Chapter 2

Institutional Aspects of Biological Data

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HIGHLIGHTS

- **Numerous Federal laws and policies require or permit Federal agencies to conduct inventories of natural resources, although few of the inventories directly address on-site maintenance of biological diversity.**
- **Federal agency objectives, differing interpretations of mandates, and lack of specificity in Federal mandates calling for biological data lead to problems of data incompatibility and data inconsistency within and among Federal agencies.**
- **In contrast to Federal agencies, some State and private institutions consider biological diversity as one objective in their biological field inventories.**

FEDERAL AUTHORITIES

Federal laws and policies regarding conservation abound, causing numerous Federal agencies in different locations to generate massive amounts of data, much of which may be applicable to efforts to maintain biological diversity on-site. Table 1 describes the Federal laws that mention biological inventories. More than 14 Federal agencies in at least 4 different departmental are identified in mandates to conduct inventories of natural resources. Some mandates call for inventories of resources within a specific geographic area, a regional area, or the Nation as a whole. Other laws authorize inventories of specific species or broad ranges of organisms or ecosystems.[2]

The table distinguishes between laws that permit inventories and those that require biological inventories. (See the column labeled "Level of requirement.") Laws permitting inventories generally provide the legislative authority for agencies to conduct research on biological resources. An example of such a law is the Anadromous Fish Conservation Act (3). The laws that require inventories may direct agencies to conduct inventories, or may indirectly require agencies to conduct inventories because of the need for biological information to carry out the intent of the laws (3). The Migratory Bird Treaty Act is an example of the indirect type of requirement.

Policies and agency directives may stimulate as much data collection as Federal mandates, An agency or department may state the need for biological data in regulations or departmental programs that address broader environmental goals. Such regulations and programs may clarify Federal legislation or may occur independently.[3] For example, the National Park Service (NPS) completed an extensive inventory of ecosystems in the United States as one result of a 1965 directive from the Secretary

I Within the executive branch of the Federal Government, departments have broad areas of Federal responsibility. Agencies may be created within a particular department to address relatively specific responsibilities within the department's jurisdiction.

'Federal laws reflected in table 1 do not include legislation that requires inventories in one specific regional area (e.g., the Columbia River watershed) or one State (e.g., Tennessee).

[3]Many agency and departmental policies and regulations calling for biological inventories are linked to the mandate for environmental assessments in the National Environmental Policy Act (NEPA; Public Law 91-190), Although NEPA does not require inventories to be conducted specifically, the agency regulations promulgated as a result of NEPA may do so. Environmental impact assessments conducted as a result of N EPA have stimulated the collection and analysis of biological data for thousands of Federal projects,

