Interim
Endangered and Threatened Species
Recovery Planning Guidance
Version 1.3

National Marine Fisheries Service

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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 de-listable, 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

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

- **S**pecific - Who, what, & where
- **M**easurable - So that species status and recovery progress can be assessed
- **A**chievable - Authority, funding, staffing are technically feasible (even if not always likely)
- **R**ealistic - Grounded in good science and defensible
- **T**ime-referenced - Not open-ended, having a set time frame for determining if the objective is be met, e.g., stable or increasing "for 3 generations" or "for a minimum of 10 years."

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 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 achieve each objective.

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.

Recovery Unit	*Minimum Population (pairs)*
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.

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

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)

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 thetime 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.