Contents

Executive Summary ................................................................................................................................................... 2
1. Program Description ............................................................................................................................................. 3
2. Relationship to Mission and Goals ...................................................................................................................... 15
3. Accreditation ....................................................................................................................................................... 16
4. Need .................................................................................................................................................................... 18
5. Outcomes and Quality Assessment .................................................................................................................... 21
6. Program Integration and Collaboration .............................................................................................................. 22
7. Financial Sustainability (attach the completed Budget Outline) ............................................................................. 24
8. External Review .................................................................................................................................................. 25
References Cited ..................................................................................................................................................... 26
Executive Summary
Fisheries and wildlife resource conservation is a challenging profession involving biological, ecological, management, policy, and social systems. Although many of professionals obtain entry-level positions with B.S. degrees, mid- and upper-level positions typically require additional training. The proposed Professional Science Masters of Fisheries and Wildlife Administration (PSMFWA) degree is designed to provide advanced training for early- and mid-career professionals employed by natural resources agencies and non-government organizations. The PSMFWA degree will assist natural resources agencies and non-government organizations in meeting workforce planning goals and will meet self-improvement goals of current employees.

The PSMFWA is a 57-credit curriculum organized into four main sections: a fish and wildlife core (18 credits), a professional core (18 credits), policy (6 credits), human dimensions (9 credits) and internships (6 credits). It will be taught primarily as a distance, on-line curriculum, although some students may choose to work toward the PSMFWA degree while in-residence at OSU. All of the courses proposed for the PSMFWA degree are already taught in-residence and many are taught on-line. Currently, enough courses are taught on-line to provide students with substantial choice among courses in all curriculum areas. Forty-eight faculty members have agreed to serve as advisors to students for completion of their internships and degree. The PSMFWA degree will be offered as a non-thesis option only, similar to a Masters in Business Administration, Masters of Agriculture, or Masters of Forestry.

We present evidence of need for the PSMFWA from several sources: published literature on workforce planning in natural resources, changes in Masters programs with comparator institutions, and a survey of potential employers. All provide strong support for such a program.

There are no closely related programs in OUS. The Department of Fisheries and Wildlife offers the only degrees related to the fish and wildlife professions in the Oregon University System. A Master of Natural Resources (MNR) degree has just been approved by the Provost’s Council and the Sustainable Natural Resources (SNR) Graduate Certificate are related programs because of their general focus on natural resources. Both of these graduate programs target much broader, less well-defined audiences than the narrow professional focus of our PSMFWA degree. Our proposal explains other differences between the degrees and identifies areas of collaboration.

Because we already have a large graduate program substantial new resources are not needed to offer this degree. However, we propose to add staff support to deliver this program. Resources to support these staff will come from revenues generated by our eCampus programs (B.S. and PSMFWA). We estimate an annual cost of $42,447 to support the program. Revenues from our eCampus program exceeded $400,000 last year and have increased at a rate of 10-20% per year for several years. We began to offer our BS on-line fall of 2009 and had >75 majors the first term. Thus, we anticipate that revenues from eCampus will easily cover these new costs.
Proposal for New Academic Program
Professional Science Masters of Fisheries and Wildlife Administration

Institution: Oregon State University
College/School: Agricultural Sciences
Department/Program: Fisheries and Wildlife

1. Program Description
a. Proposed Classification of Instructional Programs (CIP):

b. Brief overview (1-2 paragraphs) of the proposed program, including its disciplinary foundations and connections; program objectives; programmatic focus; degree, certificate, minor, and concentrations offered.

Fisheries and wildlife resource conservation is a challenging profession involving biological, ecological, management, policy, and social systems. Although many of professionals obtain entry-level positions with B.S. degrees, mid- and upper-level positions typically require additional training. The proposed Professional Science Masters of Fisheries and Wildlife Administration (PSMFWA) degree is designed to provide advanced training for early- and mid-career professionals employed by natural resources agencies and non-government organizations. The PSMFWA degree will assist natural resources agencies and non-government organizations in meeting workforce planning goals and will meet self-improvement goals of current employees.

Brief Description. The proposed 57-credit PSMFWA curriculum is organized into four main sections: a fish and wildlife core (18 credits), a professional core (18 credits), policy (6 credits), human dimensions (9 credits) and internships (6 credits). It will be taught primarily as a distance, on-line curriculum, although some students may choose to work toward the PSMFWA degree while in-residence at OSU. Many of the courses proposed for the PSMFWA degree are already taught both in-residence and on-line. The only new course required to offer the degree is FW 510, internship. Most faculty listed below have agreed to serve as advisors to students for completion of their internships. The PSMFWA degree will be offered as a non-thesis option only, similar to a Masters in Business Administration, Masters of Agriculture, or Masters of Forestry.

c. Course of study – proposed curriculum, including course numbers, titles, and credit hours.
The PSMFWA is a 57-credit curriculum organized into four main sections: a fish and wildlife core (18 credits), a professional core (18 credits), policy (6 credits), human dimensions (9 credits) and internships (6 credits). It will be taught primarily as a distance, on-line curriculum, although some students may choose to work toward the PSMFWA degree while in-residence at OSU. All of the courses proposed for the PSMFWA degree are already taught in-residence and many are taught on-line. Currently, enough courses are taught on-line to provide students with
substantial choice among courses in all curriculum areas. Faculty listed in 6a below have agreed to serve as advisors to students for completion of their internships and degree. The PSMFWA degree will be offered as a non-thesis option only, similar to a Masters in Business Administration, Masters of Agriculture, or Masters of Forestry.

