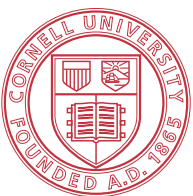


PARTICIPANT'S GUIDE TO APPLIEDORE ISLAND



Fourth edition, April 2011



Cornell University



UNIVERSITY of NEW HAMPSHIRE

PARTICIPANT'S GUIDE TO APPLIEDORE ISLAND

TOPIC	PAGES
Welcome and Introduction	2
Safety – Fire and Emergencies	3 - 4
Resource Conservation and Island Life	5 - 9
Policy on Collecting Organisms	10
Laboratory Policy on Dismissals	11
Geography and Ownership of the Isles of Shoals	12
Geology of Appledore Island	12
History of the Isles of Shoals	13
Establishment of Shoals Marine Laboratory	14
Marine and Terrestrial Environs and Organisms	14 – 18
Special Features of Interest	19
Waterfront Facilities	20
Buildings and Roads	20 - 23
Engineering Systems	23 - 24
Contact Information	24

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Welcome to Shoals Marine Laboratory (SML)! It is important to keep in mind that Appledore Island is a rough and isolated environment, and therefore, it is crucial that all SML participants read this *Participant's Guide to Appledore Island (Guide)* BEFORE starting a program at Shoals Marine Laboratory.

The offshore environment of the Isles of Shoals, home to Appledore Island, presents a variety of challenges far different to any encountered during everyday life on the mainland. The history of human use, the maritime climate and rugged terrain, and the complexities of a modern teaching laboratory, all contribute to the “mystery” of present-day Appledore Island.

On Appledore we live by the coming and going of the tides, and the vagaries of New England weather. This means that “things” change; flexibility is needed when dealing with all situations and circumstances. We depend upon each other to a greater extent than on the mainland — academically, socially, psychologically, for safety, and to “get the job done.” Our community is in a sometimes harsh and isolated environment with very limited access to services that we often take for granted on the mainland. Situation awareness and safety-conscious decision-making are important at all times. Flexibility and patience are essential for coping with unpredictable events, foul weather, equipment or power failures, and last minute changes in schedules.

This *Guide* is intended to help you enjoy Appledore Island; read it to insure that you get the most out of your educational experience at SML. The many “do’s and don’ts” included throughout the *Guide* may appear to be authoritative and even dictatorial. Perhaps some are, but most are suggestions or rules that have been proven to *work* and improve your chances of attaining your academic goals. Please talk to a staff member if you have any questions or concerns.

This *Guide* provides some information about the history and establishment of SML, but is not intended to be exhaustive! We recommend reading founding Director, John M. “Jack” Kingsbury’s book, [Here’s How We’ll Do It!](#) for details. [Here’s How](#) is available at our small mercantile, *The Appledore Store*, which also carries field guides and other books of interest to participants and visitors. This *Guide* also includes an introduction to the flora and fauna of Appledore Island, but again is not intended to cover the ecology and geology of all the rocks, plants and creatures that surround and inhabit our treasured isle. Appledore’s library and laboratories house textbooks and field guides for participant use – please feel free to take advantage of these reference materials during your program.

PLEASE NOTE: All participants need to follow the “pack it in, pack it out” rule while at Shoals! You are required to depart Appledore Island with ALL of the personal items that you brought with you; this includes, but is not limited to footwear, clothing, all toiletries, and all containers of any kind, even if empty. Thank you!

Questions? Contact us at (607) 255-3717 or shoals-lab@cornell.edu

SAFETY CONCERNS – FIRE and GENERAL EMERGENCIES

It is important to keep in mind that Appledore Island is a rough and isolated location. Situation awareness and safety-conscious decision-making are important at all times.

- FIRE is potentially our greatest danger on Appledore. There is no fire department on the island - WE are the fire department.
- LEARN where the fire alarms are located in YOUR dorm, and in all the buildings that you frequent (classrooms, labs, etc.).
- If, you DISCOVER a **fire or smell smoke** in any building:
 - EXIT the building at once, and ACTIVATE the fire alarm on your way out!
 - ALERT a staff member at once, preferably one with a **radio**.
 - Stand by for instructions from staff to help fight the fire.
 - There are fire hoses located on the exterior of each building.
- If you smoke, please do so ONLY on the main steps and porch of Kiggins Commons, and use the sand-filled receptacles provided to discard the butts. **DO NOT smoke, and NO OPEN FLAMES, in any building at any time!! DORMS INCLUDED.**
- In a GENERAL or MEDICAL emergency, first **locate a staff member**. Learn to identify staff by looking at the photos posted in Kiggins Commons on the bulletin board in the kitchen. Here are the places to LOCATE staff members: Second floor of Hamilton where our main Island office is located OR if in the evening, **Bartels Hall** (staff house at the top of the hill). **If you cannot locate a staff member, find the handheld radio** located in the Hamilton office (look in the corner near the marine radio and fax machine). **Call for help. If no one answers, go to any building** and start yelling and banging on doors. (FYI – placards with emergency response procedures are posted in all island buildings).



Other SAFETY CONCERNS: ANIMAL, VEGETABLE & MINERAL

- **ANIMAL.** Approximately 1,200 pairs of **gulls** (Great Black-backed Gull and Herring Gull) nest widely on Appledore and are particularly aggressive in June when they have young chicks. Birds close to campus are generally more acclimated to people (and thus calmer) than those that have less human contact. Wearing a hat is a good idea, and a stick held overhead could prevent a bird from striking you from behind. As much as the gulls may bother you, you are not allowed to seek revenge. **Law protects** all the gulls, their nests, and their eggs. So please, for your sake and the sake of the gulls, do not disturb the birds or their nests.
- **VEGETABLE. Poison ivy** is a definite presence on the island. We do clear and spray along most paths and in areas around the buildings, so if you stay on the paths and roads you should not come into contact with a plant. However, do be careful in areas away from the central campus -- in some places it can grow over 6 feet high!! If you have come in contact with poison ivy, use **COLD WATER** and the white bottle of **Tecnu** (located in every bathroom) to help remove the oils from your skin and prevent reaction.
- **MINERAL. KEEP YOUR SHOES ON.** Despite our efforts to remove it all, nearly 400 years of human use have left far too much glass, and other sharp objects, along our paths and roads to risk bare feet. The island's rocky terrain is a concern as well. Paths can be irregular, and random rocks on paths and road can cause you to twist an ankle or knee quick easily. PLEASE WATCH YOUR STEP. Always use caution on paths and roads, AND especially along the rocky shoreline when "intertidaling."

