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INTRODUCTION

1.1 THE PURPOSE OF THIS DOCUMENT

This manual is intended as a training tool and information resource for U.S. Department of the Interior (DOI) Fish and Wildlife Service field personnel in the application of economics to assess damages resulting from the release of oil or other hazardous materials to the environment. The purpose of the manual is not to provide a step-by-step guide for the conduct of primary economic analysis, but to provide a better understanding of how economics fits within the overall damage assessment process. With this understanding, Service personnel can work to assure that injury studies which are performed are of maximum benefit to the overall damage assessment process. In particular:

- Since most cases involve small damages and are settled out of court, this manual provides field personnel with an understanding of the techniques that are often applied to generate economic damage claims for use in settlement negotiations.

- This manual also provides field personnel with a basic understanding of the types of economic tools that may be proposed or applied in more complex and large-scale cases.

- Finally, this manual provides field personnel with a general understanding of the types of information required to support an economic damage claim, allowing these personnel to focus limited assessment funds on those studies required to support the damage claim.

The damage assessment process generally requires the coordinated efforts of scientific, legal, economic and policy specialists. Given an understanding of the role of economics in the damage assessment process, field personnel will be able to work effectively as members of the damage assessment team.

This manual assumes a basic understanding of natural resource damage assessment. While an overview of the natural resource damage assessment process is included in Chapter 2, this manual addresses only economic damage assessment in detail. For guidance on such related topics as injury assessment, restoration planning, and DOI policy on damage assessment, readers should refer to other guidance and training materials available from DOI and the National Oceanic and Atmospheric

Administration (NOAA). In addition, Service field personnel should consult with the solicitor assigned to each case to assure that agency policy and legal requirements are met.[1]

This manual does **not** represent official DOI or Fish and Wildlife Service guidance or policy. The opinions and assertions expressed in this manual are solely those of the authors.

1.2 Relationship of Natural Resource Damage Claims to CERCLA Site Remediation and Oil Spill Response Activities

Natural resource damages are separate, distinct from and residual to remedial activities under the Comprehensive Environmental Response, Compensation and Liability Act (CERCLA) or cleanup activities in response to an oil spill. That is, natural resource damages reflect injuries and lost services from the time of the release through completion of remedial activities or spill response actions, as well as any injuries or lost services remaining after these activities are completed. For example, a remedy selected for a site might address the human health risks posed by a site, but not more wide-scale ecological effects. Similarly, oil spill response activities are generally limited to removal of gross oil contamination, while effects such as reductions in fish populations or loss of wetland are not generally addressed. Thus, the purpose of a natural resource damage assessment is to identify activities that will fully restore injured resources to baseline (i.e., pre-release) conditions, and to compensate the public for services lost or diminished from the time of the release through full restoration of the resource.

1.3 An Overview of Natural Resource Damage Assessment

The purpose of this section is to define: the components of a damage claim; the meaning of the term "value" to natural resource economists; the categories of economic damages that are and are not compensable; and the relationship between restoration costs and compensable values. A discussion of the steps generally followed in conducting a damage assessment is provided in Chapter 2.

1.3.1 Components of a Natural Resource Damage Claim

A natural resource damage claim is made up of three components:

Restoration Costs + Compensable Value + Cost of the Assessment

Timely restoration of all injured resources is the primary goal of the damage assessment process. Restoration costs include all of the costs associated with the selected restoration alterative, as discussed in Chapter 3. In addition to recovering restoration costs, a trustee may decide to pursue

[1] In addition, this manual does not provide detailed guidance on the application of the Type A damage assessment model or damage compensation schedules. Detailed guidance for these approaches to damage assessment is available from NOAA's Damage Assessment Center in Silver Spring, Maryland.

a compensable value claim. "Compensable value" is the amount of money required to compensate the public for the reduction in natural resource services from the time of the release until the injured resources and the services those resources provide are returned to their baseline conditions (also referred to as "interim losses"). Compensable values represent the value of lost public use of the services provided by the injured resources plus passive use values [43 CFR 11.83(c)].[2] Assessment costs include all of the reasonable costs of assessing damages at a site.

