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Natural Resource Damages: A Research Guide

David Hodas*

I. Introduction

Although the enormity of the Exxon oil spill in Valdez, Alaska focused attention on the fragile character of the world's ecosystems,¹ the problem of natural resource damages is not limited to occasional, but all too frequent, catastrophic events. The environmental laws enacted since 1970 have reduced the impact of industrial activity on the environment and have forced the internalization of the cost of environmental controls into most industrial, commercial, and governmental activities. To the extent those laws, particularly the Clean Air Act² and the Clean Water Act,³ have been effective they have only reduced — not eliminated — the discharge of pollutants into the environment. Although this pollution imposes

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1. JOHN KEEBLE, *OUT OF THE CHANNEL: THE EXXON VALDEZ OIL SPILL IN PRINCE WILLIAM SOUND* (1991). For a detailed review, see Christine Cartwright, Note, *Natural Resource Damage Assessment: The Exxon Valdez Oil Spill and Its Implications*, 17 *RUTGERS CORP. & TECH. L.J.* 451 (1991).

2. 42 U.S.C. §§ 7401 - 7642 (1988).

3. 33 U.S.C. §§ 1251 - 1387 (1988).

very real costs on society, the dischargers do not include the cost of remedying the effects of their permitted discharges in their cost of doing business. The problems of urban smog, emission of hazardous air pollutants, acid rain, and global warming are examples of despoiling of the global commons without charge to the polluter.⁴ Because atmospheric damages are diffuse it is hard to assess the costs against the polluter, however, when a tanker spills oil or an industrial concern pollutes an aquifer with toxic chemicals, the damages are more localized and immediately apparent. In these situations environmental laws have attempted to assess against the polluter the social costs of the damages to the natural resource. Presumably, if the full social costs are assessed and collected from the responsible parties, these costs will become internalized into market decisions in the commercial and industrial world. Business decisions will then be made to avoid incurring the costs of damaging natural resources.

This research guide will focus on the federal statutory law and supporting materials available to assess natural resource damages against persons who damage natural resources as a result of discharge of pollutants into the environment. Although this guide is limited to federal natural resource damages claims, much of the material can be applicable to state statutory⁵ or common law claims.⁶

4. For an exhaustive review of the monetary costs of environmental externalities and the methods and theories used to assess these environmental costs, see OTTINGER ET AL., *ENVIRONMENTAL COSTS OF ELECTRICITY* (1991). See also *EXTERNAL ENVIRONMENTAL COSTS OF ELECTRIC POWER* (Hohmeyer & Ottinger eds., 1991).

5. It is beyond the scope of this research guide to survey the statutory and common law of each state on natural resource damages. Many states have statutes that address this issue. A Westlaw search under the "STAT-ALL" database for "Natural Resource* damage*" located statutes in Florida (28 FLA. STAT. ANN. §§ 370.116, 376.11 (1991), relating to the Coral Reef Restoration Fund and the Florida Coastal Protection Trust), Maryland (MD. ENVIR. CODE ANN. § 4-411 (1987), relating to oil discharge containment, control and clean-up), Minnesota (9 MINN. STAT. § 115A.301 (1987), relating to waste management), New Jersey (13 N.J. STAT. ANN. § 1E-106 (West 1991), relating to strict liability for damages due to operations or closure of sanitary landfills); 58 N.J. STAT. ANN. § 10-23.11G (1982), liability for clean-up and removal costs and direct and indirect damages from oil pollution), New York (Ch. 37 McKinney's Con. N.Y.A. Art. 12 § 181, liability for oil spills), Ohio (37 OHIO REV. CODE ANN. § 3734.28 (Anderson 1988), hazardous waste clean-up fund), and Virginia

The guide will identify the federal legal authorities which permit the assessment and collection of natural resource damages against dischargers of petroleum or hazardous substances on to land or water and will review the materials, both legal and nonlegal, that relate to the valuation of natural resource damages. The nonlegal materials will emphasize environmental economics and valuation methodologies. This guide is designed to provide a person interested in valuing damages to natural resources with sources of information on the measures of damages applicable to assessing the harm to the natural resources and how those measures should be applied. This guide will not cover specific substantive environmental or ecological scientific materials.

II. Legal Authority

A. Statutes, Regulations, and Legislative Histories

1. Research Guidance

For an excellent summary of research methods for locating federal statutory and regulatory materials, including legislative histories, see Christine J. McCulloch, *Wetlands: Federal Law and National Policy Research Guide*, 5 PACE ENVTL. L. REV. 167, 176-180, 186-192 (1987). This Natural Resource Damages Research Guide assumes that readers have competent legal research skills in the areas of statutes, regulations, legislative history, and case law.

To update this guide's list of federal statutes addressing natural resource damages, one should use the general indexes

(9 VA. CODE ANN. § 62.1-44.34:7 (Michie 1987), oil spill contingency fund). There is much more state law than this search revealed; when a particular state is of interest, that state's laws should be researched in depth.

6. State common law doctrines of public and private nuisance can provide causes of action to assess damages to natural resources. See, e.g., *Miller v. Cudahy*, 858 F.2d 1449 (10th Cir. 1988), *State ex rel. Dresser Industries v. Reuddy*, 592 S.W.2d 789 (Mo. 1980), and WILLIAM H. ROGERS, *ENVIRONMENTAL LAW-AIR AND WATER* (2d ed. 1988), and Landreth & Ward, *Natural Resource Damages: Recovery Under State Law Compared With Federal Laws*, 20 *Envtl L. Rep.* (Envtl L. Inst.) 10134 (1990). A review of the law of nuisance, public or private, is outside the scope of this research guide.

of United States Code Annotated and United States Code Service. Useful index headings include "environment" and "natural resources" with subheadings of "natural resource damages" or "damages." One should also look under the subject heading of the particular resource of interest, such as coastal zone, oceans, groundwater, fish, and wildlife. This should be supplemented by a computer-based search using Westlaw or Lexis in their federal statutory databases. The research should not be limited to the specialized environmental databases that both services offer because all relevant statutes might not be in the specialized databases; the researcher is at the mercy of the companies' categorization decisions.

To update regulatory material, similar headings should be used when searching the Code of Federal Regulations (CFR) index. Because this is an active field the CFR regulations must be supplemented by using the Federal Register cumulative index with its list of sections affected, and by reading the relevant notices in the Federal Register. These notices often give complete administrative histories of a regulation or proposed regulation.

Administrative materials can be the source of valuable information. The preambles of notices of rule-making and of proposed rule-making can be invaluable sources of legal, administrative, and scientific material, and they provide the names, addresses, and telephone numbers of the relevant, knowledgeable government people, and sometimes of non-government person active in the field. The docket for each administrative proceeding is open to the public at E.P.A. headquarters in Washington, D.C. The docket contains all comments received by E.P.A. on the proposed action. These comments can be useful in two ways: 1) the substance of the comment may be pertinent to the research, and 2) the comments may identify persons active in the field who may be useful sources of further information.

To locate legislative histories on the new statutes identified by subsequent research one should start with the statutory annotations, which often provide references to the legislative history of the statute. The annotations generally refer the reader to *United States Code Congressional and Admin-*

istrative News. A particularly useful work for legislative histories and for statements by witnesses in legislative hearings is Congressional Information Service, Inc.'s abstracts of Congressional publications, indexes (CIS) and on-line data base (available through Dialog). Another work useful in the area of legislative histories is NANCY JOHNSON, *SOURCES OF COMPILED LEGISLATIVE HISTORIES: A BIBLIOGRAPHY OF GOVERNMENT DOCUMENTS, PERIODICAL ARTICLES, AND BOOKS, 1ST-99TH CONGRESS* (1988). The *Congressional Record* should be used to obtain the full legislative debates. The best source of information on current Congressional developments in the environmental field is the weekly newsletter published by the Energy and Environment Study Institute and the Energy and Environment Study Conference in Washington, DC. This newsletter provides up-to-date information and analysis on all pending environmental bills and hearings. Finally, to obtain testimony given at Senate or House of Representative hearings one should contact the document office of the committee of interest for a free copy of the transcribed hearing.

2. Comprehensive Environmental Response, Compensation and Liability Act (CERCLA), 42 U.S.C. § 9601 - 9675 (1988), Pub. L. 96-510 (Dec. 11, 1980) *as amended by* Pub. L. 99-499 (Oct. 17, 1986).

- a. CERCLA

This section of CERCLA establishes who is liable to whom for what on account of the release of hazardous substances (excluding petroleum, *see* § 9601(14)) into the environment, and permits federal and state government natural resource trustees to recover "damages for injury to, destruction of, or loss of natural resources . . ." resulting from a release of a hazardous substance. Natural resources protected by CERCLA include land, fish, wildlife, biota, air, water, groundwater and drinking water supplies. (§ 9601(16)).

