CONFLUENCE
ENVIRONMENTAL COMPANY

SPARO Aquatics
IMPACT ANALYSIS

Prepared for:

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May 2022

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1.0 INTRODUCTION

This document assesses the potential impacts of a proposed kelp and shellfish farm located in Puget Sound, off Vashon Island. The information provides support and justification for project compliance with King County Code (KCC) and Shoreline Master Program.

2.0 PROJECT DESCRIPTION

The proposed project is an integrated and regenerative 10-acre (approximate) kelp and shellfish farm in the Puget Sound at the SW corner of Vashon Island, WA in Colvos Passage. The mariculture farm will grow sugar kelp (*Saccharina latissima*), clams (Manila – *Ruditapes philippinarum*), blue mussels (*Mytilus trossulus* or *M. galloprovincialis*), Pacific oysters (*Crassostrea gigas*), and possibly scallops at one location. All these species are either native or naturalized to the proposed area.

2.1 Installation

The site footprint, including the gear area and regulatory markers, will be approximately 1200′ by 350′, for a total of 10 acres. The site will be entirely in open water between depths of 30′ and 80′ and will not access the shoreline or tidal lands. Required gear includes anchors, buoys, cages, and line. There will be no nets. It is approximately 300′ offshore at mean low tide. While the total farm site will be approximately 10 acres, due to the scope required for necessary anchorage, the actual size of the area being farmed will be approximately 3-4 acres.

Helical anchors are expected to be used throughout the farm (corners and perimeter), pending site analysis of the substrate by an established helical anchor installer. Helical anchors are screwed into the seafloor and provides increased holding power over other types of anchors as well as less environmental impact. If helical anchors are not possible due to the substrate condition (cobble that is so large that exceeds the anchors' ability to screw into the seafloor), concrete blocks will be used.

If helical anchors are used, this will be supported by a small boat (22′) and Scuba divers. If concrete blocks are used, this will be supported by a local tugboat, barge, and crane. In either case, the boat/barge will anchor offshore during anchor placement and will be on site for no longer than 1 week. The number, type, weight, and scope of anchoring system will be determined by a marine engineering firm.

Installation is expected to occur according to the following table. Note that referenced "mooring buoys" are not intended for boat moorage, but support grow lines and associated anchorage.

Table 1. Construction and sequencing.

Stage	Date and Duration	Activity
1: Install farming system	• Fall 2022 • 1 week	• Install anchor system • Install primary mooring buoys to bottom anchors via mooring chains/line. • Fasten main line between anchors via shackled holdfast • Attach secondary depth control lines with floats and weight at 6-8 feet
2: Seed lines with kelp and shellfish	• Nov 2022 • 1 week	• Obtain seeding stock materials sourced in the Puget Sound and attach to mainlines. A thin line with small kelp growing on it will be attached to main line. • Obtain local shellfish stock and outplant in cages attached to long lines
3: Seasonal maintenance	• Weekly	• Inspection of farming system via boat to measure growth and ensure continuing integrity • Perform Ad-hoc repairs and/or modifications as needed • Inspection of entire farm via ROV (remote operated vehicle) • Inspection of farm via SCUBA as needed
4: Kelp Harvest	• March/April 2023	• Harvest kelp via boat by hand • Sort and consolidate product into insulated totes • Boat to Quartermaster Harbor or Dockton (Vashon Island) and trucked to processor (location TBD)
5: Continued Maintenance	• Year round	• All anchors, mooring buoys, anchor lines, main kelp and shellfish lines, and secondary depth controlling lines (floats and weights) will checked and maintained weekly • Analyze project for performance and efficiency and adjust as necessary
6: Process repeated	• Nov 2023-March/April 2024	• Repeat steps 2-5
7: Harvest shellfish	• 2024	• Mussels, clams, and oysters typically take approximately 2 years to be harvestable. Harvesting will be done by hand via a small boat.

2.2 Operations

Kelp will be out planted in November and harvested in March/April. Shellfish will grow year-round. Growing kelp and shellfish together as a polyculture requires zero inputs (no fertilizer, pesticides, or freshwater)—making it the amongst the most sustainable form of food production on the planet—while sequestering carbon and rebuilding marine ecosystems.

Quartermaster Marina on Vashon Island will be used for boat(s) that are kept continually in the water. Trailered boats will use Dockton Park boat ramp on Vashon Island.

