W A S H I N G T O N T R O U T

Comments to:
Lower Skagit River Steelhead Acclimation and Rearing Facility Draft Environmental Impact Statement

Submitted By:

Washington Trout; P.O. Box 402; Duvall, WA 98019
425/788-1167; fax 425/788-9634; wildfish@washingtontrout.org

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To: Teresa A. Eturaspe
SEPA/NEPA Coordinator
Agency Designated Official
Habitat Program
Regulatory Services Section
Washinton Department of Fish and Wildlife
600 Capitol Way North
Olympia, Washington 98501-1091
habitatSEPA@dfw.wa.gov

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INTRODUCTION

Washington Trout has reviewed the Draft Environmental Impact Statement for the Lower Skagit River Steelhead Acclimation and Rearing Facility. WT finds the DEIS fundamentally flawed; it fails to meet minimal standards of environmental review required under SEPA. We request that all the comments and attachments provided below be entered into the SEPA record.

The DEIS unjustifiably and arbitrarily restricts consideration of alternatives other than the No-Action Alternative to the siting of acclimation and release locations for the release of 534,000 hatchery winter-run steelhead smolts. In doing so, the DEIS fails to consider relevant and plausible cumulative effects that would arise from the implementation of any of the site-alternatives considered.

The DEIS provides an inappropriate justification for its dismissal of the need to consider substantive non-site alternatives: viz., that such alternatives would not meet the proponents purpose and need , which is none other than to produce and release 534,000 hatchery steelhead smolts from an in-basin hatchery stock. In view of the likelihood of harmful cumulative impacts on wild steelhead stocks arising from the recent (since 1992) increase in the numbers of hatchery steelhead smolts released annually in the Skagit River basin, including a significant decline in the annual number of wild adults steelhead returning to spawn in the Skagit River basin, both the refusal to consider cumulative impacts and the refusal to consider and evaluate substantive non-site alternatives appear to violate SEPA standards for environmental review.

The DEIS falsely asserts that the target number of smolts to be released in the Skagit River basin under any of the site-alternatives (534,000) would not represent an increase over the baseline level of releases, declared to be those that have occurred within the past 6 to 8 years. Data provided in the DEIS itself as well as relevant data provided by Washington Department of Fish and Wildlife (WDFW) in the Hatchery Genetic Management Plan (HGMP) for the Marblemount Winter Steelhead Hatchery Program submitted to National Marine Fisheries Service March 17, 2003 clearly show that the number of hatchery smolts released during this period has averaged over 100,000 *fewer* than the proposed target number. In addition, the target number itself has only been attained once during this period (1998). Consequently, if any of the site-alternatives considered in the DEIS were be implemented and were to in fact result in a consistent level of annual smolt releases of 534,000 such action would result in a considerable increase in the numbers released annually relative to the DEIS' chosen baseline.

In 1994, the DEIS for the then-proposed Grandy Creek Hatchery was found inadequate based on an insufficient analysis of the impacts on Skagit River wild steelhead of an increase in hatchery steelhead production. Since then, WDFW has increased steelhead release *targets* at Marblemount and various offsite-planting locations to the current level. That production increase has not been evaluated through SEPA, not in 1994, and not since. Even if it were true that the proposed action does not represent any significant change from current *actual* levels of hatchery production in the Skagit, it does represent an unevaluated level of production. It is inappropriate, arbitrary, and potentially illegal to now attempt to use that unevaluated production-increase as the *baseline* for an evaluation of the proposed action.

But in fact the assertion that the proposed action is not intended as a production increase is patently false. The consistent inability of the current program to meet existing smolt-release targets suggests that the proposed action is at least partially an attempt to improve overall program-performance that if successful would effect a significant practical increase in hatchery steelhead-smolt releases into the Skagit River. The DEIS uses this falsehood to assert that an assessment of the purpose and need of the WDFW Skagit winter steelhead hatchery program is unnecessary. It misconstrues the facts about the present and past scales of hatchery releases in the Skagit and falsely asserts that an evaluation of the hatchery program and the increase that would result from implementing the Proposed Action is not required. These all appear to be violations of SEPA requirements.

In several instances, the DEIS appears to contradict its central assertion that adoption of the proposed action would not represent an increase in overall smolt releases into the Skagit River. The DEIS frankly concedes that delay or deferral in implementing the proposed action would result in *continued inability* of the program to meet current production targets, including smolt-release targets. In that case, the intention of the

proposed action to improve program performance must be considered an attempt to effectively increase actual smolt production. If the proposed action meets this goal, the increase in actual smolt releases will be real and significant. It is inaccurate, unreasonable, and arbitrary to assert that no increase will occur and therefore the potential environmental impacts of releasing 534,000 steelhead smolts into the Skagit River do not warrant review under SEPA. It is clear that SEPA would in fact require such a review.

Furthermore, all of the releases during this period required the importation of hatchery steelhead from out-of-basin sources. Data for this same period provided to National Marine Fisheries Service by WDFW in the Marblemount Hatchery HGMP clearly shows that even in years when the hatchery attained numbers of adult returns for broodstock and secured egg numbers considerably in excess of the target numbers specified in the DEIS that are needed to produce the target number of 534,000 smolts, the Marblemount facility was incapable of producing the target smolt release number. This shows that even if the preferred alternative were chosen the DEIS has not adequately demonstrated that the proponent's purpose and need would be achieved, or even that it would have a higher probability of being achieved than site-alternatives not considered in the DEIS.

The DEIS is inappropriately silent on this obviously critical issue of the ability of the Marblemount Hatchery facility to produce 534,000 smolts when it secures the minimum number of adults for broodstock needed to achieve the egg-take goal. This suggests that the DEIS is disguising an important component of the proponent's purpose and need, namely, the belief that the development of acclimation and release sites discussed in the various site-alternatives will increase the survival-to-outmigration of hatchery steelhead to a level sufficient to achieve the 534,l00 target. Such a supposition is clearly controversial and requires to be discussed in the DEIS. In any case, failure to address this data constitutes a fundamental inadequacy of the discussion of the proposed alternative.

In fact, the DEIS does not satisfactorily demonstrate that the proposed action will achieve either of its stated purposes and goals, increasing harvest opportunity in the lower Skagit *or* minimizing harmful impacts on wild salmonid stocks in the river. This raises the issue of whether the Alternatives Analysis in the DEIS is adequate to satisfy SEPA requirements. Several Alternatives were dismissed from significant evaluation based on the DEIS's determination that the relevant alternatives would not meet the designated purpose and need for the proposed action. Yet it is not at all clear that the proposed action can meet either of the expressed dual goals. This would appear to render arbitrary the dismissal of several potentially reasonable alternatives.

The DEIS' choice of the baseline period of steelhead smolt releases against which to compare the site-alternatives considered (the period beginning approximately in 1995 and extending through 2003) is itself inappropriate. During this period WDFW

significantly increased the average annual numbers of hatchery winter steelhead smolts released in the Skagit River basin relative to the average numbers released during the preceding 30 years. Average annual hatchery releases from 1964 through 1993 were less than 250,000. Prior to 1993 there were no releases that approached 400,000. Since 1995, annual releases have averaged considerably above 400,000. This same period has also witnessed significant declines in the wild winter-run steelhead population. Even if the site-alternatives considered in the DEIS were, as discussed above, not to achieve the target number of releases of 534,000 any of the alternatives would institutionalize the recent significant increase in the average annual number of hatchery smolts released. This recent increase is coincident with the significant decline in wild steelhead returns to the Skagit and is *prima facie* a contributing factor to the decline. The DEIS has simply endeavored to avoid the responsibility of evaluating this impact by asserting that this is "the baseline" and then (falsely; see above) claimed that the considered site-alternatives would not result in any increase in annual hatchery smolt releases above this baseline level.

The ultimate alleged purpose of the proponent's proposed action is to achieve an increase in the numbers of adult steelhead returning to the Skagit River that can be available for harvest by tribal and/or sports fishers. The DEIS therefore must consider and evaluate plausible non-site alternatives that might achieve this. Available data clearly indicates that it is plausible to believe that the recent increase in the release of hatchery smolts during the alleged "baseline" period may in no small part be responsible for the decline in harvestable numbers of winter steelhead of both hatchery and wild origin. Consequently, the refusal of the DEIS to consider non-site alternatives is unjustifiable and a violation of SEPA standards for environmental review.

In view of these and other significant and specific shortcomings, contradictions, inconsistencies, and omissions detailed below, this review finds that the DEIS does not satisfy the standards of environmental review required under SEPA. We respectfully recommend that WDFW withdraw the DEIS and reconsider the proposed action.

SUMMARY OF COMMENTS

As can be seen, Washington Trout has taken considerable care in its analysis of this DEIS due to the level of concern it presents to the future of Skagit River salmonid populations, and most especially wild steelhead and ESA listed Puget Sound chinook.

High on the list of these concerns is the attempt in the DEIS to avoid scrutiny of the proposed acclimation and rearing facility in its relative context of the existing WDFW Skagit River winter steelhead hatchery program and from any past history. This was clearly stated on page 1 in the Goals of the Applicant:

"This proposal would not result in increased hatchery steelhead production in the Skagit River system, **nor would it attempt to evaluate or justify the need for the**

existing WDFW Skagit River winter steelhead hatchery program. The main objective of the applicant is to propose a change in the release protocol for a portion of hatchery smolts in order to: Provide increased returns of harvestable adult hatchery steelhead to the lower Skagit basin through the use of acclimation at a lower Skagit River location, and to do so in a manner that would provide increased protection of naturally spawning wild steelhead in the Skagit River system."

Washington Trout has deemed that WDFW cannot separate the plan for the proposed facility from the connective context of 56 years of Skagit River steelhead history as the only effective means for evaluating the three alternatives provided in the DEIS. In fact, the No Action Alternative, which *is* the existing program, absolutely requires that it be examined for its 11 year history since outlined in 1992.

The 56 year record of Skagit steelhead history begins with the issuance of the first winter steelhead punchcards issued in the State of Washington from which to collect sport catch as reported by anglers. That early catch initially shows a gradual increase as participating anglers are increasingly attracted to the sport of steelhead fishing with a plateau across the 1950s. There was a sudden 63% increase in the numbers of sport fishermen in Washington between 1962 to 1969 as documented by a special report to WDFW by Loyd Royal in 1972. Royal explains this coincides with the initiation of elevated hatchery smolt releases begun in 1960 statewide.

The Skagit hatchery steelhead program initiation point is identified in the DEIS as "the mid 1960s." That mid 1960s point is not further defined, but likely represents the first large return of adult hatchery steelhead resulting from escalated smolt plants at Barnaby Sough in 1962. It is also near this point where the Tables and Figures provided in our comments suggest the earliest indication of a Skagit River steelhead population decline began. It has been a progressive and steady decline ever since as an apparently direct response to the progressive ascendance of hatchery smolts released over the same period since the mid 1960s.

Any level of examination of the Skagit steelhead data is deeply disturbing in the lack of WDFW response to the obvious indications. This lack of response is perpetuated in the DEIS. It is apparent that the modern concept for effective fishery management called Adaptive Management has not occurred, and is not going to occur as planned in the DEIS which tries to separate itself from the present and past history – a history absolutely necessary as a baseline to adapt from.

Skagit River steelhead declines have continuously demonstrated one commonality: whenever the smolt plants have equaled or exceeded 250,000, the response two years as the adults related to those smolt releases return has consistently been decline at all aspects of measuring steelhead abundance – harvest, smolt-to-adult-catch ratio, escapement, and total runsize. This has not only been for wild steelhead, but for

hatchery steelhead as well. By contrast, for the years when hatchery steelhead smolt releases were 0-250,000, steelhead responded with much larger numbers.

For instance, in the 21 individual years that occurred from 1968 to 2003 when Skagit winter-run steelhead smolt plants were 250,000-612,000 the average annual harvest two years later was 6,397 winter steelhead (sport and tribes combined. By comparison, there were 35 individual years between 1946 and 2001 when winter-run steelhead smolt plants were 0-250,000 the average annual harvest two years later was 10,949 winter steelhead (sport and tribes combined), a 71% greater harvest when hatchery smolt plants were often half or less. Included among the little-or-no smolt release years, the two greatest sport catches in Skagit history occurred, 22,216 in 1964 from a plant of just 148,400 smolts in 1962, and 22,488 steelhead in 1956 with what may have been little-or-no smolts planted.

Furthermore, hatchery harvest was available for 11 of those individual 35 years when an average plant of 201,689 smolts resulted in 4,518 winter steelhead caught annually, 1,461 (48%) more hatchery steelhead harvested per year than in the 14 years of hatchery harvest record from 1979-2003 when an average plant of 365,576 smolts resulted in 3,057 hatchery steelhead harvested per year. Put another way, 81% more hatchery smolts has yielded 32% fewer hatchery steelhead harvested.

A driving purpose of the DEIS is to provide more hatchery steelhead harvested in hopes of achieving a total harvest goal of 10,000 steelhead. This goal has only been achieved once in the 28 years since 1976, but it was met or exceeded in 10 of the 14 years before there is a record of any hatchery smolts planted at all between 1948 and 1962.

The Skagit hatchery program, of which the plan in the DEIS integral to and will greatly exacerbate, has led to even more dire wild steelhead runsize consequences. Although no wild escapement records exist prior to 1978 for the Skagit, the era prior to the hatchery program twice provided catches of what would have been predominantly, if not all, wild steelhead that were typically twice as large as the entire wild runsize for the years since 1978. As a point of reference, the wild component of the 1964 catch was known due to a tagging experiment. It was 14,000 steelhead. In only two of the 26 years since 1978 has the wild steelhead runsize equaled or exceeded the wild catch alone in 1964, which was about an average catch in the years prior to the Skagit hatchery program. And obviously, catch only represents a proportion of the steelhead runsize. Due to low angler numbers identified in that era, it seems safe to assume that the catch represented no more than half of the actual runsize in that pre hatchery program era, which would means that some years the wild runsizes in those years were typically 20,000-40,000 wild steelhead.

Such numbers are staggering as compared to wild steelhead runsizes of 4,235-9,086 wild steelhead resulting from hatchery smolt plants that have averaged 418,000 over the

11 years that can be called the "existing" hatchery steelhead program on the Skagit. The planned program described in the DEIS, which describes itself as "status quo" hatchery plants to the existing 11 year record, will in fact increase annual hatchery plants that will be 116,000 higher than that 11 year average, a 28% increase.

This is of particular concern. The existing program has already driven the wild steelhead runsize on the Skagit River to a new 11 year average historic low of 6,650 fish. The past history clearly shows, further increases in smolt levels achieved once above 250,000 smolts drives the Skagit wild steelhead populations perpetually downward. Any further downward decline on the Skagit will require consideration of a winter steelhead ESA listing for Puget Sound. There is no more downward to go.

Of further concern in this decline, it does not coincide with the slow variable trends in ocean conditions called Pacific Decadal Oscillation (PDO). This suggests that there is what has been termed a smolt "density barrier" that was identified as occurring with Skagit River steelhead right from the earliest era of the Skagit hatchery steelhead program by Royal in 1972.

The 1998 smolt plant was the only year the hatchery target of 534,000 smolts of the existing program was achieved with 612,181 smolts. The results were: 627 hatchery steelhead harvested, 455 wild steelhead harvested, 1,082 total harvest, 3,780 wild escapement, 4,235 wild runsize, and 4,958 total Skagit River steelhead runsize (hatchery and wild). An astonishing 566 smolts planted were required to result in just one steelhead harvested in the Skagit in 1998, in 1962 it required only 7 smolts to result in one steelhead harvested. Whether measured by steelhead caught, practical economics, wild steelhead escapement or runsize, or total steelhead coming back to the Skagit River, the hatchery steelhead history has had disastrous results.

The DEIS would create a sustained release of hatchery steelhead not unlike that of 1998 resulting in across the board failures to accomplish any steelhead goals. Furthermore, the increased levels of release will predictably increase the levels of predation by steelhead smolts and residuals on a lower Skagit juvenile chinook population that has been experiencing a 41% decline the past 30 years. These fish are ESA listed.

Appendices

An Appendix is provided at the end of these comments which includes a series of Tables 1 to 7, Figures 1 to 5, Figures A to H, and an Excel Spreadsheet of the primary data used.

The series of tables were compiled by Washington Trout to make it possible to analyze the Lower Skagit Acclimation and Rearing Facility Draft EIS (referred to in the following comments as the DEIS). The DEIS itself was lacking in the necessary information from which to effectively evaluate the limited alternatives provided.

Tables 1, 4, and 7 provide the most complete record of Skagit River steelhead data history as Washington Trout was able to find from Washington Department of Fish and Wildlife (WDFW) sources available to us in the time limitations of the 30 day DEIS response period. The primary source for these data was the Volume II Technical Appendices for the Final Environmental Impact Statement for Grandy Creek Trout Hatchery (January 1994). These data were updated from the more limited information provided in the most recent DEIS being commented on. The basic WDFW data were computed to provide smolt-to-adult-catch ratios in Table 4. The same basic data were computed to provide harvest, escapement, and runsize estimates where missing for wild steelhead in the 56 year history of record. Table 2 was primarily taken from data found in the WDFW Hatchery and Genetic Management Plan (HGMP) with added information included that extends its comparative value. Table 3 was essentially copied from an extensive report made to Washington State Game Department (WDG) by Loyd Royal in 1972 as an analysis of Washington's anadromous trout program at that time. The data he used were supplied by WDG as part of the contracted independent evaluation (Royal was from British Columbia). In a few places Royal's information was missing and it was brought up to date with WDFW's most current records of that era. Table 5 was provided by a search of the fishery literature to compare smolt residualism levels differing studies have found. And Table 6 was Skagit River harvest data as taken from the WDFW website in July of 2003 under the category of Steelhead Harvest Summaries.

Figures 1 to 5 were created by Nathan Mantua, Ph.D., from the University of Washington Department of Atmospheric Sciences, and Vice President of Science and Education for the Wild Steelhead Coalition, as a means of better evaluating the 56 year record of Skagit River steelhead data compiled by Washington Trout from WDFW records. This provided for an independent science-based source for our analysis of the DEIS and its predicted effects on harvest, escapement, and runsizes regarding Skagit River steelhead. This lack of science-based information was consistently missing from the DEIS itself.

Figures A to H, and the Excel Spreadsheet they were derived from, include varied graphs and plots created by Stephen C. Conroy, Honors degree in Biochemistry and a Ph.D. in protein chemistry from University of Aberdeen, Scotland. This again takes the steelhead data compiled by Washington Trout from the WDFW records to provide still another layer of independent analysis from which to evaluate the effects of the DEIS on Skagit River steelhead populations, and its few alternatives provided.

DETAILED COMMENTS

The Following detailed comments are made in page by page order as found in the Draft Environmental Impact Statement (DEIS) using the appropriate heading number sequences.

Page 1, 1.1 Goals of the Applicant:

The DEIS states: The "lower" Skagit River is defined as "at or downstream of the confluence of the Skagit with the Baker River (RM 56.5)."

Comments: However, when independently asked to define the Lower, Middle, and Upper Skagit regarding fishery and fish habitat identities downstream of Gorge Dam, both Steve Fransen of NOAA Fisheries and Stan Walsh of the Skagit River System Cooperative Tribes provided similar answers:

1) (Fransen, per. Com. June 29, 2004) Lower Skagit: From the mouth upstream to Highway 9 or the pipeline crossing above Sedro-Woolley (the Wild & Scenic River boundary). The lower river is characterized as leveed and not having active floodplain access. It also has a very flat gradient. Middle Skagit: From Highway 9 or the pipeline crossing to the Baker River confluence and sometimes to the Sauk River confluence. This river reach is characterized by its active floodplain, few levees, less riprap, and the obvious influence of the unregulated Sauk River. Upper Skagit: From the Baker or the Sauk River confluence to the Gorge Powerhouse. It is characterized by a somewhat incised river channel, very limited active floodplain, regulated flow, and relatively steeper gradient.

2. (Walsh, per. Com. June 28, 2004) Lower Skagit: From the mouth upstream to the pipeline crossing. Middle Skagit: From the pipeline crossing to the Sauk River confluence. Upper Skagit: From the Sauk River confluence to the Gorge Powerhouse.

The difference is more than just semantic. The DEIS categorizes the proposed action as a "lower" river project, to help support its assertions regarding the potential impacts of spatially segregating hatchery rearing, release, and collection operations throughout the Skagit mainstem. This also helps to create the suggestion that the proposed action aligns with various hatchery-reform recommendations to locate those operations in the lower river, without noting whether those recommendations may have been based on a different definition of the lower river.

Washington Department of Fish and Wildlife (WDFW) has apparently created its own definition of "lower" Skagit especially for this DEIS as means of better justifying the alternative site locations. But the fact is, the two site locations are 45.6 and 56.5 river miles upstream from the mouth and approximately half way to Gorge Dam at RM 105. This means that both sites require passage through substantial river miles in which returning hatchery and wild adults can interact in periods of overlapping spawning maturation in February and March (particularly regarding the longer maturation periods of males combined with their potential for multiple matings). Also, outmigrating, and potentially residualizing, hatchery steelhead juveniles will have more miles to interact with wild steelhead and other wild juvenile salmonid species that

include ESA listed Puget Sound chinook than would be the case if a legitimate Lower Skagit River site were chosen for smolt releases.

The DEIS should more correctly define the locations of the two alternative sites as being in the Middle Skagit River. This is the actual case in river miles within the anadromous zone, and it would be consistent with generally accepted fishery and fish habitat jargon already understood by the involved agencies and interest groups.

The DEIS states: "This proposal would not result in increased hatchery steelhead production in the Skagit River system, nor would it attempt to evaluate or justify the need for the existing WDFW Skagit winter steelhead hatchery program."

Comments: The DEIS proposes a sustained release of 534,000 hatchery steelhead smolts into the Skagit system, with 334,000 of those occurring at the Grandy and/or Baker sites. In the 56 years from 1948-2003, in no 10 year period of time has there been an average release of 534,000 hatchery steelhead smolts. There was only year in those 56 years when 534,000 or more smolts were released, 1998. Although WDFW has had a plan to release 534,000 smolts into the Skagit ever since 1992, the actuality in those 11 years (1993-2003) has been an average annual release of 418,000 steelhead smolts, 116,000 less than the proposed sustained goal (see Table 1 as provided in the Appendix to these comments as derived from the cumulative information from the 1994 Grandy Creek Hatchery FEIS Appendices and information provided on page 35 of this DEIS). The DEIS would implement a 22% average annual increase in released hatchery steelhead smolts in the Skagit River system from present.

This also raises the issue of the quality of the Marblemount Hatchery facility: its inability to produce the smolt target even in years when the brood stock collection target and the total number of eggs collected exceeds the target purportedly needed to achieve the 534,000 smolt target. In turn, this belies the assertion that the 534,000 are (or will become) a "locally-adapted Chambers-Creek origin hatchery stock" (quite apart from the nonsense of that concept).

Thus the DEIS wording needs to be altered to: "This proposal WOULD result in increased hatchery steelhead production in the Skagit River system."

The assertion that this DEIS would not attempt to evaluate or justify the need for the existing WDFW Skagit winter steelhead hatchery program is ludicrous. How can anything new be built without first examining the foundation it is built upon? Science absolutely requires an evaluation of the existing hatchery program as a means of determining if the proposed actions are, in fact, improvements over the old, or if the old is failing and that the proposed actions may only further deepen existing problems.

The present call within fishery science is for Adaptive Management, which entails monitoring the past and present in order to effectively adapt the management program to better achieve needs and goals with future modifications. This is a fishery era that is all about evaluations and justifications of both the existing as well as the new.

It is entirely possible the existing program is preventing the ability to meet harvest goals, wild steelhead escapement needs, and/or is further driving either of the two ESA listed species in the Skagit River downward. Therefore the existing and past program must be evaluated to determine if the new layer of hatchery production further entrenches existing problems or if it provides an improvement over the old. Only by examining the existing program is it possible to evaluate a proposed alteration. The obvious question is: What is WDFW attempting to hide in its present and past steelhead program if unwilling to examine it?

In 1994, the DEIS for the then-proposed Grandy Creek Hatchery was found inadequate based on an insufficient analysis of the impacts on Skagit River wild steelhead of an increase in hatchery steelhead production. Since then, WDFW has increased steelhead release *targets* at Marblemount and various offsite-planting locations to the current level. That production increase has not been evaluated through SEPA, not in 1994, and not since. Even if it were true that the proposed action does not represent any significant change from current *actual* levels of hatchery production in the Skagit, it does represent an unevaluated level of production. It is inappropriate, arbitrary, and potentially illegal to now attempt to use that unevaluated production-increase as the *baseline* for an evaluation of the proposed action.

But in fact the assertion that the proposed action is not intended as a production increase is patently false. The consistent inability of the current program to meet existing smolt-release targets suggests that the proposed action is at least partially an attempt to improve overall program-performance that if successful would effect a significant practical increase in hatchery steelhead-smolt releases into the Skagit River. The DEIS uses this falsehood to assert that an assessment of the purpose and need of the WDFW Skagit winter steelhead hatchery program is unnecessary. It misconstrues the facts about the present and past scales of hatchery releases in the Skagit and falsely asserts that an evaluation of the hatchery program and the increase that would result from implementing the Proposed Action is not required. These all appear to be violations of SEPA requirements.

The DEIS states the goals: "Provide increased returns of harvestable adult hatchery steelhead to the lower Skagit River basin through the use of acclimation at a lower Skagit River location, and to do so in a manner **that would provide increased protection** of naturally spawning wild steelhead in the Skagit River system." (Emphasis added.)

Comments: There is a concern with the use of the phrase "that would provide increased protection." This subtle wording choice could be used to limit management responsibilities to a comparative analysis of this project's planned effects on wild steelhead to a short historic period of time – for instance, since the advocated hatchery production goal of 534,000 smolts was created in 1992.

The project outlined in this DEIS must be required to examine its place in the historic context of what has brought about Skagit River steelhead declines over the past 56 years of record (as provided in Tables 1, 3, 4, and 7, and Figures 1 to 5 in the attached Appendix), not just the most recent 12 years. The words "provide increased protection" could limit assessment of the effects of the project on wild steelhead as compared only to recent years while ignoring its context to the past.
The stated goals could be fulfilled with only a modest increase in wild steelhead protection while perpetuating hatchery management that keeps naturally spawning wild steelhead populations deeply depleted.

For instance, if Skagit steelhead history were confined to an examination no later than 1992, it would appear that the 4 wild steelhead escapements of ~7,500 fish (1992, 1995, 1998, and 1999) provide a robust number and the resource is in good health, and that a total wild steelhead runsize of 9,000 fish (1999) is a high consideration for wild steelhead production.

However, if the initial year for examination is extended back to 1978 when Skagit wild escapement data were first collected, the perspective shifts. With the larger data base, an escapement of 7,500 steelhead no longer seems robust when compared to the 4 years of 10,000-13,000 (1986, 1988, 1989, and 1990). Similarly, a total runsize of 9,000 wild steelhead no longer seems high compared to the wild runsize of 16,000 in 1988.

But steelhead history on the Skagit River did not begin in 1978 either. While less complete, the data go back another 30 years to 1948. Once again the perspective of what constitutes robust or healthy wild steelhead numbers shifts with the wider scope in time. Although wild escapement estimates did not typically exist at the time, nor hatchery from wild harvest distinctions, there remain compelling points of known steelhead numbers from the catch records.

Also, as stated on page 30 of the DEIS, "The winter steelhead hatchery program within the Skagit River basin began in the mid-1960s with early-run Chambers Creek Steelhead transferred from South Tacoma Hatchery to Barnaby Slough." This would indicate that steelhead catch and escapements prior to that time were predominantly, if not all, wild steelhead.

From Table 1 (in the attached Appendix), hatchery winter steelhead smolt records on the Skagit actually go back to 1960 with adult returns beginning in 1962. However,

there were probably hatchery juvenile steelhead released prior to that time from the old Birdsview Hatchery as operated by WDG after 1947 (a history inexplicably missing in the DEIS), although the numbers likely resulted in very few returning steelhead as indicated by the choice of the 1964 catch as the initiation point for the hatchery steelhead program.

Coinciding with the first substantial Barnaby Slough steelhead return, an estimate of hatchery steelhead in the catch was possible because hatchery fish were all marked (per. com. Curt Kraemer via e-mail dated November 12, 2003). Correcting that catch with the punchcard bias as computed from the 1994 FEIS (applied to the catch data back to the initiation of the hatchery releases), the hatchery steelhead component of the 1964 catch was ~8,216, and the wild component of the catch was ~14,000 for a total sport catch of 22, 216. The tribal catch, as provided for many years in the 1994 FEIS Appendices, was not known that year, although 2 years prior it had been 1,937. Even if the tribal catch was zero, the wild catch was at least 14,000 steelhead in 1964.

This provides a known point in Skagit steelhead history dating to the initiation of the Skagit steelhead hatchery program from which to provide a suggested baseline of comparison. At least 14,000 wild steelhead were known to have been caught. The question remains, how many escaped?

(From Table 7 in the attached Appendix) Looking at the 26 years of wild escapement record from 1978 to 2003, the highest percentage of wild harvest was 28% (1,728 fish) of the wild run size in 1981 with a wild escapement of 88% (5,323). However, it is likely that there were years prior to 1978 when wild steelhead harvest represented a larger proportion of the total wild runsize. This was probably most likely when the average number of steelhead sport fishermen increased in Washington for the period 1962-1969 by 63% over the period 1954-1961. At that same time, steelhead catch increased 53.1% coinciding with the advent of the State's hatchery steelhead program (An Examination of the Anadromous Trout Program of the Washington State Game Department, Loyd Royal, 1972).

Remembering that the tribal portion of the catch was unknown, but likely existed, it seems a fair ballpark estimate that the wild escapement was about equal to the wild sport catch, which would represent ~14,000 wild steelhead with a wild runsize of 28,000 in 1964. Going back into the 14 year period of record when sport fishermen were less numerous and sport catch was lower prior to 1962, there were 2 years when the harvest was 20,000-22,500, 3 years of 15,000-20,000, and 5 years of 10,000-15,000. The only years below 10,000 steelhead harvested were the first 4 years when punchcards were issued for catch tabulation, and when sport fishermen may have been particularly low in numbers.

Those 14 years were prior to the earliest documented record of hatchery steelhead smolt releases provided in the data. Most, if not all, of the steelhead harvested must have been wild. Sport fishermen were much lower in numbers in that era, and it seems a conservative assumption there was a wild escapement equal to the harvest (some years included tribal catch up to 715 steelhead in the harvest number). This would mean that the peak wild runsize in that period was 44,976 in 1956 with a 14 year average of 25,298 wild winter steelhead.

How realistic is this Skagit historic estimate? The Situk River is near Yakutat in Southeast Alaska. From USGS comparisons, the Situk River has a total drainage area of 124 sq. miles with an average flow of 600-700 cfs as compared to the Skagit drainage of 3,093 sq. miles and average flow of 16,000-17,000 cfs. The drainage actually accessible to steelhead is ~100 sq. miles on the Situk and ~1,200 sq. miles on the Skagit. The Situk has 8% of the watershed area of the Skagit available to steelhead and 4% of the water volume.

In the spring of 1952, a weir on the Situk counted 26,000 spawned out steelhead exiting the river after spawning (L. Knapp, USFWS Annual Report, 1952). After that point the steelhead population crashed to 1,000-1,500 steelhead after sport fishing pressure increased and a few unusual drought years occurred. Restoration efforts began in 1991. Resulting upward progress in steelhead numbers continues to the present (per. com. Robert Johnson, June 2003, and R.E. Johnson, Steelhead studies: Situk River, 1989. ADF&G).

In this historic context, the estimated average runsize of 25,298 wild steelhead on the much larger Skagit River in the period 1948-1961 seems a believable estimate – probably even conservative if an even earlier historic period could be examined.

The 56 year recorded steelhead catch and escapement history, provide the basic tool from which to evaluate the progress of both wild and hatchery steelhead management on the Skagit River. However, the DEIS has used an evasive word choice to define its responsibilities for monitoring and evaluating the DEIS project as a professed component of hatchery practice reform.

This project, like any hatchery project is suspect. The HSRG is an outgrowth of the known ability of hatcheries to suppress wild fish populations. The control on that is hatchery planning built on historic evaluations and subsequent operation with monitoring and continuing evaluations so adaptive management can occur.

The three words "provide increased protection" need to be replaced in this critical part of the DEIS by wording that can fulfill a goal of restoring naturally spawning wild steelhead populations to the production capacity of Skagit system habitat potentials that must include presently lost or degraded habitat that remains restorable. Without

such wording there is no real incentive for effective hatchery practice reform that can accommodate wild salmonid restoration, nor is there an incentive to invest in habitat restoration and preservation as a key management component.

A suggested change in wording would be: "… and to do so in a manner that would **allow for restoration** of naturally spawning wild steelhead in the Skagit River system."

Page 3, 1.2 Sites Investigated for Facility Location:

The DEIS states: "With the exception of the No Action alternative as required under SEPA, the various options listed above were not subjected to further consideration. All other non-site-related alternatives listed above were determined not to pass the test of reasonably meeting the goals and objectives of the applicant."

Comments: All three of the alternatives considered in the DEIS, including the No Action, are entirely site-related and have exactly the same hatchery production goals of 534,000 hatchery smolts released into the Skagit River system. The DEIS's refusal to consider substantive alternatives, including those involving hatchery production goals lower than 534,000, on the sole grounds that any production level less than 534,000 would not "reasonably meet the goals and objectives of the applicant" is a arbitrary and capricious, and a violation of SEPA standards and requirements.

Although the 534,000 goal has been met only one year since created in 1992, it remains that there are no numerical differences in any of the three alternatives regarding the potential problem a goal of 534,000 hatchery steelhead smolts may present for achieving increased harvest, providing needed increased wild steelhead escapement, and in meeting the required protection of ESA listed species.

This was, in fact, a question raised when the King County Superior Court ruled in favor of nine fish interest and environmental groups' appeal of the Washington State Shorelines Hearings Board's 1997 decision that was going to allow construction of Grandy Creek Hatchery. In 1998, the court ruled in favor of the nine co-plaintiffs primarily on the basis that the final EIS for the Grandy Creek plan failed to adequately consider alternatives to the hatchery proposal such as increasing natural production by addressing habitat issues. WDFW, now as then, has equally failed to provide a legitimate range of alternatives beyond hatchery production that could potentially meet the long term stated goals of providing increased harvest and in reducing wild salmonid interactions. WDFW has chosen to defy the 1998 court order by stubbornly replicating the same course in the 2004 DEIS as was taken in the 1994 FEIS.

As demonstrated in Table 1 (in the Appendix provided), in the 21 years when Skagit hatchery winter run smolt releases were 250,000-610,000 the average annual Total Harvest was 6,397 winter steelhead (sport and tribes). Hatchery Harvest data were

available 14 of those years with and average of 3,057 hatchery steelhead harvested (sport and tribes) with an average release of 365,576 smolts.

By comparison, there were 36 years when hatchery winter smolt releases were 0-250,000 smolts with an average annual Total Harvest of 10,949 winter steelhead, 4,552 more steelhead than in the years with 250,000-610,000 smolts released representing a 71% greater annual Total Harvest when hatchery smolt releases were often half, or less, of the other 21 years. Hatchery harvest was available for 11 of those 36 years when an average smolt release of 201,689 provided a Hatchery Harvest of 4,518 winter steelhead annually – 1,461 (48%) more hatchery steelhead harvested per year than in the 14 years when an average of 163,887 more smolts were released. Put another way, 81% more hatchery smolts has yielded 32% fewer hatchery steelhead harvested per year.

Table 3 (in the Appendix provided) replicates a table regarding an analysis of the results of 11 years of hatchery steelhead smolt releases and the resulting steelhead catch that was taken from page 150 of a report contracted to an independent scientist by the State of Washington over 30 years ago: An Examination of the Anadromous Trout Program of the Washington Game Department (Royal, 1972). Preceding the table in the 1972 report the author wrote: "Major examples of a declining survival rate, apparently related to increased plants, are shown in Table 31." Steelhead smolt releases and the subsequent catches for the Skagit and two neighboring Puget Sound rivers are listed in the table, the North Fork Stillaguamish and the Skykomish.

Royal goes on to state on page 155: "Since a barrier to obtaining increased runs of winter steelhead from increased smolt plants apparently exists after a certain level of planting is reached, defining the factor or factors creating this barrier becomes of paramount importance." Royal continues on page 164: "It seems logical that any improvement in the ability of a steelhead smolt to withstand stress should improve his ability to survive, thus raising the minimum limits of a 'density barrier' … However, it appears that density barriers would be created eventually by density alone and this should affect all species."

Reading this more than 30 years later is discouraging. WDFW in the 2004 Skagit DEIS has apparently learned nothing since that 1972 report. Many times more steelhead are now being planted with even greater increases planned through the 2004 DEIS.

Table 4 (in the Appendix provided) provides an extension to the 11 years of data from Royal (1972) brought up to the most recent smolt release and catch records provided in the 1994 FEIS Appendices and this DEIS. As Royal predicted and warned against, the adult steelhead runs and steelhead catch have continued to go down at about the same rate as the hatchery smolt releases have gone up.

The smolt-to-adult-catch ratios regarding Total Catch are particularly pertinent. With smolt plants of 95,900 in 1960 the smolt-to-adult-catch ratio was 7:1; as release numbers increased to an average 234,000 smolts from 1964-1974 the smolt-to-adult-catch ratio had increased to about 20:1; with a sustained release of an average 233,000 smolts annually from 1975-1992 the smolt-to-adult-catch ratio had increased to 45:1; and with the increase to an average release of 408,000 smolts from 1993-2001 the smolt-to-adult-catch ratio has leapt up to an average of 207:1. Three of those past 9 years had smolt-to-adult-catch ratios at astounding levels – 566:1, 687:1, and 907:1.

Considering the Skagit River runs directly into Puget Sound with no dams impeding steelhead smolt passage, these figures indicate increasing smolt plants long ago exceeded a density barrier somewhere during Skagit River steelhead life histories that has been affecting their survival. At this point in history, they are on a line descending more rapidly toward threatened levels coincident with annual hatchery steelhead smolt releases exceeding 400,000. This also suggests a differential (lower) fitness of hatchery smolts than wild, which in turn raises concerns re introgression of hatchery genes into the wild stock and erosion of fitness of the wild stock.

