



# Oregon

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Oregon Watershed Enhancement Board

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August 29, 2008

## MEMORANDUM

**TO:** Oregon Watershed Enhancement Board

**FROM:** Greg Sieglitz, Monitoring and Reporting Program Manager

**SUBJECT:** **Agenda Item M: Monitoring and Research Update  
September 16-17, 2008 OWEB Board Meeting**

### I. Introduction

This report provides an update on the Monitoring and Research programs. The report proposes a specific plan of action for utilizing the \$2 million reserved for monitoring as recommended in the spending plan contained in the staff report for Agenda Item D. Staff propose some alternative grant offerings for the October 2008 grant cycle and for early 2009. The report also requests Board action on funding the Non-pareil Dam/Umpqua Coho Pedigree Research Project.

### II. Background

OWEB has funded Monitoring projects through competitive grant offerings and direct Board awards for many years. The first Research solicitation was offered last year following approval of the OWEB Budget by the 2007 Legislature. In prior biennia, a small number of Research projects were funded directly by the Legislature.

At the Board's planning session held July 18-19, 2007, in Maupin, Board members expressed intent to consider targeted solicitations for a variety of OWEB grant offerings. There was an explicit recognition that the Monitoring and Research grants can and do fill a niche of providing scientific evaluation and discovery that assists in characterizing past accomplishments and describing progress toward goals and objectives of OWEB's programs. Particular interest was expressed by the Board to establish a Monitoring and Research Subcommittee that would work with staff to develop a set of recommendations for the full Board to consider prior to the 2008 grant solicitation for these two grant types. The subcommittee is comprised of Board members Meta Loftsgaarden, Ken Williamson, and Bobby Brunoe, and is staffed by Greg Sieglitz and Courtney Shaff.

At the planning session, it was established that monitoring projects have the capacity to provide data and information that is useful in describing accomplishments undertaken to further the objectives of Measure 66, the Oregon Plan, Recovery Plans, the Pacific Coastal Salmon Recovery Fund, and other large initiatives. It was recognized that without clear targets for prospective grantees to design their work towards, the agency is not likely to have all of its objectives met through these grants. Similarly, with the potential Board offering of an additional Research solicitation this biennium, and the often long-term nature of both monitoring and

research investments, it is important to act soon in establishing priorities and targets for future grant offerings. These themes have been used to guide the work of the Subcommittee.

### **III. Monitoring Program Update**

The following lists the variety of topics that the Subcommittee discussed during their meetings:

- Monitoring and Restoration Grant Administration
- Rogue and Grande Ronde Basins
- Fish and Water Quality Monitoring
- Intensively Monitored Watersheds
- Small Dam Removal
- Wetlands
- Juniper
- Urban
- Monitoring Projects and Outcomes

For each topic, the Subcommittee identified specific areas that would provide progress toward meeting the Board's objectives expressed in Maupin, either through modification to existing processes or the addition of new opportunities.

At the May 2008 Board meeting, following a discussion in detail about each of the topics shown above, Board members agreed that staff should move forward with an evaluation of which Subcommittee recommendations could be implemented with the October 2008 grant cycle or through other funding tools. The discussion below sets out the staff evaluation and includes spending plan recommendations.

#### **A. General Considerations when reviewing grant applications during the next grant cycle.**

- 1. Requiring consistent information** from grantees, and requiring that information to end up in a place (repository) that is easily accessible to others, is an important first step to making data and information readily available for analysis and distribution to the public.
- 2. Monitoring should be connected to restoration projects** whenever possible when the primary objective of the project is educational monitoring. When the logistics and conditions are favorable, OWEB should encourage grantees to site educational monitoring projects on OWEB funded restoration projects. This could provide better a better way to connect the public to OWEB funded restoration projects and could provide more project monitoring and potentially at a reduced cost.
- 3. Better linkage to Total Maximum Daily Loads (TMDLs)** will enhance OWEB's ability to characterize the value of its investments. A stronger assessment of the value provided by riparian projects to the prevention of stream warming is one example. Modeling the British Thermal Units (BTUs) saved through exiting or future riparian projects, as compared to pre-project conditions, could provide information about the value and relevance of OWEB-funded projects to other agency programs.

**4. Reporting results needs to span multiple years** in order to establish trends and provide meaningful information to the public. Annual variation, if not taken in context, is not likely to reveal compelling information nor be an especially useful tool to build citizen understanding (the annual salmon return rate for a population is a good example). Both the monitoring projects and subsequent reports need to be structured around the appropriate number of years to provide meaningful results.

