

5.1 Contents of a recovery plan

5.1.1 Title Page

The title page should include the name of the plan; indicate if it is a revision and give dates

for previous revisions; note the Regional/ Headquarters office, agency and location; and include the approval signature and date (for final plans) or month and year of issuance (for draft plans) (Figure 2).

**RECOVERY PLAN FOR THE
NORTH ATLANTIC RIGHT WHALE
(*Eubalaena glacialis*)**

REVISION

Original Version: December 1991

Prepared by

Office of Protected Resources
National Marine Fisheries Service
Silver Spring, MD

Approved: _____
William T. Hogarth, PhD.
Assistant Administrator for Fisheries
National Oceanic and Atmospheric Administration

Date: _____

Figure 2. Sample Title Page

5.1.2 Disclaimer Page

Both the disclaimer (for draft and final) and citation information should be included on this page (Figure 3). Unless there is a specific reason not to, the disclaimer should appear

exactly as it does here. NMFS should be cited as the plan's author, even if it is drafted by an individual or recovery team. Be sure to include the website from which the plan can be downloaded.

Disclaimer

Recovery plans delineate such reasonable actions as may be necessary, based upon the best scientific and commercial data available, for the conservation and survival of listed species. Plans are published by the National Marine Fisheries Service (NMFS), sometimes prepared with the assistance of recovery teams, contractors, State agencies and others. Recovery plans do not necessarily represent the views, official positions or approval of any individuals or agencies involved in the plan formulation, other than NMFS. They represent the official position of NMFS only after they have been signed by the Assistant Administrator. Recovery plans are guidance and planning documents only; identification of an action to be implemented by any public or private party does not create a legal obligation beyond existing legal requirements. Nothing in this plan should be construed as a commitment or requirement that any Federal agency obligate or pay funds in any one fiscal year in excess of appropriations made by Congress for that fiscal year in contravention of the Anti-Deficiency Act, 31 U.S.C. 1341, or any other law or regulation. Approved recovery plans are subject to modification as dictated by new findings, changes in species status, and the completion of recovery actions.

LITERATURE CITATION SHOULD READ AS FOLLOWS:

National Marine Fisheries Service. 2003. Recovery Plan for the North Atlantic Right Whale (*Eubalaena glacialis*). National Marine Fisheries Service. Silver Spring, MD

ADDITIONAL COPIES MAY BE OBTAINED FROM:

National Marine Fisheries Service
Office of Protected Resources
1315 East-West Highway, 13th floor
Silver Spring, MD 20910
301-713-1401 or 301-713-2322

Recovery plans can be downloaded from the NMFS website:
<http://www.nmfs.noaa.gov/pr/recovery/plans.htm>

Figure 3. Disclaimer Page

5.1.3 Acknowledgments

This page should acknowledge the primary

author(s), if completed in-house or by contract, or the recovery team (Figure 4). It often acknowledges other contributors to the plan.

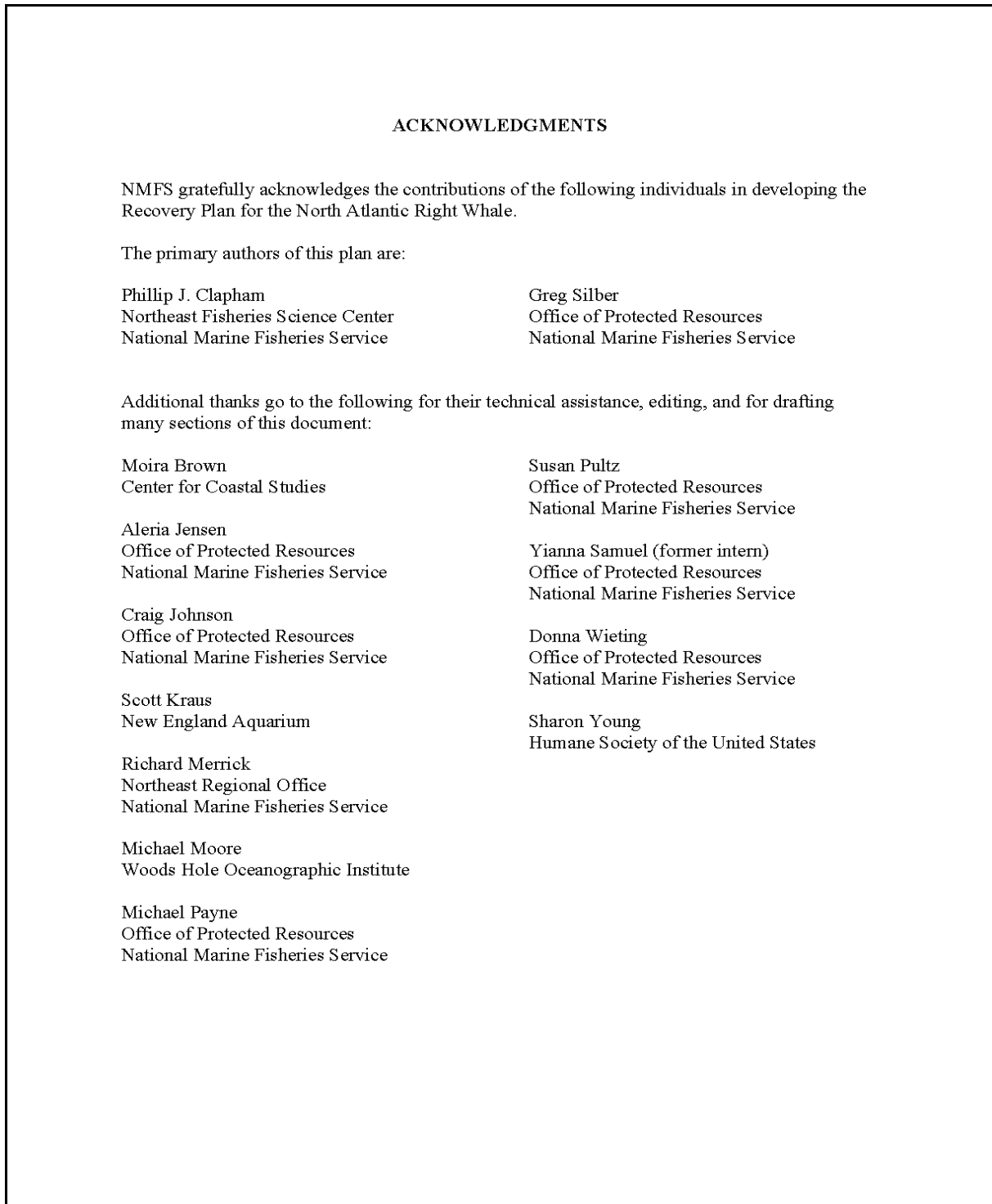


Figure 4. Sample Acknowledgments Page

5.1.4 Executive summary

The Executive Summary should summarize major sections of the plan. Try to keep the summary to a single page, front and back, if possible. The Executive Summary should be written after the main components of the plan are completed (or nearly so) and should include the following:

Current Species Status: Include listing status (threatened or endangered), date listed, recovery priority, numbers, distribution of populations, and key biological needs and constraints.

Habitat Requirements and Limiting Factors: Summarize specialized habitat requirements and major threats to be addressed under **Actions Needed**.

Recovery Strategy: State as clearly and succinctly as possible, with page references where greater detail is given, if needed.

Recovery Goals, Objectives, and Criteria: Generally take *verbatim* from the plan, but abbreviate if necessary, with page references where specifics are given.

Actions Needed: The ESA requires that recovery plans include the actions that may be necessary to achieve recovery. Include all major headings from the recovery action outline here, recognizing that there may be numerous actions that fall under each one. In other words, include 1.0 - Protect and manage existing habitat, 2.0 - Conduct management-oriented research, 3.0 - Monitor key populations, etc., but not their subcomponents. Depending on how actions are categorized in the recovery action outline, some general actions may be combined into broader categories in the Executive Summary.

Estimated Date and Cost of Recovery: After completing the Implementation Schedule, add total yearly cost estimates (section 5.1.10; Appendix Q) for each major action category, i.e., all actions beginning with the same number, and indicate the anticipated year that recovery would be achieved. Estimates should be carried through to the date of full recovery, i.e., when recovery criteria could be met. There may be extreme cases in which estimating a date and cost to

Table 4. Example Cost Estimates table.

COST ESTIMATES (in thousands)				
Year	Obj. 1	Obj. 2	Obj. 3	Yearly Total
FY 01	3		9	12
FY 02	3	9.5	9	21.5
FY 03	3	9.5	12	24.5
FY 04	3	2.5	12	17.5
FY 05			12	12
FY 06			12	12
FY 07			12	12
FY 08			4	4
FY 09			4	4
FY 10			4	4
Grand Totals	12	21.5	90	123.5

recovery is not possible due to uncertainty in what actions will need to be taken to recover the species. In such circumstances (and they should be rare), an order of magnitude for cost and some indication of time in terms of decades, should be provided if at all possible.

5.1.5 Table of Contents

For most plans, the Table of Contents should include all headings and subheadings in the plan (Figure 5). Try to keep the Table of Contents to one to three pages, so that a reader can understand the organization and find pertinent sections at a glance. For particularly complex plans, such as multiple-species plans, this may mean leaving out subheadings at the lower levels

or using some other means of keeping the number of pages to a minimum.

Headings, subheadings, tables etc. can be coded using word processing software, which allows for pagination in the Table of Contents to be adjusted with each version of the document as the plan is being written.

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Figure 5. Sample Table of Contents

5.1.6 Background

In this revised guidance, the previously used name of this section, Introduction, has been changed to Background. “Background” more accurately describes the purpose of the section which provides the background information needed to understand the Recovery Strategy, Recovery Goals, Objectives and Criteria, and the Recovery Program.

The Background section of the recovery plan is critical to the understanding and acceptance of the recovery needs of the species and should provide information to build the case for why the particular recovery program outlined in the recovery plan is the most appropriate path to recovery. Information in this section should be directly relevant to understanding the endangerment and recovery of the species. The Background section needs to discuss succinctly the information in each of the subsections outlined below and identify data gaps within these subsections. Since the Background section of the recovery plan is the primary vehicle for communication with other agencies and the public about the species’ recovery needs and its recovery program, this section needs to be biologically accurate but readable by lay persons. Appropriate references should be cited but also summarized succinctly, i.e., the recovery plan should be a stand-alone document. Like in all sections, the Background section should be arranged in such a way that the information can be accessed easily. Ensure that the titles of these subsections correspond to the titles in the Table of Contents.

