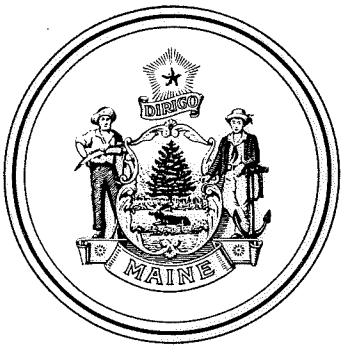
PLANNING DOCUMENT

NUMBER II



Planning for Maine Fish, Wildlife and Marine Resources

1971

Maine Department of Inland Fisheries and Game

Maine Department of Sea and Shore Fisheries

We appreciate the wholehearted cooperation of the many agencies and individuals who assisted us in the evaluation of the vast and diverse amount of information required in the initial planning effort. No listing is presented for fear of inadvertent omission.

The preparation of this report was financed, in part, by funds provided by the Commercial Fisheries Development Act, as amended, P.L. 88309, The Anadromous Fisheries Act, as amended, 89304, and Fish, Wildlife Restoration and Development Funds, FWAC-2.

PLANNING FOR MAINE

FISH, WILDLIFE AND MARINE RESOURCES

by

Phillip L. Goggins - Donald K. Christie

Kenneth H. Anderson - Kendall Warner

Charles B. Lombard - Owen C. Fenderson - Frederick Kircheis

PLANNING DIVISION

Maine Department of Inland Fisheries and Game
George Bucknam, Commissioner

Maine Department of Sea and Shore Fisheries
Ronald Green, Commissioner

in cooperation with

Philip M. Savage, Director
State Planning Office
Executive Department
State of Maine

Northeast Region (5)
Bureau of Sport Fisheries & Wildlife
U. S. Department of the Interior

National Oceanographic & Atmospheric Administration
Marine Fisheries Service

(FWAC 2-7)

Maine, 1971

There has been no period in history when critical evaluation of man's activity in relation to his environment has been needed more than from the end of World War II to the present. During this period, it has been dramatically manifest that man has the technological capability to affect adversely the complete biosphere.

Pesticides and radionucleotide contamination have been detected from ocean deeps to remote areas of the Arctic and Antarctic. Air pollution has approached lethal levels in heavily populated locations, in areas of high probability of air temperature inversion, and in locales of heavy industrialization. Settlements have sprung up in flood plains and "tornado alleys" - sometimes with catastrophic results. Lakes are dying at an accelerated rate because of thoughtless dumping of wastes. Fish products have been declared public health hazards because of contamination with heavy metal such as mercury, lead, and copper.

There are many users who assert their use as best. This produces strong competition for control of the environment.

Conservation agencies often have been shunted aside in the competition for control because of failure to assert emphatically natural resource values. Failure to plan for the future has been an important reason for this.

Federal Agencies such as the U. S. Bureau of Sport Fisheries and Wildlife and National Marine Fisheries Service (formerly U. S. Bureau of Commercial Fisheries) have long advocated long range comprehensive planning for their own agencies, and they have encouraged State agencies to begin long range natural resource planning.

State conservation agencies have experienced degradation of habitat by other users and have been receptive to long range comprehensive planning, but funds have only recently become available to mount substantial programs. As an example, in Maine, the loss of fish and wildlife habitat has not been as obvious as that of quality shellfish habitat; however, all are in jeopardy because of Maine's potential for development. Maine is within a day's drive of 50 million people. For this reason, fish, wildlife, and marine resources must be protected from the fast buck exploiter-developer. With this in mind, the Maine Departments of Inland Fisheries & Game and Sea and Shore Fisheries started a comprehensive long range fish, wildlife, and marine species-habitat planning project aimed at asserting species-habitat values and emphasizing the balance of man's demand with continuing wise use.

TABLE OF CONTENTS

SUMMARY

This report consists of a discussion of:

1. The urgency of natural resources planning as related to Fish, Wildlife and Marine Resources.

2. The organization and philosophy of the Maine planning effort.

3. The approaches and methods of planning, with a description and evaluation of data sources.

4. The development of goals and objectives and "pitfalls", centering on the problems of communication.

5. The development and description of a computerized data system.

6. The progress of functional planning emphasizing the advantages of the computerized natural resource data system.

INTRODUCTION

The initiation of natural resource planning is no different than that of any new major undertaking. Plans must be made to design programs for the attainment of a set of objectives.

Ideally, a planning project should consist of three parts:

(1) Orientation

(2) Preplanning

(3) Implementation.

Orientation

The planner cannot profit greatly by a search of the literature on natural resource planning because very little has been published on the subject. Therefore, orientation can best be accomplished by seeking out those who have had experience in comprehensive natural resource planning.

The California Fish and Game Department had completed a phase of a comprehensive plan for fish (marine and freshwater) and wildlife. Representatives of the California Planning Group conducted a planning workshop for Maine agencies. The workshop consisted of an introduction to the techniques of planning, including methods of laying out jobs and the ideal planning organization.

The most valuable contribution of this workshop was a description of the various constraints and pitfalls experienced by the California Planning Group. Two publications of the California Fish and Game Department (Stokes et. al. (1968) proved most valuable: They are Fish and Wildlife Resource Planning Guide and Fish and Game Planning Workshop (prepared for the State of Maine Departments of Inland Fisheries and Game and Sea and Shore Fisheries).

Preplanning

Because natural resource planning involves evaluation of multiple interrelated factors, this process can be exceedingly complicated requiring innovative methods to complete the project. Therefore, it is advisable to start a project with a preplanning period to develop a detailed "plan for planning". This allows the participants to become familiar with one another, identify data gaps, develop criteria for measurements, and most important, start the process of implementation, immediately.

Who Does the Planning

The first task of the Administrator is to decide who does the planning. In State government, there are usually two choices:

(1) Hire a consulting firm

(2) Use your own staff.

Because consulting firms with expertise in fish, wildlife or marine resources are practically non-existent, and State budgetary and personnel policy usually makes it difficult to establish new jobs, the obvious decision is to utilize existing staff. This has the overriding advantage of having personnel who know the area and have a "feel" for the problems of the resources. It is very important that all divisions of the conservation agency be represented on the planning staff, for comprehensive planning is impossible without group effort.

The make-up of the Maine interdepartmental planning group is as follows: assigned from staff of the Inland Fisheries and Game Department - a co-director; Inland Fisheries Biologist Planner; Wildlife Biologist Planner; Law Enforcement Supervisor and a Secretary. From the Department of Sea and Shore Fisheries - a co-director; three part-time marine resources scientists, with specialities in anadromous fish, fin fish, and crustacea and a part-time law enforcement specialist. In addition, a resource economist was hired for the duration of the preplanning project.

Implementation

Probably the most common cause of comprehensive plans not being accepted is the failure to develop and incorporate an implementation process early in the planning effort.

It is very easy for planners to retire to an "ivory tower" for six months, a year or two, and come forth with words of wisdom. Generally, these words do not have the weight of authority and fall on deaf ears, because no attempt was made to involve the wide spectrum of users which range from the top executive to the field man. If this principle of involvement is applied at the beginning and continued throughout the planning effort, the ideal climate for plan implementation will be maintained.

One can formalize the implementation process by designing work plans which assure inter and intra agency involvement. In addition to work plans relating to inventory and projection, the Maine interdepartment planning group designed three work plans relating to implementation. They are:

Resource Problem Identification and Evaluation

Species Management Plans and Problem Analysis

Coordination

The resource problem identification and evaluation work plan suggests a method of categorizing resource problems while the species management and problem analysis plan recommends a method of reviewing existing programs so that problems can be analyzed in terms of species management. The coordination work plan delineates "ground rules" for coordination. The work plan has a table of organization which will allow natural resource planning to be integrated logically into overall State planning. (See Appendix A)

The Inland Fisheries & Game - Sea & Shore Fisheries Planning Group was able to coordinate with overall State Planning because a concerted effort was made with that office from the inception of the project.

Preplanning in Maine culminated in a blueprint for planning which consisted of fifteen work plans. Eight of these are related to inventory and analysis, four to projection analysis, and three to implementation.

APPROACH TO FISH, WILDLIFE AND MARINE RESOURCE PLANNING

Goals and Objectives

The steps necessary to carry out tasks of developing a blueprint for planning are:

1. Review the State statutes to determine the area and scope of responsibility.

2. Determine and/or define the goals and/or objectives of the agency. Generally, the goals and/or objectives are stated in the enabling legislation.

3. Determine the scope, the type of plan, and the species to be included.

4. Develop second level objectives and parameters of the plan.

5. Determine the planning methods (development of a blueprint or "plan for planning").

Once the decision has been made to undertake long range planning, the boundaries, parameters, or scope of the project must be defined. At this point, it becomes necessary to decide what the plan will include. The first step is to determine the legal responsibilities of the agencies as established by the legislature. A review of the statutes or enabling legislation will point out the specific areas of responsibility, and quite often provide a documentation that constitutes the "goals and objectives" of the departments. Goals and objectives are not unfamiliar terms and must be reviewed and reaffirmed at regular intervals. The

legal authority generally sets forth goals and objectives in broad statements of purpose. In planning, then, one must constantly check to make sure that all roads lead toward the fulfillment of an agency's goals and objectives.

The statutory review also sets the scope and areas to be included in the plan.

The species and scope of responsibility for fish, wildlife and marine resource agencies often will indicate a geographic area far beyond the territorial limits of a state from which information must be gathered. To illustrate, consider migratory bird information and/or the high seas data as it applies to anadromous, sport or commercial marine species.

Review established the geographic bounds for the Maine inter-departmental resource planning effort as the State and its immediate coast, as well as the offshore waters from the tip of Long Island, New York, to Greenland, seaward to the Continental Shelf.

The smallest statistical unit for which data is collected is the minor civil division (town); however, other larger units are necessary for the resource manager. Some of these units are County, River drainage, Biologist Region, Warden District, Park Commission District, Forestry District, Economic Region, Congressional Districts, etc., and it is important that minor civil division data be additive to larger divisions and vice versa.

The next step is to establish a list of species. Both departments can claim a myriad of species for which legal responsibility can be demonstrated. Therefore, criteria for establishing species priority must be developed, relying heavily on existing current use data. For example, commercial fisheries, landed value

provides a scale of economic values which can be used to establish priorities, as licenses and other measurements provide values for recreational use for sport fish and wildlife.

Establishment of priorities should consider species which are vulnerable or endangered, those which are commercially underexploited, and those which may cause unusual problems (for example, shellfish, which may become toxic or wildlife, which cause damage to agricultural crops).

Goals and/or objectives can be defined as first level, second level, or third level. First level objectives are, of necessity, broad in scope and are generally those listed as the overall reasons for a department's existence. Second, third, fourth, etc., level goals are merely subdivided into smaller workable units of the area encompassed by the first level goals. When considered in total, a pathway toward the accomplishment of the first level goal is defined. Again, it should be reemphasized that goals and objectives must be constantly reviewed to insure direction toward the first level or basic goals.

Development of Work Plans for Present Use

In Maine, determination of the first level objective was: To insure that all species of wildlife and living marine and aquatic resource are perpetuated to be used and enjoyed by the people in this State now and for the foreseeable future.