Curriculum List (# eCampus offering; * Graduate only; + offered only at Hatfield Marine Science Center)

Fish and Wildlife Core Courses (18 credits min)
BOT 540 Field Methods in Vegetation Science (4) #
FW 520 Ecology and Management of Marine Fishes (3) #*
FW 521 Aquatic Biological Invasions (4) #
FW 525 Coastal Ecology and Resource Management (5) +
FW 527 Principle of Wildlife Disease (4) #
FW 531 Dynamics of Marine Biological Resources (4) #
FW 535 Wildlife in Agricultural Ecosystems (3) #
FW 545 Ecological Restoration (4)
FW 547 Trophic Cascades (2-3)*
FW 551 Avian Conservation and Management (4) #
FW 553 Forest Wildlife Habitat Management (4)
FW 554 Fishery Biology (4) #
FW 556 Limnology (5)
FW 558 Mammal Conservation and Management (4)
FW 563 Conservation Biology of Wildlife (3) *
FW 564 Marine Conservation Biology (3)
FW 565 Marine Fisheries (4) +
FW 570 Ecology and History of Landscapes of the Columbia Basin (3) #
FW 571 Environmental Physiology of Fishes (4)
FW 572 Advanced Ichthyology (3)
FW 573 Fish Ecology (4)
FW 574 Early Life History of Fishes (4)
FW 579 Wetlands and Riparian Ecology (3) #
FW 580 Stream Ecology (3) *
FW 581 Wildlife Ecology (4) #
FW 586 Genetics and Demography of Small Populations (3) *
FW 590 Coastal Population Genetics and Conservation (6) **
FW 591 Fish Diseases in Conservation Biology and Aquaculture (4)
FW 597 Aquaculture (3) +
FW 598 Aquaculture Laboratory (3) +
FW 661 Analysis of Animal Populations (5) *
FW 667 Research Perspectives (4) *
GEO 524 International Water Resource Management (3) #
GEO 565 Geographic Information Systems and Science (4) #
MRM 535 Rights Based Fisheries Management (3) #*
SNR 530 Ecological Principles of Sustainable Natural Resources (3) #*
SNR 535 Sustainable Management of Aquatic and Sustainable Resources (3) #*

Professional Cohort Courses (18 credits)
COMM 550 Communication & the Practice of Science (3) #*
PHL 547 Research Ethics (3) #*
PSM 513 Professional Seminar (3) #*
PSM 565 Accounting and Finance for Scientists (3) #*
PSM 566 Management & Marketing Scientific Technologies (3) #*
PSM 567 Innovation Management (3) #*

Policy Courses (6)
FW 620 Ecological Policy (3) #* or FW 517 Fisheries and Wildlife Law and Policy (3)
   plus one of the following:
AREC 532 Environmental Law (3) #
ES 544 Native American Law: Tribes, Treaties and the U.S. (3) #
MRM 521 Ocean Law (3) #*
PS 574 Natural Resource Policy and Bureaucratic Politics (4)
PS 575 Environmental Politics and Policy (4) #

Human Dimension Courses (9)
FW 585 Consensus and Natural Resources (3) #   plus two of the following:
AREC 534 Environmental and Natural Resource Economics (3) #
COMM 542 Bargaining and Negotiation Processes (3)
COMM 540 Theories of Conflict and Conflict Management (3)
SNR 520 Social Aspects of Sustainable Natural Resources (3) #*
SNR 521 Economics of Sustainable Natural Resources Management (3) #*
SNR 522 Basic Beliefs and Ethics in Natural Resources (3) #*
PHL 540 Environmental Ethics (3) #
SOC 580 Environmental Sociology (4) #
SOC 581 Society and Natural Resources (4) #

Internship (6-18)
Total Credits (57 min)

d. Manner in which the program will be delivered, including program location (if offered outside of the main campus), course scheduling, and the use of technology (for both on-campus and off-campus delivery).
The PSMFWA degree is envisioned to be mostly on-line, although some students may opt to take some of the listed classes in-residence. Thus, we expect a high level of use of on-line teaching technologies, which the department has been developing since 1995. All classes taught on-line are taught annually, most other classes are taught annually, but some are taught on an alternate year basis. In addition, a new course (FW 510) will provide experiential learning
opportunities for students. The PSMFWA will use two internship experiences for degree completion. All participants will be required to complete a professional development workshop or attend a professional society meeting for 1 credit. The workshop would be special training in their area of expertise (e.g., monitoring techniques, habitat management, harvest management, etc.) and are typically offered by professional societies at the state or national level. Otherwise, they would need to attend a local, regional or national professional society meeting such as the American Fisheries Society, The Wildlife Society or Society for Conservation Biology. All students will participate in a more intensive internship designed to last three months or more. Students will be encouraged to identify possible internship opportunities when they complete their application. Our Internship Coordinator, the student’s major professor and a workplace mentor will work with each student to develop an appropriate internship experience. Because all of our students will already be employees of an agency, internships will most likely be special assignments within an agency (e.g., develop a management or recovery plan, develop and lead a public process, etc.) or temporary training in another position or division within their agency. In some cases, it may also be possible for a student to be assigned temporarily to another agency. Some of the letters of support in Appendix D specifically mention an interest in working with students on internships.

e. Ways in which the program will seek to assure quality, access, and diversity.

Academic program quality is assured with our Annual Graduate Student Assessment of progress (http://fw.oregonstate.edu/Graduate%20Information/annual_evaluation.htm). We also conduct a statistical survey of all graduates every three years (Edge 2009). Quality of our research program is assured by the number of publications in national and international journals and competitive grants that faculty and students produce. The Chronicle of Higher Education most recent survey of Ph.D. program productivity (http://chronicle.com/stats/productivity/) ranked our Wildlife Science program number one in the nation and our Fisheries Science program number two in the nation. The Oregon University System only had one other number-one-ranked program (UO School of Psychology) and no other number-two-ranked programs.

Access to our graduate degrees is currently restricted by the number of students we can support on Graduate Research Assistantships or Graduate Teaching Assistantships; no students are accepted without some form of support. We anticipate that students in our PSMFWA program will be self-funded or will be supported by their employers. However, because we currently have a large graduate program based on thesis research supporting faculty research programs, we do not have a large capacity for PSMFWA majors. We anticipate many more applicants than we can allow in the program. However, access to graduate classes is enhanced by our on-line classes and we do not anticipate limitations on enrollment in individual classes.

