

USC Wrigley Marine Science Center Laboratory Manual



USC
Dornsife
*Wrigley Institute
for Environment
and Sustainability*

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Introduction

THE WRIGLEY INSTITUTE FOR ENVIRONMENT AND SUSTAINABILITY (WIES)

The USC Wrigley Institute for Environment and Sustainability is part of USC's oldest and most diverse school, the Dornsife College of Letters, Arts and Sciences, and USC's hub for environmental and sustainability research, education and engagement. The main offices are located in Los Angeles at the USC University Park Campus, and we proudly oversee the research laboratories and conference facilities at the Philip K. Wrigley Marine Science Center on Catalina Island, at Big Fisherman Cove near the community of Two Harbors.

The mission of the Wrigley Institute is to inspire global environmental solutions through frontier research and education. In addition to training the next generation of environmental and sustainability leaders, the Wrigley Institute is dedicated to enhancing equity and inclusion on campus and beyond. We seek mentors and student participants who can contribute to this mission both during and after participation in the program.

The three Wrigley Institute Research Launchpads merge the expertise of core faculty, staff scientists, postdoctoral fellows, and graduate students to generate data and intelligence aimed at solving the world's most pressing environmental problems. With a focus on research that breaks traditional disciplinary boundaries, these centers both help move the field of environmental studies forward and create unique training opportunities for tomorrow's environmental and sustainability leaders. The USC Wrigley Institute also works with foundations and the public to advance solutions, promote conversations with consequence, and enhance environmental awareness. More information can be found on the institute's website.

THE WRIGLEY MARINE SCIENCE CENTER (WMSC)

The Wrigley Marine Science Center (WMSC) is located near the town of Two Harbors on Catalina Island, about 26 miles from the Port of Los Angeles in Southern California. The location is remote but beautiful, with easy access to open ocean and coastal ecosystems. We have a 5.5-acre campus with housing, a conference center, dining hall, laboratory and an ocean at your doorstep! More information about the WMSC can be found on the Wrigley Institute website.

BIG FISHERMAN COVE

Big Fisherman Cove has been deemed an Area of Special Biological Significance (ASBS) within the Blue Caverns Onshore State Marine Conservation Area (SMCA). This is a no take area which includes fishing and collecting of shells. The only exception to this is if your group is on an approved scientific collection permit. This permit needs to be submitted to the Laboratory Coordinator prior to any collection activities. The cove reaches about 80 feet at its deepest, but just outside the cove along Blue Caverns it drops down past 130 feet. The cove has eelgrass beds, kelp forests and sandy bottoms. Many fish like

to aggregate in the shelter of the dock, making it a great snorkel spot. During the summer months leopard sharks have been known to aggregate in the cove. You can view the underwater camera at: [USC Wrigley Catalina Marine Reserve](#).

Laboratory

Lab Supervision Policy for Undergraduates and Minors

[View the Policy](#)

Laboratory Spaces

Space assignments inside the Laboratory building must be reserved in advance prior to arrival to ensure we can accommodate your requested needs. As WMSC is a shared use facility, please be mindful of room calendars and do not leave personal items in shared spaces. As a courtesy to others, if you put anything in an aquaria, refrigerator/freezer, on a shelf, etc. it should be labeled with your NAME, DATE, CONTENTS, CONTACT #. If anything is found without a label it will be considered trash and disposed of in a proper manner. You are personally responsible for the care of any animals, plants or other materials for your project. We expect any general lab use items to be returned in the same condition it was assigned. Any borrowed consumables must be replaced as soon as possible. As there is no laboratory janitorial service at WMSC, groups are responsible to clean up any mess that is made in your assigned spaces. We do not have the staff to be able to clean up after everyone.

Teaching Laboratories

The laboratory has two teaching labs. Lab 204 is the larger of the two with 20 workstations, five sinks, two large incubators, refrigerator, freezer and a chemical fume hood. The smaller teaching lab, Lab 211, has 16 workstations, one sink, one refrigerator, one freezer and no fume hood. Both labs are fully stocked with both dissecting and compound microscopes. These labs are considered wet labs and have room for multiple saltwater aquaria which receive constant water flow. Filtered sea water down to 0.2 microns is available in Lab 204.

Shared Use Research Laboratories

On the third floor of the lab building are smaller research laboratories which are rented out as individual cubicles. Each cubicle is roughly 110 to 140 square feet and is fitted with a lab bench and adjustable chair. Labs 302 and 303 have either a sea water table or a rack to stack aquaria in the center of the room. While labs 302 and 303 do not have fume hoods, a shared use fume hood can be located in Molecular Lab room 304. Lab 303 also has a Shimadzu Spectrometer for shared use. Microscopes are available in each lab. There is also one shared use lab on the second floor, Lab 202. This lab has an open floor plan with bench space around the perimeter of the room and one medium sized incubator. This room

does not have a fume hood or sink and has no access to the saltwater system.

Remote Satellite Laboratory

This space is located in the grassy field across from the park. It is a shipping container that can be very versatile based on your needs. The container has electricity and is fitted with A/C and a heater. With its wide double doors this space is perfect for groups that will be mostly working outside, but need space for computers or other electrical equipment. This lab is not approved for chemicals.

Faculty Laboratories

Larval Culture Lab (301), Lab 313 and Lab 314 are considered to be faculty laboratories. *Space access and equipment requests will need to be made directly with the faculty member and approved prior to access.*

All three laboratories house freshwater sinks and a chemical fume hood, while Labs 301 and 313 have access to the saltwater system. Lab 313 is also home to the Burkolater (BoL) which is a shared use piece of equipment used in Ocean Acidification monitoring. Training on the BoL is required by Laboratory Staff prior to use.

Molecular Laboratory

Lab 304 is the Molecular Lab. This space has two sinks, a chemical fume hood and two refrigerators with freezers. Specialized equipment includes: multiple centrifuges, micro balance, electrophoresis rigs, gel imager, thermocyclers, sonicator, vortexers, multiple pipettman, microwave, muffle furnace, and a pH meter. This is a shared use space but can be reserved for small classes/workshops that need a more formalized space to do molecular based work.