## **B. Monitoring and Restoration Grant Administration**

There are several areas of improvement in the administration of the monitoring and restoration programs that the subcommittee identified as immediate priorities that are described below.

### **1. Protocols**

Not unlike restoration projects, monitoring projects are often successful or not based on the methods used and a clear articulation of the problems or questions that are attempting to be addressed with the action. In restoration grants, guidelines and prescriptions are often established after years of testing and analysis to determine the methods most appropriate and successful for given circumstances and conditions. Protocols established for monitoring activities are very similar to this. In the case of OWEB grants, the agency does not presently identify or endorse specific protocols for most monitoring activities. Until 2006, when the grant application was modified to request information about protocols, the protocols being used by a prospective grantee were not known in many cases.

Through the Pacific Northwest Aquatic Monitoring Partnership (PNAMP), a variety of protocols related to aquatic monitoring parameters were evaluated and compiled into a list of recommended protocols. OWEB will use this list to inform specific monitoring grant types and make the protocols available to prospective grantees. OWEB staff will look into opportunities for training grantees in the use of new protocols where traditionally different methods have been used.

### **2. Monitoring Grant Database**

As discussed in May, the establishment or identification of a single repository for collecting data under OWEB monitoring grants at the conclusion of the projects is an important mechanism to ensure expedited data capture and retrieval. The Board recognized that data used to demonstrate agency accomplishments should not be difficult to find or report and that we should have data sent to a central location in order to make it accessible to OWEB staff, particularly as we approach 2014. OWEB staff will continue efforts in establishing a database and mapping system that will provide access to data derived from and information about monitoring grants funded by the agency.

### **3. Restoration Status Reports**

Another source of underutilized information that OWEB requires all grantees to provide is the status report produced for restoration projects. The Board recognized that while collecting status reports for each restoration project is valuable, housing this information in paper reports in hard-copy grant files is not the most useful means for generating an understanding of what we have learned or gained as an organization from our collective

investments. OWEB staff will move forward with an initiative to develop a database, data capture, and reporting processes for these reports

#### **4. Post-Project Monitoring Data**

A final area of improvement recommended by the Subcommittee, and adopted by the Board in May, is the establishment of an electronic repository of at least some of the information obtained from the post-project monitoring of restoration projects. The Subcommittee suggested staff consider the possibility of contracting for services to develop these databases and electronic means of information capture. Staff will embark on this effort beginning this winter.

### **C. Other Monitoring Investment Areas**

#### **1. South Coast and Grande Ronde Basins**

The South Coast and Grande Ronde basins were selected as pilot projects in 1992 to establish locally based watershed council organizations designed to engage citizens in an effort to improve their understanding of the watershed they live in and to promote participation in activities to make improvements to their watershed. These early efforts under the Watershed Health Program were eventually merged with the Governor's Watershed Enhancement Board, which later evolved into OWEB, and watershed councils were established in every corner of the state.

The Board recognized that with the longevity of watershed improvement investments in these basins, and with the two largest categories of OWEB restoration investment areas (fish passage and riparian) represented in the basins (Attachments A and A1), a set of watershed improvement accomplishments from these basins could provide a strong basis for describing overall accomplishment under OWEB and Oregon Plan programs.

Staff followed up on the Board's recommendation to discuss this proposal with regional staff and past grantees and inquire whether sufficient information exists in these two areas of the state about fish passage improvements and riparian area restoration currently. Through phone interviews, staff found that in neither area is there a specific set of information about the maturation of or whether objectives have been met for these projects. Most evaluation of riparian planting is occurring on more recent projects and fish monitoring is not focused in areas where fish passage barriers have been removed. Staff are in contact with ODFW to determine whether some of the fish sampling conducted by that agency covers areas where passage barriers have been removed.

Given the lack of information available for these early generation projects, and the suggestion from several grantees to have an independent party evaluate the projects, staff recommend approving \$100,000 for a request for proposal (RFP) to implement this proposal. This solicitation would occur subsequent to the October 2008 grant offering.

#### **2. Fish and Water Quality Monitoring**

Fish and water quality monitoring are the two single largest investments the Board and GWEB have made since 1997. (Attachment B) In total, nearly \$13 million has been invested in fish monitoring and \$5 million in water quality projects. The Subcommittee

felt strongly that with the top three restoration project investments (riparian, fish passage, and irrigation improvement) totaling approximately \$70 million, and with these investments having the principle objectives of improving fish passage and water quality, that the monitoring of these two parameters should be linked more closely where possible. Currently, the monitoring of fish passage and water quality is not often linked to OWEB investments in restoration projects.

