MAINE STATE LEGISLATURE

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PROJECT PROPOSAL
(revision)

COMPREHENSIVE FISH, WILDLIFE,

and

MARINE PLAN FOR MAINE

F.W.A.C. 2-11

Prepared by

State of Maine
Department of Inland Fisheries and Game
Department of Sea and Shore Fisheries

Revised and Amended
May, 1971

PROJECT   PROPOSAL   OUTLINE

F.W.A.C. 2-11

Need for Comprehensive Planning[1]

Objectives of Coordinated Planning[1]

Legal Justification[1]

    Department of Inland Fisheries and Game

    Department of Sea and Shore Fisheries

Nature of the Program[1]

Precepts of the Planning Effort[1]

Species to be included[1]

Statistical Planning Units

Plan Elements

Statistical Planning Units

All natural resource data included in MIDAS can be aggregated or analyzed on the basis of any or all of the following statistical units:

    Minor civil division (township)
    Township type (organized, unorganized, deorganized)
    Watershed
    U. S. census tract
    Warden District (Sea and Shore)
    Warden Division (Inland)
    River Basin (New England River Basins Classification)
    County
    Marine Zone (Marsden Squares Nos. 150 & 151)
    Fishery Region (Inland, administrative)
    Wildlife Region (Inland, administrative)
    Biological Zone

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1   Refer to original Project Proposal

Using the Universal Transverse Mercator (UTM) system, it will be possible to locate precisely geographic points and define land or water areas down to one acre in size.

Plan Elements

Work Plan I	Current Land and Water Use Inventory
Work Plan II	Current Inland Fish, Wildlife & Marine Habitat Inventory
Work Plan III	Current Inland Fish, Wildlife & Marine Species Use
Work Plan IV	Land & Water Use Projections
Work Plan V	Projection of Future Habitat Quality and Quantity
Work Plan VI	Current Inland Fish, Wildlife, and Marine Species Abundance
Work Plan VII	Current Human Use Opportunity Estimate for Inland Fish, Wildlife and Marine
Work Plan VIII	Current Human Use Demand Estimate for Inland Fish, Wildlife and Marine Species
Work Plan IX	Project future Use Opportunity for Inland Fish, Wildlife and Marine Species
Work Plan X	Projecting Future Demand for Fish, Wildlife and Marine Species Use
Work Plan XI	Analyze Current Demand vs. Current Use Opportunity for Inland Fish, Wildlife and Marine Species
Work Plan XII	Analyze Future Demand vs. Future Use Opportunity for Inland Fish, Wildlife and Marine resources in 1980.
Work Plan XIII	Inland Fish, Wildlife and Marine Resource Problem Identification and Evaluation
Work Plan XIV	Species Management Plan and Problem Analysis
Work Plan XV	Coordination of Inland Fish, Wildlife and Marine Resources Planning

State: Maine
Project Number: F.W.A.C. 2-11

Comprehensive Fish, Wildlife & Marine Plan for Maine

WORK PLAN I

Title: Inventory of Current Land & Water Use in Maine

A. Objective:
To collect land and water use data for the purpose of determining the overall environment of inland fish, wildlife, and marine species in Maine. To automate these data for storage, retrieval, and analysis for use in inland fish, wildlife and marine species management.

B. Justification:
Comprehensive planning of inland fish, wildlife and marine resources of the State must be based on a complete, accurate inventory of land and water uses. An inventory of this nature should and will be conducted by the State Planning Office and its subsidiary divisions where possible; however, the State Planning Office is currently under organizational development, and it is doubtful they will be able to accomplish such an endeavor within the limits described for the initial planning efforts of the departments of Sea and Shore Fisheries and Inland Fisheries and Game. We, therefore, propose the following method for accomplishment of this inventory.

C. Procedures:
Land and water use inventories for Maine are to be considered by the Departments of Inland Fisheries and Game and Sea and Shore Fisheries, for overall perspectives on land and water use, and their influence on location, type, amount, and quality of species habitat.

The primary source for land and water use inventory data will be vegetative cover types and physical features as determined by interpretation of conventional aerial photographs according to the "Specifications for Land Use Classification" developed by James W. Sewall Company (see attachment). Base maps used will be U.S.G.S. topographic maps (7 1/2' Series).

Flight coverage and interpretation of aerial photographs has been accomplished for a substantial portion of Maine, but these data are located in the files of many agencies and private companies. A concerted effort is being made to standardize classifications and access available land use data from the various sources for use in natural resource planning. Land use classification from aerial

photo interpretation is currently being done by the Maine
State Planning Office for the entire Coastal Zone through
contract with the James W. Sewall Company. The pilot areas
for our present project (Camden and Rockland area and four
Townships in Aroostook County) have also been classified for
land and water use. Land use data as used for taxation purposes
is available from the State Bureau of Taxation. Land use mapping
has also recently been completed for Baxter State Park.
Negotiations and liaison with private land owners and timber
companies will be continued to obtain use of their vegetative
cover type and land use data developed through aerial photo
interpretation.

For updating current land and water use data, we are
depending on data and methodologies developed through remote
sensing from earth-orbiting satellites (N.A.S.A. Projects
ERTS A & B and Sky Lab) and possibly high level aircraft flights.

Computer tapes for land and water use data will be available
or have been secured from the following agencies:

1. National Oceanographic Data Center (NODC)
2. National Climatological Data Center
3. Water Resources Division, U.S.G.S.
4. Environmental Protection Agency (EPA)

Other pertinent data will be collected from the following
agencies, organizations, and corporations:

Agriculture Department
Economic Development Department
Employment Security Commission
Forestry Department
Health & Welfare Department
Highway Department
Inland Fisheries and Game
Labor & Industry Department
Office of State Planning
Park & Recreation Commission
Public Utilities Commission
Sea and Shore Fisheries Department
Soil and Water Conservation Commission
Bureau of Taxation
Environmental Improvement Commission
U. S. Army Corps. of Engineers
U. S. Department of Agriculture
    Soil Conservation Service
    Agricultural Stabilization & Conservation Service
    Forest Service
U. S. Department of Interior
    Bureau of Sport Fisheries & Wildlife
    National Fisheries Service

University of Maine Cooperative Wildlife Unit
University of Maine Cooperative Fisheries Unit
U. S. Department of Commerce
     Bureau of Census
Maine Pulp and Timber Companies
Task Force on Water and Related Land Resources
Water Resources Center
Community Services Center, Bowdoin College
Public Affairs Research Center, Bowdoin College
James W. Sewall Company, Old Town
Prentiss and Carlisle
Wright and Pierce
Maine Port Authority
New England River Basins Commission
New England Regional Commission
University of Maine
Darling Marine Research Center
Land Use Planning Commission

    For details of methods and procedures to be used for
jobs in Work Plan I, reference is made to the following supporting
documents attached hereto:

1.   "Specifications for Land Use Classification" (developed
    by James W. Sewall Company)

2.   "Planning for Maine's Fish, Wildlife, and Marine Resources –
    Now and in the Future"

3.   "Maine Information Display Analysis System (MIDAS) –
    Technical Report

4.   List of Land Use Files (See Technical Report)

5.   Coding Formats

Job 1

Title: Total Land Area of Maine

Total land area of Maine will be determined from existing data sources and aggregation of land use data for the previously listed Statistical Units utilizing MIDAS.

Consideration is being given to adopting techniques for aerial photo interpretation used (for unorganized townships) by the State Bureau of Taxation and applying these to organized townships as well.

Existing data sources to be referenced are as follows:

1.   "Land Ownership Records" (James W. Sewall Co.)
2.   "Maine Posted Land Inventory - 1970" (attached)

For details on methods to be used reference is made to "Procedures", Work Plan I.

POSTED LAND ACREAGE INVENTORY

1970

DIVISION	TOTAL
A	140,438
B	212,993
C	259,738
D	40,916
E	56,754
F	109,121
G	210,573
H	10,789
I	---
J	21,079
	1,063,301

This inventory was done in very broad category - to save time and expense. The final result is that there are 19,374 more acres posted in 1970 than there were in 1969. It is also noted by most of the wardens that there will be a continued increase. This increase is largely accounted for by the increase in snowmobile activity, and the increase in numbers and use of this type of vehicle.

Job 2

Title: Urban and Industrial Land Use

Urban and Industrial Land Use will be determined for
broad classifications (See Land Use Classification System)
using aerial photograph interpretation and State Bureau of
Taxation Records, utilizing MIDAS. Pertinent data will be
aggregated from computer tapes of U. S. Bureau of Census and
Federal Water Quality Control Administration (Dunn and
Bradstreet Economic Indicators for New England).

For details on methods to be used, reference is made
to "Procedures", Work Plan I.

Job 3

Title: Recreational Land Use

Acres and ownership of recreation land will be obtained in part by compilation of data from the Department of Economic Development's "Recreation Property Inventory", and the State Park and Recreation Commission study, "Outdoor Recreation in Maine" (updated).

Major categories of Recreational Land Use will be determined by interpretation of aerial photographs. (See "Land Use Classification System")

Seasonal power demand from Public Utility data files will be used as an index to recreational land use where feasible. Data from the Environmental Improvement Commission's (EIC) Site Selection file will be an important source for evaluating present trends in developments for recreation.

Lake and Pond Habitat Inventory data (File 213K) are high on our priority list for automation and incorporation into MIDAS. Basic inventory, species, and management data will aid in evaluating recreational use of surrounding lands for warmwater and coldwater game fisheries.

For details on methods to be used, reference is made to "Procedures", Work Plan I.

Job 4

Title: Current Forest Land Use

Basic method for identification of forest land use will be definition of physical features and vegetative cover types by interpretation of aerial photographs. Classifications and data sources to be used have been mentioned previously (see "Procedures", Work Plan I).

Other pertinent data sources will include:

Wetlands Inventory - Department Inland Fisheries & Game
Return of Timber Cut - State Bureau of Taxation
Timber Harvest Data - State Bureau of Taxation
Work Sheet for Computation
   of Timber Value - State Bureau of Taxation
Property Inventory Card - State Bureau of Taxation
Forest Fire Damage - Maine Forest Service
Posted Lands Inventory - Department Inland Fisheries & Game
Public Land Ownership (in part) - Department Inland Fisheries
                                                and Game
Regional Planning Commissions - (Coordinated by State
                                            Planning Office)
Records and Files - Maine Land Use Commission
                        (unorganized townships)
Soil Suitability and Soil Type Data - U. S. Soil Conservation
                                            Service (S.C.S.)

As many of the preceding data sources as possible will be automated for use in MIDAS, using methods described in "Procedures", Work Plan I.

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Job 5

Title: Current Agricultural Land Use

A primary method of agricultural land use identification will be by interpretation of aerial photographs, using classifications and standards described in "Procedures", Work Plan I. Other data sources will include:

U. S. Soil Conservation Service
    Soil suitability and soil types
    Conservation Needs Inventory (CNI)
U. S. Bureau of Census - 1970 Census data
Maine Department of Agriculture - agricultural land use data

Data sources will be automated for inclusion in MIDAS. Methods of analysis are described under "Procedures", Work Plan I.

Job 6

Title: Transportation Land Use

Land use data for transportation will be collected from
several sources. Interpretation of aerial photographs will
provide much basic data and will be automated for use by MIDAS.
Land use classifications will include road mileages (especially
private road networks), pipelines, and powerlines. The
Maine State Highway Commission has agreed to provide data
(now partly automated) on mileage and acreage of lands devoted
to transportation use.

Other potential data sources are:

1. Public Utilities Commission
2. Maine Municipal Association
3. Private Timber Companies
4. Maine Port Authority
5. U. S. Army Corps of Engineers
6. U. S. Bureau of Commerce - 1970 Census Data
7. U. S. Geological Survey

Methods of aggregation and analysis are described under
"Procedures", Work Plan I.

Job 7

Title: Mining Use Inventory

Land use for surface mining and gravel pits will be
obtained by interpretation of aerial photographs using the
Classification System previously cited. Other data will be
sought from the following sources:

    Maine Mining Commission
    State Highway Commission
    U. S. Soil Conservation Service (SCS)

If feasible, data will be automated for inclusion in
MIDAS, using methods of analysis cited under "Procedures",
Work Plan I.

Job 8

Title: Wetlands Inventory

Wetlands data collection will be based on the inventory
conducted by the Maine Department of Inland Fisheries and
Game, supplemented by wetlands data available from the Sea &
Shore Fisheries Department, U. S. Fish and Wildlife Service,
.Office of River Basin Studies, and the U. S. Soil Conservation
Service.

Data will be automated for inclusion in MIDAS, using
methods described in "Procedures", Work Plan I.

Job 9

Title: Water Use Inventory

Water use data will be collected from the following sources
and automated, where possible, for inclusion in MIDAS for aggregation
and analysis:

	Water Use
Public Utilities Commission	Power generation
Environmental Improvement Commission (EIC)	Waste transportation
Department of Health and Welfare	Potable water supply
U. S. Soil Conservation Service (SCS)	Irrigation
Park and Recreation Commission	Recreational use
Department of Sea and Shore Fisheries	Commercial navigation
Maine Port Authority	Commercial navigation
U. S. Geological Survey	Stream flow data
New England River Basins Commission	River data
University of Maine - Water Sources Center	Penobscot River Study

Pertinent data files from the Departments of Sea and Shore Fisheries
and Inland Fisheries and Game will be automated for use in MIDAS. Lake
and Pond Habitat Inventory File (213K) has high priority for automation
and will provide important data regarding water use for freshwater sport
fisheries.