This is all information taken from WDFW's own data provided in the 1994 Grandy Creek Hatchery FEIS Appendices combined with information from this DEIS on pages 35 and 119.

Yet, this DEIS fails to consider any alternatives that would reduce, minimize, or eliminate hatchery steelhead smolt releases on the Skagit with investments in reclaiming lost habitat as a means of potentially providing greater long term harvest opportunities as well as minimizing or even eliminating risks to wild steelhead and other wild salmonids. Why doesn't the 2004 DEIS consider such obviously pertinent alternatives? Particularly when the data clearly indicate that increasing steelhead smolt releases over the past 40 years have led to fewer hatchery steelhead harvested per year, not increased hatchery harvest due to an evident density barrier exceeded by hatchery steelhead smolt releases long ago.

It is well known that WDFW is under pressure by two state legislative people representing the interests of one angling organization in Skagit county to build some sort of hatchery-related facility irregardless of its actual fish benefits, risks, or outright losses. However, that does not deny WDFW's legal responsibility to effectively evaluate such proposals and to provide a range of non-hatchery alternatives and a reduced hatchery production alternative, all of which may provide greater benefits with less risks.

Page 4, 1.2 Sites Investigated For Facility Location

From the DEIS: "The following sites were identified that could have reasonably met the project goals and objectives."

Comments: Of the 6 sites subsequently described as having been considered for selection as reasonably meeting the project goals and objectives, not one of these sites is near what is generally considered the Lower Skagit River commonly defined by past anadromous fish and habitat considerations as that section from the mouth to no further upstream of the pipeline crossing about 3 miles beyond the Highway 9 Bridge.

As previously discussed, WDFW has developed its own definition of "Lower" Skagit River that seems to be especially tailored to put the location of the two selected Action Alternatives within that special, and unusual, definition. It is apparent that the favored sites were first chosen and then a special definition for "Lower" Skagit was developed to include these sites, when, in fact, these sites are considered to be in the Middle Skagit, not Lower, in virtually all other anadromous fish and anadromous fish habitat considerations used within fish agencies and interest groups.

There are other potential locations that should have been considered that would have legitimately been close to upper limits of what is generally considered the Lower Skagit River. Among the possibilities would have been sites near Gilligan Creek on the south side of the Skagit and Hansen Creek on the north side of the Skagit. There are probably others that could also have been considered that would have reduced the area of river that released hatchery smolts would travel through, or residualize within, in their potential interactions with wild juvenile steelhead and ESA listed chinook, and that would have greatly reduced the potential for wild/hatchery interactions on the adult returns by minimizing the distance they travel upriver into increasingly used wild steelhead spawning areas. For instance, the lowest wild steelhead redd identified in recent years was at RM 22 not far below the Highway 9 Bridge (page 117 of the DEIS). To minimize adult hatchery/wild potential for spawning interactions, a release site as close as possible to this location would effectively meet the criteria of minimizing the effects of hatchery steelhead on wild populations.

However, the chosen sites are at RM 45.6 and RM 56.5, both dead center in the anadromous zone of the Skagit River. The lower site choice means that 23.6 miles of river remain within the known zone of wild steelhead spawning for hatchery/wild interactions to occur within and hatchery smolt/residual interactions would be occurring over the entire 45.6 miles. At the 56.5 mile location there would be 34.5 miles for the spawning interactions to occur within and 56.5 miles for the smolt/residual interactions to occur within. These remain significant mileages for potential adverse interactions to occur within regarding the interactions of hatchery with wild fish.

When a significant investment is being made in a project, why isn't the best possible site location being chosen that would truly minimize these potentials and truly fulfill an

intent to reform hatcheries as tools that will not further jeopardize wild fish populations? The two Action Alternatives fall far short of fulfilling the potential for effective hatchery reform. They might be termed half-way attempts.

Page 9, 1.5.2 Areas Of Controversy And Uncertainty
Grandy Creek Site

From the DEIS: "… well pumping rates necessary to maintain a fish-rearing use, some drawdown of the Grandy Creek would occur. It is unknown to what extent drawdown of the shallow aquifer or Grandy Creek would occur and at what rate recharge would occur … water uses would be non-consumptive and water would be returned to Grandy Creek at the base of the proposed fish ladder."

Comments: The description of this uncertainty suggests a risk to ESA listed chinook salmon described to spawn particularly in this section of Grandy Creek below the Cape Horn Bridge and some of which would have to migrate upstream to access the complete spawning area described as the lower 2 RM of the creek (page 125 of the DEIS). A particular area of concern is between where water is drawn out above the fish ladders and where it is returned below the fish ladders leaving an area that could make accessing the ladders potentially difficult for adult chinook that may migrate upstream in October and early November for spawning in time periods when the lowest flows of Grandy Creek have been recorded. Pumping withdrawal needs could also dewater chinook redds that may be constructed in the area and/or hinder their spawning process.

From the DEIS: "… intra and interspecific ecological interactions, including predation, competition, and potential genetic implications of hybridization between wild and hatchery steelhead are existing conditions in this system as up to 110,000 smolts are direct-released annually into Grandy Creek."

Comments: As indicated, no more than 110,000 steelhead smolts been released into Grandy Creek according to any available WDFW records (see page 126 of this DEIS). Actual releases into Grandy Creek itself will be far above past releases as indicated in Table 3-16 on page 126. The Grandy Creek average between 1996-2003 has been 40,535 annually (zero in 1998 and 2003). The largest single year release was 109,592 smolts released. The present plan is for a sustained release of 334,000 smolts at the Grandy site, 8 times the past 8-year average. This poses significantly greater risk of intra and interspecific ecological impacts to wild salmonid populations in Grandy Creek and in the Skagit River vicinity near it.

What is not discussed is that with the Grandy alternative, hatchery steelhead will also be transported from Marblemount or Barnaby for continued releases at the Baker site as well. This means that with the Grandy alternative hatchery steelhead would be

released from both sites thus doubling the distribution and potentials for ecological interaction concerns.

Even if true, these assertions of the DEIS would seem to be beside the point. Legitimate concerns exist regarding the harmful impacts on wild fitness from introgression by hatchery-origin steelhead, and WDFW and the DEIS admit to having no current genetic data that evaluate recent introgression that may have arisen in part from the increased hatchery releases since 1992. Nor does WDFW conduct any relevant field surveys at appropriate times during the winter that are designed to evaluate potential reproductive interactions between wild and hatchery steelhead. SEPA would appear to obligate WDFW to evaluate these significant issues.

Page 9-10, Baker Site

From the DEIS: "… up to 100,000 smolts are released annually into the Baker River as part of the Skagit hatchery winter steelhead program … the increase in the number of smolts released (to 334,000) may contribute to an increase in ecological interactions in the immediate vicinity of the site."

Comments: What is not discussed is that this site would reduce the total impacted release sites to only one site, the Baker site, as opposed to the Grandy choice which would continue to impact both the Baker and Grandy sites as continued hatchery steelhead release points (described on page 37 of this DEIS). This, alternative would cut the planned hatchery steelhead distribution considered in the DEIS to one impacted site thus cutting in half the potentials for ecological interaction concerns as compared to the Grandy site alternative.

While this points to the particular flaw in the Grandy alternative as a consideration, it does not minimize all the other risks still associated with the planned hatchery numbers to be released, and where, as otherwise considered throughout this evaluation of the DEIS and its limited alternative choices.

The DEIS reasonably asserts that ecological interactions would likely increase at the Baker site as a result of three-fold increase in smolt releases. However, this can not be reconciled with the previous unsupported assertion that a similar increase in smolt releases at Grandy Creek would not significantly alter "existing conditions." This false distinction between the two site-alternatives, and the favor it implies for the Grandy site, appears to be arbitrary.

From the DEIS: **"**No impacts to flow and instream habitat are anticipated under this alternative."

Comments: This is an important consideration over the risks presented by the Grandy Creek site.

Page 10, 1.5.3 Issues And Environmental Choices

From the DEIS: "The issue to be resolved is primarily related to choice of site … and other relevant considerations and documents … for instance … Hatchery Scientific Review Group (HSRG) recommendations, budgetary considerations, legislative decisions, and in the case of the Baker River site, whether a partnering relationship can be arranged."

Comments: The issue to be resolved is more than choice of sites, but whether there has been a range of alternatives provided that represents the necessities for an effective EIS meeting SEPA and other potential environmental legal requirements.

Also, missing from the list of other considerations and documents for necessary consideration are The Wild Salmonid Policy, HGMP process, and Wild & Scenic River restrictions.

Page 10, 1.5.4 Benefits and Disadvantages Of Future Implementation

From the DEIS: "Both WDFW and the HSRG have determined that there is an immediate need for a steelhead acclimation facility in the lower Skagit River …"

Comments: The HSRG does not state under its Recommendations for Skagit River Hatchery Winter Steelhead section (pages 51-52 of the HSRG document, 2003) an immediate need for a steelhead acclimation facility beyond stating that WDFW is "tentatively" looking at such a project at Grandy Creek.

The HSRG recommendations then bracket the recommendation for development of an acclimation facility "such as Grandy Creek" with several guiding qualifications to be met as already discussed: "implement monitoring and evaluation as a basic component; size the hatchery program in a manner that achieves harvest goals with minimal impact on wild populations; investigate the reasons for the recent decline in adult winter steelhead returns, formulate a working hypothesis for the decline, and take appropriate actions; and conduct a workshop to implement the wild steelhead management zones concept."

Presumably, the proposed project in the DEIS will have to meet these recommended requirements to justify that actual hatchery reform is occurring by minimizing impacts on wild salmonid populations in a way that will not impede wild species and stock restorations. Presumably, if a hatchery plan cannot meet such justifications it is vulnerable to legal action to stop its construction or to curtail its activities until it does meet certain standards.

From the DEIS: "With possible future implementation of the proposal (in other words delay), the hatchery program would continue as described in Section 2.1 and hatchery program goals described in Section 2.1.1 would likely continue to not be met."

Comments: Delay of implementation of the proposal, however, can provide the necessary evaluation needed to develop a far more effective alternative to the present hatchery program, and the one described in the DEIS, that would more realistically result in increases in Skagit River steelhead runsize.

A significant down-sizing in the present hatchery program, or even its elimination, may be the missing alternatives in the DEIS that could potentially meet the harvest goal of 10,000 steelhead. Once recovery is well established, it could then be determined what a biologically supportable harvest of a healthy Skagit wild steelhead population might provide. As it is, the present goal has been achieved only once in the 28 years since 1976, and was only within 2,000 steelhead of meeting that goal in 3 other years. Just half of that harvest goal, 5,000 steelhead, has not been even close to achieved in the 13 years since 1990 (see Table 1, and Figure 1, as provided in the attached Appendix).

Even more compelling, in the 36 years when hatchery winter smolt releases were 0-250,000 smolts released, the harvest two years later averaged 4,552 more steelhead harvested than in the 21 years when hatchery winter smolt releases were 250,000-610,000. And strictly looking at the years when hatchery harvest was broken out from wild harvest, 81% more smolts released yielded 32% fewer hatchery steelhead harvested two years later (Table 1, as provided in the attached Appendix).

The past and present inability to meet the Skagit River harvest goal through increasing hatchery steelhead numbers over the years has been very apparent and likely related to a density barrier as visible through smolt-to-adult-catch ratios which will be further discussed in other comments (see Tables 3 and 4, Figures 1-5, and Figures A-H as attached in the Appendix). This suggests that down-sizing those releases, or even their elimination, may best provide the opportunity for achieving all of the practical steelhead goals that include harvest, runsize, and wild escapement.

Most significantly, this admission appears to contradict the fundamental assertion of the DEIS that adoption of the proposed action would not represent an increase in overall smolt releases into the Skagit River. If no change in the program would result in continued inability to meet current production targets, including smolt-release targets, then the intention of the proposed action to improve program performance must be considered an attempt to effectively increase actual smolt production. If the proposed action meets this goal, the increase in actual smolt releases will be real and significant. It is inaccurate, unreasonable, and arbitrary to assert that no increase will occur and therefore the potential environmental impacts of releasing 534,000 steelhead smolts into the Skagit River do not warrant review under SEPA.

Page 14, Grandy Creek Alternative Impacts

From the DEIS: "There would be a short period in the month of October when the juvenile acclimation/rearing ponds are being filled that a lag would occur between withdrawal rate and discharge rate: water would be held in the acclimation pond system and discharge would occur at a rate lower than the withdrawal rate."

Comments: October is commonly the period of some of the lowest anticipated Grandy Creek and Skagit River flows in which passage into Grandy Creek over the bar to the Skagit, and up Grandy Creek beyond the facility water withdrawal point, could hinder or eliminate ESA listed chinook passage and spawning as has been documented to occur primarily in the lower 0.5 mile of Grandy Creek and suspected to occur in the lower 2 miles (page 125 of the DEIS). This filling period can be anticipated to occur each year with potentially critical results to the remaining small chinook population in Grandy Creek.

From the DEIS: Pumping tests … reduce Grandy Creek water levels approximately 4.8" … tests were done in August (a low flow period) …"

Comments: August is not typically the lowest flow month, but rather September and/or October. A loss of 4.8" in these minimum low flow periods would be critical for ESA listed chinook salmon entry, passage, and spawning, all which would be exacerbated in the more dewatered section between the point of withdrawal and the point of release described as 30' downstream (next page of the DEIS). This is right in the heart of the area identified as where chinook spawning occurs (page 125 of the DEIS).

Page 15, Grandy Creek Alternative

From the DEIS: Effluent discharged to Grandy Creek would contain different water chemistry and physical features than the water originally diverted …"

Comments: How many similar facilities in the State exceed State and/or federal water quality standards? The effects of this facility on water quality need to be determined from the operation from similar sites. If the track record has a high percentage of facilities exceeding water quality standards, a treatment system will need to be created.

From the DEIS: "No flood-related impacts are anticipated …"

Comments: The fact is flood impacts have already occurred at the site in the proposed location of five new drilled wells. The bank in that area eroded back 25'-30' in the October 2003 flood. It left test well casing PW-3 standing like a telephone pole in the active Skagit River channel. This area is actively and rapidly eroding with each high water event.

The bank-hardening plans described to try and protect the five new wells (pages 17 and 19 of the DEIS) and access road to them do not guarantee the new wells will not be shortly left in the river channel as has already occurred with PW-3. Furthermore, the bank-hardening activities themselves attempt to prevent the necessary dynamic processes of the river channel needed for the creation of new fish habitat. Where Grandy Creek enters the Skagit has especially high value for dynamic channel processes to occur which may eventually result in side channel braids. Habitat just downstream has already been purchased with hopes of that process occurring by the Skagit Watershed Council through the Skagit River Land Trust. Any bank-hardening ventures by WDFW can only deter the natural Skagit River and Grandy Creek processes that need to occur at this alternative site.

Page 21, Grandy Creek Alternative
Aquatic Species Impacts

From the DEIS: "Because this alternative would not increase the target number of hatchery winter steelhead smolts currently planted into the Skagit River system, overall ecological impact (competition, predation, etc.) … would likely remain near existing levels … impacts in the Grandy Creek area would increase with a successful program."

Comments: In actual practice, if the program is successful as planned, it will significantly increase the present level of hatchery winter steelhead smolts in the Skagit system from the average release of 418,000 smolts the past 11 years to 534,000 smolts. That is a 116,000 smolt increase (28%) as planned to be sustained in the DEIS. That increase can be expected to attract a probable 28% increase in predators attracted by the increased hatchery smolt levels with the more stable wild smolt population suffering increased consequences from the increased predation activity. Also, whatever direct predation on other juvenile salmonids such as ESA listed chinook is presently occurring can be expected to similarly increase.

Increases in these anticipated direct and indirect predation levels will be particularly high at the Grandy Creek site and the Skagit River near there as the release numbers increase from a past average at that site of about 36,000 to ten times higher at 334,000.

From the DEIS: The potential for co-mingling of hatchery steelhead spawners with early-arriving wild steelhead is an existing condition …"

Comments: As previously commented, the existing condition is that of significantly smaller numbers of smolts being released than is planned for sustained release in the DEIS plan. The expected level of hatchery/wild spawning interactions would increase in two ways:

1) The 28% increase in actual released hatchery smolts from the present average of 418,000 per year over the past 11 years to 534,000 can be anticipated to similarly increase whatever level of smolt residualism is presently occurring which could be anywhere from 1.6% to over 40% as found in the available literature (see Table 5, as attached in the Appendix). There has been no collected Skagit River data to suggest other than this broad potential range.

Among those residuals can be anticipated to be a high percentage of precocious males ready to immediately spawn in the month of May coinciding with peak spawning activity of wild female steelhead. The supposed temporal spread in wild and hatchery spawning time has no validity with the precocious males.

Even at the lowest known residualism levels of 1.6%, when applied to 534,000 smolts (which excludes summer run releases) the resulting 8,544 residuals can be expected to have a high number of precocious males that can overwhelm the presently escaping wild steelhead population that has been as low as 3,780 fish (2000) of which no more than 1,890 would have been anticipated to be males at 50%. The precocious males are known from the literature to migrate upstream as far as 21 km on Oregon's Imnaha River, thus meaning they will encounter wild females far from their release site as found by C.C. Jonasson, R.W. Carmichael, and T.W. Whitesel in Residual Hatchery Steelhead: Characteristics and Potential Interactions with Spring Chinook Salmon in Northeast Oregon (Oregon Department of Fish and Wildlife Report, Portland. 1995).

2) There are also overlaps in spawning interactions for wild and hatchery adult steelhead that can be predicted to be as high as 40% (court testimony, Bentzen 1998) which will increase in proportion to the DEIS's anticipation of increased adult hatchery steelhead returns related to 28% increase in smolts planned to be achieved as compared to the present actual releases.

Moreover, the issue of whether or not the DEIS is obliged to evaluate fitness impacts on the wild population from recent levels of (increased) hatchery releases still goes begging. The DEIS does not attempt to characterize or describe the "existing condition" or offer insight into the current level of "co-mingling of hatchery steelhead spawners with early-arriving wild steelhead." WDFW has adopted specific performance standards in its Wild Salmonid Policy for the "co-mingling" of hatchery and wild spawners; in this instance that standard would appear to restrict the percentage of hatchery fish in the natural spawning population to no more than 1%. Is the "existing condition" within that standard; if outside it, by how much? Insofar as the DEIS does assert that the proposed action will have no significant impact on existing conditions, it would appear to be a violation of SEPA requirements to leave unexamined whether this existing co-mingling is at an acceptable level, or whether it is compatible with the stated goal of the proposed action to "provide increased protection of naturally spawning wild steelhead in the Skagit River system."

Page 22, Grandy Creek Alternative, Mitigating Measures and Unavoidable Impacts

From the DEIS: "100% of adult early-run hatchery steelhead returning to Grandy Creek would be trapped, reducing potential interaction between hatchery and wild fish. However, prior to February 1, adults collected in excess of broodstock needs may be returned to the lower Skagit … Hatchery/wild interactions and straying would still be expected and may result in interbreeding with the earliest returning wild steelhead. However, this is an existing condition …"

Comments: While 100% of adult hatchery steelhead returning to Grandy Creek would be trapped, as indicated in the subsequent paragraph there is an expected straying factor that is unavoidable. However, what is that straying factor? The present acclimation straying factor must be determined from existing Barnaby Slough releases to see if the acclimation theory keeps homing at acceptable levels or not. That straying factor then needs to be compared to the Wild Salmonid Policy standard of 1% for hatchery fish with a low level of similarity to the wild stock (for which the highly domesticated Chambers Creek steelhead stock must qualify). Only if the straying criteria is met are the two Action Alternatives in the DEIS valid, which includes the Grandy Creek site. If the straying rate fails, as yet to be determined at Barnaby Slough, then the proposed Action Alternatives in the DEIS must be rejected.

It was found in Oregon that acclimation sites did not reduce straying (Kenaston et al. 2001), therefore there is a need to test this on the Skagit prior to committing resources to any new facility. This would seem to be part of the monitoring and evaluation process necessitated by the HSRG recommendations as well from which to base new hatchery plans. Also, it can be anticipated that recycling returning adult steelhead after being trapped at the Grandy site to a downriver location will further contribute to straying.

This again raises the issue of the DEIS's failure to adequately demonstrate whether the proposed action can meet all the stated purposes and needs in the DEIS, and how that failure renders arbitrary the dismissal of other potential alternatives on that basis.

Page 28, 2.0 Proposed Action Alternatives

The DEIS states: "The HSRG recently recommended the construction of an acclimation facility with adult collection capabilities at a location in the lower Skagit River basin."

Comments: The HSRG included a number of recommendations relative to Skagit River Hatchery Winter Steelhead planning. Among those was, "Investigate the reasons for the recent decline in adult winter steelhead returns, formulate a working hypothesis for the decline, and take appropriate actions." Presumably this would include an examination of the overall WDFW hatchery steelhead program on the Skagit including

the part a lower Skagit facility such as at Grandy Creek or the Baker River may have on perpetuating a continuing steelhead decline. Examining Tables 1,3, and 4, Figures 1-5, and Figures A-H (in the Appendix provided) indicate that at some point in the 1960s, when the initial release of 100,000 hatchery steelhead smolts increased beyond 200,000, Skagit River steelhead (hatchery and wild) reached a density barrier at some location(s) in the Skagit River eco-system. Any smolts added beyond that number bring back fewer steelhead with a diminishing runsize, harvest, and escapement.

Also, the HSRG has used quite specific wording regarding development of a lower Skagit facility: "Develop an acclimation and adult trapping facility such as Grandy Creek for the lower river releases, at a site that reduces potential ecological and genetic interactions with wild populations." It is apparent in the wording that the HSRG is depending on the WDFW to make a scientifically justifiable location and operational choice that will reduce ecological and genetic interactions with wild populations, as well as being guided by a compliance with the other recommendations. Included in those other recommendations is: "Implement monitoring and evaluation as a basic component, of both wild steelhead management zones and hatchery harvest streams."

To achieve this regarding new hatchery additions such as advocated in the 2004 DEIS would necessitate collection of information that WDFW presently does not collect, nor are such plans indicated as being included in the funding for the project as the basic need to monitor and evaluate whether the project is reducing or increasing ecological and genetic interactions with wild populations. WDFW presently does no spawning surveys prior to March 15th from which to determine feral spawning numbers and feral spawning distribution of hatchery female steelhead that primarily dig redds prior to March 15th. Without such data, it can't be known what the ecological and potential genetic interactions with wild steelhead and other wild salmonids might be.

Secondly, WDFW conducts no snorkel surveys, nor mark-recapture studies to determine what the actual residualism may be regarding hatchery steelhead smolt releases that could also include precocious males that would immediately spawn with wild female steelhead whose spawning peak is in May coinciding with smolt releases.

Without these two critical monitoring and evaluation tools in place prior to the planned facility construction to provide for a baseline, as well as continuing in the years thereafter, there is no possible means for determining if the facility is meeting its goals of reduced ecological and potential genetic interactions.

For these reasons, the planned project as described in the DEIS, does not comply with the HSRG recommendations. To build without monitoring and evaluation is to perpetuate the same hatchery mistakes as in the past. Although unstated, it is obvious that the HSRG is setting up a set of conditions for Adaptive Management to occur, but

which can't occur without developing baselines, examining past management results, and collecting sufficient data to evaluate the operative results of new projects.

Page 29, 2.0

The DEIS states: "In 2003, Skagit River hatchery steelhead were also released into the Sauk River, **although this is not an annual stocking location**."

Comments: This is incorrect. The WDFW's own website provided the stocking histories of steelhead smolts from 1995-2001 as provided in a recent article in The Osprey regarding the history of Skagit River steelhead (McMillan 2003). From those WDFW records the following winter hatchery steelhead smolt releases were found made into the Sauk: 1995 – 30,200; 1996 – 25,900; 1997 – 21,600; 1998 – 30,800; 1999 – 49,000; 2001 – 21,800. The 2000 and 2003 smolt stocking data were not available on the website at the time, although on page 31 of this DEIS it indicates 30,000 hatchery steelhead were also released into the Sauk in 2003.

Furthermore, in reply to a letter of May 31, 2001 documenting surprise that three of four steelhead caught in the Sauk River in 2000/2001 were adipose clipped, Lew Atkins, Assistant Director, Fish Program, WDFW, responded with a letter dated July 11, 2001: "For several years, the Sauk River has been planted with approximately 25,000-30,000 hatchery (adipose clipped) winter steelhead annually." (McMillan 2001).

Page 30, 2.1 History and Status of the Skagit River Steelhead Program

The DEIS states: "The winter steelhead hatchery program within the Skagit River basin began in the mid-1960s with early-winter run Chambers Creek steelhead transferred from the South Tacoma Hatchery to Barnaby Slough."

Comments: Nowhere in the DEIS is operation of the Birdsview Hatchery on lower Grandy Creek as a steelhead facility by Washington Department of Game (WDG) discussed regarding its transfer of from the U. S. Fish and Wildlife Service. The transfer to WDG is documented in the Baker River Project Relicense Initial Consultation Document, 2002, as found on page A-3 of Appendix A: "July, 1947 – Birdsview hatchery closed, then transferred to the Washington Dept. of Game. Siltation, turbidity and poor escapement prompted the closure." The hatchery was in continuing operation until at least 1956 as documented in Pacific Northwest Fishing and Hunting Guide, 1956-57, 12th Edition, edited by Gordon S. Frear on page 252 under the listing of Grandy Creek: "A game department steelhead hatchery located on this creek." The 1944 edition of Fishing Guide to the Northwest has the hatchery correctly listed as: "A federal fish hatchery located on this creek." However, by the 1968 Washington State Fishing Guide the hatchery is no longer mentioned, evidently having failed with WDG abandonment at some earlier date.

The past operation of this facility by WDG as a steelhead hatchery and subsequent abandonment at the same site as proposed for one of the two Action Alternatives in the DEIS is remarkably negligent. Certainly the past WDG operation of a steelhead facility at Grandy Creek is vital to Skagit River steelhead history, and there may be pertinent information in the past hatchery failure at the site from which to better assess consideration of using the same site over again. For instance, if the problem was inadequate water volume or quality how will the new plan avoid replication of that past failure?

Page 31, Hatchery Stock Timing

The DEIS states: "This hatchery stock steelhead has been selected over decades of development to return to the Skagit River primarily in December and January, and begin spawning by mid January. The return timing of the hatchery steelhead stock occurs one month before the initial return of the native wild winter steelhead stock. Wild winter steelhead begin to arrive in low numbers in January, but peak returns do not occur until March and April with peak spawning in April and May."

Comments: An EIS is intended for specifics, not broad generalizations that distort the facts. Steelhead Harvest Summaries provided in the WDFW website were used for a recent article in The Osprey on Skagit River steelhead history (McMillan 2003). That harvest data for the winters of 1995/96-1999/00 was broken out by month and by hatchery/wild as provided in Table 6 (in the Appendix provided):

In 3 of those 5 years of harvest data, wild steelhead were initially caught in November. In 1996/97, 14 wild steelhead were caught in November compared to 36 hatchery, and in both 1995/96 and 1998/99 wild steelhead harvested in November were half of the hatchery steelhead numbers, albeit both low. All of the 5 years indicate wild steelhead were caught in December, and in fact, in December 1998/99 there were 15 wild steelhead caught and only 7 more hatchery steelhead at 22. In January of 1998/99 the wild steelhead harvest was 154 and virtually equal to the hatchery harvest of 159. In February of 1996/97, the wild harvest of 1,036 wild steelhead was triple the hatchery harvest of 338. In February of 1998/99, a harvest of 676 wild steelhead was 13 times greater than the hatchery harvest of 53 steelhead. Also, in April of 1997/98 there was a harvest of 26 hatchery steelhead.

The data clearly indicate that proportions of hatchery to wild steelhead in their return timing and contribution to harvest are highly variable from year to year. This creates considerable opportunity to ineffectively manage for harvest and escapement of wild steelhead based on WDFW's broad and often inaccurate generalizations.

Spawning timing between hatchery and wild steelhead can also be variable from year to year regarding overlaps and potential for interactions. For instance, the expert testimony of Professor Paul Bentzen for the Shorelines Hearings Board Appeal

regarding the potential for hatchery/wild steelhead spawning interactions on the Skagit included: "Despite the separation in run timing, the FEIS reports that Chambers Creek stock exhibits 40% spawner overlap with wild winter steelhead, i.e. 40% of hatchery females have not yet begun spawning by the time the wild run begins spawning in February (p. 43, appendix A-6 FEIS). Therefore, 40% of hatchery females minus fishing mortality and hatchery taking will be available to spawn with Grandy Creek wild males. Because males are not gamete limited, they tend to stay in freshwater longer than females, and therefore have greater opportunities to reproduce than do females. If the hatchery males remain in freshwater until there are no more females to spawn with, 100%, minus fishing mortality and hatchery taking, of the Chambers Creek males would then be present when the wild winter steelhead population returns to spawn, a factor not considered in the FEIS. Some level of gene flow from Chambers Creek stock to wild Skagit winter steelhead has therefore been occurring ever since hatchery supplementation began in the Skagit drainage."

The present DEIS no better addresses this than the 1994 FEIS.

Page 32, 2.1.1 Hatchery Program Production Goals

In the DEIS: This page references the 1992 Option Paper on Hatchery Steelhead Stocking Guidelines to Limit Genetic Impacts to Wild Steelhead Stocks (WDW 1992a). The DEIS states: As a result of this analysis, WDW increased the hatchery steelhead stocking level in the Skagit River to the current target level of 534,000 smolts based on predicted harvest demands due to expected population growth in the Puget Sound area … This stocking level is not consistently being realized …"

Hatchery winter steelhead harvest goals are 10,000 fish for the Skagit River system, of which half is for tribal harvest and half is for sport harvest. Due to inadequate returns, the tribal goal for hatchery winter steelhead of harvesting 5,000 adults is not currently being achieved, and sport harvest is also low."

Comments: This discussion clearly indicates that the target level strategy of 534,000 smolts is not being achieved (only once after the target was set in 1992), and that harvest goals are not being met. What is not discussed are the reasons why.

The fact is that harvest goals have been met only once (1983) in the 28 years of harvest record from 1976-2003 (see Table 1, and Figure 1, as provided). Yet, in the preceding 28 years from 1948-1975, the harvest goal was met 22 times. Furthermore, prior to the first adult return in 1964 from Barnaby Slough releases when elevated smolt plants were initiated in 1962, in the 16 years from 1948-1963 the harvest goal was met 12 times. This was despite the fact that tribal harvest was unknown and uncounted in 9 of those years and sports fishermen were 63% greater in numbers from 1962-1969 than from 1954-1961 (Royal, 1972). Twice in those 16 years, when hatchery smolt releases were below

100,000 or non existent, the harvest goal of 10,000 was more than doubled – in 1956 and 1960.

The Skagit River was once a prodigious producer, of wild steelhead in particular, that was capable of supporting steelhead harvest that generally exceeded present harvest goals. It did so with releases of 0-100,000 hatchery smolts. As Loyd Royal (1972) long ago pointed out, as the hatchery smolt release numbers increased after 1962, the harvest did not increase, but dropped instead. That trend has continued for more than 30 years. As WDFW has insisted on perpetually trying to increase smolts released, rather than evaluate the results, a continually declining Skagit River steelhead population and a continuously declining steelhead catch, both hatchery and wild, has occurred (see Figure 1 as attached in the Appendix).

The only thing that has kept the Skagit steelhead populations from reaching threatened or endangered levels, have been 35 breather years of less than 250,000 hatchery smolts released. Those 35 years were either prior to large hatchery releases or when the numbers of adults coming back to the hatchery were inadequate to sustain the desired number of eggs and resulting lower numbers of hatchery smolts released. The adult steelhead returns equating with those lower release years are when Skagit runs sizes averaged highest as well as steelhead catch, both tribal and sport, for both wild and hatchery fish harvested (see Table 1, and Figure 1, as attached in the Appendix).

Only through greatly REDUCED hatchery steelhead production can Skagit steelhead return to something approaching historic numbers by limiting hatchery smolt releases to a level that does not exceed the obvious density barrier above which there is only steelhead lost, not gained (see Figures 1-5 and Figures A-H, as attached in the Appendix).

But the DEIS does not connect the dots. The HSRG paper discusses Skagit River Basin habitat on page 22 (Skagit River Basin, Hatchery Reform Recommendations, March 2003):

"Skagit River Estuary: Approximately 70% of the original estuary area has been lost due to diking. Much of the rest is degraded. The area bracketed by Tom Moore and Freshwater soughs on the South Fork Skagit is the only marginally functional area."

Although surface trawls by NOAA Fisheries have found both wild and hatchery steelhead smolts cohabiting Skagit Bay for only 2 months between May and June (per. com. Casimier Rice, NOAA Fisheries, July 2004 with 2002 Skagit Bay graph in the Appendix), it may nevertheless be an intensive and vital period necessary for effective sea life adaptation prior to setting off into Puget Sound and to the Pacific. Of further interest, the graph of the 2002 Skagit Bay collections indicates juvenile hatchery steelhead considerably outnumbered the wild in the month of June. To this was added

a significant note: "Mark IDs may be incomplete, underestimating the number of hatchery fish."

The estuary may be but one of several components to a complex chain of interconnected steelhead density bottlenecks Skagit River steelhead pass through in their life histories that could include Puget Sound itself, and/or the narrow migration corridor through Georgia Strait.

Although the actual *where* remains an unknown, there is little doubt from the data that a density barrier is there in the opposing up and down patterned relationships of smolts to resulting adults (see Figure 1, as attached in the Appendix). Somewhere between smolt migration time and adult returns, there is the maw to a thin bottleneck, or a chain of bottlenecks. No amount of tinkering with an acclimation/rearing pond targeted at high levels of smolt releases can alleviate this. In fact, the driving criteria of meeting and sustaining an integrated Skagit system goal of more than a half million hatchery winter steelhead smolts, can only further exacerbate the existing problem of too many smolts and too little estuary, and/or too little of some other habitat bottleneck(s) occurring in Skagit River steelhead life histories that both wild and hatchery steelhead share.

The Skagit steelhead problem is not primarily that of hatchery/wild steelhead interactions on the spawning grounds (although it is a contributing problem), nor is it primarily an issue of better quality hatchery smolts released from a more favorable facility as the necessary mechanism for increased adult hatchery returns for harvest. This is primarily an issue of a limit to juvenile steelhead rearing capacity once smolting occurs due to a density barrier bottleneck, or a chain of them as the case may be.

For 30-plus years WDFW has failed to accept the problem, and as a result there has been no adaptive management response with necessary reductions in hatchery smolts released. In fact, it can probably be argued that no hatchery smolts are required at all to regularly meet harvest goals and in-river harvest distribution on the Skagit system. Harvest of near 10,000 steelhead may well be achievable with elimination of hatchery smolt releases, significant investments in habitat restoration as a management driver, and wild Skagit steelhead were allowed to climb out of their death spiral created by hatchery smolt releases.

Released hatchery steelhead smolts may also share critical Skagit River areas with rearing juvenile chinook. Increasingly large releases of hatchery steelhead smolts, over-crowded and starving in their brief estuary adaptation to salt water, are in a position to prey upon cohabiting juvenile chinook due to their comparative size differences as demonstrated in Table 2 (provided in the attached Appendix).

Steelhead smolt residualism at an unknown level, but which can be anticipated to be somewhere between 2%-40% from the range found in the literature (see Table 5 in the attached Appendix), will be broadly spread through the river system due to the breadth of hatchery releases planned from RM 78 to RM 56.5 or RM 45.6 (20-30 miles). This continued broad smolt distribution, combined with anticipated steelhead smolt numbers 28% greater than presently realized, can be expected to increase the present level of predation occurring on chinook by hatchery steelhead smolts.

The anticipated range of residual steelhead smolts resulting from a release of 334,000 (the indicated number for both of the Action Alternatives) would be from 5,344 to potentially as high as 156,980, depending on variables from year to year regarding smolt growth conditions, water flows and temperatures at time of release, and size of the smolts that would actually come out of the planned facility.

The average release of 418,000 smolts the past 11 years, would increase to a proposed sustained release of 534,000 in the DEIS. This anticipated increase in average numbers of smolts released, even if it were to result in a somewhat lower percentage of residualism as hoped (the present residualisim level is unknown and without a collected baseline any comparison will never be known), could still result in larger actual numbers of residual smolts and further losses of juvenile chinook through steelhead predation due to the 28% increase in actual smolts released.

Page 33, 2.1.1

From the DEIS: Table 2-2. on page 33 indicates that in 4 of 9 years the necessary egg take at the hatchery to meet production needs described in the DEIS was insufficient and there was a basin-to-basin transfer of eggs to make up for the deficit. The DEIS then states: " … a decision to discontinue this basin-to-basin transfer practice was recently made in 2003 … **If** the proposal presented in this DEIS results in greater broodstock returns, **as anticipated** by fisheries managers, the broodstock collection goal could be met without supplementation." (Emphases added.)

Comments: With an apparent density barrier occurring for Skagit steelhead as demonstrated over more than 30 years, with 28% more smolts released each year as planned to occur in the DEIS from the past 11 year average of 418,000 to 534,000, it can be predicted that the hatchery broodstock return will continue downward, not up as anticipated.

Also, this ignores the years when the nominal egg-take goal was exceeded and the target smolt release of 534000 could still not be achieved. (See the table accompanying subection 7.4.2, page 20, of WDFW's Hatchery Genetic Management Plan for the Marblemount Winter Steelhead Program, "Broodstock collection levels for the last twelve years (e.g., 1988-1999), or for most recent years available". This HGMP was submitted to National Marine Fisheries Service on March 17, 2003 and was thus

available to the authors of the DEIS. Out-of-basin transfers appear to have occurred in some or all of these years. So even when egg-take goal is met there is little likelihood the target will be met without out-of-basin transfers. Hence, if out-of-basin transfers have indeed been permanently discontinued (as they should) the Proposed Action and all other Alternatives that have a 534,000 target have low probability of achieving the egg take that appears to be required in view of the problems with Marblemount Hatchery.

