



Independent Scientific Review Panel
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ISRP Programmatic Wildlife Issues

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Summary

A summary of key points from previous ISRP programmatic comments on wildlife projects is provided below followed by some verbatim excerpts from ISRP reports. This summary is intended for several audiences and purposes. First, the summary should assist the Council, BPA, wildlife managers, and ISRP in developing criteria and programmatic questions to address in the wildlife category review. Second, many of the key points should help sponsors develop and refine proposal objectives, strategies, and work elements for projects in the wildlife category.

Focal Species: Criteria and Prioritization

- Develop criteria and procedures for selecting focal (or target) species that will be useful and effective in monitoring and evaluating project effectiveness (ISRP 2005-14).
- Consider focal (or target) species that represent the diversity of the species that were initially impacted by the hydrosystem development (ISRP 2008-4). Currently, the wildlife program focuses on vertebrates, especially game species and rare and endangered species, and continues to emphasize a narrow definition of habitat (ISRP 2005-14). Ideally, the focal species selected should exhibit three characteristics: (1) they should represent the diversity of aquatic and terrestrial habitats that are the target of restoration actions in the subbasin plan; (2) they should be species that are expected to respond to the actions being implemented; and (3) it should be possible to collect abundance or distribution data for these species – ideally, some of these data will already be available (ISRP & ISAB 2004-13, cited in ISRP 2005-14).

- Target critical habitats for acquisition (ISRP 2008-4).
- The Council and BPA should consider creating project evaluation criteria that favor those projects with documented benefits to both terrestrial and aquatic species (ISRP 2005-14). Similarly, project sponsors should develop project objectives and work elements with documented benefits to both terrestrial and aquatic species.
- Better focus on landscape structure and ecosystem dynamics needed to address the ecosystem and biodiversity-based Program goals (ISRP 2005-14).
- Consider methods and criteria other than HEP evaluation when selecting acquisitions. Land acquisitions could be ranked on the relative importance of a parcel to a particular population of focal species. Factors like relative scarcity of particular habitats, contiguity to other protected habitat, role of the parcel in the lifecycle of a species and degree of restoration (if any) needed could be used to compare acquisition opportunities, or even to predetermine an acquisition strategy. Such a structure of species and parcel priorities would also allow determination of priorities among subbasins, which is currently difficult (ISRP 2008-4).
- The Council and BPA should consider RFPs directed at important species or habitats currently neglected within the Program (ISRP 2008-4).
- The biological and economic costs and benefits of active and passive management practices should be evaluated, and these should be compared with the costs and benefits of land acquisition or protection (ISRP 1998-1, cited in ISRP 2005-14). The ISRP envisions that this evaluation would likely involve participation from some combination of project sponsors, the Council, BPA, the ISRP, and the Independent Economic Advisory Board.

Crediting

- Use the Habitat Evaluation Procedure (HEP) only as an initial scoring system for mitigation agreements (ISRP 2006-4a and 2007-1). The Habitat Evaluation Procedure should not be used for biological (effectiveness) monitoring (ISRP 2006-4a).

M&E and Objectives

- Evaluate where and when habitat restoration efforts increase or sustain fish and wildlife populations and at the same time maintain or increase biodiversity. Increase attention to M&E of extensive active management (including comparison with passive management) to better understand when the high cost of such ongoing actions is actually justified. Not much progress has been made in this area. The ISRP recommends that overarching coordinated monitoring be used to evaluate effectiveness of alternative land management practices (strategies) (ISRP 2005-14).
- When monitoring of project effectiveness is to be incorporated into a broader-scale monitoring effort, that project should already be underway, or planned to continue through the proposed projects' timeline. Evidence that such collaboration has been negotiated should be part of the project agreement (ISRP 2008-7).

- Ensure that projects state target (or focal) species or measurable habitat objectives based upon documented needs of the population in question (ISRP 2008-4).
- Hold an M&E workshop -- Wildlife habitat experts should be invited to make presentations to the ISRP/ISAB on approaches for “monitoring” different focal species’ habitats (ISRP 2008-4). This could be organized within the wildlife category review process.
- Include a monitoring and evaluation component in HEP-based management projects or programs that routinely assesses the expected versus actual responses of both target and non-target wildlife species (ISRP 1999-4, cited in ISRP 2005-14).
- A good model for probabilistic sampling and inventory of terrestrial components of large subbasins should be identified. Develop a general protocol for probabilistic selection of terrestrial monitoring sites and include in a basin-wide plan or append to the subbasin plans (ISRP 2005-14).
- The time lag between implementation and measurable response in a project might be partially dealt with through selection of short-lived resident focal species to monitor, selection of “necessary but not sufficient” interim changes and provision for funding monitoring beyond the project implementation phase (ISRP 2008-7).
- Very few projects report the results of the data gathering, analysis and interpretation included within their original project proposal. Project sponsors should report these results in the narrative section of the proposal form. In some cases, projects would benefit from redefining their objectives such that progress can reasonably be evaluated (ISRP 2006-4a).
- Species should be selected to monitor that would be expected to show responses at the project scale, which most often means at a relatively small spatial scale and initially, at a short time scale (ISRP 2006-4a).
- The Program should include an explicit scientific research component designed to improve mitigation success and adaptive management, with a priority to research designed to evaluate the effectiveness of habitat measures’ impacts on wildlife populations and their ecology (ISRP 1997-1, cited in ISRP 2005-14).

Review of Ongoing Operations and Maintenance (O&M) Projects

- Develop a program that recognizes that proper management should lead to the need for fewer inputs over time as ecological function is restored and the system becomes more self-regulating. Funding should shift over time from O&M to more M&E if management is successful (ISRP 2008-4).
- State-of-the-art integrated pest management (IPM) approaches are not being used within O&M programs. Coordinate with adjacent land managers and local governments for a landscape level approach. Plan to limit invasions of new non-native species. Consider invasive weed control strategies including targeted grazing, use of bio-controls, establishing

more desirable species that can out-compete invasives, and *maybe* the use of herbicides. (ISRP 2008-4).

- Consider having the ISRP review a subset of early acquisitions, supported by regular O&M funds, to see what has actually been accomplished towards program goals. This could lead to criteria for identifying the most promising acquisitions and perhaps to operations standards that must be maintained to receive O&M funds. Another option might be linking further O&M funding to successful M&E (ISRP 2008-4).

