SELF STUDY REPORT

GRADUATE CERTIFICATE PROGRAM IN CONSERVATION BIOLOGY POLICY

March 2003

Executive Summary

The Graduate Certificate in Conservation Biology Policy was initiated in Autumn 1998 for matriculated graduate students interested in policy related aspects of Conservation Biology. The impetus for the program sprang from student demand, increasing employment prospects, and growing public concern about the environmental crisis resulting from the loss of biological diversity. To earn the Certificate, students are required to complete 21 credits in courses related to Conservation Biology Policy, including one survey/overview course, two core area courses, and a capstone. The program is overseen by an interdisciplinary faculty Steering Committee and administered by the Program on the Environment (PoE) in cooperation with the Graduate School. The Graduate School and PoE jointly fund a permanent staff member (the Graduate Program Coordinator) who is responsible for program administration and advising. Since appointment of the Graduate Program Coordinator, enrollment in the program has trended steadily upward.

The program has achieved considerable success in:

- providing well-structured, flexible, interdisciplinary education, that prepares students for careers in Conservation;
- providing students a focus on problem-based education that emphasizes development of team-building, collaboration, and communication skills to enhance career prospects;
- fostering interdisciplinary interaction among faculty and students;
- establishing an identity and "face" at UW for Conservation Biology, which is one of the University's core academic strengths;
- providing centralized advising and serving as an information node for Conservation Biology and related environmental activities at UW.

Students who have responded to questionnaires have been universally positive about their participation in the program, and have stated without exception that they would recommend the program to a fellow student.

The program operates by assembling curriculum from existing courses offered throughout the University, and has limited operating budget. In the coming years the program faces a number of challenges:

- to establish a new graduate-level overview course that provides graduate students a firm foundation in the scientific and human dimensions of conservation biology;
- to initiate a regular colloquium series or seminar in Conservation Biology to serve not only faculty and students in the program, but the broader UW community;
- to improve camaraderie and community building among students in the program;
- to take a more active role in helping to coordinate Conservation Biology curriculum across departments so as to minimize duplicated efforts, develop courses to fill gaps in curricular offerings, and ultimately better serve students across units;
- to establish a parallel Graduate Certificate in Conservation Biology Science.

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Contents

APPENDICES SPECIFIED IN SELF-STUDY GUIDELINES

ATTACHMENTS

SELF STUDY REPORT

GRADUATE CERTIFICATE PROGRAM IN

CONSERVATION BIOLOGY POLICY

The outstanding scientific discovery of the twentieth century is not television, or radio, but rather the complexity of the land organism. Only those who know the most about it can appreciate how little we know about it. The last word in ignorance is the man who says of an animal or plant: "What good is it?" If the land mechanism as a whole is good, then every part is good, whether we understand it or not. If the biota, in the course of aeons, has built something we like but do not understand, then who but a fool would discard seemingly useless parts? To keep every cog and wheel is the first precaution of intelligent tinkering.

Aldo Leopold, cited in "Round River", edited by Luna B. Leopold, Oxford University Press, New York, pp. 145-146, published 1993, from diaries of Aldo Leopold

I. INTRODUCTION

A. Impetus and Need for Program

If present trends continue, the Earth may lose one-quarter of its species, much of its temperate forests and other critical habitats, along with many of the resources and services that biological systems provide to humanity. Our civilization depends on living resources, but ongoing environmental degradation demonstrates the need for fundamental changes in the relationship between human society and biological resources. The complexity of biological resource management demands highly skilled and trained people capable of interdisciplinary problem solving.

Conservation Biology is a new discipline developed in response to the environmental crises resulting from the loss of our biological heritage. Its goals are to investigate human impacts on biological diversity and to develop practical approaches to prevent the extinction of species. Conservation Biology is a synthesis of many disciplines, including anthropology, biogeography, ecology, environmental studies, genetics, molecular biology, population biology, sociology, and taxonomy.

Although Conservation Biology is strongly tied to ecology and natural resource management, the overall complexity of environmental problems requires an understanding of law, policy, and the social sciences, as well as effective communication skills. Conservation biologists need practical experience, knowledge, training, and skills to work with scientists, politicians, developers, economists, lawyers, sociologists, and conservationists.

Although Conservation Biology as a discipline with its own name didn't emerge until the late 1970s, its intellectual roots stretch to the 19th century and earlier, fertilized by the interweaving threads of biology, natural history, philosophy, economics, and public awareness. The works of nineteenth century American writers like Thoreau and Emerson, who focused on nature as a refuge for a simpler life, paralleled advances in natural history exemplified by leaders like Charles Darwin and Wallace. The increasing appreciation for the complexity and interdependence of natural systems led the way for *ecology*, coined by Ernst Haeckel as a subfield of biology in 1866. During the 20th century, advances in ecology as a science, as well as recognition of the world's dwindling natural heritage, established firm academic and intellectual roots for conservation biology, ecology, forestry, and wildlife management. Publication of Rachel Carson's *Silent Spring* in 1964 brought to the public eye evidence of environmental and biological decay, backed by meticulous research and state-of-the-art science. This great public awakening brought the threats to biological richness into the mainstream of society.

This great environmental awakening during the 1960s and 1970s unleashed a great latent demand for the interdisciplinary field of conservation biology. The First International Conference on Conservation Biology in 1978 opened the door to this demand, and soon followed in succession the first textbooks, additional conferences, establishment of the Society of Conservation Biology, and ultimately the launching of the journal *Conservation Biology* in 1987. Since its start, the Society for Conservation Biology (SCB) has been among the most rapidly growing of all professional societies, growing from 0 in 1985, to well over 5000 members by 1998.

The early emergence of Conservation Biology as a named discipline was led primarily by biologists and ecologists, but in recent years there has been growing recognition of the important role played by social sciences and public policy in the practice of conservation biology. Advances in natural resources economics and ecological economics since the 1970s have created breakthroughs in efforts to measure the value of nature, ecosystems, and biological resources. The profound influence of economics on conservation and the evolving role of economics, policy, and business in conservation is made apparent by the year 2000 launch of a new journal, *Conservation in Practice*, by SCB to address more practical and applied aspects of Conservation Biology.

With continued loss of open space, increased population densities, deteriorating environmental quality in many parts of the world, and the unprecedented rate of decline in biological diversity, western societies have devoted extensive resources to both the science and practice of conservation. As of 1999, the Environmental Careers Organization (ECO) estimates more than 45,000 employed nationwide in land and water conservation (among more than 2 million employed in environmental fields overall), with an estimated 3-7 % annual increase through the year 2005[1]. ECO cites teamwork, cross-disciplinary thinking, and computer and technical skills as critical for future employment prospects. The importance of science in public policy was recently underscored in a campus lecture offered by William Ruckelshaus "Science and Public Policy: The Twain Must Meet". With growing threats to biological resources, an historical public

[1] Environmental Careers Organization,1999 "The Complete Guide To ENVIRONMENTAL CAREERS In the 21st Century", chapter 11. Island Press, Washington, D.C.

skepticism of the role of government in land management, and limited public resources available for conservation programs, it is essential that conservation scientists get both the science and the policy right.

The Graduate Certificate program in Conservation Biology Policy (CBP) was established to address these interweaving currents of intellectual tradition, public demand, public policy need, and practical training for students preparing for careers in biological sciences and policy. The program fills a need to prepare students for the challenge to learn and apply the best available science academics has to offer to policy issues surrounding biological resources; to integrate scientific findings from many different disciplines; and to work productively in a cooperative multidisciplinary team framework. By confronting scientific uncertainty, and assessing – and addressing – the needs of multiple interest groups and stakeholders, the program provides a valuable link between academics and the biodiversity crisis threatening the planet.

B. Conservation Biology at the University of Washington

Conservation Biology has a rich history at the University of Washington (UW) and is one of the University's core strengths in academic and research programs. Faculty members in many departments actively participate in research and teaching in many aspects of this rich field. Faculty in Zoology, Fisheries, Marine Affairs, Forest Resources, Oceanography, Public Policy, Botany, Economics, Psychology, and other academic units at the university maintain active research and graduate teaching programs in issues of conservation biology.