Directly under the heading Background, the introductory paragraph should include a sentence about the general purpose of recovery plans (to guide implementation of recovery of the species) and the ESA mandate for preparing them. It should note that they are advisory documents, and that recovery recommendations are based on resolving the threats to the species and ensuring self-sustaining populations in the wild. Include any general introductory information that may be pertinent to the particular species, e.g., that the plan covers multiple species, that it includes candidate species, that it’s a revision that contains many changes based on research conducted

between the completion of the original plan and this plan, or whatever might aid the reader in understanding the plan. This paragraph should ease the reader into the plan with an understanding of its purpose and an expectation of how the plan will build the case for the specific actions it recommends.

In addition to the introductory paragraph discussed above, the following subsections are suggested for inclusion in the Background section. They may be adapted or additional subsections added to suit the biology of, and issues affecting, the species. These subsections can refer to a recent status review or the listing package for more in-depth information.

5.1.6.1 Brief Overview/Status of the Species

Give a brief overview of the species, including its scientific and common names; status (threatened, endangered, candidate or proposed (multiple-species plans may include the latter)); date listed, proposed, or designated as a candidate; *Federal Register* citation for the final listing rule for each species, subspecies or DPS/ESU; and the species’ recovery priority number (section 3.2.3). The State status, the estimated extent of decline of the species, and a very concise overview of threats or limiting factors are optional items that may also be included.

5.1.6.2 Species’ Description and Taxonomy

Describe the taxonomy and physical appearance of the species. This should be written approximately on the level of a field guide. State the date when the species was described and refer to the best available technical descriptions. Make clear how well the species is understood regarding taxonomy, especially if genetic studies have not been conducted. Mention look-alike species, note how to differentiate between them and the species in the plan, and explain how similarity of appearance of sympatric species might influence recovery efforts, such as searches. When dealing with lesser known species describe family affiliations that may be useful to the non-taxonomist.

5.1.6.3 Populations Trends and Distribution

Give the best available information on current and historical numbers of populations and individuals and on current and historically occupied range. Give information on population trends, and projections based on recent trends, if available. Note how much confidence there is in this knowledge, including how much effort has gone into the search effort and whether there's much likelihood that more populations will be found in future searches. Be sure to include negative search results. Indicate populations known to be extirpated and habitat known to be permanently lost. Indicate whether carrying capacity is limiting the species and whether decreases in carrying capacity are necessarily permanent. Indicate population or stock (for marine mammals listed under the MMPA) discreteness. Metapopulation considerations should be included, if relevant, and modeling or viability analyses that have been conducted should be cited and briefly described. The significance of population status and distribution with respect to recovery needs and opportunities should be stated.

Include maps of appropriate scale to delineate current and historical range, without disclosing any sensitive, site-specific information. Be sure that the map has adequate margins to allow for hole-punch binding, a legend, an indication of north, and that it will reproduce clearly.

5.1.6.4 Life History/Ecology

Summarize the life history and ecology of the species. Focus on the biological or ecological aspects of the species that are relevant to ongoing threats or to future recovery. Pertinent information may include reproduction and recruitment rates and strategies, age at maturity, growth rates, phenology, breeding habits, reproductive strategy, spawning or other dispersal methods, diet and feeding habits, behavior, migration and movement patterns, habitat use patterns, and natural sources of mortality.

Frequently, considerable information on species biology has been discussed in a recent listing rule, and a succinct summary of this information, referencing the listing rule and other relevant

literature, may reduce the time involved in incorporating this information into the recovery plan. Do keep in mind, however, that the recovery plan should be a stand alone document and must, therefore, summarize this background information. This subsection may be combined with the following subsection.

5.1.6.5 Habitat Characteristics/Ecosystem

This section of the recovery plan focuses specifically on the habitat needs of the species and should note the different habitats used for different portions of the species' life history (breeding, feeding, calving, spawning, and nursery habitats; summer and wintering grounds; migratory routes; rookeries; haul-outs; seasonal wetlands or drylands; associated species; etc.). Be sure to include relevant physical and biological aspects of habitat and ecosystem needs, such as geological formations, plant or community associations, migratory pathways, cover and food use, currents, water quality and quantity, flow regimes, and host species, as well as known relationships to competitors, predators and prey, and symbiotic relationships.

Describe all elements of the ecosystem that may need to be taken into account by project planners and managers. For instance, if habitat quality is an issue for the species, discuss the differences between optimal, suboptimal, and marginal habitat. If the species opportunistically utilizes resources not deemed to be habitat, this should be noted and qualified. If the species occupies only a fraction of habitat considered to be suitable at a given time, this should be noted. This information will be used for section 7 consultations, Habitat Conservation Plans, and for other management programs.

5.1.6.6 Critical Habitat

If critical habitat has been designated under section 4(a)(3)(A) of the ESA, make it a heading in the plan. (This is usually designated at the time of listing, but may be designated subsequent to listing and revised when necessary.) Describe critical habitat, including the time when it was designated, the boundaries of the designation (include a map, if appropriate), and the constituent elements listed as essential in the designation. If

important habitat has been identified as needed for recovery but has not been designated as critical habitat, be sure to note this in this section and include the necessary management of the habitat in the recovery actions section. This may also assist in future revisions of critical habitat.

It should be noted in the recovery plan that designated critical habitat carries with it consultative requirements under section 7(a)(2) of the ESA with regard to adverse modification. See Box 5.1.6.6 for other attributes of critical habitat.

Box 5.1.6.6 - Special Attributes of Critical Habitat

- Under section 7(a)(2) of the ESA, Federal agencies must avoid adverse modification of critical habitat, whether or not the species currently uses that habitat.
- Critical habitat must be defined by specific limits using reference points and lines as found on standard topographic maps of the area.
- Physical and biological features essential to the conservation of the species and that may require species management must be considered when designating critical habitat. These include 1) space for individual and population growth, and for normal behavior; 2) food, water, air, light, minerals, or other nutritional or physiological requirements; 3) cover or shelter; 4) sites for breeding, reproduction, rearing of offspring, germination, or seed dispersal; and generally 5) habitats that are protected from disturbance or are representative of the historic geographical and ecological distributions of the species.
- Designation of critical habitat must take into consideration the impacts of the designation, including economic impacts (listing cannot). An area may be excluded if it is determined that the benefits of such exclusion outweigh the benefits of specifying such areas as critical habitat, unless it is determined, based on the best scientific and commercial data available, that this exclusion will result in the extinction of the species.
- Critical habitat designations may be revised through the rule-making process as new data become available.
- Critical habitat does not have to be designated if it is deemed not prudent to do so. A “not prudent” determination is made if the designation will increase the degree of threat to a species that is threatened by human activities (for example, through collection or vandalism), or if the designation would not be considered beneficial to the species.
- Critical habitat is not designated in areas outside of US jurisdiction.

5.1.6.7 Reasons for Listing / Threats Assessment

This subsection should include an overview of the species’ decline, and its causes of decline (to the extent they can be determined). The causes of decline, or threats, may be past, continuing from the past into the future, newly identified, and reasonably anticipated in the future (including, but not limited to, those that have been temporarily curtailed but are likely to recur). Where possible, this subsection should also identify the source of threats, e.g., if the threat is siltation in a stream, the source could be urban runoff, watering cattle, removal of riparian vegetation, recreational uses, etc. Noting the source helps tailor the recovery action(s) needed. When discussing each threat and its source(s), the geographic scope, severity, and frequency of the various threats should be indicated, noting those that present greater or lesser threats to the species. Uncertainties with respect to threats to the species should be identified as well.

The question often arises as to whether intractable threats, such as climate change or environmental shifts, should be included in recovery plans. Although sometimes difficult to address, all realistic threats should be identified, i.e., those that are likely to have an effect on the species (not a list of every conceivable threat). Although we may not be able to address the issue in the recovery plan, it is important to make the threats assessment as objective as possible, and to document the existence of all threats. In addition, in the future this might help to ascertain the extent of the threat to imperiled species or, if multiple species are affected by the same threat in a given area, it could help lead to a common solution.

To provide continuity among the listing package, this section and the recovery criteria, threats that were listed in the final rule should be addressed in this section and discussed in terms of the five listing factors (see Box 5.1.6.7 on the five listing factors). If the species was recently listed, much of this information can be taken from the “Factors Affecting the Species” section of the listing rule. Plans should assess any new threats, changes in severity of threats, and threats that have been reduced or removed since publication of the final

Box 5.1.6.7 - The five listing factors, as outlined in section 4 of the ESA

- A. The present or threatened destruction, modification, or curtailment of its habitat or range
- B. Overutilization for commercial, recreational, scientific or educational purposes
- C. Disease or predation
- D. The inadequacy of existing regulatory mechanisms
- E. Other natural or manmade factors affecting its continued existence

listing rule.

Conducting a threats assessment for the species is strongly recommended. A threats assessment is a structured approach to assessing threats, sources of threats, and their relative importance to the species’ status, and often results in a threats table which summarizes the findings of the assessment. A threats assessment aids in identifying the sources of stress to the listed species or to its habitat, and in evaluating and ranking these stresses. This is particularly valuable when there are multiple, potentially interacting threats. Conducting a threats assessment is also an extremely valuable tool for ensuring that diverse people, such as a recovery team, attendees at a public meeting, or readers of a recovery plan, approach the recovery planning process with the same assumptions about threats, their sources and their importance to the recovery of the species. Explicitly outlining the threats, their sources and their importance to recovery, results in greater understanding of the recovery strategy and actions outlined in the recovery plan. Revisiting a threats table or other results of a threats analysis can also help to get a group, such as a recovery team, back on track later in the recovery planning process, should they start digressing or losing focus. The Nature Conservancy has one approach to conducting a threats assessment that may be useful (The Nature Conservancy 2001). See Appendix C for more detailed information on the TNC approach to threats assessment.