O&M Costs - Trusts and Endowments

- Consider cost share and other funding mechanisms for wildlife O&M. Most grant programs have a cost-sharing component that the Fish and Wildlife Program does not, because it is a mitigation program for which, logically and legally, cost-share is not required unless *in lieu* provisions of the NW Power Act apply. However, consideration of benefits from cost-share and other funding mechanisms used by other land acquisition programs may be instructive to increase the efficiency and reduce the long-term costs of the wildlife program. A few of the 2007-09 proposals included provisions for future management funding (e.g., proposal 20072600: *Acquisition of a Conservation Easement over 1084 acres of Upland Prairie and Oak Habitat, Willamette Subbasin*). A provision for a limited period of O&M funding might lead to more cost-share type commitments for long-term operation, or creativity such as demonstrated by the proposed endowment.

Excerpts from Past ISRP Report

ISRP Metrics Report (ISRP 2008-7)

July 10, 2008 | www.nwcouncil.org/library/isrp/isrp2008-7.htm

Priority Reporting for Wildlife Projects

Most habitat enhancement actions for wildlife are covered in the categories below. Likewise, many of the routine M&E activities would fall into these categories in the sense that they should be supporting populations or particular resources required by populations of focal species.

Acquisition and reporting for wildlife has evolved based on the assumption that habitat is an acceptable surrogate for wildlife populations. This assumption underlies approaches using Habitat Evaluation Procedures (HEP), Habitat Units (HU), and Habitat Suitability Indices (HSI) as metrics for assigning credits to wildlife projects. While these procedures may have represented the state of the science underlying wildlife management when formulated decades ago, they are now seldom used by wildlife habitat researchers. Implementation of the Endangered Species Act has spurred evaluation of the "habitat as surrogate" concept and found it lacking, both biologically and legally. Given that BPA has committed to HEP and HUs for crediting against habitat losses, there are better strategies following acquisition and development of wildlife habitat projects to directly evaluate wildlife responses and determine if the Wildlife Program is meeting its biological objectives. The ISRP has stated that HEPs, HSIs, and HUs can provide a baseline crediting function as part of implementation tracking, but their use after that is questionable. Thus, these terms are not used below.

Priority Implementation Monitoring Metrics

Type of Wildlife Action (work element)	Implementation Metric	Rationale
Land acquisition	Type of acquisition (Fee Title, New Easement, Renewed Easement, Exchange, Lease, Mix)	Needed for current/future planning and budgeting
	Focal species/guilds to benefit	Basis for effectiveness monitoring and planning
	Area of current and anticipated habitat available for species of interest following project and anticipated use	Basis for effectiveness monitoring and planning
	Effective date of acquisition(PISCES reporting is Optional)	Needed for current/future planning
	End date of easement or lease (PISCES reporting is Optional)	Needed for current/future planning
	# of riparian miles protected to 0.01	Basis for effectiveness monitoring
	# of riparian acres protected to 0.1	Basis for effectiveness monitoring

Type of Wildlife Action (work element)	Implementation Metric	Rationale
	Start latitude of protected stream reach entered in decimal degrees to 0.000001 or GPS coordinates (PISCES reporting is Optional)	Integrate project with other spatial habitat and population data Planning
	End latitude of protected stream reach entered in decimal degrees to 0.000001, or GPS coordinates (PISCES reporting is Optional)	Integrate project with other spatial habitat and population data Planning
	Start longitude of protected stream reach entered in decimal degrees to 0.000001, or GPS coordinates (PISCES reporting is Optional)	Integrate project with other spatial habitat and population data Planning
	End longitude of protected stream reach entered in decimal degrees to 0.000001, or GPS coordinates (PISCES reporting is Optional)	Integrate project with other spatial habitat and population data Planning
	# of upland acres protected to 0.1	Basis for effectiveness monitoring
	# of wetland acres protected to 0.1	Basis for effectiveness monitoring
Produce Environmental Compliance Documentation	As required by Federal or State codes for stream channel alteration, species relocation, genetic modification, controlled burning or herbicide use.	Insure legal clearances and implementation Entry into relevant databases
Develop/modify water source	Focal species/guilds to benefit	As a basis for future monitoring
	Area of current and anticipated habitat available for species of interest following project and anticipated benefit to species (e.g. nesting, feeding)	As a basis for future monitoring
	All location data as above	For future monitoring and planning
	Water rights status	Protect resources and enter right into record Planning
Modify vegetation	Intent, acreage and location information as above	Basis for effectiveness monitoring Planning
Operate and Maintain Passage /Structure	Intent, location and acreage information as above	Basis for effectiveness monitoring Planning
Introduce new species, individuals of a species present or new genetic element within species (plant or animal)	Intent, location and acreage information as above. Number and source of individuals. Marking system. Population size (and/or pop. genetic characteristics) before and anticipated after project	Basis for effectiveness monitoring Planning
Remove individuals or populations	Intent, location and acreage information as above. Number, source and fate of individuals removed. Marking system (if used) Population size (and/or pop. genetic characteristics) before and anticipated after project	Basis for effectiveness monitoring Planning

Effectiveness Monitoring Metrics

There are two important situations to note regarding effectiveness monitoring of actions to benefit wildlife. First is the lag time before population level changes are usually apparent. Second, specific actions may only affect part of the habitat involved in a life stage or through the lifecycle of the target species, especially if the project is small in scope.

The time lag is one reason why indirect metrics or interim results such as number of acres of habitat restored are usually monitored instead of actual focal species population response. However, as a broader array of species is considered now than in the past, this may be less often the case. Populations of invertebrates, small mammals, and other species with short lifecycles may be easier to monitor than larger, longer lived game species. Time is still troublesome when most projects have a short lifespan during which even the most effective projects may yet to have had measurable effects on a population. An example would be controlling noxious weeds that compete with native vegetation needed for optimal nutritional support of early lactating herbivores. First, the weed must be successfully controlled, which can take several years, during which time desirable plants in the community may begin to respond. Several more good growing years may be needed until the plant community reaches the desired condition and could begin to impact herbivore condition. This sequence could easily take 10 years if all goes well. Bonneville has been able to offer longer funding periods than most sponsors. It is reasonable to fund monitoring beyond the action phase of a large or novel wildlife project. An alternative is to monitor “necessary but not sufficient” change – such as shifts in the plant community in the interim. Ideally, large scale population monitoring as discussed below would complement this level of monitoring. At some point, there should be a strong test of the hypothesis underlying the action. In the example above, it could be pre- and post-project fluid and tissue sampling of early lactating animals on the site or a comparable site from another study.

