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December 1, 2009

MEMORANDUM

TO: Council Members

FROM: Peter Paquet, Manager, Wildlife & Resident Fish

SUBJECT: Lower Columbia River Selective Harvest Techniques

Guy Norman, of the Washington Department of Fish and Wildlife will lead a discussion selective harvest techniques that are being tested in the Lower Columbia River. For background on this issue please refer to the attached document.

Lower Columbia River Alternative Commercial Fishing Gear Study

Year 1 Study Plan

WDFW Fish Program Region 5 and Science Division

Draft 3: August 21, 2009

Introduction

The Lower Columbia Alternative Commercial Fishing Gear study is a multi-year effort by the Washington Department of Fish and Wildlife (WDFW) and cooperating fishers, beginning in the summer of 2009, aimed at developing gear in the Lower Columbia River that can efficiently selectively fish Chinook and coho salmon. The ultimate goal of this work is to develop a fishing regime in which hatchery-origin fall Chinook and coho can be harvested at commercial scales, but also one where natural-origin fish caught with them can be released so that they can spawn successfully.

The study is a huge undertaking, because to achieve the goals of the study we have to develop and test gear types, determine what proportion of the available fish they can catch, and determine the survival rates of fish released from them. Moreover, for the work to be scientifically defensible the study will be done according to an experimental design that can be analyzed statistically. However, because the work involves fishing gear not used commercially in the Lower Columbia in several decades, it is impossible to do the full-scaled study without a development period. Thus, the first year will be very much a pilot study, with three objectives, listed in order of emphasis:

- 1) Evaluate three fishing gears: modified purse seine, beach seine, and Merwin trap. Through repetitive use, learn how to use the gear effectively, determine if the gear needs to be modified and if possible, modify accordingly.
- 2) Evaluation and refinement of protocols established to sample, tag, and release fish to assess the immediate and long-term impacts each gear type imposes on the fish it captures.
- 3) Determine the relative catch per unit effort of each gear.

Methods

Evaluation of Fishing Gears

Test gear will be operated for approximately one month, from about August 24 to September 27. All gears will be used on 10-13 days, with about half those days being fishing only and the other half used for fishing and sampling. Fishers using the three gears will use their gear under a variety of conditions (e.g., different tidal stages, light levels, weather conditions). This work will help refine how the gears should be fished, indicate whether a gear needs to be modified, and provide important information on how long it takes to make a set and process a catch under conditions that would be similar to those in a commercial fishery. An observer on each boat will record the details of each gear deployment and the number of fish caught. Details will vary somewhat by gear type, and prepared data sheets will be provided.

Merwin trap- every set the following should be recorded: 1) date, time, gear type, samplers, and fishers; 2) GPS coordinates and verbal description of location; 3) number of fish caught by species; 4) number of fish tagged and released by species; 5) observations on condition of fish (liveliness, injuries); 6) water and air temperatures; 7) weather and water conditions; 8) presence of marine mammals

Beach seine- every set the following should be recorded: 1) date, gear type, set number, samplers, and fishers; 2) times of set and pursing completion; 3) GPS coordinates and verbal description of location; 4) number of fish caught by species; 5) number of fish tagged and released by species; 6) observations on condition of fish (liveliness, injuries); 7) water and air temperatures; 8) weather and water conditions; 9) presence of marine mammals

Modified purse seine- every set the following should be recorded: 1) date, gear type, set number, samplers, and fishers; 2) times of set and time pursing is completed; 3) GPS coordinates and verbal description of location; 4) number of fish caught by species; 5) number of fish tagged and released by species; 6) observations on condition of fish (liveliness, injuries); 7) water and air temperatures; 8) weather and water conditions; 9) presence of marine mammals

Experience with previous research of this sort has demonstrated that it is important for gears and boats to be marked with a conspicuous sign that clearly indicates the gear is part of a research investigation. Further, enforcement should be notified of fishing dates for each gear so that their duties are not interfered by public calls that illegal fishing is occurring.

Evaluation and Refinement of Handling and Sampling Protocols

Handling

In real fishing operations, not only do the gears have to catch fish, they also have to be operated in a way that fish can be released from them with minimal harm. Thus, a key part of the first year's work will be to learn how to release subsets of captured fish alive. In subsequent years we will need also to measure the survival of the released fish, which will involve at least assessing

their condition and applying one or more tags, and perhaps taking tissue samples, so we also need to gain some experience with these activities the first year. This handling of fish for scientific reasons is considerably more complicated and time consuming than the routine handling for release that would be done during normal fishing, but it will be essential in later years so it is important that we gain experience with it the first year. However, we do not want it interfering with the first objective. Therefore, as previously mentioned, fishing days will be divided into days of pure fishing and days of combined fishing and sampling/tagging.

