

August 30, 2007

MEMORANDUM

TO: Oregon Watershed Enhancement Board

FROM: Greg Sieglitz, Monitoring and Reporting Manager

**SUBJECT: Agenda Item K: Research Awards
September 18-19, 2007 OWEB Board Meeting**

I. Introduction

This report seeks Board approval of up to \$3.1 million from the Restoration and Protection Research Fund for funding nine of the 10 research proposals received and reviewed during the spring and early summer of this year.

II. Background

In 1999, the Legislature enacted ORS 541.378 establishing a “Restoration and Protection Research Fund” from all interest earned from Ballot Measure 66 Lottery Funds. The research funds are subject to the 35 percent non-capital and 65 percent capital distribution as are all Measure 66 dedicated lottery funds.

In January 2001, the Board adopted a Research Investment Strategy to guide OWEB funding of research supporting implementation of the Oregon Plan for Salmon and Watersheds. The strategy identified four principles: (1) Identify critical information needs; (2) Fund research projects that address priority needs first; (3) Communicate research results to users; and (4) Evaluate what is learned and determine new priority needs.

In March 2001, the Independent Multidisciplinary Science Team (IMST) reviewed the strategy and identified 12 priority Oregon Plan research needs and ranked them in relative order of importance. After review by stakeholders, the research priorities were adjusted and adopted by the Board in March 2002. Until this biennium, the Legislature directly appropriated research funds for several projects, but had not given OWEB the expenditure authority to allocate these funds at the Board’s discretion as with other grant programs.

For the first time, the 2007 Legislature gave OWEB the expenditure authority for the Board to allocate funds from the Restoration and Protection Research Fund. The Research Fund is projected to achieve approximately \$7.7 million in revenue by the end of the 2007-2009 biennium. The composition of those funds is anticipated to be \$4.93 million in capital and \$2.75 million of non-capital.

III. Research Proposal Solicitation

At the May 2006 meeting, the Board approved the first open solicitation for research proposals in anticipation of the 2007-2009 biennium. The research priorities, adopted by the Board in 2002, were revised to incorporate the draft research priorities developed for the Coastal Coho Conservation Plan last year. This collection of research priorities accompanied the research solicitation materials provided to applicants. OWEB used the Sea Grant Program at Oregon State University (OSU) and the Oregon Plan Monitoring Team (OPMT) to assist in the administration of the research proposal solicitation and review process. Thirty-three research pre-proposals were submitted to Sea Grant in September of 2006. Following review by the OPMT and OWEB staff, 14 applicants were asked to submit full proposals for an extensive independent scientific evaluation. Four of the proponents were asked to work together to develop a single proposal, and a fifth declined the opportunity to submit a full proposal.

Attachment B contains a single page describing the highlights of each the 10 full research proposals submitted, including where the research will be conducted, what it entails, the desired outcome, who is involved, and the requested and recommended funding amounts.

A. Scientific Review

Sea Grant completed the external review of the project proposals requested by OWEB in mid-April 2007. A review of each proposal was conducted by two to five experts in the natural resource sciences from around the nation and several countries. Each reviewer provided a written evaluation and overall qualitative score at the conclusion of the review. Qualitative scores were then converted to a numeric value. Each proposal was considered within the following categories: overall *Rationale* for the proposed work, *Scientific or Professional Merit*, *Innovativeness*, *Qualifications and Past Record of Investigators*, and *User Relationship* (overall utility to end users).

All of the proposals were given scores by each reviewer in the *Good*, *Very Good*, and *Excellent* brackets except one that was given a *Fair* score. Averaging scores among reviewers reveals that 8 of the 10 proposals fall into the *Very Good* rank with the remaining two considered *Good*.

B. Staff Review

Since the conclusion of the Sea Grant review process in April, staff processed reviewers' comments and scores in preparation of selecting the proposals to recommend for Board consideration. Staff reviewed the proposals and reviewers comments and found nine of the ten proposals to have scientific merit, positive external review comments, and sufficient relationship to OWEB priorities and needs to warrant funding. The tenth proposal received the least favorable remarks from the scientific reviewers and is not recommended for funding at this time. On a related note staff are recommending a similar dam removal evaluation for two dams on the Calapooia River in Agenda Item L.