CERCLA requires the President to promulgate regulations establishing protocols for the best available procedures to determine natural resource damages, including direct and indirect injury, destruction, or loss and considering factors in-

cluding, but not limited to, replacement value, use value and the ability of the ecosystem or resources to recover. (§ 9651(c)). Although the natural resource trustee is not obligated to follow those protocols, any assessment made in accordance with the regulations shall have the force and effect of a rebuttable presumption on behalf of the trustee. (§ 9607(f)(2)(C)). While double recovery is not permitted, the measure of damages is not limited to the cost of restoration or replacement of the damaged resource. (§ 9607(f)). Funds recovered, however, must be used only to restore, replace, or acquire the equivalent of the natural resource lost or damaged. (§ 9607(f)).

b. Relevant Regulations

Pursuant to section 9651(c), the Department of Interior promulgated at 43 C.F.R. Pt. 11 (1987) regulations for valuing natural resource damages. These regulations cover Type A assessments, which are simplified assessments based upon computer models to evaluate routine spills, usually oil, in coastal and marine environments. 43 C.F.R. §§ 11.40-41. For more complex situations, the regulations require Type B assessments, which involve three phases: injury determination, quantification, and damage determination. 43 C.F.R. §§ 11.60-84. The preamble to the adoption of final Type B assessment rules contains the Department of Interior's responses to comments on and background on the procedure. *See* 51 Fed. Reg. 27,674 (Aug. 1, 1986). Both the Type A and Type B regulations were challenged in court resulting in the Department of the Interior (Interior) changing forty-three CFR sections, 11.10-11.93. The Interior had previously allowed a "lesson of" restoration or use value in evaluating natural resource damages. The court rejected that view because it found CERCLA was intended to restore or replace the damaged resources in addition to compensation for loss of use. In addition, the court held that market values were *not* the primary indication of natural resource damages and that evaluation methods were as useful and important to valuation. *Ohio v. United States Dep't of Interior*, 880 F.2d 432 (D.C. Cir. 1989) and

Colorado v. United States Dep't of Interior, 880 F.2d 481 (D.C. Cir. 1989). See also, Erik D. Olson, *Natural Resource Damages in the Wake of the Ohio and Colorado Decisions: Where Do We Go From Here?* 19 *Envtl. L. Rep.* (Envtl. L. Inst.) 10551 (1989), and Michael W. Jones, *Natural Resource Damage Assessments for Oil Spills: Policy Considerations Underlying the Evolution of the Department of the Interior's Regulations*, 1 *VILLANOVA ENV. L.J.* 491 (1991).

In the National Oil and Hazardous Pollution Contingency Plan (NCP), 40 C.F.R. pt. 300, Subpart G, §§ 300.72-74 (1991), the Federal trustees for natural resource damages are designated. The agencies responsible for managing or protecting the affected land or natural resource will also be trustees for any natural resource damage claim.

c. Legislative History

The legislative history for CERCLA can be found generally at 1980 U.S.C.A.N. 6119 and 1986 U.S.C.A.N. 2835. For persons interested specifically in the scope of the measure of damages and whether the Department of Interior regulations are consistent with CERCLA when it was amended in 1986, the Congressional Record indicates that the Senate was of the opinion that the regulations constitute an unreasonable construction of CERCLA, with no basis in law. 132 *CONG. REC.* S14930 (daily ed. Oct. 3, 1986) (colloquy of Sen. Baucus and Sen. Stafford). Other materials on CERCLA's legislative history are Frank P. Grad, *A Legislative History of the Comprehensive Environmental Responsibility, Liability and Compensation ("Superfund") Act of 1980*, 8 *COLUM. J. ENVTL. L.* 1 (1982). See also Helen Cohn Needham, *Superfund: A Legislative History*, *Envtl. Law Inst.* (1984), and Timothy B. Atkeson, *An Annotated Legislative History of the Superfund Amendments and Reauthorization Act of 1986 (SARA)*, 16 *Envtl. L. Rep.* (Envtl. L. Inst.) 10,363 (1986).

3. Clean Water Act (CWA), 33 U.S.C. § 1321(f)(4),(5) (1991)

a. CWA

These provisions provide that federal and state natural resource trustees shall act on behalf of the public to recover the costs of replacing or restoring natural resources damaged or destroyed as a result of a discharge of oil or a hazardous substance in violation of § 1321(b). Money recovered by the natural resource trustee shall be used to restore, rehabilitate, or acquire the equivalent of the damaged or lost natural resource.

b. Regulations

Natural resource trustees under the CWA are covered by the same regulations under the NCP and as promulgated by the Department of the Interior as trustees under CERCLA described above.

c. Legislative History

The legislative history of Pub. L. No. 92-500 can be found at 1972 U.S.C.C.A.N. 3668, of Pub. L. No. 95-217 at 1977 U.S.C.C.A.N. 4326, and Pub. L. No. 100-4 at 1987 U.S.C.C.A.N. 5. Other writings on the legislative histories of the CWA can be found in Ridgeway M. Hall Jr., *The Clean Water Act of 1977*, 11 Nat. Resources Law 343 (1978). United States Government Printing Office, *Legislative History of the Clean Water Act of 1977* (1978).

4. Marine Sanctuaries Authorization Act of 1988, 16 U.S.C. §§ 1431-1439 (1991).

a. Statute

The act authorizes the Department of Commerce Undersecretary for Oceans and Atmosphere (formerly the National Oceanic and Atmospheric Administration), as natural resource trustee, to sue anyone damaging a marine sanctuary for damages including the cost of replacing, restoring or acquiring the

equivalent of a sanctuary resource, the value of the loss of use of the resource, or the value of the sanctuary if it cannot be restored or replaced. (§ 1432(b)). Civil penalties collected under the Act shall be used for management and improvement of marine sanctuaries. The Secretary is named as trustee in the statute. (§ 1443(c)).

b. Regulations

The regulations for the act are located at 15 C.F.R. ch. IX, § 902.1-981.64 (1991).

c. Legislative History

The legislative history for 1988 amendments can be found at 1988 U.S.C.C.A.N. 4387, which indicates that the amendments were motivated in part by two accidents that caused significant damage to marine sanctuary resources. The amendments will permit NOAA to retain damage awards for restoration of damaged resources.

5. National Environmental Policy Act (NEPA), 42 U.S.C. §§ 4321-4370b (1991).

a. Statute

NEPA requires an environmental impact statement (EIS) to accompany every proposal for legislation or major federal actions significantly affecting the quality of the human environment. (§ 4332(C)). The EIS must consider adverse environmental effects if the proposal is implemented, alternatives to the proposal, and any irreversible and irretrievable commitments of resources which would be involved if the proposal should be implemented.

b. Regulations

The NEPA regulations are codified at 40 C.F.R. §§ 1500.1-1508.27 (1991). Of particular interest for purposes of natural resource damages is 40 C.F.R. § 1502.16(f) which requires environmental impact statements to discuss natural resource requirements and mitigation measures.

c. Legislative History

The legislative history of Pub. L. No. 91-190 is located at 1969 U.S.C.C.A.N. 2751, and for Pub. L. No. 94-83 at 1975 U.S.C.C.A.N. 859.

6. Oil Pollution Compensation Funds

a. Statutes

i. Offshore Oil Spill Pollution Fund, 43 U.S.C. §§ 1811-1824 (1991).

This act set up a \$200,000,000 fund to pay claims for damages caused by oil pollution from Outer Continental Shelf oil activities. Statutory damages include injury to, or destruction of natural resources, loss of use of natural resources, and loss of profits or impairment of earning capacity due to injury to or destruction of natural resources. (§§ 1813(a)(2)(C,D, & E)). A special feature of the Fund is that generally anyone paid by the Fund is barred from seeking damages under any other federal or state law, and anyone who obtains damages under any other federal or state law is barred from claiming damages from the Fund. (§ 1820).

Regulations, located at 33 C.F.R. §§ 136.203-223 (1991), allow natural resource trustees to seek the cost of restoring, rehabilitating or acquiring equivalent natural resources and any additional economic loss actually suffered (§ 136.217). Any person who suffered economic loss as a result of not being able directly to use any natural resource may seek to collect the net economic loss suffered so long as mitigation was attempted (§§ 136.219, 136.223). Any person who derived at least twenty-five percent of his or her income from activities which relate to the utilization of the damaged resource may be awarded his or her loss after reasonable mitigation (§§ 136.207, 136.211).

ii. Deepwater Ports Amendments of 1984, 33 U.S.C. §§ 1501-1524 (1991).

This act set up a fund to compensate persons damaged by discharges of oil into the marine environment arising from

deepwater port activities; a deepwater port is any fixed or floating manmade structure located beyond the territorial sea and off the coast of the United States, other than a vessel, and all associated components which are used or intended for use as a port or terminal for the loading, unloading and handling of oil for transportation to any State. (§ 1517). The fund will compensate for damages to natural resources of the marine environment or the coastal environment of any nation, including any affected lands, structures, fish, wildlife and biota. (§ 1517(m)(2)).

Regulations covering natural resource damage claims are located at 33 C.F.R. § 137.509 (1991).

iii. Trans-Alaska Pipeline Authorization Act, 43 U.S.C. § 1653 (1991).

This act set up a \$100,000,000 fund to compensate for all damages caused by the discharge of oil from a vessel transporting oil from the terminal facilities of the pipeline to a port of the United States.

Regulations for this act, located at 43 C.F.R. §§ 29.1-29.14 (1991), establish strict liability for all damages when a vessel discharges oil between the terminal facilities and a U.S. port. Damages to natural resources include injury to, destruction of, loss of use of, and loss of profits from or impairment of earning capacity due to injury to natural resources, including loss of subsistence hunting, fishing and gathering opportunities.

iv. Oil Pollution Act of 1990 33 U.S.C. §§ 2701-2761 (1991).

