INDEPENDENT MULTIDISCIPLINARY SCIENCE TEAM (IMST)

State of Oregon

John Buckhouse
Wayne Elmore
Stan Gregory
Kathleen Kavanagh
James Lichatowich
Logan Norris, Chair
William Pearcy

February 9, 2001

The Honorable John A. Kitzhaber
Governor of Oregon
State Capitol
Salem OR 97310

The Honorable Gene Derfler
Oregon Senate President
State Capitol
Salem OR 973 10

The Honorable Mark Simmons
Oregon House Speaker
State Capitol
Salem OR 973 10

Enclosed is the annual report of the Independent Multidisciplinary Science Team for 2000. The Team is sending the report to you, the appointing authority for the Team, and by copy of this letter to the Senate Committee for Natural Resources, the House Committee for Stream Restoration and Species Recovery, and to Mr. Roy Hemmingway, Manager of the Oregon Plan for Salmon and Watersheds. The Oregon Watershed Enhancement Board Office will make arrangements for further production and distribution of this report.

We want to alert you to science perspectives relevant to the Oregon Plan for Salmon and Watersheds that go beyond the scope of this report for 2000.

- **Conceptual Basis for Recovery**. Building on our report, Definition of Recovery, we have further refined the conceptual basis for salmonid recovery. This conceptual basis is to emulate (not duplicate) to a greater degree the historic condition and the naturally functioning ecosystem processes within the landscape. Originally developed for our 1999 report on forest practices, we have found that this conceptual base is also applicable to other land uses and to fish management as well. We are including this conceptual basis in a preface in each of our major technical reports.

  Our point here is to alert you to the increasing importance of this conceptual basis, and our continuing refinement of it. Enclosed is the current version, as it appears in the preface of our third technical report on hatcheries (artificial propagation) released February 7, 200 1.

- **Landscape Perspective.** In our 1998 and 1999 annual reports, we alerted you to the emerging importance of the scientific basis for taking a landscape perspective in accomplishing the recovery of depressed stocks of wild salmonids. This same perspective is prominent in our project reports on

hatchery management and fish-harvest management. We expect this perspective to become a dominant theme in the scientific basis for salmonid recovery articulated by the IMST. The key policy and management elements of the landscape perspective are

1. a longer time horizon to accommodate changes in population dynamics of depressed stocks and changes in the conditions of the land, streams and ocean,
2. a broader spatial perspective that looks across public and private land ownerships, as well as across diverse land uses and ocean practices, and
3. specific actions at the site level that in aggregate are complimentary to the goals of the Oregon Plan.

Implementing a landscape perspective likely has important policy implications, including coordination and cooperation within and among the natural resource and regulatory agencies, various Boards and Commissions of Oregon, and watershed councils. It also implies coordination of the management of natural resources across public and private ownerships, and an equitable sharing of "costs" among the citizens of Oregon. IMST believes the science is clear on the importance of taking a landscape perspective, but the existing policy framework does not appear to accommodate it well. This will be a key interface between science and policy in salmonid recovery and in our opinion deserves careful attention.

- **Accountability to the Oregon Plan.** Senate Bill 924, which created the IMST, specifies that agencies are to respond to the recommendations of the IMST, stating "(3) If the Independent Multidisciplinary Science Team submits suggestions to an agency responsible for implementing a portion of the Oregon Plan, the agency shall respond in writing to the team explaining how the agency intends to implement the suggestion or why the agency does not implement the suggestion. The Team shall include any agency responses in its report to the Joint Legislative Committee on Salmon and Stream Enhancement". Via agreement with the Governor's Natural Resources Ofice, the IMST arranged for responses to be sent to the Manager of the Oregon Plan and shared with the IMST.

  The 2000 Annual Report includes a catalog of our recommendations and the status of responses.

  We are releasing, with this Annual Report, an Administrative Report on our evaluation of responses to recommendations to date. The results are mixed. In our opinion, a majority of the responses are favorable to accomplishing the goals of the Oregon Plan, but for a large portion of the recommendations we lack sufficient information from the agencies to determine their intent. A small percentage of responses were found to be negative but would probably not cause major areas of the Oregon Plan to fail. In a few cases we found that the decisions or actions by an agency to be seriously flawed and could endanger the success of the Oregon Plan. Our analysis of the responses received to date is not exhaustive and is simply to alert the State to the IMST initial view of them.

The issue we want to alert you to is the possibility that at some point there may be substantive agency disagreement with one or more IMST recommendations that are critical to accomplishing the goals of the Oregon Plan, or that the agencies' approach is so passive that in effect the recommendation is being ignored.

We don't feel it is our role to enforce or mediate in these cases, but clear identification of an individual or entity responsible for this function is needed. Within the scientific community, the peer review process often has a mediator between scientists and reviewers to mediate disputes or to make unbiased decisions based on arguments presented by each party. Without such an individual or entity with specific authority to deal with these possible situations within the State we feel that the effectiveness of the role of the IMST as envisioned in Senate Bill 924 may be compromised.

- **IMST's relationships with state agencies and Oregon Plan programs**. Since the IMST was formed in 1997, we have focused on several large independent projects examining land use and resource use practices, and how they may affect salmonid recovery within Oregon. As we complete these projects, the Team is preparing to increase its role as an independent scientific reviewer of proposed policies, management and research within the Oregon Plan. To do this successfully, the Team needs to be seen as a partner working collaboratively with agencies during the development phase of projects, proposals and initiatives.

  As an example, it will be most efficient if ODFW actively includes IMST in discussion and review during the development of the Native Fish Conservation Policy it intends to take to the ODFW commission for adoption. Another example would be ODF involving IMST via discussion and review during the development of proposed changes in Forest Practice rules that will eventually be adopted by the Board of Forestry.

  Not including IMST in this way could result in policy and management decisions containing some serious scientific flaws being formally adopted. Such adoption may then require difficult and awkward reconsideration. In our view, it would be most efficient to ensure the science is correctly considered prior to formal adoption.

  We are not suggesting that the involvement won't happen in the examples offered above, but rather that it may not be well institutionalized in the Oregon Plan process. We suggest that a more active involvement of IMST with the Core Team may help.

- **Future of the IMST**. Current Team members were appointed for a four-year term, which ends in October 2001. While it is possible some current Team members may be willing to be reappointed, some others probably won't be. An entire restructuring of Team membership would not be in the best interests of the Oregon Plan, in our opinion. A plan for transition in Team membership is needed if the Team is to continue. Our report suggests a long-term model where four-year terms continue to be used but approximately half the Team is renewed (replaced, or reappointed) each two

years. Transition to this model would require that some current Team members be reappointed for a 2-year term.

We will be glad to discuss any of this with you in more detail if that would be helpful.

Sincerely yours,

Logan A. Norris, Chair
Independent Multidisciplinary Science Team

LAN:grs

Enclosures
Conceptual Basis for Recovery
2000 Annual Report

cc: House Committee for Stream Restoration and Species Recovery, with enclosures
Roy Hemmingway, Manager, Oregon Plan, with enclosures
IMST

Independent Multidisciplinary Science Team, Oregon Plan for Salmon and Watershed

2000 Annual Report

February 9, 2001

Independent Multidisciplinary Science Team,
Oregon Plan for Salmon and Watershed

2000 Annual Report

February 9, 2001

The Independent Multidisciplinary Science Team (IMST) of the Oregon Plan was established by the Oregon Legislature as part of Senate Bill 924, which was signed into law by Governor John Kitzhaber on March 25, 1997. Governor Kitzhaber constituted the Team in collaboration with Oregon Senate President Adams and Oregon House Speaker Lundquist. Team membership was announced at a press briefing in Salem on October 10, 1997.

This is a report of the Team's activities and accomplishments for the period January 1, 2000 through December 31, 2000. The report also briefly outlines the plans and direction of the Team for 2001. Appendices include listings of Team meetings, presentations and briefings by the Team, the log of active Team projects, summaries of Team reports, a catalog of the status of responses to Team recommendations, and projected budget and 2001-2003 work plan.

The Team members are funded to work 33% of full time through June 31, 2001. The funds are paid directly to Mr. Lichatowich in his capacity as a private consultant, or to Oregon State University for the services and expenses of Team members and support staff from OSU, and the one Team member from the University of Idaho. The funds to OSU were used by the academic units of OSU and University of Idaho to purchase services in various ways to compensate for the reassignment of faculty time. In no case were the funds added to existing 1.0 FTE salary. There was no charge to the State for Mr. Elmore, a federal employee.

The Team met in public meetings, usually monthly (see Appendix 1). Team meetings were open to the public, consistent with the Oregon Public Meetings law. Each meeting had an agenda and minutes, and was audio recorded. Several Team subcommittee meetings were held through out the year but were not open to the public. The Oregon Watershed Enhancement Board (OWEB) is the Repository of the Records of the Team. The Team Chair is the Custodian of the Records and authorizes their release.

Major Activities of the Team

Presentations and Briefings

The Team made numerous oral presentations or briefings (see list in Appendix 2). These included meetings with the Joint Legislative Committee for Stream Restoration and Species Recovery, the Oregon Board of Forestry, the Oregon Dept. of Forestry, the Oregon Dept. of Fish and Wildlife Commission, the Pacific Fisheries Management Council, the Salmon Core Team, and others.

Team Projects.

The Team worked on the following projects during 2000.

- Defining Recovery. This project deals with the absence of an explicit statement or definition for recovery of wild salmonids within the Oregon Plan. As the Oregon Plan progresses and significant efforts are being made to accomplish recovery it is increasingly important to have a clear understanding of what is meant by recovery. The IMST is considering, from a scientific standpoint, the biological and physical elements of the meaning of recovery, and adding to it the social dimensions. Work progressed through 2000 and the report will be completed in 2001.

- Harvest Management. This major project deals with the management of the harvest of Oregon coastal natural (OCN) coho salmon. Fishing pressure, both sport and commercial, historically had significant impact on fish stocks. With some stocks in danger of extinction, an evaluation of the scientific basis for management of fisheries was needed. This report was adopted by the Team in December 2000 and will be released early February 2001.

  In 2000 the IMST made specific recommendations to ODFW on the incidental fishery impacts on OCN coho salmon during ocean harvests and on ocean harvest recommendations relating to PFMC's harvest regulations (see February 15, 2000 and September 6, 2000 Letter Reports, respectively, and Executive Summary for Report 2000-3 in Appendix 4).

- Hatchery Management, Phase II was a scientific review of ODFW's draft final report of the *Coastal Salmonid and Willamette Hatchery Program Review*. The IMST found that the program review had little insight on the post-release interaction between the hatchery fish and the ecosystem they are released into, limiting its usefulness for the Oregon Plan.

  The IMST made specific recommendations to ODFW to improve their management and assessments of hatchery programs in order to be consistent with the goals of the Oregon Plan (see October 25, 2000 letter report in Appendix 4).

- Hatchery Management, Phase III is the IMST's final phase of our project on hatchery management. The goals are to determine how artificial propagation could be scientifically compatible with accomplishing the mission of the Oregon Plan. Phase III will describe the scientific basis for artificial propagation in the context of the recovery of wild salmonids and then describe how the State's program could be made consistent with this scientific basis. This project is completed, and the report released in early 2001.

- Western Oregon Lowlands Resources. The IMST continued work on the on this project which deals with land management issues in unconstrained alluvial plains and estuaries of western Oregon and reviews measures proposed by several state agencies. Work on this project continued through 2000 and is expected to be completed in 2001.