Spare equipment and assorted tools will be at the company owners' residence on Vashon Island. Small motor vessel(s) will be stored either at the owners' residence or docked at Quartermaster Marina. Harvested and finished product will be kept at a location to be determined.

2.3 Avoidance and Minimization

Project design and siting result in considerable avoidance and minimization of impacts to the surrounding environment. Relative to the size of the farm, the proposed substrate modification is small and limited to the areas of anchoring. If possible, helical anchors will be used to further limit substrate modification; however, the existing cobble substrate is likely to necessitate use of concrete anchors. These will be placed to avoid and minimize (to the extent practicable) impacts to critical saltwater habitats (including kelp). Once the anchors are installed, operational impacts to the substrate will be negligible.

Operations of the farm are expected to have limited impact, with potential ecological benefits. Minor impacts due to boat use and maintenance activities may occur (refer to Section 4), but these would be temporary and infrequent. Seaweed and shellfish aquaculture are largely noted as providing benefits to the surrounding ecosystem (as reviewed in Theuerkauf et al. 2022), with few negative implications. Given the limited potential for impact and the efforts taken to further minimize the effect, the proposed project is considered to be in compliance with the mitigation sequence as outlined in KCC 21A.24.125 and KCC 21A.25.080.

In addition to the above avoidance and minimization elements, the following conservation measures are included within the proposed project:

- If Pacific herring spawn on the cultivated kelp project, operators will contact the Area Habitat Biologist of WDFW and not harvest the kelp until after hatching occurs.
- To protect local wild kelp genetics, a small amount of cultivated sugar kelp (less than 5 pounds) will be originally sourced from local sugar kelp in accordance with WDNR harvest regulations. Sorus material will be collected on permitted waters and grown by SPARO Aquatics to produce sugar kelp "seed".
- All harvesting will be done manually with no mechanical equipment except for an electric/battery-powered winch to raise long lines and shellfish cages.
- No mechanical dredge harvesting, raking, harrowing, tilling, leveling or other bed preparation activities, or frosting or applying gravel/shell on beds, shall be done.

- No eelgrass is present thus activity associated with the farm will not impact eelgrass.
- No activity will occur above the MLLW tide line.
- Proposed site does not overlap with herring holding/spawning area or WDFW identified surf smelt or sand lane spawning areas.
- All shellfish (and other) gear shall either be secured to long lines and/or anchors or will be removed from the area and kept in a storage area that is landward of MHHW.
- All shellfish bags and cages will be clearly, indelibly, and permanently marked.
- All buoys/flotation devices will be constructed of commercial-grade marine material.
- Regular maintenance and surveillance of farm area, including adjacent beach, will be done to remove any project debris.
- No intentional hazing of wildlife will occur.
- No nets will be used (shellfish cages/socks will be used).
- No inputs (fertilizer, pesticides, fresh water, etc.) will be used on the farm site.
- All shellfish gear and the vast majority of seaweed gear (the exception being buoys and floating lines) will be subtidal, minimizing the potential for bird entanglement.
- Any fish or wildlife that becomes entangled in gear will be recorded and notice provided to WDFW.
- No land vehicles will be used in the farm area.
- Prior to installation of farming infrastructure, operators will survey for Southern Resident Killer Whales (SRKW) and other marine mammals (and consult with the ORCA Network) and avoid in-water activities if any are within, or anticipated to be in, the action area. Similarly, operators will not conduct farm maintenance activities or harvest if SRKW are within or are anticipated to enter the action area.
- Vessels used in operations will be maintained to avoid release of any fuels or oils and will carry absorbent pads in the unlikely event of a spill.
- Operators will maintain infrastructure to avoid release of any marine debris (e.g., cultivation lines).

3.0 ENVIRONMENTAL BASELINE

Upland vegetation adjacent to the site was typical of that found on steep shoreline bluffs in the Puget Sound region. Visible macroflora was dominated by red alder (*Alnus rubra*), followed by vine maple (*Acer circinatum*), Douglas fir (*Pseudotsuga menziesii*), Pacific madrone (*Arbutus menziesii*), other maple species, Himalaya blackberries, and ferns of various kinds. Alders and vine maple clusters were the most common plants found on the bluff face, with some firs and madrones interspersed, but these last two species (along with alders to a lesser extent) were more prevalent on the crest of the bluff.