This act creates a federal law which focuses specifically on comparing liability for spills by requiring appointment of responsible federal trustees (Exec. Order No. 1277, 56 Fed. Reg. 54,757 (1991)), providing increased liability for natural resource damages (§ 2704(a)) and requiring new regulations for damage assessment following *Ohio v. United States Dep't of Interior*, 880 F.2d 432 (D.C. Cir. 1989) (which regulations will be located at 15 C.F.R. ch. IX). The act uses the funds set aside in the Oil Spill Liability Fund (26 U.S.C. § 9509 (1991))

to cleanup spills, assess damages and recover these costs and damages from the responsible parties. The money recovered and returned to this fund is to be used for future response and natural resource damage assessment clean-up efforts.

B. Important Case Law

There are few reported decisions interpreting the natural resource damage provisions of these statutes, although there is a steady stream of litigation. In addition to standard case research tools, a useful source of information in this area is the pending litigation service in Environmental Law Institute, *Environmental Law Reporter*, Washington, D.C. (ELR). ELR provides monthly reports on pending litigation developments in the field. Pleadings and briefs are often available for a photocopying charge together with names, addresses and telephone numbers of the attorneys in the cases. The attorneys can be invaluable sources of information about developments in this field. The ELR index is useful; under "CERCLA, liability, natural resource damages" and "FWPCA - oil and hazardous substance spills" most relevant decided and pending cases can be located.

The most important natural resource damage case under these statutes is *Commonwealth of Puerto Rico v. SS Zoe Colocotroni*, 628 F.2d 652 (1st Cir. 1980), which thoroughly reviews the measure of damages for natural resource damages and applies it to an oil spill off the coast of Puerto Rico. The important West Digest key number in this area of the law is Health and Environment 25.7(23). There are no ALR or ALR Fed annotations that address natural resource damage claims.

The only other case to discuss the measure of damages is *Idaho v. Bunker Hill Company*, 635 F. Supp. 665, 676 (D. Idaho 1986), which held, without analysis of CERCLA's measure of damages provisions, that the measure of damages would be the lesser of a value basis calculation and a cost of restoration calculation. The *Bunker Hill* court reached its decision on the basis of a statement of Sen. Simpson in 1980 which was explicitly repudiated by the House and Senate when the 1986 amendments were enacted. See 132 CONG. REC.

S14930 (daily ed. Oct. 3, 1986)(colloquy of Sen. Baucus and Sen. Stafford).

An excellent compilation of judicial decisions on the valuation of natural resource damages can be found in EDWARD J. YANG ET AL., *THE USE OF ECONOMIC ANALYSIS IN VALUING NATURAL RESOURCE DAMAGES* 137-153 (1984), published for the U.S. Dep't of Commerce, the Nat'l. Oceanic and Atmospheric Administration, and the Environmental Law Institute. The authors review cases in which damages were assessed by the court or in which settlements were reached after plaintiffs had developed a damage assessment methodology and a monetary estimate of natural resource damages.

C. Relevant Federal Government Organizations

1. Research Guidance

No research in any area of environmental law would be adequate without locating and talking to the government official(s) active in the field. Turnover in both the executive and legislative branches of the federal government is high, so one should not anticipate that the persons named below as contacts will be in those positions a month or year from now. Nevertheless the information provided below will be useful as a starting point. To update the information, use the OFFICE OF FEDERAL REGISTER, UNITED STATES GOVERNMENT MANUAL, U.S. Government Printing Office (Washington, DC) and agency telephone directories (which are issued annually) for an updated agency organization chart and list of names, addresses and telephone numbers. In environmental law generally and natural resource damages particularly, finding a person who is knowledgeable takes persistence, patience, good telephone skills and hard work; but the information on the desk of right person, when he/she is finally located can be worth its weight in gold. Other sources of Washington information are: FEDERAL STAFF DIRECTORY (Ann L. Browson ed., 1991), published by Staff Directories, Ltd., Mt. Vernon, VA; CONGRESSIONAL YELLOW BOOK (Schreiber ed., 1991), published by Monitor Publishing, Washington, DC; FEDERAL YELLOW BOOK (Cook ed., 1991), published by Monitor Publishing,

Washington, D.C.; CONGRESSIONAL QUARTERLY, FEDERAL REGULATORY DIRECTORY (5th ed. 1986); and CONGRESSIONAL QUARTERLY, WASHINGTON INFORMATION DIRECTORY (1991).

GOVERNMENT INSTITUTES, INC., DIRECTORY OF ENVIRONMENTAL INFORMATION SOURCES (Thomas F.P. Sullivan ed., 2d ed., 1988) is one of the most important tools for environmental research. It contains a current listing of federal government resources, state government resources, environmentally related professional, scientific and trade organizations, newsletters, magazines and periodicals and computer databases. The information in the book is accessible by subject (air quality, coastal zone management, emergency preparedness/community right to know, environmental protection, fish and wildlife, groundwater management, hazardous waste management, natural resources, occupational safety, pesticide registration, solid waste management, underground storage tanks, and water quality) which makes locating useful sources of information relatively quick and easy.

2. Legislative Branch

- a. Office of Technology Assessment
Science, Information and
Natural Resources Division
John P. Andelin, Asst. Dir.
(202) 228-6750

Oceans and Environmental Program
Robert W. Niblock, Manager
United States Congress
600 Pennsylvania Ave., S.E.
Washington, DC 20570
(202) 228-6840

OTA reports to Congress on the scientific and technical impact of government policies and proposed legislative initiatives.

- b. Congressional Research Service
Environmental and Natural

Resources Policy Division
James Madison Memorial Building, Rm. 423
Washington, DC 20540
(202) 707-6044

- c. Senate Committee on Environment
and Public Works
SD-458 Building
Washington, DC 20510-6175
Majority Staff (202) 224-6176

This committee, which has responsibility in the Senate for environmental matters including natural resources, is divided into three subcommittees for these issues:

- (1) Senate Subcommittee on
Environmental Protection
SD-48 Building
Washington, DC 20510-6175
(202) 224-6176
 - (2) Senate Subcommittee on Water Resources,
Transportation, and Infrastructure
SD-48 Building
Washington, DC 20510-6176
(202) 224-3597
 - (3) Senate Subcommittee on SuperFund
Ocean and Water Protection
SD-48 Building
Washington, DC 20510
(202) 224-6691
- d. House of Representatives Committee on Merchant
Marine and Fisheries Fisheries and Wildlife Conserva-
tion and the Environment Subcommittee
1334 Longworth House Office Building
Washington, DC 20515-6230
Majority Committee Staff (202) 225-4047
Majority Subcommittee Staff (202) 226-3533
- e. House Energy and Commerce Committee
Subcommittee on Health and the Environment
2415 Rayburn House Office Building
Washington, DC 20515-6188
Majority Staff (202) 225-4952

3. Executive Branch

a. Council on Environmental Quality

722 Jackson Place, N.W.
Washington, DC 20006
(202) 395-5750

b. National Oceanic and Atmospheric Administration (NOAA)

John A. Knauss, Undersecretary
Herbert C. Hoover Bld.
14th and Constitution Ave., N.W.
Washington, DC 20230
(202) 377-3436

This division supports the Secretary of Commerce when he/she is acting as a natural resource trustee under CERCLA, CWA or the Marine Sanctuaries Authorization Act of 1988.

c. Environment and Natural Resource Division

U.S. Department of Justice
Barry Hartman, Acting Asst. Attorney Gen.
10th St. and Constitution Ave, N.W.
Washington, DC 20530
(202) 514-2701

This division of the Justice Department represents Federal natural resource trustees in actions against responsible parties for natural resource damages.

d. Department of Interior

Under Asst. Sec. of Policy, Management & Budget
Office of Environmental Affairs
Jonathan Deason, Dir.
NRDA Regs. Attention: Cecil Hoffmann
Room 2340
1849 C St., N.W.
Washington, DC 20240
(202) 208-3891

This office is responsible for promulgation and periodic review of the type A and B natural resource damage regula-

tions contained in the National Contingency Plan and used by natural resource trustees under CERCLA and the Clean Water Act.

III. Publications and Articles

A. Essential Writings

1. Research Guidance

Finding the key works in this field is very difficult and is not the result of ordinary library research. One should start by consulting lawyers with a broad range of experience and knowledge in environmental law. While they may not have the answers to your research questions, they will direct you to persons who are focused more specifically in the area in question. The research is an iterative process: the efforts keep missing the mark, but each time by less distance until what information is available will finally be obtained. When more than one person directs you to the same knowledgeable person, office, or written material, you will know you are on the right track. The best way to begin the job of updating this list of writings is to contact several of the authors directly.

2. Valuation of Natural Resource Damages

a. EDWARD J. YANG ET AL., *The Use of Economic Analysis in Valuing Natural Resource Damages*, Env'tl. L. Inst., National Oceanic and Atmospheric Administration, U.S. Dep't of Commerce (1984).

This is an invaluable report that covers the economic concepts underlying most valuation methods, describes and examines those methods, and places those valuation methods into the legal and regulatory framework in which they are to be applied. Any lawyer unfamiliar with welfare economics and the valuation methods of replacement costs, energy value, travel cost, contingent value and hedonic functions will find this report necessary for effective practice in this area.

b. Roger C. Dower & Paul F. Scodari, *Compensation for Natural Resource Injury: An Emerging Federal Framework*, 4 MARINE RESOURCE ECONOMICS 155 (1987).