Diversity is major issue for us because the Fisheries, Wildlife and Conservation Biology professions have historically been staffed predominately by white males. By the end of the 09-10 academic year our department will have a diversity and community enhancement plan. However, we have been actively engaged in enhancing diversity for many years. Nine of our last 15 faculty hires have been women and/or minorities. One of our most recent hires under the Tenured Faculty Diversity Initiative will specifically work on diversity recruitment and retention as part of her position. We have a 2+2 program agreement with Tuskegee University that has significantly increased the number of Black Americans in our program. Furthermore,
we have developed an endowed diversity-based scholarship and our block grant for the Oregon Laurels Scholarships designates 50% of those funds to go to underrepresented populations.

f. Anticipated fall term headcount and FTE enrollment over each of the next five years. The PSMFWA degree is designed for professionals working in the fisheries and wildlife disciplines. We expect to enroll about 10 students per year, after an initial lag time of 2 to 3 years during which time enrollments will build. This expectation is based on the evidence presented in 4a below. We anticipate that we will have awarded 30 PSMFWA degrees by 2016.
### Degree Projections

<table>
<thead>
<tr>
<th>Degree</th>
<th>AY11-12</th>
<th>AY12-13</th>
<th>AY13-14</th>
<th>AY14-15</th>
<th>AY15-16</th>
</tr>
</thead>
<tbody>
<tr>
<td>PSMFWA</td>
<td>5</td>
<td>7</td>
<td>10</td>
<td>10</td>
<td>10</td>
</tr>
</tbody>
</table>

### Expected Degrees/Certificates Produced Over the Next Five Years

<table>
<thead>
<tr>
<th>Degree</th>
<th>AY11-12</th>
<th>AY12-13</th>
<th>AY13-14</th>
<th>AY14-15</th>
<th>AY15-16</th>
</tr>
</thead>
<tbody>
<tr>
<td>PSMFWA</td>
<td>0</td>
<td>3</td>
<td>10</td>
<td>10</td>
<td>10</td>
</tr>
</tbody>
</table>

### h. Characteristics of Students to be Served

For admission, students will be required to have earned at least the equivalent of a B.A. or B.S. in one of the following areas of study: fisheries and wildlife, natural and life sciences, natural resource management, forestry, agriculture, environmental studies, or social sciences, AND have five years of professional experience within the natural resources professions. Students must identify a faculty mentor before applying to the program. Professional experience must demonstrate the application of current biological knowledge to problems and programs dealing directly with the fish or wildlife resources (administration, education, research, or management) as a significant portion of job responsibilities. Professional experience provides demonstrated expertise in making decisions in the application of ecology to stewardship and management of fish and wildlife resources and the environment. Technician-level work, such as data collection, surveys, and habitat manipulation conducted under existing protocol or under the specific direction of another, is not considered professional-level experience.

Because this program will be delivered almost entirely on-line we anticipate that approximately 75% of the students will be nonresident. Up to 10% of those may be international students. Enrollment in the PSMFWA will be restricted to currently employed professionals with five years of professional experience. Because of our enrollment requirements and because the degree will be delivered almost entirely on-line most of our students are likely to be nontraditional in the sense that they are on-line majors and they will be older than our typical graduate student body. We anticipate that most will be part-time because they will likely continue to work during their program of study.

### i. Adequacy and Quality of Faculty Delivering the Program

See statement in 1e above about our national rankings. Furthermore, our program underwent a comprehensive 10-year review in 2007 and received very high marks for our research, teaching, and outreach. Over 95% of our classes are taught by tenure-track faculty members or courtesy faculty with PhD degrees; we use very few instructors to deliver our academic programs.

### j. Faculty Resources – Full-Time, Part-Time, Adjunct
The following faculty are tenure-track, research, courtesy or adjunct faculty that currently conduct research, teach graduate classes, or advise graduate students in our M.S. and Ph.D. Fisheries Science and Wildlife Science programs. Vita for faculty members are available upon request.
Department of Fisheries and Wildlife faculty that conduct research, teach undergraduate or graduate classes and advise graduate students.

