---|---|---|
| | Grilse | Adults | Totals | Grilse | Adults | Totals | Grilse | Adults | Totals |
| Angler Harvest | | | | | | | | | |
| Klamath River (below Hwy 101 bridge) | 536 | 1,714 | 2,250 | 1,252 | 3,539 | 4,791 | 60 | 750 | 810 |
| Trinity River basin (above Willow Creek) | 1,456 | 3,174 | 4,630 | 2,554 | 2,321 | 4,875 | 116 | 2,360 | 2,476 |
| Balance of Klamath system | 5,260 | 1,095 | 6,355 | 8,678 | 2,479 | 11,157 | 175 | 1,125 | 1,300 |
| Subtotals | 7,252 | 5,983 | 13,235 | 12,484 | 8,339 | 20,823 | 351 | 4,235 | 4,586 |
| Indian Net Harvest [e] | | | | | | | | | |
| Klamath River (below Hwy 101 bridge) | 912 | 23,097 | 24,009 | 290 | 4,547 | 4,837 | 12 | 800 | 812 |
| Klamath River (Hwy 101 to Trinity mouth) | 1,104 | 8,405 | 9,509 | 1,195 | 8,424 | 9,619 | 121 | 5,700 | 5,821 |
| Trinity River (Hoopa Reservation) | 449 | 1,531 | 1,980 | 314 | 1,511 | 1,825 | 30 | 1,390 | 1,420 |
| Subtotals | 2,465 | 33,033 | 35,498 | 1,799 | 14,482 | 16,281 | 163 | 7,890 | 8,053 |
| Total In-river Harvest | 9,717 | 39,016 | 48,733 | 14,283 | 22,821 | 37,104 | 514 | 12,125 | 12,639 |

## IN-RIVER RUN

| | 1981 | | | 1982 | | | 1983 | | |
|---|---|---|---|---|---|---|---|---|---|
| | Grilse | Adults | Totals | Grilse | Adults | Totals | Grilse | Adults | Totals |
| Totals | | | | | | | | | |
| In-river Harvest and Escapement | 27,768 | 77,298 | 105,066 | 38,997 | 65,183 | 104,180 | 3,825 | 56,774 | 60,599 |
| Angling Mortality (2% of harvest) [f] | 145 | 120 | 265 | 250 | 167 | 417 | 7 | 85 | 92 |
| Net Mortality (8% of harvest) [f] | 197 | 2,643 | 2,840 | 144 | 1,159 | 1,303 | 13 | 631 | 644 |
| Total In-river Run | 28,110 | 80,061 | 108,171 | 39,391 | 66,509 | 105,900 | 3,845 | 57,490 | 61,335 |

(continued on next page)

# Klamath River Basin Fall Chinook Salmon Spawner Escapement, In-river Harvest and Run-size Estimates, 1978-1990 [a]



## SPAWNER ESCAPEMENT

| | 1984 | | | 1985 | | | 1986 | | |
|---|---|---|---|---|---|---|---|---|---|
| Hatchery Spawners | Grilse | Adults | Totals | Grilse | Adults | Totals | Grilse | Adults | Totals |
| Iron Gate Hatchery (IGH) | 764 | 5,330 | 6,094 | 2,159 | 19,951 | 22,110 | 1,461 | 17,096 | 18,557 |
| Trinity River Hatchery (TRH) | 766 | 2,166 | 2,932 | 18,166 | 2,583 | 20,749 | 3,609 | 15,795 | 19,404 |
| Subtotals | 1,530 | 7,496 | 9,026 | 20,325 | 22,534 | 42,859 | 5,070 | 32,891 | 37,961 |
| **Natural Spawners** | | | | | | | | | |
| Trinity River basin (above Willow Creek, excluding TRH) | 3,416 | 5,654 | 9,070 | 29,454 | 9,217 | 38,671 | 20,459 | 92,548 | 113,007 |
| Salmon River basin | 216 g | 1,226 g | 1,442 g | 905 | 2,259 | 3,164 | 949 | 2,716 | 3,665 |
| Scott River basin | 358 | 1,443 | 1,801 | 1,357 | 3,051 | 4,408 | 4,865 | 3,176 | 8,041 |
| Shasta River basin | 480 | 2,362 | 2,842 | 2,227 | 2,897 | 5,124 | 683 | 3,274 | 3,957 |
| Bogus Creek basin | 465 | 3,039 | 3,504 | 1,156 | 3,491 | 4,647 | 1,184 | 6,124 | 7,308 |
| Main Stem Klamath River (excluding IGH) | 200 | 1,350 | 1,550 | 156 | 468 | 624 | 196 | 603 | 799 |
| Misc. Klamath tributaries (above Hoopa and Yurok Reservations) | 150 | 990 | 1,140 | 646 | 4,214 | 4,860 | 606 | 4,919 | 5,525 |
| Hoopa and Yurok Reservation tribs. | -- b | -- b | -- b | 50 h | 80 h | 130 h | -- b | -- b | -- b |
| Subtotals | 5,285 | 16,064 | 21,349 | 35,951 | 25,677 | 61,628 | 28,942 | 113,360 | 142,302 |
| Total Spawner Escapement | 6,815 | 23,560 | 30,375 | 56,276 | 48,211 | 104,487 | 34,012 | 146,251 | 180,263 |

## IN-RIVER HARVEST

| | 1984 | | | 1985 | | | 1986 | | |
|---|---|---|---|---|---|---|---|---|---|
| Angler Harvest | Grilse | Adults | Totals | Grilse | Adults | Totals | Grilse | Adults | Totals |
| Klamath River (below Hwy 101 bridge) | 175 | 548 | 723 | 1,479 | 2,427 i | 3,906 | 704 | 2,456 | 3,160 |
| Trinity River basin (above Willow Creek) | 393 | 736 | 1,129 | 5,442 | 154 i | 5,596 | 3,438 | 12,039 | 15,477 |
| Balance of Klamath system | 384 | 2,056 | 2,440 | 4,274 | 1,001 i | 5,275 | 5,266 | 6,532 | 11,798 |
| Subtotals | 952 | 3,340 | 4,292 | 11,195 | 3,582 i | 14,777 | 9,408 | 21,027 | 30,435 |
| **Indian Net Harvest [e]** | | | | | | | | | |
| Klamath River (below Hwy 101 bridge) | 132 | 11,878 | 12,010 | 132 | 5,700 | 5,832 | 191 | 15,286 | 15,477 |
| Klamath River (Hwy 101 to Trinity mouth) | 183 | 5,622 | 5,805 | 476 | 3,925 | 4,401 | 377 | 5,033 | 5,410 |
| Trinity River (Hoopa Reservation) | 140 | 1,170 | 1,310 | 947 j | 1,941 j | 2,888 j | 286 | 4,808 | 5,094 |
| Subtotals | 455 | 18,670 | 19,125 | 1,555 | 11,566 | 13,121 | 854 | 25,127 | 25,981 |
| Total In-river Harvest | 1,407 | 22,010 | 23,417 | 12,750 | 15,148 | 27,898 | 10,262 | 46,154 | 56,416 |

## IN-RIVER RUN

| | 1984 | | | 1985 | | | 1986 | | |
|---|---|---|---|---|---|---|---|---|---|
| Totals | Grilse | Adults | Totals | Grilse | Adults | Totals | Grilse | Adults | Totals |
| In-river Harvest and Escapement | 8,222 | 45,570 | 53,792 | 69,026 | 63,359 | 132,385 | 44,274 | 192,405 | 236,679 |
| Angling Mortality (2% of harvest) f | 19 | 67 | 86 | 224 | 72 | 296 | 188 | 421 | 609 |
| Net Mortality (8% of harvest) f | 36 | 1,494 | 1,530 | 124 | 925 | 1,049 | 68 | 2,010 | 2,078 |
| Total In-river Run | 8,277 | 47,131 | 55,408 | 69,374 | 64,356 | 133,730 | 44,530 | 194,836 | 239,366 |

Prepared 12/13/90

(continued on next page)

# Klamath River Basin Fall Chinook Salmon Spawner Escapement, In-river Harvest and Run-size Estimates, 1978-1990 [a]



## SPAWNER ESCAPEMENT

| | 1987 | | | 1988 | | | 1989 | | |
|---|---|---|---|---|---|---|---|---|---|
| Hatchery Spawners | Grilse | Adults | Totals | Grilse | Adults | Totals | Grilse | Adults | Totals |
| Iron Gate Hatchery (IGH) | 1,825 | 15,189 | 17,014 | 609 | 16,106 | 16,715 | 831 | 10,859 | 11,690 |
| Trinity River Hatchery (TRH) | 2,453 | 13,934 | 16,387 | 4,752 | 17,352 | 22,104 | 239 | 11,132 | 11,371 |
| Subtotals | 4,278 | 29,123 | 33,401 | 5,361 | 33,458 | 38,819 | 1,070 | 21,991 | 23,061 |
| Natural Spawners | | | | | | | | | |
| Trinity River basin (above Willow Creek, excluding TRH) | 5,949 | 71,920 | 77,869 | 10,626 | 44,616 | 55,242 | 2,543 | 29,445 | 31,988 |
| Salmon River basin | 118 | 3,832 | 3,950 | 327 | 3,273 | 3,600 | 695 | 2,915 | 3,610 |
| Scott River basin | 797 | 7,769 | 8,566 | 473 | 4,727 | 5,200 | 1,188 | 3,000 | 4,188 |
| Shasta River basin | 398 | 4,299 | 4,697 | 256 | 2,586 | 2,842 | 137 | 1,440 | 1,577 |
| Bogus Creek basin | 1,208 | 9,748 | 10,956 | 225 | 16,215 | 16,440 | 444 | 2,218 | 2,662 |
| Main Stem Klamath River (excluding IGH) | 65 | 863 | 928 | 164 | 2,982 | 3,146 | 214 | 1,011 | 1,225 |
| Misc. Klamath tributaries (above Hoopa and Yurok Reservations) | 237 | 3,286 | 3,523 | 418 | 4,167 | 4,585 | 248 | 3,239 | 3,487 |
| Hoopa and Yurok Reservation tribs. | -- b | -- b | -- b | 55 k | 320 k | 375 k | 40 h | 450 h | 490 h |
| Subtotals | 8,772 | 101,717 | 110,489 | 12,544 | 78,886 | 91,430 | 5,509 | 43,718 | 49,227 |
| Total Spawner Escapement | 13,050 | 130,840 | 143,890 | 17,905 | 112,344 | 130,249 | 6,579 | 65,709 | 72,288 |

## IN-RIVER HARVEST

| | 1987 | | | 1988 | | | 1989 | | |
|---|---|---|---|---|---|---|---|---|---|
| Angler Harvest | Grilse | Adults | Totals | Grilse | Adults | Totals | Grilse | Adults | Totals |
| Klamath River (below Hwy 101 bridge) | 146 | 2,455 | 2,601 | 124 | 3,367 | 3,491 | 137 | 1,328 | 1,465 |
| Trinity River basin (above Willow Creek) | 923 | 9,433 | 10,356 | 2,735 | 9,341 | 12,076 | 209 | 3,054 | 3,263 |
| Balance of Klamath system | 4,367 | 8,281 | 12,648 | 2,552 | 9,495 | 12,047 | 1,921 | 4,393 | 6,314 |
| Subtotals | 5,436 | 20,169 | 25,605 | 5,411 | 22,203 | 27,614 | 2,267 | 8,775 | 11,042 |
| Indian Net Harvest [e] | | | | | | | | | |
| Klamath River (below Hwy 101 bridge) | 36 | 39,978 | 40,014 | 138 | 36,914 | 37,052 | 0 | 37,130 | 37,130 |
| Klamath River (Hwy 101 to Trinity mouth) | 117 | 8,136 | 8,253 | 173 | 9,667 | 9,840 | 120 | 4,961 | 5,081 |
| Trinity River (Hoopa Reservation) | 262 | 4,982 | 5,244 | 267 | 5,070 | 5,337 | 71 | 3,474 | 3,545 |
| Subtotals | 415 | 53,096 | 53,511 | 578 | 51,651 | 52,229 | 191 | 45,565 | 45,756 |
| Total In-river Harvest | 5,851 | 73,265 | 79,116 | 5,989 | 73,854 | 79,843 | 2,458 | 54,340 | 56,798 |

## IN-RIVER RUN

| | 1987 | | | 1988 | | | 1989 | | |
|---|---|---|---|---|---|---|---|---|---|
| Totals | Grilse | Adults | Totals | Grilse | Adults | Totals | Grilse | Adults | Totals |
| In-river Harvest and Escapement | 18,901 | 204,105 | 223,006 | 23,894 | 186,198 | 210,092 | 9,037 | 120,049 | 129,086 |
| Angling Mortality (2% of harvest) f | 109 | 403 | 512 | 108 | 444 | 552 | 45 | 176 | 221 |
| Net Mortality (8% of harvest) f | 33 | 4,248 | 4,281 | 46 | 4,132 | 4,178 | 15 | 3,645 | 3,660 |
| Total In-river Run | 19,043 | 208,756 | 227,799 | 24,048 | 190,774 | 214,822 | 9,097 | 123,870 | 132,967 |

Prepared 12/13/90

(continued on next page)

# Klamath River Basin Fall Chinook Salmon Spawner Escapement, In-river Harvest and Run-size Estimates, 1978-1990 [a]



## SPAWNER ESCAPEMENT

| | 1990 | | |
|---|---|---|---|
| | Grilse | Adults | Totals |
| Hatchery Spawners | | | |
| Iron Gate Hatchery (IGH) | 321 | 6,717 | 7,038 |
| Trinity River Hatchery (TRH) | 350 | 1,350 | 1,700 |
| Subtotals | 671 | 8,067 | 8,738 |
| Natural Spawners | | | |
| Trinity River basin (above Willow Creek, excluding TRH) | 612 | 7,313 | 7,925 |
| Salmon River basin | 410 | 2,156 | 2,566 |
| Scott River basin | 173 | 849 | 1,022 |
| Shasta River basin | 118 | 415 | 533 |
| Bogus Creek basin | 53 | 732 | 785 |
| Main Stem Klamath River (excluding IGH) | 59 | 505 | 564 |
| Misc. Klamath tributaries (above Hoopa and Yurok Reservations) | 40 | 430 | 470 |
| Hoopa and Yurok Reservation tribs. | 0 h | 30 h | 30 h |
| Subtotals | 1,465 | 12,430 | 13,895 |
| Total Spawner Escapement | 2,136 | 20,497 | 22,633 |

## IN-RIVER HARVEST

| | 1990 | | |
|---|---|---|---|
| | Grilse | Adults | Totals |
| Angler Harvest | | | |
| Klamath River (below Hwy 101 bridge) | 58 | 291 | 349 |
| Trinity River basin (above Willow Creek) | 26 | 231 | 257 |
| Balance of Klamath system | 1,879 | 2,629 | 4,508 |
| Subtotals | 1,963 | 3,151 | 5,114 |
| Indian Net Harvest [e] | | | |
| Klamath River (below Hwy 101 bridge) | 13 | 3,536 | 3,549 |
| Klamath River (Hwy 101 to Trinity mouth) | 138 | 3,447 | 3,585 |
| Trinity River (Hoopa Reservation) | 36 | 811 | 847 |
| Subtotals | 187 | 7,794 | 7,981 |
| Total In-river Harvest | 2,150 | 10,945 | 13,095 |

