THE CALIFORNIA WILDLIFE/FISH HABITAT RELATIONSHIPS SYSTEM[1]

William E. Grenfell, Jr.
California Department of Fish and Game
Wildlife Management Branch
1701 Nimbus Rd., Suite D
Rancho Cordova, CA 95670

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

William F. Laudenslayer, Jr.
USDA Forest Service
630 Sansome St.
San Francisco, CA 94111

ABSTRACT

The California Wildlife/Fish Habitat Relationships (WFHR) System is an ongoing effort to apply our knowledge of wildlife habitat requirements to identify and explain the consequences of proposed land use activities, particularly those activities that affect vegetation. The U.S. Forest Service initiated the WFHR program in California in 1976 and has developed it for all Forest Service lands in the state. The California Department of Fish and Game is currently expanding the WFHR program to include non-Forest Service lands in California.

INTRODUCTION

Excluding entirely pelagic marine animals, California supports as residents and regular migrants, 49 species of amphibians, 75 reptiles, 365 birds, and 187 mammals; a total of 675 wildlife species. The public has entrusted various state and federal agencies with the responsibility to manage these wildlife populations and their habitats. These agencies, using protection, utilization, reintroduction, and land and resource management as appropriate, maintain the state's natural floral and faunal diversity and productivity. This trust includes the maintenance of viable populations of all species and their habitats in as near their natural distribution as possible, as well as production of exploitable populations of commercial, game and special interest species.

However, the human population continues to compete with wildlife by way of ever-increasing demands for California's finite land and water resources. Requirements for residences, timber, agriculture, irrigation, drinking water, flood control, energy, grazing, recreation, and various industries all have an impact on our wildlife resource. The public trust doctrine becomes increasingly difficult to fulfill in the face of shrinking wildlife habitat.

Land and resource management decisions are based on three primary sets of information: the physical and biological capability of resource ecosystems, economic considerations, and socio-political issues. In very few cases are decisions based on the desired amount or quality of information. Economic considerations are often dominated by marketed resources with little attention being given to non-commodity resources. Socio-political issues are

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[1] Bill Grenfell's presentation of this paper received "Honorable Mention" from the Nelson-Hooper Award Committee.

laden with conflicting emotions and the search is not for the "right" solution, but for the best compromise, often with a very short-term planning horizon. And, unfortunately, the weakest information provided to a decision-maker often is that regarding the biological capability of the land and the consequences of alternative courses. This is especially true with regard to wildlife resources.

In order to fulfill our public trust of wildlife stewardship, we must improve our abilities to provide better wildlife information to resource decision makers. What is needed is a unified effort by all agencies concerned with land and wildlife to ensure: (1) a systematic, consistent method of data collection and management, (2) consistent application of analytical models, and (3) integration of wildlife information into the resource management decision process.

During the 1970s federal legislation (i.e., the Federal Land Policy and Management Act and the National Forest Management Act) provided for the integration of fish and wildlife concerns in multiple resource planning and management. This direction emphasized the use of management indicator species and attention to diversity in planning for wildlife and fish resources. The U.S. Fish and Wildlife Service began the development of Habitat Evaluation (HEP) for assessing habitat conditions of selected management indicator species. These procedures are designed for site specific resource development projects. The U.S. Forest Service initiated the Wildlife/Fish Habitat Relationships Program for the purpose of evaluating habitat capability and the consequences of resource management alternatives for all wildlife and fish on forests and rangelands in California. The principal focus of wildlife/fish habitat relationships products was wildlife and fish diversity. These projects have been operational in parts of the state since 1979.

In 1978 the California Department of Fish and Game (CDFG) and the Nature Conservancy jointly created a system of inventory for locations and abundance of rare California natural flora and fauna. A computerized system for storing and retrieving this information became operational in 1981. It is called the California Natural Diversity Data Base.

In further recognition of the CDFG stewardship role for all wildlife and fish species, and the need to integrate and standardize the habitat evaluation tools developed by the aforementioned agencies, the California Wildlife Fish/Habitat Relationships system was initiated under the leadership of CDFG in 1981.

We have come from a time when wildlife habitat assessment concentrated mainly on key game habitats. We are now in a period of resource data bases, population models, and habitat assessment models designed to account for all wildlife and all habitats.