<table>
<thead>
<tr>
<th>Name</th>
<th>Title and Institute/Department</th>
<th>Research Focus</th>
</tr>
</thead>
<tbody>
<tr>
<td>Robert Anthony</td>
<td>Courtesy Professor of Wildlife, Leader, Cooperative Fish and Wildlife Research Unit</td>
<td>Wildlife ecology, population analysis, environmental contaminants.</td>
</tr>
<tr>
<td>C. Scott Baker</td>
<td>Professor of Wildlife, Associate Director of The Marine Mammal Institute</td>
<td>Molecular ecology of marine mammals, historical demography and population dynamics of whales, molecular taxonomy, conservation genetics.</td>
</tr>
<tr>
<td>Michael Banks</td>
<td>Associate Professor of Fisheries, Director of Cooperative Institute of Marine Resources Studies</td>
<td>Genetic characterization of natural populations, Fishery subjects, aquacultural species.</td>
</tr>
<tr>
<td>Jerri Bartholomew</td>
<td>Adjunct Associate Professor of Fisheries, Department of Microbiology</td>
<td>Salmon diseases, fish parasites.</td>
</tr>
<tr>
<td>Matthew Betts</td>
<td>Adjunct Assistant Professor of Forestry, Forest Ecosystems and Society</td>
<td>Forest wildlife, landscape ecology.</td>
</tr>
<tr>
<td>George Boehlert</td>
<td>Professor of Fisheries, Director of Hatfield Marine Science Center</td>
<td>Fisheries oceanography, ecology of early life history stages in fishes, ecology of isolated oceanic islands and seamounts, fish reproduction and growth.</td>
</tr>
<tr>
<td>Mark Camara</td>
<td>Courtesy Assistant Professor of Fisheries, Agricultural Research Service</td>
<td>Quantitative and molecular genetics of shellfish, genetic analysis of life history traits.</td>
</tr>
<tr>
<td>John Chapman</td>
<td>Assistant Professor of Fisheries</td>
<td>Marine invertebrates and aquatic invasions.</td>
</tr>
<tr>
<td>Sandra DeBano</td>
<td>Assistant Professor of Wildlife</td>
<td>Riparian ecology and entomology, aquatic-terrestrial and riparian-upland linkages, trophic interactions</td>
</tr>
<tr>
<td>Bruce Dugger</td>
<td>Associate Professor of Wildlife, Mace Professor of Watchable Wildlife</td>
<td>Ecology, conservation and management of waterbirds and their wetland habitat.</td>
</tr>
<tr>
<td>Katie Dugger</td>
<td>Assistant Professor of Wildlife</td>
<td>Avian population modeling, forest bird survival rates in relation to environmental variables.</td>
</tr>
<tr>
<td>Jason Dunham</td>
<td>Courtesy Assistant Professor of Fisheries, USGS Forest and Range Ecosystem Science Center</td>
<td>Landscape ecology of aquatic ecosystems, conservation biology of focal species, ecology of natural disturbance, biological invasions, monitoring</td>
</tr>
<tr>
<td>Joe Ebersole</td>
<td></td>
<td>Fish habitat relationships, restoration</td>
</tr>
<tr>
<td>Name</td>
<td>Title</td>
<td>Research Focus</td>
</tr>
<tr>
<td>-------------------------------------------</td>
<td>--------------------------------------------</td>
<td>--------------------------------------------------------------------------------</td>
</tr>
<tr>
<td>W. Daniel Edge</td>
<td>Department Head and Professor of Wildlife</td>
<td>Nongame wildlife, habitat management, wildlife relationships in forest and agricultural ecosystems</td>
</tr>
<tr>
<td>Clinton Epps</td>
<td>Assistant Professor of Wildlife</td>
<td>Ecology, conservation, and management of mammals; effects of climate and climate change on distribution and demography.</td>
</tr>
<tr>
<td>M. Jesse Ford</td>
<td>Associate Professor of Fisheries</td>
<td>Paleoeconomy, Limnology.</td>
</tr>
<tr>
<td>Eric Forsman</td>
<td>Courtesy Assistant Professor of Wildlife</td>
<td>Spotted Owls, other forest wildlife</td>
</tr>
<tr>
<td>Tiffany Garcia</td>
<td>Assistant Professor of Wildlife</td>
<td>Amphibian population decline, animal behavior freshwater community ecology.</td>
</tr>
<tr>
<td>Guillermo Giannico</td>
<td>Associate Professor of Fisheries</td>
<td>Fish biology and ecology, aquatic ecology, limnology, fish habitat rehabilitation and conservation, riparian community dynamics</td>
</tr>
<tr>
<td>Stanley Gregory</td>
<td>Distinguished Professor of Fisheries</td>
<td>Stream ecology, riparian ecology, trophic interactions.</td>
</tr>
<tr>
<td>Jen Gervais</td>
<td>Assistant Professor of Wildlife</td>
<td>Interactions of contaminants with natural stressors and their effects on population dynamics.</td>
</tr>
<tr>
<td>Susan Haig</td>
<td>Professor of Wildlife</td>
<td>Conservation genetics, avian behavioral ecology.</td>
</tr>
<tr>
<td>Scott Heppell</td>
<td>Assistant Professor of Fisheries</td>
<td>Physiological ecology of fishes, reproductive life-history of marine fish, impacts of differing strategies on abilities of populations to sustain exploitation.</td>
</tr>
<tr>
<td>Selina Heppell</td>
<td>Associate Professor of Fisheries</td>
<td>Marine fishes population ecology, life history and population dynamics of marine vertebrates, impacts of invasive species.</td>
</tr>
<tr>
<td>Alan Herlihy</td>
<td>Professor of Fisheries</td>
<td>Large-scale aquatic ecology, biogeochemistry; quantifying aquatic effects of anthropogenic disturbances; developing survey approaches and indicators for monitoring the ecological condition of aquatic systems.</td>
</tr>
<tr>
<td>Markus Horning</td>
<td>Assistant Professor of Wildlife</td>
<td>Pinnipied ecology, behavioral physiology and ecology of diving animals; population dynamics and life histories of marine mammals.</td>
</tr>
<tr>
<td>Robert Hughes</td>
<td></td>
<td>Regional aquatic ecology; landscape ecology;</td>
</tr>
<tr>
<td>Name</td>
<td>Title/Role</td>
<td>Research Focus</td>
</tr>
<tr>
<td>---------------------------</td>
<td>---------------------------------------------------------------------------</td>
<td>---------------------------------------------------------------------------------------------------</td>
</tr>
<tr>
<td>Sherri Johnson</td>
<td>Courtesy Assistant Professor, U.S. Forest Service</td>
<td>Landscape influences on streams; abiotic factors that influence stream biota and ecosystem functions; network/patch dynamics; hierarchical analysis of effects of scale of observation.</td>
</tr>
<tr>
<td>Patricia Kennedy</td>
<td>Professor of Wildlife</td>
<td>Wildlife ecology and management, conflicts associated with the private and public land management and the ecological impact of agricultural practices on the environment.</td>
</tr>
<tr>
<td>Michael Kent</td>
<td>Adjunct Professor of Microbiology and Fisheries</td>
<td>Fish Disease, parasitology.</td>
</tr>
<tr>
<td>Robert Lackey</td>
<td>Courtesy Professor of Fisheries, U.S. EPA</td>
<td>Ecosystem management, ecological risk assessment, ecological policy.</td>
</tr>
<tr>
<td>Dixon Landers</td>
<td>Associate Professor of Fisheries, U.S. EPA</td>
<td>Limnology.</td>
</tr>
<tr>
<td>Christopher Langdon</td>
<td>Professor of Fisheries</td>
<td>Molluscan aquaculture, Invertebrate physiology and biochemistry.</td>
</tr>
<tr>
<td>Douglas Markle</td>
<td>Emeritus Professor of Fisheries</td>
<td>Fish systematic, fisheries ecology and recruitment.</td>
</tr>
<tr>
<td>Bruce Mate</td>
<td>Professor of Wildlife, Director of Marine Mammal Institute</td>
<td>Marine Mammals, migration of whales.</td>
</tr>
<tr>
<td>Jessica Miller</td>
<td>Assistant Professor of Fisheries</td>
<td>Ecology of marine and anadromous fishes, fisheries biology, early life history of fishes, larval dispersal.</td>
</tr>
<tr>
<td>David Noakes</td>
<td>Professor of Fisheries, Senior Scientist, Oregon Hatchery Research Center</td>
<td>Behavior, ecology and evolution of fishes, early development and social behavior, aquaculture, genetics.</td>
</tr>
<tr>
<td>Gordon Reeves</td>
<td>Courtesy Assistant Professor of Fisheries, U.S. Forest Service</td>
<td>Ecology of anadromous salmonids, stream habitat.</td>
</tr>
<tr>
<td>W. Douglas Robinson</td>
<td>Associate Professor of Wildlife</td>
<td>Arid land ecology, community ecology, temperate and tropical forest birds community dynamics in fragmented landscapes.</td>
</tr>
<tr>
<td>Daniel Roby</td>
<td>Courtesy Professor of Wildlife, Assistant Leader, Cooperative Fish and Wildlife Research Unit</td>
<td>Physiological ecology, energetics of birds and mammals, seabird ecology.</td>
</tr>
</tbody>
</table>
### k. Other staff.
The department has over 20 Faculty Research Assistants, 1 Head Advisor, 1 Internship Coordinator/DE Advisor, 1 Office Manager, 2 Office Specialists, 1 Grants and Contracts Technician, 2 IT support staff, 1 facilities manager/aquaculturist.

