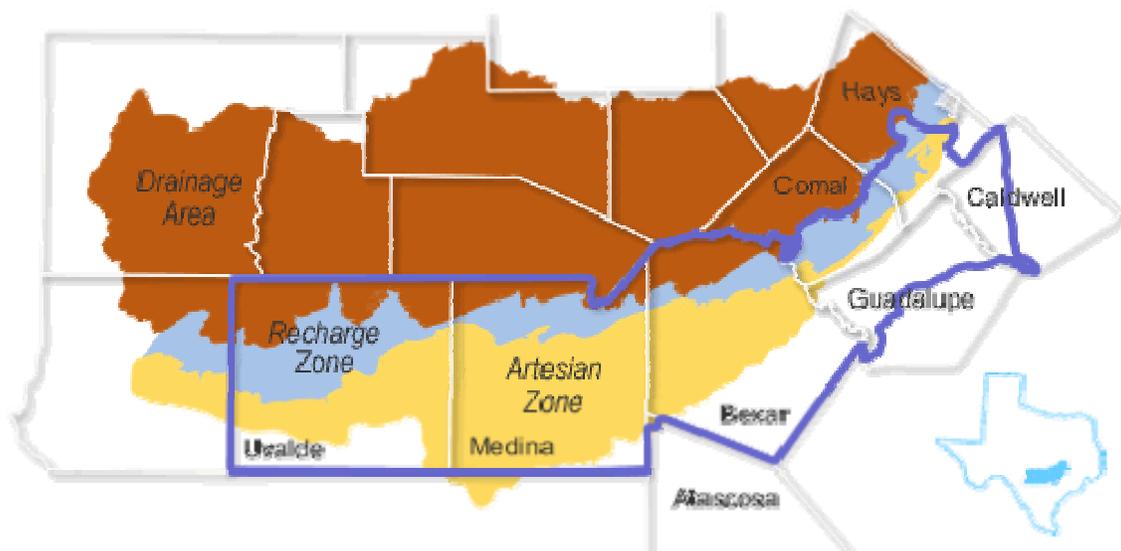


Proposal to provide Peer Review of technical materials for the Edwards Aquifer Recovery Implementation Program



Proposal to provide peer review of EARIP Science documents

Introduction to Peer Review Group

The Peer Review Group proposes to prepare a peer review of the EARIP analysis as set out in the statement of work (SOW) provided to PRG

PRG is a public benefit non-profit organization dedicated to impartial scientific work in the natural resources arena. Founded in 1992 as part of Sustainable Ecosystems Institute, the PRG adopts a non-partisan approach, and aims to support government and other parties by providing and coordinating scientific support. The organization is staffed by scientists, and governed by boards comprising eminent scientists in academia. PRG has two main foci: analysis and scientific review. The organization is a leading provider of peer review in the USA and overseas. The institute's reputation is for high-quality and impartial assessment, and its reports have successfully resolved many natural resource problems. Through the fairness and transparency of its scientific review process, PRG has built strong relationships with both government and stakeholders.

PRG's peer review program has connected many agencies with scientists willing to evaluate documents (data, models, papers, etc) or to serve on review panels. This has allowed such agencies to develop a strong administrative record of the scientific bases for their actions. Since 2000, the institute has reviewed approximately 50 sets of such documents for federal and other agencies (listing decisions, harvest plans, etc). SEI/PRG has set up, administered and facilitated 37 advisory/review panels, who have met with agency staff and stakeholders' scientists (usually in public meetings), and have evaluated different scientific information. Of these projects, three have met over several years, and have functioned as long-term facilitated review panels.

Since 2006, we have held an IDIQ contract from the Department of Interior to provide on-call peer review for any department or bureau. In 2008 we provided a review of the USFWS's draft Recovery Plan for the Spotted Owl, which had attracted congressional investigations. Our review halted the controversy on this program, re-asserted the primacy of scientific opinion, and (through the transparency and impartiality of the process) allowed the interest groups to begin working together more successfully. This review was favorably discussed in a major article in Science (May 2008).

PRG is staffed by three scientists, and several administrative staff. The institute is also supported by its scientific advisory board, which comprises 7 nationally eminent scientists, who take part in our activities. As determined by project needs, the organization also hires well-established scientists on a short-term basis (one such project, on spotted owls, employed 14 such scientists from academia). Finally the organization has long-term relationship with consulting firm (David Evans and Associates. Louis Berger, Parametrix) that provide engineering expertise and GIS and other logistical support on a sub-contractual basis.

A unique feature of PRG are our strong links to scientists at other institutions, who support our programs. Over 700 scientists have agreed to serve on our peer review programs. These scientists (drawn from academia, government, tribal agencies, the private sector, the conservation community etc.) have provided reviews to USFWS, NMFS, USDA FS, USACE (Corps of Engineers), and other federal and state agencies, as well as to foundations, local citizen groups etc. Our experience with this program gives us a firm understanding of the tasks inherent in administering an effective scientific review program.

This proposal first discusses the various tasks involved in the EARIP peer review, and proposes a program that responds to the special needs of complex natural resource issues. We also provide selected examples (drawn from a much larger set) that show the range of high-caliber review services we have successfully provided to our government clients, on-time, and on-budget.

Proposed techniques for the EARIP program

We propose to use our established techniques to carry out the review.

After initial scoping and review of materials and questions, the primary tasks of PRG will be to set up a process that will provide a clear, transparent peer review of the highest caliber, and in a compressed time-frame. We recognize that not only is the scientific quality of the review of critical importance, but it will also be imperative to use a process that is well-documented and which can be shown to be impartial. We have developed a proposal that will meet these needs, and provide a clear record.

Scoping of review: Conclusions regarding documents to review and reviewer expertise

Our initial information regarding the documents to be reviewed - Dr. Hardy's current work, recommendations on "j charges" and background documents- is based on the SOW and additional discussions with Dr. Gulley. We have concluded that the RFP contains multiple tasks that should be clearly identified and addressed separately from each other. Because these tasks involve different scientific foci, we also recommend that there be different reviewers and staff assigned to the different efforts.

Task A. Review of existing Hardy draft

Although this was not identified in the RFP, we believe that this task is essential to provide input to the program going forward. Since this is primarily a technical issue regarding model construction and assumptions, we propose that this be a document level review. Two modelers familiar with the approaches used in Dr. Hardy's work will review the models, together with a botanist who is able to understand how the assumptions regarding the ecology of Texas Wild Rice affect model construction and output.

This review of pre-final work will be of use to both decision-makers (who will gain from understanding sensitivity of the model) and to Hardy and others wishing to improve the model. This review effort can begin immediately, and would not involve lengthy meetings or discussions. The reviews will NOT be developed into a joint report, but will be presented as three individual reviews, with an introduction by PRG.

Task B. Review of SSC recommendations on "j" charges.

This review should focus on the anticipated recommendations of the SSC on the 'j' charges, as set out in the RFP. We anticipate this review being carried out by four scientists: one modeler and the botanist from task A, an additional botanist, and a zoologist. This review WILL be developed into a joint report, which will provide group assessments and recommendations, as well as individual reviews, and summaries by PRG.

Task C. Interaction with Hardy, decision-makers

We anticipate that for both of the above tasks there will be significant contact time associated with discussions with scientific participants (e.g. Dr. Hardy), and there may be a need for travel and explanation of our results with those who will make use of the reviews (SSC and decision-makers). We have therefore included a budget for these items. This reporting and interaction regarding our results is a normal part of our process, and greatly enhances the usefulness of reviews to decision-makers and others. It is particularly important when there is a possibility that the underlying scientific issues may result in significant management changes.

Both of the review tasks (A & B) will follow the following format:

Selection of reviewers

We will follow normal PRG procedures in selecting highly-qualified reviewers who are able and willing to review the materials at short notice. Names of reviewers will be solicited from PRG board members, from previous PRG panelists, and from other eminent scientists, and from PRG' standing panels of experts in various fields. We will consult with the In-stream Flow Council regarding flow modelers, as noted under the RFP. A file will be developed for every scientist considered as a reviewer, and the reasons for selecting (or not selecting) that scientist will be included.

We may also elect to use some of the reviewers previously used for our review of the 'k' charges in 2008 (Toran, Wicks, and Bain appear well suited).

After considering the available pool of reviewers, PRG staff will select those reviewers who best meet the criteria of scientific eminence and experience, and who also pass all other criteria (of independence, impartiality, etc) as set out in the SOW. Reviewers will be interviewed, their responses recorded, and they will be asked to sign statements attesting that they have no conflicts of interest (as per National Academy and PRG guidelines, and as in SOW).

At no time will agency staff control the selection of panelists/reviewers. It is critical that this review be independent of the stakeholders and interested parties.

Preparation of reviewers

Once PRG has selected reviewers, panelists will be provided with background and other materials as soon as they become available, through PRG's dedicated wiki-site (see below). This will ensure that all materials are rapidly disseminated, and that reviewers have ready access to everything they need to develop an in-depth knowledge of the materials. In order to assist in this process, PRG will also set up conference calls with panelists, and facilitate discussions ahead of the actual review. PRG staff will work with

individual panelists to ensure that they understand the materials, the review requirements, and their individual tasks.

Wiki site

A key part of the process will be maintaining a clear record of what was disseminated, what was the process used, what materials were evaluated, and individual panelist's responses. PRG's wiki is a web-based tool that records every item, including all e-mails, and allows a complete record of every draft of every document, and of discussions and comments among panelists. It thus provides a completely transparent process that admirably serves as the administrative record for how reviewers reach their conclusions. The site is secure, and allows multiple levels of 'clearance' for participation – hence EARIP participants and scientists may be allowed to watch the review unfold, but will be unable to comment on the reviews.

