Biological Assessment of Incidental Impacts on Winter Steelhead Listed Under the Endangered Species Act in Non-Indian Mainstem Columbia River Fisheries

Submitted by the
Washington Department of Fish and Wildlife
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Introduction

The states of Washington and Oregon are requesting a reinitiation of consultation with National Marine Fisheries Service (NMFS) regarding the Section 7 Biological Assessment of mainstem fisheries covered under the "Interim Management Agreement for Upriver Spring Chinook, Summer Chinook, and Sockeye" (*U.S. v Oregon* 2001) and the associated Biological Opinion (NMFS 2001). The states' proposal is to increase the incidental impacts for mainstem Columbia River fisheries from the current guideline of 2% to a new guideline of 6% for wild steelhead returning to Lower Columbia, Upper Willamette, and Middle Columbia Evolutionarily Significant Units (ESU's) during 2004 and 2005. The states' intent would be to manage for an impact rate of 5% with a 1% buffer for management error (e.g. run size forecast errors), which would result in an overall maximum impact guideline of 6%. This Biological Assessment has a two-year duration, which coincides with the expected completion of the Columbia River Fish Management Agreement (CRFMA). It is expected that the CRFMA will be in effect by 2005 and further discussion regarding the management of winter steelhead will occur during that time.

As part of this proposal the states will evaluate the conservation status of Columbia River wild winter steelhead. Additionally, the states will provide data and analyses that support the management actions included in this proposal that are consistent with recovery and sustainability goals for these steelhead populations. The states believe that the current status of wild winter steelhead and the needs of developing commercial fisheries targeting hatchery spring chinook warrant a larger impact rate guideline on steelhead than is currently in effect. The states are intent on minimizing encounter rates for wild winter steelhead to the fullest extent possible through the use of time, area, and gear restrictions; however, due to overlapping run timing of winter steelhead and Willamette hatchery spring chinook plus the requirement to maximize the survival rate of released fish, steelhead encounters in small mesh tangle net fisheries will increase in comparison to past fisheries using large mesh gill nets. In recognition of this reality the states propose to manage fisheries in 2004 and 2005 under new Endangered Species Act (ESA) guidelines for wild winter steelhead. This document will present the states justification for managing non-Indian fisheries in the mainstem Columbia River downstream of Bonneville Dam to a new maximum impact rate guideline for wild winter steelhead of 6% during 2004 and 2005, as compared to the current guideline of 2%.

Background

State managed fisheries in the Columbia River have become more restricted over time as various salmonid populations declined. All Columbia Basin anadromous salmonids were reviewed under ESA during the 1990s and many were listed so that now nearly all sub-basins within the Columbia and Snake rivers contain ESA-listed stocks. Constraints on fisheries in the Columbia River increased with ESA listings, which also coincided with a period of poor ocean rearing conditions. Since about 2000, ocean-rearing conditions improved and run sizes of most anadromous salmonid stocks returning to the Columbia River have also increased.

Over the years the states of Washington and Oregon have taken significant actions to reduce wild steelhead impacts in fisheries. Directed commercial harvest of wild steelhead by non-Indian fisheries was eliminated when commercial sales of steelhead were prohibited in 1975. Selective sport fisheries that target hatchery steelhead, but require the release of wild steelhead, were adopted for summer steelhead in 1984 and for winter steelhead in 1994. Incidental commercial harvest of steelhead by non-Indians has been restricted by time, area, and gear restrictions that limited handling and mortality of steelhead in the non-Indian commercial gillnet fishery to less than 1% of the run.

When steelhead were initially listed under the ESA the states prepared Biological Assessments of the impacts of non-Indian fisheries on listed steelhead stocks. At the time this Biological Assessment was completed both sport and commercial fisheries targeted either hatchery steelhead or other salmon stocks and various methods were already in place to reduce handle of steelhead in the commercial fishery; therefore, the states estimated that impacts to wild steelhead in all mainstem fisheries combined would be less than 2%. For the commercial fishery large mesh gear was employed during the winter and spring months to avoid steelhead encounters and direct the fishery towards harvestable spring chinook. The expectation that fisheries impacts would be less than 2% was based on how the fisheries were designed rather than the relative health of the stocks or risk analyses that determined acceptable impact rates for wild winter steelhead. Additionally, the non-Indian impact rate of 2% was the total mainstem impact allowed on wild steelhead, which was not consistent with impact rates adopted for other Columbia River salmonid stocks.

Willamette River wild spring chinook were listed in 1999 and the Willamette River Spring Chinook Fisheries Management and Evaluation Plan (FMEP) was completed in February 2001. Mass marking, using coded-wire tags (CWTs) and adipose fin-clips, of Willamette Hatchery spring chinook and of hatchery spring chinook returning to lower Columbia River facilities in the Cowlitz, Kalama, and Lewis rivers began with the 1997 brood. Beginning in 2001, selective spring chinook fisheries requiring the release of unmarked spring chinook were implemented in accordance with the Willamette River spring chinook FMEP. While selective recreational fisheries that limit retention to fin-clipped fish were already in place for steelhead, the commercial fishery in the lower Columbia River previously had not participated in this type of selective fishery. Rather commercial fisheries were designed to be selective between stocks through the use of time, area, and gear restrictions to limit handle of non-target species. In accordance with the Willamette River spring chinook FMEP, the commercial fishery was now required to release unmarked spring chinook as well as other ESA-listed stocks, which required the development of new fishing methods for this fishery.

The states began investigations of new fishing techniques in accordance with the federal Biological Opinion on hydro-system operations (NMFS 2002). A selective fishery that restricts retention to only adipose fin-clipped spring chinook required the commercial fishery to implement fishing practices that significantly reduce post release mortality rates. The abrupt adoption of the Willamette River spring chinook FMEP required rapid changes to commercial fishing practices that had been in place for over a hundred years. The commercial industry was required to purchase new nets with small mesh to act as

"tangle nets" that catch fish in the teeth or near the face rather than by the body or gill covers, thereby reducing the post release mortality rate. In addition, the industry had to purchase fish recovery boxes and attend classes to learn proper fish handling techniques to maximize post release survival rates. Initial cost to the individual fisher of the new gear and recovery box was estimated at about $3,000. In accordance with the Willamette River spring chinook FMEP, the states and the commercial industry implemented these new selective fishing methods and changed the overall techniques of commercial fishing within the span of one year. Funding was provided for research to investigate the success of these new techniques and the associated post release mortality rates. The 3-year research project on spring chinook post release mortality rates was completed in 2003.

The selective commercial fishery for spring chinook using small mesh tangle nets is still a developing fishery. The states are requesting additional time to further investigate the appropriate fishing methods and the associated post release mortality rates in the lower Columbia River commercial fishery. The intent of the states is to refine the fishery so that it will focus harvest on hatchery spring chinook, minimize steelhead encounter rates, and maximize survival rates of released fish, including both steelhead and non-fin clipped spring chinook.

Steelhead Stock Status

Life History

The two adult life histories expressed by Columbia River Basin steelhead differ based on run and spawn timing. Winter steelhead enter the Columbia River during November through May and spawn during March through June while summer steelhead enter the Columbia River during April through October and spawn the following spring during February through April. Most lower Columbia steelhead spend two summers in the ocean before they return as adults to spawn in natal streams. Substrate composition, cover, water quality, and water quantity are important habitat elements for steelhead before and after spawning. Steelhead spawn in clear, cool, well-oxygenated streams with suitable gravel and water velocities. Adult fish holding prior to or in the process of spawning are vulnerable to disturbances and predation in areas without suitable cover. Cover types include overhanging vegetation, undercut banks, submerged vegetation, submerged objects, deep water, and turbulence. Juvenile wild steelhead usually rear in freshwater for one to three years before undergoing a physiological change to become smolts and out-migrating to sea. Wild steelhead smolts migrate from freshwater to saltwater during March through June.

Distribution

Winter steelhead are the dominant anadromous life history in the Coastal subspecies of *Oncorhynchus mykiss* and their range includes all tributaries of the Columbia River upstream to Fifteenmile Creek on the Oregon shore and the Klickitat River on the Washington shore. Major spawning areas include the Hood, Sandy, Clackamas, Molalla, Santiam, and Calapooia rivers in Oregon, and the Klickitat, Wind, Lewis, Kalama, Cowlitz, and Grays rivers in Washington.

Summer steelhead are the dominant anadromous life history in the inland subspecies of *Oncorhynchus mykiss* and their range extends upstream from The Dalles Dam. They are the only life history present above historic Celilo Falls, which was inundated with the construction of The Dalles Dam. Summer steelhead are indigenous to the Hood, Wind, Washougal, Lewis, and Kalama rivers also.

The NOAA Fisheries has grouped populations of Columbia River steelhead into six different ESUs: Southwest Washington, Upper Willamette, Lower Columbia, Middle Columbia, Upper Columbia, and Snake River. The Southwest Washington and Upper Willamette ESU's include only winter steelhead. The Lower Columbia ESU includes both winter and summer steelhead, with winter steelhead comprising more than 80% of the total abundance of steelhead in the Lower Columbia ESU (Chilcote 2003a). The Middle Columbia ESU is largely comprised of summer steelhead; however, a few winter steelhead are found in the Western portion of this ESU (e.g., Klickitat and Fifteenmile basins). In terms of abundance, winter steelhead represent less than 3% of the steelhead belonging to the Middle Columbia steelhead ESU (Chilcote 2003a). The Upper Columbia and Snake River ESUs are comprised completely of summer steelhead.

Description of ESA-listed Populations

The NMFS described six Evolutionarily Significant Units (ESUs) of steelhead in the Columbia Basin (Busby et al. 1996). Five of the six ESUs were listed under ESA during the late 1990s: Lower Columbia, Upper Willamette, Middle Columbia, Upper Columbia, and Snake ESUs (63 FR 13347, 64 FR 14517, and 62 FR 43937). Only the Upper Willamette and Lower Columbia ESUs are expected to be impacted in any significant numbers by fisheries described in this Biological Assessment. Unless otherwise noted, the listed component only includes wild/naturally-spawning populations.

1) Southwest Washington steelhead, not listed. This ESU includes all naturally spawned populations of winter-run steelhead in river basins of, and tributaries to, Grays Harbor, Willapa Bay, and the Columbia River below the Cowlitz River in Washington and the Willamette River in Oregon.

2) Upper Willamette River steelhead, listed as threatened on March 25, 1999 (64 FR 14517). This ESU includes all naturally spawned populations of winter-run steelhead in the Willamette River, Oregon, and its tributaries upstream from Willamette Falls to the Calapooia River, inclusive.

3) Lower Columbia River steelhead, listed as threatened on March 19, 1998 (63 FR 13347). This ESU includes all naturally spawned summer-run and winter-run populations of steelhead in the Columbia River Basin and tributaries between Cowlitz and Wind rivers in Washington and the Willamette below Willamette Falls (including the Scappoose and Clackamas) and Hood rivers in Oregon.
4) Middle Columbia River Basin steelhead, listed as threatened on March 25, 1999 (64 FR 14517). This ESU includes all naturally spawned summer-run and winter-run populations of steelhead in the Columbia River Basin and tributaries from Little

White Salmon River upstream to Yakima River, Washington, inclusive and from Mosier Creek, Oregon upstream to the confluence of the Snake River.

5) Upper Columbia River Basin steelhead, listed as endangered on August 18, 1997 (62 FR 43937). This ESU includes the Wells Hatchery stock and all naturally spawned summer-run steelhead populations from Chief Joseph Dam downstream to Priest Rapids Dam, Washington. Listed hatchery origin steelhead are released in the Wenatchee, Methow, and Okanogan sub-basins as well as from Ringold Hatchery. Approximately 52% (43% not including Ringold) of the listed hatchery releases for this ESU are adipose fin-clipped. There are no non-listed hatchery steelhead released within the boundaries of this ESU.

