CALIFORNIA'S WILDLIFE INFORMATION SYSTEM AND ITS APPLICATION TO RESOURCE DECISIONS

Hal Salwasser
Regional Wildlife Ecologist
USDA Forest Service
630 Sansome St.
San Francisco, CA 94111

ABSTRACT.

California's wildlife and habitat management situation is diverse, complex, and subject to many new information needs. A wildlife information system is needed to effectively plan for wildlife in resource decisions. The system must meet specific decision needs for information while increasing both resource management efficiency and the accountability for wildlife in land management. The Interagency Wildlife Task Group is cooperatively developing the components of such a system. Resource managers, researchers, and data specialists are all involved in this effort.

THE WILDLIFE RESOURCE SITUATION

California supports 47 species of amphibians, 76 reptiles, 354 birds, and 186 mammals -- a total of 663 wildlife species excluding entirely pelagic marine animals and accidental visitors (Salwasser and Laundenslayer 1981). These species occupy a bewildering array of environments in six different ecoprovinces (Bailey and Cushwa 1981). Various State and Federal agencies are entrusted with responsibilities to manage these wildlife and their habitats. This stewardship role includes the maintenance of viable populations of all species and their habitats in as near their natural distribution as possible (maintenance of diversity) and the production of exploitable populations of commercial, game, and special interest wildlife (featured species production).

The wildlife stewardship task is increasingly complex and difficult to fulfill in the face of shrinking natural habitats and more intensive uses of remaining wildlands. Humans compete with wildlife for habitat resources through residential development, timber management, agriculture (including irrigation), drinking water production, flood control, livestock grazing, recreation development, minerals and energy development, and various other industries. Because these activities affect land and water habitats, they all have an effect on wildlife, favoring some species and disfavoring others. Only through intelligent consideration of wildlife habitat needs in planning for land developments and resource management can the desired wildlife effects of these activities be enhanced and the unwanted impacts be minimized.

RESOURCE DECISIONS

Natural resource management decisions generally accomplish four things: 1) they allocate land and its inherent resources to different goals, objectives, management strategies, and uses; 2) they prescribe the activities that may occur on those lands; 3) they establish utilization and environmental standards (quality controls) for those lands; and 4) they schedule the investments, practices, and outputs for the lands. Like all businesses, resource management strives to meet the demands for its goods and services within acceptable quality controls for the least cost. Much recent environmental legislation is aimed at quality control, e.g., water quality, endangered species, wilderness, and diversity.

Current political direction stresses reducing costs while increasing outputs. Resource decisions that increase management efficiency are needed to meet this current direction while maintaining a quality environment. This is especially challenging because the natural resource business differs from most other businesses in three major ways: 1) the production center is a wildland ecosystem instead of a highly controlled manufacturing plant; 2) the allocation system for resource goods and services is a complex mix of market and non-market systems; and, in the case of public resources, 3) a diverse set of special interest groups competes through political means for the goods and services. These differences make the input of wildlife information into decisions to produce mixes of resources much more complicated than a "normal" production decision.

Decisions to manage land, vegetation, and water for particular products require information on a variety of issues. Among them are: 1) demand for certain goods and services; 2) physical and biological capabilities of the land and resources in question; 3) attitudes and laws about appropriate practices, costs, and expected benefits of alternative courses; and 4) costs and benefits. Of course, few, if any, decisions are ever made on the basis of complete and perfect information are a decision maker's constant companions. Risk and uncertainty will not be addressed here as they are separate topics with their own methodologies. Lack of information will never be fully overcome, but it can be significantly reduced through the ready availability of relevant and accurate data and analytical models. Increasing the accountability for wildlife in decisions at all levels requires the efficient and effective use of available data and models to understand the wildlife capabilities, tradeoffs, and consequences of management alternatives.

A WILDLIFE INFORMATION SYSTEM

Information on wildlife and habitats is abundant. It exists in a multiple of books, papers, reports, maps, inventories, and computer files. It is not well organized, however, and it is definitely not readily available to decision makers or their planners in a form that facilitates its use. There are also large gaps in what we know and probably errors in what we think we know.