- Monitoring. As required by Senate Bill 924, IMST began evaluating the 1999-monitoring program of the Oregon Plan. The IMST delayed the 1999 report pending further information from the Oregon Plan Monitoring Team. Once the information is received, we expect to complete the report in early 2001.
- Temperature standards. The IMST began work on a temperature standards project as EPA and the State worked to reach agreement on this issue. The Team held a scientific workshop for experts in stream water temperature and fish ecology to discuss the importance of vegetation and other physical changes to stream temperature and how cold-water fishes respond to elevated temperatures. We issued a report on the workshop in 2000 (see Executive Summary for report 2000-2 in Appendix 4). We expect to release a Technical Report on temperature in 2001.
- Research Needs. At the request of the Joint Legislative Committee for Stream Restoration and Species Recovery and, independently, the Director of OWEB, the IMST is identifying the higher priority research needed to help ensure the recovery of depressed stocks of salmonids. A final report will be available in early 2001.
- Recovery Priorities. At the request of the Joint Legislative Committee for Stream Restoration and Species Recovery the IMST is identifying the higher priority areas for the programs and actions of the State of Oregon in accomplishing the recovery of depressed stocks of salmonids. A final report will be available in 2001.
- Eastern Oregon Resources. The geographic scope of this project is the region east of the Cascades, primarily in the mid-Columbia and Snake River systems. The scientific basis for this project utilizes a conceptual model that incorporates biological (i.e. vegetation) and physical (i.e. hydrology) ecosystem components. Science is telling us that when these components are intact, quality salmon habitat is sustained on the landscape. Land uses that alter these components can perturb landscape processes, altering or diminishing habitat capacity and site potential, ultimately affecting salmon recovery. The project was initiated in 2000 and is expected to be completed in 2001.
- Gravel Mining. Gravel mining as it impacts water quality and fish habitat is one of the several factors believed to influence the recovery of wild salmonids. Work on this project was initiated, but suspended as the Team focused on the forestry, hatcheries, harvest management, and lowlands projects. Work on gravel mining is expected to be completed in 2001 but the exact scope of the project has not yet been identified by Team members.

The Active Project Log is in Appendix 3.

Team Products.

A series of written products were produced during the period covered by this report. Three are detailed Technical Reports and the others are brief letter reports. All contain specific recommendations and are available on the IMST web site at http://www.fsl.orst.edu/imst. The Executive Summaries of the Technical Reports and the full text of the letter reports are in Appendix 4. The Team products include the following:

- February 15, 2000 - Letter Report to ODFW on minimizing incidental fishery impacts on OCN coho salmon in 2000 and recommend to ODFW and Pacific Fisheries Management Council to maximize spawner escapement and abundance in the adult recruits of 2000.
- May 26, 2000 - Letter Report to OWEB on the evaluation of two research proposals submitted to OWEB on juvenile salmonid survival. The evaluation was requested by OWEB.
- July 18, 2000 - Technical Report 2000-1 a report summarizing the scientific workshop held by IMST on conservation hatcheries and supplementation strategies for the recovery of wild salmonid stocks.
- September 6, 2000 - Letter Report to ODFW on ocean harvest recommendations relating to the Pacific Fisheries Management Council harvest regulations to minimize the impact on OCN coho salmon in 2001.
- October 25, 2000 - Letter Report to ODFW on the IMST's scientific review of ODFW's draft final report of the *Coastal Salmonid and Willamette Hatchery Program Review*.
- October 30, 2000 - Letter Report to Pacific Fisheries Management Council (PFMC) regarding specific issues that the IMST feels need to be included in the PFMC process and had previously reported these to ODFW.
- November 8, 2000 - Technical Report 2000-2 a report summarizing the scientific workshop held by IMST concerning the influences of human activity on stream temperatures and existence of cold-water fish in streams with elevated temperature.
- December 15, 2000 - Technical Report 2000-3 examines ocean harvest levels and escapement of OCN coho salmon. IMST makes recommendations to the State to minimize harvest impact on depressed stocks and increase spawner escapement.

Catalog of IMST Recommendations and Responses

Senate Bill 924 requires state agencies to respond to the recommendations of the IMST. The Team established a catalog of recommendations and the status of responses to simplify tracking compliance with Senate Bill 924. Roy Hemmingway, Manager of the Oregon Plan, is the recipient of the responses, and he shares them with the Team for any further attention. The Catalog (Appendix 5) is up to date as of January 31, 2001.

Prior to 12/31/1999 there had been few responses to the recommendations of the Team. As a result of this Mr. Hemmingway began working more closely with the agencies and established that a response to Team recommendations would normally be expected within six months. To date, 48 responses to 68 recommendations have been received. Several of these responses were received after the Team made direct contact with agencies reminding them to formally respond to IMST recommendations. This is an increase in the number of responses since 12/31/1999, but there are still 15 recommendations older than six months for which there is no formal response or only an acknowledgement of the recommendation by the agency.

The recommendations involving ODF and forest practices have been acknowledged, but agency completion of work on them is expected to take more than 6 months because of the rule making process.

Accountability to the Oregon Plan

The Catalog of recommendations and responses (Appendix 5) shows the status of responses to IMST recommendations but does not evaluate their adequacy or appropriateness of the responses in terms of accomplishing the mission of the Oregon Plan. In a separate Administrative Report (dated February 9, 2001), the IMST evaluates each agency response and indicates if additional consideration by the responding agency.

Four general categories were used to evaluate responses; adequate, intermediate, inadequate, and indeterminate.

- Adequate means that the IMST supports the decision reached by the agency.
- Intermediate means that the decision will decrease the likelihood of accomplishing the goals of the Oregon Plan in a timely manner, but not doom it to failure. We note our concerns but stop short of suggesting the recommendation be reconsidered.
- Inadequate means that the IMST feels the decision by the agency will seriously detract from achieving the goals of the Oregon Plan, and the IMST strongly suggests that the decision be reconsidered.
- Indeterminate means that we can not tell what the agency decided to do with the recommendation, or that we do not have enough information to fully evaluate their response.

In general the adequacy of responses received is good. In our opinion the majority of the responses were adequate with few being intermediate or inadequate. A large number were indeterminate in that they did not provide the Team with sufficient information to determine what the agency decided to do with the recommendation or how the decision may affect the success of the Oregon Plan. In a few cases an agency indicated that they did not clearly understand the meaning of the recommendation. In these cases, we expect the agency to alert the IMST to the problem and to request clarification.

Team Web Page

The Team continued to maintain a web page to facilitate access to information about the Team, its products and the calendar of Team activities. The web address for the IMST web page is http://www.fsl.orst.edu/imst.

Analysis of the Situation and Plans for the Future

1. Team Management.

   The current seven members of the IMST were appointed through October 31, 2001. It is critical that continuity of the Team be maintained into the future. To do so we suggest that some original members remain as new appointees join the Team. This may be

accomplished by reappointing for 2 or 4 more additional years those current members willing to continue. To maintain team continuity and efficiency we feel that it would be preferable to rotate approximately half of the team every two years rather than have new members transition in every year.

Personnel on our administrative and technical support staff are an essential part of the Team and have been instrumental in the Team's ability to complete its' work. Funding for the current level of support has been requested but it is anticipated that the level of support will vary by biennium. Projections of the Team's workload and levels of support needed for the 2003-2005 biennium and beyond will be the responsibility of the Team Chair.

2. Workload and Budget

Appendix 6 includes the projected Team budget for the 2001-2003 Biennium and the anticipated program of work. The budget includes a continuing service level component reflecting the last legislative appropriation and an option package reflecting the federal funds allocated to the Team in the current biennium. The projected budget funds the Team at the same rate as in the last 18 months of the current biennium. The plan of work is broadly stated and includes completion of some projects underway or that we anticipate initiating in the current biennium, some projects we expect to undertake in the upcoming biennium, and allowance for meeting specific requests to provide scientific review of ongoing or proposed programs or policies that relate to the Oregon Plan. We anticipate this review function will be a significantly larger component of the work of the Team in the 2001-2003 biennium.

The Independent Multidisciplinary Science Team remains committed to providing the scientific oversight for the Oregon Plan called for in Senate Bill 924 and Executive Order 99-01, consistent with the resources provided for the Team.

Appendices

Appendix 1. 2000 public meetings held by the IMST

Appendix 2. Oral presentations and briefings by the IMST

Appendix 3. Active Project Log (as of December 31, 2000)

Appendix 4. Team Written Products

- February 15, 2000- Letter Report to ODFW on minimizing incidental fishery impacts on OCN coho salmon in 2000 and maximizing spawner escapement and abundance in the adult recruits of 2000.

- May 26, 2000 - Letter Report to OWEB on the evaluation of two research proposals submitted to OWEB on juvenile salmonid survival. The evaluation was requested by OWEB.

- July 18, 2000 - Executive summary of the Technical Report 2000-1. Conservation and Supplementation Strategies for Recovery of Wild Stocks of Salmonids: Report of a Workshop.

- September 6, 2000 - Letter Report to ODFW on ocean harvest recommendations relating to the Pacific Fisheries Management Council harvest regulations to minimize the impact on OCN coho salmon in 2001.

- October 25, 2000 - Letter Report to ODFW on the IMST's scientific review of ODFW's draft final report of the *Coastal Salmonid and Willamette Hatchery Program Review*.

- October 30, 2000 - Letter Report to Pacific Fisheries Management Council (PFMC) regarding specific issues that the IMST feels need to be included in the PFMC process and had previously reported these to ODFW.

- November 8, 2000 - Executive summary of the Technical Report 2000-2. Influences of Human Activity on Stream Temperatures and Existence of Cold-Water Fish in Streams with Elevated Temperature: Report of a Workshop.

- December 15, 2000 - Executive summary of the Technical Report 2000-3. Salmon Abundances and Effects of Harvest: Implications for Rebuilding Stocks of Wild Coho Salmon in Oregon.

Appendix 5. Catalog of IMST Recommendations and Agency Responses as of December 31, 2000.

Appendix 6. Projected Team budget and scope of work for the 2001-2003 Biennium.

Appendix 1

IMST Public Meetings, 2000

Appendix 1. Public Meetings Held by the IMST, 2000

January 18-19, 2000 Team meeting held in Corvallis, OR

February 7-8, 2000 Team meeting held in Corvallis, OR

March 6-7, 2000 Team meeting held in Corvallis, OR

April 3, 2000 Team meeting held in Corvallis, OR

May 8, 2000 Team meeting held in Corvallis, OR

June 19-21, 2000 technical workshop, Conservation and Supplementation Strategies for Recovery of Wild Stocks of Salmonids, held in Portland, OR

July 18-19, 2000 Team meeting held in Corvallis, OR

August 31- September 1, 2000 Team meeting held in Corvallis, OR

October 5-6, 2000 technical workshop, Influences of Human Activity on Stream Temperatures and Existence of Cold-Water Fish in Streams with Elevated Temperature, held in Corvallis, OR

October 11, 2000 review of assumptions of artificial propagation with ODFW, Portland, OR

October 12-13, 2000 Team meeting held in Prineville, OR

November 8-9, 2000 Team meeting held in Corvallis, OR

December 14-15, 2000 Team meeting held in Corvallis, OR

Appendix 2

Oral presentations and briefings by the IMST 2000

Appendix 2. Oral Presentations and Briefings by IMST Members, 2000

Jan 5 - Briefing and consultation on forestry project report, Board of Forestry, Salem

Jan 10- Briefing on forestry project report, Portland Chapter, Society of American Foresters, Portland

Jan 21 - Consultation, Joint Legislative Committee on Stream Restoration and Species Recovery, Salem

Feb 9 - Briefing on forestry project report and tour with Governor Kitzhaber and Oregon Dept. Forestry.

Mar 21 - Briefing and consultation with Salmon Core Team, Salem

Mar 24 - Briefing on IMST and harvest management project, ODFW Commission, Reedsport.

Mar 28 - Consultation on Oregon Plan goals, Core Team subcommittee, Corvallis

Apr 24 - Briefing and consultation with co-chairs, Joint Legislative Committee on Stream Restoration and Species Recovery, Salem

May 2 - Consultation, on riparian issues with Core Team on field trip to Siletz River and Drift Creek.