This brings up, again, the issue of whether the Alternatives Analysis in the DEIS is adequate to satisfy SEPA requirements. Several Alternatives were dismissed from significant evaluation based on the DEIS's determination that the relevant alternatives would not meet the designated purpose and need for the proposed action. Yet it is not at all clear that the proposed action can meet either of the expressed dual goals, increasing harvest opportunity in the lower Skagit *or* minimizing harmful impacts on wild salmonid stocks in the river. This would appear to render arbitrary the dismissal of several potentially reasonable alternatives.

The purpose and need of the proposed action as described in the DEIS is furthermore at odds with the stated goals of the targeted release of 534,000 hatchery steelhead smolts stated in the WDFW's Marblemount HGMP. Subsection 1.12, page 6, of the HGMP ("Current program performance, including estimated smolt-to-adult survival rates, adult production levels, and escapement levels….") states:

> The tribal goal for hatchery winter steelhead is to harvest 5,000 adults commercially. This goal is not being achieved. The non-tribal goals are to have a self-sustaining hatchery run of 400 adults. This equates to a ~1% return on total smolt releases into the watershed (534,000 smolts).

Nothing is said in the HGMP about this hatchery production serving a non-tribal harvest objective. The numbers (5400 total adult returns from a smolt release of 534,000 and expected average smolt-to-adult survival rate of 1% (0.01)) clearly provide no room for expecting any additional adult returns that could be devoted to the realization of non-tribal harvest goals about which the HGMP makes no mention!

The HGMP is required as part of the process for securing ESA take authorization for the operations of the Marblemount steelhead hatchery (which has yet to be granted by National Marine Fisheries Service) and was submitted to NMFS more than a year before the release of the DEIS at issue. One should expect that the HGMP contains the relevant statement of the goals and objectives of the Skagit River winter steelhead hatchery production program and accurate information concerning the magnitude of smolt releases associated with those goals and objectives. One should, therefore, further expect that the DEIS would be entirely consistent with the HGMP in these details. It clearly is not. It is difficult to believe that the DEIS could be acceptable from the point of view of satisfying SEPA standards when it contains assertions regarding program goals

and objectives that appear to be in conflict with the State's own application to NMFS for ESA coverage of its Skagit River steelhead hatchery operations.

Page 34, 2.1.2.3 Juvenile Production and Release

From the DEIS: "The current smolt release goal for the Skagit River watershed is 534,000 smolts."

Comments: According to the DEIS, the 11 year average has actually been 418,000 and the smolt goal was realized only one year. Further, these figures do not appear to reconcile with WDFW's own Hatchery Genetic Management Plan for the Skagit River steelhead program at the Marblemount hatchery, already submitted to NOAA Fisheries in application for take authorization (dated 3/17/03). In several instances, the HGMP lists the current smolt release goal as only 334,000. It also documents that the actual performance of the program from 1995 through 2002 averaged only 221,300 smolts released into the watershed.

This is at considerable odds with the assertion of the DEIS that the proposed action represents little change from current hatchery steelhead production in the Skagit Basin. As described above, it also raises issues of whether the proposed action will in fact meet the purpose and need described in the EIS any better than a number of the arbitrarily dismissed alternatives would, as addressed elsewhere in these comments.

Page 35, 2.1.2.3

From the DEIS: Under the footnotes to Table 2-3: "Smolts normally released at Davis Slough were released as a one-time event to the Sauk River."

Comments: As previously demonstrated from past records, this is blatantly not true. Smolt releases into the Sauk River occurred annually from 1995-2003.

(Continuing) From the DEIS: "The inability of the hatchery program to meet production goals is attributed to several factors …"

Comments: However, none of the factors discussed is the most likely one suggested by over 30 years of evidence (see Figures 1-5 and Figures A-H as attached in the Appendix): there is a density barrier that once exceeded in smolt numbers results in a declining adult return rather than an ascending adult return. The more smolts that go in, once exceeding that barrier, the fewer adults come back.

Another unexamined factor potentially contributing to the inability to meet program goals could be relative fitness issues and the need for a thorough, current genetic-introgression evaluation. Hatchery steelhead smolts are likely surviving at lower rates than un-introgressed wild smolts, as well as depressing the survival rates of all smolts

due to density impacts. The likely impacts on smolt survival from hatchery-wild crosses is ignored by the DEIS – as acknowledging this as a possible factor for the decline would require the DEIS to recommend a genetic evaluation.

Page 36, 2.1.3 Hatchery Scientific Review Group Recommendations

The DEIS states: "In its review of the Skagit River Hatchery Winter Steelhead Program the HSRG (2003) suggested that construction of an acclimation and adult recapture facility in the lower Skagit River, specifically at Grandy Creek, would benefit the Skagit River program and could help reduce potentially adverse interactions between hatchery and wild fish."

Comments: The HSRG has used quite specific wording regarding development of a lower Skagit facility as was previously commented: "Develop an acclimation and adult trapping facility **such as** Grandy Creek for the lower river releases, **at a site that reduces potential ecological and genetic interactions with wild populations**." It is apparent in the wording that the HSRG is depending on the WDFW to make a scientifically justifiable location, and the use of "**such as"** provides WDFW with the necessary flexibility to make sure the operation of the facility and location choice will reduce ecological and genetic interactions with wild populations. Furthermore, the operation and choice needs to be guided by a compliance with the other bracketing recommendations.

Among the HSRG's bracketing recommendations was, "Investigate the reasons for the recent decline in adult winter steelhead returns, formulate a working hypothesis for the decline, and take appropriate actions." Presumably this would include an examination of the overall WDFW hatchery steelhead program on the Skagit including the part a lower Skagit facility such as at Grandy Creek or the Baker River may have on perpetuating a continuing steelhead decline. Examining Tables 1,3, and 4, Figures 1-5, and Figures A-H (in the Appendix provided), indicate that at some point in the 1960s, when the initial release of 100,000 hatchery steelhead smolts increased beyond 200,000, Skagit River steelhead (hatchery and wild) reached a density barrier at some location(s) in Skagit River steelhead life histories. Any smolts added beyond that number bring back fewer steelhead with a diminishing runsize, harvest, and escapement.

Also included in those bracketing recommendations is: "Implement monitoring and evaluation as a basic component, of both wild steelhead management zones and hatchery harvest streams."

To achieve this regarding new hatchery additions such as advocated in the 2004 DEIS would necessitate collection of information that WDFW presently does not collect, nor are such plans indicated as being included in the funding for the project as a basic need to monitor and evaluate whether the project is reducing or increasing ecological and genetic interactions with wild populations. WDFW presently does no spawning

surveys prior to March 15th from which to determine feral spawning numbers and feral spawning distribution of hatchery female steelhead that primarily dig redds prior to March 15th. Without such data, it can't be determined what the potential for genetic and ecological interactions with wild steelhead and other salmonids might be in either numbers or in distribution.

Secondly, WDFW conducts no snorkel surveys, nor mark-recapture studies to determine what the actual residualism may be regarding hatchery steelhead smolt releases. This can include precocious males that would immediately spawn with wild female steelhead whose spawning peak is in May coinciding with smolt releases.

Without these two critical monitoring and evaluation tools in place prior to the planned facility construction to provide for a baseline, as well as continuing in the years thereafter, there is no possible means for determining if the facility is meeting its goals of reduced ecological and potential genetic interactions.

For these reasons, the planned project as described in the DEIS, does not comply with the HSRG recommendations. To build without monitoring and evaluation is to perpetuate the same hatchery mistakes as in the past.

Page 36, 2.2.1 Grandy Creek Alternative

From the DEIS: "The Grandy Creek site is the location of the relic Birdsview fish hatchery that was owned and operated by the U.S. Fish and Wildlife Service (USFWS) between 1905 and the late 1950s."

Comments: As previously indicated, other sources clearly indicate, operation of the Birdsview Hatchery was transferred to WDG back in 1947. It was then owned and operated by WDG as a steelhead hatchery at least until 1956 but ceased operation sometime prior to 1968. WDFW has the record to the actual operation of that facility, and that needs to be provided as vitally pertinent to this DEIS as a means of evaluating the success of a past steelhead program at this site and the reasons for its failure.

Page 37, 2.2.1 Grandy Creek Alternative

From the DEIS: "Funds for a facility at Grandy Creek were appropriated during the 52nd Legislature 1991 Special Session under Engrossed Substitution House Bill 1427."

Comments: It has not been uncommon for court decisions in the United States to overthrow legislative actions as a part of the checks and balances of our democratic system. In 1998, the King County Superior Court ruled in favor of an appeal by 9 fish interest and environmental groups challenging the
Washington State Shorelines Hearings Board's 1997 decision to allow construction of

Grandy Creek Hatchery. The judge ruled in favor of that appeal primarily on the basis that the final EIS for the Grandy Creek plan failed to adequately consider alternatives to the hatchery proposal such as increasing natural production by addressing habitat issues as just as effective for providing increased steelhead returns.

In this regard, WDFW has made the same mistake with the 2004 DEIS as they did with the 1994 FEIS for the Grandy Creek Hatchery. WDFW has essentially defied that court decision by continuing releases aimed at achieving 534,000 smolts – hatchery or no hatchery. Coinciding with the defiance of that court ruling, both wild and hatchery steelhead numbers have declined to even lower levels in harvest, wild escapement, and total steelhead runsize on the Skagit River (as shown in attached Table 1, and Figure 1), as was predicted may occur in that court ruling by evidence and testimony given regarding the effects of increasing hatchery smolt release numbers in the Skagit River.

WDFW is more bound by its legal obligations than by legislative appropriations that may, unknowingly to most legislatures, jeopardize rather than benefit fish resources. WDFW has lost sight of its obligations to the fish resources of the State in its persistence to willingly pursue the original Grandy Creek Hatchery plan as struck down in court. The new plan is a virtual replication of the old with the substitution of "Acclimation and Rearing Facility" for "Hatchery."

(Continuing) From the DEIS: "At times, the Baker River acclimation pond may still be used as a release site if juvenile acclimation is possible considering PSE activities at the Trap. Because the HSRG recommended the discontinuation of direct releases without adult capture, the Baker River site would only be used if acclimation and adult re-capture continued to be available."

Comments: What is meant by "at times." This is not useful language for a DEIS aimed at determining how the effects of hatchery releases may affect wild salmonids. Apparently the Grandy site alternative will include the Baker site as a continued smolt distribution point. Thus it consists of two sites for release, not one, both within 11 miles of each other in the Middle Skagit as conventionally defined for RM 45.6 and RM 56.5.

This needs to be prominently considered in all of the relevant discussions for each of the two action alternatives. Obviously, the Grandy alternative is composed of two separate smolt releases sites, while the Baker alternative is composed of only one. This is never otherwise provided in the alternative discussions. It is one of the most basic and significant differences between the two site choices.

(Continuing) From the DEIS: "The Grandy Creek proposal does not propose an increase in the total number of smolts released into the Skagit system over existing production (534,000)."

Comments: Plans are not realizations. The actual release of 534,000 smolts as intended over the past 11 years has actually only been met once, and the 11 year average release in that span of time has been 418,000 smolts, 116,000 smolts less than what the DEIS says the new facility addition will be able to sustain. Also, actual releases into Grandy Creek itself will be far above past releases as indicated in Table 3-16 on page 126 of the 2004 DEIS. The Grandy Creek average between 1996-2002 has been 40,535 annually. The largest single year release was 109,592 smolts. The present plan is for a sustained release of 334,000 smolts at the Grandy site, 8 times the past 8-year average.

(Continuing) From the DEIS: In the footnotes of Table 2-5 it reads: "The proposed release dates reflect research that shows volitional release throughout the month of May decrease levels of residualism (Flesher and Whitesel 1999)."

Comments: WDFW has failed to supply an actual quote from the relevant study, nor has it provided a fuller examination of the literature review available regarding smolt residualism. This is pertinent to the assessment of the proposed facility in the DEIS. A detailed literature review is necessary to frame the possibilities. A quick look at the actual range of potential residualism levels found in a literature review is provided with Table 5 as attached in the Appendix. There also needs to be data collected regarding the present smolt residualism levels occurring in the Skagit in order to provide a baseline to demonstrate whether the proposed facility will actually provide an improvement as necessary for the concept of Adaptive Management to occur.

Page 37, 2.2.1.2 Site Location and Condition

From the DEIS: More than half of the site is within the Skagit River floodplain … Several test wells exist along the southerly site boundary adjacent to the Skagit River.

Comments: The river bank at the site of the test wells eroded back about 25'-30' in the October 2003 flood. It left one test well casing protruding from the Skagit River channel like a telephone pole (creating, by the way, a significant manmade intrusion on the Skagit Wild & Scenic River values in the area).

Page 38, 2.2.1.3 Proposed Facilities

From the DEIS: " … new wells and associated piping, a well-protection system … and … The existing foot trail to the Skagit River would be maintained and integrated into a maintenance roadway that would be used to access the area where new wells would be drilled (about 15 feet landward of the Skagit River bank)."

Comments: All of this would violate the 200' protective corridor designated for Wild & Scenic Rivers. It would require removal of vegetation within that protective corridor, not only for initial construction but for continued maintenance of the road and well casings. Furthermore, the river bank is actively eroding back in this area where the new wells are proposed.

The Skagit has been actively altering its channel in this reach as is desirable for natural river functions in the dynamic give and take of changing fish habitat. One of the identified habitat problems in the HSRG (Hatchery Reform Recommendations, March 2003, Skagit River Basin, page 22) was this particular section of the Skagit which has degraded to poor condition due to cumulative human impacts of which this activity would consist of yet another. Over the years property owners, including the State and Skagit County with the South Skagit Highway, have create bank-hardening projects to protect their land from erosion which has confined the channel and disrupted the necessary dynamic processes a river needs to express meanders and side channels in the provision of high quality fish habitat.

Location of the project at this site will entail the need for wells exposed to the erosion of the Skagit bank near them. The DEIS indicates another form of bank-hardening will occur at the site to protect the wells with a "well-protection barb system." This is later described as pile driving 150 posts just back from the river's edge in the hopes of preventing further erosion beyond that point. This indicates the well investment is at risk without bank-hardening (and may remain so even with it), and the supposed protector of the State's fishery resources is further trying to limit the creation of new fish habitat by confining the Skagit channel with its own bank-hardening activities.

Page 41, Surface Water Intake and Pump Station

From the DEIS: Bank protection (riprap) would be installed on the upstream and downstream banks of the new intake structure … riprap extending 40 feet upstream and downstream from the new structures and keyed into the existing Grandy Creek banks and channel floor."

Comments: The riprapping described will be placed in the same lower section of Grandy Creek which is later described as the lowermost area of the creek where ESA listed chinook would be most likely to spawn (page 125 in the DEIS).

Page 41, Well Water

From the DEIS: "Well water would be provided from new wells proposed to be drilled near the existing access trail that runs parallel to the Skagit River. The new wells would be drilled near existing test wells located along the southerly site boundary."

Comments: Why new wells when test wells exist? It is known that one well casing is now exposed in the active river channel, but why abandon the remaining four? This needs an explanation that potentially suggests water volume from the wells may be questionable, and may also reflect back to the past abandonment of Birdsview Hatchery by WDG as a steelhead rearing facility.

Page 43/44, 2.2.1.4 Site Preparation

From the DEIS: "The Grandy Creek site would be cleared to allow construction of the new facility components … The well access road would be staked in the field to avoid removing large trees in the area. Existing understory vegetation would be cleared to provide a maximum cleared width of approximately 14 feet to accommodate well access."

Comments: It needs to be addressed that this road construction activity and understory vegetation removal and planned well drilling and pile driving are all within the 200' riparian corridor managed as a Wild & Scenic River which is intended to exclude such activities.

Page 45, 2.2.1.5 Water Sources

From the DEIS: "New wells would be drilled and installed to replace the existing test wells that are located on the right bank of the Skagit River close to the shoreline … Over the course of facility operations (approximately 30 years), the Skagit River would likely continue its lateral migration, incising its right bank in the vicinity of proposed well field. To ensure that the wells are not damaged by incisive forces of the Skagit River, WDFW has proposed installation of wood piling protection barbs … stabilizing the river bank adjacent to the groundwater wells … the total number of piles proposed to be driven would not exceed 150."

Comments: Why are the wells being placed this close to the Skagit River where the bank is in jeopardy of eroding? One of the test well casings has already been left standing upright like a telephone pole in the active river channel after the October 2003 flood event. That well, PW-3 as later described, was drilled in 1992 (page 81 of the DEIS). The planned life of the project is stated as 30 years, yet, placement of the one well described as having the best sustained pumping flow was lost in 11 years due to erosion by the river. There is no mention of this in the DEIS. In the 2003 flood event, an estimated 25'-30' of Skagit River bank disappeared at this point.

Evidently a safer well location further inland from the erosive forces of the Skagit is not practical due to lack of sufficient groundwater flow to operate the facility. PW-3, the lost well, likely provided the best sustained pumping flow due to its proximity to the Skagit and due to tapping the Skagit River aquifer more readily than wells further inland that would tap into the less sufficient Grandy Creek aquifer.

However, by placing the wells near the river, in an effort to protect them, which may or may not succeed, bank-hardening through the pile-driving of 150 posts between the river bank and the wells is proposed in hopes, evidently, that as the known forces of the river erode toward the wells, the line of posts will prevent further erosion, that is, unless the river forces cut behind this thin line. All of this sounds like considerable risk

of monetary investment. Furthermore, this is in the Wild & Scenic zone of 200 feet meant to preclude these sort of activities.

There is also the lacking history of the past hatchery at this same location operated by WDG as a steelhead production facility from 1947 to at least 1956 (Frear 1956) before being abandoned due to probable water source problems as indicated by USFWS abandonment of their operation of the facility prior to WDG (Baker River Project Relicense, Initial Consultation Document, March 2002, Appendices). WDFW needs to provide the history of the prior operation of this facility from which it can be better determined the prospects of the provision of a sufficient water source for 30 years. If that written history has been lost somewhere (per. com. Curt Kraemer to Bill McMillan, July 14, 2004), then an oral history of its operation must be found and recorded from people undoubtedly still alive who remember its operation.

There are better uses of this valuable piece of land where a substantial creek joins a main river regarding fishery values than use of the site for hatchery purposes with a 30 year lifespan and further flawed with risks. The river reclaiming this property, as it seems want to do over time, could well lead to a new side channel at the creek's entry with the provision for outstanding natural fish production if left alone. Active habitat restoration activities at the site could accelerate the reclamation of high fish values.

Page 45, 2.2.1.5 Surface Water

From the DEIS: "A new surface water intake and pump station would be constructed on the left (east) bank of Grandy Creek to provide up to 4,490 (10 cfs) of surface water for operation of the facility … surface water and groundwater would be used in a variety of combinations throughout the juvenile acclimation and adult collection phases of Grandy Creek facility operation to meet the needs of both adult and juvenile winter steelhead."

Comments: This will inevitably have effects on the flow of Grandy Creek, and the operation of the facility includes October when very low flows can be anticipated many years, and into early November when extremely low flows have also occurred. This is of considerable concern due to known use of Grandy Creek by ESA listed chinook that may attempt spawning run passage in the section of stream that could have flows too low to accommodate them due to a combination of Grandy Creek aquifer withdrawals as well as surface water withdrawals. Of further concern, chinook redds constructed in short periods of higher flows in September could be dewatered by aquifer withdrawals previously identified under Areas of Controversy and Uncertainty on page 9 in the DEIS. The distance that would be affected may be short, but it happens to coincide with the location of known chinook spawning (page 125 of the DEIS).

Page 46, 2.2.1.6 Wastewater Facilities

From the DEIS: "Similar ponds operated by WDFW meet Washington State discharge requirements of the National Pollutant Discharge Elimination System (NPDES) without additional treatment and it is believed that the Grandy creek facility would meet the requirements as well."

Comments: More to the point, are there ponds that do not meet State water quality standards, and if not, how many, and how has the situation been corrected at those sites? This is of particular concern where past water quality on the Skagit River has been high, and for Grandy Creek whose smaller volume could be more easily disturbed by pollutants.

Page 49, 2.2.1.10 Site Operation

From the DEIS: "Surface water from Grandy Creek would be combined with well water beginning in January or February and continuing until all of the fish have been released."

Comments: Page 45 had previously indicated surface and groundwater would be used in a variety of proportions throughout the period of acclimation pond use. Which is correct?

Page 50, 2.2.1.10 Site Operation

From the DEIS: "When fish reach the smolt stage, the screens at the outlet end of the ponds would be removed and fish would be released from the acclimation/rearing ponds volitionally … water depth within the ponds would be gradually lowered over the duration of the release period."

Comments: At one point the release is described as volitional, but that is immediately qualified by a description of the depth of the pond being lowered during the release period in an apparent attempt to get all smolts to exit the pond rather than encourage those smolts that are more likely to residualize to remain. Therefore the dewatering of the ponds would appear to be a gradually forced release spread over a month's time rather than the volitional release initially described.

Page 51, 2.2.1.10 Site Operation

From the DEIS: "Through February 1, hatchery-origin steelhead collected in excess of broodstock needs would be recycled back to the lower Skagit River for increased sport and Tribal fishing opportunity. After February 1, hatchery steelhead would no longer be returned to the Skagit River in order to avoid interactions between mature hatchery fish and wild fish that may be holding in the lower Skagit."

Comments: If the site is being operated in a manner to increase protection of naturally spawning wild steelhead, this recycling practice is in direct opposition to that intended goal.

Hatchery steelhead have been stated to be mature for spawning by early January (from page 118 of the DEIS), although it is also described as mid January at another point (page 31 of the DEIS) with a reconciliation in those dates needing to be determined. It can be assumed that hatchery steelhead returning from early January onward will consist of an undetermined proportion that will be at or near spawning maturity by the time they reach the trap site. When once again released, with spawning maturation even more advanced, it will increase the likelihood those that escape the fisheries will become feral spawners in the Skagit or some tributary potentially accompanied by wild steelhead described as making initial arrival in January (page 31 of the DEIS) with potential interactions that could include mating together in the wild. This type of potentiality was described in the court testimony previously quoted regarding the potential for hatchery and wild cross-matings on the Skagit River (Bentzen 1998).

And if a hatchery female spawns with a hatchery male, the progeny from that mating would then compete with wild juvenile steelhead for rearing space and food. This is the situation described on the Clackamas River that has led to subsequent reductions in the wild steelhead population there due to the progeny of hatchery spawners taking up necessary rearing space needed for wild juveniles (Kostow et al. 2003).

Recycling steelhead once they return to the trap site can only increase the number of feral spawning hatchery steelhead from what would have occurred if all fish were contained once entering the trap. This would increase the described potentials for impacts on wild steelhead.

Pages 51-58, Baker River Alternative

Comments: All of the previous discussions regarding the Grandy site equally apply to the Baker site alternative regarding the impacts of the gross number of hatchery smolts that would be released with the same anticipated trends for Skagit River steelhead as demonstrated in Tables 1-7, Figures 1-5, and Figures A-H in the attached Appendix.

However, the Baker site does confine the defined "lower" river releases to one site rather than being spread over two sites as would be the case with the Grandy alternative. The Grandy alternative would actually result in continued hatchery smolt releases at the Baker site as well, which is not emphasized as it should be in the Grandy alternative descriptions. This is a significant difference that would limit the potentials for initial hatchery/wild and ecologial interactions due to minimizing the Skagit smolt releases sites to 3 rather than 4.

Also, the Baker site would not result in the need for bank-hardening activities to try and protect vulnerable well sites that deny naturally dynamic river channel processes. Nor would it necessitate potential violations of the Wild & Scenic River intent to exclude activities within 200′ of the Skagit River, which are planned to occur at the Grandy site for well, pile-driving of posts, and road maintenance. The entire facility would also be outside the 100 year flood plain other than the trapping facility itself.

Unlike the Grandy site, the Baker site acclimation/rearing operation would have a guaranteed surface water volume, rather than both surface and well water whose demands would potentially block ESA listed chinook returns or dewater chinook redds at Grandy Creek. Direct impacts on spawning and migrating adult chinook would not occur beyond what the operation of the Baker River hydropower system already does. Also, the past history of the Grandy site with two previously failed hatchery activities suggests that water quantity and quality may not be up to the long term needs of a planned 30 years of proposed operation.

Given the advantages to the Baker site, it is surprising that the DEIS has wasted so much descriptive effort on the two facilities when both have virtually the same goals and one of them has such obvious advantages and less risk as compared to the other. The Grandy alternative should have been culled out, and two alternatives should have been provided that actually provide legitimate steelhead management choices.

With that said, the Baker Alternative will not be much further discussed in the comments beyond the broad brush strokes of the Grandy site still being applicable to it regarding the impacts of the total numbers of hatchery fish planned for the Skagit as equally related to both site choices.

Page 59, 3.1.1.1 Elements Of The Environment, Grandy Creek Alternative, Existing Conditions

From the DEIS: "The easterly portion of the site forms an alluvial terrace that slopes steeply to a somewhat smaller terrace in the center of the site, likely an abandoned stream channel."

Comments: From the description of the abandoned old stream channel, it is evident the value of this property for natural fish habitat restoration processes, and/or for human stimulated fish habitat projects such as creation of a groundwater channel, is high. Preserving, restoring, and/or enhancing these habitat values could benefit multiple species of salmon, trout, and char. This would represent long term fish and fishery benefits as compared to a hatchery acclimation site frought with risks and a 30 year life expectancy.

Among the acclimation/rearing pond risks at this site are: drilling five wells exposed to an eroding Skagit River bank; blockage of ESA listed chinook and/or dewatering of

their redds; bank-hardening through pile-driven posts to attempt confinement of a very active Skagit River channel; increased levels of smolts released (from an average of 40,535 to 334,000) and returning as potentially feral adults in the Skagit with the complex baggage for varied wild steelhead interactions at both the adult and smolt levels; and the failure of two past hatchery operations at the site by WDG and USFWS related to unreliable water sources.

The erosion risk from the Skagit River is identified on the next page of the DEIS (page 60), but does not describe the actual effects of having already exposed one of the test well casings drilled in 1992.

Page 64, 3.1.1.3 No Action Alternative

From the DEIS: "At the Grandy Creek site, erosion would continue in the isolated areas where it occurs along the Skagit River on the Grandy Creek southerly site boundary."

Comments: It is implied that the erosion occurring at the Grandy site is a negative effect. However, new fish habitat will eventually be created in dynamic channel processes too often absent in other areas of the Middle and Lower Skagit due to bank-hardening activates to protect farm land, cities and towns, roads, houses, and in the instance of the Grandy Creek alternative, fish hatchery operations.

The Grandy site borders a fish habitat purchase made just downstream which will greatly benefit from allowing the Skagit channel to freely roam just upstream of it. Eventually a new side channel may develop with Grandy Creek running into it not unlike the present situation at Day Creek Slough in the provision of very high quality fish habitat associated with it.

The No Action Alternative, while deficient in the high numbers of hatchery fish planned but thus far seldom achieved, at least provides for natural Skagit River channel functions to occur at the Grandy site that the Grandy Action Alternative would attempt to alter by attempts at channel containment.

Page 66, 3.1.3.1 Grandy Creek Alternative, Existing Conditions, Water Quality and Quantity

From the DEIS: "… R.W. Beck (1990) determined an average discharge of 78 cfs for the winter months … at that time … analysis of flows recorded from November 2002 through March 2003 reflected a 76 cfs winter daily average with a low of 6 cfs in early November …"

Comments: This is the low flow from which it must be determined what the effects of withdrawals from both surface water at Grandy Creek and from its aquifer will have on

its ability to pass ESA listed chinook salmon in October and November and to provide for chinook spawning.

Page 66-67, Water Quality and Quantity

From the DEIS: "Water quality sampling results for Grandy Creek … show temperature exceedences … south of the SR 20 bridge. Grandy Creek is listed as a … problem area for instream temperature … In addition, Grandy Creek is listed on WDOE's Surface Water Source Limited … list … identifies low-flow streams in Washington State that, because of potential limitations in available supply, may be of concern for fish habitat …"

Comments: The aquifer and surface withdrawals planned for the acclimation facility can be expected to aggravate the low flow concerns coinciding with its operation beginning in October and continuing to early June.

A low flow of 6 cfs was documented in early November of 2002. October and early November would be anticipated times for fall chinook to potentially enter Grandy Creek for spawning, or in which spawning has already occurred with potential of dewatering their redds due to water withdrawals for the site operation, or for deterring their upstream passage in the 30 foot reach between water withdrawals and where water from the pond reenters. This is a legitimate concern from the available information, due to the identification of the lower 0.5 mile of Grandy being the most important for known chinook use (page 125 of the DEIS). This is the same section that would be impacted by project operation.

Page 70, Impacts, Water Quantity Impacts

From the DEIS: "Table 3-3. Maximum surface water and groundwater requirement (in cfs) relative to steelhead life history stage at the Grandy Creek alternative site and total discharge to Grandy Creek."

And further down: "There would be a short period, approximately two days, in the month of October, during acclimation pond filling, when a lag would occur between groundwater withdrawal rate and discharge to Grandy Creek."

Comments: Table 3-3 indicates in the months of October and November there would be **groundwater withdrawals of 6 cfs and 7 cfs** respectively to operate the Grandy Creek acclimation facility with an assumed total groundwater right of 7.0 cfs and a total surface water right of 10 cfs.

However, pages 66-67 of the DEIS indicate that:

"… R.W. Beck (1990) determined an average discharge of 78 cfs for the winter months … at that time … (and) analysis of flows recorded from November 2002 through March 2003 reflected a 76 cfs winter daily average **with a low of 6 cfs in early November** …"

And further: "In addition, Grandy Creek is listed on WDOE's Surface Water Source Limited … list … (and) identifies **(Grandy Creek as one of the) low-flow streams in Washington State that, because of potential limitations in available supply, may be of concern for fish habitat** …"

And on page 17 under Grandy Creek Alternative Impacts: "The effect of pumping from the shallow groundwater on Grandy Creek included **a water level lowering of 0.4 feet** (4.8") when the lowest site well **was pumped at about 6.7 cfs** (3.006 gpm) … Tests were conducted during low flows in August and the pumped water was discharged to the Skagit River, not back to Grandy Creek."

And on page 87: "EMCON Northwest (1992) concluded that <u>sustained</u> pumping of the shallow aquifer would **result in increased flow from Grandy Creek to the shallow aquifer**. These effects for a sustained pumping at a maximum yield scenario would result in flow **from** Grandy Creek but occurring at an unknown rate, and would result in **unknown impacts** to Grandy Creek."

And still further on page 125 under Fish Species in Grandy Creek: "<u>Chinook</u>. According to the 'Catalog of Washington Streams and Salmon Utilization' (Williams et al. 1975) and Puget Sound Harvest Management Plan (Puget Sound Indian Tribes and WDFW 2001) **Chinook are known to spawn in Grandy Creek**, although the frequency of spawning is unknown … it is not expected that Chinook spawners are abundant in Grandy Creek (WDFW 2004). However, limited utilization may occur in the lower 2 RM of the creek due to the presence of suitable spawning gravels. A low number of **incidental spawners have been observed in the creek and 2-3 redds have been seen between the mouth and the Cape Horn Bridge overpass** in past seasons (~RM 0.3) (P. Castle, WDFW, pers comm., 5/28/03)."

Chinook salmon are an ESA Threatened Species in the Skagit River and known to spawn in Grandy Creek with 2-3 redds found in the exact location of the proposed Grandy acclimation/rearing facility with proposed Grandy **withdrawals of 6-7 cfs from the identified critically limited groundwater aquifer in the expected period of chinook spawning use.** It is stated that numbers of chinook spawners are "thought" to be low, but the actual frequency of spawning is unknown.

Of course chinook numbers are low. It is a system with a chinook ESA listing where chinook escapement on the Skagit below the Sauk has dropped by 41% since the 10 year period of 1974-1984 as found by Connor and Pflug (2003) in their anlysis of WDFW chinook data. Numbers of chinook spawners would be anticipated to be low,

particularly in the section of the Skagit below the Sauk, as part of the driving force for listing Puget Sound chinook. If they were abundant, there would be no need for listing.

It can be anticipated that October will represent the lowest flow period in many years (2000 and 2002 being two recent examples). Nevertheless, brief freshets in these periods can be sufficient to attract chinook upstream into Grandy Creek for spawning use and to build redds in the very area of the planned withdrawals that are said to have "unknown" consequences on the creek flow in the DEIS.

Terms such as "unknown," when lightly regarded, are not acceptable on a stream with a long history of chinook presence. Grandy Creek is an integral component to identified Puget Sound habitat for an ESA listed species. Of further concern, concerning water withdrawals in October and November during base low flow periods **there will be relatively predictable adverse consequences for Grandy Creek:**

In October there will be a two day period when the acclimation/rearing ponds are filling to accommodate the juvenile steelhead when the quantity of water being released back into Grandy Creek will be less than the quantity of water being withdrawn from the aquifer for facility use. This means that little, if any water from the aquifer will be returned to the creek. At base low flows anticipated to occur from time to time in October/November in dry years when surface flows are 6 cfs (as documented in November 2002 and probably similar in the dry October and November of 2000), the withdrawal of 6 cfs from the aquifer **will leave the creek dry for two days**.

The only real question about the dry creek in these two days of pond refill, is how far upstream the surface flow will actually go subterranean to refind the level of the depleted aquifer. **It is not a matter of will it occur in base flow periods, but more a matter of how extensive the distance will be –** which could be the entire 0.3 mile critical for chinook from Cape Horn Bridge to the junction with the Skagit River. At any point it occurs, juvenile fish will unavoidably be killed within a section of dewatered Grandy Creek that are rearing at the time, such as coho, cutthroat, and steelhead. And any chinook and pink salmon eggs laid in the area will also be dewatered.

However, anticipated dewatering of some portion of the streambed will not be limited to the two days of October refill. As is stated in the DEIS, an average low flow of 6 cfs occurred in Grandy Creek in November of 2002, described as a low rainfall period. It is known that in October the Grandy aquifer withdrawal for the facility will be 6 cfs, and in November it will be 7 cfs. In both instances, when Grandy Creek surface water is at a base low flow of 6 cfs in prolonged dry rainfall periods between periodic short fall storms, **it is perfectly predictable that Grandy Creek will have no surface flow due to the diminished aquifer being taken for operation of the acclimation pond.**

The creek bed can be anticipated to be dry from the point upstream where the creek goes underground to join the depleted aquifer, to the point where pond discharge provides release of 6-7 cfs back into the streambed. This can be anticipated to occur every dry October and November which global warming trends may tend to increase rather than diminish.

The actual lowering of the surface flow in Grandy Creek has been described as 4.8" in August of 1990 while pumping a sustained flow of 6.7 cfs (page 17 of the DEIS). It did not describe how long this test was sustained, nor what the estimated cfs flow of the creek was at the time. Nevertheless, a 4.8" reduction in surface flow on a creek is substantial. During base low flow periods it could well represent the entire surface volume of Grandy Creek. Although it states the test was made in the August "low flow" period, August on the Skagit does not typically result in the same magnitude of flow depletion that occurs later in October and November during sustained dry summers that last through fall.

There is nothing "unknown" or "unpredictable" about the water quantity situation. Using the fingers of two hands for arithmetic: **6 - 6 = 0 for October** periods when low base flows occur, and **6 - 7 = -1 for November** periods when low base flows occur.

What are the results of this when ESA listed chinook are attracted into the stream with a September or October freshet in an otherwise dry fall? The chinook will quickly enter and spawn in the known 0.3 mile area of good gravel where chinook spawning has been found. This is the same section where the Grandy Creek alternative would be located below Cape Horn Bridge. When flows again drop to a **base level low of 6 cfs** in a continuing dry fall thereafter, the operation of the facility in October **will be withdrawing 6 cfs or 7 cfs** from the aquifer. This will result in a Grandy Creek surface flow **that is predictably zero** in precisely the same stream section where the majority of chinook spawning has been found.

The result: potentially the **entire chinook production** for Grandy Creek, perhaps down to a few pairs in some years, **could be extirpated** after laying eggs in gravel whose surface water disappears into a depleted aquifer to fulfill the needs of a hatchery steelhead acclimation facility.

A similar situation occurred on the 4-day Thanksgiving weekend in the dry fall of 2000 when Puget Sound Energy's (PSE) Baker River hydroelectric operations dewatered the Baker River resulting in potentially thousands of chum redds, and about 300 chinook redds (from an estimate by WDFW at the time), being dewatered on the Skagit River downstream. It resulted in a suit of the Federal Energy Regulatory Commission in 2001 by fish and environmental interests.

Better evaluation of impacts from a planned hatchery facility on ESA listed fish species would be expected from the State of Washington's fish managing agency than has been demonstrated in the choice of Grandy Creek as an alternative in both the 2004 DEIS and the 1994 Grandy Creek Hatchery FEIS (the latter of which has already failed the test of court for its lack of alternatives).

Furthermore, the facility itself will be rearing 334,000 smolts from which it is known by past harvest trends, past wild steelhead escapement trends, and past total steelhead runsize trends, that these smolt numbers will stimulate further declines in all three trends. The DEIS plan is for a total release of 534,000 hatchery smolts in a river system showing every indication of having long ago exceeded a smolt density barrier (an hourglass-like bottleneck) out of which return fewer and fewer returning adult steelhead (see Tables 1, 3, and 4, Figures 1-5, and Figures A-H as included in the attached Appendices). This was pointed out and predicted in analysis of the Skagit steelhead hatchery program as early as 1972 (Royal 1972). But WDFW has chosen to ignore the trends and to ignore the scientific necessity of adaptive management that could have initiated a corrective course some 30 years ago.

Implementation of the Grandy Creek alternative present considerable risk that could include extirpation of Grandy Creek's presently small chinook population, and continuing Skagit River steelhead declines. It is a "lose, lose situation" for at least two species.

Page 71, Table 3-4

From the DEIS: The table shows Grandy Creek median flows in (cfs).