ALWAYS use the buddy system, ESPECIALLY when away from the main campus. Always keep one eye on the sea when on the rocks near the water's edge.

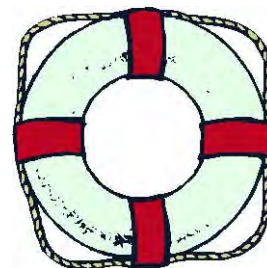
WATER CONSERVATION

- Because we live on an island surrounded by salt water, we treasure and conserve our freshwater supply. We get our water from either a well or a reverse osmosis system and both sources need to be conserved at all times. So please **NEVER** let the water run down the drain unused, and carefully shut off all faucets when finished.
- While we must conserve water at all times, please **DRINK LOTS OF WATER.** Dehydration is a serious health issue –especially if you are out in the field or on boats for long periods of time and it is easy to prevent. Water from the faucets in the dorms, labs, and kitchen is **safe drinking water.**
- In addition to being conservative with our freshwater supply, we are also restricted as to how much treated **wastewater we release** into the ocean. Please do not flush the toilets unless you need to! (If it is yellow let it mellow, if it is brown flush it down), but be careful not to let the toilet paper levels buildup in the bowl. Toilet paper is the **only** manufactured material allowed to enter SML's wastewater system. Trashcans are provided for the disposal of all other products.

ADDITIONAL INFO FOR ALL OVERNIGHT PARTICIPANTS

- Participants **are limited to 2 “Navy-style”** (only run water when rinsing) **showers per week** at any time of the day **OTHER** than 1/2 hour prior to and 1-1/2 hours after meals (**very important** because the kitchen needs full availability of water resources for meal prep/clean-up). In addition, we ask that you take showers.

- Participants may swim **only in the swimming hole (labeled “Great tidepool” on our Appledore map)**. Please use the buddy system at all times. Staff-supervised “swim calls” are scheduled during hot weather (time and location will vary).



- Participants in **SCUBA** diving programs (e.g. *Underwater Research, RIFS*) are the only participants permitted to SCUBA dive at Shoals. **Snorkeling outings** are part of many programs; bring your own gear IF you already have it – the Lab has some gear to loan participants on a limited basis.

- **PARTICIPANTS ARE NOT PERMITTED TO OPERATE ANY SML VESSEL AT ANY TIME.**

ISLAND BUILDINGS—please learn which building you have access to. Program buildings are “open” 24/7; please respect those who are using program spaces:

- The island **office** and **infirmary** are located on the second floor of **Hamilton House**. The island office is generally staffed from 8 a.m. to 6 p.m., with additional hours as needed. If you have program or transportation-related questions or needs, please be sure to take care of these in the office rather than during meal times. The classroom on the first floor is open at all times.

- The building at the top of the hill with the cupola, and the house at the top of the hill by the dock are **Bartels Hall** and the **Kingsbury “K” House** respectively. These buildings are housing for staff only so please respect that privacy. Island staff are here ALL THE TIME! And the staff housing is really their only place of retreat. In the case of an emergency, however, participants should seek out staff members in Bartels and/or the K-House when needed.

- **Laighton** House has teaching labs on the first floor, and a classroom and the island library on the 2nd floor. These rooms are open at all times.

- **Palmer-Kinne Lab (P/K for short)** is the large building next to the Radar Tower. This is the primary teaching lab and is open at all times.

- **Please stay out of the RADAR TOWER unless you are with a staff member as part of your program.**

- Most of the **facilities buildings** are located down the hill. Please **DO NOT ENTER** the **Paint Shed or the facilities workshop and generator area of the Utility Building**. Also, unless you are in a diving class, please do not enter the **Dive Locker**.

- Participants are permitted to enter the **Grass Lab**, located in the front of the Utility Building. A **bird banding station** operates during spring and fall migratory periods and is open from sunrise to sunset. Bird banders welcome **ALL visitors**, and look for the light over the front door to tell if they are there. However, everyone must take care to **avoid the mist nets (around the north end of the island)**. Do not walk the nets unaccompanied and under **NO** circumstances should anyone but a qualified bander remove birds from the nets. During the rest of the season, the Grass Lab is used by courses.
- There are four **cottages** located on the south side Appledore. They are **privately** owned and not associated with SML in any way. We are good neighbors, and respect the privacy of the residents. Please do not approach these cottages and respect any No Trespassing signs.
- **Kiggins Commons** is the most important building on island. It is where the **RESTROOMS** and **SHOWERS** are located. It is also where all the meals are served and where **the Appledore Store** is located. The main dining hall and lab are open at all times.

Meal times are:

Mon - Sat: Breakfast: 7:30am Lunch: 12:30 pm Dinner: 6:00 pm

Sunday: Brunch: 10:00 am Dinner: 5:00 pm

Proceed through the food line only **AFTER** the kitchen staff gives the “OK” to do so!

- Kiggins Commons is available to participants all day and all night. Drinks, fruit and other food are available at all times. However, please **STAY OUT OF THE KITCHEN AREA at all times unless given permission by the head chef or assistant cooks.**
- **Personal food restrictions, allergies and preferences (e.g. vegan)** should be provided to the kitchen staff when you arrive at Appledore; fill out the form on the clipboard located in the main kitchen near the serving line, across from the coffee machine (please provide this information even if you have already included it on your health history form). The kitchen staff will do their best to accommodate any and all dietary restrictions and special culinary needs.



A **clean-up schedule** will be posted on the main bulletin board in Kiggins Commons. Clean up involves bringing leftover food into the kitchen and **wiping down the tables after each meal. After dinner, chairs are turned up onto the tables, and the floor gets swept.** See the kitchen staff for supplies and instructions. Program faculty give participants time to complete these tasks; if for any reason you CANNOT clean-up at your assigned meal, then it is your responsibility to swap with another participant. DO NOT leave the task undone!