Jun 14 - Briefing on IMST for Washington Salmon Science Team, Vancouver, WA

Aug 14 - Briefing on Supplementation Workshop for Joint Legislative Committee on Stream Restoration and Species Recovery, Salem

Aug 17 - Briefing on IMST for Friends of Oregon Plan, Salem

Aug 26 - Field tour to Hatfield High Desert Ranch, Brothers

Sept 14 - Presentation on lowlands project to the Oregon Plan Monitoring Team, Salem

Sep 29 - Briefing and consultation on Supplementation Workshop for Coastal Salmon Restoration and Production Task Force, Salem

Oct 10 - Consultation on research funding priorities with OWEB Director Geoff Huntington, Corvallis

Oct 26 - Consultation on CHIP proposal with Coastal Salmon Restoration and Production Task Force, Salem

Oct 31 - Testimony to PFMC regarding IMST harvest management recommendation to ODFW and the State of Oregon, Portland

Nov 7 - Presentation of the Lowlands Project to OWEB at their annual conference, Eugene

Nov 14 - Consultation on research funding priorities with OWEB Director Geoff Huntington and two Board members, Corvallis

Nov 20 - Discussion of SB 1010 and stream temperature issues with the South Valley Soil and Water Conservation District, Springfield

Appendix 3

Active Project Log
as of December 31, 2000

IMST Active Project Log
Revised, December 31, 2000

Following is a log of the projects accepted by the IMST. This is a chronological listing not a prioritized listing. Each project has a unique identifying number. This number was assigned when the project was brought to the IMST, and will be retained throughout the time it is a project of IMST. This document will be updated as projects are added or completed.

The term "project" includes specific areas of study, or specific activities requested of the Team. The entry for each project includes a brief title (with description), the source of the project, the date received by IMST and the disposition of the project. In many cases the projects included in this log are the result of combining two or more projects that were proposed independently to the IMST. When this is the case, this reference is noted in the "Source of Project" column. A log of all projects addressed to the IMST is also available.

Project Number	Title and Description	Source of Project	Date Rec.	Disposition and Date
1	Review implementation of Oregon Coastal Salmon Restoration Initiative, as described in SB 924. This includes Review Oregon Plan's Fishery Management Regime to Ensure Protection and Rebuilding of Oregon Coastal Natural Coho, Review of data generated by state agencies, effectiveness of watershed councils, and the priorities for long-term monitoring based on the information it will yield & cost, impact of land-use practices in and around estuarine systems	Senate Bill 924, 69th Legislative Assembly Includes projects 5, 10, 14, 16, 36, 38	11/10/97	Accepted as an on-going activity (Norris, activity leader) 11/10/97
2	Prepare annual report on the implementation of the Coastal Oregon Salmon Restoration Initiative	Senate Bill 924, 69th Legislative Assembly	11/10/97	Accepted as an on-going activity (Norris, activity leader) 11/10/97
3	Serve as independent scientific peer review panel to state agencies, including evaluation of proposed changes in Oregon Forest Practices Act.	Senate Bill 924, 69th Legislative Assembly, includes project 12	11/10/97	Accepted as an on-going activity (Norris, activity leader) 11/10/97. Forestry project report issued 9/8/99
4	Report to Joint Legislative Committee on Stream Restoration and Species Recovery	Senate Bill 924, 69th Legislative Assembly	11/10/97	Accepted as an on-going activity (Norris, activity leader) 11/10/97

Project Number	Title and Description	Source of Project	Date Rec.	Disposition and Date
6	Determine extent of predator impact, and recommend mitigation. Includes effects of exotic species, although this element is deferred from initial consideration	IMST, includes project 25	12/10/98	Accepted as study topic (Pearcy, topic leader) 12/10/98, Project completed 12/7/98
7	Hatchery programs. Review scientific basis and protocols. Phase I – Adoption of scientific principles from other science reviews by Oregon Plan Phase II – Oregon hatchery audit Phase III – Oregon hatchery programs	IMST, includes project 37, 22, 45	12/10/98	Accepted as study topic (Lichatowich, topic leader) 12/10/98, Phase 1 completed 12/2/98, Phase II completed 10/25/00
8	Review harvest management (adult escapement) goals, taking into consideration fish population levels at various life stages, the relation between ocean conditions and fish survival and reproduction, freshwater habitat needs, the role of salmon carcasses on in-stream production, and Amendment 13	IMST, includes projects 15, 21, 24, 27, 44	12/10/98	Accepted as study topic (Gregory topic leader) 12/10/98. Workshop report on Recovery issued 12/10/99. Work completed 12-15-00.
9	Western Oregon Lowland Resources. Fish habitat as it relates to land use - except Western Oregon forestry and urban land uses, which are covered under other projects. July 15, 1999 IMST reorganized this project, confining the scope to the lowlands of western Oregon and combined it with project 42, lowlands and estuarine systems	IMST, includes project 22, 23, 37	12/10/98	Accepted as study topic (Buckhouse, topic leader) 12/10/98; With 7/15/99 reorganization, Kavanagh added as co-lead with Buckhouse
17	Agency monitoring effectiveness. This project includes an annual report on monitoring and may include more detailed technical reports on specific aspects of monitoring.	IMST Modified during discussion to include projects 11, 19, 13, 35 and 36	12/10/98	Accepted as study topic (Elmore, topic leader) 12/10/98 1998 annual report issued in March, 1999

Project Number	Title and Description	Source of Project	Date Rec.	Disposition and Date
41	Relationship between stream temperature, land-use and fish habitat needs (temperature standard)	IMST, and Appointing Authority	12/10/98 1/13/98	Accepted as study topic (Gregory, topic leader) 1/14/98. Team conducted workshop 10-4-00 and workshop summary completed 11-8-00.
42	Fish habitat in estuary and lowland (non-forest) systems. IMST moved this project into project 9 on land use 7/15/99.	IMST, includes elements of project 37	12/10/98	Accepted as study topic (Kavanagh, topic leader) 1/14/98. Consolidated into project 9 on land use 7/15/99.
46	Review 1998 State of Oregon Report on Salmon	GWEB	1/13/98	Accepted as activity (Norris, activity leader) 1/14/9
47	DEQ rules for Certification of grazing on federal lands	Oregon Trout	1/20/98	Accepted as activity 2/11/98, Project subsequently dropped because it was resolved in court.
49	Willamette Spring Chinook Management Plan	Oregon Trout ODFW	1/26, 2/7/98 7/23/98	Accepted as an activity for peer review, (Norris is activity leader) 8/12/98. Waiting for Agency report.
50	Gravel Mining	Executive Order 99-01 and others	Various dates	Accepted as project. (Buckhouse is activity leader)
51.	Information Management	IMST	7/15/99	Accepted as project for letter report. (Gregory is activity leader).
52	Native Fish Conservation Policy	ODFW	7/15/99	Accepted as a review project for scoping. (Norris initial activity leader)

Project Number	Title and Description	Source of Project	Date Rec.	Disposition and Date
53	Urban and Surburban Land Use	IMST	12/14/99	Accepted as project for scoping. (Norris initial activity leader)
54	Eastern Oregon Land Uses	IMST	12/14/99	Accepted as project for scoping. (Kavanagh initial activity leader)

Appendix 4

Team Written Products

**INDEPENDENT
IULTIDISCIPLINARY
SCIENCE TEAM
(IMST)**

State of Oregon

**John Buckhouse
Wayne Elmore
Stan Gregory
Kathleen Kavanagh
James Lichatowich
Logan Norris, Chair
William Pearcy**

February 15, 2000

Mr. Jim Greer, Director
Oregon Department of Fish and Wildlife
2501 SW First Avenue
Portland, OR 97207

Dear Jim,

I write to you on behalf of the IMST because ODFW represents the State of Oregon in the PFMC, and because the IMST is to provide scientific peer review of state agency programs relative to salmon recovery under the Oregon Plan for Salmon and Watersheds. The IMST is concerned about any salmon management options for the year 2000 that are not consistent with the recovery of wild coho salmon stocks. We see no evidence of rebuilding or recovery of OCN coho salmon stocks. The numbers of OCN recruits have decreased from over 200,000 in the 1970s to lows of about 15,000 in recent years.

We believe that incidental fishery impacts on OCN coho salmon should be minimized in 2000. The principal reason for this recommendation is the current status of these stocks. The number of OCN spawners surveyed in 1997 was the lowest since 1990. These spawners were the parents of the adult recruits of 2000. Thus we expect few recruits will be produced from that brood year, reducing the potential for significant recovery. The flood events of 1997 and 1998 may also decrease the recruits from the 1997 brood year.

During the past three consecutive brood years, OCN (river component) coho salmon (1996, 1997, and 1998) recruits have failed to replace spawners. These are the only brood years that have failed to replace themselves since 1970. Thus OCN stocks demonstrate a serious decline in recent years. Moreover, many local populations of OCN coho are at critically low levels along the Oregon Coast and in the Lower Columbia River (several hundred or less). These low numbers increase the risk of local extirpation.

Other considerations that argue for minimizing impacts to OCN stocks are:

1. Models for predicting abundance of OCN coho are imprecise. OCN coho abundances were overestimated in 1997, 1998 and 1999. Such overestimates are of special concern at current low levels of abundance because of the risk of local extirpation.

2. Estimates of hook-and-release mortality of unmarked coho salmon vary widely, and the assumed mortality rates from ocean fisheries may be underestimated. The impacts of increased mortality rates on OCN stocks, even if low, have uncertain risks with respect to achieving recovery.

In view of the above considerations, we recommend that ODFW and PFMC maximize spawner escapement and abundance in the adult recruits of 2000. Improved spawner escapement is a prerequisite for a rapid recovery if ocean conditions continue to improve. Where ODFW participates in fishery management decisions, we recommend that the Department minimize impacts to OCN stocks by not recommending a selective fishery in the ocean for coho salmon during the year 2000.

Sincerely yours,

Logan A. Norris, Chair
Independent Multidisciplinary Science Team

LAN:grs

cc: John A. Kitzhaber, Governor
Brady Adams, Senate President
Lynn Snodgrass, Speaker of the House
Joint Legislative Committee on Stream Restoration and Species Recovery
Roy Hemmingway, Manager, Oregon Plan
Roy Elicher, ODFW
Don McIsaac, PFMC
IMST

P:\ADMSTAFF\IMST\SCAN\02-15-00.DOC

INDEPENDENT ULTIDISCIPLINARY SCIENCE TEAM (IMST)

State of Oregon

John Buckhouse
Wayne Elmore
Stan Gregory
Kathleen Kavanagh
James Lichatowich
Logan Norris, Chair
William Pearcy

May 26, 2000

Geoff Huntington
Executive Director
Oregon Watershed Enhancement Board
775 Summer Street NE, Suite 360
Salem OR 97301-1290

Dear Geoff,

A subset of IMST members briefly reviewed the two research proposals on juvenile salmonid survival as you requested.

Our general conclusion is that the research proposed has the potential to provide information that (1) can be incorporated into the policy process (although some scientific interpretation and integration of these results with other information will be required before the information will be fully useful to policy makers), and (2) it will help advance implementation of the Oregon Plan in areas of interest to IMST.

Specifically we make four recommendations - the first two deal with the proposals provided, and the second two deal with the process for science review.

1. Fund only the proposal focusing on the Nehalem. watershed.

   This recommendation is based on our assessment that the techniques proposed are in relatively early stages of development and specific experience with them in our context is advised before making additional investments in this area.

2. Request that the investigators determine the degree to which implantation affects the behavior of these fish.

   We are concerned that the effect of implantation of the devices on the behavior of the fish is unknown. Without a method for determining that the behavior of implanted fish is essentially the same or very similar to "control" wild fish, the results will subject to criticism that the effects noted are the result of implantation and therefore not representative of what we would expect normally in wild fish.