All materials for dissemination will be placed on the wiki, and all e-mails to and among panelists will be routed through the wiki. The individual and group reports will also be crafted on-line, so that there will be a complete record of any changes made to any document.

We will expand the capacity of the wiki site to allow a large number of participants to observe the process.

Preparation of review

It is important that we obtain the individual opinions of panelists. Hence we will require that each panelist provide written responses to a series of review questions. However we will also allow panelists for Task 2 to discuss their responses, and the issues involved, and to modify their written responses in light of such discussions. We have learnt from our many previous reviews that the PRG process tends to provide consensus reports. However this is not a requirement of the review, and if there are differences of opinion among the panelists, this will be reflected in the final report. All panelist opinion will be recorded. We have also found that use of questionnaires and other means of recording individual opinions provides useful information on the degree of certainty and unanimity of reviewers. This in turn is valuable information for decision-makers.

We will also allow reviewers to interact with and question relevant agency and other scientists under PRG supervision –either through the wiki-site or on a recorded conference call. This follows PRG's normal practice of allowing in-depth reviews that not only consider a written document, but also are more investigative of (e.g.) the strength of underlying assumptions. This deeper analysis is essential to provide a review that will establish whether the best available science has been used.

We prefer to use our wiki site to present the draft report. We suggest that after we have completed the draft, we allow the Science Subcommittee to access the wiki materials, to view the draft review document, as well as the individual comments and e-mails etc that support the review. We would then allow the Science Subcommittee to interact with the review panel through the wiki, and to ask questions, or to provide additional material as necessary. We would then close the wiki access so that the panel could finalize the review. If the Science Subcommittee does not find this process optimal we would be willing to set up a more conventional conference call to address any comments or questions.

PRG works assiduously to ensure that the review only addresses the purely scientific charge, and that in any discussion with decision-makers, this distinction is maintained.

We suggest that one member of the review team accompany the PRG project lead to present results from the review to the EARIP participants, after the review is complete.

Timetable of events

After Award of contract

	Finalize scope of work Set-up project specific wiki Select Panelists Load background materials to wiki Develop instructions for panelists Discussions between PRG and Dr. Hardy
mid-late January	Conference call with reviewers under Task B (to prepare group for review)
January 31	Review under Task A completed
February 1	SSC recommendations to wiki
early February	Conference call with reviewers (to set up tasks and roles) PRG discussions with Dr. Hardy on review results
late February	Conference call with reviewers and SSC chair, USGS and Gulley (setting out needs of reviewers for additional information, and questions to be posed to scientists)
February 28	Science Subcommittee/ scientists responses to questions due
March 15	Review under Task B completed
late March	PRG/reviewer discussions with SSC, Gulley, others as needed.
April 30	Administrative Record completed

Budget

As requested, we have prepared a budget on a time and actual expense basis. Hence the below budget is our estimate, with a 'not-to exceed' cap. PRG's personnel are normally charged on an hourly basis as follows:

Dr. Courtney and other senior personnel \$205
Ms. Vercrease \$65

Hourly rates are inclusive: i.e. they include all expenses (benefits, rents, insurance, overhead etc) except for travel.

We do not pay reviewers on an hourly basis, but rather offer a lump-sum for the entire review. This is far more cost-effective than using hourly rates. For a review of this size a relatively modest stipend (\$2000 per person) should suffice for task A, and more substantive stipend (\$4000) for task B. We apply a 35% overhead rate to reviewers stipends and to travel.

We emphasize that these are maximum amounts to be charged to the account. In the event that no activities are carried out under Task C, no charge will be made to the client.

Task A	
Hourly rates	5400
Reviewer stipends	6000
Overhead	1435
Sub-Total	12835
Task B	
Hourly rates	21600
Reviewer stipends	16000
Overhead	5600
Sub-Total	43200
Task C	
Hourly rates	10800
Travel	4800
Overhead	1680
Sub-Total	17280
Total (maximum)	73315

The following material may be useful to the EARIP program in assessing PRG capabilities and experience.

Ms. Robin Vercrease will be the contact person for this project. She has worked for PRG since 2009, and has a background in both information technology and ecological management. She is currently acting as coordinator for a PRG review on the Rio Grande (anticipated completion date December 2009). She will act as the main liaison with reviewers and EARIP.

Dr. Steven Courtney will act as scientific lead. He will act as moderator of scientific issues, and will liaise with Dr. Hardy, USGS and SSC.

We anticipate adding a third person to this team. This person (under negotiation with PRG) will be a senior level executive with extensive ESA and stakeholder experience.

Major SEI/PRG reviews

Rio Grande Ecosystem restoration 2009

Missouri River Ecosystem Restoration Program 2009

Sacramento Delta ecosystem reviews 2009

Edwards Aquifer k charges 2009

USGS Columbia site assessment 2008

Lahontan Cutthroat Trout Status Review 2008

Northern Spotted Owl Recovery Plan 2008

Review of Atlantic Salmon Hatchery Protocols, Production and Assessment 2006

Catfish Harvest Evaluation 2006

Preble's Jumping Mouse Genetic and Taxonomic Review 2006

Genetics and Taxonomy in ESA 2005

Barred Owl Biology and Management 2005

Missouri River Pallid Sturgeon Review Program 2004 to present

Northern Spotted Owl Status Review 2004

Science and Ethics Policy Forum (Department of the Interior) 2003

The David and Lucille Packard Foundation: A Marine Conservation Science Program Review 2003-2004

Family Forest Foundation HCP Science Panel 2002 to present

Everglades Avian Multi-Species Plan 2002-2004, 2008

Silvicultural Development of Redwood Forest 2002

Lower Columbia River Channel Deepening Science Review Panel (Salmonids) 2001

Northern Spotted Owl Science Review Panel (HCP) 2000 to present

Marbled Murrelet Science Review Panel (HCP) 1998 to present

PREVIOUS EXPERIENCE

PROJECT 1. MISSOURI RIVER REVIEW PROGRAM FUNDED BY US ARMY CORPS OF ENGINEERS, 2004-ONGOING

Customer: U.S. Army Corps of Engineers, Yankton, SD

Contract Number: W9128F-05-P-0271

Date of Contract: 2004

Performance Period of Contract: Ongoing

Completion Date: Ongoing

Contract Value: \$160,000

Technical Point of Contact: Craig Fleming, USACE, (402) 667-2880,

Craig.A.Fleming@nwo02.usace.army.mi

Contracting or Purchasing Point of Contact: Stephanie Rostermundt, USACE, (402) 221-4134

PRG staff

Dr. Deborah Brosnan

Dr. Steven Courtney

Ms. Lisa Sztukowski

Scientists under contract to PRG

Dr. Zach Peery, University of California, Berkeley

Panelists

Dr. N. Auer, Michigan Technological University, Research Associate Professor

Dr. M. A. Bozek, Wisconsin Cooperative Fishery Research Unit/ University of Wisconsin, Stevens Point, Unit Leader

Dr. R. J. Hunt, US Geological Survey Wisconsin - Water Science Center, Research Hydrologist/Geology

Dr. H. I. Jager, Oak Ridge National Laboratory, Research Staff

Dr. J. F. Quinn, University of California, Davis, Professor

Dr. D. H. Secor, Chesapeake Biological Laboratory, Professor

The US Army Corps of Engineers (USACE), in cooperation with US Fish & Wildlife Service, Missouri Department of Conservation, Nebraska Game and Parks Commission, US Geological Service, University of Missouri, and with input from South Dakota, Iowa, and Kansas, requested that PRG conduct several independent scientific reviews (ISR) of the Monitoring and Assessment Programs for the endangered Pallid Sturgeon in the Missouri River Ecosystem, and of the hydrological modeling and other efforts supporting

this work. This program has been so successful that the partners have now decided to set up a standing panel to oversee all science issues regarding Missouri River restoration. This panel, which will operate under a 5 year charter, is currently being developed by PRG.

PRG initially reviewed three programs in the USACE effort to restore the Missouri River Ecosystem and comply with Missouri River Biological Opinion. Scientific reviews were focused on: Population Assessment Program; Habitat Assessment and Monitoring Program; Hydrological Models and Biological Data linked to these models. Reports for the completed programs may be downloaded at <http://PRG.org/sturgeon/index.htm>.

Dr. Deborah Brosnan was lead on this program, and selected a panel of experts who could address a wide range of complex issues. Initially the reviews were focused on sturgeon ecology, so several panelists had relevant sturgeon-related expertise. The team also included hydrologists, and systems ecologists. All panelists were eminent scientists in their fields – mostly they were drawn from academia, although one was from a national research laboratory, and another from the USGS. Panelists were carefully vetted to ensure that they would observe all PRG policies regarding conflicts of interest, and avoiding making statements on policy that are the prerogative of government.

As the project progressed, Dr. Brosnan also recognized the need for statistical support and (within the existing budget structure) hired a statistical consulting scientist (Dr. Peery). Hence she not only achieved an on-time performance, with a high-quality product, she absorbed the cost of hiring Dr. Peery, and flying him to the relevant meetings, in order to ensure that the government received the necessary review. Ultimately Dr. Peery wrote new code for the program, which is still in use today.