While all damage claims involve an assessment cost component, not all cases will involve recovery of both restoration costs and compensable losses. For example, an oil spill may result in interim lost use (e.g., a fishing closure), but the trustees may choose a no-action alternative for restoration to allow natural recovery. In such cases, the trustee may act to recover compensable values, which will then be used for restoration projects at other sites. Alternatively, trustees may wish to recover restoration costs following a release event, but may not attempt to recover for compensable losses. For example, interim lost use of the site might be limited (such as an oil spill that effects a bathing beach during the winter), or the cost of assessing the interim losses might exceed the expected damages. In these cases a trustee might simply present a restoration-based claim with no associated compensable damage component. A relationship will often exist between compensable values and selected restoration activities, as discussed in Section 1.3.5.

1.3.2 The Meaning of Services and Value in Natural Resource Economics

For damage assessment purposes, value can be defined in terms of the economic value of services provided by natural resources. For example, one of the services provided by a freshwater lake might be the provision of a recreational fishing and boating site. As discussed in Chapter 2, one of the first steps in a damage assessment involves development of an inventory of the services provided by the injured resource and the identification of services that have been affected by the release event. Once these affected service flows have been identified, the damage assessment team will work to identify methods that can be used to monetize the economic value of the loss. These methods are described in detail in Chapters 3, 4 and 5 of this manual.

Exhibit 1-1

EXAMPLES OF NATURAL RESOURCE SERVICES IN DAMAGE ASSESSMENT

Clean Water
-- Fish Populations - Recreation, subsistence, passive use
Clean Sediments
-- Benthic Organisms - Commercial shellfishing, marine transportation, archaeological preservation
Healthy Ecosystems
-- Diverse Wildlife Populations - Passive use, cultural/spiritual

Not all services provided by natural resources accrue directly to humans, and not all involve consumptive activities. As shown in Exhibit 1-1, the services provided by a natural resource may accrue to other resources (e.g., clean surface water can support

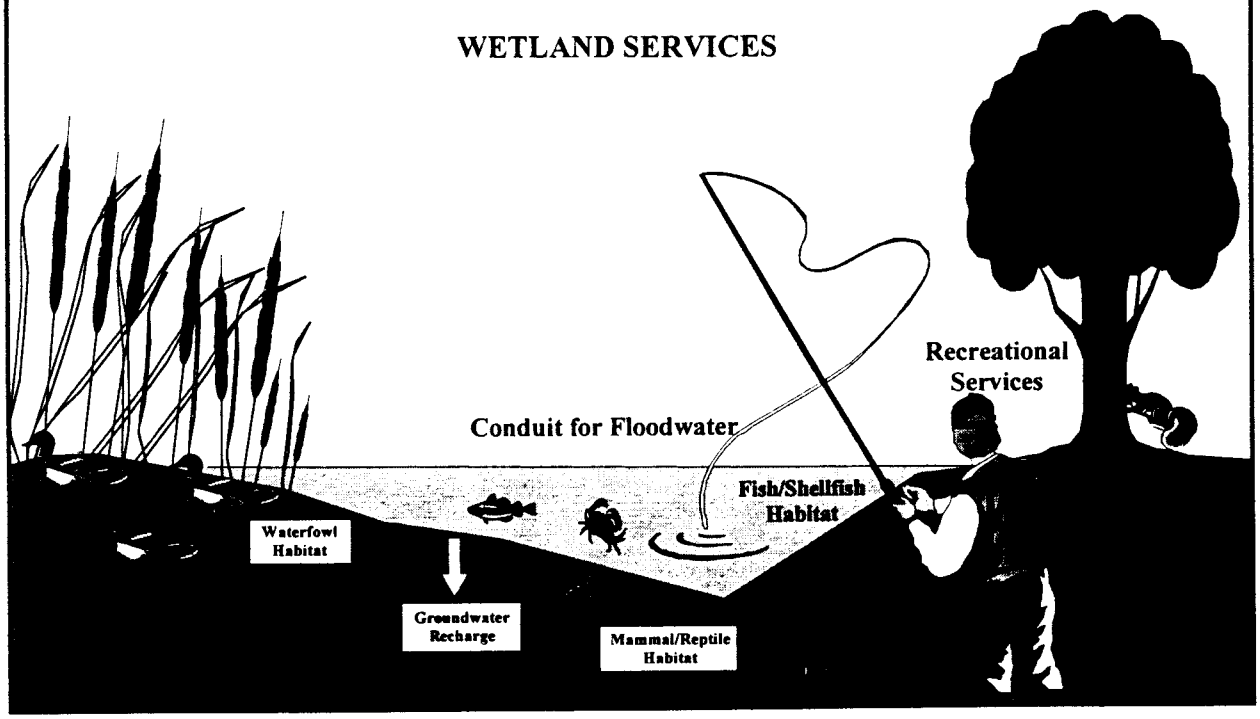
[2] Throughout this document, the term "passive use value" is used to refer to all values not based on the *in situ* consumption or utilization of a resource (e.g., the values individuals place on a resource to simply know that it exists). These values are referred to in the DOI rule for damage assessment as "nonuse values."