Comments: Median flows are not the critical criteria needed for determination of the potential dewatering of the creek flow that may occur due to withdrawals from the Grandy aquifer. What *is* necessary are the minimum low flows to be expected to occur during dry weather patterns for each month. "Not available" is not an acceptable option when it comes to ESA listed fish species when impacts from construction of a major water withdrawal facility are being considered. A good starting point is the known minimum flow of 6 cfs which was found for a period of early November of 2002.

Page 75, Discharge Water Characteristics

From the DEIS: "In-pond settling of solids would achieve NPDES discharge standards as demonstrated a similar WDFW earthen acclimation pond facility, located on Tokul Creek … (where) effluent values are, in most cases, no different or are not significantly higher than influent values."

Comments: Just for comparative assurances, what is the range of effluents from differing acclimation pond facilities from all of the differing WDFW acclimation/rearing facilities? Just the selection of one site may not effectively

represent the average, and certainly does not represent the full range of differences that likely exist from site to site dependent on how many juveniles are reared at each site, their density per amount of pond water, how long rearing occurs at each site, and other considerations.

For instance, this DEIS describes the Action Alternatives as development of an "acclimation and rearing" facility. This is an important consideration. Acclimation typically means fish use of only about 30 days, but both the Grandy and Baker alternatives will be rearing juveniles from October through May. That is 8 months. This long period of use represents a rearing facility rather than an acclimation facility. Water quality comparisons need to be made with a facility of equal fish rearing time and rearing densities as that planned for the Grandy or Baker. The longer juveniles use the pond, the greater the build up of old food, fecal matter, fish pathogens, and fish therapeutants that may enter into the effluent as described on this same page of the DEIS.

Water quality is a particularly acute issue considering the Skagit River all the way to Sedro-Woolley has been described as meeting "WDOE Class AA" water quality standards which refers to a water quality rating of "extraordinary" (from page 67 of the DEIS). This extraordinary value would not want to be compromised. It may be unique to a river as large as the Skagit in the Lower 48.

Page 76, Flood-Related Impacts

From the DEIS: "… a series of well protection barbs that would consist of driven piles to slow river flow velocities and to provide bank stabilization if or when the bank erodes to these structures. Installation of pile barbs would not affect the Skagit River floodplain or inhibit the existing overflow path on the Grandy Creek site. If the Skagit River continues to incise the right bank adjacent to exiting wells and the proposed well installation location, the presence of the pile barbs may slightly alter flood flows over the Grandy Creek site, as well as the river thalweg in the vicinity of the pile barbs as a result of accumulated debris."

Comments: Elsewhere it is described that the line of pile-driven posts to protect the new line of wells will be within 15′ of the present Skagit River bank (page 45 of the DEIS). In the October 2003 flood alone, an estimated 25′-30′ of river bank eroded away at this point leaving one test well casing identified as PW-3 exposed like a telephone pole in the active Skagit River channel. There is no doubt that the Skagit River will soon erode back the 15′ to the line of driven posts. As proposed, it would be a 150 foot long line of bank-hardening designed to try and keep Skagit floods from quickly exposing all the rest of the wells.

The purpose of this would be to confine the river channel just the same as riprapping or diking, which are known fish habitat and river channel problems that designations like

the Wild & Scenic River status are meant to contain or to prevent. It is also provides the need for a migrating river channel to dynamically create fish habitat features that an unconfined channel provides (like creation of new side channels).

Bank-hardening is of special concern at this site due to acquisition of the Skagit River property bordering and just downstream of Grandy Creek's west bank in the provision for allowing the river to roam and provide fish habitat. This is particularly valuable at the point of a stream entry in which a complex pattern of braded channels can result with increased fish spawning and rearing opportunities. The bank-hardening activities just upstream as planned by WDFW may compromise the ability of the river to migrate as it is trying to do toward the north bank.

WDFW's dilemma in the choice of the Grandy site is: in order to achieve the necessary flow of water to operate the facility, the **best sustained pumping flows are from wells that push right up to the edge of the Skagit River aquifer** and thus reduce depletion of the Grandy Creek aquifer. **But doing so entails the risk of losing the wells**, which has already occurred with one of the wells drilled in 1992.

The past histories of the Birdsview Hatchery at this same site and twice abandoned by previous owners, were cases in which water quality and volume were insufficient to supply the hatchery needs. The past histories of both of these hatchery operations, first by USFWS until 1947, and WDG as a steelhead rearing facility from that point until at least 1956, need to be better examined in the DEIS.

Page 81, 3.1.4.1 Grandy Creek Acclimation Facility, Existing Conditions, Groundwater Data

From the DEIS: "In 1992, SE/E drilled a third pumping well, PW-3, in a more favorable site location to determine maximum yield."

Comments: PW-3 was a more favorable site for maximum yield because it was the closest of the 5 wells to the Skagit River bank and the proximity to the river aquifer (see page 85 of the DEIS with a map showing PW-3 perched out further than the others toward the Skagit River, and see page 83 and 87 for the description of the shared creek and river aquifer). However, there is no description of PW-3's fate during the October 2003 flood. The river bank eroded 25'-30' and left the PW-3 casing exposed like a telephone pole in the active river channel. This is necessary discussion in the evaluation of the Grandy site.

In order to maintain strong sustained pumping flows it is probably necessary to keep the wells as close to the Skagit aquifer as possible. The inherent dilemma of doing so is not discussed. The 2003 flood demonstrated that wells in proximity to this actively

erosive location have a short life expectancy. To counter the erosion, bank-hardening is planned by pile-driving 150 posts in a line 15′ from the river's edge. That has negative consequences as well, denying the natural dynamics of a free river channel. And the narrow line of bank-hardening may fail to stop the forces of the river from claiming the wells anyway.

Page 83, Grandy Creek Site Groundwater System, Shallow Aquifer

From the DEIS: "This shallow groundwater appears to be hydrologically connected to Grandy Creek and the Skagit River. Measurements taken by SE/E in 1990 showed that Grandy Creek feeds the shallow groundwater body during periods when the aquifer is lower than Grandy Creek. This condition is unlikely to have changed in the years since."

Comments: The result of Grandy Creek feeding the shallow aquifer is that in periods of prolonged drought when the aquifer is low, Grandy Creek water would be required to replenish it. Also, if the groundwater level is further depleted by pumping, there is a point where Grandy Creek surface water flows would disappear into the aquifer in the need to find and replace it.

As previously indicated, this has particularly serious consequences for ESA listed chinook known to spawn in the section of Grandy Creek that would be impacted by dewatering. This would occur when low base level surface water flows during Octobers and Novembers that drop to 6 cfs during drought conditions would go subterranean to refill the reduced shallow aquifer depleted by well pumping at 6-7 cfs for the Grandy facility. Although the flow would return to the creek for all but two days in October needed to fill the pond, it would be at a point on the creek potentially well downstream of where the Grandy surface flow would go underground leaving a dry streambed in between.

Anticipated dewatering of the streambed would occur in periodic low rainfall years (most recent examples being the falls of 2000 and 2002) resulting in juvenile losses of coho, cutthroat, and wild steelhead and the dewatering of both pink and chinook eggs. The latter could occur when adults are attracted to Grandy Creek entry by periods of higher flows from brief storm events in September and October. Surface water would remain sufficient after spawning for egg incubation and emergence, but only if it remained uncompromised by plans to rob the aquifer of 6-7 cfs necessary for acclimation and rearing pond operation.

Page 87, Impacts, Groundwater Quantity Impacts, Site Wells

From the DEIS: "Pumping test results showed that PW-3 production potential was higher than the potential for PW-2 because PW-3 is recharged by both Grandy Creek and the Skagit River. The effect of pumping from the shallow groundwater on Grandy Creek included a water level lowering of 0.4 feet (4.8 inches) when PW-3 was pumped at about 6.7 cfs (3,000 gpm) in August (low F
flow season) … sustained pumping of the shallow aquifer would result in increased flow from Grandy Creek to the shallow aquifer. These effects … would result in unknown impacts to Grandy Creek."

Comments: PW-3 was the closest well to the Skagit River. It has subsequently been lost due to 25'-30' of erosion of the Skagit River bank at the well site where the casing is now exposed in the river channel. It was the best producing well due to it's risk of being close to the Skagit. It tapped the Skagit aquifer as well as that of Grandy Creek as described. However, the new wells will be further back (initially at least from the eroding river bank) and likely will mostly consist of the shallow and less plentiful Grandy Creek aquifer.

It would be expected that without PW-3 and it's Skagit aquifer contribution, the sustained pumping requirements of 6-7 cfs for facility operation in October and November (base low flow periods some years), would even more severely deplete the Grandy Creek aquifer than indicated by the test run with PW-3 in 1992. That test resulted in a 4.8" drop in the Grandy Creek flow in August even when sustained pumping was subsidized by the Skagit aquifer.

The cfs flow of Grandy Creek was not indicated for the August test. Typically in prolonged dry summers and falls, August is not the most extreme low flow period. Rather, it is October and even early November as previously indicated with a base flow of 6 cfs (page 66 of the DEIS). A 4.8" reduction in surface water depth, could represent the entire 6 cfs November flow of 2002 resulting in a dry streambed, dead juvenile coho, cutthroat, and steelhead rearing in the dewatered section, as well as dewatered eggs of pink salmon and chinook that entered and spawned after brief freshets in September and October.

Although for all but two days when the pond is filling in October, the withdrawn flow of 6-7 cfs would return to Grandy Creek, the discharge would likely be below the point where the surface flow of the creek goes underground to replenish the aquifer depleted by well pumping. This could result in a substantial distance of dewatered stream channel where chinook spawning has been found to occur downstream of the Cape Horn Bridge.

Considering the base-low surface flow of 6 cfs that can occur in October-November, combined with the known pumping rate of 6-7 cfs needed for facility operation in those two months a predictable result would be surface flow dewatering of Grandy Creek.

Therefore, characterization of this as "unknown" is not mathematically true: 6 – 6 = 0 and 6 – 7 = -1. Both consequences result in a dry streambed and dead juvenile fish and salmon eggs in Grandy Creek.

Page 88, Mitigating Measures, Water Quantity

From the DEIS: "Monitoring should consist, at a minimum, of periodic measurement of:
The water surface elevation in Grandy Creek
Water level elevations of on-site monitoring wells during pumping operations
Water level elevations of off-site wells if determined necessary
Measurement of aquifer recharge rate."

Comments: This suggests constructing the entire project would occur as a test of water availability and then monitoring afterward. However, this is not a realistic option given the probable impacts of the operation of the facility on ESA listed chinook. There is high mathematical likelihood that Grandy Creek will be dewatered due to well pumping in periodic low flow years of which there have been two in the past five (2000 and 2002 and potentially a 3rd in 2004).

This is the purpose of test wells. Sustained pumping tests using them, or new test wells, prior to construction will effectively determine the consequences to the creek. This should have been regularly occurring the past 10 years which would have provided good comparisons between low rainfall and high rainfall years. Presumably that was the purpose of test well investment.

If sustained pumping flows cannot meet the needs of the facility without dewatering Grandy Creek in low flow years, then construction of the facility must be denied as a known take on an ESA listed species. To do otherwise is to continue with a program in which hatcheries remain problematic to recovery of depressed, threatened, or endangered salmon and steelhead populations and hatchery reform has not taken place and fails the purpose of the HSRG.

Page 89, 3.1.4.3 No Action Alternative

From the DEIS: "No water level drawdown of Grandy Creek, associated with pumping the shallow aquifer, would occur."

Comments: This alternative is certainly preferable to the dewatering consequences of eliminating one more tributary from wild chinook production.

Page 104-105, Threatened, Endangered, Rare Species, Bald Eagle, and Marbled Murrelet

From the DEIS: "A consistent characteristic of bald eagles is that they are usually located in the tallest tree within a stand …"

"Conifers occur in much less abundance along the banks of the Skagit and none of these conifers exhibit platform characteristics that would be suitable for murrelet nesting."

Comments: On page 94 of the DEIS, a very large grand fir is described as having a 72 in. dbh along the north bank of the Skagit at the Grandy Creek site. This large fir is the most consistently used bald eagle perch tree used in the winter for nearly a mile upstream and another mile down as individuals rotate to it through each winter day as observed by Washington Trout Field Biologist Bill McMillan at his home on Savage Road opposite the Grandy Creek site and where he has noted the eagle movements (pers. com. Bill McMillan 2004):

The tree's location provides an excellent eagle view of the entry of Grandy Creek to the Skagit and the long bar below it. Good numbers of chum salmon spawn in this section just below Grandy Creek's entry, as well as on the bar on the south bank of the river just upstream and opposite the perch tree. It commands a view of both chum carcass areas with altering shifts of eagles feeding at both sites. This one grand fir is presently one of the most intensively used eagle perch trees on this section of the Skagit due to its advantageous feeding location. At some point in time, there is no reason that this tree might not eventually become an eagle nesting site.

This large grand fir also meets the nesting requirements of marbled murrelets given on page 105 as "large coniferous trees (> 32 in. dbh) within 50 miles of marine water that provide limbs of at least 5-7 in. in diameter or other suitable nesting platforms." This possibility is further suggested by the finding of a nest only one mile away also documented on page 105 of the DEIS.

Page 106, Species of Concern

From the DEIS: "Although not indicated to be present within a one-mile radius of the Grandy Creek site, the following federal SOC have been documented in Skagit County and may be located on or near the site … long-eared myotis … northern goshawk … peregrine falcon … western toad."

Comments: Each of the 4 species of concern selected above from the larger list in the DEIS have been identified at the Grandy site or within a quarter mile of it by a biologist/bird watcher resident across the river at Savage Road (per. com. Bill McMillan

2004). The long-eared myotis and western toad have both been identified on his property on the south bank of the river opposite Grandy Creek, and both the northern goshawk and peregrine falcon have been observed in flight destined for the Grandy Creek site, the former several times and the latter once.

Page 110, Increased Noise, Light and Human Activity, Bald Eagle

From the DEIS: "Increased human activity associated with the operation of a facility at the Grandy Creek site could potentially impact bald eagles. However, the effects of operational activities are not expected to impact nesting or winter communal roosting bald eagles because of the distance to nest and roost sites. There could be some disturbance to foraging eagles in the immediate vicinity of the site, but this portion of the Skagit River was identified as having only a low level of eagle foraging occurrence … Use by recreational steelhead fishers my increase; however, the disturbance caused by the current level of recreational use appears not to have significantly reduced the bald eagle recovery rate in the Northwest …"

Comments: Increased recreational activity with the operation of the site will most certainly impact present bald eagle use.

The winter roost at Savage Slough described on page 104 of the DEIS consists of two conifers side by side, one a bare snag and the other lightly limbed, at which 2-10 eagles roost each night in winter as observed by a biologist/bird watcher who lives at Savage Road (per. com. Bill McMillan 2004):

This roost site is described as 0.7 mile away from the Grandy site in the DEIS, and most of the eagles from this roost then frequently take turns using the large grand fir at the Grandy Creek site as a perch tree from the daylight hours right on through the short winter days. The big fir provides resting advantages with a good view of whatever new carcasses may wash up at the side eddy where Grandy Creek meets the Skagit, the bar below it, and the bar on the south side of the river quartering upstream. There is considerable competition for this popular perch.

There appears to be a regular, localized, site-specific winter population of eagles tied to the interwoven advantages of the roosting site at Savage Slough and the heavily used grand fir at Grandy Creek as a perch tree. Tall cottonwood and somewhat smaller evergreen trees are also used for perch trees in the mile each way up and downstream, but the grand fir is the tallest and most sought.

During typical weekdays in this section of the Skagit, use by fishermen is generally low. The eagles lazily frequent the area easily and surely. However, this dramatically alters on weekends with increased fishing pressure that is particularly tied to the two boat

launches opposite each other near Pressintin Creek about a mile upstream combined with other jet boats that access by heading upstream from the Hamilton area launch. The two groups frequently converge with continual and noisy boating activity at the popular hole off Grandy Creek and Savage Bar just upstream. During these weekend periods the eagles virtually vacate the area. They are then likely forced into considerable competition with other eagles all trying to congregate into the limited Skagit River areas of quieter opportunity on weekends.

This continual movement required by eagles back and forth in their attempted avoidance of heavy steelhead fishing pressure may be a winter constraint on the eagle populations size. While the population is presently considered large, it may nevertheless be limited by present heavy daily angling use of certain more popular sections of the Skagit River, and throughout much of the river on weekends.

Of particularly noticeable effect on the eagles is the constant noise and movement of the jet boats. An article in the Seattle Post-Intelligencer (Kathy George, January 12, 2004) provided an in depth discussion of wildlife biologist concerns regarding a sudden influx of boat traffic into the clearer Skagit River upstream of the confluence of the Sauk River's heavy siltation this past winter. The article quoted a 1998 study that found recreational activities on the river caused a 35% reduction in feeding by the bald eagles on the Skagit. The article quoted John Grettenberger, an endangered species supervisor with the USFWS in Lacey: "It's pretty evident that there's some disruption of feeding. It's not the primary threat to the species. But at the same time, we wouldn't want disturbances to increase."

Commercial boat launch use on the Upper Skagit is limited to after 11:00am while non-commercial boat users are asked to voluntarily comply with the 11:00am launch time to allow eagles to focus on their morning feeding with minimal human impacts. However, no similar boat use controls, legal or voluntary, are required or asked on the Skagit downstream of Rockport.

Any increase in numbers of steelhead coming back to a specific site will inevitably attract more intensive angler use of that area. In the case of the Grandy Creek Alternative, it is specifically intended to increase steelhead fishing opportunity at the site. This can be predicted to result in increased daily angling activity with jet boat traffic loud and continuous as is the present weekend case. This may have profound consequences on the over-wintering eagle sub-population that has come to rely on the Savage Slough to Grandy Creek, roost-to-perch rotation. In the context of the larger Skagit River over-wintering eagle population, this may not be a significant impact, but it is a noteworthy and predictable impact tied to the Grandy Creek Alternative that should have warranted a more legitimate discussion.

The peak expected return of hatchery steelhead coincides with the greatest number of overwintering eagles trying to find feeding opportunities provided primarily by chum and coho carcasses. Increased angling activity related to the hatchery steelhead smolt releases at the Grandy site could have considerable impact on the localized eagle population. Individuals in this sub-population may include the nesting pairs that use the described 3 nesting trees within, or just over, 0.5 mile of Grandy Creek. There is no way to effectively predict if this alternative might affect their future nesting choice. Nevertheless, it is a concern that requires wildlife monitoring to evaluate, and such monitoring of the eagles should begin now while a comparative baseline can be developed for a pre- and post-development comparison, particularly related to nesting site use.

Page 111, Unavoidable Adverse Impacts

From the DEIS: "Increased human activity may increase disturbance to locally occurring bald eagle populations, however, increased disturbance to bald eagles is unlikely."

Comments: It is wording like this that makes the entire DEIS suspect.

There is no possible way that disturbance of the local bald eagle population(s) will not occur if the project meets its intended goal of substantially increasing hatchery steelhead harvest in this particular section of river. While it is doubtful the goals will actually be met as planned, for reasons stated previously regarding a smolt density barrier, it will probably have enough success in this one section of river to predictably increase fishing activity at the site.

This is a fishery primarily aimed at satisfying one segment of the steelhead sport fishing community on the Skagit River who prefer fishing from jet boats and seeking hatchery harvest opportunity. While it is but one portion of the mixed steelhead angling community that frequents the Skagit River, it is the one segment of that angling community whose focus on an identified hatchery steelhead harvest site will be at a predictably high noise level, and with continual in-river movement, that will maximize disturbance of eagles trying to feed. This may include abandonment of this site for eagle feeding from December through February, excepting in periods of high flows that deter boating and any other angling activity.

There is nothing about eagles that will likely affect the decision to develop the site as planned, legally or otherwise, so what is the purpose for WDFW not simply being up front and admit this obvious eagle impact?

Page 115, 3.1.7 Aquatic Animals, Skagit Basin Overview

From the DEIS: "The mainstem Skagit in this section contains 12 miles of meandering river flowing from the town of Concrete to 1.5 miles below the community of Birdsview. Within this section, seven tributary streams occur, of which Grandy Creek (RM 45.6) is considered one of the most important for salmonid utilization (Williams et al. 1975)."

Comments: As is apparent, Grandy Creek was considered one of the most important tributaries for salmonid utilization. One of the reasons for this is Grandy Creek comes out of Grandy Lake which provides more flow stabilization than other streams without headwater lakes. Also, Grandy Creek tends to have somewhat warmer winter and spring water temperatures than the mainstem Skagit and the other nearby tributaries which drain off north facing slopes on the south side of the river. By contrast, Grandy drainage faces to the south as a winter and summer solar collector, along with shallow Grandy Lake.

Comparative Water Temperatures Taken at 10-12 Day Intervals From February 9 to March 12 at Late Afternoon in 2002:

Grandy Creek …… Range 40-41 degrees F. ……. Average 40.5 degrees F.
Finney Creek ……. Range 38.5-39.5 degrees F……. Average 38.9 degrees F.
Pressentin Creek ... Range 36.5-38.5 degrees F …… Average 37.6 degrees F.
Mill Creek …….. Range 37.5-38.5 degrees F …… Average 38.1 degrees F.
O'Toole Creek …... Range 36-38 degrees F …….. Average 37.3 degrees F.
Skagit River ……... Range 38.5-39.5 degrees F …... Average 39.1 degrees F.

This can have advantages for natural spawning steelhead. The warmer winter water temperatures can stimulate earlier spawning of steelhead arriving there, and the earlier the eggs are laid in the gravel the earlier fry will emerge with a jump start in growth and size on later emergers. This may present survival advantages, and thus Grandy Creek may once have been one of the more important smaller wild steelhead spawning tributaries prior to considerable channel degradation occurred through logging and road building along it. Nevertheless, it retains natural advantages which favor focus on investments in habitat restoration. Also because of the lake and wetlands, it has multiple salmonid attributes for species such as coho and sea-run cutthroat, and it has a remaining chinook salmon spawning population.

Key to making the most of Grandy Creek's wild salmonid attributes is habitat restoration, of which the lower creek delta where it meets the Skagit River is a vital component. A land purchase by the Skagit Land Trust for the Skagit Watershed Council has already been made immediately downstream of the Grandy Creek site being considered in the DEIS for a hatchery steelhead acclimation and rearing pond. The south bank of the Skagit in this downstream area from Grandy Creek remains undeveloped, as is the north bank for more than a mile. This allows the river to

naturally function within its channel without consequences to human developments that have occurred elsewhere in the area.

There are better longterm uses for the WDFW land being targeted in the DEIS as a hatchery acclimation and rearing pond facility with an expected 30 year useful expectancy. To fulfill the use of the land for the proposed hatchery facility there will be bank-hardening with 150 pile-driven posts along the Skagit River boundary to protect what will still remain flood-vulnerable wells needed for the hatchery operation. This bank-hardening will compormise its segment of the mile section of river it is presently connected to that is otherwise a naturally uncontained channel for a mile downstream. The river at the site will shortly erode back to the wall of pilings leaving exposed a dock-like façade of pile-driven posts rather than a nautural river bank.

Of import, there is also an old vacated creek channel identified on page 59 of the DEIS situated on a slightly elevated terrace of the Grandy Creek property site. This vacated channel may provide opportunity for creation of a groundwater channel project as has proven valuable to wild salmonids on the Upper Skagit and the Sauk. Also, the active Grandy Creek channel is described as having braided channels with logjams on page 93 of the DEIS, and although Japanese knotweed is described as a problem to the area, it may eventually become "native" vegetation to the Northwest as perceived 200 years from now. There is virtually no way to eliminate it any more than many other introduced species.

The creek channel with the logjams and braids and suitable spawning gravel for chinook, as described on page 125, are all habitat pluses. They suggest natural attributes to work with in the provision for successful habitat restoration projects.

Unlike the hatchery facility, habitat investments will increase in fish value over time with longterm fish production advantages on the scale of hundreds of years rather than a few decades that will benefit multiple salmonids. The DEIS project proposal has a singular focus on hatchery steelhead. Even in that limitation, there is considerable reason to believe it will fail to increase steelhead numbers.

The Grandy Creek land has undeniably beneficial uses for salmonids with low risks of failure, among those is to simply leave it for natural events to reclaim. The proposed use of the Grandy Creek site as an Action Alternative in the DEIS is fraught with identified risks.

Page 116, Table 3-13

From the DEIS: "List of anadromous and resident fish species present in the Skagit River system."

Comments: Missing from this list is a distinction in the cutthroat trout species present. There are both the coastal cutthroat *Oncorhynchus clarki clarki* and the introduced westslope cutthroat *Oncorhynchus clarki lewsi* present in the Skagit system. The latter has been photographed and identified as far down as Davis Slough at RM 40 on the mainstem Skagit River and in the headwater reaches of Granite Creek, tributary to Ruby Creek and Ross Reservoir between road mile 150-160 on Highway 20 in the North Cascades, and in Canyon Creek at the junction area with Boulder Creek, also tributary to Ruby Creek and Ross Reservoir (per. com. Bill McMillan 2004). There have also been reports from reliable sources of this introduced species in the headwaters of Illabott Creek drainage near Slide Lake, Jackman Creek, and in the Sauk River upstream of the Whitchuck (per. com. Bill McMillan 2004).

The presence of this non native species in the Skagit system stems from hatchery releases in high mountain lakes by WDFW, and perhaps into streams as well at an earlier point in WDG fish management history. What westslope cutthroat numbers actually are at differing points in the Skagit system and what their potential interactions may be with native species such as coastal cutthroat, rainbow/steelhead, and the five species of North American Pacific salmon (including ESA listed chinook) are not known. Although suspected numbers probably are not high in the anadromous zone of the Skagit Basin overall, there may be localized areas where this is not the case according to those that have specifically sought out where westslope cutthroat may reside in the Skagit and other areas of Washington (per. com. Bill McMillan 2004).

Page 117, Wild Steelhead

From the DEIS: "Recent population trends within the Puget Sound ESU are predominantly downward, even though upward trends in the two largest stocks, the Skagit and Snohomish river stocks, were observed in the mid 1990s …"

Comments: The point made about the mid 1990's supposed upward trend in wild steelhead in the Skagit is particularly interesting when the data indicate in the DEIS on page 119 that for the adult return years of 1996 and 1997 there were no available wild steelhead escapement estimates, and that the Skagit wild steelhead escapement figures between 1995 and 1991 are all well down from the wild escapements from 1986 to 1990.

More to the point, the longterm trend (see Table 1, and Figure 1, as attached in the Appendix) regarding not only wild steelhead but all steelhead on the Skagit has been one of great decline since 1968. This can only be based on catch figures for the earlier era (no escapement data collected prior to 1978). However, prior to the beginning of the Skagit hatchery steelhead program (defined as "The winter steelhead hatchery program within the Skagit River basin began in the mid-1960s with early-run Chambers Creek steelhead transferred from the South Tacoma Hatchery to Barnaby Slough." on page 30 of the DEIS), Skagit steelhead harvests exceeded 20,000 on two different years prior to

the Barnaby Slough's first major return in 1964, and exceeded the present harvest goal of 10,000 steelhead for 12 of 16 years of record. It must be assumed that being prior to the Skagit system hatchery steelhead program these were mostly, if not all, wild steelhead.

Obviously, there had to be some sort of wild steelhead escapement beyond the number of steelhead harvested in those earlier 16 years, mostly if not all wild (with the exception of 96,000 and 80,000 hatchery smolts planted that would have contributed hatchery adults to the catch in 1962 and 1963). Given the fact that steelhead anglers participating in Washington steelhead sport fisheries between 1954-1961 were 61% fewer on average than between 1962-1969 (Royal 1972), then it also seems probable that wild steelhead escapement in that early era was significantly greater due to fewer anglers participating in the fishery.

Even when limited to predominantly wild catch figures for those 16 years prior to the defined beginning of the Skagit hatchery program, with no escapement included wild steelhead annually harvested from 1948 to 1963 averaged 12,853 (1964 catch being the first large Barnaby Slough return). This compares to a total wild steelhead runsize (catch plus escapement) that averaged only 7,245 in the 26 years of record from 1978 to 2003 when wild harvest and wild escapement were both determined (see Table 7 as attached in the Appendix). It seems safe to assume that the total wild steelhead runsize over the past 26 years has been less than half what it averaged in the 16 years from 1948 to 1963 prior to the defined beginning of the Skagit hatchery steelhead program.

Or of more import, compare the 1948-1963 average of 12,853 mostly wild steelhead harvested with a total wild steelhead runsize (harvest plus escapment) that now averages only 6,650, just half of what the past harvest was alone. This crash in wild steelhead runsize has coincided with hatchery steelhead smolt releases that leapt to an average of 418,000 annually. This is likely one-third to one-half of what the wild steelhead runsizes averaged prior to the defined beginning of the Skagit hatchery steelhead program.

(Continued) From the DEIS: "Historically, it is estimated that total annual wild steelhead runsize (both summer and winter) was as high as 20,000 fish (DeShazo 1985)."

Comments: An historic wild steelhead runsize estimate for the Skagit estimated "as high as 20,000 fish (both summer and winter)" greatly underestimates the data provided in the 1994 Grandy Creek Hatchery FEIS (from the Volume II Technical Appendices on page 17 for sport catch and page 20 for tribal catch of Appendix section B-2) and as provided in Table 1 as attached in the Appendix to these comments.

As previously provided, the winter steelhead catch data alone (no escapement added) cleary indicate predominantly wild steelhead numbers of over 20,000 in both 1956 and

1960 (prior to the 1964 date given in the DEIS as initiating the Skagit hatchery steelhead program). Summer steelhead sport and tribal catches were not included in those numbers, and in a number of those years tribal catch of winter steelhead was also missing. Therefore, the total steelhead catch may have been conservative for some years.

The unknown factor for determining total wild steelhead runsize in the years prior to the Boldt Decision was the wild escapement. Because the steelhead runs seemed to be holding up at the time, and with sport catch apparently just beginning to ascend in the late 1940s and early 1950s, it might be assumed wild stocks were not being overharvested at the time. If this assumption is correct, it might be estimated that the catch was no more than the runsize, or about 50/50.

By applying these considerations, if wild escapement and harvest were about 50/50 prior to the Skagit steelhead program, historic wild steelhead runsize peaks would have sometimes been over 40,000. The historic runsizes, primarily wild, from 1948 to 1961, and again in 1964, are provided using the 50/50 estimate in Table 7 (as attached in the Appendix): ~44,976 wild steelhead returned to the Skagit River in 1956 and ~40,164 wild steelhead in 1960. This provides a ballpark estimate of the highest wild steelhead return years in historic record between 1948 and 1961, and prior to the defined Skagit hatchery steelhead program began.

Even these seemingly high figures of over 40,000 may be low, considering the unquantified historic summer run catch in that era and considering wild escapement may have been higher than harvest in some of those early years as suggested by the low fishing intensity back then and reduced efficiency of sport fishing tackle as was discussed on pages 10-11 of An Examination of the Anadromous Trout Program of the Washington Game Department (Royal 1972): "… for the period 1962-1969 the average number of fishermen actually fishing for steelhead increased 63% over that for the period 1954-1961, with the catch increasing 53.1%. The catch per unit dropped from 1.79 to 1.68, a decline of only 6.1 percent … Competition, as stated previously, would tend to reduce the catch per unit but improved fishing gear, by increasing the efficiency of the fishery, would tend to increase the catch per unit at the expense of escapement."

This implies that from 1962 onward, increased numbers of fishermen using more efficient tackle, caught a higher percentage of the available steelhead with reduced escapement thereafter. Along with increasing numbers of hatchery smolts that Royal had already identified as creating a density barrier early in the hatchery program, steelhead fishermen were becoming more numerous and more efficient. At some point between the mid 1960s and the mid 1970s, when escapement remained unmeasured prior to the Boldt Case, wild Skagit steelhead were being depleted like a candle lit at two ends: by harvest that was no longer allowing sufficient escapement, and by

hatchery smolt increases that were creating a density barrier beyond a certain limit that was often exceeded, and continues being exceeded.

Although harvest levels may have effectively adjusted in the latter 1970s to 1980s through collection of escapement data, hatchery smolt release numbers were not adjusted and no effective restoration to the pre hatchery years has been able to occur ever since.

Nevertheless, it remains a critical consideration to rexamine the Skagit harvest data as the one available record from which to try and best understand the steelhead productive capacity for the Skagit River as it was in the 1940s and 1950s. The estimate of harvest and escapement as 50/50 for the early era may, or may not be correct, but with honest examination a relatively accurate history of Skagit River steelhead can likely be determined from which to better guide today's steelhead management aspriritions. This remains very much a necessity that has never been effectively done.

(Continued) From the DEIS: The Skagit River contains three summer steelhead stocks: Finney Creek, Sauk River and Cascade River; and three winter steelhead stocks: mainstem Skagit and tributaries, Sauk River and Cascade River."

Comments: What baseline has been collected to determine what the effects of increasing average hatchery smolt releases from the past 11 year average of 418,000 to the sustained release of 534,000 (28% smolt increase as actually planned to be realized in the DEIS) will be on these 6 separate stocks of identified wild steelhead?

While there is an escapement goal set for wild winter steelhead returning as mixed populations, it would appear that separate escapement goals would be required to determine how weak or robust each of the three separate genetic stocks of winter steelhead are. There are no escapement goals set at all for wild summer steelhead in the Skagit River, yet it is clear that three separate genetic stocks are known to exist, all of which are particularly vulnerable due to very small population size. Despite the risks to them, they remain entirely unmanaged.

Other than the Columbia River, the Skagit may have more separate wild steelhead stocks identified than any other river in the State of Washington, yet there appears to be no attempt to separately assess each beyond, perhaps, Sauk and mainstem Skagit winter runs, and Seattle City Light's emphasis on maximizing monitoring efforts on Upper Mainstem Skagit wild steelhead escapement as separate to their flow/fish responsibilities.

This information needs to be collected regarding each of the separate stocks of steelhead identified in order to provide some sort of baseline of comparison from which to monitor the effects of the proposed acclimation and rearing pond plans proposed in the

DEIS on these individual wild steelhead populations. This would seem to be part of the recommendations suggested for effective hatchery reform by the HSRG on the Skagit.

(Continued) From the DEIS: "Wild origin winter steelhead have been defined as those fish that spawn after March 15 through early July …"

Comments: This special, and selective, WDFW definition of wild steelhead does not corroborate the biological facts. The quote from Professor Paul Bentzen (court testimony from 1998 regarding 1994 Grandy Creek Hatchery FEIS) discussed earlier in these comments remains valid: "Despite the separation in run timing, the FEIS reports that Chambers Creek stock exhibits 40% spawner overlap with wild winter steelhead, i.e. 40% of hatchery females have not yet begun spawning by the time the wild run begins spawning in February (p. 43, appendix A-6 FEIS)."

There is no reason to believe this has changed on the Skagit River since the court case in 1998. It remains a flawed assumption that wild steelhead only spawn after March 15th, and is countered by WDFW's own collected data provided in the 1994 FEIS Appendices that Professor Bentzen drew from.

(Continued) From the DEIS: "Winter steelhead in the Skagit River system spawn in the mainstems, particularly the mainstem Sauk River, and most tributaries throughout the anadromous zone from the headwaters downstream as far as Sedro-Woolley. A redd observed just near RM 22 is one of the most downstream spawning locations in recent years."

Comments: It should be added here that Grandy Creek is one of these tributaries, and has been described previously as one of the most important for salmonids in the Middle Skagit River section described between the Baker and 1.5 miles below Birdsview (page 115 of the DEIS).

Also, the redd at RM 22 effectively marks the downstream boundary for wild steelhead spawning. It should be noted that Grandy Creek is at RM 45.6 and that 23.6 miles of mainstem river and tributaries exist between the two points for wild and hatchery steelhead interactions to occur at both the adult and juvenile levels. Furthermore, it has been found that residual precocious males that fail to migrate out can be expected to migrate *upstream* as far as 21 km, as found on Oregon's Imnaha River by Jonasson et al. 1995, from their release site for potential spawning interactions with wild female steelhead right at the peak of their spawning activity in May.

The Baker site is at RM 56.5 with 34.5 miles of river below it where wild steelhead spawning occurs. With the Grandy Creek alternative, hatchery steelhead smolts will be released from both the Baker and Grandy sites as planned in the DEIS, thus creating 4

smolt release sites spread from RM 78 to RM 45.6 when including Marblemount and Barnaby.

Page 117-118, Hatchery Steelhead

From the DEIS: Prior to 1992, the average number of hatchery steelhead smolts stocked in the Skagit River was 248,000. Demands for increased stocking due to predicted population growth in the Puget Sound area resulted in the 1992 *Option Paper on Hatchery Steelhead Stocking Guidelines to Limit Genetic Impacts to Wild Steelhead Stocks*. Based on the analyses … WDG geneticists proposed a stocking option for hatchery steelhead in the Skagit that would theoretically provide for increased harvest while limiting the genetic impact on wild populations to a level considered acceptable. This option resulted in a 115% increase in Skagit River stocking to the current level of 534,000 smolts."

Comments: A necessary component of today's scientific view of fisheries includes the concept of Adaptive Management. In other words, it requires monitoring the results of management changes and adjusting management accordingly.

The WDFW has had 9 years of adult steelhead returns from which to evaluate the effects of that plan in which smolts released increased to a post 1992 average of 418,000 annually achieved and released between 1993 and 2033. What have been the results of that? Has harvest increased? Have genetic impacts reduced? What has been the straying level of feral hatchery fish into the watershed? What has been the wild spawning escapement? What has the smolt residualism level been and the resulting component of precocious males? How has the total adult steelhead runsize responded? Have hatchery steelhead, in particular, increased in the harvest component of the catch? What has been the smolt-to-adult-catch ratio?

Good science challenges WDFW to answer each of those questions. The HSRG challenges WDFW to answer those questions. Effective hatchery reform demands that WDFW answer those questions.