This paper reviews the CERCLA natural resource damage assessment and compensation framework and several legal and economic issues that are likely to undermine the ability of the framework to achieve its objectives. The paper is useful in understanding the seriousness of the dispute over the Department of Interior's Type B assessment rules' definition of natural resource use values, natural resource intrinsic values, real versus perceived injury and public versus private damages, and how these definitions can greatly affect valuation.

c. ENVIRONMENTAL LAW INSTITUTE, *ASSESSING NATURAL RESOURCE DAMAGES FROM HAZARDOUS SUBSTANCES: AN EXAMINATION OF EXISTING ASSESSMENT APPROACHES* (1985).

In addition to reviewing key concepts and analyzing existing assessment procedures (physical and economic) to hazardous substances releases, this study is useful because it applies the valuation concepts to five cases of natural resource damage caused by hazardous substances. The case studies demonstrate the state-of-the-art in real world situations and reveals the strengths and weaknesses of various assessment approaches.

d. Roger C. Dower & Paul F. Scodari, *Economics and the Law, Compensation for Damages to Public Natural Resources*, in, *ECONOMY NON-MARKET EVALUATION OF LOSSES TO FISH, WILDLIFE, AND OTHER ENVIRONMENTAL RESOURCES*, THE BAY INSTITUTE (Philip A. Meyer & Stephen O. Anderson, eds. 1987).

An excellent introductory summary of legal and economic issues in natural resource valuations.

e. RAYMOND J. KOPP & V. KERRY SMITH, *CAN NATURAL RESOURCE DAMAGES ASSESSMENTS BE PERFORMED? A SUMMARY OF ECONOMIC ISSUES* (June 1988)(Discussion paper / Quality of the Environment Division, Resources for the Future; v 88-03).

This is a useful summary of CERCLA procedures for making natural resource damage assessments with case stud-

ies, issue identification and a good list of references.

f. NATIONAL OCEAN SERVICE, U.S. DEPT. OF COMMERCE, *ASSESSING THE SOCIAL COSTS OF OIL SPILLS: THE AMOCO CADIZ CASE STUDY* (1983).

This study should be of interest to those persons following the Exxon oil spill in Alaska this spring. The study presents the various methods used to estimate costs from the Amoco Cadiz spill including clean-up, loss to marine resources (oyster culturing and open sea fisheries), loss to recreationists, loss to the tourist industry, loss of tanker and cargo and other costs. The total costs were estimated at \$190 million to \$290 million (1978 dollars).

3. Legal Articles

a. Research Guidance

The most useful bibliographic tool for locating law review articles in the environmental field is the law review bibliography published in Environmental Law Institute, *Environmental Law Reporter*, Washington, DC (E.L.R.). The bibliographies appear monthly at the end of each month's issue and are collected into cumulative bibliographies annually. Articles of relevance can be found under the subject headings "Comprehensive Environmental Response, Compensation, and Liability Act," "Economic Analysis," "Environmental Policy," "Natural Resources," "Oil and Gas," "Ocean Resources" and "Toxic Substances." In contrast, LegalTrac, a computerized database of legal periodicals is much less useful and did not reveal any articles not included in the ELR bibliographies.

b. Useful articles

i. CERCLA

Frederick R. Anderson, *Natural Resource Damages Superfund and the Courts*, 16 B.C. ENV'TL. AFF. L. REV. 405 (1989).

Timothy B. Atkeson et al., *The Unrealized Potential of SARA: Mobilizing New Protection for Natural Resources*, ENV'T, May 1987, at 6.

Timothy B. Atkeson, et al., *An Annotated Legislative*

History of the Superfund Amendments and Reauthorization Act of 1986 (SARA), [16 News & Analysis] *Envtl. L. Rep.* (Envtl L. Inst.) 10,363 (December, 1986).

Barry Breen, *Citizen Suits for Natural Resource Damages: Closing A Gap in Federal Environmental Law*, 24 *WAKE FOREST L. REV.* 851 (1989).

Barry Breen, *CERCLA's Natural Resource Damage Provisions: What Do We Know So Far?*, [14 News & Analysis] *Envtl. L. Rep.* (Envtl. L. Inst.) 10,304 (August 1984).

Michael Brennan, *Interior Department's Proposed Natural Resource Damage Regulation: An Explanation and Analysis*, 11 *Chem. Waste Litig. Rep.* (Computer Law Reporter) 532 (March 1986).

Cynthia Carlson, *Making CERCLA Natural Resource Damage Regulations Work: The Use of the Public Trust Doctrine and Other State Remedies*, [18 News & Analysis] *Envtl. L. Rep.* (Envtl. L. Inst.) 10,299 (August 1988).

Charles J. Cicchetti & Neil Peck, *Assessing Natural Resources Damages: The Case Against Contingent Value Survey Methods*, 4 *NAT. RESOURCES & ENV'T* 6 (1989).

Frank F. Cross, *Natural Resource Damages Valuation*, 42 *VAND. L. REV.* 269 (1989).

Henry F. Habicht, *The Expanding Role of Natural Resource Damage Claims Under Superfund*, 7 *VA. J. NAT. RESOURCES L.* 1 (1987).

Gordon J. Johnson, *Natural Resource Damage Assessments Under CERCLA: Flawed Regulations May Limit Recoveries*, [1987] 15 *Chem. Waste Litig. Rep.* (Computer Law Reporter) 47 (1987).

Howard Kenison et al., *State Actions for Natural Resource Damages: Enforcement of the Public Trust*, [17 News & Analysis] *Envtl. L. Rep.* (Envtl. L. Inst.) 10,434 (November 1987).

Joseph J. Maraziti, Jr., *Local Governments: Opportunities to Recover Natural Resource Damage*, [News & Analysis] 17 *Envtl. L. Rep.* (Envtl. L. Inst.) 10,036 (February 1987).

David A. McKay, *CERCLA's Natural Resource Damages Provisions: A Comprehensive & Innovative Approach to Protecting the Environment*, 45 *WASH. & LEE L. REV.* 1417

(1988).

Thomas A. Newlon, *Defining the Appropriate Scope of Superfund Natural Resource Damage Claims: How Great an Expansion of Liability?* 5 VA. J. NAT. RESOURCES L. 197 (1985).

Kevin M. Ward, *Recovery of Natural Resource Damages Under CERCLA*, 25 TORT AND INS. L. J. 559 (1990).

Edward J. Warren et al., *Natural Resources Damages Under the Comprehensive Environmental Response, Compensation, and Liability Act of 1980*, (pts. 1 & 2), 11 Chem. Waste Litig. Rep. (Computer Law Reporter) 30 (December 1985), 11 Chem. Waste Litig. Rep. (Computer Law Reporter) 176 (January 1986).

Edward W. Warren & John A. Zacrinson, *Natural Resource Damages Provisions of CERCLA*, 1 NAT. RESOURCES & ENV'T 18 (Fall 1985).

Edward J. Yans, *Valuing Natural Resource Damages: Economics for CERCLA Lawyers*, [14 News & Analysis] Env'tl. L. Rep. (Env'tl. L. Inst.) 10,311 (August 1984).

ii. Economics and Natural Resources

Linda Rosenthal & Carol Raper, *Amoco Cadiz and Limitation of Liability for Oil Spill Pollution: Domestic and International Solutions*, 5 VA. J. NAT. RESOURCES L. 259 (1985).

David J. Bederman, *High Stakes in the High Arctic: Jurisdiction and Compensation for Oil Pollution From Offshore Operations in the Beaufort Sea*, IV ALASKA L. REV. 37 (1987).

Thomas Belton et al., *Urban Fisherman: Managing the Risks of Toxic Exposure*, ENV'T, Nov., 1986, at 18.

Biniak, *The Status of Environmental Economics: 1984 Update: A Report*, Cong. Res. Serv. (Env'tl. and Nat. Resources Policy Div. 1984).

David Michael Collins, *The Tanker's Right of Harmless Discharge and the Protection of the Marine Environment*, 18 J. MAR. L. & COM. 275 (1987).

R.G. Cummings et al., *Valuing Environmental Goods: A State of the Arts Assessment of contingent Valuation Method*, Experimental methods for Assessing Environmental

Benefits, (Vol. 1A, Institute for Policy Research 1985).

David J. Bederman, Comment, *Dead in the Water: International Law, Diplomacy, and Compensation for Chemical Pollution at Sea*, 26 VA. J. INT'L. L. 485 (1986).

Paul S. Dempsey, *Compliance & Enforcement in International Law-Oil Pollution of the Marine Environment By Ocean Vessels*, 6 NW. J. INT'L. L. & BUS. 459 (1984).

S. Farber & R. Castanza, *The Economic Value of Wetland Systems*, 24 J. ENVTL. MGMT. 41 (1987).

Malcolm J. Forster, *The 1984 Protocols to the Oil Pollution Compensation Conventions*, 13 ENVTL. POL'Y. & L. 42 (1984).

Thomas W. Hertel & Timothy D. Mount, *The Pricing of Natural Resources in a Regional Economy*, 61 LAND ECON. 229 (1985).

Brad Ingram & Steve Grabaki, *Offshore Oil Impacts on the Bering Sea Fishing Industry*, 7 ENVTL. IMPACT ASSESS. REV. 109 (1987).

Douglas A. Jacobson & James D. Yellen, *Oil Pollution: The 1984 London Protocols & the Amoco Cadiz*, 15 J. MAR. L. & COM. 467 (1984).

Natural Resource Damages: The Economics Have Shifted After Ohio v. U.S. Department of the Interior, [20 News & Analysis] Env'tl. L. Rep. (Env'tl. L. Inst.) 10,127 (April, 1990).

L.L. Kruckenberg, *Wildlife Values, Wyoming's Approach to Landowner Compensation*, 3 RENEWABLE RESOURCES J. 15 (1985).

