Selecting Focal Species for Strategic Habitat Conservation

These notes, along with the comments in the SHC Technical Implementation Guide, provide suggestions on how to identify priority species for conservation and how to use the list of priority species to select focal species for Strategic Habitat Conservation.

Identifying Priority Species

Through a variety of congressional and administrative actions, the Service is charged with conserving, protecting and enhancing fish, wildlife, and plants and their habitats. In order to achieve this goal, the Service focuses its efforts on species of greatest concern - those species whose numbers have or will decline without proactive management, or are have significant public recreational or commercial value. In the context of SHC, these are Priority Species.

It is relatively easy to list of the Service's priority species by simply compiling those species that are covered by the Service's current management and regulatory activities. Priority species will include federally listed endangered and threatened species, migratory birds, fishes, etc. The list of Service priority species is very long, and includes over 1,400 endangered plants and animals, nearly 1,000 migratory birds, and a wide range of freshwater and marine fish and invertebrates. If a national list of priority species were to be compiled, it would probably contain 3,000 to 4,000 species occupying every type of habitat and ecosystem within the United State.

While identifying priority species may be relatively simple, it is difficult to rank these priority species based on species-specific biological information (*e.g.*, condition, size and number of populations; number of individuals; range, extent, and area of occupancy; short- and long-term trends; scope, severity, and immediacy of threats; number of protected and managed populations; intrinsic vulnerability; and environmental specificity, etc.). Efforts to rank priority species (*e.g.*, the Service's listing or recovery priority ranking; NatureServe heritage ranking; IUCN Red List) inevitably leads to large groupings of species with the same rank.

In an ideal world, the conservation needs of all priority species would be addressed -- species-habitat relationships and spatial patterns would be modeled for each priority species and conservation and management actions would be designed to maximum efficiency. Unfortunately, fiscal constraints require the Service to focus its actions on a smaller subset of species. It is the selection of this subset of species ((*i.e.*, focal species) that is the first critical step in designing an effective program of Strategic Habitat Conservation.

Selecting Focal Species

Selecting a relatively small subset of Focal Species from the list of priority species is not a simple task. There are no widely recognized or accepted methods or approaches for ranking priority species or selecting a subset species for full conservation and management (Hagan and Whitman 2006, Mills 2007). For the purposes of SHC, selection should be based on objective criteria that reflect the importance of the species relative to its ecological significance, management significance, legal mandates, and feasibility of implementing long-term, landscape-based adaptive management. This approach assumes that this species-specific information is available, or that it can be obtained and used in the selection process. This method of selecting