Second level objectives were:

1. To maintain all species of wildlife and the living marine and aquatic resource for their intrinsic and ecological values as well as their direct benefits to man.

2. To provide for an economic contribution of wildlife and the living marine and aquatic resource in the best interest of the people of the State.

3. To provide for diversified recreational use of wildlife and the living marine and aquatic resource.

4. To provide for scientific and educational use of wildlife and the living marine and aquatic resource.

In order to satisfy the second level objectives, it becomes necessary to develop a unique thought process - an expansion from the everyday limited scope to the ideal, long range projection. This is difficult for most fish and wildlife research and management people, as training and experience teach them to be economy minded and short term in objectives.

As discussions of the proper approach to the first and second level objectives occur, it becomes apparent that long range planning is nothing more than a project requiring expansion of the techniques and thought processes necessary for any sound research. Unlike the usual research project, however, planning is a group effort. To be effective, the individuals of the group must be prepared to accept the "Clobbering of Cherished Beliefs", to offer and receive constructive criticism, and to compromise. The final result is a blueprint or "plan for planning", which can stand critical scrutiny by the individual participants or the group as a whole.

As a result of discussions and asking the simple questions of Who?, What?, When?, Where?, Why?, and How?, the following priorities were set:

1. Resource Inventory

2. Determination of use

3. Determination of use opportunity

To accomplish these ends, work plans were developed with specific third level objectives. Work Plan I (Appendix B) is included as an illustration of the procedure discussed above.

The work plans relating to present or current use are as follows:

1. Current Land and Water Use Inventory
2. Current Inland Fish, Wildlife and Marine Habitat Inventory
3. Current Inland Fish, Wildlife and Marine Species Use
4. Current Inland Fish, Wildlife and Marine Species Abundance
5. Current Human Use Opportunity Estimate for Inland Fish, Wildlife and Marine

The five work plans which deal with "current status" provide an evaluation or appraisal of "where we are" at a particular time. However, there is more to the picture than simply taking an inventory to determine species or habitat status. To plan, one must <u>project</u>. This is a common practice in industry where future market conditions, availability of raw materials, labor supply, and demand are charted daily for varying time periods. In addition, time and money are devoted to new product development to take advantage of advanced technology and consumer trends. This approach is generally new to those engaged

in the natural resources field. Most individuals enter this field because of their natural curiosity and interest in the out-of-doors. Few, if any, enter with the goal of providing an increase in the appropriative or non-appropriative use compatible within the limits of the resources. With this in mind, it follows prediction of species abundance, habitat, use opportunity, and demand are the ultimate objectives of long range planning. Work plans developed for each of the inventory or current use groups provide the vehicle for making projections. Work plans for predicting and analyzing what supplies, needs, and demands will occur in the future are as follows:

1. Land and Water Use Projections
2. Projection of Future Habitat
3. Current Human Use Demand Estimate for Inland Fish, Wildlife and Marine Species
4. Projection of Future Use Opportunity for Inland Fish, Wildlife and Marine Species
5. Projection of Future Demand for Fish, Wildlife and Marine Species Use
6. Analysis of Current Demand vs Current Use Opportunity for Fish, Wildlife and Marine Species
7. Analysis of Future Demand vs Future Use Opportunity for Fish, Wildlife and Marine Resources in 1985.

Problem Identification

An important aspect of the planning process is problem identification. While problems vary in scope and importance, they may be classified as primary or secondary.

Problem identification is also one of the most difficult areas with which to deal. Care must be exercised to insure that items identified as problems are real and not just momentary pressures, since existing and future programs will be directly affected. Work Plan XIII, entitled "Inland Fish, Wildlife, and Marine Resource Problem Identification and Evaluation", in Appendix C, was developed to insure early detection, so that programs could be initiated to negate or mitigate adverse influences.

Primary problems are those which directly affect the fish, wildlife, or marine species and may be categorized as:

1. Problems directly affecting the supply of the resources (e.g., loss of habitat).
2. Problems of use of wildlife (e.g., inability of the public to utilize the fish, wildlife, and marine resources, as a result of posted land).
3. Problems caused by wildlife (e.g., crop damage or game vehicle collision, or public health hazards caused by fish and wildlife).

Secondary problems (Stokes, et al, 1968) are those which are people-caused or directed, and directly restrict existing or proposed programs. Examples of secondary problems are as follows: (1) legislation to restrict the size or bag limits of fish in areas of over population, (2) enactment of a buck law or other restrictive measures caused by "panic public reaction" to a set of temporary conditions, (3) initiation of a bounty system as a population control measure, and (4) rejection of proposals to change the "status" of an animal from the protected to the legal game list when populations reach safe harvestable levels, etc.

Problem identification is not confined to the two classes previously discussed. Resource specialists have a tendency to work on "special interest projects". To be sure, each project that is undertaken has a problem statement prepared to justify the study, but more often than not, the problem as stated has not been put to the "Acid Test" - the testing process which must be followed to determine the true nature of the problem. The question must be asked whether solving the problem will contribute to the following:

1. Provide the administrator with information needed to evaluate existing and proposed programs, as well as those facts necessary to justify existing and proposed programs to the public and legislative and executive branches of State Government.
2. Provide specific basic data necessary for resource management.
3. Contribute to or completion of an objective of the Departments' short or long range program.

Two methods which can be used to determine objectively whether a true problem actually exists or whether the problem is one of special interest are: The "Program and Evaluation Review Technique" (1), and the "Project Work Plan" (Pre-Planning Work Sheet) (2), (Appendix D).

Briefly, the problem as stated is subjected to a series of questions which are designed to assist in separating the real from the desired, resulting in proposals which are necessary and will contribute to Departmental objectives for the fish, wildlife and marine resources.

---

(1) Developed for use by the Bureau of Commercial Fisheries and Adapted by the Maine Departments of Inland Fisheries and Game and Sea and Shore Fisheries.

(2) B.M.T. -1 (3-2 (1)) United States Civil Service Commission Interagency Program-Basic Management Techniques 1.

There is another type of problem which is rarely recognized and understood. The planning process to be effective requires group action. A multitude of problems arise as planning is integrated in the administrative arm. The problem related to group dynamics occuring most frequently is that of communications and it is difficult to overcome. This comes as no surprise as volumes have been written on the subject. Nevertheless, it does come as a shock when one realizes that he is not only misunderstood within the planning group but also that the planning unit is misunderstood by other groups within State Government.

There are many reasons for this misunderstanding, which in time, leads to a failure of communications. In the formation of a planning unit, personnel are assigned from the various biological and enforcement divisions of the department. These men who usually have worked for a period of years within their respective divisions suddenly find themselves in the position of having to explain and defend their point of view and the view of their divisions to other members of the department more often, as well as to those from other disciplines. To illustrate the point, imagine yourself trying to explain to a resource economist or an urban planner why you cannot describe the deer, woodcock or grouse habitat in precise and measurable terms, or why you do not know how many snowshoe hare you have in your district or in the State!

In time, members of the group meld into a functional unit. In spite of this, the communications problem is still with us, but in another form. From the continued close association and group decision process, members of the unit begin to become involved with the most intricate administrative details of the planning operation. This situation is extremely undesirable, because the

danger of several independent decisions is accentuated. Members of the group may develop the feeling that the project is his and that he alone is responsible for its success and/or failure and inadvertently may say or do something without the knowledge and consent of the other members. Noses soon are bent out of shape when those who feel they should have been consulted or informed learn about a decision that has been made from a source not directly associated with the group.

The third type of communications problem which is likely to develop is the one between the divisional representative and the members of his own division. "Out of sight, out of mind" is an old saying that applies here. In the beginning, the liaison is extremely close between the representative and division personnel. However, as the planner becomes more and more involved, the opportunity to converse with old division colleagues diminishes and the communication gaps begin to widen considerably. Soon, the representative is so involved with the development of his own project that he fails to maintain the liaison which is the key to success or failure of any long range planning project. He may have a tendency to forget the problems of field personnel in assuming added work assignments, and quite often he forgets that the new "lingo" that he has acquired is not completely understood by all. In addition, he may overlook the "possessiveness" that all researchers have for their incomplete or unpublished data, and request that he be furnished the same without laying the proper ground work.

Unfortunately, communications problems as described quite often apply to the administrator of the "home division" as well. Generally speaking, the division chief has selected his planning team member because he has confidence in his ability and judgment. Once again, as time passes and the planning

project duties become more demanding, there is a tendency to tend to the business at hand or to say, "I should go kick this around with the boss, but he is busy today, and I will be out tomorrow." The administrator pressed by other pressures and feeling confident that his divisional interests are being adequately cared for, does not initiate a briefing or updating meeting. When the meeting does take place, so much has happened that he may not completely understand what is being said. Sooner or later, a briefing, orientation or selling session must be scheduled to bring him back into focus with the project.

Another example of misunderstanding is the criticism both from professionals in biology, ecology and the general public, that planners have failed to state the people's needs precisely.

Both in the statutory statement of the mission of both departments and in the objectives of the long range plan are the generalized statements of people's needs. All a comprehensive plan can do is recognize a diversity of needs, many of them conflicting. The plan can assume the spectrum of use relating to the species - habitat in order to satisfy the various needs and express the total impact by logical alternatives. In this way, executive administration will be provided an opportunity of choosing from several, the best alternative to present to the people.

Before species plans can be developed to the refined detail, it is hoped that the state objectives will have been tested to satisfy the general needs of the people. Species plans will be tested to see if they satisfy the needs of the Department's or Division's constituency. If this is not done, any plan, no matter how well conceived, will have small chance of acceptance.

The solution to the problem of communications has been stated many times and in as many ways. Basically, misunderstandings result because someone did not hear (or listen) to what was being said or did not understand what was being said. Communications is a two-way street - listening and understanding. The following suggestions are offered as ways of avoiding the communications gap:

Within the Planning Group

1. State the case, briefly, concisely and to the point in simple terms.
2. Listen to others as you would have others listen to you.
3. Avoid the use of terms or "jargonese" peculiar to your field or specialty.
4. Make sure that the administrator or project leader is aware of what you plan to do, who you plan to see and the subject to be discussed.
5. File a report of all meetings and conferences attended and circulate throughout the group.

Between Other State Agencies

1. State your case, briefly, concisely and to the point in simple terms.
2. Listen to others as you would have others listen to you.
3. Avoid the use of terms or "jargonese" peculiar to your field or specialty.

Within your Division

1. Set up a system of weekly status briefings with the top administrators.
2. Keep in personal contact with other division members, submitting your materials to them for comment and review.
3. Avoid the use of newly acquired terms or "jargonese".

4. If field data are required, always contact the person responsible for the data, in person, and well in advance of any deadline. Never ask someone else to secure the data for you without prior arrangement with the researcher or manager.

5. Encourage questions and constructive criticism.

6. Listen carefully to what is being said.

7. Avoid the position of "defending an action" if at all possible.

8. Attempt to establish an information flow through you as the divisional representative, i.e., changes in data collection forms, formats, project amendments, new projects, changes in program, etc.