The spatial element is complex because a project may only impact part of the habitat used by a population within a life stage. All the other habitat and life stages also affect and probably distort the impacts of an individual project. One reasonable means to address this is monitoring the focal species within the habitat and life stage when the action is proposed to impact that species, for example, monitoring neotropical migrant bird nesting success in newly re-vegetated riparian zones. This would isolate the effects of the specific project from influences outside the project area. Where a population level response is expected across a wide area it makes more sense to participate in larger scale monitoring efforts. When a project plans to rely upon a larger scale effort, it is reasonable to expect that effort be underway and planned to continue until the project impact is anticipated. Evidence that such collaboration has been negotiated should be part of the project agreement. It should be clear that the scale and methods used in the larger effort will yield results that can be related to the proposed actions. Furthermore, the use of a similar reference area that is unaltered provides a means for measuring changes, especially in focal species’ responses associated with habitat enhancement, whatever the time scale. The use of reference areas, when available, seems underappreciated in wildlife habitat monitoring.

Wildlife Effectiveness Monitoring Metrics Table. All the metrics in this table are high priority.

Type of Action	Metric
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Type of Action	Metric
Land acquisition	Effect on focal species population(s), health, reproductive success, distribution, diet quality or whichever criteria are best determined to assess fitness of the focal species in this situation. Change in acreage of target habitat available.
Develop/modify water source	Effect on focal species population(s), health, distribution, diet quality or whichever criteria are best determined to assess fitness of the focal species in this situation. Amount and quality of water provided.
Modify vegetation	Change in vegetation community: seral stage, composition, structure and other relevant criteria. Number of acres effected and distance to other habitat elements required by focal species when using the land affected. Effect on focal species population(s), health, distribution, diet quality or whichever criteria are best determined to assess fitness of the focal species in this situation.
Operate and maintain passage/structure	Effect on focal species population(s), survival, genetic diversity, health, reproductive success, distribution, diet quality or whichever criteria are best determined to assess fitness of the focal species in this situation. Change in acreage of target habitat available during the period when structure would be used.
Introduce new species, individuals of a species present, or new genetic element within species (plant or animal)	Effect on focal species population(s), health, reproductive success, distribution, diet quality or selection, behavior, genetic diversity or whichever criteria are best determined to assess fitness of the focal species in this situation.
Remove individuals or populations	Effect on focal species population(s), health, reproductive success, distribution, diet quality or selection, behavior, or genetic diversity, whichever criteria are best determined to assess fitness of the focal species in this situation.

ISRP Retrospective Report 2007 (ISRP 2008-4)

April 11, 2008 | www.nwcouncil.org/library/isrp/isrp2008-4.htm

WILDLIFE (PAGE 9)

In the first ISRP retrospective report (ISRP 2005-14) the panel noted that the Management Plans portion of subbasin plans tended to pay far less attention to wildlife than to fish and often did not include much consideration of landscapes, ecosystems, and overall biodiversity. There is a critical need to evaluate (and demonstrate, if possible) where and when habitat restoration efforts increase or sustain fish and wildlife populations and at the same time maintain or increase biodiversity.

Overall, much progress appears to have been made in developing productive scientific review and dialogue about wildlife. Several challenges remain for the wildlife portions of the Fish and Wildlife Program. First, integration of all elements of the Fish and Wildlife Program remains to be realized in the continuing development and implementation of subbasin plans. Second, additional time and thought must be given to criteria and procedures for selecting focal species that will be useful and effective in monitoring and evaluating project effectiveness. Third, the focus on ecosystems and biodiversity that is a central emphasis of the Council's 2000 Fish and Wildlife Program is only beginning to be incorporated into actions.

The ISRP also recommended "that the wildlife and fish habitat protection programs be better integrated and that projects be evaluated on criteria that favor those projects with documented benefits to both terrestrial and aquatic species."

In the second retrospective report (ISRP 2007-1) the ISRP recommended that the Habitat Evaluation Procedure (HEP) should be used only as an initial scoring system for the mitigation agreements that underlie the Wildlife Program. It should not serve as the sole criterion for judging whether an agreement was worthwhile.

***Progress:** Although some fine examples of wildlife projects exist among the projects listed, wildlife portions of the Fish and Wildlife Program may be considered in a formative stage with little or no connectivity among many of the diversified projects. Some projects have single focal species with quite specific monitoring efforts to understand a single species response to management activities. Other projects are broader in scope with many species targeted for monitoring efforts, i.e., emphasis on biodiversity. Many wildlife species exist and an approach for setting priorities needs to be established for both choosing focal species and targeting critical habitat needs for acquisition. Furthermore, approaches used for monitoring wildlife populations and collecting habitat data are varied. As with PNAMP and the American Fisheries Society's development of salmonid monitoring protocols, perhaps a similar set of protocols, in conjunction with The Wildlife Society, can be developed that offer the potential for some standardization of methods for monitoring various wildlife species and their habitats.*

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BENEFITTING WILDLIFE: RETHINKING CREDITING AND MONITORING IN THE WILDLIFE PROGRAM

Throughout the Fish and Wildlife Program's history, land acquisition (by fee simple or easement) has been the major component of wildlife mitigation. As land is acquired with Program funds, it has become customary for the Program to continue to support operation and maintenance (O&M) of the acquisition in perpetuity. Thus, over time, an ever-increasing proportion of funds will be allocated to maintaining the status quo. This might appear to be an economic, rather than scientific issue, except that maintaining status quo does not improve the situation for wildlife. Most project objectives are quite general (improve habitat for mule deer), and many lack focal species or a full complement of focal species that represent the diversity of the species that were initially impacted by the hydrosystem development. Reporting has relied on *activities* (built X miles of fence) rather than the activities' *effects on habitat quality* (control of trespass grazing increased winter forage for mule deer by 40%) *or on populations of target species* (additional winter forage, increased doe survival 15% and fawn production now exceeds the replacement level for this herd).

This acquisition and reporting pattern has evolved based upon the assumption that habitat is an acceptable surrogate for populations. This assumption underlies procedures like Habitat Evaluation Procedures (HEP; <http://www.fort.usgs.gov/Products/Software/HEP/>) and a more complex, but conceptually similar procedure, Combined Habitat Assessment Protocols (CHAP). While HEP may have represented the state of the science underlying wildlife management when it was formulated, HEP is now seldom used by wildlife habitat researchers. Implementation of the Endangered Species Act in recent decades has spurred evaluation of the "habitat as surrogate" concept and found it lacking, both biologically and legally. This assumption has not been tested within the scope of Program activity, but such tests would be impossible in most cases due to a *lack of target species or measurable habitat objectives based upon documented needs of the population* in question. Given Bonneville's commitment to HEP and Habitat Units (HUs) for crediting against losses, there can still be better strategies for using Program resources to evaluate responses to wildlife habitat management activities and to mitigate wildlife losses. Habitat is necessary, but not sufficient for restoring populations. Thus, we find ourselves in a quandary over choosing lands for acquisition as well as determining if the lands obtained and the wildlife program are meeting biological objectives.