Population Assessment Program:

The Pallid Sturgeon Assessment Team (for the Missouri River) requested an independent scientific review of the monitoring and assessment program for the endangered Pallid Sturgeon. The Assessment Team asked the review panel to evaluate the monitoring program's design and ability to meet its stated goals, address specific relevant aspects of the Biological Opinion, provide recommendations on adaptive monitoring for the program, and carry out a power analysis to evaluate the ability of the program to detect population trends in the Pallid Sturgeon.

The team was comprised of five experts in fish ecology, monitoring, river systems, sturgeon biology, population modeling, statistical and experimental design, and science-policy. The panel was supported by an ecological statistician who carried out a separate power analysis. This analysis was also used by the panel in their evaluation.

The review focused on four issues:

- The current design of the monitoring and analytical program
- The technical approaches in use
- The implications of statistical analysis for monitoring design

- Suggestions for adaptive monitoring to maintain the program as a living program, including institution steps that the team can take to improve the effectiveness and utility of the program.

PRG convened a panel of expert scientists who comprised the breadth of expertise necessary to carry out this review. Following the PRG Process, the independent science review panel met formally with the assessment team, the researchers, and other participants in a facilitated forum in October 2004 in Sioux Falls, S.D. to discuss and review the program. Shortly afterwards the Review Panel met in Portland, Oregon to finalize their review. This report evaluated the study design, methods and made recommendations to improve the program.

Habitat Assessment and Monitoring Program:

The goal of the Habitat Assessment and Monitoring Program is to create functional habitat in the Missouri River Ecosystem in order to benefit the endangered Pallid Sturgeon. This ecosystem has been altered by dams and water management practices which have caused the decline of native fish.

The PRG review panel was asked to evaluate the program's design, effectiveness, and ability to meet its stated goals and objectives within the framework of the Biological Opinion and to provide recommendations for identifying strengths and weaknesses and to suggest improvements in design, protocols and objectives. Specifically, the panelists were charged with addressing these issues:

- Is the conceptual model sound?
- Is the strategy valid and meaningful in the context of big river restoration?
- Are the objectives feasible?
- Are the sampling design, protocol and objectives relevant and valid?
- Does the effort enable us to detect Pallid responses to habitat manipulations over time?
- Does the program adequately address scale (i.e. basin, reach, bend, macro, micro)?
- Provide a list of recommendations identifying strengths, weaknesses and suggestions to improve design, protocols and objectives.

Hydrological and Biological Models:

Sustainable Ecosystems Institute convened a workshop in October 2006 to review the hydrological model, initial progress of the habitat assessment and monitoring program (HAMP) and the biological link between Missouri River programs. In essence this followed on from previous panel reviews, and allowed the PRG panel to assess progress.

The panel was asked to evaluate the biological data in the context of the hydrological models and overall program. Within the overall objectives of the review, specific questions for the review panel included:

- Are the data useful for addressing the objectives and for incorporation or validation of the models?

- Comment on the information provided by the data in addressing the objectives of the program.
- How do we integrate the hydrological models and biological data?
- Assuming the biological data is sufficient, and the hydrological models are sound, will these components address the objectives for the program?
- What are the best analyses to carry out with this suite of information?
- Provide a list of recommendations identifying strengths, weaknesses and suggestions to improve design, protocols and objectives.

Initially this was slated as two separate segments for review. However as the overall program progressed it became apparent that parts of the hydrology review were already completed by ACE, so Dr. Courtney suggested combining the reviews to reduce costs by \$13,500. ACE agreed with the recommendation, thus saving government monies.

The panel found that HAMP participants have moved efficiently to bend-level sampling and clearly understood the intent of the BACI design framework. The panel did however note several pressing issues and recommendations:

- A recurring recommendation from past reviews to standardize the deployment of gear.
- Standardize temporal domain (specify month(s) of sampling for selected areas). This will shift across segments (upper vs. lower).
- Proceed with a power analysis after 3-5 years of data are collected.
- Sustained statistical guidance for the program.
- Although the hydrological modeling project has made appreciable progress, it is not as far along as originally envisioned when the panel was formed, especially in the areas of model construction and calibration, and hydro-eco linking. The panel made extensive suggestions on how to improve the overall effort

PROJECT 2. LOWER COLUMBIA RIVER DREDGING RE-INITIATION OF CONSULTATION, FOR USACE, NMFS, USFWS, PORTS, 2001

Customer: US Army Corps Engineers, Portland, OR

Contract Number: N/A

Date of Contract: 1/2001

Performance Period of Contract: 8 months

Completion Date: 8/2001

Contract Value: \$350,000

Technical Point of contact: Davis Moriuchi, Division manager, USACE; also Cathy Tortorici, NOAA Fisheries, (503) 231-6268, Cathy.Tortorici@noaa.gov

PRG staff

Dr. Deborah Brosnan
Dr. Steven Courtney

Panelists

Prof. M. L. Cody (Chairman), University of California, Los Angeles, Professor
Dr. S. Bartell, The Cadmus Group Inc., Oak Ridge
Prof. D. Boesch, Center for Environmental Sciences University of Maryland, Cambridge,
Professor, President
Prof. L. Curtis, Oregon State University, Corvallis, Professor, Department Head,
Department of Environmental and Molecular Toxicology
Prof. T. Dunne Donald Bren School of Environmental Science and Management,
University of California, Santa Barbara, Professor
Prof. C. Goldman, University of California, Davis, Professor; Tahoe Research Group
Director
Dr. T. Quinn University of Washington, Seattle, Professor

The Columbia River dredging program has had a long history of negotiation, agreement, challenge, and dissent. Over a ten-year period, the action agency, US Army Corps of Engineers (USACE) and the regulatory agencies (USFWS and NMFS), in consultation with a prime stakeholder group including various Port Authorities and other interested parties including environmental and fishing communities engaged in lengthy and heated debate. This had resulted in the issuance and subsequent withdrawal of Biological Opinions (BO), extensive commentary in the press, and litigation.

At the time that the parties approached PRG, the three federal agencies were in open disagreement and relationships at all levels were under strain. NMFS had initially issued a BO approving dredging, noting little significant impact to listed salmonids; however this Opinion was later withdrawn on the basis of newly available opinion and information. This withdrawal was regarded by some USACE staff as unprofessional and as a breach of trust. Working relationships deteriorated to the point of openly voiced hostility and lack of cooperation.

PRG contracted with the parties to refocus the debate on the technical issues at hand. We established a Science Panel of seven renowned scientists who met once a month in open public discussions of the relative science. We also carried out other extensive scientific work and mediation. Technical issues were seen to be decided on the merits of the science not on politics or emotion. The Panel weighed all of the evidence and found in favor of a position supportive of low effect on salmonids. This allowed NMFS to graciously change their position and to issue a BO favorable to dredging and dredging is now underway. At the point of PRG involvement, the parties were essentially unable to reach a solution after ten years of increasingly contentious work. PRG helped the project proceeded smoothly, from start to finish, in seven short months.

This project was difficult in that working relationships had already been severely strained before PRG became involved. Dr. Courtney, project lead, committed himself and two staff full time to solving the technical and the institutional problems. He strongly

encouraged a weekly meeting of all respective project leads. Prior to this, things had deteriorated to the point that the parties could not all meet together. Dr. Courtney insisted on obtaining assurance from agency staff supervisors that cooperation would be forthcoming. When individuals performed unprofessionally, Dr. Courtney made sure that senior administrators instructed their staff to take remedial action.

Dr. Courtney also participated in discussion with each of the parties individually to make sure that they everyone understood the issues and that their positions were clearly communicated to all. This did not constitute advising the parties on *what to do* as much as ensuring that their voices were heard and that the debate was about science, rather than past actions. It was also important that each group understood that PRG was not interested in a particular outcome, but in the professional resolution of scientific debate. It was imperative that each party came to trust PRG's even-handedness and openness. This was best achieved by team- and confidence-building measures involving the frank discussion of problems. A particular and unique problem was that the funds for PRG's participation came exclusively from USACE. This raised the question of whether PRG would show a preference for USACE. Dr. Courtney insisted on an innovative response and the contract was written so that after each panel meeting, any one of the three federal agencies could elect to discontinue the process and thereby stop PRG's funding. This helped to build confidence in all the agencies that PRG was not answering to one agency more than another. This also aided with public perception of the process.

PRG selected a group of six eminent scientists who guided the debate as a Science Panel. These six experts provided knowledge in specific areas of technical relevance (i.e., risk analysis, toxics, estuaries, salmonids), as well as strong experience in the science/management interface. PRG staff managed this panel, instructing them on how to limit their comments to technical matters and how to advise agency staff who were resistant to the challenges of the panel. The panel met in open session and discussed informational needs. It rapidly became clear that new information was required. The panel tasked the agencies with providing this information. Specifically, the panel requested the construction of a conceptual model and demanded a greater focus on fish biology. It also became clear that USACE modeling efforts had not considered the full range of conditions and a very rapid research effort was initiated at OHSU to remedy this. PRG also worked with other interested parties such as the environmental community and the press to ensure that all information was easily accessible. All presentations at the public meetings were posted on a dedicated website, which is still maintained in 2006 and receives many download requests per day. A full record of discussion was made by a court reporter and also posted. Although some opposition to the dredging project persisted, there was relatively little challenge on the basis of effects on salmonids, which is a testament to the thorough work of the federal partners, PRG staff and panelists.

PRG did not compile a report as part of the project as it was not a contract requirement. The regulatory agencies had responsibility for all decision documents. PRG's careful attention to detail provided a clear and accurate record of how decisions were made, so that NEPA, FACA and APA requirements were all observed.