** Finally, if anything around the island needs attention (leaky faucet, no soap, no TP, etc.), please let the Resident Life Coordinator know!! We also welcome any comments or suggestions you may have. This is an amazing place, so enjoy and appreciate your time here!

ISLAND LIFE

- SML has a **ZERO TOLERANCE** drug policy. If you are found in possession of or using an illegal substance, you will be sent off the island on the next available boat at your expense.
- SML has a **ZERO TOLERANCE alcohol policy** for anyone less than 21 years of age. Shoals Marine Laboratory is bound by the laws of the State of Maine, and the policies of its home institutions. If you are under 21 and found to be drinking or in possession of alcohol, you will be sent off island on the next available boat at your expense. Alcohol is not permitted in any dormitory/participant residence while participants who are younger than 21 reside in the same building. Those over 21 may also be asked to leave SML if their behavior is deemed dangerous or inappropriate.
- Cell phone reception is generally good on Appledore, but we ask that everyone **leave all cell phones in their dorm rooms** during all program sessions (lab, classroom, field, boat). Please be courteous of others when choosing when and where to use cell phones.
- **Mail** service is a little irregular; we try to bring in and retrieve mail daily, but that doesn't always happen. Put outgoing mail in the box in Kiggins Commons. If you receive any mail, it will be sorted alphabetically by last name and put in the slotted red mail tray in the Commons.
- We do have **quiet hours in ALL DORMS** from 10:00 pm to 7:00 am. You are welcome to use the Commons, laboratory and class buildings, and the library at all hours, but please respect those who are sleeping.
- When you come in for meals, please wear a **NAME TAG**. It helps us get to know you and it helps you get to know us – this also helps us develop our sense of community. Masking tape and marking pens are available in the main kitchen.



- Speaking of **community**, there are a couple of things that we ask everyone to help us out with...

- EVERYTHING that you see on this island from food to pianos to hammocks has come on the island the same way you did: UP AND OVER THE ROCKS. Every **Wednesday is our island “Food Run.”** Our boat, the **KINGSBURY** will return from Portsmouth **around 5:00 pm** and blow its horn. At that point, we ask that every person on island head down to the dock and **help unload** food from the boat. However, any person with a health concern is excused.



- We ask that EVERYONE in the community pitch in to keep our facilities clean.
- During meal times, this means **bringing all used glasses, plates, etc. to the dishwashing area** in the kitchen. We **compost and recycle** as much as possible so please **separate all trash**.
- Please be sure to use the **compost buckets** in the kitchen when clearing your dishes. In addition to food scraps, be sure to **compost all paper towels**, napkins, tissues, and coffee filters. These materials help make sure that the compost does not smell and help make better quality compost in the end. However, lobster shells stay separate.
- Labeled **recycling containers** are found in all buildings; please use them!
- A **clean-up schedule** will be posted on the main bulletin board in Kiggins Commons. Clean up involves bringing leftover food into the kitchen and **wiping down the tables after each meal. After dinner, chairs are turned up onto the tables, and the floor gets swept.** See the kitchen staff for supplies and instructions. Program faculty give participants time to complete these tasks; if for any reason you CANNOT clean-up at your assigned meal, then it is your responsibility to swap with another participant. DO NOT leave the task undone!
- Every Sunday before brunch around 9am, students are responsible for **cleaning their dormitory**. This includes sweeping out rooms and hallways, emptying the trash and cleaning the bathrooms. Cleaning supplies are provided and stored in the cabinets of each bathroom. If you cannot find cleaning supplies—please find a staff member for assistance. Please don't leave the job undone if you can't find a broom!

- Empty recycling containers in your dorms into the totes out behind the Commons. Trash and cardboard go into the sheds adjacent to the totes. Everything is labeled; please **STOP AND READ THE LABELS**. Some bins are for mixed paper, some are for bottles or cans, and some are for trash. Ask if you have any questions.

There will also be a concerted effort to clean dorms, labs and classrooms at the end of each program and BEFORE you leave the island. Please clean out your room, and leave it the way you found it. Remember to: check drawers and closets, **SHUT** all the windows, sweep, and refold the blankets on the bed.

RESOURCE CONSERVATION

In addition to recycling and composting, we ask that you help the lab to minimize its electrical consumption, please **turn off lights** when you leave a room. In addition, **laptop and cell phone chargers** consume a surprising amount of power; please do not leave them plugged in.



Another element of resource conservation is closing windows in classrooms and the library if you are the last one leaving. Storms come up suddenly and can soak books, lab equipment, etc if windows are left open and unattended.

ISLAND COMPUTER LAB USE

A small number of computers for participant use are located in the library on the second floor of Loughton House. The Lab's island-wide network enables participants, staff and faculty to check e-mail, utilize on-line library systems, and conduct research,



however this service should **not be used to DOWNLOAD or UPLOAD, pictures, music, videos or play games!** Staff will disconnect the island network if these requests are not honored.

SOME “ODDS and ENDS”

A **shift in the WIND** can come on suddenly and with a vengeance. Please be alert to oncoming wind and rainstorms! Be ready to **CLOSE** windows in dorms, classrooms and labs **BEFORE** valuables, bed linens and computers get drenched or blown away! If you are close to a lab, a lecture room, the library or other common areas, please do your part by closing windows and doors for the benefit of our island community.

COLLECTING: SML allows reasonable collecting of invertebrate, vertebrate and plant specimens for academic purposes, and we encourage conservation at all times. SML holds collecting permits (for invertebrates and vertebrates) from the states of Maine and NH, and the National Marine Fisheries Service; permission to collect animals under these permits is based upon compliance with strict regulations. Handling and holding vertebrates are regulated by protocols approved by the Institutional Animal Care and Use Committees of the two parent institutions. Before collecting plants or organisms of any kind, check with program faculty or SML staff **FIRST**. This will help to avoid non-compliance issues and prevent damage to populations that may be unusual, uncommon, or involved in someone's research. ***Use of preservatives such as formalin is strictly prohibited except by or under the guidance of SML staff, faculty or and research staff with proper training.*** At the end of all programs (or the end of the week), surviving organisms should be returned to the sea.



LABORATORY POLICY ON DISMISSALS: SML is governed by the policies and rules of its parent institutions, Cornell University and University of New Hampshire. Registration in a program represents participant agreement to abide by such policies and rules.