GOAL

The primary goal of this program is to develop and implement a wildlife and fish habitat evaluation system that provides resource decision-makers with current information on wildlife and fish habitat capabilities and the predicted consequences of land and resource management alternatives for wildlife and fish resources. Secondary goals are:

1. To improve standardization and uniformity in wildlife and fish habitat inventory, classification, and evaluation through increased communication and coordination among agencies and individuals developing and publishing products for the habitat evaluation system;

2. To ensure that the habitat evaluation system encompasses all California vertebrates and their habitats, and that it provides management information for site specific projects, land and resource management planning, and statewide wildlife, fish and other resource program development; and

3. To link interagency research, development, and application efforts in implementing the habitat evaluation system and in facilitating research on the validation and refinement of system products.

DATA BASE COMPONENTS

A wildlife classification system has been developed that will provide a state list of terrestrial vertebrates including their taxonomy and management status. This represents the basic inventory. Data on fish will be added later.

A wildlife habitat classification system also has been prepared. Habitat designations are based on dominant vegetation, size/age classes and canopy closure. There are over 40 habitat types that can be linked with vertebrate species. In addition, over 100 specific habitat elements have been described in general categories such as vegetative diet elements, habitat edge elements, aquatic elements, physical elements, etc. Typical examples of these are berries, tree-water edges, springs, and rock piles, respectively.

Now that we have cataloged all wildlife species and the habitats they occupy, we need to know where they are found - a wildlife distribution inventory will be coded by habitat type, season of year and geographical area. Geographical areas include CDFG Regions, Bureau of Land Management District, U.S. National Forests, counties, latilongs, and hydrologic units.

Habitat value ratings will be assigned to each habitat and specific habitat element, based on the literature or professional judgment. Each habitat will be scored "high", "medium", or "low" for reproduction, feeding and cover. Scores will be based on implied density. Each specific habitat element also will be scored for reproduction, feeding and cover. In this case there are two ratings, "essential" and "preferred".

The final data base component will be a narrative on behavior, interspecific relationships, and on a variety of life history requisites for each species. All data base components will be stored in an automated data processing system for quick and easy retrieval.

DATA BASE PRODUCTS

Distribution maps for approximately 675 terrestrial species will be available about August 1982. These maps have a scale of 1/5,562,000 and depict in broad perspective the general area where a species can be expected to occur (Figure 1). They will be digitized and stored in a computer for easy revision. Species lists can be called up by county, latilong, and the other geographical areas described earlier. These distribution inventories and maps can be used to cross-check the probability of a species presence in a given area.

Species/habitat relationships models also will be available in computer format in late 1982 (Figures 2-4). (Wildlife experts should note that the bobcat data provided in Figures 2-4 are "hypothetical" and are intended to demonstrate the print-out format only). These models will relate all species to their appropriate habitats and special habitat elements and indicate the value ratings for reproduction, feeding and cover. These can also be easily edited and updated as necessary. Wildlife biologists using species/habitat relationships models in conjunction with an inventory of habitats for a project site will be able to predict which species occur on the site now and which can be expected to occur there under different management alternatives (Figure 5).

Species notes (narratives) will provide the user with an overview of the species with regard to management. Each is intended to be intermediate between the information found in a typical field guide and that in a detailed literature review. Species notes will be stored in a word processor and can be easily updated.