The requested budgets of all 10 research proposals slightly exceed \$4.6 million. As stated above, the Research Fund is anticipated to total \$7.7 million by the end of the 2007-2009 biennium, with \$4.93 million in capital and \$2.75 million of non-capital research funds available. Staff recommend reductions to the funds requested for most of the research proposals in order to spend less than half of the Research Fund revenue available to the Board this biennium. Staff recommend an allocation of Research Funds totaling \$2,964,616

of capital and \$129,154 of non-capital funds. This approach expends a larger amount of the available capital research funds while retaining 93 percent of the non-capital research funds. Staff recommendations for research funding proposals are included in Attachment C to their report.

Implementation of these recommendations will allow for a significant investment in a variety of important and relevant research projects, while retaining a large proportion of the research funds for a second more targeted research offering later in the biennium; this will also give the Board some flexibility to make more strategic investments as discussed at the July 2007 Planning Session.

IV. Future Research Solicitations

Staff will develop a schedule and plan of research offerings for the remainder of the 2007-2009 biennium based on the July 2007 Board Planning Session discussion. This package will focus on the Board's desire to establish a strategic approach to offering and awarding research funding based on investing in research that: (1) has relevance to OWEB's core programs; (2) is likely to be completed or yield results before 2014, and (3) focuses on the types of questions that have the greatest need to be answered by 2014. Staff will also develop a strategy that considers the use of some research non-capital funds for other types of grant offerings. Presentation of this strategy to the Board is targeted to occur before the spring of 2008.

V. Recommendation

Staff recommend the Board approve the staff funding recommendation for research proposals as contained in Attachment C to this report.

Attachments

- A. Research Priorities – March 2002 REVISED June 2006
- B. Research Proposal Highlights
- C. Research Proposals Funding Recommendations

**Oregon Watershed Enhancement Board
Research Priorities – March 2002 revised June 2006**

I. Highest Priority Information Needs for the Oregon Plan

1. Assess the status of watershed health as indicated by anadromous salmonid stocks (coho, chinook, and chum salmon, sea-run cutthroat trout, and steelhead), and the risk for their extinction by integrating dynamic ocean conditions, habitat availability and quality, and human activities.

The IMST has identified the importance of adopting a landscape context for the Oregon Plan, and the need for long-term perspectives that incorporate changing conditions in terrestrial, freshwater, and ocean ecosystems. The IMST identified several components needed to support these overall research goals. These include:

- Research that aids understanding of interactions among basin populations, metapopulations, ocean survival rates, life history stage (survival) trends, and population viability.
- Analysis and integration of information from habitat assessments and salmon spawner or juvenile surveys with models that assess salmon population trends and population dynamics and to conduct sensitivity analysis of models and model parameters.
- Research that compares distribution of spawner abundance relative to spawning habitat of differing quality.
- Evaluation of the ability of current monitoring and research programs to provide data required for life-cycle modeling and to measure the following: 1) recolonization of habitats as stocks recover, 2) straying rates, 3) distribution of spawners across their ranges, 4) degree of unoccupied habitats, and 5) variable effects of ocean survival rates within and among Gene Conservation Groups.
- Strengthen life-cycle modeling concepts and apply them to broader ranges of land use and management questions.
- Research that identifies the relationships between landscape dynamics and aquatic resources and their habitats.

II. High Priority Information Needs for the Oregon Plan

A. Related to Watershed Conditions

1. Determine how changes in land use and land cover, including riparian and upland vegetation, can affect salmonid habitat quality.

Remote sensing and ground surveys are needed to establish baseline data and to compare them to historical records in order to conduct trend assessments of watershed and habitat conditions. Currently, remote sensing has not been used to its fullest potential under the Oregon Plan. Determine the accuracy of various remotely sensed data and the proper scales at which they should be used.

2. Determine relationships between population trends of fish and wildlife and land use/land cover changes.

Research is needed to estimate: 1) the past abundance and distribution of salmon throughout the landscape, 2) the changes in abundance and distribution through time, and 3) the changes in habitat type and availability that have occurred as estuaries, rivers, and streams have been modified to accommodate a variety of human activities.

B. Specifically Related to Fishery Management

1. Determine the effects of wild-hatchery fish interactions and the impacts of hatchery management programs on wild stocks. Test the assumptions about survival differences between hatchery and wild fish.

Few studies have tracked the effects of interactions between hatchery and wild fish on the long-term persistence of wild populations. Future research should include both genetic analysis and ecological analysis of the effects of competition.