The Laboratory reserves the right to dismiss from a program any participant who violates a major SML or university policy, especially when the participant's behavior may impair the rights and privileges of others in the SML community. Dismissal means that arrangements will be made for the participant to leave Appledore Island on the next available boat (with no refund of participant fees). Students enrolled in a credit course who are dismissed before the official end of their program, will be required to complete an add/drop form, which will translate as a withdrawal on official transcripts.

SCHEDULE CHANGES: Because of changes in weather, boat schedules, plans of visiting lecturers, and many other factors, it is difficult to post detailed academic schedules much in advance, however course syllabi are available on individual program pages within the SML website: <http://www.sml.cornell.edu/>

Core faculty or T.A.s will post the day's schedule on the main board in the Kiggins Commons dining hall at breakfast; changes will usually be announced during lecture, lab OR mealtimes. Plan to arrive to all meals, lectures, labs and field trips promptly! You never know what you might miss – an impromptu field trip could be in the works, and you might miss the chance to see a whale, a special bird or other “cool” event if you are late!

VISITORS: The Isles of Shoals are unique and beautiful. "Day trippers" enjoy Appledore during pre-determined group tours throughout the summer. These visitors include the general public, Star Island conferees, alumni, friends of SML, members of the academic community, and past or potential benefactors. Non-scheduled visitors (sailors, etc.) are asked to land only at Appledore's main dock, and are asked to keep the outer end of the dock clear for Laboratory vessels.



Please greet and be friendly to visitors--THEY'RE THE ONES WITHOUT NAME TAGS! If, in your judgment, they're doing something “wrong” — for example they have a pet with them, they are trespassing in Lab buildings, or they are walking barefoot— be diplomatic yet direct, and inquire as to whether they landed at the dock (this will tell you whether or not they come from one of the privately owned cottages). If they have just come ashore, instruct them to sign-in at the welcome kiosk at the top of the hill by the dock, and collect an island map. The map includes island rules and regulations for visitors.

GEOGRAPHY AND OWNERSHIP OF THE ISLES OF SHOALS

The Isles of Shoals lie 6 statute miles from the New Hampshire and southern Maine coast in the western part of the Gulf of Maine, east of Portsmouth, New Hampshire. The northern islands of the archipelago (Duck, Appledore, Smuttynose, Malaga, and Cedar) are in Maine. Star, Lunging, White and Seavey Islands are in New Hampshire. The state line cuts the midpoint of the breakwater between Cedar and Star Islands. Malaga, Smuttynose, Cedar, and Star Island define Gosport Harbor. White Island, owned by the State of New Hampshire, has an automated lighthouse. Lunging Island, with a summer cottage, and Square Rock, are privately owned. The Star Island Corporation owns Star Island, and operates summer conferences there in the arts, humanities, and religion. The Foyes, a family of lobster fishermen, live on Cedar Island in the summer. Smuttynose is privately owned. The US Fish and Wildlife Service oversees the preservation of the island by permitting only low impact, educational and recreational activities. The US Fish and Wildlife Service owns Duck Island and its surrounding shoals as part of the Maine Coastal Islands National Wildlife Refuge. The Star Island Corporation owns approximately 90% of Appledore Island and leases it to Cornell University for purposes of education and research in marine science by the Shoals Marine Laboratory. The remaining 10% is privately owned. Of the four cottages along the south shore facing Gosport Harbor, the easternmost is the "St. Hilaire" Cottage. The gray "Birge" cottage and white "Sullivan" cottage are private, summer homes. Just inland from the Sullivan Cottage is another privately owned cottage.

Two pieces of private property lie in the middle of the SML campus. The Hugh G. Hamilton House just west of Kiggins Commons is the property of the University of New Hampshire. The foundation and ruins of a house (Winkley House) just north of Kiggins Commons are on private property. Additionally, there are two privately owned undeveloped parcels on Appledore; one including the site of a house foundation west of the Celia Thaxter Garden, and the other including the "North Head" area of Appledore. Owners of the latter two properties encourage non-destructive use of their property by the Shoals Marine Laboratory.

GEOLOGY OF APPLIEDORE ISLAND

Close examination of Appledore's rocky shoreline reveals evidence of major geological forces. The crystal structure, bedding, and stratum direction reflect Paleozoic orogeny and more recent plate tectonics. Note especially the vertical positioning of the more easily weathered layers of gneiss along the sides of the central valley and Babb's Cove. Deep clefts, or "trap dikes," can be found on the eastern side of Appledore. These were created by the erosion of softer trap-rock or diorite (similar to basalt) that intruded into fissures in the surrounding bedrock. Pleistocene glaciations polished the smooth rocks of the north side, and resulted in the "plucked" stair-step structure of rocks of the south and east sides of the island. Note also presence of rocks and gravel of glacial origin at Broad Cove, and in the northern part of the island. Our well is in gravel about 20' deep.

The action of the sea is evident in erosion along all shores, presence of large boulders near and above the high water mark, the condition of terrestrial vegetation near the white zone, and changes in the topography around the high-tide dock in Babb's Cove.

HISTORY OF THE ISLES OF SHOALS

Archaeologists suspect Vikings may have visited the islands before the 17th century. Certainly there were European fishermen at the Isles prior to their first description in 1614 by the explorer Captain John Smith. By the 1620's, there was a thriving fishing community here. The earliest descriptions of the island spoke of rugged rocky terrain with low vegetation and large quantities of fish. The present name "shoals" derives from the old English word for "schools" of fish, referring either to the number of fish or to the clustering of the islands in the archipelago.

When New Hampshire split from the Massachusetts Colony in 1680 and remained tax-free, most of the people living on Appledore moved to Star Island, and Appledore remained sparsely inhabited until the mid-19th century. In 1847, Thomas Loughton of Portsmouth began construction of a large resort hotel on Appledore, the Appledore House. Until her death in 1894, Celia Thaxter, Thomas Loughton's daughter and well-known poet, lived on Appledore during the summer months. The hotel became an important cultural center because of Celia's artistry and hospitality. The hotel, and many nearby buildings, were lost in a fire in September 1914. Appledore is quite different today, however several of SML's current campus buildings were built during the hotel era (now known as Founder's, Hamilton, and Loughton). The vegetation has changed as well, but many of the plant species and land birds remain. The only water birds breeding at the Isles of Shoals in those days were the Herring Gulls on Duck Island, and Spotted Sandpipers that nested commonly on all the islands.