As stated above, staff has been conducting research and interviewing local entities about the availability of water quality and fish passage barrier removal data and any associated fish use data. Similar findings suggest that a future RFP for fish sampling associated with water quality improvement and fish passage barrier removal projects would be warranted. The independent offering for this review is also recommended in this case due to the highly technical nature of fish sampling and the need for consistency in application of methods around vast areas of the state. Additionally, a contract could provide a composite report that would be much more difficult to develop from multiple projects and would require significant staff time to complete. Staff recommends that the Board reserve \$225,000 for the implementation of grants, agreements, and contracts related to water quality and fish monitoring. Staff will bring to the Board in January of 2009 a specific request of future action under this topic.

### **3. Effectiveness Monitoring**

There are several project types that were discussed by the Board Subcommittee and recommended for continued monitoring under the effectiveness monitoring heading. These are small dam removal, western juniper treatment, intensively monitored watersheds, and wetland restoration. Staff intend to continue to move these initiatives forward through a variety of means including through outside funding.

- a. The small dam removal monitoring continues at Marmot Dam on the Sandy River, Savage Rapids Dam on the Rogue River, and Brownsville Dam on the Calapooia River. Future projects will be selected as the restoration work of dam removal is implemented.
- b. Western juniper education and evaluation continues as three classes have been offered in eastern Oregon to grantees and project implementers to provide the information and technical tools developed from the Board's investment in juniper removal monitoring over the past two years.
- c. Intensively monitored watersheds continue in the coast range, southern, and eastern Oregon in the Trask, Hinkle Creek and Middle Fork John Day basins funded through last year's research awards and NOAA funding secured through the Pacific States Marine Fisheries Service.
- d. Wetland effectiveness monitoring will begin this fall through the EPA grant secured for the Willamette Valley mitigation and restoration evaluation project. (See Agenda Item K-2 for more detail.)

Staff have made tremendous progress in the effectiveness monitoring program over the last two years and has utilized all of the funds allocated to the effort thus far by the Board. In order to continue these efforts and to initiate effectiveness monitoring of the

next priority of Board restoration investments (Attachment B) additional resources are necessary. Staff recommend reserving \$375,000 of the Monitoring budget placeholder for future effectiveness monitoring.

**D. Monitoring Spending Plan Recommendations**

In addition to the upcoming October 2008 grant solicitation for monitoring, this report identifies several additional areas of investment for funding. Staff recommend reserving \$1.3 million for the October grant cycle. This number is based on our recent experience with monitoring solicitation and local feedback. The remaining funds are proposed for the purposes discussed in this report. A summary of the investment areas, the amount of funds proposed for these areas, and whether staff seek Board action to reserve or approve funding is contained in the following table.

**Table 1. Proposed Monitoring Spending Plan**

<b>Item</b>	<b>Amount</b>	<b>Action</b>
October 2008 Monitoring Grant Solicitation	\$1,300,000	Reserve
South Coast and Grande Ronde (Riparian & Fish Passage) as per III.C.1.	\$100,000	Approve
Fish and Water Quality Monitoring as per III.C.2.	\$225,000	Reserve
Effectiveness Monitoring as per III.C.3.	\$375,000	Reserve

**IV. Research Program Update**

**A. Overview**

The Subcommittee encouraged the continued collaboration with and use of the U.S. Forest Service Pacific Northwest Research Stations around the region. The newly established Oregon Climate Change Research Institute under the Governor’s Initiative on Climate Change and the Oregon Climate Change Commission are also important entities to continue to be connected to through our Research Grant Program. Research on climate change should focus in part on addressing the scale issue and linking results to things that are important to Oregonians.

The Subcommittee recognized that the recent research grant solicitation and the current OWEB Research Priorities (Attachment C) are significantly focused on anadromous salmonid research needs and that a broader suite of topics was likely necessary for future grant solicitations. Given the strong connection between OWEB actions and salmon health it was agreed that a continued focus, for a portion of the research funds, on salmon was important. Focusing on climate change, ocean conditions, and salmon health are important areas to establish a role for OWEB research investments. Of significant concern is the general lack of connection between fish management processes, especially predicting fish returns, and marine ecosystem research. Better predictive models could be used in concert with better coordination and the use of leading indicators rather than lagging indicators.

The Subcommittee recognized that effectiveness monitoring could add value to and highlight certain research needs over time. Again, the idea of using the Grande Ronde and Rogue basins as pilots was discussed. It was suggested that some research needs may require a direct investment or non-competitive award process to focus on the Planning Session

comments and desires to link to 2014 needs. Staff will embark upon revising the current research priorities over the winter and develop a work plan to be presented to the Board at its January 2009 meeting.