Table 1.—Federal Laws Authorizing Biological Inventories

Resource/taxon	Lead agency	Conservation program	Popular name of law	Public Law[a]	US Code[a]	Date enacted	Level of requirement
Department of the Interior: Irrigated Indian lands.	BIA	Research on Irrigation of Indian lands		Ch. 119	25 U.S C 381-390	1887	P
Indian forest lands	BIA	Research to manage reservation timber for sustained yield		Ch. 431	25 U,S. C. 406-407, 466	1910	P
Wild horses and burros	BLM	Survey of horses and burros on public lands	Wild Free-Roaming Horses and Burros Act	95-514	16 U.S. C 1333(b)	1978	R
Resources of public lands	BLM	Inventory of public lands BLM and their resources	Federal Land Policy and Management Act	94-579	43 U.s, c 1711	1976	R
Rangelands	BLM/FS	Inventory of rangeland conditions and trends	Public Rangelands Improvement Act	95-514	43 u S.c 1903	1978	R
Animals	FWS	Inventory by States of nongame fish and wildlife	Fish and Wildlife Conservation Act	96-366	16 U S.C. 2903	1980	P
Animals	FWS	Surveys of animals on land and water in public domain	Fish and Wildlife Coordination Act	Ch. 55	16 U S.C. 661 et seq	1934	R
Animals	FWS	Cooperate grants to States for restoration of fish and wildlife	Pitman-Roberfson Wildlife Restoration Act	Ch. 899	16 U S C 669 et seq.	1937	P
Animals	FWS	Reports on avadabillty and requirements of fish and wildlife	Fish and Wildlife Act of 1956	Ch 1036	16 U S C. 742d	1956	R
Migratory birds	FWS	Requires regulation of hunting according to bird surveys	Migratory Bird Treaty Act	Ch. 128	16 U S C 704	1918	R
Fisheries	FWS	National Fisheries Center and Aquarium/fisheries research		87-758	16 U S C. 1051 et seq	1962	P
Estuarlne areas	FWS	Inventory of marshes, lagoons, estuaries, including Great Lakes		90-454	16 U S C 1221-1226	1968	R
Commercial fisheries	FWS/NMFS	Reports on fish populations and their diseases		Ch. 362	16 U S C, 744	1887	R
Endangered species	FWS/NMFS	Federal studies to determine species at risk	Endangered Species Act	93-205	16 U S.C. 1533	1973	R
Endangered species	FWS/NMFS	Federal/State cooperative studies	Endangered Species Act	93-205	16 U SC 1535	1973	R
Outer Continental Shelf (OCS)	MMS	Collection of baseline data m areas proposed for OCS oil and gas leasing	Outer Continental Shelf Lands Act	92-372	43 U S C 1346	1978	R
Rivers	NPS/FWS/ BLM/FS	Inventory of rivers with potential for designation as wild or scenic	Wild and Scenic Rivers Act	90-542	16 U S C 1275	1986	P
Department of Commerce:							
Pacific coral reefs	NOAA/Sl	Studies on reefs and Acanthaster planci starfish		91-427	16 U S C 1211-1213	1970	P
Marine sanctuaries	NOAA	Research on marine sanctuaries		96-332	16 U S C 1432(f)	1980	P
Marine mammals	NMFS/FWS	Research grants on protection of marine mammals	Marine Mammal Protection Act	92-522	16 U S C. 1380	1972	P
Anadromous and Great Lakes Fisheries	NMFS	Investigation and biological surveys of anadromous and Great Lakes fish	Anadromous Fish Conservation Act	89-309	16 U S C 757b	1965	P
Pacific Ocean fisheries	NMFS	Study fish populations of Pacific to ensure resource development		Ch 451	16 U S C 758a	1960	R
Northern Pacific fur seals	NMFS	Research on Northern Pacific fur seals	Fur Seal Act	89-702	16 U S.C 1153	1966	P
Northern Pacific fur seals	NMFS	Studies of fur seal populations and trends	Marine Mammal Protection Act	92-522	16 USC 1378	1972	R
Whales	NMFS	Studies of biology of whales in U S waters	Whale Conservation and Protection Study Act	94-532	16 U.S. C 917a	1976	R
Fisheries	NMFS	Research on abundance and availability of fish	Magnuson Fishery Conservation and Management Act	94-265	16 U S C. 1854(e)	1976	P

Table 1.— Federal Laws Authorizing Biological Inventories—Continued

Resource/taxon	Lead agency	Conservation program	Popular name of law	Public Law[a]	U S Code[a]	Date enacted	Level of requirement[b]
Department of Defense:							
Animals and plants	DOD/FWS	Planning for wildlife fish, and plants on military reservations	Sikes Act	86-797	16 U S C 670a	1960	P
Environmental Protection Agency:							
Water qualify	EPA	Studies of effects of water quality on biota	Clean Water Act	92-500	33 U S C 1254	1972	R
Air qualify	EPA	Studies of effects of air quality on biota	Clean Air Act	88-206	42 U S C 7403	1963	R
Pesticide exposure	EPA	Monitoring of soil, water, plants, and animals for pesticide exposure	Federal Insecticide, Fungicide, and Rodenticide Act	92-516	7 U S C 136r	1972	R
Department of Agriculture:							
Forests	FS	Cooperate forestry research by State land grant colleges	M-Stennis Act	87-788	16 U S C 582a	1962	P
Renewable resources	FS	Inventory of lands and renewable resources of National Forests	Forest and Rangeland Renewable Resources Planning Act	93-378	16 U S C 1603	1974	R
Renewable resources	FS	Comprehensive research on renewable resources of forests and ranqeland	Forest and Rangeland Renewable Resources Research Act	95-307	16 U S C 1642	1978	R
Plants	NA	Research on tree and plant life		Ch 505	20 u s c 191-195	1927	R
Soil	SCS	Inventory of Soil quality and related resources	Soil and Water Resources Conservation Act	95-192	16 U S C 2004	1977	R
Smithsonian Institution:							
Biota	SI	Increase diffusion of knowledge		Ch 69	20 u s c 41	1877	P
Biota of former Canal Zone	STRI	Scientific Investigation of natural features of former Canal Zone		Ch 516	20 U S C 79a	1940	R