3. Develop a proposal format requirement that is designed for research. proposals.

With regards to future research proposals to OWEB, we find the format requirements of proposals to OWEB poorly structured for research

proposals. Some of the difficulty we had in our review reflects the use of the current forms. The time-tested approach to research proposals used by NSF, USDA competitive grants, and many others will better meet the needs of scientific reviewers and ultimately OWEB. These provide the framework in which

- the hypotheses to be tested can be explicitly stated,
- the methods proposed can be given in enough detail for reviewers to determine if they
- are likely to work (without the reviewers doing a review of the literature),
- investigators explain how they will go from data collection through data analysis to
- draw anticipated conclusions, and
- the financial, personnel and other resources needed or available for the project can be
- displayed.

All this information is essential to the quality scientific review called for when expenditures of this magnitude are considered.

4. Expand the scope of science review for research proposals.

The IMST can accommodate review of a limited number of research proposals, but we feel it would be useful for you to request review from others as well. As an example, ODFW has technical staff competent to provide scientific review of these proposals. A broader base of review will reduce the potential for institutional or cultural bias, it will more likely result in detection of areas of weakness or strength, and it will serve to inform others of this impending work. In aggregate this may result in improvements in the proposal and the work., and may result in levels of collaboration with others.

Please let me know if you want clarification of any of these points.

Sincerely,

Logan A. Norris
Chair, Independent Multidisciplinary Science Team

cc: IMST

Conservation Hatcheries and Supplementation Strategies for Recovery of Wild Stocks of Salmonids: Report of a Workshop

Independent Multidisciplinary Science Team
Portland, OR
June 19-21, 2000

Technical Report 2000-1

A report of the
Independent Multidisciplinary Science Team,
Oregon Plan for Salmon and Watersheds

July 18, 2000

Members of IMST
Logan Norris, Team Chair, Department of Forest Science, Oregon State University
John Buckhouse, Department of Rangeland Resources, Oregon State University
Wayne Elmore, Bureau of Land Management, US Dept. of Interior
Stanley Gregory, Department of Fisheries and Wildlife, Oregon State University
Kathleen Kavanagh, Department of Forest Resources, University of Idaho
James Lichatowich, Alder Fork Consulting
William Pearcy, College of Oceanic and Atmospheric Sciences, Oregon State University

Citation: Independent Multidisciplinary Science Team. 2000. Conservation Hatcheries and Supplementation Strategies for Recovery of Wild Stocks of Salmonids: Report of a Workshop. Technical Report 2000-1 to the Oregon Plan for Salmon and Watersheds. Oregon Watershed Enhancement Board. Salem, Oregon.

Executive Summary

The Independent Multidisciplinary Science Team (IMST) convened regional leaders in hatchery management and salmon recovery on June 19-21, 2000 for a scientific workshop on Conservation Hatcheries and Supplementation Strategies for the Recovery of Wild Stocks of Salmonids. The purpose was to provide better information (a) to help the IMST with its work on hatchery reports, and (b) to help policy makers as they consider proposals for the State of Oregon to engage in a program of supplementation. The goal of the workshop was to identify, clarify and compile the scientific basis on which conservation hatcheries and supplementation strategies may help accomplish the mission of the Oregon Plan for Salmon and Watersheds (Oregon Plan).

This report is prepared by the IMST. It was reviewed by workshop participants and revised by IMST accordingly. It does not necessarily reflect consensus on all points by workshop participants. IMST alone is responsible for the report. The report includes abstracts of plenary scientific presentations and case histories of supplementation projects, a brief description of the Oregon Conservation Hatchery Improvement Proposal (CHIP), and the results of three
concurrent work group discussions. These work group discussions focused on:

- Conditions under which supplementation could be used in wild salmonid recovery
- Appropriate methods for supplementation
- Approaches for the evaluation of supplementation over time

A series of major points emerged during the plenary sessions and during the concurrent work group sessions. These points, organized by topic, summarize the most important factors to address when planning or implementing a supplementation program.

Overview and Conceptual Framework

- Supplementation is part of a suite of strategies (e.g., habitat enhancement and restoration, changes in land use, changes in fish harvest activities, removing impediments to fish passage) that may be used together for recovery of wild salmonid populations.
- When possible, limiting factors (e.g., ecological or habitat conditions, impediments to fish passage) should be addressed before implementing a supplementation program.
- Supplementation may help to maintain a gene pool but is not likely to lead to recovery of salmonid populations unless the root causes of decline are addressed.
- Supplementation is still in experimental stages; alternative strategies for meeting the goals of a particular project should be considered before supplementation is used.
- During the design, implementation, and monitoring of supplementation, programs should, as much as possible, utilize what is known about wild salmonid life cycles while developing and testing supplementation strategies and tactics.
- Clearly defined goals and monitoring of their attainment are important to the success of supplementation programs.

Assessment and Design of Supplementation Programs

- The population status of the target population is a prime factor in considering supplementation. Supplementation efforts of greater risk can be tolerated in areas where the current probability of existing population/stock survival is very low.
- Risks and benefits should be evaluated before implementing a supplementation program.
- Supplementation might be implemented to provide "genetic conservation" while other measures (e.g., habitat improvement) that will greatly improve the chances of success of a supplementation program over the long term are also being implemented.
- Ideally, supplementation should end when recovery goals are met.

Methods

- It is extremely important to identify areas with suitable habitat and underutilized carrying capacity when choosing supplementation as a tool to aid recovery of salmonid populations.
- Supplementation should be placed in an ecosystem context. Important considerations include carrying capacity, the connectivity of the population, the impacts on existing populations/stocks and on other species, levels of adult returns, as well as additional ecological factors.
- Preservation of genotypic and phenotypic diversity is extremely important when stocks are selected or developed for supplementation. Domestication selection should be minimized. Use "local broodstocks" or an appropriate alternative to minimize divergence from the wild population. When possible, allow for a natural range in the diversity of life history patterns.

Evaluation

- Monitoring and evaluation are essential to assessing whether supplementation was successful and goals of a particular program were met. This requires adequate experimental design and "references or controls" for comparisons.
- Abundance, stock productivity, ecological and genetic diversity, and fish distribution data are all important when evaluating the results and/or success of supplementation.
- Due to the inherent cost and limitations of monitoring programs, monitoring efforts will be most efficient, and will provide the most comprehensive information, when coordinated among agencies.

Based on this workshop the IMST reaches the following interim conclusion pending completion of our phase III hatchery project report: Supplementation may be a useful strategy as part of a comprehensive program of species recovery. We note that it has not been extensively tested, therefore needs to be used cautiously and with a strong component of monitoring and adaptive management to ensure it is not harmful to recovery of wild stocks, and that it is achieving the intended goals.

INDEPENDENT MULTIDISCIPLINARY SCIENCE TEAM (IMST)

State of Oregon

John Buckhouse
Wayne Elmore
Stan Gregory
Kathleen Kavanagh
James Lichatowich
Logan Norris, Chair
William Pearcy

September 6, 2000

Kay Brown
Oregon Department of Fish & Wildlife
2501 SW First Avenue
Portland, OR 97207

Dear Kay,

The IMST has examined the management of salmon harvest under the Oregon Plan for Salmon and Watersheds. Numerous assessments, including the Oregon Plan (1997), have concluded that historical harvest rates have been too high and have contributed to the decline of OCN coho salmon. Harvest management, therefore, is a critical element of the Oregon Plan for Salmon and Watersheds.

The IMST report on harvest management of OCN coho salmon includes important information about the regional process that establishes harvest levels. This report is in its final stages of preparation but will not be completed prior to the time when material is needed for the PFMC meeting in Sacramento.

We are using this letter to convey to the Oregon Department of Fish and Wildlife specific information on harvest level establishment that we feel needs to be included in the PFMC process. In this letter, we will provide only those conclusions and recommendations that are related to the PFMC process. It is our recommendation that this information and the specific recommendations made below be part of the position of ODFW as they represent the State of Oregon to PFMC.

General Findings

Recent severe declines in coho salmon make all management decisions critical for the survival of remaining stocks. Major advances have been made in regulation of harvest and monitoring of salmon harvest in Oregon since the mid-1980s. Reductions of harvest impacts under Amendment 13 have been substantial and have been essential to prevent extinction of coho salmon stocks along the Oregon Coast and lower Columbia River.

Several analytical tools and monitoring programs have strengthened salmon management in Oregon. In particular, the life-cycle model and spawner monitoring surveys are scientifically rigorous and represent some of the most advanced salmon management tools in North America.

Habitat degradation and over-harvest are two of the major factors in the long-term decline of OCN coho salmon. Poor ocean conditions in recent years have limited population responses to decreasing levels of salmon harvest. Habitat restoration and sound harvest management will strongly influence the rate at which salmon populations recover when climate-related conditions for ocean survival improve.

The State of Oregon and PFMC have not explicitly defined recovery of depressed salmon stocks and criteria for evaluating recovery. The various efforts to restore salmon may be disconnected and less effective until such explicit perspectives have been articulated. The IMST strongly encourages the development of a program that integrates life cycle modeling with the monitoring of salmon populations, habitat, and harvest. The goal is to synthesize information to strengthen the current policy framework and fishery management programs to meet the criteria for recovery.

Because OCN coho salmon stocks have declined to such low numbers and spawners have not replaced themselves in recent years, we are continuing to recommend adjusting fisheries impacts to the lowest levels possible. The IMST strongly endorses the development of critical conservation measures to be added to the harvest impact matrix of Amendment 13. We view the development of conservative measures for both axes of the harvest matrix as essential. In addition, indicators of extreme conditions may be needed as practical limits when severe conditions are observed. An example would be estimates of the percent of survey sites for which zero spawners were observed in any given year. These indicators would be consistent with Minimum Sustainable Escapement approaches recommended by the National Research Council in its review of management of Pacific salmon.

The Year 2000 Review of Amendment 13 of the Pacific Fisheries Management Council offers an opportunity for the State of Oregon to evaluate management directions and future directions for salmon harvest management.

Specific Conclusions and Recommendations

The upcoming IMST report on harvest management will focus on the influence of harvest management on stocks of wild coho salmon in Oregon. The report identifies five specific science questions. Two of these are particularly relevant to the PFMC process.

Question 1: How has harvest management affected status of stocks? Are current harvest policies likely to contribute to rebuilding salmon stocks under the Oregon Plan for Salmon and Watersheds?

Conclusions

Past harvest practices clearly have over-harvested OCN coho salmon stocks and have contributed to the population declines that led to listing under ESA. Since 1994, harvest

impacts have been reduced dramatically from impacts that ranged from 30%-90% prior to 1990 to 8-13% since 1994.

Modeling results predict that rapid rebuilding of OCN stocks under Amendment 13 will not occur if the ocean survival rates of the late 1990's continue, regardless of harvest impacts. However, the life cycle model predicts that populations would decline at a lower rate without any source of harvest, either directed or indirect (ODFW-NMFS 1998). At low marine survival rates, elimination or reduction of human-caused sources of mortality could reduce probability of extinction or possibly allow modest recovery and would increase the rate of recovery under higher ocean survival rates. However, under poor ocean conditions, significant recovery may not be possible even with minimal harvest impacts (ODFW-NMFS 1998) because escapement of OCN coho salmon is too low. In recent years, spawners have not replaced themselves. Management actions have not improved conditions after adoption of Amendment 13. Improved escapement is essential for a rapid recovery of OCN coho, and control of fishing mortality is the best available tool for achieving improved escapements and more rapid "recovery" of these stocks. Setting minimum sustainable escapement levels could improve probabilities of recovery.

Widespread spawning distributions of coho salmon populations are needed to minimize risks of extinctions when the region shifts from climate regimes that are favorable for survival to conditions that result in low rates of ocean survival (see IMST Recovery Report). Management criteria should be linked to monitoring results for the proportion of all habitats or monitored stream reaches that are occupied by spawners. This measure is a critical index for the recovery of OCN stocks.

