



# Running Tide

**Provider:** Running Tide

**Location:** Portland, Maine

**Mechanism:** Open ocean kelp forestry

**Website:** <https://www.runningtide.com>

**Date evaluated:** Sept-Oct 2021

## About

Running Tide is piloting an open-ocean kelp farming project in which the natural metabolism of kelp captures carbon into its biomass as it grows. Kelp is ideal for carbon capture: its dry mass is approximately 30% carbon and it grows quickly and abundantly in many marine geographies. Seaborn assemblies (microforests) seeded with kelp sporophytes are deployed from offshore vessels into the open-ocean. As these free-floating assemblies are carried by ocean currents, kelp growth accumulates mass and captures dissolved ocean carbon. The entire assembly is mechanically rigged to sink after drifting for a 6-8 month growing season. The microforests sink over targeted deep water ocean basins, and the carbon embodied in the kelp biomass is delivered to the ocean floor where it is sequestered.

***Do you consider this project to be avoided emissions or emissions removed? Why?***

This project is considered carbon removal, as CO<sub>2</sub> is removed by kelp. The kelp is sunk to the deep ocean where the carbon sequestered remains for approximately 800 to thousands of years.

***What can you tell us about the carbon life cycle of the average tCO<sub>2</sub>e that your solution removes or reduces?***

Running Tide estimates its emissions to carbon removal ratio is 4.2%. So, for a project that removed 2,000 tons of CO<sub>2</sub> would create 85 tons in emissions, resulting in a negativity rate of 95.8%.

***Do you offer a direct-to-consumer purchasing option for your offsets?***

No.

***Are there additional benefits that your company offers?***

Running Tide is mapping critical ocean data in order to deploy ocean-based climate solutions more broadly around the world. Their system also produces shellfish as a source of nutrition, unlocks opportunities for coastal restoration, biofuels, animal feeds, industrial feedstocks, and more.

Today, Running Tide is working on highly automated plastic-free shellfish aquaculture to provide a low cost source of protein, in both their cost and carbon footprint. The presence of these farms enriches the water column to stabilize local fisheries. An integrated kelp forest with a shellfish bed protects a coastal community from storm surges, while absorbing nitrogen runoff from a local wastewater treatment plant. Such an engineered ecosystem protects local fisheries by buffering against algae blooms and supporting the food web of higher fish.

***How much supply do you have still available for purchase in 2021?***

500+ tons could be available for purchase in 2021, but carbon removal would occur in future years.

***When does carbon reduction or removal occur? How is it distributed over time?***

Carbon removal would occur in 2025-2026. Approximately half of the carbon removal will take place in 2025, and the other half in 2026.

# Integrity

*First, projects must cross the hurdle of actually reducing or removing the carbon they claim to. To evaluate a provider's integrity, Joro considers verifiability, enforceability, additionality, permanence, and transparency.*

## Verifiability

***How will you measure, report, and verify the emissions you are reducing or removing?***

Measurement of carbon capture will need to be inferred given the remote location of the kelp biomass during carbon sequestration. Measured carbon captured will be extrapolated from measured subsets to the larger project. The company's claims have not yet been directly measured or verified by a third party.

***What third party verifiers or other evaluators have evaluated this offset project? What verification standard or evaluation process did they use?***

Running Tide has been evaluated by Carbon Plan where it received a % rating overall and high marks for additionality and specificity. However, Running Tide has not been verified by a third party verifier.

***If none, what plans do you have in place to get verified or evaluated?***

Running Tide is approaching carbon registries and the company is targeting to have an approved methodology by mid-late 2022 in place.

## Enforceability

***Do you provide proof of retirement upon purchase of an offset?***

The company's reporting system (see Transparency section) can provide the data necessary to verify retirement. The company further anticipates that third-party verifiers will be able to validate proof of retirement when the retirement for this project is expected to occur (2025-26). More specifics on proof of retirement will be shared closer to that time.

## Additionality

***Did the project require financial capital from offsets to make the project a reality?***

Yes, the project requires revenues from carbon removal to make the project a reality.

