Attachment B

Capital equipment to support research projects at the Oregon Hatchery Research Center (OHRC)

Proposal to:
Oregon Watershed Enhancement Board
755 Summer Street NE, Ste 366
Salem, Oregon 97301-1290

Submitted by:
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Total amount requested: $154,000
Proposed duration: Ongoing (capital equipment)
Desired starting date: June 1, 2006

Principal Investigator: Dr. David Noakes
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I. Project Title: Capital equipment to support research projects at the Oregon Hatchery Research Center (OHRC)

II. Contact: Charlie Corrarino, Oregon Department of Fish and Wildlife
David Noakes, Oregon State University

III. Project Description:

The mission of the OHRC is to understand the mechanisms that may create differences between hatchery and wild salmon and steelhead, develop approaches to best manage any differences in order to meet fishery and conservation objectives, and help Oregonians understand the role and performance of hatcheries in supporting and protecting Oregon 's native fish. The OHRC will foster and support a wide range of research and education projects and provide unique state-of-the-art facilities, including simulated streams.

Information gained at the Research Center will help answer questions vital to the success of the Oregon Plan for Salmon and Watersheds and the Native Fish Conservation Policy.

The Independent Multidisciplinary Science Team conducted a workshop in October 2003 to help understand and identify the goals and objectives of the OHRC and what features would be required at the facility to accomplish the goals and objectives. Design and construction of the OHRC was provided by OWEB ($4,000,000 Measure 66 Capital and $1.125 lottery research), ODFW ($1,875,000 other funds) and R&E ($865,000).

The capital equipment that we are requesting the OWEB board to purchase is vitally needed to support the day-to-day operations of the facility and to provide the infrastructure necessary for both short and long term research projects. The funding support that OWEB provided for the design and construction of the OHRC did not include funds to purchase the research equipment necessary to furnish the simulated streams and laboratories.

IV. Initial Achievements

The Grand Opening for the facility was held on October 15, 2005. Dr. David Noakes (OSU faculty) was hired as the Senior Scientist to oversee research at the facility. A 15 member public advisory committee was formed and has met three times. All systems are currently being tested with fish from hatchery and wild stocks of all ages from fertilized eggs to mature adults.

In January 2006, ODFW and the OHRC design firm, TetraTec/KCM received the 2006 Engineering Excellence Award, presented by the American Council of Engineering Companies of Oregon for the design of the Oregon Hatchery Research Center.

ODFW owns and operates the facility. Base funding for the OHRC is provided by ODFW at $1,000,000 per biennium. The funds are used to operate the facility and pay for the ODFW facility manager and two technicians. The funds are also used to pay one-half of Dr. Noakes salary and provide graduate student support.

V. Future Objectives:

Research at the OHRC will determine the mechanisms that may create differences between hatchery and wild fish and develop approaches to best manage those differences. Research conducted at the OHRC will include studies of all stages of study species, from fertilized eggs to mature adults. We will assess the relative contributions of genetic and environmental influences on behavior, physiology, growth and survival of the fish and we will test those parameters under both controlled and field conditions. Our research will be conducted in close collaboration with research and management personnel from ODFW, Oregon State University and from sister institutions elsewhere in Oregon, through the USA and from other countries.

In adult fish we will study mate selection by wild and hatchery fish, spawning site selection, fertility and survival of that spawning in the stream channels. This will provide the critical information for decisions on the selection of broodstock for hatchery production, restoration or conservation purposes. It will relate directly to definitions and assessment of critical spawning habitat for each species, and how that may be affected by genetic background or rearing experience of adults. We will determine the contributions of genotype and rearing experience to growth, survival and smolting of young by conducting controlled matings and rearing of progeny from crosses within and between wild and hatchery broodstock. This will provide important information to benefit anglers, tribal fisheries, commercial fisheries and conservation procedures.