ACTION PLAN

The California Department of Fish and Game is working closely with the United States Forest Service and the California Department of Forestry on this project.
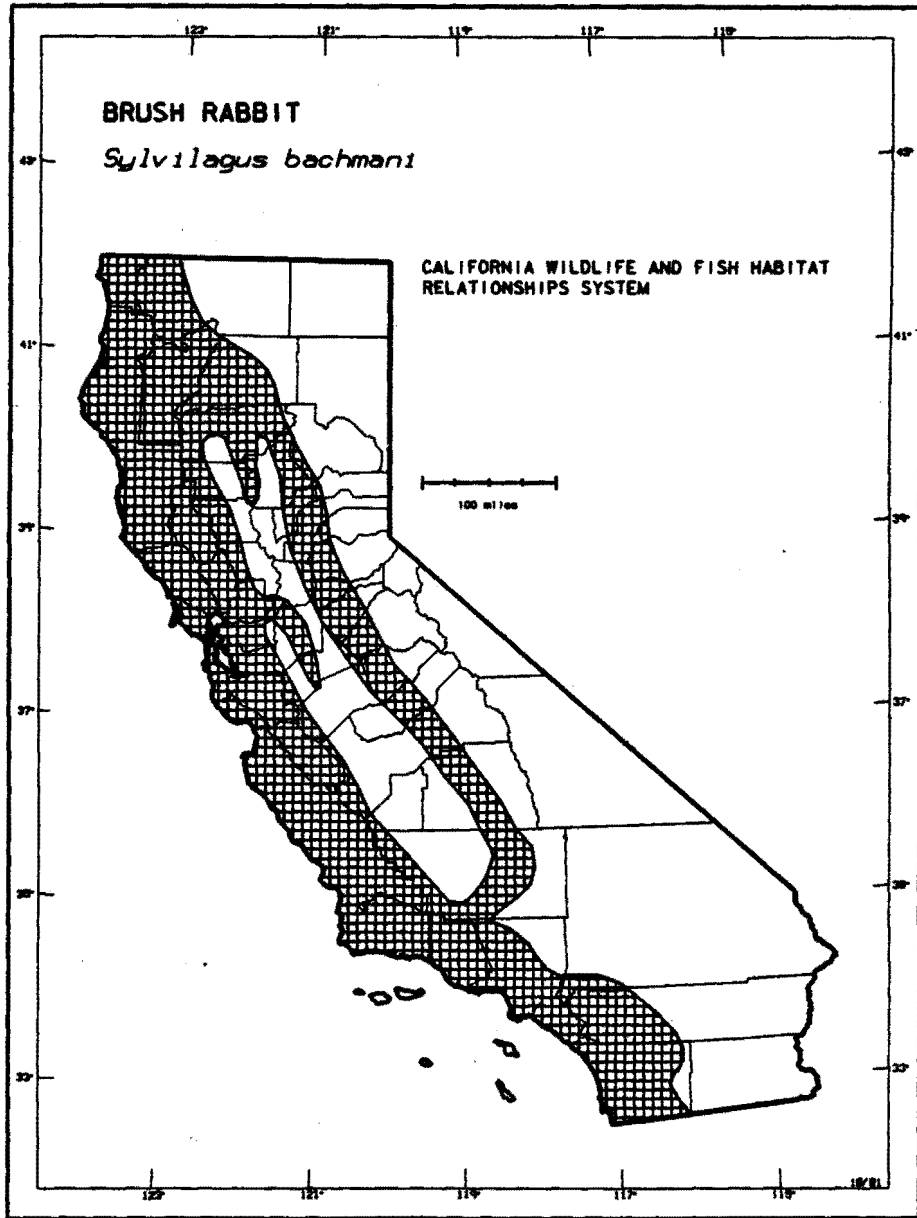
Figure 1. Computer print-out of a mammal distribution map.

CDFG's responsibilities are:

1. Synthesize and standardize all existing wildlife habitat relationships data for California.

2. Expand the program to include all non-Forest Service lands and animals in California.

3. Insure that all data are of the highest quality.

4. Design a computer storage and retrieval system.

5. Provide information to resource planners.

If the second year's funding is approved, it is expected that the Wildlife Habitat Relationships Data Base will be operational in late 1982.

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WILDLIFE HABITAT RELATIONSHIPS SYSTEM   HABITING.TSK vO.1 07-OCT-81
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TAXONOMY   (0089.1.)
....

     NAME: BOBCAT (Felis rufus)   (01)

     CLASS: MAMMALIA   (02)
     ORDER: CARNIVORA   (03)
     FAMILY: FELIDAE   (04)

     BLM #: 123456789   ST.COM.NAME: XXXXXXXXXX   (05)
     STATUS: no special designation   (06)

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LIFE HISTORY ATTRIBUTES   (0089.1.)
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DAILY ACTIVITY: CIRCADIAN   (07)
SEASONAL ACTIVITY: YEAR-LONG   (08)
MIGRATION: NON-MIGRATORY   (09)

===
SUB-SPECIES   (0089.2.)
....

