FISHERIES INPUT INTO LAND MANAGEMENT PLANNING IN THE FOREST SERVICE, REGION 5

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ABSTRACT.

This paper outlines and describes the various steps one goes through in providing fisheries input into the interdisciplinary planning process utilized by the Forest Service in California to prepare Forest Plans.

With the advent of intensive land management planning in the Forest Service each function has endeavored to devise a workable system of organizing its data so as to permit participation in interdisciplinary planning. This is only one system of many options that was developed to meet the fisheries planning needs in Region 5 (California). It was developed primarily by a committee of fishery biologists and planners during 1978, and organized into a published guideline in 1979. (Evans, W.A. 1979. USDA, Forest Service, Guideline to Fisheries Resource Input for Planning and Project Purposes, 24 pp.).

As you may know the Forest Service, as a result of the two major pieces of legislation in recent years, has been directed to prepare, by 1983, detailed integrated management plans for each forest in the United States. The above mentioned guideline was prepared to provide fisheries input to this interdisciplinary process.

Imagine for a moment that you are in a large stadium and before your eyes there is taking place a multi-functional series of athletic events simultaneously. A football event is in full swing. Also occupying the playing area is a soccer game and a baseball series. In one corner of the playing field track and field events are taking place with everything from high hurdles to the throwing of the javelin. In another corner a lawn bowling tournament is in progress.

The analogy might be made between this situation and the multiple use activites in progress on most national forests. The stadium represents the forest and the sports events are comparable to the various activities encountered. Some activities are compatible while others are in direct conflict. It is obvious that in case of either the stadium or the forest some stringent guidelines or ground rules are necessary to allow desired activities to proceed in an orderly manner.

For the Forest Service the necessary "rules of the game" for the interdisciplinary planning effort have been largely provided for in three pieces of important federal legislation. These are: (1) the Forest and Rangeland Renewable Resources Planning Act of 1974, known as RPA; (2) the National Forest Management Act of 1976; and (3) the National Environmental Policy Act of 1969 (NEPA).

The fact that all forest resources will receive equal consideration is of key importance. Of special concern to the field of fish and wildlife is the further direction provided by the Endangered Species Act of 1973 (1978). These are the driving forces of the planning system.

A logical starting point therefore is to examine the requirements for fisheries planning under these laws.

The following list briefly summarizes the requirements of the planning process as they relate to the fishery resources of the forests:

1. Both quantity and quality of fish resources and their habitat must be listed.

2. Potential or capability of the habitat and resource must be defined.

3. Diversity of species must be maintained. Fish species should be at least as diversified as that which would be expected in a forest under natural conditions.

4. Viable populations of all species indigenous to the area must be sustained.

5. Fish populations must be managed so as to provide a continuous sustained yield.

6. Use and demand for fish resources provided must be assessed.

7. The planning steps required to be followed are prescribed.

8. Indicator species, representative of larger groups, may be utilized.

9. Future goals will be stated where possible in terms of fish population trends and amount and quality of habitat.

10. Provide special protection for the habitat of threatened and endangered species.

11. Population trends of indicator species will be monitored and habitat changes noted.

12. Specifically in the matter of aquatic environments it states that:
    a. Management prescriptions for vegetative manipulation of tree cover will provide for desired water quantity and quality for fish habitat.
    b. Special attention will be given to land and vegetation for approximately 100 feet from the edges of all perennial streams, lakes and other bodies of water and will correspond to at least the recognizable area dominated by riparian vegetation. No management practice causing detrimental changes in water temperatures or chemical composition, blockage of watercourses, and deposits of sediment will be permitted within these areas which seriously and adversely affect water conditions or fish habitat.

In total this represents stronger and more specific direction than has been provided to date.

An awareness of the interrelationships of plants, animals, soil, water and air is required along with a systematic interdisciplinary approach. It emphasizes providing a sustained yield of goods and services, which are defined as outputs (both tangible and intangible), expressed in both market and non-market values.

Finally it is indicated that all management practices will conserve soil and water resources and not allow significant or permanent impairment of productivity.