5.1.6.8 Conservation Efforts

For some species, conservation efforts intended to reduce or remove threats will have been ongoing or initiated prior to the approval of the recovery plan. These efforts, conducted by individuals, private organizations, state and local agencies, or Federal agencies, should be discussed here. This should not be a laundry list of achievements. This discussion should include an assessment of the effectiveness of conservation actions to date including, if the action was in place before listing, the reasons why the efforts were considered insufficient to reduce threats to the point that listing was unnecessary, e.g., the effort only covered a small portion of the species' range or addressed only one of several threats. Explain the net benefit of these achievements to the species' conservation to date, and whether such efforts and their benefits are expected to continue. This will be instructive to the reader and help to document why NMFS is taking the strategy that it does in subsequent sections of the recovery plan. Indeed, the advances made in conservation compared with the discussion of unaddressed threats from the preceding section should lead very logically to the Recovery Strategy. For revised plans, this is the place to list the recovery actions that have been accomplished to date.

constraints and needs will inform not only recovery planning but also the development of habitat conservation plans, section 7 consultations, Safe Harbor Agreements, and any other activities that may affect the species.

5.1.6.9 Biological Constraints and Needs

Based on all of the above, identify any biological constraints or needs of the species that need to be considered in planning and management. The purpose of this section is to state up front any known limiting factors that are biologically inherent in the species and non-modifiable, and which *must be honored* when designing any management/recovery program for that species. Examples might include extremely delayed maturity which requires unusually high annual survival in juvenile stages; needs for a particular and rare habitat for one or another life history stage; or a need for a minimum population size for successful breeding behavior. For instance, in the case of freshwater mussels, the presence of fish hosts for the larval stage of the mussel in particular river reaches at particular times of year might be crucial. Identifying biological

5.1.7 Recovery Strategy

The Recovery Strategy presents and justifies the recommended recovery program for the species, based on the information presented in the Background section. It can be one of the most challenging sections of the recovery plan. This section was not included in recovery plans in the past. However, because it is the link between the biological needs and situational background of the species and the Recovery Program, the Recovery Strategy is believed to be extremely useful and is now a required section of the plan.

The Recovery Strategy is comparable to the “If . . . , then . . .” statement of a logical construct that identifies the assumptions and logic underlying the selection of one path over another to achieve the objectives and goal. Because the rationale for the species’ recovery program lies in the Recovery Strategy, it provides a cogent, well-reasoned preamble to the recovery objectives and criteria that immediately follow. Rather than merely paraphrasing or summarizing the criteria and actions, the Recovery Strategy is intended to give a clear sense, in broad brush strokes, of the “whole” of the recovery effort within which the actions are the individual parts.

An effective strategy will, in a few short paragraphs, enable the reader to grasp the species’ current situation and the logic of the recommended approach to its recovery. The strategy will also comprise an important part of the administrative record should the recovery recommendations ever be challenged.

The following elements should be addressed in the Recovery Strategy, as appropriate (not necessarily in the order presented):

- *Key facts and assumptions* – Taken from the Background, these considerations may be a combination of concerns about the species’ demography, threats, biological constraints and needs, ongoing conservation programs, data gaps, and so on. These key facts and assumptions form the foundation upon which the species’ recovery program is based.

- *The primary focus(es)/objective(s) of the recovery effort* – For some species, the recovery program will have a single overriding focus/objective, e.g., habitat protection or control of invasive species. For other species, the recovery program may have two or three objectives, e.g., protection of current populations, captive propagation for eventual re-establishment in historic habitat, and public outreach to reduce incidental take of the species. The relative priority and timing (whether simultaneous or sequential) of each objective should be made clear. In either case, the focus of the recovery effort should be evident in the plan’s recovery recommendations.

- *The overarching objectives and recovery actions of the plan and their relative priorities* – How do the objectives and recovery actions with their respective priorities support the primary focus of the recovery effort? For instance, if habitat protection is the most immediate and primary need, but recovery can not be achieved without an ambitious reintroduction program, the relative priority and timing of these imperatives should be made clear.

- *The delineation of and rationale for recovery units, or other management units, if used (see section 5.1.7.1)* – If there are important reasons to structure the recovery effort, these should comprise an important element of the strategy and be outlined in this section. Identification of recovery criteria and actions on a unit-by-unit basis will then follow in later sections of the plan. Be aware that “Recovery Units” are a special form of management unit that apply only in some cases.

- *Other important considerations or contingencies, if any* – Any other important considerations or contingencies that will play a strong role in the recovery effort should be explained.

5.1.7.1 Delineation of Recovery Units (optional)

A recovery unit is a special unit of the listed entity that is geographically or otherwise identifiable and is essential to the recovery of the entire listed entity, i.e., recovery units are *individually necessary* to conserve genetic robustness, demographic robustness, important life history stages, or some other feature necessary for long-term sustainability of the *entire listed entity*. Examples of recovery units might include various developmental stages of a species, such as the breeding and foraging assemblages; dispersed population units that represent the genetic diversity of a species necessary to provide adaptive flexibility and avoid inbreeding; or multiple population sources in a dynamic ecosystem subject to unpredictable stochastic events such as hurricanes or wild-fires. For many species, the identification of recovery units is not necessary. However, establishment of recovery units can be a useful recovery tool, especially for species occurring across wide ranges with multiple populations or varying ecological pressures in different parts of their range. Since every recovery unit is necessary for the long term health and stability of the overall listed entity, recovery criteria for the listed entity should address each identified recovery unit, and every recovery unit must be recovered, before the species can be delisted.

As noted in the Consultation Handbook, recovery units are population units that have been “...documented as necessary to both the survival and recovery of the species in a final recovery plan(s) ...” (FWS and NMFS 1998: 4-36). The Consultation Handbook goes on to indicate that establishment of recovery units in a recovery plan may streamline jeopardy determinations for a listed species. The reason is that the value of conserving a particular recovery unit to the conservation of the entire listed entity has already been laid out in the recovery plan. Therefore, if the recovery unit is jeopardized, the species as a whole is jeopardized. It is important to note that one cannot find jeopardy for a recovery unit, per se, but only for a species, as a result of loss or impairment of the recovery unit. In a recovery plan, it is imperative that a thorough explanation be made regarding how the recovery units for a

given species are being defined and their importance to the species as a whole.

Recovery units, if used, should collectively cover the entire range of the species. However, this does not mean that each individual or population within the recovery unit must be conserved; only that the boundaries around recovery units should be sufficiently broad to include all current populations. For example, a recovery criterion for a given recovery unit may be to conserve (reach certain demographic parameters and control threats in) “4 of the 5” or “6 of the 8” populations or subpopulations within that unit. On the other hand, a recovery unit may need to have populations added to reach its recovery criteria, i.e., there may be one population currently existing within a recovery unit but the goal for that recovery unit may be to have two or three viable populations (with threats controlled) to meet its recovery criteria. In any event, every recovery unit must be conserved because it is, by definition, essential to the conservation of the species.

If recovery units are identified, the plan must include the rationale. Recovery units should be delineated on a biological basis; however, sometimes minor adjustments may be made to the boundaries to reflect different management regimes or for other management purposes. Some reasons to consider delineating recovery units include the following:

- Re-establishing historical or maintaining current genetic flow
- Encompassing current and historical population and habitat distributions
- Ensuring conservation of the breadth of a species’ genetic variability
- Facilitating meta-population dynamics

Special considerations for recovery units:

- Recovery units cannot be reclassified or delisted independently
- Recovery units are not synonymous with critical habitat units – one is a unit of the listed species, the other is a unit of the species’ habitat
- Each recovery unit should be sufficiently large to buffer against successional

processes, while assuring a geographically well-distributed population

Recovery Units vs. Management Units - It is fairly common to identify management units in recovery plans. These are units that might require different management (perhaps because of different threats in different geographic areas) that might be managed by different entities, or that might encompass different populations. However, each management unit is not necessarily essential to the conservation of the species, as is the case for each recovery unit. For instance, recovery criteria may require that some subset of management units meet the criteria for downlisting or delisting (e.g., "4 of 5" or 6 of 8" management units). When in doubt whether every unit is essential to the conservation of the species, it is wise to use management units, rather than recovery units.

Once identified, recovery units are frequently managed effectively as management units; however, as stated earlier, it is also possible for a single recovery unit to encompass multiple management units. One potential scenario for delineating recovery units could occur as follows. The species may be divided into three recovery units, all of which must be conserved to ensure the long-term viability of the species. Each of the three recovery units consists of several populations. Each population might be identified as a management unit. To achieve recovery within each recovery unit, only a subset of the populations might have to reach certain abundance estimates and threats-based criteria in order to be considered for delisting.

Recovery Units vs. Distinct Population Segments
Some recovery units may qualify as a DPS, according to the 1996 DPS policy; however, a recovery unit cannot be treated as a DPS in a recovery plan. A DPS is a listable, and delistable, entity; recovery units are not. Further, while a recovery plan can identify a recovery unit, it cannot designate a DPS because designation of a DPS requires a rule-making pursuant to section 4 of the ESA.

5.1.8 Recovery Goals, Objectives and Criteria

Since the development of the previous recovery planning guidance for NMFS (1992), considerable attention has been focused on how to make recovery plans more effective, and on the statutory requirements for measurable, objective criteria for recovery. This section of the guidance reflects much of this thinking and departs from the previous guidance in both emphasis and substance, particularly with respect to recovery criteria. In addition, some of the terminology (for example, the use of the term “objectives”) has been modified for consistency with general planning terminology.

5.1.8.1 Recovery Goals

A goal is the desired outcome of an activity. For the purposes of recovery planning, the goal is almost always recovery and, therefore, delisting of the species. If a species is listed as endangered, an intermediate goal of reclassifying the species to threatened, with accompanying objectives and criteria, is also appropriate. It is possible for some species that delisting cannot be foreseen. For example, the natural habitat of some species has been so reduced that captive propagation and active management may be necessary for the foreseeable future. In these rare cases, the goal may be to achieve long term stability through ongoing management and downlisting to threatened status.

Some recovery planning efforts may attempt to set goals higher than those needed to achieve delisting of the species, e.g., the goal of Optimal Sustainable Population for species listed under the MMPA. In these cases it is important to identify the difference between the ESA delisting goals and any other goals that occur in a recovery plan.

5.1.8.2 Recovery Objectives

Goals usually can be subdivided into discrete component objectives which, collectively, describe the conditions necessary for achieving the goal. Simply stated, recovery objectives are the parameters of the goal, and criteria are the values for those parameters. Identifying the components of the overall goal facilitates both

identification of mechanisms for achieving progress toward the goal (thereby assisting in identification of necessary recovery actions) and recognition of the goal when it has been reached. Recovery and long term sustainability of an endangered or threatened species require adequate reproduction for replacement of losses due to natural mortality factors (including disease and stochastic events), sufficient genetic robustness to avoid inbreeding depression and allow adaptation, sufficient habitat (type, amount, and quality) for long-term population maintenance, and elimination or control of threats (this may also include having adequate regulatory mechanisms in place). Thus, it is appropriate to identify recovery objectives in terms of demographic parameters, reduction or elimination of threats to the species (the five listing factors), and any other particular vulnerability or biological needs inherent to the species. For example, a recovery objective might be to ensure adequate, quality nesting habitat that is held in protected status. Other objectives might include the elimination or control of incidental take of a species, reduction of competition from invasive species, or increased recruitment to the breeding population.

