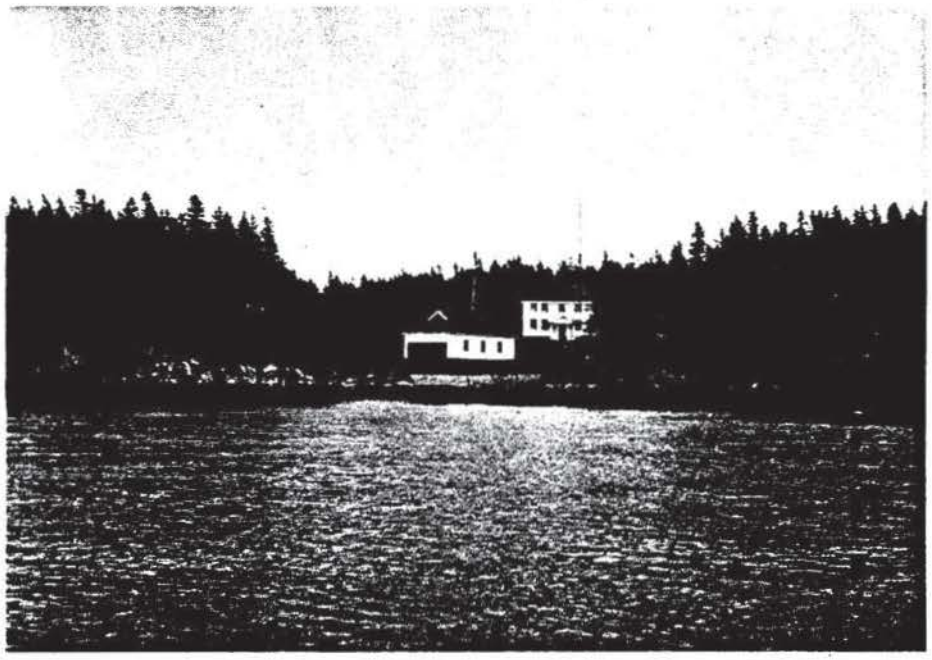
CROSS ISLAND
EVALUATION AND MANAGEMENT PLAN



ISLAND INSTITUTE

Integrated Resource Management Planning

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CROSS ISLAND:

EVALUATION AND MANAGEMENT REVIEW

for

RECREATION, EDUCATION AND RESEARCH

for

HURRICANE ISLAND OUTWARD BOUND SCHOOL

CABOT BIOLOGICAL STATION

and

THE ISLAND INSTITUTE

by

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Inexpressible kudos to Helen and her pies, the fuel that fired our enthusiasm; to 'Old Blue' for trusty transport; and finally, Ma Nature for the extra effort she put into Cross.

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EXECUTIVE SUMMARY

An evaluation and management review for recreation, education, and research for Hurricane Island Outward Bound School (HIOBS), the Cabot Biological Station, and the Island Institute was conducted on Cross Island during June and July of 1986 by four interns of the Island Institute of Rockland, Maine.

The purpose of the study is to provide HIOBS with a document that to be used for internal planning purposes. In addition, it could serve as a vehicle for discussion for use agreements between HIOBS and Cross Island co-owners, Thomas Cabot and the U.S. Fish and Wildlife Service.

The evaluation included investigations of attitudes concerning use, past and current use patterns, and an analysis of Outward Bound course and logistical support functions. Additionally, the physical facilities including, buildings, trails, waste disposal and water supply were evaluated for recommended improvements. Research and education potential were also evaluated for the Cabot Biological Station and the Island Institute.

The evaluations and recommendations are summarized by topic. Recommended improvements are incorporated into master plans regarding the potential of future uses. Three alternatives illustrate different possible courses of action: 1) Maintain Current Patterns of Use, 2) Locate Selected Uses on HIOBS Property, and 3) Consolidate Uses and Facilities on to HIOBS Property. The proposed uses are expressed in 'Use Zones' that describe and characterize the type and level of use in each area.

INTRODUCTION

Of the myriad of Maine islands, Cross Island offers distinctive opportunities for recreation, education and research. The assemblage of plants, wildlife, marine life, geology and human history make Cross Island a notable example of human and natural history on Maine islands. As co-owners, with the U.S. Fish and Wildlife Service (USFWS) and Thomas D. Cabot, the presence of a Hurricane Island Outward Bound School (HIOBS) wilderness outpost includes responsibilities and priveleges to insure that the quality of life experienced by visitors and inhabitants are similarly preserved.

GOALS AND OBJECTIVES

In an in-depth evaluation of present and potential use, four interns of the Island Institute conducted an evaluation of the present uses and developed specific recommendations for potential uses of the HIOBS property between 26 June and 3 July. The goal of the evaluation was:

> To provide a plan for HIOBS and the Island Institute to create a long-term, sustainable wilderness outpost and research station that maintains the aesthetic, wilderness and ecological integrity of Cross Island.

The plan is to be used for future planning and as a vehicle for discussion of use agreements between the USFWS, Thomas Cabot and HIOBS. The plan also addresses issues of wilderness ethics, education and discovery while translating ideals into management practices. Specific objectives of the study include:

1) To locate and evaluate present and future suitable campsites, trails, drinking water supplies, and sanitation practices on HIOBS property.

2) To assess the island trail network and recommend changes that improve comprehension, circulation, and safer acccess to solo sites and points of interest.

3) To recommend management policies that consider the constraints of island wilderness living, wildlife refuges and cooperating landowners.

4) To evaluate the potential for the Cabot Biological Station to conduct environmental education and ecological research.

DESCRIPTION OF CROSS ISLAND

Location and Ownership

Cross Island is one of the largest islands at the eastern end of the Maine archipelago (Figure 1). The island encompasses 1527 acres and is located due south of Thornton Point (Figure 2). Private ownership is retained by HIOBS (20 ac.) and Thomas D. Cabot (18 ac.). The remainder of the island is federal property and managed by the USFWS. Cross Island is part of an island reserve system including Petit Manan Island to the southwest. Preserve management is under the supervision of Thomas Goettel in Milbridge.

Access, Tides and Oceanic Influences

Bucks Harbor, a working port, is the point of departure for Cross Island, approximately 4 miles to the east. The HIOBS station overlooks the Cross Island Narrows. Average tidal fluctuation is approximately 13 feet and spring tides reach 15 feet. Because of strong tidal currents through the Narrows, boats are moored well into the throat of Northeast Harbor. Protected mooring and landing areas are also present in Northwest Harbor. Access is difficult from the southern and eastern shore because of high exposure to ocean swells and a steep, rocky coastline. The climate of Cross Island is greatly influenced by the cold Labrador current.

Topographic and Geologic Points of Interest

The coastline has a variety of coastline features that correspond to specific environmental conditions in the area. Steep, rugged 100

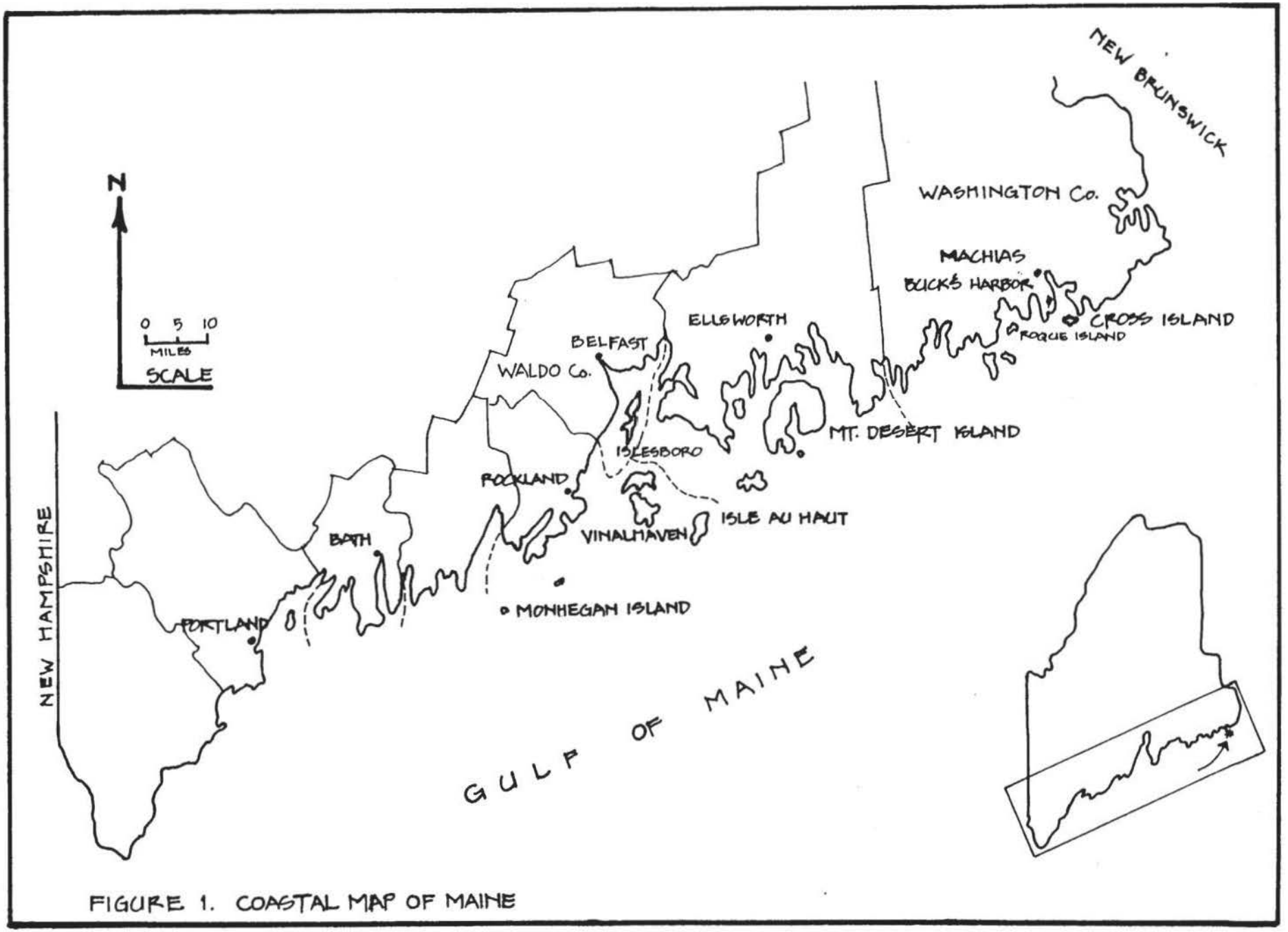


FIGURE 1. COASTAL MAP OF MAINE

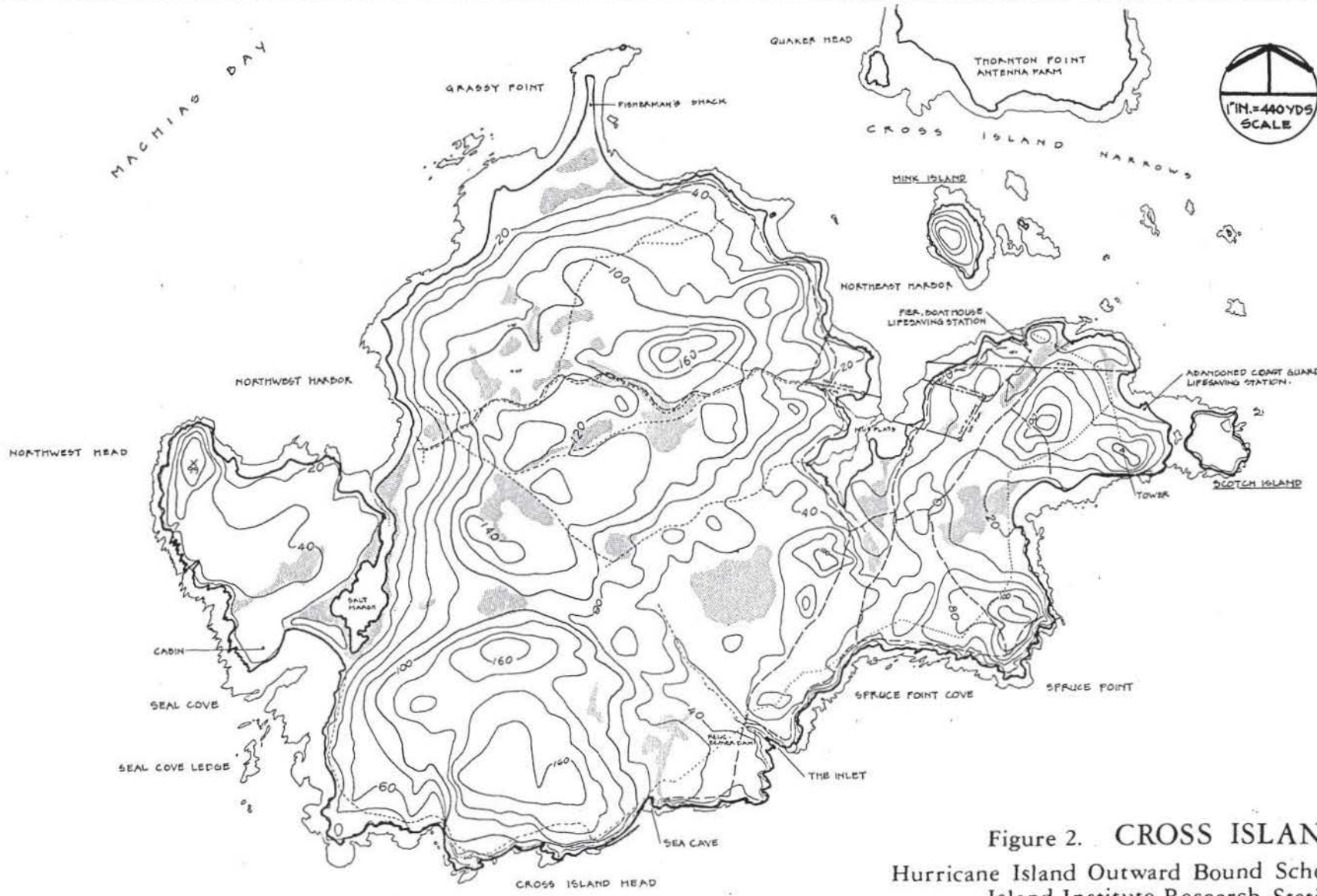


Figure 2. CROSS ISLAND

Hurricane Island Outward Bound School
Island Institute Research Station
Cabot Biological Station
CROSS ISLAND MANAGEMENT PLAN

foot cliffs of Cross Island Head resist the erosive forces of wind and sea. Several large active cobble beaches that are constantly reworked by storms and tidal surges are also present. Consequently, safe mooring and easy island access sites are virtually non-existant on the southeast side.

In addition to the spectacular Head, a sea cave and inlet are other points of special interest. The sea cave, accessible only at low tide, could be the result of faulting. The steep parallel walls of the inlet leave one wondering about the formation. Both sites would be excellent for interpretation and geologic education.

The northern and western coastlines have a different character; the shores are less forbidding and the waters are noticeably calmer. Grassy Point consists of a long sandy-gravelly spit connecting a rock outcrop with the body of the island. The skeleton of a fisherman's shack embodies a feeling of envy to live amid a place where eagles now loaf, cormorants sun and would-be poets muse. The island interior consists of gently rolling hills. Rock outcrops and small escarpments occur in localized areas.