[a]Code Citations The citations to the U.S Code reflect the smallest relevant portion of the code that directed such studies— Single sections where possible The Public Law citations are to the first laws to enact the particular provisions The reference should be understood 10 include the act and any subsequent amendments No attempt was made to Cite the original laws creating the overall chapters or subchapters where the sections of Interest were added only in later amendments

[b]Level of requirement
P = Inventories permitted
R = Inventories required

SOURCE Congressional Research Service 1985

of the Interior to develop the National Natural Landmark Program (4). Concern over wetland ecosystems prompted the U.S. Fish and Wildlife Service (FWS) to initiate an ongoing inventory of wetland areas in the United States, independent of a specific congressional directive. (See National Wetlands Inventory in app. A.)

The primary Federal agencies collecting information on biological resources are those concerned with managing land and resources. These agencies include:

- U.S. Department of the Interior
  - —Bureau of Land Management
  - —National Park Service
  - —Fish and Wildlife Service
- U.S. Department of Agriculture
  - —Forest Service
  - —Soil Conservation Service
- U.S. Department of Commerce
  - —National Oceanic and Atmospheric Administration
    - —National Marine Fisheries Service.

Other agencies that collect biological data include the Environmental Protection Agency, the Bureau of Indian Affairs, the armed forces agencies in the Department of Defense, the U.S. Geological Survey, and the Smithsonian Institution. Each agency has a specific mandate or a program directive to conduct inventories of biological resources within *its* jurisdiction. Agencies also have regulatory responsibility over actions that could affect the

maintenance of the diversity of biological resources under their stewardship. Federal agencies that collect data on biological resources are presented in table 2,

On-site maintenance of biological diversity is rarely considered in Federal legislation specifically requiring inventories of resources (3). The mandates appear to address diversity maintenance indirectly in relation to the conservation of natural resources (which include biological resources, soils, water, and air). For example, the Soil and Water Resources Conservation Act reauthorized the Soil Conservation Service to conduct national inventories, which are now known as the National Resources Inventories (NRI), Maintaining biological diversity is not a stated objective in their mandate, but the inventories provide baseline information on a wide range of natural resources, including some of the Nation's biological resources, (See NRI in app, A,) NRI data could be used to identify areas around the country where planning and management programs are needed to maintain biological diversity.

Although it does not mention biological diversity maintenance as a specific objective, the Endangered Species Act (ESA) mandates the analysis of data on species that are threatened or endangered, or potentially threatened or endangered. In response to the ESA, Federal agencies concerned with resource and land management collect and maintain data on the distribution and abundance of the endangered species that fall within the agencies' jurisdictions. These data can be used directly to determine the status and location of biological diversity and provide information necessary to maintain adequate diversity. The available data also assist agencies in efficiently and professionally carrying out their responsibilities for conserving resources.