5.1.8.3 Recovery Criteria

Recovery criteria are the values by which it is determined that an objective has been reached, and thus need to be established for each recovery objective. Combined, recovery criteria comprise the standards upon which the decision to reclassify or delist a species should be based. Recovery criteria must be “objective and measurable,” address threats as well as demographic factors and, at least for those criteria addressing threats, be written in terms of each of the 5 “listing” factors (see *Addressing threats in recovery criteria*, below).

Developing recovery criteria that are both objective and measurable is a statutory requirement in the ESA for recovery plans and a useful exercise in terms of planning. The ESA states that each recovery plan shall incorporate, to the maximum extent practicable, “objective, measurable criteria which, when met, would result in a determination. . . that the species

Box 5.1.8.3 - 1 - When drafting recovery criteria, remember that they should be “SMART”

- **Specific** - Who, what, & where
- **Measurable** - So that species status and recovery progress can be assessed
- **Achievable** - Authority, funding, staffing are technically feasible (even if not always likely)
- **Realistic** - Grounded in good science and defensible
- **Time-referenced** - Not open-ended, having a set time frame for determining if the objective is to be met, e.g., stable or increasing “for 3 generations” or “for a minimum of 10 years.”

be removed from the list.” It can be difficult to identify the exact point at which a species is recovered and thus to develop good criteria with which to recognize it. Further, because there may be trade-offs among different threats, recovery may be possible in multiple states, e.g., a species might be able to tolerate a continuing level of one

threat if another threat has been eliminated. Furthermore, each species has unique characteristics and threats. For these reasons, the ESA and this guidance do not dictate either the specific objectives or criteria for recovery of any species, but leave that to the discretion of NMFS, as informed by experts familiar with the species and their needs.

The ESA does, however, provide sideboards for criteria development, and the following guidance is intended to assist recovery biologists and recovery teams in developing useful criteria within the framework of those sideboards, applying the framework of objectives described in section 5.1.8.2, Recovery Objectives.

- Recovery criteria can be viewed as the targets, or values, by which progress toward achievement of recovery objectives can be measured. For instance, if we have identified what a species’ populations, habitat, and threats are expected to look like when the species is recovered, and is eligible for delisting, we will be better able to determine how far the species needs to move to reach those objectives and the actions needed to

Box 5.1.8.3 - 2 - Examples of Recovery Criteria from the Piping plover Recovery Plan, revised, Jan.1995

The following is an example of good demographic recovery criteria. Please note that these must also be accompanied by criteria that address the threats that are negatively affecting the species.

Criterion 1: Increase and maintain for five years a total of 2,000 breeding pairs, distributed among four recovery units as specified below.

<u>Recovery Unit</u>	<u>Minimum Population (pairs)</u>
Atlantic Canada	400
New England	625
New York-New Jersey	575
Southern (DE-MD-VA-NC)	400

Criterion 2: Verify the adequacy of a 2,000-pair population of piping plovers to maintain heterozygosity and allelic diversity over the long term.

Criterion 3: Achieve a five-year average productivity of 1.5 fledged chicks per pair in each of the four recovery units described in Criterion 1. Data to evaluate progress toward meeting this criterion should be obtained from sites that collectively support at least 90% of the recovery units’ population.

achieve each objective.

- Recovery criteria should address the biodiversity principles of representation, resiliency and redundancy (Schaffer and Stein 2000). Representation involves conserving the breadth of the genetic makeup of the species to conserve its adaptive capabilities. Resiliency involves ensuring that each population is sufficiently large to withstand stochastic events. Redundancy involves ensuring a sufficient number of populations to provide a margin of safety for the species to withstand catastrophic events.
- Recovery criteria must address threats to the species in term of each of the 5 factors outlined in section 4(a)(1) of the ESA (see Box 5.1.6.7). See discussion

under *Addressing threats in recovery criteria*, below.

- In addition to threats, recovery criteria will usually also include population numbers, sizes, trends and distribution, population structure or recruitment rates, specific habitat conditions, and minimum time frames for any of the above.
- Recovery criteria must be measurable and objective; however, they need not all be quantitative. For example, a measurable and objective criterion may be for a state to have a management plan in place that NMFS agrees will manage the species effectively after the species is delisted. This criterion is measurable and objective (although there's some subjectivity with

Box 5.1.8.3 - 3 - Examples of Listing/recovery Factor-based Recovery Criteria

The following example of a criterion related to listing/recovery factor A is from the Loggerhead Turtle Recovery Plan completed in 1991.

At least 25 percent (560 km) of all available nesting beaches (2240 km) is in public ownership [with a sea turtle management plan], is distributed over the entire nesting range, and encompasses greater than 50 percent of the nesting activity.

The following example of two criteria related to listing/recovery factors A and E are from the West Indian Manatee Recovery Plan (Florida population), third revision, completed in 2002.

Listing/Recovery Factor A: The Present or Threatened Destruction, Modification, or Curtailment of a Species Habitat or Range (Habitat Working Group and Warm-water Task Force identified in other portions of this plan are tasked to further refine these criteria). In order to ensure the long term recovery needs of the manatee and provide adequate assurance of population stability (i.e., achieving the demographic criteria), threats to the manatee's habitat or range must be reduced or removed. This can be accomplished through federal, state or local regulations (identified in Factor D below) to establish and maintain minimum spring flows and protect the following areas of important manatee habitat:

- a. Minimum flow levels at the Crystal River Spring Complex, Homosassa Springs, Blue Springs, Warm Mineral Spring, and other spring systems as appropriate, in terms of quality (including thermal) and quantity have been adopted by regulation and are being maintained.
- b. A network of the level 1, 2 and 3 warm-water refuge sites identified in Figure 7 have been protected as either manatee sanctuaries, refuges or safe havens.
- c. Adequate feeding habitat sites (extent, quantity and quality) associated with the network of warm-water refuge sites are identified by the HWG and are protected.
- d. The network of migratory corridors, feeding areas, calving and nursing areas are identified by the HWG are protected as manatee sanctuaries, refuges or safe havens.

Box 5.1.8.3 - 3 -continued - Examples of Listing/recovery Factor-based Recovery Criteria

Listing/Recovery Factor E: Other Natural or Man-made Factors Affecting Its

Continued Existence The most predictable uncontrollable threat to manatee recovery remains human-related mortality. In order to ensure the long-term recovery needs of the manatee and provide adequate assurance of population stability (i.e., achieving the demographic criteria), natural and man-made threats to manatees need to be reduced or removed. This can be accomplished through establishing the following federal, state or local regulations, tasks and guidelines to reduce or remove human caused “take” of manatees:

a. State, federal and local government manatee conservation measures (such as, but not limited to speed zones, Refuges, sanctuaries, safe havens, enforcement, education programs, County and MPPs etc.) have been adopted and implemented to reduce unauthorized watercraft-related “take” in the following Florida counties: Duval (including portions of Clay and St. Johns in the St. Johns River), Volusia, Brevard, Indian River, Martin, Palm Beach, Broward, Dade and Monroe on the Florida Atlantic Coast; Citrus, Pinellas, Hillsboro, Manatee, Sarasota, Charlotte, Lee and Collier on the Florida Gulf Coast; and Glades County on the Okeechobee Waterway. These measures are not only necessary to achieve recovery, but may ultimately helped to comply with the MMPA. (Task 1.3, 1.4, 1.5, 3.3.1)

Stable or positive population benchmarks as outlined in the demographic criteria provide measurable population parameters that will assist in measuring the stabilization, reduction, or minimization of watercraft related “take.” Two other indices (weight of evidence) [that] will assist in measuring success include: open 1) watercraft-related deaths as a proportion of the total known mortality; and (2) watercraft-related deaths as a proportion of a corrected estimated population. These and other indices should be monitored.

b. All control structures and navigational locks listed as needing devices to prevent mortality have been retrofitted. (Task 1.6)

c. Guidelines have been established and are being implemented to reduce or remove threats of injury or mortality from fishery entanglements and entrapment in storm water pipes and structures. (Task 1.7, 1.6.3)

regard to whether the plan will be effective), without having a numerical component.

Addressing threats in recovery criteria - In the past, recovery criteria have typically included population numbers, sizes, trends, and possibly distribution. These types of criteria remain valid and useful. However, few criteria have focused on threats to the species, as organized under the five listing/delisting factors of the ESA. The tacit assumption has been that the species’ population parameters serve as surrogate indicators of the status of the species, including control of threats. Although this assumption may have been accurate in some cases, it has not in others. For

example, population augmentation through captive breeding and re-establishment may increase a species’ population numbers while a threat continues unabated; however, population declines will recur once augmentation ceases. In another example, take of a species, either direct or via habitat alteration, may have been curtailed by listing the species and populations may thus have rebounded, but the threat of take could recur after delisting if adequate regulatory mechanisms have not been put in place. Thus, evaluating a species for potential reclassification or delisting requires an explicit analysis of threats under the five listing factors in addition to evaluation of population or demographic parameters. By establishing criteria

for each of the five listing/delisting factors that are currently relevant to the species, the Recovery Program for the species is more likely to ensure that the underlying causes of decline have been addressed and mitigated prior to considering a species for delisting.

Legal challenges to recovery plans have affirmed the need to frame recovery criteria in terms of threats assessed under the five listing factors.

“Congress has spoken in clarion terms: the objective, measurable criteria must be directed towards the goal of removing the endangered or threatened species from the list. Since the same five statutory factors must be considered in delisting as in listing, 16 U.S.C. § 1533 (a), (b), (c), the Court necessarily concludes that the FWS, in designing objective, measurable criteria, must address each of the five statutory delisting factors and measure whether threats to the [species] have been ameliorated.” (see Fund for Animals v. Babbitt, 903 F. Supp. 96 (D.D.C 1995), Appendix B).

