

## **South Coast Seaweed Aquaculture Report**

Attention: Mr Andrew Outhwaite

Fremantle Seaweed was accepted for the Blue Growth Grant to receive funding for a seaweed aquaculture research trip to the South Coast of Western Australia. The output of the research trip is the below report, noting that the findings made by Fremantle Seaweed are to be taken as comments from Industry and further research is recommended.

Fremantle Seaweed completed two research trips:

1. Albany 5<sup>th</sup> – 10<sup>th</sup> December 2021
2. Bremer Bay 6<sup>th</sup> – 13<sup>th</sup> February 2022

The findings for the two research trips will summarised under the following headings:

- a) Species of seaweed identified
- b) Stakeholder engagement
- c) Suitable sites for seaweed aquaculture with summary of positives and negatives
- d) Existing users of the areas
- e) Local environmental conditions
- f) Local socio-economic factors
- g) Recommendations for seaweed aquaculture

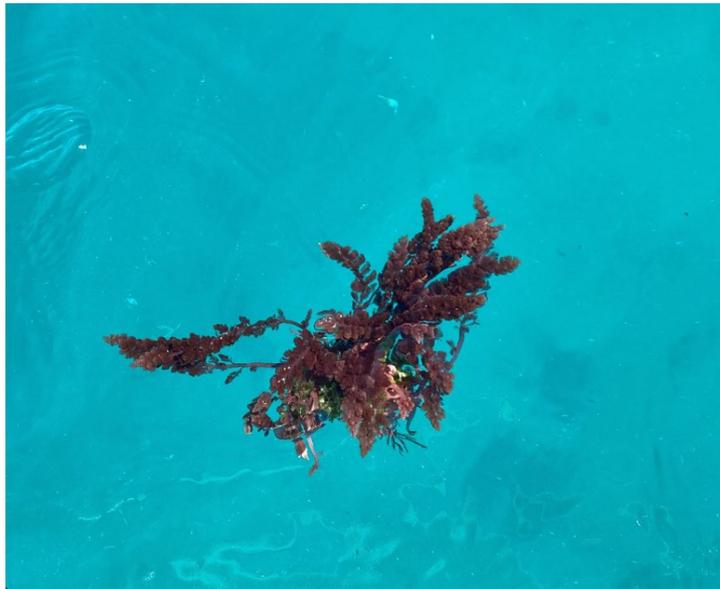
# Fremantle Seaweed

## Species of seaweed identified:

The South Coast of WA has a wide range of seaweed species, Fremantle Seaweed has not identified all the endemic seaweed species but focused on seaweed species identified in situ that have a potential market. The seaweed species are divided into three categories, red, brown and green. A further list of seaweeds is provided that were not identified but are endemic to the South Coast of WA, additional research is recommended to confirm the market use and culture method's of these seaweeds.

## Red seaweeds:

1. *Asparagopsis armata* and *Asparagopsis taxiformis*
  - Used as a cattle feed supplement to reduce methane emissions



2. *Plocamium preissianum* (Cock's Comb)
  - Potential for pharmaceutical extracts



# Fremantle Seaweed

3. *Solieria robusta*
  - Used in fertiliser that prevents root disease



Green Seaweed:

*Ulva lactuca* (sea lettuce)

- Can be consumed as a food source, high in iodine
- Photographed in the outflow pond from the Bremer Bay 888 Abalone facility with 'Stinky Pinky' the resident pink snapper. Research has been completed by DPIRD into the cultivation of *Ulva* species in aquaculture outflow ponds.



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## Brown Seaweeds:

1. *Ecklonia radiata*
  - Carbon sequestration and fertiliser
2. *Scytothalia dorycarpa* (brown strapweed)
  - Contains alginate



## Additional seaweed species of the South Coast of WA that have a potential market:

- *Gracilaria preissiana* – bio-plastics
- *Porphyria lucasii* – food (Australian Nori)
- *Eucheuma speciosum* – alginate
- *Cladosiphon filum* – alginate
- *Pterocladia lucida* – nutraceuticals
- *Sargassum spinuligerum* – nutraceuticals

## Notes:

- Seaweed is a new industry for WA and further research is required into the culture methods of the above seaweed species.
- The uses specified for the above seaweed's are derived from overseas industries, further research into the uses of the seaweeds or extracts is required.