6) Snake River Basin steelhead, listed as threatened on August 18, 1997 (62 FR 43937). This ESU includes all naturally spawned populations of summer-run steelhead in the Snake River Basin below Hells Canyon Dam in southeast Washington, northeast Oregon, and Idaho. It includes two sub-groups described as Group "A" and Group "B" steelhead.

Review of Past Fisheries and Impacts

Mainstem non-Indian fisheries occurring during January through May are directed at species other than steelhead and impacts to steelhead are incidental and minor. The first targeted steelhead fishery occurs in mid-May with the lower Columbia River steelhead sport fishery opening annually on May 16. Various techniques have been used in Columbia River fisheries to minimize impacts to non-target stocks and to provide protection to weak stocks. Gear restrictions and time and area closures have been employed successfully for commercial fisheries while sport fisheries have required the release of all non-fin clipped steelhead in recent years.

Sport catch of winter steelhead in the Columbia River ranged from zero to 1,600 since 1991 and averaged 258 fish kept, based on sampling for winter steelhead conducted during February, March, April, and October. Winter steelhead fishing is closed during April through mid-May unless salmon fishing is open and only a minor winter fishery occurred during November through January.

Prior to 2001, the commercial fishery in the winter/spring time frame employed large mesh gill nets which limited steelhead handled in this fishery to minor levels. In 2001, the Willamette River spring chinook FMEP became effective and required the release of all non-fin clipped salmon. In an effort to decrease post release mortality rates of wild spring chinook and steelhead, the states and the commercial fishing industry chose to use a small mesh tangle net to harvest hatchery-produced spring chinook.

In 2002 a large return of steelhead resulted in a large number of steelhead being handled in the commercial fishery. Additionally, the use of 5½ mesh nets in the 2002 fishery resulted in high post release mortality rates and a larger than expected impact rate on wild winter steelhead. The fishery consisted of 15 fishing days between February 25-March

27. Landings totaled 14,238 (28,727 total handle) spring chinook and impact rates were 0.70% for upriver spring chinook and 4.9%-14.5% for wild winter steelhead (TAC 2003).

In 2003 the states used a combination of large mesh gill nets (8" minimum mesh size) and small mesh tangle nets (4¼" maximum mesh size) to harvest hatchery produced spring chinook. Large mesh gear was used early in the season to minimize steelhead handle when abundance of Willamette hatchery spring chinook was expected to be high and the abundance of listed spring chinook was expected to be low. Small mesh nets were used later in the season to maximize release survival rates as abundance of listed upriver spring chinook began to increase. The fishery consisted of three fishing days: two with large mesh gear in mid-February and one with small mesh gear in mid-March.

The 2003 fishery produced landings of 3,056 spring chinook kept and 2,385 spring chinook released. Additionally, an estimated 2,097 steelhead were handled in this fishery, of which 1,043 were wild winter steelhead. The final run size estimate for wild winter steelhead returning to the Columbia River in 2003 was 26,700 adults and the post-release mortality rate for steelhead handled during the 2003 fishery was 35% for fish captured using large mesh nets and 20% for fish captured using small mesh nets. Using the aforementioned catch estimates, run size, and post-release mortality rates for net caught wild winter steelhead, an estimated 1,043 wild winter steelhead were caught, of which 229 were estimated to be post-release mortalities. Therefore, the 2003 spring chinook net fishery resulted in a 0.86% incidental impact rate on wild winter steelhead (Table 1).

Table 1. Incidental impacts on wild winter steelhead for 2003 spring chinook net fishery.

Fishery Data	
Catch: 1,043 wild winter steelhead	
Release Mortalities: 229 wild winter steelhead	
Run Size Estimates	
Return to the Columbia River mouth:	26,700
Escapement past fisheries:	26,471
Impact Rate	
Wild winter steelhead entering the Columbia River:	0.86%

The maximum mesh size of tangle net gear used in the 2003 fishery was reduced to 4¼", as compared to the 2002 fishery when the maximum mesh size was 5½. The 4¼" maximum mesh size restriction was implemented to ensure that the net used in this fishery performed like a tangle net for both spring chinook and steelhead and thereby reduced the mortality rate of steelhead handled in this fishery. If a 4¼" maximum mesh size regulation had been in effect during the 2002 fishery the post release mortality rate would have been reduced to about 20% (20% used in 2003 fishery and 18.5% to be used in 2004 fishery) and the resulting impact rate to wild winter steelhead would have been 4.9% to 6.4%.

Some handle of summer steelhead does occur during this fishery, especially during the last half of March. The bulk of the summer steelhead return (>90%) occurs after the end of March; therefore, summer steelhead typically comprise only a small portion of the total steelhead handle in this fishery. Based on analysis of the 2002 fishery, summer steelhead comprise 5% of the catch during the early part of the fishery (prior to about March 3), 15% of the middle part of the fishery (about March 3-16), and 25% during the later part of the fishery (after March 16). The number of summer steelhead by time period were estimated consistent with the analysis completed in 2002 and the range of estimates for summer steelhead (TAC 2003). Actual numbers of summer steelhead are unknown.

The impact rate to wild steelhead resulting from the spring chinook net fishery is estimated as a total number for all ESUs combined. Mortalities are not estimated for individual ESUs. The primary ESUs impacted by this fishery are the Southwest Washington, Upper Willamette, and Lower Columbia. The Lower Columbia ESU includes a significant number of summer steelhead and the Middle Columbia ESU is comprised almost entirely of summer steelhead; therefore, actual impacts to these ESUs are less than the impact rate estimated for wild winter steelhead.

Fishery Management

Selective commercial fisheries for spring chinook in the lower Columbia River will continue to require release of non-fin clipped spring chinook as long as there is a need for protection of wild stocks and this requirement is included in the Willamette River spring chinook FMEP. The states will continue to evaluate the best methods for reducing post release mortality of released fish and to reduce steelhead encounter rates in the commercial fishery.

The states will continue to implement and evaluate various selective fishing techniques for the commercial fishery to provide for conservation of listed or depressed stocks while allowing effective fishery management. In 2003, the states provided the NMFS with a list of management actions and conservation measures that would be employed to minimize the handle and mortality of steelhead in the commercial fishery targeting hatchery produced spring chinook and those actions are listed below. The states will continue to evaluate the best fishing methods and will modify the following management actions as necessary to provide additional protection for listed stocks.

<u>Management Actions and Conservation Measures introduced in 2003</u>

The management actions and conservation measures listed below were enacted prior to and during the 2003 fishery to minimize steelhead handle and mortality. These management actions and conservation measures will be implemented in 2004 and 2004 as well.

1. The *U.S. v Oregon* Technical Advisory Committee (TAC) will provide a pre-season run size forecast for wild winter steelhead prior to the start of the winter season commercial fishery. By managing for a mortality rate of wild winter

steelhead, it is expected that the mortality rate estimates for summer run steelhead of the same ESUs will be conservative.

2. Large mesh nets (8-inch minimum mesh) may be used during the late February time frame to reduce the overall handle of steelhead. Based on observations from previous winter season fisheries, the steelhead handle is greatly reduced using the larger mesh nets. A summary of that information can be found in the "Joint Staff Compact Report" dated January 23, 2003.

3. Tangle nets with a maximum mesh size of 4¼" will be used. Based on analysis of steelhead size versus mesh size, it is estimated that approximately 96% of the steelhead will be tangled in 4¼" mesh nets. Details of that analysis can be found in the TAC report titled "Steelhead Handle and Mortality Impacts in the 2002 Non-Indian Spring Chinook Tangle Net Fishery" dated January 22, 2003.

4. The fishery will be managed to have minimal days of fishing during the time frame when it is expected that wild steelhead will be in greatest abundance in the lower Columbia River, typically during mid to late March.

5. Test fishing may be conducted to determine timing of wild steelhead in relation to timing of hatchery spring chinook to maximize the ratio of hatchery chinook to wild steelhead and listed spring chinook.

6. Voluntary use of steelhead excluders by the commercial fishers has been encouraged. The excluder panel is designed to be incorporated at the top of the net and will pass steelhead completely through without being captured. The excluder panel is defined as being a minimum of five feet in depth and with a 12" minimum mesh size restriction. A significant portion of the fleet is expected to use the steelhead excluder panel in 2004. If sufficient data is collected to determine positively that the use of steelhead excluders will reduce steelhead handle, the Compact may choose to require excluders as part of future fishery gear regulations.

7. Use of recovery boxes, short soak times, and reduced net length are mandatory. These restrictions are the same as those in place in 2001 and 2002 and will be required during the entire winter/spring season. These measures will help increase the overall survival of fish that are released.

Additional Management Actions and Conservation Measures for 2004 and 2005

The following management actions and conservation measures will be enacted prior to or during the 2004 fishery to minimize steelhead handle and mortality:

1. Adoption of a commercial fishing plan occurred at the February 5, 2004 Compact hearing. This fishing plan sets forth a schedule for test fishing, decision making dates, and possible commercial fishing dates to ensure that the fishery focuses harvest on hatchery Willamette spring chinook and minimizes handle of listed spring chinook and steelhead. The plan will provide data necessary for fishery management purposes. Test fishing will provide data for fishery managers use when estimating catches and impacts expected during any proposed fishing periods.

2. Fishing period lengths will not exceed 16 hours. This is a significant reduction from 2002 when one fishing period extended for 72 consecutive hours. Short fishing periods should result in a more efficient fishery and reduce bycatch of listed species.

3. The minimum mesh size restriction for large mesh seasons was increased from 8" to 9" in 2004. Although the 8" minimum mesh size restriction used in 2003 was effective at reducing steelhead handle, some larger steelhead were captured in this gear. The 9" minimum mesh size regulation should nearly eliminate steelhead handle completely.

4. Adoption of larger sanctuaries around the Washington tributary mouths occurred at the February 5, 2004 Compact hearing. It is suspected that steelhead tend to mill around river mouth entrances prior to continuing their upstream migration into freshwater tributaries. Larger sanctuaries are intended to avoid steelhead holding at tributary mouths, thereby reducing the overall steelhead handle during the commercial fishery.

5. The 2004 fishery will attempt to limit commercial fishing during the 3rd to 4th weeks of March when wild winter steelhead abundance is at its peak. Fishing during this timeframe will be based on results of test fishing or previous commercial fishing periods. This management strategy may require some commercial fishing in April to reduce steelhead handle during late March.

6. The percent of the fleet using steelhead excluders will increase in 2004 in a voluntary effort by the commercial fishing industry to minimize encounter rates for wild winter steelhead. Although the use of steelhead excluders is not a requirement for 2004, the states may require it in 2005.

Management of Steelhead Impacts

1. The states will use information provided by the *U.S. v Oregon* Technical Advisory Committee (TAC) concerning post release mortality rates on steelhead when estimating impacts to wild winter steelhead.

2. On-board monitoring data and spring chinook landing estimates will be used to calculate impacts to wild winter steelhead (see monitoring plan below).

3. The Joint Staff and TAC will investigate the feasibility of in-season run size updates for wild winter steelhead using inseason escapement estimates as a predictor of the total run size. In 2003, early returns to Willamette Falls suggested that the wild winter steelhead run was larger than the preseason forecast; however, no formal run size update methodology was in place to update the run at that time.

4. The states will investigate potential run timing differences between steelhead populations within the effected ESUs. If data becomes available that documents run timing differences, the states will investigate methods to shape the fishery to avoid encounters with less productive stocks or further limit steelhead handle in general.