Radiation Laboratory

Lab 311 is the Radiation Lab used for tracing radioactive isotopes. The lab hosts a sink, fume hood and Beckman LS 1801 scintillation counter. No one is permitted in the Radiation Lab unless they have completed the Radiation Safety Course with Environmental Health and Safety, named on a current Radiation Permit with MSC Lab 311 listed and have a permit submitted to the Laboratory Coordinator.

Temperature Controlled Rooms

On the third floor of the lab building we have two temperature-controlled rooms. The Silver Cold room has two large deep tubs (7'6"x3'2"x2') for holding a variety of aquariums. These tubs have access to flowing seawater which comes from the Larval Culture Lab facility. This temperature control space is normally kept at 16C for most marine work

but can be adjusted based on your needs. Across from the two tubs is limited bench space and one sink.

The Black Temperature Controlled room is typically kept warmer (21C) for algae cultivation for the Larval Culture Lab. This room has shelves to keep multiple carboys and flasks of algae and is fitted with fluorescent grow lights. This room also has access to the saltwater system in a similar manner as the Silver Cold Room. There is no other bench space present in the lab.

Greenhouse

“Blue House”

On the side of the lab building is a large glass structure, half of which is the “Blue House”. This area is ideal for chemical free aquatic experiments. The laboratory side of the Blue House has a long double layered rack with seawater capabilities. This area can either receive flow through sea water, or can become a closed system with a small 100 gallon sump. The Blue House also has 5 deep tubs of multiple sizes: 2 placed in the center of the room along with a workbench and 3 on the ocean side of the room. The back of the room has 3 large conical 18” diameter tanks used for algae culturing. Next to these tanks is another rack with three levels to house more aquaria and has access to the flow through saltwater system. Each level of this rack can hold 7 kreisel tanks or 5 custom 20L tanks for animal work.

“Green House”

Adjacent to the Blue House is the GreenHouse. This area is home to the two larger aquaponics systems. Each system has a 250 gallon holding tank for fish, a mid level with clay pellets which acts on a bell syphon and a lower level which has three styrofoam floats for holding plants. As this side is closed off to the flow through seawater system, small bench type experiments can be set up on the opposite side of the room pending space availability.

Waterfront Wet Lab

The wet lab is located on the waterfront across from the dive locker. This outdoor space has 5 A-frame racks, each able to hold 4 water tables. Along with the racks there are 7 large blue poly holding tanks approximate 250 gallons each. These holding tanks are typically used for holding specimens, running experiments, or education/outreach activities. This space is ideal for groups who are spending a majority of the time out in the field and need a quick easy place to house animals or algae.

Note: Only native marine species approved by Laboratory Staff may be held in waterfront tanks connected to the seawater system. The introduction of non-native species into any system that draws from or discharges to Big Fisherman Cove is strictly prohibited.

Sea Water System

The lab is equipped with a high volume seawater system. The seawater is drawn directly from the Pacific Ocean at approximately 25 feet below the surface and filtered through a macro-screen that covers an underwater intake. The water is not treated, so it's safe from ionic or chemical contamination. The labs can draw seawater from the storage tank at a rate of 95 gallons per minute, and the water temperature is rarely more than 2 degrees Fahrenheit above the ambient ocean temperature.

A filtered sea water station can be found in Lab 204. Here water goes through 5 collection stages based on your experimental needs: raw/unfiltered seawater, 50 um, 10 um, 5 um and 0.2 um filters for the most sensitive experiments. Water can be collected at any increment.

Only local, native marine species may be housed or introduced into the seawater system or any connected holding tanks. The seawater system draws directly from Big Fisherman Cove and is discharged back into the ocean; therefore, introducing non-native or invasive species poses a risk to the surrounding ecosystem. All species used in experiments must be approved by Laboratory Staff prior to introduction into the system.

Shared Use Equipment

The equipment listed below is available for research/class use. For some of the more specialized equipment, the laboratory staff will work directly with the user to ensure familiarity to the equipment and provide any necessary training before use.

Microprep Room

The microprep room can be found on the second floor. This room is where we store glassware including, but not limited to: beakers, erlenmeyer flasks, funnels, graduated cylinders, test tubes, watch glasses, filter flasks, volumetric flasks, petri dishes and bottles. All glassware should be assumed as 'dead'; if 'live' glassware is needed it should be brought by the group. Any glassware taken should be washed and returned. If glassware is broken please inform laboratory staff. This room also houses the large Steris autoclave and Mili-Q water system which are available to use.

Specialized Water and Autoclave Room

This small room is located adjacent to the staircase next to the park on the second floor. It is home to the smaller Market Forge autoclave and

specialized water systems. Specialized water includes Mili-Q and DI water. Large volumes of Mili-Q water should be handled through this system versus the one located in the Microprep room. *Warning: This autoclave creates steam clouds and users should be careful when releasing pressure.*

Shared Equipment Room

The shared equipment room is located on the third floor of the lab overlooking the park. This room is home to the -80C freezer, drying ovens, Olympus BX51 Epi Fluorescent scope and Turner Trilogy Fluorometer.

Ultralow freezer: When adding samples to the -80 freezer make sure all of your samples are labeled, you're wearing proper thermal gloves, you leave the freezer open for the minimum amount of time and samples are noted on the sheet on the front of the freezer door. Avoid opening and closing the freezer more than is absolutely necessary. Be aware of the temperature. A dialer will notify the Laboratory Staff when the temperature rises above -80C and if the temperature rises to -65C, freezer access will be prohibited until -80C temperature is reached.

Drying ovens: The room houses 3 drying ovens, two of which have digital temperature controls. Everything put into drying ovens should be labeled and noted on the sheet on the door of individual ovens. We also ask that specimens be placed in secondary containment in order to help with cleanliness of the units.

EpiScope: The Epi Fluorescent scope can be found in the first room on the left. Use of the EpiScope is by appointment and a sign-up sheet is located on the front of the door. If using the mercury bulb, use time should be recorded in the binder next to the scope. The scope is equipped with the following filters: Chla, FitC, DAPI, and DAPI long pass. Please note that classes are given priority as time on the instrument is built into their syllabus.

Fluorometer: The Trilogy fluorometer can be found in the second room on the left. We have a variety of modules for the fluorometer that need to be signed out with laboratory staff. Failure to return any borrowed module may result in being charged for its replacement. Please note that classes are given priority as time on the instrument is built into their syllabus.