Details on methods of analysis have been cited under "Procedures",
Work Plan I.

Comprehensive Fish, Wildlife and Marine Plan for Maine

WORK PLAN II

Title: Inventory of Current Inland Fish, Wildlife and Marine Habitat

A. Objective:
To describe basic characteristics of currently available habitat for inland fish, wildlife and marine species in Maine. To determine the amount and distribution of these basic habitat types and to evaluate them for their ability to support and maintain the major fish, wildlife and marine species. To program these data for aggregation and analysis by statistical units cited previously.

B. Justification:
Definition and measurement of the quantity and quality of habitat for our major fish, wildlife, and marine species is essential before species management plans can be formulated to provide for optimum production and use of these resources. Detailed inventory of habitat for the various species will be the first step in providing the basic information necessary.

For the purpose of this Work Plan, the following broad definitions of habitat will be used:

Inland fish habitat is any part of the aquatic environment occupied by a species during any part of the year.

Wildlife habitat is all vegetative cover types utilized by a species during any part of the year.

Marine habitat is any part of the marine environment utilized by a species during any part of the year.

C. Procedures:

Job 1

Title: Inland Fisheries Habitat Inventory

The following classifications will be used with habitat types falling into two broad divisions:

1. Rivers, brooks and streams
2. Lakes and Ponds (including artificial impoundments)

The habitat types under the two broad divisions are as follows (the habitat types will be described in detail in the final species plans):

Rivers, Brooks and Streams
1. Warmwater Streams
2. Coldwater Streams
3. Intermediate Streams
4. Other Streams
5. Unclassified Streams

Lakes and Ponds
1. Eutrophic Lakes
2. Oligotrophic Lakes
3. Intermediate Lakes
4. Other Lakes

The dominant coldwater and/or warmwater game species present, the current management, and the principal species fished for in each lake or stream will be tabulated. The following game fish species will be considered:

Coldwater Game Species
1. Salmon
2. Brook Trout
3. Blueback Trout
4. Lake Trout (togue)
5. Brown Trout
6. Rainbow Trout
7. Golden Trout (Sunapee)
8. Whitefish
9. Smelts

Warmwater Game Species
1. Smallmouth Bass
2. Largemouth Bass
3. Chain Pickerel
4. White Perch
5. Yellow Perch
6. Brown Bullhead

Habitat inventory data will be tabulated for the various habitat types under the two broad habitat divisions, "Lakes and Ponds", and "Rivers, brooks and streams." Separate coding formats for existing and future data are being designed for this purpose. The "lakes and ponds" category will include all natural lakes and ponds, including those under 10 acres. Artificial or partly artificial lakes and ponds will also be included.

The habitat inventory file for "lakes and ponds" will include the following:

1. **County, Biologist Region, and River Drainage**
   The Biologist Regions (6) are administrative, geographical units which are nearly the same for the Fishery and Game Divisions. River drainages will conform to the existing categories used for the Fishery Division's lake survey keysort system and will coordinate with State Water Planning. Fisheries Drainages also conform to Wetlands Inventory Drainages (Game Division) so that information contained in the Lakes Inventory and Wetlands Inventory files may be cross-referenced.

2. **UTM coordinates**
   Universal Transverse Mercator coordinates, based on longitude-latitude, will either be added to the lake inventory file or cross-referenced from a master file for the purpose of identifying the exact location of a lake. This location will be especially important in identifying or cross-matching data from various files pertaining to specific lakes where confusion might arise from numerous cases of duplicate names or common identifiers or locators which fail to distinguish between bodies of water.

3. **Lake or pond and township(s)**
   This will include the name of the water and all townships in which it occurs. Each water and town will be assigned a code number for computer analysis.

4. **Quadrangle**
   The most recent U.S.G.S. quadrangles have been coded and the quadrangle number on which the lake is located will be included in the record.

5. **Elevation**
   The elevation of each lake will be obtained from U.S.G.S. maps.

6. **Lake type**
   This refers to habitat classifications which will be given standard definitions and will be coded as follows:

   1. Eutrophic
   2. Oligotrophic
   3. Intermediate
   4. Other
   5. Unclassified (unsurveyed)

7. **Water level**
   This refers to whether the lake level is natural with no man-made dam at the outlet, partly artificial with a dam holding a head of water, or an artificial impoundment. These will be coded as follows:

   1. Natural lake
   2. Artificial lake
   3. Partly artificial lake

8. **Physical characteristics**
   These include area measured in acres, acreage classifications (0-10, 11-50, 51-100, 101-1000, over 1000), maximum and minimum depths in feet, and shoreline length in feet.

9. **Stratification**
   This refers to whether or not the lake usually stratifies into thermal layers during summer months and will be coded as follows:

   1. Usually stratifies
   2. Does not usually stratify
   3. Unclassified (unsurveyed)

10. **Pollution**
    Legal legislative classification (A, B, C, or D) will be entered. Present quality condition in the same terms (A, B, C, or D) will also be entered. For example, a water may be legally classified as "B" but currently of "D" water quality.

11. **Legal right-of-way**
    This indicates whether or not a legal, public right-of-way leads to a body of water (1-yes; 2-no).

12. **Access fee**
    This indicates whether or not the public has legal access to a lake and if a fee is charged, and will be coded as follows:

    1. Open to public without fee
    2. Open to public with fee
    3. Closed to public access

13. **Physical access**
    Physical conditions for public access will be coded as follows:

    1. Accessible within a 1/2-mile walk from a car road
    2. Accessible within a 1/2-mile walk from a 4-wheel drive road
    3. Not accessible within a 1/2-mile walk from either car road or 4-wheel drive road

14. Boat landing
This will indicate whether or not it is reasonably possible to back a boat-trailer to the water (1-yes; 2-no).

15. Screen
This indicates whether or not a barrier screen is present at the outlet and recommendations concerning it. Classifications are as follows:

> 1. Screen present, no recommendations
> 2. Screen not present, no recommendations
> 3. Screen present but removal recommended
> 4. Screen not present but recommended

16. Fishway
This indicates whether or not a fishway is present in the outlet dam and recommendations concerning it. Classifications are as follows:

> 1. Fishway present, no recommendations
> 2. Fishway present, repairs recommended
> 3. Fishway present, removal recommended
> 4. Fishway not present, no recommendations
> 5. Fishway not present but recommended

17. Survey
The last two digits of the year the lake was first surveyed, last resurveyed, and the latest revision of the survey write-up will be entered.

18. Reclamations
If the lake has been reclaimed, the first and last year it was reclaimed, and the number of reclamations will be entered.

19. Spawning conditions
Spawning conditions within the lake and its tributaries will be classified as to whether they are considered poor, fair, or good for the principal game species.

20. Management
The principal species for which the sport fishery is being managed will be classified into broad categories as follows:

> 1. Warmwater game fish
> 2. Coldwater game fish
> 3. Both warmwater and coldwater game fish
> 4. Other species management
> 5. Unclassified (unsurveyed)

21. Anadromous species
This refers only to whether or not anadromous species are present in the lake at some stage in their life history (1-yes; 2-no).

22. Fish species present
Of the 49 fish species occurring in Maine lakes, those known to be present in a particular lake will be indicated as follows:

    1. Present
    2. Not known to be present
    3. Unclassified (unsurveyed)

23. Dominant game species
Of the 16 principal game species present in Maine lakes, those present in a lake will be indicated as follows:

    1. Dominant game species
    2. Not a dominant game species
    3. Unclassified (unsurveyed)

The "dominant game species" and "principal species fished for" are not synonymous because there are numerous cases where a game species may be present in abundance but due to some particular condition the species may be largely ignored by anglers.

24. Principal species fished for
Of the 16 principal game species present in Maine lakes, those primarily fished for in a particular lake will be indicated as follows:

    1. Primarily fished for
    2. Not primarily fished for
    3. Unclassified (unsurveyed)

25. Fish species stocked
Of the seven species reared in Maine hatcheries, those being currently stocked will be indicated (1-yes; 2-no).

26. Year species introduced
Of the 16 principal game and forage species of fish, those which are present as the result of man's introduction will be indicated by the last three digits of the year or appropriate year of introduction.

27. Water supply
This indicates whether or not the lake is being used as a municipal water supply (1-yes; 2-no).

28. Regulations

The coding format for fishing regulations which apply to each body of water will include the following:

Both open-water and ice-fishing regulations will be broken down first by general categories coded to indicate whether the lake is closed, open under general state laws, or open under special state, county, or boundary laws. These general categories are: (1) season, (2) bag limits, (3) size limits, (4) weight limits, (5) restrictions on use of live bait, (6) restrictions on lures, (7) restrictions on gear, (8) restrictions on use of certain areas within a lake, (9) restrictions on anglers (such as fishing by juveniles only), (10) special restrictions on craft and use of motors, and (11) whether the lake and/or tributaries are open to smelt fishing.

Special regulations that can best be categorized as they pertain to individual species will be broken down by season (or closure), bag limits allowed, and size and weight limits.

The broad division for "rivers, brooks, and streams" will include all those waters averaging 6 feet or more in width. Data to be coded and tabulated for the river inventory file will include the following:

1. County, Biologist, Region, Drainage
This will be the same as for "lakes and ponds".

2. River, brook, or stream and township(s)
This will include the name of each water or segment thereof and the township(s) in which it occurs. It will be necessary to break down the larger ones into segments where habitat type, dominant game species, or size group (width-range) is different for different sections. Each water or segment will be coded following a systematic coding scheme identifying its location within major drainages and association with lakes as outlets or inlets.

3. UTM coordinates and elevation
Each stream or segment will be located by UTM coordinates at its headwater and terminus together with its elevation at these points.

4. Stream type
This refers to the habitat classifications based on suitability for species management and will be coded as follows:

1. Warmwater
2. Coldwater
3. Intermediate
4. Other
5. Unclassified (unsurveyed)

5. <u>Fish species present</u>
   Species known to be present in a stream or segment thereof will be entered.

6. <u>Dominant game species</u>
   These will be the same categories as for "lakes and ponds".

7. <u>Current management</u>
   This will include the same categories as for "lakes and ponds".

8. <u>Principal species fished for</u>
   Same as for "lakes and ponds".

9. <u>Anadromous species</u>
   Same as for "lakes and ponds".

10. <u>Size group (width range)</u>
    Only streams or segments over 6 feet in width will be considered.
    Categories and code numbers will be as follows: 1-(6-20');
    2-(21-100'); 3-(101-300'); 4-(over 300').

11. <u>Number of miles</u>
    This is the number of miles of each water or segment being considered,
    as determined by measurement with dividers from U.S.G.S. maps.

12. <u>Pollution</u>
    Same as for "lakes and ponds".

13. <u>Legal right-of-way</u>
    Same as for "lakes and ponds".

14. <u>Access fee</u>
    Same as for "lakes and ponds".

15. <u>Physical access</u>
    Same as for "lakes and ponds".

16. <u>Fish species stocked</u>
    Same as for "lakes and ponds".

Other variables may be added to the stream inventory file. This will be
done when existing data are found inadequate for inclusion or when expansion
of information is contemplated. Such information may include measurements
on species abundance, stream gradients and flow, water conductivity, bottom
typing, and presence of obstructions.

The coding form for the stream inventory is being revised and will be similar in format to the lake inventory form.

Sources of habitat inventory data will be as follows:

1. Lake and stream survey reports
2. Lake survey keysort system
3. Regional files - Fisheries Division
4. Interviews with Regional Biologists and wardens
5. Water Resources Inventories (Fishery Division reports by counties)
6. D-J Progress Reports and Job Completion Reports
7. River Management Reports

Job 2.

Title: Wildlife Habitat Inventory

Habitat for non aquatic wildlife species is contained within two major land use classifications of the State - forest and agricultural. Habitat for species utilizing wetlands and other aquatic habitat will also be considered under this job.

In order to provide a basis for the determination of habitat amounts for the individual species which will be considered by the planning effort, the following measurements will be obtained from the Land and Water Use Inventory. Forest types will be divided into 9 major categories as follows:

S:	Indicates Softwood Land:	75% or more conifers in mixture
SH or HS:	" Mixed " :	25% to 75% conifers, or 75% to 25% hardwoods
H:	" Hardwood " :	75% to 100% hardwoods
P:	" Pine :	90% Pine species
WB:	" White Birch :	90% White Birch
Po:	" Poplar :	90% Poplar
Powb:	" Poplar and White Birch, with Poplar predominating
Spr:	" Spruce :	90% Spruce
CS:	" Cedar Swamp :	80% Cedar

Height and size, i.e., broad age classes, are indicated by the figures 1, 2 and 3, as follows:

1 - indicates young growth up to 30' high-generally unmerchantable
2 - indicates second growth 30' to 50' high in which the majority of the stand is in the lower merchantable diameter classes
3 - indicates growth 50' and up in which sawlog trees predominate

Density of Crown Closure

A - indicates 75% to 100% crown closure - a fully stocked stand
B - indicates 30% to 75% crown closure - a medium stocked stand
C - indicates 0 to 30% crown closure - a sparsely stocked stand or cut over

Site

S - The suffix "S" indicates wet sites-generally poor site in regard to growth
II - Indicates below normal site due to climatic or extremely rocky areas.