Prioritization

The first of these strategies is prioritization. Subbasin plans were intended to provide a basis for prioritizing Program investments within each watershed based upon scientific assessments of resource and population conditions and opportunities related to focal species. Not all of the plans were able to develop priorities. Only a small number of the FY2007-09 proposals substantively used the plans, most just referenced pages in the plan that supported their proposal. There was little evidence that the plans actually influenced thinking about what must be done and how best to do it. To date most acquisitions have been opportunistic – the land was available and it supported some kind of wildlife, usually generalist rather than specialist species. There could be a rubric for evaluating, even guiding acquisitions based on priorities among focal species. For example, a great deal more deer habitat has been acquired than neo-tropical migrant bird habitat. By considering all species equally, as now appears to be the case, the Program is unlikely to mitigate for lost species diversity. Land acquisitions could also be ranked on the relative

importance of a parcel to a particular population of focal species. Factors like relative scarcity of particular habitats, contiguity to other protected habitat, role of the parcel in the lifecycle of a species and degree of restoration (if any) needed could be used to compare acquisition opportunities, or even to predetermine an acquisition strategy. Such a structure of species and parcel priorities would also allow determination of priorities among subbasins, which is currently difficult. This model of decision making is being used successfully by organizations such as The Nature Conservancy that rigorously seek the greatest impact of expending scarce resources. The Willamette proposal (20072600: *Acquisition of a Conservation Easement over 1084 acres of Upland Prairie and Oak Habitat, Willamette Subbasin*) is a fine example of this strategy at work and addresses both rare habitats and rare or unique species. This approach might even lead to RFPs directed at species or habitats currently neglected within the Program.

Monitoring Approaches

Several wildlife projects have shown tremendous wildlife responses to management activities, especially single focal species projects where specific research procedures were used for monitoring the response to habitat improvement, e.g., sharp-tailed grouse in eastern Washington. However, when habitat management is aimed at multiple species or wildlife in general, can a standard approach be used, or must the “monitoring” approach decision be made on a case by case basis? And, who makes the decision, or who decides after the fact that the monitoring approach used was appropriate? Perhaps wildlife habitat experts should be invited to make presentations to the ISRP/ISAB. Presentations to the panel on this subject matter have not been made in recent years. The approach for general “crediting” seems set (and not subject to change), but the approach or series of approaches for “monitoring” different focal species of interest needs to be addressed.

Greater emphasis on focal species would allow development of measurable objectives, and monitoring approaches that actually document the effectiveness of management practices relative to the focal species. Under the present system, there has been minimal monitoring of the benefits of acquisitions or O&M to actual wildlife populations. Even with no change in the criteria for evaluating proposals for acquisitions and O&M, there is room for significant improvement in writing specific, measurable objectives that would lead to credible monitoring, evaluation, and adaptive management.

A common example of this opportunity is invasive species (weed) management. Many O&M proposals that dealt with this issue included budget items for personnel, 4-wheelers, and other resources to spray weeds. Then they reported how many acres were sprayed, rarely identifying what species were targeted, or to what effect. Many private landowners and agencies are finding it more economical and more effective to contract out what spraying must be done to professionals, often with County Weed Boards. Further, herbicide use is only one aspect of an integrated pest management (IPM) plan that involves adjacent landowners, local government, and others in managing invasive species in a holistic manner that includes limiting opportunities for new species to arrive in the area, surveillance to quickly control new populations before they become established, and using a suite of complementary methods to control or eliminate established populations. This might include targeted grazing, use of bio-control insects, establishing more desirable species that can out-compete invasives, and *maybe* the use of

herbicides. This state-of-the-art IPM approach is not being used within O&M programs that emphasize the status quo.

More specific management objectives would lead to this more comprehensive approach. For example one objective might be to develop a GIS map of all invasive species on a parcel and then keep it up to date. This would be followed by goals such as eliminating certain species on specific acreages and halting spread of other species. Recording each treatment on the GIS system leads to very specific monitoring regimes to follow the results of each treatment. Such an approach may be more cost-effective and would undoubtedly be more ecologically effective than current practice. It would be very useful for the ISRP to review a subset of early acquisitions, supported by regular O&M funds, to see what has actually been accomplished towards program goals. This could lead to criteria for identifying the most promising acquisitions and perhaps to operations standards that must be maintained to receive O&M funds. Another option might be linking further O&M funding to successful M&E. Proper management should lead to the need for fewer inputs over time as ecological function is restored and the system becomes more self regulating. Funding should shift over time from O&M to more M&E if management is successful. The current system rewards a lack of success with continuing funds to do the same thing over and over again, as in the weed management example. Most grant programs have a cost-sharing component that the Fish and Wildlife Program does not, because it is a mitigation program for which logically and legally cost-share is not required unless *in lieu* provisions of the NW Power Act apply. However, consideration of benefits from cost-share and other funding mechanisms used by other land acquisition programs may be instructive to increase the efficiency and reduce the long-term costs of the wildlife program. A few of the 2007-09 proposals included provisions for future management funding (e.g., the Willamette endowment idea). A provision for a limited period of O&M funding might lead to more cost-share type commitment for long-term operation, or creativity such as demonstrated by the proposed endowment. The above are just a few ideas of how more benefits to wildlife might be generated by the Program.

ISRP Retrospective Report 2006 (ISRP 2007-1)

March 1, 2007 | www.nwcouncil.org/library/isrp/isrp2007-1.htm (pages 32-33)

Appendix 1. Exemplary Proposals for Results Reporting

C. Wildlife

199609401 - Scotch Creek Wildlife Area

This project acquired land with a major land purchase and several subsequent purchases totaling 16,620 acres within one of the Washington Department of Fish and Wildlife's Sharp-tailed Grouse Management Zones. The goal was to establish and maintain a viable grouse population on the Scotch Creek WMA and surrounding area. Management included restoring old agricultural fields by using prescribed burns and collecting seeds of local native plant species to have commercially grown to provide locally adapted seed stock for planting. Well described habitat condition surveys have been made to assess habitat quality which include photo records. But, equally important was the monitoring of the sharp-tailed grouse population response to the management activities. The grouse population was nearly gone before new genetic stock was added to the population in 1998-2000. Then, as habitat management activities started showing positive effects, the grouse population began to increase substantially in 2002-2005. New population goals have been established and additional land acquisitions are planned. The proposal notes that monitoring and evaluation have been critical to the success of the project.