## **B. Non-pareil Dam/Umpqua Coho Pedigree**

### **1. Background**

The OWEB Board began its investment in the Non-pareil Dam/Umpqua Coho Pedigree Research Project in September of 2002 following a solicitation of Conservation Hatchery Improvement Program (CHIP) concepts in 2001. The Independent Multidisciplinary Science Team reviewed the CHIP proposals and developed findings that indicated Non-pareil Dam and three other proposals had merit for the purposes of aiding in salmon recovery. The project, as originally proposed to the Board, was structured to span a nine-year period from the 2001-2003 to 2011-2013 biennia. The Board funded one year of the two year proposal reviewed last May. The current request is for the next two years (years seven and eight) and would carry the project through 2011. (Attachment D)

### **2. Intent of Study**

The effective use of hatchery fish to increase the size of an existing wild population has not been demonstrated. The study concept is to take a portion of a small wild population into captivity and disproportionately increase the number of offspring produced by them, release those offspring into the wild, and then allow them to spawn naturally as adults, thereby, significantly increasing the total number of natural salmon spawners. If this larger spawning population reproduces successfully in the stream, it should produce a much larger naturally-produced (“wild”) population in a small number of generations (shorter period of time).

### **3. Proposed Work and Needed Funds**

The following is excerpted from the attached proposal and describes the proposed work and needed funds.

**2009-2010:** Funds for this period are essential for the completion of the genotyping and analysis of fish returns in 2008. As stated above, this will consist of a replicate and allow us to rigorously address task 1 through 8. By the end of this period the main results of this research will be out and peer-review processed.

**2010-2011:** Funds for this period are requested to analyze the third replicate (parental generation 2003, F2 returns in fall 2009). This consists the last year of returns from the original research proposal. However, we suggest that we wait and re-evaluate our needs before going further with processing the returns from 2009, depending on our previous findings. Adding a third replicate may or may not be worth the cost, something we'll only be able to determine once we have the first two replicate results.

## **V. Recommendations**

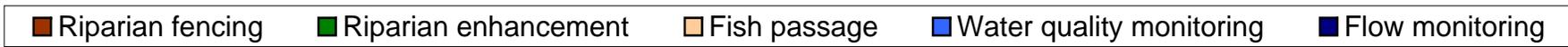
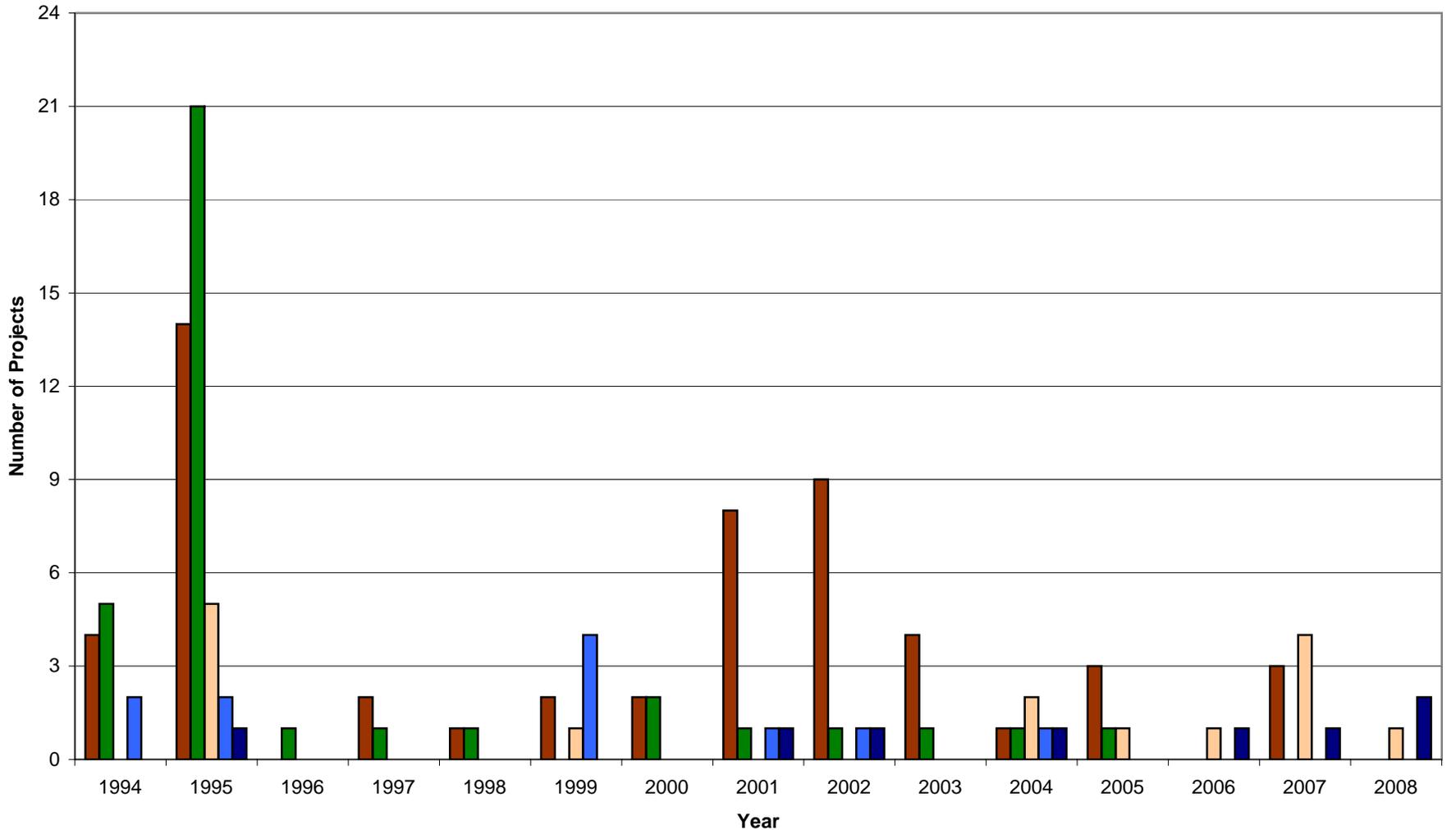
Staff recommend that the Board:

- A. Approve up to \$100,000 of non-capital funds for the Grande Ronde and South Coast riparian and fish passage project monitoring Request for Proposals (RFP) to select a contractor as shown in Section III.C.1.
- B. Reserve \$1.3 million for the October 2008 Monitoring Grant Solicitation; \$225,000 for Fish and Water Quality, and \$375,000 for Effectiveness Monitoring in non-capital funds as outlined in Table 1.
- C. Approve up to \$265,384 of non-capital research funds to Oregon State University for the Non-pareil Dam Coho Pedigree Research Project funding request for two years.

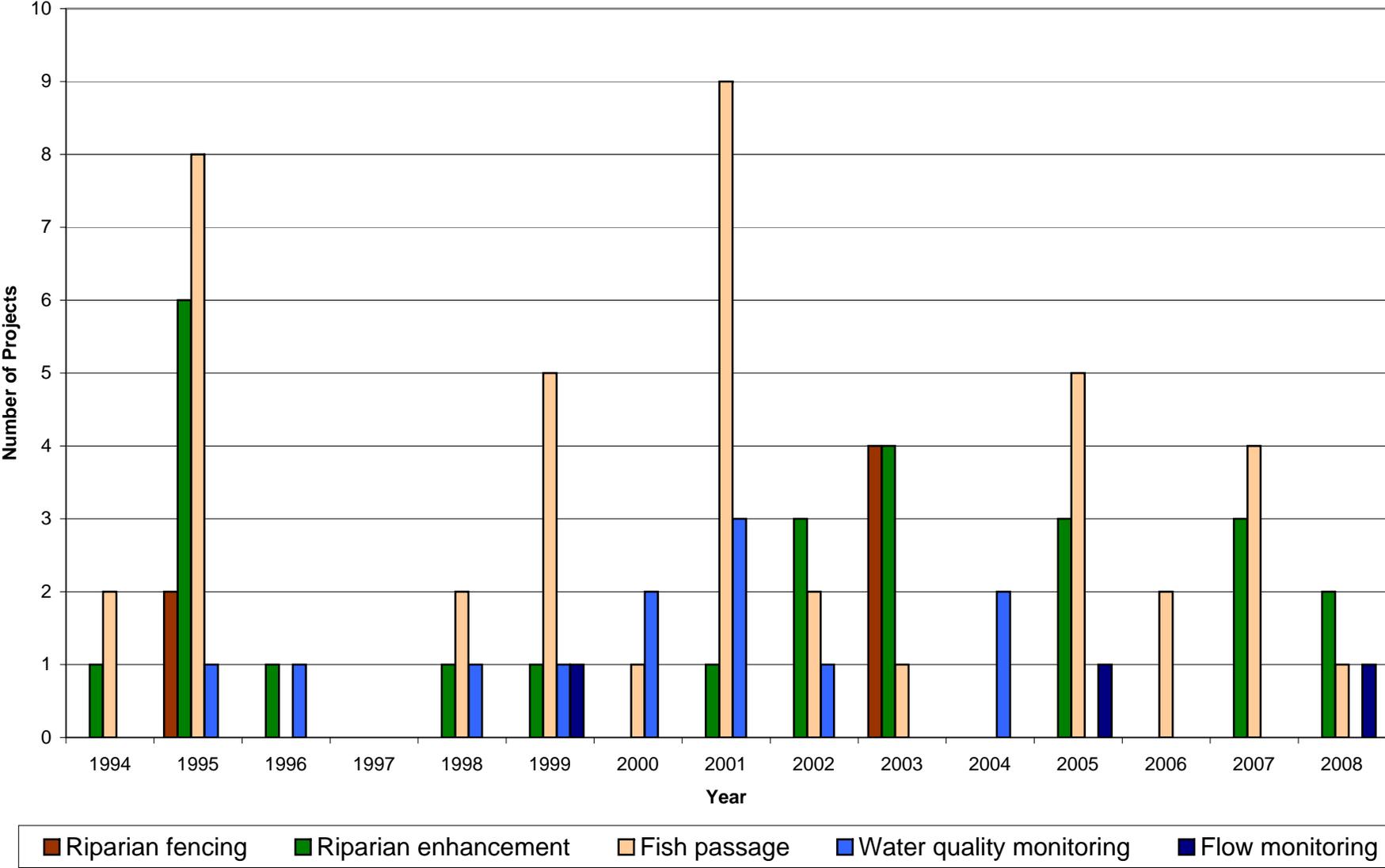
Attachments:

- A. Grande Ronde and Rogue basins restoration investments
- B. Restoration and Monitoring investments
- C. OWEB Research Priorities
- D. Non-pareil dam budget and work tasks 2009-2011

Fish Passage, Riparian Enhancement and Fencing Projects  
in the Grande Ronde Basin 1994-2008

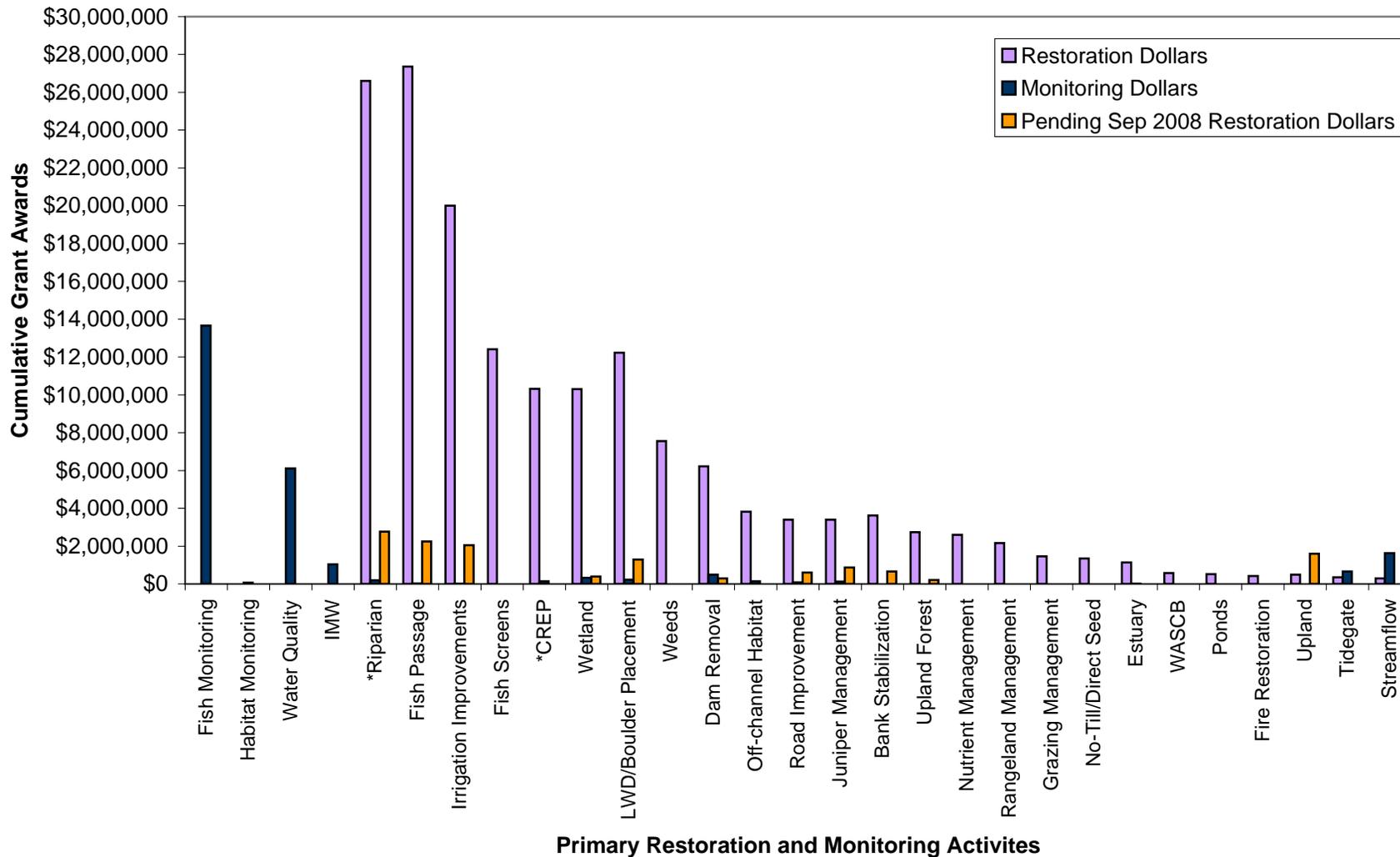


Fish Passage, Riparian Enhancement and Fencing Projects  
in the Rogue Basin 1994-2008



### GWEB/OWEB Restoration & Monitoring Grant Awards 1997 - Mar 2008

(Small and Regular grant programs are represented. Monitoring expenditures do not include monitoring funded through restoration grants. Investments less than \$1M are not shown.)



**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).

**OSU Component for Nonpareil Dam Adult Trap and Genetic Pedigree**

**Deliverable and Expectations for 2008-2009**

**Fund request biennial 2009 – 2011**

The CHIP Project Proposal Narrative detailed the following 8 primary tasks:

**Task 1.** What is the relative success of using a first generation, wild-type broodstock in a supplementation program compared to a broodstock that has been captive for multiple generations?

**Task 2.** What is the relative success of unfed fry releases compared to smolt releases in producing returning adults?

**Task 3.** What is the reproductive success in the wild of adult fish from the following treatments:

- a. First-generation hatchery fish from unfed fry releases;
- b. First-generation hatchery fish from smolt releases;
- c. Multi-generation hatchery fish from unfed fry releases;
- d. Multi-generation hatchery fish from smolt releases; and
- e. Wild fish.

**Task 4:** How does the supplementation program modify the effective population size of the population in the Calapooya (termed the “Ryman-Laikre Effect” (Ryman and Laikre 1991, Ryman et al 1995)

**Task 5:** What is the level of inbreeding that results from the supplementation program?

**Task 6:** What is the incidence of natural crossing between adults from the different treatment groups while on the natural spawning grounds and the consequences of mate choice to the relative production of offspring by individuals;

**Task 7:** What differences in reproductive success occur by treatment by age (males), by gender, by adult run time, and by adult body size (length)?

**Task 8:** Does the size of the naturally-produced population increase due to successful natural reproduction by hatchery fish? Does the contribution to this increase vary by treatment group?

Deliverables and expectation for 2008-2009

