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Please note: This document contains the findings from our impact teams' research on the impact thesis of the company, and some of the data that support it. It is only a partial representation of the complete impact due diligence we deploy in our investment process.

Company name	Ava Ocean
Products	Unprocessed wild molluscs harvested with sustainable seabed harvesters, Unprocessed wild echinoderms harvested with sustainable seabed harvesters, Seabed monitoring services, Food harvesting engineering
Industry	Ocean
Impact theme	Sustainable food systems
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Date (version)	31.12.2022 (v. 4.2)

Impact due diligence summary

Approved by PGC	Yes
Impact score	Impact-generating (5/5)
Input to investment agreement	• Collaborate with Norselab's impact team to set up the appropriate policies and mechanisms to formally address SFDR good governance criteria and due diligence processes and improve sustainability management.
Ownership strategy recommendation	• Explore adaptation of the seabed harvesting model for Arctic Scallops to other species on the sea bottom, where current harvesting methods are both destroying seabed ecosystems and depleting vulnerable fish and shellfish stocks.

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	• Expand the reach of the technology to other regions where it could replace seabed dredging.
Impact assessment summary	• Ava Ocean's technology has the potential to redefine seabed harvesting globally, installing practices that help sustain stocks of marine species and preserve marine seabed ecosystems, while maintaining access to nutritious food from the ocean.
SDGs	**SDG 2.4 (Zero hunger):** Increases access to nutritious food by gently harvesting resources that may otherwise be unavailable or unexploited. **SDG 14.4 (Life below water):** Favors regenerative catching practices through precision harvesting and real-time data collection. **SDG 13.2 (Climate action):** Preserves natural seafloor carbon sinks. **SDG 8.5 (Decent work and economic growth):** Generates employment in areas where harvesting might otherwise not be possible and preserves jobs where upcoming regulations may limit or ban dredging.
Net impact[1]	**+ 70%**
EU Taxonomy	Not applicable
SFDR	• **Sustainable investment:** Substantial contribution to at least one SDG. • **DNSH:** Limited information, but no negative SDG contribution uncovered. Additionally, the phase and size of the company indicated that any potential negative impact would be very limited. • **Good governance:** Limited information. No indication of non-compliance with good governance criteria. • **PAI:** Estimated PAI indicators have been reviewed. No indication of significant harm.
Areas to monitor	• **External risk:** Safety at sea. Despite greater awareness and improved practices, the number of accidents and deaths among fishers has risen consistently. • **Regulatory risk:** Dependency on quotas. There is a risk that the commercial research quota allocated over the next five years may not be renewed. This risk, however, is limited and marginal in the medium term and may be mitigated through expansion to other species and/or regions.

[1] Applying Norselab SDG-mapped value set to the Upright model.

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About Seabed harvesting

Seabed harvesting, in the context of fishing, refers to the practice of using trawling or dredging techniques to extract marine organisms and resources from the ocean floor. It involves dragging nets or equipment along the seabed to catch fish, shellfish, and other bottom-dwelling species. The purpose of seabed harvesting in fishing is to target commercially valuable species and meet the demand for seafood products. This practice is part of the commercial fishing industry, which encompasses a wide range of activities, including both industrial-scale operations and small-scale artisanal fishing.

About Ava Ocean

Ava Ocean was founded in 2016 by Øystein Tvedt in Ålesund, Norway. In close collaboration with research institutes and authorities, the company has developed a unique, seabed-friendly method for harvesting shellfish. Making Ava Ocean's method widely available has the potential to end harmful seabed harvesting practices for good.

1. Impact thesis: why Seabed harvesting matters

1.1 Challenge

Key takeaway: The overall health of the ocean, including marine biodiversity and ecosystems, is fundamental to the earth's health. The ocean is also an important source of protein, and with a growing population, the contribution of ocean proteins will increase. Yet, many marine stocks and ecosystems are threatened by overfishing and destructive fishing. Finding sustainable ways of harvesting from the oceans is key both to a healthy marine ecosystem for the billions of people who depend on the ocean for livelihood and food, and to maintain the ocean's climate regulating capabilities.

- **The food gap:** Despite a global commitment to eliminate hunger by 2030, one-tenth of the global population is estimated to be undernourished today[2]. Climate change and exacerbated pressure on terrestrial and oceanic ecosystems continue to threaten food security. Seafood is the largest traded food commodity globally and has represented nearly 20 percent of the protein intake for 3.3 billion people worldwide[3]. Seafood provides essential nutrients not found in plant-source foods or other animal

[2] World Health Organization, July 2021
[3] Food and Agriculture Organization of the United Nations, 2020

proteins[4]. By some estimates, the ocean could produce up to two-thirds of the edible protein required to feed the global population in 2050[5,6].