# *Fremantle Seaweed*

## **Stakeholder engagement:**

Fremantle Seaweed had meetings with the following stakeholders:

### Albany:

- Jonathan Bilton from the Albany Shellfish Hatchery – tour of the facility and observations of Akoya oyster reproduction process and the algal cultivation lab
- Jude Tyzack from Harvest Road – local aquaculture industry overview
- Juliet Grist from the South Coast Alliance – local government support for seaweed aquaculture
- Duane Schouten from the Great Southern Development Commission – socio-economic opportunities and barriers to seaweed aquaculture
- Rob Michael, Operations Manager from Harvest Road – tour of the Emu Point aquaculture facility and new specialist aquaculture vessel
- Druime Nolan from DPIRD – information on the Albany Aquaculture Development Zone

### Bremer Bay:

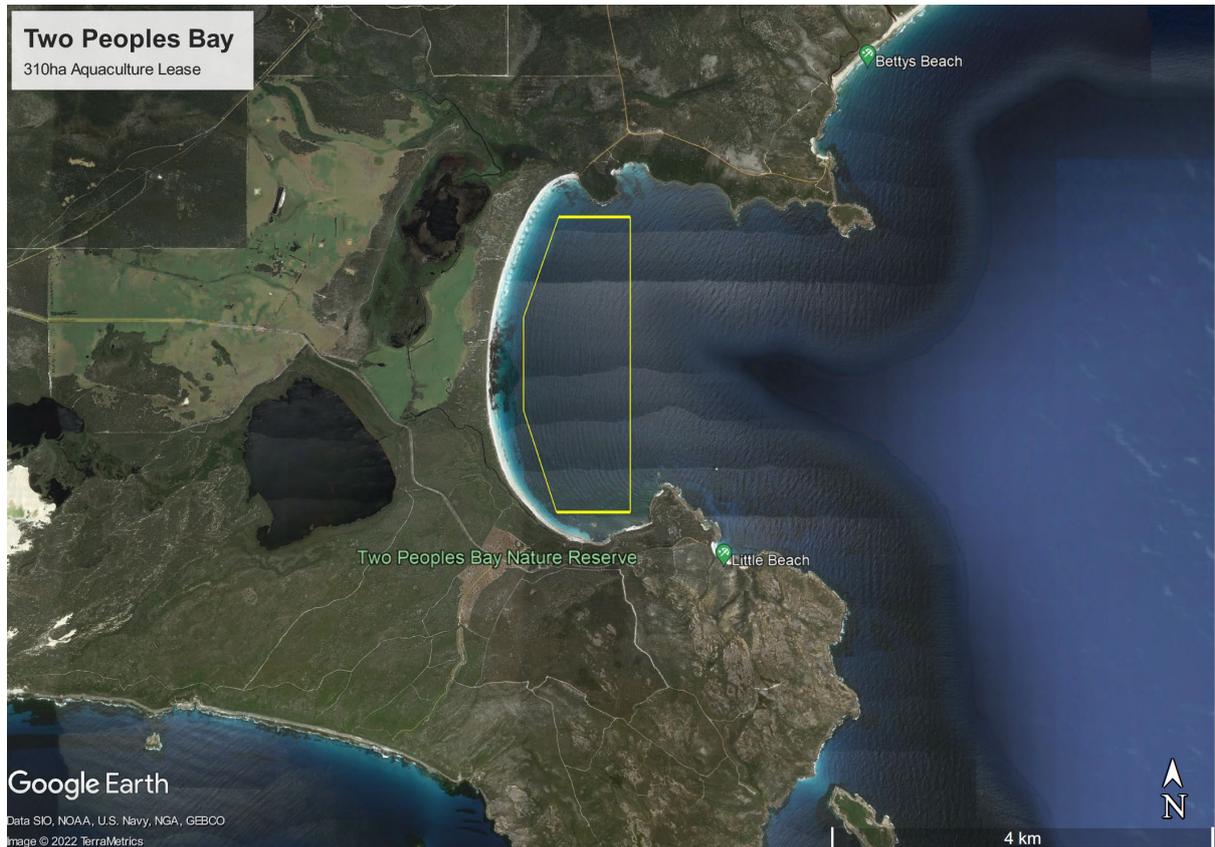
- Jake Poad, General Manager of 888 Abalone – completed a tour of the facility
- David Drew of Bremer Fish Processors – discussion on Pilchard fishing zones