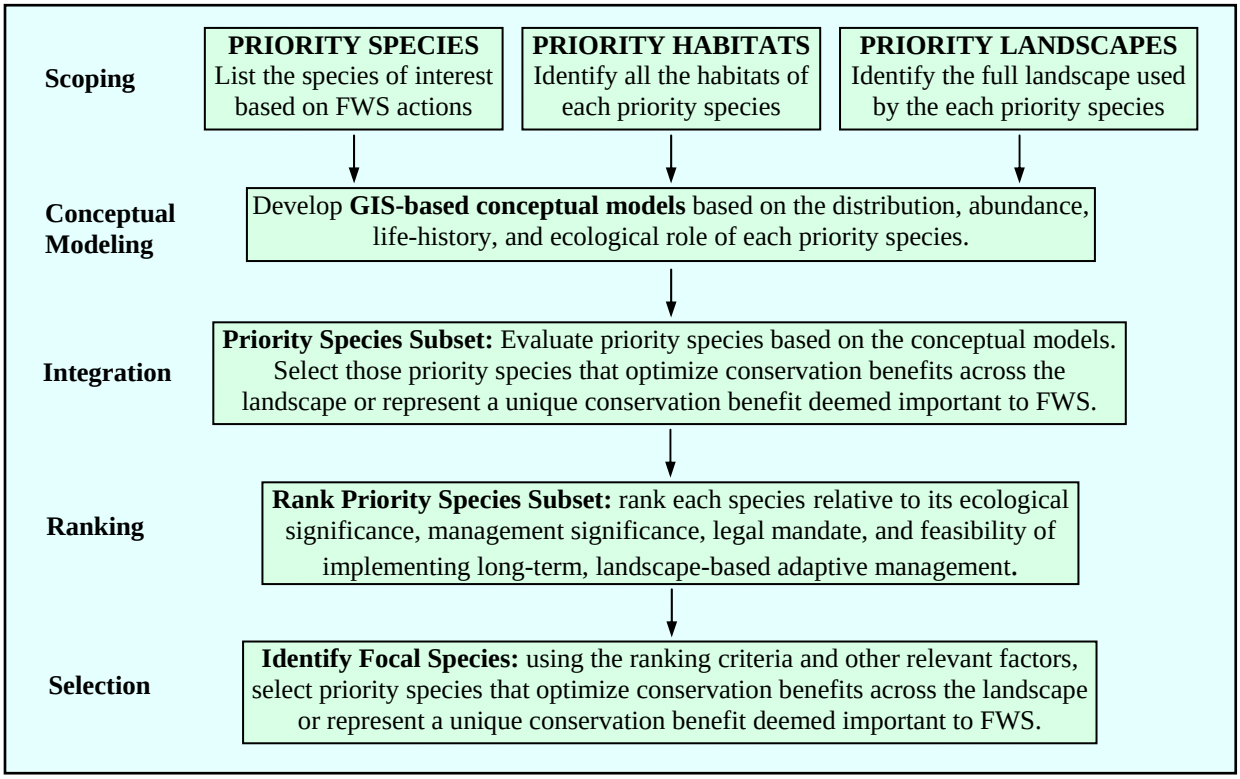
focal species for SHC actions builds on the considerable efforts of the National Park Service's Inventory and Monitoring Program.

As discussed in the SHC Technical Implementation Guide, the selection of a subset of species for full SHC adaptive management should strive to optimize landscape-scale conservation to benefit additional priority species and habitats within the landscape. It is important to consider the full species' range in assessing its landscape potential to extend management and conservation benefits to other priority species.

Focal species could be chosen to represent guilds of species that may similarly benefit from management, with the focal species being more sensitive to environmental conditions and more responsive to management actions (Lambeck 1997, 2002). Focal species might also be selected because of unique habitat requirements; keystone species status (Mills 2007); their value in improving management decisions; their value as a high profile game species; or some other well defined criterion. Multiple focal species will typically be more satisfactory than a single umbrella species (Lambeck 1997, 2002, Lindenmeyer et al. 2002). Depending of the extent of the landscape being considered for management, 5-15 focal species may be needed to fully address the ecological diversity of the landscape (Hagan and Whitman 2006). Example A in the SHC Technical Implementation Guide provides a simple example of how to use focal species to cover landscape ecological diversity.

The following comments are a guide to selecting priority species and focal species (modified from the NPS I&M Program). This process is outlined I Figure 1.

Figure 1-- Flow chart for selection focal species



The scoping process is an opportunity for participation by Service partners and experts outside of the Service, and will likely involve a series of meetings, workshops, brainstorming sessions, questionnaires, literature reviews, and other information-gathering exercises to identify the full range of priority species within the geographic area of interest.

The development of GIS-based conceptual models provides a valuable tool for evaluating the conservation benefits that may be derived from long-term landscape-based adaptive management of each priority species. The conceptual modeling exercise will also help organize and communicate the information compiled during scoping, and assist in comparisons among priority species.

What is a GIS-based conceptual model?

A hallmark of Strategic Habitat Conservation is the integration of adaptive management with a landscape assessment of entire range of the focal species. An important step in achieving this integration is to develop a conceptual model of the species' ecological role. This would including an evaluation of the location and robustness of all know populations across the entire species range. It could also include information on the life history of the species; the development of a food web, based on known or assumed relationships; and an evaluation of the role of critical processes such as stream flow, rainfall, seasonality, and climate. Combining the life-history, food web, and ecological process information with the GIS landscape overview of distribution, abundance, and robustness form the basis for the conceptual GIS-based landscape model that will help guide the selection of focal species.

If successful, the scoping and conceptual modeling efforts will lead to a subset of priority species that can then be further evaluated using Ranking Criteria based on each species' ecological significance, management significance, legal mandates, and feasibility for long-term adaptive management (see Table 1).