Barbara Kwiatkowska, *Marine Pollution from Land-Based Sources: Current Problems and Prospects*, 14 OCEAN DEV. & INT'L. L. 315 (1984).

James S. Mattson & J. Altson DeFoor, *Natural Resource Damages: Restitution as a Mechanism to Slow Destruction of Florida's Natural Resources*, 1 J. LAND USE & ENVTL. L. 295 (1985).

Gordon W. Paulsen, *Why the U.S. Should Ratify the 1984 Protocols to the International Conventions on Civil Liability for Oil Pollution Damage (1969) and the Establishment of an International Fund for Compensation for Oil Pollution*

Damage (1971), 20 FORUM 164 (1984).

A.H.E. Popp, *Liability and Compensation for Pollution Damage Caused by Ships Revisited—Report on an Important International Conference*, (pt. 1), LLOYD'S MAR. & COM. L. Q. 118 (1985).

Thomas J. Schoenbaum, *Liability for Spills and Discharges of Oil and Hazardous Substances From Vessels*, 20 FORUM 152 (1984).

Bill Shaw, Brenda J. Winslett & Frank B. Cross, *The Global Environment: A Proposal To Eliminate Marine Oil Pollution*, 27 NAT. RESOURCES J. 157 (1987).

Cheng Pang Wang, *A Review of the Enforcement Regime for Vessel-Source Oil Pollution Control*, 16 OCEAN DEV. & INT'L L. 305 (1986).

Rhoda L. White, Comment, *Natural Resource Damages: Trusting the Trustees*, 27 SAN DIEGO L. REV. 407 (1990).

4. Environmental Economics

a. Research Guidance

A lawyer involved in a natural resource damage case will probably need to explore some environmental economics issues in depth. To assist that effort I am providing a selected bibliography of current and important writings on environmental economics. The most efficient way for a lawyer to update this bibliography is to contact leaders in the field:

- (1) Resources For The Future
1616 P Street, N.W.
Washington, D.C. 20036
(202) 328-5065
- (2) Environmental Law Institute
J. William Futrell, President
Paul Scodari, Senior Economist
1616 P Street, N.W. Suite 2000
Washington, D.C. 20036
(202) 328-5150
- (3) Shepard C. Buchanan
Bonneville Power Administration
Environmental Costs and Benefits Program

P.O. Box 97208
Portland, Or. 97208
(503) 230-3038

- (4) Electric Power Research Institute (EPRI)
Environment Division
Charles Hakkarinen, Project Manager
3412 Hillview Ave.
Palo Alto, Cal. 94304
(415) 855-2411

b. Useful Writings

- (1) ALLEN V. KNEESE, *NATURAL RESOURCE ECONOMICS* (Aug. 1988) (Resources for the Future Discussion Paper QE 88-11).

Excellent review of the themes and issues in natural resource economics with a lengthy list of economic references.

- (2) ROBERT C. MITCHELL & RICHARD T. CARSON, *EVALUATING THE VALIDITY OF CONTINGENT VALUATION STUDIES* (Mar. 1987) (Resources for the Future Discussion Paper QE 87-06), to be published in *ECONOMIC AND PSYCHOLOGICAL KNOWLEDGE IN VALUATION OF PUBLIC AMENITY RESOURCES, RESOURCES FOR THE FUTURE* (Peterson, Driver & Gregory ed. in press).

A good description of this controversial valuation method, its strengths and weaknesses and methodological issues. Technical but not heavily mathematical.

- (3) ROBERT C. MITCHELL & RICHARD T. CARSON, *HOW FAR ALONG THE LEARNING CURVE IS THE CONTINGENT VALUATION METHOD?* (April 1987) (Resources for the Future Discussion Paper QE 87-07).

Prepared for a conference, on "The Role of the Social-Behavioral Sciences in Water Resources Management," this paper argues that the contingent valuation method has recently progressed from the experimental prototype stage to the initial implementation stage, but that further methodological issues must be resolved before it can proceed further. The paper includes a lengthy list of technically oriented

references.

(4) ROBERT C. MITCHELL & RICHARD T. CARSON, *USING SURVEYS TO VALUE PUBLIC GOODS: THE CONTINGENT VALUATION METHOD* (1989)(prepared for Resources for the Future).

This book contains an extensive philosophical, general and technical treatment of public policy, welfare economics, contingent valuation and public goods valuation issues, and contains an extensive bibliography.

(5) ELECTRIC POWER RESEARCH INSTITUTE, *BENEFITS OF ENVIRONMENTAL CONTROLS: MEASURES, METHODS AND APPLICATIONS* (Oct. 1988) (EPRI EA-6030).

A summary and assessment of economic measure of environmental damages and benefits, methods for calculating environmental damages and benefits, applications to air pollution effects on agriculture, materials, visual air quality, aquatic ecosystems and human health. An electric utility oriented study.

(6) Steven Edwards, *In Defense of Environmental Economics*, 9 ENVTL. ETHICS 73 (1987).

An economist's defense of willingness-to-pay/contingent valuation economics.

(7) Mark Sagoff, *Some Problems with Environmental Economics*, 10 ENVTL. ETHICS 55 (1988).

A response to Edwards that rejects use of contingent valuation and concepts of utility and efficiency in natural resource valuation, on the grounds that these concepts deprive individuals of the right to say no to activities that degrade the environment.

(8) MARK SAGOFF, *THE ECONOMY OF THE EARTH*, (1988) (Cambridge University Press, New York).

This superb full length book provides a complete philosophical overview and analysis of the relationship between economics, environmental values, and environmental harm. It is thoughtful and thought-provoking while being accessible and well-written.

(9) ALLEN V. KNEESE, *MEASURING THE BENEFITS OF CLEAN*

AIR AND CLEAN WATER, (1984) (Distributed by Johns Hopkins University Press for Resources for the Future).

This book provides non-mathematical coverage of valuation issues on both a general and specific level including a useful bibliography.

(10) **WINSTON HARRINGTON, MEASURING RECREATION SUPPLY, RESOURCES FOR THE FUTURE** (1987) (Distributed by the Johns Hopkins University Press):

This book studies the economic aspects of outdoor recreation, non-renewable natural resources, and affects of government policy. It is very technical.

(11) **MAUREEN L. CROPPER ET AL., ON THE CHOICE OF FUNCTIONAL FORM FOR HEDONIC PRICE FUNCTIONS RESOURCES FOR THE FUTURE** (June 1987) (Discussion Paper QE 87-08).

A very technical, mathematical paper that examines, in the context of urban housing markets, how errors in measuring marginal prices vary with the form of hedonic price function. Although this paper will probably be incomprehensible to most lawyers, this study could be very valuable for the lawyer's expert in a natural resource damages case.

(12) **WILLIAM RAMSAY, UNPAID COSTS OF ELECTRIC ENERGY: HEALTH AND ENVIRONMENTAL IMPACTS FROM COAL AND NUCLEAR POWER, RESOURCES FOR THE FUTURE** (1979) (Distributed by the Johns Hopkins University Press).

An excellent survey of the external environmental effects of coal and nuclear power production, including air pollution, nuclear radiation and accidents, nuclear waste, nuclear weapons, climate change, water, land and social impacts, and health risks to workers in the coal and nuclear industries.

(13) **L. GAINES, ET AL., TOSCA: THE TOTAL SOCIAL COST OF COAL AND NUCLEAR POWER** (1979) (Ballinger Publishing Co.).

Another study of the external environmental and social effects of coal and nuclear power production.

5. Bonneville Power Administration (BPA)

Because Bonneville Power Administration, BPA, was spe-

cifically mandated by Congress to study the full environmental impact of its energy production activities, BPA has been a leader in the field of environmental costing. It has published a number of thorough studies, all of which can be obtained at no charge from: Shepard C. Buchanan, Bonneville Power Administration, Environmental Costs and Benefits Program, P.O. Box 978208, Portland, OR 97208, telephone: (503) 230-3038. These publications are:

BONNEVILLE POWER ADMIN., ENVTL. COSTS & BENEFITS PROGRAM, ISSUE BACKGROUNDER: COUNTING THE COSTS - HOW BPA PERFORMS ENVIRONMENTAL COSTS ANALYSIS (1985).

BONNEVILLE POWER ADMIN., ENVTL. COSTS & BENEFITS PROGRAM, ECONOMIC ANALYSIS OF THE ENVIRONMENTAL EFFECTS OF THE COAL-FIRED ELECTRIC GENERATOR AT BOARDMAN, OREGON (COAL CASE STUDY) (1983).

BONNEVILLE POWER ADMIN., ENVTL. COSTS & BENEFITS PROGRAM, ECONOMIC ANALYSIS OF THE ENVIRONMENTAL EFFECTS OF A COMBUSTION-TURBINE GENERATING STATION AT FREDERICKSON, WASHINGTON (COMBUSTION-TURBINE CASE STUDY) (1984).

BONNEVILLE POWER ADMIN., ENVTL. COSTS & BENEFITS PROGRAM, ENVIRONMENTAL COSTS AND BENEFITS CASE STUDY: NUCLEAR POWER PLANT (NUCLEAR CASE STUDY—WASHINGTON PUBLIC POWER SUPPLY SYSTEM, PLANT No. 2) (1984).

BONNEVILLE POWER ADMIN., ENVTL. COSTS & BENEFITS PROGRAM, METHODS FOR VALUATION OF ENVIRONMENTAL COSTS AND BENEFITS OF HYDROELECTRIC FACILITIES (HYDRO CASE STUDY—SULTAN RIVER PROJECT) (1984).