199802200 - Pine Creek Conservation Area: Wildlife Habitat and Watershed Management on 33,557-acres to benefit grassland, shrub-steppe, riparian, and aquatic species

The Pine Creek Conservation Area protects 33,557 acres of grasslands, shrub-steppe and riparian habitats in the lower John Day subbasin. Along with providing improved habitat conditions for large ungulates, birds, and amphibians, aquatic habitats should be improved for summer steelhead, redband trout, and spring Chinook salmon. Management actions have included returning water to streams, prescribed fires, culvert removal, weed control, juniper cutting, and fence removal. Monitoring the conservation area has included aerial photography of habitat, deer and elk counts, bird counts, steelhead spawning surveys, and water quality, temperature, and stream flow. Data summaries for each of the monitoring metrics are provided in the project history. The project is well suited to provide evaluation of these habitat improvement strategies by ongoing monitoring of the target focal species.

ISRP 2007-09 Programmatic Review (ISRP 2006-4a)

August 31, 2006 | www.nwcouncil.org/library/isrp/isrp2006-4a.pdf (pages 18-20)

3.7 MONITORING AND EVALUATION ISSUES SPECIFIC TO WILDLIFE

HEP and M&E

In the Retrospective Report, the ISRP “urged the Wildlife program away from a sole emphasis on Habitat Evaluation Procedure (HEP) evaluation and toward more accountability (M&E) for actual wildlife populations” (ISRP 2005-14 Retro).

As in the past, reviewers commented that HEP did not provide an effective biological evaluation of project progress, and they continued to express concern that emphasis on HEP could compete with funds that could be better directed to activities with more clearly established benefit to fish and wildlife, such as acquisition of properties, easements, or other such direct conservation and mitigation actions. Techniques for evaluating quality of habitat and benefit to wildlife population have advanced significantly since HEP was developed, and many HEP models are significantly outdated or based on data and statistical methods that are no longer the best available. Some sponsors incorrectly see HEP analysis as baseline monitoring.

Recommendation: In the future, HEP should be used only as an initial scoring system for the mitigation agreements that underlie the Wildlife Program. We recommend that the Program recognize that HEP does not play any role in biological monitoring.

Wildlife Monitoring and Evaluation Plans

The ISRP has been critical of the monitoring and evaluation of results in ongoing wildlife projects and of the lack of clear and well-described plans for future monitoring and evaluation. Specifically the ISRP has stated, “Many proposals continued to lack clear descriptions of sampling design or of procedures and criteria for assessing the outcomes of management plans” (ISRP 2005-14 Retro). These comments apply equally to many fishery projects.

The failure of projects to provide description, data, and interpretive analysis of information from a monitoring and evaluation (M&E) program continues to be a major failing of wildlife proposals, a failing that brings into question the credibility of the Wildlife Program. Many proposals seem to expect future funding to meet wildlife mitigation targets based on HEP, but the O&M for these projects is expensive and ongoing and the M&E is not in place to assure that the approaches used are successful.

It appears that each proposal has a line-item M&E, but very few of these report the results of their data gathering, analysis, and interpretation (evaluation). Reviewers stress that a project does not in fact have M&E unless the data are analyzed, interpreted, used, and reported. Reviewers further note that the absence of reported data and analysis implies that use of data from PISCES to evaluate levels of M&E in the basin (assuming activities budgeted as M&E are actual M&E) could give a misleading impression of the cost and the level of M&E in the basin.

There seems to be confusion about data analysis and reporting in some proposals. For instance, some state they only have qualitative data to report, but then list activities such as bird surveys that are underway, and these clearly could be reported numerically and would be useful in project evaluation. Only a few proposals showed actual project data, but some that did provided convincing evidence of project value, for instance proposal 199609401 - *Scotch Creek Wildlife Area* showed quite simple population census data for sharp-tailed grouse that were seen by reviewers as strong evidence of project progress and value and so, as effective monitoring. This proposal contained a good example of reporting results using photo-points combined with lek counts. It helped give the local data context by also showing a graph of statewide trends for comparison with trends on the property.

Choice of Species to Monitor

Many projects may benefit from more careful consideration of which species to monitor. Species should be selected that would be expected to show responses at the project scale, which most often means at a relatively small spatial scale and, initially, at a short time scale. Monitoring may often be somewhat limited for wildlife use because the parcels involved are often a relatively small part of focal species' home or population ranges. Thus, effective monitoring requires careful selection of appropriate animals or indicators (e.g., amphibians, nesting sites, etc) that respond to the types of habitat created.

Much effective monitoring could be done with relatively simple, inexpensive techniques. For instance, use of lek counts for grouse, aerial census data for deer or other large wildlife that are regularly censused by game and wildlife agencies, and pit-trapping of amphibians can all be done at relatively low cost and might often provide adequate and effective monitoring data. Proposals can and should also monitor vegetation (habitat or focal plant species and communities). Use of low-cost techniques, such as targeted census, aerial or other remote imagery, or photo-points, should often be capable of providing sufficient information.

Effective monitoring can be quite simple, and projects would benefit from clearly rationalizing the value of one or a few things that would give direct biological data that addresses the objectives of the proposal. In some cases, projects would benefit from re-defining their objectives. Projects need to formulate objectives that are readily subject to monitoring and evaluation, that is, objectives for which progress can reasonably be evaluated.

ISRP Retrospective 1997-2005 (ISRP 2005-14)

A. Research, Monitoring, and Evaluation (page 35)

SPECIFIC RECOMMENDATIONS FOR TERRESTRIAL RM&E

It is unfortunate that a good model for probabilistic sampling and inventory of terrestrial components of large subbasins does not exist. The National Resources Inventory (NRI) has studied long-term changes in cultivated agricultural lands and has initiated pilot projects to monitor grazing lands on private property in Washington, Oregon, and Colorado. The Forest Service has its Forest Inventory and Analysis program, but it does not extend easily to other land uses and is not really appropriate for many terrestrial wildlife parameters. The Bureau of Land Management apparently has little to mimic. The EPA Environmental Monitoring and Assessment Program (EMAP) is helping some of the states instigate valid probabilistic sampling for certain aquatic parameters. In short, there is not a good existing program like the Oregon Plan for aquatic monitoring on which statistical monitoring of terrestrial habitat and populations might be attached or modeled after.

Implementation of subbasin plans allows the opportunity to help implement a coordinated statistical monitoring program for estimation of key terrestrial parameters over subbasins and to influence the direction of terrestrial monitoring for the entire Columbia basin.

Recommendation: The ISRP recommends that a general protocol for probabilistic selection of terrestrial sites be developed and included in a basin-wide plan or appended to the subbasin plans.