Finally, a 2006 Government Accountability Office audit of the NMFS’ and FWS’ endangered species recovery programs recommended that the Secretaries of Commerce and Interior direct their staff to ensure that all new and revised recovery plans have either recovery criteria evidencing consideration of all five delisting factors or a statement regarding why it is not practicable to do so (GAO 2006). For this reason, we require that all the criteria section of all plans now list out the 5 factors, and place the criteria that will address them below the appropriate factor. In the case that there are no threats that correspond to a given factor, simply note that this factor, e.g., habitat loss or destruction or modification, is not considered a threat to the given species. We anticipate that recovery plans will also include demographic criteria (abundance, distribution etc.), and that these appear separately from the “threats-based” criteria.

The role of PVA in recovery criteria – It has been suggested that a population viability analysis (PVA) indicating long-term viability should be considered an alternative to traditional population and listing factor-based recovery criteria. Such a PVA may serve as an ancillary

criterion and may be beneficial to a delisting analysis. However, a PVA is based not only on a series of estimates about the vital rates of a species (and the variability of those estimates), but also on a series of assumptions about threat conditions and other variables, and their potential effects on the vital rates. Therefore, a PVA should not be viewed as a replacement for criteria based on threats, but as a supplement to them. The criteria describe the conditions under which it is anticipated the PVA would indicate long-term viability.

Dealing with uncertainty – Criteria must often be developed in the face of considerable uncertainty. Uncertainty may itself stem from a number of different sources, e.g., parameter uncertainty, model uncertainty, measurement uncertainty, and natural stochastic variation. It is important to try to identify both the sources and amounts of uncertainty that are contributing to the determination of recovery criteria. Some, like stochastic uncertainty, cannot be easily modified by human activity, so our recovery criteria may need to ensure a species’ resilience to such an event. For example, we can expect a class 5 hurricane to hit somewhere in the southeast U.S. on average every X years, but we cannot say for certain exactly where or when, so we may need to build population redundancy into the recovery criteria for a southeastern species that is particularly vulnerable to hurricane damage. Other sources of uncertainty are more malleable, and our need to build the uncertainty into the criteria may vary depending upon our state of knowledge about the parameter. For example, our ability to estimate a species’ population size may improve with new techniques; as our measurements become more precise, we may be willing to accept lower, but more certain, population targets. By identifying the sources and magnitude of our uncertainties, we can build better criteria and more accurately target those aspects of our criteria that may bear refining in the future. Meanwhile, because it is difficult to measure the parameters upon which the recovery objectives and criteria are based, it is entirely appropriate to identify confidence limits or other means to account for uncertainty in predictions and measurements. For example, a criterion might require that a certain measurable condition be met

with 95 percent confidence for a period of three generations.

What if recovery criteria cannot be determined?

– In some rare cases, the current best available information is so seriously limited that it is truly not possible to identify delisting or reclassification criteria. This would be an unusual case, such as one in which the species' threats are not understood well enough to identify priorities and appropriate mitigation (see Gila trout case study, Box 5.1.8.3 - 4). In the rare case that recovery objectives and criteria cannot be established at the time the plan is written, the following steps should be taken: (1) describe interim objectives and criteria, which will be used for the short-term until better delisting objectives

and criteria can be determined; (2) explain clearly in the plan and the administrative record why objectives and criteria are undeterminable at the time; and (3) include the actions necessary and timelines in the plan to obtain the pertinent information and develop recovery objectives and criteria once the information is obtained. This may be a case in which research is one of the primary objectives of the plan.

Box 5.1.8.3 - 4 - The Gila Trout Case

The Gila trout lawsuit demonstrates the need to articulate the rationale for failing to provide delisting criteria in a recovery plan.

In SWCBD and Rio Grande Chapter of Trout Unlimited v. Babbitt, CIV 98-372-TUC JMR (D.Ariz, 1999), the Southwest Center for Biological Diversity and the Rio Grande Chapter of Trout Unlimited brought suit against the Secretary of the Interior for, in part, failing to identify objective and measurable delisting criteria in the 1993 Gila Trout Revised Recovery Plan. The plan stated that "Delisting criteria have not been determined ... The estimated date for downlisting is the year 2000. Delisting criteria cannot be addressed at present, but will be determined when downlisting criteria are met".

Gila trout is listed as endangered under the ESA. Based on having met the criteria set forth in the 1984 revised recovery plan, FWS proposed to downlist the species in 1987. However, due to subsequent severe fire, flooding, and drought in the species' habitat, three of the five remaining Gila trout populations declined significantly and the Service withdrew its proposal. In response to this drastic change in the species' status, the Service decided to again revise the recovery plan. The 1993 revision adopted a new approach to recovery; rather than focusing on small headwater stream restoration, the plan's focus shifted to restoration of whole drainages within the species' historic habitat in Arizona and New Mexico. With this shift came new information needs, such as genetic analysis that would provide information crucial to determining a reintroduction strategy for the remaining trout stocks, captive breeding experimentation to determine methods for successful hatchery management, and extensive stream surveys to identify appropriate locations for reintroduction. Due to insufficient information in these areas, the developers of the plan stated that they were unable to determine delisting criteria that would represent full recovery of the species.

Summary judgement was entered in favor of the Secretary, as the administrative record and recovery plan supported the need to gather additional data before delisting criteria could be developed. The administrative record documented concern among recovery team members over the quality of information available on Gila trout life history, taxonomy, and systematics, and the need to answer important questions such as whether stocks should be kept separately or interbred for reintroduction.

5.1.9 Recovery Program

The Recovery Program section of a recovery plan describes the recovery actions (formerly known as recovery “tasks”) found to be necessary to achieve the plan’s goal(s) and objectives and the monitoring actions necessary to track the effectiveness of these actions and the status of the species. Essentially, this section describes all actions that will alleviate known threats and restore the species to long term sustainability. These actions might include (but are not limited to) habitat protection, limitations on take, outreach, research, control of disease, control of invasive species, controlled (including captive) propagation, reintroduction or augmentation of populations, and monitoring actions. Ongoing or planned Federal, regional, State, local or tribal recovery activities should be incorporated into this section, if at all possible. Measuring the effectiveness of the plan via monitoring actions should be included in the recovery program, and these monitoring actions should be assigned a priority equal to the activity that is being monitored. Finally, all recovery programs should include the development of a post-delisting monitoring plan as one of their actions.

Ultimately, the Recovery Program section of the recovery plan will provide guidance to the resource manager, resource user or landowner regarding the goals of the plan and actions needed to achieve recovery (including each action’s role and priority within the overall recovery program). It will facilitate tracking recovery progress and accomplishments and assist in identification of appropriate conservation actions that can be implemented via sections 6, 7 and 10 of the ESA. As always, effective coordination with stakeholders and other interested parties is essential in the identification of recovery actions.

5.1.9.1 Threats Tracking Table (Optional)

Because of the need to address threats and frame recovery criteria and actions in terms of the five listing factors, it is useful to maintain a tracking system (which could be a simple table or spreadsheet) that cross-references (1) the listing factors, (2) the threats associated with each listing factor, (3) the recovery criteria related to each

threat and/or listing factor, and (4) the numbered recovery actions (from either the narrative description of the recovery program or the Implementation Schedule) that address each threat. An example of the threat and recovery action table can be found in Appendix V, Actions Table and Tip Sheet. The use of such a table early in the planning process can promote internal consistency in the document by ensuring that the recovery criteria adequately reflect the threats identified in the background, and that there are adequate and appropriate actions to address these threats and achieve the recovery criteria for the species. Inclusion of the tracking table in the recovery plan should facilitate understanding on the part of stakeholders of the rationale and need for the various recovery actions included in the Recovery Action Narrative.

5.1.9.2 Recovery Action Outline (= Stepdown Outline)

The recovery action outline (previously referred to as the stepdown outline) is a “skeleton” list of tasks in the recovery action narrative (previously the recovery narrative). It includes all actions in the recovery action narrative without the accompanying descriptions and helps facilitate seeing the big picture of the program.

Recovery action outlines are included at the discretion of the region. Sequential numbering using decimal points to indicate “stepped-down” actions is recommended (see below). Generally, the recovery action outline is inserted into the plan after the recovery action narrative is completed because it reflects the recovery action narrative verbatim. Box 5.1.9.2 exhibits portions of a recovery action outline from the Atlantic Coast Population Piping Plover Recovery Plan.

**Box 5.1.9.2 - Recovery Action Outline:
Atlantic Coast Population of the Piping Plover (*Charadrius melodus*)**

1. Manage breeding piping plovers and habitat to maximize survival and productivity.
 - 1.1 Monitor status and management of Atlantic Coast piping plovers.
 - 1.1.1 Monitor population trends, productivity, and distribution in each recovery unit.
 - 1.1.2 Monitor plover breeding activities at nesting sites to identify limiting factors.
 - 1.2 Maintain natural coastal formation processes that perpetuate high quality breeding habitat.
 - 1.2.1 Discourage development that will destroy or degrade plover habitat.
 - 1.2.2 Discourage interference with natural processes of inlet formation, migration, and closure.
 - 1.2.3 Discourage beach stabilization projects.
 - 1.2.4 To compensate for disruption of natural processes, create and enhance nesting and feeding habitat, especially in the vicinity of existing stabilization projects.
 - 1.2.4.1 Encourage deposition of dredged material to enhance or create nesting habitat.
 - 1.2.4.2 Discourage vegetation encroachment at nesting sites.
 - 1.2.4.3 Draw down or create coastal ponds to make more feeding habitat available.
 - 1.3 Reduce disturbance of breeding plovers from humans and pets.
 - 1.3.1 Reduce pedestrian recreational disturbance.
 - 1.3.1.1 Fence and post areas used by breeding plovers, as appropriate.
 - 1.3.1.2 Implement and enforce pet restrictions.
 - 1.3.1.3 Prevent disturbance from disruptive recreational activities when plovers are present.
 - 1.3.2 Reduce disturbance, mortality and habitat degradation caused by off-road vehicles, including beach-raking machines. . . .

2. Monitor and manage wintering and migration areas to maximize survival and recruitment in the breeding population.
 - 2.1 Monitor known and potential wintering sites.
 - 2.1.1 Monitor abundance and distribution of known wintering plovers.
 - 2.1.2 Survey beaches and other suitable habitat to determine additional wintering sites.
 - 2.1.3 Identify factors limiting the quantity and quality of habitat or its use by piping plovers at specific wintering sites.
 - 2.2 Protect essential wintering habitat by preventing habitat degradation and disturbance.
 - 2.2.1 Protect habitat from impacts of shoreline stabilization, navigation projects, and development.
 - 2.2.2 Protect wintering habitat from disturbance by recreationists and their pets.
 - 2.2.3 Protect piping plovers and their wintering habitat from contamination and degradation due to oil or chemical spills. . . .