     NAME: Xxxxxxxxxxx xxxxxxxxx   (01)
     STATUS: xxxxxxxxxxxxxxxxxxxx   (02)
             xxxxxxxxxxxxxxxxxxxxxxxxxxxx   (03)

     NAME: Xxxxxxxxxxxxx xxxxxxxx   (04)
     STATUS: xxxxxxxxxxxxxxxxxxx   (05)

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DISTRIBUTION BY SEASON   (0089.3.)
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FISH & GAME REGIONS   BLM DISTRICTS   COUNTIES   LATILONGS
-----------------------   ---------------------   -----------------   ----------------------
REGION 1   yearlong(01.01) BAKERSFIELD yearlong(03.01) ALPINE   yearlong(05.01) BISHOP   yearlong(06.01)
REGION 2   "   (01.02) REDDING   "   (03.02) AMADOR   "   (05.02) MINERAL KING   " (06.02)
REGION 4   "   (01.03) SUSANVILLE   "   (03.03) BUTTE   "   (05.03) MOKELUMNE HILL " (06.03)
                                                        CALAVERAS   "   (05.04) T. LASSEN   " (06.04)
                                                        EL DORADO   "   (05.05) OROVILLE   " (06.05)
NATIONAL FORESTS   HYDROLOGIC UNITS   FRESNO   "   (05.06) SACRAMENTO   " (06.06)
-----------------------   ---------------------   KERN   "   (05.07) SIERRA CITY   " (06.07)
EL DORADO yearlong(02.01) TRUCKEE   yearlong(04.01) MADERA   "   (05.08) SONORA PASS   " (06.08)
LASSEN   "   (02.02) KLAMATH   "   (04.02) MARIPOSA   "   (05.09) SUSANVILLE   " (06.09)
PLUMAS   "   (02.03) UPPER SACRAMENTO " (04.03) NEVADA   "   (05.10) TURLOCK LAKE   " (06.10)
SEQUOIA   "   (02.04) LOWER SACRAMENTO " (04.04) PLACER   "   (05.11) VISALIA   " (06.11)
SIERRA   "   (02.05) SAN JOAQUIN   "   (04.05) PLUMAS   "   (05.12) YOSEMITE VALLEY " (06.12)
STANISLAUS   "   (02.06) NORTH LAHONTAN "   (04.06) SHASTA   "   (05.13)
TAHOE   "   (02.07) MONO OWENS LAKES " (04.07) SIERRA   "   (05.14)
TOYIABE   "   (02.08) SALTON SEA   "   (04.08) TEHAMA   "   (05.15)
                                                        TUOLUMNE   "   (05.16)
                                                        YUBA   "   (05.17)
....   continued ....

Figure 2. Computer print-out format for WFHR data showing species classification and distribution.

IDENTIFICATION   (0089.0.)

NAME: BOBCAT (Felis rufus)   continued

SPECIES/HABITAT RELATIONSHIPS   (0089.4.)

HABITAT	SEASON	SIZE/AGE CLASS	CANOPY CLOSURE	IMPORTANCE TO: REPRO.	COVER	FEEDING	INDEX	
MIXED CONIFER	yearlong	SEEDLING TREE	SPARSE 10-24%	low	high	-	high	(01.01)
		SAPLING TREE	SPARSE 10-24%	high	high	high	high	(01.02)
			OPEN 25-37%	high	high	high	high	(01.03)
			MODRTE 40-59%	med	med	high	high	(01.04)
			DENSE 60-100%	-	low	med	med	(01.05)
		POLE TREE	SPARSE 10-20%	low	high	low	high	(01.06)
			OPEN 25-37%	high	high	high	high	(01.07)
			MODRTE 40-59%	med	med	high	high	(01.08)
			DENSE 60-100%	low	low	low	low	(01.09)
		SMALL TREE	SPARSE 10-20%	low	high	low	high	(01.10)
			OPEN 25-37%	high	high	high	high	(01.11)
			MODRTE 40-59%	med	med	high	high	(01.12)
			DENSE 60-100%	low	low	low	low	(01.13)
		MED/LARGE TREE	SPARSE 10-20%	low	high	med	high	(01.14)
			OPEN 25-37%	high	high	high	high	(01.15)
			MODRTE 40-59%	med	med	med	med	(01.16)
			DENSE 60-100%	-	low	occurs	low	(01.17)
		MULTI-STORIED	MODRTE 40-59%	-	low	low	low	(01.18)
			DENSE 60-100%	-	-	-	-	(01.19)
PONDEROSA PINE	spring&summer	SEEDLING TREE	SPARSE 10-20%	med	high	low	high	(02.01)
		SAPLING TREE	SPARSE 10-24%	med	med	low	med	(02.02)

HABITATS NOT USED

DESERT WASH
ORCHARD-VINEYARD
CROPLAND-PASTURE
RESIDENTIAL-PARK
BARREN

. . . .   continued   . . . .