The substrate is small to medium size (golf ball to softball) cobble with occasional large (4-5') rocks. No eel grass was found nor was it expected considering the absence of any sandy/silty substrate. At depths less than -40 ft MLLW there was found to be areas of macroalgal cover of sugar kelp (*Saccharina latissima*) and various anchored red macroalgae (*Cryptopleura reprechtiana, Sarcodiotheca gaudichaudii, Ulva* and *Ulvaria* spp., and *Delesseria decipiens*). This coverage decreased with increasing depth; at depths of 70 ft MLLW and greater, little to no macroalgae was present.

There are 2 waterfront homes in the vicinity of the proposed farm. One is boat in access only and the other is walk in access only. Both have bulkheads. The farm site was intentionally chosen and placed such that is not directly in front of either home. There are 6-8 homes adjacent to the farm site on the high bank (approx. 100-150' high) set back several hundred feet from the bank. The closest road (SW Pohl Rd) is lightly used for local access only and is approximately 800'-1000' from the high bank. There are several private roads/driveways for homeowner access on the high bank. There is no road/land vehicle access to the beach. The beach has limited public access and is used for recreational purposes.

The proposed site is not used for commercial marine navigation or for commercial fishing/crabbing/shellfish. It is, however, used for recreational boaters (power, sail, kayak/canoe) and fishers. It is rarely used for recreational crabbing.

4.0 IMPACTS ANALYSIS

As defined in KCC 21A.24, King County regulates a variety of different critical areas, including geologically hazardous areas, wetlands, and aquatic habitats. The only critical areas that the proposed project has the potential to impact are aquatic areas. Puget Sound is Type S aquatic area and is therefore regulated under King County's Shoreline Master Program (KCC 21A.25), in accordance with chapter 90.58 RCW. Refer to the SPARO Aquatics Code Consistency Analysis (Confluence 2022) for further information on the compliance of the proposed project with relevant regulations.

The following discussion focuses on potential impacts to aquatic areas, specifically potential critical saltwater habitat. As defined in KCC 21A.06.261, critical saltwater habitat is "all kelp

beds, eelgrass beds, spawning and holding areas for forage fish, such as herring, smelt and sand lance; and subsistence, commercial and recreational shellfish beds; and mudflats, intertidal habitats with vascular plants and areas with which priority species have a primary association." There is no forage fish spawning identified within the proposed project area (WDFW 2022, Figure 1). The closest documented spawning is for sand lance, approximately 1,500 feet southeast along the shoreline. Consistent with DNR surveys and documented in the underwater video survey associated with the project, there are no eelgrass beds within the proposed project area or adjacent (Figure 2). The closest eelgrass beds identified by DNR are near the mouth of Tahlequah Creek, more than 2,000 feet from the project area. Additionally, as the site is subtidal, there are no intertidal areas and no shellfish beds (including geoduck tracts) have been identified within the proposed area. The only potential critical saltwater habitat that may be impacted by the proposed project is kelp beds.

As discussed in the underwater video report for the project (SPARO Aquatics 2022), macroalgae observed within the project area is limited. Macroalgae is effectively absent from depths greater than 85 feet MLLW. Between depths of 45 and 85 feet MLLW, sparse macroalgae was observed, primarily Laminariales and red macroalgae species. Similar species were observed at depths of 25 to 45 feet MLLW, but at slightly greater densities. No bull kelp (*Nereocystis luetkeana*) was observed. Installation impacts of the project would be limited to anchor placement. These impacts would largely be temporary, as macroalgae would be expected to recolonize suitable areas affected by helical anchor placement and concrete anchors could themselves become attachment substrate.

Operational impacts would be restricted to presence of buoys and boat use for maintenance. Boat use is unlikely to result in impacts to existing macroalgae resources but could result in temporary disturbance of priority species within the vicinity of the project. Buoys are integrated into the grow lines and would not have the scope associated with mooring buoys, limiting the spatial extent of impacts. Mid-line floats would additionally minimize any scour impacts. Based on a review of relevant literature, the grow-out of the cultured seaweed and shellfish is likely to provide ecological benefits with few associated impacts (Theuerkauf et al. 2022).