2. Determine the origin and the temporal and spatial distribution of wild ocean-caught fish.

Research is needed to determine which freshwater populations are altered by ocean harvest, and when, where, and how many fish are encountered. Harvest management decisions and policies will not be effective for protecting critically low populations without this information.

3. Determine the spawning escapement rate of steelhead.

There are comparatively few steelhead survival data due to difficulties in monitoring both juvenile migrants and adult returns. Little is known about both freshwater and marine survival of steelhead. There is a need for increased emphasis on monitoring the spawning escapement of steelhead to obtain better estimates of survival and abundance.

4. Determine the genetic basis of various life history strategies in salmonids.

Environmental and genetic controls of life-history paths need to be determined so genetic life history stages can be preserved on both the population and metapopulation levels. The diversity in migration times, spawning times, and unique life history paths (e.g. residual fish and precocial males) should be preserved to maintain a population's resiliency.

III. Moderate Priority Information Needs for the Oregon Plan

1. Determine the impacts of declining wild salmonid populations on ecosystem processes.

Examples of research needs include, but are not limited to:

- Determining the response of juvenile salmonids and their food webs to carcass abundance and how many spawners are needed to support the next generation of developing salmonids. Experiments are needed to establish this relationship and to determine the processes involved. This is crucial when available carcass numbers are low.
- Determining the effects of hatchery releases on the same and other species. Ecosystem attributes to consider include stream and ocean carrying capacity, biodiversity, life history diversity, the effects of inter- and intra-specific competition, diseases, and ocean trends and climate conditions.

2. Determine the effects of predation on salmonid recovery and how predation interacts with other environmental factors.

A holistic approach is required to evaluate predation in comparison with other causes of population declines and to effectively undertake management actions. The information required for this purpose is not currently available.

IV. Low Priority Information Needs for the Oregon Plan

1. Determine the impacts of non-indigenous (exotic) aquatic and terrestrial species on salmonid recovery.

The extent of deleterious effects from non-native species on salmonids and their recovery and the overall effect of non-native species on the health of natural ecosystems in the state are not known.

2. Determine the cause and effects of disease, tumors, and other abnormalities of fish on the population dynamics of the fish and the implications for ecosystem and human health.

The extent and consequences of an increase in the incidences of diseases, tumors, and physical abnormalities and their epidemiology is not fully known but may have the potential to prevent some salmonid stocks from fully recovering.

Additional Research Priorities for OWEB Research Solicitation 2006

I. Oregon Coastal Coho Recovery Plan Research Priorities

Prioritization of *potential* Research, Monitoring and Evaluation Needs related to the Conservation Plan.

Top Tier RME

- Verify results of Coho Winter High Intrinsic Potential habitat model.
- Evaluate effects of marine mammal and avian predation on salmonids in Oregon coastal rivers especially regarding achieving desired status goals.
- Evaluate effectiveness of restoration actions.
- Evaluate methods to support management of beaver populations

Middle Tier RME

- Tools to identify and prioritize restoration projects at local watershed and stream-reach scales;
- Evaluate re-establishment of a self-sustaining population of coho in Salmon River.

Lower Tier RME

- Marine derived nutrient (salmon carcasses) benefits to coho.
- Document actual versus permitted water use
- Evaluate land values to support new incentives to fund CREP and other long term conservation contracts.
- Methods to remediate the primary factors limiting the production of coho from Tahkenitch, Siltcoos, Tenmile, and Floras Lakes;
- Impacts of hatchery programs (species other than coho salmon, including effects of Columbia River Releases).

Research Proposal Highlights

Application #208-8000

Project Name: Evaluating the Role of Dam Removal for Salmon and Sucker Recovery in Oregon.

Where the research will be conducted: Klamath and Rogue River basins: Chiloquin Dam on the Sprague River and Savage Rapids Dam on the Rogue.

What does the research entail: *Objective 1:* Determine the reliability of bio-indicators for detecting biological responses that are relevant to small dam removal. Benthic macro-invertebrates will be evaluated as indicators of ecological change associated with dam removal, complimenting ongoing fish studies being conducted by various agencies (e.g., USGS, ODFW, and USFWS).

Objective 2: Implement protocols to document the rate, magnitude, and spatial extent of dominant geomorphic processes. High resolution channel surveys, surface and subsurface sediment sampling, and habitat assessments will be performed to document, analyze, and interpret geomorphic processes associated with dam removal.