In addition to demonstrating the scientific, organizational and mediation skills of PRG and its staff, this project also testifies to our willingness to engage and provide leadership on complex and difficult environmental issues. Prior to commencing the project work, PRG staff had little familiarity with issues such as salmonid ecology in estuaries, persistence of toxics under different hydrological regimes or the issues involved with entrainment. PRG was familiar with how science is structured and how best to appeal to the collaborative nature of scientists and managers. It was our partners' willingness to work together in this framework that allowed them to successfully put aside past mistrust and to work constructively as they continue to do today.

PROJECT 3. COMPREHENSIVE STURGEON RESEARCH PROGRAM REVIEW, FOR THE US GEOLOGICAL SURVEY, COLUMBIA, MISSOURI, 2007-2008

Customer: US Geological Survey, Columbia Environmental Research Center, Columbia, MO

Contract Number: 07CRSA0584

Date of Contract: 08/16/2007

Performance Period of Contract: 8 months

Completion Date: 04/30/2008

Contract Value: \$69,875

Technical Point of Contact: Susan B. Jones, Deputy Center Director, USGS/CERC, (573)876-1828, sbjones@usgs.gov

Contracting or Purchasing Point of Contact: Robert Valdez, USGS, (303) 236-9336

PRG staff:

Dr. Steven Courtney

Ms. Lisa Sztukowski

Science Panel:

Dr. D. Brosnan (Chair)

Prof. M. Bain, Cornell University

Prof. S. Doroshov, University of California, Davis

Prof. T. Dunne, University of California, Santa Barbara

Prof. D. Secor, University of Maryland

In 2008, PRG carried out a review of the Columbia Environmental Research Center, at the request of the Center director. The main focus of this review was to assess the programmatic strategy of CERC to issues of Pallid Sturgeon management on the Missouri River. This program (funded to the extent of several million dollars annually by USACE) is essential to recovery of the species, but was not receiving strong oversight by USACE, and minimal input from USFWS. The BRD staff at CERC were charged with establishing new standards and methods, and in fact with designing the entire program of activities for this difficult to study species. PRG's review was the first comprehensive review of the program since its inception.

PRG's review consisted of two parts. The scientific assessment of BRD's scientific programs was carried out by the review panel, through evaluation of written materials, one-on-one interviews, a public meeting with formal presentations and question-and-answer sessions, and by evaluation of publications etc. The programmatic element was also examined by considering budgets, priority setting by the director, and by customer satisfaction as determined from interviews. We interviewed USFWS, USACE, state

agencies, and university scientists; these interviews were recorded and became part of the record of the assessment.

The results of the evaluation were as follows. Firstly, PRG's panelists praised the individual scientists for the quality of their work, and for the diligence with which they tackled difficult problems. This was particularly noteworthy since some essential work e.g. developing capture techniques, does not result in major scientific publications or other career-enhancing metrics. Secondly, they praised the programmatic design and leadership shown by BRD (in the absence of strong direction by clients) in providing a comprehensive and forward-looking research agenda, which had significantly advanced studies of sturgeon (from field-work to modeling to data base management to hatchery practices). Thirdly, they stated that it was now time to move from an exploratory phase of research to a more hypothesis-driven agenda. This may be a difficult transition, which will entail changes in priority and funding. Fourthly, as revealed by customer surveys, there is poor communication among the partners, leading to several problems. For instance, BRD scientists felt isolated from their clients, and did not understand whether their results were helpful. In addition, some clients other than USACE felt that BRD were responsive only to USACE, and were not addressing some important subjects that were essential for good decision-making. There were also clear miscommunications about the roles of BRD and USFWS, and about how research results should be interpreted and released to decision-makers. The PRG panel stated: "there is a potential for haphazard release of policy-relevant science". This review appears to have been useful in redefining the roles of CERC, USFWS, and USACE on the Missouri River, and in clarifying the client-BRD relationship.

PROJECT 4. PRG PEER REVIEW PROGRAM, NATION-WIDE, 2000-ONGOING

Customer: USFWS, Nationwide

Contract Number: Varies

Date of Contract: 2000

Performance Period of Contract: Ongoing

Completion Date: N/A

Contract Value:

Location of Work (state, city, county): Varies

Technical Point of Contact:

USFWS Program:

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Everglades: Jay Slack, Assistant Regional Director, USFWS, (303) 236-7920,

Jay_Slack@fws.gov

Northwest Forest Plan Monitoring: Cindy West, Deputy Station Director Pacific

Northwest Research Station, (503) 808-2104, cdwest@fs.fed.us

Catfish Harvest Evaluation: Ron Dent, Resource Science Field Chief, Missouri Dept

Conservation, (573) 522-4115 ext. 3168, ron.dent@mdc.mo.gov

Contracting or Purchasing Point of Contact: N/A

PRG staff:

Dr. Deborah Brosnan

Dr. Steven Courtney

Dr. Tatiana Boyle

Dr. Kim Powers

Ms. Lisa Sztukowski

Ms. Wendy Hudson

Ms. Sarah Hemphill

Panelists and reviewers:

Members of the Conservation Science Network.

Examples include:

Everglades Panelists (Ongoing):

Dr. R. Bowman, Archbold Research Station, Associate Research Biologist

Dr. V. R. Van Sickle-Burret, US Geological Survey, USGS Global Change Science Coordinator

Prof. M. Collopy, University of Nevada, Academy for the Environment, Director

Dr. C. S. Elphick, University of Connecticut Assistant Professor

Dr. P. C. Frederick, University of Florida, Associate Research Professor

Dr. R. J. Hunt, US Geological Survey Wisconsin - Water Science Center, Research Hydrologist/Geology
Prof. B. R. Noon, Colorado State University, Professor
Dr. K. W. Potter, University of Wisconsin, Madison, Professor
Dr. J. R. Walters, Virginia Polytechnic Institute and State University, Professor
Department of Interior Science Ethics Policy:
Dr. B. Gold, The Packard Foundation
Dr. J. Reichman, National Center for Ecological Analysis and Synthesis, Director
Dr. A. Bartuska, Ecological Society of America, President
Dr. C. Boggs, Center for Conservation Biology Stanford University, Director

In 2000, PRG recognized the need for a different form of peer review; one which specifically addressed the needs of managers of natural systems, e.g. of large river systems, or of endangered species. PRG President, Dr. Deborah Brosnan has discussed such needs in a series of articles (e.g., Brosnan 2000) and in testimony before the US House of Representatives (subcommittee on water) and US Senate (Environment and Public Works). Peer review in applied contexts should not slavishly follow academic models if it is to be truly effective. **For instance, peer review cannot be anonymous.** It must recognize that the standard for decision-makers is 'best available' science, rather than an academic level of certainty. It is most effective when levels of uncertainty are explicitly discussed, together with potential risks. It must also be rigorously managed to ensure that peer reviewers answer only questions of science, not those of policy or management.

PRG instituted the Conservation Science Network (CSN), which currently comprises some 700 scientists. They have committed to provide peer review of materials, recognizing the rapid turn-around and explicitly impartial approach that is essential to peer review in applied settings. Network members serve pro bono or for payment, when clients (e.g., conservation groups, federal agencies) ask for review of materials. The same members may also serve as panelists, where the clients and PRG elect to form a panel and hold public or other meetings to review materials. PRG has directly approached each of these CSN members and asked for their service. We have ensured that they are able to provide impartial evaluation of materials, and that they have excellent qualifications in their fields. **A partial list of CSN members is appended.** Most members are tenured in academia, with several being elected members of the National Academies. The scientists cover a wide range of disciplines, from hydrology to genetics, ecology to statistics, economics to physiology. The CSN also act as a primary source of recommendations, in the event that we need additional expertise. Typically we fill about 50% of our reviewer needs from the CSN, and find the remainder by active solicitation of recommendations from PRG board members, panelists, professional societies, and CSN members.

We have completed numerous reviews under this program for both large and small projects. Some of the reviews consisted entirely of evaluating documents. Others involved large-scale public processes. Examples of this program include:

- Ongoing scientific review of USFWS background and decision documents (i.e., Critical Habitat, Recovery Plan, Listing decisions, etc.) subject to an agreement established with then USFWS Director Jamie Clark.
- IDIQ for review, synthesis and programmatic review for three DOI agencies. (see 4A below)
- Northern Spotted Owl Status Review and Spotted Owl Program (see 4B below)
- Review of Northwest Forest Plan monitoring program for US Forest Service, including modules on Spotted Owls, Marbled Murrelets, LSOG forests.
- Review of bat and other forest wildlife monitoring (US Forest Service).
- Review of endangered species management in the Florida Everglades for USFWS.
- Review of endangered species data and papers for the Family Forest HCP in Washington.
- Review of monitoring programs for the San Bruno HCP (California).
- Review of the proposed science ethics policy of the US Department of the Interior.
- Review of endangered species management and monitoring for the Pacific Lumber HCP.
- Review of large scale marine ecosystem programs for the Packard and Moore Foundations.
- Review of research and monitoring proposals for controversial catfish fishing actions (for Missouri Dept. of Conservation).

Within the peer review program, the following projects have used a panel process to evaluate scientific rigor: *Florida Everglades*; *Pacific Lumber HCP*; *Packard Foundation Project*, *Department of Interior Science Ethics Policy*, *Catfish Harvest Evaluation*. Some of these projects required management recommendations while others, applying Federal regulations, have prohibited such recommendations. PRG's goal is to provide useful products within the specifications and limitations of the contract, while exceeding expectations. These panels have been composed of established, well-respected, high caliber scientists from diverse backgrounds and perspectives selected to maintain a balanced and impartial review. A few projects (*Family Forest*, *San Bruno HCPs*, *Packard and Moore reviews*) have involved site-visits to examine field techniques.