We will progressively conduct controlled experiments to sequentially address standard production hatchery techniques to determine their impact on critical measures that differentiate hatchery and wild fish. We will test alternatives to these standard procedures to determine the optimal conditions for hatchery rearing to minimize differences from wild fish. Education and outreach, to people of every age, background and interest group, is an important objective for the Center. We will develop interactive educational programs with primary and secondary schools. We will serve as the site for teaching and research for students at postsecondary and postgraduate levels and we will strongly encourage interactions, outreach and upgrading of technical personnel from ODFW and other agencies. We will initiate and continue to develop a variety of techniques (e.g., web pages, video feeds, printed matter) for public dissemination of our activities. Most importantly, in terms of basic science, we will require that all research conducted at the Center be subjected to peer review, critical assessment and publication in the primary scientific literature.

VI. Conclusions:

The requested capital items are fundamental to the successful operation of the OHRC and could not be purchased with funds provided by the OWEB board for design and construction of the facility. All items in this request were included in earlier planning and preliminary estimates for the Center. Matching funds for the requested items are listed in the table below.

VII. Budget Proposal for 2006-2007:

1. Video equipment (cameras and recorders) to document fish behavior in the simulated stream channels, the fish ladder (and trap) and in the wet lab (early rearing).

These cameras are necessary for researchers to document the behavior patterns of both adult and juvenile (hatchery and wild) fish as they interact with each other and their habitats in the simulated stream channels. Cameras will be state-of-the-art equipment and allow for viewing under extremely low light conditions and located to view all four simulated channels in their entirety. This will require 4-5 cameras per channel. It is necessary to monitor fish behavior (= passage) in the fish ladder as the responses to barriers and fish ladders is likely to be a significant difference between wild and hatchery fish. We will monitor the activity and movements, as well as social interactions, of young fish being held under controlled conditions in the wet lab. The images obtained from these cameras will be analyzed to discern critical aspects of fish behavior. Some of the images will be made available for public viewing at the OHRC, OSU, Hatfield Marine Science Center and on the World Wide Web. In particular, this vital equipment will allow the simulated streams to achieve their full research potential and is critical to achieving the mission of the OHRC.

2. PIT Tagging and Detection Equipment.

Techniques for marking and identifying both adult and juvenile fish have made rapid advances in the last few years. Fish tags have become smaller and capable of obtaining larger amounts of information with the advent of PIT tags (passive integrated transponders, that relay information about the fish to ground based antennas and computers) and radio and sonic tags that are capable of operating in freshwater, estuarine and marine environments. It is critical to the mission of the OHRC that we have the ability to mark and track the fish that are used in experiments. This includes the simulated stream channels, the fish ladder, Fall Creek and the Alsea River and bay. This equipment will allow researchers at the facility to have access to the latest technology available for tracking and monitoring experimentally and naturally reared fish throughout their entire life history and is fundamental to the success of the OHRC.

3. Analytical lab equipment and software.

These are necessary items to determine accurate weights for fish and chemicals, separate solutions, prepare tissue samples for storage and to mark fish with identifying cold brands. They are all standard items in most fishery labs. This equipment is vital to the operation of the OHRC because we need to determine the age and health of all the experimental organisms kept at the facility. It is critical to have this type of equipment to view and digitize the growth and age patterns present on fish scales and otoliths. It is also necessary for identifying microorganisms and parasites that may cause disease or be related to health problems in experimental fishes. This equipment allows the operator to examine images under variable and extreme magnifications and to analyze resultant images with state-of-the-art computer software.

4. Age and growth

Determination of age and growth of fishes is a critical part of the experimental work to be conducted at the Center. The digitizing software (3, above) will allow us to capture and assess digital images, but we must first extract and prepare the calcified structures (otoliths, scales, bones, fin rays) that are the basis for these techniques. The saw, grinding unit and polishing unit are all necessary items of equipment that must be used in preparing these tissues for microscopic examination. Collaboration with colleagues at other institutions will allow us to conduct studies of microchemistry (e.g., elemental analyses, isotopic analyses) that can determine the migratory history of individual fish, their habitat use, and food habits. Those analyses are beyond the range of the Center (equipment costs alone would be hundreds of thousands of dollars, operating and maintenance costs are comparable) – there are very few locations where those analyses are done and we have a history of research collaborations with those colleagues.