## IN-RIVER RUN

| | 1990 | | |
|---|---|---|---|
| | Grilse | Adults | Totals |
| Totals | | | |
| In-river Harvest and Escapement | 4,286 | 31,442 | 35,728 |
| Angling Mortality (2% of harvest) f | 39 | 63 | 102 |
| Net Mortality (8% of harvest) f | 15 | 624 | 639 |
| Total In-river Run | 4,340 | 32,129 | 36,469 |

Prepared 12/13/90

(continued on next page)

Klamath River Basin Fall Chinook Salmon Spawner Escapement, In-river Harvest and Run-size Estimates, 1978-1990 a/ (continued)



a/ Prepared December 13, 1990. All figures are California Department of Fish and Game counts/estimates unless otherwise indicated. All figures for Iron Gate and Trinity River hatcheries represent counts of fish entering those facilities. All spawner escapement figures for the Shasta River basin for 1978-1987, plus those for the Bogus Creek basin for 1980-1990 are based on counts made at counting stations located near the mouths of those streams. All remaining spawner escapements and all harvest figures are estimates developed from data obtained through ongoing field investigations in the Klamath-Trinity system. Figures for years through 1989 are final; 1990 figures are preliminary, subject to revision.

b/ Figure not available.

c/ U.S. Fish and Wildlife Service (USFWS) estimate.

d/ In 1978, the Klamath River system sport salmon fishing season was closed August 25. There was essentially no sport harvest of fall chinook in the Trinity River basin in 1978.

e/ USFWS estimates for years through 1982; 1983 through 1990 estimates jointly made by USFWS and Hoopa Valley Business Council Fisheries Department (HVBCFD).

f/ Factors for non-landed catch mortality calculated by the Klamath River Technical Advisory Team (KRTAT, 1986, "Recommended Spawning Escapement Policy for Klamath River Fall-run Chinook").

g/ U.S. Forest Service estimate.

h/ HVBCFD estimate. Estimate for streams in Hoopa Valley Indian Reservation only.

i/ In 1985, the Klamath River system sport salmon fishing season was closed to the taking of all salmon below the U.S. Highway 101 bridge from September 9 through December 31; the Klamath from the U.S. Highway 101 bridge to Iron Gate Dam and the Trinity River from its mouth to Lewiston Dam were closed to the taking of salmon 22 inches and longer from September 23 through December 31, 1985.

j/ Estimates for Hoopa Valley Indian Reservation portion of catch (=947 grilse and 1,941 adults) are of catch occurring during open fishing periods only.

k/ Estimates jointly made by USFWS and HVBCFD.

ATTACHMENT 3

(to ATTACHMENT 3)

Trinity River Spring Chinook Salmon Run-Size, Angler Harvest and Spawner Escapement Estimates, 1977 through 1989.

| Year | Portion of Trinity basin covered by estimate | Run size estimate | | | Spawner escapement estimate a/ | | | Trinity River Hatchery count b/ | | | Angler harvest estimate | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Grilse | Adults | Total | Grilse | Adults | Total | Grilse | Adults | Total | Grilse | Adults | Total |
| 1977 | Above Junction City | NO ESTIMATE | | | NO ESTIMATE | | | 385 c/ | 1,124 c/ | 1,509 c/ | NO ESTIMATE | | |
| 1978 | " | 190 | 18,816 | 19,006 | 182 | 18,064 | 18,246 | 153 | 3,680 | 3,833 | 8 d/ | 752 d/ | 760 |
| 1979 | " | 113 | 7,964 | 8,077 | 113 | 6,666 | 6,779 | 113 | 1,658 | 1,771 | 0 | 1,298 | 1,298 |
| 1980 | " | 1,949 | 2,301 | 4,250 | 1,665 | 2,161 | 3,826 | 353 | 547 | 900 | 284 | 140 | 424 |
| 1981 | " | 347 | 7,913 | 8,260 | 337 | 5,767 | 6,104 | 95 | 2,405 | 2,500 | 10 | 2,146 | 2,156 |
| 1982 | " | 656 | 5,731 | 6,387 | 537 | 5,094 | 5,631 | 150 | 1,226 | 1,376 | 119 | 637 | 756 |
| 1983 | " | NO ESTIMATE | | | NO ESTIMATE | | | 223 | 930 | 1,158 | NO ESTIMATE | | |
| 1984 | " | 255 | 2,465 | 2,720 | 216 | 2,090 | 2,306 | 76 | 736 | 812 | 39 | 375 | 414 |
| 1985 | " | 1,434 | 8,278 | 9,712 | 1,307 | 7,542 | 8,349 | 508 | 2,645 | 3,153 | 127 | 736 e/ | 863 |
| 1986 | " | 7,018 | 23,403 | 30,421 | 5,796 | 20,454 | 25,250 | 1,461 | 7,083 | 8,544 | 1,222 | 2,949 | 4,171 |
| 1987 | " | 4,358 | 46,016 | 50,374 | 3,964 | 37,549 | 41,513 | 1,387 | 8,466 | 9,353 | 394 | 8,467 | 9,361 |
| 1988 | " | 720 | 61,972 | 62,692 | 618 | 53,234 | 53,852 | 377 | 13,905 | 14,282 | 102 | 8,738 | 8,840 |
| 1989 | " | 502 | 25,804 | 26,306 | 402 | 20,669 | 21,071 | 17 | 4,983 | 5,000 | 100 | 5,135 | 5,235 |

Footnotes:

a/ Spawning escapement is run-size estimates minus angler harvest, and includes fish that entered Trinity River Hatchery

b/ Except where indicated otherwise, the total number of spring chinook salmon and grilse and adults entering Trinity Ri Hatchery are Trinity River Project personnel estimates.

c/ Figures are from 1977-78 Trinity River Hatchery annual report prepared by hatchery personnel. Sizes separating grils and adults vary from those of the other estimates.

d/ Trinity River closed to sport salmon fishing on August 25. Spring chinook sport harvest limited to closure.

e/ Trinity River closed to the sport harvest of salmon >56cm TL from September 22 through December 31, limiting the harv of adult spring chinook.

EH/cw

ATTACHMENT 4

(to ATTACHMENT 3)

Trinity River Coho Salmon Run-Size, Angler Harvest and Spawner Escapements, 1977 through 1989.

| Year | Portion of Trinity basin covered by estimate | Run size estimate Grilse | Adults | Total | Spawner escapement estimate a/ Grilse | Adults | Total | Trinity River Hatchery count b/ Grilse | Adults | Total | Angler harvest estimates Grilse | Adults | Total |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1977 | Above Willow Creek | 3,106 | 752 | 3,858 | 2,986 | 723 | 3,709 | 1,230 c/ | 698 c/ | 1,928 c/ | 120 | 29 | 149 |
| | Above Junction City | NO ESTIMATE | | | NO ESTIMATE | | | 1,230 c/ | 698 c/ | 1,928 c/ | NO ESTIMATE | | |
| 1978 | Above Willow Creek | 6,685 | 2,447 | 9,132 | 6,685 | 2,447 | 9,132 | 2,376 | 1,279 | 3,655 | CLOSURE d/ | | |
| | Above Junction City | 5,324 | 2,036 | 7,360 | 5,324 | 2,036 | 7,360 | 2,376 | 1,279 | 3,655 | CLOSURE d/ | | |
| 1979 | Above Willow Creek | 9,067 | 2,557 | 11,624 | 3,360 | 2,437 | 10,797 | 2,793 | 742 | 3,535 | 707 | 120 | 828 |
| | Above Junction City | NO ESTIMATE | | | NO ESTIMATE | | | 2,793 | 742 | 3,535 | NO ESTIMATE | | |
| 1980 | Above Willow Creek | 2,499 | 3,595 | 6,094 | NO ESTIMATE | | | 1,545 | 1,778 | 3,323 | NO ESTIMATE e/ | | |
| | Above Junction City | NO ESTIMATE | | | NO ESTIMATE | | | 1,545 | 1,778 | 3,323 | NO ESTIMATE | | |
| 1981 | Above Willow Creek | 6,144 | 4,826 | 10,970 | 5,480 | 4,524 | 10,004 | 1,994 | 2,529 | 4,523 | 664 | 302 | 966 |
| | Above Junction City | NO ESTIMATE | | | NO ESTIMATE | | | 1,994 | 2,529 | 4,523 | NO ESTIMATE | | |
| 1982 | Above Willow Creek | 2,021 | 9,508 | 11,529 | 1,981 | 9,072 | 11,053 | 823 | 3,975 | 4,798 | 40 | 436 | 476 |
| | Above Junction City | NO ESTIMATE | | | NO ESTIMATE | | | 823 | 3,975 | 4,798 | NO ESTIMATE | | |
| 1983 | Above Willow Creek | 536 | 1,435 | 1,971 | 487 | 1,302 | 1,789 | 192 | 514 | 706 | 49 | 133 | 182 |
| | Above Junction City | NO ESTIMATE | | | NO ESTIMATE | | | 192 | 514 | 706 | NO ESTIMATE | | |
| 1984 | Above Willow Creek | 15,208 | 4,486 | 19,694 | 13,915 | 4,105 | 18,020 | 7,727 | 1,134 | 8,861 | 1,293 | 381 | 1,674 |
| | Above Junction City | 10,488 | 1,797 | 12,285 | NO ESTIMATE | | | 7,727 | 1,134 | 8,861 | NO ESTIMATE | | |
| 1985 | Above Willow Creek | 9,216 | 29,717 | 38,933 | 9,035 | 29,135 | 38,170 | 4,237 | 7,549 | 11,786 | 181 | 582 f/ | 763 |
| | Above Junction City | 8,064 | 14,398 | 22,462 | NO ESTIMATE | | | 4,237 | 7,549 | 11,786 | NO ESTIMATE | | |
| 1986 | Above Willow Creek | 18,909 | 9,063 | 27,972 | 18,436 | 8,836 | 27,272 | 5,402 | 2,589 | 7,991 | 473 | 227 | 700 |
| | Above Junction City | 13,168 | 6,312 | 19,480 | NO ESTIMATE | | | 5,402 | 2,589 | 7,991 | NO ESTIMATE | | |
| 1987 | Above Willow Creek | 7,253 | 51,826 | 59,079 | 6,840 | 48,871 | 55,711 | 2,865 | 20,473 | 23,338 | 413 | 2,955 | 3,368 |
| | Above Junction City | NO ESTIMATE | | | NO ESTIMATE | | | 2,865 | 20,473 | 23,338 | NO ESTIMATE | | |
| 1988 | Above Willow Creek | 2,731 | 36,173 | 38,904 | 2,593 | 34,350 | 36,943 | 743 | 12,073 | 12,816 | 138 | 1,323 | 1,461 |
| | Above Junction City | 1,529 | 24,841 | 26,370 | 1,466 | 24,002 | 25,468 | 743 | 12,073 | 12,816 | 63 | 839 | 902 |
| 1989 | Above Willow Creek | 290 | 18,462 | 18,752 | 285 | 18,167 | 18,452 | 77 | 4,893 | 4,970 | 5 | 295 | 300 |
| | Above Junction City | 196 | 12,429 | 12,625 | 195 | 12,354 | 12,549 | 77 | 4,893 | 4,970 | 1 | 75 | 76 |

(Footnotes are listed on the next page)

BH/cw

Trinity River Coho Salmon Run-Size, Angler Harvest and Spawner Escapements, 1977 through 1988. (Continued)

Footnotes:

a/ Spawning escapement is run size estimate minus angler harvest, and includes fish that entered Trinity River Hatchery.
b/ Except where noted otherwise, the number of grilse and adult coho salmon entering Trinity River Hatchery are Trinity River Project personnel estimates. All estimates of the total number of coho entering the hatchery are the same as estimates used by Trinity River Hatchery personnel.
c/ Figures are from 1977-78 Trinity River Hatchery annual report prepared by hatchery personnel. Sizes separating grilse and adults vary from those of the other estimates.
d/ Trinity River closed to sport salmon fishing on August 25. There was essentially no sport harvest of coho.
e/ Anglers returned no tags; hence, no harvest estimate was made.
f/ Trinity River closed to sport harvest of salmon ≥56cm TL from September 22 through December 31, severely limiting the harvest of adult coho.
g/ Angler harvest upstream of Junction City was estimated by multiplying the percentage of Willow Creek-tagged coho that were reportedly caught in the Trinity River upstream of Junction City by the run-size estimate upstream of Willow Creek.

BH/cw

ATTACHMENT 5

(to ATTACHMENT 3)

Trinity River Adult Steelhead Run-Size, Angler Harvest and Spawner Escapement Estimates, 1977-78 through 1989-90 Seasons. a/

| Season | Portion of Trinity basin covered by estimate | Run size estimate | | | Spawner escapement estimate | | | Trinity River Hatchery count b/ | | | Angler harvest estimate | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Hatchery | Wild | Total | Hatchery | Wild | Total | Hatchery | Wild | Total | Hatchery | Wild | Total |
| 1977-78 | Above Willow Creek | NO ESTIMATE | | | NO ESTIMATE | | | 269 c/ | 16c/ | 285 c/ | NO ESTIMATE | | |
| | Above Junction City | NO ESTIMATE | | | NO ESTIMATE | | | 269 c/ | 16c/ | 235 c/ | NO ESTIMATE | | |
| 1978-79 | Above Willow Creek | NO ESTIMATE | | | NO ESTIMATE | | | 628 | 55 | 683 | NO ESTIMATE | | |
| | Above Junction City | 3,965 | 6,469 | 10,434 | 3,687 | 4,658 | 8,345 | 628 | 55 | 683 | 278 | 1,811 | 2,089 |
| 1979-80 | Above Willow Creek | NO ESTIMATE | | | NO ESTIMATE | | | 329 | 53 | 382 | NO ESTIMATE | | |
| | Above Junction City | NO ESTIMATE | | | NO ESTIMATE | | | 329 | 53 | 382 | NO ESTIMATE | | |
| 1980-81 | Above Willow Creek | 8,449 | 16,645 | 25,094 | 7,004 | 14,564 | 21,568 | 1,903 | 102 | 2,005 | 1,445 | 2,081 | 3,526 |
| | Above Junction City | NO ESTIMATE | | | NO ESTIMATE | | | 1,903 | 102 | 2,005 | NO ESTIMATE | | |
| 1981-82 | Above Willow Creek | NO ESTIMATE | | | NO ESTIMATE | | | 892 | 112 | 1,004 | NO ESTIMATE | | |
| | Above Junction City | NO ESTIMATE | | | NO ESTIMATE | | | 892 | 112 | 1,004 | NO ESTIMATE | | |
| 1982-83 | Above Willow Creek | 2,106 | 8,426 | 10,532 | 1,505 | 6,968 | 8,573 | 634 | 79 | 713 | 501 | 1,458 | 1,95 |
| | Above Junction City | NO ESTIMATE | | | NO ESTIMATE | | | 634 | 79 | 713 | NO ESTIMATE | | |
| 1983-84 d/ | Above Willow Creek | | | 8,605 | | | 7,260 | | | 599 | | | 1,34 |
| | Above Junction City | NO ESTIMATE | | | NO ESTIMATE | | | | | 599 | NO ESTIMATE | | |
| 1984-85 e/ | Above Willow Creek | | | 7,833 | | | 6,572 | | | 142 | | | 1,26 |
| | Above Junction City | NO ESTIMATE | | | NO ESTIMATE | | | | | 142 | NO ESTIMATE | | |
| 1985-86 e/ | Above Willow Creek | NO ESTIMATE | | | NO ESTIMATE | | | | | 461 c/ | NO ESTIMATE | | |
| | Above Junction City | NO ESTIMATE | | | NO ESTIMATE | | | | | 461 | NO ESTIMATE | | |
| 1986-87 e/ | Above Willow Creek | NO ESTIMATE | | | NO ESTIMATE | | | | | 3,780 c/ | NO ESTIMATE | | |
| | Above Junction City | NO ESTIMATE | | | NO ESTIMATE | | | | | 3,780 | NO ESTIMATE | | |
| 1987-88 e/ | Above Willow Creek | NO ESTIMATE | | | NO ESTIMATE | | | | | 3,007 c/ | NO ESTIMATE | | |
| | Above Junction City | NO ESTIMATE | | | NO ESTIMATE | | | | | 3,007 | NO ESTIMATE | | |
| 1988-89 | Above Willow Creek | | | 12,743 | NO ESTIMATE | | | | | 817 | NO ESTIMATE | | |
| | Above Junction City | | | 7,907 | NO ESTIMATE | | | | | 817 | NO ESTIMATE | | |
| 1989-90 | Above Willow Creek | | | 37,276 | | | 33,698 | | | 4,765 | | | 3,5 |
| | Above Junction City | | | 13,574 | | | 11,361 | | | 4,765 | | | 2,2 |

(Footnotes are on Next Page)

Footnotes:

a/ Adult defined as ≥41cm FL.

b/ Hatchery counts included in run size and spawning escapement estimates.

c/ Figures from Trinity River Hatchery Annual Report.

d/ Approximately 52% of the steelhead released from Trinity River Hatchery in 1982 and all steelhead released in subsequent years were unmarked. Therefore, it is impossible to determine the origin of unmarked steelhead beginning with the 1983-84 season.

e/ No records of tagged steelhead recovered at Trinity River Hatchery.