5. Mainstem Columbia River sport fishery impacts on wild winter steelhead are expected to be less than 0.1%.

In-season Management

The states inseason management strategy for the commercial fishery is expected to be similar to the strategy employed in 2003. The management actions and conservation measures described in this Biological Assessment will be utilized in 2004 and 2005. The fishery will be managed based on the preseason forecast provided by the TAC until inseason run size updates become available. The WDFW and ODFW staffs will conduct monitoring of the fishery, with possible help from some TAC members. The level of monitoring is expected to be the same as the previous two years, which included a total of 16 monitors. The information from the monitoring will be the same as that gathered in 2003 (see monitoring plan below). At the February 5, 2004 Compact hearing the states adopted the TAC recommended mortality rates of 18.5% for steelhead captured in small mesh nets ($\leq$ 4¼") and 30% for steelhead captured in large mesh nets ($\geq$ 8").

The states and industry representatives have developed a fishing plan for 2004, which includes test fishing prior to opening the fishery. The commercial fishing industry leaders have offered to provide test fishers on a volunteer basis to fish throughout the season to provide information on spring chinook stock composition and overall steelhead abundance. Monitors will be on-board for all test fishing. The states will use this information in determining when it is appropriate to set a full fleet fishery and which gear restrictions, primarily mesh size restrictions, should be adopted. The states believe test fishing will be a valuable tool to help determine when the best conditions are in place to

maximize harvest of hatchery spring chinook and minimize handle of steelhead and what is the best gear to accomplish this task. The states will be looking or a large percentage of Willamette hatchery spring in the catch and a low percentage of upriver spring chinook. The fishing plan calls for the full fleet fishery to occur within two days of the test fishery, which should assure that the conditions during the actual fleet fishery, in terms of spring chinook stock composition and steelhead abundance, will be the same as those observed during the test fishery. The use of steelhead excluders for 2004 is being strongly encouraged, but will not be mandatory in 2004. The states intend to collect additional information on the effectiveness of these nets and may require their use in 2005 and beyond. Information gathered in 2004 on the steelhead excluder will be added to the data from previous years and tested to see if there is a difference in steelhead catch with or without a steelhead excluder. The first test fishing day is scheduled for February 22, with a potential full fleet fishing day on February 24. The states are optimistic that the commercial fishery can be focused to occur during the months of February and March; however, there may be a need to allow a portion of the fishery to occur in the month of April to further avoid handle of steelhead. The states will use every device available to maximize opportunity for harvest of hatchery chinook and minimize steelhead handle.

Monitoring Plan for 2004

The states will monitor the 2004 fishery based on the successful monitoring programs conducted during the 2002 and 2003 fisheries. Staffing levels are likely to be similar to effort levels expended during 2002 and 2003. Data collected during 2002 and 2003 provided adequate data for fishery management purposes. Specifically, data collected will provide reasonable confidence intervals around point estimates of wild winter steelhead handled in this fishery (Whisler and North 2004). The goal of the monitoring program in 2004 and 2005 will be to collect unbiased data from this experimental demonstration fishery necessary to measure, evaluate, or describe effort and catch. Data collected will be used to describe:

- Kept and released catch by species
- Mark rate by species
- Impact rates on listed chinook and steelhead
- Species-specific immediate mortality rates
- Recovery box use and effectiveness

Additionally, the monitoring program will collect information concerning capture and release condition of non-target salmonids, net configurations (and associated catch) fished, use of and species-specific catch rates for nets equipped with steelhead excluders, and distribution of fishing effort within fishing zones.

Data will be used to describe catch and mark rates of target and non-target species or stocks, estimate numbers of kept and released catch, evaluate condition at capture and release of non-target salmonids (including immediate mortality rates), and track impact rates to listed stocks. Effort data will incorporate specific details of gear construction, net deployment and pick times, and fishing locations. The presence, type, and frequency of

voluntary use of nets incorporating steelhead excluding devices will be recorded, along with associated catch data to determine if species-specific catch rates of nets incorporating these modifications differ from nets without this option. Environmental data will be collected daily in each location to describe other factors that could potentially affect the fishery.

In addition to on-the-water monitoring, dockside sampling of the sold catch will occur at commercial buying and processing stations. Standard commercial fishery sampling protocol will be followed including a goal to sample a minimum of 20% of the landed commercial spring chinook catch for coded-wire-tag (CWT) recoveries and a minimum of 10% of the catch for samples of length, weight, sex, scales, and stock (visual stock identification). Data will be used to describe the relative stock components, determine age structure, and characterize other biological aspects of the sold catch. Total landings will be estimated by dividing landing data (pounds sold) from fish receiving tickets by average fish weights obtained from dockside sampling.

Both data sources (on-board monitoring and dockside sampling) will be used to evaluate and track the fishery in-season to ensure that ESA-related catch limits are not exceeded and other management goals are achieved. In-season impact estimates will be based on pre-season estimates of long-term post-release mortality rates. Estimates of the sold catch will be used in conjunction with onboard monitoring data to estimate the number of fish released by species. Estimates of released steelhead will include numbers of marked and unmarked fish. Specific data to be collected in the 2004 and 2005 commercial tangle net demonstration fishery is shown below:

- Environmental Data
  - Area
    - Commercial fishing zone
    - Drift
    - Geographic location
    - River mile
  - Date
  - Surface water temperature
  - Water clarity
  - Tidal stage
- Effort Data
  - Time: layout start/finish, pick start/finish
  - Gear
    - Presence/Absence and type of steelhead excluder (if applicable)
    - Net length
    - Mesh size
    - Number of meshes deep
    - Hang ratio
    - Presence of strings or slackers
    - Fishing depth of net
    - Mesh type

    - Recovery Box
        - Single/double
        - Size
- Catch Data
    - Adipose marked chinook: number of adults and jacks
    - Non-adipose marked chinook: number of adults and jacks, condition at capture/release, length of time in recovery box
    - Steelhead: number captured, fin marks present, condition at capture/release, length of time in recovery box
    - Presence of anchor tags and tag number indicating a previously encountered salmonid
    - Physical capture methods[a] of salmonids and estimate of scale loss (if feasible)
    - Other catch: number of sturgeon by species and size groupings, number of other species encountered
- Additional comments will be recorded including marine mammal interactions/loss of catch, problems or specifics of a particular drift, etc.

[a] Tangled: captured anterior of the opercle insertion, clamped: captured so gills are held shut theoretically restricting ventilation, gilled: captured under the operculum, and wedged: captured by the body

Population Status and Risk Analysis

Wild Steelhead Stock Status and Abundance Trends

Abundance estimates are for total wild winter steelhead returning to the Columbia River include all ESUs where wild winter steelhead exist. Total abundance by ESU has not been estimated due to the lack of data necessary for complete run reconstruction. Escapement data for wild winter steelhead index populations in the Upper Willamette, Lower Columbia, and Middle Columbia ESUs is summarized in Table 2. For the Lower Columbia ESU escapement estimates are available for nine of the 17 populations or subpopulations listed, and most are either on increasing abundance trends or have been relatively stable in recent years. The index stocks listed in the state's document represent about 53% of the populations within the Lower Columbia ESU. Within the Upper Willamette ESU, escapement information is available for five of six populations. Approximately 80% of wild steelhead produced in this ESU originate from these five populations. Information is also available for the ESU as a whole by evaluating passage over Willamette Falls. The Willamette Falls data set contains information on wild winter steelhead counts from at least 1990 and would represent the total escapement for the Upper Willamette ESU. For the Middle Columbia ESU, escapement information is not available for any of the winter steelhead populations. Other information listed in this Biological Assessment included stock assessments for steelhead belonging to the Southwest Washington ESU, which is not listed under the ESA. The states believe that this information helps document general health of wild winter steelhead in the lower Columbia River.

Table 2. Escapement Data Availability for Wild Winter Steelhead Populations within the Listed ESUs.				
Tributary	ESU	Esc. Data Available?	Increasing Trend in Esc?	Comments
Cispus	Lower Columbia	Some		Only recent few years
Tilton	Lower Columbia	Some		Only recent few years
Upper Cowlitz	Lower Columbia	Some		Only recent few years
Lower Cowlitz	Lower Columbia			
N. F. Toutle/Green	Lower Columbia	Yes	Yes	
S. F. Toutle	Lower Columbia	Yes	Yes	
Coweeman	Lower Columbia	Yes		
Kalama	Lower Columbia	Yes	Yes	
N. F. Lewis	Lower Columbia			
E. F. Lewis	Lower Columbia	Yes	Yes	
Clackamas	Lower Columbia	Yes	Yes	
Salmon	Lower Columbia			
Sandy	Lower Columbia	Yes		Stable since late 1990
Washougal	Lower Columbia	Yes		Low/Stable until 2003
Lower Gorge	Lower Columbia			
Upper Gorge	Lower Columbia			
Hood	Lower Columbia	Yes		Increased thru 2002
Molalla	Willamette	Yes	Yes	
N. Santiam	Willamette	Yes	Yes	
S. Santiam	Willamette	Yes	Yes	
Calapooia	Willamette	Yes	Yes	
Westside tribs	Willamette			
White Salmon	Mid-Columbia			Bonneville Dam
Fifteenmile	Mid-Columbia			Bonneville Dam
Klickitat	Mid-Columbia			Bonneville Dam

In general, the trend in wild steelhead abundance for the Lower Columbia and Willamette ESUs was a decline to low levels during the 1990s followed by increased returns beginning in 2000 (Tables 3 and 4). This pattern is illustrated in Figure 1 for eight key index populations belonging to the lower Columbia ESU and in Figure 2 for the primary populations of the Willamette ESU. The abundance trends during the 1990s observed for the Lower Columbia and Upper Willamette ESU's was common to Columbia River steelhead and resulted in five steelhead ESU's being listed under the ESA.

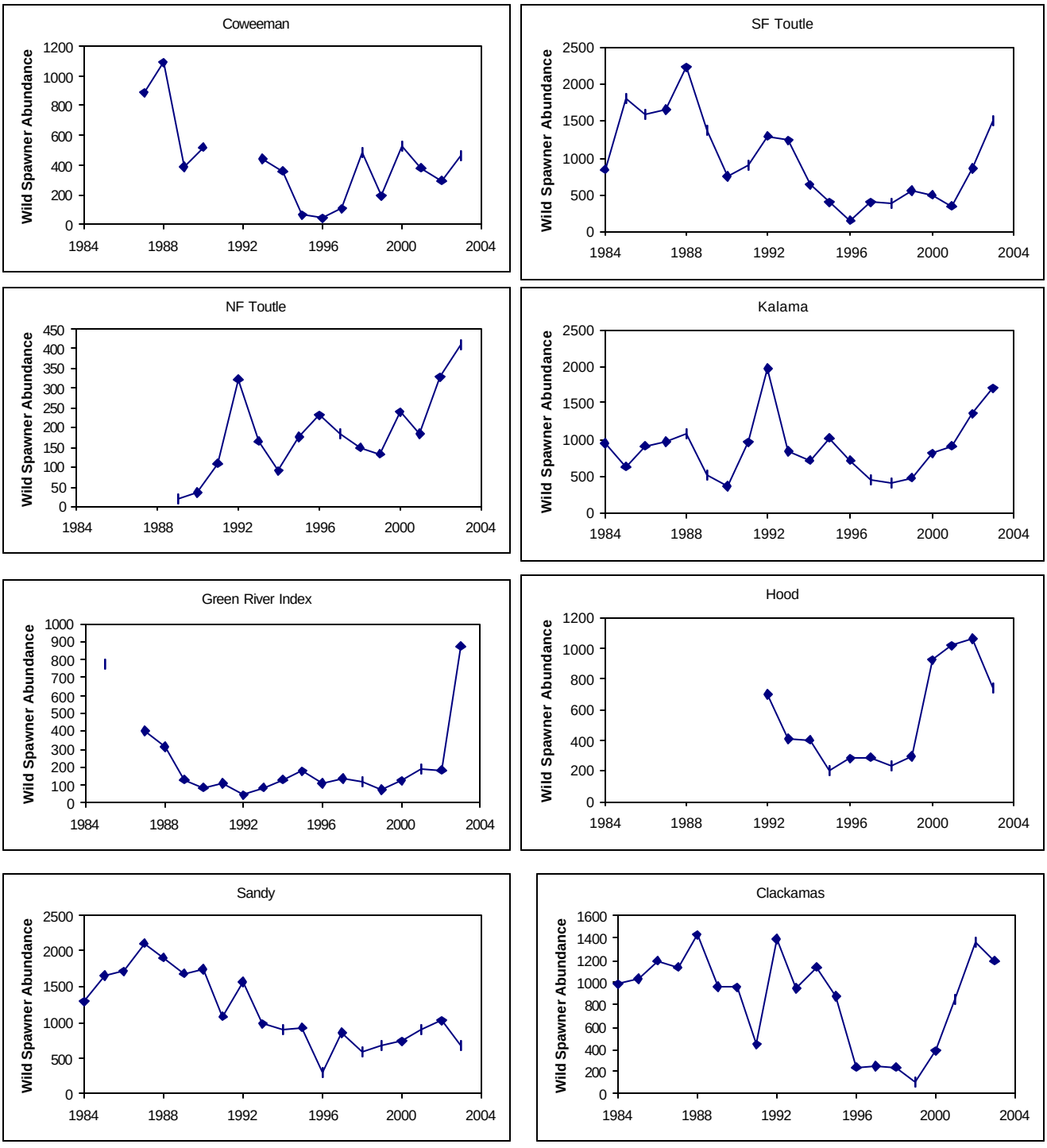

Figure 1. Annual spawner abundance estimates (or index counts) for wild winter steelhead returning to eight populations belonging to the lower Columbia ESU, 1984-2003.

