RESOURCES MANAGEMENT PLAN

ACADIA NATIONAL PARK

~~1970~~?

Submitted: _____ Date _____
Superintendent

Concurred: _____ Date _____
Regional Director

Approved: _____ Date _____
Director

INDEX:

	Page
Introduction	1
Resource Management Problems	3
Park Purpose	13
Resource Management Plan	14
Man and Park	15
Development	16
Community	18
Management Attitudes	20
Interpretation	22
Protection	24
Concessions	25
Ambient Threats	26
The Intertidal Zone	29
Splash Zone	32
Barnacle Zone	32
Rockweed Zone	33
Red Algae Zone	34
Kelp Zone	34
Sand Beach Habitat	35
Mud Flat Habitat	36
Salt Marsh Habitat	37
The Sea	38
Pollution	38
The Terrestrial Ecosystem	41
The Very Human Concept of an Ecosystem	41
Major Plant Communities	45
Wildlife	48
Summary	51
Appendix	52
Statement to Accompany Boundary Proposal Map	54
Boundary Proposal Map	
Check List of Mammals	62
Check List of Reptiles	64
Check List of Amphibians	65
Check List of Birds	66
A Study of Conservation Objectives of Acadia National Park Relating To Its Establishment and Boundary	81
Bibliography	156
Resource Management Plan Study Proposals	159

INTRODUCTION

The Gulf of Maine archipelago, and its monarch Mount Desert Island, is a premier example of the natural world. It is a place where man senses a natural masterpiece, where his mind may drift at ease in the world that surrounds him. Early in the century men were motivated to act for perpetuation of its natural beauty: to donate wealth and personal effort toward creation of a preserve safe from exploitation by others less sensitive. (Appendix, Acadia National Park, Luther S. Winsor, 1955.)

Dorr, Eliot, and Rockefeller have led in an unselfish conservation commitment. By their will a concept has become the reality of a 33,000 acre national park. A park not cut from the public domain or acquired by Federal tax dollars, but almost wholly donated to the nation by a variety of concerned private citizens. Even today donations continue to be received.

Eagles soaring above a bold headland - life struggling for existence in the 12' tide zone that so vividly displays the clasp between rocky shore and sea - vigorous growths of jack pine and scrub oak that meet here as a living connection between arctic and southern plant communities - fresh water lakes

touched by the echo of crashing surf - profuse mammal and bird life - mountains and valleys vividly etched by passage of the last great ice sheet - summer winds that invited the Penobscot and Passamaquoddy Indians to linger and hunt, the European to claim and settle, the affluent to covet - the drama of life below the ocean surface - islands cast on the sea as if by a master artist. These are Acadia.

Through foresight and initiative the National Park Service has been granted the custodianship of an idea and its actuality. Our responsibility is imaginative management of an island group whose grace held attention of the first venturing European explorers, islands that have collided with the tools and machinery of man. Management must present people with an opportunity to meet Acadia on its own natural terms, and to understand why it is preserved.

Above all, to understand.

mid 1970's or before

Resource Management Problems

Much is known about ecosystems and resource management problems in Acadia National Park. The most significant studies are referred to in this plan. However, many problems remain unsolved. Some, such as control of over use, may be acted upon based on the judgment of professional park managers. Others will require research. Natural science studies proposals are listed below in priority. Priorities will be reexamined each year; the studies should be programmed to be completed within five years.

1. Distribution and abundance of Harbor Seals and Gray Seals near Acadia National Park. ACAD-N-0002. Seals were formerly more abundant near Acadia shores than they are today. Furthermore, no state laws control the killing of seals. The park staff proposes a cooperative study (NPS and State of Maine) to determine the historic and present distribution and abundance of seals near Acadia, suggest reasons for changes in distribution and abundance, and propose state legislation which will assure that seals survive in reasonable numbers near park shores. This will mark the first research that has taken park resource management beyond the edge of the sea, a vital and timely precedent.

2. Biological significance of islands proposed for inclusion in Acadia National Park. ACAD-N-0003. About 75 islands near Acadia National Park are being considered for inclusion in the park. Endangered or uncommon animals such as common tern, leach's petrel and harbor seals may use some of these islands for breeding. Park administrators should know which islands are most important, biologically, when trying to acquire new islands for the park. A major biological survey of these islands would supplement the meager knowledge we have of them now (Choate, 1966; Manville, 1942, 1960, 1964), (Favour, 1968; Roop, 1967).

3. The feasibility of reintroducing spruce grouse to Mount Desert Island. ACAD-N-0004. Overhunting apparently extirpated spruce grouse from Mount Desert Island about 1930 (Barden, 1970). Enough suitable habitat (Communities 7 and 8, Table 1) exists on southwestern Mount Desert Island in Acadia National Park to successfully reintroduce the species. The problem has been studied and the bird will be reintroduced within the next few years.

4. An alanysis of blister rust control. ACAD-N-0005. Thousands of dollars have been spent on a control program whose objectives are not clearly defined. Consequently, we do not know whether

too much or too little money is being spent to control blister rust. The objectives, cost, and methods of the present program should be analyzed and needed changes recommended.

5. Statistical survey of visitors to Acadia National Park. ACAD-N-0006. Little is known about the interests and background of visitors to Acadia National Park, what they seek, how they spend their time, what impressions they take with them when they leave. Because of Acadia's location near the Atlantic Coast megalopolis, interests of visitors may differ significantly from other parks in the system. Detailed information on the visitor will apply directly to planning of the park interpretive programs, protection activities, and informational materials.

6. Fisher (Martes pennanti) in Acadia National Park. ACAD-N-0007. Fisher are believed to have formerly resided within the present borders of Acadia National Park. The park staff needs to know whether fisher were native here; whether they still inhabit the park; if not, why they disappeared; and whether a reintroduction is needed to overcome a man-caused alteration of natural conditions.

7. Role of fire and hurricane in the forest ecology of Acadia. ACAD-N-0008. Two natural disasters, fire and hurricane, historically have played a major role in the ecology of Acadia National Park. There is evidence that both have drastically altered forest species composition, but frequency and ecological importance are unknown. Fire may be an important resource management tool, hurricanes may have great affect on succession in coastal spruce-fir forests. A sound understanding of these natural forces is necessary to effective park management.

8. Distribution and abundance of intertidal zone flora and fauna in Acadia. ACAD-N-0009. As pollution and population pressures increase on the Maine Coast, it is important that park managers have thorough knowledge of the distribution and abundance of intertidal zone flora and fauna so that changes can be measured. If a major oil spill occurred off Acadia shores today, there would be very little quantitative information available upon which to judge the impact on the tide zone.

9. Distribution of native fish in ponds and streams in Acadia National Park. ACAD-N-0010. The distribution of species of fish in ponds and streams of Acadia National Park has been

influenced by isolation from the mainland since Pleistocene glaciation. Early settlers planted some exotics (small mouth bass, brown trout) but a distinctive distribution of native species still exists in small ponds (Community 12, Table 1). Local sportsmen are exerting pressure to stock these ponds. Before any new fish plantings are attempted these small ponds and streams should be studied to determine whether such plantings would conflict with National Park policy of maintaining or restoring natural biotic associations (Batchelder, 1927; Bishop and Clarke, 1923).

10. Management of a relict stand of scrub oak (Quercus ilicifolia). ACAD-N-0011. The northernmost stand of scrub oak in New England occurs as an isolated relict stand on Acadia Mountain in Acadia National Park (Community 10, Table 1). Moore and Taylor (1927) found it the dominant plant on part of the south-facing mountainside. Fire, which is suppressed at present, is known to be beneficial to scrub oak elsewhere in New England. In order to manage the species properly, the park staff should know whether fire is responsible for the presence of scrub oak in Acadia.

11. Role of insects in the forest ecology. ACAD-N-0012. Insect epidemics occasionally occur in the forests of Acadia National Park, particularly where repeated man-caused fires have created

unusually high densities of plant species which benefit by burning. (Example: outbreak of fall leaf miner on northern red oak, Community 4, Table 1). In the past the park staff has sometimes reacted to such infestations with spraying which was not founded on sound ecological research. The staff should know the natural versus unnatural role of insects in the forest ecology.

12. Distribution of reptile and amphibian species. ACAD-N-0013. The distribution of the limited number of species of reptiles and amphibians in the park may have been seriously altered by repeated man-caused fires. Isolation of Mount Desert Island and the 10 other islands in the park since Pleistocene glaciation has also undoubtedly affected these species. Fortunately, one study of amphibian distribution was done before the 1947 fire (Manville, 1939), and a second study was done by Davis in 1958. A new study on the distribution of amphibians has been begun in the spring of 1970.

13. Distribution and abundance of exotic plants in Acadia National Park. ACAD-N-0014. Many species of exotic plants such as Scots pine, lupine, and Japanese knotweed grow in Acadia National Park. The park staff should have a list of exotic species, know how abundant they are and where they are growing, and how to eradicate them, if practicable.

14. Management of a relict stand of jack pine (Pinus banksiana). ACAD-N-0015. The southernmost stand of jack pine in New England occurs in Acadia National Park (Community 11, Table 1). Jack pine has apparently perpetuated itself in the park on Schoodic Point without human influence. Fire, which is suppressed at present, may be an important factor for the perpetuation of jack pine. Three small isolated stands on Mount Desert Island seem to have benefited from the 1947 fire. Research will show whether fire suppression has created unnatural conditions which are detrimental and which will require corrective management on the ecology of jack pine.