### l. Facilities, library, and other resources.
The Department of Fisheries and Wildlife is housed in two buildings on the main campus and at several locations around the state. In addition, research is conducted at several off-campus facilities. The on-campus buildings include Nash Hall and Weniger Hall. The main campus facilities also include the Valley Library (Liaison pending) and a computer lab in Withycombe Hall. The computer lab is a shared resource with the Animal Science Department. Because most students admitted to the PSMFWA degree will be on-line learners, the current facilities are sufficient for meeting the needs of these students.

Research and instruction, and research support are conducted at several off-campus facilities.

**Hatfield Marine Science Center (HMSC)**--The HMSC (http://hmsc.oregonstate.edu/index.html) is located in Newport, Oregon, approximately 53 mile west of Corvallis. Seven tenure-track faculty members, research faculty an instructor and numerous courtesy faculty members are
housed at HMSC. The HMSC brings OSU's diverse marine science programs together for effective collaboration and higher national and international visibility. The Center plays an integral role in marine and estuarine research and instruction, as a unique laboratory facility serving resident scientists and graduate students, and as a base for oceanographic research. The Department of Fisheries and Wildlife offer 16-24 credits of courses at HMSC during the fall term.

**Fish Performance and Genetics Laboratory (FPGL)**--The FPGL is located approximately 4 miles northeast of main campus, and is situated on 7 acres of Agricultural Experiment Station land, adjacent to the Willamette River. The FPL consists of four main buildings, and an outside cement pad area for large fish rearing tanks. The facility is ideal for performance testing, physiological assessments, and behavior observations. This laboratory also allows for testing the genetic bases of phenotypic traits. In addition, research on the effects of various toxicants have been and are being conducted. The laboratory has a large number of rearing units, thus permitting replication of experimental units. In addition, the abundant, constant temperature, pathogen-free water is ideal for the rearing of Northwest fishes. The facility has the ability to raise fish over their entire life cycle; it also has the capacity to cool and heat water. In addition, the FPGL has a warm water facility that is used for rearing tilapia and zebrafish.

**Oak Creek Biology Lab (OCBL)**--The OCBL is located approximately 4 miles northwest of main campus, and is situated within the boundary of McDonald Forest on approximately 8 acres. The facility consists of eight buildings with five currently in use. Previous work at this facility was aquatic toxicology. Present use is now related to avian research; the facility is actively being used by a faculty member and graduate students. There is also a small apartment on this site, which is occupied by a student caretaker.

**Fairplay Facility**--This facility is located 4 miles north of main campus on 8.34 acres of university property on the corner of Hwy 20 and Conifer St. The facility consists of five main buildings and a mobile home used as the residence of a caretaker. The facility is used by several faculty members and graduate students for storage and staging areas for field equipment (i.e., travel trailers, boats, snowmobiles, etc.). There are two large barns and an open bay pole barn for storage. At the entrance to facility is an office building, which is periodically used for processing of field samples. A cinder block building is also used for processing samples, and is designated for development as a lab for amphibian work. Another cinder block building previously used by ODFW fish pathology has been recently transferred to the department and has been designated as storage by facilities services.

**Oregon Hatchery Research Center (OHRC)**--The OHRC (http://www.dfw.state.or.us/OHRC/) is a research facility located on Fall Creek off of Hwy 34, approximately 35 miles southwest of Corvallis. The OHRC is an innovative facility designed to address both practical management issues and fundamental research questions. The OHRC is owned by the Oregon Department of Fish and Wildlife (ODFW) and is operated jointly by ODFW and the Oregon State University, Department of Fisheries and Wildlife. The OHRC investigates the differences that may exist between fishes from hatchery and wild origins, in relation to the management and conservation of Oregon’s native fish species. The design and construction of the facility, which opened in
October 2005, allow for a wide range of research, including tests of conventional hatchery procedures as well as innovative experimental analyses under controlled environmental conditions. Major research features of the OHRC include: controlled environment space, with the availability of either ambient water or water that can be sterilized and recirculated at controlled temperatures; extensive dry lab research space; a large number of tanks of various sizes for controlled rearing of experimental fish; and four very large simulated stream channels. The OHRC provides residential dormitory space, office space and research space for research collaborators. We anticipate continuing research collaborations with colleagues from management agencies, OSU and other institutions within Oregon, from universities and management agencies in other states, and with colleagues from other countries. Another major function of the OHRC is education and outreach. This includes design features to encourage the public to visit and tour facilities, to internship programs with universities and colleges across Oregon, to electronic and conventional print publication of information about the activities of the OHRC.

_Hyslop Farm Small Mammal Enclosures_—The department maintains a series of small mammal enclosures at Hyslop Farm, a Crop and Soil Science facility. The 12.25 acre site includes 24, 0.5-acre rodent-proof enclosures. The site, which is approximately 10 miles north of Corvallis is leased from Crop and Soil Science and has been used for ecological risk assessment and wildlife damage management research.

### m. Anticipated start date.

If approved, the program will become operational in fall 2011. We will begin promoting the PSMFWA degree as soon as we receive its approval. The first student will graduate from the program during academic year 2012-2013.

### 2. Relationship to Mission and Goals

#### a. Manner in which the proposed program supports the institution’s mission and goals for access; student learning; research, and/or scholarly work; and service.

Our current graduate program is among the largest at OSU and thus supports OSU’s goals for access and student learning. The Professional Science Masters degrees are a high priority for OSU. See 1e above regarding our national rankings based on scholarship and faculty productivity, which are the highest in OUS. Many of our faculty serve on state or federal panels, task forces, endangered species recovery teams, as editors of scientific journals, etc., as well as the normal complement of college and university committees.