UW sports among its faculty many world-renowned researchers in conservation biology science, and several faculty have played leading roles nationally and internationally in scientific and advisory panels related to conservation biology. P. Dee Boersma, first Director of the CBP Steering Committee and Professor of Zoology, served as President of the Society for Conservation Biology from 1997 to 1999, during which time the Society's national headquarters and membership office was housed at UW. The Society's professional journal *Conservation in Practice* remains housed at UW. The Department of Zoology (now merged into the Department of Biology) recently appointed Samuel Wasser as an Endowed Chair in Conservation Biology, and Gordon Orians, Professor Emeritus, was past president of the Ecological Society of America. In the College of Forest Resources, Professor Jerry Franklin is one of the world's foremost experts on Northwest ecosystems and northwest forest conservation, and Jim Agee is a leading expert on fire ecology. In Fisheries, James Karr, Robert Francis, and Charles Simenstad are authorities in conservation and management of aquatic and marine species. In the Social Sciences, Gardner Brown in Economics, Richard Zerbe in Public Affairs, and William Rogers in Law are all recognized authorities in human elements of conservation, and the application of human institutions to conservation problems. It is not possible to mention all of the dozens of faculty at UW who are leaders in conservation biology, but these few examples demonstrate some of the breadth and depth of UW's traditional strengths in this field. Recent hires across the University in both natural science and social sciences offer great promise of continuing to build on these traditions.

C. Establishment of Graduate Certificate Program in Conservation Biology Policy

The first efforts to create a program in Conservation Biology at UW began in the early 1990's. Recognizing the need for more formalized graduate training in Conservation Biology at the University of Washington, professors from the Schools and Colleges of Architecture and Urban Planning, Arts and Sciences, Engineering, Forest Resources, Law, Ocean and Fishery Sciences, and the Graduate School of Public Affairs formed an interdisciplinary faculty in Conservation Biology in 1993 (see Attachment 6).

In 1997, the interdisciplinary faculty, now the Steering Committee for the Conservation Biology Policy Certificate Program, developed a Certificate Program in Conservation Biology Policy aimed at enhancing graduate programs of students in a variety of fields. This program, administered by the Graduate School in cooperation with Program on the Environment, is designed for students who wish to pursue policy-related careers in either the public or private sector, and for students in the natural sciences interested in science careers that influence or effect policy.

This program arose (1) to meet an increasing demand by students from both natural sciences and social sciences for background and training in policy processes that influence conservation initiatives; (2) to improve recognition and support for study of conservation biology policy and science at UW; and (3) to leverage UW's broad faculty expertise into increased visibility for Conservation Biology at UW. An informal group consisting of both natural and social scientists produced the program proposal, which is attached as Attachment 1. Originally it was thought that a Masters degree program was desirable. However, a number of factors led the interdisciplinary faculty to propose a Certificate program instead. First, resources for such a program were extremely limited. Moreover, an interdepartmental program would provide better flexibility for students to extend their breadth by taking courses beyond just one department, while maintaining the disciplinary depth that is one of UW's strengths. The certificate program was conceived as an economical and innovative way to leverage existing resources to bring greater visibility and recognition to one of UW's core strengths, while providing graduate students access to the cross-disciplinary educational background and team-building skills so critical in the 21st century employment market.

The Certificate in Conservation Biology Policy was approved by the Board of Regents in 1998, and established by the Graduate School in Autumn 1998. The program was administered in the Department of Zoology with half-time support form a permanent staff member until Spring 1999. At that time, the staff position was not renewed, and administrative responsibility was placed in the Graduate School. In November 2000, the Graduate School in cooperation with the newly established Program on the Environment (PoE) created a new shared, full-time, staff position for a Graduate Program Coordinator to administer and provide advising and outreach for interdisciplinary graduate education. The program is presently administered in PoE by the Graduate Program Coordinator.

D. Purpose and Objectives of the Certificate Program for Conservation Biology Policy

As stated in the program proposal, the academic mission of the Conservation Biology Policy Certificate Program is to "expose students to multiple disciplines, allowing them to communicate effectively with biological resource managers in a variety of specialized fields." As the program has evolved, the Steering Committee has recognized the growing need to provide students with skills and experience in interdisciplinary problem-solving, team-building, and collaboration across disciplines. The current mission statement reproduced below reflects the original multidisciplinary focus, while stating more explicitly the skills and knowledge base the program seeks to provide.

> *The Graduate Certificate in Conservation Biology Policy seeks to provide students with education and skills to assess impacts on biological diversity and to develop practical approaches to prevent species extinction. Integrating ecology and natural science with studies in law, public policy, and social sciences, the program is designed to prepare students to understand, interpret and communicate research findings from a wide range of fields; to work cooperatively in interdisciplinary teams; and to understand and weigh competing interests in assessing and developing conservation programs.*

The original Interdisciplinary Committee for Conservation Biology anticipated that a parallel Certificate Program in Conservation Biology Science would be developed once the Certificate in Conservation Biology Policy was established and operational. A Certificate in Conservation Biology Science would operate in parallel to the Conservation Biology Policy program. The Conservation Biology Science program would maintain independent governance and there would be limited overlap in curriculum, although there would be close interaction between the respective faculty Steering Committees, and we anticipate considerable synergy in coordinating curriculum offerings. Toward that end, a draft proposal for a parallel program in Conservation Biology Science will be submitted to the Graduate School early in Spring quarter 2003 and is included by reference with this Self-Study Report.

E. Structure

The Graduate Certificate in Conservation Biology Policy requires 21 credits in courses that emphasize concepts in Conservation Biology Policy. The 21 credits must include at a minimum the following:

- One survey course in Conservation Biology
- One course each in two of three core areas:
    - Law and Policy,
    - Economics, and
    - Social Ecology;
- One capstone course.

Courses that fulfill each of the required areas are identified on the program website and informational flyer (included as Appendix C). Students are required to meet with a program

adviser — either the Graduate Program Coordinator or a member of the Steering Committee or both — and submit their study plan for approval to the Graduate Program Coordinator and the Steering Committee. Students are encouraged to submit their program plan prior to completing courses toward the Certificate, but in any case students must enroll in the program prior to completing the capstone requirement.

The Capstone requirement may be fulfilled by taking any one of a limited set of courses selected by the Steering Committee in consultation with course instructors. In the capstone courses, participating students from various disciplines work as a team, combining their talents to tackle a theoretical or local conservation problem. Each Capstone course involves an intensive, and broad, multidisciplinary group project that requires integration of knowledge, theory, and methods from the breadth of the program. Projects are chosen to require application of policy concepts to practical problems in Conservation Biology. In most cases, projects are conducted in cooperation with outside practitioners and are representative of the work done by people employed in the field.

Students take additional elective courses from the approved lists for each of the subject areas to complete 21 credits.

F. Governance

The Graduate Certificate Program is administratively under the direction of the Graduate School and the Dean of the Graduate School, Marsha Landolt. The Graduate Certificate is awarded by the Graduate School. The program is governed by an interdisciplinary Steering Committee consisting of seven members representing seven different departments and six different colleges. The Steering Committee sets the curriculum, program requirements, and student responsibilities, and approves student programs plans, any changes to the program, and special requests.

Day-to-day administration is handled by the Graduate School in cooperation with the Program on the Environment (PoE), and is directed by the Graduate Program Coordinator. The Graduate Program Coordinator is housed physically in the PoE offices and shares a joint appointment between the Graduate School and PoE.

II. SELF STUDY

A. Strengths of Conservation Biology Policy Certificate Program

The program offers a number of strengths and provides key benefits to students enrolled in the program, to faculty teaching the courses, and to the University as a whole. The program's main strengths center on its interdisciplinary nature, the breadth and depth offered by both faculty and students in the program, and the emphasis on practical, problem-based education. The interdisciplinary aspect of the Program serves an integrating function across a number of units in the social sciences, life sciences, physical sciences, and the professional schools. By cooperating closely with units, the Program offers students a broad array of courses with considerable program flexibility, taught by faculty who are internationally recognized in their fields. This interdisciplinary cooperation also ensures that students in the program interact with faculty and students from a wide range of disciplines, and that the courses themselves enjoy an enhanced breadth of expertise beyond what is normally encountered in graduate courses.