Projections for the Future

One of the major functions of long range planning is projecting and predicting future supplies (populations), demands (human use), accessibility (restriction of private lands to public use) and space (habitat). Many different factors affect the supply, demand, and habitat. Examples include industrial development, urban sprawl, recreational development, and economic factors (business recessions, demands for forest and agricultural products, etc.). Factors of this type will be considered for each of the work plans previously listed. Each work plan is composed of two segments - present and future. The present segment consists of an assessment or inventory of present conditions which will provide the basis for measurement of change.

In order to measure change, comparison must be made of the status of the item measured to an established standard. Unfortunately, standards have not been established for many factors that require measurement in the natural resources field. The amount of change has often been speculated and opinion substituted for fact. If change cannot be measured, meaningful projections of the future become impossible.

The first predictions will, of necessity, be made from historical records and will be of questionable validity. However, once a base data year has been established according to predetermined standards, subsequent updating to established standards will allow direct comparison for the time interval selected. A number of updatings will be necessary before the nature of trends can be identified and predictions made with reliability and confidence. Generally, the greater the time span covered by the prediction, the greater the likelihood of significant error. It is, therefore, necessary to select time spans and goals which appear reasonable. For long range resource planning, a goal of providing 15 year projections, 5 year programs and two year budgets appear to be the most reasonable. The techniques for long range forecasting described by Ayers (1969) will be used. These range from trend extrapolation cited above to sophisticated heuristic (mathematical modeling) and intuitive methods (Delphi method, for example).

However, even the projections made from the most sophisticated methods are subject to chance happenings and this technique will be no exception. Prediction for long range planning requires continuous update. These processes can never be considered completed.

DEVELOPMENT OF PLANNING METHODS

Availability and Identification of Natural Resource Data Sources

During the preplanning period, fifteen work plans were devised providing sequential tasks necessary to complete species plans. The blueprint was idealized. Third level objectives were stated and the information measurement techniques necessary to attain the objectives were established.

Completion of the idealized planning blueprint was the first step in the long range planning effort. It was, then, necessary to determine the following:

1. What data was needed to formulate and implement a plan?
2. Whether the needed data existed.
3. If in existence, was the needed data adequate and accurate enough to make meaningful projections?
4. Were existing data sources readily available from the originating agencies?
5. Were existing data sources accessible in a form that could be used directly in an electronic data processing (EDP) system?

Initial determination was made of the information needed to develop dynamic Species Management Plans. Once the resource data needs were defined, investigation was begun to determine the existence, location, and accessibility of necessary data. Because of the limited time originally established for the project, the initial intent was to use available data which might be incomplete or limited in accuracy. Projections were to be made from these data with shortcomings qualified in the final reports. With these general assumptions, a preliminary data search was begun. General interviews were conducted with key personnel in the major State, Federal and private agencies concerned with various aspects of natural resources. The interview results were both surprising and disappointing.

Several sources of valuable data were applicable to the planning effort, but many of the data were incomplete, of limited accuracy, or not easily accessible. The methods by which the data were stored (file structure) were diverse, including tape storage of electronically processable data, semi-automated keysort card files, manual file storage, and even on backs of envelopes. The most striking "gap" was lack of accurate, adequate, and uniformly formatted data on land and water use.

As a result of these preliminary findings, it immediately became apparent that another approach had to be taken for fish, wildlife, and marine resource planning. The utilization of the available data sources was viewed to be difficult and the use of these data would result in reports and projections with limited accuracy and confidence.

Based on the preliminary findings, it was evident that it would be necessary to develop a natural resource data base, as well as an automated storage and retrieval system which would allow the following:

1. Collection of available resource data in readily usable form.
2. Transcription of available data in various forms of storage to easily usable, automated storage.
3. Collection, organization and storage of new data files. First priority was given to land and water use data, basically essential in natural resource planning.

Because of limited staff and experience in developing a comprehensive data base for land and water use, a consulting firm was engaged to assist in performing this function. In addition to the development of a data base, other prime functions of the consultants was to design and develop a comprehensive Natural Resource Data System which would permit the use of data presently available, as well as the development of new files.

Preliminary investigations and interviews concerning availability of natural resource data yielded important facts. However, a more thorough evaluation and analysis of all potential resource files was essential prior to development of a Natural Resources Data System.

Detailed evaluations of potential natural resource data files were made by the planning staff and consultants. Interviews using a specific format of questions were held with key individuals in State and Federal agencies, institutions, and private industries concerned with natural resources (State of Maine, 1971). The primary purposes of the data search were to assess availability, reliability (for planning purposes), duplication, accessibility (retrievability), degree of dispersal throughout various agencies, and the form in which data was stored (file structure). While the preliminary interviews had been general in nature, detailed evaluations were designed to collect specific information in a standardized manner. The experience of the consultants was valuable not only in establishing methods and content of the data search, but also in identifying certain potential sources of data applicable to natural resource planning that would not ordinarily occur to those with less experience in data management.

Several factors were considered in evaluation of data files and were applied specifically to natural resource data for use in an automated Natural Resource Data System. The interviewers gathered the following information on standard forms designed especially for this purpose:

1. Identification of the collector and/or user of the data
2. Purpose of each specific piece of data (data element) and its use
3. File size (number of records)
4. Source document (map, survey, report, etc.)
5. Purpose of the file
6. Base year of the file (year(s) data collected)
7. Update cycle
8. Reliability (in terms of statistical sampling)
9. Geographic coverage (accuracy and system of reporting, coordinate, etc.)
10. Units of measurement used (feet, acres, etc.)
11. Error rate of edited data
12. Methods and format of data storage and access
13. Cross section analysis capability (by computer)
14. Use or applicability for automatic (ADP) or electronic data processing (EDP)

For each interview, the volume of data, the form in which the data was stored (format), the data content, and the use of the data determined its acceptability to the proposed data system. The reliability of data for planning purposes depends on the accuracy, importance of its use, update cycle and ease of accessibility.

Three major categories of data should be considered when investigating sources for natural resource planning. These relate to:

1. The Resource

   This category includes species data on harvest, abundance, and other pertinent information relating to fish, wildlife, and marine organisms.

2. The Habitat

   This category includes data pertinent to land, fresh water, marine, and air environments where the various species live.

3. Demand

   This classification concerns interaction of human and physical forces in competition for the habitat and the resource.

The interrelationships of these major categories should be kept in mind during a data search so that all pertinent data may be identified.

The data search revealed 12 sub-categories of data files relating to natural resource planning for fish, wildlife, and marine organisms. These data sources could be related in some manner to either the Resource, Habitat, or Demand for them. An outline of these interrelationships is presented in another section.

During the initial formulation of work plans, list of priority species were compiled for freshwater fish, wildlife, and marine organisms. The priority lists were based on use for sport, commercial, and esthetic purposes. Endangered or vulnerable species were also identified as a basis for future management programs. During the data search, it was found that existing data files relating to priority species were dispersed through many files in several agencies, and were not available to potential users in any one place. Furthermore, data for many of the endangered species was limited. Thus, the data search indicated a need to expand the collection of data for some endangered species, as well as a need to centralize data sources for important priority species. Adequate data was not available for many priority species and the need to expand programs was indicated.

ANALYSIS OF NATURAL RESOURCE DATA SOURCES

As a result of conducting over 100 interviews, approximately 300 data files were identified as potential sources of information for natural resource planning. These files included 1,100 individual pieces of data. Of those identified, 170 data files considered applicable to natural resource planning were included in the Natural Resource Data System.

Of the applicable data files, 90 percent were located within State Agencies (Figure 3.2), with the majority residing in the Departments of Inland Fisheries & Game (47%) and Sea and Shore Fisheries (21%). The remaining 10 percent were divided between the Federal Agencies (9%) and institutions (1%).

In the following discussion, analysis of the applicability (or reliability) of each data file is made from the standpoint of its usefulness for planning purposes on a statewide or other geographic basis. Specific files may be completely reliable and accurate for use by an investigator in a particular study but not pertinent for planning purposes.

Species Files

These files are concerned with species abundance for wildlife, fish and marine organisms. An analysis of the results of the data search revealed that few of the species files were completely usable in their present form. Many files contained important species data but were highly variable in completeness, method of data storage, degree of accessibility and reliability. For most species files, the primary limiting factors were lack of geographic locators, variable sampling procedures, lack of form standardization, and resulting in limited use of content. Of 69 files, only 36 were directly applicable.