At recent low population numbers and lack of replacement of stocks and stock aggregates, fishery impacts on OCN coho salmon are very uncertain. Knowledge of population dynamics for coho salmon at extremely low populations is technically weak because of the lack of research on these conditions. Strongly conservative management criteria and explicit definition of "extremely low populations" (e.g., 10% of fully seeding high quality habitats) are needed in such conditions.

Current management includes irregular and relatively haphazard distribution of carcasses with no link to priorities or expected outcomes. Successful management of carcasses under the Oregon Plan will require explicit experimental measurement of the responses of salmon at all life stages to additional food resources from carcasses.

These conclusions are particularly relevant to the PFMC process, and on that basis we make the following recommendations:

Recommendations

1. The IMST recommends that ODFW advocate that new criteria be incorporated into the matrix of Amendment 13 to include "very low" OCN coho salmon parent spawner abundance and "very low" marine survival.

This will strengthen the criteria designed for protection or recovery of populations under extreme conditions. Under these conditions, no directed coho fisheries should be allowed and fishery related impacts should be reduced to the lowest levels possible.

2. The IMST recommends that ODFW advocate the applicability of (a) the minimum sustainable escapement (MSE) concept to augment the use of (b) the number of OCN ocean recruits in setting harvest impacts.

   This could provide a safeguard against loss of stocks during periods of low freshwater or ocean survival. The National Research Council (1996) recommends this methodology to minimize extinction risks of a population or metapopulation and to enhance recovery. Because spawner abundances have been extremely low and recruitment for all three recent brood years (1995, 1996, 1997) has been below replacement, fishery impacts should be as close to zero as possible until established signs of recovery are observed.

3. The IMST recommends that ODFW advocate that decisions to change harvest levels incorporate elements of stock abundance over longer periods of time and include consideration of the spatial distribution of stocks.

   The timeframe and spatial distribution of OCN coho salmon stocks is a critical aspect of measuring recovery. Harvest policies should be revised to require responses over sufficient time to indicate real population trends. We offer the following criteria as possible examples to be incorporated into the decision process whereby harvest levels are changed.

   Criterion 1. Stock Abundance. Stock abundance has achieved a defined minimum sustainable escapement before harvest impacts can exceed 10-13 %.

   Criterion 2. Duration of Recovery. Stocks have achieved greater than 1: 1 spawner-to-spawner replacement for each brood year over at least three brood cycles.

   Criterion 3. Spatial Distribution. Stocks have achieved two consecutive generations of recovery (spawning recruits/parental adult of >1.5) with seeding above level 2 (75% seeding of available habitat).

4. The IMST recommends that ODFW advocate initiation of a scientific review of the Fisheries Regulation Analysis Model (FRAM) used to estimate harvest impact on OCN stocks components.

Such a review might be incorporated into the Year 2000 review of Amendment 13.

5. The IMST recommends that ODFW advocate adherence to the policy that links decisions on ocean harvest to the status of the weakest stock component.

   Oregon currently adheres to this requirement, but pressures to allow fishing by sport or commercial fishermen create challenges for following this policy.

6. The IMST recommends that ODFW advocate determining the relationship between the response of salmon juveniles and their food webs to carcass abundance.

   Criteria should be developed that consider the impacts of harvest management on carcass abundance and distribution. Strategies for stock recovery need to recognize the role of food resources and carcasses in production of smolts in freshwater habitats. As an example, management criteria could identify minimum numbers of spawners per mile of stream to provide the food base necessary to support young salmon.

Question 2: Are estimates of mortality from non-retention fisheries accurate and does this source of mortality affect recovery of salmon?

Conclusions

Current estimates of mortality from non-retention fisheries are highly variable, subject to substantial uncertainty, and cannot be characterized as accurate. Experimental methods are limited and subject to many sources of error. Even low incidental mortality rates of OCN coho salmon could significantly slow recovery for depressed stocks. Scientific review of hook and release mortalities should be an on-going process, as environmental conditions change.

Recommendations

7. The IMST recommends that ODFW support PFMC review of hook & release.

   This is a key factor for impact analysis of fisheries. Analysis of hook & release mortality should continue after 2000 because uncertainty is high and ocean conditions are highly variable.

8. The IMST recommends that ODFW advocate determination of the degree to which plausible extremes in mortality and in spatial and temporal variation can influence the risk of extinction.

   Hooking mortality and encounter rates are variable, and sensitivity analysis can help evaluate their impact on probability of extinction. Highly sensitive parameters should be strengthened by monitoring, especially by double-index tagging.

Question 3: Are models used for exploring management questions about Oregon coho salmon scientifically rigorous? Are these models effectively integrated into management and policy analysis and decision-making?
Conclusions

The life cycle models developed by ODFW and NMFS (Nickelson and Lawson) are rigorous, but are not being used to their full potential. This model can be strengthened, and additional models can be developed to provide the ability to confirm model performance and identify areas of uncertainty.

Several features of the model and information base that could be improved in future model development and applications are 1) scarce data, 2) aggregated functions that should be articulated separately, and 3) incorporation of variability (locally and regionally; short term and long term) into model projections. Currently modeling by PFMC and ODFW uses a static view of future landscape conditions. Restoration of freshwater habitats and future disturbance processes are not considered. Current analyses are dynamic in terms of ocean conditions and fish populations, but they treat watersheds and freshwater habitat as fixed and unchanging.

Coordinated analysis of harvest management, monitoring, model applications, and risk assessment would create a more scientifically sound decision-making context for salmon harvest management and allow management to adapt and improve more quickly. Unfortunately we do not find a concrete link between the operation of the model, the monitoring program and the development of harvest management policy. The efforts in SRS monitoring system, basin habitat surveys, life cycle monitoring sites, and life-cycle models would be strengthened if they were integrated into an on-going program of assessment and integration of information and future stock projections.

Recommendations

9. The IMST recommends that ODFW advocate that PFMC use an explicit analytical process that incorporates monitoring results, harvest records, and the life-history model as part of the decision process for harvest levels.

   This analysis should link spawner surveys, habitat surveys, marine survival or impacts and model projections. It should also be spatially explicit to the greatest degree allowed by the data and model structure.

10. The IMST recommends that ODFW advocate that PFMC incorporate dynamic and changing landscape conditions in the analytical process to reflect potential habitat restoration, human-related degradation, and natural disturbances.

    Use of dynamic conditions for both ocean and freshwater environments will provide more realistic projections of future population trends and risks of

extinction. Such integration also recognizes regional goals to protect and restore watershed conditions along the Pacific Coast.

We hope this information will be helpful as ODFW represents the State of Oregon to the PFMC. By copy of this letter we are notifying Director Greer, ODFW Commissioners and PFMC of the IMST scientific recommendations in this matter.

Sincerely yours,

Logan A. Norris
Chair, IMST

cc: Director Jim Greer, ODFW
ODFW Commissioners
Don McIsaac, PFMC
Roy Hemmingway, Manager,
Oregon Plan
IMST

INDEPENDENT MULTIDISCIPLINARY SCIENCE TEAM (IMST)

State of Oregon

John Buckhouse
Wayne Elmore
Stan Gregory
Kathleen Kavanagh
James Lichatowich
Logan Norris, Chair
William Pearcy

October 25, 2000

Kay Brown
Oregon Department of Fish & Wildlife
2501 SW First Avenue
Portland, OR 97207

Dear Kay,

In 1998, the Oregon Department of Fish and Wildlife (ODFW) staff was directed to review the performance of several hatchery programs. The review carried out was limited to state operated hatcheries for salmon, steelhead and trout in coastal watersheds and the Willamette trout hatchery program. Private and federal hatcheries and the Salmon and Trout Enhancement Program (STEP) were excluded from the review. The goal of the review was to evaluate the performance of hatchery programs relative to production goals, policy compliance, fish quality, operational, and economic considerations. A draft of the review was completed in March 1999.

The purpose of this letter is to report on the IMST's scientific review of the draft final report of the *Coastal Salmonid and Willamette Hatchery Program Review* (hereafter Hatchery Audit). This letter is Phase II of our evaluation of Oregon's artificial propagation program. Phase I addressed the consistency of hatchery measures in the Oregon Plan for Salmon and Watersheds with findings on salmon hatcheries from three scientific review panels (IMST Technical Report 1998-1). Phase III will address the scientific basis for the state's program of artificial propagation. We expect to complete Phase III in January 2001.

Analysis of the audit

The Hatchery Audit is tactical not strategic in its approach. It does not address the strategic direction of hatcheries in the state, nor does it identify the role any individual hatchery plays in this strategy. While this is a policy issue, we see compelling scientific reasons for having a hatchery policy and strategy within the context of the Oregon Plan for Salmon and Watersheds. Having a strategic plan would provide the basis on which hatchery management could be scientifically consistent with the mission of the Oregon Plan, and it would provide a useful technical basis for analysis of individual hatchery operations in future audits. Informal communication with ODFW indicates there is no strategic plan for a system of hatcheries for the State.

Strengths of the audit

Even with this limitation however, the Hatchery Audit is a useful tactical assessment document, and if its findings are utilized by ODFW, it could improve the programs of individual hatcheries. It identifies areas where

improvements in individual hatchery operations are needed, and pinpoints specific programs that deserve additional attention. The Hatchery Audit's greatest potential benefit is in the improvement of operations within the hatcheries. The audit evaluated 43 performance measures and most of those were of operations within the hatcheries. Examples of those performance measures include an evaluation of the security alarm and the intake structure alarm and if the flow alarms are checked daily. An evaluation of predator control structures was another measure of performance within the hatchery. The audit evaluated many critical steps in the day-to-day operations of hatcheries.

Limitations of the audit

The audit offers very little insight into the issues and concerns that begin once the hatchery fish are released into the natural environment. For example, 41 of the 51 salmon and steelhead programs reviewed in the audit used smolt releases as a performance measure; 34 of the 51 salmon and steelhead programs used egg takes as a performance measure; and only 9 of the 51 salmon and steelhead programs evaluated performance using adult returns. These data clearly show the emphasis on activities inside the hatchery - egg takes and rearing juveniles to the smolt stage. Survival to adult, which takes place outside the hatchery, received little attention.

Where the audit tried to address performance measures outside the hatchery, the requisite data were often not available or it was not clear how the information was obtained. Evaluation of compliance with the Wild Fish Management Policy (WFMP) illustrates that point. For 36 of the 51 salmon and steelhead hatchery programs, it was appropriate to measure the percentage of hatchery strays on the natural spawning grounds to determine if the programs were in compliance with the WFMP. Of those 36 programs, 12 were not in compliance, 20 were in compliance, and for 4 programs the compliance status was not known.

However, it is not clear how compliance was measured, how data were obtained, or how estimates of proportions of hatchery fish on the spawning grounds and the confidence limits for those estimates were measured. For most of the 36 programs that needed to be reviewed for compliance with the WFMP, the Hatchery Audit contained language similar to the following example for the Applegate River winter steelhead program.

> Estimates of the hatchery stock composition of naturally spawning fish were not made. However, for the purposes for this review, we assumed that the Applegate River wild winter steelhead population was most likely to be influenced by fish from this hatchery program, and further, that all hatchery winter steelhead spawning naturally in the Applegate River originated from this hatchery program. The estimated proportion hatchery fish spawning naturally in the Applegate River was used to evaluate program compliance with the WFMP.

The methods for estimating compliance and the confidence limits on those estimates need to be included in the audit reports to permit a scientifically sound analysis of confidence. From a review of the report *Status of Oregon Coastal Stocks of Anadromous Salmonids* (Jacobs et al., 2000) it appears that the department is trying to improve their estimates of

the number of hatchery strays on the natural spawning grounds. The IMST realizes that making this estimate is a complex sampling problem that will take some time to resolve. However, this should be a high priority area and it is needed to bring the hatchery program in line with the goals of the Oregon Plan for Salmon and Watersheds.

