

MLML Graduate Student

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3. Phone Number: (310) 995-2193
4. Year or Anticipated completion date: 2018
5. Faculty Advisor: Dr. Scott Hamilton
6. Faculty Coadvisor, if applicable.
7. Do you have an approved thesis proposal that is the basis for this project? Y / N
8. Are you in good standing? Y / N

9. Project Description, with emphasis on elements that include UROC Student participation. Use the following space or attach one page (one paragraph).

My project is going to examine the sex-ratios at which males become limiting to the reproductive output of goby populations. The first part of the project is going to involve assembling artificial reefs (made out of cinder blocks) and collecting the necessary fish while diving (through the use of nets). The artificial reefs will then be set out at Big Fisherman's Cove at Santa Catalina Island, CA. Gobies will be placed onto these reefs and the sex-ratio of each population will be manipulated (from 1:25 M:F to 1:10 M:F). These manipulated sex-ratios will be maintained throughout the course of experiment. The relationship between the sex ratio and the reproductive output will then be determined for each population.

10. UROC Student's Anticipated Role. Use the following space or attach page (one paragraph).

My UROC student's will be involved in the:

- Assembly of reefs
- Collection of goby individuals with hand nets
- Tagging of individuals
- Placement of aforementioned artificial reefs
- Maintenance of manipulated sex-ratios
- Counting of fertilized eggs

11. Append a detailed description of all procedures and protocols that will be used by the UROC Student, including a description of equipment, vehicles, boats, chemicals, or any other potentially hazardous element to the research plan.
12. For each protocol or procedure, append a training plan for the UROC Student. (Note that training must be completed and documented before research can commence).
13. Append a list any necessary equipment, supplies, or resources not provided by UROC, the MLML graduate student, or your faculty advisor (e.g., SEM or other microscopes, flume, molecular classroom).

Appendix 1. Procedures and Protocols

My UROC student's will be involved in the:

- Assembly of artificial reefs. To construct these, PVC pipes will be cemented into cinder blocks. Proper form when lifting heavy objects will be reviewed before handling the cinder blocks.
- Collection of goby individuals with hand nets. Dives will take place all around Santa Catalina Island and will be no deeper than 60 feet. Proper diving procedures will be followed for all dives. The potential hazards that we might encounter (e.g., DCS, lost diver, out of air, etc.) as well as the proper mitigation measures will be reviewed at the beginning of the summer.
- Tagging of individuals using visible implant elastomer (VIE) tags. Visible implant elastomer is a two-part silicone based material that is mixed immediately before use. VIE tags are injected as liquid that cures into a pliable, bio-compatible solid. The tags are implanted beneath transparent or translucent tissue and remain externally visible. While the process is relatively straight forward, the proper mixing/injecting procedures will be reviewed before the tagging process begins.
- Placement of aforementioned artificial reefs. Reefs will be lowered into the study site (Big Fisherman's Cove) using lift bags and/or rope. The proper procedures to go about this safely will be reviewed before the dive (e.g., no divers below lift bag; if lift bag makes uncontrollable ascent, immediately swim other way in case lift bag surfaces and loses buoyancy, etc.). The student's will be familiar with this type of work from the AAUS certification course.
- Maintenance of manipulated sex-ratios by hand netting specific individuals. This will occur after the artificial reefs have been placed in Big Fisherman's Cove. The reefs will be no deeper than 50 feet.
- Counting of fertilized eggs. This will involve examining pictures that were taken at depth at the artificial reefs. Proper procedure will be reviewed beforehand (students will be looking for eggs that have a cloudy, white appearance; these are fertilized).

We will be using two whaler's (provided by CSUN) as well as a MLML inflatable (red Achilles). None of my student's will be driving any of the boats. While I believe that most of my student's are already fairly comfortable around boats, they will be briefed on boat safety before our first trip out on them. Personal flotation devices will be worn at all times when on boats.

This project will involve extensive diving (4-5 days a week; 2-3 dives per day). All students are AAUS certified and have a significant amount of diving experience. Proper safety procedures will be followed for all dives. Safety is, of course, of utmost importance. The potential hazards that we might encounter (e.g., DCS, lost diver, out of air, etc.) as well as the proper mitigation measures will be reviewed at the beginning of the summer. Given the DCS exposure of multi-day diving, it has been recommended that every 4-5 days, divers take a day off. When we first arrive at USC's Wrigley Marine Station, the DSO (Eric Castillo) will also provide a "dive orientation briefing".

Appendix 2. Training Plan. (Training must be documented and filed with the MLML Safety Officer).

Both of my student's are already AAUS certified so no further training is needed for the diving that will be taking place at Catalina this summer. Both received their certification at CSUMB. Neither will be driving the boats there or the MLML inflatable so training is not required for that.

Training for the visible implant elastomer (VIE) tags will take place on Santa Catalina Island. I will demonstrate the proper procedure on 5 fish and will have the student's observe me while I do it. I will then supervise the student's as they implant VIE tags on 5 fish as well. If necessary, I will have them tag additional fish if they are having some trouble with the process. Once they are comfortable with the process, they will tag fish without my supervision.

Proper netting techniques will be demonstrated beforehand by Dr. Mark Steele (CSUN), who has extensive experience with gobies. Dr. Scott Hamilton and myself will then accompany/observe each diver on the first few dives in which we collect gobies. If the students are having trouble netting fish, I will have them observe Dr. Hamilton or myself for 15 minutes before having them try again. I will continue to observe and coach them until they are comfortable netting fish on their own. Netted gobies will be transferred to plastic containers where they can be safely kept until we return to the lab.

To count fish, two divers will work on each reef to ensure the collection of all fish present. The cages will be removed and fish will be individually netted from the artificial reefs. Fish will be counted and sexed as they're collected. Counted fish will then be transferred to plastic containers to avoid re-counting individuals.

Appendix 3: MLML equipment, supplies, or other requested resources.

- Red Achilles inflatable boat
- Four-stroke 20 HP outboard motor

AMMENDMENTS

Faculty Advisor/Co-advisor

Signature

MLML Safety Officer

Signature

Chair

Signature