The first steps in building a wildlife information system to resolve some of these problems were to: 1) organize what we know (and think we know) into a system that better meets decision needs; 2) make the information and analytical models available to resource managers; and 3) identify the gaps for research to address. This process was begun in 1976 by the USDA Forest Service under the Wildlife Habitat Relationships Program (Verner and Boss 1980, Marcot 1979, Airola 1980, Salwasser et al. 1980) and in 1978 by the California Department of Fish and Game and The Nature Conservancy through the California Natural Diversity Data Base (Csuti 1982). Other State and Federal agencies and institutions have since joined these efforts through the California Interagency Wildlife Task Group. Cooperating in the development of the multi-agency information system are: the Forest Service, Department of Fish and Game, California Department of Forestry, California Energy Commission, University of California, USDA Soil Conservation Service, USDA Bureau of Land Management, Southern California Edison Company, and the Pacific Gas and Electric Company. The general goals of the task group are to better coordinate wildlife and habitat terminology, classification, inventory, and analytical models, and to cooperatively develop and apply these products within each agency to increase efficiency and accuracy of wildlife input to resource decisions. The goal is <u>not</u> a grandiose system that must be used in its entirety by any organization.

<u>Criteria for Judging the Success of California's Wildlife Information System</u>

Common sense, past experience, current resource management methods, and a knowledge of evolving technologies (e.g., automated data processing and mapping, simulation and optimization models, and remote sensing) provide the perspective for developing system criteria. The investment and reliance upon existing inventories and analytical models lead to the first criterion:

1. The wildlife information system must capitalize on existing inventories, models, research findings, past experience and data management systems through better coordination to improve information transfer and use in meeting decision needs.

In other words, make better collective use of what we know and are already doing.

By bringing the different agencies and their methods together in developing a common framework for wildlife and habitat classification and analysis it is hoped the information system can guide the evolution of multi-agency inventories, research, and data management. This will result in significant savings of time and money, yet result in more effective wildlife planning. Criterion number two is thus:

2. The terminology, classifications, inventories, and analytical models should meet all agency needs to the maximum extent possible and should facilitate the adoption of new technologies in resource management.

The information system will thereby serve interagency communication and cooperation much as the English language serves to tie the various segments of our society. We recognize and support the notion that each agency will find a relatively unique way to use parts of the system, just as dialects and special jargons are used in language.

The performance and capabilities of the information system are a major concern of the task group and agency leaders. These concerns lead to the following four criteria:

3. The system must provide predictive capabilities for projecting the occurrence and response of all wildlife species (diversity analyses) to habitat conditions and changes that result from management alternatives. Detailed attention and special capabilities are needed for species selected for management attention because they are threatened, endangered, sensitive, game, commercial, or of special interest.

4. The system must maintain current information on the locations and abundance of rare and sensitive elements of the State's flora and fauna and their habitats.

5. The system must make all information and analytical models readily available in a useable format for application to resource analysis and decisions at all levels.

6. Use and maintenance of the system should result in more efficient use of personnel (e.g., optimum use of field time and remote sensing for inventories; minimum duplication of efforts on inventory, monitoring, research and development; and better accountability for wildlife in all resource decisions).

The final criterion recognizes that there are gaps in our knowledge and a need for better analytical tools:

7. The system should serve to identify needs and guide research and development efforts to more effectively improve both the information system and its continuing utility.

The Interagency Wildlife Task Group has developed a schema for relating inventories and analytical models to various decision levels (Table 1). This matrix provides a perspective on the future integration of such components as Wildlife Habitat Relationships (WHR) (Salwasser et al. 1980, Grenfell et al. 1982), Habitat Evaluation Procedures (USFWS 1980), the California Natural Diversity Data Base (CNDDB) (Csuti 1982), Habitat Capability Models (Hurley et al. 1982), and other inventories and models.

PROGRESS REPORT

Development of California's wildlife information system is now in its "adolescence". It passed through "childhood" with the development and partial implementation of the WHR system (Salwasser et al. 1980) and the CNDDB (Csuti 1982). WHR is continuing to evolve under

the leadership of the Department of Fish and Game (Grenfell et al. 1982) to eventually encompass all vertebrates in all habitats within the State. CNDDB will evolve as a function of agency uses and future needs. Habitat capability modelling is still in a developmental and testing phase, with the primary applications being made in National Forest planning (Hurley et al. 1982), Soil Conservation Service planning (Longwood 1980), and USDI Fish and Wildlife Service Habitat Evaluation Procedures (USFWS 1981).

Table 1. Relationships between inventory, species-habitat relationships models, and resolution of evaluations.