Northeast Harbor is a sheltered cove with a variety of features, namely a large mudflat that reveals converging island streams at low tide. The mud flat is an excellent educational complement to the estuarine salt marsh emptying into Northwest Harbor.

Vegetation

Cross Island vegetation is influenced by factors of climate, geology, soil, post-glacial migration of plant species, and past human

use. The cold Labrador current, a dominant climatic influence, creates a foggy, cool environment on Cross Island. The combination of cool, moist conditions, shallow mineral soil, and organic soil development have created a boreal forest.

The boreal forest is dominated by red spruce (Picea rubens) and white spruce (Picea glauca) with balsam fir (Abies balsamea)and paper birch (Betula papyrifera) as subdominants. The associated ground cover varies with the amount of light that penetrates the overstory and the amount of available moisture. Many species proliferate in well-drained mesic areas including mosses (Pleurozium spp., Polytrichum spp.,and Hylocomnium splendens), clubmosses (Lycopodium spp.), herbs - Canada mayflower (Maianthemum canadense), starflower (Trientalis borealis), and goldthread (Coptis groenlandicum) and the creeping shrub- mountain cranberry (Vaccinium vitis-idaea).

Vast areas of Cross Island are wetlands (Figure 2). Fen-like communities developed where poorly drained soils, low lying depressions or seeps created wet areas. Dense thickets of alder (Alnus rugosa) have developed along streams and drainages. In more open areas, low-bush blueberry (Vaccinium angustifolium) and Labrador tea (Ledum groenlandicum) were found.

In addition to the boreal forest, other areas of particular botanical interest are:

1) Cobble beaches
2) Salt marsh of Northwest Harbor
3) Seaward cliff meadows
4) Southern cliffs

Within these ecosystems, three sub-arctic disjunct plant species, considered rare in Maine, were found on Cross Island. They are: oysterleaf (Mertensia maritima), beachhead iris (Iris hookeri), and roseroot stonecrop (Sedum rosea). These species are at the southern limit of their geographical range along the Maine archipelago (Olday et al., 1983).

On cobble beaches of the western, northern and eastern shores, salt stress has a significant influence on the developing plant community. These beaches are dominated by salt adapted species: beachpea (Lathyrus japonicus), sea rocket (Cakile edentula) and oysterleaf. Further on the rocky shore, but still within the spray zone, beachhead iris is not an uncommon find.

The salt-marsh and flats near Northwest Harbor are especially rich and productive. Salt tolerant plants, migratory waterfowl, and marine organisms add to the highly diverse ecosystem.

Above the southern cliffs, terraces are topped by unstable exposed peat. Progressing inland, the peat is stablized by a sub-arctic species black crowberry (Empetrum nigrum), cranberry (Vaccinium macrocarpon), bayberry (Myrica pennsylvanica) and well-established spruce. Meadow communities of grasses, forbs and an occasional stunted spruce carve seaside niches out of the spruce forest. Establishment and maintenance of seaside meadows is a poorly understood process.

The cracks and crevasses of the southern cliffs also contain highly adaptive communities of lichens and small plants. A notable species is the roseroot stonecrop. Roseroot, which is at the southern

end of its range, grows profusely with black crowberry among the cliffs. Overall, Cross Island would be an excellent laboratory for the study of plant ecology.

Wildlife

Cross Island is an important addition into the wildlife reserve system of Maine. It is the largest island reserve in "Downeast Maine". A fairly large white-tailed deer population lives on the island. Deer are frequently seen grazing in the seaside meadows. The bald eagle (Haliaeetus leucocephalus), an endangered species, and osprey (Pandion haliaetus) are common sights around Cross Island.

Cross Island is perhaps most valued for its location as a research station. Its proximity to nesting colonies such as Machias Seal Island and Old Man Island provides a valuable logistical advantage to research scientists. Razor-billed auks (Alca torda), the rarest nesting birds on the Maine coast, occur on nearby Old Man Island in relatively large numbers and are currently being studied.

Human History

While little is known of the indians of the area, fishermen's base camps were the oldest traditional use of Cross Island by European descendants. Several shacks and other remnants remain as windows to its fishing history. With the increase in commercial activity along the coast, the U.S. Lifesaving Service included Cross Island with its system of coastal lifesaving stations. The first station was established on a cove near Scotch Island between 1873

and 1875. The original station, once an elegant architectural specimen, was abandoned and now stands in near ruin on the beach. The lifesaving station had a reknown hardwood floor and was the scene of frequent dance parties attended by mainland folks and islanders alike. Research on the site, history, and architecture should be researched before it disintegrates completely.

A second lifesaving station and a boathouse were built overlooking Northeast Harbor in another flurry of Coast Guard expansion between 1918 and 1929. An island-wide network of trails, buildings, telephone lines and a lookout tower were also built. Most of the former trails and telephone cuts have been overgrown with spruce forests though a few stretches remain open.

Much of the island's western half was logged between 1939 and 1941. Some of the skid trails remain open and lead to a cleared landing on Northeast Harbor.

EXISTING CONDITIONS - HIOBS PROPERTY AND FACILITIES
Description, Evaluation and Recommendations

HIOBS Use History.

In 1968, Thomas D. Cabot generously donated the island to the Nature Conservancy and HIOBS, while keeping a small parcel for himself. The Conservancy has since given the land to the USFWS. Tom Cabot also donated funds to establish the Cabot Biological Station as a facility for education and research.

Cross Island was first used by HIOBS in 1969. Day use and solo visitation was sporadic between 1969 and 1982. Sea courses formerly operated out of mobile bases on Lakeman's Island (near Roque Island) and Bartlett's Island (near Mt. Desert). The only established course facilities consisted of a temporary ropes course and a wall, which have since disintegrated.

In 1983, HIOBS decided to make Cross Island a more active base. The increase in interest was attributed to three factors:

1) Cross Island was recognized as one of the few remaining places to provide a high quality wilderness experience.

2) Renovation of the lifesaving station and boathouse were coordinated with money donated by Tom Cabot to establish the Cabot Biological Station.

3) The desire to take proprietary interest and invest in an establish base.

Work on the station and property began in 1983 with a large work project that included trail work, land clearing around the station and

station renovations. Since 1983, the island has been regularly used by HIOBS courses for solo visits.

HIOBS Property.

The 20 acre parcel of HIOBS land includes a variety of landforms, coastline and vegetation communities (Figure 3). An alder thicket/ wetland drainage bisects the property. Except for the clearing around the station and wetland, mature and overmature red spruce forests cover the rolly terrain.

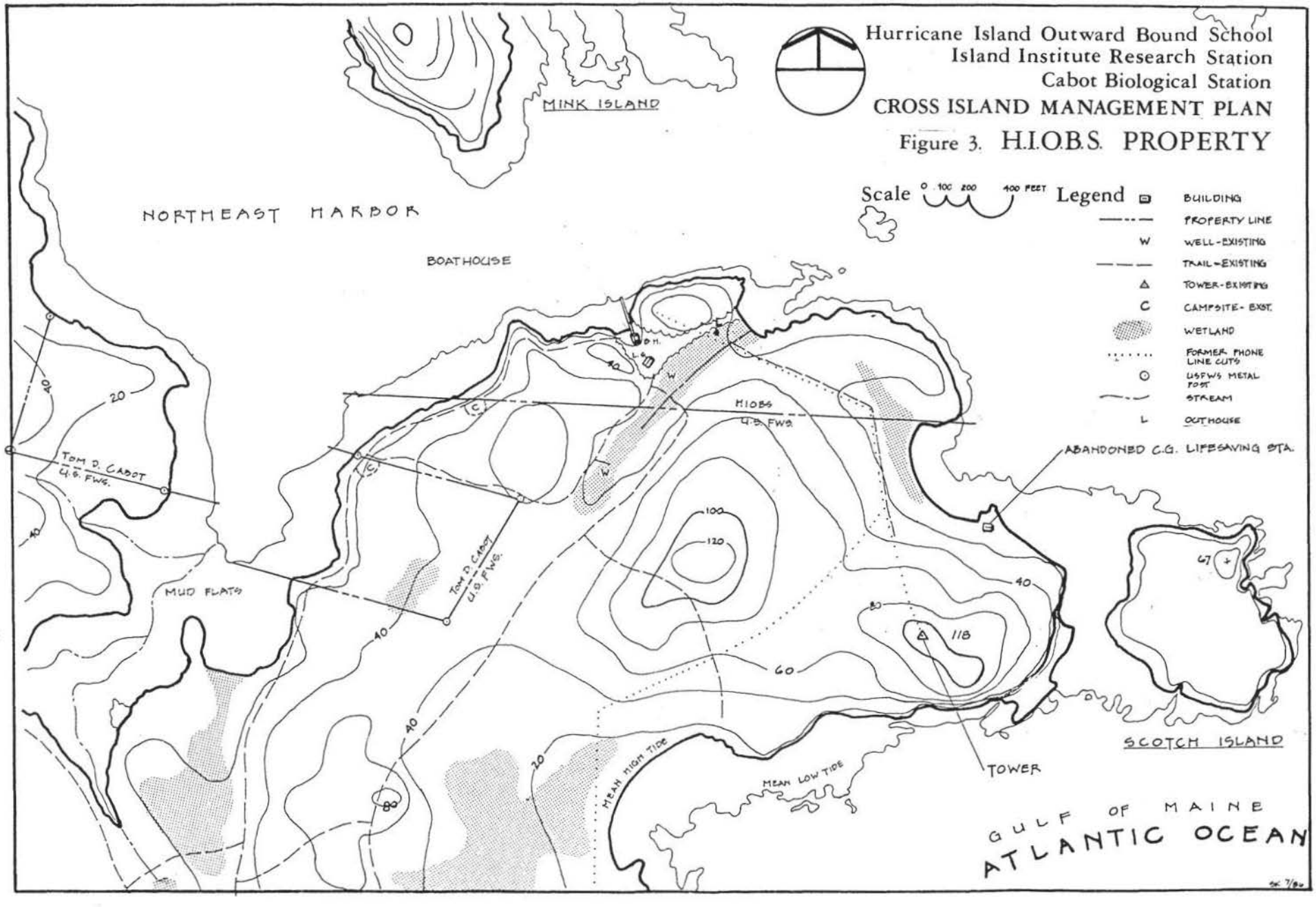
While the original survey holes in the coastal rock marking the property were never found, the approximate boundary location was remeasured according to the legal description (Appendix A). In Northeast Harbor, a quartzite vein above the high tide line demarcates the property line. The property boundary is tentatively flagged with day-glow orange plastic flagging numbered and marked with a 'P'. Ideally, the USFWS and HIOBS should collaborate to have property line re-surveyed and marked.

Staff Quarters and Support Facilities

Lifesaving Station.

Current Use. Currently, HIOBS and the Island Institute (I.I.) are the only active users of the island. The lifesaving station provides living quarters for the HIOBS staff and researchers of the I.I. The station is in good condition and is in the process of being adaptively renovated for new uses.

The layout of the $2^1/2$ storied structure is shown in Figure 4.


Hurricane Island Outward Bound School
Island Institute Research Station
Cabot Biological Station
CROSS ISLAND MANAGEMENT PLAN
Figure 3. H.I.O.B.S. PROPERTY
Scale 0 100 200 400 FEET
Legend
BUILDING
PROPERTY LINE
W WELL-EXISTING
TRAIL-EXISTING
TOWER-EXISTING
C CAMPSITE-EXIST.
WETLAND
FORMER PHONE LINE CUTS
USFWS METAL POST
STREAM
L OUTHOUSE
MINK ISLAND
NORTHEAST HARBOR
BOATHOUSE
H.I.O.B.S. U.S. FWS.
TOM D. CABOT U.S. FWS.
TOM D. CABOT U.S. FWS.
ABANDONED C.G. LIFESAVING STA.
MUD FLATS
MEAN HIGH TIDE
MEAN LOW TIDE
TOWER
SCOTCH ISLAND
GULF OF MAINE
ATLANTIC OCEAN

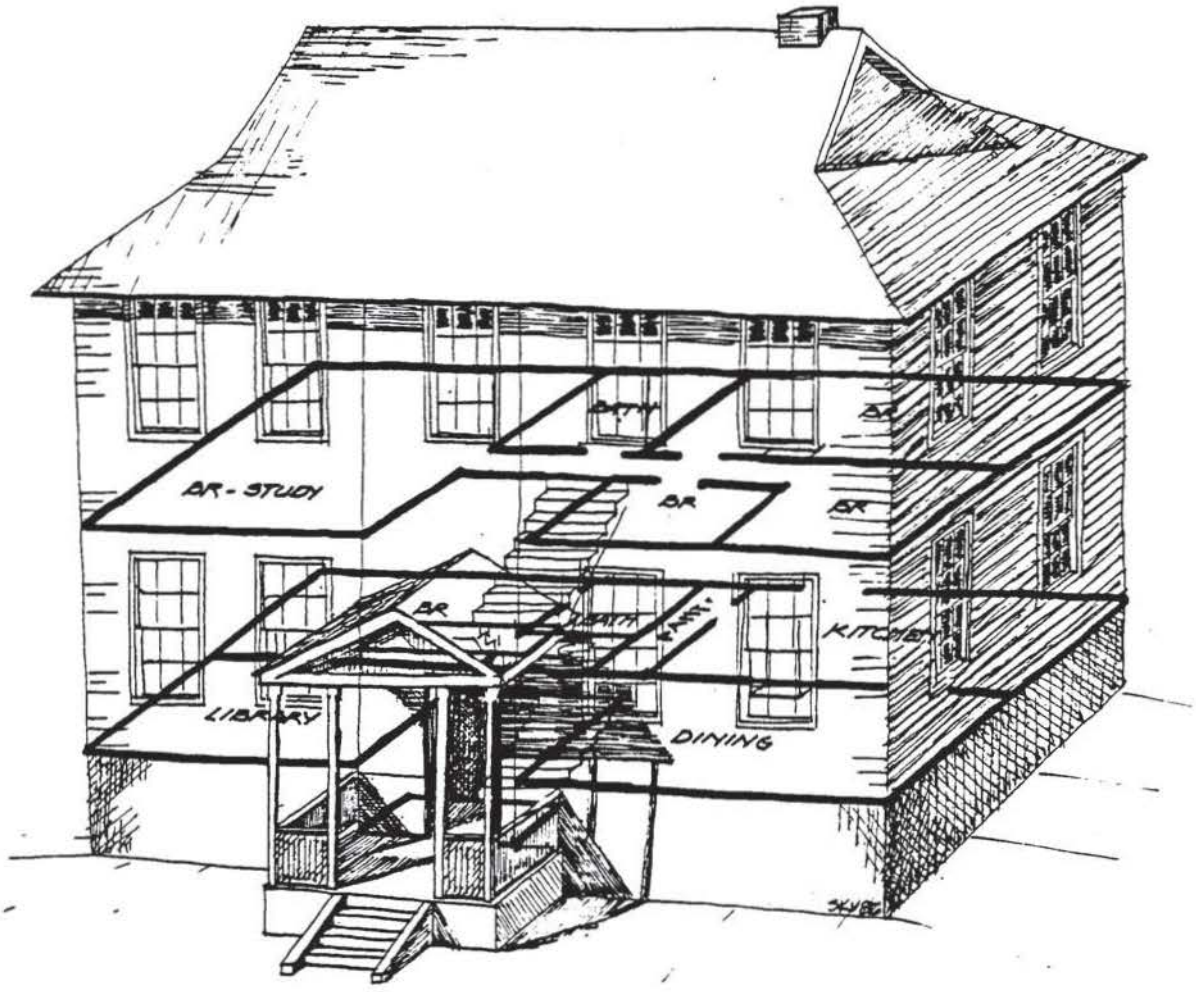


FIGURE 4. SCHEMATIC LAYOUT OF LIFESAVING STATION

The station is partially wired for 12v electric supply and replumbed for cold water service. To date, one upstairs room, one downstairs room and the kitchen have been renovated and repainted. Most of the remaining rooms require scraping and painting, which is planned and underway. Additionally, there is a large attic which may be utilized for storage or sleeping should the need arise. Several large rooms with good natural lighting (windows) are ideal for educational and research workspace.