How does the fishery biologist on the typical forest cope with meeting all of these requirements? To begin with it is indicated that the planning approach as outlined in NEPA will be followed. This means that the following general planning steps must be taken for interdisciplinary planning:

1. Definition of goals and objectives.
2. Delineation of critical issues, problems and opportunities.
3. Delineation of existing fish habitat, its quantity, quality and potential.
4. Delineation of fish resources, existing estimates, trends and potential.
5. Development of alternative management plans.
6. Selection of a preferred alternative.
7. Implement the accepted plan.

At first glance it may look like a tremendous job. How does one take the vast accumulation of data collected over the years and convert it into a form usable for this type of planning? In actuality, it may not be as difficult as it sounds. Here is one system of data organization that is used in the Forest Service to accomplish this task:

1. Collect the necessary inventory data.
2. Organize the data into usable form.
3. Present the data to other functions.
4. Interrelate with other functions to fully understand both compatibilities and conflicts.
5. Prepare several alternative management plans, each of which provides for an integration of various resources and functions.
6. Display the consequences of each alternative plan.
7. Assist in recommending a preferred alternative plan.
8. Once the decision is made, assist in implementation of the selected plan.

Let us examine briefly some of the details of these various steps. The most important basic information utilized by the fishery biologist is the inventory data provided by the stream and lake surveys. In Region 5 a reconnaissance level survey, with which we are dealing in this case, consists of four essential parts: (1) a sketch map of the water showing the location of key features; (2) a detailed written description of the entire stream by 1/4 mile increments; (3) a completed survey data form providing for the major information and recommendations; and (4) an analysis of management recommendations.

If surveys are properly conducted and data recorded in the above form it should be possible to extract from them the fisheries information needed for the land management planning process.

Assuming now that the fishery biologist has complete inventory data of this type for his entire forest, how does he organize it in order to effectively communicate with others? Keeping in mind at all times his basic objectives, the following steps are taken to complete the inventory:

1. Organized Classification of Waters

    a. Drainage basins - the basic unit of subdivision of waters is by drainage basins. The river drainages of California have been adequately classified into the various river basins. (See Table 1.)
    b. Types of waters - the next breakdown is of the various types of waters within each drainage basin. These are classified, as shown in Table 2, into flowing water or standing water; cold, intermediate or warm water; and lastly, into size categories. From these data one has a complete understanding quantitatively of the water available in any given planning area.
    c. Quality of waters - the quality of waters is then determined, on a basis of high, medium and low. It is extremely important that the definition of these terms be clear and accepted by all as a common standard. This information is obtained from a review of the individual stream and lake surveys, and is highly important in obtaining a broad perspective of the current condition of fish habitats. It is then possible to present both quantitative and qualitative information on all waters in a consolidated form (Table 3). This is normally expressed in miles and surface acres.
    d. Potential of waters - at the same time that stream and lake surveys are being scanned for qualitative data, the potential of the waters to be improved from the fish habitat standpoint should be assessed. Such an assessment determines the suitability of the water under alteration or more intensive management to produce a greater fishery resource. This is one of the most important pieces of datum for fisheries planning. It is also shown as high, medium and low (Table 4). Even at this stage certain patterns will be emerging. Habitat of prime quality, but low potential for improvement will indicate the need for protection rather than active management. Other habitats of low/or medium quality but high potential for improvement will indicate need for management.

2. Classification of fish species - to aid in organizing the array of fish species into a usable format they have been categorized into the following groups for management purposes:

    a. Emphasis species - (Major management species)
        1. Recovery species (threatened, endangered, or sensitive species)
        2. Harvest species

TABLE 1. River drainages of California*

ORDER - Colorado River Drainage Area (no National Forest lands)

ORDER - Great Basin Drainage Area

- CLASS - South Lahontan Subregion
  - FAMILY - Owens Lake Basin, Mono Lake Basin
- CLASS - North Lahontan Subregion
  - FAMILY - Walker Lake Basin, Humboldt-Carson Sink Basin, Pyramid and Winnemucca Lake Basin, Honey Lake Basin