5. Field collecting equipment

In order to sample both naturally reared and hatchery produced fish as they migrate upstream and downstream of the OHRC we need to have a drift boat to allow us to safely navigate and sample the main-stem of the Alsea River and a larger boat with an outboard motor for sampling and monitoring in the estuary and near-shore environments. Without this equipment we have an extremely limited area of the river (accessible from shore) where we can monitor the movement, growth and behavior of the fish used in our experiments. One of the most useful and efficient means of collecting and sampling fish in freshwater is to use an electrofishing device. This is a technique that utilizes an electronic apparatus to produce an electric field that temporarily stuns fish and allows for their subsequent capture. These devices are designed to use either as an

operator transported (backpack) unit or boat mounted unit. The backpack device produces less power than the boat mounted device and is often used in remote locations or small bodies of water. These devices are a standard method used throughout the world to sample and collect fishes and are a basic tool in many modern fisheries investigations.

6. Tagging and tracking

Specialized equipment (ultrasonic and radio receivers) is needed to track individually tagged fish (wild and hatchery origin) in Fall Creek, the estuary and when they enter salt water. The transmitting tags are expendable research items and are not included in this budget request. These techniques are well established and widely used by investigators throughout North America (and elsewhere). We are fortunate that colleagues at Oregon State University (e.g., Dr. Carl Schreck) have established research programs with such equipment so we can rely on their experience to select the optimal equipment and operational procedures.

7. Rotating drum screen to remove sediment from OHRC water supply.

Initial operations of the water intake facility at the OHRC during the first freshet of the year revealed that large amounts of sediment are capable of entering the facility during these events. The consequence of the silt and fine debris in the water supply is that the ultra-violet (UV) equipment used to sterilize the effluent from the quarantine room will not operate effectively under these conditions. This would result in un-sterilized water being released into the pollution abatement pond and subsequently into Fall Creek, if the UV equipment and quarantine room were operating at the time of the freshet. A drum screen filter would alleviate this potential problem and also allow us to UV treat and sterilize the water entering the wet lab and quarantine room if that were to be necessary during a freshet event.

VIII. Budget Justification:

All items will be purchased by ODFW and will be entered as capital items in the ODFW inventory-tracking database. They will also be inventoried and tracked on an OHRC database designed for that purpose. We will follow all statues, guidelines, policies and procedures for the purchase of capital equipment as defined by Oregon revised statutes and administrative rules. We have gone to considerable lengths to contact colleagues who have experience with all these techniques and procedures to confirm availability, desirability and operational features of all this equipment. In most cases Dr. Noakes has an established record, with research publication, based on the application of these techniques and utilizing this type of equipment. We have received specific quotations from

manufacturers and suppliers for items that are “off the shelf” specifications. In other cases (e.g., video equipment, sediment filter) we have relied on the expertise and advice of authorities familiar with designing, installing and operating that equipment.

Proposed OHRC Research Equipment Costs and Matching Funds Provided by ODFW and OSU

Number	Item	Notes	Cost	Matching Funds	Cummulative OWEB Request	Total Cummulative Request
1	Video recording & monitoring equipment	Stream channels, fish ladder, wet lab	$50,000		$50,000	$50,000
2	PIT tag detection system	Stream channels, fish ladder, Fall Creek	$45,000		$95,000	$95,000
3	Analytical lab equipment	Microsccope, balances, centrifuges; software	$41,000		136,000	136,000
4	Age and growth	Otolith & scale saw, grinder & polishing	$12,000	$12,000 (OSU)	$136,000	$148,000
5	Field collecting	Electrofishing unit, collecting boats, nets	$33,000	$15,000 (ODFW)	$154,000	$181,000
6	Tagging & tracking	Ultrasonic, radio, coded wire tag detectors	$17,000	$17,000 (OSU)	$154,000	$198,000
7	Drum screen filter	Process water intake – tank farm and wet lab	$50,000	$50,000 (ODFW)	$154,000	$248,000

- **Total cumulative match from ODFW and OSU is $94,000**
- **Costs are based on current quotes from suppliers and estimates from technical staff (e.g. OSU video staff for custom installations)**
- **Costs for all items have been rounded to the nearest $1,000 for clarity**