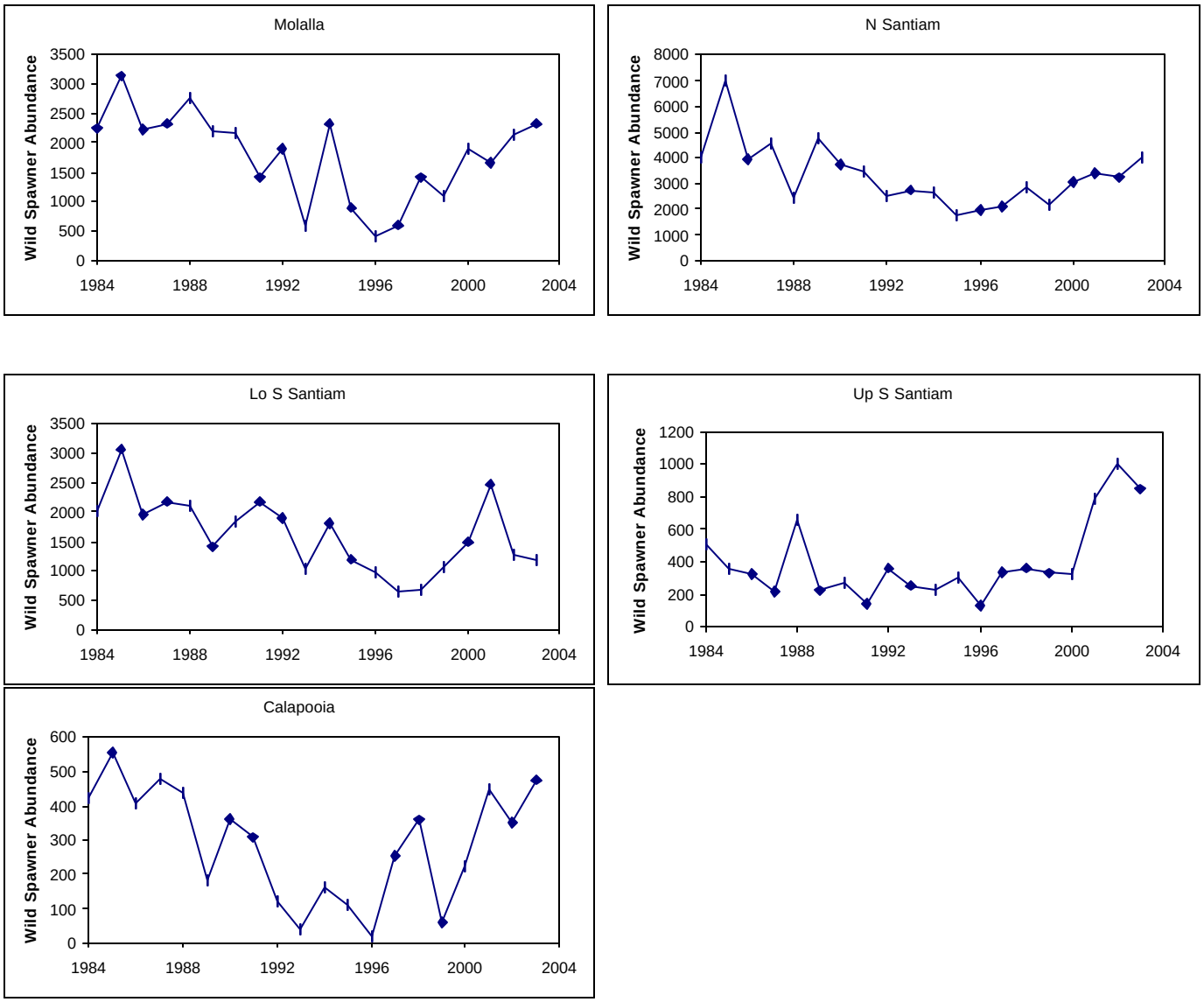

Figure 2. Annual spawner abundance estimates for wild winter steelhead returning to five populations belonging to the upper Willamette ESU, 1984-2003.

Table 3. Estimated spawner abundance of wild winter steelhead in index areas in Lower Columbia River ESU tributaries, 1984-2003.

Year	Coweeman	SF Toutle	NF Toutle	Kalama	Cedar Creek	Washougal	Green Index	EF Lewis Index	Clackamas	Sandy	Hood
1984		836		943					1,238		
1985		1,807		632			775		1,225		
1986		1,595		919				282	1,432		
1987	889	1,650		982			402	192	1,318		
1988	1,088	2,222		1,079			310	258	1,773		
1989	392	1,371	18	506			128	140	1,249		
1990	522	752	36	356			86	102	1,487	2,581	
1991		904	108	959		114	108	72	829	1,680	
1992		1,290	322	1,974		142	44	88	2,106	2,457	697
1993	438	1,242	165	843		118	84	90	1,174	1,378	411
1994	362	632	90	725		158	128	78	1,218	1,319	392
1995	68	396	175	1,030		206	174	53	1,131	1,415	203
1996	44	150	251	725	70		108		203	451	277
1997	108	388	183	456	78	92	132	192	273	1,177	285
1998	486	374	149	413	38	195	118	420	265	794	220
1999	198	562	133	478	52	294	72	476	133	530	298
2000	530	490	238	817	73		124		442	742	920
2001	384	348	185	922	41	216	192	328	893	902	1,013
2002	298	858	328	1,355	88	286	180	474	1,328	1,031	1,052
2003	460	1,510	410	1,699	237	764	876	652	1,230	671	608
Esc. Goal	1,064	1,058		1,000	328	520		204			

Table 4. Estimated spawner abundance of wild winter steelhead in selected populations in the Upper Willamette River ESU.

Year	Molalla	North Santiam	Lower S. Santiam	Upper S. Santiam	Calapooia
1984	2,244	4,010	1,997	504	420
1985	3,129	6,966	3,075	355	555
1986	2,226	3,944	1,964	326	407
1987	2,324	4,523	2,180	214	481
1988	2,757	2,444	2,106	656	439
1989	2,206	4,725	1,411	222	183
1990	2,155	3,707	1,846	272	360
1991	1,398	3,443	2,180	139	309
1992	1,898	2,484	1,906	361	119
1993	577	2,754	1,032	256	39
1994	2,321	2,619	1,811	234	161
1995	898	1,755	1,204	297	109
1996	398	1,955	972	131	18
1997	590	2,106	642	336	253
1998	1,411	2,835	684	359	358
1999	1,090	2,163	1,076	328	59
2000	1,898	3,021	1,499	326	225
2001	1,654	2,375	2,485	783	446
2002	2,140	3,227	1,274	1,003	351
2003	2,321	4,010	1,179	850	477

Forecasting Methodology

In 2003, the TAC reviewed a number of methods of forecasting wild winter steelhead returns based on average smolt survival, 1-salt summer steelhead returns in the previous year, average index area expansions, and average wild winter steelhead returns. A forecasting methodology was developed based upon the relationship between the abundance of wild 1-salt summer steelhead counted at Bonneville Dam and the estimate of wild winter steelhead for the next year. Paired data (1-salt summer-run counts and wild winter run estimates) for the years 1993 to 2002 were used to establish what was believed to be a predictive relationship. Based upon this relationship, the 2003 return for wild winter steelhead was predicted to be 15,500 fish with a likely range from 11,400 to 22,200 fish. The actual wild steelhead return in 2003 came in considerably higher at approximately 27,000 fish (Figure 3).

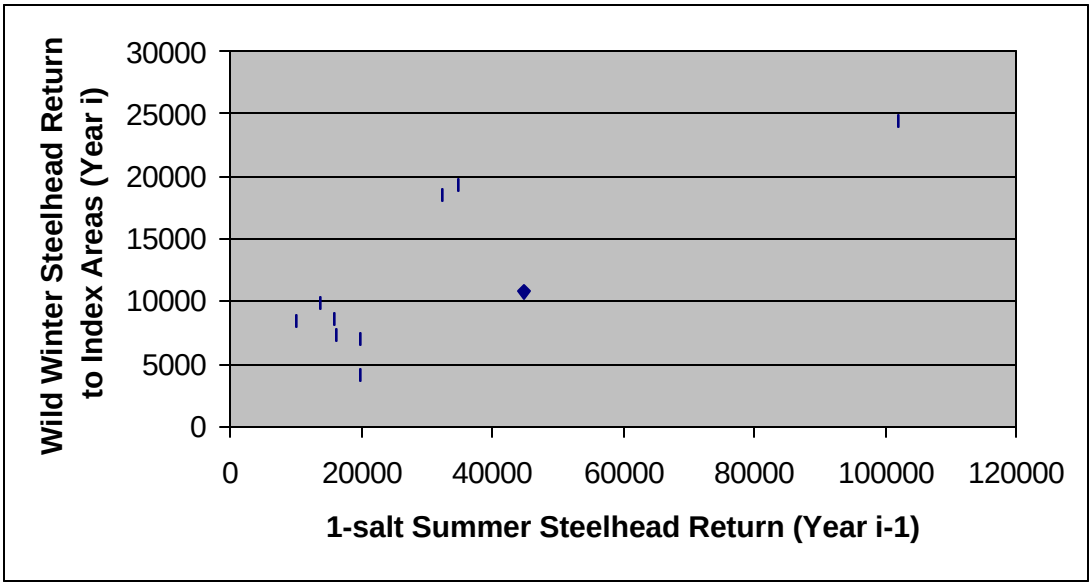

Figure 3. Correlation between wild winter steelhead returning to index areas and returns of 1-salt summer steelhead in the preceding year.