Objective 3: Inform and link the science, practice, and monitoring of dam removal both regionally within Oregon and nationally for the United States.

What is the desired outcome: A fundamental outcome of the proposed research is the documentation of physical and biological responses of the Sprague and Rogue rivers to dam removal.

Who is involved: Oregon State University, Biological and Ecological Engineering; Geosciences; and Civil Engineering, Drs. Desiree Tullos, Gordon Grant, Wayne Huber.

Funds Requested: \$426,354; Capital-\$385,134 & Non-Capital-\$41,220

Match Provided: \$136,519

Funding Recommendation: Do Not Fund

Recommended Funding Amount: \$0

Research Proposal Highlights

Application #208-8001

Project Name: Effects of Contemporary Forest Harvest on Aquatic Ecosystems in Trask, Hinkle, and Alsea Watersheds.

Where the research will be conducted: The North Coast and Umpqua basins; specifically the Trask and Alsea rivers and Hinkle Creek.

What does the research entail: Three watershed studies (Trask River, Hinkle Creek and Alsea Revisited) described in this proposal are evaluating the question “Are contemporary forest management strategies adequate to sustainably meet Oregon Plan goals for this state’s forested watersheds?” Specifically, the responses of aquatic systems to forest harvest in headwaters, and quantifying downstream impacts are being examined. There are multiple hypotheses, with the overall objectives to investigate: 1) the effects of forest harvest on the physical, chemical and biological characteristics of small headwater streams; and 2) the extent to which alterations in stream conditions caused by harvest along headwater channels influences the physical, chemical and biological characteristics of downstream fish-bearing streams. Hinkle and Trask are investigating linkages between small streams and downstream fish bearing streams for multiple parameters. Alsea is a smaller area but has long-term data to compare impacts of contemporary forest practices with those from historic logging. The Alsea also will investigate the effect of instream wood placement on fish habitat and fish populations.

What is the desired outcome: The findings will benefit state and private forest landowners and natural resource managers by expanding the understanding of linkages between forest practices, aquatic habitat, and fish. This improved understanding will enable state and federal agencies to develop and refine forest management strategies that protect and restore aquatic habitat while enabling forest owners to profitably manage their lands.

Who is involved: Oregon State University, Forest Engineering; Dr. Arne Skaugset. U.S. Forest Service, PNW Research Station; Dr. Sherri Johnson. U.S. Geological Survey, Forest and Rangeland Ecosystem Science Center; Dr. Jason Dunham. Weyerhaeuser Company; Dr. Bob Bilby. Oregon State University, Department of Fisheries & Wildlife; Drs. Dave Wooster and Judith Li. National Council for Air and Stream Improvement; Dr. George Ice. Oregon Department of Forestry; Liz Dent.

Funds Requested: \$499,384; Capital-\$426,106 & Non-Capital-\$73,278

Match Provided: \$400,000

Funding Recommendation: Fund at Reduced Amount

Recommended Funding Amount: \$400,000; Capital-\$395,000 & Non-Capital-\$5,000

Research Proposal Highlights

Application #208-8002

Project Name: Fiber-optic Observation of Stream Function and Condition: Demonstration and Application.

Where the research will be conducted: The Walla Walla River Basin.

What does the research entail: This project is designed to test the utility of using a Fiber Optic Distributed Temperature Sensing (DTS) system for monitoring of stream and air temperature. The proposed work has three major components: field measurement, numerical modeling, and collaborative data interpretation. The DTS systems will be installed with three of the fibers in water and one fiber used to monitor air temperature and solar exposure above each of the stream sections in sequence. Along these 12 kilometers of fiber optic cable, a network of 10 SensorScope micro-meteorological stations will be installed to continuously report air temperature, relative humidity, solar radiation, soil moisture content, soil matric potential, wind speed and direction, rainfall, and surface temperature (IR). These continuous field measurements will be complemented by monthly site visits to characterize shade conditions, measure stream temperatures, bed temperatures, and measure stream flow. By having tight constraints on environmental variables and stream temperature, we expect to be able to estimate the thermal inertial imposed by the hyporheic flow.