The program is open only to matriculated graduate students enrolled in graduate degree programs. All students in the program are engaged in discipline-focused graduate work. The interdisciplinary nature of the program thereby benefits from both the breadth of topics covered in coursework, as well as the depth of disciplinary knowledge brought by both faculty and students. This dynamic interchange of depth of knowledge plus breadth of topic focus is a rare and valuable experience for students and faculty alike.

By taking advantage of the extraordinary breadth of courses available at UW in themes related to Conservation Biology, the program is able to provide a curriculum that offers students great flexibility to choose courses that match their individual interests. The program requires that students complete courses within two of three core areas: (1) Law and Policy; (2) Economics; and (3) Social Ecology. By providing students options, the program allows students to choose those courses that most closely fulfill their academic and professional objectives.

The individualized advising offered by the Program further enhances this flexible curriculum. Students have frequent access to the Graduate Program Coordinator who provides guidance and support in developing a program of study for the Certificate program, as well as general guidance and counseling in selecting courses, identifying faculty advisers, and career planning. The Graduate Program Coordinator also provides a wide range of information to students on opportunities available on campus and off, including not only available courses, but also seminars and speakers, funding opportunities, internships, and other opportunities in programs across a number of departments and schools. The Graduate Program Coordinator also assists in graduate recruiting by providing a common "face" for graduate study in Conservation Biology and by answering inquiries and directing prospective students to appropriate graduate degree programs. More details on student advising and career assistance are described in Section II,G,5. "Mentoring".

The Program culminates in a Capstone project that emphasizes a hands-on, applied, problem-based perspective. Students not only learn the issues and context of contemporary problems in

conservation biology, but also gain valuable skills in team-building, collaboration, communication, and application of academic knowledge to solving real problems. These skills are highly prized by employers, but are frequently not emphasized in a traditional academic setting.

In addition, the Program, through its affiliation with Program on the Environment, has cooperated closely with departments in developing new interdisciplinary courses that both strengthen the Program and contribute to successful interdisciplinary efforts within departments. Examples are a special three-quarter course on the Northwest Salmon Crisis in 2001-2002, which provided an integrated assessment of the science, economics, and policy of salmon management in the Pacific Northwest. In general these courses have received very high student ratings and broad participation from graduate students in a wide range of fields. We are presently collaborating with faculty in the life sciences to develop a new graduate level course in Conservation Biology that would be suitable both for students in the program and for graduate students in the life science departments focused on ecology and conservation.

In a broader context, the Certificate program plays a number of roles for the University and participating departments beyond the immediate academic objectives. Foremost in this context, the Certificate brings an identity and face to teaching and research at UW in the area of Conservation Biology. The presence and vitality of the Certificate program provides visibility for one of UW's core strengths, formalizes Conservation Biology as a visible part of the UW graduate and research community, and helps to streamline curriculum across the university. This improved visibility and identity provide many benefits to the university. Among these broader programmatic successes, the program:

- provides a centralized face to graduate education in Conservation Biology at UW, thereby improving visibility to prospective graduate students and assisting in recruiting the most highly qualified applicants;
- fosters Conservation Biology teaching and research across disciplines within the University, and creates a more coordinated and integrated program to encourage student and faculty interaction across academic units;
- lends greater coherence to graduate studies across environmental-conservation disciplines; and
- provides specialized training and formal certification that enhances career opportunities for students with an interest in conservation biology.

The program has succeeded in all of these ways with relatively modest investment and very minimal operating budget.

B. Measurement of Success

Program assessment has been a priority since administrative responsibility was transferred to program on the Environment in Autumn 2000. We employ a number of methods to monitor program quality and outcomes of students, and to improve the value of the program to students and the University. Assessment efforts and results of evaluation are summarized below.

1. Student Questionnaires

Beginning in June 2001 we have administered exit questionnaires to graduating students. Response rate has been variable, but generally about 50%. Given the small number of graduates in these initial years of the program, the total number of responses is small. Examples of exit interviews and representative responses are included as Attachments 2 and 3.

Students who have responded to questionnaires have been universally positive about their participation in the program, and have stated without exception that they would recommend the program to a fellow student.

By far the most common benefits of the program mentioned by students are its interdisciplinarity; the mixed perspectives among science, social science, and policy; and the flexibility of curriculum. Students praise the way the program extends their education into new and challenging realms. It is especially gratifying that students from natural sciences appreciate the improved perspective they acquire on social science and policy, while students from social sciences and policy benefit from improved understanding of how policy decisions intersect with natural processes.

In this program and others, students routinely praise flexibility of curriculum and criticize rigid program requirements. At the same time, students would like an improved sense of community and increased opportunity for camaraderie, and these benefits are often in conflict in developing a program: required courses that all students must take together help build community and establish camaraderie, but impose rigid requirements that students may find difficult to reconcile with their departmental degree requirements. Balancing these student needs, and continuing to maintain rigor in depth as well as interdisciplinary breadth, remain key program objectives.

2. Quality, Breadth, and Relevance of Courses

Every quarter we review the curriculum to verify that course offerings remain current; that courses fulfill the objectives set out for them; and to verify that there is space in the courses available for Certificate students. Based upon these reviews, we add a number of courses to the approved list, and drop courses that are no longer offered, no longer fulfill program objectives, or do not offer sufficient space to accommodate the program's students. In addition we maintain close contact with instructors teaching program courses to confer about the degree to which courses are addressing the objectives of the Certificate and the needs of Certificate students in course design and assignments. We maintain especially close communication with instructors for capstone courses.

3. Course Evaluations

As part of this self-study we reviewed course evaluations for selected courses in the Certificate curriculum, focusing especially on Capstone courses. Evaluation summaries are included as Attachment 4.

Overall, courses for which evaluations are available received moderately good to excellent ratings, as indicated by the rating evaluation system, and range from just above the median value for all courses at UW to well above average. Although course evaluations are only a small part of assessing course effectiveness, these results suggest that students find the capstone courses valuable, and none of the results raise concern about the effectiveness of courses.

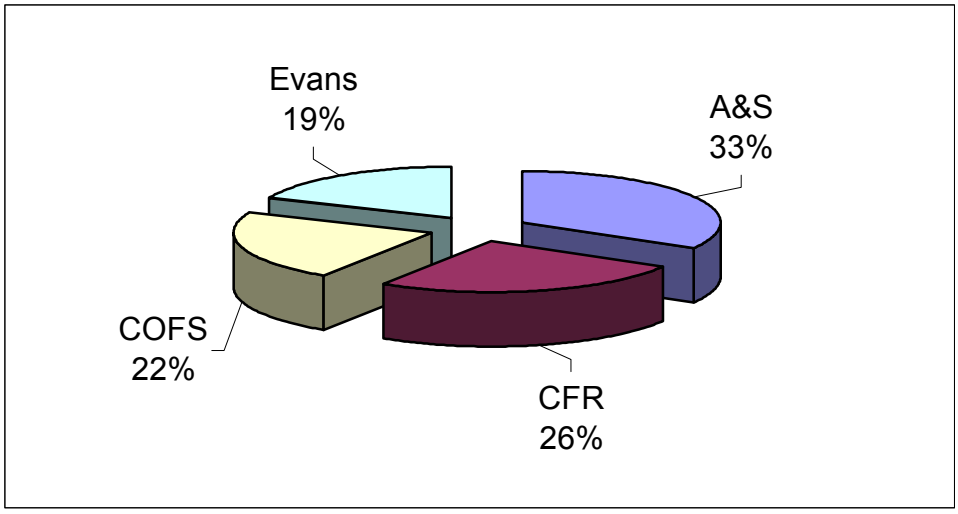
4. Range and Diversity of Students and Enrollment Trends