Stock Room

Many other types of equipment are available on a sign in/sign out system. For access to any of the following please talk with laboratory staff.

- Aquarium items: 10 gallon tanks, bubblers, air stones, tubing, chillers, heaters, nets

- Filtration: Vacuum pumps, rig systems, filtration apparatus, clips
- Oceanographic tools: YSI (10 M, 30 M), Lightmeter, secchi disk, niskin bottles, sample bottles, coolers
- Lab equipment: stir plate, hot plate, thermometers, stands, vortex, scoopula, spatula, scalpel, forceps, probes, dissection kits, hemocytometer, small propane torches, plate spreaders,
- Field equipment: quadrats, transect tapes, buckets, plankton nets, meter sticks, trowels, seine net,
- Tools: wrenches, screwdrivers, allen keys, pvc cutters, hacksaws, ratchets, rubber mallets,
- Miscellaneous: rubber and cork stoppers, nalgene bottles, plastic funnels, extension cords

Note: Consumable items are the user's responsibility to bring. In the event, you run out or forget an item, we may be able to help. Please check with Laboratory Staff for availability. If we are able to provide you with the item, we expect for it to be replaced.

Other

Other larger pieces of shared use equipment can be found throughout the laboratory building. These include:

- Centrifuges: Lab 304
- Gel Imager: Lab 304
- Sonicator: Lab 304
- Percival Incubators: Lab 202 and 204
- Shimadzu UV-1800 Spectrophotometer: Lab 303
- Beckman DU 640 Spectrophotometer: Lab 204
- Burokolater: Lab 313

If you like to transport your own instruments or experimental setups, please contact Laboratory Staff prior to shipping. The Laboratory Staff needs to ensure we have enough space to house your instruments and/or experimental setups. We will also need to coordinate boat space and possible mainland storage until the equipment can be delivered to WMSC.

Chemical Storage

When bringing chemicals out to the island please be sure that they are labelled, shipped in appropriate secondary containment and Safety Data Sheets are readily available. Flammable, corrosive and toxic cabinets can be found in each individual lab. Chemicals in glass bottles and particularly hazardous substances should be stored in secondary containment and never above eye level. Acute toxins, reproductive toxins and carcinogens should be labeled as such. The only refrigerator approved for flammable storage is located in the molecular Lab 304. Please reach out to Laboratory Staff about any

uncertainties. If you are planning on leaving chemicals on site for extended periods, please contact Laboratory Staff to ensure space availability.

Hazardous Waste

Care should be taken to dispose of hazardous waste appropriately. Waste should be labeled with a Hazard waste tag and the tag must be filled out completely. Waste bottles must be capped at all times when not in use. Any questions on disposal locations or labeling procedures can be found on USC Fact Sheets: Hazardous Waste Disposal and Hazardous Waste Labeling in every lab. If a waste bottle reaches capacity (80% full) inform Laboratory Staff who can then transfer the waste to the Hazmat Shed.

General Lab Safety

To conduct research in a lab unsupervised, all researchers must complete a 6-hour General Lab Safety Course (or the equivalent at your home institution) prior to arrival and a 1-hour WMSC-specific safety talk which is performed onsite at WMSC.

To work in a lab under supervision (by a graduate student or instructor), all undergraduates must complete a 3-hour safety course (or equivalent at your home institution) and a 1-hour WMSC-specific safety talk. All supervisors must complete the 6-hour training and 1-hour WMSC specific safety talk.

Students under the age of 18 are not allowed to work unsupervised in the labs. If ANY students in the group are under 18, the group must have a supervisor (who has completed the 6-hour training) and an adult chaperone to watch over each “bay” being used in the lab. Chaperones are not required to complete any formal training but are encouraged to complete the 1-hour WMSC safety course. Fact sheets can be found in every lab covering a range of topics for quick reference.

READING OF THIS MANUAL DOES NOT REPLACE PROPER TRAINING.

General Lab Rules

- NO Food or Drink allowed in the labs.
- Long pants, closed toe and heel shoes, and a lab coat must be worn at all times in the lab.
- Long hair should be tied back out of one's face to avoid chemical exposure
- Wear appropriate Personal Protective Equipment (PPE) for your activity. (ie safety goggles, gloves, etc)
- When using chemicals be sure to read through appropriate Standard Operating Procedures (SOPs).
- Do not use gloved hands on door knobs and other public surfaces (i.e. sinks)

- Do not leave the lab building wearing PPE and dispose of all used gloves
- Dispose of waste in the appropriate labelled containers.

Personal Protective Equipment

PPE is available in every laboratory. Be sure to know what you need for your specific activity. If stock is low please inform Laboratory Staff. Gloves are meant to be single use. PPE should only be worn in the laboratory building to prevent cross contamination between the lab and personal space. For more information on PPE please refer to the following USC Fact Sheets available in every lab: [Eye Protection](#), [Footwear: Shoes](#), [Goggle/Face Shield for Splash Hazards](#), and [Lab Coat Selection](#).

Safety Equipment

The lab is stocked with safety equipment for all kinds of emergencies.

Fire safety: There are fire hoses located near each stairwell and each laboratory is equipped with a fire extinguisher. The lab building is not equipped with a fire suppression system so staying vigilant when working with flammable materials is a must. In the event of a large-scale emergency, the lab building is equipped with 2 emergency response duffle bags in Room 202. These bags will be grabbed by staff in the event of an emergency so please do not move or remove supplies from them.

Chemical safety and Medical Emergency Equipment: The lab building is equipped with 4 safety showers and emergency eyewash stations (2 on the second floor and 2 on the third). Next to every safety shower location is a first aid kit. In the laboratory courtyard next to the safety shower is where you will find the biggest and most stocked kit and chemical spill kit (large tub). In addition to the 1st aid and chemical spill kit, an emergency oxygen cylinder and an AED are also located in this central location. A phenol spill kit can be found in the large teaching laboratory (RM 204).

Do not attempt to clean large spills or spills with particularly hazardous materials. In the event of any spill, laboratory staff must be notified. If the spill is large, evacuate the area first before notifying the laboratory staff. The laboratory staff will work with USC Hazmat on proper spill cleanup management. In the case of an emergency dial 9-911 and inform a staff member immediately.