# Fremantle Seaweed

## Suitable sites for seaweed aquaculture in Albany:

Fremantle Seaweed identified inspected four sites:

1. Two Peoples Bay
2. Gull Rock
3. Frenchman Bay
4. West Cape Howe



A 310ha site was identified at Two Peoples Bay with the following positives and negatives:

### Positives:

- Protected from large swell events
- Close to Albany (45 minutes)
- Beach launching permitted
- Mostly flat bottom with gradual slope from 5m to 20m

### Negatives:

- Storage required for beach launching equipment (boat, trailer and tractor)
- Open to Easterly seas
- 40km by sea from closest marina (Emu Point)
- Presence of seagrass, impact assessment and baseline monitoring required
- Multiple users:
  - Sardine and herring fishery
  - Nature reserve

# Fremantle Seaweed



A 115ha site was identified at Gull Rock with the following positives and negatives:

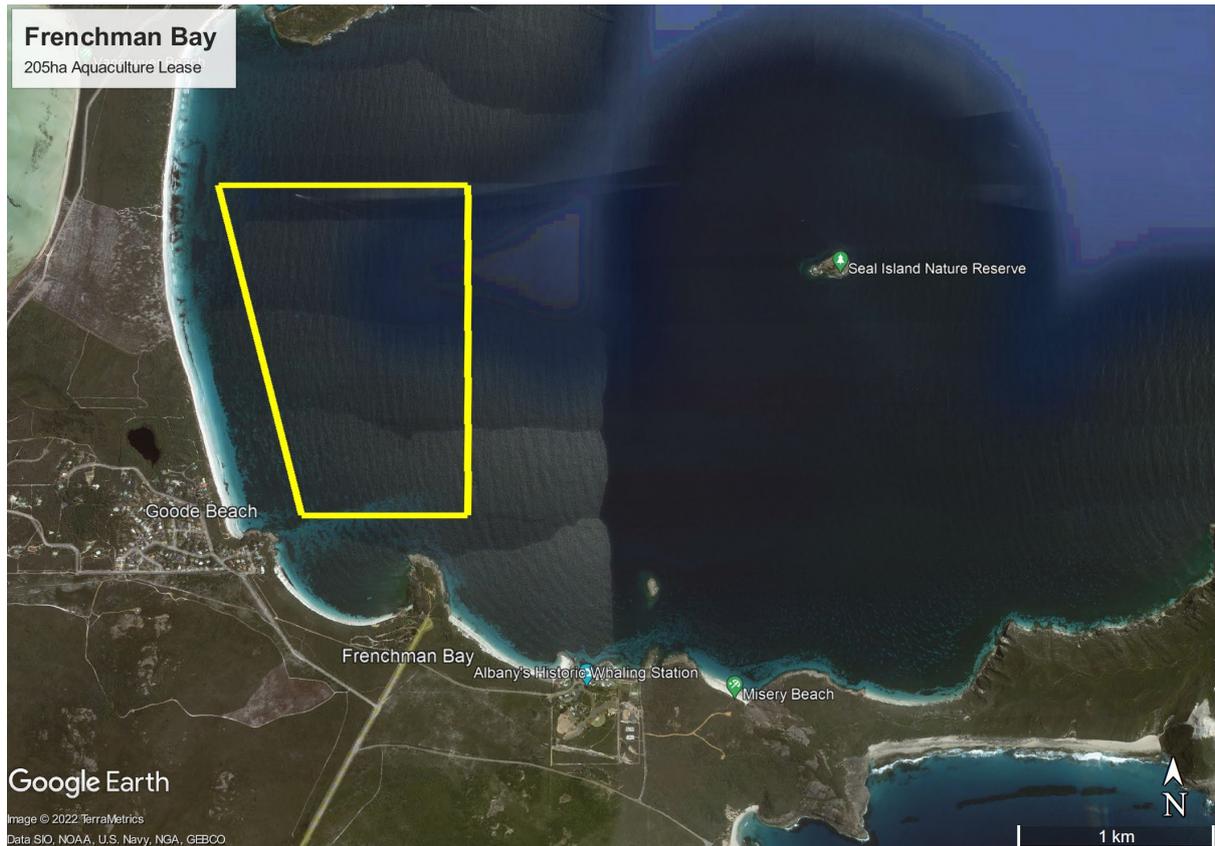
## Positives:

- Protected from large swell events
- Protected from Easterly seas
- Close to Emu Point Marina (5km)
- Mostly flat bottom with gradual slope from 5m to 20m

## Negatives:

- Within existing Aquaculture Development Zone that is fully allocated for shellfish aquaculture
- Presence of seagrass, impact assessment and baseline monitoring required
- Multiple users:
  - Sardine and herring fishery
  - Recreational fishing

# Fremantle Seaweed



A 115ha site was identified at Frenchman Bay with the following positives and negatives:

## Positives:

- Protected from large swell events
- Close to Albany Marina (9km)
- Mostly flat bottom with gradual slope from 5m to 15m

## Negatives:

- Open to Easterly seas
- Within existing Aquaculture Development Zone that is fully allocated for shellfish aquaculture
- Presence of seagrass, impact assessment and baseline monitoring required
- Multiple users:
  - Albany Shellfish Hatchery aquaculture lease
  - Recreational fishing

# Fremantle Seaweed



A 300ha site was identified at West Cape Howe with the following positives and negatives:

## Positives:

- Mostly flat bottom with gradual slope from 5m to 15m

## Negatives:

- Semi protected from large swell events
- Open to Easterly seas
- Distance to nearest boat ramp and marina is 50km (Albany)
- Presence of seagrass, impact assessment and baseline monitoring required
- Multiple users:
  - Sardine and herring fishery
  - Recreational fishing

# Fremantle Seaweed

## Suitable sites for seaweed aquaculture in Bremer Bay:

Fremantle Seaweed identified inspected two sites:

1. Doubtful Island Bay
2. Main Beach



A 1000ha site was identified at Doubtful Island Bay with the following positives and negatives:

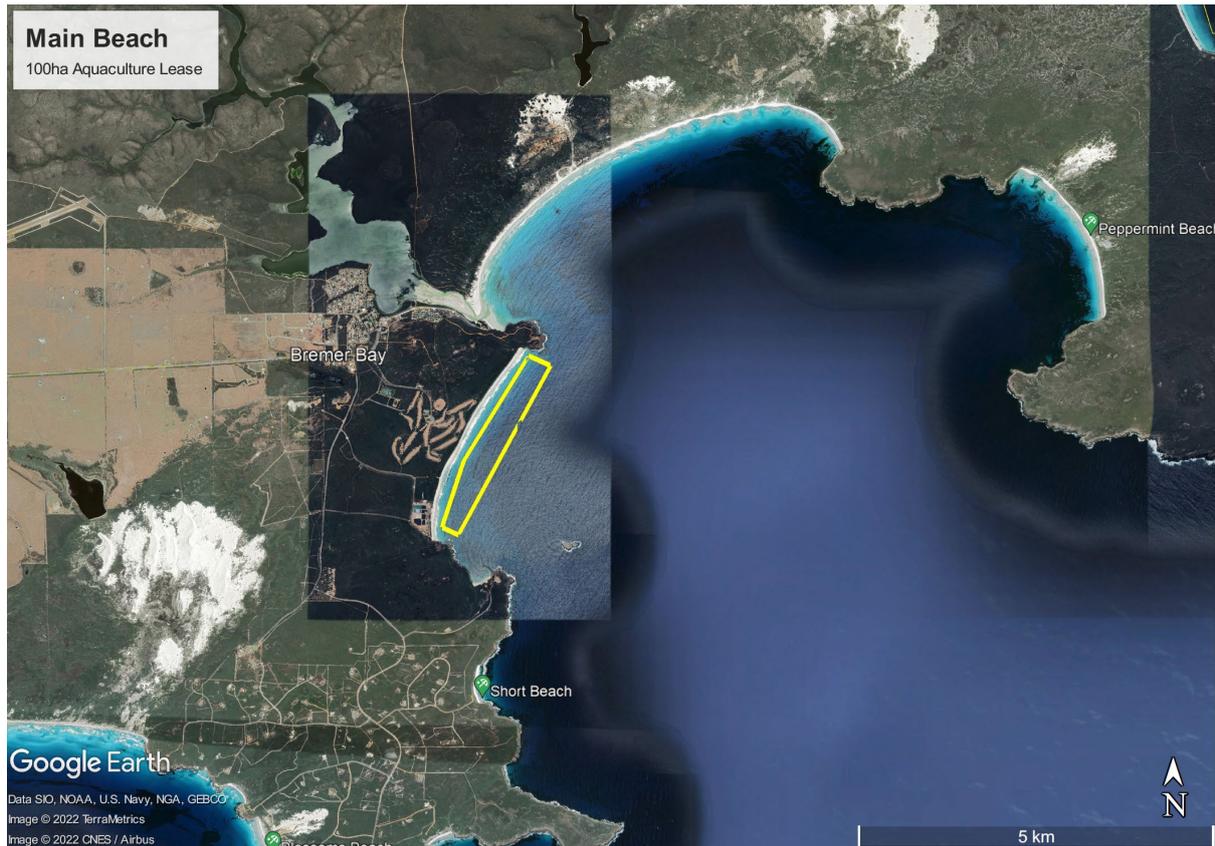
### Positives:

- Mostly flat bottom with gradual slope from 5m to 20m
- Local commercial fishers do not fish the area
- Protected from large swells

### Negatives:

- Open to Easterly seas
- Distance to nearest boat ramp and marina is 30km (Bremer Bay)
- Presence of seagrass, impact assessment and baseline monitoring required

# Fremantle Seaweed



A 100ha site was identified at Main Beach with the following positives and negatives:

## Positives:

- Mostly flat bottom with gradual slope from 5m to 15m
- Local commercial fishers do not fish the area
- Close to boat ramp and marina

## Negatives:

- Open to Easterly seas
- Presence of seagrass, impact assessment and baseline monitoring required
- Multiple users – 888 Abalone may be concerned about biosecurity risks from proximity
- Recreational fishing

# *Fremantle Seaweed*

## **Existing users of the area:**

### **Albany:**

Albany has had a commercial fishery since 1828 with the target species being pelagic (tuna and sardines), perch (salmon and herring), demersal (pink snapper, dhufish, nannygai and harlequin) and estuarine (King George whiting and sand whiting). The local fishers are inter-generational and are an important part of the fabric of the town. They provide a socio-economic benefit to Albany by providing local and fresh seafood to the town and wider export market along with employment opportunities for local people.

In recent years the commercial fishery has been curtailed due to reduced fish stocks (with limits placed on catches) and the allocation of the Albany Aquaculture Development Zone. As such, the commercial fishing industry is not supportive of additional aquaculture leases. Genuine stakeholder engagement with advocacy from local government and industry bodies is required to ensure that future aquaculture leases do not impact existing commercial fishing operations.

Additional to the commercial fishing operators is the recent allocation of the Albany Aquaculture Development Zone designated for shellfish aquaculture. This zone extends from Bald Head in the West to Herald Point in the East, encompassing two of the sites inspected (Gull Rock and Frenchman Bay). Seaweed aquaculture is currently not permitted in this zone.

Recreational fishers frequent the waters off Albany. However, it is suggested that a seaweed aquaculture lease will lead to increased fish stocks by providing a habitat and nursery for juvenile fish. Recfish West is the key stakeholder who should be consulted in the process of applying for an aquaculture lease.

### **Bremer Bay:**

Bremer Fish Processors specialise in Pilchards and harvest up to 1500 tonnes per year using the purse seine fishing technique. Fremantle Seaweed met with the owner of this fishery, David Drew and discussed the two proposed lease areas. David was supportive of both locations as they are in areas not used by the pilchard fishery. Additionally, Bremer Fish Processors have available freezer space depending on pilchard catches along with established logistic providers.

Albany herring commercial fishers visit the areas infrequently. However, this fishery was closed in 2015 due to depleted fish stocks. Recent reports have indicated that the WA herring population has recovered, as such, this fishery may be opened in the future.

Bremer Bay is famous for Orcas which congregate around the continental shelf off of Bremer Bay. A tourism operation, Whale Watch Western Australia operate two site seeing vessels. Seaweed aquaculture is not likely to affect this tourism operator.