15. DDT residue in park ecosystems. ACAD-N-0016. DDT is known to persist and even build up in ecosystems for years after spraying has ceased. Gypsy moth spraying in the park has probably created a DDT residue which will persist for years. The present level and buildup and decline of DDT residues in the park should be monitored through annual samplings of small predators. These data can then be extrapolated to estimate DDT residue in higher mammalian predators and raptors. (Sherburne and Dimond, 1969).

Park Ranger Larry S. Barden has completed the spruce grouse study, priority #3. Arrangements must now be made for reintroduction of spruce grouse in Acadia. Tentative discussions with staff at the University of Maine and State Department of Sea and Shore Fisheries point to promising progress in the recommended studies on Seals, the Blister Rust Control Program, and Reptiles and Amphibians.

In addition to the resource studies proposals, the following management problems require continuing attention.

1. The problem of whitetailed deer. ACAD-N-1 (Research Project Number). After the 1947 forest fire burned about 10,000 acres of park land on Mount Desert Island, shrubs and saplings sprouted vigorously, providing plenty of food for the major herbivore, white tailed deer. The deer herd increased in numbers throughout the 1950's, and about 1960 park personnel decided the herd had exceeded the carrying capacity of the land. They began a controlled hunt which continued until 1968. By then more than 900 deer had been killed. Studies in 1967-68 (McLaughlin, 1968) showed that plant reproduction was not being seriously hampered except in wintering areas. By the late 1960's much of the post-fire vegetation had grown too tall for deer to feed on.

The hunting has been stopped, but the problem has not been solved. Hunting for sport is not permitted by state law on either Mount Desert Island or Isle au Haut. There are no natural predators except possibly a few bobcats whose predation would be insignificant. The only limiting factor is starvation, and starvation of deer usually means damage to vegetation, especially in wintering yards (Communities 1 and 8, Table 1).

This problem deserves annual monitoring of vegetation in and around deer exclosures. A new exclosure will be built in 1970; four others have already been built. For references, see Banasiak and Peppard (1956), Baird (1966), Klataske (1968), Allen (1970).

2. Human erosion. Heavy public use areas such as Blackwoods and Seawall Campgrounds, Sand Beach, Seawall Bog, and otter Point have been damaged by crowds of visitors. Resource management studies such as Barden's (1970) study of Sand Beach should be carried out to help the park staff protect and manage these areas. Destruction of vegetation and erosion should be minimized through proper management.

3. Major Plant Communities. The description of major plant communities in Table 1 is very roughly estimated. A quantitative mapping of major communities should be carried out so that gradual changes, both natural and man-caused, can be detected, and the information used by the staff in interpretation and in resource management. (Moore and Taylor, 1927; Hill, 1919 and 1923; Davis, 1961 and 1966; Kuchler, 1956).

4. Management of beaver. Beaver were extirpated from Mount Desert Island, probably in the early 19th century. They were reintroduced during the 1920's, but most of the roads in the park were designed without considering the habits of the

beaver. Consequently, the park staff must continually trap a native mammal to protect park roads from flooding caused by beaver dams. Also, beaver are trapped to protect a brook trout spawning ground and to preserve a meadow of rhodora from flooding. A study should clearly define the assets as well as the liabilities of these beaver. For references, see Baird (1964).

5. Ecological effects of carriage paths on park watersheds. Acadia is an ideal site to study the hydrological and hence ecological effects of gravel roads in a national park. The results of such a study could have many practical applications in locating roads in other national parks. The results should show how roads have altered natural vegetation of the park.

6. Management of Rhodora. Rhodora blooms in a magnificent display at Great Meadow below Sieur de Monts Spring (Community 8, Table 1). However, some who have watched the display over many years feel it has declined in quantity of blossoms. Management by defoliant spraying and beaver trapping has been based on opinions rather than sound research. A study would determine the causes of the decline and would suggest management which may be necessary.

RESOURCE MANAGEMENT PLAN

This is a plan for management of Acadia's resources. It is a plan that cannot remain a static document and still fulfill its function. It must be usable, and used, - a plan that continually is refined by park managers to meet the demands of change.

What are the park resources? They are the soil, water, air, and living things, including man, found within the park area.

What is resource management at Acadia? It is man's intellectual effort to preserve natural processes and to define the laws of nature.

The resource management plan is divided into the following parts:

Man And Park

The Intertidal Zone

The Terrestrial Ecosystems

Appendix

MAN AND PARK

" - - - to conserve the scenery and the natural and historic objects and the wildlife therein and to provide for the enjoyment of the same in such manner and by such means as will leave them unimpaired for the enjoyment of future generations." (Act of August 25, 1916, to establish the National Park Service.) This act contains the basic contradiction of park management "to provide for . . . enjoyment," "to leave . . . unimpaired."

Raymond F. Dasmann on the contradictory problem of conservation and human use has said "Perhaps a general guideline for man's use of the natural world, based upon our present knowledge, would be: THE DISTURBANCE OF ANY NATURAL ENVIRONMENT SHOULD NOT EXCEED THE MINIMUM NEEDED TO ACCOMPLISH ITS RATIONAL USE FOR WORTHY HUMAN GOALS."

Mr. Dasmann comments further:

> "Rational use of the environment takes the future into account. It is based on an understanding of the continuing long-term needs of humanity. It involves consideration of the natural laws that govern man's occupancy of the planet. It will involve at times non-use of resources, if these happen to be scarce and their preservation of importance. It will at times be based on consideration of tomorrow's requirements as well as today's necessities. It is non-rational to destroy a living species or to shatter the last remnant of a living community in order to make way for some marginal expansion of some already abundant crop of a misplaced suburb. But what is non-

> rational for society in the long run may seem entirely rational to an individual or to a social group with short-term objectives. Furthermore, ignorance of the interrelationships among living things and their environment may often lead to unexpected damage when a resource is exploited in a superficially rational way."

In light of growing concern for a wounded and limited environment, what should be the role of Acadia? As with other national parks, Acadia has been a place of passive curiosity about nature with man a passing spectator; it has been a place of scenery-spattered leisurely days; it has been a fast stop on a frantic vacation.

It will continue to be these things, but these are not enough.

Acadia should be a place where the concepts of ecology are presented in terms that will activate people to do something to help reverse the man-caused disintegration of their natural world. It may be difficult to attempt a link between Acadia and urban blight, Acadia and the population explosion, Acadia and the ghetto, but the need is urgent and the attempt must be made.

Development

One measure of man's role in nature can be found in the development of Mount Desert Island. On the island can be traced the initial assault on a wilderness, the early dependence of the settler on the products of nature, the development of a

pleasuring ground for the rich, and the crash of 20th century technology. It is, in miniature, a summary of man's activity in the rural coastal areas of the nation.

A clash between French Jesuits and Englishmen of the Virginia Colony in 1613 at Fernald's Point, Mount Desert Island, marked the beginning of a struggle for North America that was to span a century and a half. (The Story of Mount Desert Island, S. E. Morison, 1960). Antoine Laumet, Sieur de Cadillac, stayed briefly in the island wilderness in 1688. In 1740 ship wrecked survivors of the ill-fated Grand Design bound from Ulster to Boston spent harrowing and death-filled months at Ship Harbor. Rescue finally came after their plight was reported by Indians. But not until 1761 did Abraham Somes and James Richardson debark at the head of a strikingly beautiful fjord, slash with axes into the virgin forests, and with their families begin the permanent settlement of Mount Desert Island. They, and those who followed, lived off the bounty of land and sea. By 1870 the entire virgin forests of the region had been either cut or burned. Great gaping rents in rocky ledge mark the era of quarrying that supplied building granite for cities all along the Atlantic Coast. The sea lanes were choked with commerce to the growing nation and Mount Desert Island became a major landmark and point of

supply for agricultural products. The sea provided a bounty that supported an industrious and proud downeast community.

Two hundred years after permanent settlement 10,000 residents live on the Island; another 2,400,000 visit annually. Severe pollution mars the coastal waters. 500 miles of asphalt roadway crisscross in a pattern of crazy confusion. Billboards offer the delights of triteness. Heavy industry is proposed for the region as treatment for economic ills. Visitors arrive and are disappointed when they find "nothing to do." In this transformation from early settlement to the spangles and blights of rural sprawal, the last 30 years represent more development than the previous 180.

Community

In the progression of development a community of people has been established who have great influence on Acadia. This community generally can be divided into five groups. First, the tourists and all commercial ventures related to the tourist industry. Second, the permanent summer colony - a varied collection of families that have the means and time to escape megalopolis for extended periods. Third, the society of fishermen, woodsmen, and farmers whose colorful and individualistic way of life is seemingly impregnable to other pronounced changes. Fourth, the scientific colony that surrounds the Jackson Laboratory. Fifth, the military on the Schoodic Peninsula.