BH/cw

South Fork Trinity River Salmon and Steelhead Counts and Population Estimates, 1963 Through 1990

| Year | Spring Chinook | Fall Chinook | Summer Steelhead | Fall Steelhead | Coho Salmon |
|---|---|---|---|---|---|
| 1963 | 7,000 a | nd b | nd | nd | nd |
| 1964 | 11,600 c | 3,300 c | nd | nd | nd |
| 1965 | few a | nd | nd | nd | nd |
| 1966 | few a | nd | nd | nd | nd |
| 1967 | few a | nd | nd | nd | nd |
| 1968 | few a | nd | nd | nd | nd |
| 1969 | few a | nd | nd | nd | nd |
| 1970 | 100 d | nd | nd | nd | nd |
| 1971 | 98 d | nd | nd | nd | nd |
| 1972 | 13 e | nd | nd | nd | nd |
| 1973 | nd | nd | nd | nd | nd |
| 1974 | 36 f | nd | nd | nd | nd |
| 1975 | 322 f | nd | nd | nd | nd |
| 1976 | 342 f | nd | nd | nd | nd |
| 1977 | nd | nd | nd | nd | nd |
| 1978 | nd | nd | nd | nd | nd |
| 1979 | 301 f | nd | 91 g | nd | nd |
| 1980 | 25 d | 249 c | nd | nd | nd |
| 1981 | nd | nd | nd | nd | nd |
| 1982 | 161 f | 230 c | 27 g | nd | nd |
| 1983 | nd | nd | nd | nd | nd |
| 1984 | 27 d | nd | nd | 55 h | 3 h |
| 1985 | 300 i | 2,239 c | 8 j | 206 h | 109 c |
| 1986 | 183 f | 2,189 c | 73 g | 386 h | 12 h |
| 1987 | 153 k | 470 c | nd | 245 h | 17 h |
| 1988 | 59 f | 412 c | 26 g | 228 h | 2 h |
| 1989 | 7 f | 500 c | 37 g | 3,122 c | 1 h |
| 1990 | 82 f | 450 l | 66 g | na m | 8 h |

a. California Department of Fish and Game (CDFG) estimate.
b. Not determined.
c. CDFG estimate (Petersen).
d. 40–70 % of holding area surveyed.
e. 20–40 % of holding area surveyed.
f. 90–100 % of holding area surveyed.
g. 70–100 % of holding area surveyed.
h. Partial season count at Sandy Bar weir (river mile 1.5).
i. Estimate based on index section expansion.
j. 25–49 % of holding area surveyed.
k. 70–90 % of holding area surveyed.
l. Preliminary CDFG estimate.
m. Fieldwork in progress, estimate not available.

ATTACHMENT 4

M E M O R A N D U M

To: Klamath Fishery Management Council

Date: January 4, 1991

From: Klamath River Technical Advisory Team

Subject: Report on Various Technical Issues

A. Genetic Stock Identification (GSI) as a Management Tool for Klamath River Chinook

The Team has reviewed a proposal for a GSI investigation made by California Department of Fish and Game (CDFG). The proposal, actually a program to establish a salmon genetics laboratory in California, discusses the potential uses of GSI in ocean fishery management and is attached for your review (Appendix A). While CDFG did not envision using GSI in management of Klamath River inriver fisheries, that potential may exist. A program has recently been initiated in a lower Columbia River net fishery, for instance, to identify stocks being impacted. The goal of that program is to limit impacts on stocks of concern while allowing harvest of abundant stocks.

In 1989, CDFG estimated the cost of a salmon genetics laboratory at about $300,000, the majority of which would be personnel and operating costs associated with monitoring the fisheries. Equipment costs were estimated at about $60,000.

B. Estimation of Age Composition of Klamath Fall Chinook Salmon by Scale Analysis

The methodology used to estimate the age composition of the fall chinook run into the Klamath Basin is based on in-river coded-wire tag (CWT) recoveries of Iron Gate and Trinity River hatchery fish. This methodology was adopted in 1988 when data analysis suggested that the prior methodology, scale analysis from U.S. Fish and Wildlife Service estuary beach seining, tended to overestimate the occurrence of older aged chinook in the run. At the time this methodology was reviewed, the Team concluded that biases in age composition estimates based on beach seining probably resulted from the inability of estuary beach seining to representatively sample the run, not from problems associated with ageing chinook from scales. The Team chose to use the CWT recovery methodology because it provided the best available alternative. Key assumptions implicit in applying this methodology to the natural component of the

run have not been validated. Differences in maturity rates between natural and hatchery stocks would bias results based on the CWT methodology.

The methodology employed in the Columbia River to estimate the age composition of lower river fall chinook stocks could possibly be used in the Klamath Basin to improve age composition estimates. This methodology is based on ageing fish in all recovery locations in the river (fishery landings, hatchery recoveries and natural spawning areas) and compiling returns by age to these areas as the total run of each age class. Estimates of chinook age composition for each recovery area are based on representative scale sampling at each site. In-river accounting in the lower Columbia River fall chinook run is analogous to that in the Klamath basin, in that returns to all major recovery areas are either directly counted or sampled. Thus, if representative scale collections could be obtained at all Klamath basin counting and sampling sites, an unbiased estimate of the age composition could potentially be obtained.

There may be some difficulty in obtaining representative scale collections from all sampling sites. In particular, obtaining representative samples from sampling sites in natural spawning areas may need to involve adjustments for differences in sampling efficiency among different age fish or different periods of the run. Additionally, because a scale ageing program would add to current work loads, resources required to sample and read scales need to be identified if this methodology is adopted for the Klamath basin. The Team would like further direction from the Council on how it should proceed on this matter.

C. Proposal to Fin Clip Hatchery Production

Costs of Marking Production at IGH and TRH

At the request of the Team, California Department of Fish and Game staff compiled information relating to the manpower and monetary costs of marking fish at Iron Gate Hatchery (IGH) and Trinity River Hatchery (TRH) with a single fin clip. At TRH, it would require approximately $26,000 for initial equipment with annual costs of $155,000. It would require about 80 personnel-months of time, mainly seasonal employees. At IGH, start-up costs were estimated at $17,000, with an annual cost of $260,000. About 135 personnel-months would be expended.

While annual costs would vary somewhat, depending on the actual number of fish available to be marked, segments of production would generally cost as follows at each facility:

| Production Segment | Facility IGH | Facility TRH |
|---|---|---|
| Fall chinook | $247,000 | $76,000 |
| Spring chinook | N/A | 38,000 |
| Coho | 3,000 | 15,000 |
| Steelhead | 10,000 | 26,000 |
| Total | 260,000 | 155,000 |

These estimates assume a local labor force is available and that no additional costs are involved in physical facilities (parking lots, restrooms, etc.) at either hatchery.

## Effects of Finclipping on Survival

Finclipping is widely used for marking many species of fish. In using this method, effects of fin clipping on survival must be considered. Mortality associated with finclipping may bias the interpretation of tag recovery data or reduce fishery production. Any proposal to identify Klamath basin hatchery fall chinook salmon by ventral fin clips needs to be evaluated in terms of the effect of this marking on survival and thus, contribution of these fish to fisheries and escapement. Any advantage of such a proposal relative to increasing harvest of hatchery fish needs to be weighed against potential reductions in hatchery production attributable to finclipping mortality.

Although not completely consistent, available data indicates that finclipping substantially reduces post-release survival of Pacific salmon (Table 1). Eight out of the 10 data sets reviewed suggest that finclipping causes substantial reductions in post-release survival of juveniles to adulthood. Estimates of the reduction in survival attributable to finclipping range from 16% to as high as 90%. For the two data sets that did not show any effect of finclips on survival (Stolte 1973, CDFG unpub.), low recovery rates (less than 1%) may have masked any survival differences.

Results from some of the data sets that were reviewed were difficult to interpret. The indirect manner in which survival between clipped and un-clipped survival was compared may have led to results that were influenced by fin regeneration, differential straying or counting errors. However, the overall consistency of the results clearly

Table 1. Estimates of the Mortality Rate[a] of Pacific Salmon Attributable to finclips.

| Reference | Species | Finclip[b] | Mortality rate (%) | Comments |
|---|---|---|---|---|
| Fry (1961) | sockeye | Ad-RV-LV | 58 | Results cited by Fry in summary article. Pre-release mortality rate unknown. |
| | pink | Misc. | 62-90 | |
| | chinook | Misc. | 83 | |
| Weber and Whale 1969) | sockeye | Ad-LM | 39 | Controlled experiment. Un-clipped fish identified by OTC marks. |
| Nicola & Cordone (1973) | rainbow trout | Ad | 50 | Maximum mortality rate estimates. Fish clipped as fingerlings. Survival estimated as relative catch of adults by angler in lake. |
| | | LV/RV | 60 | |
| | | RP/LP | 70-80 | |
| Stolte (1973) | coho | LV | 0 | Smolts released in New Hampshire. Poor survival of releases may have influenced mortality estimates. |
| Wahle & Vreeland (1978) | fall chinook | Ad-LM/RM | 39-62 | Indirect comparison of return rate of clipped and unclipped adults to Columbia River hatcheries over four brood years. Indicates average of 35% mortality caused by ventral clips. |
| | | Ad-LM-RM-LV/RV | 60-75 | |
| Schnute et al. (1990) | chinook/coho | Ad+CWT | 22 | Indirect comparison based on return rates of 17 groups of marked and unmarked fish. Results not corrected for biases associated with fin regeneration, counting errors or differential straying. |

Table 1. Estimates of the Mortality Rate[a] of Pacific Salmon Attributable to finclips (continued).

| Reference | Species | Finclip[b] | Mortality rate (%) | Comments |
|---|---|---|---|---|
| ODFW (unpublished data) | spring chinook | LV/RV<br>LV/RV-LM<br>RP/LP | 43<br>40<br>53-76 | Direct comparison based on ocean recovery of coded-wire tagged fin-clipped and control groups. Released in Rogue River over 4 brood years. |
| | spring chinook | LV/RV-LM/RM<br>LP/RP | 23-51<br>56-62 | Indirect comparison based on inriver recoveries of fin-clipped and Ad+CWT control groups. Released in Deschuttes River over 3 brood years. |
| CDFG (unpublished data) | fall chinook | LV | 0 | Indirect comparison based on hatchery return of age 2 jacks. Control groups were Ad+CWT. Fish released as fingerlings from Iron Gate and Trinity hatcheries over 3 brood years. |
| Washington Dept. of Fisheries (Personal Communication) | coho | Ad+CWT | 16-20 | Phone conversation with Lee Blankenship on 11 Dec 90. Mortality rates are range of "ballpark" estimates from informal observations. |

[a] Except where noted otherwise estimates are for mortality occurring after release.
[b] Ad = adipose, LM = left maxillary, RM = right maxillary, LV = left ventral, RV = right ventral, LP = left pectoral, RP = right pectoral, CWT = coded-wire tag.

indicate that one should expect reductions in survival due to finclipping. Generally, finclipping programs for salmon should anticipate survival reductions as follows: adipose fin, 10-20%; single ventral fin, 20-50%; and single pectoral fin, 50-80%. If 100% of the Klamath hatchery fall chinook production is to be marked with a single ventral fin clip an average 30% reduction in survival should be anticipated.

## Fishery Strategy for Fin-clipped Klamath Fall Chinook

The Team has analyzed a harvest strategy for marked Klamath hatchery fall chinook whereby marked fish would be released in ocean fisheries and retained in river fisheries. The model developed to analyze this strategy is described in Appendix B. The model assumes certain distributions of Klamath fall chinook in ocean fisheries (those observed in 1986 and 1989) as well as life history and fisheries impacts as used by the Harvest Rate Model (KRTAT, 1986).

The results of the modeling are detailed in Appendix B, Tables B-1 through B-4. In general, it can be said that such a strategy would:

1) increase the total ocean commercial landings,
2) decrease the ocean sport landings,
3) increase shaker mortality, and
4) decrease the river fishery landings except in the highest abundance years.

## Harvest Strategy for Spring Chinook Produced at Trinity River Hatchery

The Team has investigated the opportunity to increase harvest on hatchery spring chinook in river fisheries if they were recognizable from naturally produced fish. For this analysis an adipose mark was selected since mortality from marking is low (15%). No attempt was made to alter ocean fishery impacts on spring chinook stocks. The details, assumptions and potential harvests based on 1982-1987 population sizes are fully described in Appendix C. It is pointed out in the analysis that a program to mark spring chinook from Trinity River Hatchery would decrease the number returning as adults and, in all but the highest abundance years (1986 and 1987), there are limited opportunities for additional harvest if the hatchery goal of 3,000 spawners is considered.

## Potential Study Uses for a Salmon Marking Program in the Klamath River System

The Team reviewed and discussed the uses of a marking program for hatchery chinook salmon (and steelhead) in the Klamath River system other than those directed at harvest. The following uses were identified by the Team and discussions occurred relating to the need for external or internal markings.

Discussion of study issues included:

1. Distribution of adult hatchery fish in natural spawning areas--

   The major concern of this study issue is straying. The number of hatchery fish populating natural spawning areas may have a genetic mixing effect or a physical displacement effect upon wild stocks.