After the turn of the century, the hotel lost money and came into the ownership of a syndicate. In 1908 a Manchester firm drew up a subdivision map, still stored in the York County Courthouse, Alfred, Maine, that subdivided the island into several hundred tiny lots, with many named streets. By 1909, various parcels from that subdivision were for sale. The US Coast Guard bought rights to use the head of Babb's Cove for a lifeboat-



launching site, and gained title to the highest point of the island, in 1910, they built what is now known as Bartels Hall (formerly the Coast Guard Building). By 1930, most of the island had been obtained by the Star Island Corporation. In 1928, Dr. C. Floyd ("Prof") Jackson, of the Department of Zoology at the University of New Hampshire, developed the Marine Zoological Laboratory on Appledore. Through the summer of 1940, UNH offered summer courses here. Alumni of those programs call themselves "Barnacles." With the coming of World War II in the early 1940's, the federal government replaced the landowners at the islands, and built the concrete tower on Appledore and several other structures that since have been demolished. During and just after the war years much of the formerly open land, including several cranberry bogs, grew back up into brush and poison ivy, and Herring Gulls increased in abundance tremendously, nesting on all the islands. Between the end of World War II and about 1970, Appledore was nearly deserted except for the gulls, and was subject to considerable vandalism.

ESTABLISHMENT OF THE SHOALS MARINE LABORATORY

In the early 1960's, Dr. John M. Kingsbury of Cornell University brought Cornell students to the Marine Biological Laboratory at Woods Hole for summer work in marine biology, but was interested in finding a more satisfactory way to introduce undergraduates to the science of the sea. He'd been a conferee in the programs at the Star Island Conference Center, and recognized the attractiveness of bringing students to the Isles of Shoals. In 1966 he began bringing students in the early summer to Star Island to a fledgling "Shoals Marine Laboratory." From the beginning, Cornell and UNH were interested in mutual operation of the Laboratory. Further, Dr. Kingsbury desired a more permanent setting at the Isles for its operation. In the late 1960's, with the lease of Appledore to Cornell from the Star Island Corporation, Dominic Gratta of Kittery began construction of SML. During the late 1960's and early 1970's, Dominic's crew, along with student volunteers and early staff of SML were hard at work on Appledore. They cleared brush and removed portions of ledge for establishment of roads, constructed docks, installed moorings, and lines for electricity, water and sewage. Old buildings were renovated and six buildings were built. The considerable funds required for these projects came from private donors dedicated to the educational mission of the Laboratory.

MARINE ENVIRONS

The characteristics of the waters surrounding the Isles of Shoals derive from many factors, including . . .

- (1) SEA LEVEL. Evidence from several sources indicates that sea level has increased approximately 10-20cm during the past century, obliterating some near-shore construction of the colonial period, and decreasing the islands' land area.
- (2) CURRENTS. Runoff from the Piscataqua River, 6 miles to the west, lowers the salinity slightly from that of the central Gulf of Maine (to about 32 parts per thousand), and carries nutrients. The island is influenced by major currents of the Gulf of Maine, often in a counterclockwise gyre in our area, and by local tidal currents that change direction and velocity constantly.
- (3) OFFSHORE WATER TEMPERATURE. By late summer, surface waters heat nearly to 60° F. At that time, there usually is a seasonal thermocline at a maximum depth of approximately 60 feet. Below this, temperature decreases rapidly to nearly 40° F. Major storms in the summer may mix the water column enough to obliterate the thermocline.
- (4) TIDES. Tides are regular and semidiurnal, with each day's cycles about 50 min. later than those of the preceding day. The mean tidal range is approximately 8.5 vertical feet and the mean spring range approximately 9.5 feet. The lowest spring tides usually are at approximately -2.0 feet. The predicted extreme high tide mark of +12.5 feet may be exceeded due to wave action accompanying severe storms. At such times, the effective high tide mark may be +25 feet or more, with a likelihood of sea spray higher than that, depending upon fetch. Such factors affect the extent of intertidal algal zonation, and the lower limit of terrestrial turf and vegetation.
- (5) SALINITY. The salinity is approximately 30-33‰ in the open water around the islands, but may vary considerably in intertidal and supratidal pools.
- (6) WIND VELOCITY AND DIRECTION. The Isles of Shoals are windy. In the summer, Gosport Harbor forms a refuge for vessels except during northwest blows, when sailing vessels often moor on the seaward side of the breakwaters. The Appledore dock in Babb's Cove generally is protected. However, southwest blows can create waves even in summer

that make use of the dock impossible. Wind-blown sea spray limits the lower limit of turf and terrestrial vegetation, as well as vertical growth of trees and shrubs, by “nipping” buds, especially during critical periods of growth in April and May. The same species of shrub (e.g. Choke cherry) may not grow at all on very low Duck Island, only reach a few inches in height on higher Seavey Island, and reach heights in excess of 20 feet only in the relatively protected low valleys on Appledore.

(7) WAVES. The sea surface usually has several classes of waves present, often many at the same time. The most important for navigation often are *local wind waves*. Generated by local wind conditions, they may form white caps that interfere with small boat operation. The most important waves ecologically are *storm waves* that emanate from storm centers 10-100 kilometers or more to sea and which are responsible for surf and most onshore wave action. In the heaviest storms, waves crash completely over the lower islands, break against the White Island Lighthouse, destroy breakwaters and near-shore construction, move mooring stones on the bottom and deposit huge boulders above the high tide line.

(8) TOPOGRAPHY OF THE SEA FLOOR. Local nautical charts include “isobaths” that show the ocean bottom between the Isles and the mainland to be generally even, with scattered rock outcroppings. The bottom represents glacial deposits of sand and gravel at a maximum depth of nearly 100 feet of water. Nearer the island are examples of faults and dikes in subtidal bedrock that produce a markedly uneven topography to the bottom, with many sudden drop-offs. In general (and this is the case along the Maine coast as a whole due to glacial sculpturing), the north and west sides of the islands are gradually sloping, ground off by the advancing glaciers, and the seaward sides evidence a stair-step character and drop off more suddenly to greater depths.