The lifesaving station is large and could be utilized for several purposes. There is sufficient floor space upstairs to sleep 30-40 people sardine style in emergencies. For normal periods of HIOBS operation, however, that number is probably not sustainable. Maximum working capacity probably numbers around 10-15 providing logistical bottlenecks of kitchen and bathroom use could be resolved. Should the larger rooms be used for education or research workspace, sleeping capacity would decrease.

Potential Uses. Uses for the station can easily be visualized in three sections, by floor. Each section is suitable for:

2nd Floor- dormitory style sleeping
lecture, project space - large room

1st Floor- kitchen, pantry
lounge, library, radio room
caretaker, boatdrivers quarters

Basement- utilities, shop, storage

To accommodate each of these uses, the following improvements are listed. Recommended changes should be implemented to improve safety, sanitation and function for present levels of use. Optional

changes will improve convenience if the use changes or increases.

2nd Floor- Recommendations

1) Install railing for the stairway.
2) Scrape and paint remaining walls and ceilings.
3) Provide electric lights in halls and the stairway.
4) Install water tank in attic for reserve supply.
5) Provide screens for windows.

Optional for increased use

1) Acquire more sleeping pads.
2) Running water for toilet and shower.
3) Tables and chairs.

1st Floor- Recommendations

1) Scrape and paint remaining walls and ceilings.
2) Provide more chairs and tables.
3) Install a woodstove for heating.
4) Lights over kitchen workspace-sink, counter, and stove.
5) Stove repair needed-knobs and springs.
6) Install a gas refrigerator.

Options

1) More shelves in pantry.
2) Move sink into kitchen with more counterspace.
3) Running water to bathroom sink, toilet and shower.
4) Relocation of lights to be near users- hung lights near chairs and tables.

Basement Recommendations

1) Lights!

Options

1) Shelves to keep things dry and off floor.

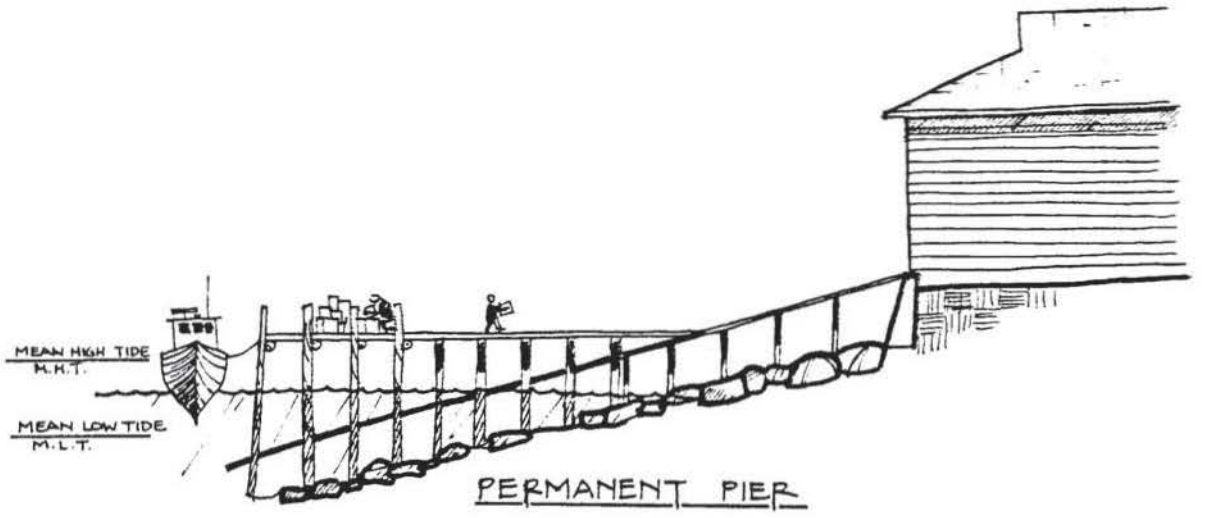
Boathouse and Pier

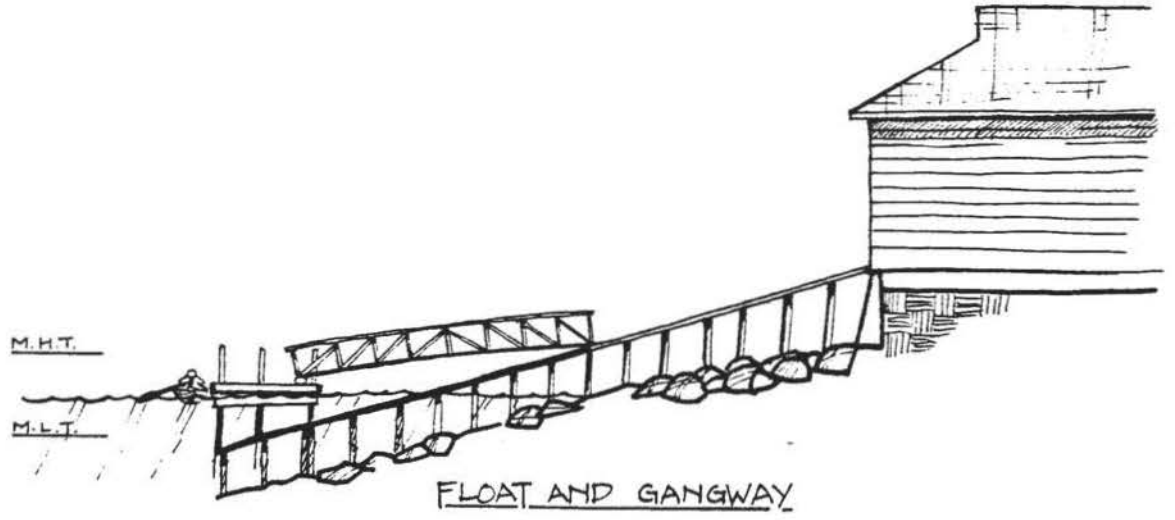
Condition. The boathouse is a sturdy, functional structure. It has high potential to be the multi-purpose building needed to support a variety of activities should use increase. A sloped concrete floor leads to two overhead sliding doors. The frame of the former haul-out sled, now resting wheel-less on its track, should be removed to make more space. It is important to note some foundation deterioration beneath the sliding doors. Several potential hazards are present in the guise of floor holes and low head clearances. Prompt repairs are recommended to assure that the structure remains sound.

Access to the shore near the lifesaving station is presently restricted to beach landings by small boat. The former haul-out ramp cannot funtion as a pier in its present state. All supplies are ferried ashore via small boat. If use is to increase, constructing a pier may be the first step.

The existing haul-out ramp may be an excellent foundation for such a permanent pier. It may be possible to incorporate the old haul-out sled as an integral part of the structure, thereby effectively getting out of the way in the boathouse. A few schematic pier alternatives are shown in Figure 5).

Potential Uses. The possibilities for restoration are endless depending on the intended needs. Several uses considered for the boathouse include:





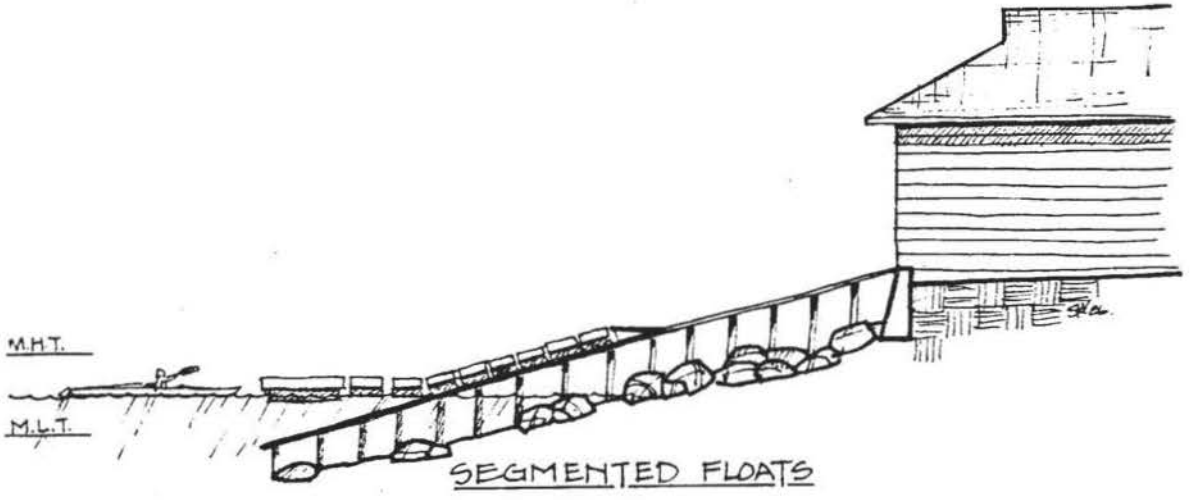


FIGURE 5. SCHEMATIC PIER ALTERNATIVES

1) Classroom lecture amphitheater - downstairs
2) Wet/ dry labs for education and research - upstairs or down
3) Watch locker space - upstairs
4) Equipment maintenance and storage - upstairs or down

To accommodate the intended use, some minor structural changes may be possible to improve the buildings new function. Some plausible changes may include.

1) Partial lowering of the first floor ceiling to make more head room upstairs.
2) Repairing or rebuilding damaged floors.
3) Creating level storage space for watch lockers with provision for hanging and drying equipment.
4) Provide safer access to the upstairs.
5) Create some type of office space.

Other considerations to create an educational/ research facility may include:

1. Electrical requirements - An additional 110 volt generator may be needed to satisfy standard classroom needs and laboratory equipment such as fish tank pumps, slide projectors and ventilation.
2. Furnishings - Students and researchers need workspace, desks pin-up space, chalk boards, chairs, specimen and equipment storage space.
3. Heat- Because of the frequent cold foggy days on Cross Island, wood stoves may be required to provide classroom heat.

Utilities

Power Supply. Electric power is supplied by a 110 volt generator and used for running the pump and recharging the 12 volt

battery system. Existing house circuits were reworked and connected to the battery system for lighting.

The 12 volt lighting system is appropriate, but not carried far enough. Lightbulbs are inefficiently located in the middle of the ceiling near the boxes. Running wire and lights to be near work stations and reading areas would be simple and greatly improve the system.

Another way to conserve wear and tear on the generator would be to install a reservoir water tank in the attic. The reserve capacity would consolidate pump/ generator running time, improve water delivery and provide steady pressure.

Water Supply. Water for the lifesaving station is drawn from a well located in the alder wetland to the east of the house. The well is a 5 foot deep, rock lined pit and capped with a section of clay pipe, 2 feet in diameter. The well is in good condition.

Water quality was tested in 1983 and found to be satisfactory, however, a trace of lead was found. Since lead could have been introduced into the system from batteries, shotgun shells etc. , a thorough cleanout of the well might be worth the effort. Such a 'mucking out' would be best performed during the fall shutdown to allow disturbed debris to settle over the winter.

Water is supplied, by electric pump, to the house and connects to the existing plumbing. Outlets include: an outdoor shower, kitchen sink, 1st floor bathroom sink and 2nd floor bathroom sink. The plumbing system is comfortable for existing use (assuming cold showers are appreciated by most). An attic reservoir would be a

worthy improvement.

Waste Disposal

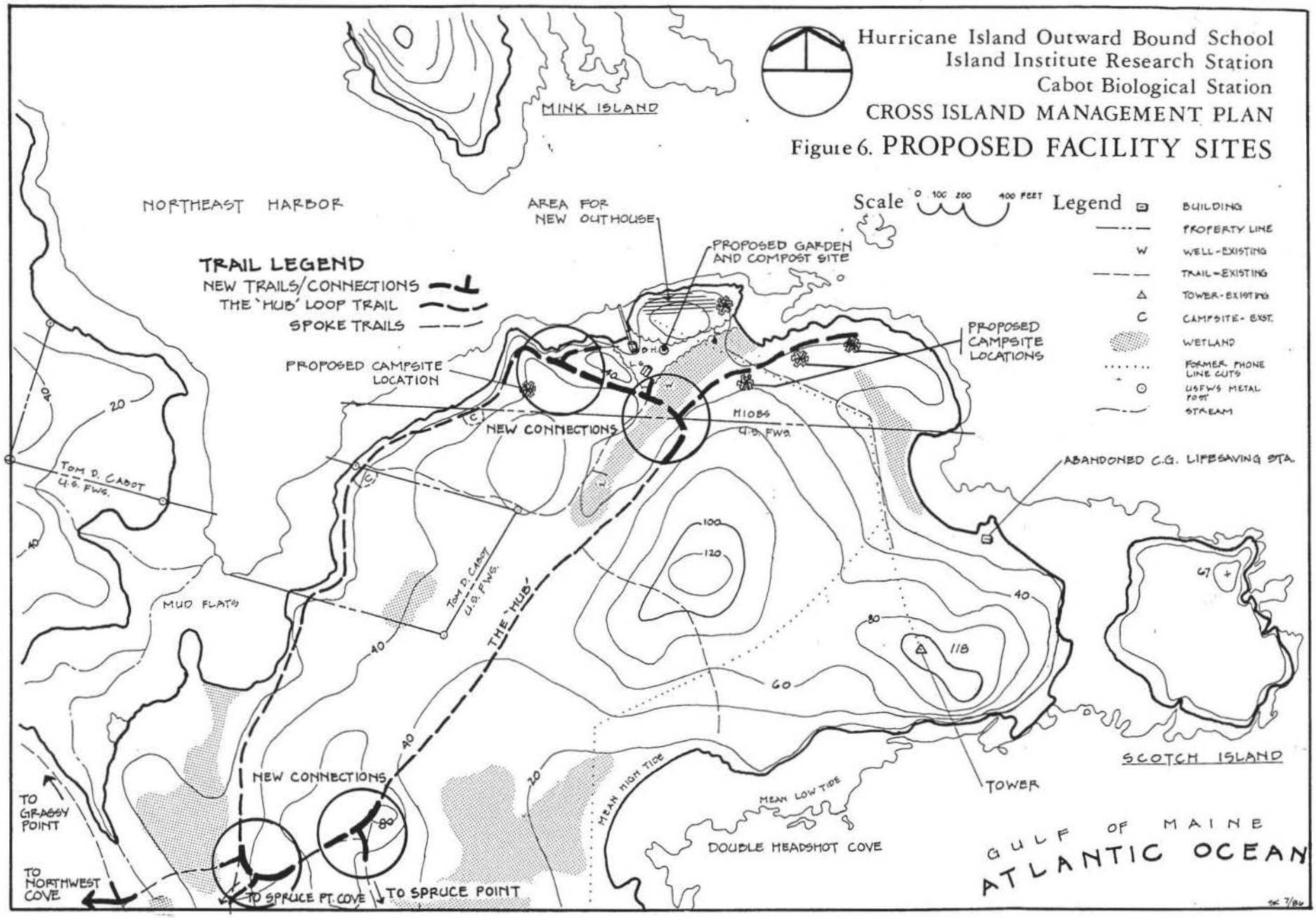
Waste disposal is a critical issue to sustainable use of islands. Proper, ecologically sound waste disposal techniques should become a part of the educational experience of all who visit the island. Waste is currently disposed by acceptable means but there is room for improvement.