Some of the answers to those questions are provided from Table 1, 4, and 7, Figures 1-5, and Figures A-H in the Appendix attached. The adult returns returning from the 1993 to 2001, 9 year average of 408,259 hatchery smolts released have resulted in 9 years of catch and escapement data from which the following were computed (hatchery summer steelhead smolt plants not included):

Avg. total steelhead harvest = 1,972 (sport and tribal)
Avg. smolt-to-adult-catch ratio = 207:1
Avg. hatchery steelhead harvest = 1,399 (sport and tribal)
Avg. wild steelhead harvest = 573
Avg. wild steelhead escapement = 4,839

Avg. wild steelhead runsize = 6,650
Avg. total steelhead runsize = 8,176

This compares with the previous 17 years of adult returns recorded from 1978 to 1992 with an average of 239,416 winter smolts released:

Total steelhead harvest = 6,268
Smolt-to-adult-catch ratio = 38:1
Hatchery steelhead harvest = 4,830
Wild steelhead harvest = 1,444
Wild steelhead escapement = 7,903
Wild steelhead runsize = 9,347
Total steelhead runsize = 15,025

For the 9 return years since implementation of the 1992 recommendation plans, every comparative value has dropped from the 17 previous years as a negative result from increasing the hatchery smolt releases from an average of 239,416 to 408,259. In the 9 years when hatchery smolt releases were increased by 70%, the total harvest has fallen by 69%, the smolt-to-adult-catch ratio has increased by 5.45 times, the hatchery steelhead harvest has fallen 71%, the wild harvest has fallen 60%, the wild escapement has fallen 39%, the wild runsize has fallen 29%, and the total steelhead runsize has fallen 46%.

Furthermore, this is not a trend limited to the past 9 years. From 1946 to 2001 there were 21 individual years when hatchery winter run smolt releases were 250,000-612,000. The average annual total harvest two years later was 6,397 winter steelhead those years. By contrast, there were 35 years between 1946 and 2001 when hatchery winter smolt releases were 0-250,000 that provided a total average harvest of 10,949 winter steelhead two years later. This was 4,552 more steelhead harvested (71%) when often half, or less, smolts were released.

Regarding strictly hatchery steelhead harvest, records were available for 14 of the years between 1979 to 2003 when smolt releases two years earlier were over 250,000 with an annual average of 365,576. The resulting hatchery harvest averaged 3,057 steelhead. Hatchery steelhead harvest records were available for 11 years between 1964 and 2003 when smolt releases were less than 250,000 (averaging 201,689). The resulting hatchery harvest averaged 4,518 steelhead. Comparing the results between the higher smolt release years and the lower smolt release years, 81% more hatchery smolts yielded 32% fewer hatchery steelhead harvested per year.

There is an apparent relationship between larger numbers of smolts released at or above 250,000 at which there is a diminishing return. This is not new. It was first identified

on the Skagit more than 30 years ago (Royal 1972) as indicated earlier in the comments provided (see Table 3 attached in the Appendix).

Page 2 of Appendix 2 (Responses to Pubic Comments) in the 1994 Grandy Creek Hatchery FEIS provides the qualifications that went with the 1992 *Option Paper on Hatchery Steelhead Stocking Guidelines to Limit Genetic Impacts to Wild Steelhead Stocks*:

"The allowable smolt stocking level is calculated based on estimates of:

a. proportion of hatchery steelhead that spawn at the same time and place as wild fish,
b. wild steelhead escapement
c. harvest rate of hatchery steelhead,
d. return rate of hatchery steelhead, and
e. the fecundity of hatchery steelhead.

If these factors change substantially, then the stocking level will be modified as appropriate to stay within the allowable guidelines. For example, if wild fish escapement increases, the proportion of hatchery fish on the spawning grounds increases. This could allow a corresponding increase in smolts stocked. A drop in wild fish escapement would require a reduction in the number of smolts stocked in order to maintain compliance with the allowable impact."

Of the 5 criteria, 2 have changed substantially since the increased smolt stocking level began in 1993. Wild steelhead escapement has fallen 39% and at 4,839 wild steelhead is 19% below the new escapement goal of 6,000. Inexplicably, in response to the plunge in steelhead numbers in the winter of 1999/2000 the escapement goal was lowered from 10,300 as set by WDG back in 1985. This was an apparent maneuver by the state's steelhead co-managers (WDFW and Washington Treaty Tribes) to circumvent concerns regarding falling wild steelhead escapement and to minimize constraints on angling and netting activities.

Also, the return rate of hatchery steelhead has dropped with smolt-to-adult-catch ratio being one measure of that. It has skyrocketed from an average of 38:1 to 207:1. In 2003 that ratio was an astounding 907:1, and in the only year the post 1992 hatchery smolt release goal was ever achieved was with 612,181 in 1998 resulting in a smolt-to-adult-catch ratio of 566:1.

Every useful indicator for achieving steelhead goals and standards has altered for the worse since initiating the 1992 plan of increased smolt numbers on the Skagit River. Yet despite the obligation required by the 1992 plan to heed altering indicators, WDFW has chosen to resolutely maintain a reckless course of unaltered smolt release goals as embraced in the 2004 DEIS. The blind determination remains to achieve 534,000 released smolts annually, even though it could not achieved in the average release of

418,000 smolts in the 11 years from 1993 to 2003, and even though the Skagit steelhead population has crashed in response to the attempt to reach that goal. It has become fully apparent in the DEIS that WDFW has no intention of applying Adaptive Management or effective Hatchery Reform on the Skagit River.

(Continued) From the DEIS: "Steelhead of hatchery origin that spawn in the wild are defined as those fish spawning before March 15, for management purposes on the Skagit."

Comments: The biological reality is hatchery steelhead remain for potential spawning after March 15th, depending on the year, conditions, and sex of the steelhead. For instance, Table 6, as attached in the Appendix, was taken from the 5 years of catch information from 1996 to 2000 that was provided on the WDFW website under Steelhead Harvest Summaries. In 2 of those 5 years hatchery steelhead were included in the April catch, well past the March 15th definition deadline.

Also, from Professor Bentzen's court testimony in 1998: "Because males are not gamete limited, they tend to stay in freshwater longer than females, and therefore have greater opportunities to reproduce than do females. If the hatchery males remain in freshwater until there are no more females to spawn with, 100%, minus fishing mortality and hatchery taking, of Chambers Creek males would then be present when the wild winter steelhead population returns to spawn, a factor not considered in the FEIS. Some level of gene flow from Chambers Creek stock to wild Skagit winter steelhead has therefore been occurring ever since hatchery supplementation began in the Skagit drainage."

WDFW did not consider this in the 1994 FEIS, nor has WDFW considered it in the 2004 DEIS. It remains a biological fact that WDFW continues to stumble over.

From the DEIS: "Hatchery steelhead have been released as smolts at … the Sauk River (one time event in 2003)."

Comments: As previously commented, this is a falsehood. From the WDFW's website under Steelhead Harvest and Hatchery Planting Summaries it is found that releases of hatchery winter steelhead smolts were released each of 5 years of record: 1995 = 30,200, 1996 = 25,900, 1997 = 21,600, 1998 = 30,800, 1999 = 26,800, and 2001 = 21,8000. For some reason the 2000 smolt data was available on the website. In 2003, the DEIS previously indicated 30,000 were released into the Sauk. So for at least 8 continuous years from 1995 to 2003 winter hatchery smolts were released into the Sauk. The Sauk stocking record was further confirmed by a letter dated July 11, 2001, from Assistant Director of the WDFW Fish Program, Lew Atkins to Bill McMillan: "For several years, the Sauk River has been planted with approximately 25,000-30,000 hatchery (adipose clipped) winter steelhead annually."

It would appear that the purpose for trying to conceal this hatchery history is to fulfill the HSRG recommendation to create wild steelhead management zones. The Sauk River was recommended to be one of those where no hatchery plantings would occur (pages 52-53 of HSRG Recommendations – March 2003). The fact is, the Sauk has had at least an 8 year history of winter steelhead hatchery plantings and straying summer steelhead released into the Skagit at Marblemount are common there as well. The latter is also described in the letter of July 11, 2001 from Lew Atkins.

This means a wild steelhead management zone could be as equally recommended for the mainstem Skagit as the Sauk. Both have hatchery planting histories, and either could benefit by ceasing that activity and managing entirely for wild steelhead. Given the increasing failure of the Skagit hatchery program, there would presently be little or nothing to lose with its elimination beyond saving a lot of hatchery dollars on smolts that do not return with any reasonable prospect to benefit the Skagit River catch (the example of the 2003 smolt-to-adult-catch ratio of 907:1 is particularly noteworthy).

Page 118-119, Hatchery and Wild Steelhead Population Data

From the DEIS: "Historically, wild winter steelhead have accounted for approximately 55 percent of Skagit steelhead adult returns and hatchery adult returns accounted for the remaining 45 percent (DeShazo 1985). However, recent data indicates that hatchery fish no comprise only 10 percent of the total returns to the Skagit River."

Comments: Yet, in recent years Skagit hatchery steelhead winter smolt releases have increased from an average of 239,416 per year in the period 1976-1992, to 418,000 per year in the period 1193-2003. And the DEIS proposes to increase them to a sustained average of 534,000.

Tables 1, 3, and 4, Figures 1-5, and Figures A-H (as attached in the Appendix) clearly demonstrate the longterm relationship of decline of both hatchery and wild steelhead with winter steelhead smolt plants increasingly over 250,000. Yet the DEIS plans to perpetuate a predictably continuing decline clearly related to increasing smolt releases. Where is the concept of hatchery reform in this? And why isn't effective adaptive management being applied with the REDUCED numbers of hatchery smolts required to restore Skagit River steelhead runsizes to historic numbers as existed prior to the Skagit River steelhead hatchery program in the years before 1964?

From the DEIS: "The minimum wild winter-run escapement goal for the Skagit is 6,000 fish. This goal fluctuates annually based upon seasonal escapements (6,000 minimum goal, plus 16% of the run greater than 6,000 fish when run exceeds 6,000).

Comments: What is the science supporting this spawning escapement methodology? Typical for other rivers in the State are static spawning goals, not shifting spawning goals that escalate with return numbers. Why is the Skagit different and for what

justifications? Typically it is determined how many eggs and resulting juveniles are required to fill varied habitat points in a river system, and thus a set number of spawners carrying so many eggs are always required to fill the habitat. Typically habitat capacity remains relatively steady as a given number of stream miles with so much rearing area for each species. So how does WDFW justify shifting steelhead escapement goals upward during larger return years, and why the percentage of 16%? How is it that habitat magically increases on the years when adult steelhead returns are larger, and decreases mysteriously coinciding with years of more depleted steelhead returns?

The Skagit co-managers appear to be playing a "shell game" with Skagit steelhead escapement goals for the justification of continued harvest and/or fishing opportunity, and to keep from having to address the problems an overly ambitious hatchery steelhead smolt release program may have in resulting longterm steelhead declines.

For example from page 21 of the 1994 Grandy Creek Hatchery FEIS Volume II Technical Appendices, Technical Appendix B-2: "Escapement goals for wild steelhead were first set in 1980-81. An escapement goal is that portion of a stock or group of stocks that is protected from harvest and allowed to spawn to meet management objectives and perpetuate the stock (WDW 1992a). It is fully expected that actual escapement will fluctuate around the targeted escapement goal due to the fluctuating nature of steelhead runs and varying environmental conditions. These goals have been based on utilization of spawning and rearing area, historical escapement levels, and judgments of biologist conducting spawning surveys on the Skagit River (WDW 1992d).

For 1980-81 the escapement goal for wild steelhead was 7,000. For 1981-82 and 1982-83 the goal was 8,000 for each year. The state and tribes could not agree to a goal in 1983-84 and it was decided to allow 10% incidental harvest of the wild run while harvesting the hatchery steelhead in the system. For the 1984-85 season through the 1990-91 season it was agreed to harvest 2,500 wild steelhead each year while the wild run sizes fluctuated. For the 1991-92 and 1992-93 seasons the parties agreed to fish a fixed fishing schedule …

The current Washington Department of Wildlife escapement goal for winter-run steelhead was established in 1984-85, and is currently 10,300 for the Skagit River (Cooper and Johnson, 1992).

The WDW recognizes that there are other methods available to establish an escapement goal for the Skagit system. The WDW method is based on the rearing potential of the system. The Skagit System Cooperative goal is derived by analyzing the number of returning adults from a known escapement. The parties continue to collect data and work toward agreeing to an escapement goal."

At The Wild Steelhead Conference in Seattle in September of 2001, it was announced by Bob Leland and Bob Gibbon of WDFW that the Skagt River steelhead escapement goal was 6,000 steelhead as agreed by WDFW and the Skagit Cooperative Tribes. This was the apparent response to the plummet in wild steelhead numbers on the Skagit in the winter of 1999/2000 followed by a second low return in 2000/2001. Rather than close the fisheries, or take other meaningful steps to address the problem such as develop a research plan for determining the cause, instead the escapement goal was simply dropped from 10,300 to 6,000 as a number more easily achieved in light of the low steelhead returns. Nothing further has occurred since beyond resurrecting the Grandy Creek Hatchery Plan as the reborn Lower Skagit Acclimation and Rearing Facility DEIS.

What sort of science is this? The results of this sort of steelhead management hodgepodge have been over 30 years of declining steelhead on the Skagit.

(Continued) From the DEIS: "Interactions between hatchery and wild steelhead spawners have been a cause for concern among conservationists and scientists alike. However, Hindar et al. (1991) found that gene frequencies of naturally produced juvenile fish in the Skagit River were typical of wild populations. Hindar et al.'s study suggested that introgression between hatchery and wild fish was not occurring at high levels at the time of the study."

Comments: If hatchery/wild spawning interactions were to result in very low survival, would it not be anticipated that very little surviving evidence would result to demonstrate hatchery/wild spawning interactions ever occurred?

The better way to determine if spawning interactions are taking place is to actually observe what is occurring on the spawning grounds at a time when hatchery and wild fish might most interact – for instance mid January through February. These would most likely be wild males with hatchery females as suggested at that date by Bentzen (1998) as previously quoted from court testimony.

If hatchery/wild spawning is observed on the spawning grounds, and subsequent collections of juveniles in those same areas do not exhibit genetic crosses, then it can be surmised that very few eggs, fry, and/or parr lived long enough to become part of the sample size collected. In such instances there would be little, or no, remaining genetic evidence in most of the surviving steelhead population. Yet, the wild population would be driven downward nevertheless due to spawning interactions that produce very few, if any, survivors.

This problem could be particularly extensive if hatchery smolts that residualize are composed of miniature, but sexually mature, males immediately ready to spawn on release in May and which are known to travel upstream from their release site as far as

21 km as previously discussed in the findings from Oregon's Imnaha River (Jonasson et al. 1995). May is the same month identified as the wild Skagit spawning peak.

Page 120, Chinook

From the DEIS: "The abundance of naturally spawning Chinook has declined only slightly in the Skagit Basin (Cramer et al. 1999) … In recent years, it appears that there has been a shift of wild Skagit Chinook production increasingly into sections of the Skagit that are upstream of Rockport. Between 1974-1984 the percentage of the overall wild Chinook population that spawned upstream of Rockport was 62% between 1985-1993 it was 73%; and between 1994-2001 it was 78% (Connor and Pflug 2003)."

Comments: What has not been quoted out of that same study is that the percentage of change in mean escapement between the 1974-1984 time period and the 1985-2001 time period was +3% for the Upper Skagit chinook while it was -41% for the Lower Skagit and -52% for the Lower Sauk River, the major wild chinook spawning tributary to the Skagit (Changes in the Distribution and Density of Pink, Chum and Chinook Salmon Spawning in the Upper Skagit River in Response to Flow Management Measures. E. Connor and D. Pflug. 2003). So while the Upper Skagit wild chinook have remained stable, or increased slightly, the remaining basin has experienced precipitous wild chinook declines.

There is no information presently available, nor studies done on the Skagit, to determine what part large hatchery steelhead smolt releases may be contributing to wild chinook declines in areas outside the Upper Skagit where habitat investments and river flow regulations by Seattle City Light hydroelectric operations have resulted in a leveling, or even slight increase, in wild chinook numbers in that river section. Nor have studies been done to document the levels of steelhead smolt residualism and resulting precocious males (the latter especially known to be piscivorous as previously cited from Werlen, 2003) relative to the elevated steelhead smolt releases averaging 418,000 begun in 1993 and planned to increase to a sustained 534,000 with implementation of the DEIS project.

Nor have studies been done to determine the increased level of predators such as merganser, cormorant, gulls and etc. that are attracted to the large releases of steelhead smolts as they occur in their spread through the shared migration corridor of the Middle and Lower Skagit and what consequences this has on all of the other migrating wild salmonid species en route downriver and in the Skagit estuary.

Without the direct and indirect effects of predation resulting from steelhead hatchery smolt releases (and their related residuals) in the shared migration corridor and estuary, how much more successful might the results have been for Upper Skagit chinook through the investments in hydro-project flow alterations and habitat investments? It may have resulted in significant Upper Skagit chinook increases rather than mere

leveling. And how may hatchery steelhead smolt consequences have contributed to the declines in wild chinook in the Lower Skagit and Lower Sauk in the shared migration corridor of the Lower Skagit and estuary?

This all remains an unknown on ESA listed chinook in the Skagit system that the DEIS plan needs to first collect relevant data on, and then to effectively evaluate if hatchery reform is to take place as touted and as the HSRG recommends in the monitoring and evaluation criteria for the Skagit. The DEIS project would increase hatchery steelhead smolt levels from an average release of 418,000 in the past 11 years, to a sustained level of 534,000 if the DEIS plan is successful – a 116,000 steelhead smolt increase of 28%.

(Continued) From the DEIS: "Skagit Chinook generally migrate to saltwater during the summer and fall of their first year of life, although significant numbers overwinter in freshwater and emigrate during their second year as early as January through May. Chinook fry have been captured at Skagit smolt traps as early as mid-January and continue their migration through the summer … (C. Kraemer, WDFW, pers comm., 12/12/03)."

Comments: This information all further corroborates the potential large steelhead smolt releases can have on emerging, rearing, and migrating chinook as previously discussed through both direct and indirect predation increases related to smolt migrations, residualism, and precocious males that remain in the system for at least one more year and are known to be particularly piscivorous. There has been no discussion to tie this together in the DEIS with a plan to develop the necessary monitoring and evaluation needed as required to go further with the planned DEIS project.

(Continued) From the DEIS: The WDFW formerly identified six stocks of Chinook in the Skagit River system: three spring runs, two summer runs and a fall run. In the 2002 SASI revision, run-timing designations were dropped from stock names because timings were inconsistently applied to Puget Sound stocks. Although these stocks are identified as unique based on spawning timings and geographical distributions, they share a similar genetic composition, although the frequency of alleles varies from stock to stock."

Comments: As stated, science has identified six genetically unique chinook stocks in the Skagit basin. An effective ESA restoration strategy would monitor and evaluate the health of each of these stocks with management goals set for each in order to maintain the Skagit system's presently known range of genetic diversity. It is this range of diversity which provides a primary mechanism for adaptation of the species as a whole, and as a primary mechanism for restoring Puget Sound chinook above ESA levels.

Page 124, 3.1.7.1 Grandy Creek Alternative, Existing Conditions

From the DEIS: "However, low flows conditions are common within the creek during the fall and likely limit use by most fall spawning salmonids … DOE placed Grandy Creek on the 303d list (under the Clean Water Act) for elevated temperatures and listed the creek as 'restricted with low flows' (WDOE 2002)."

Comments: How will the operation of the DEIS facility further affect the low flow situation and the use of Grandy Creek by fall salmon, especially chinook?

The DEIS has indicated the proposed Grandy alternative would withdraw 6-7 cfs from the groundwater of the shared Grandy Creek and Skagit River aquifer. It also indicated that in early November of 2002, Grandy Creek was only running 6 cfs due to the long period of low rainfall. The proposed groundwater withdrawal needs for the operation of the facility in October and November will be sufficient to make the creek go dry for some undetermined length in October and/or November in prolonged low rainfall conditions such as have occurred twice in October/November in the past five years. This has been previously commented on as a significant risk to ESA listed chinook in Grandy Creek, and it remains applicable here.

Page 124-125, Fish Species in Grandy Creek, Steelhead

From the DEIS: "… there is no historic wild steelhead ground survey data for Grandy Creek. However … a small number of wild steelhead have been observed spawning all the way up to Grandy Lake. Although steelhead have been observed spawning in the Grandy Creek system, the majority simply dip into the tributary for short periods on their continued upstream migration. Most lower Skagit wild steelhead spawn upstream within the mainstem, between Grandy Creek and Newhalem …"

Comments: On page 118 of this DEIS it states, "Most winter steelhead (approximately 75%) that spawn in the Skagit basin use tributary streams …" and from page 115 of this DEIS it states, "… this section (Skagit) contains 12 miles of meandering river flowing from the town of Concrete to 1.5 miles below the community of Birdsview. Within this section, seven tributary streams occur, of which Grandy Creek (RM 45.6) is considered one of the most important for salmonid utilization (Williams et al. 1975)."

There are a number of inconsistencies that need to be reconciled in the discussion of Grandy Creek and its wild fish species use. At this point in the DEIS Grandy Creek is identified as of apparently low value for all species except for cutthroat in the upper reaches. Yet it was identified for its high salmonid value in 1975. This suggests considerable habitat degradation has occurred since, and/or hatchery/wild fish interactions.

Given the 1975 reference point, there may be considerable opportunity for Grandy Creek habitat restoration activities to occur with prospect for regaining that reported high salmonid value based on its past attributes. However, this is not discussed in the

DEIS because there has been no Action Alternative presented that would allow exploration of what better salmonid values may be represented by Grandy Creek than the narrow focus on the lower creek as a hatchery steelhead acclimation and rearing facility.

For instance, it is apparent that tributaries such as Grandy Creek are of high importance to Skagit river winter steelhead where it was estimated on page 118 that 75% of the spawning occurs. One by one, each of these smaller tributaries provides the necessary web for high wild steelhead production as well as for other salmonid species. Grandy Creek is one of these. Yet, the WDFW has released hatchery steelhead smolts numbering 30,000-110,000 into Grandy Creek in 6 of the past 8 years (page 126 of the DEIS), with no monitoring of what the effects of that have been on the indigenous wild populations of steelhead, coho, cutthroat, and ESA listed Chinook. After the passage of 8 years since the initial 1996 smolt introductions, there has not been one scrap of evidence provided in the DEIS that WDFW has monitored and evaluated the results of outplanting into Grandy Creek.

It is not as if this was some remote time of limited fishery science tools in the 1930s. The present era is that of a touted elevation in fishery science, adaptive management, and hatchery reform. Yet, for WDFW this has merely been the mouthing of words on the Skagit River system with no evidence of implementation of on the ground monitoring and evaluation necessary to realize the requirements of modern fishery science and management.

How does WDFW justify a comment such as, "the majority (of wild steelhead) simply dip into the tributary for short periods on their continued upstream migration." In the same discussion it indicates there is no historic wild steelhead spawning ground survey data for Grandy Creek. So how was all this time spent to observe wild steelhead merely dipping into Grandy Creek and then traveling onward upstream. This is utter nonsensical fabrication – purely fiction, not science.

Page 125, Chinook

From the DEIS: "According to the 'Catalog of Washington Streams and Salmon Utilization' (Williams et al. 1975) and Puget Sound Chinook Harvest Management Plan (Puget Sound Indian Tribes and WDFW 2001) Chinook are known to spawn in Grandy Creek, although the frequency of spawning is unknown … limited utilization may occur in the lower 2 RM of the creek due to the presence of suitable spawning gravels. A low number of incidental spawners have been observed in the creek and 2-3 redds have been seen between the mouth and the Cape Horn Bridge overpass in pat seasons (~RM 0.3) … in years with higher than average fall flows, adult mainstem Chinook may indeed spawn in the system."

Comments: Obviously, if chinook redds have been found in the system they spawn there. How is it determined that the low number of spawners found in the system are "incidental" when Grandy Creek has an apparent long history of chinook use? What has been the survey effort to determine this use. With the Grandy Creek Hatchery Plan in 1994 and now the newer DEIS, it would seem logical that WDFW would have been collecting specific information focused on Grandy Creek as a means to help evaluate the Grandy Creek Alternative in both EISs. But there has apparently been little or nothing collected on Grandy Creek for steelhead or chinook. This makes leaves the Grandy Alternative fraught with risk.

Page 126, Hatchery Fish

From the DEIS: Table 3-16 provides the hatchery smolt releases into Grandy Creek from 1996-2003.

Comments: The smolt releases have ranged from lows of zero each in 1998 and 2003, to a high of 109,592 in 1997. While recent smolt numbers have been sometimes shockingly high for such a small stream, they have been far below the numbers that are proposed in the DEIS at 334,000. The past 8 year average in Grandy Creek has been 40,535 smolts, or about 1/8 of the smolts planned for release in the DEIS.

Questions:
How many juvenile chinook rear in, or outmigrate from Grandy Creek at the period the smolts will be released? What will smolt residualism be and the resulting precocious males that can be expected to migrate up Grandy Creek to prey on juvenile wild coho, steelhead and chinook, and to spawn with wild female steelhead? And how might residual smolts and precocious males affect the Skagit River as a whole?

Even at the lowest residualism level found in the literature, 1.6% (see Table 5 as attached in the Appendix), the resulting residual smolts from 334,000 released at Grandy Creek would be 5,344. If 55% are precocious males as found in the Tucannon River by Viola and Schuck (1995), it would result in 2,939 that are mature and ready to immediately spawn with female steelhead. Such numbers would overwhelm the much smaller population of wild adult males trying to spawn with wild females in Grandy Creek in May, the spewing peak. This would describe the best possible case, which there is no reason to believe will be the actual outcome on the Skagit among all of the potential variables from year to year and from river to river.

Precocious males are also piscivorous as found on the Keogh River by Werlen (2003). 28% of those of over 250mm were found to have been feeding on coho smolts of 80-100mm (the Keogh being primarily a coho system, not chinook). This would indicate that the steelhead were preying on coho 32%-40% of their own length. Even though residualism was lower as found in the Keogh in 2003 than in other years, it was estimated that in high coho production years about 4% of the coho smolts were

consumed by the residuals, but that in a low coho production year that it would proportionally raise to 10% of the coho smolts which was considered problematic. Skagit River juvenile chinook average much smaller than coho smolts (see Table 2 in the attached Appendix), and presumably would be even more readily consumed by residualized steelhead that could do so at considerably less than the 250mm required to prey on coho smolts.

The residualism of 2,939 steelhead smolts could potentially sweep Grandy Creek clean of any wild juvenile salmonids that would include chinook and emerging steelhead through the summer. Also, a certain percentage of the residuals would survive right on through the following winter and spring in continuing ecological interactions with wild species.

Furthermore, many of the residuals and precocious males will also find their way into the Skagit. The precocious males are roamers known to travel as much as 21 km upstream (as found on Oregon's Imnaha River by Jonasson et al., 1995), which could be either Grandy Creek or the Skagit.

The total Skagit wild steelhead runsize averaged 6,221 fish the past 9 years since smolt releases leapt up on the Skagit in 1993. Of those, about half would be females, or 3,111. The total combined residuals from all Skagit releases would be 8,544. If 55% (Viola and Schuck, 1995) are precocious males, it would result in 4,699 ready to spawn on release – a number capable of dominating the spawning grounds occupied by only 3,111 wild female steelhead in the Skagit the past 9 years.

The residuals and precocious males will be spread through the Skagit system reflecting their planned Grandy Alternative releases at Marblemount @ RM 78, Barnaby @ RM 70, Baker @ RM 56.5 (still a planned release point in the Grandy Alternative), and Grandy @ RM 45.6. The precocious males are known to migrate upstream 12 km (McMichael et al. 2001) to 21 km (Jonasson et al. 1995) or about 7-12 miles. This means that wild female steelhead from RM 45.6 to RM 68.5 and from RM 70.1 to RM 90.2 on the Mainstem Skagit would all have precocious males as potential spawning mates in nearly 45 contiguous miles (except for a 1.6 mile stretch); on Grandy Creek from RM 0 to its source at RM 7; on the Sauk River from RM 0 to RM 1.3 (coming upstream from the Baker release site); and on the Cascade River from RM 0 to RM 13. Presumably a few may spread downstream as well, but upstream seems to be the pattern most documented in the literature.

Where and when do most wild steelhead spawn in the Skagit system?

On page 125 of the DEIS it is indicated: "Most lower Skagit wild steelhead spawn upstream within the mainstem, between Grandy Creek and Newhalem (C. Kraemer, WDFW, pers comm., 5/13/02; P. Castle, WDFW, pers comm., 5/28/03)." Although this

curiously conflicts with previous information found on page 118 of the DEIS, "Most winter steelhead (approximately 75%) that spawn in the Skagit basin use tributary streams …", it seems evident that whether most wild steelhead spawn in the tributaries or the mainstem, that 45 miles of the primary spawning reach for wild steelhead, including portions of all of the tributaries in that 45 miles (whether large or small), would be impacted by primarily *upstream* bound precocious males from hatchery smolt residualism.

The Skagit wild steelhead spawning is described on page 117 of the DEIS: "Wild origin winter steelhead have been defined as those fish that spawn after March 15 through early July (Woodin et al. 1984; C. Kraemer, WDFW, pers comm., 12/12/03). Spawning activity is limited until mid to early April, with peaks of activity in the second and third weeks of May (C. Kraemer, WDFW, pers comm. 12/22/03)."

It has commonly been theorized by WDFW that Chambers Creek origin hatchery winter steelhead and wild steelhead have a short period of spawning overlap: "Steelhead of hatchery origin that spawn in the wild are defined as those fish spawning before March 15, for management purposes on the Skagit (Woodin et al. 1984). This cut-off point … is the approximate mid-point of overlap between hatchery and wild spawning. Based on returns to hatchery racks, only 5% of hatchery fish have spawned after March 1 …" This presumed narrow period of overlap in hatchery/wild spawning is based primarily on adult female steelhead maturation differences through egg taking at hatcheries, and observed construction of redds by wild females on the spawning grounds.

However, it takes males as well as females to effectively create fertilized eggs. This tends to confound the hoped for temporal separations between hatchery and wild spawning in two ways:

1) As quoted from Professor Paul Bentzen earlier in his 1994 Grandy Creek Hatchery court testimony: "Despite the separation in run timing, the FEIS reports that Chambers Creek stock exhibits 40% spawner overlap with wild winter steelhead, i.e. 40% of hatchery females have not yet begun spawning by the time the wild run begins spawning in February (p. 43, appendix A-6 FEIS). Therefore 40% of hatchery females minus fishing mortality and hatchery taking will be available to spawn with Grandy Creek wild males. Because males are not gamete limited, they tend to stay in freshwater longer than females, and therefore have greater opportunities to reproduce than do females. If the hatchery males remain in freshwater until there are no more females to spawn with, 100%, minus fishing mortality and hatchery taking, of the Chambers Creek males would then be present when the wild winter steelhead population returns to spawn, a factor not considered in the FEIS. Some level of gene flow from Chambers Creek stock to wild Skagit winter steelhead has therefore been occurring ever since hatchery supplementation began in the Skagit drainage."

2) There is increasing realization that adult, as well as juvenile, wild steelhead populations can potentially be overwhelmed by residual hatchery steelhead smolts that do not outmigrate. 55% of residuals have been found to be sexually mature precocious males in studies on Washington's Tucannon River (Viola and Schuck, 1995). Smolts are planned for release from the Action Alternatives in the DEIS in May. Some undetermined proportion of the 534,000 to be released will residualize. As indicated, about 55% of these will be precocious males that are immediately able to spawn with wild female steelhead that the DEIS has indicated will be at a spawning peak in the second and third weeks of May on the Skagit.

Thus, not only will spawning interactions take place early in the spawning season during an overlap period when wild males spawn with hatchery females, and hatchery males with wild females, but it will also occur in the peak of the wild female egg laying period of May through precocious hatchery males. The latter, even if residualism levels are very low, would still be able to overwhelm the depressed wild adult male populations as a result of over half a million hatchery smolts released. This would nullify the flawed theory that hatchery/wild steelhead spawning interactions are minimal because Chambers Creek steelhead have a temporal separation in spawning time from wild steelhead.

So not only is there a probable density barrier for Skagit steelhead that large numbers of hatchery steelhead smolts will exacerbate when they migrate to the estuary, Puget Sound, Georgia Strait, or some other bottleneck; but those smolts that don't migrate will be heavily eroding the potential for wild steelhead to successfully procreate due to the interactions of the precocious males on the spawning grounds. As suggested in a previous example, it is like a candle lit at both ends and wild steelhead are melting away as hatchery smolt numbers cripple the chance for wild Skagit River steelhead to express productivity.

The precocious males are also piscivorous and will have been spread through the Skagit and Grandy Creek in a manner to maximize their ability to impact juvenile chinook, coho smolts (as found on the Keogh be Werlen in 2003) and emerging steelhead by eating them; and they will impact yearling steelhead with displacement and other aspects of competition.

Page 134, Methods and Magnitude of Release

From the DEIS: "The volitional release strategy … these studies show that steelhead released in May expressed a greater readiness to migrate as smolts … (and) releasing smolts throughout the month of May may help to minimize possible interaction with listed juvenile Chinook salmon as this timing allows them to grow to a size that reduces the potential for predation … (and) release of smolting fish at 5-7 fpp reduces in-river residency time, as these fish typically migrate immediately."

Comments: It has not been described how smolts that are more reluctant to migrate will be kept from residualizing. The previous description of the "volitional" release method indicated a gradually dewater of the pond as the fish begin to move out. This would continue until early June. Evidently it is assumed all the smolts will have vacated the dewatered pond. However, that would appear to be a more-or-less forced "pushing" of the fish from the pond even if they were inclined to want to remain. Are most of the smolts inclined to residualize really expected to remain in a pond being actively dewaterd? The DEIS needs to more fully describe how this sort of "volitional" protocol has worked at other sites to improve culling out residuals.

The theory that retaining steelhead smolts until May will minimize interactions with juvenile chinook does not appear a very strong argument: Table 2 (as provided in the Appendix) indicates that the actual size increase of chinook per rearing week would not significantly change their vulnerability to steelhead smolt predation. Even if the prey length of 33% (USFWS 1994) is used for predation predictions than the actual test that found 46% (Pearsons et al. 1998), with a targeted average of 6 fpp for smolts released the resulting average smolt size would be 196 mm long (Gayeski, 2003) as quoted in this DEIS. A 196 mm steelhead smolt would be able to eat Skagit-sized chinook juveniles until the 24th week (about 2nd week of June).

Of further concern, with a 6 fpp target goal for smolts, the average size of 196mm would have to include considerable numbers over that average. Smolts of over 200 mm would not be uncommon. Smolts of over 200mm have been identified as the primary suspects for becoming precocious males and piscivorous as found on the Keogh River (Werlen. 2003).

Also, from the paper, Length and Condition Factor of Migrating and Nonmigrating Hatchery-Reared Winter Steelhead Smolts by J. Tipping et al., 1995, it is stated on page 120 in the American Fisheries Society Publication where it was printed under Methods: "Precocious (sexually mature) males, identified by darkened skin color and presence of sperm, were excluded from this experiment."

This would mean that prior to the transport of the approximate 1,000 smolts each year from South Tacoma Hatchery to Snow Creek for release, all of the obviously precocious males that would most certainly have residualized were culled out of the experiment. The reasons for culling out the precocious males in an experiment that was supposed to test the differences between migrating and non-migrating hatchery-reared winter steelhead smolts is baffling. It had to have skewed the resulting percentages over all three years toward smolts that successfully migrated. There is no mention of how many of these precocious males were culled out of the experiment at the hatchery prior to transport and release.

The culling of precocious males prior to release might also explain why smolts that were larger in size were not as inclined to residualize in this experiment. If the precocious males had not been first selected out, it seems that somewhat different results might have been discovered. In the Keogh River study by Werlen (2003), smolts of over 200mm were most inclined to stay in the river, and piscivorous predation behavior was most common when 250mm was reached. Werlen indicated smolt residualism was lowest when smolts were 160mm-200mm (avg. 180), but in Tipping et al. 1995, it was found that smolts of 190mm or larger outmigrated best. The larger size found by Tipping et al. may not be a valid conclusion. If the precocious males had been left in the release groups rather than selected out, it could led to different conclusions.

It seems probable that if the precocious smolts had not been culled out, the residualism levels found on Snow Creek in the 3 years of the experiment, would have been higher than the 13.8%-26.1% reported. Nevertheless, even at the reported levels, when applied to the 334,000 smolts released from Grandy Creek it would result in 46,092-87,174 residuals, depending on the year. For the entire 534,000 targeted for release into the Skagit, it would mean 73,692-139,374 residuals competing with wild juvenile steelhead and preying on ESA listed juvenile chinook. These are staggering numbers, but they are only about half of what the high range found in the literature would result in at 47%.

The potential for a continuing hatchery plan with a target of 534,000 smolts is on track for devastating consequences to wild steelhead and potentially chinook.

Also, the released smolts should be graded not by the measure of fish per pond (fpp) but by actual length in mm. The most reliable relationship for determining the level of smolt residualism appears to be body length. An average of 180mm was found best on the Keogh; on Snow Creek it was 190mm or more (although this experiment was skewed in a way to make it highly suspect). When graded by fpp, any given pound of fish weighed could include a broad range of length-to-girth relationships, from long skinny fish to short thick fish. At either end of the scale, expected residualism would be high. These are all critical determinations when it comes to predicting residualism levels and precocity.

Page 135, (Continued) Methods and Magnitude of Release

From the DEIS: Table 3-18. The current and proposed Skagit River hatchery winter steelhead release protocol under the Grandy Creek Alternative is shown.

Comments: The "Current Program" numbers are those that were planned for 11 years but which were only achieved once in 1998. The failure to fulfill the 534,000 smolts dates to an origin with a 1992 plan: Option Paper on Hatchery Steelhead Stocking Guidelines to Limit Genetic Impacts to Wild Steelhead Stocks (WDFW 1992a). It was previously described in the DEIS on page 32. It was further detailed in the 1994 Grandy

Creek Hatchery FEIS on pages 2-3 of Appendix 2, Responses to Public Comments. The 11 years goal of 534,000 smolts has fallen short by an average of 116,000 with a resulting average of only 418,000 steelhead smolts actually released in those years. Therefore, the actual "status quo" of the 11 years of recorded hatchery releases has not been 534,000 smolts, but 418,000 smolts.