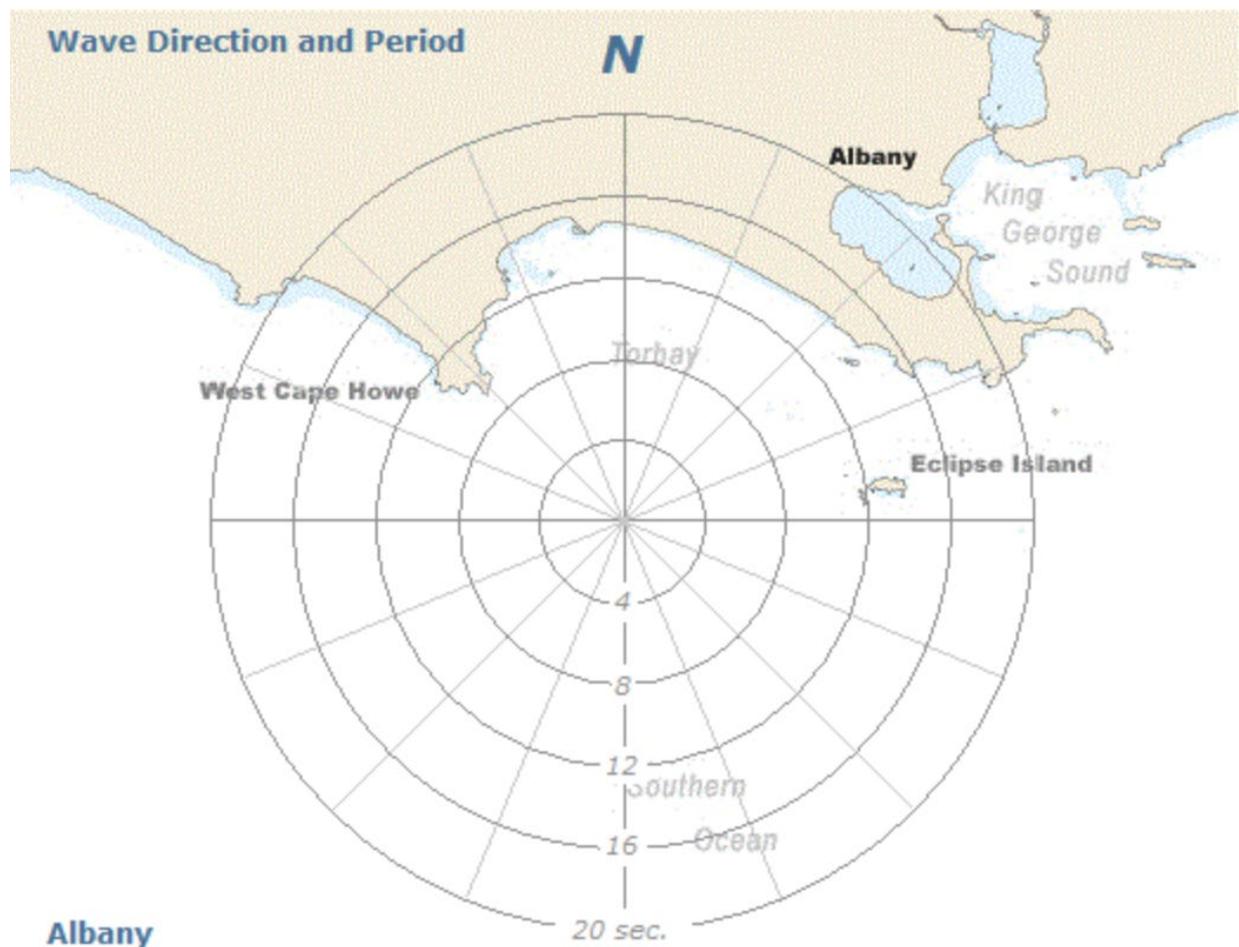
# Fremantle Seaweed

## Local environmental conditions:

The South Coast of WA presents challenging conditions for aquaculture with most current aquaculture operators having leases within fully protected waters or on land-based sites. However, Ocean Grown Abalone practice a ranching technique that involves placing concrete structures (Abitats) on the ocean floor in Flinders Bay off Augusta which is open to the full might of the Indian and Southern Oceans.