***How will the project result in carbon reduction or removal that would not have otherwise happened without our purchase?***

The kelp is grown specifically to sequester carbon. The kelp is not sold or utilized for another purpose, but is rigged to sink into the deep ocean after a 6-8 month growing period. Therefore the project would have occurred without Joro's purchase.

## Permanence

***What is the duration in years over which the carbon storage or reduction represented by this project's offsets can be reasonably assured? What supporting research would you point to?***

Carbon removed from the kelp which is then rigged to sink in the deep ocean is expected to remain in the deep ocean for 800 to thousands of years. See supporting studies referenced below.

- Krause-Jensen, D., Lavery, P., Serrano, O., Marba, N., Masque, P. & Duarte, C.M. (2018). Sequestration of macroalgal carbon: the elephant in the Blue Carbon room. *Biology letters* 14, (6):20180236.
- Broecker, W.S. (1971) A kinetic model for the chemical composition of sea water. *Quaternary Research* 1, 188-207.
- Broecker, W.S. & Peng, T.-H. (1982) Tracers in the Sea. Lamont-Doherty Geological Observatory, Palisades, N.Y., Eldigio Press.

## **Transparency**

Running Tide is leveraging technology to ensure carbon removal takes place in a transparent manner. They are developing a remote camera verification system that gets images back on a daily basis and feeds into the company's databases. Regular images of the sequestration process that feedback from the company will be made available via a customer dashboard that is under development, and regular customer calls to review progress are planned. The company is also in the process of working with verification agencies to provide additional transparency on the progress of the project.

# **Transformative Potential**

*Creating a just and sustainable future will require fundamentally transforming our society. We prioritize carbon removal projects that contribute to a world for all life to thrive, considering efficiency, scalability, catalytic potential, ecosystem benefits, and community benefits.*

## **Efficiency**

**What is the cost per carbon credit (tCO<sub>2</sub>e) for this project?**

The cost per ton is \$250/ton.

**Tell us more about your fee structure. Specifically, what percentage of an offset purchase goes towards your company, the project owner, and any other parties involved in the offset project?**

There are no other intermediaries in this project. 100% of funds go directly to Running Tide.

**Risks: What are the primary risks to the success of this offset project?**

Running Tide considers the following to be primary risks of this project:

1. *Biological:* Kelp aquaculture yield data is available for near-shore growing, however it is unknown how open ocean growth yields will compare to their coastal counterparts. Nutrient availability, particularly that of nitrates, is lower in the open ocean than near the coasts. Running Tide is conducting ongoing studies of kelp growth in this environment.
2. *Regulatory:* Running Tide is engaged in careful study of the regulatory environment governing open ocean operations of this kind. Because this specific industrial use of a public common (the high seas) has never before been practiced, there is mismatched guidance over in whose jurisdiction and through what pathway we may proceed. Because

the ocean has historically been subject to unsustainable exploitation, Running Tide advocates for, and hopes to realize, an unambiguous regulatory regime in which to operate

3. *Quantification:* because of the remote location of the aggregated biomass and successful flux to the deep sea, measurement of carbon capture will need to be inferred (e.g. extrapolation from measured subsets to full population in the presence of a model), and will almost certainly be an underestimate.

## **Scalability**

*Does this offset project represent a solution from Project Drawdown? If so, which one(s)?*

Project Drawdown references the use of kelp and seaweed for carbon sequestration under [Coastal and Wetland Protection](#) and [Coastal and Wetland Restoration](#).

*Can this solution theoretically be scaled up to reduce or remove at least 1 gigaton of carbon dioxide by 2050?*

Project Drawdown estimates that coastal and ocean sinks that include kelp and seaweed carbon sequestration to have 1.07 to 1.48 gigatons of potential CO2 reduced and sequestered.