Recommendation: ISRP reports have often included the recommendation that better attention be given to M&E of extensive active management (including comparison with passive management) to better understand when the high cost of such ongoing actions is actually justified. Unfortunately, not much progress has been made in this area. The ISRP recommends that overarching coordinated monitoring be used to evaluate effectiveness of alternative land management practices.

WILDLIFE MONITORING AND EVALUATION

Habitat Evaluation Procedure (HEP) makes sense as a method for defining losses of land and of habitat. It also makes sense as a conceptual approach to wildlife habitat acquisition and restoration. Indeed, the wildlife portion of the Council's FWP is based on the HEP concept, and land acquisitions are pursued and accounted for using the HEP currency. While the ISRP does not contest this approach or the policy decisions behind it, we continue to have concerns that the monitoring and evaluation of wildlife projects and programs should not rest solely on a HEP-based analysis.

Recommendation: The ISRP recommends that HEP-based management projects or programs should include a monitoring and evaluation component that routinely assesses the expected versus actual responses of both target and non-target wildlife species.

D. Wildlife

The Wildlife Program has been significantly smaller than the Fish Program, and was largely separate from the Fish Program when the ISRP began its reviews in 1997. The Wildlife Program also differed in focus from the Fish Program, deriving from its separate history of development based on assessment of habitat losses as an assumed proxy for wildlife losses. Thus, the Wildlife Program had focused on habitat acquisition to replace habitat losses caused by development of the federal hydrosystem.

In developing its first report in 1997, the ISRP reviewed the FWP, including many documents that described development of the Wildlife program. The ISRP noted that "...coordination with other parts of the FWP (i.e., Resident Fishes, Anadromous Fishes) seems largely lacking." The ISRP also observed that, although the Wildlife Program presumably was effective in its emphasis on habitat acquisition and protection, which were assumed to benefit the wildlife species themselves, there was little if any attempt to measure directly the benefits of habitat acquisition (or intended habitat improvement, through management actions) at the level of wildlife populations.

The section on Wildlife in the ISRP's first report (ISRP 1997-1) included nine procedural recommendations, most notably:

- that a separate Scientific Review Group for the Wildlife Program not be formed, but rather that a single Review Group (currently the ISRP) be charged with review of both Fish and Wildlife issues within the FWP. *This should improve program coordination, which will likely remain difficult in such a large and complicated program as the FWP, and several scientific recommendations:*
- that the Wildlife Program include an explicit scientific research component. *This would be likely to increase mitigation success and would make evaluation and adjustment of the Program over time much more feasible,*
- that additional scientific criteria be added to those currently used to prioritize proposals for mitigation projects. *For instance, the geomorphologic suitability of a site to sustain Habitat Units anticipated to be gained should be considered in prioritizing mitigation projects,*
- that the Program give increased attention and priority to research designed to evaluate effectiveness of habitat measures in terms of direct assessment of wildlife populations and their ecology,
- that Council include a portion of the Wildlife Program funds each year within the competitive grants program for research that could contribute to the benefit of wildlife. *Innovative monitoring and research proposals could be encouraged through this part of the Program,*
- that monitoring, which now is based on the unit of mitigation, habitat (measured as HUs [Habitat Units], determined from HEP [Habitat Evaluation Procedure]), be extended to include a requirement for some degree of direct monitoring of target (and perhaps some non-target) wildlife populations.

The Council was largely supportive of these recommendations, from which they extracted two key issues for immediate attention (FY98 Council AIWP): that monitoring and evaluation be extended to include some population monitoring and that acquisition of land continue to be emphasized in the wildlife program. The Council also essentially implemented the recommendation that a common group review both fish and wildlife proposals, as both of these continued to come to the ISRP for outside peer review.

In its next project review report (ISRP 1998-1), the ISRP reiterated the recommendations from its 1997 report that had not been implemented completely. The ISRP stated concerns about location and management of habitat that was acquired to mitigate wildlife losses. The ISRP noted the important trade-offs between allocation of funds to land acquisition versus to land management, as well as the high costs of the large amount of active management that was included in wildlife projects. Thus, the ISRP recommended that the program include research designed to evaluate effectiveness of alternative active and passive management actions that are intended to benefit wildlife, and, more generally, that more relevant and contemporary research be incorporated into the Wildlife program. The ISRP noted that incorporation of an explicit scientific research component would be likely to both increase mitigation success and make adaptive management more feasible.

Future ISRP reports consistently noted the same set of core concerns, but evolved to address more specific examples of implementation and practice. For instance, the FY2000 ISRP review (ISRP 1999-2) noted that few wildlife proposals presented a clear rationale for acquisition of particular parcels of land. The ISRP noted the need for proposers to justify the value of parcels of land to particular wildlife species and to make clear the cost-effectiveness of parcels to be acquired. Thus, the ISRP recommended that: “no land acquisition be funded without a clear description of the land to be acquired and without demonstration of its priority for the fish and wildlife program.”

The ISRP additionally suggested in this review that an umbrella proposal could provide a natural mechanism for explaining the integration and planning that should underlie land acquisition decisions. Several wildlife umbrella proposals for FY2000 addressed this concern effectively (e.g., Oregon Wildlife Mitigation Umbrella) and presented this background and rationale, but others gave no clear justification for land acquisition or land easements. Use of umbrella proposals was an additional step toward improved project coordination, which evolved over the next few years into rolling Subbasin reviews and the Subbasin Planning exercise.

The ISRP remained critical of the monitoring and evaluation of results in ongoing wildlife projects and of the lack of clear and well-described plans for future monitoring and evaluation. Many proposals continued to lack clear descriptions of sampling design or of procedures and criteria for assessing outcomes of management plans, but several proposals had significantly improved monitoring and evaluation sections. The ISRP also gave examples of the improvements in ongoing and planned data collection, including quoted examples from a selection of proposals, all of which focused on direct measurement of wildlife species or of specific habitat criteria that are of benefit to fish and wildlife. These were suggested as useful models for future wildlife proposals. The ISRP continued the practice of pointing out useful

examples of innovations or high quality approaches in its reviews, drawing examples from within the FWP, from other programs, and from the literature.