Solid waste. Hauling trash from an island means that solid waste is handled many times in many ways. To minimize the removal effort, emphasis should be given to separation and recycling whenever possible. Organic matter should be recycled in a compost pile for garden use or simply natural decomposition. The compost should be located near the proposed garden and convenient for staff and student use. A garden and compost site are shown in Figure 6.

Paper products are usually separated and burned in the old boiler. Burning is probably the most efficient means to dispose of the small amounts of paper. Metal and plastics are simply bagged and hauled back to Buck's Harbor for disposal. These items could be separated but recycling facilities are not available in Buck's Harbor.

Human Waste. The staff area currently utilizes two methods for disposing of human wastes: the lifesaving station's septic system and an outhouse. A third method, use of the inter-tidal zone, is generally not utilized by the staff.

The septic system of the lifesaving station receives very little use. The condition of the system should be thoroughly checked before


Hurricane Island Outward Bound School
Island Institute Research Station
Cabot Biological Station
CROSS ISLAND MANAGEMENT PLAN
Figure 6. PROPOSED FACILITY SITES
MINK ISLAND
NORTHEAST HARBOR
AREA FOR NEW OUTHOUSE
PROPOSED GARDEN AND COMPOST SITE
Scale 0 100 200 400 FEET
Legend
BUILDING
PROPERTY LINE
W WELL-EXISTING
TRAIL-EXISTING
TOWER-EXISTING
C CAMPSITE-EXST.
WETLAND
FORMER PHONE LINE CUTS
USFWS METAL POST
STREAM
TRAIL LEGEND
NEW TRAILS/CONNECTIONS
THE 'HUB' LOOP TRAIL
SPOKE TRAILS
PROPOSED CAMPSITE LOCATION
PROPOSED CAMPSITE LOCATIONS
NEW CONNECTIONS
H10BS U.S. FWS.
TOM D. CABOT U.S. FWS.
ABANDONED C.G. LIFESAVING STA.
MUD FLATS
THE 'HUB'
SCOTCH ISLAND
TOWER
MEAN HIGH TIDE
MEAN LOW TIDE
DOUBLE HEADSHOT COVE
GULF OF MAINE
ATLANTIC OCEAN
TO GRASSY POINT
TO NORTHWEST COVE
TO SPRUCE PT. COVE
TO SPRUCE POINT
SK 7/84

being used. If found satisfactory, there may be no need to have outhouses or other toilet facilities.

The outhouse is located 300 feet east of the lifesaving station and is renowned for being the outhouse "with the best view in the world" (pers. comm., Dave Schick). Properly located and constructed outhouses are an acceptable means of waste disposal, but the present outhouse has two deficiencies as measured by Maine Department of Environmental Protection (MDEP) standards.

First, the outhouse is too close to the small creek draining the wetland. A setback of 100 feet from open water is the current standard for siting pit toilets. Second, outhouses should be be sealed to prevent possible entry by animals. The existing outhouse should have the bottom edge sealed and covers installed over the seats. It is recommended that the existing outhouse be closed and one of the following alternatives be implemented.

Alternatives. One alternative considers use of a continuous composting toilet (CCT) for staff use. Organic waste from the kitchen could composted as well. CCT's require less maintenance than other composting techniques (batch or bin methods) and produce pathogen free fertilizer. High construction cost, high bulk and a less than trouble free track record are negative attributes of CCT's.

The second alternative considers moving the outhouse, further away from the stream, to the currently unused north end of the island. The area appears to be feasible from the standpoint of having an isolated watershed (with good views!), however, thin soils could be a factor limiting capacity and use. It may be possible to build up the

soils in an area to meet construction criteria.

Course Related Facilities

Current Level of Use. Student facilities are intended to be physically and functionally separate from the staff area whenever possible. With the exception of the Semester Course, where there are academic and wilderness experiences, standard Outward Bound courses on Cross Island emphasize independent, wilderness living. The separation policy is intended to provide continuity of the student's wilderness experience and give the staff the R & R that is often needed. Each aspect of a course's use will be evaluated with respect to use of the island facilities.

HIOBS students account for most of the users on Cross Island. A summary of HIOBS use since 1983 is shown on Table A.

Table A: HIOBS Use Patterns

Year	Course Type and #	# boats per Course	Total People	Type of Use	Person days	Total Person-days
1986	Downeast (2)	2	48	camp	72	
				solo	120	
	Multi-jrs. (2)	2*	96	camp	144	
				solo	240	576
1985	Downeast (2)	4	96	camp	144	
				solo	240	384
1984	Downeast (2)	3	72	camp	108	
	(estimated)			solo	180	288
1983	Downeast (2)	3.5	84	camp	126	
				solo	210	336
					Total	1584

1982-

1969 Sporadic use- visitation for solo, length of stay unknown.
Assumptions:

1) Average of 10 people + 2 instructors per boat.
2) Juniors course had 24 per course, 1/2 in-land and 1/2 on pulling boats. The switch was made at Cross Island.
3) Uses- camp: pre-solo-1 day and overnight; 1/2 day and overnight post-solo at campsites for students and instructors.
   solo: 3 days and nights at solo sites for students only.
4) Person day- Includes 1 day and overnight stay per person.

Future Use Considerations. The primary factor limiting use of Cross Island by HIOBS student groups is the limited number of solo sites. There are currently 24 active sites. While it may be possible to find more sites or move existing sites closer together, having more than 24 students on the island at any given time may be perceived as detracting from the wilderness quality of the area. Assuming 16 active weeks in a summer, 24 students per stay per week, 4.5 days as the average length of stay, an arbitrary upper capacity of Cross Island is 1728 person days (pds) per summer.

As with any limit, the assumptions can be changed for variable conditions. If one considers May and 1/2 of June to be 'off limits' due to nesting, and if operating at 1/2 capacity until mid-July, for 'nesting insurance', the capacity is cut back by one half to 864 pds. One must also consider the other intricacies of filling courses and moving people 'Downeast'.

Use of HIOBS property on the other hand is highly flexible and may be used for a variety of courses. While it is plausible to have a

more established base, with 'initiative' opportunities, full time staff and permanent facilities, such action would duplicate the Hurricane Island experience. It was the considered opinion of many to spare Cross Island from such development for the sake of maintaining wilderness.

Current Limitations to Increased Use. There are several factors that, if ignored, may lead to environmental degredation, health and safety risks, or a decrease in the quality of the experience. Such limitations are:

1) The present condition of the trail system.
2) The present condition of the water suppy.
3) The number of solo sites.
4) The number of campsites.
5) Possible waste disposal problems.
6) Conflict between use patterns and the goals of a wildlife preserve.

Transport, Access and Mooring

Most students in 'Downeast' courses arrive by pulling boat. 'Multi- element' courses are split; half arriving by pulling boat and half picked up in Machias by motor vessel. Cross Island is used as the turn around point for each course.

Students beach the pulling boats near shore to load and unload their gear and supplies. While on the island, pulling boats are moored in Northeast Harbor for easy surveillance and safe refuge. There are currently 3 mooring; 2 of them are for pulling boats. If use is to increase, mooring capacity will have to expand.

Camping

There are two group campsites currently used along Northeast Harbor (Fig 6). Neither site is on HIOBS property. Nor is either site exemplary of low impact camping. Campsites are generally trampled and full of exposed roots, stumps and woody debris. Since campsites are off of HIOBS property, they are candidates for discussion and use agreements with the island owners. Furthermore, camping practices should be reviewed to minimize impact to the site.

Areas for new campsites on HIOBS property were located (Figure 6). Location criteria for the new sites are:

1) Within viewing distance (~ 200 feet) of the shoreline, preferably near a gently sloping beach for easy access.
2) Within 1/4 mile of the staff area for emergency access.
3) Location on dry, gently sloping ground.
4) Location near large rocks or ledges to conceal the campsite.

Additional consideration should be given to avoiding large, overmature trees, particularly spruce, that are susceptible to windthrow. Placing tent platforms near ledges and large rocks may provide some protection in the event a tree is blown over (Fig 7).

It would also be desireable not to have campsites on a main trail such as the existing condition of the Northeast Harbor sites. If use were to increase, HIOBS would want to minimize disruption between different groups. Removing campsites from the main trail would also reduce the perception of others present on the island.

PLATFORMS NEAR LEDGES OR ROCKS MAY PROVIDE AN ADDED MEASURE OF SAFETY IN THE EVENT OF A BLOWN DOWN TREE.

ROCKS MAY CONCEAL THE IMPACT OF A CAMPSITE FROM VIEW.

FIGURE 7. TENT PLATFORM LOCATION CONSIDERATIONS

Areas for suitable campsites are by no means expected to be developed to the 'full' extent possible. With several campsites, it is possible to rotate use and spread the impact among the sites. It is further recommended that portable tent platforms be built to mitigate tenting impacts and protect the campsite from 'sprawl'. Platforms should be small, fitting 1 or 2 tents, so that they are easily moved by 3-4 people.

If it were desired or required that camping be restricted to HIOBS property, easy surveillence of the moored boats would be difficult. Most of the suitable campsites are located far away from the mooring sites. Mooring sites for good weather or temporary use may be investigated to the west of Scotch Island.

Trails

Function. Cross island trails serve several functions during a typical course:

1) Provide access to campsites and water.
2) Transport to and from solo sites.
3) Natural history and educational hikes.
4) General island exploration.
5) Run and dip.

The existing island trail network were shown in Figure 2. A closer detail of the trails near the station was shown in Figure 3.

The island trail system is initially difficult to learn and use because of cryptic intersections, formerly incorrect maps and inconsistent trail organization. While a 'primitive' trail is often associated with wilderness, primitive also means 'crude and

unsophisticated' according to Webster. There is a great need to rethink and upgrade the trail system for easier circulation and comprehension, safer access, and improved resource protection.

Trail Improvements.

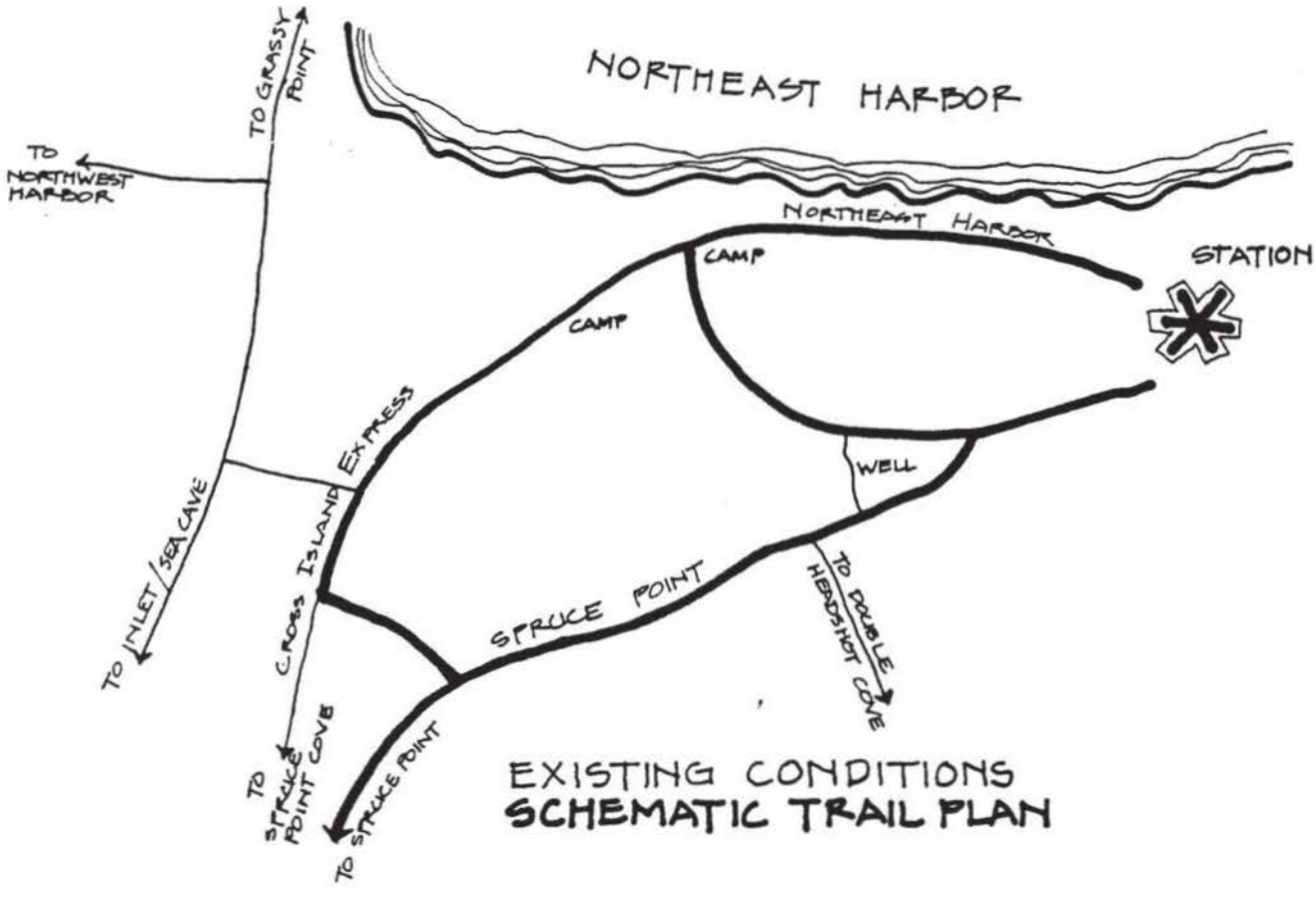
Hub and Spoke. From an evaluation of the existing trails, the concept of a 'Hub and Spoke' will be simple and easily implemented. Figure 8 shows a conceptual map of existing condition and proposed changes in the island trail system. The 'Hub and Spoke' concept offers the following benefits:

1) Easier comprehension and way-finding over the existing system.
2) It is easily adapted from the existing trail system.
3) It enhances distinctions between separate use areas.
4) It permits swift and efficient access between 'core' areas i.e. campsites, moorings, water supply, and staff.