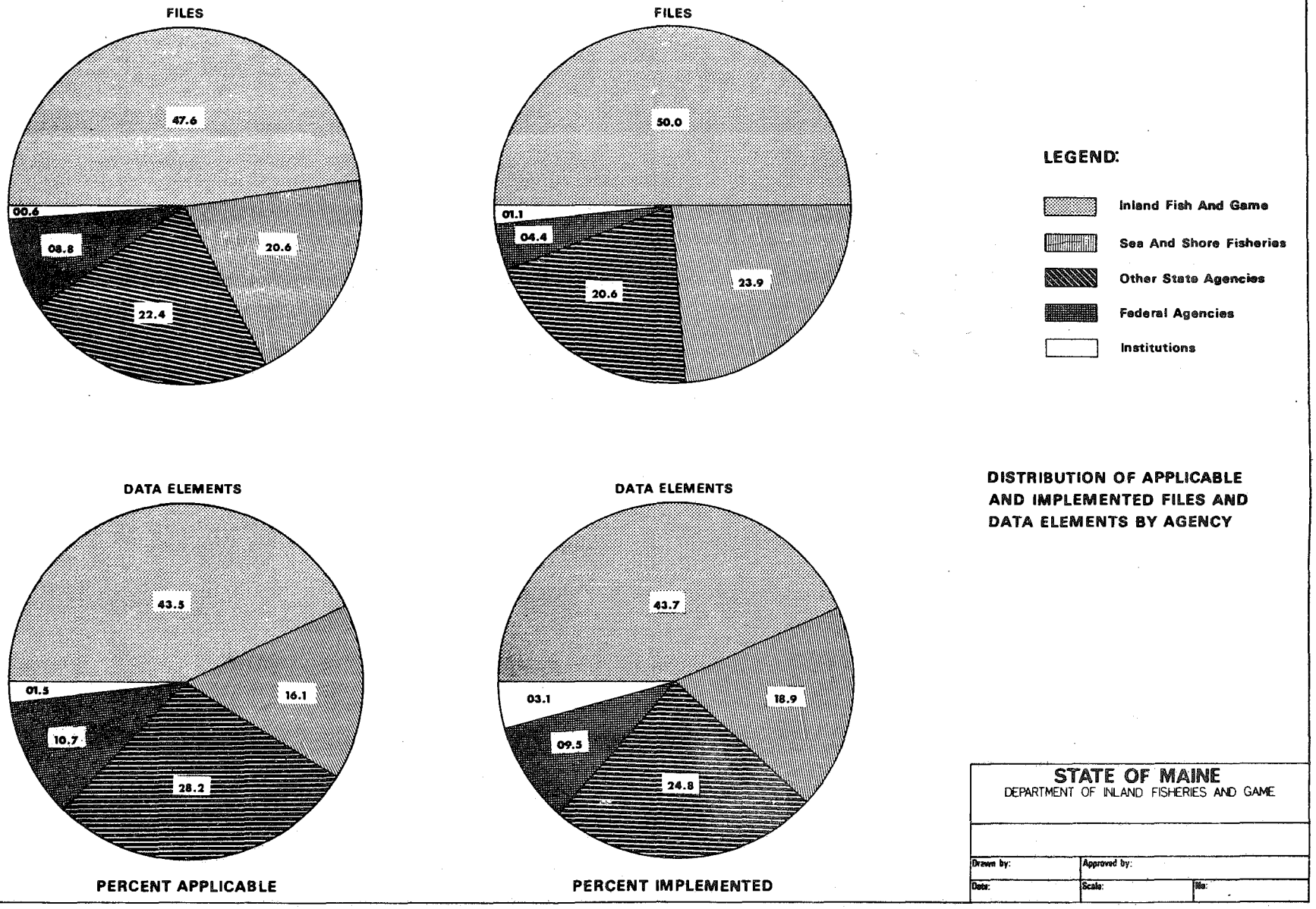

FILES
47.6
00.6
08.8
20.6
22.4
FILES
50.0
01.1
04.4
20.6
23.9
LEGEND:
Inland Fish And Game
Sea And Shore Fisheries
Other State Agencies
Federal Agencies
Institutions
DATA ELEMENTS
43.5
01.5
10.7
16.1
28.2
PERCENT APPLICABLE
DATA ELEMENTS
43.7
03.1
09.5
18.9
24.8
PERCENT IMPLEMENTED
DISTRIBUTION OF APPLICABLE AND IMPLEMENTED FILES AND DATA ELEMENTS BY AGENCY
STATE OF MAINE
DEPARTMENT OF INLAND FISHERIES AND GAME
Drawn by:
Approved by:
Date:
Scale:
No:

Figure 3.2.

Harvest Files

A total of 46 harvest data files were identified during the data search and analysis with the majority found in the Departments of Inland Fisheries and Game (27) and Sea and Shore Fisheries (17). Of these files, 20 from the Department of Inland Fisheries and Game and 14 from Sea & Shore Fisheries contained data which were considered potentially useful in the Resource Data System. In addition, two Federal harvest files, which could be easily accessed, were identified.

Analyses revealed several pertinent facts regarding harvest files:

1. Many of the harvest files concentrated on a limited number of wildlife species (e.g., deer).
2. There is a need for Statewide harvest and use studies for freshwater sport fisheries.
3. Nearly all harvest information could be obtained using the License Files as a universe control for sampling.
4. Data for endangered species were limited. Expanded data collection programs for these species are necessary.
5. Duplication of data is common for some species.
6. Location of harvest is lacking or not precise in some data files.
7. Forms for data collection need improvement in design in many cases to be compatible with EDP for computer analysis.
8. Some biases in data collection were revealed.

In most cases, it was determined that the License Files should be used as the universe control for sampling species harvest. Use of EDP would allow closer control and more refined sampling procedures, better formatting and forms design, and inclusion of data more directly useful for natural resource planning.

License Files

Of the 86 license (or permit) data files identified, 43 were selected for inclusion in the Resource Data System. The various license files serve as the most valuable basic data source for sampling licensed users of fish, wildlife, and marine resources. By sampling such parameters as success, preferences, attitudes, demand, and economic contributions, the various interactions among species, users, and the environment (habitat) can be more clearly shown. Such analyses can be vital to the researchers and administrators of the Departments in clarifying the directions, formulation for research, management programs, and regulatory policies.

Habitat Files

Of 49 files relating to species habitat, 21 were potentially usable in the Resource Data System.

Data files on habitat describe land, water, and air environments and factors affecting their use. These data are basically essential in any resource data system to analyze interrelationships between the species and their environments.

Investigations revealed that land and water use (habitat) data in Maine are presently being collected and reported in two general forms:

1. File - Structured Data

   These data are automated to some degree, and the data can be retrieved with relative ease. Form of storage ranges from keysort cards to computer tapes.

2. Land and Water Use Maps

These maps classify and delineate various land and water uses for specific geographic areas, and are compiled by State, Federal, and local agencies. Of 49 files identified during the data search, 21 were potentially usable for the Resource Data System.

Classification and measurement of various land and water uses (habitats) for specific geographic areas is an essential prerequisite to natural resource planning and the establishment of a Natural Resource Data System. In our data search, we found much useful land use data was available, but was dispersed through out agencies in varying file formats. To be of optimum value, all such data must be uniformly accessible through an automated Resource Data System. Available data could then be utilized and additional data gathered to complete geographic coverage of the State.

Important land use data were identified from the following sources:

1. Tax Maps of Unorganized Townships

Forest-type maps are prepared for tax purposes by the State Bureau of Taxation, Property Tax Division. These maps and accompanying summary sheets contain information on ownership, parcel size, location of roads, forest types, and other useful data.

2. Municipal Tax Maps

There is a significant amount of tax mapping available for organized towns, mapped over the past 20 years. These maps are of value in land use (habitat) classification, particularly when based on coverage by aerial photography.

3. Timber Process File of the Maine Forestry Department

   This file provides county summaries by type of timber harvested. This can be directly related to the Species and Environmental Files.

4. Wetlands Inventory File

   This file locates and identifies wetlands using aerial photography and U.S.G.S. maps. Statewide coverage will soon be available.

Environmental Files

These data files provide measurements of the qualitative factors affecting the environment. All 18 data files investigated contained information of value to the Natural Resource Data System. The Environmental Improvement Commission (EIC) is the major State data source. Primary factors limiting present utility of these data are lack of precise geographic locators and the necessary consolidation of forms to permit use of the data in the System. These files should be formatted to permit direct interrelation with Species and Habitat Files.

There are several important National environmental files which are computerized and have geographical locators. Most important of these are the National Oceanographic Data Center, National Climatological Data Center, Environmental Protection Agency and U. S. Geological Survey.

Enforcement Files

These files relate directly to violations of State and Federal laws and their effect on harvest of various species. These data can be linked directly with the License and Harvest Files and will be of value in determining needed legislation related to species management and resource planning in addition to more efficient handling of violations.

Of 18 files identified, 13 were applicable to the Natural Resource Data System.

Access Files

These data are concerned with accessibility to the habitat in order to harvest or observe the various species. The access system consists of Federal, State, County, Town, and private road networks as well as legal and physical access by all methods of travel.

The State Highway Commission maintains a "link-node" file (disk storage) on the State primary road system, and this system may be expanded to include county and town road networks. Data on private road networks should also be included in the Data System to evaluate its effect on use of the resource and on the environment itself.

Utility Files

These files (tape storage) describe in computer form additions and deletions of utility service by political units and serve as an index to seasonal fluctuations in service by geographical area. These files can be directly related to both Species and Habitat Files and will provide information on type of consumer, land use (habitat), and geographic locator.

Satellite Data

These data are discussed in another section of this report.

Population Data

Socio-economic, housing, and population data available from the 1970 U. S. Census (tapes) can be used together with species and habitat data to evaluate their interrelating effects. The Census File can be used in conjunction with the license file to provide a complete monitoring capability of all users of the resources and environment.

MAINE INFORMATION DISPLAY ANALYSIS SYSTEM (MIDAS)

Several basic considerations influenced the decision to use a systems approach for handling the comprehensive Natural Resource Data. The initial data search indicated much of the natural resource data necessary was either non-existent, incomplete, limited in accuracy, or not available in a readily usable form. The temptation was to "take the easy way out" and use available data; however, future projections based on such data could be made with only limited confidence and would not be realistic for planning purposes. Consequently, even though it necessitated complete revision of the original time and work schedules, the decision was made to "do it right" and begin development of a Natural Resource Data System, using the reliable data available, while concurrently developing files of needed data.

Because of the volume and complex nature of the information, this decision required the application of computer technology in order to accomplish the development of a useful data system. At this point, a definition of a computerized data system is pertinent. It is as follows: A computerized natural resource data system is a series of computer programs that perform the functions of connecting interrelated and interdependent data files.

Specifications were written and presented to the consultants for incorporation in the design of the computerized data system. They were:

1. The system must be easy to use requiring little knowledge of computer programming.
2. The system must be open ended.

3. The system must be flexible and adaptable to the commonly used computers.
4. The system must provide for easy editing and updating of information files.
5. The system must provide data referenced to a geographical locator so that small units can be aggregated to larger and vice versa.
6. The advanced system must have the capability of computer graphics.

The ensuing is a summary of the final design for the Environmental Data System. A detailed description of the system is available in a publication entitled, "Technical Design Report (MIDAS), Maine Information Display Analysis System, 1971".

The Maine Information Display Analysis System design is a concept utilizing three specific criteria necessary to undertake natural resources management and planning. The three criteria are:

1. Human Population Resources
2. Renewable Resources (Fish, Wildlife & Marine)
3. Land and Water Resources (Including vegetation & atmospheric conditions)

These three areas represent all aspects which have an important effect on the environment.

Fourteen informational subsystems have been designed to functionally support the three major analysis criteria. These subsystems, cross indexed, one to another, contain over 200 individual and unique data files:

1. Accident Subsystem
2. Species Census Subsystem
3. Harvest Subsystem
4. License Subsystem
5. Land & Water Use Subsystem
6. Pollution Subsystem
7. Prosecution Subsystem
8. Population Subsystem
9. Master Indices Subsystem
10. Access Subsystem
11. Public Utilities Subsystem
12. Satellite Subsystem
13. Cartographic Subsystem
14. Resource Economics Subsystem

Refer to Figure #1 - MIDAS Schematic Chart

1xxx Accident Subsystem

Contains data on hunting, boating and snowmobile accidents.