3. Undertake scientific investigations that will facilitate recovery efforts. . . .

5.1.9.3 Recovery Action Narrative

This section of a recovery plan describes all actions necessary to achieve full recovery of the species, both in the near and long term, and the monitoring actions necessary to track the

effectiveness of these actions and the status of the species. The narrative that accompanies the actions should address the priority of the action (see section 5.1.10, Implementation Schedule and Cost Estimates), and any monitoring actions accompanying an action should be given the same

priority. Within the recovery action narrative, recovery actions should be stepped down to discrete actions that can be funded, permitted, or carried out independently. Actions should also be listed as separate recovery actions if one should receive a higher priority than the other. Use judgement in deciding how finely to slice the recovery actions. Generally, this is a rare opportunity to describe the actions needed to recover the species and may assist agencies to get funding for these actions, so seize the moment and make them as specific as possible while leaving sufficient flexibility to allow for creative or new solutions.

If certain actions are dependent on the outcome of other planned actions, this should be noted in the narrative, and the time frame for the later recovery action should follow the first action in the Implementation Schedule. The following parameters should be applied to the recovery action narrative:

- Recovery actions should be discrete and action oriented, and their descriptions concise.
- Whenever possible, recovery actions should be site-specific, as per ESA section 4(f)(1)(B)(i)).
- Recovery actions should be stepped-down to items at a level at which they can be funded or contracted, if at all possible.
- The narrative should include both near-term actions (those that prevent extinction or lead to long-term recovery actions) and long-term actions (all those actions needed to reclassify to threatened status and delist).
- Recovery actions that are dependent on the outcome of earlier actions should be indicated as such.
- Priority 1 recovery actions (see section 5.1.10, Implementation Schedule and Cost Estimates) must be justified in the recovery action narrative as those actions necessary to prevent extinction or prevent the species from declining irreversibly in the foreseeable future.
- Actions should be described with sensitivity and discretion. For instance, reference to specific parcels of land or

actions can result in a positive reaction (help them receive a higher priority) or a negative reaction (give unwanted attention to a specific landowner or other stakeholder). Good stakeholder communications during the planning process should help minimize these concerns.

Although near-term needs (for the next five to ten years) may be better known and identification of costs and possible funding sources easier to ascertain, longer term actions that will lead to a delisting must be identified unless identification of such actions is not possible. For threats and other issues that cannot be resolved in the near term, at a minimum, identification of interim steps that can be taken toward future resolution should be identified. The intent is to focus on accomplishments that can be pursued in the near-term, while ensuring that all actions fit within the long-term strategy and direction for recovery.

Recovery actions must include specific actions to control each of the identified threats to the species, as categorized under the five-listing factors of the ESA. Such might include, but are not limited to, specific actions such as: limiting direct or incidental take, habitat protection and restoration, or population augmentation to reduce vulnerability to small population sizes, etc. In addition, some types of actions may be cross-cutting and address multiple threat factors, such as outreach, or recur under each of the threat categories, such as: research, monitoring, or adaptive management. Specific comments on some of these categories of actions follow.

Control of Threats – An increase in numbers and in populations is not adequate to delist a species; rather, it must also be clear that threats to the species' well-being are sufficiently controlled to ensure that the species no longer fits the definition of threatened or endangered (see court cases described in section 1.2, Legal and Policy Guidance for Recovery Planning). Recovery actions that control identified threats should be included, and the reasons for including the actions should be made clear. Control of threats includes, but is not limited to, a management regime to control an invasive species (the expected effectiveness should be discussed in the narrative),

means to control vessel traffic that affects a species, means to control bycatch of the species, protection of certain key areas of habitat from development or other threats, and putting a regulatory mechanism in place to control these or any other threats. For situations in which more information is needed to determine the extent of threats or potential future threats, e.g., diseases that are likely to spread, there should be recovery actions to study these threats.

When putting together the recovery action narrative, clarify to the reader the magnitude and immediacy of the threats (this information should be obtainable, and paraphrased, from the Threats Assessment in section 5.1.6.7), and state the priority and extent to which the threats are expected to be addressed with the given management action.

Habitat Protection and Restoration – Recovery actions should seek to protect and, possibly, restore habitat that is important to the continued existence and recovery of the species. This habitat should have been identified in the Background section of the plan. When identifying recommendations for the protection or management of the species' important habitats, clearly identify the area and describe the goal of the action, but be careful not to limit your options by being too prescriptive. For instance, “Exclude cattle from Site A via fencing or other means,” is different from “Fence Site A.” Biologists in resource-management agencies have noted that specifying sites needed for protection or management in the recovery plans facilitates obtaining funding and staff-time to carry out those actions. Remember also, that it is often assumed that some recovery actions, such as habitat protection, necessarily control threats. However, depending upon the type of protection and management regime, a threat to habitat may be more or less controlled. If continuing management or controls are necessary, be sure to include them.

In the case of land that may need to be protected via land acquisition, identification of sites for acquisition (by fee title or by conservation easement) may also be extremely useful in getting funding for site purchases. Indeed, for some agencies and grants, having the site

specified in the plan as important to the recovery of the species is a requirement. Identification of land acquisition needs may also assist other partners in focusing efforts on land protection schemes. However, be aware that this can be viewed as controversial by stakeholders and the public in some areas. Be sensitive to potential stakeholder concerns in these cases and initiate stakeholder contacts early in the process to minimize misunderstandings and controversy. In some cases it may be deemed necessary to be less precise about specific parcels in the recovery plan.

Limiting Take – Recovery actions can specify the need and means to eliminate or minimize take, direct or indirect, of the species. For instance, “Reduce nest disturbance by creating seasonal no-take zones ” or “Establish no take zones around rookeries” may be appropriate actions to include in some plans. They may simply provide information on how to limit take, although they may also provide valuable information for development of a Habitat Conservation Plan, or serve as a reasonable and prudent measures or provide conservation recommendations in a section 7 consultation.

Population Augmentation/Establishment of New Populations – In some cases, population augmentation (considered here to include establishment of new populations) may be necessary to prevent extinction of a species or to build a species' numbers to a self-sustaining level. NMFS has a controlled propagation policy to guide biologists in such circumstances (FWS and NMFS 2000; Appendix P). This will often involve artificial propagation, although it may involve outplanting or releasing individuals directly from another population. It should be noted that population augmentation can have benefits and risks to both the target species and other listed and unlisted species. Population augmentation and the species propagation that often accompanies it can entail large monetary, time and staffing commitments, risks of disease outbreaks, and uncertainty of success. An assessment of risks and uncertainties must be undertaken, and alternatives that require less intervention should be considered seriously before undertaking such a program. Population augmentation should receive foremost

consideration for recovery only when it is believed that recovery within an acceptable timeframe would not occur without it. It should not be used as a substitute for resolving the threats that led to the species listing. Population augmentation should always take place in concert with other recovery actions, such as habitat protection and restoration, in order for augmented populations to become self-sustaining and to achieve recovery goals.

Where population augmentation is appropriate, it should be considered and planned for as early in the recovery process as possible, both in order to identify and capture/collect the maximum amount of genetic variation available in the extant population for breeding stock, and in order to allow adequate time to get a successful captive propagation/breeding program in place. In the case of plants, care should be taken to ensure that the appropriate genotypes are used (not simply the easiest to grow or the “weediest”) and are planted in appropriate densities. In the case of such aquatic species as salmon and trout, some artificial propagation programs, or hatcheries, have been in existence for over 100 years, and extensive mixing of hatchery populations has occurred. Care must be taken to ensure that those individuals used to develop a conservation hatchery program for a listed species are closely related to the species that is being recovered.

The following steps may be included as part of a recovery action for population augmentation: (1) A determination of the genetic variation of an extant population(s); (2) development of a plan for artificial propagation and release/outplanting; (3) development of techniques for captive breeding/artificial propagation, if necessary; (4) development of a captive breeding/artificial propagation population, if necessary; (5) release/outplant of individuals; and (6) monitoring of population augmentation. These steps should be considered early in the recovery process, and planned for, as appropriate.

Outreach – Outreach is a key component for ensuring the long-term recovery of listed species. Historically, in a recovery plan, the outreach strategy was a low priority action and placed at the end of implementation schedules and action lists. However, providing information to the

public and especially to those entities that are most likely to affect the species may be crucial to species and habitat recovery. Effective partnering is a good start to outreach, but other means, such as holding public meetings, producing fact sheets, writing news articles, and giving public programs will usually result in increased support for recovery actions and can help ensure conservation of the species far beyond that offered by NMFS alone. Increasing public interest also results in better chances of maintaining funding (see section 4.4, Public Communication and Outreach). Unfortunately, in the past, recovery actions that refer to public education or outreach frequently have not been detailed enough to serve the recovery objectives.

As appropriate for the species, include recovery actions that relate to educational and interpretive activities, public hearings, public events, media broadcasts or publications. Specifically, develop/improve public education materials, explain through the media how the species will be delisted, create community based partnerships to further the message, share current science with the public, and hire professional communications consultants to develop an outreach strategy. The recovery plan should make reference to issues identified in the FWS National Outreach Strategy (Appendix O). The sample outreach plan found at the end of Appendix O can be completed for recovery planning when appropriate. The outreach plan may be adapted to fit a particular situation.

Research – Research actions in the recovery program section of the plan should be limited to those essential to meeting recovery criteria and achieving goals of the plan. These may include identifying and studying aspects of life history critical to population growth and persistence, determining underlying biological and ecological causes of population decline, and identifying and studying threats to the species. Genetic research may also be important when establishing new or augmenting existing populations, when establishing priorities where only a subset of the existing population can be protected, or for a species with critically low levels (Schemske et al., 1994). Within the recovery action narrative, also explain the potential need to change recovery actions or priorities as the results of research

become available (see Monitoring and Adaptive Management in this section). Note that specifying research actions may be necessary for obtaining funding for these actions and helpful in obtaining scientific research permits under section 10(a)(1)(A).