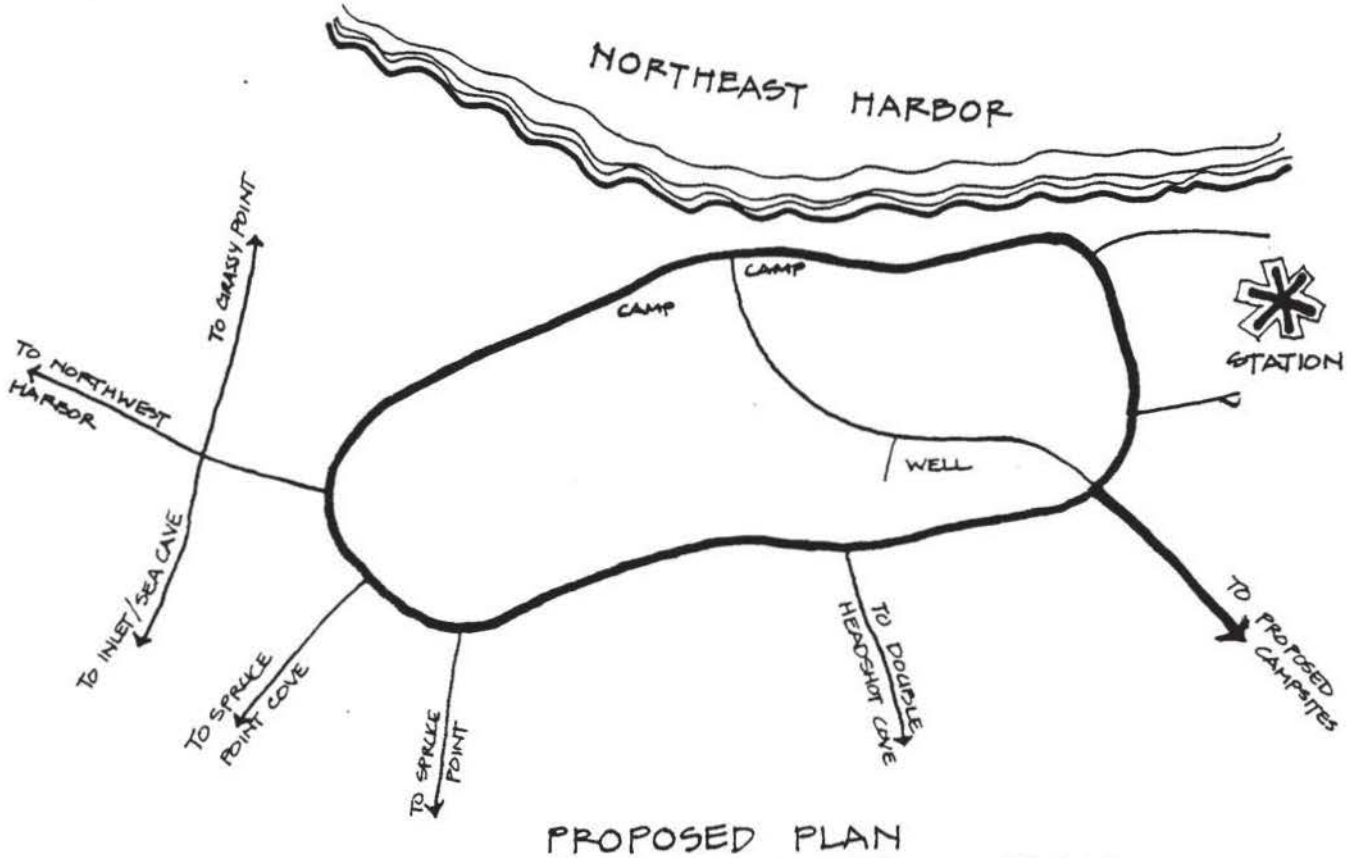
The network is visualized as having a central loop or 'Hub'. The loop can avoid the staff area by creation of a trail to the west of the staff area. The staff area should be unseen by locating the trail behind a knoll with a substantial buffer of vegetation. The staff area could be conceived as another 'spoke' off the 'hub', rather than the 'hub' as defined by current conditions.

The identity of the loop trail should be enhanced by altering trail connections, selective widening, selective clearing, and straightening unnecessary switch back curves. The main loop or 'hub' trail should be free of branches and obstructions, providing 4-6 feet of horizontal clearance over the entire length.

The 'spoke' trails to the shore should connect perpendicularly with the loop so that the direction of the main trail is easy to follow.



EXISTING CONDITIONS
SCHEMATIC TRAIL PLAN



PROPOSED PLAN
FIGURE 8. **SCHEMATIC TRAIL PLAN**

The spoke trails should remain as footpaths as they are now.

Generally, little improvement is needed except for wet or steep areas. It may be necessary to regrade and insert water bars to prevent erosion in steep areas. Where the trail passes through a wet area, rocks or 2-3 foot sections of logs laid edge-to-edge across the trail should be installed to minimize trampling and disturbance.

Northwest Harbor Route. There was expressed need for the trail to Northwest Harbor to be re-routed. Approximately one half of the existing trail follows a former skid trail which is also a creek bed and prone to erosion. Furthermore, the existing route is indirect and inefficient in the event of an emergency evacuation from solo sites along Northwest Harbor. The proposed trail location is shown on Figure 9. Trail placement along the route should receive prudent attention to avoid negative impacts on vegetation quality, wildlife and erosion.

Selective Vista Clearing. While hiking around the island trails, it became apparent that the ability to see the coast would greatly improve ones ability to comprehend and orient on the trail system. At one particular location, climbing a tree revealed that very limited clearing of branches, understory and perhaps an overmature tree or two would expose a view to Double Headshot Cove (Figure 9). Depending on permission of the USFWS such a clearing may or may not materialize.

Water Supply

The student water supply is located on USFWS property in a

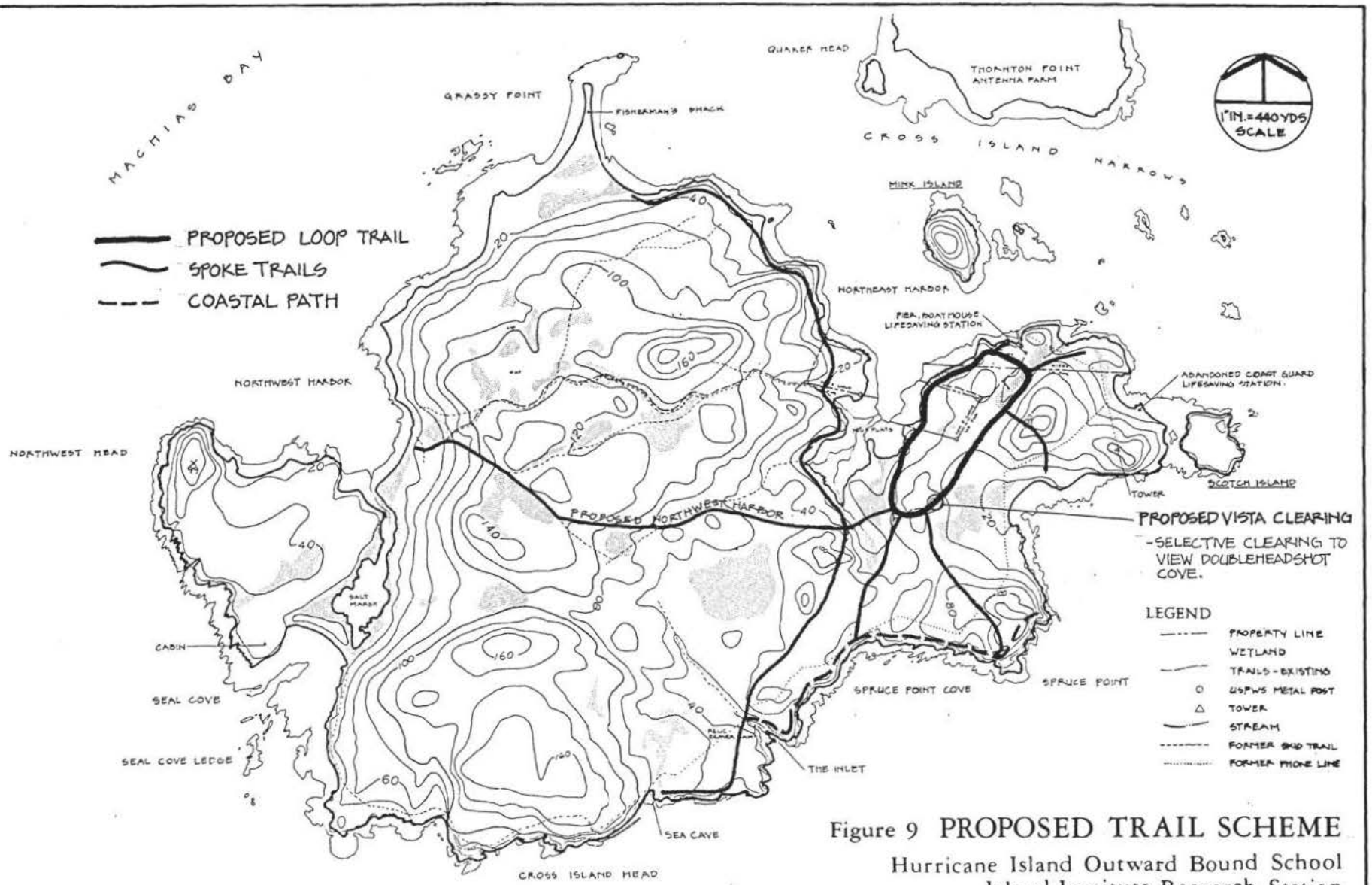


Figure 9 PROPOSED TRAIL SCHEME

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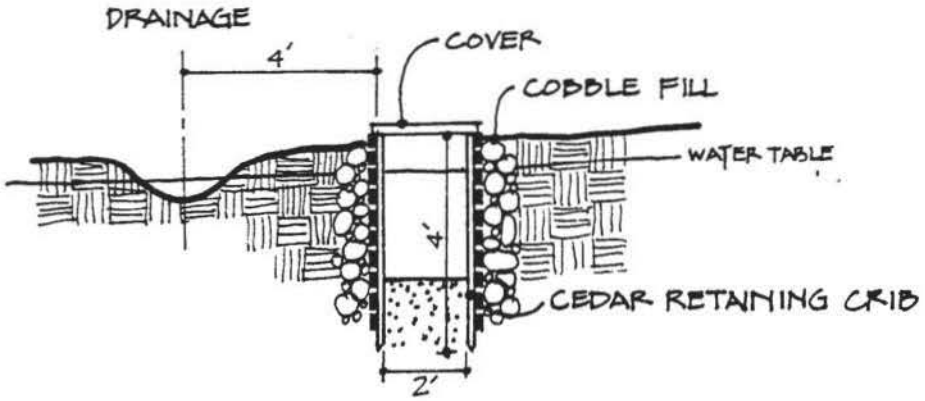
wetland south of the station's well. The well consists of a large, ~10 feet x 10 feet, board-lined pit dug into the wetland. The pit is uncovered and exposed, providing a possible breeding ground for insects and other disease vectors. There is also the high risk of contamination by wildlife and debris carried on the users shoes. Although there are no reported cases of water caused sickness, the student water supply warrants prompt improvement. The present well should be closed, filled in or covered with logs or large branches and allowed to restore its fen community.

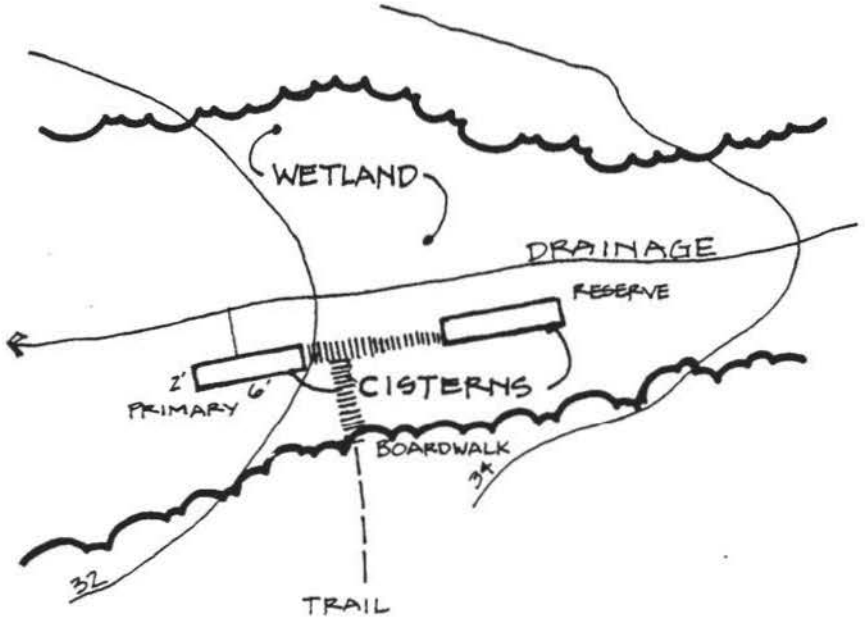
Improvements. A two-tiered cistern is proposed as a practical solution (Figure 10). Cisterns are infiltration galleries that use soil to filter impurities from the water source. Two tiers are proposed so that a back-up supply exists. The cisterns would consist of rock lining retained by a cedar crib. These cribs may need maintenance every few years and could be expected to last 5-10 years. CCA (Chromium Copper Arsenate, Wolmanized) treated wood should not be used as a construction material because the chemicals are toxic and partially water soluble.

Waste Disposal

Current Practice. Students presently are instructed to restrict their sanitation practices to the inter-tidal zone. Of all of the methods formerly tried on island, inter-tidal disposal seems most practical and least destructive. Cross Island has the advantage of a high tidal flush with tides varying 15 feet daily and a strong tidal current.



CISTERN SECTION



CISTERN PLAN

FIGURE 10. A SCHEMATIC TWO-TIERED CISTERN

Considerations. There are considerations for continued use of this practice. It is recommended that separate areas be designated for dishwashing and bathing from those areas used for waste disposal. Since it is unknown how Northeast Harbor is affected by the increase in biological loading, the effects of increased use should be researched and monitored. It may be necessary to resort to more conventional terrestrial systems.

Solo Sites

The primary purpose of Cross Island is to provide a suitable area for a wilderness solo experience; a quality rapidly vanishing in the developing coastline. There are currently 24 solo sites on Cross Island and the nearby islands. The sites are located near the coast for boat observation and safety checks. Impact on solo sites is variable from barely noticeable to the well established site with associated debris and sleeping spot.

Efforts should be made to minimize the impact of the soloist. A few sites are near osprey nests and warrant careful consideration so as not to disturb the wildlife. Seasonal use or closure of these areas may be necessary.

IMPORTANT AREAS OF CONCERN REGARDING USE

U.S. Fish and Wildlife Service

Areas of Concern. An area of potential conflict in the long-term management of Cross Island may arise because the majority of Cross Island is a National Wildlife Refuge. At first glance it would appear that the ideals of a wildlife refuge and the numerous uses by Outward Bound would be inherently antithetical. Fortunately, HIOBS has a good relationship with Thomas Goettel, the USFWS offical in charge of the Cross Island refuge. Despite the good current situation, the status of long-term use is somewhat precarious since there is no formal written agreement.

Two areas of concern to the USFWS on Cross Island are: 1) The presence of migratory birds, particularly waterfowl, and 2) the presence of endangered species, most notably, the Bald Eagle. Any uses or actions that negatively impact the existence of these species are strictly prohibited.

Agreements. To insure continued good standing, HIOBS should pursue a written use agreement with the USFWS specifying what uses are/ are not permitted and under what specified circumstances. Several possible conflicts between USFWS policy and Outward Bound activities need to be discussed. Uses that occur on USFWS property, such as the solo, group camping, and trail use, noise, and waste disposal may possibly contribute to potential problems that detract from the ideal of a wildlife refuge. It is vital that input from the USFWS be solicited pertaining to what levels of use are allowable on Cross Island.