ORDER - Central Valley Drainage Area

- CLASS - Kern River Basin Subregion
  - FAMILY - Kern River Basin, Tule River Basin
- CLASS - Tulare Lake Basin
  - FAMILY - Kaweach River Basin, Kings River Basin
- CLASS - San Joaquin River Subregion
  - FAMILY - San Joaquin River Basin, Merced River, Tuolumne River, Stanislaus River, Calaveras River, Mokelumne River
- CLASS - Sacramento River Subregion
  - FAMILY - Sacramento River, Pit River, Cottonwood Creek, Storry Creek, Cache Creek, Feather River, American River, Putah Creek
- CLASS - Goose Lake Subregion

ORDER - Central and South Pacific Slope Drainage Area

- CLASS - South Coastal Subregion
  - FAMILY - Tia Juana River, Santa Margarita River, Santa Ana River, Los Angeles River, Santa Clara River
- CLASS - Central Coastal Subregion
  - FAMILY - Santa Ynez River, Santa Maria River, Salinas River, Pajaro River, San Lorenzo River
- CLASS - San Francisco Bay Subregion
  - FAMILY - Coastal Streams (all coastal streams from San Lorenzo River to San Francisco Bay)
  - FAMILY - Central Coastal Streams (all coastal streams San Francisco Bay north to and including Russian River)
- CLASS - Central Coastal Streams Subregion (from Russian River north to Oregon line along coast)
  - FAMILY - (all small coastal streams not tributary to rivers) Eel River, Mad River, Lost River, Lower Klamath Lake Basin, Klamath River Basin

* Adopted from the California Department of Water Resources system.

b. Maintenance species - (limited management but maintain viable populations)
c. Pest Species - (undesirable species)
Time does not permit detailed discussion of each of these categories, as utilized by the Forest Service. However, ample information is available for those interested. Around 80 fish species have been recognized in California as being present in national forest waters.

3. Combining habitat and species - the next step is to organize the data by preparing habitat summaries for each important fish species of species group, indicating such things as relative importance, existing quantity and quality of habitat and potential for improvement. (See Tables 5, 6, and 7.)

TABLE 2. Classification of aquatic ecosystems - R-5

This classification system utilizes the broad upper hierarchial classification utilized by RPS, which is a modification of Baily* and Kuchler.** It also coincides generally with the higher hierarchial categories utilized by the Fish and Wildlife Service wetlands classification.

SYSTEM I - FRESHWATER - salinity concentration less than 1 part per 1000 ppm.
- ORDER I - Riverine - flowing water, lotic such as rivers, streams, springs
  - FAMILY I - cold water - ave. daily temperatures under 65°F most of the year; may reach 70°F for short time in summer; contains primarily cold water fish
    - TYPE I - large rivers - perennial - summer width over 300 feet
    - TYPE II - small rivers - perennial - summer width 101-300 feet
    - TYPE III - large streams - perennial - summer width 21-100 feet
    - TYPE IV - large streams - perennial - summer width 8-20 feet
    - TYPE V - small streams - perennial - summer width under 8 feet
    - TYPE VI - river and streams - intermittent - normally goes dry annually
  - FAMILY II - warm water - average daily temperatures exceed 70°F for at least several months during summer-fall; contains primarily warmwater fish
    - TYPE I - large rivers - perennial
    - TYPE II - medium rivers - perennial
    - TYPE III - small rivers - perennial
    - TYPE IV - large stream - perennial
    - TYPE V - small stream - perennial
    - TYPE VI - rivers and streams - intermittent
  - FAMILY III - intermediate waters - intermediate between cold and warm waters; contains both cold and warmwater fish species
    - TYPE I - large rivers - perennial
    - TYPE II - medium rivers - perennial
    - TYPE III - small rivers - perennial
    - TYPE IV - large streams - perennial
    - TYPE V - small streams - perennial
    - TYPE VI - river ans streams - intermittent
- ORDER II - Lacustrine - lentic or still waters (lakes, reservoirs, ponds)
  - FAMILY I - cold water - ave. daily surface temperatures under 65°F most of the year; may reach 70°F for short time in summer; contains primarily cold water fish
    - TYPE I - major lakes - over 2,000 surface acres (natural waters)
    - TYPE II - large lakes - 501 -2,000 surface acres
    - TYPE III - medium lakes - 51-500 surface acres
    - TYPE IV - small lakes - 6-50 surface acres
    - TYPE V - major reservoirs - over 2,000 surface acres at normal operating level; NOL (artificial waters)
    - TYPE VI - large reservoirs - 501-2,000 surface acres at NOL
    - TYPE VII - medium reservoirs - 51-500 surface acres at NOL
    - TYPE VIII - small reservoirs - 6-50 surface acres at NOL
    - TYPE IX - ponds (natural and artificial), less than 5 surface acres at NOL
  - FAMILY II - warm water - ave. surface temperatures exceed 70°F for at least several months during saummer-fall; contains primarily warmwater fishes
    - TYPE I - major lakes
    - TYPE II - large lakes
    - TYPE III - medium lakes
    - TYPE IV - small lakes
    - TYPE V - major reservoirs
    - TYPE VI - large reservoirs
    - TYPE VII - medium reservoirs
    - TYPE VIII - small reservoirs
    - TYPE IX - ponds
  - FAMILY III - intermediate waters - intermediate between cold and warm water; contains both cold and warmwater fish species
    - TYPE I - major lakes
    - TYPE II - large lakes
    - TYPE III - medium lakes
    - TYPE IV - small lakes
    - TYPE V - major reservoirs
    - TYPE VI - large reservoirs
    - TYPE VII - medium reservoirs
    - TYPE VIII - small reservoirs
    - TYPE IX - ponds