INTERTIDAL ENVIRONS

The part of Appledore Island between the tide marks is predominantly consolidated igneous/metamorphic bedrock, except for a few coarse gravel coves and the “Swimming Pool”/Babb’s Cove area of fine gravel and mud.

Intertidal zonation typical of the rocky Maine coast includes . . .

(1) Supralittoral WHITE ZONE of bare rocks with scant, hardy halophytes or seasonal terrestrial plants and pools of highly variable salinity; few organisms of marine origin except in deeper pools.

(2) Black or green SPRAY ZONE, dominated by encrusting filamentous algae, cyanobacteria, and the rough periwinkle, *Littorina saxatilis*.

(3) Major intertidal ROCKWEED ZONE, dominated by the abundant coarse brown algae in the genera *Ascophyllum* and *Fucus*, and intertidal barnacles. Many other marine invertebrates and algae are present, as well as vertebrates such as gulls and even fishes.

(4) CHONDRUS ZONE along the “low tide line,” dominated by red algae of the genera *Chondrus* and *Mastocarpus*; many invertebrates are found in the shell gravel at the bases of these low wiry algae, some graze over the zone at high tide.

(5) KELP ZONE at and below the spring low water mark, marked by the presence of large (over 1 meter in length) brown algae, predominantly of the genera *Laminaria* and *Alaria*. Some parts of the kelp zone (so-called “urchin barrens”) have been denuded by the grazing of the Sea urchin (*Strongylocentrotus droebachiensis*), and are covered by calcareous red algae, annual fine red algae, or the newly arrived green alga, *Codium*.

SOIL

The island has such different soils as . . .

- (1) Dense peat, representing tough tangles of roots of grass and herbaceous plants along exposed ledges. Prior to 1940, few gulls nested on Appledore. The increase in their numbers through the mid-1970's led to a significant enrichment of the soil. This peat has increased in thickness three inches in the past 50 years.
- (2) Deep black organic soils in protected valleys such as south of Bartels Hall (formerly the Coast Guard Building),
- (3) Bog mats in small depressions such as the Hotel Reservoir and the northern valley,
- (4) Isolated chunks of tidal marsh peat along the northern shore, in the region of drainage of the northern valley, and
- (5) Relatively barren areas of gravel resulting from recent storm action, such as the eastern part of the central valley, last flooded by the Patriot's Day storm of 2007.

VEGETATION

At least from the time of first recorded Isles of Shoals history (1614), the island apparently has not had a cover of spruce forest as is typical of Maine islands down east from Pemaquid Point, but rather has been shrub, bramble, and grass-covered. The island was more open during the last century due to mowing and grazing. Since 1950, however, with the abandonment of areas kept open previously, and with the activity of the gulls, the island's woody vegetation has developed into dense thickets. In the protection of the rocky ridges, the plants form a DUNE SHRUB COMMUNITY, of a species composition to be expected on a barrier island between fore dunes and back dunes. The deepest valleys are moist, and covered by a mixture of Winterberry (*Ilex verticillata*), Juneberry (*Amelanchier intermedia*), various species of cherry, and many other shrubs and small trees.

Exposed ridges support a mixture of GULL LAWN, with low herbaceous plants resistant to the activity of the birds, and DRY SHRUB THICKET, dominated by Pasture Rose (*Rosa virginiana*), other members of the rose family, and many other low shrubs. Around buildings and pathways are DISTURBED AREAS with many introduced weeds, including grasses and composites.

The island's boggy, wet depressions have many species of wetland plants.

The rocky shore has many species of halophytes, tidal marsh plants, and species that may establish from time to time due to transport of their fruits or seeds on the surface of the ocean.



TERRESTRIAL AND FRESHWATER ANIMALS

Several species of terrestrial mammals occur on Appledore. Muskrats (*Ondatra zibethica*) are abundant, easily visible rodents whose fecal “signposts” adorn nearly every stone on the trail. They are vegetarians, and apparently cause no harm to the nesting gulls. They occur in a wider variety of ecological niches than their counterparts on the mainland. They probably were introduced in the mid-1940’s.



muskrat

Norway rats (*Rattus norvegicus*) probably have been introduced many times. They are secretive and nocturnal, being most visible in the evening around the rear of the Commons. The population increases in late summer, and decreases in the winter.

Students in the 1930’s introduced two species of snakes to Appledore Island, the Smooth Green Snake (*Liochlorophis vernalis*) and the Northern Brown Snake (*Storeria dekayi*). They occur under rocks and boards in the central valley.

Please see SML’s website for the *Checklist of Flora and Fauna*; this document includes an overview of the species commonly found living among the Isles of Shoals.



BIRDS OF APPLIEDORE ISLAND

LAND BIRDS. About a dozen species of land birds nest on Appledore, of which the most common and regular are the Song Sparrow, Common Yellowthroat, Gray Catbird, European Starling, Red-winged Blackbird, and Barn Swallow. Over 200 additional species occur as migrants, winter visitors, or vagrants from the mainland.

WATER BIRDS. About 700 pairs of Herring Gulls and about 500 pairs of Great black-backed Gulls (pictured) nest on Appledore annually. Herring Gull numbers are decreasing each year.

Please avoid unnecessary entry into the gull colony away from regular paths during May, June and July when young birds can be frightened out of their territory. Around the northern half of the island, follow carefully the trail marked with paint marks on rocks. During especially hot or cold, wet, or rainy weather, avoid lingering unnecessarily in any one gull's territory.

About 200 pairs of long-legged wading birds, including Snowy Egret, Black-crowned Night-Heron, Glossy Ibis, and Little Blue Heron used to nest each year in the dense woody vegetation east of Crystal Lake. In the late 1990s and early 2000s, many of these birds shifted to nest to the southwest of Palmer Kinne Lab. In 2003 and 2004, raccoons appeared on Appledore and Smuttynose Islands; their depredation devastated the resident gull colony and may have had an impact upon wading bird nesting efforts. While gulls have bounced back quickly, the wading birds have yet to return to Appledore in large numbers. Glossy Ibis and Snowy Egret sightings in 2007 and 2008 on and around Appledore, and the discovery of two Black-crowned Night-Heron nests in 2007 give us reason to hope that these beautiful birds will once again nest on Appledore successfully.

