

Sept 18, 2022

SPARO Industries, LLC dba Pacific Sea Farms

Seaweed/Shellfish farm planting and harvesting narrative

Prepared for the Department of Natural Resources (permit application - 20-103032 SPARO)

Overview:

SPARO Industries, LLC, doing business as Pacific Sea Farms, will be creating a 10 acre combined seaweed and shellfish farm in Puget Sound/Colvos passage. Sugar Kelp will be the primary crop with a relatively small number of shellfish (oysters, clams, and mussels) being grown using the same infrastructure.

The farm is completely subtidal and consists of anchors, buoys, lines, shellfish cages and supporting hardware. No nets are used.

Seaweed is planted in November and typically harvested the following April. There is only one crop per year.

Shellfish can be planted and harvested year-round. Shellfish take between 18-36 months to mature to a harvestable size.

Planting Seaweed

Seaweed will grow from lines that are suspended between 8'-10' below the surface of the water. The holdfast (the part of the seaweed plant that typically attaches to rocks on the substrate) will attach to the line and since seaweed is neutrally buoyant it will grow downward.

The seed production and planting process is a well-established industry best practice. Seaweed seeds are produced by following this general process:

- Sorus tissue (part of the seaweed blade that contains spores) is collected from native wild plants.
- Spores are prepared and incubated.
- Spores are placed in a land based salt water aquarium along with PVC piping with small gauge line wound around it.
- As the spores grow, they look for something to attach to. In the wild they would attach to rocks. In the hatchery they will attach to the line that is wrapped around the PVC pipe.
- After approximately 30 days the spores have grown to a plantable size



- The small seaweed “seeds”/plants are transferred to the farm site.
- At the farm site, the small gauge line with the seaweed on it is wound around the larger gauge lines that have been previously installed in the water.
- Once “planted” regular maintenance will be performed. Maintenance includes:
 - Checking/monitoring growth
 - Ensuring that lines aren’t tangled
 - Ensuring all hardware/lines are in good shape

Harvesting Seaweed

Pacific Sea Farms is growing seaweed for commercial food grade purposes.

Sugar Kelp will continue to grow year-round however we will harvest it in the April time frame before the water warms and other algae start to grow that would potentially “bio-foul” the sugar kelp. Food grade sugar kelp should be relatively free of any other organism growing or otherwise attached to it. Harvesting it in April precludes it from growing to its full size but preserves the quality of it.

No harvesting will be done if there is fish spawning activity near the farm site or if roe is seen on any of the seaweed. If this is seen, Pacific Sea Farms will immediately notify WDFW.

If the seaweed is bio-fouled such that it cannot be used for food grade purposes, it will be left in the water to continue to grow to maximize bio-mass and then will be harvested for non-human food purposes (e.g. fertilizer, animal feed).

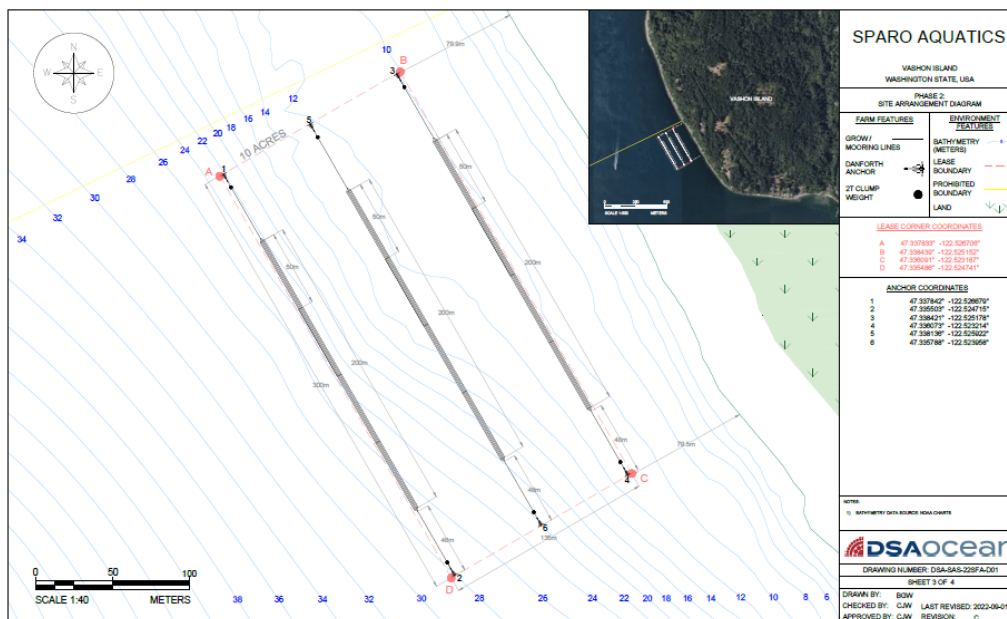
Harvesting is done manually by a small number of individuals (2-3) in a small skiff. The grow lines are lifted to the surface and the seaweed is cut off using a knife. The seaweed is stored in bins and then transferred to a refrigerated truck for storage or immediate processing.



After the seaweed has been harvested the grow lines will be removed from the water to clean off the small lines used during planting as well as any residual seaweed. Removing the lines from the water will also help to prolong the life of the lines.

Size/Scale of the farm

Below shows the farm site, location, and design:



Some things of note:

- Year 1 (2022) will focus on best practices, learning, and experimentation. We will only be using between 10-15 grow lines. If there is a sufficient harvest the seaweed will be sold commercially.
- While we will be leasing 10 acres, not all the 10 acres is farmable due to the positioning of the anchors. On the picture above you'll see empty space on all 4 sides where there will be no grow lines.
- The yield per grow line is unknown at this point.
- In years 2 and beyond I will add more grow lines to fill in the entire farmable area. Yields will come into focus.

Shellfish process

- Shellfish cages will be suspended from grow lines and will not be visible from the surface.
- The cages are approx. 4'x2'x1' and are typically grouped in batches of 5.



- Shellfish seeds will be sourced from Puget Sound based shellfish hatcheries (e.g. Taylor Shellfish).
- Once the shellfish are planted regular maintenance occurs including:
 - Removing bio-foul
 - Checking equipment for wear/tear
 - Monitoring growth/health
 - Turning oyster to promote growth
- Harvesting is done once they have reached a marketable size (18-36 months from planting) and can be done anytime during the year. The department of health requires the water temperature to be lower than 68 degrees for harvesting. The water temperature at the farm site doesn't go above 60 degrees year-round.
- I plan to start with less than 20,000 of each type of shellfish.

Below is similar planting/harvesting information in an abbreviated format including duration of each step:

Stage	Date and Duration	Activity
1: Install farming system	<ul style="list-style-type: none"> • Fall 2022 • 1 week 	<ul style="list-style-type: none"> • 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 8-10 feet
2: Seed lines with kelp and shellfish	<ul style="list-style-type: none"> • Nov 2022 • 1 week 	<ul style="list-style-type: none"> • 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	<ul style="list-style-type: none"> • Weekly 	<ul style="list-style-type: none"> • 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	<ul style="list-style-type: none"> • April 2023 	<ul style="list-style-type: none"> • 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	<ul style="list-style-type: none"> • Year round 	<ul style="list-style-type: none"> • 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	<ul style="list-style-type: none"> • Nov 2023- March/April 2024 	<ul style="list-style-type: none"> • Repeat steps 2-5
7: Harvest shellfish	<ul style="list-style-type: none"> • 2024 	<ul style="list-style-type: none"> • Mussels, clams, and oysters typically take approximately 18-36 months to be harvestable. Harvesting will be done by hand via a small boat.