In addition, park managers must communicate with a multitude of representatives from local political subdivisions. The main island of Mount Desert is divided into four towns; Bar Harbor, Mount Desert, Southwest Harbor, and Tremont. Park lands also lie in the towns of Trenton, Winter Harbor, Gouldsboro, Swans Island, and Isle au Haut. Hancock and Knox Counties include portions of the park and, of course, the State Government through its various bureaus is closely associated with park activities. But the town governments are by far the most intimately involved with park management. And each town varies in its attitude toward the park and control of its own land areas. Strict zoning in the Town of Mount Desert is contradicted by none in Southwest Harbor, Tremont, and others. Bond issues for pollution control have met with success in Bar Harbor, vocal opposition in less affluent towns. Bar Harbor and Trenton are tourist oriented, Mount Desert caters to wealthy summer residents, the others depend primarily on the fishing industry and thus see less benefits from the presence of the park. Politically the park is unpopular at the local level and often used as a whipping boy for real and imagined complaints.

One of the most interesting sociological impressions of Mount Desert Island and adjacent areas is how separate groups and political subdivisions manage to remain. To each the park

has separate meaning. To the tourist, recreation or entertainment. To the Chamber of Commerce, income. To the summer resident a refuge from the demands of sophisticated urban living. To the lobsterman, a barrier to individual rights. To the laboratory community, a primary factor in the quality of local living conditions. To the military, a curiosity. To town selectmen, a subject of criticism, but, also an organization that can provide special services. To all in varying degree, a violation of the local tax structure. To all in varying degree, a suspect bureaucracy.

Most do not fail to be impressed by the park's natural scenery, but few stop to consider the pressures that threaten to consume it. And most pass by leaving the trails, the carriage paths, the quiet places of beauty and natural life, untouched and unknown.

Management Attitudes

The park staff is buffeted by the demands, support, hostility of the combined community of people that frequent Mount Desert Island. Diverse pressures in combination with poorly defined resource management goals have resulted in some contradictory actions and decisions. Examples of past decisions opposed to protection of the park's natural environment are mass recreation

at Echo Lake Swimming Beach, use of DDT to control Gypsy Moths, a parking lot hard against the shore of Bubble Pond, a concession trinket shops at Cadillac Mountain and Thunder Hole, indiscriminate gravel pits.

Decisions taken by the park staff have tended to be in response to the tourist group and local commerce, as logically would be anticipated. With limited funds and staff, first priority in management has been directed at the "heavy use areas." Less visited areas of the park, its trails and carriage paths, have suffered from neglect. The attempt to accommodate more and more people at major points of interest within the park has caused increasingly serious human erosion. The Seawall Bog, Wonderland, Sand Beach, Otter Point, and Little Moose Island are being beaten to death merely by the touch of striding feet. (Sand Beach Study, Lawrence Barden, 1969).

Recently a concerted attempt has been made by the park staff to eliminate or curtail many formerly condoned management practices that contradict the basic purposes of Acadia. Examples are closure of gravel pits and deliberate deemphasis of Anemone Cave, a sea cavern that contains a fragile tidepool environment. The two major campgrounds, Blackwoods and Seawall, will not be increased in size even though camper demand increases. Beginning in 1971 Blackwoods will be operated on

a reservation basis. Private campground operators outside the park have been successfully encouraged to meet the demand for more campsites. The Ocean Drive and Schoodic Road have been converted to one-way traffic. Much more emphasis is being placed on use of carriage paths and trails through naturalist-conducted events, such as bicycle rides and mountain hikes. The Leopold Report and Research have become active rather than passive natural resource management tools.

Interpretation

As the means of communicating management goals, interpretation plays a critical role in the use of Acadia. It is the connection between rational people and rational management. If people begin to understand more clearly the purpose of Acadia, and its management, they will understand better the connection between their lives, nature in the park, and human "progress" elsewhere. They perhaps will recognize intolerable contradictions in the legal establishment of a national park and continuing rape of the general environment.

In past years interpretation has been somewhat of a stepchild to park management. Springing from scientific interest of the earliest park naturalists, interpretation at Acadia evolved into a short course in plant and animal identification. Facts and figures. Names. Eighty slides on park plants, all

appropriately labelled. The assumption appeared to be that if people visited Acadia they must want to share, in specific detail, the interest of the park naturalist.

But the interpretive program at Acadia has changed with a recognition that interpretation must serve a higher purpose, must be the contact that binds the visitor to the purposes of conservation. It must convince him that he is part of the environment, and its greatest danger, and, in a positive manner, interpretation can help the visitor take a fresh look at his role. It can motivate.

Interpretation, too, must include consideration of growing visitor use. Personal contact must be supported by other methods of communication such as display, self-guiding devices, and automatic audio-visual devices in order to serve visitors numbered in the millions.

The need for communicating with park visitors by means other than personal contact is not a new or startling concept. But it is a concept that must be applied to Acadia to a much greater extent than has been the case.

Protection:

Perpetuation of natural cycles - and their use for recreation and study - of necessity means protection as well as interpretation. The responsibility for enforcement of regulations and response to emergenc ies cannot be separated from the larger realm of resource management. Without adequate protection, park programs would be intolerably crippled.

As an attraction "visit Arcadia if you ever get to Maine" the park draws massive visitation. (Figure 1) Shifting travel habits are extending the traditional summer travel season well into spring and fall. (Figure 2)

Winter now brings with it the technology of the snowmobile. 600 visits were registered on one January weekend in 1970.

People massed in a limited area generate crime and accident. Acadia is no exception. Crime in Acadia is increasing at an erratic but constant rate. (Figure 3) Accidents are taking statistical jumps ahead of visitation. (Figure 4) Although the hypothesis is untested, such disproportionate statistics could indicate a drift past the limit of park capacity.

Protection is hindered by problems of split law enforcement jurisdiction (exclusive and proprietary), a far removed court

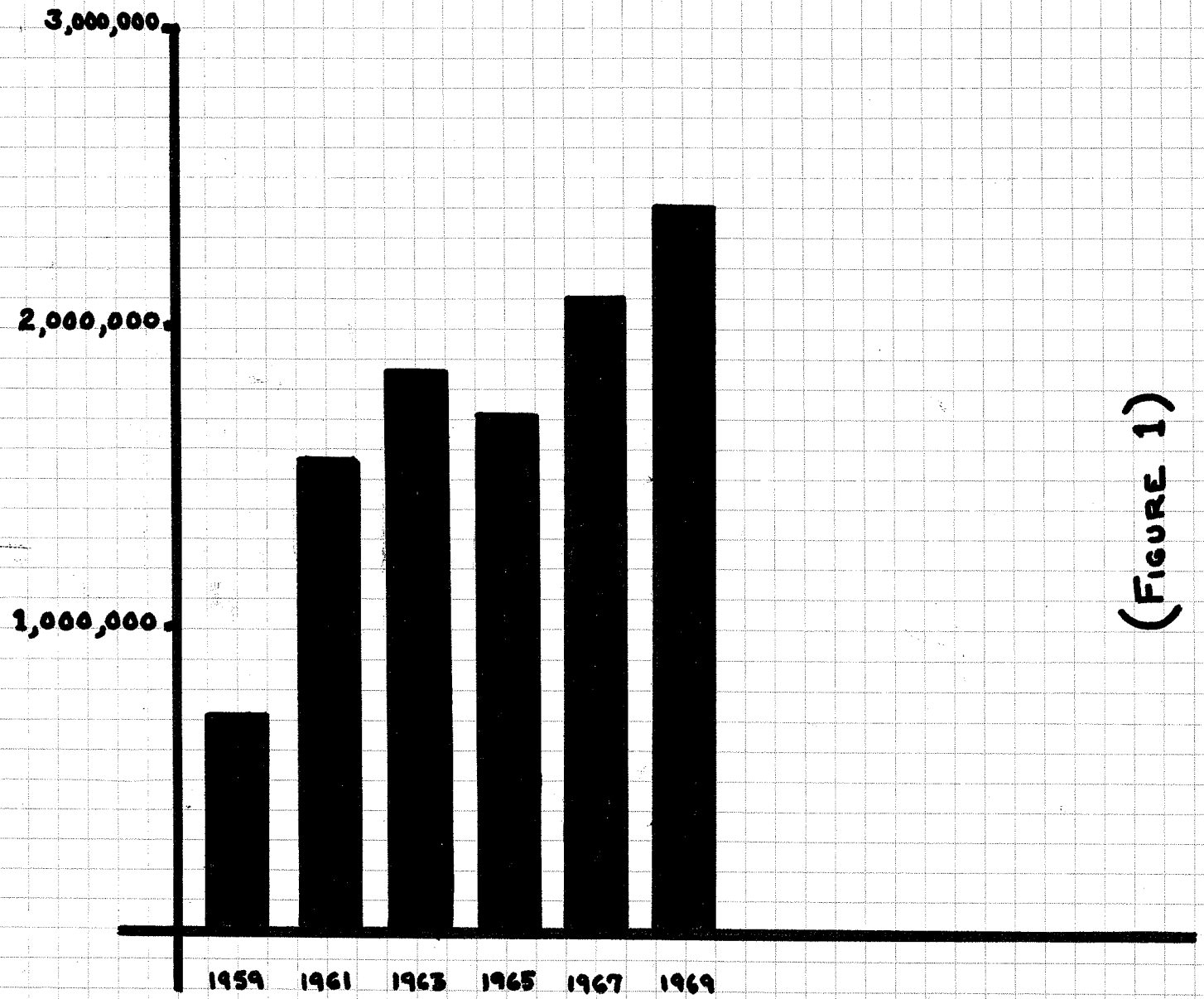
system, vandalism, juvenile delinquency on which the United States Commissioner can take no action, and traffic congestion. More subtle, but potentially more damaging, is youthful rejection of any authority. In Acadia, mindless attacks and pranks are common against interpretive signs, road and trail markers, life buoys placed to prevent tragic water accident - almost anything "park."