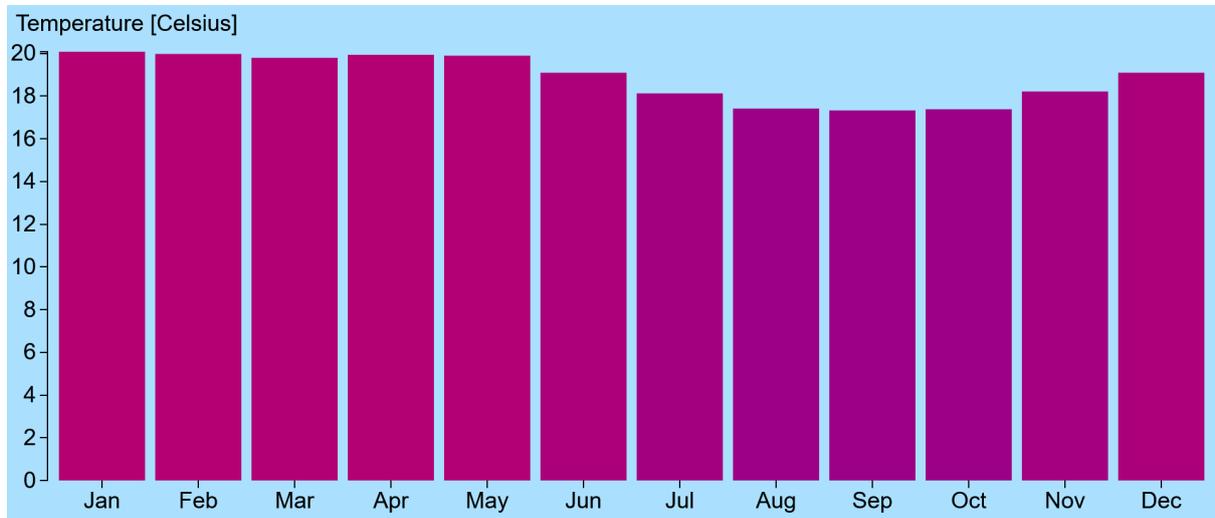
Seaweed aquaculture typically involves a suspended rope system, with long lines in a grid system attached by anchors and weighted dropper lines at intervals along the long line. This setup can be damaged by large swells (created by long distant low-pressure systems with an interval greater than 8 seconds). However, it can withstand large seas (created by local wind whipping up choppy conditions with an interval less than 6 seconds), if the anchor is robust.

The South Coast sees regular swells of 3m+ from a Southwest direction during the Autumn, Winter and Spring months with a consistent Easterly trade wind of 25knots+ during the summer months. As such, it is recommended that seaweed aquaculture take place in areas where natural land features such as bays or headlands exist, offering protection from the Southwest swells.