The ISRP noted in the FY00 report (ISRP 1999-2) that many of the habitat and wildlife projects allocated substantial funds to control of non-native plant species, but that these projects rarely included monitoring to evaluate effectiveness of control methods or experimental designs that would allow comparison of methods of control or of treated and untreated areas. Reviewers stated concerns with the long-term and large-scale commitment of funds for control of non-native species, as well as with the lack of consideration or evaluation of unwanted effects of the use of herbicides, fire, and hard-engineering methods for non-native plant control (e.g., effects on soil fertility, non-target plant species, or wildlife). Active treatment to remove non-native plants, such as broadcast application of herbicides, provides one example of an expensive form of active habitat management that was routinely done, but for which studies to evaluate effectiveness of alternative approaches were rare or lacking. The ISRP suggested that such problems be addressed by directed project solicitations and by increased emphasis on evaluative research. For instance, from the FY00 report, “The ISRP recommends that the Council solicit innovative proposals for development, testing, and evaluation of cost-effective passive methods for control of non-native species.”

Council noted in the FY99 AIWP that the ISRP had essentially repeated several recommendations for the wildlife program from their past report and stated that efforts already were under way to respond to these comments and recommendations. For example, the Wildlife Working Group had released a request for proposals to develop an improved monitoring, evaluation, and research component for the wildlife program, and the group had revised its project selection criteria to address ISRP concerns. Additionally, Council noted that the wildlife program did now include projects that provide integrated fish and wildlife habitat protection (e.g., the Squaw Creek, Pine Creek, and Coeur d’Alene initiatives). However, Council noted that “More needs to be done to integrate anadromous fish, resident fish and wildlife values and habitat protection; this is in part one of the hopes for the multi-species framework development process.”

The ISRP (1999-4 FY00 Response) continued to call for improved monitoring and evaluation of wildlife land acquisitions, noting specifically the limitations of HEP as a monitoring and evaluation tool. “While the ISRP does not contest [HEP evaluation as a method for defining losses of land and losses of habitat and as a conceptual approach to wildlife habitat acquisition and restoration] or the policy decisions behind it, we continue to have concerns that the monitoring and evaluation of wildlife projects and programs should not rest solely on a HEP-based analysis. A fundamental premise in the HEP approach is that target wildlife species (and associated non-target species) will respond in a positive fashion (usually abundance) to species-specific habitat improvements. While there are strong theoretical reasons to expect a positive relationship between habitat improvements (usually brought about through acquisition and subsequent land management), biological responses are variable and often complex. Therefore, a necessary complement to a HEP-based management project or program, should be a monitoring and evaluation component that routinely assesses the expected versus actual response of both target and non-target wildlife species.”

In reviewing the Albeni Falls proposal for wildlife monitoring and evaluation, the ISRP noted that it included provision for long-term HEP evaluations and suggested that (1) effort put into long-term repetition of HEP analyses may not be very useful and (2) that use of HEP analyses and their associated Habitat Units (HUs) to guide land management may lead to counterproductive management practices. HEP is based on the assumption that habitat suitability for a species can be described by a Habitat Suitability Index (HSI). However, these indices vary in quality, and many are based on limited information. Measures of uncertainty in the form of confidence bounds on HSIs are rarely given, but have been found to be very broad. Management to produce or maintain habitat that is predicted by an index of untested quality to provide good habitat for a particular species is not warranted when better and more direct information on wildlife is available. Thus, the ISRP urged the program away from continuing emphasis on HEP evaluation as a tool for long-term evaluation or management planning. The development of good-quality direct monitoring programs will make this coarse approximation obsolete as an evaluation tool.

The ISRP also again recommended that specific mechanisms be developed to better coordinate the FWP, both internally and with other programs that have significant impact on fish and wildlife and their habitat in the Columbia River Basin. “In general, our concerns were that many projects tended to deal with protection and enhancement of steppe-shrub upland habitat without relating the potential benefits to fish and wetland species in a more integrated ecosystem approach. On the other hand, few of the fish projects, if any, related potential benefits to terrestrial wildlife. The ISRP believes that better integration of projects for protection of habitat for spawning and rearing for fish with protection of terrestrial habitat will provide long-term benefits. For example, many fisheries projects called for fencing of streambanks to limit access by cattle, while most wildlife projects call for purchase of land or conservation easements. Both of these practices are desirable, but it may be more economical, and more ecologically effective, for the two programs to work in harmony with each other.” Thus, the ISRP recommended “that the wildlife and fish habitat protection programs be better integrated and that projects be evaluated on criteria that favor those projects with documented benefits to both terrestrial and aquatic species.”

In the FY00 Council AIWP, the Council “declined to accept the recommendation that it solicit specific types of proposals for control of non-native species at this time, instead electing to continue the project solicitation and selection model currently used, where both it and the ISRP receive and review the proposals that are recommended by CBFWA.” The AIWP further stated that “... Council believes efforts to control non-native species should be articulated in the context of a subbasin plan (and in light of complete assessments). Therefore, these types of proposals, and all others for that matter, should be made and reviewed in the context of activities seeking to implement a subbasin plan rather than in the abstract. The Council does encourage the ISRP to identify and comment upon innovative proposals for development, testing, and evaluation of cost-effective passive methods of control of non-native species in the context of its review of proposed projects in its annual reports. The Council will take those comments into account in making its funding recommendations in Fiscal Year 2001 and future years.”

The trade-offs between allocation of funds to management intended to enhance the fish and wildlife value of lands and the alternative allocation of funds to acquire or protect lands

continued to be noted by the ISRP, and the responses of Council have varied. Council seems to have embraced the ISRP's recommendation that evidence be provided of the value of active land management that is intended to maintain or improve habitat value to fish and wildlife, but funding decisions have not always supported this position. For instance, in FY 2002, Council declined to recommend funding for active habitat management of uplands in Garfield County for which the ISRP had noted a lack of justification of the biological benefits from the project: "The Council concludes that the ISRP's comments highlight critical concerns about the continuation of this project. The Council recommends continued funding of the base program and selected passive restoration strategies... The Council recommends that the budget not include funding for Section 5 (objective 1a), no-till, direct seeding and changing crop rotation until better justification of the biological benefits is presented" (Columbia Plateau Issue Memo FY 2002, Lower Snake Mainstem Issue 1: Garfield County Sediment Reduction and Riparian Improvement Program, Project 199401807). However, in FY 2003, Council considered a set of proposals for the Lower Columbia Estuary Province and recommended funding for the aspects of the projects that supported habitat enhancement objectives, while recommending against those that would have expanded land acquisition in the Willamette Basin (Lower Columbia Estuary Province FY03 Council Issue Memo).