Acadia should be a place of freedom, especially for the young. In fact, increasing demands for control mean larger protection staffs, more frequent patrols, and increasingly "routine" law enforcement action.

Still there remains a relatively free and tolerant atmosphere at Acadia. But if current trends continue, the experience of many summer visitors may be diluted by more obvious surveillance and the impersonality of congestion. The alternative is to seek some reasonable limits on park use.

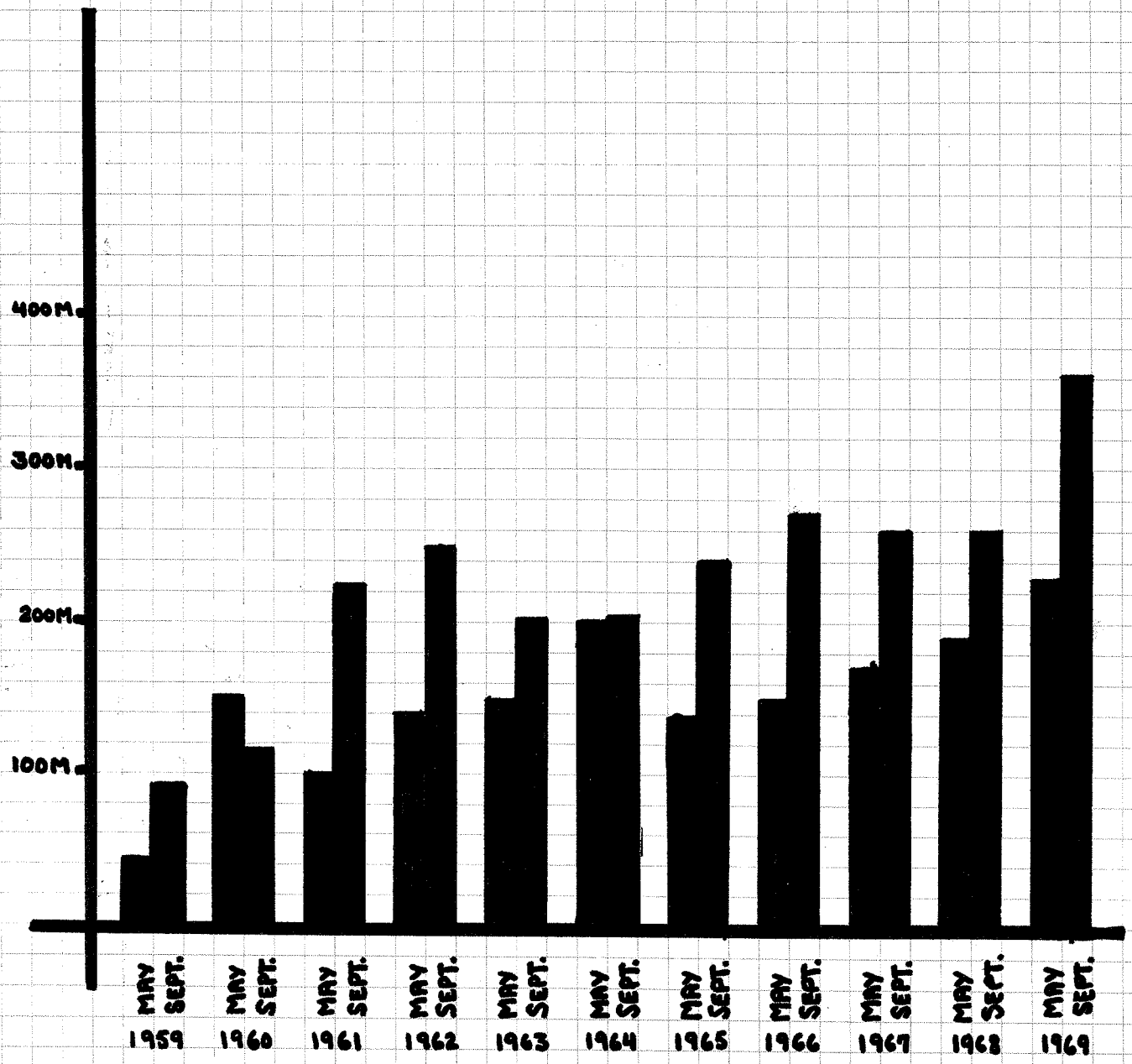
Concessions

The park is served by a large business community located within driving minutes from most major scenic features. Mount Desert Island offers 5000 pillows of overnight accommodations, 1000 private campground sites, many restaurants, shops and travelling



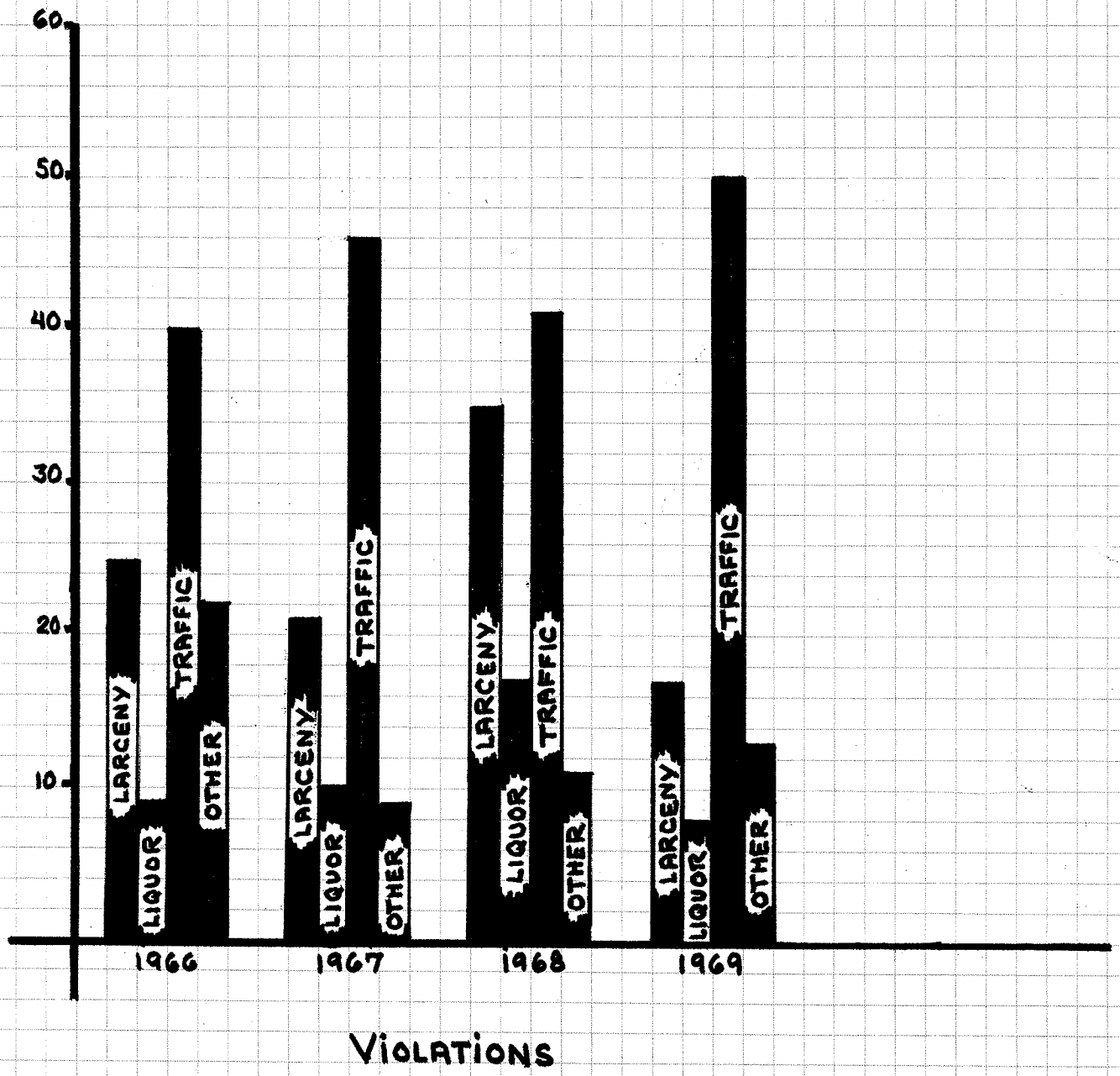
(FIGURE 1)