Additional water birds that nest each year include the Mallard, American Black Duck, Common Eider, Canada geese and occasionally Black Guillemot.



SPECIAL FEATURES OF INTEREST

There are numerous places of interest to the visitor on Appledore. Many are close to the dock and Babb's Cove. Others are on the seaward side of the island, and involve taking paths slightly out of the way.

With the hard work of volunteers, the UNH Thompson School of Applied Science, and staff of the Laboratory, we maintain CELIA THAXTER'S GARDEN adjacent to the foundations of her house, near the Utility Building. The design and plantings match, as nearly as practical, the arrangement of her plantings as described in her 1894 book, *An Island Garden*.

On a site on high ground in the shrubs north of the Utility Building is the LAIGHTON CEMETERY, where Thomas and Eliza Loughton, their two sons Cedric and Oscar, and daughter Celia are buried. Hidden by shrubs north of the central valley are FOUNDATIONS of buildings associated with the Appledore Hotel that burned in September 1914. We hope that relics discovered around these foundations will not be moved, or at least not taken from the island, but will be left to await proper investigation.

Near the edges of open areas of the central valley, and especially along the path called "Celia Thaxter Way," are many APPLE TREES, some of which are of the variety "Gravenstein" that dates back to the middle of the last century.

On the shore west of the Utility Building are several objects of interest, including timbers jutting from the shore gravel (down shore from the power pole) that remain from the hotel pier, and the NAVY PIER with pilings and cribs beyond it. The original marginal road is so eroded in that area, as well as partially destroyed by quarrying of rocks used later for the pier, that except for the remaining iron gate posts it is nearly unrecognizable. The exposed bedrock of the island may bear a number of interesting man-made features, including carved initials, U.S. Coast Guard and Geodetic Survey markers, iron posts, various eyebolts, and ringbolts. SML personnel in the 1970's set in place transect marking pins that mark the position of 28 transect locations across the intertidal zone, for use in field research exercises of students at SML. The pins are at +13.5' above MLW.

Adjacent to the only clump of American elm (now dead) on the island, inland from the Navy Pier, is the Hotel Reservoir site, now nearly empty, and covered with bog and marsh vegetation.

On the seaward side of the island are some spectacular geological features, including, *Broad Cove*, a gravel beach overrun by severe winter storms, *Thunder Hole*, a narrow inlet just southeast of Broad Cove where at certain times the waves crash with a roar, *Broadway and 42nd Street*, an X-shaped depression in the shore rocks on the northeast end of the island, formed by an eroded diabase dike crossed by a deep east-west cleft, and *Sheep Cave*, a cavity beneath a granite ledge inland from the southeast side of the island, just about big enough for two people (Celia Thaxter wrote of this in her book).

WATERFRONT FACILITIES

The Laboratory maintains several vessel moorings located just offshore of Babb's Rock specifically designed for SML vessels. From time to time with SML permission, visiting commercial or recreational vessels use these moorings for day visits. SML does not encourage overnight moorage.

SML's fleet of vessels includes the 47-foot [R/V JOHN M. KINGSBURY](#) and the 36-foot R/V JOHN B. HEISER. The KINGSBURY (pictured), delivered in 1984, was built to the Laboratory's specifications and is used as an integral component of many courses to provide students with working experience aboard a coastal research vessel. The HEISER is a state of the art aluminum vessel that provides additional support to SML's programs, operational needs and research activities. The R/V STORM PETREL, two Boston Whalers, inflatables and a 19-foot sailboat, the S/V MAKO, round out SML's fleet. **Participants are not permitted to operate SML vessels at anytime.**



ROADS

During the last century, the Appledore House Hotel ownership constructed a road that completely encircled the island above the lower limit of terrestrial vegetation. This road is no longer in use. Building new roads during the Laboratory's establishment was a major engineering challenge! They had to be surveyed through dense thickets of poison ivy, cleared, graded, and filled.

PRE-1970 BUILDINGS

FOUNDER' S HALL was built as part of the Appledore Hotel complex in the last century, and was named informally by the students in the SML class of 1974 for one of the "founders" of SML, Dr. Oliver Hewitt. Founder's is typical of the architecture of the 17th and 18th century, and is nearly identical in design to the no longer existing Celia Thaxter's cottage. Founder's served as the kitchen and dormitory for the UNH Marine Zoological Laboratory between 1928 and 1940, when it was called Barton Hall. During World War II, it served as the Operations Building for the Navy stationed there.

Sometime during the 1950's and 1960's vandals entered the building and destroyed windows and sashes, removed radiators and pipes, and defaced walls. Prior to SML's construction of the three dormitories, it served as student housing. Currently it functions as housing for students, staff and faculty. This building was completely renovated in 1993.

WINKLEY HOUSE. This building was built in the 19th century along the hillside near Founder's, and was vacant for over a half century. It is privately owned and now collapsed.
THE HUGH G. HAMILTON HOUSE. This was also built in the last century, with its easterly

foundation so aligned that the porch could be connected by a continuous straight set of steps, porches, and boardwalk with both Founder's Hall and the hotel in central valley. Early in this century it had a circular gazebo in the corner of the porch. Hamilton House served as faculty housing for the Marine Zoological Laboratory 1928-1940. Mr. Hamilton's widow donated the building to the University of New Hampshire. Hamilton House was renovated for combined UNH/SML use; the lower floor is a large lecture hall, and the upstairs rooms provide space for administrative offices.

LAIGHTON HOUSE. Built in the last century, but more recently than the previous two, this was the main laboratory building for UNH's Marine Zoological Laboratory in the 1930's. A memorabilia cabinet just inside the front entrance contains articles relating to that era. SML has completely renovated the building, rebuilt the porch, and redesigned the interior. The upstairs now houses a library, student computer stations, and a classroom. Downstairs are two labs, one with running seawater. The front porch offers a fine view of the sunset.