What is the desired outcome: Demonstrate the use of DTS methods to monitor stream temperature. Publicize a validated stream temperature model that allows users to estimate locations and magnitudes of critical stream temperature features. The model will allow forecasting of stream conditions to assist managers in allocating water in a predictable, optimized approach to obtain the greatest benefit to habitat and economic interests. Training of watershed staff and project graduate students to use and interpret DTS data and stream temperature modeling methods.

Who is involved: Oregon State University, Biological and Ecological Engineering: Dr. John Selker.

Funds Requested: \$641,756; Capital-\$596,756 & Non-Capital-\$45,000

Match Provided: \$160,919

Funding Recommendation: Fund at Reduced Amount

Recommended Funding Amount: \$325,000; Capital-\$280,000 & Non-Capital-\$45,000

Research Proposal Highlights

Application #208-8003

Project Name: Recovery of Wild Coho Salmon in Salmon River Basin

Where the research will be conducted: The North Coast Basin, specifically the Salmon River.

What does the research entail: The researchers will monitor the Salmon River coho salmon population across habitat types and life history stages to identify population responses on a landscape scale. As a conceptual framework, other analysis will be guided by the “viable salmonid population” criteria identified by McElhany (2000) and modified by Chilcote et al. (2005) and Nicholas (2006), including abundance, productivity, distribution, diversity, and habitat quality. The approach will integrate original research, existing Oregon Plan monitoring, and past research in Salmon River (Mullen 1978, 1979; Cornwell et al. 2001; Bottom et al 2005; Volk et al. unpublished) to test the following general hypotheses: 1) no change in viability metrics (abundance, distribution, productivity, diversity) will occur following cessation of the hatchery coho program; 2) quality or quantity of stream habitat does not limit wild coho salmon production in Salmon River; and 3) non-wadeable streams and estuarine habitats (natural and restored) do not provide rearing habitat that contributes to coho salmon recovery. By synthesizing historic data with new information collected by the research activities, population structure during three distinct periods: pre-hatchery (1974-77), hatchery (1990-2008), and post-hatchery (2009-2013) will be compared.

What is the desired outcome: This study will document the changes in population abundance, distribution, and life history structure of coho salmon following the removal of hatchery coho salmon from the watershed. Research findings will demonstrate the link between productivity and survival at each life stage to the recovery of the adult population and will highlight the potential resiliency of coho salmon, detail the biological benefits/tradeoffs to returning to natural production, and assess whether supplementation should remain an option in Salmon River. This research program will have broad implications for salmon management in other coastal basins.

Who is involved: Oregon Dept Fish & Wildlife, Conservation and Recovery Program; Kim Jones, David Hering, and Trevan Cornwell. National Marine Fisheries Service; Dan Bottom.

Funds Requested: \$749,335; Capital-\$742,305 & Non-Capital-\$7,030

Match Provided: \$510,177

Funding Recommendation: Fund at Reduced Amount

Recommended Funding Amount: \$400,000; Capital-\$396,160 & Non-Capital-\$3,840

Research Proposal Highlights

Application #208-8004

Project Name: Effects of Tide Gates on Juvenile Coho Movement and Residence Time in Estuarine Habitats.

Where the research will be conducted: The Coos River Basin on the South Coast, specifically Palouse, Larson, and Winchester creeks.

What does the research entail: The general goal of the proposed project is to assess the effects of tide gates on juvenile salmonid migration patterns and estuarine habitat utilization. The study will focus on coastal coho salmon because their poorly understood estuarine-life-history type is likely to be the most affected by tide gate operation. Although there is a broad spectrum of tide gates with “fish friendly” designs (see Giannico and Souder 2005 for examples), this study will focus on the two most prevalent types in the Pacific Northwest: the original top-hinged version and the relatively newer side-hinged type. The project’s specific objectives are: 1) to determine the effects of top-hinged and side-hinged tide gates on seasonal and diel changes in water depth, temperature, salinity, and dissolved oxygen in the adjacent creek and marsh channels; 2) to assess differences between top-hinged and side-hinged tide gates regarding opening time and duration, as well as water flow during critical fish passage periods; 3) to determine differences in the proportions of sub-yearling and yearling (smolt) coho salmon that reach the mouth of creeks and pass through a top-hinged vs. a side-hinged tide gates; 4) to determine the proportions of sub-yearling coho salmon that migrate back upstream during early fall through a top-hinged vs. a side-hinged tide gate; 5) to characterize coho salmon seasonal use of and residence times in habitats immediately above and below tide gates; and 6) to establish if tide gate presence and type affects sub-yearling and yearling coho salmon condition factor, growth and survival rates.