2. Verification of production multiplier method currently used in cohort reconstruction--

   The main purpose for this issue would be to improve accuracy of the present production multiplier. Theoretically, if every hatchery salmon was marked, the production multiplier would have 100% accuracy for the model. The natural vs. hatchery fish ratio of the basin could be determined in any given year. The survival effects of marking fish could be estimated accurately. It is presently assumed in the model that marking does not affect survival.

3. Hatchery vs. natural fish interactions during juvenile migration--

   This study issue would involve the determination of juvenile migration patterns of hatchery and natural smolts. Information on outmigration timing, growth parameters, and spacial competition would be available.

4. Ocean harvest distribution--

   The overall effect of this study issue would be an improvement in precision of the distribution patterns. This may become important if management schemes develop into small harvest cells, or specific quota areas.

5. Comparison of run timing and age composition in river harvest--

   The separation of distinct genetic stocks and hatchery/wild stocks is an important part of inriver management. There is some belief that the present marking and sampling techniques are biasing the true age composition data for natural spawning chinook. This study issue may provide some improved age composition and run timing information.

6. Evaluation of hatchery practices--

   The improvement of hatchery practices may be a key to future chinook resource management in the Klamath basin. This study issue could provide information on proper smolt release time, release densities, improved diets, marking survival, and increased straying.

External marking

External marks generally involve some type of fin clipping (single or multiple fins). Other external marks can include jaw bone clips (maxillary), freeze brands, external dyes, and spaghetti or disc tags.

Most external marks result in a long-term higher mortality rate for fish. Some of the marking methods (dyes and freeze brands) do not last from the juvenile to adult stages. Coded wire tags (CWT's) are an internal tag accompanied with an external fin clip (Adipose fin).

When marking millions of juvenile fish, external marks are costly and time consuming to apply. However, the visual observation of adult and juvenile samples is easy and frequently more cost effective.

Internal marking

Although the coded-wire tag (CWT) is an internal tag, it is always accompanied by an external adipose fin clip. Other methods of internal marking include tetracycline (food additive), barium dyes, rare earth element marking of boxes or scales, pit tags, radio tagging, and experimental organ stains. Tetracycline shows up an rings in bone and otolith growth and is easily applied in diets during juvenile growth stages. It is a cheap marking method that creates almost no mortalities. However, detection of adult returns can be difficult, time consuming and expensive.

Pit tags (small numbered discs placed in a juvenile fish's eye socket) and radio tagging are expensive to apply to large numbers of fish. Organ staining is in the experimental stages. The recovery of internaly marked fish is usually possible only at their terminal life stage (spawning or catch). Internal marks do not work for catch and release programs.

Study issues and mark types recommended for consideration are:

| Study issue | Mark type | | All fish marked | Fractional marking |
|---|---|---|---|---|
| | External | Internal | | |
| 1. Distribution of adult hatchery fish in natural spawning areas | X | | | X |
| 2. Verification of production multiplier method used in cohort reconstruction | X | X | X | |
| 3. Hatchery vs. natural fish interactions during juvenile migration | X | | X | |
| 4. Ocean harvest distribution | X | X | | X |
| 5. Comparison of run timing and age composition in river harvest | X | X | X | |
| 6. Evaluation of hatchery practices | X | X | | X |

D. Natural Spawning Escapement Estimates and Goals for Fall Chinook in the Trinity River

The Council asked the Team to document the available information on spawning escapements for fall chinook in the Trinity River basin and to discuss the various escapement goals that have been developed. Moffett and Smith (1950) estimated that the annual catch of Trinity River salmon (primarily fall chinook) averaged 762,000 pounds (about 76,000 fish) for the period of 1928 to 1943. These workers performed the first direct counts of salmon in the river in the 1940's, as part of the preliminary studies for a planned dam above Lewiston, at river mile (RM) 109.

## Escapement Estimates

Frederikson and Kamine (1980) have assembled estimates of spawning escapement in the Trinity River from 1944 through 1978. The validity of the data varies from informed guesses to carcass surveys to mark and recapture estimates. The area above Lewiston shows a wide range of estimates (846-39,000). The mitigation goal for fall chinook above Lewiston was set by the California Department of Fish and Game (CDFG) at 9,000 adults. For the purposes of this report the river downstream of Lewiston is of primary interest. For the most part the spawning surveys were conducted between the North Fork and Lewiston (40 river miles). The data includes grilse, but spawner surveys generally underestimate numbers of grilse. For example, a spawner survey of the upper Trinity in 1987 recovered 5.8% grilse, while the hatchery recovery rate was 20% (Stemple, 1988).

The data also includes spring-run salmon, but prior to the operation of the hatchery, this area of the river had little spring run spawning. The hatchery-supported spring run becomes significant after 1962. From that year through 1976, the spring race made up 11-70% of the fish trapped at the hatchery annually.

Two intensive escapement estimates for fall chinook spawning from the North Fork to Lewiston prior to completion of the dam in 1962 are the mark-and-recapture surveys done in 1955 (Gibbs, 1956) and 1956 (Weber, 1965). The estimate of Gibbs ranged from 14,550 to 26,570 for the river between the North Fork and Lewiston. Weber's estimate for the same reach was 28,200. Post-dam estimates, based on five intensive carcass surveys between 1963 and 1971 ranged from 72,500 in 1963 (LaFaunce, 1965) to 45,900 in 1969 (Smith, 1970). Only the 1963 survey included the South Fork, where the fall-run escapement was estimated to be 3,500 by LaFaunce (1967) for a total river escapement of 76,000. This estimate was the highest of record and may be a good estimate of the capacity of the natural habitat prior to the major habitat changes that have subsequently occurred as a result of large scale sediment deposition, primarily in the 40-mile reach downstream of Lewiston (USFWS, 1983). Bedell (personal communication) believes that the 1963 fall run did not include significant production from the river above Lewiston, because of construction activities beginning in 1959.

The modern era of escapement estimates for adult fall chinook began in 1978, when fish were tagged at Willow Creek (above

RM 30) with recoveries from the hatchery, carcasses, and sport angling. Escapements for naturally spawning and hatchery fall chinook are summarized as follows:

| Year | Natural | Hatchery |
|---|---|---|
| 1978 | 31,000 | 6,000 |
| 1979 | 8,000 | 1,300 |
| 1980 | 7,700 | 4,100 |
| 1981 | 15,300 | 2,400 |
| 1982 | 9,300 | 2,100 |
| 1983 | 17,300 | 5,500 |
| 1984 | 5,700 | 2,200 |
| 1985 | 9,200 | 2,600 |
| 1986 | 93,500 | 15,800 |
| 1987 | 71,900 | 14,000 |
| 1988 | 44,600 | 17,400 |
| 1989 | 29,400 | 11,100 |
| 1990 | 7,300 | 1,350 |

In 1986 and 1987 the Trinity River comprised 64 and 70%, respectively, of the adult, naturally spawning fall chinook in the entire Klamath basin. The term "naturally spawning" refers to any fish spawning naturally regardless of the origin of that fish. In 1987 Stempel (1988) compared adipose fin-clip rates at the hatchery with natural spawners in the river above the North Fork (RM 71) and concluded that 59% of the natural spawners were of hatchery origin. As would be expected, the density of spawners was highest immediately below the hatchery; 9,800 spawners/mile as opposed to 155/mile below Junction City (RM 85). Stempel reported that CDFG estimated as much as 80% of total Trinity River fall chinook escapement in 1987 was first generation hatchery fish. It is apparent that the hatchery production was driving the Trinity River production and the large escapements did not reflect the inherent capacity of the habitat.

Escapement goals

Several escapement goals for the Tirnity River have been developed. Those which merit discussion are listed below:

| Area | Number | Reference |
|---|---|---|
| Willow Creek-Lewiston | 62,000 | Trinity Basin Program EIS (1983) |
| Willow Creek-Lewiston | 43,190 | CDFG (1965, 1978) |
| North Fork-Lewiston | 41,000 | USFWS (1980) |
| Mouth-Lewiston | 45,000 | Adair (1981) |
| Trinity River Basin | 19,490-25,040 | Hubbell and Boydstun (1985) |

In 1978, CDFG (1982) adopted a fall-chinook, spawner-escapement goal for the entire Klamath basin of 115,000. The naturally-spawning component of this goal for the Trinity River was 43,190. CDFG stated that the data source was from Department personnel familiar with the river basin. The Environmental Impact Statement for Trinity River Flow Management (1980), using a variety of sources, established a pre-dam spawning escapement goal, from the North Fork to Lewiston, of 41,000. In contrast the post-dam escapement was estimated to be only 32,100 fall chinook.

Adair (1981) used estimates from the 1966 California Fish and Wildlife Plan (CFW) to derive his recommendation for a goal of 45,000 natural fall chinook in the Trinity basin. The CFW plan is not generally accepted as a reliable data source. The EIS for the Trinity basin fish and wildlife management program (USFWS, 1983) lists the North Fork to Lewiston goal as 62,000 natural fall chinook, based upon unpublished CDFG information. This is the only goal that attempts to scale the goal to fully restored habitat conditions in the basin.

In 1985, CDFG estimated the optimum spawning capacity for fall-run chinook of the Klamath basin and all major tributaries, including the Trinity River. Table 1 from that report (Hubbell and Boydstun, 1985) is attached as Appendix D. All CDFG biologists familiar with the habitat and escapement surveys in the basin were asked to make estimates of the optimum spawning capacity for the streams and river reaches listed. Theoretically this estimate considers only the current, not the restored, condition of the spawning and rearing habitat. The range for fall chinook in the Trinity basin is 19,490 to 25,040. This estimate can best be characterized as an informed opinion by biologists working the basin, but it is unique in that it attempts to assess the capacity of the habitat. It should be noted that one of the major considerations in development of the harvest-rate management program for fall chinook in the Klamath system was the inability to estimate Beta, the basin carrying capacity in the spawner-recruit model of Ricker (1975).

Conclusion

The escapement estimates for fall chinook made prior to completion of Trinity and Lewiston dams in 1962 have little relevance to the capacity of the existing habitat. The diversion of over 1 million acre-feet of Trinity River flow annually has caused an estimated 80-90% reduction of habitat from the North Fork to Lewiston (USFWS, 1983). The Trinity River restoration program is now in the fifth year and the goal is to restore full natural anadromous fish production in the Trinity basin, downstream of Lewiston. The goal for

artificial propagation is limited to compensation for the habitat lost above the dams (9,000 fall chinook). It would seem appropriate that any long-term escapement goal for the Trinity River must consider the habitat restoration potential. Theoretically, if habitat is restored to pre-project condition the early estimates could be used to establish an escapement goal. This was probably best done by the 62,000 goal of the USFWS (1983), discussed above.

For many years the habitat restoration efforts in the upper river were directed to spawning habitat, but recent USFWS studies of available habitat indicate that the limiting factor for juvenile chinook production is very likely a lack of low velocity rearing habitat (USFWS, 1987). A major program to increase this type of habitat is currently being implemented, but potential sites are limited.

E. Preseason Projections for 1991 Fisheries

The Team has scheduled a meeting for February 5 and 6, 1991 in Rancho Cordova to complete assignments relating to fishery regulation in 1991. The Team will make recommendations on;

1. Klamath fall chinook ocean population size.
2. Allowable ocean/river allocation combinations and catch levels.
3. Klamath Ocean Harvest Model (KOHM) calibration parameters.

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Appendix A

DEPARTMENT OF FISH AND GAME
BUDGET CHANGE PROPOSAL
Fiscal Year 1989-90

Salmon Genetics Laboratory

Problem

The Klamath River in northwestern California is a major producer of king (chinook) salmon. The fish are harvested as adults in ocean and inriver fisheries. Non-Indian commercial and recreational fisheries operating in the ocean off northern California and southern Oregon have a major impact on the resource. Indian and non-Indian fisheries impact the resource in the river. The Indian fisheries harvest the fish for subsistence and commercial purposes while the inriver non-Indian fishery operates for recreational purposes. Overharvest of the resource has occurred in recent years, stemming from the lack of a resource sharing agreement between ocean and inriver users. Since 1986, harvest-sharing agreements have been negotiated under the auspices of the Klamath Fishery Management Council, and its predecessor council.

A major problem persists in the management of ocean salmon fisheries to achieve an allocated harvest level of a particular stock of salmon, such as Klamath River king salmon. The problem stems from the highly variable mixing and relative abundances of salmon stocks in ocean fishery catches. While pre-season agreements have been reached on the number of Klamath River salmon that can be safely harvested in the ocean fisheries, no reliable in-season means of measuring the actual harvest level of the stock has been in place. (All harvest level estimates have been made based on preseason expectations; applying a large number of assumptions about stock abundance, harvest rates by fishing area and fishery, and relative abundances of the other salmon stocks that mix in the ocean with Klamath River salmon).

The rate of contribution of individual salmon stocks to the ocean fisheries has been a continuing concern of Pacific coast salmon managers. Such information is needed to evaluate in-river salmon management efforts in streams where spawning escapement estimates have not been possible. The information could also be important in determining ocean migration patterns and the effectiveness of ocean fishery regulatory regimes.

A technology has been developed in the past ten years to estimate the contribution of salmon stocks from individual rivers to ocean fishery catches. The technique, commonly referred to as the Genetic Stock Identification (GSI) technique, relies on differences in protein sample patterns between stocks of salmon from the different river systems. The strong "homing" instinct of salmon to

their streams of origin has affected the evolution of unique genetic patterns among individual salmon stocks. These patterns can be measured in the laboratory using standard gel electrophoreses. Specific protein samples taken from salmon of different river systems can be differentiated as to their probable river of origin using a "maximum likelihood estimator"--a mathematical procedure. Baseline protein sample data have been collected on Pacific Coast chinook salmon stocks with which mixed ocean fishery samples can be analyzed. The technology exists, therefore, to produce "real time" or "inseason" as well as "postseason" estimates of Klamath River salmon landings in the ocean fisheries, rather than to rely on preseason estimates or expectations under the adopted ocean fishing regulations.

The need for inseason estimates of Klamath River salmon contribution to ocean landings has been repeatedly voiced by the various federal and state entities responsible for the management of California (and Oregon) salmon fisheries. Special equipment and expertise are required to apply GSI technology. Additional man-power and facilities are required to collect, process and analyze inseason, and additional protein baseline data. Contribution rates of salmon from rivers such as the Eel, Smith and Mad rivers have been a major concern and may be possible to answer with the GSI technique.

At stake in the proper management of California ocean and inriver salmon fisheries are millions of dollars worth of fish to the State's economy, recreational opportunity for thousands of citizens; and the social, subsistence and religious needs of the Indians of the Klamath and Trinity rivers.

Interest in the GSI technology and its use in California salmon management was manifest in the passage in 1986 of AB 1727 (Hauser). This legislation directs the department to assess the contributions of various salmon stocks to the ocean fisheries (Section 1000.6[b], Fish and Game Code). Subsequent to the passage of this legislation was the award of a multi-year contract to U.C. Davis to evaluate the GSI technique. Results from the U.C. Davis contract have been supportive of the technique and its use in inseason management and post season evaluation of the ocean salmon fisheries (report attached).

Fishery management objectives and responsibilities are directed under the Federal Magnuson and Bosco acts (PL 94-265 and PL 99-552). Both acts provide for Department participation in the development of ocean salmon fishery regulations aimed at meeting allocation and conservation goals. Attainment of allocation goals is a primary objective of the current proposal.