Because the audit offers little insight to the post-release interaction between the hatchery fish and the ecosystem they are released into, it is not very useful in assessing the hatchery programs relative to the goals of the Oregon Plan for Salmon and Watersheds.

Wild fish management
We are concerned about the large differences that seem to exist among hatcheries in complying with the Wild Fish Management Policy. For some hatcheries all or nearly all of their programs (including different species) were in compliance with the WFMP. In contrast for other hatcheries, all or nearly all their programs were not in compliance (for example, see North Nehalem and Rock Creek hatchery programs). These differences indicate either that some programs may have been better at controlling strays than others, or perhaps there are differences in the methods used to determine compliance. We are not able to judge between these explanations because the methods used to estimate the strays on the spawning grounds were not described. In either case the issue needs attention.

Cost-benefit analysis
The cost-benefit analysis could be misunderstood because it does not clearly state the specific costs that are included and those that are excluded. It should specify whether or not the costs are included for administration of the program at the region and statewide level, for research, and for the time management personnel devote to hatchery issues.

Summary
The Hatchery Audit is an important first step in reforming hatcheries so their operation is consistent with the Oregon Plan for Salmon and Watersheds and they can make a contribution to the recovery of Oregon's listed salmon and steelhead ESUs. The Hatchery Audit revealed important short comings in the hatchery program that need correcting. The program appears to be weak in evaluating performance "outside the hatchery fence."

Recommendations
Based on our review, the IMST makes the following specific recommendations to ODFW:

1. Develop a strategic plan for the management of hatcheries to be consistent with the goals of the Oregon Plan for Salmon and Watersheds.
2. Develop a strategy for evaluating hatchery performance that includes assessing the performance of fish outside of the hatchery (survival of hatchery fish from smolt to adult).
3. Develop a strategy for the assessment of the impact of hatchery released fish on the performance, production and survival of naturally spawning wild stocks of fish.

4. Include direct and indirect costs in cost-benefit analyses.

5. Develop and use a consistent method for (a) evaluating the degree of straying of hatchery fish onto natural spawning beds and (b) assessing the impacts on wild stocks.

I hope these comments from IMST are useful in helping ODFW as they describe and implement a statewide hatchery strategy, and audit procedures and reporting methods that can be used to evaluate success.

Sincerely Yours,

Logan A. Norris
Chair, Independent Multidisciplinarv Science Team

LAN:grs

Cc: Governor Kitzhaber
Senate President Adams
House Speaker Snodgrass
Joint Legislative Committee for Stream Restoration and Species Recovery
Roy Hemmingway, Manager Oregon Plan
IMST

Independent Multidisciplinary Science Team. 1998. Review of the Hatchery Measures in the Oregon Plan for Salmon and Watersheds. Report 1998-1 to the Oregon Plan for Salmon and Watersheds. Governor's Watershed Enhancement Board. Salem, Oregon.

Jacobs, S., Firman, J., Susac, G., Brown, E., Riggers, B., and Tempel, K. 2000. Status of Oregon coastal stocks of anadromous salmonids. Monitoring Program Report Number OPSW-ODFW-2000-3, Oregon Department of Fish and Wildlife, Portland, Oregon.

INDEPENDENT ULTIDISCIPLINARY SCIENCE TEAM (IMST)

State of Oregon

John Buckhouse
Wayne Elmore
Stan Gregory
Kathleen Kavanagh
James Lichatowich
Logan Norris, Chair
William Pearcy

October 30, 2000

Don McIsaac
Executive Director
Pacific Fisheries Management Council
2130 SW Fifth Ave, Suite 224
Portland, OR 97201

Dear Don,

Enclosed is testimony of Stan Gregory to PFMC. While given by Stan, it is the position of the IMST on this matter. We hope this information will be helpful to ODFW and the PFMC in the review of Amendment 13.

Sincerely yours,

Logan A. Norris
Chair, IMST

Enclosure (Testimony of Stanley Gregory to PFMC)

cc: with enclosure
Director Jim Greer, ODFW`
Kay Brown, ODFW`
ODFW` Commissioners
Roy Hemmingway, Manager, Oregon Plan
IMST

Influences of Human Activity on Stream Temperatures and Existence of Cold-Water Fish in Streams with Elevated Temperature: Report of a Workshop

Independent Multidisciplinary Science Team
Corvallis, OR
October 5-6, 2000

Technical Report 2000-2

A report of the
Independent Multidisciplinary Science Team,
Oregon Plan for Salmon and Watersheds

November 8, 2000

Members of IMST
Logan Norris, Team Chair, Department of Forest Science, Oregon State University
John Buckhouse, Department of Rangeland Resources, Oregon State University
Wayne Elmore, Bureau of Land Management, US Dept. of Interior
Stanley Gregory, Department of Fisheries and Wildlife, Oregon State University
Kathleen Kavanagh, Department of Forest Resources, University of Idaho
James Lichatowich, Alder Fork Consulting
William Pearcy, College of Oceanic and Atmospheric Sciences, Oregon State University

Citation: Independent Multidisciplinary Science Team. 2000. Influences of Human Activity on Stream Temperatures and Existence of Cold-Water Fish in Streams with Elevated Temperature: Report of a Workshop. Technical Report 2000-2 to the Oregon Plan for Salmon and Watersheds. Oregon Watershed Enhancement Board. Salem, Oregon.

Executive Summary

The Independent Multidisciplinary Science Team (IMST) convened a panel of experts on stream temperature and fish ecology on October 5-6, 2000 for a scientific workshop on human influences on stream temperature and responses by salmonids. The workshop was designed to review and discuss scientifically credible data and publications about 1) factors related to human activity that influence stream temperature and 2) behavioral, physical, and ecological mechanisms of cold water fish species for existing in streams with elevated temperatures. The goal of the workshop was to review empirical evidence and to identify points of agreement, disagreement, and knowledge gaps within the scientific community concerning the factors that influence stream temperature and fish responses to elevated temperatures. This information will assist the IMST in preparing a broader temperature report on Oregon's stream temperature water quality standards and their implementation.

This report is prepared by the IMST. It was reviewed by workshop participants and revised by the IMST accordingly. The report includes abstracts of plenary presentations on factors that influence stream temperatures and fish responses, and the results of group discussions. The workshop participants focused on three main questions and were asked to list statements of agreement and disagreement, and to identify gaps in the scientific knowledge related to each question:

- How and where does riparian vegetation influence stream temperature?
- Do other changes in streams cause increases in stream temperature?
- How can apparently healthy fish populations exist in streams with temperatures higher than laboratory and field studies would indicate as healthy?

The workshop participants provided answers to the questions in the form of bullets. The answers below represent the IMST's summation of the workshop findings and were reviewed by the participants. Several gaps in the scientific basis for specific questions or relationships were identified. The participants found no areas of disagreement for which technical information was available. They noted that any disagreements were not related to scientific interpretation, but were based on concerns or opinions about application, regulation, and management.

How and where does riparian vegetation influence stream temperature?

The influence of riparian vegetation on stream temperature is cumulative and complex, varying by site, over time, and across regions. Riparian vegetation can directly affect stream temperature by intercepting solar radiation and reducing stream heating. The influence of riparian shade in controlling temperature declines as streams widen in downstream reaches, but the role of riparian vegetation in providing water quality and fish habitat benefits continues to be important. Besides providing shade, riparian vegetation can also indirectly affect stream temperature by influencing microclimate, affecting channel morphology, affecting stream flow, influencing wind speed, affecting humidity, affecting soil temperature, using water, influencing air temperature, enhancing infiltration, and influencing thermal radiation. It is critical to know the site potential to understand what vegetation a site can support. There is not a good scientific understanding of how much vegetation shading is required to affect stream temperature. This lack of understanding may

be due to the spatial and temporal variability in landscape components, and the resulting variability in both the direct and indirect influences of vegetation on stream temperature. Therefore, it is difficult to generalize about the effects of vegetation on stream temperature.

Do other changes in streams cause increases in stream temperature?

The answer to this question is yes, other physical changes in the stream system can modify stream temperatures. Stream temperature is a product of complex interactions between geomorphology, soil, hydrology, vegetation, and climate within a watershed. Changes in these factors will result in changes in stream temperature. Human activities influence stream temperature by affecting one or more of four major components: riparian vegetation, channel morphology, hydrology, and surface/subsurface interactions. Stream systems vary substantially across the landscape, and site-specific information is critical to understanding stream temperature responses to human activities.

How can apparently healthy fish populations exist in streams with temperatures higher than laboratory and field studies would indicate as healthy?

Workshop participants identified several mechanisms that might explain the ability of fish populations to exist at higher than expected temperatures. The first mechanism was that the fish may have physiological adaptations to survive exposures to high temperatures. A second possibility was that stream habitats may contain cooler microhabitats that fish can occupy as refuge from higher temperatures. A third consideration is that ecological interactions may be different under differing thermal conditions resulting, for example, in changes in disease virulence or cumulative effects of stressors. Finally, since substantial differences exist between laboratory and field studies, it is difficult to apply results of laboratory studies to fish responses in the field. It is important to note that these proposed mechanisms are speculative and, as the list of gaps indicates, substantial experimental work is required to establish their influences on fish in different stream systems.

Workshop Summary

Workshop participants recognized gaps in the available science. Additional knowledge about human influences on stream temperatures and, consequently, influences on cold-water fish populations, will improve our ability to prevent further degradation of stream habitat and will enhance efforts geared towards the recovery of depressed fish populations. Even with these gaps, there was enough agreement on factors that influence stream temperature to indicate information is available to start developing and implementing management practices that are designed to reduce stream warming. It was suggested that managers should consider riparian vegetation, channel morphology, and hydrology, and should account for site differences.

Appendix 5

Catalog of IMST Recommendations and Agency Responses as of January 31, 2000

Catalog of Recommendations from IMST and Status of Responses
January 17, 2001

Recommendations, Technical Reports	Agency Acknowl.[1]	Response Received[2]
Technical Report 1998-1, Hatchery Report, Phase 1 – December 10, 1998	Yes	
1. ODFW give measure II.A.3 (development of management objectives for each hatchery program, including genetic guidelines) of the Oregon Plan higher priority and complete the development and adoption of objectives and management guidelines for each coastal coho hatchery as quickly as possible.		Yes
2. ODFW establish and implement a specific program to determine if its coastal coho hatcheries are meeting their objectives, and the process by which management will be adapted if they are not		Yes
3. ODFW develop and implement a program of research that determines the effects of wild-hatchery fish interactions.		Yes
4. Based on research findings (see recommendation 3), ODFW develop monitoring measures that can be used to judge the operational effectiveness of hatchery management programs with respect to their adverse impact on wild fish stocks.		Yes
5. ODFW develop a strategy that will be useful in quantifying and reducing the impact of mixed stock fisheries on the recovery of depressed OCN stocks.		Yes
6. ODFW determine the impact of hatchery release practices on predation of hatchery and wild fish. This should be coordinated with the ODFW Action Plan to assess avian and pinniped predation.		Yes
7. ODFW use hatcheries as important tools in research that supports monitoring programs.		Yes
8. ODFW establish explicit coordination between hatchery programs and monitoring programs to help them ensure that they accomplish management and research objectives.		Yes
Technical Report 1998-2, Predation – December 22, 1998	Yes	
1. Determine the factors influencing high predation rates on salmonid smolts in the Columbia River estuary.		Yes
2. Improve the estimates of the impact of pinniped predation on salmonid stocks and on the recovery of depressed stocks.		Yes
3. Improve estimates of the impacts of seabird predators on wild salmonids.		Yes
4. Test the feasibility of relocation of Caspian terns to other nesting sites and evaluate the consequences of tern relocation on all salmonids stocks in the area.		Yes
5. Evaluate the effectiveness of cormorant hazing in Oregon's estuaries		Yes
6. Use modeling of pinniped and avian predation in risk assessment.		Yes
7. Improve coordination with monitoring activities under the Oregon Plan, and coordinate with research projects on pinniped predation along the northwestern coast of North America.		Yes
Technical Report 1999-1, Forest Practices – September 8, 1999	Yes	
1. Explicitly incorporate the policy objective of the Oregon Plan and Executive Order 99-01 into OFPA.		No
2. ODF should develop a policy framework to encompass landscape (large watershed) level planning and operations on forests within the range of wild salmonids in Oregon. IMST recommends that the following elements be included in this modified forest policy framework:		No
3. Treat non-fish-bearing streams the same as small, medium, and large fish-bearing streams when determining buffer-width protection.		No
4. Provide increased riparian protection for the 100-year floodplains and islands.		No
5. Increase the conifer basal-area requirement and the number-of-trees requirement for RMAs, with increases in these requirements for medium and small streams regardless of fish presence.		No