#### b. Connection of the proposed program to the institution’s strategic priorities and signature areas of focus.

OSU’s Strategic Plan, Phase II identified science of sustainable Earth ecosystems as a signature area of distinction. Conservation and management of vertebrate organisms is central this signature area. Vertebrate organisms have captured the imagination of the American public and conserving these organisms is a high priority based on national and state policies and funding levels. The PSMFWA program will support research, teaching and outreach related to
sustainability, ecosystem services, ecology and management of vertebrate species, communities and their habitats and ecosystems.

c. Manner in which the proposed program contributes to Oregon University System goals for access; quality learning; knowledge creation and innovation; and economic and cultural support of Oregon and its communities.
Professional Science Masters degrees are a high priority for OUS. See 1e and 2a above. We train many of the fisheries and wildlife professionals in the state and region and have good to excellent employment statistics (Edge 2009). We employ over 350 people on an annual basis with our grants and contracts. Furthermore, fish and wildlife resources, which our graduates manage, have substantial economic impact in Oregon. Based on a 2009 economic survey (http://www.dfw.state.or.us/agency/docs/Report_5_6_09--Final%20(2).pdf), Oregonians and visitors spent $2.5 billion dollars per year on fishing, hunting, shellfishing and wildlife viewing activities and equipment. Other states around the country report similar statistics. The long-term sustainability of this economic engine is dependent on effective management of these resources. Graduates of our PSMFWA degree will rapidly advance in the employment structure of the agencies they currently work for.

d. Manner in which the program meets broad statewide needs and enhances the state’s capacity to respond effectively to social, economic, and environmental challenges and opportunities.
See 2c above for ways in which the program meets state’s economic capacity. The teaching, research and outreach of the department are central to meeting the state’s environmental challenges and opportunities. The science we are engaged in is central to concepts of sustainability, ecosystem services and natural resources management. We estimate that there are approximately 3,500 fish and wildlife professionals in the state of Oregon employed by state and federal agencies or non-government organizations. Graduates of the PSMFWA program will be promoted to mid- to high-level positions within their agencies and will therefore have significant impact on management of natural resources within Oregon.

3. Accreditation
a. Accrediting body or professional society that has established standards in the area in which the program lies, if applicable.
There is no organization that accredits a PSMFWA degree. However, the three primary professional societies (American Fisheries Society, Society for Conservation Biology, and The Wildlife Society) all have specific missions and codes of ethics, but these societies do not accredit academic programs.

b. Ability of the program to meet professional accreditation standards. If the program does not or cannot meet those standards, the proposal should identify the area(s) in which it is deficient and indicate steps needed to qualify the program for accreditation and date by which it would be expected to be fully accredited.
Both the American Fisheries Society (AFS [http://www.fisheries.org/afs/certification.html]) and The Wildlife Society (TWS [http://joomla.wildlife.org/index.php?option=com_content&task=view&id=29&Itemid=234]) have certification programs designed to certify professionals at two levels (Associate and full certification). However, certification is not a requirement for employment in most state or federal agencies. Undergraduates of our programs generally qualify for certification depending on electives they choose in their programs. The proposed program of study will enable all graduates to become certified as either a Certified Fisheries Biologist (AFS) or Certified Wildlife Biologist (TWS). Both certification programs require the completion of a rigorous program of study, typically accomplished by a B.S. degree. The most common deficiencies in candidates for certification for either program are the number of policy or human dimensions courses. All students in our program will be advised to consider course-work requirements for certification. Certification for both professions also requires five years of professional work experience. Because enrollment in the PSMFWA degree will be limited to employees with five years of professional experience, all students completing the PSMFWA degree will be certifiable by one of these two professional societies.

c. If the proposed program is a graduate program in which the institution offers an undergraduate program, proposal should identify whether or not the undergraduate program is accredited and, if not, what would be required to qualify it for accreditation.
Not applicable—see 3a and 3b above.
d. If accreditation is a goal, the proposal should identify the steps being taken to achieve accreditation. If the program is not seeking accreditation, the proposal should indicate why it is not. Not Applicable.

4. Need

a. Evidence of market demand.

Evidence of need for a PSMFWA comes from several sources: published literature on workforce planning in natural resources, changes in Masters programs with comparator institutions, and a survey of potential employers. Workforce planning is a huge issue in the natural resources market place (Berkson et al. 2009, Julian and Yeager 2002, National Research Council [NRC] 2000, U.S. Department of Commerce [USDC] and U.S. Department of Education [USDE] 2008). The primary employers of fisheries and wildlife graduates are state and federal natural resources agencies. Most of these agencies experienced huge workforce expansions during the period from the early 1970s to the mid 1980s as a consequence of numerous environmental laws at both the state and federal level. Examples of federal legislation include the National Environmental Quality Act, the Endangered Species Act, Clean Water Act, Federal Land Policy and Management Act, and the National Forest Management Act; most states passed related laws during the same time period. Most state and federal natural resources agencies are experiencing large retirement pulses as their workforce grays (Julian and Yeager 2002). This retirement pulse and the subsequent workforce planning ramifications have been the subject of numerous articles in the natural resources literature in recent years (Berkson et al. 2009, Julian and Yeager 2002, NRC 2000, USDC and USDE 2008). In addition to challenges of finding sufficient, well-trained fish and wildlife biologists, employers are also calling for additional knowledge, skills and abilities (KSAs) from employees including interpersonal communications, conflict resolution, leaderships and teamwork skills, policy, ethics, budget development and administration, and human dimensions of fish and wildlife management (Baydack et al. 2009, Bissonnette et al. 2000, Bleich and Oehler 2000, Millenbah and Wolter 2009, Stauffer and McMullin 2009, The Wildlife Society 2009). These KSAs are particularly important as employees of natural resources agencies move up the career ladder.

Many of our comparator institutions have begun offering similar non-thesis masters degrees. In 2005, only 2 of 60 member institutions of the National Association of University Fish and Wildlife Programs offered non-thesis masters degrees in fish and/or wildlife science. In 2009, that number had grown to 18. Only 1 of these institutions (Texas A & M) offers part of their degree on-line.