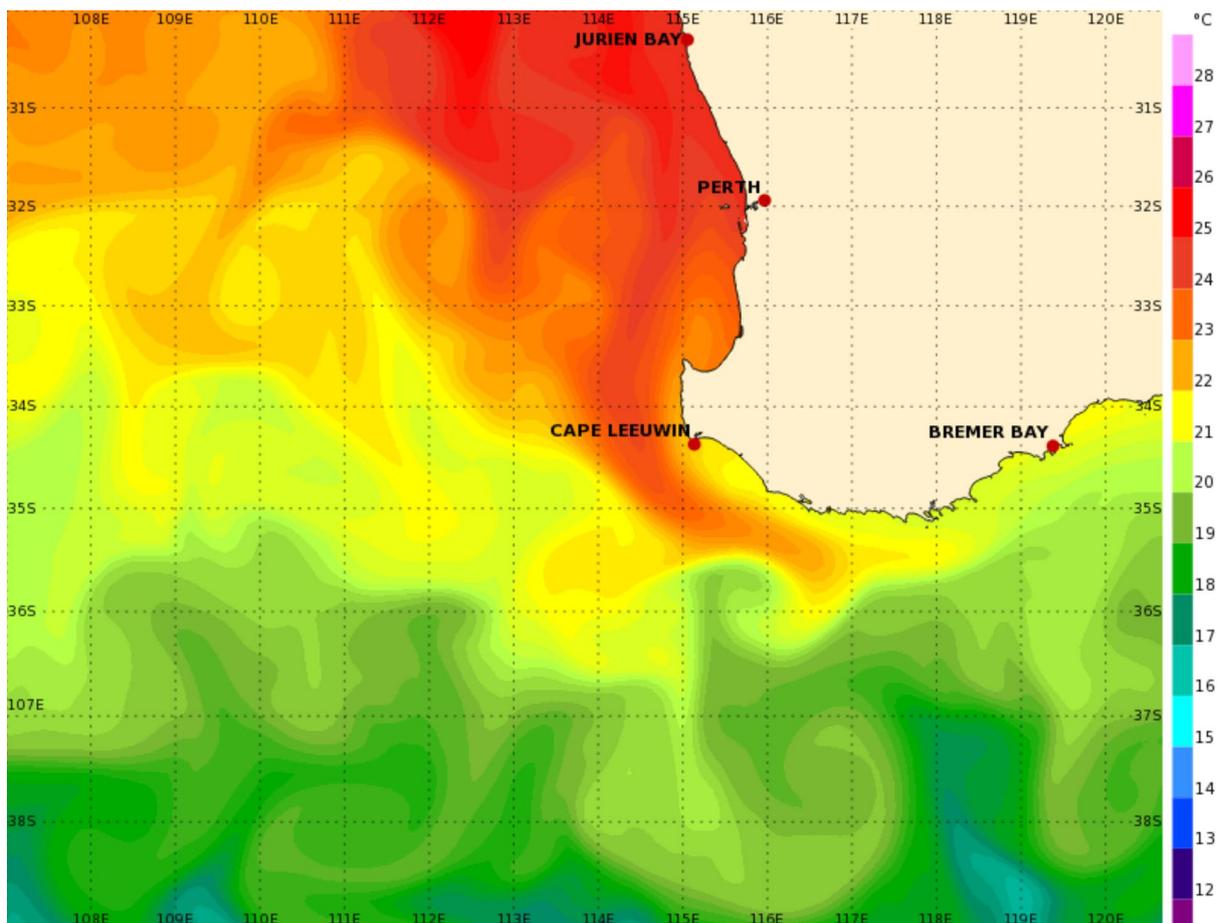


# Fremantle Seaweed

Sea temperatures range from an average of 17 degrees Celsius in the winter months to 20 degrees during summer. This small variation in water temperature provides excellent growing conditions for all types of aquaculture.



Albany is slightly influenced by the Leeuwin current and in the late summer months with higher than average water temperatures of 21 degrees.



# *Fremantle Seaweed*

## **Local socio-economic factors**

### **Albany:**

Albany is the aquaculture hub of WA with multiple aquaculture operators and facilities to support the industry. The town is well suited to attract new aquaculture such as seaweed as it offers the following:

- Population of 38,000 people with an attractive lifestyle that is seeing steady population growth of 2% providing a large enough population to provide workers for the current and future aquaculture operators
- Processing facilities for seafood to freeze and store product
- Existing supply chains to transport product
- Marine infrastructure and marine service providers available

### **Bremer Bay:**

The population of Bremer Bay ranges from 300 in the winter months to 5000 in the summer months with half of the permanent residents being retirees. This poses a challenge to seaweed aquaculture operators due to the seasonal nature of the work. However, 888 Abalone have maintained steady operations by offering attractive working conditions.

With offshore seaweed aquaculture being seasonal it is possible to locate a harvesting vessel and small workforce in Bremer Bay for the growing season. This team could then be moved North for the winter months when ocean conditions are too rough for offshore seaweed aquaculture.

Bremer Bay also presents the opportunity for inshore seaweed aquaculture with available access to land, power and water.

# *Fremantle Seaweed*

## **Recommendations for seaweed aquaculture on the South Coast**

Both Bremer Bay and Albany can support seaweed aquaculture with the presence of multiple high value seaweed species including *Asparagopsis*. Both towns have all the required facilities including marinas, seafood processing, logistics and freezer space.

Of the sites that Fremantle Seaweed inspected, only Two Peoples Bay in Albany is suitable. However significant stakeholder engagement will be required to work with existing commercial fishing operators and persons concerned for the nearby nature reserve.

In Bremer Bay, only the Doubtful Island site is suitable with main beach being too open to swell along with the biosecurity risk posed to 888 Abalone.

Recommendations:

- Provide advocacy for stakeholder engagement, particularly in the Albany zone
- Investigate with local government for the possibility of storing beach launching equipment (boat, trailer and tractor) at the Two Peoples Bay Nature Reserve information centre
- Additional research into the uses of the seaweed species endemic to the South Coast of WA
- Additional research into cultivation methods for selected seaweed species
- Additional funding for seaweed aquaculture proponents to support research activities on the South Coast of WA