Because one of the program's main strengths is the interdisciplinary nature of the program, another important metric for program success is the diversity of disciplines represented among the program's faculty and students. Ideally students and faculty would represent a cross-section of campus, with participants about evenly spread among law/policy, social sciences, and natural sciences, and representation across the breadth of disciplines encompassed by the field. By this measure the program has been successful. A listing of students enrolled in the Certificate program (included as Attachment 5), together with a breakdown by school/college (Figure 1) and by department/major (Figure 2) shows the following breakdown by broad focus area:

- law & policy: 40%
- natural sciences: 40%
- social sciences/humanities: 20%

Figure 1. Conservation Biology Students by School/College

n = 27
(25 students, 2 dual degree students are enrolled in two colleges)



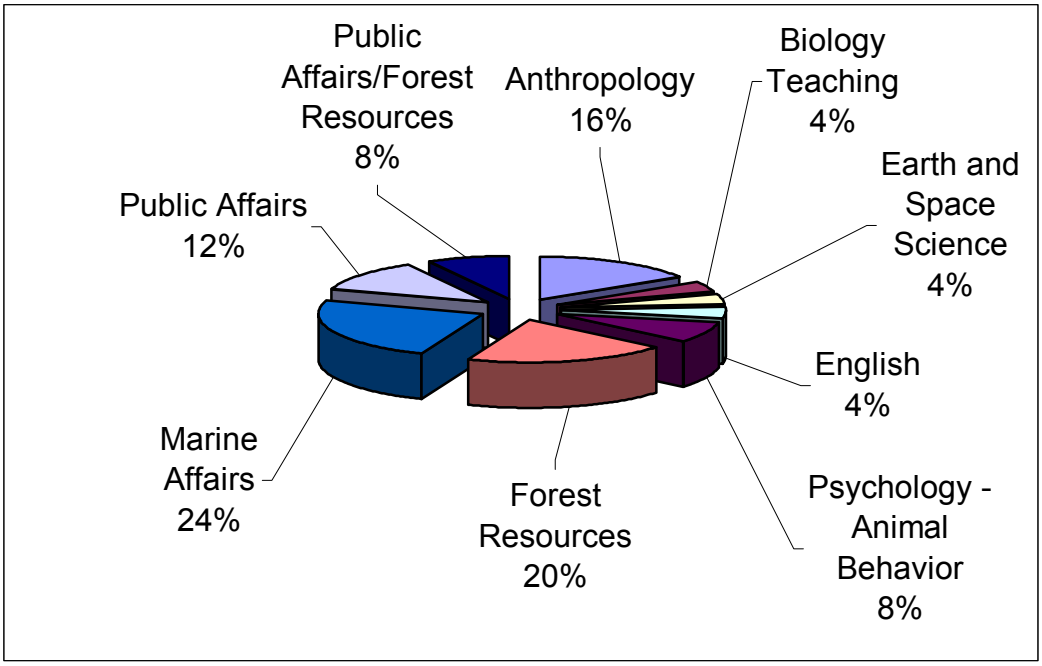
The absolute breakdown by department shown in Figure 2 demonstrates the wide range of disciplines represented. There is somewhat of a concentration of students from policy programs (SMA and Evans School), but given that the program is a *policy* certificate this is not terribly surprising or troubling. The great variety of disciplines represented, from English to Earth &

Space Sciences, and from Forest Resources to (Animal) Psychology, is testimony to the broad cross-disciplinary appeal of the program and the fertile intellectual exchange it fosters.

Still, there is room for improvement. There are no students enrolled in the program from the School of Law, the College of Architecture, or the Departments of Biology and Aquatic and Fishery Sciences. Improved outreach by the Graduate Program Coordinator and members of the Steering Committee to better publicize the program may help reach interested students in these fields, although the nature of the Graduate degrees in those programs (professional degrees in the first two, and mainly Ph.D.-seeking students in the latter) may render a Certificate less coveted among those students.

Figure 2. Conservation Biology Students by Department/Major

n = 25

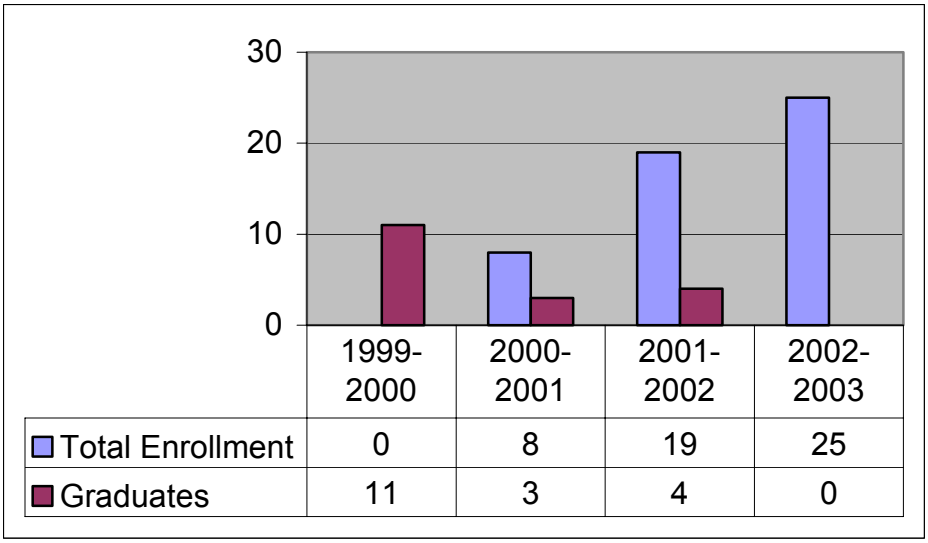


A second important metric for program success, especially for a new program, is the numbers of total enrollments and graduating students (Figure 3). Initial strong enrollments upon establishment of the program in Fall 1998 led to a burst of graduates in the 1999-2000 academic year. In 1999 the program lost its half-time administrative staff position and its administration was transferred to the graduate school.

The decline in the number of graduates for 2000-2001 and 2001-2002 reflects very limited program publicity and recruiting during the period summer 1999 to autumn 2000, when the program was administered temporarily in the Graduate School, and during which very few new students enrolled in the program. Following appointment of the Graduate Program Coordinator

in November 2000, the number of students enrolled in the program has grown steadily from 7 to 25 as of March 1, 2003, and we anticipate that the numbers of graduates will increase to double digits over the next two years as these newly enrolled students complete their degree and Certificate programs.

Figure 3. Total Enrollment Trend*



	1999-2000	2000-2001	2001-2002	2002-2003
Total Enrollment	0	8	19	25
Graduates	11	3	4	0

*Total enrollment for 1999-2000 is not available; number of graduating students for June 2003 is not known at this time.

C. Obstacles to Greater Success

Although the program has achieved a degree of success, many challenges remain. The program operates with very limited budget, and the curriculum is taken completely from existing courses offered in departments and schools across the university. The great interdisciplinary interchange is an obvious benefit both to the program and the university, but the corollary is that the program has no control of its own courses, and this can leads to problems:

- departmental courses are sometimes temporarily cancelled, sometimes with late notice, and the Program is not always able to substitute for them;
- there are no courses that belong exclusively to the program, and which all students complete together as a group;
- because of its interdisciplinary nature, and wide range of flexibility in course selection, it is difficult to develop an esprit de corp among the certificate students, and this is exacerbated by the fact that there are no courses unique to the program.

A relatively modest budget devoted to the program would make it possible to develop courses that would provide the program improved coherence and establish a stronger identity. Our proposals to develop a one-quarter seminar/colloquium series and an introductory, interdisciplinary graduate-level survey course for the program are discussed below in Section II,D.

In establishing the Conservation Biology Policy Certificate program, the original interdisciplinary faculty committee envisioned a parallel program in Conservation Biology Science. We have not yet established such a certificate in Conservation Biology Science though we have long thought such a certificate was desirable. Initial efforts to design and launch the program are underway, and a draft structure for such a program will be submitted to the Graduate School in the coming weeks. The new program, if approved, would share the seminar series and the graduate-level survey course with the existing Conservation Biology Policy program to help integrate and promote interaction among the program participants.