2xxx Species Census Subsystem

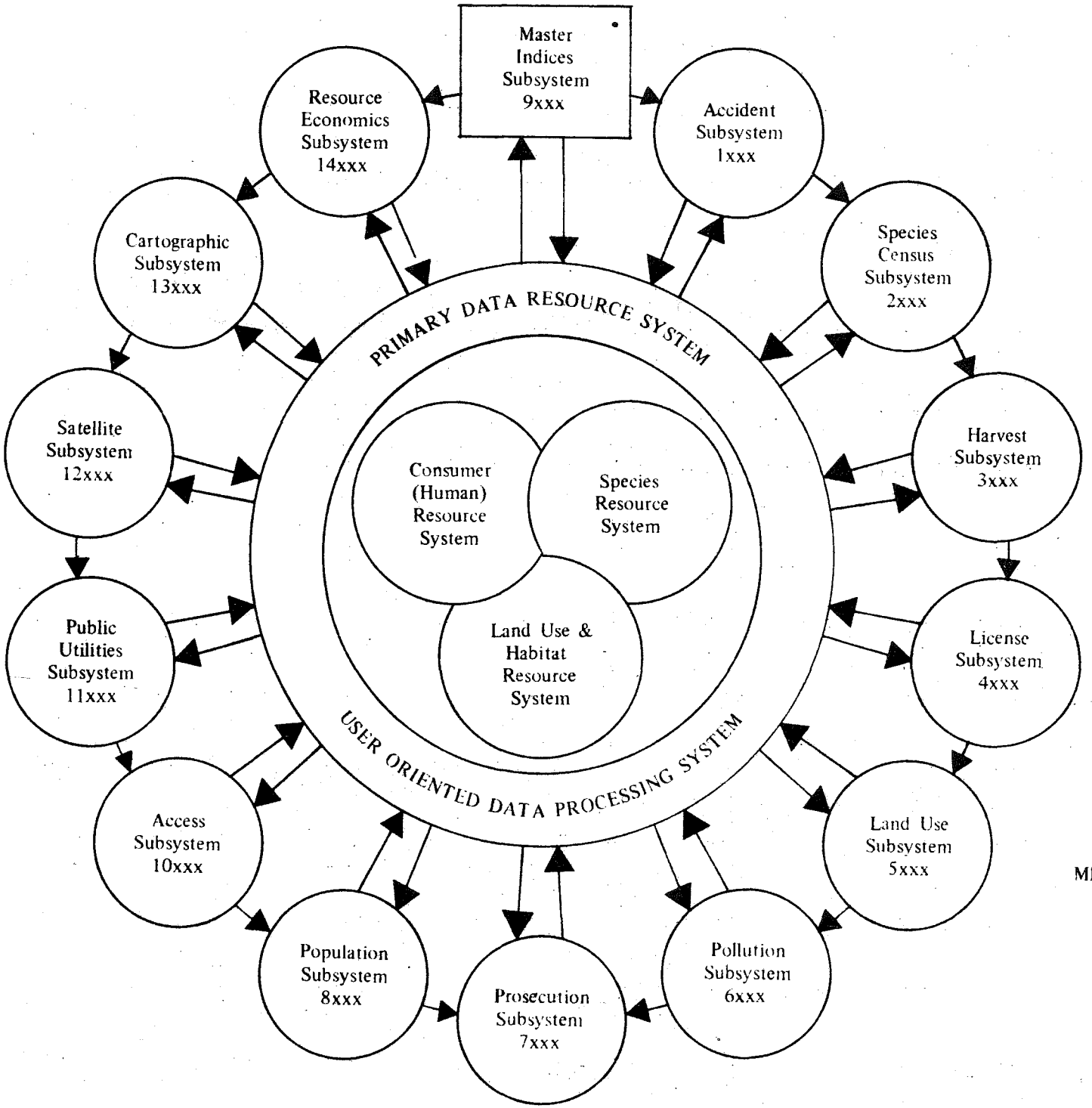
Contains data on population characteristics of wildlife, fish and marine species.

3xxx Harvest Subsystem

Contains data relative to harvest and other mortalities of fish, wildlife and marine resources.

4xxx License Subsystem

Contains information with respect to human utilization of renewable and non-renewable resources.



MIDAS Schematic
Figure 1

5xxx Land Use Subsystem

Contains data relative to current land use practices development and encroachment.

6xxx Pollution Subsystem

Contains data on chemical and effluent discharges into the environment.

7xxx Prosecution Subsystem

Contains data on violators of environmental or natural resources rules and regulations as promulgated by the State Legislature and/or Federal Government.

8xxx Population Subsystem

Contains information on human population characteristics as enumerated in the U. S. Census.

9xxx Master Indices Subsystem

Contains geographic identifiers (political and jurisdictional) which serve to cross-reference data files in the other twelve subsystems.

10xxx Access Subsystem

Contains road networks (Federal, State, local and private) which provide a means for access to natural resources from human population centers.

11xxx Public Utilities System

Contains information monitoring current major land use activities and seasonal population trends via electric service for residential, industrial and commercial demand.

12xxx Satellite Subsystem

Data in this Subsystem is based on currently available environmental data being reported from space platforms relative to meteorological and surficial monitoring of the earth. It is also designed to accept research and experimental data from the consortium of Federal agencies working in conjunction with NASA as it becomes available.

13xxx Cartographic Subsystem

Contains data from photo interpreted maps which locates parcels of cover type, wetland, recreation and major urban land uses by Universal Transverse Mercator Grid system.

14xxx Resource Economics Subsystem

Contains data assembled and summarized from files in other subsystems. It will also include the Dunn and Bradstreet Economic Indicators for New England (as provided by the U. S. Federal Water Quality Administration).

Files & File Identifiers

The following coding scheme represents the third digit of the MIDAS file number. The alphabetic code refers to the specific author agency or department.

Maine State Department of Agriculture	A
Maine State Bureau of Watercraft Registration and Safety	B
Maine State Environmental Improvement Commission	C
U. S. Department of Agriculture	D
U. S. Bureau of Sport Fisheries and Wildlife	E
Maine State Forestry Department	F
Maine State Health and Welfare Department	G
Maine State Highway Commission	H
Maine State Insurance Department	J

Maine State Department of Inland Fisheries and Game	K
U. S. National Oceanographic Data Center	L
Maine State Parks and Recreation Commission	M
Maine Department of State	N
Maine State Motor Vehicle Division, Snow Travelling Vehicles	P
Maine State Department of Sea and Shore Fisheries	R
Maine State Bureau of Taxation	S

The following is a partial list of all files included in the MIDAS system, and their respective file numbers. The first digit of each file number indicates the subsystem:

1 = Accident Subsystem

2 = Species Census Subsystem

3 = Harvest Subsystem

4 = License Subsystem

5 = Land Use Subsystem

6 = Pollution Subsystem

7 = Prosecution Subsystem

8 = Population Subsystem

9 = Master Indices Subsystem

10 = Access Subsystem

11 = Public Utilities Subsystem

12 = Satellite Subsystem

13 = Cartographic Subsystem

14 = Resource Economics Subsystem

101B Boating Accident Report
102K Hunting Accident Report
103P Snowmobile Accident Report

201E Banding Returns and Recoveries
202E Banding Schedule
203K Beaver Closure Recommendations
204R Worm Egg Size Sample
205R Worm Length Weight & Segments
212K Eider Survey
213K Habitat Inventory - Lakes
214K Habitat Inventory - Rivers
218K Winter Moose Survey
226K Stocking Record
235K Winter Deer Check
236K Woodcock Singing Ground Survey
237R National Register
240K Moose Census
251K Deer Kill Record (Log Landing Study)
252K Winter Waterfowl Inventory (Aerial)
253K Live Trapping
254K Deer Census Data
255K Moosehead Lake Creel Census

304K Bear Registration
305K Beaver Tag
306K Bobcat Bounty Claim
314K Deer Registration
317K Fisher Tag
318K Hunter Questionaire (Station)
319R Landings Record
323K Personal Hunting Report
325R Shellfish Purification
328R Sport Fishery Interview
338K Deer Biological Data
339R Lobster Sample
340K Deer Hunter Questionnaire (Log Landing Study)
342K Statewide Fur Resources
343K Statewide Fur Resources - Beaver
345K Deer & Bear Mortality

401B Boat Registration
402K Camp or Lodge Proprietor
403F Camping Permit
404M Campsite Registration
405R Commercial Shellfish
406K Complimentary Fishing Permit
407K Complimentary Fishing Permit for Blind
408N Corporation - Domestic
409N Corporation - Foreign
410K Eel, Alewife, and Sucker Permit
411K Fur Buyers
412A Garbage Feeding
413K Indian Hunting
414R Interstate Shellfish Shucker (certificate)
415R Interstate Shellfish Transportation
416R Intrastate Shellfish (certificate)
417K Live Bait Dealer
418R Lobster & Crab Fishing

419R Lobster Meat Permit
420R Marine Worm Digger
421E Migratory Bird Permit
422E Migratory Bird Permit - Harvest
423R Non-Resident Commercial Fishing
424K Non-Resident Fur Buyers
425K Non-Resident Game or Fish
426R Non-Resident Sea Moss
427K Non-Resident or Alien Trapping
428K Resident Archery
429K Resident Combined Fishing and Hunting
430K Resident Combined Servicemen's
431R Resident Commercial Fishing
432K Resident Fishing
433K Resident Hunting
434K Resident Junior Hunting
435R Resident Sea Moss
436R Scallop Fishing
437K Scientific Collectors Permit
438K Sell Inland Fish
439P Snowmobile Registration
440K Trap - Organized
441K Trap - Statewide
442R Wholesale Seafood Dealer
443R Worm Dealer
444K Non-Resident 7 Day Fishing
445K Non-Resident 15 Day Fishing
446K Non-Resident Season Fishing
447K Non-Resident 3 Day Fishing
448K Non-Resident Junior Fishing
449K Non-Resident Hunt Big Game
450K Non-Resident Hunt Small Game
451K Non-Resident Junior Small Game
452K Non-Resident Archery
453K Guide
454K Resident Servicemen's Fishing
455R Interstate Lobster Transportation
456K Retail Seafood Dealer

504F Forest Fire Report
507R Herbicide Spraying
510S Return of Timber Cut
513K Posted Land Inventory
515F Timber Processed Report
521K Wetlands Inventory
530F Sample Town Woodland Study
531K 500 Foot Belt Transect (Log Landing Study)
532K Vegetation Analysis (Log Landing)

605A Pesticide Control
606C Pollution License
607C Sawmill Survey
610C Stream Pollution
611C Tidewater Monitoring
612C Waste Disposal Survey
617K Water Analysis

708K Fish & Game Prosecution
712R Sea & Shore Prosecution

901Z Master Block Index
902Z Town Name Index
904Z County Name Index
905Z River Name Index
906Z Lake Name Index
907Z Species Name Index
908Z USGS Map Index
909Z Political Unit Boundary

ENGLISH LANGUAGE INFORMATION ASSEMBLY SYSTEM (ELIAS)

ELIAS is a series of connected computer software programs designed to service analysis criteria by processing data through the 13 subsystems. This user-oriented data processing system incorporates simple English commands to direct a supervisor program to perform the following functions:

MERGE - combines subsystem files

CREATE - builds files

EDIT - checks data fields for validity

UPDATE - adds, deletes or changes records in a file

EXPAND - adds data to a file from the Master Indices Subsystem

REPORT - summarizes data in tabular, graphic and/or map form

COPY - duplicates a file

LIST - prints a file

The design of ELIAS also provides the user with the following features:

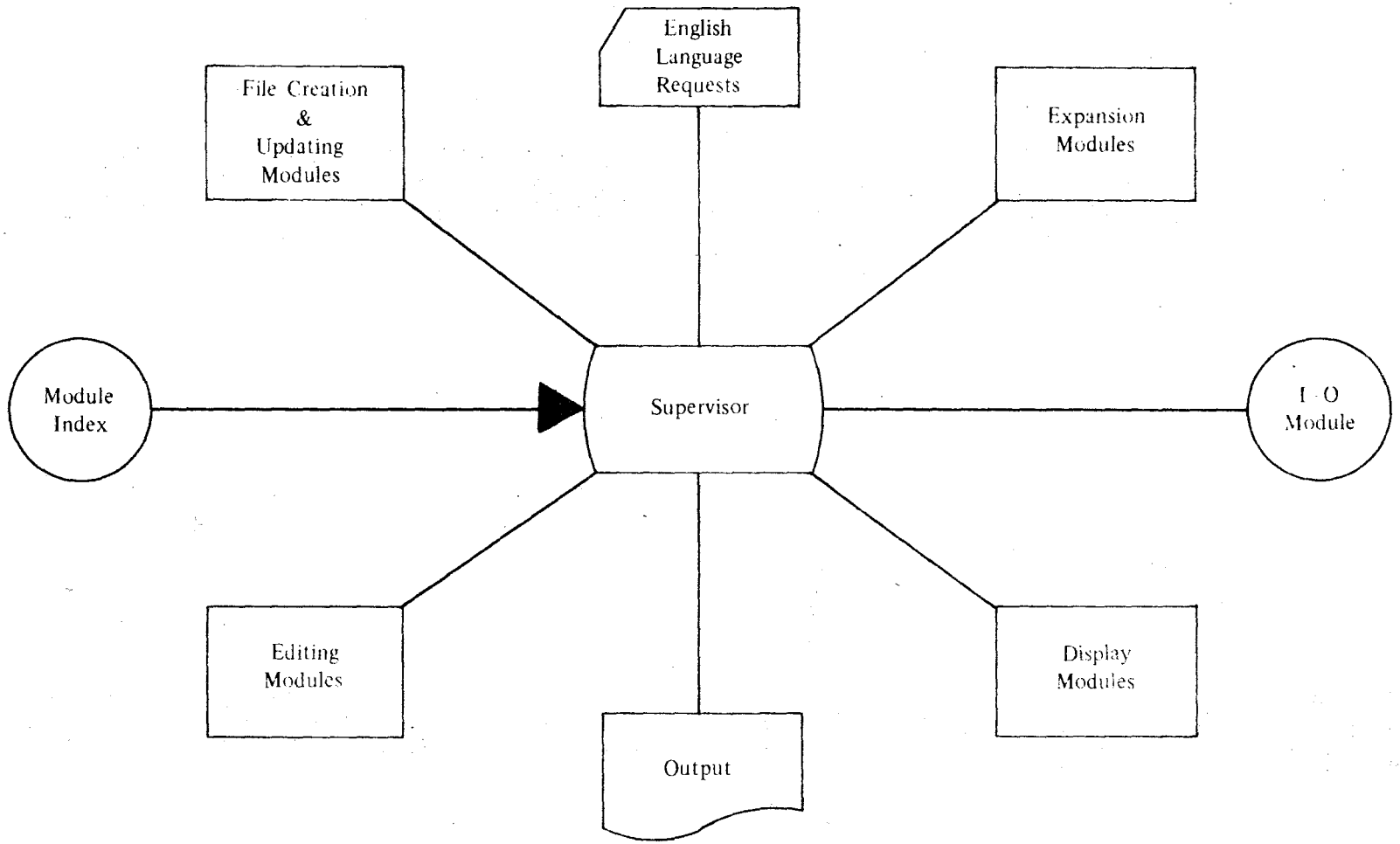
1. A flexible system, adaptive to regional and national needs.
2. A dynamic system - new data sources can easily be entered in the system, the content of output reports can easily be changed and response to modifications in existing data sources is immediate.
3. A self-sustaining system - large investments in specialized talents of systems analysts and computer programmers is not necessary for the system to be responsive to changing needs.

4. A system simple to use - routine control of data files entering the system, and data reports generated by the system, can be controlled by individuals who do not have extensive knowledge of EDP.

5. A system that is hardware responsive - with minimal modification, the software will respond to changes in computer hardware configurations.

See Figure #2 - "ELIAS" Software System Concept

For more detailed information on MIDAS and ELIAS, see technical report #1 entitled, "Design of the Maine Information Display Analysis System".



"ELIAS"
Software System Concept
Figure 2

PILOT DEMONSTRATION

The pilot demonstration consisted of two testings:

1. Computerized program
2. Land and Water Use classification

Two percent of the various categories of statewide information were loaded.

The ability of the MIDAS network to store, retrieve, and interrelate information from the various information files was demonstrated, and as a result, necessary program modifications were made. This is described in detail in the technical report previously mentioned.

The second pilot test was that of the land use classification system, for land use mapping through conventional interpretation of existing aerial photography. The survey of existing data revealed that relatively recent aerial photographs of the State were available ranging from 1968 to 1970.

Questions relating to land use categories and classifications were approached from the empirical point of view, i.e., what categories were desirable to have as a basis for long range resource planning. Subsequent discussion with persons engaged in photogrammetry and surficial classification systems used in other studies led to a coordinated classification system which spans from recreational use to forest type mapping. Included in the classification system are various classes of forest vegetation, based on stand composition, height, density of crown closure; nine classes of agricultural land (MacConnell 1969), transportation inventory data including forest roads, railroads, airports, pipe and transmission lines; a mining operations inventory; a water and wetlands

inventory (Anderson, 1969; Day, 1961) [1], urban areas and recreational lands (See Appendix E).

Every attempt was made to ensure compatability with classification systems currently in use, particularly in the area of forest type mapping. Approximately 87% of the State of Maine is forested, with much of the forest land in commercial ownership. The forest classifications are those currently in use by the majority of commercial owners and the State Bureau of Taxation. The Bureau of Taxation use is for timber resource inventory for ad valorem tax purposes in the unorganized townships of the State of Maine.

The pilot testing of land use data was conducted in two areas which represent the extremes occurring in the State. The areas are the 7½ minute quadrangles of Camden and Rockland in the populated coastal zone of Knox County and T-8 R-11, T-9 R-11, T-10 R-11 in Aroostook County in the uninhabited commercial forest area.

The data obtained by standard photogrammetric methods have been processed for loading in the MIDAS network.

---

(1) A Federal funded project (P-R, Bureau of Sport Fisheries & Wildlife) to inventory existing and potential wetlands of Maine utilizing conventional aerial photo interpretation with ground checks has been under way since 1962 and is expected to be completed during the summer of 1971.

DISCUSSION OF PROGRESS OF FUNCTIONAL PLANNING

For organizational convenience, implementation and functional (ongoing) planning will be considered synonymous.

Although implementation must start immediately at the conceptual stages of planning, it is more significant to the action program aims of functional planning.

The long-range advantages gained by development of a Resource Data System easily justify any additional expenditures in time and money. First, fish, wildlife and marine planning will be done on a firm basis of fact. Where voids in data are identified, programs of data collection and analysis will be initiated. Data presently in inaccessible form will be transcribed to EDP formats and will become readily available for planning purposes as well as for other functional needs of departments and cooperating agencies. However, it will also be necessary to revise some methods and forms for field collection of basic data for compatibility with computer analysis. The system will be "open ended" allowing for continuous correction and update of working files and addition of new data files at any time.

The Natural Resource Data System should become the established "data bank" for natural resource interests in Maine. It will be mutually advantageous for other natural resource agencies to become cooperators by making their data files compatible with the System. In this way, any cooperating agency can easily avail itself of all available natural resource data in the system for analysis of interrelationships among various factors affecting the environment.

A major advantage of the System is ease with which requests for analysis can be made by those untrained in computer technology. This will be accomplished by use of certain English Keyword Commands.

A basic problem with existing environmental data has been the inability to relate or compare directly data collected by various agencies. This is caused by difficulty in accessing available data because of data storage methods, and because data are collected by varying standards, in varying units of measurement, and varying methods of geographical location. A major advantage of the System will be the capability of comparing data collected in different ways, using the computer to translate the data into common terms for direct analytical comparisons. As an example, data collected using latitude-longitude as the geographic locator can be compared directly with data collected using the Universal Transverse Mercator (UTM) coordinates.

As the MIDAS is used, there is a provision for file creation and update. It is very important to provide an easy update process. The ideal is one which the data collectors could insert values directly on computer tape or disk. This is practical only for certain types of data. Other files like licenses and some water quality information can be code formatted so that it is immediately ready for keypunch. Other forms must be redesigned for easier coding. The acceptance of standard codes (State or National) makes the updating process easier. Maine has made considerable progress in developing standard codes for minor civil divisions (towns and counties), river, lakes, and islands. Standard code for minor civil divisions has been accepted. The others are in advanced development stage and user concurrence is being sought.

Land use classifications and standard maps for this purpose have been recommended (U.S.G.S. 7½" series). Standardization of data collection, code forms, and display formats compatible to the MIDAS network makes the update process almost automatic.

The Federal Government provides an important input to any information system with several national data networks. Some of the most important ones, which have computerized files are: The National Oceanographic Data Center, National Climatological Data Center, Water Resources Branch of the U.S. Geological Survey, Bureau of Census, Environmental Protection Agency and National Marine Fisheries Service. Some of these agencies will provide duplicates of computer tapes for a nominal charge; for example, NODC, U. S. Geological Survey, National Marine Fisheries Service and the Census Bureau have provided the Maine inter-departmental planning group duplicates of computer tapes or punched computer cards. These data are in the process of being incorporated in the MIDAS network. Other Federal computerized data files will be incorporated in the network in the future.

One of the most important of these is the National Aeronautics and Space Administration's Earth Resources Technical Satellite program using remote sensing techniques from earth orbiting satellites. The Maine planning unit will use data from ERTS A and B and Skylab satellites. It is expected that these data will provide environmental monitoring and identification of changing land patterns required for updating the land use and habitat system. Furthermore, the infrared scanning may provide interpretation of the aquatic environment comparable to the aerial photo interpretation applied to land use.

In addition to remote sensing techniques for determining land use by these satellites, future technology indicates data collection will be available in a computer compatible form. Satellites will be used as transmitters of data from automatic analyzer platforms to central data processing centers. The boundaries of various land classifications will be automatically digitized on computer tape by photoscanning methods. The MIDAS network can accept these types of data.

The interfacing of MIDAS with other important computerized networks can be accomplished with relative ease. For example, only three days of system analyst's time was required to interface with the 1970 census tapes for Maine. No greater expenditure of time is expected to do the same with the National Oceanographic Data Center and other Federal agencies' tapes which are included in MIDAS. This truly provides vast information sources to Maine, making it easy to link with regional, national and international programs.

Most State agencies collect vast amounts of data. Contacts made during the initial data survey must be maintained.

A State data coordinating agency can obtain interagency agreements on standard formatting and reporting. This is especially easy between agencies whose objectives are similar. For example, most living resource management agencies have similar management objectives and require the same types of information on species (age, distribution, natural mortality, harvest, etc.)

In a state like Maine where vast forested areas are in private ownership, land management data are collected by several, large paper and landholding companies. These companies generally see the advantage of having some of their land use data in the resource data bank just as clearly as other user agencies.

Another private source which should not be overlooked is the billing data of public utility companies. The power companies usually label consumers in user categories (residential, commercial, industrial). Analysis of this data could provide a useful monitoring system with an update according to the billing cycle. Great care must be taken, however, to assure that privacy and confidentiality are maintained.

It has been the experience of the Maine group that even limited data in the MIDAS network allows useful output. The MIDAS network's early output has demonstrated to Inland Fisheries and Game, Sea and Shore Fisheries and other State agencies the value of an accessible, environmental data bank both for research and planning purposes.