An agency's response to a given mandate or policy for a biological inventory depends, in part, on the specifications included for the data. Few Federal agencies consolidate resource data nationally, unless specific direction is provided by Congress or in a policy, because data coordination is considered time-consuming, and because large volumes of data are costly to maintain. Additionally, many Federal resource agencies have decentralized their internal decisionmaking processes, Field offices or regional offices are given authority for collecting data and for managing the resources under local jurisdiction. Consequently, many inventories are decentralized, reflecting the organizational structures of the Federal agencies, and national aggregation of data may be of little use to field offices,

Consolidating or even analyzing data from disparate sources is difficult at present, because standardized definitions are lacking, because different agencies have different objec-

Table 2.—Federal Agencies With Resource Information and Data-Gathering Programs by Resource Type

	NPS	BIA	DOD	Scs	FWS	FS	BLM	NOAA	EPA	Corps
Wildlife:										
Wildlife habitat		x	x	x	x	x	x	x		
Migratory birds					x					
Anadromous fish					x			x		
Freshwater fish	X		x		x	x		x		
Endangered species	X	x	x	x	x	x	x	x	x	x
Pesticide monitoring					x				x	
Marine birds					x		x		x	
Vegetat:										
Forest	X	x	x	x	x	x	x	x		
Rangelands		x	x	x	x	x	x			
Aquatic					x			x	x	x
Riparian	X				x	x	x			
Wetlands				x	x	x	x		x	x

KEY NPS—National Park Service; BIA—Bureau of Indian Affairs; DOD—Department of Defense; SCS—Soil Conservation Service; FWS—Fish and Wildlife Service, FS—Forest Service; BLM—Bureau of Land Management, NOAA—National Oceanic and Atmospheric Administration, EPA—Environmental Protection Agency; and Corps—Corps of Engineers

SOURCE Adapted from Council on Environmental Quality, 1980, and Appendix A.

tives, and because data collection efforts either overlap or are duplicative. Confusion exists over the meanings of terms such as *wildlife, fish and wildlife, biological resources,* and *natural resources. Wildlife,* for instance, may be interpreted legislatively in several different ways, including:

- mammals that are hunted or trapped (game);
- mammals generally, the word *animal* also is sometimes used in this way;
- those animals, whether vertebrates or invertebrates, that are not fish—a usage that has no technical or biological equivalent;
- vertebrates; and
- both vertebrates and invertebrates (3),

Because of disparate definitions of wildlife, two agencies mandated to inventory wildlife may collect data on different subsets of the resource. For example, one agency might inventory game mammals, and the other might collect data on all resident terrestrial vertebrates and invertebrates, Interpretation of what kind of biological data to collect can vary within an agency, as well.

In addition to defining terms differently, agencies have different objectives for biological inventories and consequently collect different kinds of data. The kinds of data collected usually reflect the missions of the agencies, For example, although both the National Oceanic and Atmospheric Administration (NOAA) and the Bureau of Land Management (BLM) have authority to inventory fishes, NOAA might conduct inventories of commercially harvested fish species for economic forecasting in the fishing industry, whereas BLM might conduct inventories of the nongame fish populations the agency is directed to manage and sustain. Generally, the authority to conduct an inventory does not clearly define what resources the data collection should address.

An inventory, itself, may be incidental to a broad mandate within an agency. This is the case with the migratory bird inventories conducted under the authority of the Migratory Bird Treaty Act. The act directs FWS to manage migratory bird populations and regulate harvesting of selected species. In order to accomplish the objectives of this mandate, FWS maintains large volumes of data for tracking population trends.

Finally, mandates and policies to conduct inventories of biological resources may overlap other mandates within an agency or among agencies. Data collection in the coastal zone is a case in point. Apparently, NOAA, FWS, and NPS each have authority to conduct coastal resource inventories. Federal data collection in the coastal zone may be duplicative, or it may overlap State efforts to inventory and manage coastal resources,

STATE AND PRIVATE INSTITUTIONS

State agencies concerned with managing land or natural resources are authorized to conduct resource inventories under mandates and policies similar to Federal legislation. Such agencies include State fish and game departments, wildlife departments, forestry agencies, and others. Like Federal agencies, few State agencies are instructed to collect data that are directly applicable to the maintenance of biological-diversity. Although most biological inventories do not consider biological diversity maintenance, exceptions include State natural history surveys, State heritage programs, and similar efforts.