A market survey of potential employers indicates that the need for non-thesis masters degrees and additional training is high. We estimate that there are approximately 3,500 fish and wildlife professionals in the state of Oregon employed by state and federal agencies or non-government organizations, and most western states would have a similar number. In the fall of 2008 we conducted an on-line survey of approximately 90 state and federal fish and wildlife agencies. Division (fish, wildlife, marine) administrators in state agencies or regional human resources administrators of federal agencies were the target of our survey. Although the response rate was poor (21%; 16 of 78 valid email addresses), the results suggests a strong
demand for an on-line, non-thesis masters in fish and wildlife. Eighty-one percent of respondents stated that their employees would benefit from an on-line masters degree. All respondents indicated that their agency had from 2 to more than 5 employees that would benefit from such a degree (the modal response was 3 employees). Half of the respondents stated their agency has a policy of supporting employees in advance training and an additional 6 of 16 stated they may be able to support employees. When asked what types of support an agency might offer an employee, 63% (10 of 16) would pay tuition, 63% would offer salary support, and 50% would allow a leave of absence for advanced training. When asked what KSAs employers hoped an employee might receive in such a program, the responses were consistent with the literature cited above. In addition to advanced training in fish and wildlife ecology and conservation science, employers commonly cited human dimensions of fish and wildlife, budget development and administration, interpersonal communication, media relations, policy and ethics as desired KSAs.

Oregon State University offers thesis-based Masters of Science degrees in Fisheries or Wildlife Science. Our MS degrees provide training for researchers and managers in natural resources and typically requires two field seasons of data collection for a thesis. The OSU’s Survey Research Center conducts a survey of our past 3 graduating classes every 3 years. The results from the past 3 surveys (9 graduating classes) have been remarkably consistent (See Edge 2009, the most recent): response rate was good (~60%), over 60% of B.S. graduates have permanent employment in natural resources within 3 years, and employment success with a masters degree is greater than 95%. For many years, a Masters degree was considered the entry level degree in the fish and wildlife professions. Our surveys suggest that a substantial number of B.S. graduates become permanently employed in natural resources agencies and that essentially all of our masters graduates get jobs. Taken together, these statistics suggest that there are insufficient numbers of graduates with masters and a large number of permanent employees in the workplace with B.S. degrees that might benefit from additional education. Our traditional thesis-based M.S. degree is not feasible for permanent employees because of the extensive period of data collection required for a thesis.

b. If the program’s location is shared with another similar OUS program, proposal should provide externally validated evidence of need (e.g., surveys, focus groups, documented requests, occupational/employment statistics and forecasts).
Not applicable—there are no other similar programs in the state.

c. Manner in which the program would serve the need for improved educational attainment in the region and state.
The data and literature cited in 4a represent national workforce needs in the fish and wildlife professions. However, most of the letters of support in Appendix D are from state or regional natural resources agencies. These letters do not provide estimates of number of employees that might seek a PSMFWA degree, but all imply there will be a high level of interest among employees for the degree. We suspect that our enrollment goals can be met from the state and regional service area alone, but because the degree will be available completely on-line we will market the degree nationally and internationally.
d. **Manner in which the program would address the civic and cultural demands of citizenship.**

Knowledge of environmental stewardship and conservation of fish and wildlife resources will become increasingly important as the U.S. population increases and as climate change places additional stress on ecosystems. This program will train professionals that will assist the public in understand their civic and cultural responsibilities for maintaining intact ecosystems.
5. Outcomes and Quality Assessment

a. Expected learning outcomes of the program.

The proposed PSMFWA degree is an integrated curriculum designed to provide advanced, professional training in four areas: (1) core knowledge in fish or wildlife biology, ecology and management; (2) professional skills and abilities; (3) human dimensions of natural resources management; and (4) natural resources policy. In addition, each student will participate in an intensive internship experience engaging students in real world work situations involving technical problems, teamwork, communication skills, and decision-making. Specific learning outcomes for each of the major components of the PSMFWA degree are listed below.

Fish or Wildlife Biology, Ecology and Management

Graduates of the PSMFWA will have an in-depth understanding of:

- nature and characteristics of ecosystems;
- complex interrelationships among biological, physical, and human components of ecosystems;
- spatial and temporal variation in ecosystem structure and processes;
- linkages and interfaces of terrestrial and aquatic systems;
- ecosystems as context for the dynamics and adaptation of populations and life histories;
- application of ecosystem principles in development and implementation of holistic, synthetic approaches to management; and.
- information requirements to support application of conservation principles and develop approaches for specific ecosystems or specific organisms within these ecosystems.

Professional Skills and Abilities

Graduates of the PSMFWA will have an understanding of:

- basic concepts in practical accounting and finance, marketing, project management, and entrepreneurship,
- interpersonal and organizational communication styles,
- ethical issues in scientific and social settings, and
- how to apply scientific knowledge in a variety of settings and by working as part of a multi-disciplinary team.

Human Dimensions of Natural Resources Management

Graduates of the PSMFWA will be able to:

- identify interactions between human ecology and nature; and
- incorporate social information (e.g., demographics, environmental policy, economic systems) in development of conservation plans and natural resource decision making.

Natural Resources Policy

Graduates of the PSMFWA will have an understanding of:

- fundamental operations and assumptions of human institutions, including politics,
- economics, culture, history and social/value systems; and
- how natural resources are affected by actions dependent on human philosophy, ethics, world views, religion, and psychology.

b. Methods by which the learning outcomes will be assessed and used to improve curriculum and instruction.
We conduct a statistical survey of all graduates every three years (Edge 2009). This survey asks respondents to characterize the importance of different Knowledge, Skills and Abilities in their current jobs and ask how well our program trained them in those areas. Questions specific to the PSMFWA learner outcomes will be added to the survey and responses will be stratified by degree. Thus, we will have graduates self-assessment of the importance of individual learner outcomes and how well we prepared them in each area. We will also conduct follow-up surveys with employers to determine: (1) if the training we provide is still relevant to their needs, and (2) if the employees that recently completed their degrees were well trained in the areas identified in our learner outcomes.

c. Program performance indicators, including prospects for success of program graduates (employment or graduate school) and consideration of licensure, if appropriate.
See 3b above for certification requirements. Because all students admitted to the program will be currently employed professionals, employment success will be 100%. We anticipate that most will be promoted by their employers within a year or two of completing the program.

d. Nature and level of research and/or scholarly work expected of program faculty; indicators of success in those areas.
The science we are engaged in is central to concepts of sustainability, ecosystem services and natural resources management. See 1e above. We are arguably the best graduate program in OUS.