The first generation of returns (F1) from the three parental generations in the hatchery (2001, 2002 and 2003) has ended with run year 2006 (November 2006 to January 2007). All these data are now genotyped and the pedigree analysis is completed. The first results derived from the F1 are published in Moyer et al. (2007) (focusing on task 1,4,5). The F1 data will also be used for 2 publications that are on the way and should be submitted by the end of 2008:

1. Moyer, G.R. V. Theriault, and M. Banks. Assessing the Ryman-Laikre effect for a typical hatchery supplementation program. Intended for Canadian Journal of Fisheries and Aquatic Sciences.
2. Moyer, G.R. V. Theriault, and M. Banks. Avoiding a depression in

offspring fitness: maximization or optimization of offspring genetic diversity in coho salmon. Intended for Behavioral Ecology and Sociobiology

A third publication (brief communication/management brief) is in preparation by Theriault focusing on task 2. We now have 3 years/replicates to compare survival rates of smolt vs fry release. This paper is expected to be submitted by the end of summer 2008.

Run year 2007 (November 2007 to January 2008) comprised the end of the F2 returns for the 2001 parental generation. These data are all genotyped and the pedigree analysis is completed. We now have the first estimates of reproductive success of hatchery coho in the *wild*. These data provide the first results for task 3, 6, 7 and 8. However, because this is the core of the project, we want to wait to add a replicate before going further for publications with peer review. The F2 returns for the 2002 parental generation will end in run year 2008 (November 2008 to January 2009). These fish will be genotyped during the spring of 2009 and the data analyzed subsequently. By the end of 2009-beginning of 2010, we should have the main publications out concerning this research.