These areas generally occur on mountain tops.

When no site classification is given, site is normal.

Pure Stands

In addition to the foregoing forest land type subdivisions, there are frequently found pure types, i.e., any softwood species which constitute 90% (sometimes 80% is used) or more of the stand and of sufficient size in area to be mapped is designated as a type, such as Spruce Land, with its density and height designations.

White Pine, when occurring in softwood or mixed wood land in an operable stand for sawlogs, is designated by the letter P following the type classification; no account is made of White Pine in a scattered stand and when occurring in pure stands that can be mapped, it is classified as such, i.e., P3B, etc.

Agricultural Land reverting to forest is designated A. F. (Abandoned Field), and when the young trees are of sufficient size to indicate what the future forest type will be, it is shown as A. F./S1B, an abandoned field seeding into softwoods, or if the seeding is into hardwood A. F./H1A.

To illustrate: Symbol S3B would indicate:

Softwood land (S)
In which sawlogs predominate (3)
With medium stocking (B)

The above explanation of forest type symbols when used in conjunction with the accompanying plan will indicate the composition of the forest growth on the township.

Minimum size type:

Forest - 10 acres
Non-Forest - 1 acre

Forest classifications would include a type for alders and also for bogs. Bogs would be classified as open bog (leather leaf myeira gale, etc.) and as forested bog.

Areas of clear cutting (50 percent or more of the crown cover removed) will be delineated and mapped and defined in age, to a 10 year time period. SELECTIVE CUTS AND DIAMETER LIMIT CUTS WILL NOT BE DELINEATED OR LOCATED.

Areas damaged as a result of insect damage or destroyed by fire will be delineated and located to a minimum size of 100 acres if the disaster occurred within the last ten years.

AMOUNT OF CURRENT CUTTING WILL HAVE TO BE OBTAINED FROM OTHER SOURCES. IN ADDITION, SEWALL COMPANY WILL NOT PROJECT FUTURE HARVEST DATES OR CURRENT VOLUME PRODUCTION. THESE DATA CAN BE OBTAINED FROM AN ANALYSIS OF THE TYPING AREA.

Forest Nurseries.

Minimum acreage of forest land to be located and typed is ten (10) acres.

Acreages, stage of growth, and volume figures will be obtained from existing timber surveys and surveys in progress conducted by the State Forestry Department, Bureau of Taxation, forest inventories of the U. S. Forest Service; surveys conducted by the U.S.D.A. Soil Conservation Service; U.S.D.A. censuses; University of Maine; and from the industrial forest landowners of the state.

Agricultural land will be treated as follows:

    (a)   Tilled land - intensively used land which would include row crops (potatoes, corn, etc.) and grains used in rotation with row crops. Cultivated hay land would also be included in this category as there is some DOUBT ABOUT BEING ABLE TO DISTINGUISH BETWEEN CULTIVATED HAY LAND AND INTENSIVELY FARMED LAND.

    (b)   Wild hay land (initial stages of reversion) will be determined depending upon the quality of the photos and the time of year the area was flown.

    (c)   Berries or berry land will be limited to the location and delineation of low bush blueberries and will include managed and unmanaged acreages.

    (d)   Pasture land - improved pasture will be included with tilled land as it is usually included in rotation.

    (e)   Unimproved pasture lands will be included under abandoned field category or with forest types, depending upon the stage and amount of woody vegetation.

    (f)   The timber classifications as described in the planning proposal will be treated as follows:

           Tree Farms - WOULD BE OBTAINED FROM FOREST SERVICE.
           Plantations will be located and delineated.
           Woodlots will be included with forest types.

    (g)   Orchards including abandoned orchards will be located and delineated.

    (h)   Discontinued crop land will be included in the abandoned field and unimproved pasture classification. IRRIGATED LAND WILL NOT BE LOCATED. THIS INFORMATION WILL HAVE TO BE OBTAINED FROM ANOTHER SOURCE.

    (i)   Minimum acreage of non forest land to be located, typed, and classified is one (1) acre.

Land ownership patterns and acreages of ownership will be determined where possible. All land-use data will be recorded and programmed to town, county, biological zone, biologist region, and watershed. Where data are limited, the collection will be to the smallest division which contains the data.

The amount and quality of habitat for each species will be determined by comparing the forest land use data, wetlands inventory data, agricultural land use data, industrial land use data, and land ownership patterns to known harvest figures, censuses, and direct observations. Habitat for aquatic furbearers and waterfowl will be determined from the Wetlands Inventory. Harvest and census data will be obtained from continuing studies conducted by the Department of Inland Fisheries and Game.

Direct observation data will be obtained from Warden Service reports including factual information for non-seasonal mortalities and crop damage complaints. In addition, opinions resulting from direct observation and contact with the general public will be evaluated. Careful analysis of these data should provide an indication of the habitat kinds and amounts for the measurement unit selected.

Data will be recorded and entered in the MIDAS network, reference "Procedures", Work Plan I.

Job 3

. Title: Marine Habitat Inventory

The objective of this job is to classify and measure the marine species habitat. The estuarine classification system outlined in the National Estuarine Inventory - Handbook of Descriptors, U. S. Department of the Interior, Federal Water Pollution Control Administration, June 1968, will be used when practicable. The attached outline captioned Marine Habitat Classification will be the classification system used. For the F.W.P.C.A. descriptions; unrestricted river entrance and embayments with continuous river inflow, the first upriver barrier (dam, tidal falls, etc.) will mark the division between the freshwater and marine environment.

The littoral fringe classification is not considered significant since no currently important species occupy this zone. Its inclusion is justified, however, since it is an integral part of the marine environment requiring recognition.

The amount of marine species habitat will be measured by planimeter or a grid system within the classification categories. The dimensions will be expressed in acres for the inshore to intertidal zones and in square miles for some of the offshore habitat areas. The habitat will be plotted on U. S. Coast and Geodetic 7 1/2 minute quadrangles and "300" series navigational charts, if available.

Intertidal habitat will be digitized according to Universal Transverse Mercator (UTM) coordinates and loaded in the MIDAS network so that quantity and quality can be determined. For example, shellfish habitat will be related to point-location of sources of pollution and shore developments.

In addition to the factors required for marine use, continued direction will be provided to the State Coastal Zone Study for definition of variables necessary to attain Study objectives.

The habitat will be characterized according to critical factors relating to the benthic and pelagic environment. Critical factors to be considered are bottom type, temperature, salinity, and bacterial water quality. The bottom type classification is that of the State of Maine Department of Sea and Shore Fisheries' soil classification for clam and worm flats. Bottom type classification relating to ground fish will be ledge, boulders, sand, gravel and mud.

Salinity, temperature and water quality records will be obtained from Maine Sea and Shore Fisheries, Water and Air Environment Improvement Commission, and the U. S. Bureau of Commercial Fisheries.

The following is a list of the sources of information which will be
used: For finfish - U. S. Bureau of Commercial Fisheries at Boothbay
Harbor, Maine, Woods Hole, Massachusetts and Gloucester, Massachusetts.
In particular, the Ground Fish Atlas compiled by the U. S. Bureau of
Commercial Fisheries, Gear Research, Gloucester, Massachusetts,
Fisheries Research Board of Canada, St. Andrew, New Brunswick, Sea and
Shore Fisheries and Atlantic Salmon Commission, and Inland Fisheries
and Game Department for the anadromous fish; for the bivalve mollusc;
U. S. Bureau of Commercial Fisheries and Sea and Shore Fisheries, in
particular, Intertidal Marine Species Atlas; for crustacea, Sea and
Shore Fisheries, Bureau of Commercial Fisheries, and Fisheries Research
Board of Canada, at St. Andrews, New Brunswick.

Marine habitat for the finfish is well documented in the following
publications: Bigelow and Shroeder, 1953, Fishes of the Gulf of Maine,
U. S. Fish and Wildlife Fisheries Bulletin 74, Washington, D. C.
Leim and Scott, 1966, Fishes of the Atlantic Coast of Canada, Fisheries
Research Board of Canada, Ottawa.

Data will be recorded and entered in the MIDAS network.

Marine Habitat Classification

1. Estuarine

    1.1 Salt Marsh
    1.2 Littoral Fringe

2. Intertidal (mean high water to mean low water)

3. Subtidal (mean low water to 1 fathom line)

    3.1 Pelagic
    3.2 Benthic

4. Inshore (1 fathom line to 3 mile limit)

    4.1 Pelagic
    4.2 Benthic

5. Offshore (3 mile limit to continental shelf)

    5.1 Pelagic
    5.2 Benthic

LAKE INVENTORY

FORM A-1

LAKE _____ TOWN _____ COUNTY _____ REGION _____ DRAINAGE _____

CARD 1

FILE # | LAKE # | COUNTY | TOWN | REGION | DRAINAGE | YEAR RECORDED | QUADRANGLE | ELEVATION | LAKE TYPE / WATER LEVEL | ACRES | ACRE CLASS | MAXIMUM DEPTH | MEAN DEPTH | SHORELINE LENGTH | ... ACCESS ...

CARD 2

FISH SPECIES PRESENT — DOMINANT GAME SPECIES

FILE # | LAKE # | ...

CARD 3

PRINCIPAL SPECIES FISHED FOR — YEAR FISH SPECIES INTRODUCED

FILE # | LAKE # | ... | ALEWIFE | BASS LARGEMOUTH | BASS SMALLMOUTH | BULLHEAD | PERCH WHITE | PERCH YELLOW | PICKEREL | SALMON ATLANTIC | SALMON PACIFIC | SMELT | TROUT BLUEBACK | TROUT BROOK | TROUT BROWN | TROUT LAKE | TROUT RAINBOW | TROUT SUNAPEE | WHITEFISH LAKE | ...

CARD 4

OPEN-WATER REGULATIONS

FILE # | LAKE # | GENERAL | BASS | ... | BURBOT | PERCH WHITE | PERCH YELLOW | PICKEREL | SALMON | SMELT | TROUT ... BROOK | TROUT ... | TROUT ... LAKE | TROUT ... | TROUT ... | ...

CARD 5

ICE-FISHING REGULATIONS

FILE # | LAKE # | GENERAL | BASS | ... | BURBOT | PERCH WHITE | PERCH YELLOW | PICKEREL | SALMON | SMELT | TROUT ... BROOK | TROUT ... | TROUT ... LAKE | TROUT ... | ...

State: Maine

Project Number: F.W.A.C. 2-11

Comprehensive Fish, Wildlife and Marine Plan for Maine

WORK PLAN III

Title: Current Inland Fish, Wildlife, and Marine Species Use

A. Objective:
To estimate the current appropriative and non-appropriative use of the primary inland fish, wildlife, and marine species of the State, and to evaluate and program these data for use in MIDAS on the basis of statistical units previously described.

B. Justification
Limited current use data for fish, wildlife, and marine species use makes it extremely difficult to accurately assess resource demands in the State at the present time.

In order to make projections and determine trends of use, we must be able to ascertain current species uses. Work in this segment is designed to determine current appropriative and non-appropriative uses in order to measure and analyze for current and future demand, and current and future use opportunity.

C. Procedures:

Job 1

Title: Current Inland Fish Species Use

Available data on current use of Maine's inland fishery resource are limited; however, some data on angler days of use for different species and habitat types are available from research and creel census studies. Angler-use data collected for currently existing and proposed research and creel census studies will be standardized and formatted for use in the MIDAS network. After this is accomplished, historical creel census (angler-use) data will be automated insofar as possible.

Major emphasis will be placed on design and pilot-testing of a mail questionnaire designed to estimate use and yield of freshwater sport fisheries by licensed anglers. Use estimates will be made for resident and non-resident anglers, with data aggregated by various species groupings for many of the Statistical Units previously listed (e.g. Watershed, County, etc.).

Samples of anglers will be drawn from license holders by computer, according to a predetermined technique. While the inherent biases in mail samplings are realized, the resultant data will be valuable in assessing trends in use of the freshwater sport fisheries. Design and operation of the sampling technique will be undertaken after consultations with personnel of these agencies:

>West Virginia Department of Natural Resources
>University of Maine
>>School of Forestry
>>Department of Resource Economics
>>Cooperative Fishery Unit
>Department of Inland Fisheries and Game
>Other State and Federal Agencies

Angler-use data collected by this study will be automated for use in MIDAS.

Investigation and determination of non-appropriative species use categories will be undertaken in this job, and estimates will be based on existing data and personal consultations with groups, organizations, and individuals having knowledge in the field of reference.

Job 2

Title: Current Wildlife Species Use

Appropriative use of the major wildlife species of the State will
be determined by analyzing and comparing data contained in the
game kill questionnaire, fur resources questionnaire, registration
data (deer, fisher, bear, beaver, and bobcat); the waterfowl harvest
inventory, industrial landowner records, biologist and warden reports,
highway department surveys, national use survey records; records of
the Maine Motel-Hotel Owners Association and a department operated
hunter traffic survey.

These data will be supplemented by information obtained from form
letters or questionnaires distributed to the field force of the .-
Department of Inland Fisheries and Game and to selected non department
observers.

Where possible, the data will be analyzed on a five year basis,
including the base year, to minimize the possibility of distortion
due to weather conditions or socio-economic influences.