Some of these projects (*Everglades*, *Interior Science Policy*, *all HCPs*, *Catfish*) dealt with contentious issues or conflicting views on resource management. Our goal is always to provide a fair and transparent evaluation of such issues, so that all parties can see that their points of view were fairly evaluated. We have never yet carried out a review/panel process that failed to resolve such issues.

Of the projects mentioned above, the following have required final reports: *Northwest Forest Plan Monitoring Review*, *Florida Everglades Project*, *US Department of the*

Interior Ethics Policy Review, Packard Foundation. Catfish. Not all projects entail a final report, since the review process itself is often the goal of clients.

Many others reviews have consisted solely of document reviews. For instance, we reviewed the proposed Recovery Plan for Steller's Eider, and the proposed Critical Habitat designations for several Californian plants. In most such cases our role is simply to identify potential reviewers, to enlist their support, and then to collate and communicate the reviews to the responsible agencies. However occasionally, as with the Steller's Eider Recovery Plan, the reviews are strongly divergent in opinion. In that case we evaluated the different reviews and determined that the views expressed by one reviewer were unfounded. In essence we act in a manner analogous to a journal editor, who must decide whether to accept a reviewer's comments. In several other cases (e.g. *Northwest Forest Plan, Family Forest HCP*) we have written reports that summarize the different reviews, synthesize the findings, point out any inconsistencies, and provide recommendations on how to deal with the reviews.

Many of these reviews were completed under tight timeframes and budgets. We have never yet failed to complete a task on time, and either on or under budget. An important focus is our understanding of the different contexts of academic science and applied that to government action. We ensure that potential reviewers understand that there is no luxury of leisurely evaluation – managers are constrained to make decisions on whatever information is available to them. Hence we work with reviewers so that they carry out the tasks they commit to in a timely manner. At the same time we work with managers so that they have realistic expectations from reviewers, and do not seek last-minute evaluation of complex materials. Throughout our program we have developed and maintained cooperative relations with both federal, state agencies and interested parties, to successfully complete the review as defined by their contract.

We have also acted to strengthen the peer review process as applied by government agencies. In addition to testimony to Congress, and to the GAO, we have advised several agencies on the best means to institute review, including application of the OMB guidelines. In 2006, we reported to USFWS Director Dale Hall on the various successes and problems we had encountered while carrying out peer review for the Service. We have found, for instance, that reviews are more likely to succeed when the agency gives us longer lead times, and ample opportunity to alert reviewers of the need for support. We also note that even a small stipend helps ensure a prompt response by reviewers. We have also encountered both reviewers and agency staff who wish to blur the lines between science and management decisions (e.g. seeking to support a particular point of view on management). We have developed guidelines to maintain that demarcation of roles.

Currently we are under contract with Region 1 of USFWS to provide support for peer review. The goal of this contract is not so much as to carry out reviews, as to train Service staff in the region in how to approach the peer review process. Appended is a document we have recently prepared that sets out the “do’s and don’ts” of peer review, in a practical guide. This includes topics such as when to seek review, what sort of review to

apply, how to find reviewers, instructions for reviewers and how to reconcile differences of scientific opinion.

PROJECT 4A. IDIQ FOR REVIEW, SYNTHESIS AND PROGRAMMATIC OVERSIGHT FOR THREE DOI AGENCIES FOR THREE DEPARTMENT OF INTERIOR AGENCIES, 2007-ONGOING

Customer: Department of Interior

Contract Number: 601817D600 (varies with projects)

Date of Contract: 5/29/2007

Performance Period of Contract: 5 years

Completion Date: Ongoing

Contract Value: Unknown, as awarded

Technical Point of Contact: Dr. Renne Loehefener, Regional Director USFWS, Portland, Oregon, 503-231-6122, Renne.Lohefener@fws.gov

Contracting or Purchasing Point of Contact: Obeid Shaikh, USFWS (303) 236-4334

PRG Staff

Dr. Steven Courtney

Dr. Kim Geist

Ms. Lisa Sztukowski

Mr. Kevin O'Hara

Panelists: (for Northern Spotted Owl Recovery Plan program)

Prof. M. Cody, University of California, Los Angeles

Dr. A. Carey, USDA-Forest Service (Retired)

Prof. J. Franklin, University of Washington

Dr. M. Fuller, US Geological Survey

Dr. R. Gutierrez, University of Minnesota

Dr. M. Hemstrom, USDA-Forest Service

Dr. P. Hessburg, USDA-Forest Service

Dr. J. Lehmkuhl, USDA-Forest Service

Prof. S. Stephens, University of California, Berkeley

In 2007, PRG was awarded an IDIQ contract by DOI to convene advisory and review panels, and to provide analytical and assessment tasks for the department on an as needed basis. This contract is to run for the next five years, with a maximum award of \$50 million in any one year. We have teamed with DEA for this IDIQ. To date, one task has been awarded under this contract: an assessment of the draft Recovery Plan for the Northern Spotted Owl.

The draft Recovery Plan was published in late 2007 after a two-year development process. Both the draft Plan, and the process itself then received intense criticism from

scientists, other government agencies, and three professional organizations contracted for peer review. GAO and other investigations were launched, and USFWS were in danger of failing to produce a credible science-based plan by a court-appointed deadline. In November 2007, PRG was requested to form a science assessment panel, and to resolve all outstanding issues of science.

We convened a panel of eminent scientific experts (from academia, USGS, and other government agencies), and had held two public meetings by early 2008 where all scientific issues were discussed in a transparent fashion, and we reached out to potential critics to ensure that all scientific views were heard. We dealt with all issues of science in the Plan, and developed several new analyses and initiatives. We found that many of the criticisms leveled at the draft Plan were accurate – some of its provisions were based on ‘deeply flawed analysis’. We carried out more appropriate analyses, and provided a clear scientific rationale for management actions.

We maintained a complete administrative record of our processes, and completed our report on-line at the dedicated wiki site. Our evaluation was complete by early April. The Final Recovery Plan was signed in mid May 2008, ahead of the USFWS deadline. Favorable testimony on this process and on the Final Recovery Plan was delivered at the House Resources Committee in late May 2008.

This program was successful in reversing inappropriate science, and achieving a complete turn-around of scientific and public opinion regarding the Recovery Plan. It was carried out under a highly compressed timeframe, and difficult external conditions. At all times, PRG emphasized the integrity of science and of our processes, and we maintained a completely transparent and well-documented process. This commitment to scientific quality and ethics has enabled the USFWS to complete its processes on time, and to public satisfaction. This, 18 years after listing under ESA, is the first Recovery Plan for the Northern Spotted Owl.

**PROJECT 4B. NORTHERN SPOTTED OWL STATUS REVIEW
AND SPOTTED OWL PROGRAM, FOR THE US FISH & WILDLIFE
SERVICE, PORTLAND, OREGON, 2004-ONGOING**

Customer: USFWS, Portland, OR

Contract Number: 10181-3-C047

Date of Contract: 2004

Performance Period of Contract: Ongoing

Completion Date: N/A

Contract Value: \$434,000

Technical Point of Contact: Terry Rabot, Assistant Regional Director, USFWS, (503)
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Subcontractor: David Evans and Associates

PRG staff:

Dr. S. Courtney

Ms. L. Sztukowski

Dr. J. Blakesley,

Dr. W. LaHaye

DEA staff:

Mr. K. O'Hara

Mr. D. Kennedy

Panelists:

Dr. R. E. Bigley, Washington State Dept. of Natural Resources

Prof. M. L. Cody, University of California, Los Angeles, Professor

Dr. J. P. Dumbacher, California Academy of Sciences, Department Chair

Dr. R. C. Fleischer, Smithsonian Institution, Head of the Genetics Program

Dr. A. B. Franklin, Colorado State University, Research Scientist

Prof. J. F. Franklin, University of Washington, Professor

Prof. R. J. Gutierrez, University of Minnesota, Professor

Dr. J. M. Marzluff, University of Washington, Professor

Other Scientists under contract to PRG:

Dr. A. B. Carey, U.S. Forest Service (Retired)

Dr. C. Moritz, University of California, Berkeley

Dr. W. Monaghan, University of California, Berkley

Dr. B. Noon, Colorado State University

Reviewers:

Dr. F. Cooke, Simon Fraser University, Professor & Senior Chair, CWS/NSERC Wildlife Ecology Chair

Dr. E. D. Forsman, U.S. Forest Service

Dr. L. L. Hicks, Plum Creek

Dr. J. F. Lehmkuhl, U.S. Forest Service

J. Lint, Bureau of Land Management

Dr. M. G. Raphael, U.S. Forest Service, Wildlife Ecology Team Leader/ Chief Wildlife Biologist

Prof. H. Salwasser, Oregon State University, Dean of the College of Forestry

Prof. J. Tappeiner, Oregon State University, Professor Emeritus

Dr. J. Thornton, University of Oregon, Asst. Professor

R. M. Zink, University of Minnesota, Professor

No other threatened or endangered species is as well studied as the Northern Spotted Owl. The scientific literature alone comprises more than 1,500 documents. In 2004, PRG was contracted to perform an evaluation of all relevant scientific information to support the Status Review. This allowed the Service to evaluate the status of the taxon, and to determine whether a change in listing status was warranted. Our evaluation was an extensive undertaking involving review, debate, public discussion, new research, analysis, and synthesis. PRG, working with its cooperators and subcontractors, completed the project on time, on budget, and to the satisfaction of not only the Service but many stakeholders, notably interested scientists, private landowners, and the environmental community as well. The report was one of several documents used by the Service in making its final determination to leave the listing status of Northern Spotted Owl unaltered. The work enabled the Service to move to a rapid and well-supported decision and received no public dissent. We append the letter received from the Regional Director of the Service expressing his satisfaction with the project. His successor has recently requested that PRG continue its oversight role in an ongoing capacity.