Because of the reliance on existing courses, the curriculum provides limited opportunity for establishment of community and camaraderie among students in the program, although faculty interaction has been strong. This is a common problem even for many departmental based degree programs, and is especially difficult to address for an interdisciplinary program with no control over course offerings. Among the steps we have taken to improve this community building include organizing program open house events for faculty and student interaction, but these have met with low student attendance. Clearly greater effort is needed in this area, and we outline in the next section specific steps we will be taking to address it.

Despite the strong working relationships among faculty, there is continuing need for faculty consultation and closer coordination in course offerings in Conservation Biology across the disciplines. Both CFR and the newly developed Department of Biology are working actively to redesign their curricula and these changes will necessarily affect program offerings in the Conservation Biology Policy program.

Finally this Self-Study process has made it apparent that student representation on the steering committee would be desirable, and we will recruit and appoint a student member during Spring 2003.

D. Plans to Improve the Quality and Effectiveness of the Program

In this section we detail plans to address the challenges noted above and our strategy for ongoing improvement in the quality and effectiveness of the program. A summary of these plans and procedures for establishing goals is also provided in Appendix H, section *i*.

1. Immediate Recommendations

To address some of the issues identified in our ongoing assessment and this Self-Study process, we have developed the following internal recommendations that we plan to implement as soon as practicable:

- appoint a student representative to the Steering Committee in Spring 2003;
- initiate a monthly Conservation Biology colloquium series commencing in Spring 2003 to bring vitality and to improve and expand the sense of community within the Certificate program and among the broader research and teaching community at UW;
- submit a proposal for a certificate program in Conservation Biology Science during Spring 2003;
- continue the monthly Conservation Biology colloquium, or introduce a 1-quarter seminar (1 credit) beginning in the 2003-2004 academic term that would feature speakers related to Conservation Biology Policy and Conservation Biology Science, and which would be a required part of the Certificate curriculum for both programs;
- invite Conservation Biology faculty across the university to join a curriculum group to share ideas on conservation biology teaching and to more effectively and efficiently coordinate course offerings across departments;
- initiate a requirement for students to meet with Graduate Program Coordinator or Steering Committee faculty adviser at least once per academic year to track student progress and enhance the value of program mentoring.

2. What is the process by which your unit sets its overall goals? How often are departmental goals reviewed and reassessed?

The underlying objectives of the program were specified in the program proposal and approved by the Board of Regents. Program objectives and goals are reviewed and defined by the Steering Committee in consultation with the Graduate Program coordinator.

The Steering Committee meets periodically, generally at least once per quarter and more often if necessary, to review the broad program mission, as well as set immediate goals and objectives for continuing operation and improvement of the program. Day to day operations are administered by the Graduate Program Coordinator, who reports to the Steering Committee and makes specific recommendations on curriculum and governance.

Broad program objectives are generally developed by the Steering Committee. Day-to-day administrative and procedural goals are developed by the Graduate Program Coordinator for review and approval by the Steering Committee and Director.

The broad program mission statement identified in Appendix F originated from the original program proposal. It has been revised periodically to more accurately reflect the curriculum and the underlying program objectives, but remains essentially the same as outlined in the original program proposal.

3. In what ways do you anticipate the goals of your program will change in the next ten years?

With the rapid and accelerating rate of change in social and political institutions, as well as the state of the natural world, it is an enormous challenge to anticipate the specific nature of the field of conservation biology, the institutional role of interdisciplinary graduate education at UW, and the most pressing global conservation problems over the next ten years.

Likewise, graduate education itself is changing nationally. It is not possible to predict with any confidence what formats will become important, what role distance learning may play, and to what degree teamwork may be incorporated more ubiquitously into graduate curricula. The Graduate Certificate structure is somewhat innovative in applying interdisciplinary "specialization" to discipline-based degree programs. It is not clear how this Certificate model will fit into graduate education and how it may evolve in the coming years. The Conservation Biology Policy program will be part of this evolution and adjust its programmatic goals accordingly.

The subject matter of Conservation Biology Policy is nothing less than the understanding of natural and social processes *and their interactions,* and the future welfare of the biota. The leading concepts in this immensely broad but crucially important field are bound to change as scientific understanding grows, environmental conditions change, technology advances, the voices of the economically less developed nations and their peoples become more prominent, and globalization moves forward in unpredictable ways. What is predictable are:

- the increasing role of technology in both education and conservation problem-solving;
- the increasing importance of large data sets from automated and calculated data processing systems,
- the ever-increasing complexity in human systems; and
- the growing public demand that governments and science not only *study* problems, but also develop innovative and workable *solutions*.

The Conservation Biology Policy program's educational goals will evolve as these major forces evolve and as skill requirements change to meet these evolving demands.

In addition to changes in the face of education and conservation biology as an academic field, the overall goals of the Conservation Biology policy program will be strongly affected by potential organizational changes at the University level. There has been much recent discussion of an Earth Institute and at least some revival of old discussions about possible realignments affecting the natural resource units. Ongoing major curriculum revision at both undergraduate and graduate levels in the College of Forest Resources and the newly formed Biology Department, as well as the proposed new Ph.D. in the Evans School, will have unpredictable effects on graduate education in Conservation Biology Policy at UW. The ways the Conservation Biology Certificate program evolves will be affected by whatever organizational changes are actually implemented.

4. Describe your goals for the next 5-7 years.

Principal goals for the next 5 to 7 years include:

- Establish parallel Graduate Certificate in Conservation Biology Science, with independent but overlapping Steering Committees, and a shared seminar and graduate level survey course;
- continue to improve collaboration and cooperation across the University in Conservation Biology teaching and research;
- establish a new, graduate level course that:
    - provides an advanced overview of conservation biology from the perspective of natural science, social science, and policy;
    - is team-taught, including at least one faculty member from the biological sciences and one from social sciences or policy;
    - is part of the required core curriculum for both the Conservation Biology Policy and Conservation Biology Science programs; and
    - is open to graduate students of Conservation Biology in participating departments;
- acquire funding to offer a high-level seminar in Conservation Biology that brings in local experts as well as nationally and internationally recognized authorities;
- attempt to raise funding to support a post-doctoral research associate:
    - acquire funding to offer a high-level seminar in Conservation Biology that brings in local whose affiliation may be shared with one or more participating departments,
    - who would participate in teaching the "team-taught survey course", and
    - who would organize the one-quarter seminar series;
- increase outreach to broader community outside the university;
- establish the Certificate program as a well-recognized and prized credential for UW graduates and participate more actively in graduate student outreach and recruitment, especially among under-represented groups.

5. Describe areas and strategies for developing your potential for academic and pedagogical leadership in your field.

The Graduate Certificate model is a relatively new development in graduate education at UW and elsewhere. The structure is particularly valuable for introducing an interdisciplinary component to graduate education, while maintaining the depth and rigor of discipline-based learning and research.

The pedagogical model of assembling program requirements from existing courses offered through other academic units is somewhat unique, and fraught with challenges. For the program to be established as a leader, we must:

- ensure that quality is not sacrificed for the sake of breadth;
- work to attract growing numbers of the most qualified students from a broad spectrum of academic disciplines;

- continually review and revise curriculum structure to ensure that curriculum requirements are of the highest quality and provide the knowledge and skills students will need in advancing their career goals;
- strive constantly to foster the complementary relationships that form the basis for the interdisciplinary exchange that is the program's key strength;
- continue to make the program more widely visible and highly prized outside the university.

6. How could the college and/or university assist you in achieving your goals, especially through means other than increased budgets?

The University is publicly committed to the value of interdisciplinary studies. Nevertheless, there is a widespread internal perception that faculty and units who emphasize interdisciplinary work are in competition with those who focus on more traditional, discipline-based approaches. Moreover, initiatives are often perceived as a zero-sum gain, whereby benefits to one unit represent a loss to another. Development of specific mechanisms for "crediting" units whose faculty participate in interdisciplinary programs would be extremely helpful.

As an interdisciplinary program with limited operating budget, the program faces many administrative barriers, such as almost total reliance on existing courses and limited program documentation in campus data acquisition and analysis. Improvement in data tracking and reporting would ease the administrative burden.