What is the desired outcome: To provide managers with an understanding if and how tide gates affect juvenile salmonid movement, and, if a “fish friendly” tide gate design may improve juvenile fish passage in both directions over what traditional top-hinged gates allow. The project findings will be broadly applicable to estuarine habitat conservation and restoration and coho salmon recovery.

Who is involved: Oregon State University, Fisheries and Wildlife; Dr. Guillermo Giannico. Coos Watershed Association; Dr. Jon Souder.

Funds Requested: \$267,121; Capital-\$234,180 & Non-Capital-\$32,941

Match Provided: \$111,446

Funding Recommendation: Fund

Recommended Funding Amount: \$267,121; Capital-\$238,180 & Non-Capital-\$28,941

Research Proposal Highlights

Application #208-8005

Project Name: Reconstructing Water Temperatures in Oregon Streams through Analysis of Growth Increments in Long-lived Pearlshell Mussels.

Where the research will be conducted: The study will include four sites representative of diverse climatic regimes: the Alsea River in the coastal forests of western Oregon, the Middle Fork of the Willamette River, Steamboat Creek at higher elevation in the western Cascades, and the Malheur River in the semi-arid, continental climate of eastern Oregon.

What does the research entail: The objectives of this study are to develop and validate methods for building freshwater mussel chronologies and relating those chronologies to the physical environment. These methods will be based on techniques developed by dendro-chronologists, which have been applied on a diverse assemblage of tree species around the world and are now being used on other long-lived animal species (rockfish and marine bivalves) in the Pacific Northwest (e.g., Black et al. 2005). At each site, the researchers will rigorously apply dendro-chronology (tree-ring) techniques to: 1) ensure all mussel growth increments are assigned the correct calendar year using the dendro-chronology technique of cross dating; 2) build high resolution, multi-decadal chronologies that capture variability on a range (inter-annual to decadal) of timescales; 3) establish climate-growth relationships using available records of stream temperature (Middle Fork Willamette River and Steamboat Creek) and flow, as well as regional measures of air temperature and precipitation (all sites); and 4) use mussel chronologies and climate-growth relationships to reconstruct thermal regimes over periods longer than those provided by instrumental records. Strengths of the chronologies and climate-growth relationships will be compared among these diverse regions to determine which climatic variables are captured by freshwater mussel growth. This will represent the first rigorous evaluation of this approach for applications in North America.

What is the desired outcome: The main outcome of this study will be the development of techniques for building mussel chronologies and climate reconstruction with potentially widespread application in Oregon streams.

Who is involved: Oregon State University, Hatfield Marine Science Center; Dr. Bryan Black. U.S. Geological Survey, Forest and Rangeland Ecosystem Science Center; Dr. Jason Dunham.

Funds Requested: \$47,649; Capital-\$45,899 & Non-Capital-\$1,750

Match Provided: \$99,572

Funding Recommendation: Fund

Recommended Funding Amount: \$47,649; Capital-\$46,649 & Non-Capital-\$1,000

Research Proposal Highlights

Application #208-8006

Project Name: Linking Coldwater Refuges into a Framework for River and Floodplain Restoration.

Where the research will be conducted: The mainstem Willamette River between Eugene and Albany.

What does the research entail: The researchers will map thermal refuges in the Willamette River between Albany and Eugene. A database will be used to predict dynamic features that create cold water refuges. The composition of fish assemblages that use these thermally distinct habitats, based on sampling known cold water and warm water habitats during July to September, will be identified. Researchers will sample equal numbers of lateral habitats that are cold water, warm water, and ambient with beach seines and a combination of boat electro-shocking and backpack electro-shocking. Cutthroat trout will be fitted with radiotags, PIT tags, and ibuttons. The trout will be placed in live cages for four weeks in cold water, warm water, and ambient temperature lateral habitats. The potential ecosystem services provided through floodplain and river restoration and protection will be articulated. A spatially explicit map of the current active channel and floodplain and thermal distributions in July through September and create companion maps of historical and existing floodplain characteristics will be generated. Candidate locations for coldwater stepping stones that a) do not exceed effective travel distances, b) offer high biophysical potential for restoring coldwater refuges, and c) present low socio-economic obstacles to restoration will be depicted and described.