fish populations), or to humans (healthy fish populations can support a sport fishery). As described in Chapter 4, methods exist to monetize services accruing to humans and to other resources. In addition, these services need not be consumptive -- many individuals derive passive use values from natural resources (e.g., the value of simply knowing that natural resources exist). Exhibit 1-2 presents a stylized graphic demonstrating some of the services provided by a freshwater wetland.

Exhibit 1-2

NATURAL RESOURCE SERVICES IN DAMAGE ASSESSMENT

WETLAND SERVICES



In addition to their use as a means to monetize economic losses, measures of natural resource services can be used to evaluate the extent to which injured natural resources have been restored (i.e., the actual or expected effectiveness of a restoration activity). These services, however, should not be viewed as a separate commodity to be restored independently of the resource. Specifically,

> [DOI] does not believe that Congress intended to allow trustee agencies to simply restore the abstract services provided by a resource, which could conceivably be done through an artificial mechanism. For example, nothing in the language or legislative history of CERCLA suggests that replacement of a spring with a water pipeline would constitute 'restoration, replacement, and/or acquisition of equivalent resources.' CERCLA requires that natural resources damages be based on the cost of restoration, rehabilitation, replacement, and/or acquisition of an actual natural resource [58 Fed. Reg. 39340, July 22, 1993].

1.3.3 WHAT CATEGORIES OF ECONOMIC DAMAGE ARE COMPENSABLE?

A variety of measures of economic damage are applied within damage assessments conducted under CERCLA and the Oil Pollution Act (OPA). Specifically, the following categories of economic loss are compensable within these statutes:[3]

- Changes in consumer surplus associated with the injured resource. or example, recreational anglers may place a lower value on a stream if the quality of the stream is degraded by releases from an upstream hazardous waste site.

- Changes in economic "rent" associated with the injured resource, including economic benefit accruing to private parties because a federal or state agency or Indian tribe does not charge a fee or price for use of the resource. For example, economic rents are generally not collected on marine fisheries; however, in the event of an oil spill the rent accruing to the commercial fishing operations that utilize these resources might decline. This reduction in rent is claimable by trustees as a compensable value.[4]

- Fees or payments that would have been collected by a federal or state agency or an Indian tribe for a private party's use of the injured resource. For example, a state agency might lease a lake to a concessionaire. In the event of a contaminant release, the concessionaire might fail to make a payment, representing a compensable loss.

In some cases natural resource damages may result from site remediation or oil spill response activities. Damages associated with these activities are recoverable under DOI's and NOAA's rules. For example, the selected remedy for an uncontrolled hazardous waste disposal site might include installation of an impermeable cap, whose construction results in the destruction of wetland. Similarly, intensive cleanup activities following an oil spill can result in collateral damages (e.g., loss of shoreline vegetation). Consideration of the potential effects of such activities should be given at the time of the action (e.g., during oil spill response planning activities or in the form of comments on the proposed remedy for a site), in order to minimize this category of economic damage.

A detailed discussion of economic surplus and a review of the methodologies that can be used to address these categories of compensable values is provided in Chapter 4.

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[3] Many of the terms used in this section, including "consumer surplus" and "economic rent" are defined later in this manual.

[4] Economic rents can be associated with a wide-range of natural resources. For example, a waterway that is used for commercial shipping provides economic rent in the form of transportation services. The economic rents may or may not be collected by a sovereign authority (e.g., a regional transportation authority may impose a fee for use of a canal). If the authority does not collect a fee for use of the resource the economic rent associated with that resource will accrue to the users; if the authority does collect a fee for use of the resource, all or part of the rent will be captured by the authority. In either case, a reduction in the magnitude of the rent due to a release can be claimed as a compensable value.