The extremely difficult overall budget situation provides no leverage for the program to coordinate curriculum offerings in conservation biology across departments, and especially augment these offerings with interdisciplinary courses that would serve student needs in many units. Even a relatively modest budget could provide the catalyst needed to initiate introduction of a new graduate-level seminar and survey course that would serve students in several participating departments and improve collaboration among programs.

There also is growing pressure to seek external funding to support the program. However, because of the contentious nature of many conservation issues it is in a particularly delicate position with respect to external funders. The Conservation Biology program faces a challenge to remain, first and foremost, neutral and even-handed in its approach to the issues and in the relationships it develops. Neither a particular ideology nor the differential availability of financial resources among different stakeholders can be allowed to influence relationships with the wider community.

E. Changes in Field

Much of this report has focused on the evolution of Conservation Biology as a field over the last decade, and the evolving role of the Conservation Biology Policy Certificate program in graduate education at UW in this field. In particular, Section II,D addressed past and anticipated future changes in the field and our strategy to develop the program to not only respond to but anticipate these changes.

Foremost among these, the trends we noted at the time of the program proposal have intensified: There has been a growth in demand for the Certificate, an increasing recognition of the importance of interdisciplinary study, and especially an increasing perception of environmental crisis, particularly with regard to the next 50 years. Likewise, scientists appear to be gaining increasing recognition by scientists of the importance of public policy in their attempts to effect successful conservation outcomes. At the same time, there has been increasing recognition and acceptance by policy wonks of the importance of science in making good decisions. Perhaps the development most significant for the program has been the evolving trend to demand not only study, but also solutions, for conservation problems.

The program has attempted to address these trends by focusing on applied problems, and practical, team-based applications to real-world problems and by fostering interdisciplinary exchange across the natural sciences and social sciences. Our ongoing and future goals are stated more completely and explicitly in Section II,D.

F. Relationships with Other Units

The Conservation Biology Policy program is an interdisciplinary program with no faculty of its own, with the objective to coordinate and deliver an integrated, interdisciplinary curriculum across the University. It is entirely dependent on productive relationships with faculty and units. Therefore, establishing and nurturing relationships is core to the mission of the Conservation Biology Policy program. These relationships with other units include:

- *Steering Committee*: eight faculty representing seven departments and six colleges/schools;
- *Students*: 25 students representing eight majors and four colleges/schools;
- *Course Faculty*: course offerings from 15 departments/disciplines in six schools/colleges.

The Conservation Biology Policy program depends on these faculty interactions for its governance and curriculum, and these relationships help build bridges in valuable ways. Students gain access to faculty and course offerings across the university. Faculty benefit because they work collaboratively across disciplinary lines on shared goals, and these benefits can be striking. For example, Eric Smith (Anthropology) and Julia Parrish (Biology/Fisheries), members of the Steering Committee, developed an interdisciplinary IGERT proposal linking natural and social scientific aspects of conservation biology. The proposal was unsuccessful, but the example

nevertheless illustrates the sometimes unexpected benefits to faculty of the collaborative relationships that develop.

Over the next academic year we plan to further improve collaboration and interchange by:

- introducing the Conservation Biology colloquium/seminar, which should not only increase community building within the program, but also serve to attract faculty and students from across campus interested in Conservation Biology issues;
- developing a new graduate-level survey course in Conservation Biology that would serve Conservation Biology Policy and Conservation Biology Science Certificate students, and also fill a gap for graduate students studying conservation biology-related themes throughout participating departments;
- initiating a discussion among faculty teaching conservation biology to improve curriculum options and course offerings.

These plans are detailed in other Sections of this report.

G. Graduate Students

1. Graduate Student Profile

A list of graduate students and their home department and college is provided in Attachment 5; a discussion of student composition and trends in enrollment is provided above in Section II,B,4.

2. Recruitment and Retention

Recruitment
We employ a number of strategies to publicize the program and recruit capable students. Because the program is open only to students already enrolled in a degree program at UW, and because the program itself cannot admit students to the University, recruitment is focused largely on entering and continuing UW graduate students.

We encourage the reviewers to visit our web site to see the range of information and services provided to students: http://depts.washington.edu/poeweb/gradprograms/conbio/index.html.

Among the strategies we use to publicize the program and recruit students are:

- visits, presentation about the program, and distribution of program literature by the Graduate Program Coordinator to incoming graduate student orientation meetings;
- presentations about the program to students enrolled in key courses linked to the program;
- electronic distribution of program literature and updates through e-mail and listservs;
- frequent maintenance, updating, and promotion of the program web site;
- participation in campus-wide promotional events, such as the Environmental Opportunities Fair and DogDaze.

Retention
Student retention focuses on helping students complete Certificate requirements while completing and succeeding in their degree program. In addition to general academic advising and mentoring described elsewhere in this report, we provide other services to help students progress in the program. These services include:

- Providing annual progress reports to students to advise them of their status in the program, courses completed, and remaining requirements to complete the Certificate;
- quarterly update and review of program curriculum to provide up to date information on course offerings;
- frequent announcements delivered by e-mail and the program web site on updates to program requirements and course offerings.

3. Inclusion in Governance

To date, graduate students have not participated directly in the Steering Committee or direct governance, however student input and suggestions have been sought (as noted above in Section II,B,1) both for formal program review and less formal curriculum and program assessment. Students have also made recommendations from time to time on specific curriculum issues, and many of these suggestions have been incorporated permanently into the program. For example, the F M 464 course was incorporated into the core curriculum under "Economics" following student recommendation.

This assessment process has made clear the valuable role that students can play in review and continued improvement of the program, and we have initiated the process to appoint graduate student representatives to the Steering Committee.

4. Diversity

Student recruitment thus far has not specifically emphasized underrepresented groups. The program can play only a limited role in enhancing the university's diversity since only students already admitted into UW are eligible, and therefore the program reflects the diversity of the graduate student population in relevant majors. Still, to the degree that the program helps the University publicize its leadership role in Conservation Biology it can serve as a recruiting "carrot" for under-represented groups.

Toward his end, we have made some efforts to enhance diversity of the program and to promote the program to underrepresented groups. With support of PoE, the Graduate Program Coordinator participated in the National Conference of the Association for Minorities in Agriculture, Natural Resources, and Related Sciences (MANRRS) in Portland in April, 2002, and participated in a presentation session on "Strategies for Graduate School Applications". The conference attendance exceeded 800 participants, and the session on Graduate School

opportunities was attended by approximately 100 prospective students from underrepresented groups.

Our long-term strategy to enhance diversity includes engagement with a number of UW programs who are already active in minority recruitment, including the Office of Minority Affairs, the Minority Science and Engineering Program, American Indians in Science and Engineering, the Multicultural Alumni Partnership, UWSTEM (Science, Technology, Engineering and Mathematics) Outreach Program, UW Educational Outreach, and multicultural student clubs and organizations.

5. Mentoring and Career Guidance

Certificate students are full-time graduate students enrolled in degree programs in academic units at UW. Therefore, their dissertation advisers and committees provide the bulk of their mentoring. Nevertheless, student mentoring is one of the strengths of the Conservation Biology Policy program. Each student meets with the Graduate Program Coordinator to plan their program of study, and each student may designate a member of the Steering Committee as a faculty adviser. The program offers individualized guidance in course selection, curriculum planning, career planning, and general advising and mentoring for students enrolled in the program and students interested generally in interdisciplinary graduate environmental education.

The Graduate Program Coordinator maintains regular contact with Certificate students and distributes frequent announcements about program developments, on-campus events, professional activities and conferences, and career and employment opportunities. Members of the Steering Committee place great emphasis on faculty–student and student–student interaction in course selection and design. The program capstone is completed as part of a course selected to emphasize mentoring of student groups working on interdisciplinary, problem-based projects.