## **Catalytic Potential**

*Does this project use a novel approach or a well-tested solution?*

While seaweed and kelp farming has existed for centuries, the practice of sinking kelp to the deep ocean where it can reliably remain for hundreds of years is quite new. In fact, large scale kelp deployments in the deep ocean have never been tried. Finding a way to do this at scale, where millions of tons are sequestered over the next several decades only adds to the novelty. While the solution may seem simple, the design, execution and scale must be executed with extreme sophistication. Running Tide is combining its ocean experience, engineering experience, and data and ocean science to tackle the scale problem.

*Does this project help demonstrate replicability and inspire similar future projects?*

This project could potentially inspire similar projects around the world where there are existing kelp and seaweed industries or people working in the fishing sector looking to diversify. Running Tide is creating a blueprint for its solution and a playbook to help replicate their experience to make it possible to scale to gigatons of CO2 removal.

*How does your project lead to greater innovation in the broader carbon removal field?*

This project demonstrates the potential of using the oceans to remove atmospheric CO2. Where land use constraints and high energy inputs can constrain the potential of other technologies like BECCS and direct air capture, Running Tide's process could open the doors to more CO2 removal taking place in coastal areas. Running Tide is leveraging ocean science and data science to inform how it deploys its solution. This could have beneficial spillover effects for other groups innovating in ocean-based carbon removal.

## **Ecosystem Benefits**

*Does this offset project address any Sustainable Development Goals beyond Climate Action? If so, which three is your solution most closely aligned with?*

Beyond Climate Action, Running Tide supports Sustainable Development Goals #9 (Industry, Innovation, and Infrastructure), #10 (Reduced Inequalities), and #14 (Life Below Water). The company will be supporting industry development in vulnerable coastal communities across the globe, in turn helping to reduce inequities faced by these communities. Their kelp forest project may also potentially buffer ocean acidification, oxygenate the water column, and provide ecosystem stability for depleted fish stocks.

***Are these co-benefits tracked and/or measured? If so, how?***

Given Running Tide's early stage of development, the company can only speculate about the co-benefits at this stage, and have not yet put in place systems for tracking and measuring these co-benefits.

## **Community Engagement**

***Who are your community stakeholders? How are local communities involved or consulted in this project?***

Running Tide considers its stakeholders to be all inhabitants of planet earth, who face an existential threat as climate change progresses. Being stewards of the marine environment is at the heart of Running Tide's mission, and the company has engaged with scientists, law practitioners, commercial fishermen and engineers to design an ocean-friendly technology that minimizes the risk of secondary environmental impacts. Running Tide plans to regularly update, communicate with, and seek dialog with these and additional stakeholders at the community, Federal, and international level.

Running Tide has engaged with both in-house and external advisors to design microforests that intentionally minimize any foreseen negative interaction in the open ocean. For instance, with regards to marine mammals, they design to ensure that devices limit any entanglement threat. The company has spoken with leading marine mammal scientists to determine what breaking strength their kelp lines should aim to be under. They have spoken with engineers and boat captains, both in-house and externally to minimize the chance of problematic entanglement in boat propellers. They have also spoken with in-house and external consultants to fully understand the scope of international regulations on the use of plastics in the ocean, which drove them to build entirely biodegradable microforests.

***What potential risks do these communities face directly or indirectly related to your work? What steps have you taken to address these risks?***

Running Tide has engaged with stakeholders to help clarify the set of environmental risks of greatest concern, and the need to build systems that accommodate many potential environmental impacts. The communities are somewhat sheltered from these risks given that the kelp farming is done in open water far from coastal areas. However, on the coastal restoration side, the company works directly with local communities and conducts extensive planning with localities. The company believes this approach can help mitigate risks.

On the policy side, Running Tide has learned that there are a variety of international frameworks in place to regulate commercial activities on the ocean, however, none of these are designed to deal with their specific nature-based CDR technique. The range of ocean-related treaties under the United Nations include, but are not limited to: The Law of the Sea, The London Protocol, The

Convention on Biological Diversity, The International Seabed Authority, and the International Maritime Organization. Based on initial assessment, no treaty to which the US is a Contracting Party currently exists that would provide the operating framework for this particular nature-based ocean CDR system on the high seas. For that reason, the company is actively seeking the advice of the relevant US government agencies.