The *U.S. v Oregon* TAC committee met on January 29, 2004 to discuss forecasts for 2004 wild winter steelhead. The TAC reviewed a variety of methods in 2003 and evaluated those same methods in 2004. The TAC is predicting a total Columbia River mouth return of 32,200 wild winter steelhead in 2004. The forecast is based on the recent two-year average run sizes in 2002 and 2003 of 37,700 and 26,700, and is within the range of other estimates examined. The TAC also looked at the relationship between wild 1-salt summer steelhead at Bonneville Dam versus wild winter steelhead abundance in Washington and Oregon index areas. A positive relationship was evident showing a relationship between the two groups and produced an estimate of 16,700 for the index areas ($r2 = 0.64$). Expanding this estimate of the index areas to total run size (0.67) produced a forecast of 25,000 for 2004. This was the same methodology that was used in 2003 and underestimated the actual return by approximately 40% (15,500 predicted versus 26,700 actual). The TAC then considered using a correction factor for this estimate based on the forecast error observed in 2003, and that produced an estimate of 43,800 to the Columbia River mouth. The TAC concluded that because there was a positive trend in the relationship between wild 1-salt summer steelhead at Bonneville Dam and wild winter steelhead run size the following year, an increase in the wild winter steelhead forecast from the 2003 return was supported by the increase in wild 1-salt steelhead abundance in 2003. Although the magnitude of the change within the two stocks is not the same, both stocks increase or decrease at the same time. The TAC believes this is likely an indicator of good ocean survival and expects that this increase in survival and abundance is likely to continue for 2004 and 2005. The states believe TAC's 2004 forecast of 32,200 wild winter steelhead is based upon the "best available analyses"

of the data and an understanding of factors affecting steelhead abundance in the lower Columbia River basin.

Smolt Abundance Trends and Seeding Levels

Smolt trapping has been conducted in three Washington tributaries during 2000-2003. Wild winter steelhead smolt production has been estimated from this data. Total production of winter steelhead smolts averaged 2,418 (range 1,700 to 3,100) from Mill Creek; 6,438 (range 4,100 to 9,900) from Abernathy Creek; and 7,157 (range 6,800 to 7,600) from Germany Creek. The numbers of smolts observed and the low inter-annual variation in smolt production, along with information about available habitat and stream structure, indicate that these streams may be fully seeded with juvenile production (Seiler 2003). Comparisons of these three streams (although they are not within the Lower Columbia ESU) with other upstream tributaries (which do contain listed steelhead) demonstrates a number of similarities and provides at least some evidence that other streams in the lower Columbia River may also be approaching full seeding, in terms of juvenile steelhead densities. The Cowlitz and Lewis rivers might be exceptions because of habitat impacts caused by the several dams located in these basins and the impact of the Mt. St. Helen's eruption in 1980.

In addition, smolt monitoring has also occurred in the Hood and Clackamas rivers in Oregon. Smolt production has increased in the Hood River during the late 1990s and appears to be approaching carrying capacity (Olsen 2003). Smolt production in the Clackamas declined during the 1990s, concurrent with the decline in adult production, but has since returned to historic levels. Figure 4 depicts wild smolt production for the 1958-2000 broods in the Clackamas River and the 1992-1998 broods in the Hood River. Total smolt production in the Clackamas River has been adjusted to remove the effects of natural spawning hatchery summer steelhead (based on results from Kostow et al. 2003).

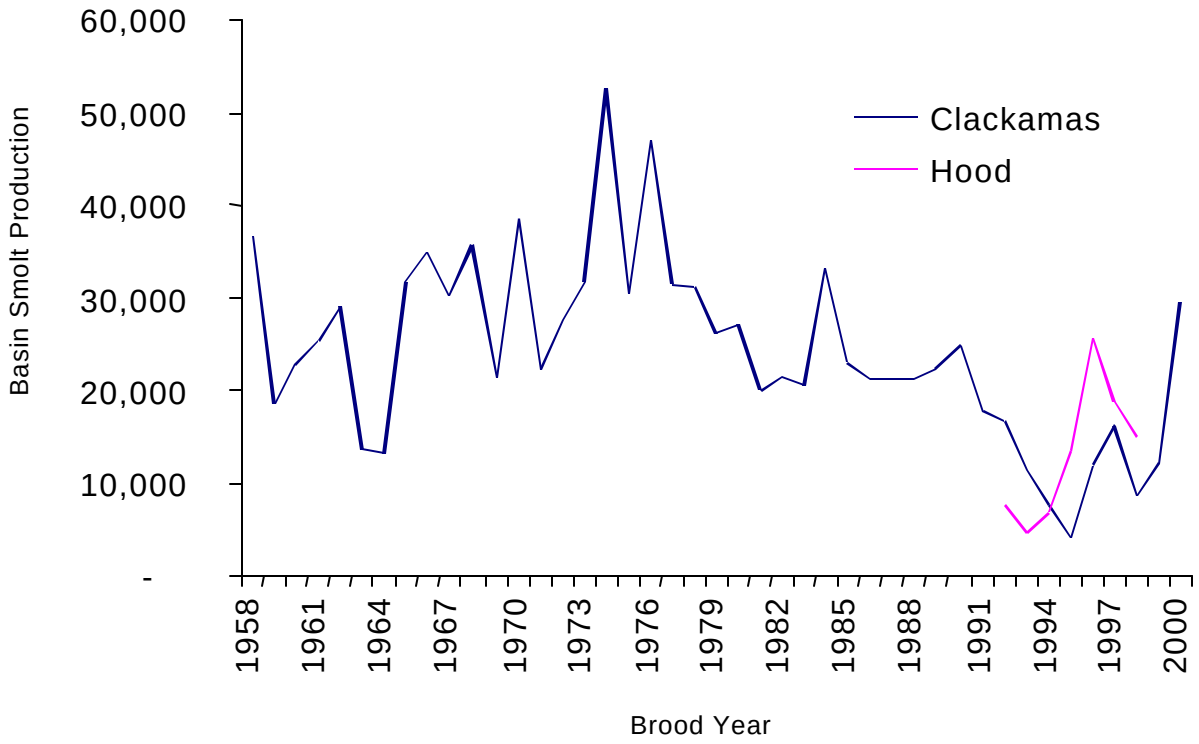

Figure 4. Wild winter steelhead smolt production in the Clackamas (1958-2000 broods) and Hood (1992-1998 broods) rivers.

Marine Survival Trends

The ocean distribution of Columbia Basin steelhead is generally known from tagging studies. It differs from that of other Columbia Basin anadromous salmonids in that it is concentrated in the central North Pacific Ocean; therefore, steelhead experience a different marine regime than, for example, Oregon coastal coho. Variation in the demographic behavior of different Columbia Basin populations suggests that the general understanding of marine distribution and survival may be over simplified.

It appears that some lower Columbia Basin populations experienced low marine survival for several years during the late 1980s and early 1990s. For example, the Clackamas River population dipped to below 2% survival (smolt to escapement) in the early 1990s. During this same time period the Hood River population remained above 4% throughout and reached some of its highest observed survival levels while the Clackamas River population was at its lowest levels (Figure 5). Some of the differences may be due to different inherent productivity of the populations since the Hood winter population appears to be more productive than the Clackamas population; however, these differences also suggest that the two populations are subject to different marine experiences, which is supported by tagging studies conducted on Columbia Basin steelhead (Burgner et al. 1992). Results of this study indicated that two distinct abundance concentrations were evident in the North Pacific Ocean (Figure 6). These abundance concentrations may be related to different behaviors by different populations within the Columbia Basin or may be due to migration from the Columbia Basin to the mid-North Pacific Ocean. Recent survival data indicates that most declines in marine survival have now reversed. For example, the smolt to escapement survival for the 1998 brood of Clackamas wild winter steelhead was 14%, which is a record high survival rate since the 1958 brood year (Figure 5).

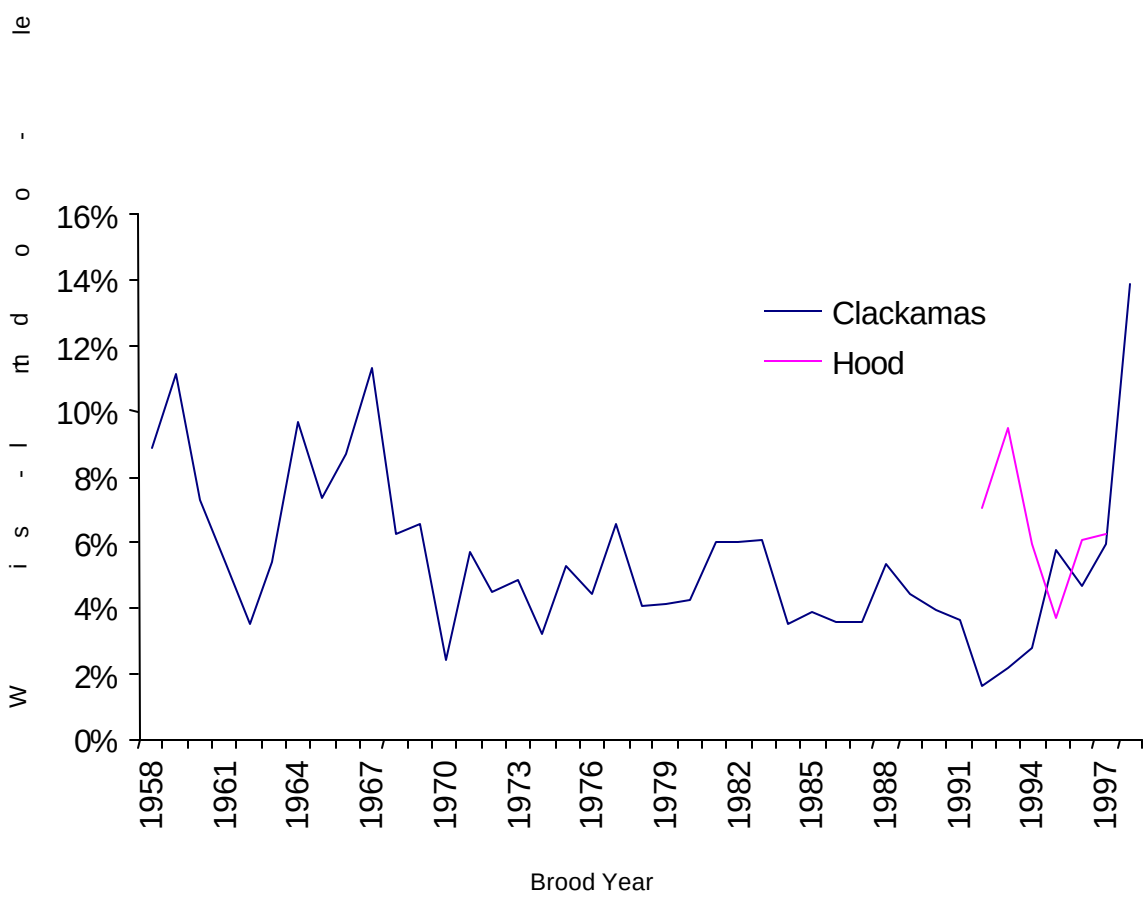

Figure 5. Wild steelhead smolt-to-escapement survival in the Clackamas River (1958-1998 brood years) and in the Hood River (1992-1997 brood years).