Ongoing experimental design work, coupled with year-1 tagging and recovery results, will determine the relative roles external and internal tags will play in the long run evaluating survival rates. Our experience has been that external tags are detectable with little expense, but recovery rates are low. Internal tags (PIT tags in our case) can have high recovery rates, but detection can be expensive. This year we will use mainly external tags (jaw and spaghetti tags) but also tag a portion of the fish with PIT tags. To evaluate tag loss we will also opercle-punch each tagged fish (these punches can also serve as DNA samples, if needed for this purpose). Our goal in year 1 is to tag 500 coho from each gear with both external tags, 500 Chinook from each gear with both external tags, and 100 of the externally tagged Chinook from each gear with PIT tags.

A key unknown at this point is whether fish will need to be anesthetized during sampling and tagging, and if so, how to accomplish anesthesia and recovery. Therefore, we have developed three basic fish handling protocols listed below in order of preference, and modified somewhat based on gear type. Some general principles apply regardless of which handling option is used.

A rubberized hand net should be used net to brail the fish from the gear to a tote of fresh river water, workup should be done as quickly as possible, and the fish should be released in such a way that they won't be recaptured by the gear. In addition to the person brailing the fish into the tote, at least two people and preferably three (one for recoding data and two for sampling and tagging) will be needed. Fish should be held with one hand supporting the head and the second holding the caudal peduncle. It will be easiest to have only one fish in the tagging tote at a time. Multiple totes should be placed as close as possible to each other so that fish can be moved from with minimal time out of the water. The recommended tote is the common and readily available (WDFW owns several) DACO IB1803. This insulated container is 42"L x 24"W x 26"H, and has a 67-gallon capacity. This size tote has been used in numerous harvest gear studies and allows the fish to be tagged efficiently and easily recaptured if they escape from one's grasp.

Option A: Two totes are used. Fish are placed in the first tote of fresh river water for tagging and data collection then placed in the second tote and allowed to recover before returning them to the river. The second tote can be the same size as the tote used for tagging fish. Or, if space allows, the second tote could be larger; this will allow more fish to be recovered at one time and will speed up fish tagging because the operation won't be limited by the number of fish in the recovery tote.

Option B: Same as option A, but uses sodium bicarbonate as anesthetic (642 ppm, pH of 6.5-7.5) in the first tote.

Option C: Two totes are used. Multiple fish are placed in the first tote and then individually moved to a second tote for tagging. Provided the fish are actively swimming, they can be released into the river immediately after tagging and collection of biological data. Fish that need further revival time can be placed back into the first tote. Because they have a visual tag, they can be distinguished from fish that have not been tagged. The first tote could be the same size as the tote used for tagging fish but if space permits it will be larger than the tote used for tagging fish; this will allow more fish to be collected at one time and will reduce the time needed for the fisherman to collect fish for tagging.

Although all three options recommend a larger tote for the recovery role, this will probably be impractical for the Merwin trap and modified purse seine, where all fish handling has to occur on the boat. For the beach seine, where the operations will not be on a boat, the desired tote configuration would be one standard tote and a much larger one for holding/recovery. The recommendation here, based on previous work, is a DACO DX333 (48”L x 48”W x 46”H), which has a 293-gallon capacity. The large tote is best filled using a pump, and can be equipped with a recirculation (bilge) pump that pumps water through a standpipe filled with bio-rings for aeration. To further reduce stress to the fish, ice blocks and four cups of salt can be added.

Sampling and Tagging

The following data should be collected for each fish: 1) species; 2) fork length; 3) sex; 4) adipose fin clip (hatchery or wild); 5) visual tag type, color and number; 6) opercle punch side and number of punches (left for beach seine, right for purse seine, both for Merwin trap); 7) PIT tag syringe number (or PIT tag code if fish is already PIT-tagged); 8) tag number if fish is a recapture; 9) condition.

For the sake of consistency, condition will be rated according to a scheme developed for tangle-net research, the scale used previously for WDFW tangle-net research will be used: 1=lively, not bleeding; 2= lively, bleeding; 3= lethargic, not bleeding; 4= lethargic, bleeding; 5=no visible signs of life; 6=fish was clearly dead on arrival because of pinniped predation. Only fish in condition 1-4 should be tagged, but occurrence of fish in condition 5 or 6 should be noted.

A cm tape that is glued or taped on the lip of the tote will enable staff to quickly collect a fork length (FL). The fish should be turned belly up and lifted up to where the tape is and FL measurement quickly collected. When the FL is collected the fish will be out of the water briefly. Care should be taken to keep the fish in water and have water over the gills as much as possible because being out of the water is very stressful to fish. Opercle punches and jaw tags (on the left jaw only, so it will be noted at Bonneville Dam) can be applied at this point. While the fish is in this inverted position, it can be scanned with a PIT tag detector to determine if the fish already has a PIT tag, and if so, the number is recorded. If the fish is to be PIT-tagged, the tag is applied

by insertion the tag into the ventral cavity near the pelvic girdle using a pre-numbered syringe. The syringes are pre-numbered so that the PIT tag code is already assigned to the numbered syringe. This saves much time because the PIT tag codes are long. The syringes can be re-used but need to be soaked in alcohol prior to being re-used. The final step in the tagging operation is to turn the fish upright and apply the spaghetti tag on the left side.