ANNUAL VISITATION

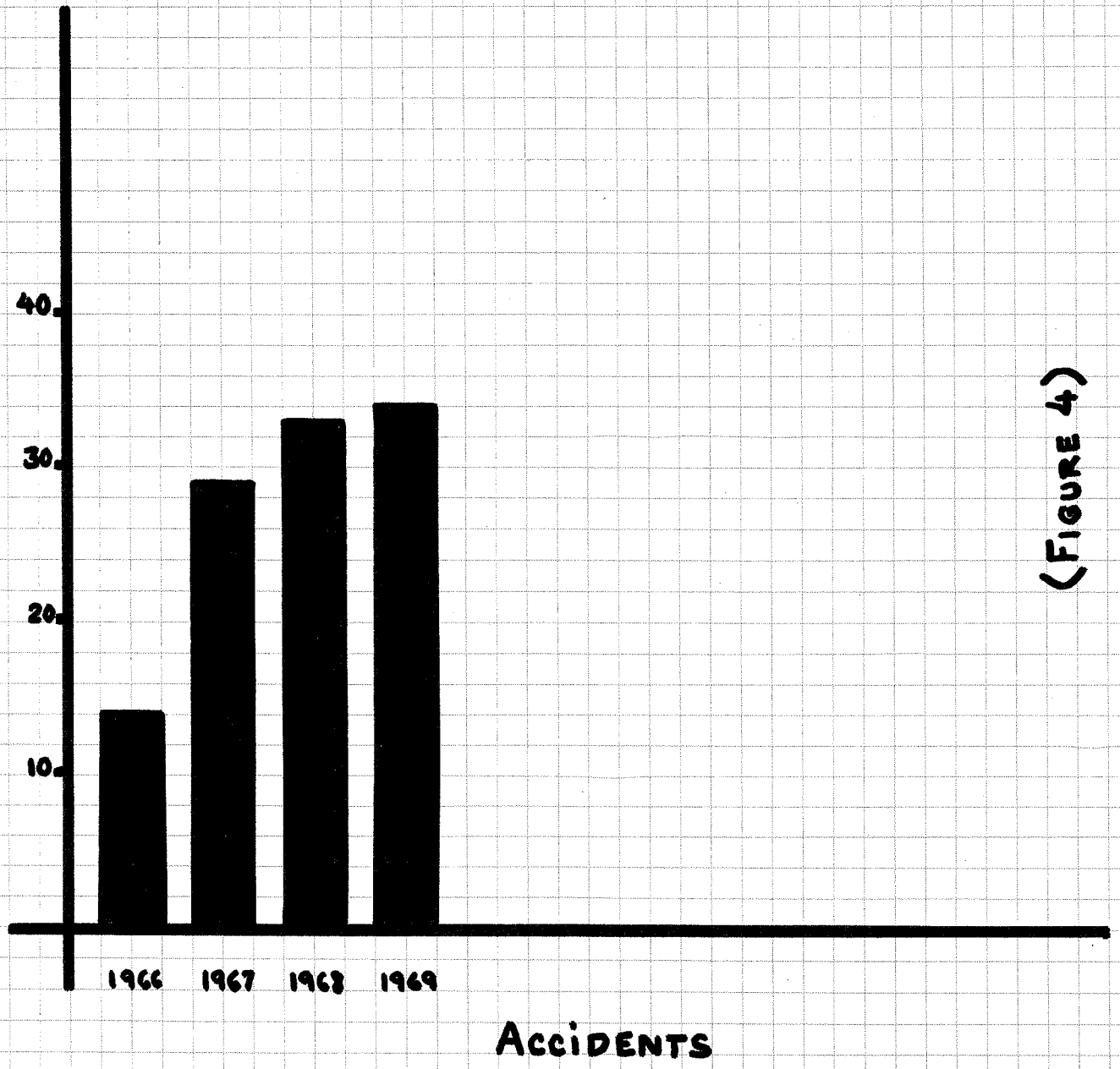


(FIGURE 2)

VISIT ION
MAY AND SEPTEMBER


60
50
40
30
20
10
LARCENY
LIQUOR
TRAFFIC
OTHER
1966
1967
1968
1969
VIOLATIONS

(FIGURE 3)



(FIGURE 4)

services. Most park visitors seek the services of the private business community and as a result, concession services inside the park are modest.

The Acadia Corporation operates a restaurant/gift shop at Jordan Pond and gift shops located at Cadillac Mountain and Thunder Hole. A sub-concessioner operates the horse concession at Dane Farm. Special use permits have been issued for a tour bus service, taxi service, and canoe rental. The popular naturalist sea cruises are operated wholly on a private basis with park personnel aboard the cruise boats under informal agreement. The sea cruise arrangements have worked extremely well.

The desirability of the two gift shops at Cadillac and Thunder Hole is highly questionable. Similar gift items can be purchased only a few miles away in local villages. There seems no real justification for the privilege of a special monopoly to provide these services at already congested locations within the park.

Ambient Threats

All management problems do not lie within Acadia's boundaries. The park cannot be divorced from technology that surrounds it. In 1968 a combination aluminum reduction plant/nuclear power generator was proposed only brief miles upwind from the park.

Air and thermal pollution from this industrial complex posed a serious threat to Mount Desert Island. Fortunately, the proposal was defeated in a local referendum of 350 voters. But the pressure is increasingly great for development on the Maine coast.

The era of the supertanker has brought the oil industry to Machiasport, 30 miles "downeast" from park shores. Prevailing ocean currents from the vicinity of the proposed Machiasport facility move directly toward Mount Desert Island.

Dr. Vincent J. Schaefer of the State University of New York has labelled the area surrounding Mount Desert Island the "exhaust pipe of the nation." Here, Dr. Schaefer claims, particulate matter from our industrial society is carried by prevailing jet streams out to sea. And here, he suggests, instruments could be located to monitor national progress in the battle against air pollution.

Islands in the Gulf of Maine are drawing attention of developers who have "done their thing" in Florida and elsewhere. Many see the coast, including parklands, only in the context of 50' lots. The only significant barriers against wholesale development appear to be those owners of large acreage who presently prefer not to sell and limited technology

in desalinization. Both barriers surely are temporary. If portions of coastal Maine are to be saved for future generations, the time is now. (Appendix, Why a Need for Acadia Legislation). The 40 miles of rocky shore already protected in Acadia cannot represent man's total concern for the 3000 mile Maine coast. The conservation concept must reach beyond limits of the park toward islands and shore now lying directly in the path of avaricious "progress."

THE INTERTIDAL ZONE

It is the coast that brings the visitor to Acadia National Park. The wedding of land and sea in a union of cliffy headlands, tiny rocky coves, and islands like green pebbles in a sea of blue is the essence of the park. These elements and the life which attends them can only appreciate in value as megalopolis spreads into Maine with consequent destruction of natural coastline, of public access, and need for public parks. It is this same march of progress which threatens the existence of the Northeast's only national park.

Although half of America lives within 100 miles of the sea, a visit to Acadia remains unique. Here the visitor stands looking at strange sights, hearing unfamiliar sounds, and smelling the tangy breeze of the sea. A natural world assails his senses, and whether his visit be a few hours or several days, he is impressed and perhaps receptive to new thoughts.

Who can sit on a rocky point, watch the tide fall, and walk away unchanged? Foot by foot the waves fall away exposing countless living things undreamed of, in pools, under rocks, clinging to sheer cliffs. What was sea is now land and soon will become sea again; ~~What~~ a graphic example of change and the ability of life to adapt; ~~What~~ an obvious dependence upon

natural rhythms. Here at the edge of the sea an interpreter speaks of life, change, and man's dependence on nature upon a stage whose every element reenforces his message so well he must shout for attention!

Various geologic and marine conditions produce strikingly different habitats in Acadia's intertidal zones which can be described as:

1. The Rocky Shore
2. The Sand Beach
3. The Mud Flat
4. The Salt Marsh
5. The Sea

Most of the park's 40+ miles of shoreline are rocky. Scenic drives and trails emphasize this type of shore and it is the image which springs to mind when one hears the word, Acadia. On sheer cliffs and ledges of fortresslike granite, plants and animals of the sea attach themselves securely for they must withstand the smashing waves of winter storms as well as the sun and dryness of summer. In other places the shore is composed of jumbled slabs and blocks, relicts of bygone storms. Among them and hollowed out of bedrock are the tide-pools which are so popular with young and old alike.

One has only to look once at the rocky shore to see that living things occur in zones. Because these zones are close together, easily observed, and contain such a variety of life, they are the places visited and spoken of in guided hikes and talks. Beginning above high tide and proceeding down are the:

Splash Zone

Barnacle Zone

Rockweed Zone

Red Algae Zone

Kelp Zone

As one would expect, the pattern of life in these zones reflects varying dependencies on ocean water. All forms harvest the sea's bounty, but most of those living in the spray zone are land plants and animals with a tolerance of salt, those living in lower zones are marine forms which can tolerate a nonmarine environment for periods of time. The dynamic nature of life in the zones, the eminence of evolution, the problems of numbers, and the threats posed by distant events are so obvious that people with the most casual interest in nature can be led to recognize the kinship between our society and the natural world of the tidal zones.





Rocky Shoreline at Forest Edge (The Ovens Area)

The Splash Zone

The splash zone belongs primarily to the land world, except during the most violent ocean storms when huge waves break against the granite and erupt into fine salt spray. In the splash zone, land animals dominate - spiders, birds, ants and small insects forage over the bare rock surfaces. One marine snail, the Rough Periwinkle, has become adapted to breathe air directly and lives in the splash zone.