A recent survey [4] of State natural resources programs indicated that the responding States collected biological data, but that the responsibilities for data generation and maintenance tended to be scattered and uncoordinated among agencies. Natural history surveys

[4] An informal survey of State agencies was conducted by the Librarian of the Illinois Natural History Survey. The results from the letters sent to the States are unpublished and uncompiled.

within some States represent efforts to consolidate biological and natural resource information in centralized locations. Formally authorized surveys of State biota exist in Kansas, Illinois, Montana, Oklahoma, Nevada, New York, North Carolina, and Wisconsin. These surveys were mandated to collect and synthesize biological data and, in some cases, maintain voucher specimens, but the completeness of the surveys varies widely. Montana's Natural Resource Information System, authorized in 1983, has not been funded, and Wisconsin's biological data has not been updated for more than 40 years. Illinois' Natural History Survey, however, has been active for more than 100 years and maintains a large collection of biological data.

States without formal natural history surveys generally have authority to collect data on game fish and wildlife, and on land cover (e.g., forests, croplands, rangelands). Recent interest in nongame species and rare plants led to new authorizations in most States for research and inventories on nongame species, as well.[5]

A cooperative State and Federal effort began a few years ago to consolidate information on fish, mammals, birds, and selected invertebrates into statewide databases whose formats were consistent among the States. These State biological information systems, known as State Fish and Wildlife Information Systems or "Procedures" databases, are operating in 10 States to help State agencies organize and manage fish and wildlife information, and to provide a consistent source of information for Federal agencies concerned with how particular projects will affect fish and wildlife resources (l).

No discussion of institutions conducting biological inventories would be complete without highlighting the State Natural Heritage Programs and The Nature Conservancy (TNC). Each of the approximately 43 existing Natural Heritage Programs conducts or consolidates inventories of existing biological data to identify the occurrence of organisms or species assemblages that are rare, threatened, endangered, or locally endemic. The Natural Heritage Programs assimilate biological data with the express purpose of using it to maintain biological diversity. Heritage programs may be operated in one of three ways: 1) solely by the State, 2) under cooperative agreement between TNC and the State, or 3) solely by TNC.

Natural Heritage Programs make important contributions to State and Federal agencies involved in protecting threatened and endangered species—which means protecting species diversity. The programs provide data to identify land or water areas that need protection to maintain diversity. Although data quantity and quality vary from State to State, data generated at the State level are collated and summarized at the national level by TNC to provide information on biological diversity across the country. In many geographic areas, TNC is the only institution collecting data on rare, sensitive, or endemic resources that may require special management considerations to maintain their integrity as populations. In these areas, TNC efforts help to fill an important gap in biological data needed for the on-site maintenance of biological diversity.

In addition to TNC heritage programs, numerous small, nonprofit organizations collect data on biological resources. Groups like the land-preservation trusts conduct inventories of the lands under their stewardship; and species-protection organizations, such as the World Pheasant Organization, collate data for specific taxonomic groups." A survey of all data generated by these organizations and biological research data generated by universities would be an impossible task.

[5]The following States have enacted legislation to fund nongame fish and wildlife programs: Alabama, Arizona, Arkansas, California, Colorado, Delaware, Idaho, Illinois, Indiana, Iowa, Kansas, Kentucky, Louisiana, Maine, Massachusetts, Michigan, Minnesota, Montana, Nebraska, New Jersey, New Mexico, New York, North Carolina, Ohio, Oklahoma, Oregon, Pennsylvania, South Carolina, Utah, Virginia, West Virginia, Wisconsin (2).

[6]See OTA's background paper, *Grassroots Conservation of Biological Diversity in the United States,* prepared in support of a forthcoming OTA assessment on *Technologies To Maintain Biological Diversity.*

In summary, biological data are collected, collated, or synthesized by most institutions with responsibilities for, or interests in, conserving biological resources. Little effort is made to consolidate the vast amounts of data generated by these institutions.

CHAPTER 2 REFERENCES

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