The evaluations of the "Proposed Program" would assumably succeed where the Current Program has failed (otherwise why create the new plan). The actualized annual release of 534,000 steelhead smolts would result in a 28% increase over the smolt numbers realized in the past 11 years of the program's failure.

What needs to be done to legitimize Table 3-18, is to provide a comparison of the actual 11 year average "# Smolts Released" for the "Current Program." For the "Proposed Program," the numbers provided would remain the same in the assumption the planned numbers would be realized. Only through a comparison of numbers presently achieved (the past 11-year average), can the reviewers of this document effectively evaluate the Action Alternatives as different than the No Action Alternative.

To state that the Current Program has released the actual figures listed beneath the "# Smolts Released" column, would in fact, be perjury if used as an answer in court when asked to provide the numbers of smolts released at each site in the Current Program. While there is a caveat in fine print beneath the table, "number of smolts released varies annually …" and other qualifications, it does not absolve WDFW from directly answering the need to know how many smolts have been released into the Skagit River. Only from an effective evaluation of the present and recent past is there an opportunity to build from a Current Program to an improved future provided by a Proposed Program. This is WDFW's duty as steward of the State's fish resources: to evaluate and to implement programs that can be best expected to perpetuate the State's fish and wildlife resources in a way that can sustain their uses for the .

Also, unlisted under the "Release Site" column of the current program, WDFW has excluded the Sauk River site. The Sauk has a hatchery smolt history accessible via the WDFW website. Under Steelhead Harvest and Planting Summaries. At the time it was examined in 2003, there was no information regarding releases in 2000, 2002 or 2003. However, this DEIS provided the 2003 smolt release number of 30,000. However, this DEIS has consistently claimed that the Sauk smolt release was a "one time release only," which is blatantly false:

Year	Winter Smolts Released
1995	30,200
1996	25,900
1997	21,600

1998	30,800
1999	26,800
2000	Information not available
2001	21,800
2002	Information not available
2003	30,000

Why WDFW has falsified this information for detailed review in the DEIS remains a difficult question that a court room process may be the only means of resolving. If such necessary and basic information can't be provided for public review in a SEPA process, legal action remains the only option to get at the facts.

The lack of pertinent, reliable, and even honest information has been a consistent weakness and obstacle throughout this DEIS document.

Also lacking in Table 3-18 under "Proposed Program" in the "Release Site" column is the Baker River release site. It will continue to be used as an integral component of the Skagit hatchery plan with the Grandy Creek option. This is never clearly stated and most often hidden from easy view in the DEIS. This needs to be rectified. The Grandy Alternative is composed of four, not three, release sites on the Skagit River while the Baker Alternative has only three release sites. This is one of the most significant differences between the two Action Alternatives.

Page 138, Ecological Interactions

From the DEIS: "Ecological interactions between Skagit River hatchery fish and wild salmonids currently occur within the system. There would be no increase in the target production number of smolts released … however, under the Grandy Creek alternative, the full broodstock needs may be met, resulting in an increase in the actual number of smolts released compared to recent years (see Table 2-4) … increased adult returns and smolt releases in the immediate vicinity of Grandy Creek may result in increased localized impacts, but impacts upstream of the creek, where the majority of wild steelhead spawn, would likely decrease … the ecological interactions presented below are based on existing conditions and the proposed release scenarios."

Comments: Yes, ecological interactions do currently occur within the system. However, there is no sense in suggesting a Proposed Program unless there is a basis of probability it will succeed where previous programs have not. Presumably this is the intent of the Proposed Program change. The current goals have not achieved the past goals, and rather than reduce the goals to what may be more realistic and biologically appropriate levels, this proposed program assumes it can achieve those goals that have failed in the Current Program.

In 1993 the jump upward in smolt releases for the Current Program were initiated resulting in an 11 year average of 418,000 smolts released, 116,000 short of the Current Program goal and the Proposed Program goal in its biological implications regarding Ecological Interactions. The biological reality is, the Proposed Program would increase the current 11 year smolt release average by 28% with the additional 116,000 smolts, a large and significant number which was actually more than, or comparable to, the full number of smolts released into the Skagit for 6 of the past 44 years of recorded Skagit River hatchery history (see Table 1 as attached in the Appendix):

1960 … 95,900
1961 … 79,100
1963 … 101,000
1974 … 118,400
1975 … 117,500
1987 … 136, 100

If the Proposed Program will not increase that Current Program average, then there is no reason for proposing it. So it must be assumed it will increase the currently achieved average as a driving purpose for the project described in this DEIS. As a result there *will* be increased numbers of smolts and an expected increase in the ecological interactions associated with them. In fact, as shown in Tables 1, 3, 4, and 7, Figures 1-5, and Figures A-H (as attached in the Appendix), there is a demonstrated reaction to increases in elevated levels of smolt releases into the Skagit and corresponding decreases in the adult wild steelhead catch, escapement, and wild runsize, as well as decreases in hatchery catch and total steelhead runsize. This has been identified for more than 30 years as first described as a smolt "density barrier" for Skagit River steelhead by Loyd Royal as previously discussed in these comments (Royal 1972).

Page 138, Intraspecific Interactions: Interactions Within

From the DEIS: "However, no causal relationship between increases in the number of hatchery fish released and long-term changes to predator population abundance have been established (HSRG 2000)."

Comments: This is incorrect. From Nickelson, Thomas. 2003. The influence of hatchery coho salmon on the productivity of wild coho salmon populations in Oregon coastal basins. Can. J. Fish. Aquat. Sci. 60: 1050-1056:

"To aid in the recovery of depressed wild salmon populations, the operation of hatcheries must be changed to reduce interactions of juvenile hatchery fish with wild fish. Evidence suggests that productivity of wild populations can be reduced by the presence of large numbers of hatchery smolts in lower rivers and estuaries that attract predators … productivity … in 12 Oregon coastal basins and two lake basins was

negatively correlated with the average number of hatchery coho salmon smolts released in each basin."

(Continued) From the DEIS: "Since the total goal release of juvenile steelhead would not change from existing conditions …" and further on, "Fish would be released as actively migrating smolts and are not anticipated to reside in Grandy Creek or the lower Skagit River for any duration. These smolts should migrate rapidly through to the lower river and enter the Skagit estuary for continued rearing until moving into Puget Sound. Additionally, the young-of-the-year steelhead in the Skagit do not emerge from the gravel until mid-summer, after the hatchery smolts have emigrated."

Comments: As previously repeated in these comments, the total goal of released juvenile steelhead, as expected to be achieved in the Action Alternatives of the DEIS, would increase the achieved existing smolt releases as found over the past 11 years since the 1992 decision to increase hatchery production. That increase would be 28% over the 11-year existing average into the Skagit system.

There was no place found in the literature where 0% residualism has ever been found. There will always be a certain amount of hatchery smolt residualism. The only question is how great the percentage will be.

In a search of the literature, there was no lower than a 1.6% residualism rate found for hatchery steelhead smolt releases. It can be considered as the lowest level for consideration in the DEIS.

The low 1.6% residualism on the Keogh River resulted when the smolts from a netpen acclimation and rearing site in a headwater lake **were transported for release to a point 0.3 km above the mouth near saltwater**, and by releasing the smolts at a size range of 160-200mm. This protocol may have helped to reduce previously higher levels of residualism (Werlen, 2003). **(It should be noted this is a very different program than being advocated in the Action Alternatives of the DEIS where the smolts will have to minimally migrate 45.6 miles to reach the Skagit River mouth.)**

The range of smolt residualism has been highly variable on the Keogh River over a 20 year span of time dating to 1980 (Slaney and Harrower 1981) and 1983 (Ward and Slaney 1990) with levels found as high as 47%. A representative range found in the literature is provided in Table 5 as attached in the Appendix. Regarding the release of 334,000 hatchery steelhead as planned from either the Grandy or Baker Action Alternatives, the range of residualized smolts would be from 5,344 @ 1.6% residualism (the lowest found) to 156,980 @ 47% residualism. Regarding the release into the Skagit system as planned in the two Action Alternatives, the sustained release of 534,000 hatchery smolts would result in 8,544 residuals @ 1.6%, to as high as 250,980 residuals @ 47%. There is no reason to believe the operation of the described hatchery practices in

the Action Alternatives would not have smolt residualism somewhere within this range.

Tied to hatchery steelhead smolt residualism are precocious males found to make up 55% of the residualizing population on the Tucannon River by Viola and Schuck (1995). They also found that "hatchery-reared juvenile steelhead that fail to emigrate from the Tucannon by June 1 would not do so through the remainder of the summer and fall." It is clear from this that hatchery residual smolts would remain in the river for sufficient periods of time to prey on wild steelhead emerging from the gravel later in the summer. Werlen (2003) found that hatchery smolt residuals in the Keogh during his studies sometimes remained in the river for one and two years.

This indicates the effects of residualism from one year's release would have detrimental consequences to wild steelhead and other wild salmonids for as much as two years and would not be limited to a few weeks or months. This would be cumulative with succeeding layers of newly added residuals each year.

It is up to WDFW to demonstrate what the actual smolt residualism presently is, both in percentage of smolts and in overall numbers regarding varied levels of smolt release numbers presently occurring and how that would be anticipated to affect wild steelhead and other salmonid populations in the Skagit system based on those findings. Future operational plans would have to be fully evaluated to demonstrate how they would improve on that baseline information. The HSRG clearly ties monitoring and evaluation of present and future hatchery operations as the necessary basic to hatchery reform.

Page 139, Harvest Regimes

From the DEIS: "The majority of angling effort for hatchery winter steelhead has historically occurred between RM 46, just upstream of the Grandy Creek confluence, and RM 85 (WDFW et al. 1997)."

Comments: How has this distribution of effort been measured? For instance, it is known that there is a popular "plunking" steelhead fishery from a number of Skagit River bars and eddies from Lyman to Mt. Vernon. Presumably this significant component of Skagit River steelhead fishermen is there to harvest hatchery fish as well.

Steve Fransen of NOAA Fisheries, in an e-mail dated June 30, 2004, described what he considered the commonly considered "lower" Skagit River boundary as either the "pipeline crossing" just above Sedro-Woolley, or the Highway 9 Bridge Crossing. He added in that e-mail: "The lower Skagit fishery is a plunking fishery, which has a very low harvest efficiency on hatchery steelhead – maybe because the fish are stocked far upstream and race back to that location. The plunking fishery does much better on wild steelhead, which apparently migrate upstream at a much slower pace."

Neither of the Action Alternatives in the DEIS will benefit this significant group of lower Skagit steelhead fishermen with improved prospects of catching hatchery steelhead that will remain destined for release points no lower than RM 45.6 or 56.5. This group of steelhead fisherman, typically harvest focused, would remain an excluded benefactor of both Action Alternatives due to harvest benefits primarily provided near the release sites 20-30 miles further upstream that are erroneously included as part of the "lower" Skagit.

Any release point(s) chosen for hatchery smolts will result in adult returns that tend to benefit one or more user group(s) while excluding others. The only way to provide every group of anglers with anticipated benefits from hatchery steelhead releases would be to disperse the release points all along the river, thus further increasing the range of wild/hatchery interactions.

The alternative to this is to maximize wild steelhead production on the Skagit River which naturally disperses steelhead in a slow migration throughout the Skagit basin with broad distribution. But wild steelhead can only recover to achieve past historic fishing and harvest opportunities as once provided in the recorded catches of 1948-1961 (prior to the initiation of hatchery smolt releases of consequence), by significantly reducing hatchery smolt releases. The harvest in those 14 years more than doubled the presently unachieved harvest goals of 10,000 steelhead in 1959 and 1956 with over 20,000 mostly, if not all, wild steelhead. Hatchery smolt releases of over 250,000 have continually driven the wild populations downward (and the adult hatchery returns as well) as exemplified in Tables 1, 3, 4, and 7, Figures 1-5, and Figures A-H, as attached in the Appendix. The DEIS plan will only perpetuate further losses of wild steelhead as the data clearly indicate has historically occurred.

Page 139, Adult Capture

From the DEIS: " … prior to March, wild steelhead are **rarely** observed in traps at Marblemount and Barnaby Slough."

Comments: What is meant by "rarely." This suggests data have been colleted. If so, let the reviewer of the information determine the significance of the data by including them. This would provide the opportunity to see the numbers of wild fish handled at the traps over the breadth of trap use, and what the sex ratio has been of the individual wild fish handled and presumably returned into the wild. This is the sort of pertinent monitoring and evaluation from which the potential for wild and hatchery spawning interactions can be better determined. But it is not provided.

Page 139, Competition

From the DEIS: "Among the primary concerns of artificial production is the potential decline of wild populations in response to large-scale releases of hatchery juveniles as a

result of competition (Flagg et al. 1995). Although the extent to which juvenile salmonids may compete for resources is **unknown** … However, because hatchery smolts **generally** migrate to saltwater immediately … effects **should** be minor and similar to existing conditions."

Comments: The DEIS simply blows off this major concern repeatedly. Yet the WDFW response to such concerns are over and over: "unknown," "generally," and "should." These are difficult words to fit into predictive models to evaluate the program. There is the continual implicit assumption in the DEIS that in the absence of data there is no problem.

In the Appendix as attached are Tables 1, 4 and 7, Figures 1-5, and Figures A-H. They have all taken the same WDFW databases available from the combined documents of the 1994 Grandy Creek Hatchery FEIS Appendices and the 2004 DEIS in order to more effectively analyze the 56 year available Skagit steelhead history. It is clear from all of these tables and their graphed and plotted patterns that the DEIS is presenting Action Alternatives that will further deplete the Skagit River steelhead populations. Furthermore, the existing No Action Alternative will similarly do so. There is no alternative provided in the DEIS that would reverse the continuing Skagit River steelhead crash toward threatened and extinction levels.

Page 140, Co-Mingling of Wild and Hatchery Steelhead

From the DEIS: "Potential interactions between hatchery and wild steelhead are existing conditions … Additionally, if hatchery males do remain in the system to attempt to mate with early spawning wild females, it is likely that wild males would out-compete hatchery males, reducing the potential for interactions."

Comments: The present interaction levels need to be quantified so that comparisons between existing conditions to those planned for in the DEIS can be evaluated. However, effective monitoring of where and when feral hatchery steelhead spawning is occurring in the Skagit system has not been done due to spawning surveys limited to after March 15th. This is critically lacking information. Lacking it, there is no way to effectively plan for hatchery practice reforms.

Regarding the presence of hatchery males to spawn with wild females, what research has WDFW done to document this assumption?

At a presentation given to WDFW managers (and other West Coast managers and research biologists present) at the Steelhead Managers Conference in March of 2004 by John McMillan (Salmonid Ecologist with the Wild Salmon Center), he provided the results of studying the activities of both wild and hatchery steelhead on the spawning grounds in the Sol Duc and Calawah rivers in Washington. He carefully noted that secondary males commonly contributed to steelhead spawning through sperm release

of multiple males at once in the egg fertilization act. His some 55 observed spawning acts not only included hatchery males with wild males, but precocious male residual smolts as well in the fertilization activity of eggs from wild females. Also, earlier in the spawning season, it was found that wild males were contributing to the fertilization of hatchery female spawners. It should be noted that the hatchery precocious males observed were Bogachiel Stock (Chambers Creek origin) **released from acclimation ponds** on the Calawah and Sol Duc rivers.

Page 141, Genetic Interactions, Empirical (as continued from page 139)

From the DEIS: "Although non-local origin hatchery steelhead have generally been shown to have reduced fitness, some researchers have found that interbreeding between hatchery and wild stocks has not eliminated the genetic distinctiveness of the wild stocks … most researchers caution however, that these results do not suggest that introgression has not occurred …"

Comments: There is no way to now determine how many genetically distinct wild steelhead stocks have been lost in Washington rivers. We can only know what remains.

The long history of hatchery steelhead programs in Washington, combined with the known reduced fitness they contribute to wild populations on the spawning grounds, and combined with historic harvest pressures on them brought about by the presence of co-mingled hatchery fish, it is not only possible but likely that significant loss of genetic diversity occurred. For instance, Reisenbichler and Phelps (1989. Canadian Journal of Aquatic Science. 46: 66-73.) found steelhead collected from various sites in nine drainages in northwestern Washington had evidently lost genetic variation: "… genetic variation among drainage was much less than reported in British Columbia; these results may be the consequences of gene flow from hatchery stocks that have been released in Washington since the 1940s."

The range of genetic variation that presently exists tells us nothing about the genetic variation that may have been lost with no remaining evidence. This has undoubtedly occurred in Washington over many long years of wild stocks inbreeding with hatchery stocks with resulting reduced survival fitness further aggravated by histories of high harvest. For instance, in British Columbia it is reported there are 858 identified steelhead stocks plus 9 more that have gone extinct (from Status of Anadromous Salmon and Trout in British Columbia and Yukon, by T.L. Slaney, K.D. Hyatt, T.G. Northcote, and R.J. Felden, 1996, as commissioned by the American Fisheries Society.)

As a comparison, 141 stocks of steelhead were identified in the Washington Salmon and Steelhead Stock Inventory (SASSI) (WDFW et. Al., 1992). How many stocks have been lost can't be entirely known in Washington, and as indicated by Reisenbichler and Phelps 1989 study of Washington's northwest coast streams, many of the stocks among

the remaining 141 may contain much lower genetic diversity than they once had as suggested by the comparisons to the British Columbia populations.

To determine the actual effects of genetic interaction will require juvenile collections and electrophoretic and/or DNA analysis in those areas of the Skagit where hatchery/wild spawning interactions are thought most likely to occur, such as those areas historically used a long time on the lower Cascade and Skagit in the Marblemount area, and again in the area between the Sauk River confluence and Barnaby Slough.

A more recent historic area optimal for genetic study is Grandy Creek itself where hatchery introductions were initiated in 1996 (page 126 of the DEIS) with sometimes very large smolt releases.

Also, sampling the Sauk River near the release sites of hatchery winter smolts that occurred from 1995-2003 need to be done to determine if a genetic print has been left on the wild population or not. Unfortunately, WDFW has not been straightforward about this Sauk River hatchery history in the DEIS, and given the consideration of the Sauk as a wild steelhead management zone, this information needs to be determined.

Page 141, Existing Conditions in the Skagit River

From the DEIS: "Since Hindar et al.'s study, stocking level have approximately doubled in the Skagit … from 1994 through 1996 … the level of introgression was minor and was not widespread in the system over the past twenty years (Phelps et al. 1997). This conclusion must be cautioned, however, since the researchers used only seven different genetic markers … although funding is uncertain at this preliminary stage, new genetic studies **could** be included within an M&E plan for the proposed project."

Comments: The word "could" is not sufficient guarantee. It is known the money for this project is limited to construction of the facility by the legislature, and that it is worded in a way that would likely exclude anything beyond hatchery production itself. If effective hatchery reform is to occur, the hatchery facility can't be allowed to be constructed without monitoring and evaluation occurring before and after facility operation. To do otherwise is to merely perpetuate the hatchery era of the past.

Page 142, Reducing Existing Impacts, Particularly Upstream of Grandy Creek

From the DEIS: " … co-mingling of stocks likely occurs as an existing conditions … the section of the Skagit River that has historically been the most heavily used by hatchery-origin adults is the area upstream of Grandy Creek between the Cascade and Sauk rivers … therefore, increased returns to Grandy Creek due to acclimation could potentially reduce the presence of hatchery fish upstream."

Comments: Since 1995 periodic large releases of hatchery steelhead have occurred in the Grandy Creek section. This section may not have been substantially affected by hatchery steelhead interactions prior to that time, but now certainly has been. As long as this continues, it will create the same sort of long-term history as created for the upper Skagit by hatchery operations there with an increasingly lengthened geographic imprint of the hatchery program. That can still be contained by elimination of releases at this river point with prospects that wild fish can reclaim an ecological hold on this middle section of the Skagit. The hatchery imprint has not been as long as has occurred upstream with more hopeful prospects for wild fish reclamation of the area.

Furthermore, hatchery smolt residualism will result in some unknown level between 1.6%-47% (from Table 5 in the attached Appendix). Of those residuals, 55% would be precocious males (Viola and Schuck, 1995) that will migrate upstream as far as 21 km as documented on the Imnaha River in Oregon (Jonasson et al. 1995). It can be anticipated these precocious males will spawn with wild female steelhead spawning in the Skagit River well upstream of Grandy Creek (RM 45.6) on the Skagit.

Also, the Grandy Creek Alternative will include continued releases from the Baker River (RM 56.5) which will further spread the precocious male migrations 21 km upstream from that point, and deep into areas of highest wild steelhead spawning at the same time of year as the wild spawning peak in May. Even at low percentages, the resulting numbers of precocious males from over half a million released smolts would be enough to overwhelm the wild male steelhead population as presently returning to the Skagit.

Page 142, Straying

From the DEIS: "… found the percentage of steelhead hatchery strays in Oregon to be … about 11%. However, researchers of steelhead in western Washington streams have found that hatchery fish tend to return close to the hatchery …"

"A limited amount of hatchery steelhead straying likely occurs in the Skagit River. One goal of the proposed Lower Skagit River facility is to reduce adult straying through use of acclimation … evidence of straying due acclimation is contradictory."

Comments: Before investing in any acclimation pond on the Skagit, first test straying as occurs at Barnaby Slough where steelhead should have as high level of return as an acclimation and rearing facility such as proposed for Grandy. To test Barnaby Slough, eliminate any hatchery smolt releases downstream of it and then measure the fidelity of return to it. Once that level of straying is determined, then it can be relatively well predicted what the straying would be to the Action Alternatives planned in the DEIS. This straying level needs to be compared to that required within the Wild Salmonid Policy as a guide to Washington's hatchery operations.

The quoted work from Lindsay et al. 2001, and Kenaston et al. 2001, in this discussion from the DEIS represents excellent documentation of what straying actually was on the Oregon coastal rivers studied. The basis for that good work were investments in counting weirs on a number of tributaries from which the studies came. Greater investments need to be made along this line so effective monitoring and evaluation can occur in Washington, particularly so on the Skagit River.

Page 143, (continued) Straying

From the DEIS: "The activity most likely to reduce the effects of straying would be increased harvest rates due to better homing and concentrations of hatchery fish in the lower Skagit."

Comments: If this strategy of harvest has not effectively worked on the upper Skagit, which seems to be a driving justification for the Action Alternatives in the DEIS, why would it work on the lower Skagit?

Also, in recent years the hatchery fishery near the release sites of several rivers in Puget Sound (including the Skagit) had to close to provide enough hatchery escapement to meet broodstock needs. With harvest periodically closed in these areas of return, it can be expected that harvest will not always be occurring in the area of the release sites. Therefore harvest would no longer provide the anticipated tool to minimize straying.

Page 144, Predation

From the DEIS: "Researchers in the Lewis River found that steelhead hatchery smolts did prey on Chinook fry and other salmonids, although at low levels … researchers on the Cowlitz River have observed evidence of hatchery steelhead smolt predation on juvenile coho in the range of 60-80mm in length … however, it was estimated that only one percent of those steelhead smolts passing through the downstream trapping structures showed evidence of preying on coho."

Comments: There can be two anticipated levels of juvenile chinook predation related to hatchery steelhead smolt releases:

1) One would be the "estimated" levels as low as one percent, as was found at the smolt trap collection points on the Lewis and Cowlitz. This represents the predation from smolts that effectively outmigrated to the trap. (While 1% may seem a low percentage, it can mean significant numbers of fish when discussing more than half a million smolts [>5,000]. Also not discussed was the number of chinook consumed by each smolt.)

2) Another level that was not measured or estimated in these studies would be from residualized steelhead smolts that did not outmigrate and which did not reach the smolt traps. Many of these residuals would be precocious males which were found to

be particularly piscivorous by Werner (2003) on the Keogh River. Also at this second level of residual predation there would be a continuing predation that occurs due to residual smolts that remain in the system for one and even two more years preying on juveniles at all points of their life history from egg to emergence (also from Werner 2003).

Also, predation levels may increase on chinook when steelhead smolts cohabit with them in the short period of accumulated confinement together in the estuary. This may be particularly problematic on the Skagit where it has been estimated 70% of the historic estuary area has been lost (HSRG Report, Skagit River Basin, March 2003. p. 22).

In the instance of estuary loss, or other habitat area losses, the planned high hatchery steelhead releases as indicated in all alternatives of the DEIS can only perpetuate the problem, no matter which alternative is chosen. An alternative is needed which provides a choice for a solution rather than perpetuation of all the existing problems. Investments in estuary and other habitat areas of the Skagit would be the logical alternative to sustaining high levels of hatchery steelhead smolt releases that are only driving overall Skagit steelhead returns downward (see Tables 1, 3, 4, and 7, Figures 1-5, and Figures A-H, as attached in the Appendix).

Residualism levels of hatchery steelhead smolts are not presently known in the Skagit. The level of residualism from the proposed facility would be anticipated to be the same as from Barnaby Slough, which needs to be determined. As already indicated, residualism can be expected to fall within a range from 1.6% all the way up to 47% depending on the year and the effectiveness of facility operation to eliminate smolts that residualize (see Table 5 as attached in the Appendix).

However, there is no mechanism presently in place to assure that smolt sizes released will be of optimal size range to outmigrate. WDFW uses fish per pound to grade its smolts for release, but this does not effectively indicate the actual body-length-range of smolts released. It is the length of the smolts (Tipping et al., 1995, and Werlen, 2003), not the average weight of several, that will most effectively predict residualism levels.

WDFW needs to implement a smolt length range to be met, not fish per pound, as the most effective means of limiting residualism. But that is presently of no value until a baseline is established regarding residualism levels and smolt length ranges as determined for existing releases on the Skagit from which to effectively evaluate any subsequent changes. None of this is being done, nor is it planned to be done, as indicated in the DEIS.

From the DEIS: "… because steelhead smolts would be released in May, they would enter the river well after the Chinook fry have emerged."

Comments: Chinook outmigration is not as simplistic as indicated in this glib comment (this is a place for WDFW to insert actual periods of chinook juvenile presence in the Skagit, in the estuary, and in outmigration), nor is the potential for predation of chinook limited to active chinook outmigration. Residual steelhead smolts can remain in the river for 1-2 years (Werlen, 2003) as found on the Keogh River and would be chinook predators at all stages of their in-river life histories from egg to estuary collective gathering.

(Continued) From the DEIS: "Although steelhead smolts may prey on juvenile fry, including Chinook, the current level of predation in the Skagit River is generally unknown, but is likely to be low (pers comm. C. Kraemer, WDFW, 5/13/03) … based on limited sampling of hatchery steelhead smolts in the lower Skagit River, predation by hatchery steelhead appears to be limited to those species that are small and abundant in the system … "

Comments: The absence of legitimate studies and information can't be compensated for with glib personal comments. If WDFW doesn't have the information, leave it at that, and suggest plans on how to collect the information to answer the unknown. Then implement it. That is commonly called science. What is presented is trivial flack that fills this DEIS from cover to cover in the absence of science to answer the necessary questions.

The later part of the above quote from page 144 of the DEIS does suggest there have been a few smolt samplings from which to determine stomach contents. Why isn't this more pertinent data, as collected and recorded, provided for evaluation by the reader of the DEIS?

(Continuing) From the DEIS: "Predation on rearing juvenile salmonids upstream of the Grandy Creek/Skagit River confluence (RM 45.6), including the area upstream of Rockport where 78% of wild Chinook have been reported to spawn (Connor and Pflug 2003), would likely decrease since fewer hatchery steelhead would be emigrating through that stretch …"

Comments: The greater area of concern is the lower section of Skagit River where chinook have been in 41% decline the past 30 years (Connor and Pflug 2003). They indicated the upper Skagit chinook population had remained relatively stable. One reason for this might be, the hatchery steelhead smolt releases have occurred at the lower end of the most successful chinook spawning reach in the upper Skagit. By now focusing on middle Skagit hatchery steelhead release points (RM 45.6 and RM 56.5), the predation problems related to steelhead smolt releases, as outlined in the DEIS, are simply being shifted to include the area of the mainstem Skagit where chinook are in steepest decline. This will occur no matter what alternative is chosen. However, at least the No Action Alternative would likely never meet its production goals and keep

actual releases at an average of 418,000 hatchery steelhead smolts per year, well below the predicted 534,000 that would be achieved by the Action Alternatives. That would be a preferable outcome for chinook survival.

Page 145, Predation (Continued)

From the DEIS: "… since **most** hatchery fish would emigrate quickly, the short-term impact of potential predation should be relatively minor … predation on wild salmonids by residual hatchery steelhead is also low (Martin et al. 1993; Persons et al. 1993), but may occur."

Comments: The word "most" regarding residualism effects is not a useful term. Most can mean anything over 50% in this instance meaning that 49% residualism could exist. In fact, the highest steelhead smolt residualism level found indicates that 47% of steelhead smolts *have* sometimes been found to residualize (Ward and Slaney, 1990, from the Keogh River). The range of steelhead smolt residualism found in the literature is provided in Table 5 of the attached Appendix with a low of 1.6% up to a high of 47%. With no data to the contrary, it must be assumed that smolt residualism on the Skagit could be anywhere in between and variable from year to year. Even at low percentages, when more than half a million smolts are released, those small percentages end up resulting in significant numbers of fish.

Page 145, Competition

From the DEIS: "The vast majority of smolts (some may residualize) would be utilizing the river primarily as a corridor to the sea …"

Comments: See the preceding comments. Continuing smokescreens and flack with no collected information fill this DEIS.

Page 145, Impact of Residualism

From the DEIS: "However, residualized hatchery steelhead smolts have been found in very low numbers in past investigations in the Skagit River (Johnston 1996), when hatchery juveniles were force released at the end of the release period.

Comments: This could potentially be useful information. Why aren't the actual findings provided? An actual percentage is necessary from which to apply to the 534,000 steelhead smolts the DEIS Action Alternatives indicate will be achieved. To date, the actual percentages resulting from this study have not been found in a literature search. Why isn't it provided here if its relevance is as strong as indicated?

Page 146, Resource Management

From the DEIS: "The HSRG recommendations for the Skagit River suggest the establishment of a wild steelhead management zone, an area where hatchery fish are

not released. The purpose of such a zone is to protect the genetic integrity of wild stocks. Currently, there are no wild steelhead management zones within the Skagit River, although plans to establish a steelhead management zone are being developed …"

Comments: Previously in the DEIS, it was stated the Sauk River would be established as wild steelhead management zone, and the HSRG similarly suggested that location. However, this indicates no commitment to that.

One problem with the Sauk has been the past, unpredictable, and rogue nature of steelhead hatchery releases into the Skagit system. These have included the Sauk from 1995-2003 (1995-2001 releases were on the WDFW website under Steelhead Harvest and Planting Summaries as found in July of 2003, and the 2003 Sauk was in this DEIS). Another option could have once included the Cascade River prior to Marblemount Hatchery. Still other options could have included certain sections of the mainstem Skagit.

However, the WDFW hatchery steelhead smolt release history has been so extensive, there is virtually no place where some hatchery steelhead have not been released, or strayed to, in the basin. Thus, any site chosen would be as legitimate as another.

The Skagit is a big river with a lot of protected habitat in its upper reaches, not unlike the situation in Olympic National Park due to the North Cascades Park, which makes it a prime candidate for an extensive wild steelhead management zone.

Tables 1, 3, 4, and 7, Figures 1-5, and Figures A-H (as attached in the Appendix), indicate that hatchery steelhead smolt releases have driven the Skagit River to its present steelhead depletion. Elimination of hatchery smolt releases, or confinement of hatchery management to an area on the lowest section of the Skagit with modest smolt releases near Sedro-Woolley, could provide an extensive wild steelhead management zone with the working potential to produce large numbers of wild steelhead and harvest, as was once provided from 1948-1962, and prior to the establishment of the Skagit hatchery program. The long, continuous decline came thereafter – a decline typically aggravated by hatchery smolt releases of 250,000 or more (clearly shown in the plots and graphs of Figures 1-5 in the Appendix for these comments).

CONCLUSION

The Tables and Figures provided in the Appendix to these comments, clearly identify the long steelhead decline on the Skagit River and its specific coincidence with large hatchery smolt releases as independent of ocean trends known as periods of Pacific Decadal Oscillation (PDO). These longer periodic ocean cycles were identified in Figure 3, on page 9, of The Osprey (Issue No. 35, July 1999) as written by noted University of

Washington climatologist Nate Mantua and Professor Percy Washington, College of Oceanic and Atmospheric Sciences, Oregon State University.

The most recent Skagit steelhead declines, in particular, do not reflect the most recent PDO trends. Also, long-term annual smolt-to-adult-catch ratios that most commonly increased in those specific years when smolt numbers were highest, do not correlate with the more even pattern of the ocean trends. This suggests steelhead declines on the Skagit River have not primarily been due to long, sweeping changes in ocean trends, but have been an immediate negative-response-relationship to high numbers of smolts released.

This DEIS does not provide a range of alternatives from which the steelhead declines on the Skagit River can be effectively addressed, and from which implementation of a plan toward restoration can be accomplished. It simply adds yet another deeper layer of institutionalized hatchery steelhead smolt releases to a river system already overburdened and collapsing from hatchery steelhead overload. Yet, the Skagit River basin retains perhaps the best habitat recovery potentials of any river system in Puget Sound.

Appendix

To:

Washington Trout's Comments
Lower Skagit River Steelhead Acclimation and Rearing Facility
Draft EIS
(Issued June 22, 2004)

Appendix Contents:

Tables 1 to 7
Figures 1 to 5
Figures A to H
Excel Data Spreadsheet

Table 1. Historic To Present Skagit Steelhead Data (1994 FEIS Appendices & 2004 DEIS)

Year	Smolt Release	Hat. Harvest 2 Years Later	Wild Harvest 2 Years Later	Total Harvest 2 Years Later (Tribe portion)	Wild Escapement 2 Years Later	Total Steelhead (With Hat. Esc.)
1946	?	?	~3,807	3,807+(?)	?	?
1947	?	?	~5,394	5,394+(?)	?	?
1948	?*	?	~7,287	7,287+(?)	?	?
1949	?*	?	~6,007	6,007+(?)	?	?
1950	?*	?	~13,784	13,784+(?)	?	?
1951	?*	?	~13,277	13,277+(?)	?	?
1952	**?***	**~1,210 (~7%)***	**~16,076***	**17,286 (41)**	**~16,076***	**~33,000***
1953	?*	?	?	11,231+(?)	?	?
1954	?*	?	?	22,488+(?)	?	?
1955	?*	?	?	15,140 (715)	?	?
1956	?*	?	?	12,023 (438)	?	?
1957	?*	?	?	16,006 (7)	?	?
1958	?*	?	?	20,082 (457)	?	?
1959	?*	?	?	14,483 (493)	?	?
1960	95,900	?	?	13,719 (1,937)	?	?
1961	79,100	?	?	13,638 +(?)	?	?
1962	**148,400**	**~8,216***	**~14,000***	**22,216+(?)**	**~14,000***	**~36,000***
1963	101,000	?	?	13,324+(?)	?	?
1964	210,800	?	?	16,699+(?)	?	?
1965	183,700	?	?	16,830+(?)	?	?
1966	245,400	?	?	20,392+(?)	?	?
1967	201,300	?	?	13,708+(?)	?	?
1968	**278,300**	**?**	**?**	**7,581+(?)**	**?**	**?**
1969	**361,000**	**?**	**?**	**11,065+(?)**	**?**	**?**
1970	**293,600**	**?**	**?**	**14,818+(?)**	**?**	**?**
1971	**319,500**	**?**	**?**	**8,992+(?)**	**?**	**?**
1972	**155,200**	**?**	**?**	**10,385 (3,668)**	**?**	**?**
1973	**256,800**	**?**	**?**	**21,711 (15,968)**	**?**	**?**
1974	118,400	?	?	7,985 (6,338)	?	?
1975	117,500	?	?	2,710 (1,469)	?	?
1976	204,700	6,498	1,158	7,656 (4,252)	5,757	14,950
1977	**358,800**	**8,624**	**1,141**	**9,675 (4,887)**	**2,982**	**13,708**
1978	**275,800**	**6,725**	**953**	**7,678 (4,200)**	**5,288**	**13,687**
1979	**319,200**	**3,595**	**1,728**	**5,323 (2,987)**	**4,308**	**10,758**
1980	202,600	3,948	1,407	5,355 (2,697)	9,609	15,139
1981	171,700	2,332	947	3,279 (1,981)	7,732	11,044
1982	**236,700**	**4,926**	**375**	**5,301 (3,307)**	**8,963**	**14,656**
1983	237,200	9,483	1,718	11,201 (4,973)	8,603	23,506
1984	236,600	7,189	2,149	9,338 (4,897)	11,098	21,775
1985	**312,450**	**5,207**	**2,431**	**7,638 (4,065)**	**8,305**	**16,907**
1986	**298,400**	**6,439**	**2,619**	**9,058 (4,907)**	**13,194**	**23,477**
1987	136,100	4,194	2,568	6,762 (3,640)	11,854	19,395
1988	212,104	4,574	1,623	6,197 (3,563)	10,017	17,066
1989	**286,833**	**1,822**	**1,102**	**2,924 (2,146)**	**5,818**	**9,081**
1990	210,071	3,285^	135	3,420 (2,393^)	7,514	10,934^
1991	205,800	2,542	1,364	3,906 (867)	6,900	10,916
1992	**165,000****	**727**	**1,126**	**1,853 (201)**	**6,412**	**8,429**
1993	**409,000****	**1,785**	**832**	**2,617 (1,069)**	**7,656**	**10,427**
1994	?*	2,200	477	2,677 (1,182)	n/a	n/a
1995	**309,563**	**1,911**	**1,682**	**3,593 (145)**	**n/a**	**n/a**
1996	**316,000**	**408**	**52**	**460 (64)**	**7,448**	**8,357**
1997	**265,027**	**651**	**1,216**	**1,867 (276)**	**7,870**	**10,101**
1998	**612,181**	**627**	**455**	**1,082 (224)**	**3,780**	**4,958**
1999***	**422,623**	**1,603**	**239**	**1,842 (217)**	**4,584**	**6,701**
2000***	**470,000**	**2,957**	**146**	**3,103 (112)**	**5,394**	**9,247**
2001***	**461,680**	**449**	**60**	**509 (35)**	**6,818**	**7,440**
2002***	**430,000**	**n/a**	**n/a**	**n/a**	**n/a**	**n/a**
2003***	**488,500**	**n/a**	**n/a**	**n/a**	**n/a**	**n/a**

Key To Table 1:

Rows in **gray** are the 21 years when hatchery winter run smolt releases were **250,000-610-000**. 1994* may also have been a release of over 250,000 hatchery winter run smolts, but there was no release data provided in either the 1994 FEIS or the 2004 DEIS so it is excluded. Of those 21 years, there were 19 years of harvest data with an average **Total Harvest of 6,397** winter steelhead annually. For 4 of those years the tribal harvest was **not included** in either EIS. There was an annual **Hatchery Harvest of 3,057** steelhead in the 14 years hatchery harvest data were available with an average **release of 365, 576 smolts**.