INCREASED RESOLUTION →

POPULATIONS ← GROUPS ← INDIVIDUALS

SPECIES-HABITAT RELATIONSHIPS MODELS	HABITAT INVENTORY SYSTEMS: LEVEL 1 Resolution >10^6 ac FORMATION, SERIES High Flight Air Photo to Landsat 1:30,000-1:250,000	LEVEL 2 Resolution <10^6 ac SERIES, COMMUNITY Medium Level Air Photo to Landsat 1:10,000-1:250,000	LEVEL 3 Resolution <10^3 ac ECOLOGICAL SITE, ASSOCIATION Field Work to Medium Level Air Photo 1:1 to 1:10,000
LEVEL 1 Life history value of single stand and specific habitats	Predicted species occurrence and response to habitat change: primarily for diversity analysis -mod. accuracy -lowest cost	-mod. accuracy -mod. cost	-high accuracy -high cost
LEVEL 2 Capability of mix of stands for all habitat needs	Predicted habitat capability and response to habitat change for supporting groups of animals: primarily used for featured species analysis -low accuracy -low cost	-mod. accuracy -mod. cost	-high accuracy -high cost
LEVEL 3 Range capacity for aggregate and distribution of habitats	Predicted range capacity and response to habitat change for populations of animals: primary use in featured species analysis -lowest accuracy -low cost	-mod. accuracy -mod. cost	-mod. accuracy -highest cost

Validation studies for WHR models and habitat capability models are ongoing at the Pacific Southwest Forest and Range Experiment Station, University of California, and Oregon State University. The California Department of Forestry, through the Forest Resources Assessment Program is evaluating application of habitat models to remote sensing habitat inventories at the statewide level. These and many other efforts will continue as the cooperating agencies support the evolving system as it grows into "maturity". The foundation and initial framework of a wildlife information system for California have been established. The work of maintenance, revision, and augmentation will offer sufficient challenges to keep managers and researchers cooperating closely throughout the 1980's.

In closing, it is important to keep a perspective on how the wildlife information system fits into the resource decision making process and how it relates to other inventories and models. The entire process (Figure 1) is sufficiently complex and large that its continued success will require cooperation between different agencies and between wildlife professionals and managers. Challenging areas for further work include developing statistically sound remote sensing inventories and monitoring practices, validating analytical models and classifications, and implementing user oriented automated data processing systems.

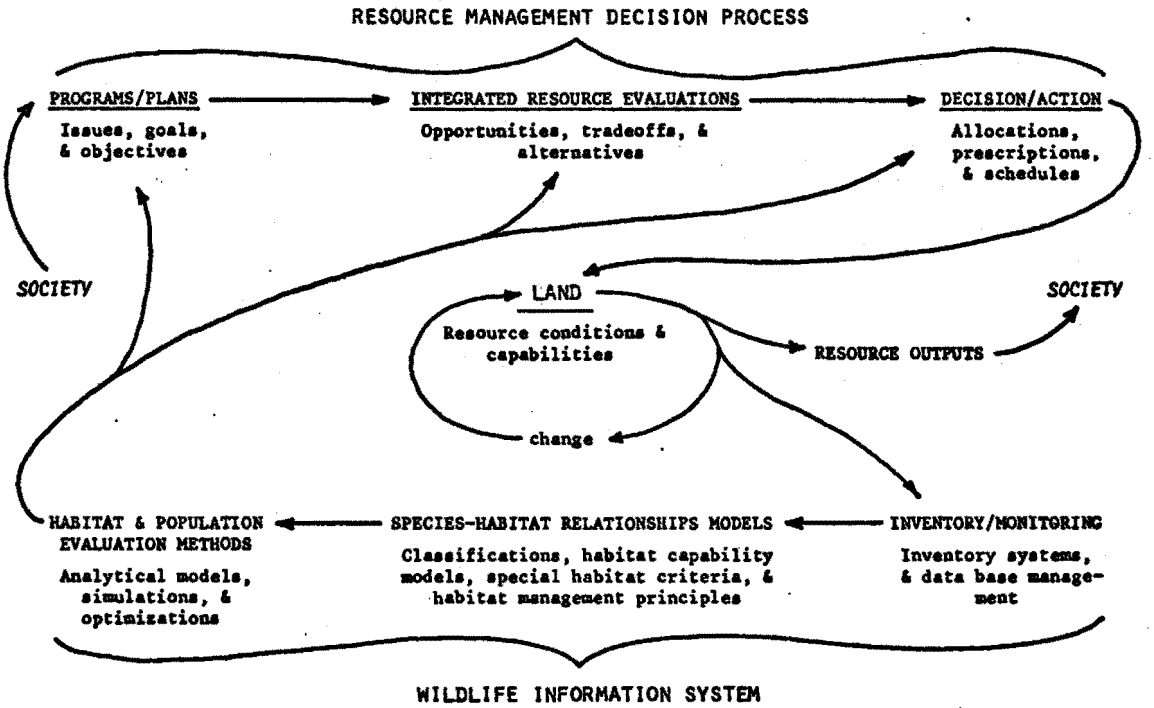

Figure 1. Integration of a wildlife information system into resource management.

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