The staffing request in this proposal was based on input solicited from the Washington Department of Fisheries, which has a GSI laboratory. The request includes a full-time genetist, a full-time

technician and six months of temporary help. The genetist analyzes the data and prepares project reports; the temporary help collects the field samples (5,000-7,000 adults and 1,000-1,500 juveniles annually); and the technician prepares the protein gels and reads them. The Department is requesting $179,262, $89,631 from the Fish and Game Preservation Fund-Commerical Salmon Trollers Account and $89,631 from Dingell-Johnson/Wallop-Breaux.

Reasons Why Proposal is Not Being Met with Current Levels

Special expertise is required to implement this program. No geneticist is currently on department staff. Fishery biologists generally are not sufficiently trained in the use of protein analysis techniques. A specially-trained technician is needed to read the protein gels. Other Ocean Salmon Project staff are being fully utilized to sample the ocean salmon fisheries for species and marked fish landings.

Analysis of Alternative Means of Solving Problem

1) Contracting externally -- Special expertise is required to "read" chinook salmon protein gel samples; plus, many of the "recipes" currently in use on the Pacific Coast are not familiar to commercial laboratories. Turnaround time for inseason ocean fishery samples would be given top priority in a department lab, but possibly not in a commercial lab. Reprioritization of ocean samples by a commercial lab would defeat the purpose of the proposal. Changes in commercial lab personnel would require considerable retraining time and effort, and could frequently be expected.

2) No change. The current procedure of determining allowable ocean fishery catch levels of Klamath River salmon requires numerous assumptions about the fish and the fisheries. Deviations averaging 50 percent between pre-season estimates of allowable catch and post-season estimates of actual allowable catch can be expected. This amounts to possible losses to the state's economy of millions of dollars. It also threatens overfishing and reduced salmon production three and four years later.

3) Establish a salmon GSI Laboratory. This would establish a specialized salmon genetics staff within the department. It would allow for inseason and postseason estimation of salmon landings in the ocean fisheries by salmon stock grouping, including Klamath River chinook salmon. It would better insure that the ocean fisheries exactly meet their pre-season allocations of specific salmon stocks. The approach could also reduce the political controversy surrounding ocean salmon management each year.

Recommendation

Recommend alternative 3 -- Establish a salmon GSI laboratory within the department. This alternative was selected because of improved cost efficiency and effectiveness over alternative 1); alternative 2) was rejected because of the potentially large fishery losses that may occur basing fishery landings on pre-season assumptions about the fish and the fisheries, the current procedure. Alternative 3 will allow the Department to use state-of-the-art procedures and apply them to the management of salmon resources.

Implementation

May-June, 1989: Interview for full-time positions; acquire or lease laboratory facilities to begin July 1, 1989.

July 1989-March 1990: Hire staff; organize lab; begin baseline sampling of juvenile populations.

April-September 1990: Sample and analyze ocean fishery samples.

Explanation of Operating Budget

A general expense operating budget of about $7,800 will be spent on such items as office supplies and purchase of biological specimens from commercial salmon fishermen. Salmon heads containing CWTs run about $3.00 each and the purchase of 100 heads per year can be expected. Field sampling supplies will include measuring boards, ice chests, weighing scales, forcepts and scale envelopes. Lab glassware will run about $1,000 (flasks, beakers, test tubes, cylinders).

The cummunications item ($1,500) will cover a monthly phone bill of around $100.00, mostly in long distance calls to labs in other states and Canada.

The in-state travel budget ($4,000) will cover about 40 field days to conduct fishery sampling and collection of juvenile salmon. The field work will be intense from April through August for the two permanent personnel and one or two seasonal aides.

Out-of-State travel ($1,000) will provide for two trips by the project geneticist, to GSI labs in Washington, Canada or Alaska.

The training budget ($2,000) will enable project personnel to participate in technical workshops in statistics and fishery sampling techniques. Several such sessions are offered each year and project personnel are expected to attend three each.

Laboratory and office space rental is expected to run about 400/month (600 square feet at $0.67 per foot). The utilities budget (about $170 per month) will cover lights, temperature control and waste disposal. A wide variety of specialized chemicals ($5,800) are used in GSI work. A listing is attached.

Considerable vehicle travel is expected in collecting samples from coastal ports between Monterey and Crescent City and in inland salmon waters north of Fresno. Two vehicles will be needed during the busy season and are expected to be driven about 1,500 miles each during the months of April through August (15,000 miles total). The remaining 5,000 miles will be driven during off-season months. This budget item was computed at 20.5 cents per mile (19,500 miles total).

The equipment budget of $60,250 will cover the purchase of two ultra-freezers, a refrigerator, four centrifuges, balancing scales, an incubator, cooling systems for gells, a mixer, ice machine, pH meter, a stove and a computer system (full listing attached).

Funding Source

Fish and Game support and Dingell-Johnson funds have been identifie for project funding. The other possible funding source, Anadromous Fish Act, has been greatly reduced in recent years and is needed to fund the Ocean Salmon Project's commercial fishery sampling program.

## Proposed Budget - Fisheries Genetics Laboratory

| | (PY's) | Dollars | |
|---|---|---|---|
| **Personnel** | | | |
| 1 - Fish and Wildlife Geneticist | (1.0) | 42,742 | (bottom) |
| 2 - Laboratory Assistants | (2.0) | 42,740 | (top) |
| Temporary help | (2.6) 1/ | 30,247 | 1/ |
| | Subtotal | 115,729 | |
| Employee benefits (.286) | | 24,448 | |
| | | 140,177 | |
| **Operating** | | | |
| General | | 7,800 | |
| Communications | | 1,500 | |
| Postage | | 500 | |
| Travel, in-State | | 4,000 | |
| Travel, out-of-State | | 2,000 | |
| Printing | | 2,000 | |
| Facilities Operations | | 5,000 | |
| Training | | 2,000 | |
| Contracts (ODFW) | | 9,000 | |
| Chemicals | | 5,800 | |
| Vehicle Operations | | 4,000 | |
| | | 43,600 | |
| Equipment | | 60,250 | |
| Overhead (.234) | | 57,102 | |
| | | 301,129 | |

1/ From DFG/U.C.Davis 88-89 Contract proposal.

# Equipment Listing
## Salmon Genetics Laboratory

| | | |
|---|---|---|
| Freezer (-80C, Forma Scientific) | 2 @ 5,500 | $ 11,000 |
| Refrigerator/freezer | | 800 |
| Centrifuges (B5060-1-Sarc-Fuge) | 4 @ 600 | 2,400 |
| Heathkit Power Unit (SP17A) | 12 @ 500 | 6,000 |
| Balance for starch | | 1,500 |
| Balance for chemicals | | 1,200 |
| Incubator for staining gels | | 800 |
| Cooling system for gels | | 2,500 |
| Ice machine | | 1,200 |
| Vortex mixer | | 1,500 |
| pH meter | | 600 |
| Camera and photo stand | | 750 |
| Microscope w/ lenses | | 15,000 |
| Computer - personnel with accesssories | | 15,000 |
| | | $ 60,250 |

| SIGMA CAT # | ITEM | SIGMA |
|---|---|---|
| A7251 | cis-aconitic acid | $ 37.85 /5g |
| A2002 | adenosine 5' monophosphate | 3.00 /g |
| A7644 | adenosine 5' triphosphate | 8.00 /g |
| A6253 | aldolase | 21.00 /100mg |
| A9028 | N-(3-aminopropyl) morpholine | 33.45 /500ml |
| B0630 | brilliant blue R | 37.75 /100g |
| D3252 | O-dianisidine di HCl | 12.10 /5g |
| D1878 | 2,6 dichlorophenol-indophenol | 3.75 /g |
| F0250 | fast blue BB | 5.40 /25g |
| F0500 | fast blue RR | 7.95 /25g |
| F6504 | fast garnet GBC | 8.75 /g |
| F3627 | D-fructose-6-phosphate | 15.75 /g |
| 752-1 | fructose-1, 6-diphosphate | 27.00 /5g |
| G1259 | D-glucose-1-phosphate | 24.60 /5g |
| G7879 | D-glucose-6-phosphate | 11.00 /g |
| G7877 | glucose-6-phosphate dehydrogenase | 43.80 /1000u |
| G7878 | glucose-6-phosphate dehydrogenase | 41.90 /1000u |
| G2626 | L-glutamic dehydrogenase | 117.60 /g |
| G4501 | glutathione | 25.20 /g |
| G0763 | glyceraldehyde-3-phosphate dehydrogenase | 41.00 /25000u |
| G6751 | α-glycerophosphate dehydrogenase | 72.80 /5000u |
| G2138 | DL-α-glycerophosphate | 17.20 /25g |
| G2002 | glycyl-L-leucine | 20.00 /5g |
| H5625 | hexokinase | 20.25 /2500u |
| H9377 | hypoxanthine | 6.05 /5g |
| I0879 | inosine-5'-triphosphate | 29.90 /g |
| I1252 | DL-isocitric acid | 27.50 /5g |
| I8377 | p-iodonitrotetrazolium violet | 34.55 /g |
| I5882 | isocitric dehydrogenase | 28.75 /1000u |
| K1750 | α-Ketoglutaric acid | 17.20 /100g |
| L1254 | lactic dehydrogenase | 43.70 /25000u |
| L4127 | DL-leucylglycylglycine | 24.25 /g |
| L9250 | L-leucyl-L-alanine | 19.70 /g |
| L8753 | L-leucyl-L-proline | 28.80 /250g |
| L0501 | L-leucyl-L-tyrosine | 21.50 /g |
| 410-13 | malic dehydrogenase | 30.50 /25000u |
| M8754 | D-mannose-6-phosphate | 61.00 /g |
| M0883 | 4-methylumbelliferyl acetate | 3.00 /g |
| M8883 | 4-methylumbelliferyl phosphate | 25.20 /g |
| M7633 | 4-methylumbelliferyl α-D-galactoside | 45.35 /100mg |
| M1633 | 4-methylumbelliferyl β-D-galactoside | 13.90 /g |
| M9766 | 4-methylumbelliferyl α-D-glucoside | 163.35 /100mg |
| M3633 | 4-methylumbelliferyl β-D-glucoside | 4.15 /g |
| M4383 | 4-methylumbelliferyl α-D-mannopyranoside | 48.30 /100mg |
| M6250 | 2-mercaptoethanol | 5.95 /100ml |
| M2128 | MTT | 22.00 /g |

| SIGMA CAT # | ITEM | SIGMA |
|---|---|---|
| N8505 | α-naphthyl acetate | $ 9.00 /25g |
| N0376 | α-napnthyl propionate | 19.80 /10g |
| N7004 | β-nicotinamide adenine dinucleotide | 68.25 /5g |
| N8129 | β-nicotinamide adenine dinucleotide reduced form | 30.45 /g |
| N0505 | β-nicotinamide adenine denucleotide phosphate | 415.00 /5g |
| N1630 | β-nicotinamide adenine dinucleotide phosphate reduced form | 166.00 /500mg |
| N1875 | naphthol AS BI-β-D-glucosaminide | 45.75 /100mg |
| N4006 | naphthol AS BI-N-acetyl-β-D-glucosaminide | 18.20 /100mg |
| N3003 | nucleoside phosphorylase | 103.95 /10mg |
| P8125 | peroxidase | 28.35 /50000u |
| P9625 | phenazine methosulfate | 22.75 /5g |
| P7627 | 6-phosphogluconic acid | 53.15 /g |
| P9010 | phosphoglucose isomerase | 11.80 /1000u |
| P6502 | phosphocreatine | 19.50 /5g |
| P7252 | phospho(enol) pyruvate | 27.25 /g |
| P6757 | PIPES | 30.45 /100g |
| P5381 | phosphoglucose isomerase | 32.75 /5000u |
| P0769 | D(-)3-phosphoglyceric acid | 27.80 /5g |
| P6528 | L-phenylanalyl-L-proline | 34.50 /g |
| P3876 | " " "-leucine | 19.60 /g |
| P1381 | pyruvate kinase | 11.35 /10000u |
| P9255 | pyridoxal-5'-phosphate | 6.45 /g |
| T2507 | triosephosphate isomerase | 21.75 /5mg |
| T1378 | Tris (Sigma 7-9) | 80.30 /5kg |
| V7000 | venom, snake | 32.45 /500mg |
| X4875 | xanthine oxidase | $ 27.55 /40u |

## Appendix B

Evaluation of population and fishery impacts of marking all Klamath hatchery fall chinook and releasing hatchery fish caught in the ocean fisheries.

The proposal evaluated here entails marking all hatchery fall chinook from the Klamath basin with an external mark that would be readily recognizable and unique to Klamath basin hatchery fish. When these marked fish were subsequently caught in the ocean fisheries, they would be released. River fisheries would then target exclusively on hatchery fish. This would allow ocean fisheries to increase harvest rates on natural Klamath stocks and other stocks from the Central Valley and the north coast while, in theory, still providing fish for the river fisheries.

This proposal was evaluated using spreadsheets written in Lotus 123 release 2. The model was based on 5 port areas, or cells: Northern Oregon (NOR), Coos Bay (CSB), Klamath Management Zone (KMZ), Fort Bragg (FTB), and Southern California (SOC). Calculations were made for five time periods (Fall, May, June, July, and August) for both commercial and sport ocean troll fisheries. The model uses six separate salmon stocks: Klamath natural 3-yr-olds, Klamath hatchery 3-yr-olds, Klamath natural 4-yr-olds, Klamath hatchery 4-yr-olds, Central Valley stocks, and North Coast stocks. Each stock has its own, user specified, initial abundance, initial distribution, and maturity rate, natural mortality rate, and vulnerability to the commercial and sport fisheries.

Assumptions of the model include:

1. No movement of fish between cells. Each cell effectively has a separate population that is determined by the initial size and distribution of the six component stocks. During the course of the fishing season, each population is only affected by fishing mortality, shaker mortality, and natural mortality within that cell and not by movement of fish into or out of that cell. Such movement certainly occurs, but we lack the data to quantify it, including movement would require a much more complex model, and it is doubtful that including movement would substantially alter the results.

2. Shaker mortality rate is assumed to be the same for legal and sublegal fish in both the commercial and sport fisheries.

3. Klamath natural escapement goal is calculated as 33.5% of the run that would occur if there were no fishing.

4. Fishing effort in each cell is scaled by the size of the cell. Cell size is roughly the number of degrees of latitude assigned to each cell (SOC = 3, FTB = 1, KMZ = 3, CSB = 1, NOR = 2). This means that the fraction of the population that a fisherman can encounter in one day of fishing is 3 times larger in FTB than in SOC because in SOC the population is spread out over 3 time the area.

5. Catchability is assumed to be constant coastwide for the commercial fleet. This means that a commercial fisherman in Coos Bay is just as effective at catching fish as a commercial fisherman in Monterey.

6. The ratio of natural fish to hatchery fish in the Klamath basin was assumed to be 2:1.

7. Hatchery escapement goal was set at 40,000 adult spawners. This effectively assumes that the river fisheries are non-lethal and can harvest hatchery fish with no incidental mortality on natural fish, but that approximately 1/2 of the hatchery fish will wind up spawning elsewhere.

8. There is either no delayed mortality from the marks used to identify Klamath basin hatchery fish or a delayed mortality of 20% is assumed.