The ISRP's recommendation that proposals for active land management should justify the costs and values of the proposed active management techniques was applied also to proposals intended primarily to benefit fish or that involved linkages of wildlife and fish habitat. For instance, in the Umatilla River Basin, Council wrote: "These projects are intended to implement actions that protect and enhance riparian and in-stream habitat in the Umatilla River Basin. The Council concludes that the ISRP's comments highlight concerns about the continuing watershed restoration, to this degree and intensity, without a subbasin assessment and plan. ... The Council recommends continued funding of the base program and passive restoration strategies (i.e. screening, riparian buffers) for these projects pending subbasin planning. The Council recommends that the budget not include funding for aggressive channel design/implementation techniques" (page 35/56, Columbia Plateau Issue Memo FY02, Umatilla Issue 1: Enhance Umatilla River Basin Anadromous Fish Habitat, Project 198710001, and Umatilla Subbasin Fish Habitat Improvement, Project 198710002). Similarly, regarding a project in the Walla Walla Basin, Council wrote: "The Council concludes that the ISRP's comments highlight concerns about the continuing watershed restoration, to this degree and intensity, without a better link of an assessment and geomorphic stability. ... The Council recommends continued funding of the project and passive restoration strategies (e.g., screening, riparian buffers) pending subbasin planning. The Council recommends that the budget not include funding for aggressive channel design/implementation techniques." (p. 40/56: Col Plat Issue Memo FY 2002, Walla Walla Issue 2: Walla Walla Basin Fish Habitat Enhancement; Project 199604601." These examples also illustrate the Council's general support of watershed-level assessment and planning, the demonstration of benefits of active management, and the integration of fish and wildlife benefits, all of which had been recommended consistently by the ISRP.

Ultimately, the ISRP's recommendations featured prominently in the 2000 FWP, which embraces coordination among elements of the Program, including linkage of the goals, objectives, and strategies for habitat, wildlife, and fish, and more emphasis on monitoring and evaluation and its coordination among projects, groups, and subbasins. The ISRP's

recommendations also feature in the Technical Guide for Subbasin Planners (Council Document 2001-20), which emphasizes coordinated, subbasin-scale planning that integrates habitat, wildlife, and fish goals and that incorporates explicit consideration of ecological relationships, including linkages amongst multiple populations of fish and wildlife and their habitat. Thus, the dialogue of proposal and program review that occurred between the ISRP, the Council, and project proponents seems to have evolved into substantive program changes that reflect more emphasis on research, monitoring and evaluation, and adaptive ecosystem management, all within a more coordinated Fish and Wildlife Program.

Review of the first Subbasin Plans was completed by the ISRP, ISAB, and a large group of peer reviewers in summer 2004. Subbasin Planning was intended to significantly increase the coordination and integration of the fish and wildlife programs, as well as to facilitate coordinated planning and review of fish and wildlife actions among subbasins, and the Subbasin Planning process certainly made significant progress in meeting these goals. However, several concerns of the ISRP from earlier reviews remained prominent in comments from the ISRP and ISAB's review of subbasin plans (ISRP&ISAB 2004-13):

- "... the Management Plans tend to incorporate far less attention to wildlife than to fish and often do not include much consideration of landscapes, ecosystems, and overall biodiversity."
- "... there is a critical need to evaluate (and demonstrate, if possible) where and when habitat restoration efforts increase or sustain fish and wildlife populations and at the same time maintain or increase diversity."

Additionally, concerns about wildlife monitoring and about the integration of habitat, wildlife, and fish actions, similar to those that were voiced by the ISRP in earlier reviews, emerged in slightly different form as concerns about the selection and use of focal species in monitoring and evaluation of FWP actions:

- "... the emphasis on ESA-listed species, especially aquatic species, led some planners to exclude non-listed species, which resulted in some important habitat types being overlooked. The strongest plans were those that used functional analysis in selecting terrestrial focal species. Focal species that had very low abundances present a costly task for monitoring changes in these species and their habitats."
- "... augmenting focal species information with an assessment of changes in the characteristics of biological communities or ecosystem processes would provide a more complete picture of progress towards improved 'ecosystem health.'"
- "Discussion of population status and trends ... was almost universally lacking for terrestrial and non-salmonid aquatic species."
- "The choice of focal species affects not only the selection of objectives and strategies in a plan, but also the ability of plan implementers to monitor the effectiveness of actions towards meeting plan objectives."
- "Ideally, the focal species selected should exhibit three characteristics: (1) they should represent the diversity of aquatic and terrestrial habitats that are the target of restoration actions in the plan; (2) they should be species that are expected to respond to the actions being implemented; and (3) it should be possible to collect abundance or distribution data for these species – ideally, some of these data will already be available. "

- “The feasibility of collecting data on the current and future status of focal species was ignored in many of the subbasin plans. The tendency to select focal species for which little status and trend information exists (or can be practically collected) compromises the ability to evaluate the success of plan implementation. There are many species, however, for which data can be collected, given sufficient commitment to this effort.”
- “Augmenting focal species information with an assessment of changes in the characteristics of biological communities or ecosystem processes would provide a more complete picture of progress towards “ecosystem health.” In future revisions of the subbasin plans, some thought should be given to the identification of “focal processes” as well as focal habitats and focal species.”

Overall, much progress appears to have been made in developing productive scientific review and dialogue. The concerns that were voiced in the first ISRP reviews have evolved in conjunction with changes that were made to address those concerns. The scientific basis of the FWP has been significantly updated in the Council’s 2000 FWP. The depth and quality of discussion of the issues that have persistently been raised by the ISRP have increased significantly, and there have been many efforts to develop better monitoring and evaluation, strike the best balance between land acquisition and land management, choose wisely (using scientifically sound, evaluative information) between different land management alternatives, improve coordination of wildlife and fish programs, and balance attention to biological populations, whether fish or wildlife, with attention to habitat and ecosystem dynamics.

Several challenges remain for wildlife portions of the FWP.

Recommendation: Aquatic and terrestrial elements of the FWP should be fully integrated in continuing development and implementation of Subbasin Plans.

Recommendation: Additional time and thought should be given to criteria and procedures for selecting focal species that will be useful and effective in monitoring and evaluation.

Recommendation: The focus on ecosystems and biodiversity that is a central emphasis of the Council’s 2000 FWP should continue to be incorporated into actions. Currently, the wildlife program focuses on vertebrates, especially game species and rare and endangered species, and continues to emphasize a narrow definition of habitat. In the future, a broader representation of focal wildlife should be included, and landscape structure and ecosystem dynamics should be considered as needed to address the ecosystem and biodiversity-based FWP goals.

Recommendation: To facilitate better decisions about allocation of limited funds to actions intended to benefit fish and wildlife, the biological and economic costs and benefits of active and passive management practices should be evaluated, and these should be compared with the costs and benefits of land acquisition or protection.

Finally, it remains to be resolved what will be the best balance between research and direct actions to accomplish the restoration and conservation of fish and wildlife.