1.3.4 What Categories of Economic Damage are Not Compensable?

Several categories of economic impact are not compensable under CERCLA or OPA. These include:

- Taxes foregone. For example, if a spill event results in a reduction in wages for individuals working in tourism-related businesses, the loss in income taxes paid by these individuals is not a compensable damage. Reductions in taxes paid do not represent net economic losses, but simply transfer payments not made from individuals or businesses to the government. Taxes differ from fees in that fees are generally assessed in exchange for access or services, while taxes are generally assessed as a percentage of income, sales receipts or real property value.

- Wages and other income lost by private individuals, except that portion of income that represents uncollected economic rent. Following on the example above, reductions in the incomes of individuals working in a tourism-related business following a spill are not recoverable as damages. Economic losses to private parties may be recoverable by affected individuals or private organizations through other legal means.

- Economic damages associated with a speculative use of a resource ("speculative losses"). In practice, speculative use of a resource is defined as any use for which no significant consideration was given prior to the release. For example, a release might result in contamination of an aquifer. If a regional water authority had purchased land above the aquifer prior to the release, with intentions of using the aquifer as a water source at some time in the future, the use in question would not be speculative. However, if no documented consideration had been given to the use of the resource prior to the release, any compensable losses associated with that resource might be considered speculative. The concept of speculative loss is closely tied to the term "committed use" as defined in DOI's final rule.[5]

Private versus Public Losses

The issue of "private" versus "public" losses commonly arises in damage assessment cases. As described in this manual, the compensable loss resulting from a release event represents the reduced value of the resource, as measured by changes in consumer surplus, economic rent, and fees and other payments to trustees. In some cases the claims of individuals may overlap with those of the trustees (e.g., a class action suit by homeowners in response to reduced property values following a groundwater contamination event). Service field personnel should work closely with the regional solicitor assigned to the case to address such issues.

[5] Committed use is defined as either a current public use or a planned public use of a natural resource for which there is a documented legal, administrative, budgetary or financial commitment established before the discharge of oil or the

- For cases under CERCLA, economic damages which occurred wholly before December 11, 1980, and which were associated with pre-December 11, 1980 releases may not be recoverable.[6]

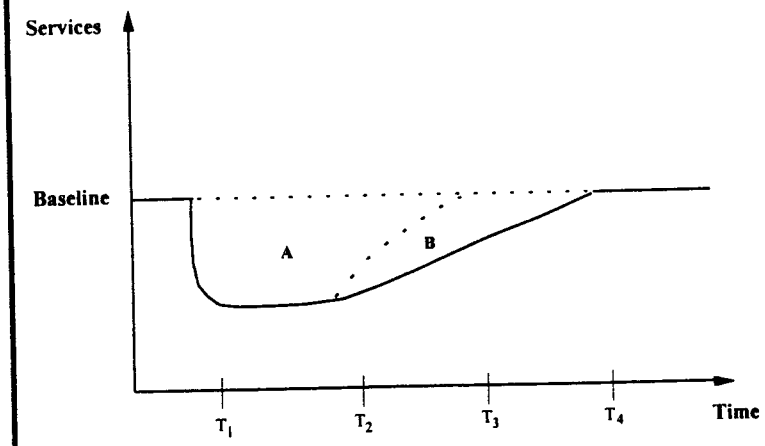
This is a partial list of economic damages that are not recoverable under CERCLA and OPA. Service employees should discuss the categories of damage they hope to pursue with the DOI solicitor assigned to each case early in the damage assessment process in order to identify potential legal obstacles.

1.3.5 The Relationship Between Restoration Costs and Compensable Values

Compensable values are often a function of the restoration option chosen for a site. For example, consider the graphic presented in Exhibit 1-3. In this case some event has occurred at time T_1 which reduces services from the baseline (i.e., pre-spill) level to a lower level. This example assumes that, if no restoration activity is undertaken, the resource will recover to the baseline level by time T_4. In this case economic damages would be represented by the area A+B. Now assume that some restoration activity begins at time T_2, which allows the resource to recover more quickly (by time T_3). In this case damages would be represented by area A. In other words, the benefits of the restoration action (in the form of avoided losses) are represented by area B.