Usually a mixture of small salt and fresh water pools form when it rains. As evaporation proceeds, these pools become a trap for many forms of life such as venturing aquatic bugs, beetles and isopods. Very few land plants survive within the splash zone. A few species of land lichens are found on the rocks. And a marine lichen (the orange wall lichen) often grows where the salt spray falls. In fact, this marine lichen is dependent upon salf-laden moisture either as spray or through absorption from air.

The Barnacle Zone

Below the splash zone lies the barnacle zone, dominated by its namesake. Barnacle colonies often form a broad white band several feet high. The tidal water level covers the upper level of this band only at high tide. Alternating

bands of black (mussels) and white (barnacles) sometimes are found in this zone. A carniverous sea snail, the dog whelk, is often found at the lowest portion of the barnacle zone. Plants are almost absent, except for some of the lichens distributed from the splash zone. Tidepools in the barnacle zone support small specimens of the green algae, sea-lettuce, and the hairy spongamorpha. Here the dominant mobile forms of animal life are the amphipods and isopods.

The Rockweed Zone

About midway within the intertidal region is an area of great life abundance. The rockweed zone is dominated by mats of Fucus and Asocphyllum. In and under these dripping mats may be found many foraging animals.

This region belongs more to the sea than to the land. The flora and fauna can tolerate only brief exposure to air and intense sunlight. The starfish, periwinkles and dog whelks, limpets, nudibranchs, sea urchins, crabs, anemones, chitons, and sponges are common. It is in rockweed zone, at low tide, that the park visitor is best able to study and explore a portion of the sea world.



Exploration in the Rockweed Zone



"A place for interpretation"



Naturalist holding Starfish

The Red Algae Zone

The lower portions of the rockweed zone blend into the zone of red algae. This zone is characterized by the various species of red algae such as Irish Moss (Chondrus crispus) and dulse (Rhodymenia palmata). It is one of the most heavily populated by both plant and animal life of all the zones within the rocky shoreline area. But, unlike the rockweed zone, close proximity to the water's edge even at low tide generally discourages all but distant observation. However, during very low tides in Acadia National Park, some of the finest tidepools on any coastal segment can be explored.

To gaze into one of the briefly exposed pools almost is to enter the sea itself. Brush aside some of the Irish moss and a thick coating of the beautiful green crumb-of-bread sponge is revealed. Most of the rock surface here appears sprayed with a thin coating of pink coloring. The pink crust is a common red alga (Hildenbrantia rosea). The tidepools usually harbor colonies of sea urchins. And starfish can be found in abundance underneath the mats of Irish moss and dulse.

The Kelp Zone

Finally, the seldom exposed laminarian or kelp zone. It is the lowest of all the intertidal zones. Two species of brown algae, the sugar kelp (Laminaria saccharina) and the long-

stalked kelp (Laminaria longicruris) usually supported as graceful designs under the surface of the sea lie as a tangled mass when released by extreme low tide. Then one can probe the kelp holdfasts and discover brittle stars, scale worms or horse mussels. Hermit crabs scuttle among the fronds dragging snail shells in which they live.

These zones within the habitat of ledges and rocks are the pages of nature's book that so visually span the transition between land and sea.

Sand Beach Habitat

Along Acadia's many miles of rugged rocky coastline, sand beaches are notably lacking. The largest and best known on Mount Desert Island is "Sand Beach." Several of the smaller islands within the bays also contain sand habitats. Although the variation between high and low tide is just as great on the sand beaches as it is on the rocky shoreline, the various zones harboring different species of plants and animals are not so evident. This is because sand beaches slope very gradually from high tide to low, and that the substratum of the sand beach is constantly changing, preventing permanent holding surfaces for plants and animal life.

Larger living things burrow into the sand for survival. Clams and marine worms are common but seldom more than their feeding and breathing holes are evident at low tide. Sea water between sand grains is home for myriads of tiny living things but a microscope is required to see them.

Perhaps the most interesting features of sand beaches are their composition (largely organic fragments) and the ways they respond to storms and tidal current.

Mud Flat Habitat

Along some segments of park shoreline the tide fluctuation alternately creates a lagoon or mud flat. Otter Cove and Thompson Island are excellent examples of the Mud Flat Habitat within Acadia. The mud flats are formed where the supply of fine detritus and organic material is great but wave and current actions are too weak to remove them. They contain life communities which differ markedly from any other sea environment.

Species of algae, Fucus and Ascophyllum, cling to rocks along the upper edge of the mud flats. Seldom do flowering plants grow in salt water, but several species - eel-grass (Zostera marina), sea lavender (Limonillum nashii), and seaside plantain (Plantago olignathos) can be found thriving at the limits of Acadia's mud flats.



Sand Beach



Visitors enjoying Sand Beach
(Note rockweed washed up on shore)



Mud flat habitat during low tide
(Ship Harbor Area)

Many animals live on and among these plants. Spider-crabs and hermit-crabs hide within the tangle of vegetation. Mud flats are the homes of many mollusks. Species of the periwinkle (littorina) crowd the strands of fucus. The animals that live in the mud itself are chiefly burrowers. Holothurians such as the sea-cucumber draw their tentacles through the mud, sifting out microscopic bits of food.

When the tide is out, gulls, crows, herons and other birds come to feed upon mud flat inhabitants. And man himself comes to reap the harvest. Clam digging is a popular and economically productive activity.

As with the sand beach shoreline type, research about Acadia's mud flat habitat is lacking.

Salt Marsh Habitat

Acadia National Park contains some sizable marsh areas which are influenced by the tidal range. Major examples are the Bass Harbor Marsh, The Thompson Island Marshes, and smaller areas on the Schoodic Peninsula. The seaward margins of these salt marshes are inhabited by animal life such as sand hoppers, crabs, marine snails and clams.

Changes from salt to fresh water flora and fauna may extend for considerable distance before the transition is complete.

No significant study of Acadia's salt marshes has been made.



Salt Marsh Habitat

The Sea

Beyond the fringes of all the shoreline habitats is the sea itself.

The sea seemingly has formed a mental as well as physical barrier at the edge of Acadia National Park. At the surf line interpretation has ended. Only the scuba diver intent on the challenge of the frigid North Atlantic is aware of the fantastic scene just inches below the low tide line. Visual records of this, the other world, have not been brought back as interpretive tools for the park. People seek the edge of the sea and gaze upon its surface; they have only the briefest concept of the drama below.

The sea must become a part of Acadia's interpretive story, a part of the conservation ethic, a subject of research and understanding.

Pollution

Raw sewage is emptied into the sea from the 364-site Blackwoods Campground; at the 224-site Seawall Campground the problem is similar. Summer homes, restaurants, motels, towns, all pollute the sea.

Except for a few segments within the park, the total coastline of Mount Desert Island is polluted to some degree. In many locations clamming is not permitted because of the threat to health from fouled waters.

Beyond the references in the park library, much has been accomplished recently in marine biology as it relates to the coast of Maine. Of particular note is the existence of the Mount Desert Biological Laboratory, a summer workshop for eminent marine biologists and students from a host of surrounding states. To date, park managers have taken little advantage of the opportunities represented by this nearby research installation.

Channels of communication will be opened with individuals, universities, and organizations in the field of marine biology. The proposed underwater interpretive facility now under study for location at the park undoubtedly will be of great interest to the researcher as well as the casual visitor. Efforts are to be instituted to obtain a much broader and more current reference library related to the tide zones and sea.

The Terrestrial Ecosystems

Man's influence on the natural world has been a contradiction. He has scoured, polluted, exterminated, and exploited in quest of food, security, comfort, and material wealth. And as apparent retribution for his excess he has reacted by attempting to save at least a vestige of the once vast undisturbed wilderness. As curiosities or pleasuring grounds, man plucks choice bits of scenery from less desirable surroundings, over-controls, over-protects, and over-uses them - and calls them parks.

In both instances, exploiter and protector, man fails to equate his own existence with the natural processes that he bends to his will. He seemingly feels himself a part, a spectator. Man has failed to see that he is of the environment and that where the environment degenerates he, too, degenerates. Preservation of natural ecosystems within Acadia is important as it serves the purpose of sharpening man's perception of himself as the most powerful and destructive resident in nature.

The Very Human Concept of an Ecosystem

The word "ecosystem" has come of age in 1970. Politicians, bureaucrats and scientists use it every day. But in the real world (of nature) there is no such thing as a well-defined, self-contained ecosystem. The word is vague and full of holes, but it can be useful.

If you fly over Acadia National Park,you see marshes, coniferous forests, hardwood forests, lakes, ocean shoreline, and large patches of bare rock on mountains. These recognizable areas form a mosaic on the land. Often the dividing lines between pieces of the mosaic are sharp, like the shoreline between a lake and forest. Usually, however, the line is indistinct, like the gradation from coniferous to hardwood forest. In spite of such gradation, dissimilar vegetation patches usually stand out on an aerial photograph. Inking the outline of these patches on the photograph creates a mosaic of irregular areas which corresponds to the real mosaic on the land (Figure 1).

If you walk around within the boundaries of an outlined area, using the photograph as a map, you notice that the mixture of species is similar. If you walk out of this area into a second outlined area which appears to be different on the photograph from the area you were first in, the change in plants should be striking. Common species in the first area are uncommon, or not found at all, in the second. In the new area, however, the common plant species again occur in a generally constant proportion to each other. Thus, particular species of plants characteristically grow together, usually because of their special climate or soil requirements. A group of these associated plant species is a plant community.