The Graduate Program Coordinator also provides services for career counseling and employment search. These include:

- frequent distribution of Conservation related graduate student funding opportunities for students, including grants, fellowships, assistantships, and internships, both on campus and off campus;
- frequent distribution of Conservation related career and employment opportunities;
- maintenance and frequent job postings to the Puget Sound Conservation Biology Jobs listserv (psscbjobs@u.washington.edu), which averages about 5-10 postings per week;
- individual meetings on request with Certificate students to provide guidance on resume writing, networking, and general job search strategies.

Several graduate student groups have developed informal affiliations with the program through contact with the Graduate Program Coordinator: the Graduate Environmental Policy Forum (GEPFa) based in the Evans School of Public Affairs, the Coastal Society in the School of Marine Affairs, the Environment and Society Interdisciplinary Forum (ESIF) based in

Anthropology and Forest Resources, NetImpact in the Business School, and GreenLaw in the Law School. The links of these groups through the Graduate Program Coordinator consist of information sharing, shared publicity for lectures and other events, announcements about courses, etc. The Graduate Program Coordinator has worked actively with these student groups to support their individual initiatives. Recent examples include assistance with planning and publicity for a campus-wide "Mixer Panel" on sustainability organized by the Coastal Society, publicity for a panel discussion on the Northwest Forest Plan organized by GreenLaw, and coordination with several graduate groups in participating in Earth Week activities in cooperation with UW Earth Week, an undergraduate student organization.

APPENDICES SPECIFIED IN SELF-STUDY GUIDELINES

Appendix A: Graduate Student Statistical Summary

As a Certificate program, rather than a degree, the Graduate School does not compile these data. A profile of Graduate Students enrolled in the program is included in the text in Section II,B and Attachment 5.

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Appendix B: Academic Unit Profile

As a Certificate program, rather than a degree, the Office of Institutional Studies does not prepare an academic profile.

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Appendix C: List of Special Pathways, Options

There are no special pathways, but the program offers a great degree of flexibility and students are encouraged to develop a program of courses that best fulfills their academic and career goals. The Graduate Certificate in Conservation Biology Policy requires a minimum of 21 credits in pre-approved courses that emphasize key elements of Conservation Biology Policy. The 21 credits must include at a minimum the following:

- One survey course in Conservation Biology
- One course each in two of three core areas:
  - Law and Policy,
  - Economics, and
  - Social Ecology;
- One capstone course.

Courses that fulfill each of the required areas are identified on the program website and informational flyer (included on following pages). Students are required to meet with a program adviser — either the Graduate Program Coordinator or a member of the Steering Committee or both — and submit their study plan for approval to the Graduate Program Coordinator and the Steering Committee. Students are encouraged to submit their program plan prior to completing courses toward the Certificate, but in any case students must enroll in the program prior to completing the capstone requirement.

The Capstone requirement may be fulfilled by taking any one of a limited set of courses selected by the Steering Committee in consultation with course instructors. In the capstone courses, participating students from various disciplines work as a team, combining their talents to tackle a theoretical or local conservation problem. Each Capstone course involves an intensive, and broad, multidisciplinary group project that requires integration of knowledge, theory, and methods from the breadth of the program. Projects are chosen to require application of policy concepts to practical problems in Conservation Biology. In most cases, projects are conducted in cooperation with outside practitioners and are representative of the work done by people employed in the field.

Students take additional elective courses from the approved lists for each of the subject areas to complete 21 credits.

Complete program policies and requirements are updated continually on the program website at http://depts.washington.edu/conbiol.

Program flyer page 1

Program flyer page 2

Appendix D: List of Faculty by Rank

As an interdisciplinary program, the Graduate Certificate in Conservation Biology Policy does not have any faculty lines or formally affiliated faculty.

Members of the Steering Committee, by rank and departmental affiliation, are as follows:

Professor

Francis, Robert, Aquatic & Fishery Sciences
Franklin, Jerry, College of Forest Resources
Rodgers, William (Stimson-Bullitt Professor) School of Law
Smith, Eric, Anthropology
Zerbe, Richard O. (Director), Public Affairs

Associate Professor

Kyes, Randall, (Animal) Psychology, UW Primate Center
Layton, David –Public Affairs
Parrish, Julia - Biology and Aquatic & Fishery Sciences (completed term January 2003)
Robertson, Iain M. - Landscape Architecture

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Appendix E: Placement of Graduates Last Three Years

No systematic records of graduation placement are available prior to November 2000.

Since then, there have been seven graduates, three during 2000-2001 and four during 2001-2002.

Of these, five have responded to exit surveys. Placement among these five students is as follows:

- Further Graduate/Professional School: 1
- Consulting/Self-employment/Independent Contractor: 3
- Seeking placement/employment: 1.

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Appendix F: Mission Statement

The Graduate Certificate in Conservation Biology Policy seeks to provide students with education and skills to assess impacts on biological diversity and to develop practical approaches to prevent species extinction. Integrating ecology and natural science with studies in law, public policy, and social sciences, the program is designed to prepare students to understand, interpret and communicate research findings from a wide range of fields; to work cooperatively in interdisciplinary teams; and to understand and weigh competing interests in assessing and developing conservation programs.

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Appendix G: Faculty Curriculum Vitae

Included below are Curriculum Vitae for members of the Steering Committee.

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Appendix H: HEC Board Summary

As a Certificate program, rather than a degree program, the Graduate School does not provide these data to the HEC Board, and not all data identified below are relevant to the Certificate program.

However, we provide below information we think the Graduate School will find relevant. In cases where these data are addressed in the main text, reviewers are directed to the relevant section of the text..

a. *Name of unit authorized to offer degrees*: Certificate is offered by the Graduate School, and is administered in cooperation with Program on the Environment

b. *School or College(s) as applicable*: Graduate School

c. *Exact title(s) of degrees offered:* Graduate Certificate in Conservation Biology Policy

d. *Year of last review:* this is the initial 5-year review

e. *Brief description of the field and its history at the University of Washington (no more than one page).*

Conservation Biology has a rich history at the University of Washington (UW) and is one of the University's core strengths in academic and research programs. Faculty members in many departments actively participate in research and teaching in many aspects of this rich field. UW sports among its faculty many world-renowned researchers in conservation biology science, and several faculty have played leading roles nationally and internationally in scientific and advisory panels related to conservation biology.

P. Dee Boersma, first Director of the CBP Steering Committee and Professor of Zoology, served as President of the Society for Conservation Biology from 1997 to 1999, during which time the Society's national headquarters and membership office was housed at UW. The Society's professional journal *Conservation in Practice* remains housed at UW. The Department of Zoology (now merged into the Department of Biology) recently appointed Samuel Wasser as an Endowed Chair in Conservation Biology, and Gordon Orians, Professor Emeritus, was past president of the Ecological Society of America. In the College of Forest Resources, Professor Jerry Franklin is one of the world's foremost experts on Northwest ecosystems and northwest forest conservation, and Jim Agee is a leading expert on fire ecology. In Fisheries, James Karr, Robert Francis, and Charles Simenstad are authorities in conservation and management of aquatic and marine species. In the Social Sciences, Gardner Brown in Economics, Richard Zerbe in Public Affairs, and William Rogers in Law are all recognized authorities in human elements of conservation, and the application of human institutions to conservation problems. It is not possible to mention all of the dozens of faculty at UW who are leaders in conservation biology, but these few examples demonstrate some of the breadth and depth of UW's traditional

strengths in this field. Recent hires across the University in both natural science and social sciences offer great promise of continuing to build on these traditions.

Despite UW faculty's long-standing international role and recognition in Conservation Biology, there was no organized graduate curriculum at UW that specifically addressed conservation biology as part of its name until 1997. Recognizing the need for more formalized graduate training in Conservation Biology at the University of Washington, professors from the Schools and Colleges of Architecture and Urban Planning, Arts and Sciences, Engineering, Forest Resources, Law, Ocean and Fishery Sciences, and the Graduate School of Public Affairs formed an interdisciplinary faculty in Conservation Biology in 1993. In 1997, the interdisciplinary faculty, now the Steering Committee for the Conservation Biology Policy Certificate Program, developed a Certificate Program in Conservation Biology Policy aimed at enhancing graduate programs of students in a variety of fields. The Certificate in Conservation Biology Policy was approved by the Board of Regents in 1998, and established by the Graduate School in Autumn 1998.

f. Documentation of continuing need for your program

Because the Graduate Certificate in Conservation Biology Policy is a broad-based, interdisciplinary program leading to a wide range of careers and drawing graduate students from a wide range of disciplines, it is difficult to accurately assess the ongoing need for the program as graduates take such widely varying paths. However, the Environmental Careers Organization (ECO) charts broad information on trends in a range of careers. ECO notes seven "drivers" in the environmental career market: regulation and legislation, liability concerns, competitiveness, entrepreneurial opportunities, citizen concerns, mergers and acquisitions, and retirements.