BARTELS HALL (formerly known as the COAST GUARD BUILDING). The U.S. Life Saving Service built this building in 1910 at the very top of Appledore, in a distinctive style typical of many east-coast Coast Guard structures from that period, such as the one at the mouth of Portsmouth Harbor. Some of the foundation stones were taken from a cairn that according to legend was built by Captain John Smith. It now houses SML staff. The building is newly renovated and a complementary addition has been added through the generosity of Hank and Nancy Bartels, dedicated Cornell and SML supporters. From the front porches or windows, you may catch a glimpse of Crystal Lake, the hotel buildings on Star Island and the evening egret flight. On clear evenings, those with a sharp eye can see about a dozen lighthouses from Cape Ann, Mass. to Cape Elizabeth, Maine.

RADAR TOWER. This is the only major construction of the 1940's that remains. Today it is kept locked, due to the deterioration of its floors. It contains stored equipment and supplies. The base of the tower boasts a fine population of *Xanthoria*, the Golden Lichen, a species especially resistant to, or benefited by, gull guano. The Tower houses all the research equipment for UNH's AIRMAP project. **The Tower is off-limits to participants.**

PAINT SHED. Also built in the World War II years, this holds the Laboratory's paint and some flammable materials.

DIVE LOCKER. Adjacent to the Paint Shed, this has been renovated to serve as a staging area for SML research divers, such as members of the Underwater Research course and research interns.

POST 1970 CONSTRUCTION

Construction of Palmer-Kinne Laboratory, Kiggins Commons, Utility Building, and the three dormitories was financed by private, non-governmental donations, primarily raised by the Laboratory's founder and first director, Dr. John M. Kingsbury. Dominic Gratta of Kittery, Maine and his crew, following his and Dr. Kingsbury's designs, constructed all the new buildings. They are positioned to be a functional and integrated campus, and blend with the topography.

KIGGINS COMMONS. This building, completed in 1974, houses SML's main kitchen and

dining area. The *Appledore Store* is located on the first floor. The spacious dining area also serves as a commons for study, lectures, and evening socializing. The ground level floor houses a recently renovated laboratory and classroom. The Commons back porch serves as a loading dock, and the front deck is a favorite gathering place with a magnificent view of the north part of Appledore and the mainland to north and west.

PALMER-KINNE LABORATORY. Dedicated in 1975, this building is SML's major teaching laboratory, with space for as many as 60 students simultaneously. Each student has about a meter of space along the windowed borders of a spacious work area for books, notes, specimens, tools, and optical equipment. The lab is equipped with a variety of scientific sampling equipment, and two large sea tables supply running seawater for housing marine organisms.

DORMITORIES. Built over several seasons in the late 1970's, each of the three dorms has washrooms and 10 double occupancy rooms. Their location is convenient both to the Commons, laboratories and classrooms. On the roof of Dorm #3 sits an array of solar panels, which provide most of the power to Dorms #2 and #3 during the summer months.

For more descriptions and pictures of all SML campus facilities, see:
<http://host31.spidergraphics.com/sml/doc/campus.pdf>



UTILITY BUILDING. The first building to be constructed at Appledore Island in the early 1970's, this building houses . . .

- The Grass Foundation Laboratory, that provides space and running fresh and salt water for faculty and student research, and our Appledore Island Migratory Bird Banding Station,
- A central bay with machine workshop and space for winter storage of equipment and vehicles,
- A power room for generation of electricity. It is located so as to take advantage of a large water tank left from the 1940's that can be pressurized to allow distribution of fresh water to other buildings,
- A reverse osmosis desalination system.

POLE BARN. Completed in 2000 this multi-functional building was built specifically to house all of SML's heavy equipment and vehicles. It serves as a woodworking shop in summer.

KINGSBURY HOUSE. Completed during the summer of 2001, this multi-use building serves as the home of SML's director, family and guests, as well as a residence for open-up and close-down crews in the spring and in the fall. The house is named in honor of John and Louise Kingsbury, SML's founding director and his wife.

ENGINEERING SYSTEMS

The Laboratory operates nearly as diverse an engineering system as you might expect for a coastal city, including power supply, transport, communication, water supply and treatment, and waste disposal.



POWER GENERATION. SML obtains its power from one of three diesel generators in the rear of the Utility Building. Kitchen equipment is powered by propane gas. Outboard motors run on gasoline. We bring propane and gasoline from the mainland on laboratory vessels as needed. Small coastal tankers deliver diesel fuel for the generators; this fuel is stored in twin tanks located in the central valley. Insulated conduits on or under the ground transmit electricity among the Laboratory buildings. In 2007, SML installed a 7.5kW wind turbine (pictured at left). Its primary purpose is to provide year-round power to UNH's AIRMAP project. Check out AIRMAP online at: <http://airmap.unh.edu/>

VEHICLES. Trucks face many hazards on Appledore, including rough roads bordered by unforgiving rocks, and a continuously salty atmosphere. The Laboratory has 2 trucks, a multi-use tractor, and 2 "gators." A backhoe is used for moving heavy cargo, road and high water dock maintenance, and other heavy-duty jobs.

COMMUNICATION. The Laboratory communicates with the rest of the world using marine radios and cell phones. “Job-coms” and marine radios are used for island communications, and communication between vessels. Internet service is provided by a wireless microwave link from the mainland. Most cell phone carriers work fairly well on Appledore.

DRINKING WATER SUPPLY and TREATMENT. A dug well located in the central valley of the island provides the Lab with drinking water. This water is filtered and disinfected, and is safe for human consumption. The well water is supplemented by a reverse osmosis system during the main part of the summer. The “RO” desalinates water from the ocean; this water is then disinfected and routed into the drinking water system.

WASTEWATER SYSTEM and TREATMENT. In 2009, the Lab installed two new leach fields on Appledore Island to handle wastewater treatment. This new system eliminates the use of harsh chemicals for treatment, and uses fewer pumps, which conserves energy!

SEAWATER. From a pump house located near Appledore’s main dock, seawater is distributed throughout our island campus. Cool seawater enables us to keep marine organisms alive in our teaching/research lab “sea tables.”

CONTACTING SHOALS MARINE LABORATORY: www.sml.cornell.edu

SML’s main administrative office is at Cornell. We also operate two other offices, one at [Creek Farm](#), known as our coastal office, and one on Appledore during summer.

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