SYSTEM II - ESTUARINE - brackish water; salinity range 1-20 parts per 1000; normally tidal areas with intermingling of fresh and marine waters (No breakdown required in R-5)

SYSTEM III - MARINE - salt water; salinity over 30 parts per 1000; normally ocean tidal areas (No breakdown required in R-5)

* Ecoregions of the U.S. by Robert G. Bailey, USFS 1976

**Potential Natural Vegetation of the Coterminous U.S. by A.W. Kuchler, American Geographic Soc. #30, 1964.

EXISTING WATERS IN PLANNING AREA

TABLE 3

Water Type	Total Quantity: No. of Waters	Total Quantity: Rivers Miles	Total Quantity: Surface Acres	Quality: High No.	High Mi.	High Acres	Medium No.	Medium Mi.	Medium Acres	Low No.	Low Mi.	Low Acres
Riverine Coldwater Large rivers - p.	1	20	60	1	15	50	1	5	10	--	--	--
Medium rivers - p.	4	60	120	2	22	45	1	20	40	1	18	35
Small river - p.												
Large stream- p.												
Small stream - p.												
Rivers & stream - i.												
---etc. subtotal												
Riverine warm water --- subtotal												
Riverine Intermediate --- subtotal												
Lacustrine-coldwater Major lakes	2	--	6,000	1		4,000	1		2,000	--	--	--
Large lakes (over 2,000 acres)												
Medium lakes (51-500 acres)												
Small lakes (6-50 acres)	25		500	10		200	5		100	10		200
Large Major reservoirs												
Medium reservoirs Small reservoirs subtotal												
TOTAL	180	500	25,000									

Fisheries Potential of Waters in Planning Area *

TABLE 4

Water Type	No. of Waters	Rivers Miles	Total Quantity Potential: Surface Acres	Total Quality Potential: High No.	High Mi.	High Acres	Medium No.	Medium Mi.	Medium Acres	Low No.	Low Mi.	Low Acres

*List only those waters which have a potential capability greater than existing conditions.

Planning Area Fish Species by Category

TABLE 5

Category	Species	Relative Importance
Emphasis - T&E	Modoc Sucker	Critical habitat found only in this Forest
	Lahontan Cutthroat Trout	Present only in one small stream
Emphasis - Harvest		
Anadromous Fishes	King Salmon	Only 5 miles of spawning tributary on Forest
	Steelhead	Key species-Many miles of spawning and nursery area
Resident Trout		
	Rainbow Trout	
	Brown Trout	
	Brook Trout	Found only in 3 high country lakes
Emphasis - Unique		
	Golden Trout	Found only in 2 high country lakes
Maintenance Species		
Coldwater Species		Widespread throughout Forest; of secondary importance