The result should be a list of Focal Species along with an initial assessment of the management landscape – at least in the ideal world. In the real world, this list is likely to be more that fiscal constraints can accommodate. So, the actual final step is to use the list of focal species in combination with other criteria such as efficient use of personnel, cost and logistical feasibility, partnership opportunities, and a large dose of common sense to select the focal species that will be included in Strategic Habitat Conservation.

Functionally, the prioritization of species and the final selection of focal species are two inter-related but separate actions; prioritization is based on objective ecological, managerial, and legal criteria, and it constrains the selection process to relevant species; the actual selection of focal species is further based on the realities of fiscal support, policy, partnership potential, and other factors that make the conservation of species a societal enterprise.

An Outline of a Prioritization and Selection Process

The following is a brief outline of how the prioritization and selection process could lead to a set of focal species.

1. The regional SHC team first develops a set of general attributes for focal species. Then the team leads a series of meetings, workshops, brainstorming sessions, questionnaires, literature reviews, and other information-gathering exercises to identify priority species throughout the Region. This is an open meeting that solicits a wide range of input, and allows partners to suggest priority species based on their specific concerns. This process will likely lead to a relatively long list of species some of which may not fully qualify as priority species.

   The following properties might be used to help limit the list of priority species that will later be evaluated as focal species:

   - Species' population dynamics track changes in the larger landscape or ecosystem;
   - Species and habitat parameters can be accurately and precisely estimated (high signal-to-noise ratio);
   - The likelihood of detecting a change in the species' status is high, given a change in the status of the ecosystem;
   - Species/habitat dynamics have low natural variability, or additive variation, and changes in their values can be distinguished from background variation;
   - The cost of monitoring the species is not prohibitive.

2. The Workshop list of priority species and associated information is compiled and developed into an initial conceptual GIS-based model (or models) by the regional SHC team. Modeling should help organize and communicate existing information and promote input across Service programs. It is important to note that trying to integrate information about too many species representing key ecological processes can become overwhelming; efforts should be made to reduce the number of focal species candidates at each step. Failing to meet the general attributes for a focal species should be the major reason for excluding a priority species. Care should be taken to justify all removals from the list of priority species, and to provide a justification stating why each species should be considered a priority species.

3. Next, using the conceptual GIS-based model and a set of ranking criteria (Table 1), the priority species are ranked by managers and species experts within and outside of the Service. Major criteria may be: Ecological Significance of the species, Management Significance of the species, Legal/Policy Mandate for the species, and Cost Effectiveness and Feasibility of managing the species. This ranking effort may be assisted by an appropriate method of structured decision making (see discussion below). A conceptual model showing how the species is distributed on the landscape and how it interacts with the ecosystem can be helpful in demonstrating the ecological relevance of the species. This is particularly the case when the focal species may serve as an umbrella or surrogate species for other priority species or habitats. A report of the prioritization process should be available for review by Workshop participants, managers, species experts and others.

Table -- An example of possible ranking criteria for selecting focal species

***Ecological Significance of the Species* (30%)**

Statements:

- There is a strong, defensible linkage between the species and the overall ecological function of the landscape (or focal area) or the species is strongly linked to a critical resource.
- The species is of high ecological importance based on a conceptual model of the species-ecosystem interaction (*i.e.*, food web) and supporting ecological literature and data.
- Data on the species are needed to fill gaps in current ecological knowledge.
- The species provides early warning of undesirable changes to important resources - it can signify an impending change in the ecological system.
- The change in the species population status or change in its habitat has a high signal to noise ratio and does not exhibit large, naturally occurring variability.
- The species is sufficiently sensitive = small changes in the species population or its habitat can be used to detect a significant change in habitat or ecosystem stability or function.
- Reference data on the species exist within the region, and/or threshold values are specified in the available literature that can be used to measure deviance from a desired condition.
- The status of the species or its habitat reflects the status of other priority species or the status of larger scale ecological processes or biological organization.