Calculations

In each cell, each time period, for each stock, the survival of fish is calculated as:

(1) $N_{t+1} = N_t \exp(- Z_t)$

where $N_t$ is number of fish in that cell at the beginning of time period t, and Z is the total mortality rate of that stock in that cell. Total mortality rate is

$$Z = (F_s + F_c + S + M)$$

where $F_s$ is sport fishing mortality rate, $F_c$ is commercial fishing mortality rate, S is shaker mortality rate, and M is natural mortality rate. Commercial catch is then calculated by

(2) $C_c = (F_c/Z)(N_t - N_{t+1})$

sport catch by

(3) $C_s = (F_s/Z)(N_t - N_{t+1})$

and shaker deaths by

(4) $D = (S/Z)(N_t - N_{t+1})$.

Catches are then summed over all stocks and time periods to calculate the annual landings for each port.

Fishing mortality rates are computed as

(5) $F = fqv/L$

where f is fishing effort, q is catchability of fully vulnerable fish to the commercial troll fishery, v is vulnerability that depends on the fishery (commercial or sport), stock and time, and L is the length of the cell. Sport fishing effort is scaled into commercial effort equivalents by multiplying sport effort by the ratio of sport CPUE to commercial CPUE for each port. Commercial catchability and sport fishing vulnerabilities are then used to calculate sport fishing mortality rates.

## Calibration

The model was calibrated to historic catch and effort data from 1986, 1987, 1988, and 1989, using auxiliary information to tune the calibration. The first step in calibration involved adjusting the initial stock sizes and stock distribution patterns. The stock sizes and distribution patterns determine the initial abundance and composition of the stock mix in each cell at the beginning of the year. These were adjusted until the calculated total landings and Klamath River contribution rate resulting from the observed pattern of fishing effort closely matched the observed landings and Klamath contribution rate from the same year. Then maturation rates for the central valley and northern stocks were adjusted (these depend on the age structure of the stocks) to get the central valley harvest index to agree as closely as possible to the observed index in the base year. The relative abundances and distributions of the age 3 and age 4 Klamath stocks were then readjusted to match, as closely as possible, the observed age 4 Klamath exploitation rate and the contribution rates of Klamath basin fish in each of the cells. Once calibrated, the model represents a plausible description of the fisheries in that year. Harvest rates can then be manipulated by changing the fishing effort in commercial and sport fisheries in individual time intervals.

## Model Runs

Examination of the data during the calibration phase revealed that 1986 and 1989 were the two most extreme years of the four

years used for calibration. In 1986, Klamath stocks were distributed widely and commercial fishing effort was higher within the KMZ than it has been in subsequent years. In 1989, Klamath stocks were more concentrated in the KMZ and commercial effort within the KMZ was the lowest of all four years. Because these two years were the most extreme, the patterns of stock distribution and fishing effort from 1986 and 1989 were used in the simulations to evaluate the consequences of the proposed harvest strategy. For each of the two patterns of stock distribution and fishing effort, the proposed harvest strategy was implemented for simulated stocks with high abundance, medium abundance and low abundance designed to span the range of stock sizes observed in the last decade. For the high abundance simulations stock sizes were set at 1.5 million Central Valley fish, 500 thousand north coast fish and a combined Klamath stock of 900 thousand Klamath 3s and 4s in the high abundance year. These were all reduced to 60% of their high abundance values for the medium abundance case and 30% for the low abundance case.

## Results

### Ocean Impacts

In years of high and moderate abundance, the proposed harvest strategy increased landings in the commercial troll fisheries by 2.6% for the 1986 pattern of distribution and effort (Tables B-1 and B-3) to 9.8% for the 1989 (Tables B-2 and B-4) pattern of distribution and effort. In all cases, the increase in commercial landings within the KMZ was substantially larger than the increase reported for the ocean commercial landings as a whole. This large increase in KMZ landings was offset in part by decreased commercial landings outside of the KMZ. In the low abundance cases, commercial troll harvest rates were limited by the minimum escapement requirement of 35,000 naturally produced adults. These reduced harvest rates produced a 1.1% decrease in commercial troll landings when compared with the 1986 patterns of distribution and effort, and a 5.7% increase compared to the 1989 patterns. In all cases, the ocean sport landings were reduced by approximately 12%. Reductions in landings of some of the ocean fisheries resulted from the release of hatchery fish only. The model included no changes in fishing effort in response to changes in management except for the increase in KMZ commercial effort to achieve the target harvest rate on natural Klamath fish.

At all abundance levels, the proposed harvest strategy resulted in an increase in shaker mortality of 3s and 4s to levels that were more than twice the present levels (the model does not include shaker mortality on 2-year-olds). Almost all of this additional mortality is from the capture and release of Klamath

hatchery fish. Klamath hatchery fish constitute only about 10% of the total stock in the model, and yet account for about 60% of the shaker mortality. Part of the explanation for this apparent disparity is that the ocean fisheries harvest almost 2/3 of the other stocks during the course of the fishing season. This means that if marked fish make up 10% of the population at the beginning of the season, they will be approximately 25% of the population by the end of the season.

The population remaining in the ocean at the end of the fishing season was also reduced by 2.3% to about 15%. The size of the reduction in the ocean population at the end of the season again depended on the relative increase in harvest rate. Because ocean harvest rates were higher in 1986 than in 1989, most changes in ocean impacts were more pronounced compared with the 1989 patterns of distribution and effort. This reduction in the ocean population would have less impact on fisheries in the following year than the percentage reduction would suggest. In the next year the majority of the ocean population (80% or more in most years) will be 3-year-old fish. However, increasing ocean harvest rates will also increase the shaker mortality of sublegal 2-year-old fish which will reduce the subsequent recruitment of 3s. These reductions in initial abundance with increased ocean harvest rates were not included in the model.

Inriver Impacts

The proposed harvest strategy resulted in decreases in landings for the river fisheries in all cases except the high abundance case with 1986 ocean distribution and effort patterns (Tables B-1 through B-4). Model runs that incorporated a 20% marking mortality (Tables B-2 and B-4) at high or medium abundance showed a magnified decrease in the river fisheries because fewer hatchery fish returned to the river. In 1986, the target ocean harvest rate was substantially exceeded, so the allowable harvest for river fisheries was already reduced in the baseline case. In the low abundance cases the returns of hatchery fish are insufficient to meet hatchery egg take needs, and because the ocean has already harvested all of the surplus from the natural stocks, nothing remains for the river fisheries. The increased ocean harvest rates also decrease the run size of other stocks from 10% to about 22% depending, again, on the relative increase in ocean harvest rates resulting from the change in harvest strategy.

One final effect of the change in harvest strategy is that it changes the ratio of hatchery fish to natural fish in the Klamath basin. In years of high abundance, hatchery fish are harvested at a higher rate than natural fish and thus the percentage of hatchery fish in the spawning escapement is reduced from 33.3% down to about 28%. In years of moderate or low abundance,

harvest rates on hatchery fish are reduced in order to meet hatchery egg take needs. This results in hatchery fish making up about 50% of the spawning escapement in low abundance years.

Table B-1. Simulations of high, medium, and low abundance years with the 1986 patterns of ocean distribution and fishing effort. numbers are thousands of fish.

| Year | Present harvest | Proposed harvest | Change | Percent change |
|---|---|---|---|---|
| High abundance | | | | |
| Ocean commercial | 1415.2 | 1452.5 | 37.3 | 2.6 |
| Ocean sport | 212.7 | 185.7 | -27.0 | -12.7 |
| River fishery | 55.7 | 73.9 | 18.2 | 32.7 |
| Shaker deaths | 61.8 | 138.4 | 76.6 | 123.9 |
| Hatchery escapement | 52.5 | 40.0 | -12.5 | -23.8 |
| Natural escapement | 105.0 | 105.0 | 0.0 | 0.0 |
| Other escapement | 400.5 | 343.4 | -57.1 | -14.3 |
| Ocean population | 421.7 | 390.4 | -31.3 | -7.4 |
| Medium abundance | | | | |
| Ocean commercial | 849.1 | 871.5 | 22.4 | 2.6 |
| Ocean sport | 127.6 | 111.4 | -16.2 | -12.7 |
| River fishery | 33.4 | 28.3 | -5.1 | -15.3 |
| Shaker deaths | 37.1 | 83.0 | 45.9 | 123.7 |
| Hatchery escapement | 32.5 | 40.0 | 7.5 | 23.1 |
| Natural escapement | 63.0 | 63.0 | 0.0 | 0.0 |
| Other escapement | 240.3 | 206.1 | -34.2 | -14.2 |
| Ocean population | 253.0 | 234.2 | -18.8 | -7.4 |
| Low abundance | | | | |
| Ocean commercial | 424.6 | 419.8 | -4.8 | -1.1 |
| Ocean sport | 63.8 | 56.4 | -7.4 | -11.6 |
| River fishery | 11.5 | 0.0 | -11.5 | -100.0 |
| Shaker deaths | 18.5 | 39.7 | 21.2 | 114.6 |
| Hatchery escapement | 17.5 | 34.9 | 17.4 | 99.4 |
| Natural escapement | 35.0 | 35.0 | 0.0 | 0.0 |
| Other escapement | 120.0 | 108.4 | -11.6 | -9.7 |
| Ocean population | 126.5 | 123.6 | -2.9 | -2.3 |

Table B-2. Simulations of high, medium, and low abundance years with the 1989 patterns of ocean distribution and fishing effort. numbers are thousands of fish.

| Year | Present harvest | Proposed harvest | Change | Percent change |
|---|---|---|---|---|
| High abundance | | | | |
| Ocean commercial | 1332.8 | 1463.5 | 130.7 | 9.8 |
| Ocean sport | 255.9 | 223.9 | -32.0 | -12.5 |
| River fishery | 80.5 | 72.0 | -8.5 | -10.6 |
| Shaker deaths | 70.7 | 151.4 | 80.7 | 114.1 |
| Hatchery escapement | 52.5 | 40.0 | -12.5 | -23.8 |
| Natural escapement | 105.0 | 105.0 | 0.0 | 0.0 |
| Other escapement | 401.6 | 314.5 | -87.1 | -21.7 |
| Ocean population | 430.6 | 365.4 | -65.2 | -15.1 |
| Medium abundance | | | | |
| Ocean commercial | 799.7 | 878.1 | 78.4 | 9.8 |
| Ocean sport | 153.6 | 134.3 | -19.3 | -12.6 |
| River fishery | 48.3 | 27.2 | -21.1 | -43.7 |
| Shaker deaths | 42.4 | 90.8 | 48.4 | 114.2 |
| Hatchery escapement | 32.5 | 40.0 | 7.5 | 23.1 |
| Natural escapement | 63.0 | 63.0 | 0.0 | 0.0 |
| Other escapement | 240.9 | 188.7 | -52.2 | -21.7 |
| Ocean population | 258.3 | 219.3 | -39.0 | -15.1 |
| Low abundance | | | | |
| Ocean commercial | 399.9 | 422.8 | 22.9 | 5.7 |
| Ocean sport | 76.8 | 68.0 | -8.8 | -11.5 |
| River fishery | 18.9 | 0.0 | -18.9 | -100.0 |
| Shaker deaths | 21.2 | 43.7 | 22.5 | 106.1 |
| Hatchery escapement | 17.5 | 34.4 | 16.9 | 96.6 |
| Natural escapement | 35.0 | 35.0 | 0.0 | 0.0 |
| Other escapement | 120.5 | 100.0 | -20.5 | -17.0 |
| Ocean population | 129.2 | 116.1 | -13.1 | -10.1 |

# Appendix C

## Potential Increased Harvest Opportunities on Trinity River Hatchery Spring Chinook with All Hatchery Production Marked

If all hatchery production was distinguishable from natural production by the presence of an external mark (Ad-clip), it would be possible to take advantrage of any excess returns of spring chinook originating from Trinity River Hatchery (TRH), especially if a non-lethal method of capture could be employed. This would allow for the release of non-target species and naturally produced spring chinook. An additional constraint placed upon this selective harvest would require a method be developed to determine when a sufficient number of hatchery fish have escaped into the spawning areas to reach the hatchery escapement goal of 3,000 adults. Spawning of hatchery fish in natural areas, ranging from 41% in 1985 to 79% in 1987, (1982-1987 average of 60.8%) and pre-spawning mortality must also be included in the escapement of hatchery spring chinook. At this time, there is not enough informatin concerning run timing of natural and hatchery spring chinook to implement a "selective" fishery on hatchery spring chinook by the timing of the fishery.

The data used for this analysis was primarily taken from the Klamath-Trinity River Basin Spring Chinook Salmon Stock Evaluation and Run Size Forcast (USFWS 1990). Only adult in-river harvest estimates, natural spawning escapement estimates, and hatchery returns for the 1982 to 1987 return years were used (Table C-1). There were no estimates of sport harvest or natural spawning escapement in 1983. Impacts by ocean fisheries were assumed to be the same as described in the Stock Evaluation Report. It is also assumed that no selective ocean fishery on tagged chinook would exist. Using the expanded coded-wire tag (CWT) recoveries multiplied by the production multiplier (PM) to account for all fish of hatchery origin resulted in estimates of hatchery contribution that exceeded the total hatchery returns for 1982 and 1984, the estimated sport harvest in 1982, and the estimated Yurok harvest in 1987. To "adjust" the estimated contribution of hatchery chinook to the Yurok fishery in 1987, the proportion of hatchery chinook in the estimated in-river run (0.788) was applied to the harvest estimate (1,646), resulting in a hatchery contribution of 1,267 spring chinook. The other three cases in which estimated hatchery contribution exceeded actual estimates were not adjusted because they occurred during years in which there were no excess spring chinook returning to the hatchery.

Marking all hatchery spring chinook with an adipose fin-clip would result in a decrease in their contribution to ocean and in-river fisheries as well as a decrease in spawning escapement

(hatchery returns and hatchery fish spawning in natural areas) because of the decreased survival of marked fish when compared to unmarked hatchery production. To account for the loss of unmarked hatchery fish due to the decreased survival rates of being marked, the estimated contribution of hatchery spring chinook to the in-river fisheries and spawning escapement was calculated by multiplying expanded CWT recoveries by the appropriate PM (Table C-2). The number of unmarked hatchery spring chinook contributing to the fisheries and escapement was determined by subtracting the estimated contribution of Ad+CWT fish from the total estimated hatchery contribution (expanded Ad+CWT x PM). The unmarked hatchery contributions were then multiplied by 0.85 to account for the reduced survival due to marking. The "adjusted" hatchery contribution to in-river fisheries and spawning escapement was calculated by adding the expanded Ad+CWT values to the "adjusted" values for the unmarked fish contribution (which would now e marked) (Table C-3). To calculate the harvest and escapement estimates for 1982-1987 had 100% marking been implemented, the differences between the values of total hatchery contribution (Ad x PM) and the "adjusted" hatchery contribution values (based on reduction due to 100% marking) were subtracted from total harvst and escapement estimates (Table C-4).

The extent to which any fishery or spawning escapement would have been affected by the marking of all the hatchery spring chinook production is related to the magnitude of the impacts that fishery has on the hatchery stock and the differential mortality of marked fish (Table C-5). The reduction to the in-river run ranged from 2.7% in 1982 to 9.4% in 1987 (1983 was not included due to the lack of sport harvst and natural spawning escapement). Even with the decreased returns, the hatchery escapement would have been met in 1986 and 1987.