Research

Conducting Research at WMSC

The Wrigley Marine Science Center on Catalina Island supports research throughout the year. The labs are busy, particularly from May through September, and we recommend that you apply for research space at least five

months in advance. You will need to fill out the Research Activities Plan and submit it to the Laboratory Coordinator Brittany Martinez for approval. Depending on the type of research conducted you may need to submit additional permits prior to the start of your research project.

Conducting Research on Catalina (non-USC property)

Catalina Island Conservancy Property

Please visit the Catalina Conservancy [website](#) for additional information.

Private Coves

For research conducted in private coves, prior access by the managers of the specific coves must be granted prior to arrival to ensure your presence will not disrupt their operations. The WMSC Administrative Office may be able to provide you with contact information upon request.

**Please note that many of the surrounding coves host youth groups so the safety of minors is their top priority and permittance may not be allowed.*

Permits

Scientific Collection Permits:

"Fish and Game Code (FGC) sections 1002, 1002.5 and 1003 authorize the California Department of Fish and Wildlife (Department) to issue permits for the take or possession of wildlife, including mammals, birds and the nests and eggs thereof, reptiles, amphibians, fish, certain plants and invertebrates for scientific, educational, and propagation purposes. The Department currently implements this authority through Section 650, Title 14, California Code of Regulations (CCR), by issuing Scientific Collecting Permits (SCP) to take or possess wildlife for such purposes."

Please visit CA Department of Fish and Wildlife website for additional information:

[Scientific Collecting Permits](#)

An approved SCP will need to be submitted prior to the start of your planned research.

IACUC Permits:

"The University of Southern California Institutional Animal Care and Use Committee (IACUC) oversees USC's animal programs, animal facilities, and policies ensuring appropriate care, ethical use and humane treatment of animals. The USC IACUC is a committee formed by animal scientists, scientists that do not use animals, non-scientists (e.g., biosafety and radiation safety specialists), veterinarians, and finally, public members

not affiliated with USC. The IACUC serves as a resource to faculty, technicians, students, staff, and administrators, providing guidance in fulfilling the obligation to plan and conduct all animal use procedures required for research, teaching, and testing at USC.

Additional information can be found at: [Institutional Animal Care and Use Committee](#)

For marine based research at WMSC, an IACUC permit is required when holding vertebrates or octopuses in tanks. For non-USC research staff, you will need to register for an istar account as a volunteer. You will need to fill out the permit application but do not submit. USC IACUC will only accept permit requests by a USC Staff member. Save a copy of your application and submit it to Brittany Martinez (bm27081@usc.edu) as she is the PI for WMSC. She will submit it on your behalf and will grant you access to modify it once submitted.

Drone Flights:

Please refer to the [Drone Policy and Operating Procedures](#) for additional information.

Conservancy Lands Permit:

Please refer to the [Catalina Island Conservancy](#) for additional information.

Research Data Sets

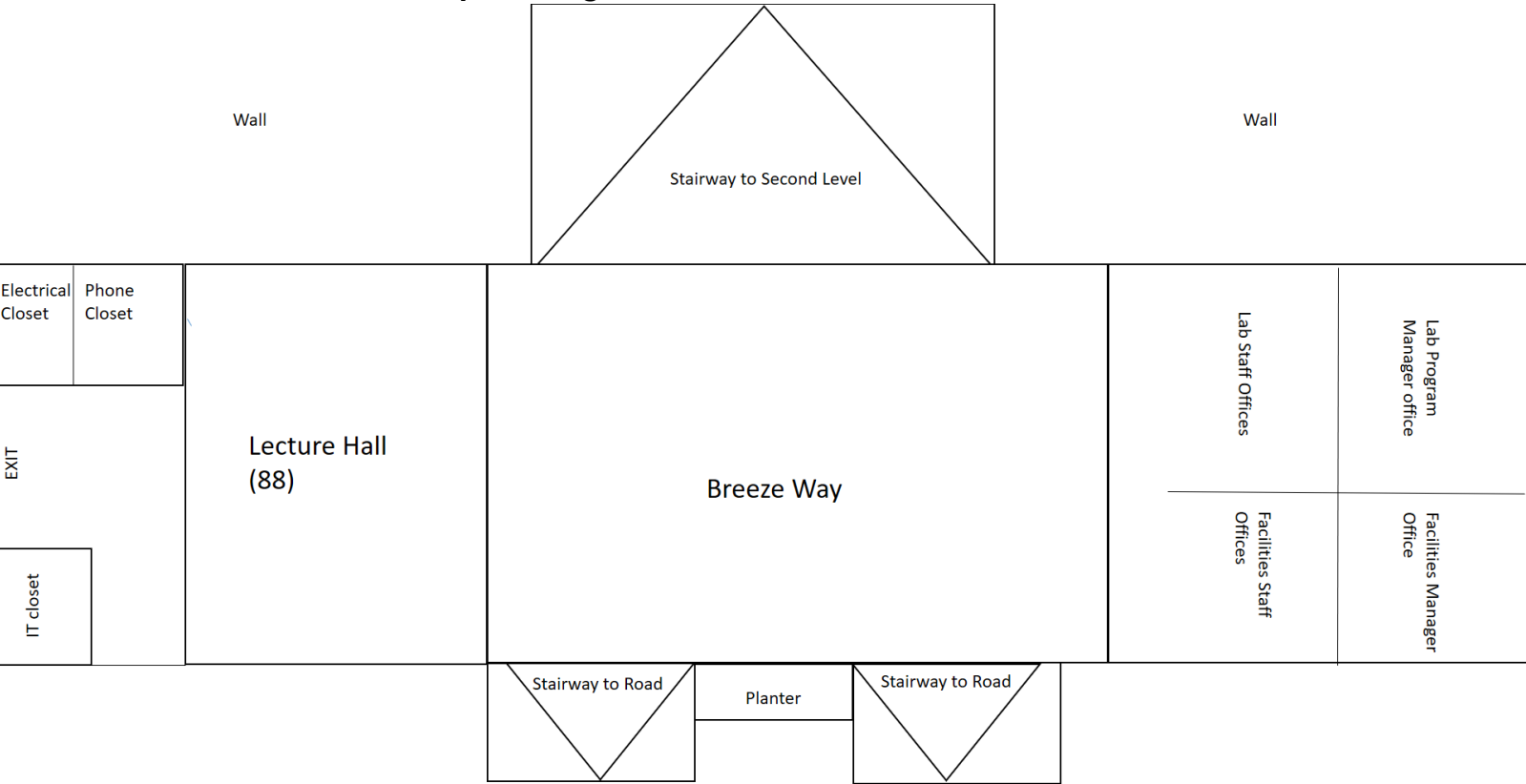
The Wrigley Institute recognizes ocean and coastal monitoring is a global enterprise. We have an online portal for access to USC data sets and those worldwide by visiting:

<https://dornsife.usc.edu/wrigley/dataportals/>

In addition to the posted resources, we also have site specific data sets which include a pier sensor package (temperature, salinity, dissolved oxygen, chlorophyll, turbidity, pH and phosphate.), burkolater measurements (dissolved inorganic carbon, pCO₂, pH, temperature, salinity), and a water temperature log. Please email wrigdata@usc.edu for additional information.

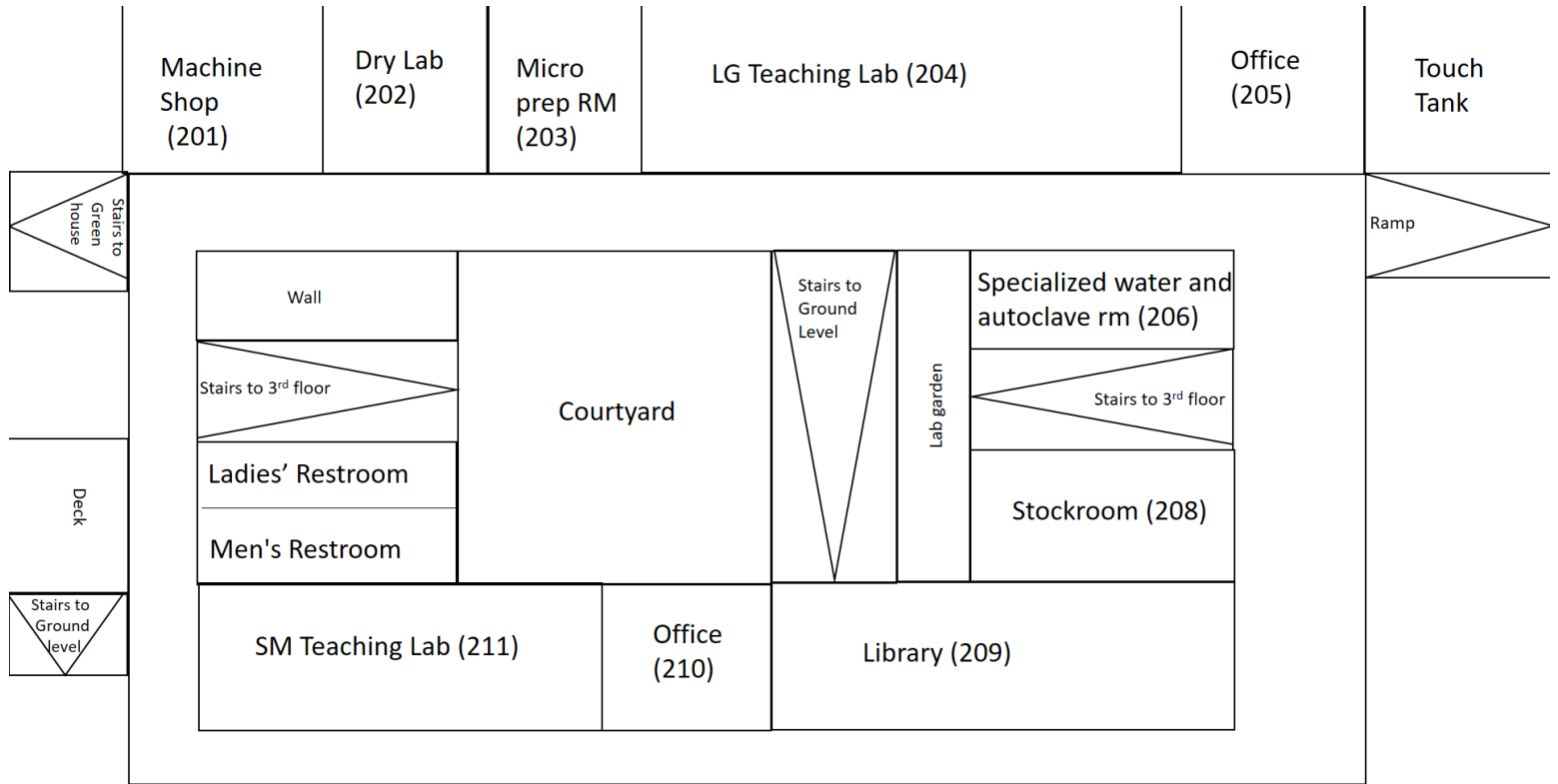
Appendices

Appendix I: Laboratory Facilities Layout
A1. Laboratory Building-Ground Level



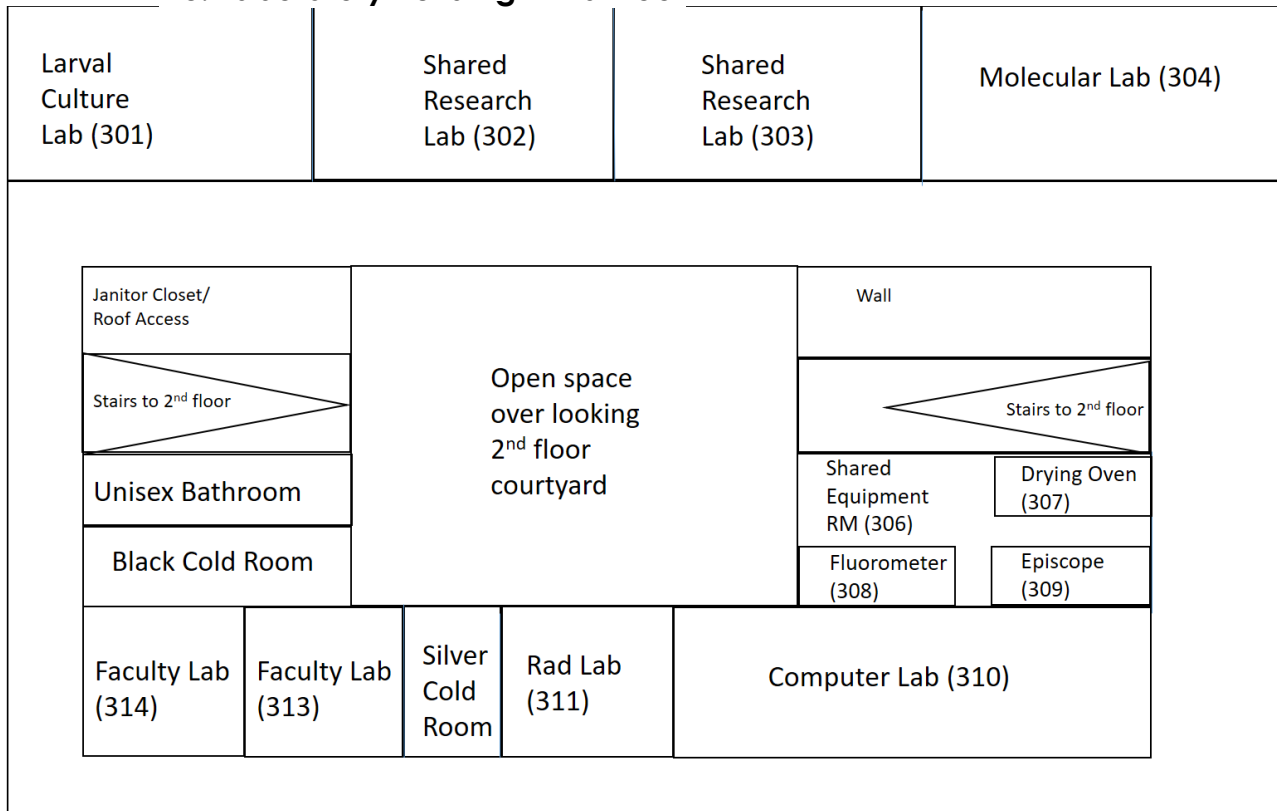
Ground Level

A2. Laboratory Building-Second Floor



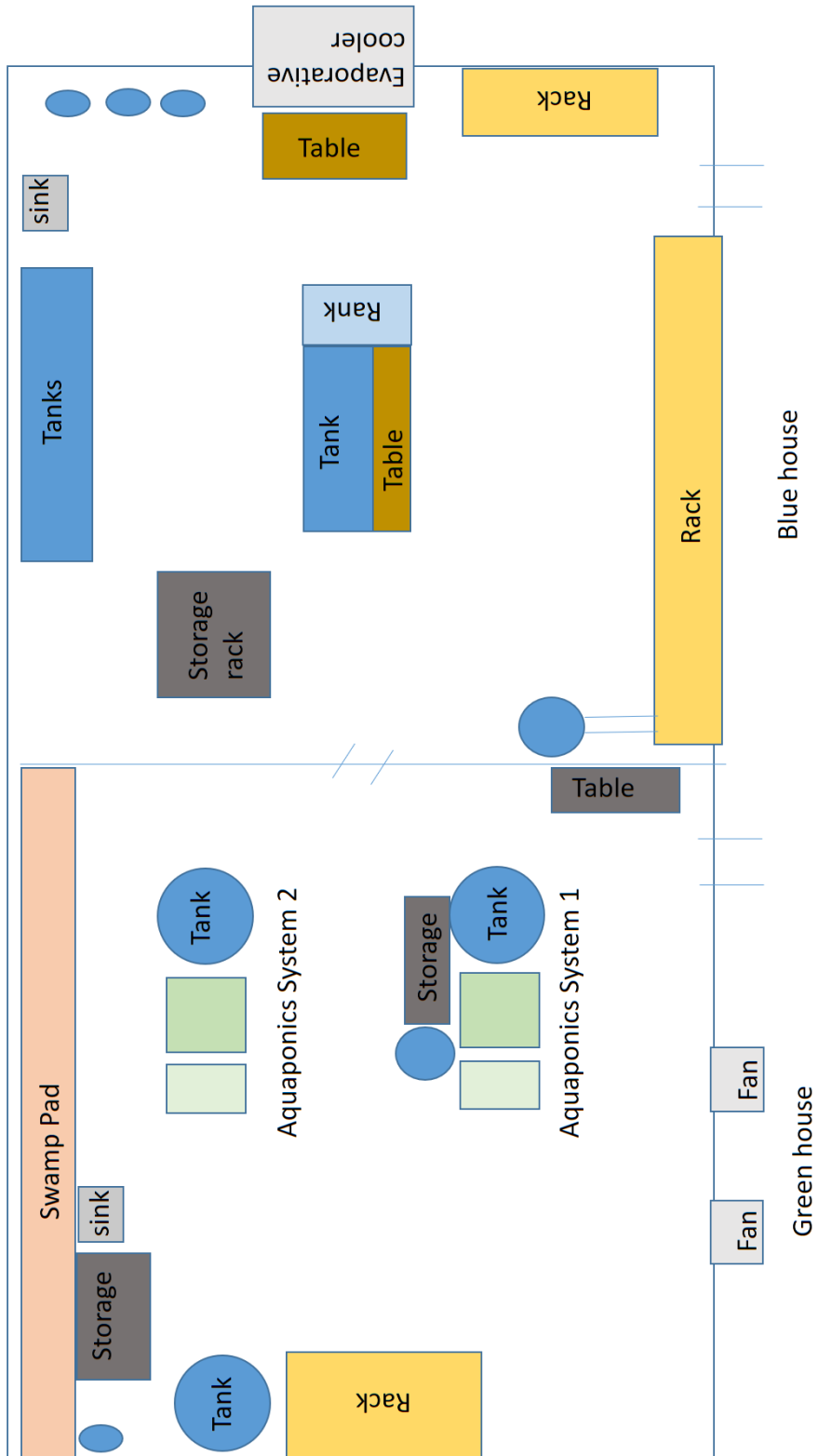
Second Floor- General Public

A3. Laboratory Building-Third Floor