[1] **Agency has acknowledged receipt of recommendations**

[2] **Agency has provided their response**

6. Complete the study of the effectiveness of the OFPA rules in providing large wood for the short- and logng-term.		No
7. Provide enhanced certainty of protection for “core areas”.		No
8. Develop and implement standards or guidelines that reduce the length of roadside drainage ditches that discharge into channels.		No
9. Implement the standards and guidelines for the length of roadside drainage ditch between cross-drainage structures, especially on steep-gradient roads.		No
10. Require the flow capacity of cross-drainage structures and stream-crossing structures and culverts to meet current design standards.		No
11. Provide for the stabilization of roads not constructed to current standards (including "old roads and railroad grades") in critical locations. Stabilization means reduction or elimination of the potential for failure. It includes a variety of strategies ranging from removal to abandonment, entirely or of sections, by which specific roads and railroad grades become a much less important source of sediment.		No
12. Require durable surfacing on wet-season haul roads and require that hauling cease before surfaces become soft or “pump” sediment to the surface.		No
13. Retain trees on "high risk slopes" and in likely debris torrent tracks to increase the likelihood that large wood will be transported to streams when landslides and debris torrents occur.		No
14. Continue to apply the current best management practices (BMP) approach to the management of forest lands with significant landslide potential, and develop a better case history basis for evaluating the effectiveness of BMP in this area.		No
15. Modify culverts and other structures to permit the passage of juvenile and adult salmonids upstream and downstream at forest road-stream crossings.		No
16. ODFW and ODF should develop a collaborative program of monitoring to quantify the linkages between parameters of ecosystem condition and wild salmonid recovery.		Yes
17. ODFW should complete "core area" designation for all wild salmonids in Oregon and identify high priority protection/restoration areas that are not covered by current "core area" designations. ODFW should work with the Oregon Plan Implementation Team in prioritizing habitat for enhanced levels of protection and/or restoration.		Yes
18. ODFW should include consideration of practices (forestry, agriculture, urban, other land uses) above and below core areas, as these may affect the conditions and processes critical to maintenance of core area function in forestry areas.		Yes
19. The Oregon Forest Research Laboratory (FRL), in collaboration with ODFW, should develop forest road-stream crossing strategies that facilitate the passage of large wood at road-stream crossings.		Yes

[1] **Agency has acknowledged receipt of recommendations**

[2] **Agency has provided their response**

3/22/99 letter to Jim Greer re PFMC plans 1. The State of Oregon encourage the PFMC to adopt the goals of Amendment 13 ("to remove the fishery related impacts as a significant impediment to the recovery of depressed OCN coho and to allow rebuilding of the component populations subgroups to higher levels"). 2. The State of Oregon encourage the PFMC to adopt • the recreational fishery option III (no selective fishery south of Cape Falcon), • troll option III north of Cape Falcon, and troll option II south of Cape Falcon *2/15/00 letter to Jim Greer re PFMC plans* 1. ODFW and PFMC maximize spawner escapement and abundance in the adult recruits of 2000. 2. Where ODFW participates in fishery decisions, ODFW minimize impacts to OCN stocks by not recommending a selective fishery in ocean coho salmon during the year 2000.		Yes Yes Yes Yes
4/1/99 Monitoring letter report to Appointing Authority 1. The Interagency Monitoring Team organization. The monitoring Teams should be organized to effectively address and prioritize key issues, to identify the highest priority questions that are to be answered by monitoring in the context of the goals of the Oregon Plan, and to implement actions. This will result in prioritization of effort and a shift of focus from the tasks in the monitoring program to the goals to be attained. Tasks need to be adopted to answer the high priority questions. We feel this will encourage cooperation and minimize omissions in the scientific approach. 2. The Interagency Monitoring Team should do the following: **Short Term** • Define what constitutes an annual period in the monitoring program. Is it the calendar year, or would some other 12-month period be more logical? • Define what constitutes a comprehensive report of the monitoring effort for this period. It seems logical that this might be the Annual Monitoring Report and the synthesis that results from the Interagency Monitoring Conference. • Establish a schedule for the production of these documents and provide them to the IMST to facilitate our annual review of the monitoring program. • Provide the IMST with specific questions on which scientific guidance is desired. **Long Term** • Develop and adopt a strategy to ensure integrating and synthesizing of monitoring data collected by the agencies, and relate the output to the goals of the Oregon Plan. We think this is particularly important in understanding the relationships between ocean conditions and onshore aquatic habitat conditions. • Encourage cooperation and coordination with the Governor=s Watershed Enhancement Board and the Watershed Councils. • Develop strategies and specific mechanisms to ensure that information from the monitoring program is incorporated into the adaptive management strategies of each agency. Part of this may be various forms of technology transfer. Findings of the Monitoring Team apparently are not being transferred and getting to field level entities responsible for implementing elements of the Oregon Plan (watershed councils, agency field personnel, etc.). We suggest the report for the annual monitoring program should include a section on technology transfer that will facilitate adaptive management actions. 3. The Interagency Monitoring Team has identified ocean and estuarine systems as key components in the Monitoring Plan. These monitoring efforts have not been implemented, yet these environments are a critical part of the habitat. 4. The Manager of the Oregon Plan should evaluate staffing needs and levels devoted to the oversight, management and integrative and synthetic activities of the monitoring program. The Steelhead Supplement pg. 16-33 lists two staff positions that will be funded to		Yes Yes Yes Yes Yes Yes Yes Yes Yes

accomplish this task, but our observation is that these are existing staff members that have been assigned these functions on a collateral duty basis. It is our opinion that this has resulted in inadequate staff time to successfully accomplish the task. 5. The Salmon Core Team should accomplish greater integration and collaboration between federal and state monitoring efforts. The IMST recommends active participation from the Federal Agencies at the Regional and State Office level with State Agencies. This cooperation is critical to any successful species recovery effort, given that essential habitat occurs on both federal and non-federal lands. Disconnected, uncoordinated individual monitoring strategies simply will not be sufficient to provide adequate information to implement adaptive management on the landscape scales that will be necessary to restore aquatic habitats in the Pacific Northwest. After many meetings and even with agreement to coordinate at the policy level, it is clear that State and Federal Agencies are still not very good at working together. We believe it will likely take a concerted effort by agency executives to ensure this goal is achieved at the operating level.		Yes
5/26/00 letter to Geoff Huntington regarding proposals submitted to OWEB Specifically we make four recommendations - the first two deal with the proposals provided, and the second two deal with the process for science review. 1. Fund only the proposal focusing on the Nehalem watershed. This recommendation is based on our assessment that the techniques proposed are in relatively early stages of development and specific experience with them in our context is advised before making additional investments in this area. 2. Request that the investigators determine the degree to which implantation affects the behavior of these fish. We are concerned that the effect of implantation of the devices on the behavior of the fish is unknown. Without a method for determining that the behavior of implanted fish is essentially the same or very similar to "control" wild fish, the results will subject to criticism that the effects noted are the result of implantation and therefore not representative of what we would expect normally in wild fish. 3. Develop a proposal format requirement that is designed for research proposals. With regards to future research proposals to OWEB, we find the format requirements of proposals to OWEB poorly structured for research proposals. Some of the difficulty we had in our review reflects the use of the current forms. The time-tested approach to research proposals used by NSF, USDA competitive grants, and many others will better meet the needs of scientific reviewers and ultimately OWEB. These provide the framework in which ? the hypotheses to be tested can be explicitly stated, ? the methods proposed can be given in enough detail for reviewers to determine if they are likely to work (without the reviewers doing a review of the literature), ? investigators explain how they will go from data collection through data analysis to draw anticipated conclusions, and ? the financial, personnel and other resources needed or available for the project can be displayed. All this information is essential to the quality scientific review called for when expenditures of this magnitude are considered. 4. Expand the scope of science review for research proposals. The IMST can accommodate review of a limited number of research proposals, but we feel it would be useful for you to request review from others as well. As an example, ODFW has technical staff competent to provide scientific review of these proposals. A broader base of review will reduce the potential for institutional or cultural bias, it will more likely result in detection of areas of weakness or strength, and it will serve to inform others of this	Yes	Yes Yes Yes Yes

impending work. In aggregate this may result in improvements in the proposal and the work, and may result in levels of collaboration with others.		
9/6/00 letter to Kay Brown, ODFW, re PFMC process		
The IMST recommended the following conclusions and recommendations be adopted as the ODFW position in the PFMC process to establish harvest levels.	Yes	
Past practices of over-harvest have contributed to the population decline resulting in listing under ESA. Management actions after adoption of Ammendment 13 have not improved conditions, and current management includes irregular and relatively haphazard distribution of carcasses with no link to priorities or expected outcomes. The IMST recommendations that:		Yes
1. ODFW advocate new criteria be incorporated into the matrix of Ammendment 13 to include "very low" OCN coho salmon parent spawner abundance and "very low" marine survival.		Yes
This will strengthen the criteria designed for protection or recovery of populations under extreme conditions. Under these conditions, no directed coho fisheries should be allowed and fishery related impacts should be reduced to the lowest levels possible.		
2. ODFW advocate the applicability of (a) the minimum sustainable escapement (MSE) concept to augment the use of (b) the number of OCN ocean recruits in setting harvest impacts.		Yes
This could provide a safeguard against loss of stocks during the periods of low freshwater or ocean survival. The National Research Council (1996) recommends this methodology to minimize extinction risks of a population or metapopulation and to enhance recovery. Because spawner abundances have been extremely low and recruitment for all three recent brood years (1995, 1996, 1997) has been below replacement, fishery impacts should be as close to zero as possible until established signs of recovery are observed.		
3. ODFW advocate that decisions to change harvest levels incorporate elements of stock abundance over longer periods of time and include considertion of the spatial distribution of stocks.		Yes
The timeframe and spatial distribution of OCN coho salmon stocks is a critical aspect of measuring recovery. Harvest policies should be revised to require responses over sufficient time to indicate real population trends. We offer the following criteria as possible examples to be incorporated into the decision process whereby harvest levels are changed.		
Criterion 1. Stock Abundance. Stock abundance has achieved a defined minimum sustainable escapement before harvest impacts can exceed 10-13%.		
Criterion 2. Duration of Recovery. Stocks have achieved greater than 1:1 spawner-to-spawner replacement for each brood year over at least three brood cycles.		
Criterion 3. Spatial Distribution. Stocks have achieved two consecutive generations of recovery (spawning recruits/parental adult of >1.5) with seeding above level 2 (75% seeding of available habitat).		
4. ODFW advocate initiation of a scientific review of the Fisheries Regulation Analysis Model (FRAM) used to estimate harvest impact on OCN stocks components.		Yes
Such a review might be incorporated into the Year 2000 review of Amendment 13.		
		Yes