The display and report generating programs of MIDAS without sophisticated analysis has been one of the best selling points for the system. For example, typical of some of the requests MIDAS has been able to satisfy with only samples of the statewide data loaded are an estimate of the loss of income resulting from proposed legislation granting hunting licenses to citizens seventy years and older; calculation of coordinates of the centroids of all the minor civil divisions (all 950 of them) in the State of Maine; display of fur harvest data on a computer drawn map of one of the counties; and graphic display of various size classes of lakes by the county. All these requests could be satisfied in one computer run, since MIDAS can handle 256 requests simultaneously.

The two Departments have already profited as a result of the decision to develop a computer-oriented Natural Resource Data System. Inadequacies and voids in needed data have been identified and steps are currently underway to correct these situations. Plans are being made to automate the license files not only for more efficient operations but also as prime data sources for sampling resource users for harvest, use, and demand data. For most efficient operation, many of the Departments' records concerning administration, management, research, and law enforcement will need to be reformatted and automated for use within the Departments as well as for use in the system for planning purposes.

All departmental prosecution reports will be automated and these can be interfaced with other computerized networks (state police, and national law enforcement networks). This gives the officer in the field access to a vast amount of necessary information by radio which would permit him to deal better with any sensitive field situation.

The existence of the joint interdepartmental planning group with the MIDAS network, has presented, automatically, some further advantages. One of the most important of these results from the provisions of a new site selection law, which subjects certain developments to review by natural resource agencies. The two departments are both review agencies and are in the process of developing standard formats of site data for insertion into the MIDAS network. The network, therefore, will be able to access the impact of current land development almost at once.

The Resource Data System, because of its unique design, has broad applicability both geographically and organizationally. Cooperating natural resource agencies at the Federal, Regional, State, and institutional levels can avail themselves of the system's capabilities, and immediate direct benefits will be realized. Other states can benefit from the system, as it can be adopted to them with little modification in design.

APPENDIX A

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 Fisheries 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.

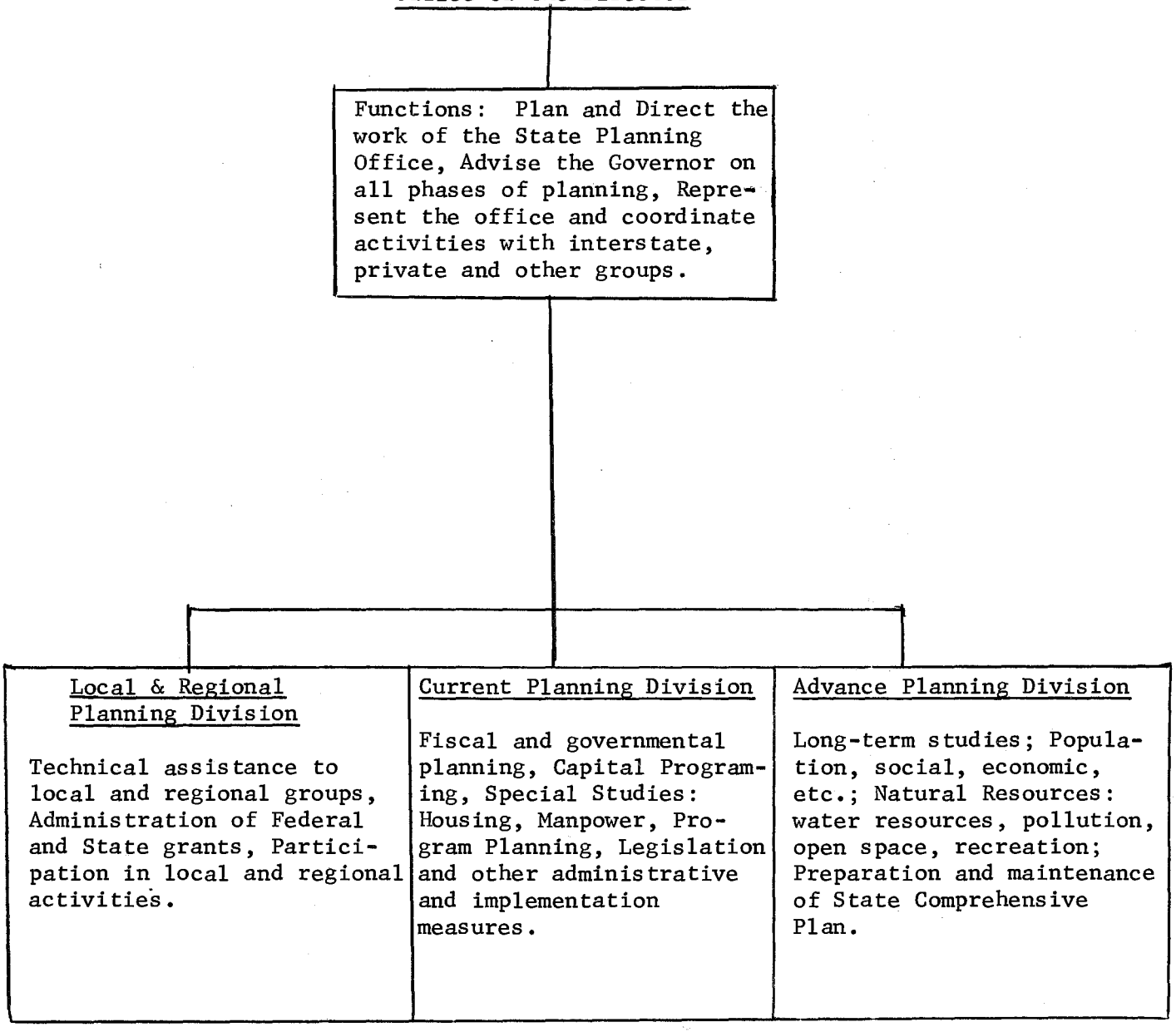
Decisions will be made on a System Design for data retrieval and analysis which will conform to and be approved by the State Planner and other resource agencies.

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

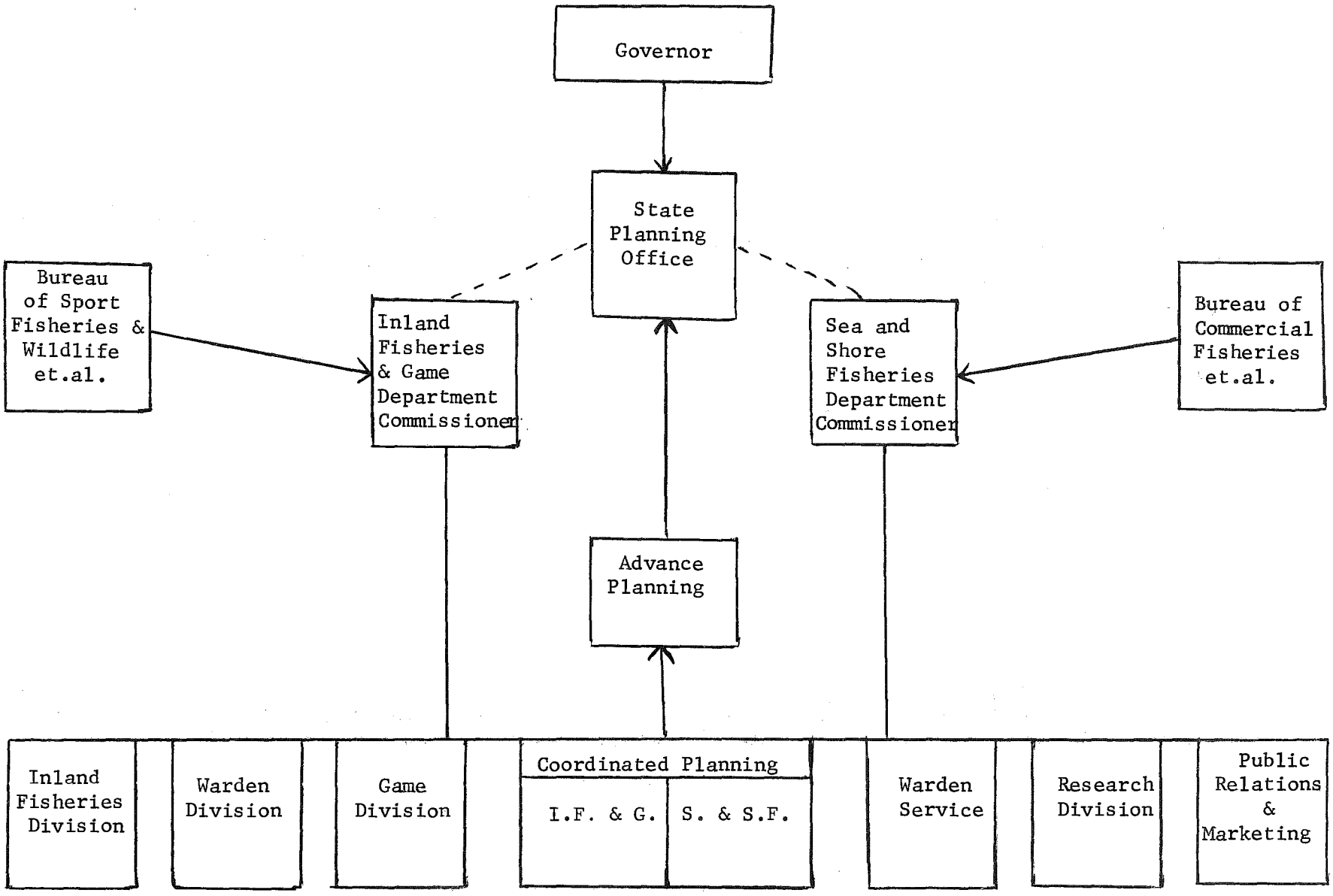
APPENDIX A (Continued)

Organization and Functions

Maine State Planning Office



APPENDIX A (Continued)



APPENDIX B

State: Maine
Project Number:

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 compile and program these data so they can be rapidly retrieved 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 well grounded and complete 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 element within the scope of the comprehensive fish, wildlife and marine planning effort.

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. 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 Committee
Taxation Bureau
Water and Air 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
    Bureau of Commercial Fisheries
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
Sewall Company, Old Town
Prentiss and Carlysle
Wright and Pierce
Maine Port Authority
New England River Basins Commission
New England Regional Commission
University of Maine
Darling Marine Research Center

Job 1. Total Land Area of Maine

Total land area of Maine will be inventoried through the collection of ownership acreage data by town, county, watershed, biologist region and biological zone.

Within these categories, land ownership, other than those designated "Urban Compact", will be determined. Land ownership in "Urban Compact Areas" would be too costly to obtain and of little value in the development of fish, wildlife and marine resource plans. The categories of ownership selected for inclusion are available from the State Bureau of Taxation publication listing ownership, acreage and value of lands in the unorganized towns.

Valuation, ownership and plot size data for organized towns is recorded in the registry of deed offices of the respective counties. Investigation will be conducted to determine the most feasible method of obtaining these data.

Job 2. Urban and Industrial Land Use

Urban and industrial land use will be obtained by compilation of data from the Department of Economic Development, "Housing and Urban Development Studies (H.U.D. 701), Soil Conservation Service, "Conservation Needs Inventory", State Highway Commission, Planning Division studies, State Bureau of Vital Statistics information, and United States Bureau of the Census studies.