Fish Habitat Inventory - Anadromous Fish Group

Summary of Existing and Potential Capabilities

TABLE 6

	EXISTING												POTENTIAL								
	Quantity			Quality									Quality								
				High			Medium			Low			High			Medium			Low		
Habitat Type	No. of Water	Rivers Miles	Surface Acres	No.	Mi.	Acres	No.	Mi.	Acres	No.	Mi.	Acres	No.	Mi.	Acres	No.	Mi.	Acres	No.	Mi.	Acres
Riverine-Coldwater	1	40	80	1	20	40	1	10	20	1	10	20	1	10	20	--	--	--	1	5	10

Riverine Warmwater																					

Riverine Intermediate																					

Fish Habitat Inventory - Anadromous Fish Group

Summary of Existing and Potential Capabilities

TABLE 7

	EXISTING												POTENTIAL								
	Quantity			Quality									Quality								
				High			Medium			Low			High			Medium			Low		
Habitat Type	No. of Water	Rivers Miles	Surface Acres	No.	Mi.	Acres	No.	Mi.	Acres	No.	Mi.	Acres	No.	Mi.	Acres	No.	Mi.	Acres	No.	Mi.	Acres
Riverine-Coldwater																					
Large Rivers																					
Smith Rivers																					
Medium Rivers																					
Jones River																					
Bear River																					

4. Compilation of fishing use data - utilizing all available sources the total use picture for fisheries resources produced within the forest or planning area can be described. Both commercial and recreational uses should be included. It is also essential to include fisheries resources that are produced in the planning area but are utilized elsewhere, as is the case with anadromous fisheries. Table 8 illustrates the type of summary data obtained, expressed in recreational and commercial days of angling.

5. Supply and demand data - supply and demand tables and a brief narrative discussion should be prepared for each major species or species group. (See Table 9.) Assessment of demand (which normally exceeds supply) may be difficult. Forest Service Recreational Information Management (RIM) and Renewable Resources Planning Act (RPA) data will be helpful. The analysis should also indicate any underutilized species groups.

6. Relate to fisheries goals and objectives - from a review of the fisheries data thus summarized, plus knowledge of overall planning direction provided by the decision makers, it should now be possible to summarize and prioritize the fisheries management goals and objective. Tables 10 and 11 illustrate how summaries may be prepared, by species, or those goals and objectives proposed as planning guidelines for fisheries input. These should be discussed with the decision maker (line officer) for acceptability and may involve modifying the planning criteria. Those accepted will serve as standards in all plan alternatives developed later, unless conflicting standards are noted. This completes the basic inventory process and preliminary organization of the resulting data. One is now ready to proceed with the actual integrated planning process.

7. Formulate management alternatives - this involves meeting with the interdisciplinary team and beginning the difficult task of developing several alternative management plans that bring together all tentative functional plans into the best mix. All functions will receive equal consideration in producing the greatest benefits for the land area in relation to its potentialities.

   Alternatives developed should reflect issues and concerns recognized by management and by means of public involvement. Three general guidelines are followed for fisheries input:

   a. See that all fisheries requirements mandated by law, or directives, are included in all alternatives.
   b. Develop a range of levels of fisheries resource development that may be displayed in various alternatives.
   c. Every alternative presented must be a viable solution. The fisheries biologist must be prepared to present how the proposed fisheries goals would be accomplished and what activities would be required for each alternative, as shown in Tables 11 and 12.

8. Assess the effects of multi-functional alternatives - the physical, biological, economic and social effects of implementing each alternative should then be assessed, as shown in Table 13. The expected outputs in terms of goods, uses, and services that will result from implementing each alternative should also be shown. Make adjustments and modifications with other disciplines where possible to minimize negative impacts on fisheries.

   As a final step a summary table (Table 14) is prepared that will display the effects of each alternative upon various fish species groups. Utilizing the data tables prepared during the inventory stage one can assess the fish habitat acreage changes (in both quantity and quality) anticipated under the various alternatives.

Although at first glance this entire process may appear somewhat detailed and cumbersome, upon trying it I think you will be pleasantly surprised how it brings into focus the essential fisheries information needed to interact with other functions in the preparation of resource integrated plans for forests or other large areas.