***What non-carbon benefits from this project accrue to local communities?***

Running Tide believes its model can support economic development in vulnerable coastal communities around the world. These communities have been disrupted by major changes in the fishing industry. Local fishermen are being forced to compete with massive, subsidized international fishing vessels, and increased fishing has negatively impacted fish stocks, all while more time and resources are expended to catch the same amount of fish. Running Tide's model offers a different revenue stream and economic opportunities for fishing communities.

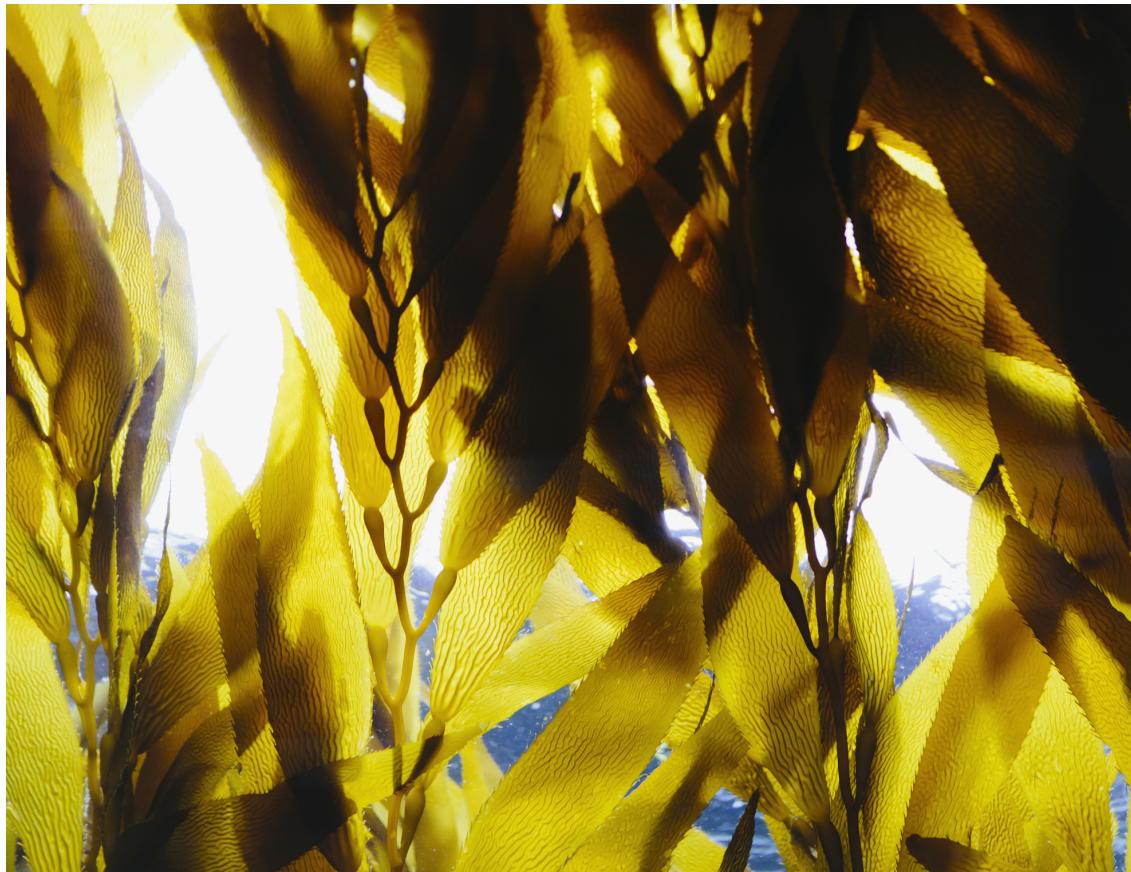
***What are the land use implications on local communities as a result of your projects?***

Running Tide's land use and energy use are both very minimal, and local (coastal) water use is primarily for kelp reforestation.

## Images

*Additional photos, shared by the provider*





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