Job 3. Recreational Land Use

Acres and ownership of recreation land will be obtained 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".

Job 4. Current Forest Land Use

Current forest land data will be gathered from the United State Forest Service study, "Timber Resources of Maine", currently in progress and scheduled for publication in 1971. Significant portions of these data are presently available from the Northeastern Forest Experiment Station, Upper Derby, Pennsylvania. Other supplemental data sources include the Maine Forest Service, Soil Conservation Service, "State Land Use Summary - Expanded Data Study", records of the independent timber and pulp companies, and private contractual surveys of the Maine woodlands by Sewall Company, Prentiss and Carlysle Company, and Wright and Pierce Company.

Job 5. Current Agricultural Land Use

Agricultural land use data will be obtained from current records of the United States Department of Agriculture, "Marketing Service Division Census", and the Soil Conservation Service. Attached outline details categories to be investigated.

Job 6. Transportation Land Use

Data on transportation land use will be collected primarily from the Maine State Highway Commission which has agreed to provide mileage and acreage of lands devoted to transportation use. Data pertaining to railroads, airfields, and utility rights of way will be obtained from the Public Utilities Commission, Department of Economic Development, and private corporate interests.

Job 7. Mining Use Inventory

Mining land use data will be collected from the office of the State Geologist, State Highway Commission, and Soil Conservation Service. These data exist in crude form; however, they should be sufficient for developing fish, wildlife and marine resource plans.

Job 8. 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.

Job 9. Water Use Inventory

Water use data will be obtained from the Inter-departmental Task Force on Water and Related Land Resources. They are currently preparing a "Comprehensive Water Resources Inventory"; however, if this study is not completed early enough for our planning effort, we will utilize the following data sources: water use for power generation from the State Public Utilities Commission; waste transportation data from the Water and Air Environmental Improvements Commission; potable water supply data from the State Department of Health and Welfare, Division of Sanitary Engineering, irrigation data from the United States Agricultural Census, and Soil Conservation Service; recreational water use from the State Park and Recreation, Department of Inland Fisheries and Game, and Soil Conservation Service; commercial navigation data from the Department of Sea and Shore Fisheries and the Maine Port Authority.

APPENDIX C

State: _____
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.

APPENDIX C (Continued)

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.

APPENDIX D

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- relationships.

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 wildlife 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 relationships.

2.4 Financial Assistance and Other Direct Aid

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

3. 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.

APPENDIX D (Continued)

PROGRAM EVALUATION CHECKLIST
WILDLIFE

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	Species
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.

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.)

APPENDIX D (Continued)

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

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. Factors Limiting Access to and Harvesting of the Resource	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.)

APPENDIX D (Continued)

	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								

UNITED STATES CIVIL SERVICE COMMISSION
Interagency Training Program

BASIC MANAGEMENT TECHNIQUES I

Project Work Plan
(Pre-Planning Work Sheet)

1. State Project objective:_____

_____

_____

a. Will accomplishment of the objective, exactly as stated, give me exactly what I want?_____

b. How does plan objective further accomplishment of total organizational goals?_____

_____

_____

c. Is this a project that can be accomplished within the limits of my responsibility?

YES Proceed.

NO It involves my peers -- tell them now that I am working on a plan, consult them when I have a rough plan to show.

NO It involves my boss or my boss and his peers, or my boss and his boss: give my boss a finished plan for approval or for his own consultation purposes.

2. List acceptable alternatives that will achieve objective:

(1)_____

_____

Strengths	Weaknesses
_____	_____
_____	_____
_____	_____
_____	_____

(2)_____

_____

Strengths	Weaknesses

(3)_____

_____

Strengths	Weaknesses

a. Is there anything in agency policy that limits my choice?

_____

b. Should I attempt to have limiting policy changed? _____
c. Am I limited by law, regulation or ethical considerations?_____
d. Am I limited by organizational climate?_____
e. Has this been tried before, when -- by whom? _____

_____

_____

3. Restate the objective -- be more precise:_____

_____

_____

_____

_____

4. Which alternative do I intend to pursue? _____

_____

_____

_____

_____

_____

_____

5. List resources and requirements:

   a. A resource is anything I have available and can utilize on my own authority.
   b. A requirement is anything that is needed for the accomplishment of the plan, but is unavailable or must be secured through the authority of others.

Resources	Requirements
Men	
_____	_____
_____	_____
_____	_____
_____	_____
_____	_____
_____	_____
Money	
_____	_____
_____	_____
_____	_____
_____	_____
_____	_____
_____	_____

Equipment

Supplies

Facilities

c. If I do not have what I need, can I get it? _____

6. List critical deadlines:

Deadline	Can Meet	Not Sure

a. If I am unsure of critical deadlines, can I get them extended now or get extra help?_____

7. Is the alternative I selected practical in the light of available time and resources?

NO -- Choose a less acceptable but more realistic alternative.
YES -- Proceed to Step 8.

8. List major plan components, step, and man hour and dollar estimates. *Steps that have a mandatory sequential relationship; e.g., the horse goes in the stable and then the door is locked.

Major Plan Components	Steps	Man Hour	$ Estimate

APPENDIX E

FOREST AND AGRICULTURAL PROPOSED LAND USE CLASSIFICATION - MAINE DEPARTMENTS OF INLAND FISH & GAME AND SEA & SHORE FISHERIES PLANNING PROJECT

LAND CLASSIFICATION

Forest Types

(a) Main Forest access roads. Haul roads, ancient haul roads and trails. Where visible, major changes in road location will be mapped. Summary of roads by classes will be furnished according to predetermined classifications.

(b) Forest Land Classifications

We have adopted the following forest type symbols:

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 sub-divisions, there are frequently found pure types, i. e. any softwood species which constitutes 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 mycira gale, etc.) and as forested bog.

(c) 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.

(d) 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.

(e) 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.

(f) Forest Nurseries.

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

Agricultural Land Classifications

Agricultural classification will include all of the nine types described in the Connecticut River Study (include name of study and date). These types are briefly described 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.

Transportation Inventory

(a) Forest roads as described under the forestry section.

(b) Railroads will be delineated and measured in acres of cleared right of way.

(c) Airports and air strips will be located and delineated and measured in acres.

(d) Pipe lines and transmission lines will be located, delineated and measured in acres of cleared right of way.

Mining Operations Inventory

Current gravel and quarry operations will be located, delineated and measured in acres. DEPTH OF OPEN PIT MINES WILL NOT BE DETERMINED. HOWEVER, THIS DATA CAN BE OBTAINED IN SOME INSTANCES FOR AN ADDITIONAL FEE. No attempt will be made to distinguish between active and inactive gravel pits. However, this data will be recorded for quarries.

Shaft mines or deep mines will be located.

Water and Wetlands Inventory

(a) Locate water areas including the wetlands located and classified by the Fish and Game Department; flowages, lakes, ponds, rivers and readily discernible streams and brooks and measure in acres. THIS DOES NOT INCLUDE INTERMITTENT WATER WAYS.

(b) Locate dams and indicate whether or not the dam is active or abandoned.

(c) Will locate commercial power generating sites.

(d) Locate riffle areas depending upon the size of the stream, water conditions at time of photography, etc.

(e) Locate marinas and moorings in both inland waters as well as coastal areas.

(f) Locate breakwaters, causeways and jetties in inland waters and coastal areas. Causeway location will depend upon the tide when the photo was taken.

(g) Mud flats will be shown when possible.

Urban Areas

(a) Urban areas to be combined with the industrial and commercial lands according to present use. Retail shopping centers, warehouses and wholesale outlets will be considered as commercial sites.

(b) Delineate paper mills and oil tank farms as separate entities. ANY REFINEMENT OF THE ABOVE CLASSIFICATIONS WOULD RESULT IN ADDITIONAL COSTS.

(c) Dumps will be shown.

(d) Cemeteries will be shown.

Recreational Lands

(a) Locate and measure ski areas in current use.

(b) Locate and measure State Parks (DOES NOT INCLUDE ROADSIDE PICNIC AREAS).

(c) Locate and measure camp grounds and tenting areas when visible.

(d) Locate and measure golf courses.

(e) Beaches.

Parameters and Display

(a) Enlarge U.S.G.S. 15 minute quadrangle sheet to a scale of 1:24,000.

(b) Delineate onto aerial photographs both forest and non-forest land types.

(c) *Transfer detail regarding land classification onto base map and/or overlays.

(d) Field check typing only. Use airplane and ground travel when deemed necessary.

(e) Draft maps on suitable material to obtain transparent overlays.

*Overlays to show following information

(1) Vegetation Cover Types (Forest, Agriculture) and Wetlands, Water and Dams.

(2) Urban, Industrial, Commercial, Recreational land use areas as well as wharves, jetties, beach and marinas.

(3) Contours

Base map will show transportation and mining - to be updated where needed from latest available aerial photography.

REFERENCES

Anderson, Kenneth H., 1969. Application of the Wetlands Inventory in Maine. Proceedings of the 1969 Northeast Section of the Wildlife Society, Greenbrier, West Virginia. Pages 27-40.

Ayers, Robert U., 1969. Technological Forecasting and Long Range Planning. McGraw-Hill Book Co., Inc., New York, New York.

Canadian Department of Economic Expansion, 1970. The Canada Land Inventory: Objectives, Scope and Organization. Report No. 1.

---------- 1969 ----------
Soil Capability Classification for Agriculture. Report No. 2.

---------- 1967 ----------
Forest Land Productivity. Report No. 4.

---------- 1969 ----------
Land Classification for Outdoor Recreation. Report No. 6.

---------- 1970 ----------
Land Capability Classification for Wildlife. Report No. 7. Queens Printer for Canada, Ottawa

Day, Benjamin W., 1961. Procedures for Wetland Inventories, Maine Department of Inland Fisheries and Game, Final Job Completion Report, Maine Project W-37-R-10, Mimeo.

MacConnell, William P., and H. Ross Pynell, 1969. Use of Aerial Photography to Evaluate the Recreational Resources of the Connecticut River in Connecticut. Experiment Station, University of Massachusetts. Bulletin No. 574.

MacConnell, William P., and G. Peter Stoll, 1969. The Connecticut River in Massachusetts. 1952-1965. Experiment Station, College of Agriculture, University of Massachusetts, Bulletin No. 581.

State of Maine, 1971. Departments of Inland Fisheries & Game and Sea & Shore Fisheries Technical Design Report (MIDAS), Maine Information Display Analysis System, Augusta, Maine.

Stokes, James D., Glenn E. Delisle, and James B. McCormick, 1968. Fish and Wildlife Resource Planning Guide, State of California, The Resource Agency, Department of Fish and Game.

Stokes, James D., James B. McCormick, and Harold D. Bissell, 1968. Fish and Wildlife Planning Workshop prepared for State of Maine Department of Inland Fisheries and Game and Department of Sea and Shore Fisheries.

ERRATA

Page 40 - 456K Retail Seafood Dealer should read 456R Retail Seafood Dealer

507R Herbicide Spraying should read 507F Herbicide Spraying

Page 45 - Line 11 and 12
T-8 R-11, T-9 R-11, T-10 R-11 should read T-11 R-8, T-9 R-8, T-10 R-8