Figure 3.   Computer print-out format for WFHR data showing species/habitat relationships.

IDENTIFICATION   (0089.0.)

NAME: BOBCAT (Felis rufus)   continued

SPECIFIC HABITAT ELEMENTS   (0089.5.)

LIVE VEGETATION		IMPORTANCE TO: REPRO.	COVER	FEEDING	
TREE LAYER		-	preferable	-	(01.01)
HERBACEOUS		preferable	-	preferable	(01.02)
RIPARIAN INCLUSION		-	preferable	-	(01.03)
SHRUB LAYER		-	-	essential	(01.04)

DEAD OR DECADENT VEGETATION	DECAY CLASS	IMPORTANCE TO: REPRO.	COVER	FEEDING	
MEDIUM SNAG	SOUND	essential	-	essential	(02.01)
MEDIUM SNAG	ROTTEN	preferable	-	essential	(02.02)
LARGE SNAG	SOUND	essential	-	essential	(02.03)
LARGE SNAG	ROTTEN	-	-	essential	(02.04)
LARGE SLASH		-	-	preferable	(02.05)
MEDIUM LOG	SOUND	-	-	preferable	(02.06)

ELEMENTS OF NO IMPORTANCE

HABITAT EDGE ELEMENTS   (03.01)
PHYSICAL ELEMENTS   (03.02)
AQUATIC ELEMENTS   (03.03)
ANIMAL DIET ELEMENTS   (03.04)
MAN MADE ELEMENTS   (03.05)
VEGETATIVE DIET ELEMENTS   (03.06)

. . . .   END OF REPORT   . . . .

Figure 4.   Computer print-out format for WFHR data showing specific habitat elements.

CONVERSION FROM - MCNSD (Mixed Conifer Med/large Tree With Dense Canopy)
            TO - MCN1   (Mixed Conifer Seedling Tree)
            TO - MCNSM (Mixed Conifer Sapling Tree With Moderate Canopy)

COMMON NAME	MGT STATUS	MCN SD REPRO	MCN SD FEED	MCN 1 REPRO	MCN 1 FEED	MCN 2M REPRO	MCN 2M FEED	SPECIFIC HABITAT ELEMENTS SNAGS	LOGS	GROUND LITTER
SHREW MOLE		M	M	L	L	L	L			
LONG-EARED MYOTIS		M	M	L	M	L	L	P		
SILVER-HAIRED BAT		M	M	L	L	L	L	P		
DOUGLAS SQUIRREL		M	M	O	O	O	O	P		
NORTHERN FLYING SQUIRREL		M	M	O	O	O	O	E	E	E
WESTERN RED-BACKED VOLE		M	M	M	M	L	L	P	P	
RED FOX		O	M	O	M	O	M			
BALD EAGLE	FE,CE	M	L	O	M	O	M			
SPOTTED OWL	FS	M	M	O	O	O	O	P		
PILEATED WOODPECKER		M	M	O	O	O	O	E		
HAMMOND'S FLYCATCHER		M	M	O	O	O	O			
CHESTNUT-BACKED CHICKADEE		M	M	O	O	O	O	P		
RED-BREASTED NUTHATCH		M	M	O	O	O	O	P		
BROWN CREEPER		M	M	O	O	O	O		P	P
WINTER WREN		M	M	O	O	O	O			
VARIED THRUSH		O	M	S	L	O	O			
HERMIT THRUSH		M	M	O	O	O	O			
GOLDEN-CROWNED KINGLET		M	M	O	O	O	O			
PURPLE FINCH		M	M	S	L	O	L			
NORTHERN ALLIGATOR LIZARD		M	M	M	M	M	M			
RUBBER BOA		M	M	M	M	M	M			

@1@ TOTAL FOR 21 ITEMS WITH TYPE EQUAL TO 1.00

.... end of report ....

Figure 5. Computer print-out of WFHR data showing the predicted effects of a mixed conifer clearcut.