If all fish had been marked, only return years 1986 and 1987 would have had sufficiently large returns of hatchery spring chinook to allow for a selective fishery targeting on them. If a 100% marking program had been in place, an estimated 11,365 hatchery spring chinook would have contributed to the spawning escapement (75% in natural areas) in 1986 (Table C-3). In 1987, 25,916 hatchery spring chinook would have contributed to the spawning escapement (90% in natural areas). An additional 8,365 and 22,916 spring chinook of hatchery origin would have been available for harvest in 1986 and 1987, respectively (based on a hatchery escapement of 3,000 adults). The "availability" of these fish for harvest is questionable due to the nature of spring chinook "holding" in upriver pools prior to spawning and the fact that a large proportion of hatchery spring chinook spawn in natural areas. If all "excess" hatchery fish were harvested in a selective fishery, there would be the danger of the hatchery not meeting its escapement goal due to the portion of the

remaining hatchery spring chinook utilizing natural spawning areas. In high return years such as 1986 and 1987, it appears that there is a substantial contribution of fish of non-hatchery origin to the hatchery spawning escapement. These are most likely second generation hatchery fish which would not be harvested in a selective fishery. The contribution of these "natural" fish would be important in sustaining the hatchery spawning escapement.

Removing "excess" hatchery fish from the run may be beneficial in protecting "natural" stocks from interbreeding with hatchery stocks but this positive aspect will probably not be realized due to the large degree ot mixing that has already occurred in some areas. Excess spawning of hatchery fish in natural areas would become a concern if large numbers of hatchery fish were observed on some of the tributaries that do have a distinct spring chinook run of primarily wild origin.

Unless a selective fishery is conducted in the immediate vicinity of the hatchery, there will be the potential to over-harvest hatchery spring chinook depending on the actual in-river run size, harvest and pre-spawning mortality levels. Any fishery that is designed to target hatchery spring chinook stocks must be flexible enough to cease fishing if it appears that the strength of the run was not as large as projected pre-season.

Table C-1. Adult spring chinook harvest and escapement estimates for return years 1982-1987.

| Return year | In-river harvest | | | Spawning escapement | | In-river run |
|---|---|---|---|---|---|---|
| | Yurok | Hoopa | Sport | Hatchery | Natural | |
| 1982 | 1,316 | 398 | 346 | 666 | 2,102 | 4,830 |
| 1983 | 510 | 75 | N/A | 930 | N/A | 1,515 |
| 1984 | 247 | 380 | 375 | 736 | 1,354 | 3,092 |
| 1985 | 1,074 | 1,000 | 736 | 2,645 | 4,897 | 10,352 |
| 1986 | 692 | 2,022 | 2,949 | 7,083 | 13,371 | 26,117 |
| 1987 | 1,646 | 4,146 | 8,467 | 8,466 | 29,083 | 51,808 |

N/A = No sport harvest or natural spawning estimates made in 1983.

Table C-2. Estimated contribution of adult spring chinook (marked and unmarked) from Trinity River Hatchery to in-river harvest and escapement for return years 1982-1987 (calculated using production multiplier).

| Return year | In-river harvest | | | Spawning escapement | | In-river run |
|---|---|---|---|---|---|---|
| | Yurok | Hoopa | Sport | Hatchery | Natural | |
| 1982 | 1,288 | 338 | **350** | **1,158** | 1,696 | 4,830 |
| 1983 | 172 | 19 | N/A | 553 | N/A | 744 |
| 1984 | 73 | 0 | 281 | **744** | 771 | 1,869 |
| 1985 | 562 | 607 | 364 | 2,510 | 1,684 | 5,727 |
| 1986 | 646 | 1,259 | 1,820 | 3,244 | 9,599 | 16,568 |
| 1987 | **2,112*** | 2,510 | 6,662 | 6,215 | 23,313 | 40,812 |

N/A = No sport harvest or natural spawning estimates made in 1983.
BOLD = Cases in which estimated contribution of hatchery fish exceeds the total estimated harvest or return.
* = This number was adjusted by multiplying the estimated proportion of hatchery fish in the run (0.788) to the harvest estimate (1,646) which resulted in an estimated hatchery contribution of 1,297 spring chinook.

Table C-3. "Adjusted" contribution of adult spring chinook from Trinity River Hatchery to in-river harvest and escapement for return years 1982-1987 (considering losses in survival of unmarked hatchery production due to 100% marking).

| Return year | In-river harvest | | | Spawning escapement | | In-river run |
|---|---|---|---|---|---|---|
| | Yurok | Hoopa | Sport | Hatchery | Natural | |
| 1982 | 1,250 | 331 | 341 | 1,131 | 1,648 | 4,701 |
| 1983 | 169 | 19 | N/A | 550 | N/A | 738 |
| 1984 | 69 | 0 | 251 | 664 | 688 | 1,672 |
| 1985 | 505 | 541 | 327 | 2,232 | 1,513 | 5,118 |
| 1986 | 573 | 1,113 | 1,612 | 2,865 | 8,500 | 14,663 |
| 1987 | 1,163* | 2,206 | 5,847 | 5,455 | 20,461 | 35,132 |

N/A = No sport harvest or natural spawning estimates made in 1983.
* = This is the adjusted number of hatchery spring chinook.

Table C-4. "Adjusted" adult spring chinook harvest and escapement estimates for return years 1982-1987 using "adjusted" hatchery contribution values to account for decreased survival of hatchery production due to 100% marking.

| Return year | In-river harvest | | | Spawning escapement | | In-river run |
|---|---|---|---|---|---|---|
| | Yurok | Hoopa | Sport | Hatchery | Natural | |
| 1982 | 1,278 | 391 | 337 | 639 | 2,054 | 4,699 |
| 1983 | 507 | 75 | N/A | 927 | N/A | 1,509 |
| 1984 | 243 | 380 | 345 | 656 | 1,271 | 2,895 |
| 1985 | 1,017 | 934 | 699 | 2,367 | 4,726 | 9,743 |
| 1986 | 319 | 1,876 | 2,741 | 6,704 | 12,272 | 23,912 |
| 1987 | 1,512 | 3,842 | 7,652 | 7,706 | 26,231 | 46,943 |

N/A = No sport harvest or natural spawning estimates made in 1983.

Table C-5. Losses of hatchery spring chinook to harvest and escapement due to reduced survival caused by marking 100% of the hatchery production (percent reduction in parentheses)*.

| Return year | In-river harvest | | | Spawning escapement | | In-river run |
|---|---|---|---|---|---|---|
| | Yurok | Hoopa | Sport | Hatchery | Natural | |
| 1982 | 38 (2.9) | 7(1.8) | 9(2.6) | 27 (4.1) | 48(2.3) | 129(2.7) |
| 1983 | 3 (0.6) | 0(0.0) | N/A | 3 (0.3) | N/A | 6(0.4) |
| 1984 | 4 (1.6) | 0(0.0) | 30(8.0) | 80(10.9) | 83(6.1) | 197(6.4) |
| 1985 | 57 (5.3) | 66(6.6) | 37(5.0) | 287(10.9) | 171(3.5) | 609(5.9) |
| 1986 | 73(10.5) | 146(7.2) | 209(7.1) | 379 (5.4) | 1,099(8.2) | 1,905(7.3) |
| 1987 | 134 (8.1) | 304(7.3) | 815(9.6) | 760 (9.0) | 2,852(9.8) | 4,865(9.4) |

N/A = No sport harvest or natural spawning estimates made in 1983.
* = Assumes 15% differential mortality due to marking.

## References

U.S. Fish and Wildlife Service. 1990. Klamath-Trinity River Basin Spring Chinook Stock Evaluation and Run Size Forecast. Arcata FAO.

TABLE 1. Comparison of California Department of Fish and Game November 1978 Adult Spawner Escapement Goal and June 1985 Assessment of Current Optimum Spawning Escapement Levels for Adult Fall-run Chinook Salmon in Klamath River Basin Spawning Areas.

| Subunit | Element | Nov. 1978 | June 1985 Low | June 1985 High |
|---|---|---|---|---|
| | NATURAL COMPONENTS | | | |
| TRINITY RIVER | Main stem | | | |
| | Upper (Lewiston Dam-Douglas City) | NA | 3,500(a) | 3,500(a) |
| | Middle (Douglas City-N.F. Trinity R.) | NA | 1,000(b) | 6,000(b) |
| | Lower (N.F. Trinity R.-mouth) | NA | 2,500(b) | 2,500(b) |
| | Rush Creek | NA | 500(b) | 1,000(b) |
| | Reading Creek | NA | 40(b) | 40(b) |
| | Browns Creek | NA | 50(b) | 100(b) |
| | Canyon Creek | NA | 1,000(b) | 1,000(b) |
| | North Fork | NA | 1,000(b) | 1,000(b) |
| | Big French Creek | NA | 200(b) | 200(b) |
| | New River | NA | 7,200(a) | 7,200(a) |
| | Willow Creek | NA | 240(a,c) | 240(a,c) |
| | Horse Linto Creek | NA | 360(a,c) | 360(a,c) |
| | Hoopa Res. streams in Trinity basin | NA | 400(b) | 400(b) |
| | South Fork Trinity River | NA | 1,500(a) | 1,500(a) |
| Subtotals - Trinity River | | 43,341 | 19,490 | 23,040 |
| SHASTA RIVER | | 14,400 | 5,600(d) | 18,220(a) |
| SCOTT RIVER | | 5,760 | 6,000(b) | 9,260(a) |
| SALMON RIVER | | 6,480 | 3,000(b) | 26,000(a) |
| BALANCE OF KLAMATH SYSTEM | Main stem (Iron Gate Dam-mouth) | NA | negl(e) | 10,000(b) |
| | Bogus Creek | NA | 1,000(f) | 3,500(g) |
| | Willow Creek | NA | negl(b) | negl(b) |
| | Cottonwood Creek | NA | 460(b) | 460(b) |
| | Humbug Creek | NA | 100(b) | 100(b) |
| | Beaver Creek | NA | 1,000(b) | 2,500(a) |
| | Horse Creek | NA | 200(b) | 600(a) |
| | Seiad Creek | NA | negl(b) | negl(b) |
| | Grider Creek | NA | 300(b) | 1,120(a) |
| | Thompson Creek | NA | 250(b) | 1,390(a) |
| | Indian Creek | NA | 750(b) | 2,800(a) |
| | Elk Creek | NA | 100(b) | 400(a) |
| | Clear Creek | NA | 250(b) | 740(a) |
| | Dillon Creek | NA | 250(b) | 920(a) |
| | Camp Creek | NA | 400(b) | 800(b) |
| | Boise Creek | NA | negl(b) | negl(b) |
| | Red Cap Creek | NA | 260(a,c) | 800(b) |
| | Bluff Creek | NA | 200(b) | 200(b) |
| | Blue Creek | NA | 1,000(a) | 1,000(a) |
| Subtotals - Balance of Klamath system | | 27,500 | 6,520 | 27,330 |
| TOTAL - NATURAL COMPONENTS | | 97,481 (rounded to 97,500) | 40,610 | 105,850 |
| | HATCHERY COMPONENTS | | | |
| Trinity River Hatchery | | 9,000 | 12,000(h) | 12,000(h) |
| Iron Gate Hatchery | | 8,500 | 12,000(h) | 12,000(h) |
| TOTAL - HATCHERY COMPONENTS | | 17,500 | 24,000 | 24,000 |
| GRAND TOTALS | | 114,981 (rounded to 115,000) | 64,610 | 129,850 |

(a) Based on redds per unit of available spawning area.
(b) Based on field observations of percent utilization of available spawning habitat.
(c) U.S. Forest Service estimate.
(d) Based on stock recruitment analysis (L.B. Boydstun, unpublished manuscript).
(e) Based on Klamath and Shasta rivers spawning gravel enhancement study (Calif. Dept. Wat. Res. 1981. 173 p.).
(f) Based on two years of egg-to-fry survival estimates.
(g) Based on historic counts.
(h) Current hatchery capacity.

Source: Hubbell and Boydstun, 1985.

TABLE 11

TRINITY RIVER FISH AND WILDLIFE MANAGEMENT PROGRAM

SUMMARY OF KING SALMON SPAWNING ESCAPEMENT IN THE TRINITY RIVER MAIN STEM

| Year | Natural | | | | Hatchery (Adults Only) |
|---|---|---|---|---|---|
| | Above Lewiston | Below Lewiston | | Total | |
| | | Main Stem | Tributaries | | |
| 1944 | 12,000[1] | 13,500[2] | - | 25,500 | - |
| 1945 | 9,000[1] | 10,000[2] | | 19,000 | - |
| 1955[3] | 25,000 | 15,600 | 300 | 40,900 | - |
| 1956[4] | 39,000 | 28,200 | | 67,200 | - |
| 1958 | 3,013[5] | | | | |
| 1959 | 4,549[5] | | | | |
| 1960 | | 2,112 | | | 988[6] |
| 1961 | 846 | | | | 1,652[7] |
| 1962 | | 1,504 | | | 1,412[7] |
| 1963 | | 72,500 | 3,500 | 76,000[9] | 4,196[10] |
| 1964 | | | | | 5,016 |
| 1965 | | | | | 1,554 |
| 1966 | | | | | 2,054 |
| 1967 | | | | | |
| 1968 | | 25,500 | 100 | 25,600[11] | 3,899 |
| 1969 | | 45,900 | | 45,900[12] | 1,505 |
| 1970 | | 14,900 | | 14,900[13] | 2,656 |
| 1971 | | 42,800 | | 42,800[14] | 8,519 |
| 1972 | | 20,600[15] | | 20,600 | 11,042 |
| 1973 | | 6,200[16] | | 6,200 | 3,635 |
| 1974 | | 4,000[15] | | 4,000 | 6,710 |
| 1975 | | | | | 6,363 |
| 1976 | | 4,000[15] | | 4,000 | 4,746 |
| 1977 | | 4,500[15] | | 4,500 | 3,159 |
| 1978 | | 7,000[15] | | 7,000 | 9,802 |

1/ Moffett and Smith (1950), total population, including grilse.

2/ Assumes that 47 percent spawned above Lewiston based on Gibbs estimate.

3/ Gibbs (1956). Gibbs estimated 27,445 to 50,126. The 40,900 arrived at by dividing 6,019 carcasses recovered by 14.7 percent (the number of tags recovered) per Hubbell, 1973.

4/ Weber (1965).

5/ Data from Bedell, 1979, as reported by VTN.

6/ Assumes male-to-female ratio was 1 to 1. 494 females spawned.

7/ Assumes male-to-female ratio was 1 to 1. 706 females spawned.

8/ Difference between the adults trapped and those trapped and transported upstream.

9/ LaFaunce (1963). Assumes 15 percent of carcasses recovered. Estimate includes small males which made up 7.3 percent of carcasses examined.

10/ Heavy loss of eggs and fry occurred from "white spot."

11/ Rogers (1968). Assumes 14.7 percent of carcasses recovered. Estimate includes small males and females which comprised 12.8 percent of carcasses examined.

12/ Smith (1969). Estimate using Peterson's model. Method and estimate not agreed upon. Hubbell (1973).