Strongly agree with:	all 8 of the statements	7 of the statements	6 of the statements	5 of the statements	4 of the statements	< 4 of the statements
Ranking Value:	**Very High**	**High**	**Moderate**	**Low**	**Very Low**	**None**
[+]Numerical Ranking:	**10**	**8**	**6**	**4**	**2**	**0**

[+]Numerical ranking should be set to spread ranking values and so give a clear indication of highest ranking species.

***Management Significance of the Species* (30%)**

Statements:

- There is an obvious, direct application of the data on the species to a key management decision, or for evaluating the effectiveness of past management decisions.
- Information on the species is clearly understood and accepted by managers, other policy makers, research scientists, and the general public, all of whom should be able to recognize the implications for protecting and managing the species.
- Population and/or habitat data are badly needed for informed management of the species.
- Monitoring the species is likely to provide early warning changes in populations and /or habitat.
- In addition to addressing a specific management decision, data on the species are very useful in evaluating other management decisions.
- Information on the species is of great interest to the public.
- There is an obvious, direct application of species data to performance (*e.g.*, GPRA) goals.

Strongly agree with:	all 7 of the statements	6 of the statements	5 of the statements	4 of the statements	3 of the statements	< 3 of the statements
Ranking Value:	**Very High**	**High**	**Moderate**	**Low**	**Very Low**	**None**
[+]Numerical Ranking:	**10**	**8**	**6**	**4**	**2**	**0**

[+]Numerical ranking should be set to spread ranking values and so give a clear indication of highest ranking species.

Table 1 continues on next page

Table 1 -- An example of possible ranking criteria for selecting focal species – continued.

***Legal/Policy Mandate for the Species* (20%)**

Very High: Legal mandate to monitor species (*i.e.*, Endangered Species Act, enabling legislation, etc.).

High: The species is specifically covered by an Executive Order, a binding memorandum of understanding, or other binding legislative mandate or management policy.

Moderate: A performance goal (*i.e.*,GPRA, etc.) relies on species data; or managing the species is indicated by a federal or state law, general legislative mandate, or management policy, but there is no specific legal mandate to manage the species.

Low: Listed as a species of concern by credible state, regional, or local conservation groups, but the species is not specifically identified in any legally-binding legislation or management policy; there is no specific legal mandate to manage the species.

Very Low: The species is covered by general legislative or Congressional mandates or management policies, but there is no specific legal mandate to manage the species.

None: There are no general or specific legal mandates exist for the species.

***Cost Effectiveness and Feasibility of Managing the Species* (20%)**

Statements:

- Sampling and analysis is cost-effective for the species.
- Well-documented, scientifically sound monitoring protocols already exist for the species.
- The results are repeatable when using different, qualified personnel.
- Implementing monitoring of the species is feasible given all possible constraints (*i.e.*, site accessibility, sample size, equipment maintenance, etc.)
- Data on the species will be comparable with data from other monitoring studies being conducted elsewhere in the region and/or by other agencies, universities, or private organizations.
- The opportunity for cost-sharing partnerships with other agencies, universities, or private organizations in the region exists for the species.

Strongly agree with:	all 6 of the statements	5 of the statements	4 of the statements	3 of the statements	2 of the statements	< 2 of the statements
Ranking Value:	**Very High**	**High**	**Moderate**	**Low**	**Very Low**	**None**
[+]Numerical Ranking:	**10**	**8**	**6**	**4**	**2**	**0**

[+]Numerical ranking should be set to spread ranking values and so give a clear indication of highest ranking species.

4. The final selection of SHC focal species will most likely be done by individuals selected by the Regional Director. This group should include field and regional office representatives and species experts that can discuss the merits and practicalities associated with conservation and management of the focal species. Final selection should be constrained to the priority species covered in the ranking analysis, and it should evaluate all available information including comments from the review of the Prioritization Process Report, the results of the workshops, and inputs from the SHC team.

Revisiting the Selection of Focal Species

After focal species have been selected, information may come to light that necessitates re-evaluating the remaining priority species and their contribution to long-term landscape management under SHC. While it is unlikely that established focal species will be taken out of

SHC management, it is quite likely that new species will need to be added to SHC in order to address new legal mandates and managerial objectives, and to better track the ever changing eco-climatic regime that is likely to result from global climate change.