Exhibit 1-3

RELATIONSHIP BETWEEN RESTORATION COSTS AND COMPENSABLE VALUES



T_1 = Injury begins
T_2 = Restoration results begin
T_3 = Restoration achieves baseline
T_4 = Baseline achieved through natural recovery
A = Interim compensable values, given restoration
B = Compensable values avoided through restoration

This relationship is also considered in Exhibit 1-4. In this case three alternative restoration options are available, which vary in terms of the number of years to full recovery of the injured resource. For these options, as restoration effort increases, compensable values decrease. For example, releases from an uncontrolled hazardous waste site may have resulted in contamination of a riverine environment. A less intensive restoration action (e.g., source control

release of a hazardous substance is detected [43 CFR 11.14(h)].

[6] While there have been several interpretations of this "wholly before" limitation, this interpretation is the most common.

Exhibit 1-4

RESTORATION COSTS AND COMPENSABLE LOSSES ASSOCIATED WITH DIFFERENT RESTORATION ALTERNATIVES

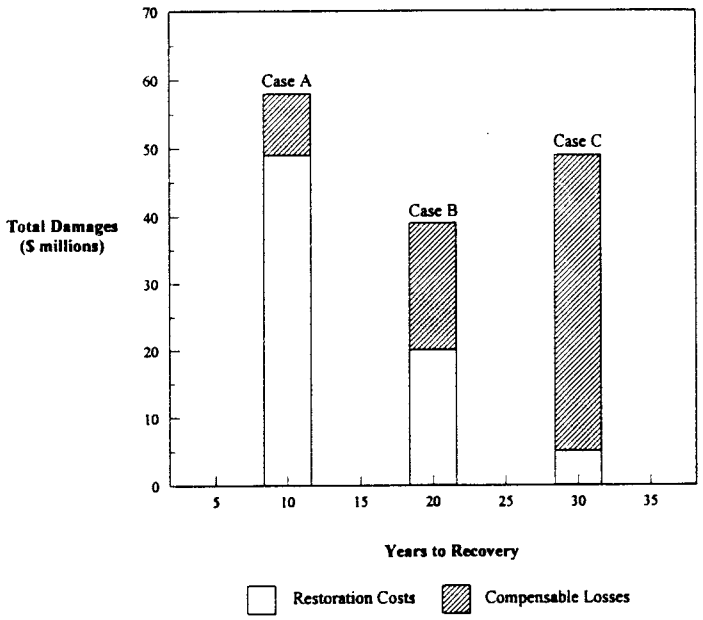
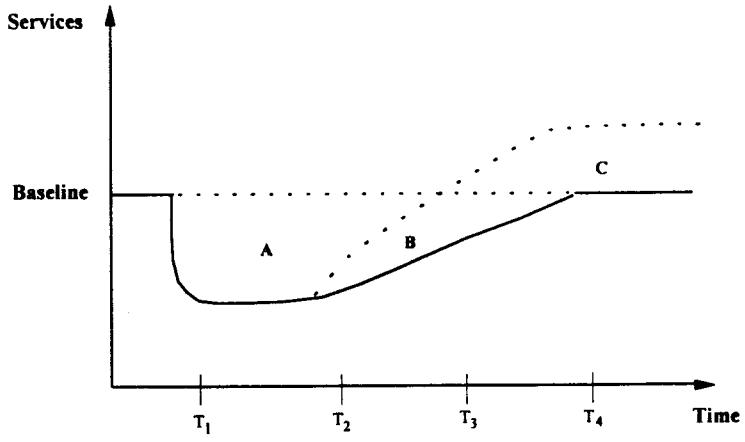


Exhibit 1-5

RELATIONSHIP BETWEEN RESTORATION COSTS AND COMPENSABLE VALUES



T_1 = Injury begins
T_2 = Restoration results begin
T_3 = Restoration achieves baseline
T_4 = Baseline achieved through natural recovery
A = Interim compensable values, given restoration
B = Compensable values avoided through restoration
C = Compensatory services

with no treatment of contaminated sediments) might cost relatively little, but leave significant compensable value losses (as illustrated in Exhibit 1-4 as Case C). Alternatively, a more intensive restoration program (e.g., treatment of contaminated sediment combined with restoration of injured biota) might be relatively expensive, but allow for a large reduction in compensable losses (Case A). In the single example shown in Exhibit 1-4, the economically optimal restoration action would be Case B, which represents the option with the lowest total restoration cost plus compensable losses (i.e., the minimum of total damages). Of course, in many cases it will not be feasible to monetize all compensable losses, or to generate such a complete set of restoration options. The general concept that restoration costs and compensable losses should be balanced, however, should be considered in all cases.