Justification of budget 2009 through 2011

2009-2010: Funds for this period are essential for the completion of the genotyping and analysis of fish returns in 2008. As stated above, this will consist of a replicate and allow us to rigorously address task 1 through 8. By the end of this period the main results of this research will be out and peer-review processed.

2010-2011: Funds for this period are requested to analyze the third replicate (parental generation 2003, F2 returns in fall 2009). This consists the last year of returns from the original research proposal. However, we suggest to wait and re-evaluate our needs before going further with processing the returns from 2009, depending on our previous findings. Adding a third replicate may or may not be worth the cost, something we'll only be able to determine once we have the first two replicate results.

<b>Nonpariel Dam coho pedigree Genetics 2009-2010</b>						
<b>'SALARIES &amp; WAGES</b>						
<b>Name, Position, Title</b>		<b>Monthly Salary</b>	<b>OPE %</b>	<b>FTE</b>	<b>MM</b>	<b>Totals</b>
Post doc (Veronique Theriault)		3,605	56%	1	12	\$ 43,260
Res. Asst		\$1,820	0.1	1	3	\$ 5,460
<b>A. TOTAL SALARIES &amp; WAGES</b>						\$ 48,720
<b>B. FRINGE BENEFITS</b>						\$ 24,772
student medical benefit						\$ -
<b>C. EXPENDABLE SUPPLIES &amp; EQUIPMENT - under \$5,000 per unit</b>						\$ 40,000
<b>D. TRAVEL</b>						
				Instate:	2,000	
Domestic				Outstate:	3,000	\$ 5,000
<b>E. PUBLICATION COSTS</b>						
OTHER COSTS (subcontracts, consultants, computer time, etc.)						
1. Communications						\$ 180
2. Publications						\$ 600
<b>F. TOTAL OTHER COSTS</b>						\$ 780
<b>G. GRADUATE STUDENT TUITION ( 1 students for 3 terms)</b>						\$ -
<b>H. PERMANENT EQUIPMENT</b>						
<b>I. TOTAL PERMANENT EQUIPMENT - \$5000 or more per unit</b>						
<b>J. GRAND TOTAL REQUESTED (sum items G to J)</b>						\$ 119,272
<b>K. INDIRECT COSTS</b>						
				Indirect Cost Rate		
	ON-campus Cost at	0.1	% (multiply G x rate)			\$ 11,927
<b>L. GRAND TOTAL REQUESTED</b>						\$ 131,199

<b>Nonpariel Dam coho pedigree Genetics 2010-2011</b>						
<b>'SALARIES &amp; WAGES</b>						
<b>Name, Position, Title</b>		<b>Monthly Salary</b>	<b>OPE %</b>	<b>FTE</b>	<b>MM</b>	<b>Totals</b>
Post-doc (Veronique Theriault)		3,750	56%	1	12	\$ 45,000
Res. Asst		\$1,820	0.1	1	3	\$ 5,460
<b>A. TOTAL SALARIES &amp; WAGES</b>						\$ 50,460
<b>B. FRINGE BENEFITS</b>						\$ 25,746
student medical benefit					3	\$ -
<b>C. EXPENDABLE SUPPLIES &amp; EQUIPMENT - under \$5,000 per unit</b>						\$ 40,000
<b>D. TRAVEL</b>						
				Instate:	2,000	
Domestic				Outstate:	3,000	\$ 5,000
<b>E. PUBLICATION COSTS</b>						
OTHER COSTS (subcontracts, consultants, computer time, etc.)						
1. Communications						\$ 180
2. Publications						\$ 600
<b>F. TOTAL OTHER COSTS</b>						\$ 780
<b>G. GRADUATE STUDENT TUITION ( 1 students for 3 terms)</b>						\$ -
<b>H. PERMANENT EQUIPMENT</b>						
<b>I. TOTAL PERMANENT EQUIPMENT - \$5000 or more per unit</b>						
<b>J. GRAND TOTAL REQUESTED (sum items G to J)</b>						\$ 121,986
<b>K. INDIRECT COSTS</b>						
				Indirect Cost Rate		
ON-campus Cost at	0.1	% (multiply G x rate)				\$ 12,199
<b>L. GRAND TOTAL REQUESTED</b>						\$ 134,185
<b>Total</b>						<b>\$ 265,384</b>