Non appropriative use levels of wildlife will be difficult to determine.
Estimates of the amount of time devoted to watching birds and animals
will be made from information supplied by organized bird and nature
study groups, use records of the state game farm, and state owned game
management areas, and from questionnaires distributed to department
personnel.

Current use will be reported as user days of effort for the major
wildlife species. Where data are lacking, species will be grouped
and treated as a unit.

Species use data collected by this study will be automated for use in
MIDAS.

Job 3

Title: Current Marine Species Use

Statistics published in <u>Maine Landings</u> will be used for commercial
use aspects. These statistics are expressed in pounds, value, and
type of gear. The numbers of fishermen participating in the most
important fisheries can be estimated with accuracy by analyzing
license information. Catch per unit of effort estimates will be
made when adequate information is available.

Marine, commercial, and sports fishing data relating to current use
will also be obtained from ongoing research programs, particularly
those funded under PL 88309 and PL 89304.

The two categories of non-appropriative use, recreational and
scientific-educational has not been formally recognized as part
of fisheries management. However, in the recreational category
there are activities which can be evaluated. These are alewife
runs, an Atlantic Salmon Hatchery, a marine aquarium and a seal
viewing point.

Outside the bounds of resource agencies and universities, scientific-
educational use will be difficult to evaluate because there are no
recognizable foci for these activities; however, investigations of
possible methods of evaluation will be undertaken in this job.

Comprehensive Fish, Wildlife and Marine Plan for Maine

WORK PLAN IV

Title: Land and Water Use Projections

A. Objectives

To estimate land and water use trends in Maine to the year 1980, and develop a method for regular periodic update of these trends.

B. Justification:

Evaluation of the trends in land and water use will enable us to estimate the amount and quality of habitat which will exist at some future date. The amount and quality of habitat will have significant effects on the population levels of the various species. The analysis of these data will provide a basis for identifying problems that may exist between demand for use opportunity and available supply. Programs can then be developed which will bring demand and supply closer to equilibrium. This will provide the resource manager a sound basis for executing programs consistent with overall objectives.

C. Procedure:

Projections for land and water use (categories outlined in Work Plan I) will be obtained where available from the various state, federal, and private agencies which have responsibilities for collecting and developing these data. Where projections are not available, the fish, wildlife, and marine planning staff, working through the State Planning Office, will encourage and support the development of programs in the various agencies to supply data needs.

In those instances where projections are not available from the responsible agencies, our Planning Unit will develop projections methods using current and historical data supplied by these agencies and automated for use in MIDAS (see references cited under "Procedures", Work Plan I). Primary data sources will be accessed from the following agencies and organizations:

U. S. Department of Commerce — Census Bureau population data
Environmental Improvement Commission (EIC) — site selection data
Maine Municipal Association
State Park and Recreation Commission
State Highway Commission
Private Land Owners — Planning Units
Department of Economic Development (DED)
U. S. Soil Conservation Service
Maine Department of Agriculture
Maine Land Use Commission

Where adequate data are available, short term projections may be possible using data automated and stored in MIDAS.

Comprehensive Fish, Wildlife and Marine Plan for Maine

WORK PLAN V

Title: Projection of Future Habitat Quality and Quantity

A. Objectives:
   To project the quality and quantity of habitat for the major fish,
   wildlife and marine species of the State to the year 1980 and
   develop a method for regular periodic update of these trends and
   their relationship to resource management.

B. Justification:
   Trend estimates of this magnitude are required if the cooperating
   departments are to be able to accurately assess the value or
   priority of programs in research, and management.

   It is also necessary to have such data in order to advise other
   agencies and individuals of the ramifications of environmental
   changes.

C. Procedures:

   Job 1

       Title: Projection of Future Quality and Quantity of Inland
               Fish Habitat

       Projection of future habitat for Inland Fisheries will depend,
       to a considerable extent, on land and water use changes
       projected in Work Plan IV. Depending on trends of changes in
       use, some habitat may be improved or increased, while other
       habitat may be degraded or eliminated.

       Approximate effects of changes in habitat as a result of
       proposed water impoundments will be estimated where details
       concerning the proposed changes are available. Loss in
       miles of river and stream habitat for different habitat and
       species categories due to inundation will be estimated.

       Prediction of loss or gain in stream habitat below proposed
       dams will be projected.

       Prediction of loss or gain in stream habitat due to changes
       in pollution characteristics will be possible in some cases.

Changes in water and land use will also affect the amount and quality of "lake and pond" habitat by creation of new impoundments. Where data are available, the increase of reservoir area (acres) and the probable type of fishery resulting from impoundment will also be estimated.

Decreases in lake and pond habitat will be predicted in some cases where removal of present dams or degradation of lake habitat by cultural or natural eutrophication.

Major emphasis is being placed upon automation of habitat data already collected by the Fishery Division, but presently stored in several files on a variety of forms. Habitat data is for:

    1. Lakes and Ponds
    2. Brooks, Rivers, and Streams

A concerted effort is being made to collect current and future data related to habitat on standardized formats for use in MIDAS (See Procedures, Work Plan I).

First priority has been given to loading base-year lakes data and second priority to historical data. Once all available data are automated, methods of projection will be developed after thorough evaluation. Projections of future quality and quantity of fishery habitat, using historical and base-year data, will be executed by MIDAS.

Job 2

Title: Projection of Future Quality and Quantity of Wildlife Habitat

Habitats for the species under consideration are heterogenous and vary greatly within the State. As a result, definitions which are acceptable for the biological discipline are not meaningful from the statistical viewpoint. It will, therefore, be necessary to determine future habitat, for each species under consideration, from an analysis and projection of current and future land and water use to the year 1980.

Projections will be made by direct comparison of the factors measured and programmed in Work Plan I, "Inventory of Current Land and Water Use in Maine", to those data compiled in Work Plan IV, "Land and Water Use Projections", to the year 1980.

Special emphasis and consideration will be given to the following factors which will influence future land and water use patterns and which will subsequently affect wildlife habitat.

Forest Lands
The following management practices will greatly affect habitat for the major wildlife species:

(1) Fire suppression; (2) Cutting practices; (3) reforestation methods and programs; (4) recreational development; (5) water resources, including flood control projects, hydro-electric developments, and developments for public water supplies; (6) demands for wood products; (7) sub-division of extensive land holdings; (8) and the legal aspects, which will include zoning of wildlands, taxation, and public use, which will result from state or federal legislation.

Agricultural Lands
The following factors, which will affect lands in this category, will also have a pronounced affect on wildlife habitats: (1) future demands for agricultural products; (2) land ownership patterns, particularly, the resident - non-resident relationship, size of holdings, and proposed use; (3) encroachment by housing developments, urbanization, mining, flood control, hydro-electric facilities, public water supplies; and (4) recreational development, which will include the lands used for golf courses, camping areas, shooting preserves, and lands acquired by the state or federal government for parks, etc.

Industrialization and Transportation
Industrial expansion and demands for increased transportation facilities (roads, and airports) will also exert a measurable influence on future wildlife habitats.

Department field personnel will participate in the analysis and projection of these data for their area of responsibility.

A concerted effort is being made to collect current and future data related to habitat on standardized formats for use in MIDAS (see "Procedures" in Work Plan I).

Job 3

Title: Projection of Future Quality and Quantity of Marine Habitat

Future marine habitat will be projected on the basis of trends indicated by land and water use analysis (Work Plan I, "Inventory of Current Land and Water Use in Maine" and Work Plan IV, "Land and Water Use Projections.").

Land and water use trends which will be examined closely for this purpose are those which change water circulation (piers, breakwaters, causeways, etc.); encroach on present marine habitat (fills, seawalls, etc.) and change water quality (waste treatment, spoil sites & upriver land management practices).

New technological developments should provide data which will make refined estimates of habitat possible, especially from interpretation of remote sensing imagery from earth-orbiting satellites (National Aeronautics and Space Administration research).

It is hoped that regression analysis can be applied from a high level of information.

Some of the land and water use trend changes are obvious; for example, the water quality objectives of both state and federal government have the force of law behind them. Therefore, it can be assumed that the objectives will be attained with improvement in quality and quantity of lower estuarine marine habitat.

State: Maine

Project Number: F.W.A.C. 2-11

Comprehensive Fish, Wildlife and Marine Plan for Maine

WORK PLAN VI

Title: Current Inland Fish, Wildlife and Marine Species Abundance

A. Objective:
To determine current population levels and trends and their distribution for the major inland fish, wildlife, and marine species on the basis of previously described Statistical Units.

B. Justification:
Abundance data for fish, wildlife, and marine species are presently limited. Species abundance data are necessary in order to project future availability, and appropriative and non-appropriative opportunity for recreational, commercial, scientific, and educational use.

C. Procedure:

Job 1

Title: Current Inland Fish Species Abundance

Several methods or combinations thereof will be investigated to determine the best method of estimation of current species abundance and to tabulate available data. Refined population data are available for some of the more important coldwater game species in lakes and streams, but these data are available for only a limited number of waters. Production (standing crop) estimates have been made for brook trout and salmon, using the mark and recapture method, for several lakes and ponds. Standing crop estimates have also been made for brook trout and young salmon in some streams. An index to relative abundance has been used to measure density of brook trout in stream habitats. This index is the total number of trout captured in a 500-foot sample section of stream by single "electrofishing run". These indices have been determined for a relatively large number of trout streams. Other than these data, it will be necessary to evaluate species abundance by less refined methods.

Possible methods to be investigated for estimation of current species abundance include:

1. **Present production (standing crop)**
   This measurement is the total number of a species or total number of pounds per acre present in specific waters at specific times. A limited amount of refined data is available for salmon and brook trout in lakes and streams.

2. **Indices to relative abundance**
   These data are available for a fairly large number of streams for brook trout and young salmon.

3. **Estimated relative abundance of dominant game species**
   Based on knowledge of current biological conditions, regional personnel can evaluate the relative abundance of the "dominant game species" present in the population for the different habitat types. The "principal species fishery" can be determined by the same method. This classification refers to principal species that are currently being fished for in the various habitat types. Both of these parameters will be tabulated, coded, and automated for storage and analysis by MIDAS (see Work Plan I, "Procedures"). The "game species" that are being considered for the purposes of this study are listed in Work Plan II.

4. **Distribution**
   Geographical distribution is considered an indicator of species abundance throughout various parts of the State. Analysis of Habitat Inventory data through MIDAS will provide documentation (and possibly computer generated maps) on fish species distribution aggregated by the various Statistical Units.

5. **Yield (harvest)**
   Angler-harvest measurements (in numbers of fish and pounds per acre) are available for some species in a few waters. Yield data may be of some value in indicating abundance trends but tend to be subject to bias.

Job 2

Title: Current Wildlife Species Abundance

Estimates of the relative abundance of the wildlife species of primary
importance will be made by several methods. Numerical estimates will
be made when sufficient data are available from life equation tables
and intensive census methods. Species in this group will include
deer, moose, and black bear.

Population estimates for the species which have not been censused
will be accomplished through establishing population trends by comparing
harvest figures to license sales for the latest five year period,
reference to the game kill questionnaire; fur resources study, tagging
and registration data; bag checks, wing surveys, warden reports of non
seasonal mortalities, and crop damage complaints. Inventories and
banding data will also be utilized. Special emphasis will be placed
on the utilization of population and distribution data obtained by
direct contact and/or questionnaire with district game wardens, fire
tower observers; biologists, and selected members of the public.
Population estimates obtained in this manner will be reported as a
relative abundance, i.e., as scarce, common, or abundant for the
majority of the species. When data are sufficiently refined, estimates
will be reported as follows: 0-10; 10-20; 20 ----------90 to 100
animal units per acre or per square mile depending upon the species.

It is anticipated that the major portion of species abundance data will
be included in the MIDAS system and that analysis will be accomplished
utilizing a statistical pac which will be included in the ELIAS system.

Job 3

Title: Current Marine Species Abundance

To determine the relative abundance of the marine species, estimates of population will be made on the best information available.

This information may be categorized as follows:

I. Commercial catch analysis

    a. Gross catch per unit effort (for example, total lbs. per day, per boat)

    b. Gross catch per unit effort, size, and age composition.

II. Special population studies

    a. Catch data based on specially designed capture gear. These data include yield effort relationships, age, growth, size composition, natural mortality, and stock identification (by means of tagging - artificial and natural).

    b. Ongoing marine sports fishing studies by Sea and Shore Fisheries and the University of Maine.

III. Environmental data

    a. Water temperature analysis has revealed significant relationship between water temperature at spawning and relative abundance of adults in the future for some species.

IV. Harvest Statistics

    a. Subjective estimates of relative abundance will be made based on yield data as published in Maine Landings and Fisheries Statistics of the U. S. Statistical Digest.

These data will be automated, stored, and analyzed utilizing MIDAS. (See "Procedures", Work Plan I)

State:___Maine___

Project Number:_____

Comprehensive Fish, Wildlife and Marine Plan for Maine

WORK PLAN VII

Title: Current Human Use Opportunity Estimate for Inland Fish,
Wildlife and Marine Species

A. Objective:
To determine current human sport and recreational use opportunity
for inland fish, wildlife and marine species in Maine on the basis
of town, county, watershed, biological region and biological zone,
where possible.

To determine the economic supply of commercial species in Maine.