Strategies. HIOBS can adopt two strategies to promote their continued presence on Cross Island. The first is to formulate a use plan that divides the island into several categories of 'use zones'. Each zone should have specific activities that are tolerated or prohibited. The intent is to demonstrate that HIOBS users can be self-policing to minimize the effects of their presence. Use zones are discussed in a following section.

The second strategy is to take an active role as the island's steward. This role may include activities ranging, from collecting information for the USFWS, to facilitating future research of the island. long-term studies of sensitive and endangered species would aid HIOBS planning and satisfy an essential refuge management research niche. The Island Institute and affiliated institutions could have an important involvement by providing young enthusiastic professional ecologists (YEPEs).

Recommended Actions. It is recommended that concern for wildlife be given a top priority. Actions can take two forms. First, a survey should be made of all sensitive species (such as nesting osprey) and endangered species, including their use requirements and locations of critical areas. It is also important to know when each use is happening in order to flag critical periods, particularly nesting periods in April, May, and June. Since Cross Island receives sporadic human use during May and June, it is feasible that many possible conflicts can be avoided with judicious scheduling of activities. Use will be heavier later in the summer (July and August), thereby avoiding the nesting times earlier on. Care should be taken not to

interfere with fall migration if use is to be extended into the fall.

Second, all areas used by HIOBS should receive yearly, pre-season reconnaissance to check for potential interference with nesting birds. Conflict can therefore be avoided during the critical time periods.

Vegetation Quality

Minimizing disturbance to vegetation communities is a primary consideration for developing a use plan of Cross Island. Low levels of disturbance can have the following benefits to:

1) Maintain the integrity of island ecosystems.
2) Maintain the presence of rare plants.
3) Maintain and protect isolation 'rights' of wildlife.
4) Maintain contiguous wildlife habitat.
5) Preserve the scientific and educational value of unique environments.
6) Minimize erosion
7) Maintain the highly aesthetic wilderness quality.

An improved effort should be made to educate and inform Cross Island visitors to the various methods of low impact use.

Negative impact on vegetation can be mitigated in several ways. First, areas with sensitive plant species should be identified and avoided. Trampling studies conclude that the ability of a plant to tolerate stress is a funtion of its reproductive strategy and growth form (Conkling et al. 1984). Lichen species show the greatest resistance to trampling damage. Their vegetative reproduction mechanisms allow them to recover quickly. Lichen growing on rocks or slopes, however, are more vulnerable to damage and should be avoided.

Suprisingly, feathermosses and Sphagnum mosses were shown to be quite resistant to trampling. Although their delicate structure and lack of roots render them vulnerable to mechanical damage and displacement, their reproductive mechanisms allow for rapid recovery. None-the-less, mosses are subject to considerable damage in wet areas where hikers create multiple pathways in an attempt to avoid the wet depression of the original trail. Despite accounts of trampling resistance, the wet areas where these plants occur should be avoided.

Although susceptible to trampling damage, low growing, early blooming rhizomatous herbs such as bunchberry (Cornus canadensis), Canada mayflower (Maianthemum canadense)and the creeping herb, twinflower (Linnea borealis) recovered quickly. Taller rhizomatous perennials such as goldenrod (Solidago spp.) and sarsaparilla (Aralia nudicaulis) are more vulnerable to damage. Plants with tall stems are easily broken and require more reserve energy to recover and sprout each year.

Efforts should be made to place trails in areas where plant species are resilient or where damage can be minimized. Special concern should be given to avoid disruption of the rare sub-arctic disjunct populations of Iris hookeri, Sedum rosea, Mertensia maritima and Empetrum nigrum.

A second method to minimize damage to plants requires careful thought about placement of campsites and trails. Trampling studies on Hurricane Island indicate that trampling damage has little or no long-term effects on the floor of a closed canopy spruce forest with a

duff layer of at least 15-20 cm. in depth and zero percent slope (Leonard and Conkling 1984). Slope is a critical factor, governing the impact of trails and subsequent erosion. Trails planned for heavy use, i.e. between campsites, outhouses and water supply, should be located along the same topograpical contour rather than crossing several contours (Leonard et al. No Date).

Third, in high use or particularly fragile areas, 'site hardening' may be necessary to minimize damage. Wet areas in trails should be protected with simple bridges, boardwalks or stepping blocks. Platforms in camping areas would concentrate and focus use onto a small area, minimizing the need to look for flat sites, disturb soil, and generally lessen campsite sprawl. Alternatives for platforms are discussed in a later section.

Finally, campsite 'rotation' would enable the use to be distributed between several areas allowing unused areas to lie fallow and recover. Lightweight, portable platforms would facilitate easy campsite rotation. It may be necessary to initiate research to determine the rotation based on the time needed for a campsite to recover its original quality.

SCENARIOS FOR FUTURE USE

Future use by Outward Bound is dependent on many variables. Since many of the existing facilities are located on USFWS property, written permission or use agreements should be obtained before extensive plans are made to send more courses to Cross Island. The most important issues to be disscussed are:

1) Consideration for wildlife.
2) Water and sanitation.
3) Acceptable levels of trail use for purposes of hiking and running.
4) Use of solo sites particularly where nesting birds are nearby.
5) Continued use of campsites and water supplies.

Use Zones

The area used by HIOBS is best characterized by delineation of use zones. Generally, most of the use is concentrated in the eastern quarter defined by the 'pinch' between Northeast Harbor and Spruce Point Cove. The majority of the island to the west is contiguous and undisturbed except for a proposed footpath to Northwest Harbor. Each alternative is graphically displayed by 'Use Zone'. The zones describe the spatial orientation and characterize the activity that occurs within each zone. Four zones or categories of use are characterized as:

A) Overnight/ Seasonal- This category consists of areas that are or have potential to be used by groups of people to stay overnight throughout the summer season. The campsites and base station are the primary elements of this category.

B) Solo Use- This category refers exclusively to the solo sites. Solo sites are used by one person for a 3 day/night period an estimated maximum of once per week. Current use only is 3-4 times per season.

C) Regular Day Use- This category includes areas that are used regularly in every day activities and operation of Outward Bound courses. Uses may include general circulation on a daily basis by most of the island residents numbering between 24-36 at peak periods.The primary elements include the loop trail, water sources and meeting places.

D) Sporadic Day Use- This category consists of the special areas of interest that are not likely to be used on a regular daily basis by groups of people. Use would most likely consist of passage by small groups of 10-12 people less than 3 times per week. The elements include 'spoke' trails, the Sea Cave, Grassy point, Spruce point and Northwest Harbor.

Alternative Plans

Given the need for improvements and potential for increasing the level of use in the future, three alternatives for planning are possible. The merits and drawbacks of each should be discussed openly with Tom Cabot and the USFWS to agree on cooperative use of the island.

Alternative One - Continued Present Pattern of Use. HIOBS could continue to use the facilities on USFWS land providing cooperation and consent were given by the USFWS. The current level

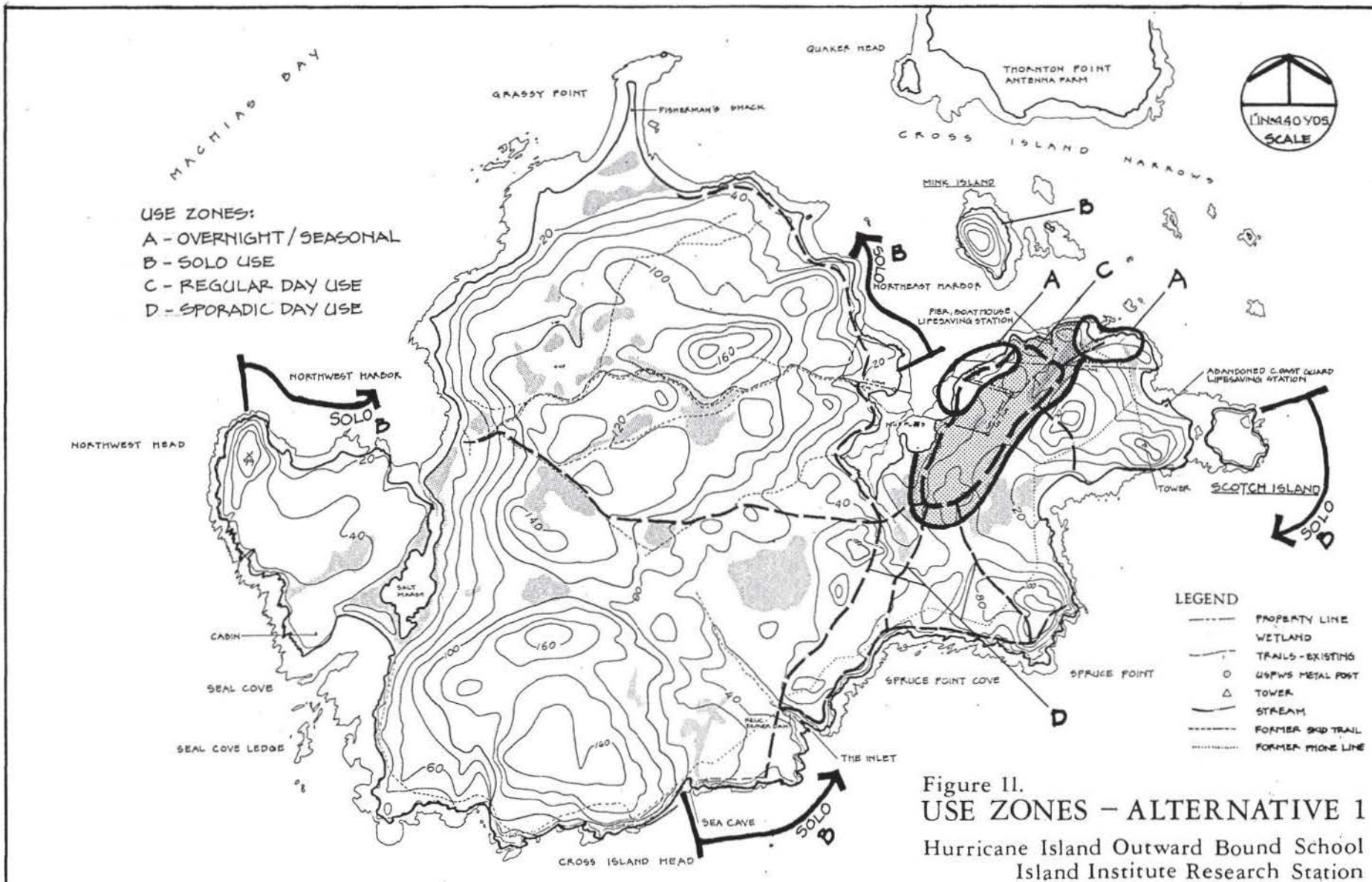


Figure 11.

USE ZONES – ALTERNATIVE 1

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of use may or may not increase depending on the terms of the agreement. Improvements of the wells, campsites and trails would be aimed at up-grading quality and not necessarily geared to expand capacity. Figure 11 shows the proposed use zones of the Alternative One.

Alternative Two - Selected Uses on HIOBS Property. Selected uses, now occurring on USFWS property, may need to be moved to HIOBS property. Concern on the part of HIOBS over the lack of control or disturbance caused by a particular use may encourage them to relocate that use. Moving a group campsite or building a new student water source are examples. The USFWS may also wish to have a certain use restricted to HIOBS property because of perceived conflicts with their own management philosophy.

Alternative Three - Consolidate Use on HIOBS Property. Two conditions may prompt HIOBS to relocate most or all of its use patterns on to their own property. First, the USFWS may desire that the more intensive uses and facilities be concentrated on HIOBS land rather than in the preserve. The move would require that a new well and campsites be established. In a second situation, HIOBS may desire to consolidate its uses on to its own land to maintain better control of its interest in Cross Island.

Furthermore, it would be easier and more practical to justify investment of resources toward facility improvement and maintenance if proprietory interest is maintained. In either situation, cooperation and negotiation with the USFWS should be maintained regarding use of trails and solo sites. Use zones for

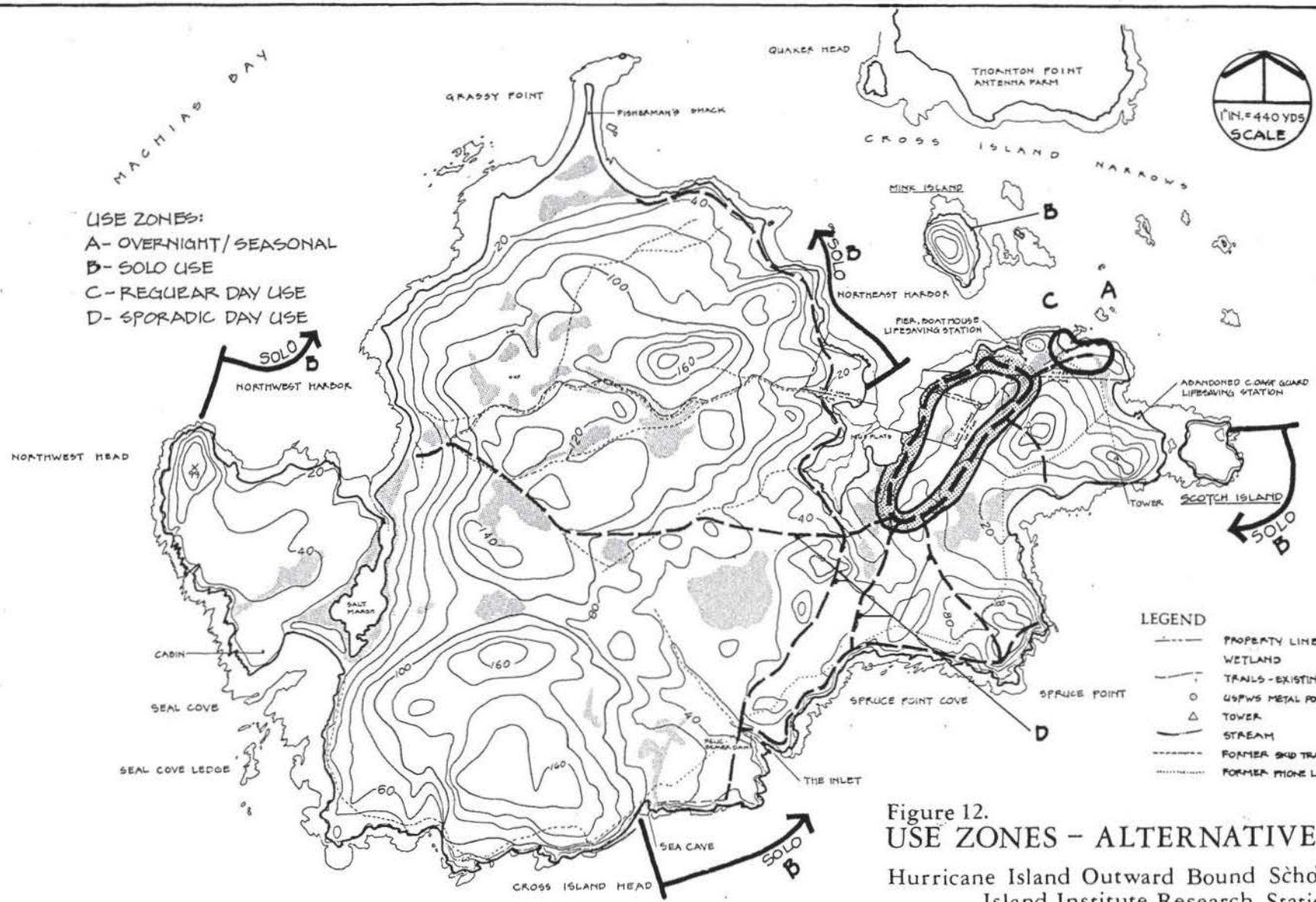

Figure 12.
USE ZONES – ALTERNATIVE 3

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Island Institute Research Station
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Alternative Three are shown in Figure 12.