In 31 white rows and 5 of 6 **blue** rows are the 36 years in which hatchery winter smolt releases were **0-250,000** (1994 excluded as unknown**)**. In those 36 years there was an average **Total Harvest of 10,949** winter steelhead annually. For 15 of those years the tribal harvest was **not included** in either EIS. When smolt releases were 0-250,000 the annual total harvest averaged **4,552 more steelhead** than in the years when 250,000-612,000 were released. That represents a **71% greater** annual Total Harvest when hatchery smolt releases were often half, or less, of the other 21 years. Hatchery harvest is only known for 11 of the 36 years. In those 11 years, an average **smolt release of 201,689** provided a **Hatchery Harvest of 4,518** steelhead annually – **1,461 (48%) more hatchery steelhead harvested per year than in the 14 years when an average of 163,887 more smolts were released.** Or put in another way**, 81% more smolts yielded 32% fewer hatchery steelhead** harvested per year.

Marked in **blue** are **10 year intervals** spaced prior to, and after, the first big hatchery winter steelhead return from 148,400 smolts released at Barnaby Slough in 1962. This traces the **downward progression** in Wild Harvest and Total Steelhead (run size) at 5 ten years intervals from 1952 to 2002. This decline **coincides with increasing hatchery steelhead smolt releases** and harvest pressures created to harvest the adult hatchery returns.

An * indicates prior to 1960 there were no smolt release numbers provided for the era of the operation of the **Birdsview Steelhead Hatchery at Grandy Creek**. It was sold to WDG when the USFWS ceased hatchery operation there in July, 1947 (Baker River Project Relicense Initial Consultation Document, March 2002, as found in the Appendices). Exactly how long that WDG steelhead hatchery continued operation after 1947 is not known. It was **still listed in the Pacific Northwest Fishing and Hunting Guide (1956) as an operational WDG steelhead facility on lower Grandy Creek**. Neither the 1994 FEIS nor the 2004 DEIS mention the WDG operation of this steelhead hatchery beyond its once having been operated by the USFWS beginning in 1905. Low steelhead returns there probably led to the Barnaby Slough facility.

An * has been put beside the Hatchery Harvest, Wild Harvest, Wild Escapement, and the Total Steelhead run size for the **1952** and **1962** smolt release years regarding the adult returns they provided in **1954** and **1964**. In the absence of Skagit information, a 1954 Hatchery Harvest estimate of **7%** found on the Satsop River (Royal 1972) was used. **Hatchery returns were very low** in those early years. Personal correspondence with Curt Kraemer (Nov. 12, 2003) provided the 1964 hatchery sport catch. A Wild Escapement estimate was made for both years as ~equal to the total harvest due to relatively low angling pressure in that era. The average number of steelhead fishermen in Washington was found to be 63% greater between 1962-1969 than between 1954-1961 and fishing tackle was less efficient in the earlier years (Royal 1972). This may have resulted in less than 50% harvest of the run size in 1954. Increasing anglers and efficiency by 1964 may have resulted in harvest somewhat above 50% of the run size. With no other estimates to go by, 50% was used as a ballpark figure. By **1972**, declines in Wild Escapements and Total Steelhead suggested that harvest above 50% of the wild run size had been occurring and no escapement estimate was attempted. After the Boldt Decision required escapement determinations, in the 26 years from 1978-2001 wild escapement **exceeded 10,000 steelhead only 4 years**. Although no escapement numbers exist prior to that time, **the predominantly wild** Total Harvest in the 14 years of adult returns from 1948 to 1961 **exceeded 10,000 fish 10 times,** and low angler pressure may have resulted in at least equal escapement. The harvest of less than 10,000 steelhead from 1948-1953 occurred when low angler numbers and tackle inefficiency likely provided significantly greater escapement than harvest.

An ^ is beside the Hatchery Harvest, Total Harvest (tribe), and Total Steelhead for the adult returns from the 1990 smolt release year because the 2004 DEIS did not provide the full tribal catch. However, it was included in the Appendices of the 1994 FEIS.

In **red type** is the **612,181** smolts released in **1998.** It has been **the only year that achieved the 534,000 hatchery smolts that the 2004 DEIS calls the "status quo"** planned since 1992. The adult returns 2 years later resulted in the **2nd lowest Hatchery Harvest** in Skagit history, the **5th lowest Wild Harvest**, the **2nd lowest Wild Escapement**, the **2nd lowest Total Wild Steelhead** run size, and the **lowest Total Steelhead** run size (hatchery and wild) in Skagit history.

The ** designates years which include hatchery **summer steelhead smolts** in the total as provided to Washington Trout by Steve Foley (WDFW) in the absence of 1992 and 1993 smolt numbers in the 1994 FEIS. (They are also absent from the 2004 DEIS.) Summer steelhead hatchery smolts were likely between 10,000-30,000 of the total.

The *** indicates the **most recent 5 years** of smolt releases within 50,000-110,000 of the 534,000 smolt goal.

The Size Range of ESA Listed Chinook Salmon Juveniles Outmigrating from the Skagit River from April through June With a Comparison of the Sizes Required for Juvenile Steelhead To Prey on Them from Two Different Scientific Sources

Table 2

Average length by statistical week of natural origin juvenile chinook salmon migrants captured in traps on the Skagit River from Seiler et al (1998. 1999. 2000. 2001. 2002) . The minimum predator length corresponding to the average length of chinook salmon migrants is shown for two differing estimates regarding the assumptions of minimum predator length required from two different sources: 1) USFWS (1994) indicating predators are thought to prey on fish approximately 1/3 or less their body length, and 2) Pearsons et al. of WDFW (1998) in which coho salmon juveniles were observed to consume chinook juveniles up to 46% of their total length. (Information is from WDFW Hatchery and Genetic Management Plan (HGMP) for Dungeness River Steelhead. March 19, 2003. Pages 13-14.)

Steelhead smolt length range and average length necessary to minimize the potential for residualization is provided beneath the other information. Those length ranges come from a steelhead smolt residualism study on the Keogh River on Vancouver Island (Werlen, 2003) and which seems to concur with most other recommendations. The smolts released that were most inclined to residualize and become piscivorous on available coho smolts (80-100mm) as well as to become sexually precocious (immediately mature) were males of over 250mm. Thus they were consuming coho smolts that were 32%-40% of their own size. Planned steelhead smolt releases on the Skagit River would consist of smolts averaging 6 fish per pound or about 196mm in length, even larger than suggested for the Keogh. This helps to determine predator-to-prey size relationships regarding juvenile steelhead and the availability of other salmonids as a potential food source.

Skagit River 1997-2001	Statistical Week from April through June (In yellow approximate weeks of hatchery smolt releases)										
	16	17	18	19	20	21	22	23	24	25	26
Chinook Length mm	43.2	48.3	50.6	51.7	56.1	59.0	58.0	60.3	61.7	66.5	68.0
Min Predator Length in mm @Prey Size of 33%	131	147	153	157	170	179	176	183	187	202	206
Min Predator Length in mm @Prey Size of 46%	94	105	110	112	122	128	126	131	134	145	148
Steelhead Smolt Length in mm Needed to Minimize Residualism	160-200	160-200	160-200	160-200	160-200	160-200	160-200	160-200	160-200	160-200	160-200
	Avg 180	Avg 180	Avg 180	Avg 180	Avg 180	Avg 180	Avg 180	Avg 180	Avg 180	Avg 180	Avg 180

Table 3 Hatchery Steelhead Smolt Releases Compared to Resulting Sport Catch (1969-1970)

From An Examination of the Anadromous Trout Program of the Washington Game Department
By Loyd Royal 1972

River	Year Planted	Smolts Planted	Sport Catch 2 Years After	Smolt-to-Adult-Catch Ratio
Skagit	1960	80,000	1962 – 18,541	4.31
	1961	83,000	1963 – 21,420	3.87
	1962	133,000	1964 – 34,900	3.81
	1963	74,000	1965 – 20,829	3.55
	1964	**224,000**	**1966 – 26, 683**	**8.39**
	1965	144,000	1967 – 24,833	5.79
	1966	175,000	1968 – 31,524	5.55
	1967	128,000	1969 – 21,958	5.82
	1968*	**(~200,000)**	**1970 – (11,441)**	**(17.48)**
	1969	**269,000**	**1971 – 17,303**	**15.54**
	1970**	**224,000**	**1972 –** 17,000 **(22,796)**	13.17 **(9.83)**

* The 1968 smolt release year and subsequent 1970 adult return year were excluded by Royal as "an aberrant survival year for both hatchery and wild fish" as thought at the time due to poor ocean survival conditions. By going back to old WDG catch records the missing information for those years is provided in parentheses. The 1970 sport catch is from the same WDG catch data Royal drew from at the time. The 1968 smolt figure has been computed from the smolt release figure for the Skagit provided in the 1994 Grandy Creek Hatchery FEIS Appendices. Why the smolt release figures are consistantly lower as provided to Royal by WDG in 1972 as compared to the figures in the 1994 FEIS are not known. Perhaps smolts released into the Sauk River and/or other tributaries were excluded by Royal but were included in the 1994 FEIS as part of the Skagit River total. Royal did not include Sauk River sport catch figures, so that would have been appropriate for his comparative Skagit River information provided. By comparing the 1994 FEIS smolt figures as compared to Royal's other smolt figure years, Royal's were 64% less in 1967 and 75% less in 1969. The missing 1968 smolt releases consistant with Royal's information base would have been about 180,000 smolts @ 64% of the 1994 information, or about 210,000 smolts @ 75% of the 1994 information. A median figure between the two would be ~200,000 smolts as in parentheses for 1968 that would have been consistant with Royal's data base used at the time.

** Royal had to estimate the 1971/1972 sport harvest projected from the November and December catch estimates of 1971. It turned out the acutal sport catch was considerably higher later that winter, much of which was likely wild steelhead contribution. In parentheses is the actual catch from WDG data records at the time (not bias corrected) and the smolt-to-adult-catch ratio that would have fit Royal's comparative information base from WDG.

Rows colored in gray indicate those years when 80,000-175,000 hatchery smolts yielded smolt-to-adult-catch ratios of 3.55-5.82 (comparatively high catches per smolts released).

Yellow high-lights emphasize those years when 200,000 or more hatchery smolts yielded smolt-to-adult-cach ratios of 8.39-17.48 (comparatively low catches per smolts released).

Table 4 **Hatchery Steelhead Smolt Releases Compared to Resulting Catch (1960-2001)**

From 1994 FEIS Appendices & 2004 DEIS Combined Information

Year Planted	Smolts Planted	Sport Catch 2 Years After (Hat & Wild)	Smolt-to-Adult Sport Catch Ratio	Total Catch 2 Years After (Tribe portion)	Smolt-to Adult Total Catch Ratio
1960*	**95,900**	**1962 – 11,782**	**8:1**	**13,719 (1,937)**	**7:1**
1961*	**79,100**	**1963 – 13,638**	**6:1**	**?**	**?**
1962*	**148,400**	**1964 – 22,216**	**7:1**	**?**	**?**
1963*	**101,000**	**1965 – 13,324**	**8:1**	**?**	**?**
1964	210,800	1966 – 16,699	12:1	?	?
1965	183,700	1967 – 16,830	11:1	?	?
1966	245,400	1968 – 20,392	12:1	?	?
1967	201,300	1969 – 13,708	15:1	?	?
1968	278,300	1970 – 7,581	37:1	?	?
1969	361,000	1971 – 11,065	33:1	?	?
1970	293,600	1972 – 14,818	20:1	?	?
1971	319,500	1973 – 8,992	36:1	?	?
1972	155,200	1974 – 6,717	23:1	10,385 (3,668)	15:1
1973	256,800	1975 – 5,743	45:1	21,711 (15,968)	12:1
1974	118,400	1976 – 1,647	72:1	7,985 (6,338)	15:1
1975*	117,500	1977 – 1,241	95:1	2,710 (1,469)	43:1
1976*	204,700	1978 – 3,404	60:1	7,656 (4,252)	27:1
1977*	358,800	1979 – 4,878	74:1	9,675 (4,887)	37:1
1978*	275,800	1980 – 3,478	79:1	7,678 (4,200)	36:1
1979*	319,200	1981 – 2,336	137:1	5,323 (2,987)	60:1
1980*	202,600	1982 – 2,658	76:1	5,355 (2,697)	38:1
1981*	171,700	1983 – 1,298	132:1	3,279 (1,981)	52:1
1982*	236,700	1984 – 1,994	119:1	5,301 (3,307)	45:1
1983*	237,200	1985 – 6,228	38:1	11,201 (4,973)	21:1
1984*	236,600	1986 – 4,441	53:1	9,338 (4,897)	25:1
1985*	312,450	1987 – 3,541	88:1	7,638 (4,065)	41:1
1986*	298,400	1988 – 4,128	72:1	9,058 (4,907)	33:1
1987*	136,100	1989 – 3,122	44:1	6,762 (3,640)	20:1
1988*	212,104	1990 – 2,634	81:1	6,197 (3,563)	34:1
1989*	286,833	1991 – 778	369:1	2,924 (2,146)	98:1
1990*	219,071	1992 – 1,027	213:1	3,420 (2,393)	64:1
1991*	205,800	1993 – 3,039	68:1	3,906 (867)	53:1
1992*	165,000	1994 – 1,652	100:1	1,853 (201)	89:1
1993*	**409,000**	**1995 – 1,548**	**264:1**	**2,617 (1,069)**	**156:1**
1994*	**?**	**1996 – 1,495**	**?**	**2,677 (1,182)**	**?**
1995*	**309,563**	**1997 – 3,448**	**90:1**	**3,593 (145)**	**86:1**
1996*	**316,000**	**1998 – 396**	**798:1**	**460 (64)**	**687:1**
1997*	**265,027**	**1999 – 1,591**	**167:1**	**1,867 (276)**	**142:1**
1998*	**612,181**	**2000 – 858**	**714:1**	**1,082 (224)**	**566:1**
1999*	**422,623**	**2001 – 1,625**	**260:1**	**1,842 (217)**	**229:1**
2000*	**470,000**	**2002 – 2,991**	**157:1**	**3,103 (112)**	**151:1**
2001*	**461,680**	**2003 – 468**	**987:1**	**509 (35)**	**907:1**

Key to Table 4:

Yellow high-lighted are the first and last years in 42 years of hatchery "progress" on the Skagit River.

* Shows 4 years when an average of 106,000 smolts released resulted in one steelhead caught per an average of 7 smolts.

Gray colored rows show the first 11 years when the average number of hatchery smolts annually released more than doubled to an average of 239,000 resulting in one steelhead caught per an average of 20 smolts.

* Shows 18 succeeding years when continuing hatchery smolt releases averaged 233,000 resulting in catches that were driven continually downward with one steelhead caught per an average of 45 smolts.

* Shows the recent 9 years when hatchery smolt releases jumped to an average of 408,000 resulting in a steelhead crash with one steelhead caught per an average of 207 smolts.

Table 5 **Levels of Residualism for 334,000 & 534,000 Steelhead Smolts**
As Planned for Release from Grandy or Baker Acclimation/Rearing Sites
And for the Skagit River as a Whole
Using Differing Possible Steelhead Smolt Residualism Levels Found in the Literature
(In the Absence of Available Smolt Residualism Studies for Puget Sound Rivers)

Residualism Rates In Differing Studies	Resulting Residuals From 334,000 Smolts At Grandy/Baker	Resulting Residuals From 534,000 Smolts On Entire Skagit River
Werlen 2003 *		
@ 1.6%	5,344	8,544
Keogh River		
Viola/Schuck 1991		
@ 17.7%	59,118	94,518
Tucannon River		
Viola/Schuck 1992		
@ 10.3%	34,402	55,002
Tucannon River		
Viola/Schuck 1993 **		
@ 3.1%	10,354	16,554
Tucannon River		
Tipping et al. 1995 ***		
1991 @ 26.1%	87,174	139,374
1992 @ 13.8%	46,092	73,692
1993 @ 19.6%	65,464	104,664.
Snow Creek		
WDG 1966 ****		
(from Royal 1972)		
@ 44%	146,960	235,400
@ 35%	116,900	186,900
Elochoman River		
Ward/Slaney 1990		
@ 42%	140,280	224,280
@ 47%	156,980	250,980
Keogh River		
McMichael et al. 2000 *****		
@ 26%	86,840	138,840
@ 39%	130,260	208,260
Teanaway River		

* Smolts acclimated in netpens in lake in upper watershed and then released in the lower Keogh at mean length of 180mm. **Smolts above 200mm considered problematic as precocious males.** Broodstock was wild.
** Smolts acclimated in lake, volitional emigration, release time 4/19-5/3, smolts released weighed **10.4 fish/kg.** Broodstock was Lyons Ferry Hatchery Stock.
*** Smolts transported from South Tacoma Hatchery to release site 4.7 km upstream of fish trap. Residuals identified as primarily smolts released below 190mm. **Smolts above 200mm were not found problematic,** although the Methods section indicates **precociously mature smolts were selected out prior to release** which in many ways invalidated the experiment which was not discussed. **Nevertheless, residualism remained comparatively high.** Broodstock was **Chambers Creek Hatchery Stock.**
**** Smolts were reared at hatchery on Beaver Creek at **7 fish per pound** and released on 4/15. Outmigrating fish were then counted at trap one mile downstream. Broodstock was **Chambers Creek origin.**
***** Smolts were transported from WDFW's Yakima Hatchery and released into Jungle Creek trying to mimic volitional releases from an acclimation pond over a 10 day period. The study occurred from 1991-94 with varied levels of residualism and precocious males each year. **Smolts released were from 179-201mm.** Broodstock from Yakima Hatchery.

Table 6. Recent Skagit River Harvest Data by Year and by Month Showing Both Hatchery and Wild Contribution
(From the WDFW website under Steelhead Harvest Summaries)

Year	Origin	Nov	Dec	Jan	Feb	Mar	Apr	Total Catch
1995/96	**wild**	3*	3	105	**290**	15	0	**wild** 416
	hat.	6	192	417	**294**	53*	6^	**hat.** 968
1996/97	**wild**	14*	42	210	1036	**68**	0	**wild 1370**
	hat.	36	341	662	338	**73***	0	**hat. 1450**
1997/98	**wild**	0	15	17	0	11	0	**wild** 43
	hat.	17	22	130	57	46*	26^	**hat.** 298
1998/99	**wild**	4*	41	**154**	676	24	0	**wild** 899
	hat.	8	142	**159**	53	33*	0	**hat.** 395
1999/00	**wild**	0	10	147	127	0	0	**wild** 284
	hat.	6	40	200	173	18*	0	**hat.** 437

Key to Table 6:

High-lighted yellow are wild catches that surpassed hatchery catches in 2 of 5 Februarys and one of 5 years.

Marked with an * are the hatchery contributions to the catches in March of all 5 years clearly indicating hatchery steelhead annually remain in the wild when wild steelhead are spawning.

In red type are the months and/or years when hatchery and wild catches were about equal which was one January out of 5, one February out of 5, one March out of 5, and one of 5 years.

Marked with an * are 3 of 5 Novembers when wild steelhead were a component of the winter catch.

Marked with an ^ are the 2 of 5 Aprils when hatchery steelhead were a component of the catch clearly indicating that some years hatchery steelhead remain in the wild even when approaching the wild spawning peak.

Table 7. Skagit Wild Steelhead Data Compared to Hatchery Smolt Releases

Year	Smolt Release	Wild Harvest 2 Years Later	Wild Escapement 2 Years Later	Wild Runsize 2 Years Later
1946^	?	~3,807	~3,807	~7,614
1947^	?	~5,394	~5,394	~10,790
1948^	?	~7,287	~7,287	~14,574
1949^	?	~6,007	~6,007	~12,014
1950^	?	~13,784	~13,784	~27,568
1951^	?	~13,277	~13,277	~26,554
1952^	?	~17,286	~17,286	~34,572
1953^	?	~11,231	~11,231	~22,462
1954^	?	~22,488	~22,488	~44,976
1955^	?	~15,140	~15,140	~30,280
1956^	?	~12.,023	~12,023	~24,046
1957^	?	~16,006	~16,006	~32,012
1958^	?	~20,082	~20,082	~40,164
1959^	?	~14,483	~14,483	~28,966
1960	95,900	?	?	?
1961	79,100	?	?	?
1962	**148,400**	**14,000+(?)**	**~14,000**	**~28,000**
1963	101,000	?	?	?
1964	210,800	?	?	?
1965	183,700	?	?	?
1966	245,400	?	?	?
1967	201,300	?	?	?
1968	278,300	?	?	?
1969	361,000	?	?	?
1970	293,600	?	?	?
1971	319,500	?	?	?
1972	155,200	?	?	?
1973	256,800	?	?	?
1974	118,400	?	?	?
1975	117,500	?	?	?
1976	204.700	1,158	5,757	6,915
1977	358,800	1,141	2,982	4,123
1978	275,800	953	5,288	6,241
1979	319,200	1,728	4,308	6,036
1980	202,600	1,407	9,609	11,016
1981	171,700	947	7,732	8,679
1982	236,700	375	8,963	9,338
1983	237,200	1,718	8,603	10,321
1984	236,600	2,149	11,098	13,247
1985	312,450	2,431	8,305	10,736
1986	298,400	2,619	13,194	15,813
1987	136,100	2,568	11,854	14,422
1988	212,104	1,623	10,017	11,640
1989	286,833	1,102	5,818	6,920
1990	210,071	135	7,514	7,649
1991	205,800	1,364	6,900	8,264
1992	165,000	1,126	6,412	7,538
1993*	409,000	832	7,656	8,488
1994*	?	477	n/a	n/a
1995*	309,563	1,911	n/a	n/a
1996*	316,000	52	7,448	7,500
1997*	265,027	1,216	7,870	9,086
1998*	**612,181**	**455**	**3,780**	**4.235**
1999*	422,623	239	4,584	4,823
2000*	470,000	146	5,394	5,540
2001*	461,680	60	6,818	6,878

^ Harvest is estimated as mostly wild; wild escapement is estimated equal to harvest and added to it for runsize.
Blue type is **known** wild harvest; wild escapement is estimated equal to harvest and added to it for runsize.
* Years when hatchery smolt goal was 534,000, but was only met once as shown in **red type** for 1998.

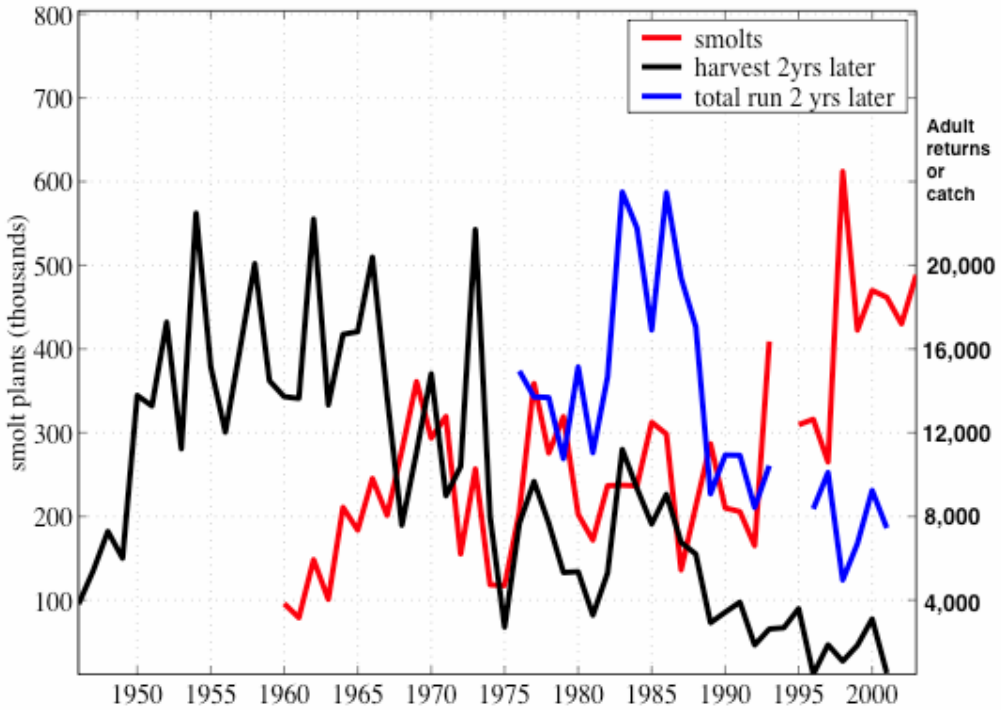


Figure 1: Annual smolt plants, annual harvests (wild+hatchery), and total annual steelhead run-size (harvest+escapement) for the Skagit Basin. The harvest and run-size data are shifted 2 years back in time to aid in the direct comparison with annual smolt releases.

Data provided by Bill McMillan and Washington Trout (see Table 1). Plots were created by Nathan Mantua, Ph. D., VP of Science and Education for the Wild Steelhead Coalition.

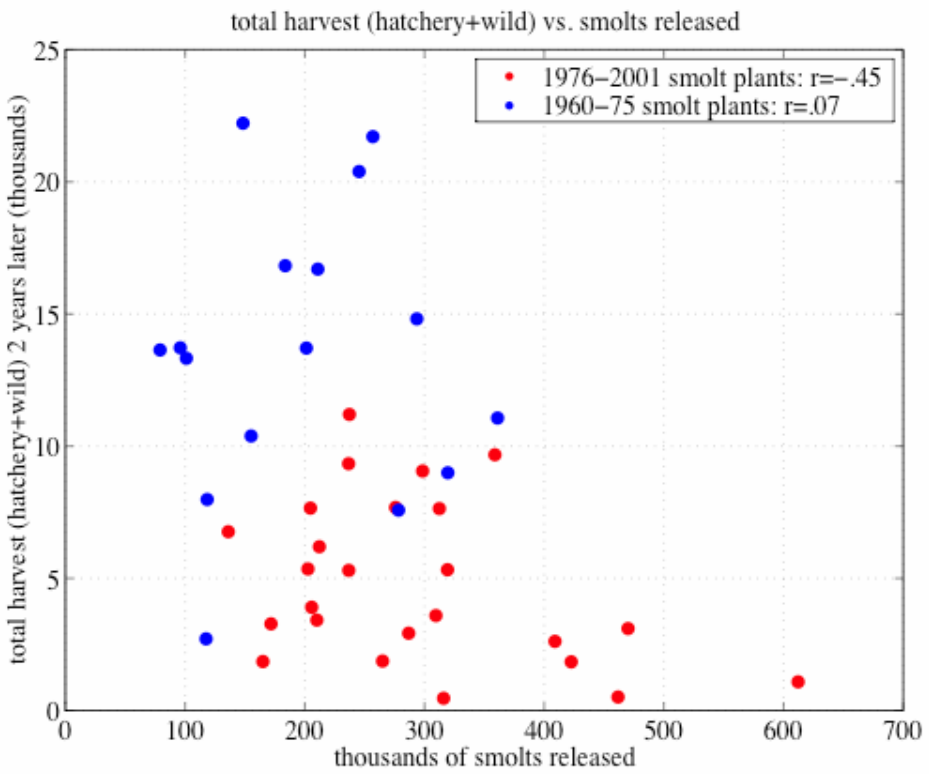


Figure 2: Comparison of annual total steelhead harvest (hatchery+wild) versus annual smolt releases for the Skagit Basin. Harvest data are offset by 2 years from the smolt release data to focus on the typical ocean-age of returning adults. Blue dots are for smolt plants from 1960-75 (and harvests from 1962-77). Red dots are for smolt plants from 1976-2001 and harvests from 1978-2003; "r" values in the legend are correlation coefficients for the two periods of record. The Correlation between these records from 1960-75 was 0.07 indicating no relationship, while the correlation is -.45 for the period from 1976-2001 indicating a strong negative association.

Data provided by Bill McMillan and Washington Trout (see Table 1). Plots were created by Nathan Mantua, Ph. D., VP of Science and Education for the Wild Steelhead Coalition.

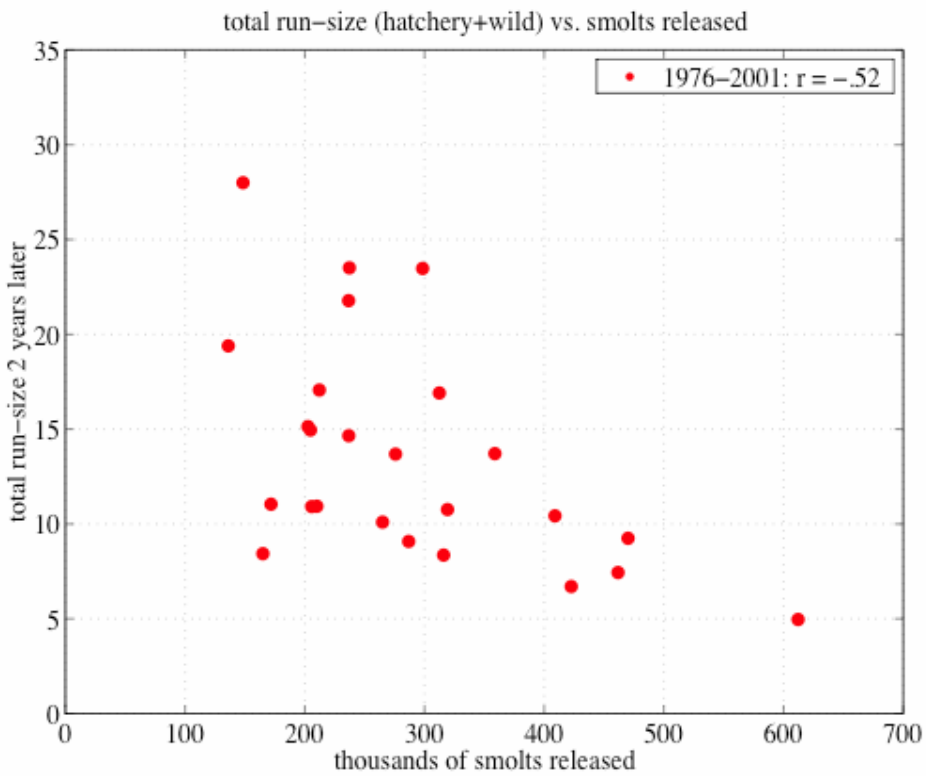


Figure 3: Comparison of annual total steelhead run-size versus annual smolt releases for the Skagit Basin. Run-size data are offset by 2 years to focus on the typical ocean-age of returning adults. Red dots are for smolt plants from 1976-2001 and run-sizes from 1978-2003; "r" value in the legend is the correlation coefficient for the data points shown. The correlation between these records is -.52 indicating a strong negative association.

Data provided by Bill McMillan and Washington Trout (see Table 1). Plots were created by Nathan Mantua, Ph. D., VP of Science and Education for the Wild Steelhead Coalition.

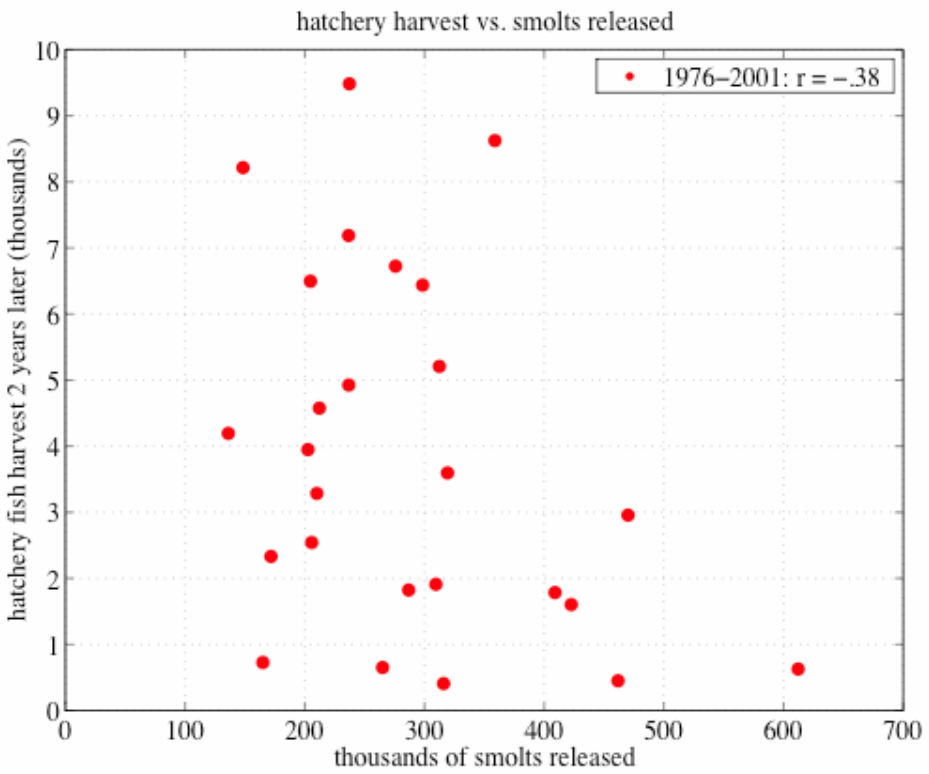


Figure 4: Comparison of annual hatchery steelhead harvest versus annual smolt releases for the Skagit Basin. Harvest data are offset by 2 years to focus on the typical ocean-age of returning adults. Red dots are for smolt plants from 1976-2001 and harvests from 1978-2003; "r" value in the legend is the correlation coefficient for the data points shown. The correlation between these records is -.38 indicating a negative association.

Data provided by Bill McMillan and Washington Trout (see Table 1). Plots were created by Nathan Mantua, Ph. D., VP of Science and Education for the Wild Steelhead Coalition.

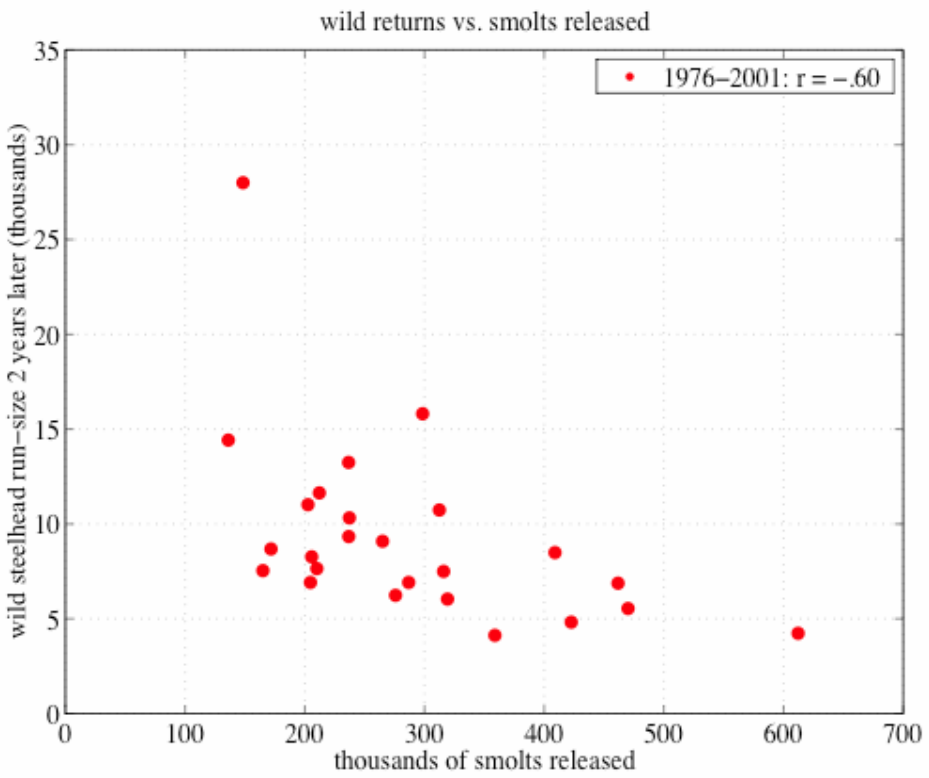
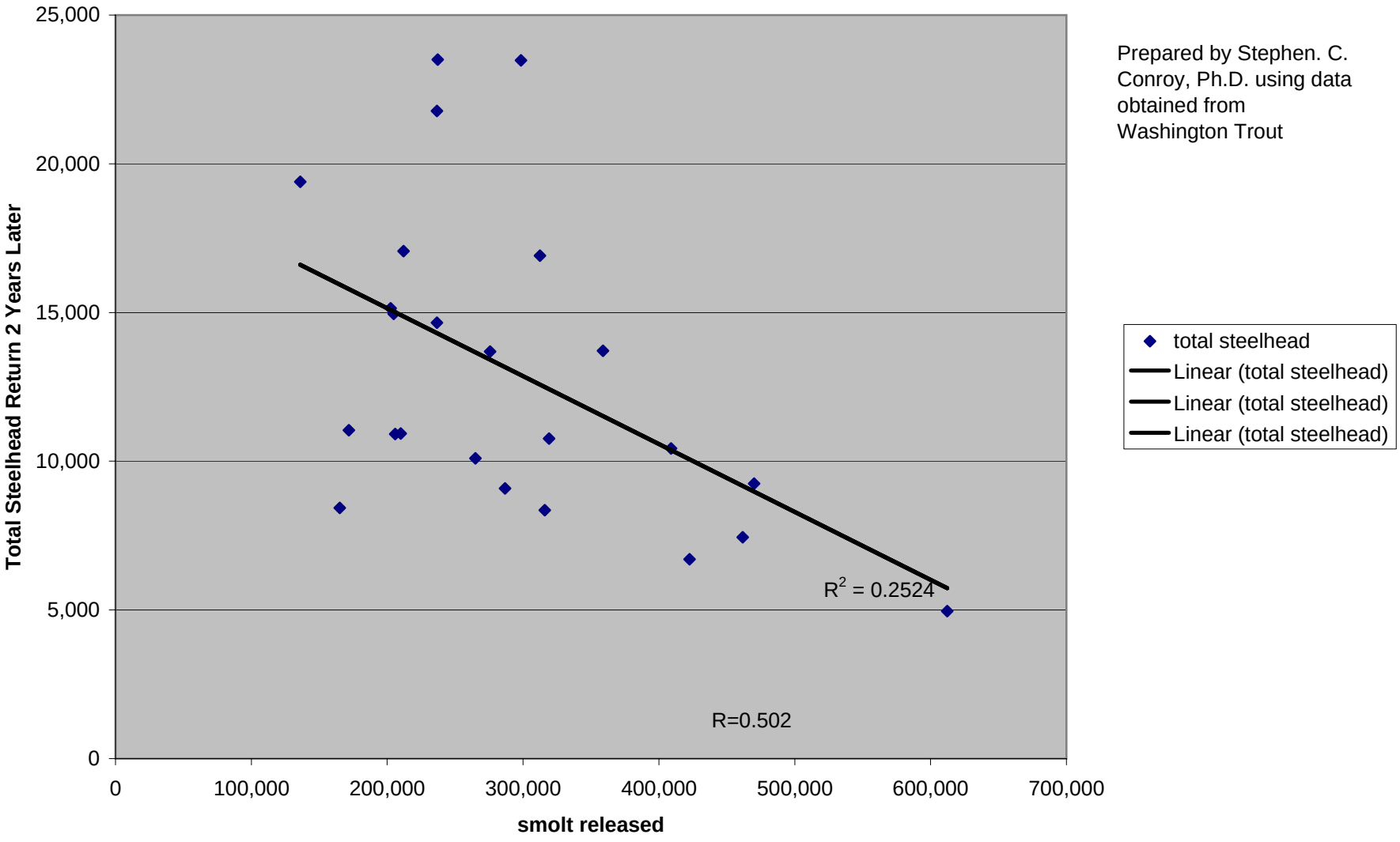


Figure 5: Comparison of annual wild steelhead run-size (catch+escapement) versus annual smolt releases for the Skagit Basin. Run-size data are offset by 2 years to focus on the typical ocean-age of returning adults. Red dots are for smolt plants from 1976-2001 and run-sizes from 1978-2003; "r" value in the legend is the correlation coefficient for the data points shown. The correlation between these records is -.60 indicating a strong negative association.