B. Justification:
In addition to knowing the current amount of species habitat and
populations and the projected habitat areas and species abundance,
it is necessary to know what amount of these species are available
for human use. A comparison of current demand and current use
opportunity (economic supply) will reveal the amount of use opportunity
available in relation to the demand being placed on these resources.
This analysis is required before recommendation for the development,
maintenance, or discontinuation of programs can be made. In addition
to the comparison between current demand and current use opportunity,
future demand and future use opportunity will have to be projected
and compared. Any disequilibrium which exists between the two will
imply certain policies and programs should be developed.

C. Procedures:
A. For Recreational Activities:
1) Determine current physical supply (this data will be obtained
from Job II and Job VI)
2) Determine current legal supply (this data will be available
from Job I and the study on posted lands and the statutory review.
3) Determine accessibility to legal supply (much of this data will
be available from Job I, section VI)
4) Determine regulations controlling legal supply (this can be
obtained from statutory review)
5) Establish quality criteria for defining and limiting use
activities (see Attachment VII-A for suggestions of criteria
which will measure satisfactory use)
B. For Commercial Activities:
1) Determine current physical supply (this data will be available
from Jobs II and VI)
2) Determine current legal supply (obtain from Job I and statutory
review)
3) Measure the economic supply of marine species based on the history
of prices paid to fishermen and the quantity harvested (including
production costs & economies of scale)
4) Do a regression - correlation study to identify factors which may
be affecting the location and elasticity of the supply curve.

(See Attachments VII-B, VII-C, VII-D for suggestions of more species

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procedures from the Divisions on Inland Fisheries and Wildlife
and the Department of Sea and Shore Fisheries)

PHYSICAL SUPPLY --
HABITAT andPOPULATION

LEGAL SUPPLY

ACCESSIBLE SUPPLY

Posted Lands
Private Off-Limits

REGULATIONS LIMITING
USE OF SUPPLY

No land vehicle trans,

QUALITY OF USE

All species under size

Amount of
user days
supplied
at
different
levels of
quality

Season

No water trans.
No air trans.

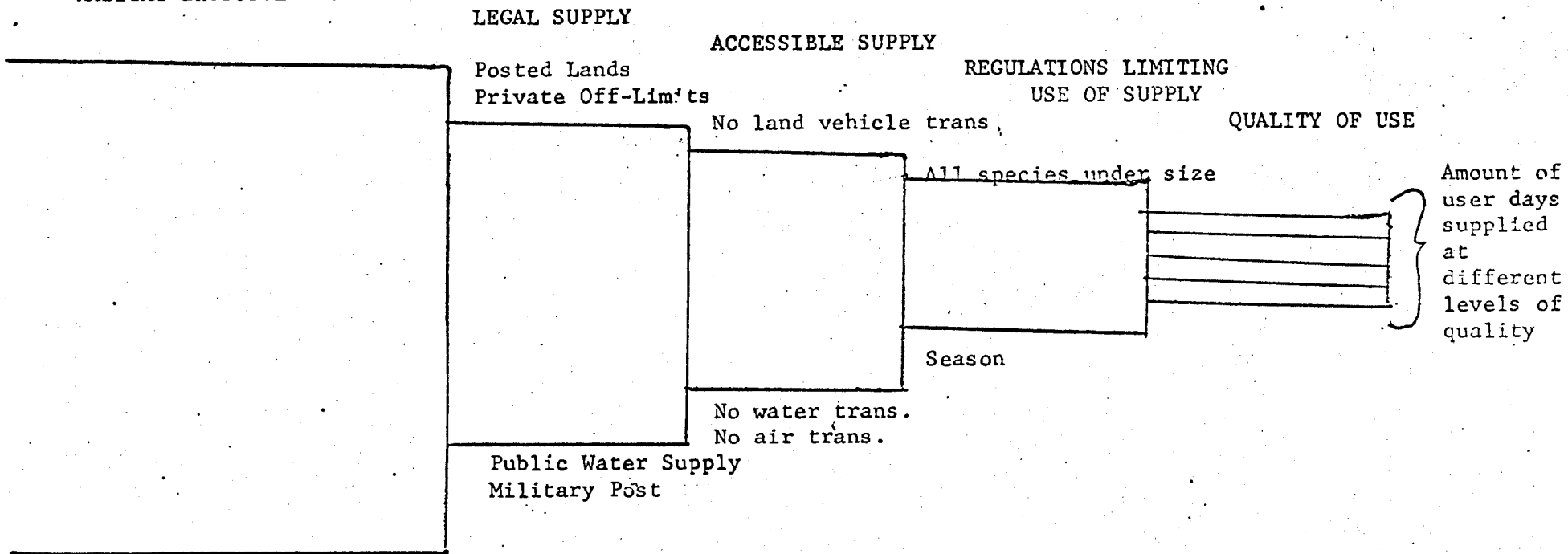Public Water Supply
Military Post

FIGURE   VII-I

Suggestion for Satisfactory Use Opportunity for Fishermen

1. Diversity
   A. gear
      1) fly
      2) bait
      3) spin casting
      4) trolling
      5) spear
   B. species
   C. environmental diversity

2. Space
   A. lakes
      1) anglers per acre
      2) anglers per feet of shoreline
   B. rivers and streams
      1) anglers per acre
      2) anglers per feet of shoreline
   C. bays, coves, estuaries
      1) anglers per acre
      2) anglers per feet of shoreline
   D. ocean
      1) anglers per sq. mile
      2) anglers per feet of shoreline

3. Fishing success (catch per angler hour)

4. Size
   a. length
   b. weight

5. Satisfactory bag limit

6. Satisfactory season
   a. length
   b. weather conditions
      1) temperature
      2) precipitation
      3) pests

7. Satisfactory physical access
   A. type
      1) two wheel drive
      2) four wheel drive
      3) walking
      4) flying
      5) two wheel drive & walking
      6) four wheel drive & walking
      7) boat launching
      8) snow vehicles
      9) motor scooter
   B. size of vessels
   C. access marking
   D. access location
   E. facilities available (gas, oil, repairs)

8. Legal access

9. Distance from urban centers
   1 hr.

10. Conflicting Activities
    a. other recreational
    b. industrial

11. Enjoyable surroundings —EQA
    a. smell
    b. noise
    c. view

12. Private - Public

13. Legal Constraints (quality of activity - controlled access)

ATTACHMENT VII B

Possibilities for measurement of current use opportunity - Inland Fisheries
(By County, Region, Drainage)

1. Availability and diversity of various game fishes and their fisheries in various habitat types can be measured through tabulation by computer of data in appropriate columns of the habitat inventory forms for "Lakes and Ponds" and "Rivers, Brooks, and Streams". Public information on the availability of various species fisheries could be made available by use of "Fishermen's Maps", similar to the State highway atlas.

2. Legal access to various habitat types for various categories of game fishes can be determined in the above-mentioned manner for waters:
    a) Open to public without fee
    b) Open to public with fee
    c) Closed to public access

3. Physical access to various habitat types for various categories of game fishes can be determined as above for waters:
    a) Accessible within a ½-mile walk by car road
    b) Accessible within a ½-mile walk by a 4-wheel drive road
    c) Not accessible within a ½-mile walk by either a 4-wheel drive or a car road

4. Data for availability of launching facilities on various bodies of water can be secured from the State Parks and Recreation Commission.

5. Current public use opportunity can be measured by determining available amounts of various habitat types for various categories of game fishes in waters on State and Federally owned lands.

6. Availability of waters with various regulations and restrictions can be obtained from fishing law booklets.

ATTACHMENT VII C

Job VII Maximum Current Use Opportunity for Wildlife Species

Objectives: To determine the maximum current opportunity of the public
to utilize the wildlife resources of the State.

Procedures: The maximum opportunity to use wildlife resources is dependent
upon many factors. The principle restrictions to use are (1) insufficient
numbers (population); (2) inaccessibility; (3) restricted or limited *private roads*
land areas available for public use; and (4) prohibitive regulations
or use restrictions. *(laws)*

A measure of the amount of land available for public use must
be obtained. Much of this data will be obtained from Job 1,
"Collection, Compilation and Programming of Current Land and
Water Use Data". These data will be supplemented by estimating
the acreage of privately owned lands removed from public use by
restricted entrance or by the posting of lands to trespass. These
estimates will be determined by requesting Game Wardens and Biologist
to estimate the amount of posted or restricted lands in their
respective regions.

Accessibility of lands to the public will be determined from
the distribution pattern of roads and other transportation facilities
throughout the state, with particular emphasis on road networks in
privately owned lands. For the purposes of this study, all lands
more than one mile from a secondary road, jeep trail, or water course
will be considered inaccessible for general public use. Population
level estimates for major wildlife species determined in Job VI,
"Estimate of Current Species Populations for Inland Fish, Wildlife,
and Marine Species" will be utilized to determine the current use
opportunities for the individual species. Regulations will be
reviewed to determine their restrictiveness and/or affect upon
use opportunity.

Attachment VII - D

Job Description - Current Use Opportunity

Objective: To determine current use opportunity for the marine species.

Procedure: For the commercial marine species, economic supply and current use opportunity are identical.

Most of the coastal shoreline is in the private sector and most of the waters from the high tide mark to the extent of the territorial waters is in the public domain. It will, therefore, be necessary to measure the limitation on use related to ownership; particularly the impact of private restrictions on access of public waters.

The public restrictions will also be measured. Some of these are as follows; waters adjacent to military reservations, state and federal parks, private colonial land grants to the low water mark, colonial fishing rights and protective restrictions for public health and "conservation" purposes.

The assessment of use opportunity for marine sports fishery will be the same as that for fresh water sport fisheries.

State:_____Maine_____

Project Number:_____

Comprehensive Fish, Wildlife and Marine Plan for Maine

PLAN VIII

Title: Current Human Use Demand Estimate for Inland Fish, Wildlife and Marine Species

A. Objectives
To estimate current demand for hunting and trapping activities on a statewide, county, biologist region, and biological zone for deer, bear and moose. To estimate current demand for hunting and trapping activities on a statewide and county basis for sea ducks, dabbling ducks, beaver, fur bearing animals other than beaver, grouse, snowshoe hare, pheasant, woodcock, and other game.

To estimate current demand for fishing activities on a statewide, river basin and county basis for brook trout, landlocked Salmon, Atlantic Salmon, lake trout (togue), smelt, other coldwater fish, smallmouth bass, largemouth bass, chain pickerel, white perch and other warm water fish.

To estimate current demand and analyze the supply of the commercial marine resource on a statewide and county basis for lobster, crab, shrimp, mussels, oysters, scallops, smelts, whiting and flatfish; and on the basis of biologist region and county for soft shell clam, hard shell clam, sandworms and bloodworms.

B. Justification:
The demand for fishing and hunting activities by species will be a measure of the interest people have . in pursuing these activities and their willingness to pay for them. It is a strong method which resource managers should use to justify their current and future resource programs. The allocation of limited environmental area for fish, wildlife and marine programs can be evaluated in terms of the desires and wants of the people and optimum use can be made of the resources available.

C. <u>Procedures</u>

Measure demand using the techniques employed by Rudbeck in "An Economic Evaluation of a Recreation Area in Washington County, Moosehorn National Wildlife Refuge", based on methods developed by Marion Clawson. He measured the relationship between cost and number of visits and developed equations for the demand curve. This technique, based on the development of concentric zones generating from the geographical area for which demand is being measured, should have considerable merit for estimating demand for fishing and hunting activities. The universe of participants is well defined with the stubs from the hunting and fishing licenses. The place of residence of each sportsman is recorded on the license stub so the number of participants within each concentric zone is also known. From each zone, then, a reliable sample can be drawn to measure costs, number of visits, number of user days, species fished for or hunted, and area in which activity took place. (See attachment A for summary of Rudbeck's work.)

Demand may also be measured using the techniques described in <u>Michigan Outdoor Recreation Demand Study</u>, Vol. 1. Their cost factors include time costs, specifically participation time, travel time and leisure time. Also individual tastes or preferences have been included as a factor to be measured. (See Attachment B for summary of Michigan technique). Unfortunately, specific methods for developing data are not presented.

A combination of these two techniques may be the best alternative for the demand study in Maine. The first step will be to measure the relationship between monetary costs and number of user days spent in hunting or fishing X species, statewide and for each county. The second step would be to develop participation equations whereby the independent variables affecting use such as time costs, amount of leisure time, income, population, etc. would be measured. From this equation demand projections can be made.

Data for demand study will be obtained from both primary and secondary sources. The secondary sources will include: (1) <u>Outdoor Recreation in Maine</u> by Johannes Delphendahl, University of Maine, 1965, which estimates current use and projects the number of user days in 1975 and 2000 for fishing and hunting on a statewide basis. (2) <u>Characteristics of Hunters and Fishermen</u>, Malcolm I. Bevins, Chairman University of Vermont, 1966, which contains data on socio-economic characteristics of hunters and fishermen in Maine, their patterns of participation and other data which will be utilized in the regression equations. (3) <u>National Survey of Fishing and Hunting</u>, U. S. Dept. of the Interior, Fish and Wildlife Service, Bureau of Sport Fisheries and Wildlife, 1965. Data on participation and cost for hunting and fishing.

-3-

Data on monetary costs, user days, area hunted or fished in will be obtained through revision of the game kill questionnaire and other surveys conducted by the Departments of Inland Fish and Game and Sea and Shore Fisheries.