What is the desired outcome: This study will result in two to three on-the ground restoration projects to demonstrate the relevance of cold water habitat to native fish and the use of floodplain restoration to address on-going challenges of addressing the state's temperature management challenges. This approach will be directly transferable to all Oregon streams and rivers where thermal environments create challenges for aquatic communities and restoration efforts of the Oregon Plan for Salmon and Watersheds.

Who is involved: Oregon State University, Fisheries and Wildlife; Dr. Stan Gregory. University of Oregon; David Hulse.

Funds Requested: \$628,311; Capital-\$627,311 & Non-Capital-\$1,000

Match Provided: \$186,662

Funding Recommendation: Fund at Reduced Amount

Recommended Funding Amount: \$450,000; Capital-\$449,000 & Non-Capital-\$1,000

Research Proposal Highlights

Application #208-8007

Project Name: Mapping Current Conditions and Modeling the Dynamic Responses of Riparian Vegetation and Salmon Habitat in Oregon.

Where the research will be conducted: The North Coast and John Day basins, specifically; the Nehalem River and Middle Fork John Day River basins.

What does the research entail: The proposed research integrates riparian zone mapping with dynamic models to evaluate the response of riparian zones, stream channels, and salmon habitat to natural disturbance and land-use activities. The proposal has two components: 1) remote sensing and riparian mapping; and 2) riparian and aquatic modeling.

What is the desired outcome: The overall objective of this work is to produce a decision support tool for habitat restoration planning that incorporates advanced remote-sensing technology and information about disturbance-recovery processes with existing knowledge of critical habitat needs for salmonids. The objective of the mapping component is to explore different methods for mapping riparian and in-stream conditions using Landsat, LiDAR, and NAIP imagery, and to use these methods to delineate, classify and map the attributes of riparian zones needed for riparian assessment and monitoring and to support the modeling component. The objective of the modeling component is to examine current conditions relative to the historic range of variability, examine the potential of passive restoration to meet recovery goals, and examine the potential of active restoration to accelerate recovery.

Who is involved: USDA Forest Service, PNW Research Stations in Corvallis and Olympia; Drs. Steve Wondzell, Kelly Burnett, Janet Ohmann, Warren Cohen, Miles Hemstrom, Peter Bisson and Jimmy Kagan, Oregon State University, Institute for Natural Resources.

Funds Requested: \$745,711; Capital-\$727,491 & Non-capital-\$18,220

Match Provided: \$220,808

Funding Recommendation: Fund at Reduced Amount

Recommended Funding Amount: \$640,000; Capital-\$624,500 & Non-capital-\$15,500

Research Proposal Highlights

Application #208-8008

Project Name: Development of Physiological Health Criteria to Assess Habitat Quality in Degraded and Recovering/Restored Stream Systems.

Where the research will be conducted: The John Day and Deschutes basins; specifically, the South Fork John Day, Bridge Creek, and the Crooked River.

What does the research entail: The goal is to evaluate the utility of physiological metrics to understand how changes in stream habitat quality (specifically temperature) affect individual fish performance. From this the researchers expect to be able to create physiologically-based threshold temperature targets to be used in monitoring restoration efforts as a complement to monitoring population change. Specific objectives include 1) testing the patterns of Heat Shock Protein (HSP) induction and whole body lipid levels; 2) evaluating whether growth rates truly differ for those animals that are under thermal stress (water temperatures > 22 C) and that fail to accumulate lipid during the summer; and 3) determining whether any growth differential can be explained by the impacts of the temperature differential (increased metabolism, decreased appetite) or are there other factors, including differences in prey availability, that can explain the inability of fish in warm stream segments to accumulate energy reserves.

What is the desired outcome: At the end of the project it is expected that evidence will suggest that the HSP-whole body lipid paradigm exists outside of the South Fork John Day, and that growth rates are linked to stream temperature, lipid accumulation rates, and induction of HSPs. From this information explicit, physiologically based thermal habitat quality categories can be defined, and this assessment tool for thermally impacted streams can be used to supplement population monitoring to evaluate the effectiveness of habitat restoration efforts.

Who is involved: Oregon State University, Fisheries and Wildlife; Drs. Scott Heppell, Guillermo Giannico, Hiram Li, and Peter Bayley.