Structured Decision-Making and Focal Species Selection

Whenever possible, a structured group decision-making process should be used with all available information and ideas as the basis for judgments, to manage conflict, and enable consensus. Several approaches to group decision-making are briefly discussed below in in creasing order of value to the selection of focal species. More details on group decision-making are available within the Service (check with your regional office).

- BOGSAT (Bunch of guys/gals sitting around a table). Not recommended for prioritizing or selecting focal species. Often used to describe workshop scoping meetings, it is the most common and often least effective approach to group decision-making (also called "social-loafing" or "group-think"). Deficiencies include member shyness, individual dominance, poor communications, social pressure, personality conflicts, and uncooperative individuals. Outcomes often are an unfocussed mix of judgmental and substantial issues, an inefficient effort, and the loss of ideas introduced in the wrong context (Schmoldt and Peterson 2000).

- Delphi Method. Recommended for brainstorming, but not for prioritizing or selecting focal species. Provides an ideal vehicle for rapidly and efficiently drawing together expert knowledge and opinion on complex issues faced by natural resource managers (Oliver 2002; Kangas and Leskinen 2005). It is a structured group communication process that allows a group of experts to deal with complex problems. Delphi is assumes that opinions of experts are justified as inputs to decision-making where absolute answers are unknown, and that a consensus of experts will provide a more accurate outcome than a single expert. Delphi is an iterative process that begins with generating many initial unevaluated ideas (*i.e.*, species). It presents these unevaluated ideas in a questionnaire to experts, who respond anonymously. The evaluated, revised, and returned to the experts, with commentary, for further evaluation. This process is repeated until a final opinion is reached. Delphi can accommodate large groups and remote input from distant locations.

- Analytic Hierarchy Process. Recommended, with adjustments (see next method). AHP uses a hierarchical structure to describe a problem and paired comparisons to rank decision alternatives with respect to importance (or preference or likelihood). This technique has been applied to a wide variety of decision problems (Schmoldt and Peterson 2000; Schmoldt and Peterson 1997). Workshop facilitators and specialized software are available.

- Simplified Analytical Hierarchy Process. Recommended. A combination of BOGSAT, questionnaires, DELPHI, and scoping workshops to brainstorm and produce a list of priority species. A smaller group of individuals (e.g., technical committee) then establishes a set of criteria (with numerical weights) for ranking species. It may rely on database information in a group setting to select the focal species. If needed, the list of focal species can be adjusted based on expert opinion, 'common sense' judgment calls, etc. to produce the final set of recommended species.

Literature Cited

Hagan, J.M. and A.A. Whitman. 2006. Biodiversity indicators for sustainable forestry: simplifying complexity. Journal of Forestry 104:203-210.

Kangasa, J. and P. Leskinen. 2005. Modelling ecological expertise for forest planning calculations-rationale, examples, and pitfalls. J. Environmental Management 76: 125–133

Lambeck, R. J. 1997. Focal species: a multi-species umbrella for nature conservation. Conservation Biology 11:849-857.

Lambeck, R. J. 2002. Focal species and restoration ecology: Response to Lindenmeyer et al. Conservation Biology 16:549-551.

Linedenmeyer, D. B., A. D. Manning, P. L. Smith, H. P. Possingham, J. Fischer,, I. Oliver, and M. A. McCarthy. 2002. The focal species approach and landscape restoration: A critique. Conservation Biology 16:338-345.

Mills, L. S. 2007. Conservation of wildlife populations. Demography, genetics and management. Blackwell, Malden, Massachusetts, USA.

Oliver, I. 2002. An expert panel-based approach to the assessment of vegetation condition within the context of biodiversity conservation. Stage 1: the identification of condition indicators. Ecological Indicators 2(3): 223-237.

Schmoldt, D.L., and D.L. Peterson. 1997. Using the AHP in a workshop setting to elicit and prioritize fire research needs. ACSM/ASPRS Annual Convention & Exposition, Technical Papers, ACSM 57th Annual Convention, ASPRS 63rd Annual Convention, Seattle, Washington, Volume 4, Resource Technology Institute

Schmoldt, D.L. and D. L. Peterson. 2000. Analytical group decision making in natural resources: methodology and application. Forest Science 46(1): 62-75.