D. For the commercial fisheries, demand and supply data are more readily available. Market prices for commercial species, quantities sold, and quantities harvested or supplied can be obtained primarily from secondary sources. From these demand and supply curves can be developed.

Attachment 8A

Summary of "An Economic Evaluation of a Recreation Area in
Washington County - Moosehorn National Wildlife Refuge" by
James P. Rudbeck, 1965, Orono, University of Maine, Dept. of
Agricultural Bus. & Econ.

Evaluating outdoor recreation:
1. gross expenditure method
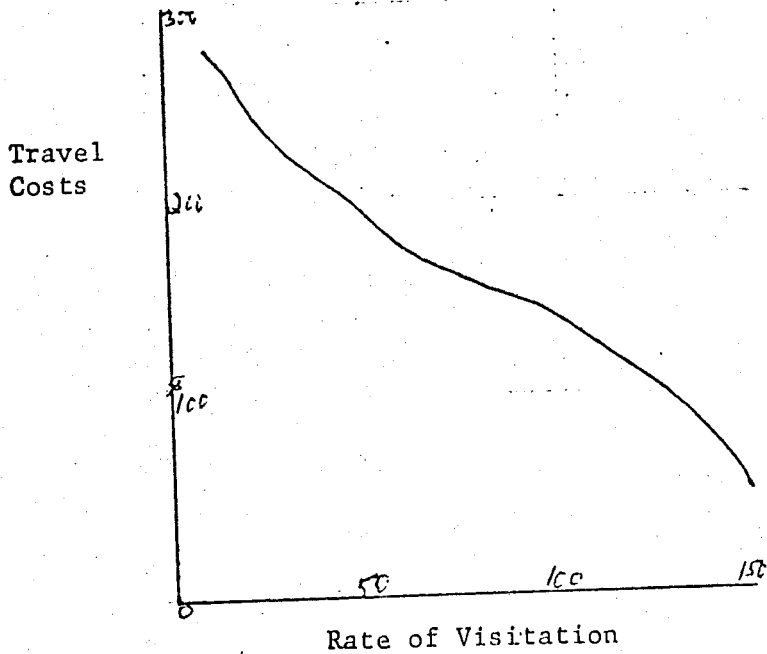2. gross national product method
3. market value method
4. cost method
5. demand curve

Total recreation experience   p. 19
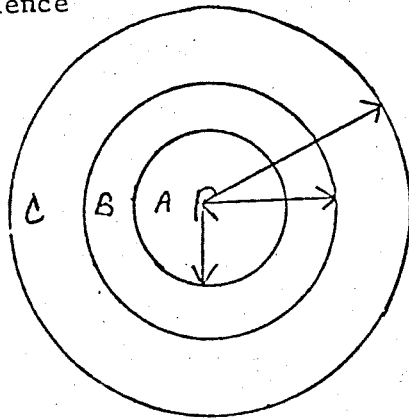
Zone A: no. of visits per 100,000 popu. & ave. cost per visit
Zone B: no. of visits per 100,000 popu. & ave. cost per visit
Zone C: no. of visits per 100,000 popu. & ave. cost per visit

Travel
Costs

Rate of Visitation

Demand Equation: <u>Michigan Outdoor Recreation Demand Study</u>, Volume 1, Methods and Models, Technical Report No. 6, Michigan Department of Commerce, June 1966, P. 3.3 and 3.4

$$D_{ir} = f\ (P_{ir},\ P_{ia},\ \ldots,\ P_{in},\ Y_i;\ S_{ir},\ S_{ia},\ \ldots,\ S_{in},$$

$$E_{ir},\ E_{ia},\ \ldots,\ E_{in},\ L_i;\ T_i)$$

D_{ir} = the total demand by the population of individuals <u>i</u> for outdoor recreation activity <u>r</u>

P_{ir} = the money price or cost to consumer <u>i</u> of participating in activity <u>r</u> (including the costs of travel to and from the site of <u>r</u>)

$P_{ia},\ \ldots,\ P_{in}$ = the money prices of the <u>n</u> significantly competitive or complementary leisure or non-leisure activities obtainable by individual <u>i</u> (including respective travel costs)

Y_i = the relevant income (money budget) of <u>i</u>

S_{ir} = the time cost for <u>i</u> to participate at the consumption site in activity <u>r</u> (<u>excluding</u> travel time to and from the site)

$S_{ia},\ \ldots,\ S_{in}$ = the inherent time required to make use of the significant alternative goods or services (<u>excluding</u> travel time)

E_{ir} = travel time for <u>i</u> enroute to and from the site of activity <u>r</u>

$E_{ia},\ \ldots,\ E_{in}$ = travel times for <u>i</u> to the purchase sites of the significant alternatives

L_i = the leisure or discretionary time (budget) available to <u>i</u> for participation in outdoor recreation or significant alternative activities

T_i = the individual tastes of preferences of <u>i</u>; that is, the consumer's relative rankings of alternatives which may be purchased out of his time and money budgets.

Sentence description of demand equation:

The demand for a particular recreation activity is a function of the cost to the consumer (including travel costs), the costs of competitive or complementary activities, income, time cost excluding travel time, time cost excluding travel of alternative activities, travel time to activity site, travel time to alternative site, leisure time available, and the preferences for activities based on relative rankings of alternatives available to the consumer out of his time and money budgets.

For each zone

Level of
Entrance
Fee
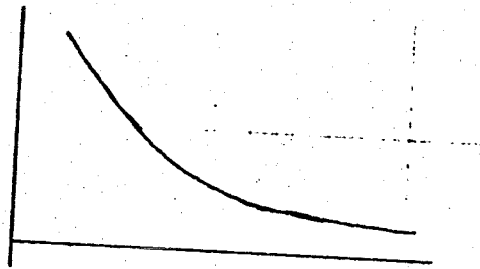
Number pf Visits

Projections of Future Recreation Visits

Variables usually used:
1. attendance records
2. physical limits of the facility
3. distance from principal population concentrations
4. attendance records at similar facilities

What are people willing to give up, in monetary terms, to use the facilities?

Sample techniques
1. Blocks of days chosen based on total number of days refuge was open.
2. All parties interviewed during block period.

Characteristics of Visitors
1. Place of residence
2. Distance of total trip
3. Type of trip - vacation, day, weekend, other
4. Ave. size of party
5. Parties with more than one family
6. Ave. family income
7. Dist. of Family income & % of users,   3000, 3 - 4,999, etc.
8. Dist. of ages
9. % parties making 1st visit
10. % parties planning to return
11. Days away from home
12. Ave. days at refuge
13. Reason for visiting refuge:
      - primarily to visit
      - secondarily to visit
      - happened on the refuge

Expenditures for campers - total & per user day   p. 47

Dollars	Number Users	Per Cent
0.00 - .99	38	23.2
1.00 - 1.99	51	31.1
.	.	.
.	.	.
.	.	.

Direct relationship found between expenditures per user day
& length of stay.

Length of Stay
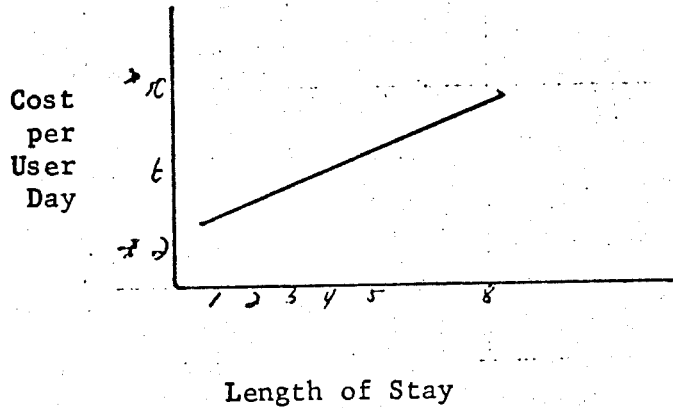
Expenditures at Moosehorn & ave. for total
trip were itemized as follows: p. 93
1. Camping (or trailer)
2. Other lodging
3. Meals in restaurants
4. Groceries & Meats etc.
5. Auto expenses
6. Recreation
7. Amusements
8. Clothing
9. Boating, camping, and fishing equipment
10. Other (souvenirs, photos. etc.)

Concentric zones

A. 10 area zones were developed: first being   100 miles
   up to   1700 miles.

B. User-days & popu. of each zone were found. User days based on no. of
   parties originating from each zone.

C. No. of visits per 1,000,000 popu. were developed

D. Cost per visit for each zone consists of: time required to complete
   trip ✗ median cost per user day)+ transportation costs. (time was
   weighted by miles traveled.)

$$\left(\frac{total}{1+1.48}\right)\left(\frac{travel\ time}{}\right) \gtrless 2.48\ days \times \$2.45\left(\frac{median}{cost\ traveling\ to\ Refuge}\right) + 592\left(\frac{total}{miles}\right) \times \frac{\$.0\%}{4}\left(\frac{avr.\ no.}{in\ party}\right)$$

Assumed: visit to Refuge was main purpose of Trip.???!

On log-log paper - demand curve was plotted   p. 62

Visits per 1,000,000 popu
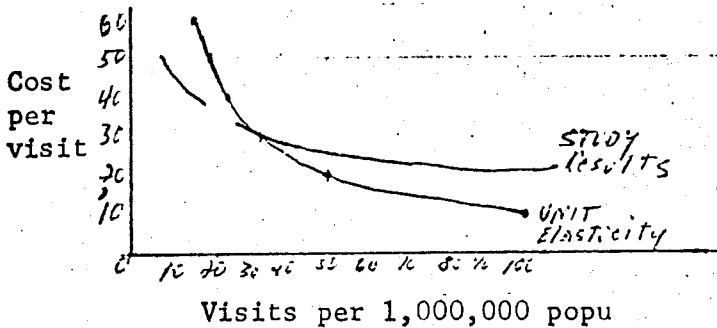
Effect of increases in entrance fees on no. of visits
                log-log paper   p. 68
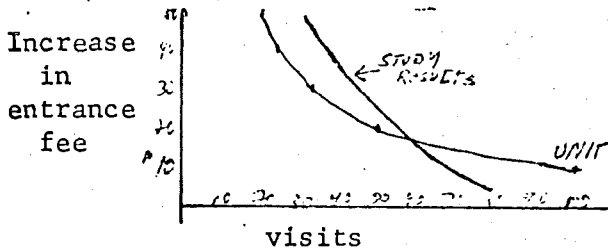
visits

Elasticity = - .57
     inelastic demand
Less inelastic in zone 1
(local) than in others.

DEMAND CURVE FOR OUTDOOR
RECREATION & MOOSEHORN

The value of recreation = to area under demand curve
 Regression analysis significant at 95% level:
 No. of visits = 4,092.51 - 93.42 (f) entrance fee

Projections of Future Use Levels
Y_1 = -899.25 + 46X_1 - 3.71X_2 - 1.77X_3 + .63X_4
Y_1 = visits per 10,000 popu. for camping
X_2 = per capita real disposable income
X_3 = per capita intercity automobile travel in 1000's of
       passenger miles
X_4= weekly hours of leisure time per employed person
NOTE X_1 = time of years

The Demand Curve
(log-log paper used on all graphs)

Cost per Visit

Visits per 1,000,000 population
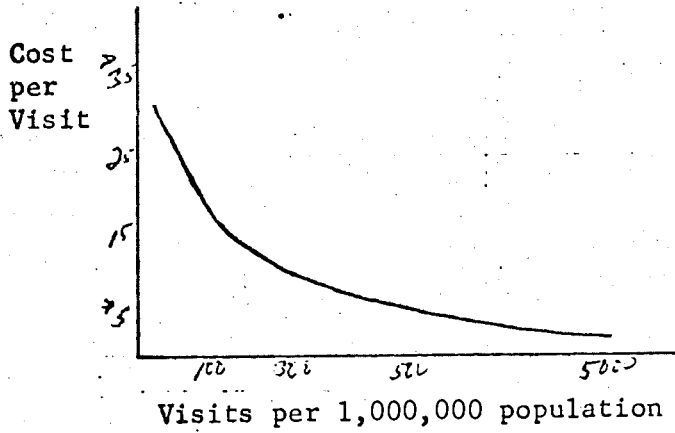
Miles from Refuge	Visits per 1,000,000 popu.	Cost per Visit
< 100	5,486	3.61
100-199	378	10.67
200-299	140	16.44
300-399	91	21.64
400-499	36	29.99
.	.	.
.	.	.
.	.	.