The PRG scientific evaluation, while remaining our responsibility throughout, was developed through a strong cooperative relationship with the staff of the Service. PRG staff devoted to the project included Dr. Steven Courtney and Lisa Sztukowski. PRG also employed other science writers and consultants including David Evans and Associates, Inc. (DEA), and established a Science Panel comprised of leading experts in owl biology, ecology, forestry, and genetics. This panel was ultimately responsible for the production of the Scientific Evaluation document, which at 440 pages, is the most complete synthesis of Spotted Owl biology to date. Additionally, several new analyses and syntheses were completed during the project, and four scientific publications resulted from it.

The Science Panel was set up using PRG's established practice for development and management of similar panels. Because of the extraordinary nature of the project, we felt that it was important to maintain a good administrative record and a transparent process throughout, including for panel selection. Each panelist was selected following extensive

discussion within PRG. We sought a team of eminent scientists whose experience allowed them to command respect across the spectrum of interests. It was also important to include some members with expertise in local forest and genetics issues. Ultimately we selected a panel of eight PhD scientists, seven from academia and one from a state agency. The panel included international eminent scientists such as Dr. Jerry Franklin (Heinz award winner and National Academy member; also a PRG board member) and Dr. Rocky Gutierrez, probably the most widely experienced owl biologist. We also included other scientists as support staff (particularly in owl biology) and recruited additional eminent scientists to deal with particular issues of concern (genetics and morphology, forest management options, population viability analysis). All team members were required to follow normal PRG procedures, including avoidance of conflict of interests, and respecting the prerogative of USFWS to make all management and policy decisions.

PRG believes that scientific issues should be debated fully and publicly, in such a way that all interested parties may participate. At the same time, we focus attention on science and rigorously protect the distinct roles of the scientist and the decision-maker. We seek scientists' full contributions in their specific area of scientific expertise, but also instruct them not to cross the line into making recommendations for management. This is particularly important for issues involving federal actions or decisions, where compliance with FACA is a special concern. In more than ten years of this program, we have successfully reached consensus in each and every effort, leading to near unanimous acceptance of our conclusions. Even when one party's position ultimately is not best supported by our conclusions, participants are able to accept the results because their point of view was fully considered, explored and evaluated.

The Northern Spotted Owl Status Review panel met several times in public, and at other times in working sessions, either alone or with Service staff. Each panel member was responsible for selected writing tasks, as well as attending the public meetings and participating in extensive debates. These occurred in person or by frequent conference calls. The high quality of the project relied on the individual expertise of the panelists and staff, but also on the extensive teamwork and a healthy level of debate. Dr. Courtney managed these aspects of the program, making sure that drafts were completed on time, and focusing attention on issues that needed resolution. For instance, there was an extensive and lively debate among panelists on the strength of evidence in regards to the effects of Barred Owls. Dr. Courtney allowed this debate to occur while keeping the project on schedule. All participants felt their views were respected and represented. In order to acknowledge the diversity of opinion that is common among scientists, Dr. Courtney developed an effective approach using a questionnaire that made clear the degree of agreement and disagreement and the levels of certainty associated with different subject matters. This innovation allowed decision-makers a clear understanding of the relative uniformity of opinion of all the panelists, allowing Service personnel to be clear on what was the best scientific opinion.

Four of the team's meetings were held in large public gatherings, where interested parties were invited to present scientific information. Dr. Courtney met with every presenter

ahead of time to ensure that all presenters and individuals with questions adhered to a policy of presenting science, and not opinion on policy or management (i.e., listing status or need for protection of habitat). The management of Northwest forests, in particular the iconic status of the Northern Spotted Owl, has a long and contentious history with public meetings drawing passionate and vocal audiences. PRG's approach maintained and encouraged a professional process, which ultimately led to a product that was well-received.

Another significant aspect of panel management involved facilitating clear and efficient communication between panelists, Service staff, and other participants. Dr. Courtney and Ms. Sztukowski made sure that information was dealt with swiftly, and that no roadblocks developed because of differing interests or value systems. Weekly meetings with Service staff were initiated at PRG's request. Similarly PRG staff met with interest groups throughout the process and advised them on how best to present information and when in the process information would be most relevant. This entailed walking a fine line between advising the interest groups on what to do and making sure that they had every opportunity to present information.

Typically, PRG prefers to staff panels and teams with scientists who are acknowledged as impartial, with a strong record of professional accomplishment, and an understanding of the need to maintain a separation between science and opinion. However, high-caliber scientists also often have strong opinions on public issues. The Northern Spotted Owl Status Review panel included several owl biologists and forest ecologists with previous histories of commentary on public issues, notably Dr. J. Franklin. Dr. Courtney discussed with these team members the need to maintain scientific approaches while still allowing the free expression of opinion outside of the panel. Occasionally, panelists needed to be reminded of this separation, at times even during public meetings.

The PRG science evaluation document was produced in a short timeframe without sacrificing rigorous standards. PRG commissioned new science (i.e., niche space analysis, summary of owl competition) as well as subsidiary documents (i.e., Population Viability Analysis (PVA) needs, habitat management). PRG staff read and became familiar with all of this material, becoming full participants in the writing. The overall document was read and approved by all panelists, but each chapter was crafted by sub-teams (sometimes of panelists, sometimes of panelists and subcontractors). Several problems were encountered and solved during the project. For instance, a primary author of the genetics chapter failed to deliver materials on time and a replacement author had to be conscripted. Similarly, there were problems with the Barred Owl chapter. In this instance, Dr. Courtney stepped in to take over authorship duties. Subsequently, authorship changed again as timeframes necessitated. Throughout the process, PRG staff monitored progress and acted swiftly to take corrective action as needed.

Numerous significant scientific tasks were encountered during the preparation of the Status Review. For instance divergent opinions were reported on highly technical materials relating to the genetic distinctiveness of the Northern Spotted Owl subspecies. Evaluating these materials and opinions required that the panel and PRG understood the

nuances of different DNA analyses. A second significant project management task was to devise a means whereby potential threats to the subspecies could be ranked. It was imperative that this threats analysis include explicit discussions of uncertainty, and also captured and expressed the range of opinion of the panelists. We have found, with this and other projects, that decision-makers appreciate a clear understanding of the degree of unanimity among scientists considering an issue. In the case of the Northern Spotted Owl, we used explicit questionnaires that established that on some issues (e.g. effects of timber harvest, fire) there was little uncertainty, and unanimity among the scientists. On some other issues (e.g. Barred Owl) there was less certainty but a perceived high threat.

The PRG process was also substantially altered in scope after just a few weeks, resulting in a revised timeline. PRG worked creatively and carefully to meet these challenges and was able to complete the contract without renegotiating budgets. PRG maintained a clear record of activities including phone-calls and e-mails, to present the Service with an exemplary administrative record that set out what decisions had been made and why. This included using a court reporter for public meetings and maintenance of a website for the dissemination of materials. This met compliance with DQA and FACA and facilitated Service compliance with NEPA and APA. PRG also maintained open contacts with the press and met with reporters to ensure accurate and free access to information.

As the process neared completion, PRG staff contracted with outside reviewers to consider the scientific materials. We sought reviewers with a strong background in science, able to make impartial evaluations. However, PRG did not avoid reviewers with professional affiliations with interested parties, so that both environmental community and timber industry scientists were able to comment on materials. When any reviewer raised substantive scientific issues, they were discussed with the relevant authors and changes, often minor, were made. Throughout PRG, science peer review practices were used – reviews were *not* anonymous and were structured so as to be completed rapidly and efficiently.

PRG also developed a working relationship with Service media experts and with print, radio, and television reporters. These relationships continue to this day, facilitating a clear line of communication with the regional press. Interestingly, some initial press reports of our involvement in the status review were framed in negative terms, because of some interest groups' political standpoint. By staying on message and 'on science', by maintaining scrupulously open communication, and most importantly, by delivering a demonstrably fair product of high quality, we have developed a good working relationship with the press, who report accurately on our work. Interestingly, we also now enjoy the confidence of some of those who initially opposed our involvement.

The final report was made available free of charge in print, CD and electronic form. It may be downloaded from the dedicated website, which is still maintained and updated.

The final product was a Status Review that summarized a wealth of new and existing material, and a Status Review that is valued by owl biologists, decision-makers and interested parties. PRG's evaluation is widely-regarded as a high-caliber scientific report,

while the Regional Director of the time (Dave Allen) was informed by the Service Director that the final Service report was the ‘best Status Review ever yet completed’.

Following completion of the Status Review by the Service, PRG elected to continue working on Spotted Owls on a *pro bono* basis. We decided that there was a need for leadership on some difficult issues worthy of further resolution. Of particular concern was the question of Barred Owl incursion and how to approach the emotionally charged issue of controlling their effects on Spotted Owls. Following discussion with the Service, PRG committed to drawing together the different parties to discuss the situation in an open forum. We held a workshop in Arcata, California in June 2005, where these problems were discussed freely and scientifically. PRG worked with all parties including divergent interest groups to ensure that they understood the current state of the science and the current state of potential management options.