Summary of Fisheries Use*

TABLE 8

Category	Angler Vistor Day	Commercial Fisherman Days
1. T&E Species		
2. Anadromous Fishes		
3. Resident Trout		
4. Other coldwater fishes		
5. Warm water fishes		
TOTAL		

*(May be shown in % of use)

Fisheries Supply and Demand Relationship

TABLE 9

Species Category	Supply			Demand			Potential for Improvement		
	High	Medium	Low	High	Medium	Low	High	Medium	Low
T&E Species			x			x		x	
Anadromous Fishes		x		x			x		
Coldwater fishes		x		x			x		
Warmwater fishes		x			x		x		
Under-utilized Species Brown bullhead	x					x	x		

TABLE 10

Summary of possible Fisheries Management Goals and Objectives

Goals

1. T&E species habitat will be fully protected and increased when possible.
2. Anadromous fishes will be increased in all areas where they are found.
3. All maintenance species will be retained at viable sustained yield levels.

Objectives

1. Existing T&E species habitat will be increased to the 200% level by 1985.
2. Anadromous fish will be increased to the 120% level by 1985.
3. All maintenance species will be retained at not less than the 60% level.

Summary of Possible Fisheries Management Goals and Objectives

TABLE 11

Species or Species Group	Population Trend	Target Date	Waters Involved	Methods
Emphasis T&E				
Modoc Sucker	200%	1985	List waters	Stream rehabilitation

			---	Transplant to other waters
Summer Steelhead	115%	1983	List waters	Improve spawning areas monitor timber sales
			---	

Emphasis-Harvest Anadromous Fishes	125%	1985	List waters	Stream rehabilitation
			---	Develop new input into timber sales prep. plans

Maintenance Coldwater Species	100%	1985	List waters	Decline anticipated in some areas; offset by increase in others.

Summary of Proposed Fisheries Activities - Alternative A

TABLE 12

Species Category	Proposed Management Objectives
1. Emphasis - T&E	
a. Painte Trout	Increase critical habitat to 120% by 1985
	Improve quality of habitat to 125% by 1985
b. Modoc Scucker	Increase critical habitat to 110% by 1985

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2. Emphasis-Harvest Anadromous fishes	Increase habitat quality on 300 acres of streams so as to increase population trend to 110% by 1990.

Resident trout	Maintain existing habitat and population trend at 100% thru 1985.

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3. Maintenance Species	Maintain population and habitat at not less than 60% level thru 1985.
	(Prepare similar tables for each alternative)

Summary of Effects of All Resource Plans Upon Fisheries Resource

Alternative A

TABLE 13

Resource Proposal	Compatible (+)	Conflicting (-)	Overall Rating
Timber Management	Improved accoss to fishing recreation	Impacts water quality - 10% for 300 acres of anadromous fish stream	-
Range	Reduction of one allotment improves streamside cover 200 acres	Increased Aum's impacts T&E species Paiute Trout on 30 acres	+
Recreation		Creates campground in T&E critical habitat	-
Wilderness	Provides habitat protection for anadromous fishes 25 acres	Reduces habit management manipulation options	neutral
Fisheries	Protect T&E Species Increase anadromous fishes to 110%	Maintain maintenance species at not less than 60%.	-

(Prepare similar Tables for each Alternative)

Analysis of Effects of Alternatives-Fisheries Emphasis-Harvest-Anadromous Fishes

TABLE 14

	Habitat Quantity and Quality				Distribution and Diversity	Population level trend	EcoSystem Integrity	Change in Fishery Value
	Total Acreage	High Suitability Acres	Medium Suit Acres	Low Suit Acres		on basis of 100 = Stable	Scale of 100 = Status quo	Scale of 100=Existing
Existing Situation	3,000	500	1000	1500	OK	100%	80	100
Full Fisheries Potential	3,500	1000	2000	500	OK	200%	90	200
Alternate A	3,000	500	1000	1500	Too limited	80%	75	80
Alternate B	32,000	1000	1500	700	OK	150%	85	150
Alternate C								

RPA Targets & Goals	3,300	3000	300	--	OK	200% by 1990	100	200