DEMAND CURVE FOR TOTAL RECREATION EXPERIENCE

P. 65

Increase in Entrance Fee

Number of Visits
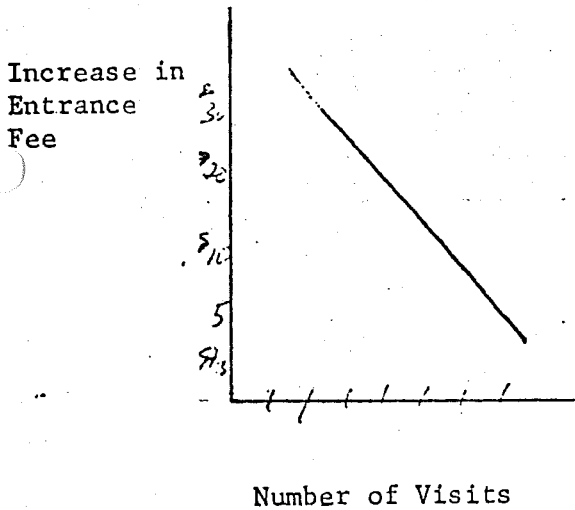
Distance Zones	No. of Visits	Cost per Visit	Estimated no. of visits after raising entrance fee by				
			$3 per person	$5	$10	$20	$30
< 100	1775	$3.61	391				
1-200							
2-300							
3-400							
4-500							
5-600							
6-700							
7-1200							
12-1700							
> 1700							
Totals	6672						

DEMAND CURVE FOR RECREATION OPPORTUNITY PER SE
(Imposed increases in per day expenditures)

COST ESTIMATES - JOB VIII
(Current Demand Study - Two years)

1. STAFF

Resource Economist (20 months)	$20,000
Statistical Clerk (12 months, $78. per wk.)	4,056
Clerk-Typist (12 months, $78. per wk.)	4,056
Two Enumerators (6 months each, $80. per wk.)	4,160
Cartographer (3 months, $130 per wk.)	1,560
Consultants	
Economic (3 months, 60 days, $100. per day)	6,000
Statistical Design (60 days, $100. per day)	6,000
TOTAL STAFF	$49,432

2. EQUIPMENT

Desk Calculator (Monroe type)	$ 900

3. SUPPLIES AND MAILING (20,000 pieces of mail) $ 1,500

4. COMPUTER TIME AND PROGRAMMING $ 2,000

5. TRAVEL EXPENSES (Transportation & Subsistence)
    A. For Enumerators
        $10. per day for subsistence
        $ 9. per day for transportation
            (100 miles x .09) $ 4,750
        $19. per day total x 250 days
    B. Economists, Planners, Consultants
        (in-state and out-of-state travel $ 3,000

6. PRINTING $ 2,500

TOTAL COST $64,082

State:_____

Project Number:_____

Comprehensive Fish, Wildlife and Marine Plan for Maine

Work Plan IX

Title: Project Future Use-Opportunity for Fish, Wildlife, and Marine Species

A. Objectives:
To project future use-opportunity on a statewide and county basis, and also on a watershed, biological zone and biological region basis where possible, for inland fish, wildlife, and marine sport species.

To project economic supply of commercial species to 1980, (include production function and economics of scale).

B. Justification:
It is important that resource managers examine the trends in land use, land ownership, pollution abatement, legislation, road construction, and other factors which affect use-opportunity to determine what amount of the inland fish, wildlife, and marine species will be available for use in the future. The future use-opportunities will then be compared with projections of future demand in order to ascertain whether the economic supply of species is sufficient to meet the demands to the year 1980. This analysis will be the basis for the development of refined objectives, policies, and programs.

C. Procedure:
The method for projecting future use-opportunity and economic supply of commercial species will be the same as that used in the projections of future demand. That is, a predicting equation will be developed as follows:

$$Y_{ijk} = L + A_1 X_1 + A_2 X_2 + A_3 X_3 + \ldots + A_n X_n$$

Y_{ijk} = the use-opportunity for i species in j county at k level of use

i = species
j = area
k = quality characteristics of use
L : a constant
$A_1 \ldots A_n$: coefficients of independent variables
$X_1 \ldots X_n$: independent variables

The independent variables would include future habitat area, future species populations, posted lands, road construction, legislation, and other factors influencing use-opportunity. All projected values for these variables will be available from studies carried out under the planning program.

State:_____

Project Number:_____

Comprehensive Fish, Wildlife and Marine Plan for Maine

WORK PLAN X

Title: Projecting Future Demand for Fish, Wildlife, and Marine Species Use

A. Objectives:
    To project demand to the year 1980.
    Inland Fish on a statewide, river basin, and county basis for:
      1. brook trout
      2. landlocked salmon
      3. Atlantic salmon
      4. lake trout (togue)
      5. smelt
      6. other coldwater fish
      7. smallmouth bass
      8. largemouth bass
      9. chain pickerel
    10. white perch
    11. other warmwater fish

Wildlife
1. Statewide, county and biological zone basis for:
    a. deer
    b. bear
    c. moose

2. Statewide and county basis for:
    a. sea ducks
    b. inland ducks
    c. beaver
    d. fur bearing animals other than beaver
    e. grouse
    f. snowshoe hare
    g. pheasant
    h. woodcock
    i. other game

Marine Species
1. Statewide and marine regional basis for:
    a. lobster
    b. crab
    c. shrimp
    d. mussels
    e. oyster
    f. scallops
    g. smelts
    h. whiting
    i. flatfish

2. Sea and Shore division and county basis
   a. soft shell clam
   b. hard shell clam
   c. sand worms
   d. blood worms

B. Justification:
Developing projections of future demand will be of considerable benefit
for guiding current programs and is a necessity for justifying the development
of new programs. The evaluation of trends in population, income, leisure
time, recreational activity and other critical elements that affect demand
for species use will enable the resource manager to plan programs that will
best utilize his resources in the future to meet the wants and desires of
the people.

C. Procedures:
Projections will be made using the regression equations developed during
the Current Demand phase of the planning project (Job VIII, section 5 C)

The Michigan Outdoor Recreation Demand Study, Volume 1, (Attachment 8B,
Job VIII) offers suggestions for critical factors to be used in the regression
equations. Independent variables such as cost in money, time, distance,
population, real incomes, and leisure time will be tried in the equation,
and the coefficient of determination will be calculated to eliminate those
independent variables which are not significant.

The regression equation is as follows:

$$Y_{ij} = L + A_1 X_1 + A_2 X_2 + A_3 X_3 + \ldots A_n X_n$$

Y_{ij} = the demand for i species in j county
> i: species
> j: area

L: a constant
$A_1 \ldots A_n$: coefficients of independent variables
$X_1 \ldots X_n$: independent variables

To estimate the demand for deer hunting in Aroostook County at some future
date such as 1980 or 2000, a value for each of the independent variables
will have to be developed for the future data. Thus the amount of population,
real income, leisure time and all of the X variables in the equation will have
to be projected to 1980 or 2000. These values may be obtained from various
state and federal agencies that have developed projected figures for the
critical values in the fishing and hunting equations. Or, the planning staff
may have to develop straight line projections to estimate X values in 1980.

The demand for deer hunting in Aroostook County in 1980 will be obtained by
putting the projected values of the independent variables in the regression
equation and solving it.

In summary, the major activity in Job X will be
1. to obtain projected values for the independent variables
   in the regression equations for 1980.

2. to solve the regression equations to obtain the projected
   demand for i species in j areas.

67

State:____Maine____

Project No:_____

Comprehensive Fish, Wildlife and Marine Plan for Maine

WORK PLAN XI

Title: Analyze Current Demand vs Current Use Opportunity for Inland Fish, Wildlife, and Marine Species

A. Objectives
To compare current demand with current use-opportunity for recreational use of inland fish, wildlife, and marine species.

To determine market equilibrium - the price at which the quantity supplied by producers is equal to the quantity demanded by consumers - for the commercial species.

B. Justification:
The comparison of current use-opportunity and current demand for inland fish, wildlife and marine recreation will reveal the following:
   a. which species are currently more abundant than the demand for them; a surplus of use-opportunity exists.
   b. the species for which use-opportunity and demand are the same, there is no surplus of use-opportunity or unsatisfied demand.
   c. the species for which demand exceeds use-opportunity; there is unsatisfied demand.

This analysis will reveal problems that may exist between use-opportunity and demand and will provide a basis for developing, maintaining, or discontinuing departmental policies and programs.

A supply and demand analysis for the commercial species will determine the equilibrium price and quantity for the species. This information will provide a background for better marketing and management policies and programs.

C. Procedure:
   A. For recreational activities:
      1) define each activity naming species, location, quality characteristics
      2) record current participation[1] in user days
      3) record current use-opportunity in user days
      4) record surplus use-opportunity or demand or equilibrium

   B. For commercial activities: Compare supply and demand schedules and determine equilibrium price.

1 Note: Participation days figures will be obtained from summary of user days on demand schedule.

State: _____ Maine _____

Project Number: _____

Comprehensive Fish, Wildlife and Marine Plan for Maine

WORK PLAN XII

Title: Analyze Future Demand vs Future Use Opportunity for Inland Fish,
Wildlife and Marine Resources in 1980

A. Objectives:
Compare future demand with future use-opportunity for recreational
use of inland fish, wildlife, and marine species.

Compare future demand with future supply of commercial species and
determine future equilibrium price.

B. Justification:
This analysis will be the basis upon which new departmental policies
and programs will be developed and current ones either maintained
or discontinued. This analysis will reveal what amounts of inland
fish, wildlife, and marine species will be available for use in the
future and what demands people will place on these species in the
future.

C. Procedures:
A. For recreational activities
1) define activity naming species location, quality characteristics
2) record total future demand for user days
3) record future use-opportunity in user days
4) note surplus of demand or use-opportunity or equilibrium
5) identify problems with future use, if any
6) develop alternative solutions to problems
7) establish policies, objectives, precepts
8) develop programs to meet objectives and solve problems

B. For commercial species
1) compare schedules of future supply and future demand and determine
equilibrium price
2) identify problems, if any
3) develop alternative solutions to problem
4) establish policies, objectives, precepts
5) develop programs to meet objectives and solve problems

State:_____Maine_____

Project Number:_____

Comprehensive Fish, Wildlife and Marine Plan for Maine

WORK PLAN XIII

Title: Inland Fish, Wildlife and Marine Resource Problem
        Identification and Evaluation

A. Objective:
    To provide a format and method for identifying and evaluating
    problems for fish, wildlife and marine resources.

B. Justification:
    Before planning can proceed in a logical manner, problems of
    the resources must be identified and evaluated.

C. Procedure:
    Resource problems, that is, anything that prevents, reduces or
    threatens the objectives of the Inland Fish, Wildlife or Marine
    Resource can be divided in two broad categories: Primary - those
    related to the resource and secondary - those related to programs.

    Primary problems can be categorized further; into those that (1)
    affect the welfare of the resource; (2) restrict man's use of the
    resource and (3) are caused by the resource. Primary problems which
    affect several species can be considered major. Problem priority
    can be established on the basis of importance of the species, time
    elements (threat time) abundance trends and control capability.

    Most primary problems can be expected to be identified early in the
    planning process during the accumulation and evaluation of inventory
    data.

    Ordinarily secondary problems if they are not part of the individual
    organization program, or recorded in the files, can be expected to
    emerge during the development of refined species plans.

    The attached form is designed to provide a format for the description
    of primary and secondary fish, wildlife and marine resource problems
    on a statewide or more restricted basis.

Problem Identification and Evaluation

Species: Location:

Problem Description:

	Primary Problem[1]			Secondary Problem
	Type A	Type B	Type C	
Problem Type				
Threat Time				
Trend				
Control Capability				
Financial				
Technical				
Legislative				

1. Type A - Affecting welfare of fish and wildlife.

    Type B - Restricting man's use and enjoyment of fish and wildlife.

    Type C - Caused by fish and wildlife.

State: Maine

Project Number:_____

Comprehensive Fish, Wildlife and Marine Plan for Maine

Work Plan XIV

Title: Species Management Plan and Program Evaluation

A. Objective:
To evaluate existing programs and to develop Species Management
Plans for Fish, Wildlife and Marine Species.

B. Justification:
Evaluation of programs is necessary in order to expose the areas
where planning is necessary. The development of individual species
plans is the logical culmination of the compilation and analysis
of data to this point.

C. Procedure:
Program review and evaluation can be accomplished using the formats
of the attached program evaluation check lists for Fish, Wildlife
and Marine Species.

First Broad Species Plans can be designed. These are long range
plans which have programs to attain the planning objectives and to
solve primary problems.

Refined species plans may be developed concurrently with broad
speciesplans for some high priority species.

The method for designing refined species plans is by means of
close analysis of current operation resulting from the program
review check list. The results of this review can allow decisions
to retain good programs and low priority or needless programs
to be deferred or dropped.

Regional biologists, project leaders, warden supervisors, chief
wardens will accomplish the detailed species planning in close
association with the planning group.

PROGRAM EVALUATION CHECKLIST

General Instructions

1. Consider this form from the Maine point of view; i.e., in light of current programs and/or information needed by you, as a researcher or manager, to evaluate the current status of the species under consideration. This form is divided into three major headings. The major headings are subsequently subdivided into more detail statements. As you go through the form, bear in mind the fact that each detail statement <u>refers only to the major heading under which it is found</u>. To illustrate do not try to relate 2.3.1 to 1.1.10, etc. It is hoped that the completed form will provide the administrators of the Department and the Division with an up to date assessment of our current programs and the direction that future programs should take. In short, it is a measure of where we stand in relation to the job that must be done.

2. <u>General Definitions</u>

   A list of "Wildlife Definitions" is included with the "Program Evaluation Checklist." These definitions correspond by number, and clarify the headings listed on the left of the Program Evaluation Checklist sheet.

   The checklist portion is divided into six columns, each with a specific heading. The headings or questions are defined as follows:

   1. Is it available?

      This question should be asked for each entry on the left of the sheet. For example, 1.1.1. Definition of the Species. Reference to the definition sheet explains 1.1.1. as identification of the species including the nomenclature, taxonomy and morphology. Is a suitable definition available?