PRG and DEA staff (Dr. Courtney, Dr. Blakesley, Ms. Sztukowski, and Mr. O’Hara) organized the meeting and facilitated the discussions over two days at Humboldt State University. This was potentially a difficult and highly emotional meeting and indeed some statements were made during the meeting that expressed anger, frustration and dismay. However, Dr. Courtney guided the program successfully and significant progress was made. Substantive agreement was reached. Dr. Courtney had worked ahead of time with Dr. Livezey of the Service, who presented an exhaustive analysis showing that there is little likelihood that Barred and Spotted Owls will use separate habitats. Therefore coexistence is unlikely. This presentation alone appears to have settled this point.

Ultimately, the workshop participants elected to draft a resolution calling for action by the Service. The most significant achievement of the workshop and of other PRG work since the Status Review is that the grounds of the debate has shifted. There is now widespread attention on how to investigate and address the Barred Owl threat.

PAST PERFORMANCE

In this section we address issues of performance as set out in the solicitation with reference to the following projects.

1. Missouri River Program
2. Columbia River Dredging Program
3. Comprehensive Sturgeon Research Program Review (CSRP)
4. PRG Peer Review Program
 - A. IDIQ for Review, Synthesis and Programmatic Oversight for Three DOI Agencies
 - B. Northern Spotted Owl Status Review, Barred Owl Program, Spotted Owl Recovery Plan
 - C. Everglades Restoration Review

We have selected these **seven** programs for emphasis, since they demonstrate our experience and institutional capacity to complete all of the tasks inherent in the **review**. Six of the above projects are described in detail in the previous section, and their technical details will not be described again. . Project 4C comes from within the PRG Peer Review Program (also described above). As in the current proposal, our PRG Peer Review Program (Project 4) consists of several “projects” or task orders. To emphasize our abilities and performance, we have selected three of these ‘tasks’, including the Everglades Restoration Review.

Project 5, the Everglades Restoration Review, is an ongoing evaluation of the effects of restoration (changes in water flow, and habitat) on population viability of different bird communities. In 2007 PRG was asked to reconvene a panel to: evaluate new information since our 2003 review; to consider new hydrological models and monitoring results; and to assess the effects of the restoration plan on threatened species. This continuation is a testament to PRG’s superior customer service during the past workshops, the integrity of the PRG process, high-caliber panel and quality of the products (the workshop itself, report and administrative record).

As with any ecosystem management plan that is controversial and affects a large number of agencies and stakeholders (Federal, state, Tribal, others), the Everglades review requires careful management and communication with all parties involved. The impartiality of the process, key personnel and panel are critical.

Projects 1, 2, 3, and some ‘tasks’ in 4 were large-scale programs, addressing complex and difficult issues. Likewise, some of the work carried out under PRG’s Peer Review Program (Project 4) addresses complex large-scale systems (i.e., Everglades, Northwest

Forests, PISCO Marine Science Program, etc.) and demands that PRG staff develop a strong grasp of difficult issues. Many of our past projects address regulatory issues under ESA, where PRG has not only summarized difficult technical materials, but also maintained a clear delineation of roles (respecting the Service's decision-making prerogatives). Project 2 (Columbia River) was very large, but was accomplished under difficult circumstances in only seven months. The Northern Spotted Owl Status Review (Project 4B), although involving much analysis, synthesis and discussion of contentious material, was completed (following peer review) within the contracted one-year period. Similar strict deadlines have applied to products under the peer review program – in one instance the US Forest Service relied upon our ability to successfully carry out document review under a truncated three-week timeframe.

Each of these projects has led to the production of high quality work, under budget and on-time. In 14 years of operation, PRG has never gone over-budget or failed to meet a specified deadline.

The table below summarizes the types of review and tasks addressed in each of these projects. We show how these reviews demonstrate different capabilities required under the RFP. The table is provided for illustration purposes only, and to demonstrate which projects have emphasized particular capabilities and needs.

We have noted where each of these 7 programs/contracts address some of the relevant factors specified in the RFP. Factors with XX have a greater emphasis than X for the selected project.

	<i>Project 1.</i> Missouri River Program	<i>Project 2.</i> Columbia River Dredging Program	<i>Project 3.</i> CSRP	<i>Project 1.</i> PRG Peer Review Program	<i>Project 4.</i> Peer Review Program	<i>Project 4A.</i> IDIQ	<i>Project 4B.</i> Northern Spotted Owl Status Review	<i>Project 4C.</i> Everglades (within PRG Peer Review Program)
Manage large science programs	X	X	X	XX	X	X	XX	X
Large complex ecosystems Committee	XX	XX	XX	XX	X	X	XX	XX
environment: stakeholder and management agency involvement	X	XX	XX	XX	XX	XX	XX	XX
Interdisciplinary setting	X	XX	XX	X	X	X	XX	XX
High-caliber scientific review	XX	XX	XX	XX	XX	XX	XX	XX
Producing a final report	XX		XX	X	X	XX	XX	XX
Maintaining an official record	X	X	X	X	XX	XX	XX	X
Adhering to timelines	X	XX	XX	XX	XX	XX	XX	XX
Compliance to budget	XX	XX	XX	XX	XX	XX	XX	XX
Complex scientific material	XX	XX	XX	XX	XX	XX	XX	XX
Degree of public controversy		XX		X	X	X	XX	XX

QUALITY OF PRODUCTS AND SERVICES

In all project work PRG seeks to not simply comply with contractual requirements, but to exceed them. Our goal is to provide scientific advice and support to government agencies, at a level that is not available elsewhere. We have established a reputation for scientific excellence, and for impartial evaluation of materials. Our reports (e.g. Northern Spotted Owl Status Review) are regarded as state of the art summaries of material, which have resulted in several publications by agency staff and PRG panelists.

Our reports are accurate and insightful, and frequently exceed the expectations and demands of the contract per se. For instance on the recent Preble's Meadow Jumping Mouse review, PRG panelists re-examined the raw data of two scientists. We discovered serious inconsistencies in one data set, which had been missed by 16 previous peer reviewers, several agency staff, and the editors of a major journal. On all projects we carefully evaluate the scope of the tasks, and take an adaptive approach – modifying the evaluation process as the project unfolds. This flexibility is key to successful integration of science with management.

TIMELINESS OF PERFORMANCE

In 17 years of operation, PRG has always met contractual deadlines. For instance on the Preble's Meadow Jumping Mouse review, we had only 30 days to carry out the evaluation, including writing a 60 page report (and holding a public meeting). Our success in meeting deadlines is due in part to development of project milestones, and careful monitoring of the scientists who are evaluating technical materials (not all academics are used to Service deadlines!). On some projects we have also hired additional staff in order to meet our timeframes. This high-quality service is an important feature of our approach. We will not take contracts that we think are unrealistically scoped – the Northern Spotted Owl Status Review was initially assessed to take 1 month – we took the contract only after the scope of work had been re-assessed by DOI and the Service (it took 12 months).

COST CONTROL

In 17 years of operation, PRG has always complied carefully with negotiated budgets. We have never exceeded our budgets, and have always billed promptly with a full explanation of expenditures and expenses, as detailed in contracts. Although actual costs have occasionally exceeded negotiated costs for particular items (e.g. court reporters and security for the Preble's Meadow Jumping Mouse review), we have always made adjustments to ensure budget compliance – reducing the number of hours billed if necessary. PRG also works assiduously to promote efficiencies, and reduce unnecessary

expense (such as a reassessment of review needs in the Missouri River resulting in a \$13,500 savings to the government in FY 2007). These savings are passed on to our clients. It should be noted that PRG is a non-profit organization, so that no profits are charged to our clients.

BUSINESS RELATIONS

PRG contracts set out clear expectations for our work on behalf of our clients. However it is PRG's responsibility to ensure that projects run smoothly. For instance on the Northern Spotted Owl Status Review, we were responsible for coordination of the work of 16 scientists, and liaison with Service biologists, media relations staff, managers and decision-makers. We work hard to ensure that these relations run smoothly – this is particularly important for sensitive issues where Service staff may not be used to working with outside experts.

PRG typically works with scientists under subcontract – again there has never been a significant problem for the Service in this area. This often entails significant effort on PRG's part, however. On the Spotted Owl review, one panelist failed to perform as required by our contract. PRG took remedial action, and found additional scientific support, so that the final evaluation was complete, and finished on time.

PRG is also sensitive to the particular needs of the Service when dealing with difficult scientific decisions, which have significant policy implications, or large-scale impact. We have established a reputation, not just for the quality of our scientific work, but also for ensuring that the Service has a clear, transparent, and defensible scientific record for whatever decision the Service elects to make. We recognize the need for careful protection of the Service's prerogatives and responsibilities.

CUSTOMER SATISFACTION

PRG always complies with government service requirements. We have included some testimonials on our work (see appendices and reports), and encourage the Service to seek additional information from our clients. We are proud of our service in support of the government. Perhaps the strongest recommendation in our favor is that we rarely apply for contracts by competition – most of our work comes from clients who are familiar with our successes, and who approach us directly. Thus all our current work on endangered species on the Missouri River, on catfish management, peer review under ESA, and most recently on the Everglades Restoration Review has come from extensions of contracts or purchase orders. This satisfaction extends beyond government contractual relations to the ultimate end-users of our work – the public. After the Northern Spotted Owl Status Review, both the timber industry and the environmental community expressed satisfaction with our work, and asked us to stay involved with the issues. That review was

unique in evaluating such an emotive and important issue, and in successfully maintaining scientific impartiality and integrity. The public as well as the Service expressed great appreciation for our efforts.