BONNEVILLE POWER ADMIN., ENVTL. COSTS & BENEFITS PROGRAM, ESTIMATING ENVIRONMENTAL COSTS AND BENEFITS FOR FIVE GENERATING RESOURCES (1986) (a generic study of environmental costs of biomass cogeneration, municipal solid-waste cogeneration, geothermal, wind, and solar).

BONNEVILLE POWER ADMIN., ENVTL. COSTS & BENEFITS PROGRAM, TECHNICAL APPENDIX TO FIVE GENERATING RESOURCES (1986).

BONNEVILLE POWER ADMIN., ENVTL. COSTS & BENEFITS PROGRAM, CALCULATION OF ENVIRONMENTAL COSTS AND BENEFITS ASSOCIATED WITH HYDROPOWER DEVELOPMENT IN THE PA-

CIFIC NORTHWEST (1986) (Generic Hydro Study).

BONNEVILLE POWER ADMIN., ENVTL. COSTS & BENEFITS PROGRAM, BPA EVALUATION OF GENERIC ENVIRONMENTAL COSTS AND BENEFITS STUDIES (1986).

BONNEVILLE POWER ADMIN., ENVTL. COSTS & BENEFITS PROGRAM, GENERIC COAL STUDY (1987) (a generic study of environmental costs associated with emissions to the airshed from coal plants).

BONNEVILLE POWER ADMIN., ENVTL. COSTS & BENEFITS PROGRAM, REVIEW OF UNCERTAINTY AND RISK IN BPA SPONSORED ANALYSES OF ENERGY RESOURCES (1987) (applies risk and uncertainty issues to environmental decisions and fuses economic with psychological risk assessment).

6. Environmental Impact Statements

Environmental impact statements under NEPA and state statutes resembling NEPA could easily be the subject of one or more research guides. Environmental Impact Statements are lengthy documents available from the issuing agency and on microfilm at a government depository library. *EIS*, vol 1, no. 1, Jan. 1977 to present, from Washington Information Resources Press, is a monthly digest of environmental impact statements with an annual cumulative index. Persons interested in the discipline of environmental impact assessments should read:

WALTER E. WESTMAN, *ECOLOGY, IMPACT ASSESSMENT, AND ENVIRONMENTAL PLANNING* (1985) (John Wiley & Sons). This outstanding book covers environmental law, public policy and decision-making, summarizes the quantitative and economic approaches to evaluating and predicting impacts on the physical environment (land, air, and water), and the biota (biological communities, ecotoxicology, sampling and analysis of ecological data, species and landscape diversity, and succession and resilience of ecosystems).

NEW YORK STATE BAR ASSOCIATION, *ENVIRONMENTAL IMPACT ASSESSMENT: PROCEEDINGS OF A CONFERENCE ON THE PREPARATION AND REVIEW OF ENVIRONMENTAL IMPACT STATEMENTS* (Robinson ed. 1989). An excellent review of legal and

substantive issues with respect to environmental impact statements with a chronological survey of methodological articles, bibliography and annotated list of federal and state statutes, regulations, case law and legal commentary on the procedural and legal aspects of the environmental impact assessment process.

WALTER E. WESTMAN & W. DAVID CONN, *QUANTIFYING BENEFITS OF POLLUTION CONTROL*, U.C.L.A. (1976) (Report to the California Energy Resources Conservation and Development Commission). Copies of this book length report are available from the California Energy Commission, 1111 Howe Ave, Sacramento, CA 95825; it can also be obtained by inter-library loan from Michigan State University, Lansing, Michigan. This is an excellent review of methods of evaluating the benefits of pollution control and the costs of pollution.

7. Polychlorinated Biphenyl (PCBs)

It is not possible within the scope of this research guide to cover the innumerable substantive scientific fields that can related to natural resource damages. However, because oil pollution and PCB contamination to marine ecosystems are the most obvious and catastrophic causes of natural resource damage, some introductory materials in those areas will be provided.

NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION, *ASSESSMENT OF ECONOMIC DAMAGES TO THE NATURAL RESOURCES OF NEW BEDFORD HARBOR: DAMAGES TO THE COMMERCIAL LOBSTER FISHERY* (Dec. 1986).

NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION, *THE DAMAGES TO RECREATIONAL ACTIVITIES FROM PCBs IN NEW BEDFORD HARBOR* (Dec. 1986).

8. Marine Oil Pollution

Bolze & Lee, *Offshore Oil and Gas Development: Implications for Wildlife in Alaska*, MARINE POLICY, (National Audubon Society 1989). This article reviews the vulnerability of fish and wildlife species to oil and gas activities and contains a lengthy list of references in the substantive field. For further

information contact Doreen Bolze, Environmental Policy Analyst, National Audubon Society, 950 Third Ave, New York, NY 10022; telephone: (212) 546-9300.

BOESCH & RABALAIS, *LONG-TERM ENVIRONMENTAL EFFECTS OF OFF SHORE OIL AND GAS DEVELOPMENT*, (Elsevier Applied Science, New York 1987).

RESTORATION OF HABITATS IMPACTED BY OIL SPILLS, (Cairns & Buikema ed. 1984) (Butterworth Publishers, Boston, Mass.)

9. Newsletters, Magazines, and Periodicals

a. Research Guidance

When beginning research in a new environmental field it is hard to decide where to look for information, who to call and what questions to ask. Often a preliminary review of magazines, newsletters, and periodicals in the area of interest can orient the researcher by providing an overview of the field and by identifying authors who are knowledgeable. Experts are usually delighted to discuss their work in more detail and provide more information on the topic. A word of advice: reading the background articles in advance will impress the author with your seriousness and enable you effectively to use the all-to-brief time the busy author will spend talking with you.

To assist you in locating information relating to natural resource damages I include below an eclectic list of publications compiled in an unsystematic fashion during the course of the past year. For me, the best way to start or update a literature search in this area is to browse through the current journal/magazine stacks of a major university library from A to Z, skimming those issues that seem likely to contain articles in your subject area. This process orients me to who is writing about what, what is not being written about, what the current schools of thought are, and which schools of thought are represented in which journals. This invaluable overview cannot be obtained at the start of a project by any other method.

Another interesting source of publication information is

GALE RESEARCH, INC., *ENCYCLOPEDIA OF ASSOCIATIONS*, Detroit, Mich. (Koek ed. 1988), which identifies each listed organizations' publications, many of which, like newsletters to members, may contain important information that can be difficult to locate from any other source.

b. Topical Publications

- (1) **THE AMERICAN NATURALIST**
American Society of Naturalists
Biological Sciences, University of Kansas
Lawrence, KS 66045
(913) 864-3763

This monthly publication contains articles by professionals in biological sciences interested in environmental issues.

- (2) **BALANCE WHEEL**
The Association for Conservation Information
Louisiana Department of Wildlife and Fisheries
2156 Wooddale Blvd., Suite 900
Baton Rouge, LA 70806
(504) 922-0427

A quarterly publication devoted to the protection and management of natural resources and wildlife. The Association is composed of officials of state fish and game, parks, recreation, soil and forestry departments.

- (3) **ECOLOGICAL ECONOMICS**
International Society of Ecological Economics
c/o Dr. Robert Costanza
Coastal and Environmental Policy Program
Center for Environmental and Estuarine Studies
University of Maryland
Solomons, MD 20688-0038
(301) 326-6342/Fax (301) 326-4281
- (4) **ECOLOGICAL MONOGRAPHS**
Ecological Society of America
730 11th Street, N.W., Suite 400

Washington, DC 20001

(202) 628-1500

A quarterly publication on ecological issues.

- (5) **ECOLOGICAL SOCIETY OF AMERICA BULLETIN**
Ecological Society of America
Washington, DC

A quarterly professional publication for persons interested in the study of living things in relation to their environment.

- (6) **ECOLOGY**
Ecological Society of America
Washington, DC

A bimonthly scientific journal on the study of living things in their environment.

- (7) **ECOLOGY USA**
Business Publishers, Inc.
951 Pershing Drive
Silver Spring, MD 20910
(301) 587-6300

A biweekly publication for professionals in government, industry and academia concerned with ecological issues ranging from air and water pollution control, waste management and toxic substances to wildlife and natural resources protection.

- (8) **ECOMOD**
ISEM - North America
School of Natural Resources
Ohio State University
2021 Coffey Rd.
Columbus, OH 43210-1085

This is a monthly members' newsletter of the International Society for Ecological Modeling reports on current events in the area of ecological and environmental modeling.

(9) ENVIRONMENT

Heldref Publications
1319 18th Street, N.W.
Washington, DC 20036
(202) 296-6267

This magazine, published 10 times per year, is written and read by scientists, lawyers and policy analysts who study the environment and its public policy problems.

(10) E.P.A. REGULATORY AGENDA

U.S. Environmental Protection Agency
401 M Street, S.W.
Washington, DC 20460
(202) 260-5480

Published in April and October in the Federal Register and available for free, separately from EPA, and one of E.P.A.'s most valuable documents, this publication provides specific information on the status of regulations that are under development, revision, and review by E.P.A.

(11) JOURNAL OF ENVIRONMENTAL QUALITY

American Society of Agronomy
677 S. Segoe Road
Madison, WI 53711
(608) 273-8080

This quarterly journal covers a wide range of environmental topics and is used as an outlet for reports and brief reviews on the environment, protection of environmental quality and natural ecological systems.