Recall that all funds recovered as part of a damage claim must be used only to compensate the trustees for assessment costs and to restore the resource. Thus, in some cases the pattern of services at the site of a release will look more like the graphic presented in Exhibit 1-5. That is, activities will be undertaken to restore services at time T_2, which will continue past time T_3. These additional services, which are sometimes referred to as compensatory services, are represented by area C.

1.4 TRACKING ASSESSMENT COSTS

A complete damage claim will include all "reasonable" costs incurred in completing the assessment. Damage assessment costs are reasonable when the various phases of the assessment have a well defined relationship to one another and are coordinated, when the anticipated incremental benefit obtained by using a more costly injury or damage assessment technique is greater than the anticipated cost of the technique, and when the expected cost of the assessment is expected to be less than the expected damages. This manual does not provide detailed guidance on assessment cost accounting; however, several general statements can be made:

- Guidelines are available for cost accounting and documentation for purposes of damage assessment (e.g., Superfund cost recovery guidance, Coast Guard spill response cost recovery guidance). Service employees should consult these sources early in the damage assessment process to assure that appropriate procedures are being followed to allow for full recovery of all costs properly allocable to the assessment.

- Costs incurred in all phases of the damage assessment that are properly allocated to the assessment should be recovered. These include the costs of developing a preassessment screen, conducting assessment planning activities, completing the assessment, and conducting post-assessment activities (e.g., restoration planning).

- All costs, both direct and indirect, that are properly allocated to the assessment should be recovered. For example, costs incurred in identifying and contracting with outside experts is a category of costs recoverable within an assessment. Similarly, indirect costs associated with Service employees (e.g., fringe benefits) are also recoverable.

- In some cases pre-judgement interest may be collected on assessment costs incurred prior to a judgement against (or settlement with) the responsible party. In addition, post-judgment interest may accrue on damage awards. Readers should refer to Chapter 6 for further discussion of this topic.

Many of the issues raised in accounting for assessment costs are the same as those in accounting for restoration costs. Readers should refer to Chapter 3 for further review of these issues.

1.5 INTERIOR'S TRUST RESOURCES

States, Indian tribes and various federal agencies serve as natural resource trustees under CERCLA and OPA, among other statutes. Within the federal government, the Secretary of the Interior shares trustee responsibilities with the Secretaries of Commerce (delegated to the National Oceanic and Atmospheric Administration), Agriculture, Energy and Defense. The Secretary of the

Interior speaks for all DOI agencies, including the Fish and Wildlife Service. Many, if not most damage assessment cases involve multiple state, federal and sometimes tribal trustee agencies.

DOI regulations define trust resources to include:

> ...land, fish, wildlife, biota, air, water, groundwater, drinking water supplies, and other such resources belonging to, managed by, held in trust by, appertaining to, or otherwise controlled by the United States..., any state or local government, any foreign government, any Indian tribe, or, if such resources are subject to a trust restriction on alienation, any member of an Indian tribe [43 CFR 11.14(z)].

The definition of trust resources promulgated by NOAA under OPA is substantively the same as this definition.

The Secretary of the Interior acts as trustee for natural resources managed or controlled by DOI. Examples of the Secretary's trusteeship include, but are by no means limited to, the following natural resources and their supporting ecosystems: migratory birds; anadromous fish; endangered species and marine mammals; federally-owned minerals; and certain federally managed water resources. The Secretary is also trustee for those natural resources for which an Indian tribe would otherwise act as trustee, in cases where the United States acts on behalf of the Indian tribe. In addition, the Secretary is trustee for natural resources located in, over, or under land administered by DOI. Examples of these land resources include units of the Natural Park Service, the Natural Wildlife Refuge System, and public lands managed by the Bureau of Land Management (Title 40, Subpart G, Part 300.600, "Trustees for Natural Resources," The National Oil and Hazardous Substances Pollution Contingency Plan under CERCLA).