13/ Rogers (1970). Assumes 14.7 percent of carcasses recovered. Estimate includes small males which comprised 25.5 percent of the carcasses examined.

14/ Estimates by Rogers as reported by Hubbell (1973). Assumes 14.7 percent of carcasses recovered. Implied that final estimate could be considerably higher.

15/ Estimates by Miller, as reported by VTN. Note: Personal communication with Miller indicates that data do not reflect a valid estimate.

16/ Estimate by Burton.

Table B-1. Klamath River adult inriver fall chinook run size, spawning escapement, sport catch, and Indian net harvest in numbers and percent of the total inriver run size, 1978-1988.

| | Spawning Escapement | | Inriver Sport Catch | | Indian Net Catch | | Inriver Run Size |
|---|---|---|---|---|---|---|---|
| Year | Numbers | Percent | Numbers | Percent | Numbers | Percent | Numbers |
| 1978 | 71,500 | 78 | 1,700 | 2 | 18,200 | 20 | 91,300 |
| 1979 | 34,300 | 68 | 2,100 | 4 | 13,700 | 27 | 50,100 |
| 1980 | 28,000 | 63 | 4,500 | 10 | 12,000 | 27 | 44,500 |
| 1981 | 38,300 | 49 | 6,000 | 8 | 33,000 | 43 | 77,300 |
| 1982 | 42,400 | 65 | 8,300 | 13 | 14,500 | 22 | 65,200 |
| 1983 | 44,600 | 79 | 4,200 | 7 | 7,900 | 14 | 56,800 |
| 1984 | 23,600 | 52 | 3,300 | 7 | 18,700 | 41 | 45,600 |
| 1985 | 48,200 | 76 | 3,600 | 6 | 11,600 | 18 | 63,400 |
| 1986 | 146,300 | 76 | 21,000 | 11 | 25,100 | 13 | 192,400 |
| 1987 | 130,800 | 64 | 20,200 | 10 | 53,100 | 26 | 204,100 |
| 1988 | 112,300 | 60 | 22,200 | 12 | 51,700 | 27 | 186,200 |
| 1989[a/] | 67,100 | 55 | 9,800 | 8 | 45,100 | 37 | 122,500 |
| 1990 | 20,497 | 65 | 3,151 | 25 | 7,794 | 10 | ~~36,464~~ * 32,129 * |

a/ Preliminary.

* include angling & net mortalities

Source: PFMC 1989 [illegible]

ATTACHMENT 5

# FRAMEWORK PLAN FOR THE YUROK INDIAN GILL NET HARVEST OF FALL CHINOOK SALMON - KLAMATH RIVER, CALIFORNIA, 1991

The Klamath Fishery Management Council has asked to review all harvest management plans for 1991 which involve salmon originating in the Klamath River Basin of California. This draft plan was prepared in response to that request.

By necessity, this plan is conceptual in nature since no allocations of harvestable fish have been determined for 1991. Two scenarios for the harvest of fall chinook are presented; one with commercial fishing and one without commercial fishing.

## With Commercial Fishing

Once the final determination of the number of adult fall chinook salmon available for harvest on the Yurok Indian reservation is made, the Superintendent of the Northern California Agency will consult with representatives of the Yurok tribe to determinate if an Indian commercial fishery for fall chinook salmon is possible in 1991.

If a commercial fishery is possible, it will be conducted in a manner similar to previous commercial fisheries on the Yurok Indian Reservation. The important features of those fisheries which would be continued in 1991 are:

a. Indian subsistence needs for fall chinook salmon must be met before any salmon are available for commercial sale.

b. All fisheries for fall chinook will operate under an area management and quota system similar to previous seasons.

c. The commercial harvest area will be limited to the Klamath River area below the Highway 101 bridge.

d. The Bureau of Indian Affairs will withhold a portion of the individual fishers commercial sale receipts. Those monies will be deposited in an interest-bearing trust account for the future use of the Yurok Tribe.

e. The Bureau of Indian Affairs will manage the buying station or any other system selected to market the Indian commercial harvest. If an appropriate on-reservation buying station cannot be located, the Bureau may pursue alternatives, including the location of a buying station at a fish processing plant in Crescent City.

f. The commercial fishery will be conducted and regulated under provisions contained in a Final Harvest Plan and 25 Code of Federal Regulations, Part 250 with pre-season and in-season adjustments as appropriate.

g. Subsistence fishing for fall chinook on the [illegible] of the Yurok Reservation not involved with commercial harvest will be conducted and regulated by 25 Code of Federal Regulations, Part 250 with pre-season and in-season adjustments as appropriate.

h. All fisheries for fall chinook will be monitored by [illegible] nical and professional staff from the U.S.Fish and Wildlife Service under contract with the Bureau of Indian Affairs.

i. Enforcement of the fishery will be accomplished by qualified law enforcement personnel from the Bureau of Indian Affairs. Warrants, citations and arrests resulting from their activities will be prosecuted through the Yurok Court of Indian Offenses at Klamath, California.

Without Commercial Fishing

If the Superintendent of the Northern California Agency, after consultation with representatives of the Yurok Tribe, determines that the allocation of adult fall chinook salmon is inadequate to provide for both an Indian subsistence fishery and a commercial fishery, the commercial portion of the fishery may be eliminated.

Under that scenario, all fishing for fall chinook salmon during 1991 will be for subsistence use. That fishery will be conducted and regulated under provisions contained in 25 Code of Federal Regulations, Part 250 with pre-season and in-season adjustments as appropriate. Some of the significant portions of those regulations are:

a. The entire reservation is open to subsistence fishing for 24 hours per day. Fishing is permitted seven days a week except for the period from 9:00 AM to 5:00 PM each Monday to permit law enforcement to remove lost or abandoned nets from the River.

b. A reservation-wide quota based on the overall in-river allocation will be established prior to the season. Those fish will be re-allocated into management areas and fishing will continue until the run is over or until the quota(s) are reached, which ever comes first.

c. This fishery will be monitored and reported by the U.S.Fish and Wildlife Service under contract with the Bureau of Indian Affairs.

d. Enforcement of the regulations governing this fishery will provided by qualified law enforcement personnel from the Bureau of Indian Affairs. Warrants, citations and arrests resulting from their activities will be prosecuted through the Yurok Court of Indian Offenses at Klamath, California.

ATTACHMENT 6

# POSITION STATEMENT AND BRIEFING PAPER OF THE HOOPA VALLEY TRIBE

## TRIBAL RIGHTS, THE FEDERAL TRUST RESPONSIBILITY, AND THE MAGNUSON ACT

Presented to:
Klamath Fishery Management Council
January 10-11, 1991
Arcata, CA

The Magnuson Fishery Conservation and Management Act, 16 U.S.C. §§ et seq., was not intended to override tribal fishing rights or to grant any authority to Regional Management Councils to infringe or restrict tribal rights. At least two provisions of the Magnuson Act expressly require that fishery management plans recognize tribal rights. Section 303 (a)(1)(C) of the Magnuson Act, 16 U.S.C. § 1853 (a)(1)(C), requires that fishery management plans be consistent with "any other applicable law;" other applicable law has been interpreted to include tribal fishing rights, whether based on treaty or on Congressional statute and Executive Order.

Section 303 (a)(2) of the Magnuson Act, 16 U.S.C. § 1853 (a)(2), also requires that management plans describe "Indian treaty rights." Legislative history to the Magnuson Act, including two letters to Hoopa tribal attorneys from Senator Magnuson and a statement on page 52 of the final Senate Conference Committee Report, No. 94-711, March 24, 1976, indicate that management plans are to describe tribal fishing "harvest rights," whether recognized by treaty "or otherwise." And of course, once a plan has described those tribal rights, it must remain consistent with those rights under the "other applicable law" provision mentioned above.

The fishing rights of the Hoopa Valley Tribe were recognized and protected under authority of the 1864 Act of Congress, and an Executive Order issued thereunder, which created the Hoopa Valley Reservation. This source of Hoopa tribal fishing rights has been repeatedly recognized by the U.S Court of Appeals for the Ninth Circuit, by the California Supreme Court, and by the Secretary of the Interior in, for instance, his Decision of January 14, 1981, which implemented certain reforms in Trinity River streamflow policy. It is clear that Hoopa tribal fishing rights are of a kind that Congress intended be protected as fully under the Magnuson Act as any tribal fishing right based on a treaty.

The above interpretation of tribal rights under the Magnuson

Act is also supported by a March 15, 1975 memorandum letter from the Interior Department Regional Solicitor in Portland to the Regional Counsel for NOAA in Seattle. This memorandum recognizes and quotes the above mentioned letters from Senator Magnuson and the final Conference Committe Report, No 94-711, March 24, 1976, mentioned above.

The federal trust responsibility is also applicable law with which fishery management plans must comply under Section 303 of the Magnuson Act. The KFMC and the PFMC are advisory committees to the Secretary of Commerce. All agencies of the United States, not simply the Bureau of Indian Affairs or the Interior Department, owe a trust duty to tribes to protect reserved fishing and water rights. Eberhardt v. United States, 789 F.2d 1354, 1363 (9th Cir. 1986). Trust responsibility principles are also applicable to the actions of the various federal agencies that serve on the KFMC and PFMC.

In his 1981 Decision on Trinity River streamflows, the Interior Secretary recognized that the trust responsibility includes a fundamental duty of loyalty to tribes to manage trust assets and reserved rights in a way that provides maximum benefit to the tribes: "The Secretary may not abrogate these rights even if the benefit to a portion of the public from such an abrogation would be greater than the loss to the Indians." In addition, the Interior Secretary has recently reiterated his support of harvest rate management for Klamath-Trinity basin stocks.

Hoopa tribal fishing rights arise under the broadly worded "Indian purposes" clause of the 1864 Act of Congress. The rights are exercised on the reservation. Congress has not limited the scope of the Hoopa tribal right in any way, unlike the situation with the Washington tribes whose treaties expressly limit their right to one "in common with" other citizens. In such an instance, applicable U.S. Supreme Court and other federal court decisions have attempted to define the scope of the tribal right in terms of a "moderate stndard of living." Washington v. Washington State Commercial Passenger Fishing Vessel Association, 443 U.S. 658 (1979). The trust responsibility would thus entail affirmative obligations on the part of federal agencies to manage the fishery so as to assist the achievement of a moderate standard of living from the exercise of tribal rights.

The Tribe has proposed an alternative option relative to a two tiered allocation process, now renumbered for the January 10-11 KFMC meeting as option 7.2. The Tribe's proposal is fully consistent with federal trust responsibility principles applicable to each federal agency and to the management councils as entities. The federal representatives to the KFMC have affirmative obligations to address this issue, either to aid in its resolution before this Council or to develop a meaningful record for the PFMC.

In view of this, it may be appropriate for the KFMC to seek to refer some of these questions to legal counsel for NOAA.

010991fish\magnus.mem

THE SECRETARY OF THE INTERIOR

WASHINGTON

November 30, 1990

Ms. Susan Masten
Acting Chairperson
Yurok Transition Team
P.O. Box 218
Klamath, CA 95548

Dear Ms. Masten:

Thank you for your letter of September 28, 1990, enclosing Yurok Transition Team Resolution Number 74 requesting assistance in maintaining an adequate allocation of Klamath River salmon to support a tribal commercial fishery on the Yurok Indian Reservation.

In response to your concerns, I have transmitted a letter to the Secretary of Commerce (copy enclosed) endorsing the harvest sharing agreement signed by all members of the Klamath River Fishery Management Council (KFMC), and supporting a harvest allocation in 1991 that conforms to that agreement. I have further asked my representative on the KFMC, Dr. Lisle Reed, to work closely with the Assistant Secretary - Indian Affairs in monitoring allocation-related developments next year, and to provide me with recommendations, as necessary, for addressing any associated potential impacts on the Indian fisheries.

I appreciate your interest in the complex issues involved.

Sincerely,

Manuel Lujan Jr.

Enclosures

THE SECRETARY OF THE INTERIOR

WASHINGTON

November 30, 1990

Honorable Robert A. Mosbacher
Secretary of Commerce
Washington, D.C. 20230

Dear Mr. Secretary:

Enclosed for your information is a copy of a September 28, 1990, letter I received from Ms. Susan Masten, Acting Chairperson, Yurok Tribal Transition Team, and accompanying Yurok Transition Team Resolution Number 74 requesting assistance in maintaining a tribal commercial fishery on the Klamath River in northern California.

As you know, offshore and inland fisheries operating on Klamath River salmon stocks are managed through a complex set of rules and regulations. The Klamath River Fishery Management Council (KFMC) established pursuant to the Klamath River Basin Fishery Resources Restoration Act of 1986 provides harvest allocation recommendations to the Pacific Fisheries Management Council (PFMC) which, in turn, recommends harvest management measures to meet the guidelines set forth in the Magnuson Fishery Conservation Management Act of 1976 through regulations promulgated by the National Marine Fisheries Service. Indian fishing on the Yurok and Hoopa Valley Reservations is governed by regulations promulgated by the Bureau of Indian Affairs (BIA), provided, however, that ordinances set forth by the Hoopa Valley Business Council govern fishing by Hoopa Valley tribal members on their reservation to the extent that they comply with overall tribal harvest quotas established by the BIA.

The failure of the 11-member KFMC to reach a consensus concerning the allocation of the 1990 harvest of Klamath River fall chinook salmon between ocean and in-river interests in accordance with their harvest sharing agreement of 1987 shifted the burden of resource allocation to the PFMC. As you may recall, the PFMC recommended a somewhat lower harvest rate for the in-river fisheries and a somewhat higher harvest rate for the offshore fisheries than those previously adopted by the KFMC.

I endorse the harvest sharing agreement signed by all KFMC members providing for an ocean fisheries harvest rate of 0.35, and an in-river fisheries harvest rate of 0.52 on fully vulnerable age 4 and 5 fall chinook salmon, and support an

allocation in 1991 that conforms to the KFMC harvest sharing agreement. I have instructed my representative on the KFMC, Dr. Lisle Reed, to work closely with the Assistant Secretary - Indian Affairs in monitoring allocation-related developments next year, and to provide me with recommendations, as necessary, for addressing any associated potential impacts on the Indian fisheries. A copy of my letter to Dr. Reed is enclosed.

I look forward to working with you in addressing the complex issues involved.

Sincerely,

Manuel Lujan Jr.

Enclosures

THE SECRETARY OF THE INTERIOR

WASHINGTON

November 30, 1990

Dr. J. Lisle Reed
Regional Director
Minerals Management Service
770 Paseo Camarillo
Camarillo, CA 93010

Dear Lisle:

Enclosed for your information as the Department's representative on the Klamath Fishery Management Council (KFMC) are copies of my response to a September 28, 1990, letter received from Ms. Susan Masten of the Yurok Transition Team, and follow-up letter to the Secretary of Commerce referencing concerns about the allocation of Klamath River salmon. My letters endorse the harvest sharing agreement signed by all KFMC members in 1987, support a 1991 allocation conforming to that agreement, and encourage close cooperation between you and the Assistant Secretary - Indian Affairs in addressing any allocation-related developments next year.

Please keep me informed on harvest sharing developments relative to the 1991 salmon fishing season, and, in cooperation with the Assistant Secretary - Indian Affairs, provide me with recommendations, as necessary, for addressing any associated potential impacts on the Indian fisheries.

Sincerely,

Manuel Lujan Jr.

Enclosures