6. Program Integration and Collaboration
a. Closely related programs in other OUS universities and Oregon private institutions.
There are no closely related programs in OUS. The Department of Fisheries and Wildlife offers the only degrees related to the fish and wildlife professions in the Oregon University System. A Master of Natural Resources (MNR) degree has just been approved by the Provost’s Council and the Sustainable Natural Resources (SNR) Graduate Certificate are related programs because of their general focus on natural resources. Both of these graduate programs target much broader, less well-defined audiences than the narrow professional focus of our PSMFWA degree. Furthermore, the Professional Science Core classes and the internship requirement in the PSMFWA make our degree very different in focus than the MNR degree, which concentrates on interdisciplinary studies and includes a capstone project. Because our degree is much more focused on the fish and wildlife professions and professional-level training for currently employed professionals, we believe there will be very little overlap in student interests in these very different degrees. A student pursuing a MNR degree may elect to include our Fisheries Management Certificate as an area of emphasis but this training would still be very different than the professional core training and internship we have proposed.
b. Ways in which the program complements other similar programs in other Oregon institutions and other related programs at this institution. Proposal should identify the potential for collaboration.

There are no closely related programs in OUS. The Department of Fisheries and Wildlife offers the only degrees related to the fish and wildlife professions in the Oregon University System. OSU is currently the only university in OUS offering professional science masters degrees and currently offers PSM degrees in Applied Biotechnology, Applied Systematics in Botany, Environmental Science, and Applied Physics. Except for the professional science core classes, these programs are unrelated to the proposed PSMFWA degree. Many of our graduate classes are taken by students in Environmental Sciences, Forest Science, Rangeland Ecology and Management, Sustainable Natural Resources and Zoology. A few of our graduate classes are taken by students at other OUS institutions, primarily UO. As mentioned above in 6a, two other graduate programs at OSU, the MNR and the SNR, require some of the same classes as in the PSMFWA degree. For example the SNR lists five of the same classes listed in two sections of the PSMFWA degree and the MNR degree list six of 18 classes in the ecology/production area and eight of 21 classes in the human systems area that are on the course lists for PSMFWA. We believe that students pursuing a PSMFWA degree will be drawn from a different potential client base and therefore having students pursuing these different degrees are likely to increase enrollment in the on-line classes more than compete for students in these programs. Thus, we will be collaborating in that Fisheries and Wildlife faculty teach some of the classes listed in both the MNR and SNR programs; having increased enrollment will help us achieve minimum enrollment requirements for these classes. Our faculty may also elect to advise MNR students on their capstone projects.

c. If applicable, proposal should state why this program may not be collaborating with existing similar programs.

Not applicable.

d. Potential impacts on other programs in the areas of budget, enrollment, faculty workload, and facilities use.

We do not anticipate any major impacts to our unit or other units on campus. We anticipate increased interest in our graduate programs and the number of potential students contacting our faculty. However, because enrollment will be limited to current professionals with at least 5 years of professional experience and because we believe we only have capacity for approximately 10 students/year, the PSMFWA degree will be a minor component of our graduate program. We do not anticipate significant impacts on other units because this degree is unique to our program (see response in 6a and 6b above), and because enrollment will be limited to professionals already in the workplace. Because we will limit enrollment, some students applying to the PSMFWA program may elect to enroll in the MNR degree and thus, we expect interest in our program to increase enrollment in the MNR degree. Students pursuing the MNR degree may seek Fisheries and Wildlife faculty to mentor them on their capstone projects, but we do not believe that the PSMFWA program will cause a workload problem. We have 48
faculty members who have expressed an interest in serving as major advisors for students in the PSMFWA program. Given that we will limit enrollment to 10 students per year, we have the additional capacity to mentor the few MNR students that are doing fish and wildlife related capstone projects.

7. Financial Sustainability (attach the completed Budget Outline)

a. Business plan for the program that anticipates and provides for its long-term financial viability, addressing anticipated sources of funds, the ability to recruit and retain faculty, and plans for assuring adequate library support over the long term.

Because we already have a large graduate program substantial new resources are not needed to offer this degree. However, we propose to add staff support to deliver this program. Resources to support these staff will come from revenues generated by our eCampus programs (B.S. and PSMFWA). We estimate an annual cost of $42,447 to support the program. Revenues from our eCampus program exceeded $400,000 last year and have increased at a rate of 10-20% per year for several years. We began to offer our BS on-line fall of 2009 and had >75 majors the first term. Thus, we anticipate that revenues from eCampus will easily cover these new costs.

One 0.25 FTE PSMFWA degree Director/Advisor (Appendix A)
One 0.20 FTE PSMFWA Distance Degree Coordinator (Appendix A)
One 0.1 FTE for clerical support (Appendix A)

The College of Agricultural Sciences has a priority staffing process for allocating FTE to replace faculty loss to attrition or for developing new positions. Because of our unit metrics we have been successful in the process in refilling or acquiring new positions for years. Because of our national and international reputation we easily recruit and retain new faculty.

Minor additional library resources will be required to offer this degree (see library assessment—Appendix B). The scientific and technical literature required are largely available for the M.S. and Ph.D. programs we currently offer but additional funds will be required for the on-line support.

b. Plans for development and maintenance of unique resources (buildings, laboratories, technology) necessary to offer a quality program in this field.

No unique resources are necessary to offer this degree.

c. Targeted student/faculty ratio (student FTE divided by faculty FTE).

Not all faculty members will have the capacity to advise PSMFWA majors. However, 21 have specifically said they would advise students admitted to the PSMFWA. Thus, with 10 majors per year the student/faculty ratio for advising will be 10/21 = 0.5. Combined with our current graduate degrees we might anticipate having a maximum of 100 students enrolled during any term. All faculty listed in 1j above have advised graduate students and many teach graduate
classes. If all graduate students including PSMFWA are considered then the student faculty ratio would be $100/47 = 2.1$.

d. **Resources to be devoted to student recruitment.**
Because the degree will be offered predominately on-line, eCampus will develop a comprehensive marketing plan. In preparing for our market survey (4a) we developed a comprehensive list of natural resources employers that can be used to recruit students.

8. **External Review**

(if the proposed program is a graduate level program, follow the guidelines provided in *External Review of new Graduate Level Academic Programs* in addition to completing all of the above information)
References Cited