Research and Education Potential

Cross Island offers a unique setting for providing oustanding research and education opportunities. The presence of HIOBS, the Cabot Biological Station, the Island Institute and USFWS present potentially significant opportunities. The prospects for forging cooperative links between these organizations should be actively pursued.

The geographic location of Cross Island is reason enough to devote some of its philosophy to research and education. Being an undeveloped, 'Downeast', coastal island with close proximity to important bird-breeding islands, coupled with its protection as a National Wildlife Refuge make Cross Island all the more significant to scientific and academic pursuits. Another strong selling point is that research and education are generally low impact uses; exactly what all the owners of the island want.

Because of their relationship on Cross Island, Outward Bound, the Cabot Biological Station and the Island Institute, in conjunction with the USFWS, would be in a position to participate in and control what types of research occurs. Since the USFWS has the land and HIOBS has the accommodations, cooperation should be fairly simple. Regardless of whoever conducts research on the island, be it university scientists, graduate students, or other enviromental interns; Outward Bound, the Cabot Biological Station and the Island Institute should be participants at the review and recommendations

level, at the very least. The Island Institute should use its connections to secure grants and researchers to utilize the opportunities available.

Research conducted on Cross Island could be emphasized in two areas: Outward Bound related and USFWS related. The Cabot Biological Station and/or the Island Institute could serve as facilitators and/or sponsors for conducting research. Outward Bound related research may be concerned with such things as:

1) Long-term monitoring of use related impacts.

2) Investigation of waste disposal alternatives such as composting toilet designs and island waste management.

3) Investigation of biological loading from human wastes and flushing capacity of the coves.

4) Long-term vegetation monitoring and site recovery.

The opportunities for biological and ecological investigations are almost endless. The USFWS may be interested in research concerning:

1) Collection of base-line biological data to be used in a biological survey of the coastal islands of Maine, including a list of flora and fauna, ecosystem / plant community delineation, soil survey, and a geologic interpretation.

2) Population dynamics of the island deer herd.

3) Breeding and population research for bald eagles.

4) Studies of eagle platform nesting success.

5) A habitat survey and analysis.

6) Continuation of the Razor-billed Auk population study.

The Island Institute may be interested in research of the human history on Cross Island. Information about fishing, logging and the Coast Guard would provide another piece in the puzzle of historical use of Maine's islands.

Full advantage should be taken of the opportunity for education on Cross Island. Education programs could be designed to either supplement or incorporate research into their teaching plans. There are many topics of interest that could serve as the basis for educational and interpretive programs. A partial list of topics could include:

1) Ecology of lichen communities, moss communities, seaward meadows and wetlands.

2) Marine life studies.

3) Wildlife and wildlife habitat related topics including study of a relic beaver pond and tidal flat ecology.

4) Migratory bird courses may include studying the southern extension of boreal breeders, endangered species management, raptor ecology, and seabird ecology.

All of these potential areas could serve to enhance previous research or serve as the source of inquiry from which further research would emanate. Neither research, nor education, is independent of the other and both should be equally stressed.

In fulfilling the role of the Cabot Biological Station, educational opportunities could take several forms:

1) Self-contained Cross Island based courses. This would require substantial preparation and conversion to

accommodate a small population of students.

2) Outward Bound semester courses are geared to include academic subjects which could be taught on Cross Island.

3) Island Institute internships (such as this project) could conduct some of the previously mentioned research.

4) The Island Institute's 'Cold Coasts' course could use Cross as a component of it's curriculum.

5) Use contracts could be solicited from universities and conservation organizations, such as Audubon, or oceanographic institutes to use the station as a field camp.

The suggestions in this section are the result of a short analysis of demands and opportunities of Cross Island. To further realize the educational potential at Cross Island, an Island Institute intern could produce workable curriculums for possible courses. By combining a recognition of the possibilities with the myriad of opportunities, plans for permanent incorporation of research and education facilities can be made.

CONCLUSIONS

There seems to be concensus that Cross Island should remain 'forever wild'. If the level of use is expected to increase, while maintaining a high quality wilderness experience of Cross Island, considerations must be given to aesthetic, environmental and physical factors affecting use of the island. First and foremost, there seems to be widespread agreement that Cross Island should remain as pristine as possible. While the concept of wilderness is highly debated, Cross Island can provide a wilderness experience as good as any available on the Maine coast.

Outward Bound must find balance between sending groups into a wild isolated area for a wilderness experience, and limiting their own use in order to protect the qualities they cherish. Limitations for use of Cross Island should be based on an 'acceptable' level of change. 'Acceptable Limits of Change' are being investigated in wilderness areas of the west.

This report can be described as a background discussion of Cross Island interspersed with 30 pages of management recommendations. The weighting of each recommendation as well as their feasibility are not all readily apparent. The following list is an attempt to refamiliarize the reader with the recommendations, and to identify the most important ones.

CROSS ISLAND RECOMMENDATIONS

Staff Quarters and Facilities

Lifesaving Station**

2nd Floor-Recommendations

1) Install railing for the stairway.
2) Scrape and paint remaining walls and ceilings.
3) Provide electric lights in halls and the stairway.
4) Install water tank in attic for reserve supply.
5) Provide screens for windows.

Optional for increased use

1) Acquire more sleeping pads.
2) Running water for toilet and shower.
3) Tables and chairs.

1st Floor- Recommendations

1) Scrape and paint remaining walls and ceilings.
2) Provide more chairs and tables.
3) Install a woodstove for heating.
4) Lights over kitchen workspace-sink, counter, and stove.
5) Stove repair needed-knobs and springs.
6) Install a gas refrigerator.

Options

1) More shelves in pantry.
2) Move sink into kitchen with more counterspace.
3) Running water to bathroom sink, toilet and shower.
4) Relocation of lights to be near users- hung lights near chairs and tables.

Basement Recommendations

1) Lights!

Options

1) Shelves to keep things dry and off floor.

Attic Recommendations

1) Make usable for storage space.

Boathouse and Pier**

- Classroom lecture amphitheater - downstairs
- Wet/ dry labs for education and research - upstairs or down
- Watch locker space - upstairs
- Equipment maintenance and storage - upstairs or down
- Partial lowering of the first floor ceiling to make more head

room upstairs.
- Repairing or rebuilding damaged floors.
- Creating level storage space for watch lockers with provision for hanging and drying equipment.
- Provide better access to the upstairs.
- Create some type of office space.
- Electrical requirements - An additional 110 volt generator may be needed to satisfy standard classroom needs and laboratory equipment such as fish tank pumps, slide projectors and ventilation.
- Furnishings - Students and researchers need workspace, desks pin-up space, chalk boards, chairs, specimen and equipment storage space.
- Heat - Because of the frequent cold foggy days on Cross Island, wood stoves may be required provide classroom heat.

Utilities.

- Run wire and lights to appropriate areas.**
- Placement of reservoir water tank in attic.
- Clean-out well.
- Separate trash for recycling.
- Develop garden and compost pile.
- Check septic system.
- Close current outhouse.
- Purchase composting toilet (CCT), or
- Move outhouse*

Course Related Areas

Camping**

- Review camping practices so as to minimize impacts.
- Find new locations for group campsites.
  - Within viewing distance (~ 200 feet) of the shoreline, preferably near a gently sloping beach for easy access.
  - Within 1/4 mile of the staff area for emergency access.
  - Location on dry, gently sloping ground.
  - Location near large rocks or ledges to conceal the campsite.
  - Locate away from overmature trees.
- Remove from main trails.
- Minimize disturbances between campsites.
- Do not develop suitable sites to the full extent possible.
- Rotate sites used to disperse impacts.

- Look into portable platforms for 1-2 tents.

Trails:

- Develop 'Hub and Spoke' system.**
  - Central hub - alter connections, selectively widen, selectively clear, straighten.
- Locate staff area on a spoke, not on the hub as it is now.
- Wet or steep areas need improvement/protection.**
- open up areas for views (?)

Water:

- Close current student water supply**
- Build two-tiered cistern**

Waste:

- Designate areas for washing and dishwashing away from 'intertidal bathrooms.'**
- Research affects of increased 'intertidal bathroom' use on water quality in NE Harbor.

Solo Sites:

- Minimize impacts of campsites - visually, and keep away from sensitive wildlife species.**

Other Concerns

General:

- Pursue written use agreement with the USFWS**
- Remain active as Island's Steward**

Wildlife:

- Conduct survey of sensitive species on island**
- Look for use conflicts between people and wildlife.

Vegetation:

- Educate and inform visitors concerning low impact uses and areas.
  - Identify and avoid sensitive plants.
  - Avoid wet areas.
  - Place trails where plants are resilient.
  - Use 'site-hardening' techniques where appropriate.

Scenarios for Future Use

Use Zones**

A) Overnight/ Seasonal- This category consists of areas that are or have potential to be used by groups of people to stay overnight throughout the summer season. The campsites and base station are the primary elements of this category.

B) Solo Use- This category refers exclusively to the solo sites. Solo sites are used by one person for a 3 day/night period an estimated maximum of once per week. Current use is only 3-4 times per season.

C) Regular Day Use- This category includes areas that are used regularly in every day activities and operation of Outward Bound courses. Uses may include general circulation on a daily basis by most of the island residents numbering between 24-36 at peak periods.The primary elements include the loop trail, water sources and meeting places.

D) Sporadic Day Use- This category consists of the special areas of interest that are not likely to be used on a regular daily basis by groups of people. Use would most likely consist of passage by small groups of 10-12 people less than 3 times per week. The elements include 'spoke' trails, the Sea Cave, Grassy point, Spruce point and Northwest Harbor.

Alternative Plans**

Alternative One - Continued Present Pattern of Use.
Alternative Two - Selected Uses on HIOBS Property.
Alternative Three - Consolidate Use on HIOBS Property.

Research and Education**

- Long-term monitoring of use related impacts.
- Investigation of waste disposal alternatives such as composting toilet designs and island waste management.
- Investigation of biological loading from human wastes and flushing capacity of the coves.
- Long-term vegetation monitoring and site recovery.
- Collection of base-line biological data to be used in a biological survey of the coastal islands of Maine, including a list of flora and fauna, ecosystem / plant community delineation, soil survey, and a geologic interpretation.

- Population dynamics of the island deer herd.
- Breeding and population research for bald eagles.
- Studies of eagle platform nesting success.
- A habitat survey and analysis.
- Continuation of the Razor-billed Auk population study.
- Ecology of lichen communities, moss communities, seaward meadows and wetlands.
- Marine life studies.
- Wildlife and wildlife habitat related topics including study of a relic beaver pond and tidal flat ecology.
- Migratory bird courses may include studying the southern extension of boreal breeders, endangered species management, raptor ecology, and seabird ecology.

* Still with a good view
** High priority recommendations

Strict adherence may not always be possible or feasible, but it is felt that these recommendations will help Cross Island and its users arrive at the best possible long-term management scheme while encountering the least amount of trouble.

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UNITED STATES
DEPARTMENT OF THE INTERIOR
FISH AND WILDLIFE SERVICE
OFFICE OF REALTY

TRACT DESCRIPTION

OF

THE NATURE CONSERVANCY OF THE PINE TREE STATE, INC., TRACTS

(10,-I,-II,-III,a,b,-I,c,-I,d,-I)

WASHINGTON COUNTY, MAINE

CROSS ISLAND NATIONAL WILDLIFE REFUGE

CONTAINING 1,527 ACRES

REPORT PREPARED BY

Pasquale Volpe
Land Surveyor
February, 1981

APPENDIX A.

OF

THE NATURE CONSERVANCY OF THE PINE TREE STATE, INC., TRACTS

(10,-I,-II,-III,a,b,-I,c,-I,d,-I)

WASHINGTON COUNTY, MAINE

The hereinafter-described eleven (11) tracts of land are located in the State of Maine, Washington County, Town of Cutler, being a group of islands in the "Cross Island" complex, situate approximately 5.7 miles southwest of Cutler center, south of Thornton Point, being a portion of the land conveyed to the UNITED STATES OF AMERICA from The Nature Conservancy of the Pine Tree State, Inc., a Maine corporation, in a Quitclaim Deed dated July 3, 1980, recorded in Deed Book 1104, Page 281, on file at the Registry of Deeds of said County and State at Machias, and being more particularly described as follows:

All bearings in this description are based on the State of Maine Plane Coordinate System. (East Zone)

TRACT 10

BEGINNING at Corner 1, on the mean high water line of the northeasterly portion of Cross Island; thence Southwesterly, Northerly and Southeasterly, along the meanders of the mean high water line, 35,685 feet, more or less, to Corner 2; thence S 24° 50' W, leaving the said mean high water line, passing on line a standard USF&WS aluminum monument set at 21 feet, more or less, continuing a total distance of 693 feet, more or less, to Corner 3, a standard USF&WS aluminum monument set; thence S 77° 08' E, passing on line a standard USF&WS aluminum monument set at 769.57 feet, continuing a total distance of 807 feet, more or less, to Corner 4, on the mean high water line of the northerly portion of Cross Island; thence Southwesterly, Southeasterly and Northeasterly, along the meanders of the mean high water line, 4,856 feet, more or less, to Corner 5; thence S 75° 06' E, leaving the said mean high water line, passing on line a 3/8" drill hole set at 26 feet, more or less, continuing a total distance of 724 feet, more or less, to Corner 6, a standard USF&WS aluminum monument set; thence N 31° 42' E, 641.22 feet to Corner 7, a standard USF&WS aluminum monument set; thence N 77° 13' W, passing on line, a standard USF&WS aluminum monument set at 772.78 feet, continuing a total distance of 814 feet, more or less, to Corner 8, on the mean high water line of the northerly portion of Cross Island; thence Northeasterly, along the meanders of the mean high water line, 467 feet, more or less, to Corner 9; thence S 86° 41' E, passing on line, two (2) 3/8" drill holes set at 51 feet, more or less, and at 2,041 feet, more or less, respectively, continuing a total distance of 2,196 feet, more or less, to the PLACE OF BEGINNING, containing 1,244 acres, more or less, and

BOUNDED from Corner 1 to Corner 2 by land of THE NATURE CONSERVANCY OF THE PINE TREE STATE, INC., TRACT (10-I); from Corner 2 to Corner 4 by land of Thomas D. Cabot; from Corner 4 to Corner 5 by land of THE NATURE CONSERVANCY OF THE PINE TREE STATE, INC., TRACT (10-II); from Corner 5 to Corner 8 by land of Thomas D. Cabot, from Corner 8 to Corner 9 by land of THE NATURE CONSERVANCY OF THE PINE TREE STATE, INC., TRACT (10-III); from Corner 9 to Corner 1 by land of the Hurricane Island Outward Bound, Inc.

TRACT 10-I

Being a tract of land subject to the interest of the State of Maine, being a portion of the land described in the above-mentioned Deed.