Funds Requested: \$244,763; Capital-\$233,363 & Non-capital-\$11,500

Match Provided: \$104,865

Funding Recommendation: Fund at Reduced Amount

Recommended Funding Amount: \$240,000; Capital-\$235,500 & Non-capital-\$4,500

Research Proposal Highlights

Application #208-8009

Project Name: Integrated Dynamic Landscape and Coho Salmon Model.

Where the research will be conducted: Oregon Coast Range.

What does the research entail: The overall goal of the project is to develop a set of tools that can be used to model and evaluate habitat conditions on the Oregon Coast Range at landscape scales and to understand the relationship between these conditions and coho salmon through multiple life stages. Objectives are to: 1) improve understanding of the relationships between upslope, riparian, and in-stream habitat and coho salmon abundance; 2) produce a landscape dynamic model for Oregon Coastal river basins that can be used to help understand the dynamic interactions between geomorphology, land use, and land cover and their effects on stream habitat quality for coho salmon; 3) link a coho salmon life-cycle model with the landscape dynamic model to help understand relationships between landscape processes and coho salmon viability, abundance, distribution, and metapopulation dynamics; 4) provide a set of tools that can be used by scientists and managers to help design effective and efficient restoration strategies and projects; 5) conduct a preliminary analysis of effects of potential land-use policies in the Nehalem River basin on coho salmon viability over the next 100 years; and 6) establish a basis for future work exploring the effects of environmental conditions in both marine and freshwater, harvest, and climate change.

What is the desired outcome: This set of products will give OWEB and other managers a better understanding of the landscape-scale processes operating in the Oregon Coast Range and the relationship between coho salmon and these processes. The tools provided will be useful for designing habitat restoration projects and evaluating coho salmon abundance, distribution and viability on short and long time frames.

Who is involved: National Marine Fisheries Service, Northwest Fisheries Science Center Newport and Seattle; Drs. Peter Lawson and Ashley Steel. USDA Forest Service, PNW Research Station Olympia and Corvallis; Drs. Steve Wondzell and Kelly Burnett. Earth Systems Institute, Seattle; Dr. Daniel Miller.

Funds Requested: \$352,914; Capital-\$324,541 & Non-capital-\$28,373

Match Provided: \$197,669

Funding Recommendation: Fund at Reduced Amount

Recommended Funding Amount: \$324,000; Capital-\$299,627 & Non-capital-\$24,373

Research Proposals Recommended for Funding

App #	Region	Project Name	Category of Research	Capital	Non-Capital
208-8001	1,2	Effects of Comtemporany Forest Harvest on Aquatic Ecosystems in Trask, Hinkle and Alsea Watersheds*	Effectiveness(IMW)	\$395,000	\$5,000
208-8002	5	Fiber-optic Observation of Stream Function & Condition: Demonstration & Application*	Indicator of Conditions	\$280,000	\$45,000
208-8003	1	Recovery of Wild Coho Salmon in Salmon River Basin*	Hatchery/Wild Fish Interaction	\$396,160	\$3,840
208-8004	2	Effect of Tide Gates on Juvenile Coho Monvement & Residence Time in Estuarine Habitats	Effectiveness(Project)	\$238,180	\$28,941
208-8005	SW	Reconstructing Water Temperatures in Oregon Streams through Analysis of Growth Increments in Long-lived Pearshell Mussels	Indicator of Conditions	\$46,649	\$1,000
208-8006	3	Linking Coldwater Refuges into a Framework for River & Floodplain Restoration*	Landscape Evaluation(Cutthroat)	\$449,000	\$1,000
208-8007	1,5	Mapping Current Conditions & Modeling the Dynamic Responses of Riparian Vegetation & Salmon Habitat in Oregon*	Landscape Evaluation(Coho)	\$624,500	\$15,500
208-8008	5	Development of Physiological Health Criteria to Assess Habitat Quality in Degraded & Recovering/Restored Stream Systems*	Indicator of Conditions	\$235,500	\$4,500
208-8009	1	Integrated Dynamic Landscape & Coho Salmon Model*	Landscape Evaluation(Coho)	\$299,627	\$24,373
Total Funding Recommended				\$2,964,616	\$129,154

* Recommended for funding at a reduced amount

Research Proposals Not Recommended for Funding

App #	Region	Project Name	Category of Research	Capital	Non-capital
208-8000	2,4	Evaluating the Role of Dam Removal For Salmon & Sucker Recovery in Oregon	Dam Removal	\$385,134	\$41,220