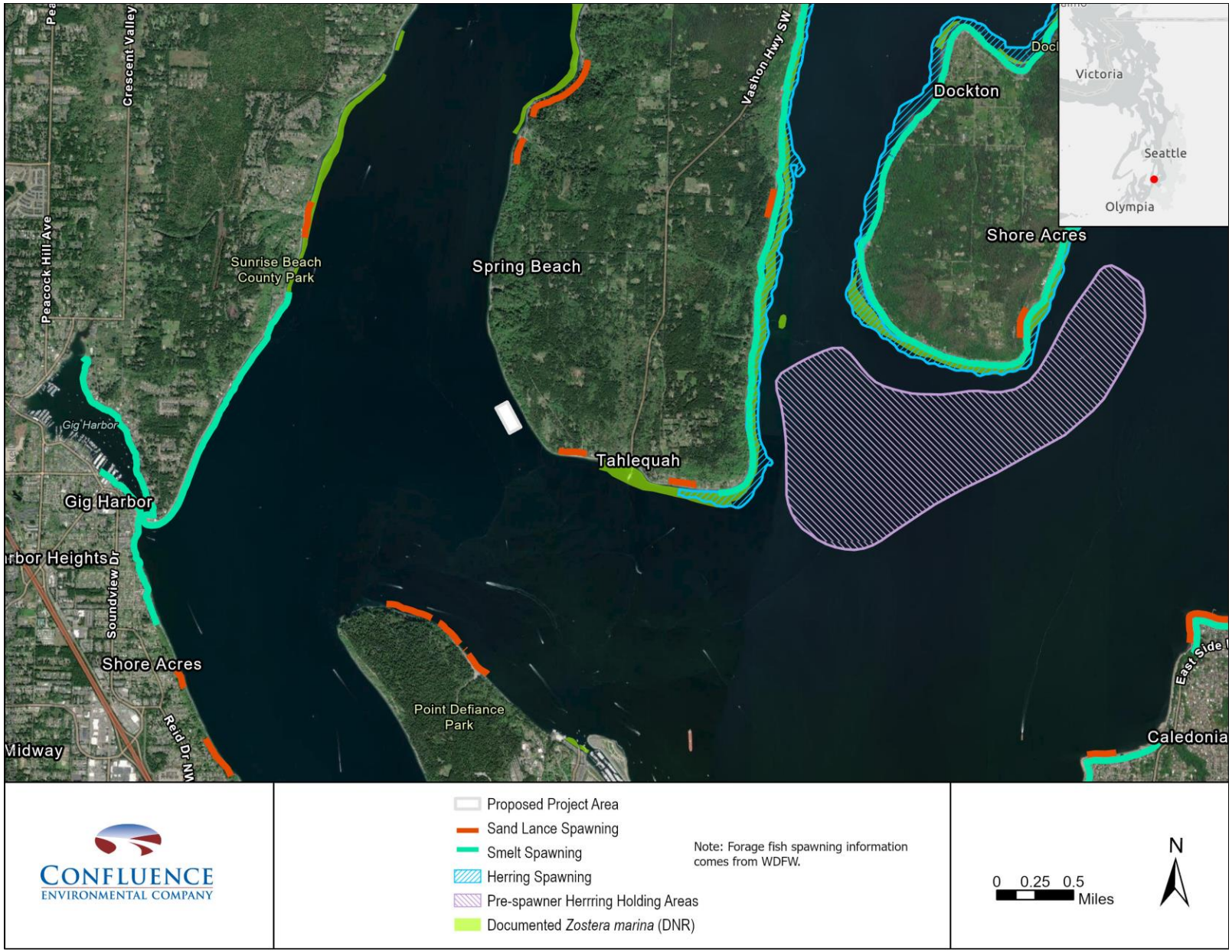

Figure 1. Documented forage fish spawning and eelgrass near the proposed project.

5.0 CONCLUSION

The proposed project is sited so as to largely avoid critical saltwater habitats. No eelgrass, bull kelp, forage fish spawning, or shellfish resources occur within the project area. Sparse macroalgae was observed within the project area, typical of subtidal areas with cobble substrate. Impacts of the proposed project would be limited to minimal substrate modification associated with the anchors and temporary disturbance associated with boat use.

6.0 REFERENCES

Confluence Environmental Company (Confluence). 2022. Code consistency analysis. Prepared for SPARO Aquatics.

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