Monitoring – Monitoring is the measurement of an action or an environmental characteristic to determine compliance, status, trends, or effects of the action or characteristic. Three basic types of monitoring are conducted in the recovery program as follows: (1) implementation (compliance) monitoring, which is used to see whether the plan is being implemented fully (Did we do what we said we could do in the recovery plan?); (2) status and trend monitoring, which determines whether a population or threat is increasing or decreasing (What is happening to our population right now? To what extent has the threat been controlled? Is the population increasing over time and what can we predict for the future?); and (3) cause and effect monitoring, which tests hypotheses and determines (via research) whether an action is effective and should be continued (Is the dam hindering fish migration? Is our management action causing the population to increase?). Implementation monitoring is generally completed by NMFS through some type of tracking system and may not be reflected in the recovery action narrative per se (see section 6.0, Using and Updating the Plan and the Implementation chapter of the handbook). However, it will have a great influence on whether recovery goals and objectives are met. “Status and trend” and “cause and effect” monitoring will be more meaningful in guiding a recovery action along the way. This is especially true of “cause and effect” monitoring, where adaptive management may be useful. “Status and trend” and “cause and effect” monitoring may be best achieved by partnering with other programs within NMFS, other Federal agencies, academic institutions, and researchers.

Two particular approaches have been used to include monitoring actions, particularly “status and trend” and “cause and effect” monitoring, in the Recovery Action Outline and Narrative. The first approach includes monitoring actions throughout the recovery action narrative, directly

following each action or a suite of actions to be monitored. The second approach combines monitoring actions into a separate monitoring section in the narrative. The first approach reminds managers and others using the recovery plan of each point at which monitoring should be undertaken. It also clarifies that monitoring is an integral component of achieving and tracking recovery, especially for cases in which populations are geographically distinct and localized, and each population is likely to be managed by different entities. This way, if monitoring actions are included with other recovery actions within a geographic area, managers can focus on all actions, including monitoring, to be taken for the populations of concern to them. Managers should not have to look for information in a separate monitoring plan and determine what applies to them (although there may be an appendix with protocols or other specifics included in the plan). On the other hand, combining all monitoring into a separate section of the narrative may ensure that monitoring is consistent across the range of the species and result in a more cohesive monitoring program. This may work best for wide-spread species for which many different entities may be managing portions of the same population. It will ensure that monitoring is done consistently across the species’ range, and may be especially helpful where numerous HCPs or other plans for the species are being implemented or are anticipated. It will also be helpful in organizing information for future post-delisting monitoring plans (see Post-Delisting Monitoring below).

The decision regarding whether monitoring actions are included throughout the plan or in a separate monitoring section is left up to the authors. Whichever way it is included, monitoring should be an integral and important component of the plan, and, as stated earlier, monitoring actions and their implementation should be given the same priority as the actions they are monitoring. For those species for which a separate monitoring section is developed, it may be useful to cross reference key actions to that monitoring to ensure that such monitoring is not overlooked.

The ESA requires NMFS to monitor delisted species for at least five years post-delisting to ensure that removal of the protections of the ESA

does not result in a return to threatened or endangered status. While it is not necessary to include a post-delisting monitoring plan in the recovery plan, per se, an action for development of a post-delisting monitoring plan should be included in the Recovery Action Program. As importantly, the need for a post-delisting monitoring plan should be kept in mind while other monitoring programs are being developed, to ensure that early monitoring programs are designed in such a way as to lead naturally into post-delisting monitoring, including providing appropriate baseline data. The post-delisting monitoring plan should also be developed well before delisting is contemplated. This will ensure that a well thought out plan is in place at the time of delisting.

Adaptive Management - Adaptive management can be an extremely useful tool for moving toward recovery when uncertainty exists regarding the threats to the species, the species' life history, or the effectiveness of various management actions. Adaptive management uses the scientific method "learning by doing," and then adapting accordingly. It involves (1) formulating an action (in this case a recovery or research action), (2) setting it up as a hypothesis to be tested, (3) implementing the action while monitoring the outcome, (4) evaluating its effectiveness or outcome using *pre-determined* criteria, and (5) adjusting, discontinuing, or continuing the action as necessary or, in the case of research actions, taking the next appropriate step depending on the outcome of the research. This process provides feedback to ensure that actions are effective and minimizes surprises if additional steps become necessary because an agreed-upon objective is not reached.

Thus, in cases of significant uncertainty, the description of a recovery action within a recovery plan should include an adaptive management plan for the action. This adaptive management plan should include the hypothesis to be tested, how the effectiveness of the action will be monitored, what criteria will be used to determine if the action is effective, and how the action will be adjusted if these criteria are not met. Every recovery action should have two accompanying actions: "Monitor effectiveness of the action,"

and "Adjust the action based on effectiveness, if necessary."

The keys to adaptive management include the following: (1) appropriate monitoring of an action, (2) agreed upon criteria to determine whether an action is effective, and (3) agreed-upon actions to take as a necessary step for a research action or for a management action if the effectiveness threshold is not reached during the agreed upon timeframe. When uncertainty exists, management actions should have specific criteria for evaluating their effectiveness. For example, if the goal is to increase the species' habitat over time, it is important to note whether any amount of increase is acceptable, or whether a minimum percentage increase (say, ten percent) would be acceptable. It is also important to note the timeframe over which the increase must be maintained. Having the objective stated clearly, in measurable terms when possible, and agreed upon beforehand makes it easier to determine the point at which goals have been met. Finally, it is important to determine up front what actions will be taken if the objective is not reached. For instance, in a case where the objective is not reached, it should already be decided whether additional habitat will be protected, the habitat will be protected more intensively, the management should be changed, or the management will be curtailed. More information on adaptive management will be included in the Implementation Chapter of the Recovery Handbook.

5.1.10 Implementation Schedule and Cost Estimates

The implementation schedule is designed to satisfy the requirement under the ESA that recovery plans must contain “estimates of the time required and the cost to carry out those measures needed to achieve the plan’s goal and to achieve intermediate steps toward that goal” (ESA section 4 (f)(1)(A)(iii)). The implementation schedule also identifies a priority for each recovery action in the narrative and recommends responsible party(ies) for carrying out each recovery action. The implementation schedule can be used in securing and in obligating funds and in establishing associated regulatory and other management priorities. The implementation schedule also provides the basis for tracking plan implementation performance.

The implementation schedule is usually located immediately after the recovery action narrative. It is usually presented in a table format in a landscape orientation with each row representing an individual action (see Appendix Q).

Introduction/Disclaimer – Given the limitations to the information contained in an Implementation Schedule, it is advisable to include as a preface an introduction/disclaimer, such as the following:

The Implementation Schedule that follows outlines actions and estimated costs for the recovery program for the [name of species], as set forth in this recovery plan. It is a guide for meeting the recovery goals outlined in this plan. This schedule indicates action priorities, action numbers, action descriptions, duration of actions, the parties responsible for actions (either funding or carrying out), and estimated costs. Parties with authority, responsibility, or expressed interest to implement a specific recovery action are identified in the Implementation Schedule. When more than one party has been identified, the proposed lead party is indicated by an asterisk (). The listing of a party in the Implementation Schedule does not require the identified party to implement the action(s) or to secure funding for implementing the action(s).*

Assigning priorities – Priorities are assigned to each action in the implementation schedule. In compliance with NMFS’ Endangered and Threatened Species Listing and Recovery Priority Guidelines (55 FR 24296) (Appendix S), all recovery actions will have assigned priorities based on the following:

Priority 1: Actions that must be taken to prevent extinction or to prevent the species from declining irreversibly

Priority 2: Actions that must be taken to prevent a significant decline in species population/habitat quality or in some other significant negative impact short of extinction

Priority 3: All other actions necessary to provide for full recovery of the species

It is important to emphasize that a priority 1 recovery action is an action that must be taken to prevent extinction. Therefore, the use of priority 1 recovery actions in a recovery plan for a threatened species should be done judiciously and with a constant reflection back to the original definitions. Given the number of species that are on the brink of extinction or in serious decline, the temptation to assign recovery actions a higher priority than is warranted should be avoided. That said, one should also be careful not to assign a lower priority than is warranted, just because an action is one component of a larger effort that must be undertaken. For instance, there is often confusion as to whether a research action can be assigned a priority of 1 since, in and of itself, it will not prevent extinction. However, the application of some research tasks may be necessary to prevent extinction (e.g., applying the results of a genetics study to a captive propagation program for a seriously declining species) and would warrant priority 1 status.

Assigning priorities does not imply that some recovery actions are of low importance; instead it implies that they may be deferred while higher priority recovery actions are being implemented. For some species, especially those with complicated recovery programs involving many actions, it may be useful to assign sub-priorities within these categories, e.g., priority 2a, priority 2b, priority 2c. If sub-priorities are assigned, a definition of each sub-priority should be provided.

Table structure – Recovery actions in the implementation schedule can be arranged in various ways, depending on what the authors feel is the most useful organization for users of the plan. They are usually arranged in the order of the recovery outline/narrative, although they may also be arranged according to geographic locations (where they occur in distinct populations), by the categories of threats delineated in the threats analysis (section 5.1.6.7), by category of actions (habitat protection, research, population augmentation etc.), in priority order (all priority one recovery actions grouped first, priority two recovery actions grouped next, and priority three actions last), or any combination therein. For instance, actions can be arranged by priority within a category of tasks (where different entities would be carrying out research and management) or by priority within geographic location (where different managers would be carrying out the actions but it would be helpful to have actions within a geographic location prioritized). (See Appendix P.)

Recovery action number – This number should be identical to that identified in the recovery action narrative. Recovery actions listed in an implementation schedule should be of the lowest (most specific) order, i.e., there is no reason to list 1.0 and 1.1 if you list 1.1.1, 1.1.2, and 1.1.3.

Recovery action description – Enter the title or a brief description of the recovery action (this should reflect the wording in the recovery action narrative to the extent possible).

Recovery action duration – Estimate the length of time to complete the recovery action. State whether the recovery action is currently underway by putting adding a comment under the comment column or, if the action will be continuous throughout the recovery of the species and is currently underway, it may be described as “ongoing”. Some actions may be continuous throughout the recovery period but not currently underway, and may appropriately be described as “continuous.” Other actions are of a definite duration, such as research projects and development of regulations, should include specific time estimates, unless the administrative record reflects that time estimates were not

feasible. These time estimates are important in estimating the overall cost of recovery of the species. Be precise and note that identifying too many actions as “ongoing/continuous” is inappropriate (Defenders of Wildlife v. Babbitt, 130 F. Supp.2d. 121 (D.D.C. 2001); Appendix B.).