(12) MARINE ECOLOGY

Paul Parey Scientific Publishers
P.O. Box 1815
New York, NY 10156-0610
(212) 679-0782

This quarterly journal contains information on specific organisms in the environment and reports on their interac-

tions within the environment.

- (13) **MARINE RESOURCE ECONOMICS**
Taylor and Francis
1900 Forst Road, Suite 101
Bristol, PA 19007-1598
(800) 821-8312

This quarterly publication includes studies of biological, social, political, legal and other issues related to the economics of marine resources.

- (14) **NATURAL RESOURCES & ENVIRONMENT**
American Bar Association
750 North Lake Shore Drive
Chicago, IL 60611

- (15) **SPILL CONTROL ASSOCIATION OF AMERICA NEWS BRIEF**
Spill Control Association of America
400 Renaissance Center, Suite 1900
Detroit, MI 48243-1895
(313) 567-0500

This is a monthly membership newsletter for companies and persons concerned with cleaning up spills of hazardous materials and manufacturers of specialized products for spill control and clean up.

- (16) **WORLD*WATCH MAGAZINE**
Worldwatch Institute
1776 Massachusetts Avenue
Washington, DC 20036

A bimonthly magazine published and written by Worldwatch staff members for the stated purpose of reversing environmental trends perceived as undermining the human prospect. It is a source of diverse information for concerned citizens on global issues of energy, the environment, food, population and peace. Worldwatch also publishes a series of monographs on current issues on these areas.

IV. Environmental Organizations

A. Research Guidance

In the rapidly moving field of environmental law, particularly the field of natural resource damages, effective research demands that the researcher locate the network of people who are at the cutting edge of the problem. This effort takes persistence, creativity, and good telephone skills. The best way to find knowledgeable people is to contact an organization that seems to be active in the field, pick the brains of the people contacted, and faithfully follow up on all references gleaned from your investigation. Make sure you thank your sources so that the well does not dry up.

Several reference works provide good starting points; they are:

1. GOVERNMENT INSTITUTES, INC., DIRECTORY OF ENVIRONMENTAL INFORMATION SOURCES (Thomas F.P. Sullivan ed., 3d ed. 1990).
2. OFFICE OF THE FEDERAL REGISTER & NATIONAL ARCHIVES AND RECORDS ADMINISTRATION, UNITED STATES GOVERNMENT MANUAL (1991).
3. FEDERAL STAFF DIRECTORY (Ann L. Brownson ed., 1991).
4. U.S. GOVERNMENT PRINTING OFFICE, TELEPHONE DIRECTORY, ENVIRONMENTAL PROTECTION AGENCY (1991) (published annually).
5. GALE RESEARCH, INC., ENCYCLOPEDIA OF ASSOCIATIONS, (Deborah M. Burek ed., 26th ed. 1992).

The Encyclopedia of Associations is particularly useful for locating American and international organizations that engage in activities relevant to the researcher's subject. The work has an extensive subject matter index that is relatively easy to use and functional. For natural resource damages the most useful subject headings are "Environmental and Agricultural Organizations," and "Engineering, Technological, and Natural and Social Science Organizations."

B. Organizations

1. Sierra Club
Alaska Coalition
Mike Matz, Chairman
408 C Street, N.E.
Washington, DC 20002
(202) 547-1141

This organization promotes education, research, and legislative policy in an effort to preserve Alaska's wild heritage and natural resources, the Arctic National Wildlife Refuge, and seeks to prevent the development of refuge land by the oil and natural gas industry.

2. American Forestry Association
R. Neil Sampson, Executive Vice President
1516 P Street, N.W.
Washington, DC 20005
(202) 667-3300

This is a citizen conservation organization working to advance management and use of forests, soil, water, wildlife and other natural resources. Publications: AMERICAN FORESTS MAGAZINE (monthly) and RESOURCE HOTLINE (bimonthly).

3. American Littoral Society
D. W. Bennett, Executive Director
Sandy Hook
Highlands, NJ 07732
(908) 291-0055

This organization is interested in issues relating to the littoral zone along waterbodies and has an active fish tagging program.

4. Association of Conservation Engineers
c/o Gary Wilken, President
64 N. Union Street
Montgomery, AL 36130

(205) 242-3476

This is an organization of people employed by or retired from state and federal agencies and allied disciplines for the development of fish, wildlife, forestry, and recreational facilities. It is affiliated with the International Association of Fish and Wildlife Agencies.

5. Association of Environmental and Resource Economists
Marilyn Voigt, Executive Secretary
1616 P Street, N.W., Room 507
Washington, DC 20036
(202) 328-5077

This is an association of professional economists from universities, government, and industry who are interested in resource and environmental issues, including water and land resources and air pollution.

Publication: J. OF ENV. ECONOMICS AND MANAGEMENT (quarterly).

6. National Association of University Fisheries and Wildlife Programs
Dr. Ira L. Adelman, President
University of Minnesota
Department of Fishery and Wildlife
1980 Fulwell Avenue
St. Paul, MN 55108-6124
(612) 624-4228

This is an association of department heads of fish and wildlife programs at American and Canadian universities.

7. Atlantic Salmon Federation
David R. Clark, President
P.O. Box 429
St. Andrews, New Brunswick, Canada E0G 2X0
(506) 529-4581
Center for Holistic Resource Management
Allan Savory, Founding Director

P.O. Box 7128
Albuquerque, NM 87194
(505) 344-3445

World Wildlife Fund
1250 24th Street, N.W., Suite 400
Washington, DC 20037
(202) 293-4800

Earth Island Institute
David R. Brower, Chairman
300 Broadway, Suite 28
San Francisco, CA 94133
(415) 788-3666

International Assoc. of Natural Resource Pilots
c/o Val Judkins, Secretary-Treasurer
1596 West North Temple
Salt Lake City, Utah 84116
(801) 538-4740

This is an organization for natural resource aviation, which involves in-flight observations for purposes such as game and waterfowl census and study, pollution tracking, forest fires, law enforcement, search and rescue and radio tracking of birds, fish, and other wildlife.

8. Colorado Department of Law
Natural Resources Section
CERCLA Litigation Unit
Casey Shpall, First Assistant Attorney General
1560 Broadway, Suite 250
Denver, CO 80202
(303) 894-2299

This office has been active in pursuing natural resource damage claims, in *Colorado v. Asarco*, #83-C-2383 (D. Colo.), *Colorado v. Union Carbide Corp.*, #83-C-2384 (D. Colo.), *Colorado v. Cotter Corp.*, #83-C-2389 (D. Colo.), and *Colorado v. Idarado Mining Co.*, 83-C-2385 (D. Colo.). Summaries of the amended complaints in these cases can be obtained through [20 Pending Litigation Service] *Envtl. L. Rep. (Envtl. L. Inst.)* 65,876 (Dec. 1990).

9. Environmental Law Institute
J. William Futrell, President
Paul Scodari, Senior Economist
1616 P Street, N.W., Suite 200
Washington, DC 20036
(202) 328-5150

This organization engages in a wide variety of important research on vital environmental issues and publishes many useful environmental materials, both books and periodicals. Its *Environmental Law Reporter* is an especially valuable tool for environmental attorneys.

10. Get Oil Out (GOO!)
Robert Hopps, Pres.
P.O. Box 1513
Santa Barbara, CA 93102
(805) 965-1519

This organization maintains a national center for information and research on oil pollution and oil development.

11. International Bird Rescue Research Center
Alice B. Berkner, Exec. Dir.
699 Potter St.
Berkeley, CA 94710

This group engages in research and other activities to prevent the deleterious effects of man-made and natural phenomena on birds and on methods of bird rehabilitation, particularly oiled water birds. They also provide consulting services for government and industry contingency planning and consulting assistance in the event of an oil spill emergency. Publication: INTERNATIONAL BIRD RESCUE NEWSLETTER (quarterly).

12. The Center for Marine Conservation
Marine Mammal Conservation Fund
Roger E. McManus, Exec. Dir.
1725 DeSales St., N.W.
Washington, DC 20036

(202) 429-5609

National Audubon Society

Peter A. Berle, Pres.

Jan Beyea, Ph.D, Senior Staff Scientist

Mercedes Lee, Environmental Policy Analyst

950 Third Ave.

New York, NY 10022

(212) 832-3200

National Audubon Society

Scully Science Center

Dr. Carl Satina, Director

(516) 277-4289

550 S. Bay Ave

Islip, NY 11751

(516) 224-3669

National Wildlife Federation

Erik Olson, Esq.

1412 16th St., N.W.

Washington, DC 20036

(202) 797-6887

Erik Olson is particularly knowledgeable in natural resource damage issues and has represented the National Wildlife Federation in its challenge to the Department of Interior Type B assessment regulations. He also represented the National Wildlife Federation as an intervenor opposing settlement by the United States of its natural resource damages claim against a major discharger of PCBs into New Bedford, MA harbor. The New Bedford Harbor case titled *In re Achused River & New Bedford Harbor*, 712 F. Supp. 1010 (D. Mass. 1989).

V. Automated Databases

A. Research Guidance

There are now automated databases in every field of intellectual endeavor. Computer based research is an important source of up-to-date information in any technical field; but computer research is a supplement to, not a substitute for, other methods of environmental research, particularly per-

sonal contact with knowledgeable people in the field. Nevertheless, databases are excellent sources of technical environmental information. A good, although general, research tool for getting started in this area is U.S. DEPT. OF COMMERCE, NATIONAL TECHNICAL INFORMATION SERVICE, A DIRECTORY OF COMPUTERIZED DATA FILES, (1987) (published annually).