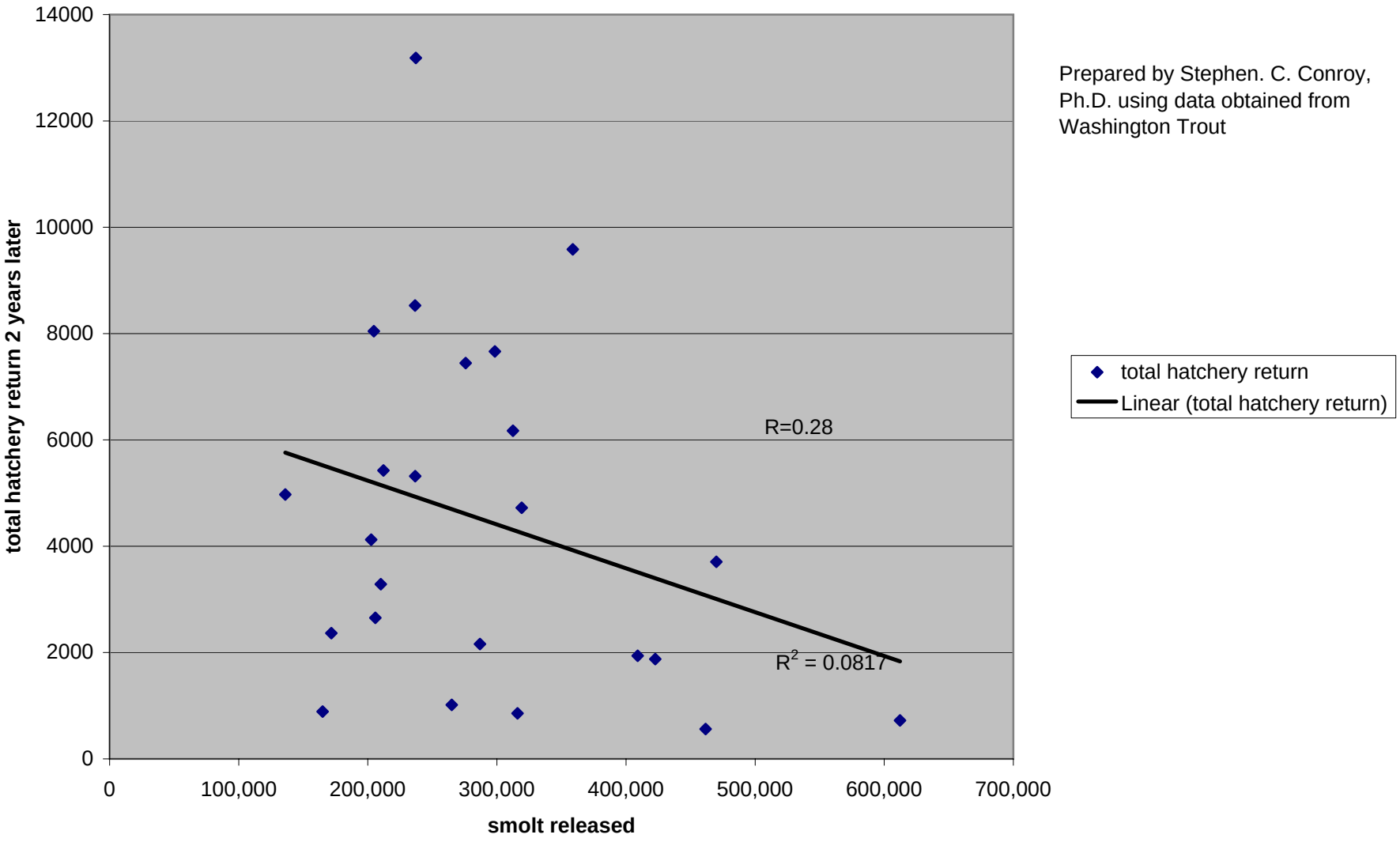
Data provided by Bill McMillan and Washington Trout (see Table 1). Plots were created by Nathan Mantua, Ph. D., VP of Science and Education for the Wild Steelhead Coalition.

Figure A: Total Steelhead Return and Smolt Released



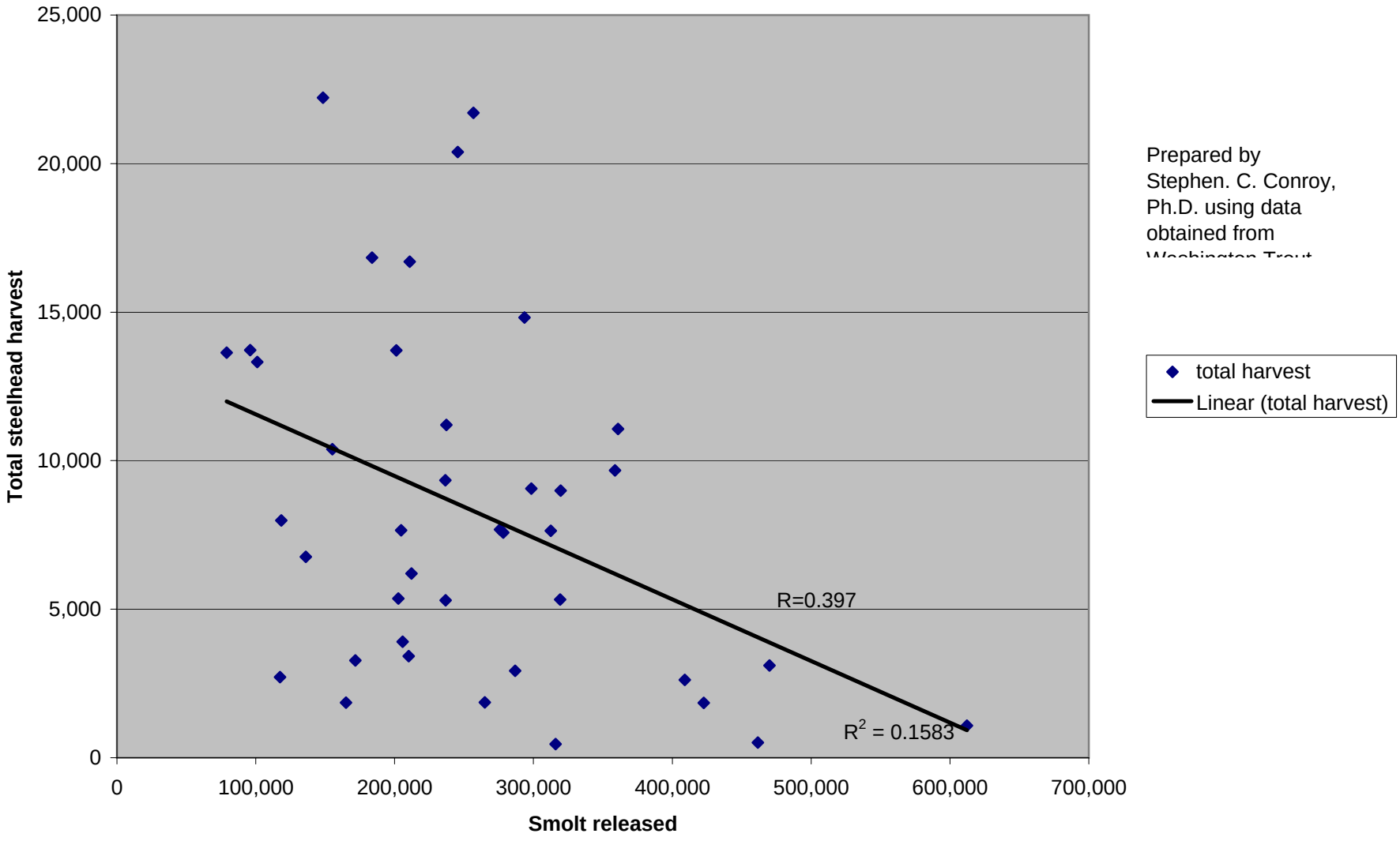
Prepared by Stephen. C. Conroy, Ph.D. using data obtained from Washington Trout

Figure B: Total Hatchery Steelhead Return and Smolt Released



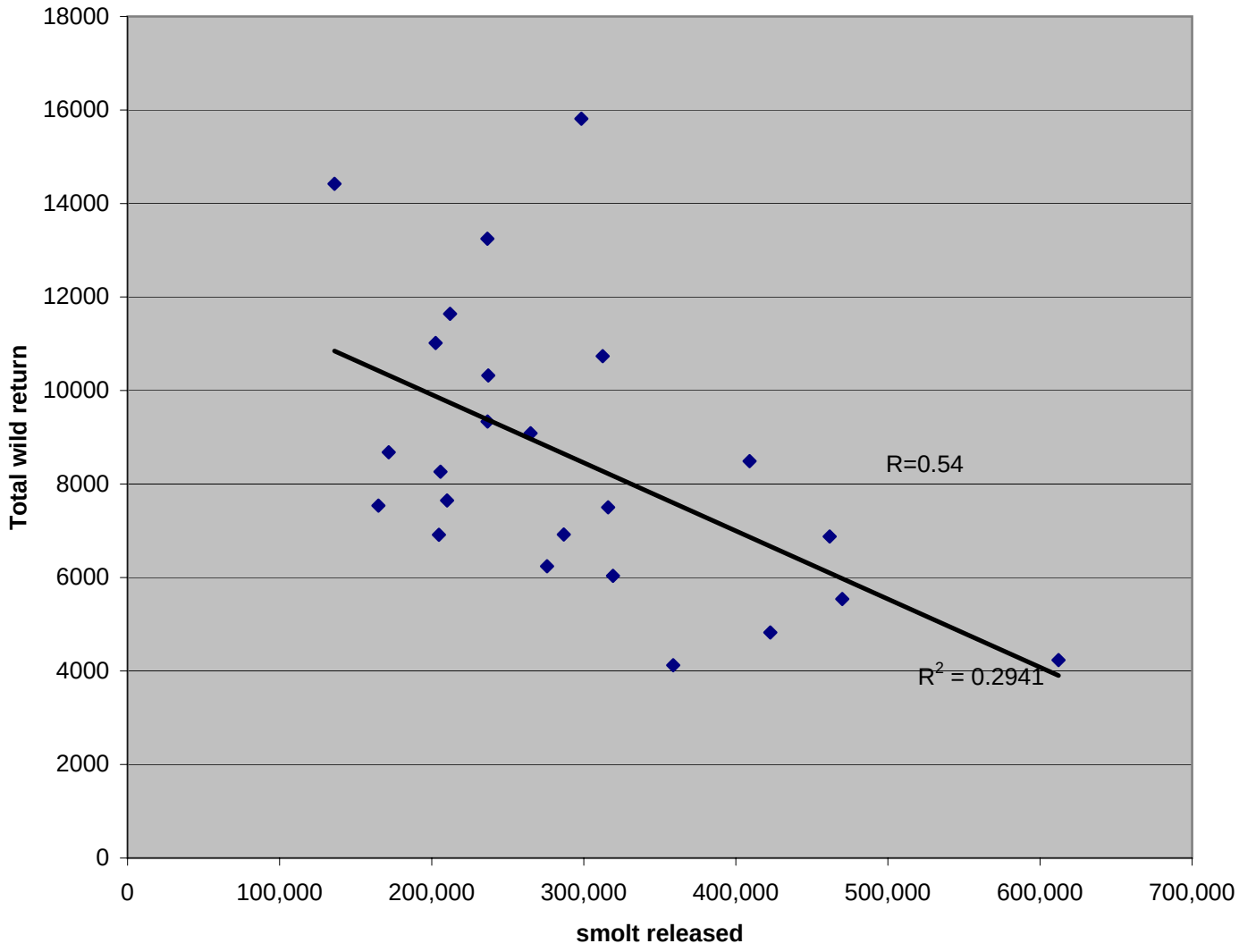
Prepared by Stephen. C. Conroy, Ph.D. using data obtained from Washington Trout

Figure C: Total Steelhead Harvest 2 Years Later and Smolt Released



Prepared by Stephen. C. Conroy, Ph.D. using data obtained from Washington Trout

Figure D: Total Wild Steelhead Return 2 years Later and Smolt Released



Prepared by Stephen. C. Conroy, Ph.D. using data obtained from Washington Trout

Total wild return
Linear (Total wild return)

Figure E. Smolt Released and Total Steelhead Return by Year

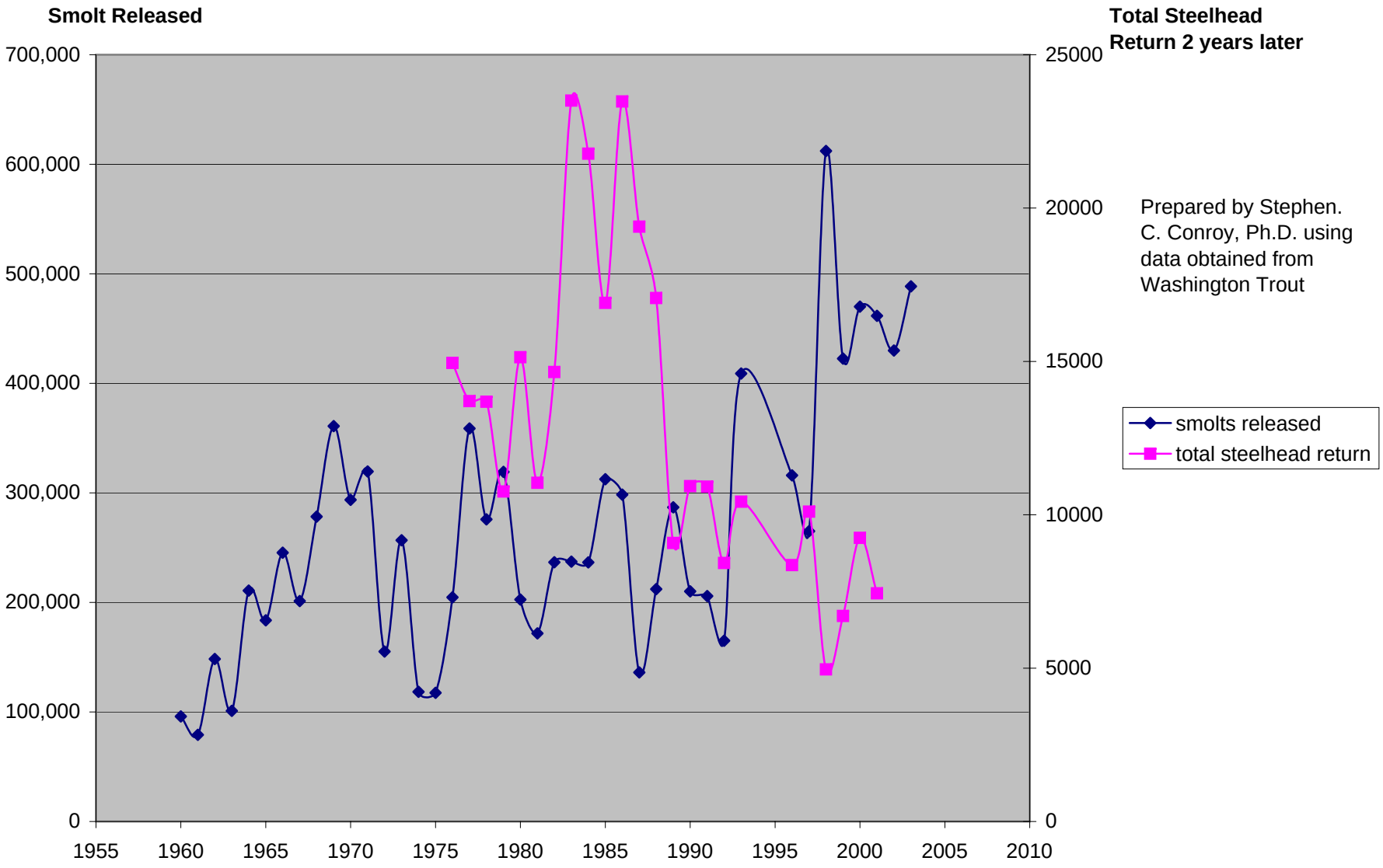
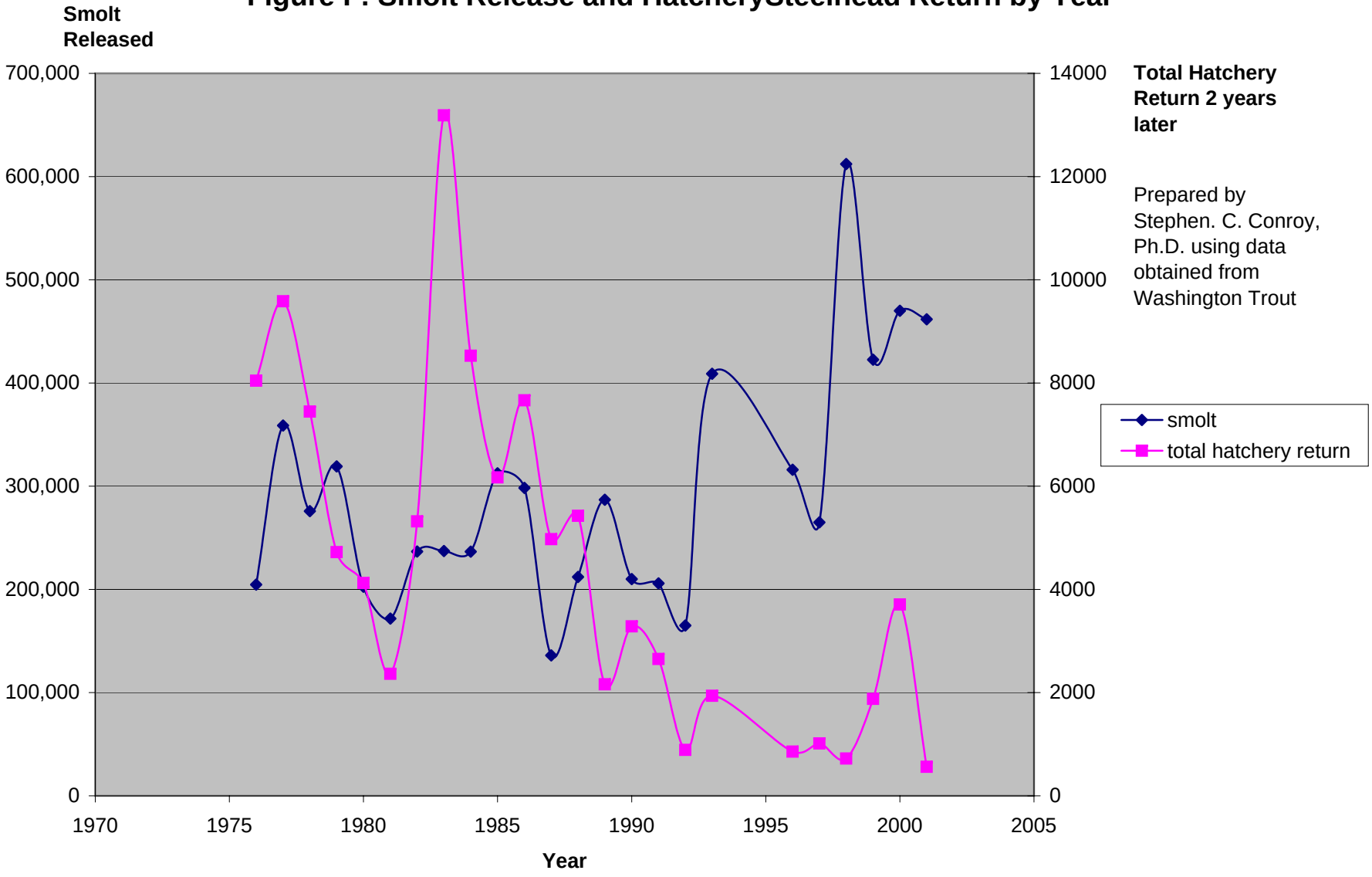


Figure F: Smolt Release and HatcherySteelhead Return by Year



Prepared by Stephen. C. Conroy, Ph.D. using data obtained from Washington Trout

Figure G: Total Wild and Hatchery Steelhead Return by Year and by Smolt Released

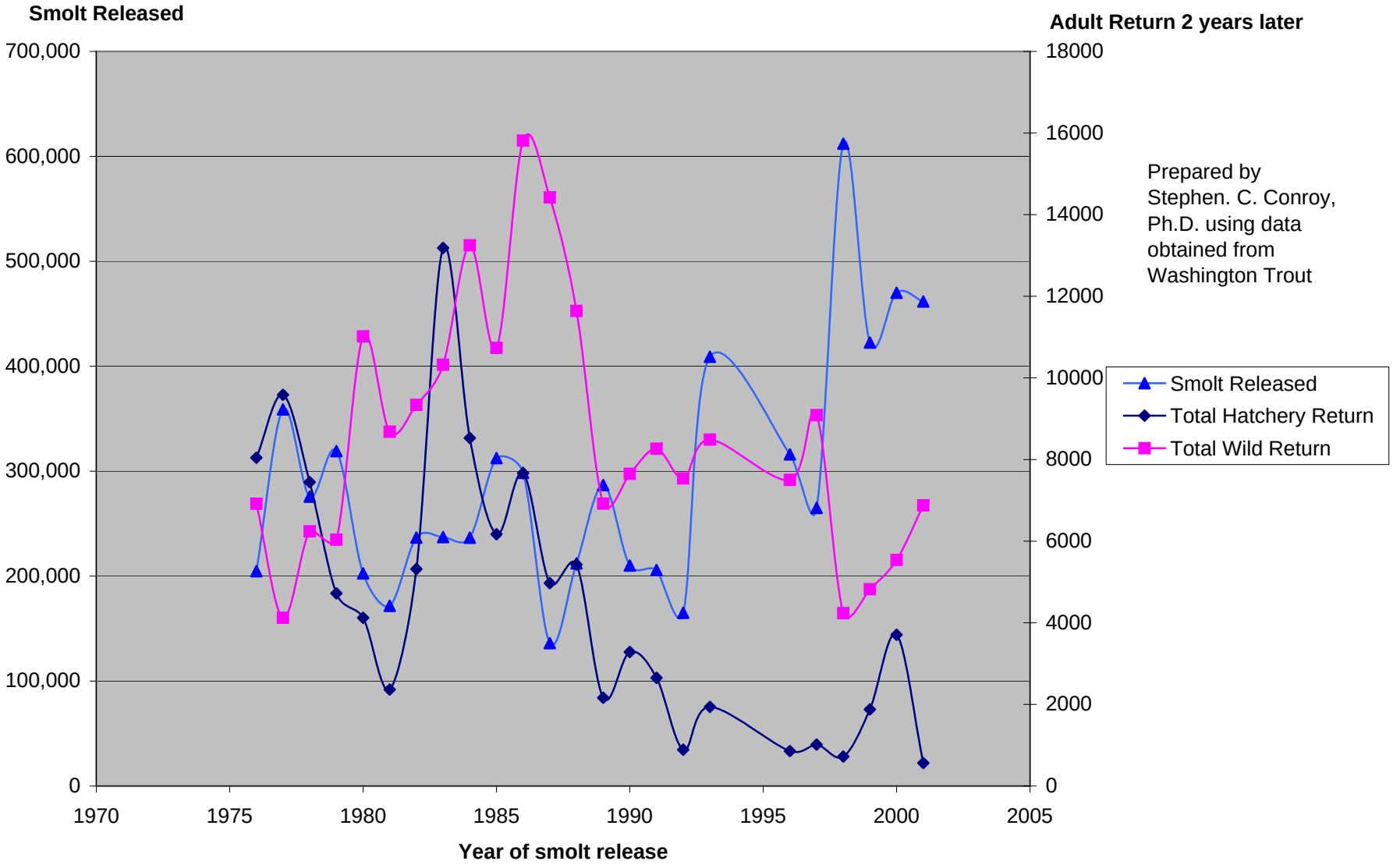
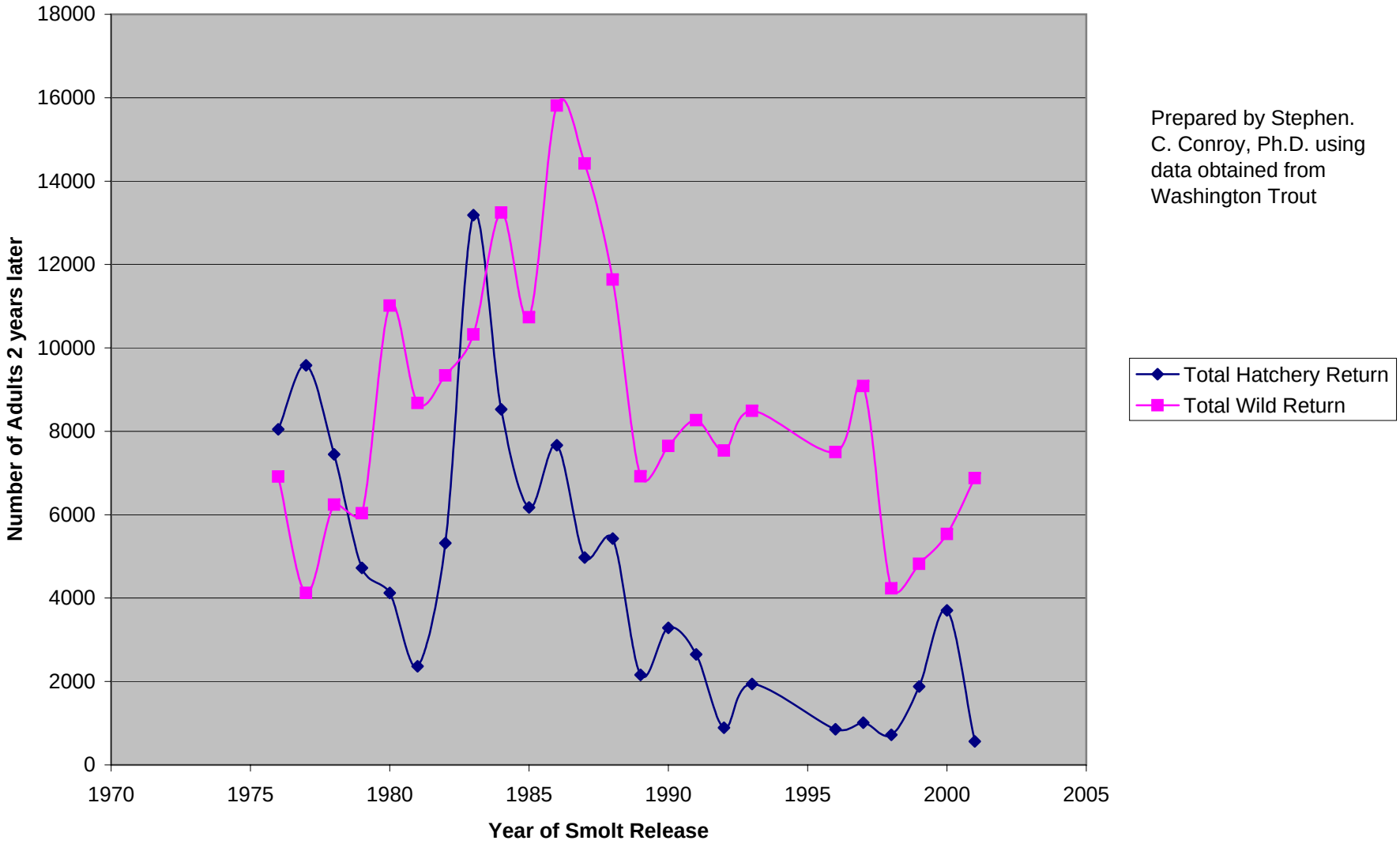


Figure H: Adult Steelhead Returns by Year



Prepared by Stephen. C. Conroy, Ph.D. using data obtained from Washington Trout

Year	Smolt release	Hatch harvest	wild harvest	total harvest	wild escapement	Total Steelhead	Hatchery escapment	Total hatchery	total wild
1946	?	?	3,807	3,807					
1947	?	?	5,394	5,394					
1948	?*	?	7,287	7,287					
1949	?*	?	6,007	6,007					
1950	?*	?	13,784	13,784					
1951	?*	?	13,277	13,277					
1952	?*	1,210	16076	17286	160076	34000			
1953	?*	?	?	11,231					
1954	?*	?		22488	?				
1955	?*	?	?	15,140	?	?			
1956	?*	?	?	12,023	?	?			
1957	?*	?	?	16,006					
1958	?*	?	?	20,082	?	?			
1959	?*	?	?	14,483	?	?			
1960	95,900	?	?	13,719	?	?			
1961	79,100	?	?	13,638	?	?			
1962	148,400	8,216	14,000	22,216	14000	38000			
1963	101,000	?	?	13,324					
1964	210,800	?	?	16,699					
1965	183,700	?	?	16,830					
1966	245,400	?	?	20,392					
1967	201,300	?	?	13,708					
1968	278,300	?	?	7,581					
1969	361,000	?	?	11,065					
1970	293,600	?	?	14,818					
1971	319,500	?	?	8,992					
1972	155,200	?	?	10,385	?	?			
1973	256,800	?	?	21,711	?	?			
1974	118,400	?	?	7,985	?	?			
1975	117,500	?	?	2,710	?	?			
1976	204,700	6,498	1,158	7,656	5,757	14,950	1574	8045	6915
1977	358,800	8,624	1,141	9,675	2,982	13,708	961	9585	4123
1978	275,800	6,725	953	7,678	5,288	13,687	721	7446	6241
1979	319,200	3,595	1,728	5,323	4,308	10,758	1127	4722	6036
1980	202,600	3,948	1,407	5,355	9,609	15,139	175	4123	11016
1981	171,700	2,332	947	3,279	7,732	11,044	33	2365	8679
1982	236,700	4,926	375	5,301	8,963	14,656	392	5318	9338
1983	237,200	9,483	1,718	11201	8,603	23,506	3702	13185	10321
1984	236,600	7,189	2,149	9,338	11,098	21,775	1339	8528	13247
1985	312,450	5,207	2,431	7,638	8,305	16,907	964	6171	10736
1986	298,400	6,439	2,619	9,058	13,194	23,477	1225	7664	15813
1987	136,100	4,194	2,568	6,762	11,854	19,395	779	4973	14422
1988	212,104	4,574	1,623	6,197	10,017	17,066	852	5426	11640
1989	286,833	1,822	1,102	2,924	5,818	9,081	339	2161	6920
1990	210,071	3,285	135	3,420	7,514	10,934	0	3285	7649
1991	205,800	2,542	1,364	3,906	6,900	10,916	110	2652	8264
1992	165,000	727	1,126	1,853	6412	8429	164	891	7538
1993	409,000	1785	832	2,617	7656	10427	154	1939	8488
1996	316,000	408	52	460	7448	8357	449	857	7500
1997	265,027	651	1,216	1,867	7,870	10,101	364	1015	9086
1998	612,181	627	455	1,082	3,780	4,958	96	723	4235
1999	422,623	1,603	239	1,842	4,584	6,701	275	1878	4823
2000	470,000	2,957	146	3,103	5,394	9,247	750	3707	5540
2001	461,680	449	60	509	6818	7440	113	562	6878
2002	430,000	n/a	n/a	n/a		n/a			
2003	488,500	n/a	n/a	n/a		n/a			

smolt	total steelhead
204,700	14,950
358,800	13,708
275,800	13,687
319,200	10,758
202,600	15,139
171,700	11,044
236,700	14,656
237,200	23,506
236,600	21,775
312,450	16,907
298,400	23,477
136,100	19,395
212,104	17,066
286,833	9,081
210,071	10,934
205,800	10,916
165,000	8429
409,000	10427
316,000	8357
265,027	10,101
612,181	4,958
422,623	6,701
470,000	9,247
461,680	7440

	smolt	total hatchery return
1976	204,700	8045
1977	358,800	9585
1978	275,800	7446
1979	319,200	4722
1980	202,600	4123
1981	171,700	2365
1982	236,700	5318
1983	237,200	13185
1984	236,600	8528
1985	312,450	6171
1986	298,400	7664
1987	136,100	4973
1988	212,104	5426
1989	286,833	2161
1990	210,071	3285
1991	205,800	2652
1992	165,000	891
1993	409,000	1939
1996	316,000	857
1997	265,027	1015
1998	612,181	723
1999	422,623	1878
2000	470,000	3707
2001	461,680	562

smolt	total harvest
95,900	13,719
79,100	13,638
148,400	22,216
101,000	13,324
210,800	16,699
183,700	16,830
245,400	20,392
201,300	13,708
278,300	7,581
361,000	11,065
293,600	14,818
319,500	8,992
155,200	10,385
256,800	21,711
118,400	7,985
117,500	2,710
204,700	7,656
358,800	9,675
275,800	7,678
319,200	5,323
202,600	5,355
171,700	3,279
236,700	5,301
237,200	11201
236,600	9,338
312,450	7,638
298,400	9,058
136,100	6,762
212,104	6,197
286,833	2,924
210,071	3,420
205,800	3,906
165,000	1,853
409,000	2,617
316,000	460
265,027	1,867
612,181	1,082
422,623	1,842
470,000	3,103
461,680	509

smolt	Total wild return
204,700	6915
358,800	4123
275,800	6241
319,200	6036
202,600	11016
171,700	8679
236,700	9338
237,200	10321
236,600	13247
312,450	10736
298,400	15813
136,100	14422
212,104	11640
286,833	6920
210,071	7649
205,800	8264
165,000	7538
409,000	8488
316,000	7500
265,027	9086
612,181	4235
422,623	4823
470,000	5540
461,680	6878

year	smolts released	total steelhead return
1960	95,900	
1961	79,100	
1962	148,400	
1963	101,000	
1964	210,800	
1965	183,700	
1966	245,400	
1967	201,300	
1968	278,300	
1969	361,000	
1970	293,600	
1971	319,500	
1972	155,200	
1973	256,800	
1974	118,400	
1975	117,500	
1976	204,700	14,950
1977	358,800	13,708
1978	275,800	13,687
1979	319,200	10,758
1980	202,600	15,139
1981	171,700	11,044
1982	236,700	14,656
1983	237,200	23,506
1984	236,600	21,775
1985	312,450	16,907
1986	298,400	23,477
1987	136,100	19,395
1988	212,104	17,066
1989	286,833	9,081
1990	210,071	10,934
1991	205,800	10,916
1992	165,000	8429
1993	409,000	10427
1996	316,000	8357
1997	265,027	10,101
1998	612,181	4,958
1999	422,623	6,701
2000	470,000	9,247
2001	461,680	7440
2002	430,000	
2003	488,500	

Year	Total Hatchery Return	Total Wild Return	Smolt Released
1976	8045	6915	204,700
1977	9585	4123	358,800
1978	7446	6241	275,800
1979	4722	6036	319,200
1980	4123	11016	202,600
1981	2365	8679	171,700
1982	5318	9338	236,700
1983	13185	10321	237,200
1984	8528	13247	236,600
1985	6171	10736	312,450
1986	7664	15813	298,400
1987	4973	14422	136,100
1988	5426	11640	212,104
1989	2161	6920	286,833
1990	3285	7649	210,071
1991	2652	8264	205,800
1992	891	7538	165,000
1993	1939	8488	409,000
1996	857	7500	316,000
1997	1015	9086	265,027
1998	723	4235	612,181
1999	1878	4823	422,623
2000	3707	5540	470,000
2001	562	6878	461,680