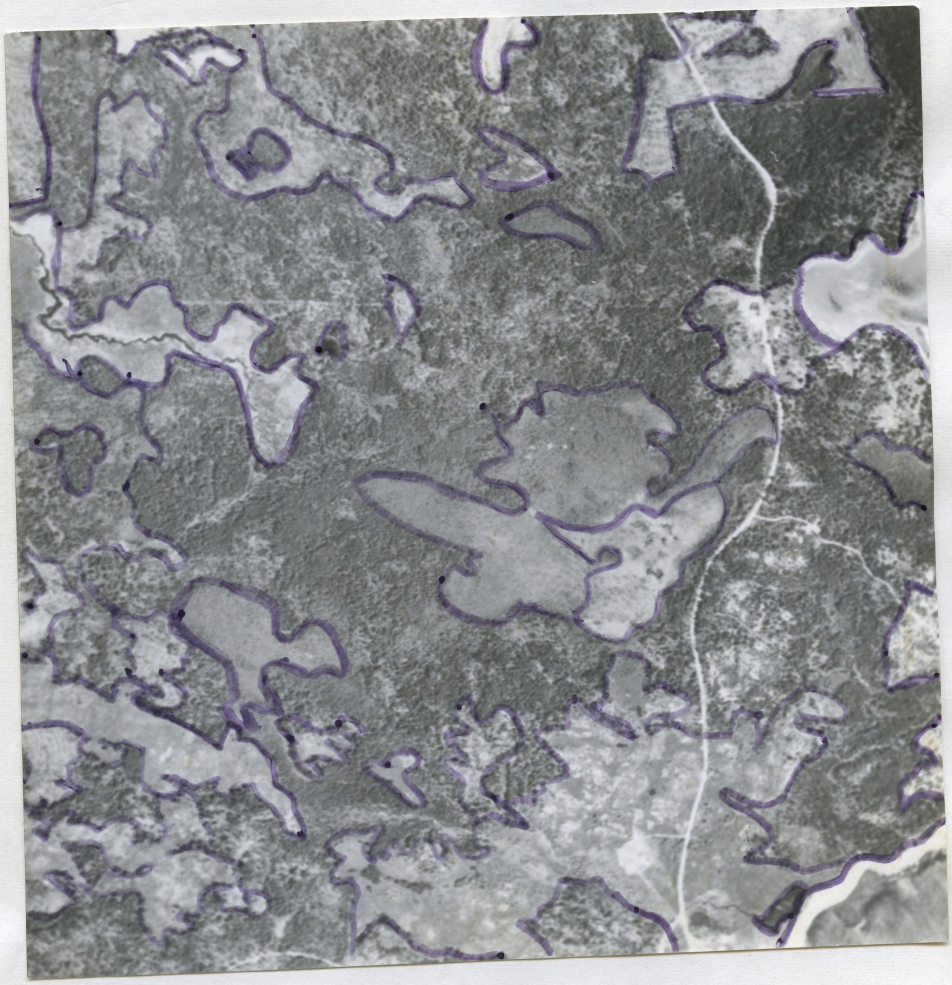


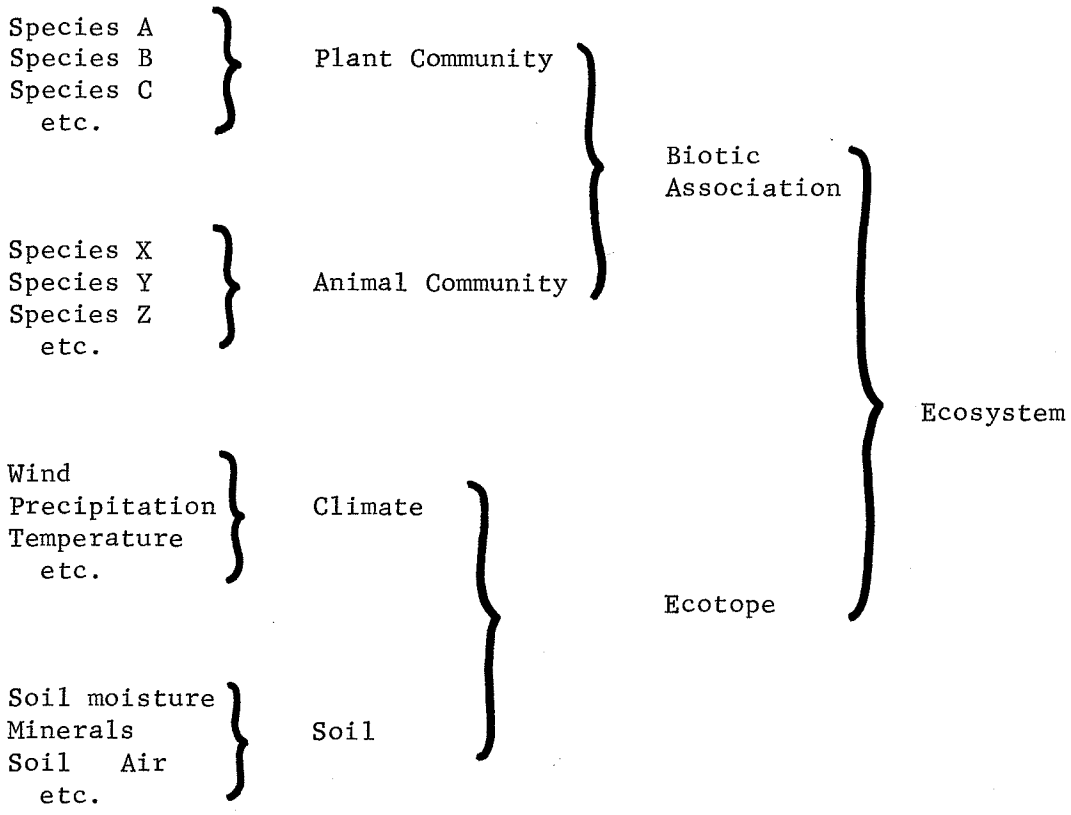
FIGURE 1. PATCHES OF DIFFERING VEGETATION OUTLINED ON AN AERIAL PHOTOGRAPH

Scale: 1" = 1500'

An example of a plant community found in Acadia National Park is the group of plants which grows in bogs: sphagnum moss, black spruce, cranberry, pitcher plant and leatherleaf. All of these plants thrive in very wet, very acid organic muck.

If you surveyed the animals which live in one of the larger outlined areas on the aerial photograph (Figure 1), you would notice a constancy of species similar to that observed among plants, except that animals would not be tied as firmly as plants to single outlined areas. Large animals move freely from one plant community to another. Yet most animals prefer to live in one, two or very few different plant communities at a given time of year. For example, spruce grouse live near or in marshes and bogs; they spend little time in upland hardwood forests. Thus, within a plant community there exists a community of animals. Together, the plant and animal communities constitute the living half of an ecosystem. This living half is called a biotic association.

The non-living half of an ecosystem also falls into two parts: climate and soil. Thus, an ecosystem may be diagrammed as follows (Daubenmire, 1968):


Species A
Species B
Species C
etc.
Plant Community
Species X
Species Y
Species Z
etc.
Animal Community
Biotic Association
Wind
Precipitation
Temperature
etc.
Climate
Soil moisture
Minerals
Soil Air
etc.
Soil
Ecotope
Ecosystem

As the following examples show, an ecosystem is not self-contained. It is an open system where animals pass in and out. Even plants are not faithful to one ecosystem; sphagnum moss grows just as well in moist hollows high on a hill as it does in bogs. Soil nutrients from coniferous forests drain into lakes where aquatic plants rapidly absorb those nturients into a new ecosystem. Oceans absorb most carbon dioxide produced by land animals. Even the locations of lines which were drawn around plant communities on the aerial photograph (Figure 1) depend largely on the scale of the photograph. Thus, individual ecosystems are largely figments of the human imagination. The only real ecosystem is the entire earth, and even that has holes in it.

Major Plant Communities

The easiest way to identify ecosystems is to describe the community of plants which live there. A list of plants growing together in a community may not mean much to a layman, but such a list tells an ecologist what kind of soil, climate, and animals he might expect to find associated with that plant community. Therefore, in this report, ecosystems of Acadia will be named by listing major plants of their associated plant communities. The following descriptions and acreages are very roughly estimated.

Community Reference Number	Major Plant Communities	Approximate Area in Acres
1	Spruce-Fir forest	7000
2	White pine-birch-maple-spruce forest	7000
3	Birch-Aspen-Blueberry forest	7000
4	Northern Red Oak-Birch Forest	2500
5	Birch-Beech-Maple forest	2000
6	Pitch Pine-Blueberry	1500
7	Black spruce-Sphagnum bog	1000
8	Sedge-Alder marsh	1000
9	Cedar-Maple forest	400
10	Scrub Oak-Pitch Pine-Blueberry	200
11	Jack Pine-Blueberry	200
12	Water Lily-Water Shield (fresh water ponds)	100
13	Grass-Sedge marsh	100
14	Beach Grass-Beach Pea	3
	Total	30,000
	Rockland or open water	3000
15	Rockweed-Kelp (Intertidal Zone)	500?