BEGINNING at Corner 1, on the mean low water line of the northeasterly portion of Cross Island; thence Southwesterly, along the meanders of the mean low water line, 28,516 feet, more or less, to Corner 2; thence N 70° 18' E, leaving the said low water line, 588 feet, more or less, to Corner 3, on the mean low water line of the westerly portion of Cross Island; thence Northerly and Southeasterly, along the meanders of the mean low water line, 18,177 feet, more or less, to Corner 4; thence S 24° 50' W, leaving the said low water line, 155 feet, more or less, to Corner 5, on the mean high water line of the northerly portion of Cross Island; thence Northwesterly, Southerly and Northeasterly, along the meanders of the mean high water line, 35,685 feet, more or less, to Corner 6; thence N 82° 09' E, leaving the said mean high water line, 123 feet, more or less, to the PLACE OF BEGINNING, containing 204 acres, more or less, and

BOUNDED from Corner 1 to Corner 2 by the Atlantic Ocean; from Corner 2 to Corner 3 by land of Frederick L. McNeeland; from Corner 3 to Corner 4 by the Atlantic Ocean; from Corner 4 to Corner 5 by land of Thomas D. Cabot; from Corner 5 to Corner 6 by land of THE NATURE CONSERVANCY OF THE PINE TREE STATE, INC., TRACT (10); from Corner 6 to Corner 1 by land of the Hurricane Island Outward Bound, Inc.

Excepting from the above-described tract, a parcel of land designated as THE NATURE CONSERVANCY OF THE PINE TREE STATE, INC., TRACT (10a), containing 8 acres, more or less, leaving a remaining acreage of 196 acres, more or less, for THE NATURE CONSERVANCY OF THE PINE TREE STATE, INC., TRACT (10-I).

TRACT 10-II

Being a tract of land subject to the interest of the State of Maine, being a portion of the land described in the above-mentioned Deed.

BEGINNING at Corner 1, on the mean low water line of the northerly portion of Cross Island; thence S 70° 49' E, leaving the said mean low water line, 213 feet, more or less, to Corner 2, on the mean high water line of the northerly portion of Cross Island; thence Southwesterly, Northwesterly and Northeasterly, along the meanders of the mean high water line,

4,856 feet, more or less, to Corner 3; thence S 77° 08' E, leaving the said mean high water line, 176 feet, more or less, to Corner 4, on the mean low water line of the northerly portion of Cross Island; thence Southeasterly, along the meanders of the said mean low water line, 358 feet, more or less, to the PLACE OF BEGINNING, containing 19 acres, more or less, and

BOUNDED from Corner 1 to Corner 2 by land of Thomas D. Cabot; from Corner 2 to Corner 3 by land of THE NATURE CONSERVANCY OF THE PINE TREE STATE, INC., TRACT (10); from Corner 3 to Corner 4 by land of Thomas D. Cabot; from Corner 4 to Corner 1 by the Atlantic Ocean.

TRACT 10-III

Being a tract of land subject to the interest of the State of Maine, being a portion of the land described in the above-mentioned Deed.

BEGINNING at Corner 1, on the mean low water line of the northerly portion of Cross Island; thence S 86° 41' E, leaving the said mean low water line, 448 feet, more or less, to Corner 2, on the mean high water line of the northerly portion of Cross Island; thence Southwesterly along the meanders of the mean high water line, 467 feet, more or less, to Corner 3; thence N 77° 13' W, leaving said mean high water line, 129 feet, more or less, to Corner 4, on the mean low water line of the northerly portion of Cross Island; thence Northeasterly, along the meanders of the mean low water line, 332 feet, more or less, to the PLACE OF BEGINNING, containing 2 acres, more or less, and

BOUNDED from Corner 1 to Corner 2 by land of the Hurricane Island Outward Bound, Inc.; from Corner 2 to Corner 3 by land of THE NATURE CONSERVANCY OF THE PINE TREE STATE, INC., TRACT (10); from Corner 3 to Corner 4 by land of Thomas D. Cabot; from Corner 4 to Corner 1 by the Atlantic Ocean.

TRACT 10a

Being all of the land lying above the meanders of the mean high water line of the island known as "Scotch Island", lying 200 feet, more or less, northeasterly of THE NATURE CONSERVANCY OF THE PINE TREE STATE, INC., TRACT (10), containing 8 acres, more or less, and

BOUNDED entirely by land of THE NATURE CONSERVANCY OF THE PINE TREE STATE, INC., TRACT (10-I).

TRACT 10b

Being all of the land lying above the meanders of the mean high water line of the northerly island, of the two (2) islands known as "Double Head Shot Island", lying 1,300 feet, more or less, southeasterly of THE NATURE CONSERVANCY OF THE PINE TREE STATE, INC. TRACT (10a), containing 5 acres, more or less, and

BOUNDED entirely by land of THE NATURE CONSERVANCY OF THE PINE TREE STATE, INC. TRACT (10b-I).

TRACT 10b-I

Being a tract of land subject to the interest of the State of Maine, being a portion of the land described in the above-mentioned Deed.

Being all of the land between the meanders of the mean high water line and the meanders of the mean low water line of the northerly island, of the two (2) islands known as "Double Head Shot Island", lying 1,200 feet, more or less, southeasterly of THE NATURE CONSERVANCY OF THE PINE TREE STATE, INC., TRACT (10a), containing 11 acres, more or less.

TRACT 10c

Being all of the land lying above the meanders of the mean high water line of the southerly island of the two (2) islands known as "Double Head Shot Island", lying 2,200 feet, more or less, southeasterly of THE NATURE CONSERVANCY OF THE PINE TREE STATE, INC., TRACT (10a), containing 10 acres, more or less, and

BOUNDED entirely by land of THE NATURE CONSERVANCY OF THE PINE TREE STATE, INC., TRACT (10c-I).

TRACT 10c-I

Being a tract of land subject to the interest of the State of Maine, being a portion of the land described in the above-mentioned Deed.

Being all of the land lying between the meanders of the mean high water line and the meanders of the mean low water line of the southerly island, of the two (2) islands known as "Double Head Shot Islands", lying 2,000 feet, more or less, southeasterly of THE NATURE CONSERVANCY OF THE PINE TREE STATE, INC., TRACT (10a), containing 14 acres, more or less.

TRACT 10d

Being all of the land lying above the meanders of the mean high water line of an island known as "Mink Island", lying 1,300 feet, more or less, northerly of THE NATURE CONSERVANCY OF THE PINE TREE STATE, INC., TRACT (10-III), containing 10 acres, more or less, and

BOUNDED entirely by land of THE NATURE CONSERVANCY OF THE PINE TREE STATE, INC., TRACT (10d-I).

TRACT 10d-I

Being a tract of land subject to the interest of the State of Maine, being a portion of the land described in the above-mentioned Deed.

Being all of the land lying between the meanders of the mean high water line and the meanders of the mean low water line of an island known as "Mink Island", lying 1,200 feet, more or less, northerly of THE NATURE CONSERVANCY OF THE PINE TREE STATE, INC., TRACT (10-III), containing 8 acres, more or less.

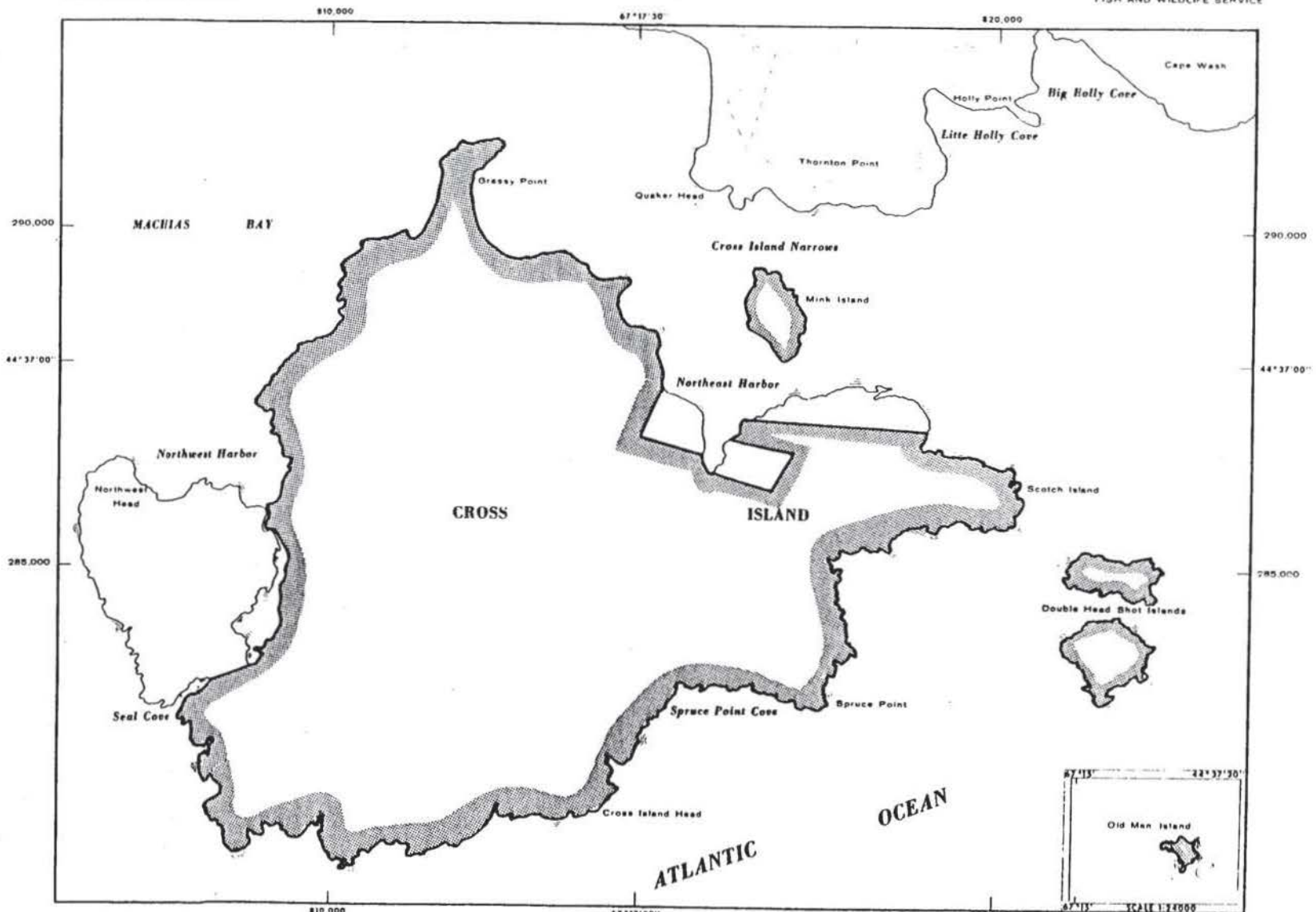
The above-described eleven (11) tracts of land, containing in the aggregate 1,527 acres, more or less, are delineated on a map tracing designated THE NATURE CONSERVANCY OF THE PINE TREE STATE, INC., TRACTS (10,-I,-II,-III,a,b,-I,c,-I,d,-I) bearing date of February 20, 1981, of record in the files of the Department of the Interior. A print from that map tracing is attached.

CROSS ISLAND NATIONAL WILDLIFE REFUGE

UNITED STATES
DEPARTMENT OF THE INTERIOR

WASHINGTON COUNTY, MAINE

UNITED STATES
FISH AND WILDLIFE SERVICE



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NEWTON, MASS. FEBRUARY 1981
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SCALE 0 1000 2000 3000 4000 FEET

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T.N. G.N. M.N. 19½° E B.M.P.C.S.

MEAN DECLINATION 1977

5R ME. 971 401

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10-I	196
10-II	19
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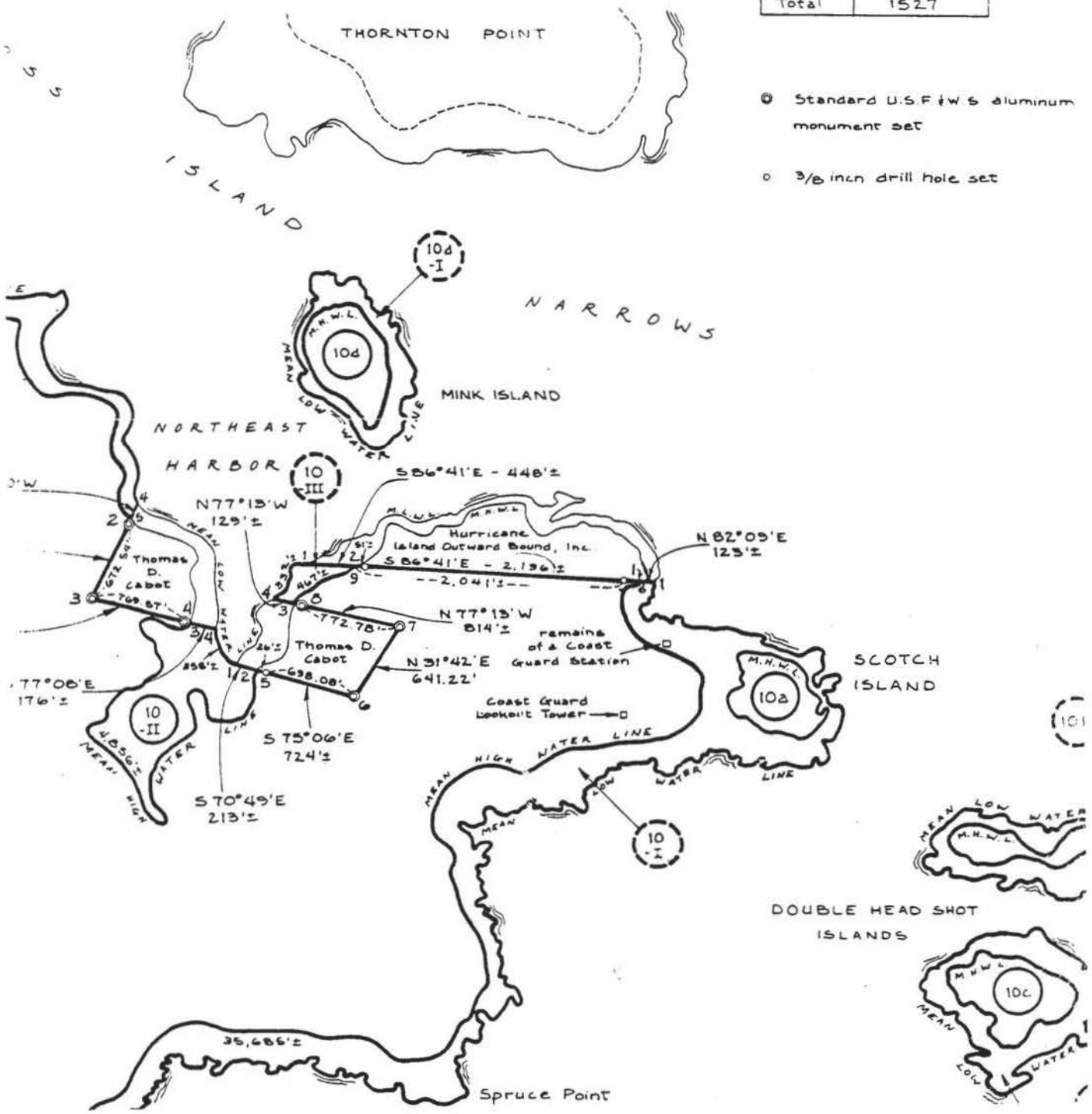

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o 3/8 inch drill hole set