However, locating useful databases in the vast forest of databases is itself a significant research project. The best place to start updating the list of databases given below is GOVERNMENT INSTITUTES, INC., DIRECTORY OF ENVIRONMENTAL INFORMATION SOURCES (Thomas F.P. Sullivan ed., 3d ed. 1990). Section five contains a list of 119 databases of environmental information available through one or more of nineteen different data services. The book gives a description of the databases, the name and address of the organization that generates the database, and what data service makes it available. Although the databases are indexed by subject matter, the index is too limited to be relied upon completely. It is useful, and not very burdensome, to review the entire list of databases directly to see if there are any helpful databases which are not indexed. Beyond this work, locating databases requires review of the catalogs of databases (e.g. Dialog, Westlaw, Lexis). Probably the best source of information about databases is the database professional in the library you are using.

B. Relevant Databases

1. Legal Databases

a. Lexis/Nexis

Lexis contains an environmental law library ("ENVIRN") with court decisions, National Oceanic and Atmospheric Administration Decisions ("NOAA") since November 1976, BNA Environment Reporter and Chemical Regulation Reporter, and the complete Environmental Law Reporter. Nexis does not have a separate environmental library but it does have three libraries which contain a broad range of federal legislative and administrative materials - "CMPGN", "EXEC", and

“LEGIS”.

b. Westlaw

Westlaw's environmental law databases contain documents that relate to environmental protection and conservation. Among the subjects included are the Clean Air Act and Clean Water Act, similar state statutes, radioactive, solid and toxic waste management, and the impact of administrative and zoning laws. For purposes of natural resource damages, the Federal Environmental Law - Ocean Resources and Wildlife Reporter (“FENV-ORW”) is useful; it contains administrative decisions made by the NOAA and the U.S. Fish and Wildlife Service. Both Westlaw and Lexis/Nexis add databases regularly, so the most current catalog should be consulted as well as the on-line index of the environmental libraries.

2. Technical Environmental Databases⁷

- a. American Petroleum Institute Literature - APILIT
American Petroleum Institute
275 7th Avenue
New York, NY 10001
(212) 366-4040

This database includes literature about petroleum refining and the petrochemical industry and covers, *inter alia*, transportation and storage of petroleum, pollution and conservation. It starts in 1964 and is updated monthly.

- b. AQUALINE
Water Research Center
Medenham Laboratory
Marlow, Buckinghamshire SI7 2HD England

7. The information on databases in this portion of the research guide was obtained from the extensive information on environmental databases contained in section 5 of GOVERNMENT INSTITUTES, INC., DIRECTORY OF ENVIRONMENTAL INFORMATION SOURCES (Thomas F.P. Sullivan ed., 3rd ed. 1990).

049 166 531

This database contains 125,000 items on water research, including abstracts and bibliographic citations; its subjects include water management, waste disposal and management, and ground, surface and tidal waters. It begins in 1960 and is updated monthly. It is available on DIALOG.

c. **AQUAREF**

Inland Waters Directorate (WATDOOC)
Environment Canada
Ottawa, Ontario K1A 0H3
(819) 997-2324

This is a merger of Canadian Environment (CENV) and Environment (ENV) databases containing references to English and French documents pertaining to Canadian water resources, air pollution, and other environmental topics. It is updated every two months. It is available from CISTI.

d. **AQUIRE - Aquatic Information Retrieval**

U.S. Environmental Protection Agency
Office of Pollution Prevention and Toxic
401 M St., SW
Washington, DC 20460
(202) 260-2902

This database contains aquatic toxicity data including information on acute and chronic toxicity, bioaccumulation and sublethal effects of pollution on fresh and saltwater species. Data include chemical substance information, organisms, study protocol and experimental details and results. It is updated irregularly. It is available on CIS.

e. **Aquatic Sciences and Fisheries Abstracts**

ASFA
Cambridge Scientific Abstracts
7200 Wisconsin Avenue
Bethesda, MD 20814
(301) 961-6700 or (800) 843-7751

This is a comprehensive database covering oceans and seas, fresh water, estuaries, and marshes. The topics covered include marine and aquatic biology, ecology, fisheries, water pollution, oceanography, climate, health and petroleum products effects, and legal, political, and regulatory topics. It contains about 300,000 entries and is jointly produced by NOAA, the Food and Agricultural Organization of the United Nations, and other international organizations. It is available on DIALOG and compact disk.

- f. Biosciences Information Service Previews
BIOSIS
Biosciences Information Service
2100 Arch St.
Philadelphia, PA 19103-1399
(215) 587-4800

This is the major English-language compilation of research in the life sciences. It is available on DIALOG and ORBIT.

- g. Computer-Aided Environmental Legislative Data System (CELDS)
Environmental Technical Information Systems (ETIS)
U.S. Army Corps of Engineers
University of Illinois
1003 W. Nevada
Urbana, IL 61801
(217) 333-1369

This database is a collection of abstracted federal and state environmental regulations and standards that affect the environment and data for environmental impact analysis and environmental quality management. It is updated daily. The CELDS database is a database subset of ETIS.

- h. Enviroline
R.R. Bowker, Inc.
121 Chanlon Road
New Providence, NJ 07974
(800) 521-8110

This is a database of bibliographic summaries of documents, articles, papers and films relevant to environmental issues. It is available on DIALOG and ORBIT.

- i. Environet
ERT
696 Virginia Rd.
Concord, MA 01742
(800) 633-0366

This is a regulatory database of federal and state environmental compliance requirements. It is available from ERT.

- j. Environmental Periodicals Bibliography
EPB - Online
Environmental Studies Institute
International Academy at Santa Barbara
800 Garden Street, Suite D
Santa Barbara, CA 93103
(805) 965-5010

This database contains over 370,000 records in the areas of human and animal ecology, energy, land resources, marine and freshwater resources, nutrition and health. It is updated six times per year. It is available on DIALOG.

- k. Life Sciences Collection
Cambridge Scientific Abstracts
7200 Wisconsin Avenue
Bethesda, MD 20814
(301) 961-6700

This database contains about 600,000 records from 1978 published in seventeen abstracting journals covering biochemistry, microbiology, animal behavior, biotechnology, ecology, toxicology, and other subjects. About 130,000 records are now added yearly. It is available on DIALOG and compact disk.

- l. National Environmental Data Referral Service
NEDRES
National Oceanic and Atmospheric Admin.

National Environmental Satellite, Data and
Information Service
NEDRES Program Office
1825 Connecticut Ave, N.W.
Washington, DC 20235
(202) 606-4548

This database contains environmental data from a wide range of sources including published documents, computer media, ship's logs, and private research covering the subjects of climatology, meteorology, oceanography, geology, hydrology, and related fields. The user can specify environmental parameters, geographic locations and/or time periods as search criteria. Contact NOAA for information about availability.

m. National Technical Information Service - NTIS
U.S. Dept. of Commerce
Office of Data Base Service
5285 Port Royal Road
Springfield, VA 22161
(703) 487-4807

The NTIS database lists information about technical reports (generated by the government or contractors) that can be obtained through NTIS. Each entry contains complete bibliographic information, subject-indexing words, an abstract of the report, and an NTIS order number. There are about 1,000,000 entries starting in 1964; the database is updated twice monthly with about 70,000 reports added each year. It is available on DIALOG.

n. Oceanic Abstracts
Cambridge Scientific Abstracts
7200 Wisconsin Avenue
Bethesda, MD 20814
(301) 961-6700

This bibliographic database covers oceanography and marine sciences including marine geology, geophysics, meteor-

ology, acoustics, optics, remote sensing, engineering, mining, biology, law, government, desalination, diving, coastal and off-shore resources, oceanic pollution, and fisheries. It is available on DIALOG.

o. Oil and Hazardous Material Data System

OHM-TAD

U.S. E.P.A.

Emergency Response Division

401 M Street, S.W.

Washington, DC 20460

(202) 260-8720

OHM-TAD, a computer version of E.P.A.'s Oil and Hazardous Materials Technical Assistance Data System, contains published data describing materials designated as hazardous. The information is designed to help in assessing the danger resulting from discharges of petroleum products or hazardous materials. Each record contains 126 fields of information, including chemical identification, physical properties, uses, toxicity, handling procedure, disposal information, and effects on water quality. It is available from CIS and Micromedia's Times Plus Series.

p. Registry of Toxic Effects of Chemical Substances - RTECS

National Institute for Occupational Safety and Health

Robert A. Taft Laboratories

Mail Stop C-19

4676 Columbia Parkway

Cincinnati, OH 45226-1998

(800) 356-4674

This is a compendium of test results of more than 100,000 toxicological measurements carried out on more than 60,000 chemicals. Data for each material include Chemical Abstracts Service numbers and registry numbers, chemical formulae, alternative names, short and long-term *in vivo* findings, *in vitro* mutagenesis results, and data on eye and skin irritation. Contact NIOSH for availability information. It is available on CIS

and DIALOG.

- q. Selected Water Resources Abstracts
U.S. Geological Survey
421 National Center
Reston, VA 22092
(703) 648-4000

This is a database of abstracts from journals, magazines, newspapers, government reports and conference proceedings on water management, water conservation, water quality, resource planning and water-related law. Data starts in 1968 and is updated monthly. It is available on DIALOG.