5. ODFW advocate adherence to the policy that links decisions on ocean harvest to the status of the weakest stock component. Oregon currently adheres to this requirement, but pressures to allow fishing by sport or commercial fishermen create challenges for following this policy. 6. ODFW advocate determining the relationship between the response of salmon juveniles and their food webs to carcass abundance. Criteria should be developed that consider the impacts of harvest management on carcass abundance and distribution. Strategies for stock recovery need to recognize the role of food resources and carcasses in production of smolts in freshwater habitats. As an example, management criteria could identify minimum numbers of spawners per mile of stream to provide the food base necessary to support young salmon. Current estimates of mortality from non-retention fisheries are highly variable, subject to substantial uncertainty, and cannot be characterized as accurate. Experimental methods are limited and subject to many sources of error. Even low incidental mortality rate of OCN coho salmon could significantly slow recovery for depressed stocks. Scientific review of hook and release mortalities should be an on-going process, as environmental conditions change.		
7. ODFW support PFMC review of hook & release. This is a key factor for impact analysis of fisheries. Analysis of hook & release mortality should continue after 2000 because uncertainty is high and ocean conditions are highly variable.		Yes
8. The IMST recommends that ODFW advocate determination of the degree to which plausible extremes in mortality and in spatial and temporal variation can influence the risk of extinction. Hooking mortality and encounter rates are variable, and sensitivity analysis can help evaluate their impact on probability of extinction. Highly sensitive parameters should be strengthened by monitoring, especially by double-index tagging. The life cycle models developed by ODFW and NMFS (Nickelson and Lawson) are rigorous, but are not being used to their full potential. This model can be strengthened, and additional models can be developed to provide the ability to confirm model performance and identify areas of uncertainty. Several features of the model and information base that could be improved in future model development and applications are 1) scarce data, 2) aggregated functions that should be articulated separately, and 3) incorporation of variability (locally and regionally; short term and long term) into model projections. Currently modeling by PFMC and ODFW uses a static view of future landscape conditions. Restoration of freshwater habitats and future disturbance processes are not considered. Current analyses are dynamic in terms of ocean conditions and fish populations, but they treat watersheds and freshwater habitat as fixed and unchanging. Coordinated analysis of harvest management, monitoring, model applications, and risk assessment would create a more scientifically sound decision-making context for salmon harvest management and allow management to adapt and improve more quickly. Unfortunately we do not find a concrete link between the operation of the model, the monitoring program and the development of harvest management policy. The efforts in SRS monitoring system, basin habitat surveys, life cycle monitoring sites, and life-cycle models would be strengthened if they were integrated into an on-going program of assessment and integration of information and future stock projections.		Yes
9. The IMST recommends that ODFW advocate that PFMC use an explicit analytical process that incorporates monitoring results, harvest records, and the life-history model as part of the		Yes

decision process for harvest levels. This analysis should link spawner surveys, habitat surveys, marine survival or impacts and model projections. It should also be spatially explicit to the greatest degree allowed by the data and model structure.		
10. The IMST recommends that ODFW advocate that PFMC incorporate dynamic and changing landscape conditions in the analytical process to reflect potential habitat restoration, human-related degradation, and natural disturbances. Use of dynamic conditions for both ocean and freshwater environments will provide more realistic projections of future population trends and risks of extinction. Such integration also recognizes regional goals to protect and restore watershed conditions along the Pacific Coast.		Yes
10/25/00 letter to Kay Brown, ODFW, re Hatchery Audit	Yes	
Based upon its review of the Hatchery Audit, IMST recommends:		
1. Develop a strategic plan for the management of hatcheries to be consistent with the goals of the Oregon Plan for Salmon and Watersheds.		No
2. Develop a strategy for evaluating hatchery performance that includes assessing the performance of fish outside of the hatchery (survival of hatchery fish from smolt to adult).		No
3. Develop a strategy for the assessment of the impact of hatchery released fish on the performance, production and survival of naturally spawning wild stocks of fish.		No
4. Include direct and indirect costs in cost-benefit analyses.		No
5. Develop and use a consistent method for (a) evaluating the degree of straying of hatchery fish onto natural spawning beds and (b) assessing the impacts on wild stocks.		No

Appendix 6

Projected Team Budget and Scope of Work for the 2001-2003 Biennium

IMST Scope of Work
July 1, 2001 – June 30, 2003

Logan Norris
January 29, 2001

The IMST has two broad areas of work.

- **Independent projects** dealing with the scientific basis for management of resources and settings relative to the Oregon Plan. These are areas of work identified by the Team as crucial to the programs of the state that influence the outcome of the Oregon Plan. Examples include land use such as the forestry project, hatchery management, fish harvest management etc.
- **Review projects** in which the Team is reviewing ongoing or proposed programs and activities that could influence accomplishing the mission of the Oregon Plan. These are projects that are brought to the Team for our consideration to conduct a scientific review and evaluation. Examples include water temperature standards, monitoring programs, Native Fish Conservation Policy, etc.

The IMST believes that the independent projects should be helpful in shaping the programs of the State and for that reason we have put first priority on them. As State programs are developed, initiated or modified there will be greater need for the Team to emphasize its review function. The independent projects lay the groundwork and background information on which the Team is able to base their reviews. Below we have listed potential projects that the IMST may address during the 2001-2003 Biennium, the projects and their scope may be revised to reflect changes in Team membership.

- Annual Review of the Oregon Plan Monitoring Program (mandatory)
- Comprehensive technical report on the Monitoring Program
- Ocean management
- Implementation of landscape approach and scientific issues
- Toxic substances and fish health
- Impacts of aquatic and terrestrial species on salmonids
- Fish passage
- Flood plain function and water management
- Evaluation of the effectiveness of restoration efforts (using available experimental and monitoring data

We anticipate at least one independent project (Eastern Oregon Resources) started in the 1999-2001 Biennium to continue into the 2001-2003 Biennium but to be completed before new members of the IMST begin their appointments.

Independent Multidisciplinary Science Team
State of Oregon

Program Budget
(Continuing Service Level + Budget Option)
2001-2003 Biennium
8/3/2000

	July 1, 2001-June 30, 2002	July 1, 2002 – June 30, 2003	Biennial Total
Personnel			
Team Members (0.33 FTE rate)			
Buckhouse, Gregory, Kavanagh, Norris, Pearcy	$200,254	$202,851	$403,105
Team Support			
Clerical Assistance (0.40 FTE)	18,273	18,273	$36,546
Literature Assistant (1.0 FTE)	41,010	41,010	$82,020
Research Assistants (3 @ 1.0 FTE)	125,399	125,399	$250,798
Total Team Support	$184,681	$184,681	$369,362
Supplies and Services	$5,000	$5,000	$10,000
Travel and per diem	$15,000	$15,000	$30,000
Total Direct Costs	$404,935	$407,532	$812,467
Indirect Costs (remains to be approved by OSU)	0	0	0
Funds to be transferred to Oregon State University for biennium			$812,467
Contract to Lichatowich (direct from OWEB)	$47,481	$47,481	$94,962
Total Costs	$452,416	$455,013	$907,429

Independent Multidisciplinary Science Team
State of Oregon

Program Budget (Continuing Service Level)
2001-2003 Biennium
8/3/2000

	July 1, 2001-June 30, 2002	July 1, 2002 – June 30, 2003	Biennial Total
Personnel			
Team Members (0.20 FTE rate)			
Buckhouse, Gregory, Kavanagh, Norris, Pearcy	$121,366	$122,940	$244,306
Team Support			
Clerical Assistance (.25 FTE)	10,829	10,829	$21,658
Literature Assistant (.75 FTE)	30,758	30,758	$61,516
Total Team Support	$41,587	$41,587	$83,174
Supplies and Services	$800	$824	$1624
Travel and per diem	$5,344	$8,000	$13,344
Total Direct Costs	$169,097	$173,350	$342,447
Indirect Costs (remains to be approved by OSU)	0	0	0
Funds to be transferred to Oregon State University for biennium			$342,446
Contract to Lichatowich (direct from OWEB)	$28,777	$28,777	$57,554
Total Costs	$197,873	$202,127	$400,000

Independent Multidisciplinary Science Team
State of Oregon

Proposed Program Budget (Budget Option Package)
2001-2003 Biennium
8/3/2000

	July 1, 2001-June 30, 2002	July 1, 2002 – June 30, 2003	Biennial Total
Personnel			
Team Members (0.13 FTE rate)			
Buckhouse, Gregory, Kavanagh, Norris, Pearcy	$78,888	$79,911	$158,799
Team Support			
Clerical Assistance (0.15 FTE)	7,444	7,444	$14,888
Literature Assistant (0.25 FTE)	10,253	10,253	$20,506
Research Assistants (3 @ 1.0 FTE)	125,399	125,399	$250,798
Total Team Support	$143,096	$143,096	$286,192
Supplies and Services	$4,200	$4,176	$8376
Travel and per diem	$9,656	$7,000	$16,656
Total Direct Costs	$235,839	$234,183	$470,022
Indirect Costs (remains to be approved by OSU)	0	0	0
Funds to be transferred to Oregon State University for biennium			$470,022
Contract to Lichatowich (direct from OWEB)	$18,704	$18,704	$37,408
Total Costs	$254,543	$252,886	$507,429

Option Package #119: IMST Support for the Oregon Plan for Salmon and Watersheds

This package provides funding support to continue the current work of the seven-member Independent Multidisciplinary Science Team (IMST) in support of the Oregon Plan for Salmon and Watersheds. Funding for IMST was included in OWEB's 1999-2001 budget in an amount set at $400,000, In December 1999, with the endorsement of the Joint Legislative Committee on Stream Restoration and Species Recovery. The Watershed Enhancement Board authorized an additional $397,000 to enhance the services provided by the members of the IMST in the last 18 months of the budget biennium. The additional funds increased the time allocation of IMST members from approximately .20 FTE to .33 FTE each and allowed for additional research and clerical assistance. As proposed, this budget option package seeks funds in an amount sufficient to continue the current staffing level and commitments by IMST members.

The budget expansion in 1999-2001 was necessary for the IMST to be able to address the greatly expanded scope of the Oregon Plan for Salmon and Watersheds in a timely manner. When the IMST was originally conceived in Senate Bill 924 in the 1997 Legislature, the scope of work was coastal coho salmon and steelhead. In 1999 it was expanded to include all wild salmonids in Oregon. This expansion of responsibility both greatly complicates the work and adds urgency to its completion.

To meet this demand the individual members of the IMST have expanded the proportion of their time allocated to this work to 0.33 FTE. In each case these funds are being used to cover the **responsibility of Team members** in their normal full-time positions. In no case are these funds used as salary augmentation. The IMST support technical staff was also expanded (from one technical literature specialist) by adding three disciplinary specialists (two are specialists in land use and one is a aquatic systems and fish ecology) and additional clerical support. All of the support staff are full time on IMST work and are housed in Richardson Hall at OSU where they are under the direct supervision of the Chair of the IMST.

Previous experience of the IMST indicates that the funding level requested is necessary for completion of the statutory obligations of the Team and for meeting the expectations of the Legislature. The work of the IMST is of two types: Projects that articulate the scientific basis on which land, ocean and fisheries resources can be managed, and Reviews of current or proposed programs of the State of Oregon. Examples of Projects include forest practices, eastern Oregon land **uses and urban land-use management. Examples of Reviews include hatchery audits, monitoring, and native fish** conservation policy.

The results of this work are in reports to the appointing authorities of the IMST and the Legislature with subsequent distribution to Oregon natural resourced agencies and others. Information about the IMST, its current work and its work products are on the following web site: http://www.fsl.orst.edu/imst/index.htm

Total cost: $507,429
FTE: 0
Fund **Source: Measure 66, non-capital**