All of these "drivers" have remained relatively stable since the mid-1990s, except liability concerns. Additionally ECO forecasts that among the "hottest" environmental sectors over the period 2000—2005 will be conservation biologists / ecosystems managers, "dual track" environmental managers, global climate change scientists, "smart growth" urban planners, policy integration specialists, and community organizers. The Conservation Biology Policy program provides excellent background and hands-on training for many of these careers.

As of 1999, the Environmental Careers Organization (ECO) estimates more than 45,000 employed nationwide in land and water conservation (among more than 2 million employed in environmental fields overall), with an estimated 3-7 % annual increase through the year 2005[2]. ECO cites teamwork, cross-disciplinary thinking, and computer and technical skills as critical for future employment prospects. The importance of science in public policy was also recently underscored in a campus lecture offered by William Ruckelshaus "Science and Public Policy: The Twain Must Meet".

ECO also points to state-level environmental expenditures, which are up over 200% since 1986 and grew slightly during 2001 as an important factor. Finally, ECO emphasizes that

[2] Environmental Careers Organization,1999 "The Complete Guide To ENVIRONMENTAL CAREERS In the 21st Century", chapter 11. Island Press, Washington, D.C.

environmental careers have been in transition over the past 10 years - from pollution control to pollution prevention to the development of closed-loop and zero-emissions systems; from command and control regulatory systems, to mixed regulatory systems, to results based systems; from single species protection schemes to ecosystems management to a focus on sustainable regions. Increasingly emphasis is placed on sustainable solutions that are economically feasible, ecologically viable, and socially desirable. This ecosystems or "big picture" emphasis should bode well for practitioners trained in the Conservation Biology Policy core curriculum areas of law & policy, economics, and social ecology.

g. Assessment information relating to student learning outcomes and program effectiveness

Because the Conservation Biology Policy program is a small, graduate education program with limited administrative overhead, no formal departmental structure, no faculty, and no research/publication mission, this entire Self-Study addresses student learning outcomes. As such, reviewers are directed to the main text in its entirety for our assessment of student learning outcomes and program effectiveness.

h. Please complete the following grid:

	1999-2000	2000-2001	2001-2002
Graduates with Certificate in Conservation Biology Policy	11	3	4

The decline in the number of graduates for 2000-2001 and 2001-2002 reflects the absence of program publicity and recruiting during the period June 1999 to November 2000, during which no new students enrolled in the program. The number of students enrolled in the program has grown from 7 in November 2000 to 25 as of March 1, 2003, and we anticipate that the numbers of graduates will increase toward double digits over the next two years as these newly enrolled students complete their degree and Certificate programs.

i. Plans to improve the quality and effectiveness of the program.

Specific steps we plan to take to improve the quality and effectiveness of the program are detailed in Section II,C.

What is the process by which your unit sets its overall goals? How often are departmental goals reviewed and reassessed?

The underlying objectives of the program were specified in the program proposal and approved by the Board of Regents. Program objectives and goals are reviewed and defined by the Steering Committee in consultation with the Graduate Program coordinator.

The Steering Committee meets periodically, generally at least once per quarter and more often if necessary, to review the broad program mission, as well as set immediate goals and objectives for continuing operation and improvement of the program. Day to day operations are administered by the Graduate Program Coordinator, who reports to the Steering Committee and makes specific recommendations on curriculum and governance.

Broad program objectives are generally developed by the Steering Committee. Day-to-day administrative and procedural goals are developed by the Graduate Program Coordinator for review and approval by the Steering Committee and Director.

The broad program mission statement identified in Appendix F originated from the original program proposal. It has been revised periodically to more accurately reflect the curriculum and the underlying program objectives, but remains essentially the same as outlined in the original program proposal.

In what ways do you anticipate the goals of your program will change in the next ten years?

With the rapid and accelerating rate of change in social and political institutions, as well as the state of the natural world, it is an enormous challenge to anticipate the specific nature of the field of conservation biology, the institutional role of interdisciplinary graduate education at UW, and the most pressing global conservation problems.

Graduate education itself is changing nationally. It is not possible to predict with any confidence what formats will become important, what role distance learning will play, and so forth. The Graduate Certificate structure is somewhat innovative in applying interdisciplinary "specialization" to discipline-based degree programs. It is not clear how this Certificate model will fit onto graduate education and how it may evolve in the coming years. The Conservation Biology Policy program will be part of this evolution and adjust its programmatic goals accordingly.

The subject matter of Conservation Biology Policy is nothing less than the understanding of natural and social processes *and their interactions,* and the future welfare of the planet and all its inhabitants. The leading concepts in this immensely broad but crucially important field are bound to change as scientific understanding grows, environmental conditions change, technology advances, the voices of the economically less developed nations and their peoples become more prominent, and globalization moves forward in unpredictable ways. What is predictable are the increasing role of technology in both education and conservation problem-solving; the increasing importance of large data sets from automated and calculated data processing systems, and ever-increasing complexity in human systems. The Conservation Biology Policy program's educational goals will evolve as these major forces evolve and as skill requirements change to meet these evolving demands.

In addition to changes in the face of education and conservation biology academic field, the overall goals of the Conservation Biology policy program will be strongly affected by potential organizational changes at the University level. There has been much recent discussion of an

Earth Institute and at least some revival of old discussions about possible realignments affecting the natural resource units. Ongoing major curriculum revision at both undergraduate and graduate levels in the College of Forest Resources and the newly formed Biology Department, as well as the proposed new Ph.D. in the Evans School, will have unpredictable affects on graduate education in Conservation Biology Policy at UW. The ways the Conservation Biology Certificate program evolves will be affected by whatever organizational changes are actually implemented.

Describe your goals for the next 5-7 years.

Principal goals for the next 5 to 7 years include:

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- continue to improve collaboration and cooperation across the University in Conservation Biology teaching and research;
- establish a new, graduate level survey course that provides an advanced overview of conservation biology from the perspective of natural science, social science, and policy;
- acquire funding to offer a high-level seminar in Conservation Biology that brings in local experts as well as nationally and internationally recognized authorities;
- attempt to raise funding to support a post-doctoral research associate;
- increase outreach to broader community outside the university;
- establish the Certificate program as a well-recognized and prized credential for UW graduates and participate more actively in graduate student outreach and recruitment, especially among under-represented groups.

Describe areas and strategies for developing your potential for academic and pedagogical leadership in your field.

For the program to be established as a leader, we must:

- ensure that quality is not sacrificed for the sake of breadth;
- work to attract growing numbers of the most qualified students from a broad spectrum of academic disciplines;
- continually review and revise curriculum structure to ensure that curriculum requirements are of the highest quality and provide the knowledge and skills students will need in advancing their career goals;
- strive constantly to foster the complementary relationships that form the basis for the interdisciplinary exchange that is the program's key strength;
- continue to make the program more widely visible and highly prized outside the university.

How could the college and/or university assist you in achieving your goals, especially through means other than increased budgets?

Steps the university could take to improve the program would include:

- improve reporting systems to provide proper "credit" to faculty and student initiatives, especially teaching and committee service, outside the home department;
- reform course load and student hour crediting system to allocate credits among many participating departments;
- provide true faculty incentives to participate in interdisciplinary and extra-departmental initiatives;
- proactively promote the program and assign development officer to assist with development efforts;
- provide authority and funding to enable effective coordination and, where necessary, supplementation of curriculum offerings.