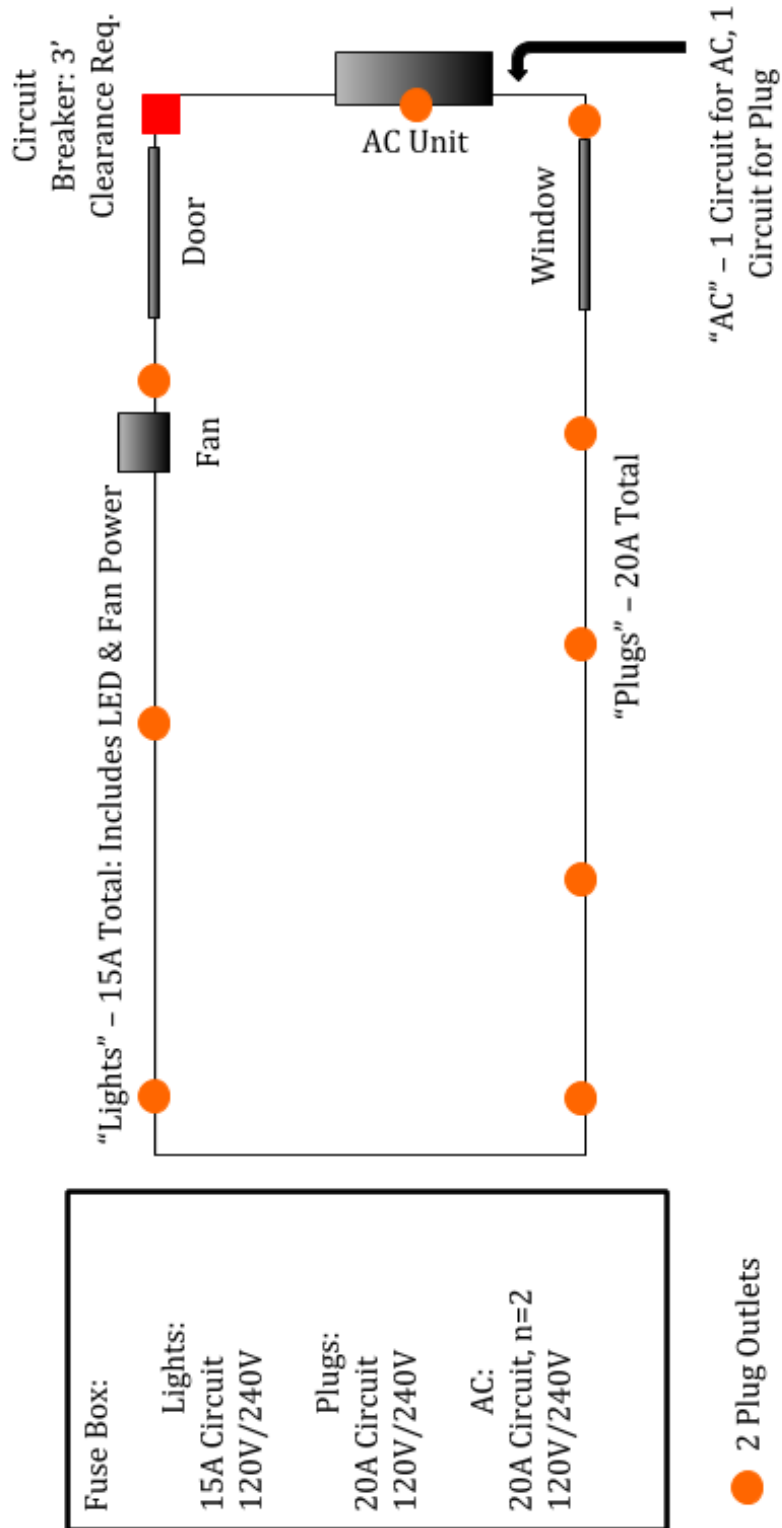


Third Floor- Research Level

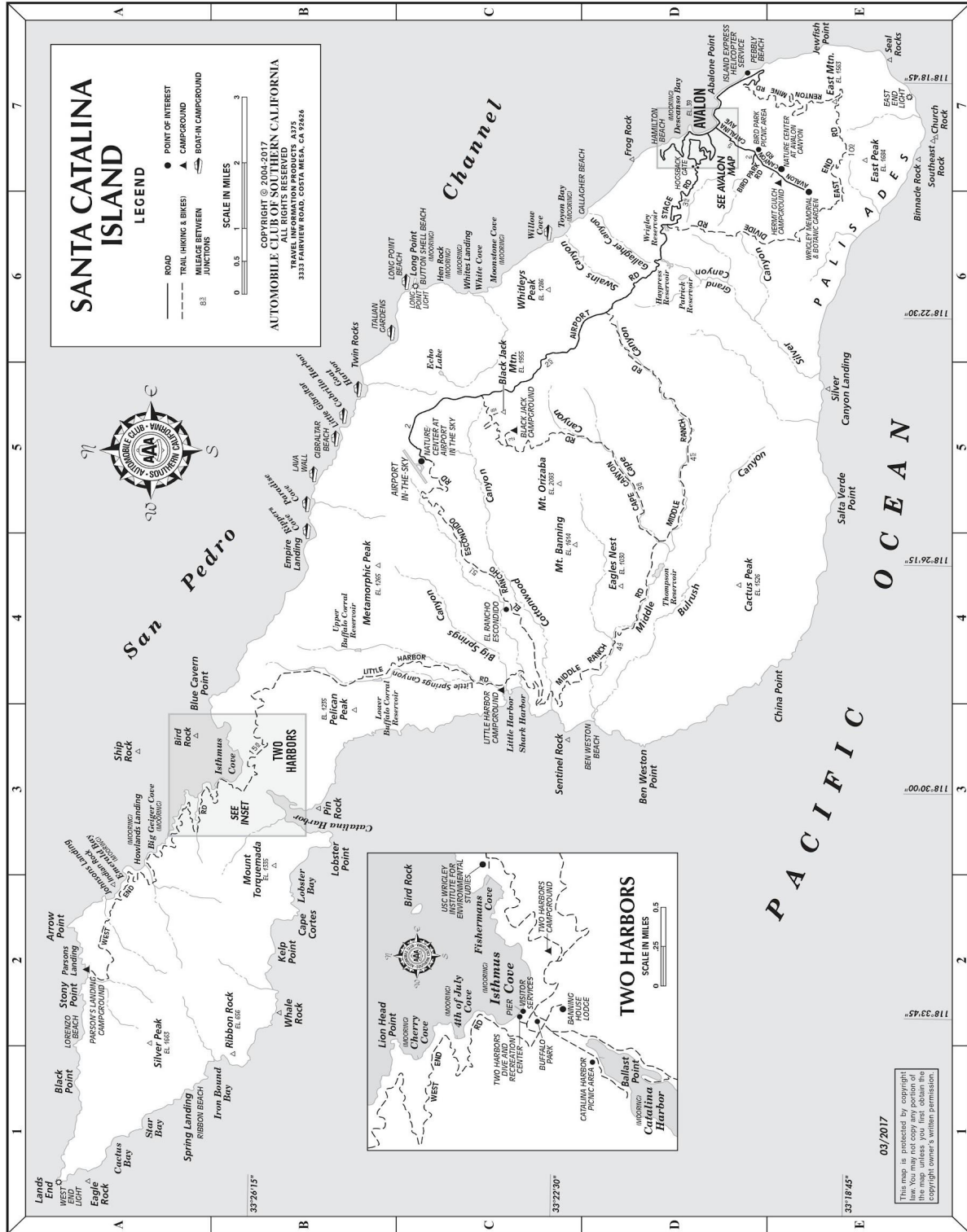
B. Greenhouse Facility



C. Remote Satellite Lab

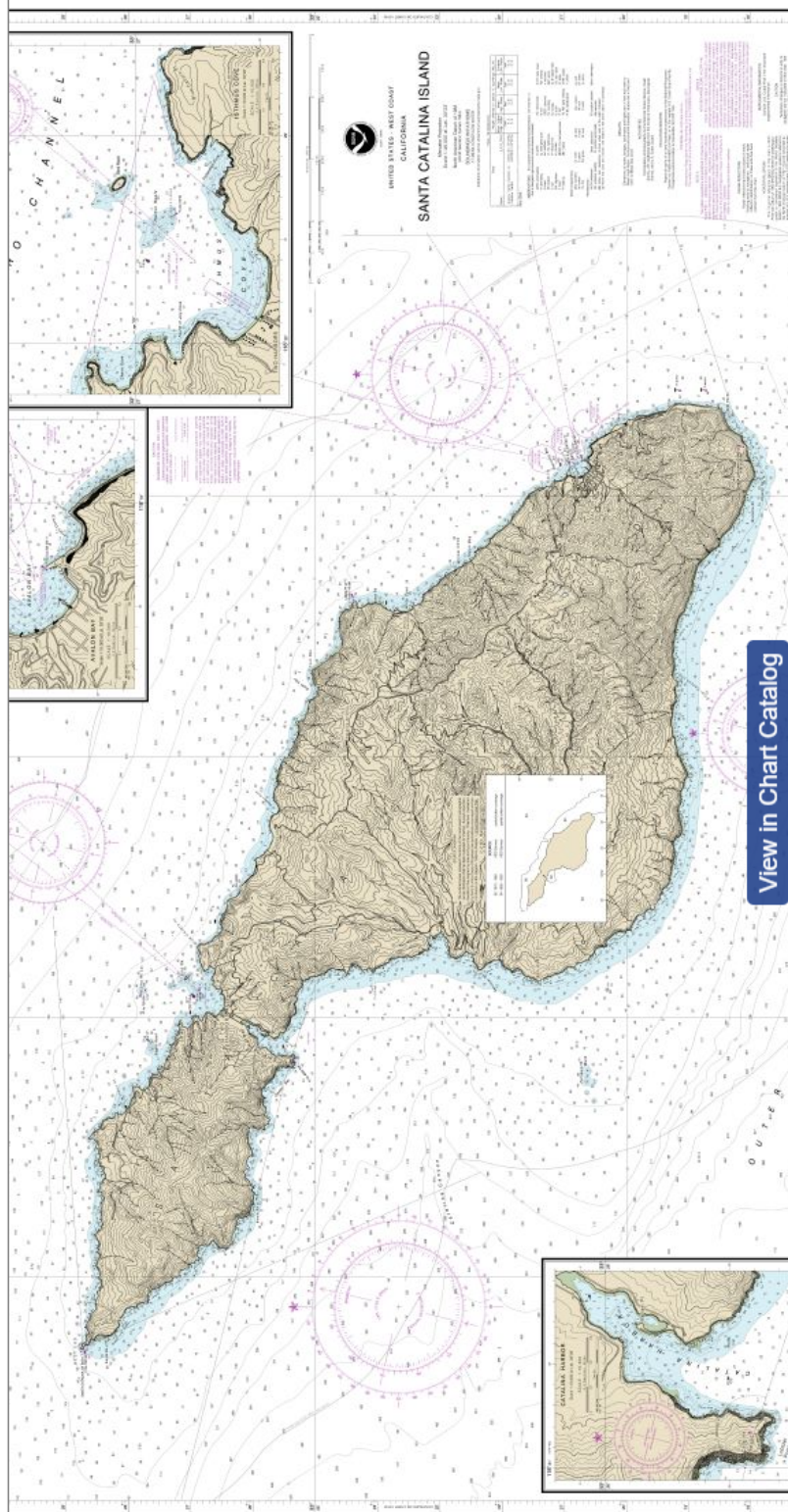


Appendix II :Santa Catalina Island Map



http://www.aaa.com/aaa/common/mapgallery/ca/catalina_avalon.pdf

Santa Catalina Island Nautical Map:



<https://www.charts.noaa.gov/ChartCatalog/PacificCoast.html>

Chart: 18757

Appendix III: Related Links

- [WIES Website: USC Wrigley Institute for Environment and Sustainability](#)
- [Research Activities Plan](#)
- [General Lab Safety Training](#)
- [Fluorometer Modules](#)
- [Hazardous Waste Disposal and Labeling](#)
- [Eye Protection](#)
- [Footwear: Shoes](#)
- [Goggle/Face Shield](#)
- [Lab Coat Selection](#)