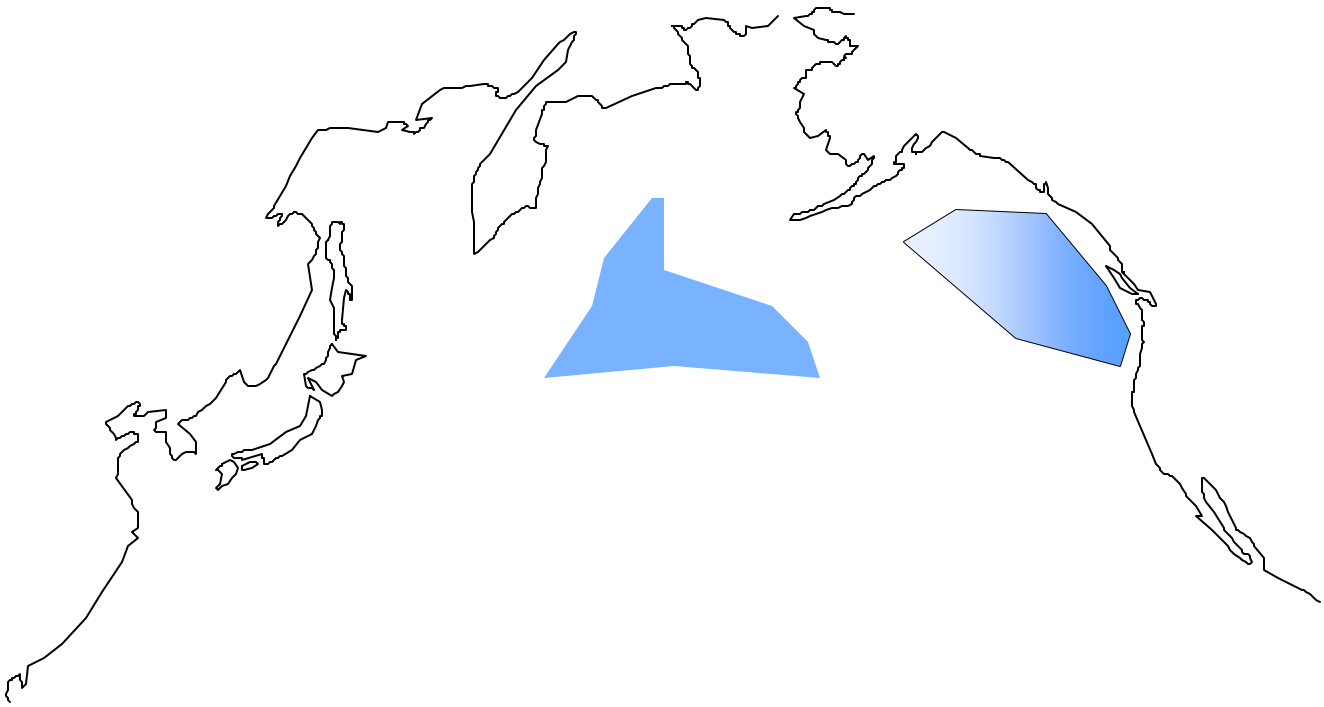

Figure 6. Marine distribution of Columbia Basin steelhead based on Burgner et al., 1992.

Winter Steelhead Productivity

For the purposes of this Biological Assessment the joint Oregon and Washington staff have used two different measures to evaluate wild winter steelhead productivity in the Columbia River Basin, intrinsic productivity estimates and recent year trends in recruit per spawner ratios. Both measures are calculated from observed estimates of recruits per spawner. In the case of the estimates presented in this Biological Assessment, only wild fish were counted as recruits, but "spawners" included wild and naturally spawning hatchery fish, if present. Further, the estimates of recruits included only fish that actually returned to the basin to spawn (i.e., post-fishery recruits).

To estimate intrinsic productivity it is necessary to have a sufficiently long term database that includes periods of good and poor marine survival conditions in order to adequately represent the dynamic nature of this metric. Unfortunately, the majority of the data available for wild winter steelhead have been collected during the last 15 years when marine survival rates have been in a low cycle. Only in recent years, since 2000, have marine rearing conditions improved. For this reason the intrinsic productivity estimates would probably have been higher had it been possible to sample a longer time interval that would have likely included a full range of ocean survivals.

Measures of intrinsic productivity were made for several populations for which adequate data existed (i.e., a time series longer than 12 years, known ratios of hatchery and wild spawners, age composition estimates, etc.). Intrinsic productivity estimates were based upon fitting a Ricker recruitment model to observed spawner and recruit data sets. The alpha parameter of the Ricker recruitment model, which is determined from the recruitment curve fitting exercise, was estimated for each population and was used as the index of intrinsic productivity. The results for 10 populations show a range of intrinsic productivity values from 1.19 to 3.82 recruits per spawner (Table 5). The 95% confidence intervals about these point estimates were quite wide, a result of the relatively poor fit of the data to the assumed recruitment curve.

All point estimates for intrinsic productivity were greater than 1.0, which suggests that these populations have the capability to increase when depressed to low levels of abundance; however, the lower confidence interval bound of the alpha value for two of the five lower Columbia ESU populations was less than 1.0, which suggests that the assumption of resiliency for these populations should be applied with caution. In general, populations in the Willamette ESU appeared healthier, in terms of higher productivity values, than those of the lower Columbia ESU.

Clackamas winter steelhead appear to be modestly productive with an intrinsic productivity value of 2.18, which indicates that at low spawning densities each steelhead could produce, on average, approximately two steelhead (Table 5). The Kalama and North Fork Toutle River steelhead populations have similar intrinsic productivity values of 2.39 and 2.15. Within the Willamette steelhead ESU, intrinsic productivity estimates for the five measured populations ranged from 1.90 to 3.82.

The South Fork Toutle population has the lowest resiliency at only 1.19 recruits per spawner at low density. By definition a stock must have intrinsic productivity values greater than 1 to prevent extinction. Further, for this population a more conservative analysis using a hockey stick recruitment model yielded an intrinsic productivity estimate of 1.08, with a 95% confidence interval of 0.62 – 2.0. Likelihood tests indicate that both the Ricker and hockey stick recruitment curves have similar fits to the data. In either case, the less than 1.0 value for the lower bounds of the 95% confidence interval for the intrinsic productivity estimate indicates that there is some chance that this stock may not currently be self-sustaining. Intrinsic productivity estimates for the Kalama River population is confounded because the 1993-1997 broods were comprised of both wild and hatchery stocks with hatchery stocks comprising approximately 50% of the total adult return. Recent evidence presented by Chilcote (2003) suggests that such high rates of naturally spawning hatchery fish can have a strong depressing effect on overall population productivity.

Table 5. Estimates of intrinsic productivity (recruits per spawner at low spawner density) for several wild winter steelhead populations in the Lower Columbia and Upper Willamette ESUs.

Population	Sample Brood Years	Ricker Alpha Value	95% CI for Alpha Vale
NFk Toutle		2.15	1.87-2.48
SFk Toutle		1.19	0.65-2.25
Green River		2.88	1.99-4.17
Kalama		2.39	1.67-3.42
Clackamas	1980-1997	1.57	0.70 – 3.53
Molalla	1980-1997	2.64	1.45 – 4.76
North Santiam	1980-1997	1.90	1.22 – 2.94
Lower South Santiam	1980-1997	2.46	1.32 – 4.62
Upper South Santiam	1980-1997	1.95	1.38 – 2.80
Calapooia	1980-1997	3.82	1.79 – 8.25

Wild winter steelhead in the Columbia River are comprised of populations having a range of productivity values. Out of the five populations in the Lower Columbia ESU with long-term data available, three of the five populations have intrinsic productivity estimates greater than 2.0 and lower bounds for the 95% confidence interval of these estimates greater than 1.0. Out of the five populations in the Upper Willamette ESU with long-term data available, three of the five populations have intrinsic productivity greater than 2.0. In addition the lower bounds for the 95% confidence interval for the intrinsic productivity estimates for all five populations are greater than 1.0.

A second measure of productivity, trends in recruits per spawner, was also evaluated. In this case, the actual observed value for recruits per spawner estimate was calculated for the most recent 5-year time period during which spawner escapements were likely less than full seeding. For most populations this time period corresponds with the recruitment from parents that spawned during the years 1993 to 1997. The purpose of evaluating these data was to demonstrate whether or not these populations were resilient and rebounding from the poor survival years of the 1990s.

As illustrated in Figures 7 and 8, the observed number of recruits per spawner for populations belonging to the Lower Columbia ESU during the last two brood years (1996 and 1997) was substantially greater than for the first two brood years of the data set (1993 and 1994). This pattern is especially evident for steelhead populations in the Upper Willamette ESU (Figure 9). However, it is apparent that winter steelhead populations in the Upper Willamette ESU have demonstrated better productivity and resiliency than those belonging to the lower Columbia ESU. One likely explanation for this is that hatchery programs for winter steelhead were terminated during this time frame for Upper Willamette ESU populations and therefore the straying of reproductively less capable hatchery fish into natural production areas also ended during this same time period.

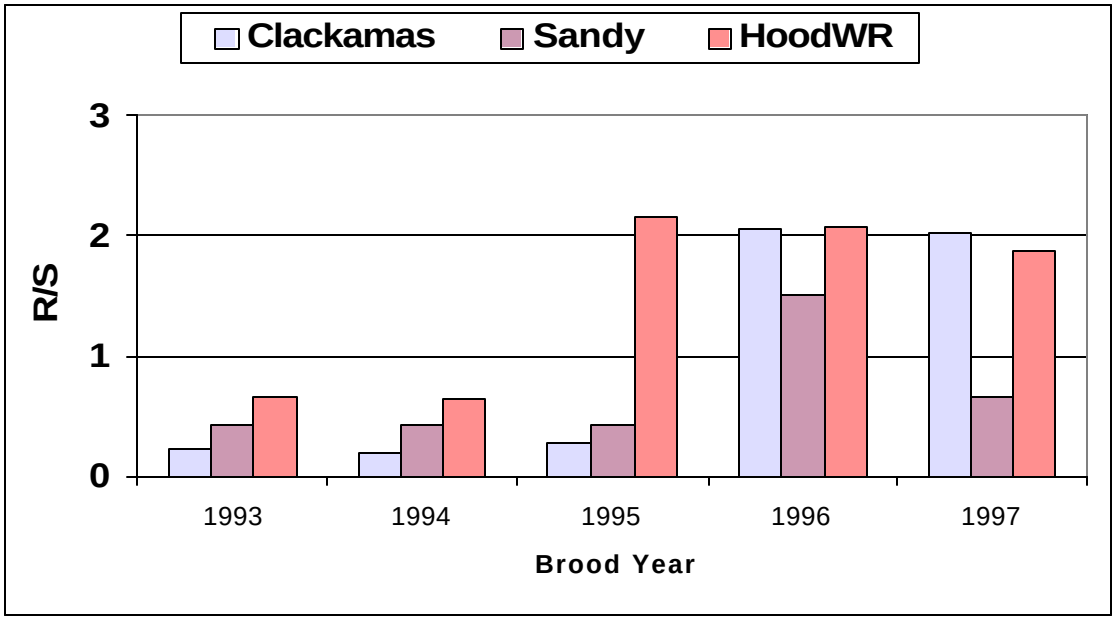

Figure 7. Observed recruits per spawner for three Oregon populations of Lower Columbia River ESU winter steelhead, 1993 to 1997 brood years.

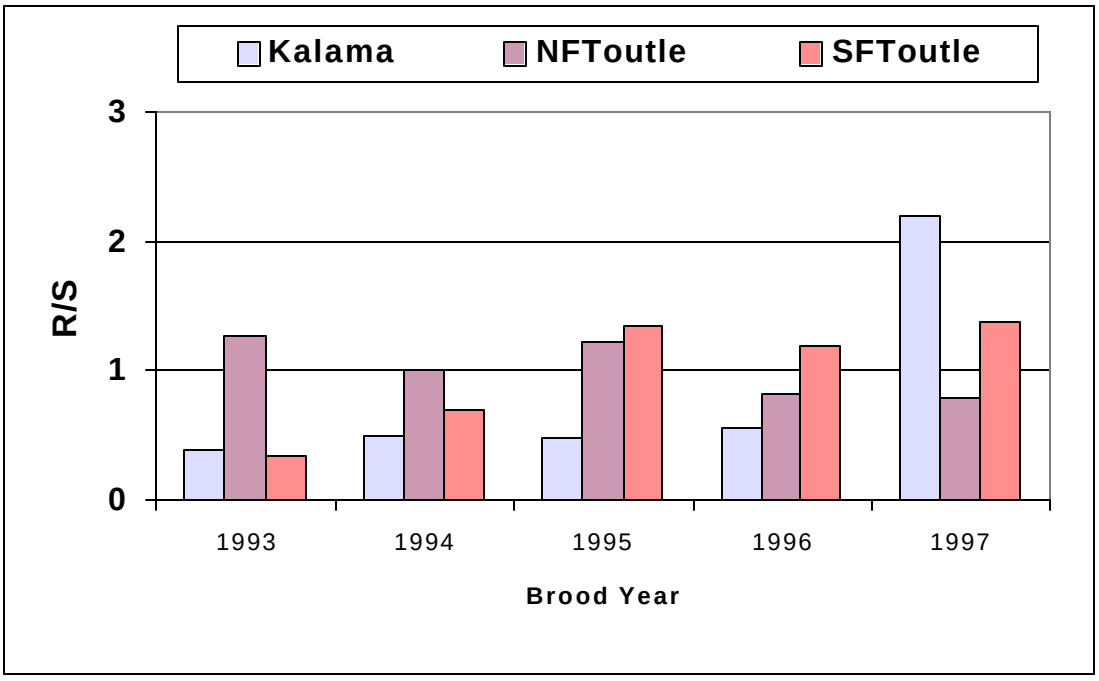

Figure 8. Observed recruits per spawner for four Washington populations of Lower Columbia River ESU winter steelhead, 1993 to 1997 brood years.