TABLE 1. MAJOR PLANT COMMUNITIES OF ACADIA NATIONAL PARK

(These descriptions and acreages are very roughly estimated)

White pine is the dominant species characterized under reference number 2 of the major plant communities in Acadia National Park.

White pine in conjunction with the native ribies plant establishes the natural cyclic host relationship necessary for the perpetuation of the White Pine Blister Rust disease. This condition, if left unchecked, would ultimately destroy the majority of the park's white pine population. Therefore, control measures are necessary to insure the maintenance of the park's native forest cover, as directed by the National Park Service policy for administration of natural areas.

Special emphasis must be given to retain and encourage white pine. Most of the park's white pine is located in a 7,750 acre burn area that resulted from the 1947 Mount Desert Island fire. In 1971 the Maine State Forestry Department identified the park as being located in a high climatic hazard area for Blister Rust and recommends that careful attention be directed toward the park's Blister Rust control program.

Acadia National Park has been an area of concern and subjected to Blister Rust control projects since 1929. Past efforts have apparently been effective and have kept major outbreaks in check. However, there is much to be learned concerning the effectiveness of methods presently being used, density of the island's white pine population, location of the trees, aesthetic values involved and the establishment of long range objectives for control of this disease.

ACAD-N-0005 (Appendix) has been accepted as a means of answering some of these questions and to provide basic information for re-evaluating the Acadia National Park White Pine Blister Rust Control Program.

PLANT SUCCESSION

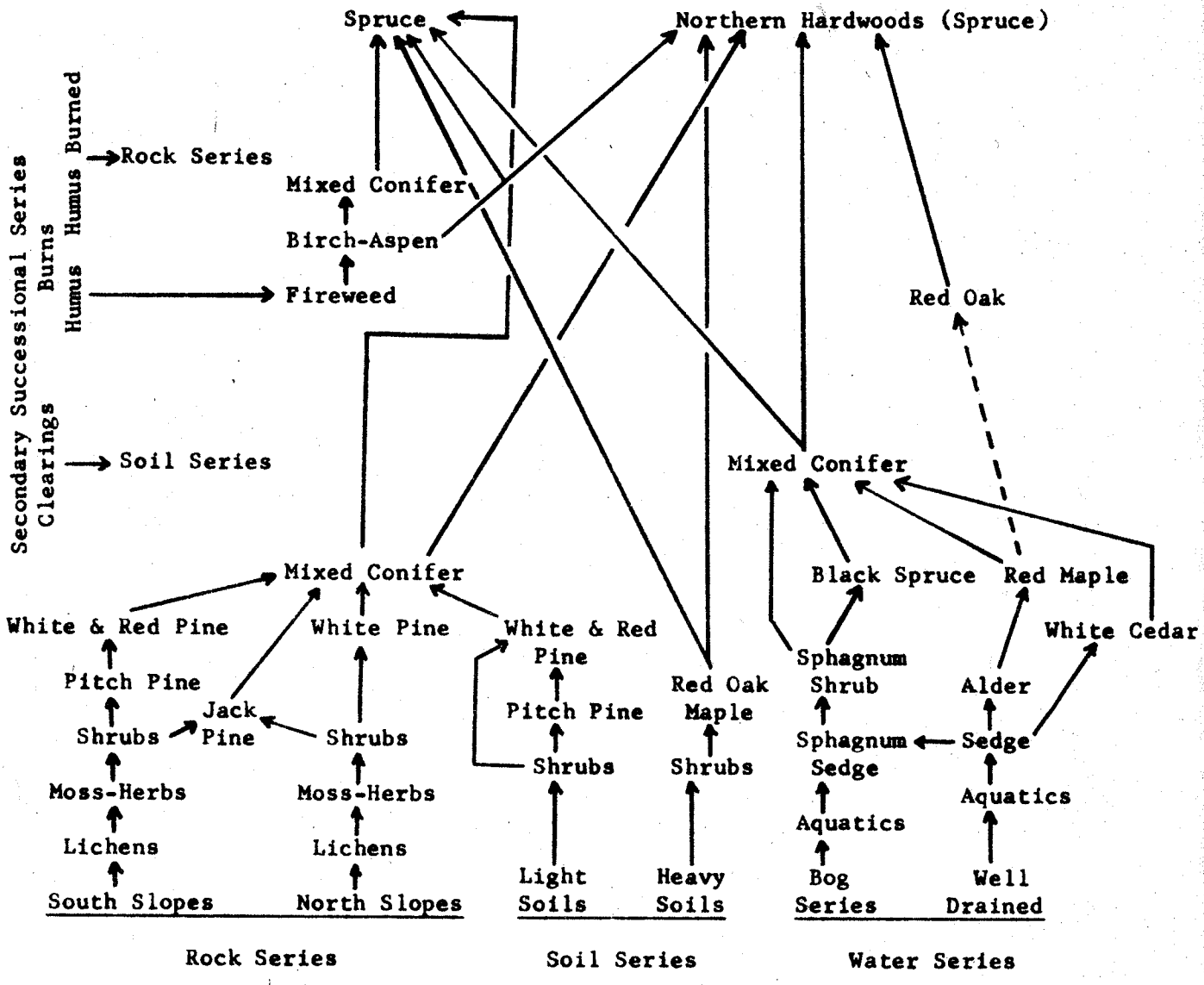


Chart indicates stages in successional series in the development of vegetation of Mount Desert Island. (Moore & Taylor, Favour)

Figure 3

Wildlife

Forty-four species of land mammals and three hundred thirteen species and sub-species of birds have been recorded on Mount Desert Island. (Favour) Sea fauna have been more generally documented but little is known of their distribution and abundance near Acadia shores. Fresh water fish species in the park have been subject to scientific inquiry (Bishop and Clarke, 1923; Batchelder, 1927), but current data is lacking.

It is obvious that the heavy hand of a fellow creature - man - has taken its toll on other residents in the natural community. The Canada Lynx and Spruce Grouse have been extirpated. Rare or endangered in Acadia are the Fisher, Bald Eagle, Osprey, Peregrine Falcon, Wood Duck, Black Bear, Bog Lemming, River Otter, Bobcat, and Woodchuck. The Gray Squirrel, once extirpated on Mount Desert Island, has been successfully reintroduced. The status of Harbor and Gray Seals, Whales, Porpoise, and other locally observed sea creatures is unknown.

Terns are a glaring example of the marginal status of some wildlife species. One spring morning in 1966 three people who wanted to photograph terns visited a common tern colony on a small island near Acadia National Park. Most eggs had already hatched and the chicks were hiding in tall grass around the nests. The people carefully avoided stepping on nests, but

they did not know chicks were concealed nearby. They inadvertently stepped on and killed five chicks, and possibly more (Roop, 1967).

If tern colonies were thriving this accident would have less significance. Unfortunately, these colonies have suffered a drastic decline in numbers for at least 85 years. Roop (1967) gives documented estimates of 75 known colonies in Maine in 1885, 31 colonies in 1890 after the millinery trade began using tern feathers, not over 25 colonies in 1911, and 21 colonies on the coast of Maine in 1931. Many of these 21 colonies have since been abandoned (Roop, 1967).

The common tern is, of course, not the only island-nesting bird whose survival is in question. Arctic and roseate terns, which often nest with common terns, have also abandoned former nesting islands. Leach's Petrel and blackpoll warblers are known to nest on only two sites near Acadia National Park - Greater Duck and Little Duck Islands. These two islands are among 73 proposed by Favour (1968) for inclusion in Acadia National Park.

Only the Whitetailed Deer (Baird, 1964; Klataske, 1968; McLaughlin, 1968) and Beaver (Baird, 1964) have received detailed study in recent years. Three recent studies, the





Attaching long-life radio transmitters to Whitetailed Deer. (University of Maine research project.)



Deer trapped in newly developed aluminum-framed nylon mesh trap. Trap baited with apples.

SUMMARY

Perhaps Marston Bates has best expressed the purpose of resource management in Acadia. In "The Forest and the Sea" he writes, "I have faith in man's future, faith in the possibilities latent in the human experiment: but it is faith in man as a part of nature . . . faith in man sharing life, not destroying it."

If this message is somehow gained or personally renewed by a visit to Acadia, then we will have accomplished part of our job. If the natural integrity of Acadia is perpetuated, then we will have accomplished the other part.

Man and the park - as he has left his mark, as he now meets and reacts to an area protected from him, conserved for him - presents a compelling and complex challenge. His assault may overwhelm the park environment and culminate in serving the demands of mass entertainment. But it can be a meeting in harmony with the intricate and beautiful world of nature. The choice rests uncertainly with a friend in court - the park manager.

Red Spruce Forest (Allen, 1969), Sand Beach (Barden, 1969), and Spruce Grouse (Barden, 1970) have turned park resource management strongly toward ecology.

Research, though primary, is only one aspect of data collection that may lead to better park management. Continuous and well documented observation by the professional park staff and qualified amateurs has confirmed the gradual extension northward of southern and temperate bird species such as the brown thrasher, mockingbird, towhee, and cardinal. The off-duty efforts of a seasonal Ranger-Naturalist have contributed important information on amphibians (Davis, 1958). A member of the present interpretive staff has brought the academic phrase "natural resources" to life through the eye of a movie camera - a contribution that communicates a personal message on the park environment to many visitors.