Given the mobility of many fish and wildlife species, the Fish and Wildlife Service plays a broad role in a wide-range of damage cases. For example, Service employees' concerns are not limited to releases that result in acute injury to migratory bird species, but can more broadly encompass the loss of clean habitat for these species. That is, since all habitat has the potential to support DOI trust resources, such habitat may itself be a trust resource.

While the principal responsibility of Service employees is to those resources for which the Fish and Wildlife Service has explicit responsibility (e.g., endangered species or their supporting habitat), in many cases Service employees will need to be aware of other Interior trust responsibilities (e.g., National Park Service lands, off-reservation fishery rights held by Indian tribes), and the trust responsibilities of other state or federal agencies (e.g., groundwater) who may be involved in a damage assessment. Consideration of these resources will facilitate development of a comprehensive damage claim that meets the goals of all trust agencies involved.

DOI's trust responsibilities do not appear to extend to "non-natural" resources, such as cultural and historically important resources (e.g., archeological or historic objects, human remains). However, the services provided by natural resources may include support and preservation of these non-natural resources. For example, a service provided by shoreline sediments might include

The "Grossly Disproportionate Test"

Responsible parties have argued that a "grossly disproportionate" test should be applied to selected restoration activities. That is, the cost of a selected restoration activity should not be "grossly disproportionate" to the benefits of the action, with benefits measured in terms of the increase in resource value or services provided. The term "grossly disproportionate" does not appear in the CERCLA or OPA statutes, nor does it appear in DOI's or NOAA's NRDA rules. Its use was first proposed by the court in a footnote to the Ohio v. Interior decision. In this footnote, the court stated:

> Scholars agree that recovery of full restoration cost in every case, no matter how large the sum is, is not required by CERCLA. DOI obviously has some latitude in deciding which measure applies in a given case: the rule might for instance hedge on the relationship between restoration cost and use value (e.g., damages are limited to three-times the amount of use value)" [880 F.2d at 443-44 n. 7].

Instead of relying on this test in the selection of an appropriate restoration program, Service employees should follow the DOI and NOAA guidelines for restoration alternative selection. These guidelines include consideration of the cost-effectiveness of available options and the relationship between expected costs and benefits (not all of which can be monetized), as well as a range of other factors.

serving as a "vessel" for historical artifacts. An oil spill might result in the inability to carbon date these artifacts, or shoreline erosion resulting from the loss of vegetation might lead to a loss of archaeological remains. In this case, the value of the natural resource is partly the value of preserving or maintaining historically or culturally significant resources. Similarly, other natural resources might provide the context for cultural resources (e.g., the cultural value of an historic lighthouse may, in part, be related to the beauty of the natural setting in which it is found). In some cases, other statutes (e.g., the Archaeological Resource Protection Act) might serve as a legal means for recovering damages to these resources. Further discussion of the various services provided by natural resources is provided in Chapter 2.

1.6 Overview of Manual

The remainder of this manual is presented in six chapters. Chapter 2 provides an overview of the damage assessment process, with a focus on the role of economics in this process. Chapter 3 addresses the issue of restoration costing for purposes of natural resource damage assessment, with the goal of assuring that restoration cost estimates are complete and accurate. Chapters 4 and 5 address direct and indirect methods for assessing compensable losses. Chapter 6 describes the role of time in the natural resource damage assessment process, including the calculation of present value

restoration costs, compensable values and damage assessment costs. Finally, Chapter 7 contains a general discussion of the role of uncertainty in the damage assessment process.

Several appendices are also provided. Appendix A contains a glossary of terms and definitions of abbreviations commonly encountered in economic damage assessment. Appendix B presents an annotated bibliography of selected documents that provide additional discussion of the issues and topics raised in this manual. Appendix C proposes a standard format for reports of economic damage assessments.

Readers should note two conventions used in this manual. First, citations to DOI's final rules and NOAA's proposed rules for damage assessment are given in an abbreviated format (43 CFR 11.xx and 15 CFR 990.xx, respectively). Since NOAA's rules were proposed rather than final at the time this manual was developed, they had not yet been published in the Code of Federal Regulations. Until they are, these rules can be found at 59 Federal Register 1167-1189 (January 7, 1994). In addition, the term "restoration" is used throughout this manual to refer to any actions to restore, replace, rehabilitate, and/or acquire the equivalent of injured natural resources.