Tag Recovery

Visual tags will be retrieved by fishers, hatchery workers, and spawning ground surveyors. When tagged fish are encountered, the following information should be collected: tag color, tag number, species, location, date, agency or collector name, and telephone number (the latter in case clarification is needed as well).

Estimates of post-release survival rate depend on tag recoveries, the higher the number of tags recovered, the more precise the estimates. To encourage reporting of tag interceptions from anglers, laminated posters will be placed at boat ramps and fishery samplers will be informed about what tags to look for and information to collect. A press release issued by WDFW will also assist in publicizing the tagged fish. An example of a poster used in previous studies can be found at <http://wdfw.wa.gov/fish/commercial/selective/index.htm>.

Federal, tribal, and state agencies that may encounter fall Chinook and coho salmon from this study will be contacted, sent posters, and asked for their support in this crucial research. Tule Chinook and coho can be expected on the spawning grounds in virtually all lower Columbia tributaries, but because most of the recoveries will come from hatcheries. Hatchery staff at all state facilities below Bonneville on both sides of the river must be contacted. In addition, staff at Spring Creek National Fish Hatchery will be contacted, because that hatchery produces approximately one-third of the Chinook that will be encountered.

PIT tags will be detected at 90% or above at Bonneville Dam, but only Spring Creek fish will pass above the dam. Elsewhere, actual PIT-tag recovery will depend on staffers checking externally marked fish for PIT tags using a handheld detector. This will become a larger effort in future years if PIT tags play an important role in future work. However, this year use of detectors will be very limited. Because PIT-tagged fish will also be externally marked, recovery of an externally marked fish will also be considered a PIT-tag recovery. Detectors will be used at only one hatchery, for purposes of assessing PIT tag loss. In addition we will ask that untagged opercle-punched fish be scanned for PIT tags if detectors are available, or put aside for later scanning by project personnel. The group that manages the central database for PIT tags, PTAGIS, should be contacted and made aware of this project. Further, the PIT tag codes that will be used should be entered into PTAGIS before the study begins so that they are not listed as “ghost fish.”

Determination of Relative Catch per Unit Effort of Fishing Gears

The relative effectiveness of gears must be considered when selective fishery regimes are implemented, and is especially important in the initial stages of the study, when there are a variety of gear options. This will be done first by contrasting the potential number of fish each gear type may catch per day. This value equals catch per set (CPUE) times the number of sets that can be made per day.

2009 Alternative Gear Study

| Date | Gear Type | Species Caught | | | | | | Comments |
|-----------|-----------|----------------|---------------|-------------|------------|-------------|------------|-------------------------------|
| | | Chinook Adults | Chinook Jacks | Coho Adults | Coho Jacks | STHD Adults | STHD Jacks | |
| | | | | | | | | |
| 8/25/2009 | Purse | 3 | 1 | 3 | 1 | 1 | | |
| | | | | | | | | |
| 8/26/2009 | Beach | | | | | | | |
| | | | | | | | | |
| 8/27/2009 | Purse | 1 | 1 | | | 3 | | 16 Fall Ck Smolts |
| | | | | | | | | |
| 8/29/2009 | Merwin | | | 1 | | | 1 | |
| | | | | | | | | |
| 8/30/2009 | Beach | 23 | 6 | 30 | 2 | 12 | | |
| | | | | | | | | |
| 8/30/2009 | Merwin | | | | | | | |
| | | | | | | | | |
| 8/31/2009 | Merwin | | | | | | | |
| | | | | | | | | |
| 8/31/2009 | Purse | 16 | 9 | 99 | 3 | 5 | | |
| | | | | | | | | |
| 8/31/2009 | Beach | 4 | | 24 | | | | |
| | | | | | | | | |
| 9/2/2009 | Purse | 22 | 4 | 13 | 2 | 4 | | |
| | | | | | | | | |
| 9/2/2009 | Beach | 4 | | 4 | | | | |
| | | | | | | | | |
| 9/3/2009 | Purse | 17 | 2 | 24 | | 4 | | |
| | | | | | | | | |
| 9/5/2009 | Merwin | | | | | | | Flood Tide over powered leads |
| | | | | | | | | |
| 9/6/2009 | Beach | | | 12 | | | | Tide to strong on third set |
| | | | | | | | | |
| 9/7/2009 | Beach | 2 | | 11 | | 3 | | |
| | | | | | | | | |
| 9/7/2009 | Purse | 13 | 5 | 37 | | 5 | | 4 Fall Ck Smolts |
| | | | | | | | | |
| 9/8/2009 | Beach | | | | | | | Three good sets, no fish |
| | | | | | | | | |
| 9/9/2009 | Purse | 26 | 3 | 22 | | 12 | | |