Responsible parties – Identify the best lead party or parties to actually accomplish the recovery action. It is preferable, but not required, to obtain agreement from the party(-ies) beforehand, in order to help facilitate implementation of the plan. Note that inclusion under Responsible Parties does not commit any party to actually doing the work, but merely identifies the best candidate for completing the action. Be aware however that in some agencies, e.g., the National Park Service, if a party is not identified as lead or co-lead, it may be difficult for it to obtain funding and staffing for that action. Thus you may want to be liberal in your identification of leads if it will assist parties in participating in the action.

Cost Estimates – Enter the estimated costs for each identified recovery action. Although section 4(f) of the ESA requires the time and cost to be estimated to reach the plan’s goal (usually delisting), a 2006 Government Accountability Office audit of the NMFS’ and FWS’ endangered species recovery programs found that most plans only included time and costs estimates for a 5-7 year period (GAO 2006). In response to the audit, the Department of Commerce and NMFS agreed that estimates of the time and cost to recover each species will be included in new and revised recovery plans. For the sake of brevity, in the Implementation Schedule that accompanies the plan, costs should be provided on an annual basis for the first 5 years and also projected out to the estimated time of full recovery, i.e., there should be 6 columns for cost estimates, 5 stating the costs for the first five years and the 6th giving the cost for that action to recovery. In order to estimate all costs, including those that don’t occur in the first 5 years, it is wise to use a spreadsheet on which costs are input for the entire recovery period and derive the Implementation Schedule from that. Given the duration and annual cost of an action, the cost to recovery is a matter of filling out the spreadsheet/table. The total of all actions will be the estimated cost to recovery.

It is recognized that completing this section can be difficult in part because obtaining cost estimates from other identified parties can be challenging and estimating costs far into the future becomes increasingly imprecise. Consulting with potential responsible parties can often be helpful in establishing cost estimates – and keeps them from being surprised when they see the recovery plan. In some cases, best estimates are all that can be supplied; in others, it may be acceptable to state “To Be Determined” or TBD, especially where it is unclear whether or not the action will be necessary, e.g., for the action “Adjust action in response to effectiveness monitoring, if necessary.” Estimates should be based on realistically optimistic projections of the ability to get actions funded and staffed, as this may assist in obtaining funding at the appropriate time for the species.

Estimating costs is also difficult because recovery plans contain actions that may be required under mandates other than the ESA, e.g., state law, Clean Water Act (CWA), etc. Although it is recognized that only so much time can be given to figuring the cost of every action, there may be instances in which it may be worthwhile to figure the incremental cost, if any, above those incurred under the other mandates. A rule of thumb would be, if the costs are incurred because the species is listed and the action is necessary for recovery (i.e., if they wouldn't be incurred “but for” the recovery action for the listed species), include the cost in the plan. If, on the other hand, the action truly would take place regardless of the involvement of the listed species, and the plan says to consider the needs of the species while taking the action, you may add only the incremental costs, if there are any, or partial costs if that's more appropriate (and note this in the comments column). For example, actions may be underway or planned to meet CWA standards in a river in which a listed species occurs. These actions may be cited in the plan as important to the species' recovery, but the cost of these actions in the implementation schedule may be zero because the action is taking place regardless of the need to recover the listed species. It is important to note that not all recovery actions have costs – sometimes it is just a matter of considering the needs of the species while implementing an action that would be done

regardless. If incremental costs are negligible, but the action's important to the recovery of the species, it's acceptable to put \$0 under the party that would need to consider the needs of the species while undertaking that action. Be sure, however, to explain in the comments section that the consideration of species has a negligible cost but is still important.

As usual, the administrative record should document how cost estimates were made, or why they could not be determined, if that is the case.

Comments – This section of the implementation schedule is a good place to note if a recovery action is already underway, if an action relates to another action (if the action will likely be accomplished simultaneously with another action or if it is dependent on another action being completed first), and if any other relevant information pertaining to that recovery action exists.

5.1.11 Literature Cited

Be sure to refer to all literature that is cited in the recovery plan in proper scientific citation format and to list it alphabetically at the end of the plan. It may also be helpful to include a list of references not cited but which were used in background research or may be of interest to the reader. Uncited references may be listed in a separate section, or in the same section as the literature cited, provided that the title of the section is changed to References.

The following references are provided as examples and are given in Name-Year format for the bibliography. They can be cited in the body of the paper using the "In-Text:" example.

Book [In-Text: (Wagner et al. 1990)]

Wagner, W.H., D.R. Herbst, and S.H. Sohmer. 1990. *Manual of the Flowering Plants of Hawai'i*. University of Hawai'i Press and Bernice P. Bishop Museum Press, Honolulu. 1853 p.

Book Chapter (or other part with different author) [In-Text: (Belovsky 1987)]

Belovsky, G.E. 1987. Extinction models and mammalian persistence. Pp. 35-37 in M.E. Soule (ed.), *Viable populations for conservation*. Cambridge University Press, New York, New York.

Journal Article [In-Text: (Ackerman 1980); (Mace and Lande 1991); (Taylor et al. 1996)]

Ackerman, R.A. 1980. Physiological and ecological aspects of gas exchange by sea turtle eggs. *American Zoologist* 20:575-583.

Mace, G.M., and R. Lande. 1991. Assessing extinction threats: toward a reevaluation of IUCN threatened species categories. *Cons. Biol.* 5:148-157.

Taylor, B.L., P.R. Wade, R.A. Stehn, and J.F. Cochrane. 1996. A Bayesian approach

to classification criteria for spectacled eiders. *Ecol. App.* 6(4):1077-1089.

Same-author Documents in the same year [In text: (Haig and Oring 1988a; Haig and Oring 1988b)]

Haig, S.M. and L.W. Oring. 1988a. Genetic differentiation of piping plovers across North America. *Auk* 105(4):260-267.

Haig, S.M. and L.W. Oring. 1988b. Distribution and dispersal in the piping plover. *Auk* 105(3): 630-638.

Dissertations and Theses [In-Text: (Dettmers 1995); (Gerstein 1995)]

Dettmers, J. M.. 1995. Assessing the trophic cascade in reservoirs: the role of an introduced predator. *Dissertation*. Ohio State University, Columbus, OH. 88 pp.

Gerstein. E.R. 1995. The underwater audiogram of the West Indian manatee (*Trichechus manatus latirostris*). M.S. Thesis. Florida Atlantic University. 40 pp.

Conference Paper [In-Text: (Balazs et al. 1995); (Ogren 1984)]

Balazs, G.H., P. Siu, and J.P Landret. 1995. Ecological aspects of green turtles nesting at Scilly Atoll in French Polynesia. Pp. 7-10 in Richardson, J.I. and T.H. Richardson (compilers), *Proceedings of the Twelfth Workshop on Sea Turtle Biology and Conservat.* NOAA Tech. Memo. NMFS-SEFSC-361. 274 pp.

Ogren, L. 1984. Overview of the biology of the green turtle. Pp. 78-80 in P. Bacon, F. Berry, K. Bjorndal, H. Hirth, L. Ogren and M. Weber (eds.), *Proceedings of the Western Atlantic Turtle Symposium*. RSMAS Printing, Miami.

Technical Reports [In-Text: (Cowardin et al. 1979); (Angliss et al. 2002)]

Cowardin, L.M., V. Carter, F.C. Golet, E.T. LaRoe. 1979. *Classification of wetlands*

- and deepwater habitats of the United States. U.S. Fish and Wildlife Service Report FWS/OBS/-79/31. 103 pp.
- Marine Fisheries Service, Silver Spring, MD. 84 pp.
- Angliss, R.P., G.K. Silber, and R. Merrick. 2002. Report of a workshop on developing recovery criteria for large whale species. NOAA Technical Memorandum NMFS-OPR-21. 32 pp.
- Unpublished Documents* [In text: (Cuddihy et al. 1983); (Ehrhart 1983); (Helgerson, *in litt.*, 2000)]
- Cuddihy, L.W., J.A. Davis, and S.J. Anderson. 1983. A survey of portions of Kapala and Ka'u Forest Reserves, Island of Hawai'i. Prepared for Endangered Plant Species Program, Division of Forestry and Wildlife, Hilo, Hawaii.
- Ehrhart, L.M. 1983. A survey of nesting by the green turtle, *Chelonia mydas*, and loggerhead turtle, *Caretta caretta*, in South Brevard County, Florida. Unpublished Report to World Wildlife Fund-US, Washington, DC. 49 pp.
- Helgerson, Ken. Baker County Transportation Department. 2000. Letter to Edna Rey-Vizgirdas. 4 pp.
- Recovery Plans* [In text: (FWS 1998); (NMFS 1992); (NMFS and FWS 1998)]
- U.S. Fish and Wildlife Service. 1998. Recovery Plan for insect and plant taxa from the Santa Cruz Mountains, California. U.S. Fish and Wildlife Service. Portland, Oregon. 83 pp.
- National Marine Fisheries Service. 1992. Recovery Plan for the Steller Sea Lion (*Eumetopias jubatus*). Prepared by the Steller Sea Lion Recovery Team for the National Marine Fisheries Service, Silver Spring, Maryland. 92 pp.
- National Marine Fisheries Service and U.S. Fish and Wildlife Service. 1998. Recovery Plan for U.S. Pacific Populations of the Green Turtle (*Chelonia mydas*). National
- Federal Register* Notices [In text: (FWS 1990; 55 FR 32088, month day, year)]
- U.S. Fish and Wildlife Service. 1990. Endangered and threatened wildlife and plants: Determination of threatened status for the Puritan tiger beetle and the northeastern beach tiger beetle; Final rule. 55 FR:32088-32904, month, day, year.
- Electronic Journals* [In-Text: (Slater and Jones 1995)]
- Slater, P.J.B., and A.E. Jones. 1995. Timing of songs and distance call learning in zebra finches. *Animal Behavior* [serial online] 49(2):123-248. Available from: OhioLINK Electronic Journal Center via the Internet (<http://journals.ohiolink.edu/etext/>).
- Personal Communication* [Generally only citation is in text: (B.A. Schroeder, National Marine Fisheries Service, personal communication, 2003)]

5.1.12 Appendices

Any peripheral but pertinent documents can be included in the appendices of the recovery plan. Resist putting too much into the appendices. Appendices can include outreach materials, relevant reports (or their executive summaries), data, monitoring protocols, habitat management plans, the comments or summaries of public comments and information on public meetings. Appendices can be good places for specific issues to be fleshed out in detail.