2. Is it required? Do we need additional taxonomic work or is what we have sufficient from our point of view.

3. Is an increase needed? This refers to existing program

4. Has a program been designed? This applies only if you indicate that additional work is required.

5. Is it underway? This refers to the program mentioned in Number 4.

6. Priority of work - the degree of importance you attach to the program or project.

3. To insure uniformity, please follow the following coding procedure:

1. If your answer is "Yes" indicate by a check (✓).

2. If partial information is available, indicate by an asterisk (*).

3. If "No" leave blank.

4. If you feel that an increased effort is needed for existing programs or that a program should be designed to obtain the desired information, assign a priority rating of from 0 to 3, zero indicating the lowest priority and 3 the highest.
The process of asking the same series of questions is continued for each of the statement; i.e., 1.1.1, 1.1.2,-------3.1.1., 3.1.2. listed on the left of the "Program Evaluation Checklist." To illustrate, if you feel that the species is adequately defined (see 1.1.1.) you would so indicate by putting a (✓) in the first box; leave the second blank indicating that it was not required; leave a blank in the third, a blank in the fourth, a blank in the fifth and enter a 0 in the last indicating a zero priority. Conversely, information may be available but you may feel that additional information is needed. In this case you would check boxes one and two and answer the remaining questions - has a program been

designed and is it underway. Once again you would indicate your

priority rating of from 0 to 3.

4. Two additional statements are included for your consideration on

the right side of the "Program Evaluation Checklist." It would

be helpful if you would indicate the group, agency or institution

you feel could best provide the necessary research that is not

available at this time, or if available, indicate the group,

agency or institution that has conducted the research. The

point to be considered here is that some phases of needed re-

search may best be accomplished by groups or agencies other

than our own. To illustrate, 1.2.3. (Social Restrictions),

1.2.4. (Legal Restrictions), etc., may best be determined by

individuals from another discipline.

Biologist:

Region:

1. Resource Supply

1.1 Species Assessment

	Is it available	Is it required	Has a program been designed	Is it underway	Is an increase needed	*Priority of work
1.1.1 Definition of Species						
1.1.2 Life History Studies						
1.1.3 Distribution of Species						
1.1.4 Ecology, Biological Environment and Habitat						
1.1.5 Distribution and Amount						
1.1.6 Habitat Manipulation and Protection Techniques						
1.1.7 Competing Uses of the Environment						
1.1.8 Population						
1.1.9 Population Dynamics						
1.1.10 Use Feasibility						
1.1.11 Potential Harvest						

*Scale of Priorities. Indicate your opinion of priorities utilizing a
0 to 3 scale.

_____

Species

If not available what source could
best provide it.

If available who has it (Dept.,
Div., Corp., Inst., etc.)
Location of information
(Title, Dept. Div., etc.)

Column headers (rotated):
- Is it available
- Is it required
- Has a program been designed
- Is it underway
- Is an increase needed
- *Priority of work

If not available what source could best provide it.

If available who has it (Dept., Div., Corp., Inst., etc.)
Location of information
(Title, Dept. Div., etc.)

1.2 Maintaining the Supply and Harvest

1.2.1	Effects of Harvesting on the Species
1.2.2	Competing Uses of the Environment
1.2.3	Social Restrictions
1.2.4	Legal Restrictions
1.2.5	Habitat or Land Use Legislation
1.2.6	International Wildlife Management
1.2.7	Management and Regulatory Plans

1.3 Artificial Propagation

1.3.1	Rearing
1.3.2	Diets
1.3.3	Disease and Competition Control
1.3.4	Genetic Manipulation
1.3.5	Engineering Development and Environmental Control
1.3.6	Economic Feasibility
1.3.7	Alternate Species

2. Factors Limiting Access to and Harvesting of the Resource

Column headers (rotated):
- Is it available
- Is it required
- Has a program been designed
- Is it underway
- Is an increase needed
- *Priority of work

2.1 Resource Use Opportunity

- 2.2.1 Access
- 2.2.2 Land Ownership Trends
- 2.2.3 Restriction by Closure
- 2.2.4 Seasons and Bag Limits
- 2.2.5 User Time
- 2.2.6 Climatic Conditions
- 2.2.7 Commercial Availability
- 2.2.8 Accommodation Facilities
- 2.2.9 Optimum Participation Levels

2.3 Harvesting Efficiency

- 2.3.1 Hunting and Harvesting Techniques
- 2.3.2 Behavior Studies (Human)
- 2.3.3 Behavior Studies (Animal)

If not available what source could best provide it.

If available who has it (Dept., Div., Corp., Inst., etc.)
Location of information
(Title, Dept., Div., etc.)

Is it available	Is it required	Has a program been designed	Is it underway	Is an increase needed	*Priority of work

If not available what source could best provide it.

If available who has it (Dept Div., Corp., Inst., etc.)
Location of information
(Title, Dept. Div., Etc.)

2.3.4   Restrictions on Equipment and Harvest Efficiency

2.3.5   Department Organization and Capability

2.4 Financial Assistance and Other Direct Aid

3. Public Relations

3.1 Extension

3.2 International Affairs

PROGRAM EVALUATION CHECKLIST
WILDLIFE DEFINITIONS

1. Resource Supply

1.1 Species Assessment

1.1.1 Definitions of Species

Identification of the species including nomenclature

(Scientific name), taxonomy, and morphology.

1.1.2 Life History Studies

Reproduction, sex ratios, distribution and movements of

juveniles and adults; age and growth; food and feeding

habits; and disease and parasites.

1.1.3 Distribution of Species

Distribution, geographic range, migrations, and seasonal

and chance movements.

Relationship of distribution of the species to environmental

features and changes.

1.1.4 Ecology, Biological Environment and Habitat

Identification and description of physical features of the

environment affecting distribution, migrations, behavior,

survival, breeding, feeding, aggregation, and other responses

important for locating, harvesting, forecasting, and managing

the species. Includes vegetation, climatic changes, soils,

pollutants, pesticides, and species inter- and intra- relation-

ships.

1.1.5 Distribution and amount of habitat peculiar to the individual

species including seasonal and short- and long-term variation,

natural and man-made.

1.1.6 Habitat Manipulation and Protection Techniques

Improvement of the natural environment.

Prevention or mitigation of man-made changes in the environment.

Enhancement of environment through multiple use.

Includes River Basins, Forestry, SCS, Highway activities,

urbanization and industrialization.

1.1.7   Completing Uses of the Environment

Preventing or mitigating adverse effects of urban and

industrial use, waste disposal, power (hydraulic and thermal),

recreation, transportation (nets), timber (harvesting), and

mining.

1.1.8   Population

Magnitude or estimate of size of population

1.1.9   Population dynamics

Growth, mortality, intra-specific relationships, inter-

specific relationships including identification, distribution,

movements, and life history of competing species; reaction

including shifts in distribution and numbers to seasonal changes,

environmental change, natural or man-made, for proper management

or efficient harvesting.

1.1.10   Use Feasibility

Short-run predictions and immediate information concerning

probable abundance and location of the wildlife species,

estimate of age groups of wildlife species, concentration and

movements, and effects on resource of weather changes, useful

in assisting sportsmen in orderly harvesting and optimization

of take.

1.1.11   Potential Harvest

Estimate of sustainable harvest (animal units per acre, square

mile, town, country, or state).

1.2 Maintaining the Supply and Harvest

1.2.1 Effects of Harvesting on the Species

Reaction of species---breeding, growth, mortality, intra- and inter-specific relationships---to hunting.

1.2.2 Competing Uses of the Environment

Preventing or mitigating adverse effects of urban and industrial use, waste disposal, power (hydraulic and thermal), recreation, transportation (nets), timber (harvesting), and mining.

1.2.3 Social Restrictions

Economic, political, historical (customs), and human factors affecting rational utilization of the resource, and the local, regional, and statewide aspects of maintaining the species.

1.2.4 Legal Restrictions

Enforcement of rules and regulations (international, federal, state, or municipal). Evaluation of the laws which restrict the use of wildlife.

1.2.5 Habitat or Land Use Legislation

Effect of land use legislation upon federal and state agencies and the private community (individual as well as industrial).

1.2.6 International Wildlife Management

Migratory treaties, season, disease control, enforcement reciprocity.

1.2.7 Management and Regulatory Plans

Development of management and regulatory plans, and legal policy, to achieve society's goal by the most efficient means.

1.3 Artificial Propagation

1.3.1 Rearing

Propagation of and transplanting young, and adults in either natural or artificial environments. Includes transplanting wild

stock as young or breeding adults from one natural area to another to provide new or more suitable habitat; rearing species to harvestable size under completely controlled conditions; and finally, propagation using a combination or variety of current and newly developed techniques.

1.3.2 Diets

Determination of nutritional requirements.

Formulation of diets and development of wildlife food.

1.3.3 Disease and Competition Control

Identification of diseases, pests, and predators that affect production and survival.

Elimination and control of diseases, predators, pests, and competing species.

Development of techniques for effective disease and predator control.

Conditioning of propagated species to improve survival when transplanted in natural environment.

1.3.4 Genetic Manipulation

Selection, cultivation, and production of desirable strains.

1.3.5 Engineering Development and Environmental Control

Design of breeding areas, artificial enclosures, and mechanical devices for feeding, harvesting, predator control.

Development of engineering methods for maintaining favorable environmental conditions in artificial propagation areas.

1.3.6 Economic Feasibility

Demand, production, and species analyses to assist in sound decisions, production planning, and need.

Economic feasibility analyses to determine relative practicabilit

Systems analyses to determine optimum production.

1.3.7 Alternate Species

Determine feasibility (see 1.1.10) of other resources in wild-
life area to supplement or broaden the resource base.

2. Factors Limiting Access to and Harvesting of the Resource

2.1 Resource Use Opportunity

2.2.1 Access

Physical access to the species; i.e., federal, state, or
privately owned lands.

2.2.2 Land Ownership Trends

Federal, state, local, private, and industrial; resident and
non-resident.

2.2.3 Restriction by closure, federal, state, local private, industrial
resident and non-resident ownership.

2.2.4 Seasons and bag limits, fees and licenses.

2.2.5 User time and money allocation.

2.2.6 Climatic conditions - seasonal weather factors.

2.2.7 Commercial availability.

2.2.8 Accommodation facilities (private and commercial).

2.2.9 Optimum Participation Levels

Hunter density (man-land ratios)

2.3 Harvesting Efficiency

2.3.1 Hunting and harvesting techniques of sportsmen.

2.3.2 Behavior Studies (Human)

Understanding of psychological and sociological factors which
motivate hunters: attitudes which directly affect regulations
(seasons, bag limits, harvesting methods).

2.3.3 Behavior Studies (Animal)

Determine understanding of wildlife behavior to develop methods

for controlling harvest and/or development of new harvesting

techniques.

2.3.4 Restrictions on Equipment and Harvest Efficiency

Governmental barriers (international, federal, state, or

municipal) to effective economic and recreational utilization

capacity such as restriction or limit of firearms and equipment

capacity and restrictions on areas of utilization.

2.3.5 Department Organization and Capability

Necessary personnel and scientific disciplines available;

desirable flow of information and intra-divisional relation-

ships.

2.4 Financial Assistance and Other Direct Aid

P.R., D.J., National Science Foundation Grants, Industry, Public Health,

etc.

Public Relations

3.1 Extension

New releases, publication procedures, educational programs in-service

training.

3.2 International Affairs

Joint treaties; border problems; itinerant workers, international

waters, etc.

State: Maine

Project Number: FWAC-1-1

Comprehensive Fish, Wildlife and Marine Plan for Maine

WORK PLAN XV

Title: Coordination of Fish, Wildlife and Marine Resources Planning Process

A. **Objectives**:
To coordinate the planning efforts of the Departments of Inland Fisheries and Game, and Sea and Shore Fisheries. To coordinate the Inland Fish and Game and Sea and Shore Fisheries planning with that of other natural resource agencies through the State Planning Office.

B. **Justification**:
Because of diversity of the resource data, the compilation and analysis phase requires close coordination of effort directed within the planning group.

Outside the planning group strong lines of communication must be developed with other natural resource agencies, particularly those which are in the process of planning through the State Planning Office, Advance Planning Division so there will be no duplication of effort.

C. **Procedures**:
Personnel assigned to the project will follow the various jobs closely. In the event that the proposed methods do not meet the job objective, alternatives will be developed and applied.

Project personnel will develop liaison between the Planning Group and agencies which may compile and analyze data for the Planning Group.

Decisions will be made on a System Design for data retrieval and analysis which will conform to and be approved by the State Planner and other resource agencies.

Resource planners will develop a planning format to be presented to various groups in state, regionally and nationally.

Organization and Functions

Maine State Planning Office

Office of the Director

Functions: Plan and Direct the
work of the State Planning Office,
Advise the Governor on all phases
of planning, Represent the office
and coordinate activities with
interstate, private and other groups.

Local & Regional Planning Division	Current Planning Division	Advance Planning Division
Technical assistance to local and regional groups, Administration of Federal and State grants, Participation in local and regional activities.	Fiscal and governmental planning, Capital Programming, Special Studies: Housing, Manpower, Program Planning, Legislation and other administrative and implementation measures.	Long-term studies; Population, social, economic, etc; Natural Resources: water resources, pollution, open space, recreation; Preparation and maintenance of State Comprehensive Plan.