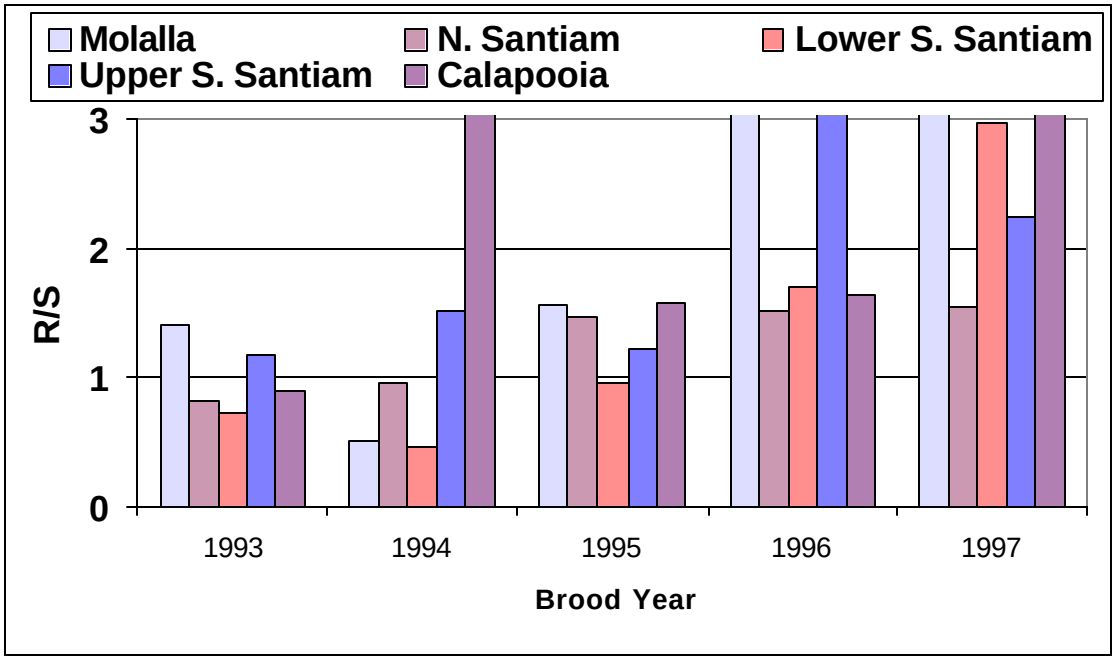

Figure 9. Observed recruits per spawner for five populations of upper Willamette ESU winter steelhead, 1993 to 1997 brood years.

For any population, the impact of additional life cycle mortality (whether due to fisheries, dams, or habitat degradation) will put the persistence of the population at high risk if the cumulative result is that the net productivity declines to a rate less than 1.0 recruits/spawner. Although, the mortality rate increase proposed by the states for these populations is a modest 4%, estimates of intrinsic productivity have a high degree of uncertainty and the lower of the 95% confidence interval was less than 1.0 for two of the 10 populations evaluated.

The improved recruit per spawner ratio observed for 10 of the 11 populations evaluated indicates that most populations have been responding favorably to improved marine survival conditions; therefore, the states believe that, at least in the short term, they have demonstrated that the modest increases in mortality, due to the proposed fishery actions, will be countered by the much stronger effect of favorable ocean conditions. The states also believe that the long-term management strategy for wild winter steelhead needs to be one that is responsive to changes in marine survival conditions and parental escapement levels.

Wild Winter Steelhead Impacts

Proposed Impact Rates

The states propose that impact rates on wild winter steelhead for non-Indian fisheries in the mainstem Columbia River downstream of Bonneville Dam be increased to a maximum impact guideline of 6%. This is expected to limit overall impact rates on wild winter steelhead to 9% or less, assuming the impact of catch and release tributary fisheries results in a 3% mortality rate. A 9% impact rate guideline is consistent with WDFW's Wild Salmonid Policy of limiting impacts to under-escaped runs to 10% or less, although some populations within the winter steelhead ESUs are meeting escapement goals. The 9% impact rate is also consistent with ODFW's Native Fish Conservation Policy (NFCP) and the recovery and sustainability goals set forth by this policy.

The proposed maximum impact guideline of 6% would be applied to fishery management for 2004 and 2005 in a similar manner as the 2% impact guideline was applied in 2003. Fisheries occurring in 2003 were managed for an impact rate of 1.4%-1.6% inseason to ensure that post-season analysis did not result in impacts exceeding 2%. Similarly, the states are proposing that the 6% impact guideline would be the maximum allowable impact rate. The states intend to manage for a 5% impact rate inseason to ensure that the 6% impact guideline is not exceeded.

The states have requested a maximum impact rate on wild winter steelhead in mainstem fisheries of 6%. A major objective of increasing the impact rate on wild steelhead (up to 6%) is to have some flexibility in managing the commercial fishery within the constraints set forth for spring chinook impacts while minimizing, to the degree possible, the handle of steelhead. There may be some populations that could support a higher impact rate while for other populations a lower impact rate may be more appropriate. The states

believe that an impact rate of 6% or less is justified for winter steelhead as a whole and conforms with WDFW's Wild Salmonid Policy of limiting impacts on under escaped runs to a maximum impact rate of 10%.

The states expect that a sliding scale impact rate will be developed in cooperation with NOAA Fisheries prior to 2005. With the discussions ongoing in the *U.S. v Oregon* arena, a sliding scale impact rate seems reasonable; however the states have not completed the analyses necessary to recommend a sliding scale impact rate at this time. It is the intent of the states to reduce overall steelhead handle and mortality in the commercial fishery to the extent possible and the states will continue to investigate ways to accomplish this goal. The states are attempting to determine what impact rate is most appropriate for prosecuting the commercial fishery while minimizing impacts to steelhead, both listed and unlisted.

In the absence of a new Columbia River Fish Management Plan, and as an interim measure, the states would propose two triggers for reduction of the maximum impact rate in 2004 and 2005. The states propose that if the wild winter steelhead forecast is less than 13,000 fish then the maximum impact guideline for the spring chinook net fishery will be reduced from 6% to 4%, with a management guideline of 3.3%. Further, if the wild winter steelhead forecast is less than 9,000 fish then the maximum impact guideline would be reduced to 2%, with a management guideline of 1.7%. These triggers are based on the ODFW and WDFW staff analysis of past years' abundance data. The 9,000 fish trigger corresponds to pre-fishery abundance observed during the late 1990's when the listings occurred and the current 2% impact rate guideline was adopted.

Impact rates are calculated by applying the estimated post release mortality rate to the estimated catch for each species. The Columbia River Compact adopts post release mortality rates after review by the TAC. Since 2002, the TAC has annually evaluated results from the long-term mortality study and presented their recommendations for appropriate post release mortality rates to the Compact.

Prior to initiation of the 2003 winter commercial spring chinook fishery, the TAC reviewed data resulting from the ongoing long-term mortality study and provided the Compact with recommendations regarding release mortality rates for the 2003 tangle net fishery. The TAC recommendations included release mortality rates of 50% for chinook and 35% for steelhead captured using large mesh (≥8") nets and 25% for chinook and 20% for steelhead captured using small mesh (≤4 ½) nets (TAC, 2003). The TAC recommendations were adopted by the Compact with no modifications. The TAC's 20% release mortality rate for steelhead was primarily based on the 25% mortality rate recommended for spring chinook.

The TAC reviewed data from the long-term mortality study conducted during 2001-2003. Based on the results of this review the TAC provided the Compact with recommendations concerning post release mortality rates for steelhead that were ultimately adopted by the Compact with no modifications. The Compact met on February 5, 2004 and at this hearing adopted the TAC recommended post release mortality rates for steelhead of 30% for large mesh (8" or 9" minimum mesh size) and

18.5% for small mesh (4¼" maximum mesh size) nets (TAC 2003). No long-term mortality study is in progress at this time; therefore, these mortality rates will likely be in effect during 2005 also.

The states will continue to manage the winter/spring commercial salmon fishery to minimize impacts to listed species to the fullest extent possible. Management actions for the commercial fishery, described under the "Future Fishery Expectations" section, will continue to minimize overall steelhead encounters in the fishery, and the states will continue to evaluate additional gear restrictions or fishing strategies that would reduce steelhead encounter rates. For example, additional management actions are being considered for the 2004 fishery that were not required in 2003 (see "Additional Management Actions for 2004" section) in an effort to minimize wild winter steelhead encounter rates in the winter commercial spring chinook fishery. Sport fishery impacts to wild winter steelhead are very low, less that 0.1%, and are based on the 10% catch and release mortality rate recommended by the TAC for all mainstem Columbia River sport fisheries. The states believe that a maximum impact rate of 6% is an appropriate level of risk to the population and provides opportunity to further explore the potential of selective fishing techniques in the commercial spring chinook fishery.

Effect of proposed impact rates

Currently the majority of the fishery-related impacts to wild winter steelhead occur in tributary sport fisheries with an estimated impact rate of 3% (range of 0%-6%), which is the product of the percentage of the wild return caught by anglers multiplied by the post release mortality rate (catch and release regulations apply to all sport steelhead fisheries). The impact rate currently allowed for wild winter steelhead in non-Indian fisheries in the mainstem Columbia River downstream of Bonneville Dam is 2%. In this document the implications of increasing the mainstem Columbia River fishery maximum impact rate to 6% are evaluated relative to the current agreement (2%); therefore, the actual increase under evaluation is a 4% increase over the current level of 2%. Two issues of critical importance to this evaluation are the biological magnitude of the potential impact and the risk to the population caused by the increase in the impact rate (4%).

The abundance of wild steelhead populations is very sensitive to the natural survival rate. Survival rates (smolt-to-escapement) observed for Clackamas River wild winter steelhead have ranged from just under 2% to 14% since 1958 (Figure 5). Based on past smolt to escapement survival rates (2-14%) and adult escapements (250 - 4,000) a simple model can be developed that demonstrates how a change in natural survival rates of only 2-3% can have a profound influence on the abundance of the population (Figure 10).

Since fishery related impacts to wild winter steelhead occur after most of the natural mortality has already occurred, the influence of a 4% increase in incidental impacts associated with Columbia River fisheries decreases the population size by relatively few fish. Assuming a 10% natural survival rate and a 5% mortality rate for tributary sport fisheries, a model can be developed that would estimate how increasing Columbia River incidental handling mortality rates would affect adult escapement (Figure 11). The

estimated total abundance in 2003 of wild winter steelhead in the lower Columbia (all ESUs combined) was 26,700 fish. The current impact rate of 2% would have reduced this run-size by about 534 fish. Increasing the impact rate to 6% would reduce this abundance by a maximum of 1,068 additional fish (1,602 fish total impact). This reduction in total escapement is contained within the variations in abundance that would occur due to the fluctuations in natural survival; therefore, the magnitude of the impact of a 4% increase in mortality may not be biologically detectable. Increasing impact rates to 15% or 20% would be biologically detectable compared to either a no-harvest baseline or to the current 2% baseline. Fluctuations in natural survival would likely exceed 4% but not 15%-20% (Figures 10 and 11).

