**Safety Plan for Thesis Work**

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Safety concerns for this thesis work involve various risks associated with scuba diving. Utilizing SCUBA for research comes with its own inherent risks and is potentially more dangerous as it requires task-loading and deployment of additional equipment. While volunteers will not be required to deploy any additional equipment underwater, they will go through some level of screening before joining me in the field.

**Screening Process**

* Proof that volunteer diver has at least 20 logged dives in Puget Sound
* Volunteer must show a valid Open Water or Advanced Open Water certification
  + Follow the link for PADI certifications and their descriptions: <https://www.padi.com/courses?experience=continuing-education>
* Due to the cold conditions, they must be familiar with diving in a dry suit. Thus, a Dry Suit certification is highly recommended
  + Link to Dry Suit Certification: <https://www.padi.com/courses/dry-suit-diver>
* Equipment will be checked prior to entering the water to ensure all components are functioning properly. This follows SDI/TDI guidelines and includes:

1. Air on – Ask buddy to open valve all the way and ensure pressure gauge is functioning. Also, locate alternate air source in the event of an out-of-gas emergency
2. BCD (buoyancy compensator device) inflated – Inflate BCD and verify it holds gas… notice any differences in gear configuration
3. Computer on – Confirm computer is ON and working (sufficient battery, straps secure, and verify correct gas is used)
4. Dive equipment complete – Ensure all necessary equipment is present and in good condition: mask, fins, snorkel, weights, and other potential necessities
5. Enter water safely – No back roll or giant stride necessary for field work… entry will simply be walking in from the shoreline

* Volunteers will be asked to stay hydrated and drink plenty of water the day before diving. This is done to avoid muscle cramping and fatigue, increased heart rate and blood pressure, and confusion
* They must NOT have had any intoxicating substance in in their system 8 hours before the dive, including alcohol, marijuana, or prescription drugs that might cause drowsiness or confusion. They should not have travel plans that involve flying at high altitudes within 24 hours of the last dive

**Field Methods Disclaimer**

*Note:* Field methods have been adapted for SCUBA using kelp monitoring protocols developed by the Marine Plan Partnership for the North Pacific Coast (MaPP). More information can be found by following the link: <https://mappocean.org/science-and-planning-tools/regional-kelp-monitoring/>

Source: Thompson, Markus (2021) MaPP Kelp Monitoring Protocol. Marine Plan Partnership.

Additional guidelines for field work safety and methodologies were acquired from globally recognized organizations such as Reef Check and Coral Watch

**Links:**

Reef Check: <https://www.reefcheck.org/wp-content/uploads/2021/03/RCCA_Manual_10th_Edition_web.pdf>

Coral Watch: <https://coralwatch.org/monitoring/survey-methods/>

**Field Work Safety Steps**

**Before**

* If environmental conditions are unsafe for scuba diving such as extremely poor visibility, lightning, strong winds, etc., then surveys will be postponed
  + Criteria for re-scheduling fieldwork include:
    - Visible white-water from cresting waves
    - Winds exceeding speeds of 15 mph
    - Visibility less than 6 ft (roughly the wingspan of lead researcher)
    - Heavy/torrential rain (light rain is permitted and does not interfere with SCUBA activities as long as lightning and strong winds are absent)
  + **Note** – Currents associated with tidal changes are not prevalent in this study area, but surface currents may occasionally become noticeable. Overall, this is not anticipated to be a significant hazard to divers

**During**

* Divers will conduct a preliminary safety check underwater before each dive:
  + Checking each other’s first stage regulators for leaks
  + Check for leaks in hoses, BCD valves, etc.
  + Identify any other malfunctions with their equipment
* Divers will be given a knife in the event of any potential entanglement. While the transect line consists of a fiberglass reel measuring tape, it is not anticipated that this will create an entanglement hazard.
* Navigation / Locational Awareness
  + Divers will be familiar with their compass bearings to avoid getting disoriented… following a west-oriented compass reading will always lead divers back to shore, with an east-oriented reading leading to open water
  + If divers become separated, they will follow these steps as prepared by SDI/TDI:

1. As soon as you realize that your buddy is gone, stop and take a good look around you, looking up and down, as well as from side to side.
2. It helps to rise a few feet when you survey the area around you. If your buddy has stayed at the same depth, you may see the reflection of light off the tops of his bubbles
3. Spend no more than about a minute looking for your buddy. It may help to backtrack a bit to determine if he stopped for some reason, rather than wandered off on his own.
4. Ascend to the surface, always observing the correct ascent rates and procedures.
5. If not already there looking for you, your buddy should arrive shortly.
6. If your buddy has not returned to the surface after 5 minutes, there may indeed be a problem and you should consider calling for assistance.

* Oxygen bottles will be kept nearby in the event of decompression sickness
* First-Aid kits will be available for each fieldwork day

**After**

* Divers will go through a safety debrief following each dive. During this time, participants will:
  + Discuss general observations (wildlife, visibility, marine vegetation, etc.) and level of comfort (buoyancy, trim, gear configuration, etc.)
  + Write down or discuss any possible safety issues or general approaches that could be improved upon (Prompt: Did all divers feel comfortable with the task at hand? If no, explain why and seek improvements)
  + Compare any notes if taken (species ID, density counts, substrate, etc.)
  + Bring up any concerns with personality conflicts or trouble communicating underwater