OVERVIEW

Perhaps our best reference is the fact that PRG is continually asked to extend our process in overall programs (Everglades, Missouri River, Spotted Owls, PALCO HCP, etc.), referrals to new projects, and invitations to improve agency processes such as the Peer Review Guidance document. PRG exemplary products and process have also been provided as an example of the high quality work the Service would like to see on future status reviews (Northern Spotted Owl Evaluation cited in 2006 USFWS guidance document on 5 year status reviews). Along with all of these accolades, each of these projects has led to the production of high quality work, on- or under- budget and on-time. In 17 years of operation, PRG has never gone over-budget or failed to meet or exceed the contractual obligations and client expectations.

REFERENCES

Missouri River Pallid Sturgeon Program Review

Craig Fleming, USACE, (402) 667-2880, Craig.A.Fleming@nwo02.usace.army.mil

Lower Columbia River Dredging Re-Initiation of Consultation

Cathy Tortorici, NOAA Fisheries, (503) 231-6268, Cathy.Tortorici@noaa.gov

Comprehensive Sturgeon Research Program Review, for the US Geological Survey

Susan B. Jones, Deputy Center Director, USGS/CERC, (573)876-1828,
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Peer Review Program

IDIQ for Review, Synthesis and Programmatic Oversight for Three Department of Interior Agencies

Dr. Renne Lohofener, Regional Director USFWS, Portland, Oregon, 503-231-6122,
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Northern Spotted Owl Draft Recovery Plan Review, for the US Fish & Wildlife Service, Portland

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Northern Spotted Owl Status Review

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Atlantic Salmon Hatchery Program Review

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Mary Colligan, Assistant Regional Director, National Marine Fisheries Service, (978)
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Preble's Meadow Jumping Mouse Taxonomic Review

Mitch King, USFWS, Regional Director, Denver (303) 236-7920

Jay Slack, USFWS, Assistant Regional Director, Denver (303) 236-7920

Catfish Harvest Evaluation

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Appendix: Partial list of PRG's Conservation Science Network and Sample CVs.

Below is a partial list of PRG's Conservation Science Network.

NAME	AFFILIATION
Abrahamson, Warren G.	Bucknell University
Ackakya, Resit	Applied Biomathematics
Acker, Steve	US National Park Service
Albert, James	Florida Museum of Natural History
Alcock, John	Arizona State University
Allen, Craig R.	Clemson University
Allendorf, Fred W.	University of Montana
Allison, Gary	Oregon State University
Amato, George	Wildlife Conservation Society
Andelmann, Sandy	NCEAS
Arbogast, Brian	Humboldt State University
Ashton, Peter	Harvard University
Auer, Nancy	Michigan Technological University
Avise, John	University of Georgia
Babbitt, Kim	University of New Hampshire
Balda, Russell L.	Northern Arizona University
Barrie, Fred R.	Missouri Botanical Garden
Bartell, Steven	Cadmus Group
Becker, Mimi Larsen	University of New Hampshire
Bednarz, Jim	Arkansas State University
Bergey, Elizabeth A.	University of Oklahoma
Bertness, Mark	Brown University
Bierzzychudek, Paulette	Lewis & Clark College
Bigger, David	PRG Oregon
Bigley, Richard	Washington State University
Bishop, John	Washington State University
Blaber, Stephen J.M.	CSIRO Marine Research, Australia
Blakesley, Jennifer	Colorado State University
Block, Barbara	Stanford University
Boersma, P. Dee	University of Washington
Boesch, Donald	University of Maryland
Boggs, Carol	Stanford University
Bollinger, Eric	Eastern Illinois University
Bossert, William H.	Harvard University
Boyce, Mark	University of Alberta, Canada
Bozek, Michael	University of Wisconsin
Brennan, Leonard A.	Tall Timbers Research Station
Broberg, Len	PRG Montana
Brody, Alison	University of Vermont
Bronstein, Judith	University of Arizona (sabt: Duke)
Brooks, Ken	University of Minnesota

Brooks, Paul	University of Arizona
Brooks, Thomas	Conservation International
Brown, Brian V.	Nat. Hist. Mus, Los Angeles Co.
Brussard, Peter F.	University of Nevada
Buckley, Francine	University of Rhode Island
Burger, Joanna	Rutgers University
Burkhead, Noel	USGS Florida Caribbean Sci. Ctr.
Caccone, Gisella	Yale University
Camphuysen, Kees	Netherlands Inst. for Sea Research
Carroll, C. Ron	University of Georgia
Carter, Tracy S.	Oklahoma State University
Cary, Andrew	US Forest Service (Retired)
Chandler, Donald S.	University of New Hampshire
Chan-Mcleod, Ann	University of British Columbia, CA
Chesson, Peter	UC Davis
Clark, David B,	U. Missouri, La Selva Costa Rica
Clark, Deborah	U. Missouri, La Selva Costa Rica
Clark, Tim W.	Yale University
Cody, Martin	UC Los Angeles
Cohen, Yosef	University of Minnesota
Collinge, Sharon	University of Colorado
Connor, Mary	Colorado State University
Cooch, Evan	Cornell University
Cooke, Fred	Simon Fraser University, Canada
Courtenay, Walter R. Jr.	Florida Atlantic University
Courtney, Greg	Iowa State University
Cowie, Robert H.	Bishop Museum
Crandall, Keith	Brigham Young University
Cronin, Greg	University of Colorado, Denver
Crump, Martha L.	Northern Arizona University
Cummings, Kevin S.	Illinois Natural History Survey
Curtis, Lawrence	Oregon State University
Danielson, Brent	Iowa State University
Debinski, Diane	Iowa State University
DeMaster, Douglas	National Marine Fisheries Service
Dethier, Megan	University of Washington
Dhondt, Andre	Cornell University
Diller, Lowell V.	Simpson Timber Company
Dugger, Katie	Oregon State University
Dumbacher, John (Jack)	California Academy of Sciences
Dunne, Thomas	University of California
Dunning, Barny	Purdue University
Ehrlich, Paul	Stanford University
Erckmann, Jim	Seattle Public Utility District
Erwin, Terry	Smithsonian Institution
Evenhuis, Neal L.	Bishop Museum

Faaborg, John	University of Missouri
Fairweather, Stephen	Mason, Buce and Girard
Ferson, Scott	Applied Biomathematics
Fitz, Carl	University of Florida
Flecker, Alex	Cornell University
Fleischer, Robert	Smithsonian Institution
Fleischman, Erica	Stanford University
Fleming, Ian	University of Nova Scotia
Fleming, Ted	University of Miami
Forsman, Eric	US Forest Service
Franklin, Alan	Colorado State University
Franklin, Jerry	University of Washington
Frelich, Lee E.	University of Minnesota
Gaither, Jim	The Nature Conservancy
Garshelis, Dave	Minnesota Dept. Natural Resources
George, T. Luke	Humboldt State University
Gillespie, Rosemary	UC Berkeley
Ginzburg, Lev	Applied Biomathematics
Gladfelter, Elizabeth	Woods Hole Oceanological. Inst.
Goldman, Charles	University of California
Gotelli, Nicholas	University of Vermont
Grandison, Kate	Southern Utah University
Green, Steve	University of Miami
Greene, Harry W.	Cornell University
Gregory, Stan	Oregon State University
Groom, Martha	University of Washington
Grosholz, Edwin	UC Davis
Grunbaum, Daniel	University of Washington
Gu, Roy	Iowa State University
Gutierrez, Rocky	Humboldt State University
Hacker, Sally D.	Washington State University
Halaj, Juraj	University of Kentucky
Harestad, Alton	Simon Fraser University, Canada
Harrison, Susan	UC Davis
Harvell, C. Drew	Cornell University
Hay, Mark	Georgia Tech University
Hayes, William K.	Loma Linda University
Helfman, Gene	University of Georgia
Henderson, Jan	US Forest Service
Hendrickson, Dean A.	University of Texas
Hendrix, Stephen	University of Iowa
Highley, J. Mark	Hoopa Tribal Forestry
Hixon, Mark	Oregon State University
Hollingsworth, Bradford D.	San Diego Natural History Museum
Holmes, Tyson	Independent Consultant
Holsinger, Kent	University of Connecticut

Holt, Robert	University of Kansas
Hood, Laura	Defenders of Wildlife
Hordon, Robert M.	Rutgers University
Horovitz, Ines	Nat. Hist. Mus, Los Angeles Co.
Howarth, Francis G.	Bishop Museum
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Hunt, George	University of California
Hunt, Grainger	Long Marine Laboratory
Huston, Michael	Oakridge National Laboratory
Jaeger, Henrietta	Oakridge National Laboratory
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Jodice, Pat	Oregon State University
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Kelly, Patrick	CSU Fresno
Kennedy, Don	Stanford University
Kennedy, Patricia	Colorado State University
Kesler, David	Rhodes College
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Klinger, Terrie	University of Washington
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Kohn, Alan	University of Washington
Krannitz, Pam	Environment Canada
Kruse, Kipp C.	Eastern Illinois University
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Robinson, Scott K.	University of Illinois
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Valentich-Scott, Paul	Santa Barbara Museum of Nat.Hst.
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Walsberg, Glenn	Arizona State University
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