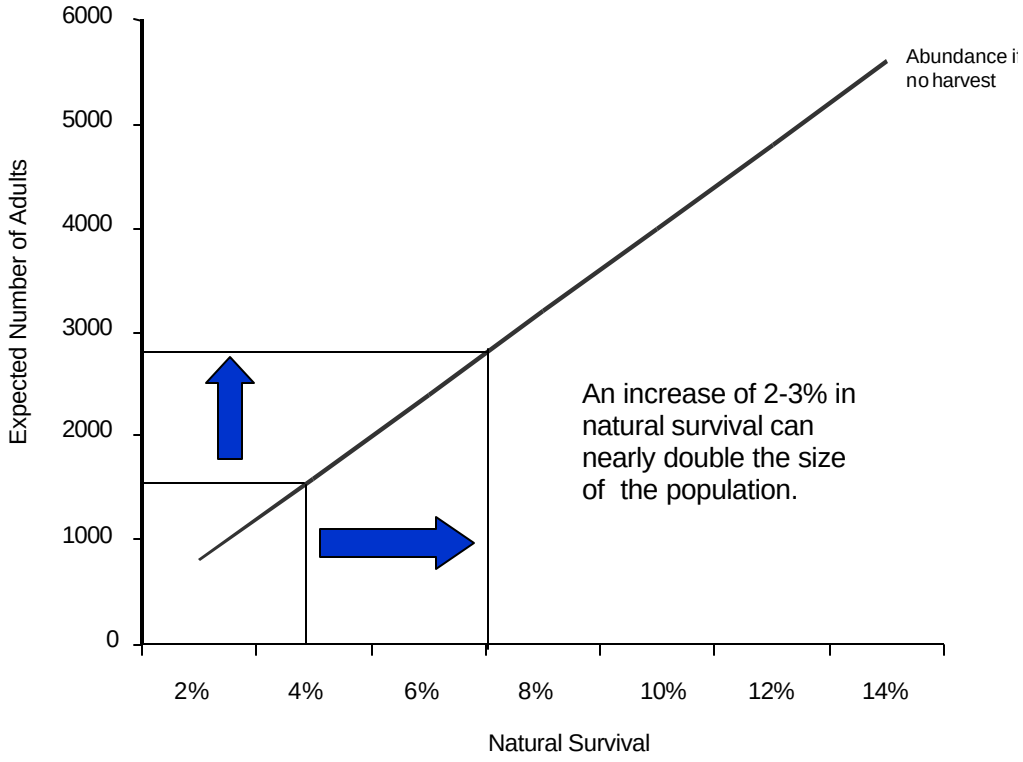

Figure 10. A simple model demonstrating the impact of natural survival rates on adult abundance.

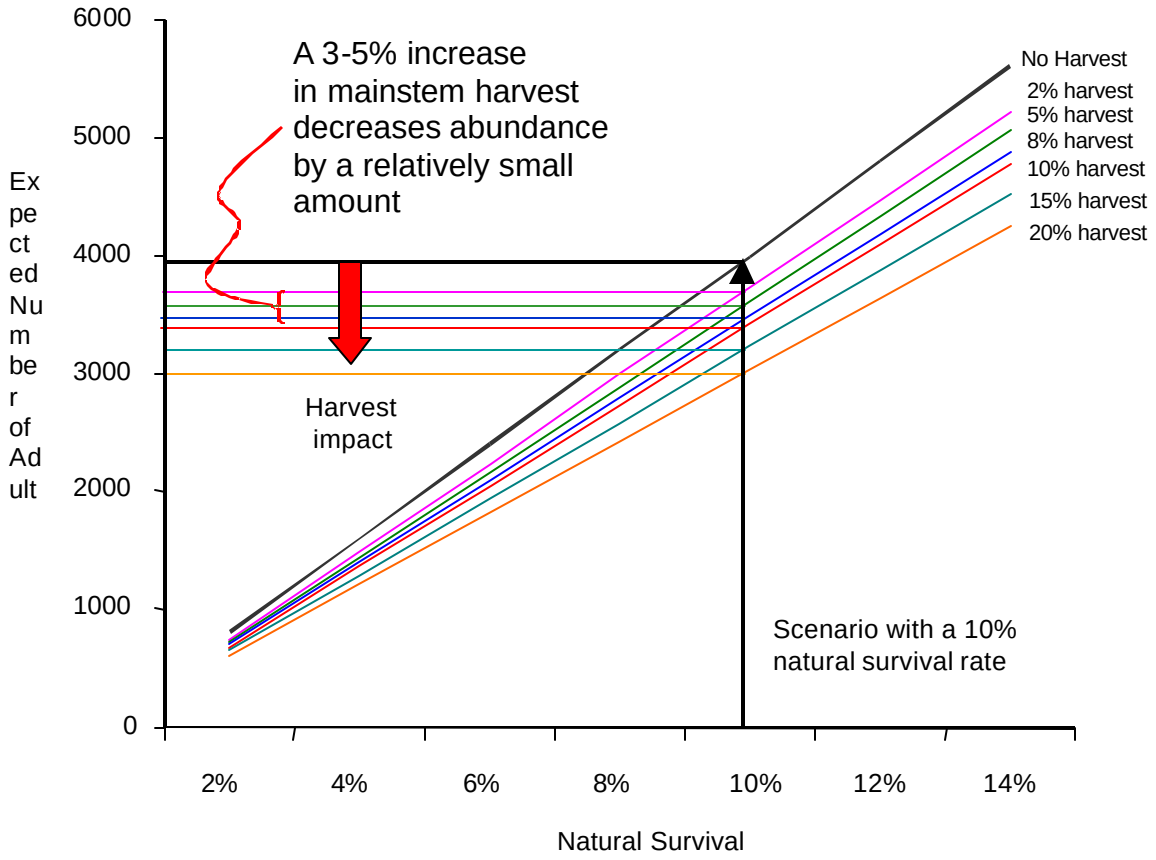

Figure 11. The impact of varying Columbia River mainstem catch and release mortality rates on adult escapement.

The expected response of a population to a given harvest impact can be obtained from an analysis of the productivity of the population. The productivity of lower Columbia River and Willamette River wild winter steelhead populations was discussed earlier in this document under the "Population Status and Risk Analysis" section. In order for a population to be self-sustaining on average, it must have an intrinsic growth rate of at least replacement, recruits per spawner = 1.0, or 2 parents produce 2 offspring. The production of offspring in excess of replacement at low densities would allow a population to grow, while offspring produced in excess of replacement at higher densities could be available for harvest. The Upper Willamette River wild winter steelhead populations appear to have intrinsic and recently observed growth rates in the range of 2.0 recruits per spawner or greater. In addition, the lower bound of the 95% confidence interval of these estimates are all greater than 1.2 recruits per spawner for all five populations evaluated. The lower Columbia River wild winter steelhead populations appear less productive, with the intrinsic and observed productivity values in the range of 1.5 recruits per spawner. In addition, the lower bound for the 95% confidence interval for intrinsic productivity appears less than 1.0 recruits per spawner in two of the five populations evaluated.

The states propose that the current proposed impact limits of 6%, 4% and 2% sunset after the 2005 season (or sooner) and that it be replaced with a management protocol that incorporates a sliding scale impact rate for wild winter steelhead that is established by measurable variations in marine survival, parental escapement, and perhaps other factors. This new management protocol should also take into account the management imprecision of run-size forecasting, monitoring, and measurement error, especially errors associated with the assumptions concerning steelhead interception rates and the post-release survival of net caught and sport caught steelhead. The states believe that such a management protocol could be developed and included in the new Biological Opinion and Management Agreements that are expected to be completed prior to the 2006 winter management period. In the short term, 2004 and 2005, the states have proposed abundance levels at which the allowable impact rate would decrease to 4% or 2%.

Summary

The abundance of wild winter steelhead in the affected ESUs has been improving since 2000. Ocean rearing conditions during the early 1990s were poor and reduced the abundance of all Columbia River salmonid stocks, including wild winter steelhead. Favorable ocean conditions in recent years have contributed to improved returns since 2000. Recent information from smolt trapping in the lower Columbia River suggests that at least some streams may be fully seeded. It is not the intention of the states to argue whether these populations require listing under the ESA, but to show that the populations are vigorous enough to withstand a modest reduction in escapement numbers due to increased incidental impacts from spring chinook fisheries targeting hatchery produced stocks. The states believe the overall risk to recovery or rebuilding of the wild winter steelhead populations as a result of increasing the effective mortality rate in these steelhead populations from 2% to 6% for the years 2004 and 2005 is negligible.

An increase in the allowable impact rate for wild winter steelhead would provide the flexibility to continue to test the use of tangle net gear in the Columbia River to harvest hatchery stocks of spring chinook. It is the desire of the states to continue to minimize handle and mortality of wild winter steelhead and continue testing gear and methods for commercially harvesting hatchery produced spring chinook. The NMFS has stated in other opinions that "NMFS believes that the harvest needs of the states and tribes during an interim period of recovery can best be achieved through a transition to selective fishery methods that can minimize the impacts to listed species and other weak stocks that require protection" (NMFS 2002). The use of selective commercial fisheries requiring the release of non-fin clipped fish "are likely more effective during the winter months when the water temperatures are coldest" (NMFS 2003). The states are attempting to achieve the objective of implementing selective commercial fisheries requiring the release of non-fin clipped fish and expect the NMFS to support the states in this objective. The NMFS has also stated that they have "not sought to eliminate harvest and as discussed in this opinion and elsewhere has accepted a certain measure of increased risk to the species to provide limited harvest opportunity..." (NMFS 2002). The states believe that providing harvest opportunity for hatchery spring chinook with a limited risk to wild winter steelhead is consistent with the NMFS's statements.

Proposed impacts in this assessment represent a large reduction from historic fishing levels. All non-Indian fisheries, which directly target listed stocks, have been closed. Remaining fisheries attempt to provide access to harvestable surpluses of unlisted stocks while continuing to minimize impacts to listed stocks consistent with preservation and recovery goals. The marginal benefits of harvest reductions of 2% versus 6% will not appreciably reduce the likelihood of the survival and recovery of listed wild winter steelhead. The proposed impacts are consistent with WDFW's Wild Salmonid Policy of limiting impacts to under-escaped runs to 10% or less and recovery and sustainability goals set forth in ODFW's NFCP.

The proposed fisheries and increased impacts address the statutory obligation and authority of the states of Oregon and Washington to provide for harvest opportunity when the situation exists. The economic and social benefits of proposed fisheries remain significant to affected non-Indian fishers, specifically the commercial fishing industry. The preservation of these limited fishing opportunities allows the region to move forward in implementation of selective commercial fisheries targeting fin-clipped hatchery fish to improve access to harvestable hatchery surpluses, many of which are mitigation for other habitat impacts including extirpation or depletion of salmon runs from areas blocked by dam construction or otherwise affected by the hydropower system and other habitat uses. The preservation of these limited fishing opportunities also allows the region to bridge the interval until effective habitat and hydropower measures recover listed ESUs. Proposed fisheries do not likely represent an equitable sharing of conservation constraints on salmonid production among industries that impact salmon throughout the Columbia River basin.

In conclusion, the NMFS should approve the states request to manage non-Indian fisheries targeting spring chinook in the mainstem Columbia River below Bonneville Dam such that mortality impacts do not to exceed 6% on wild winter steelhead. Additionally, the states recommend that the NMFS 1) fund and/or support efforts by the states to determine long-term mortality rates for winter steelhead released in the commercial tangle net fishery, and 2) support the states efforts to provide for meaningful commercial fishing opportunity in concert with the ESA guidelines to minimize mortality of listed salmonids, by supporting the tangle net fishery as it unfolds and as new information becomes available.

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