- **Ocean's fundamental role in climate change:** The ocean is a fundamental climate regulator. It dictates rain and drought patterns, redistributes heat, and births violent storms and hurricanes. Seawater has a heat absorption capacity four times larger than air and holds 50 times more carbon than the atmosphere[7]. Heat, water, and gases balance out at the sea surface, and winds, tides, and wave dynamics redistribute these throughout the ocean[8]. Improvement is urgent for a range of ocean health indicators. For example, the health and extent of vital carbon-storing habitats has been in decline for decades. This may compromise the ocean's ability to absorb anthropogenic CO2 and retain its climate regulating abilities indefinitely[9]. Despite the ocean's crucial role in keeping our planet in balance, only 3 percent of the ocean has been described as free from human pressure[10].

- **Ocean biodiversity under pressure:** The ocean is one of the main repositories of the world's biodiversity, holding 80 percent of all life forms[11]. Decades of overfishing and destructive fishing, both legal and illegal, have resulted in substantial reduction of key marine fish stocks and collateral impacts on marine ecosystems. There is limited knowledge about the status of the ocean floor, suggesting we could be underestimating the impacts of our activities. According to the UN Food and Agriculture Organization, one-third of assessed fish populations are harvested faster than they regenerate[12]. This assessment leaves out the majority of fish stocks, as the status of 80% of stocks is uncertain[13].

  The most common catching method for shellfish globally, so-called dredging, causes widespread damage to the seabed ecosystems, which can take up to 10 years to recover[14]. Dredging uses an enormous, toothed bar mounted on a device called a dredge to scrape the seabed. The dredge throws the intended catch into a cloud captured by a net trailing behind. The cloud also contains anything at or just below the seabed surface. This leads to unintentional catch of other types of fish, crustaceans and molluscs, and the destruction of sponges, seaweeds, and centuries-old corals. This catching method is also estimated to release as much as 1 billion tons of naturally stored carbon from the seafloor, equivalent to aviation carbon emissions[15]. Dredging the seabed is contentious and banned or restricted in a handful of countries, including Norway and the UK[16], but about 1 000 active shell dredgers still operate today[17].

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[4] World Resource Institute, June 2014
[5] World Resource Institute
[6] High Level Panel for a Sustainable Ocean Economy
[7] SDG Action, February 2022
[8] Intergovernmental Panel on Climate Change, 2019
[9] SDG Action, February 2022
[10] Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services, 2019
[11] UN Environment Programme, April 2022
[12] Food and Agriculture Organizations of the United Nations, 2022
[13] World Wildlife Fund
[14] Lambert et al., 2014
[15] Sala et al., Feb 2021
[16] The Guardian, April 2022
[17] The Fishing Daily, Jan 2022

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1.2 Theory of change

Key takeaway: Ava Ocean contributes to sustainable food systems by gently and selectively harvesting resources from the sea that have until now been unexploited or exploited using destructive fishing practices. This contributes to the increasing availability of nutritious marine protein, while protecting fragile marine ecosystems, preserving invaluable carbon sinks, and maintaining the ocean's climate regulating properties.

- **First-mover in sustainable seabed harvesting:** Ava Ocean has developed and patented a unique method for harvesting bottom-dwelling species that leave seabed ecosystems and carbon sinks intact. Their technology makes it possible to identify, select and sort such species without contact with the seabed. The method, developed in collaboration with Norwegian independent research institute SINTEF, opens up new, sustainable opportunities for fisheries around the world[18]. In 2022, the company reopened commercial Arctic scallops (*chlamys islandica*) harvesting in Norway after being awarded an annual quota of 15,000 tonnes for the next five years. This resource has remained inaccessible for the past 30 years in Norwegian waters due to the ban on destructive seabed harvesting methods. Ava Ocean is also in advanced talks with the authorities in Iceland and Greenland about quotas for sustainable harvesting of Arctic scallops. The company is exploring how to further the reach of their technology for other species, both in deep-sea and coastal areas. They are also considering the restoration of the once-lush kelp forests in the Norwegian coasts by removing and regulating the sea urchin populations[19,20]. Making Ava Ocean's method widely available has the potential to minimize harmful seabed harvesting practices.

[18] The Fishing Daily, Jan 2022
[19] NPR, March 2021
[20] The Explorer, March 2022

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1.3 Company impact thesis

1.3.1 Product SDGs contribution

These are the SDGs where Ava Ocean can have the greatest contribution in order of significance. It's not considered an exhaustive list of all the SDGs Ava Ocean contributes to.

SDG	SDG target	Company contribution	Metric
2 - Zero hunger	2.4 By 2030, ensure sustainable food production systems and implement resilient agricultural practices that increase productivity and production, that help maintain ecosystems, that strengthen capacity for adaptation to climate change, extreme weather, drought, flooding and other disasters and that progressively improve land and soil quality.	Contributes to sustainable food production systems by gently harvesting resources that have until now been unavailable and unexploited.	# tonnes harvested # modules in use
14 - Life below water	14.4 By 2020, effectively regulate harvesting and end overfishing, illegal, unreported and unregulated fishing and destructive fishing practices and implement science-based management plans, in order to restore fish stocks in the shortest time feasible, at least to levels that can produce maximum sustainable yield as determined by their biological characteristics.	Favors regenerative fishing practices through precision harvesting and real-time data collection.	# km2 where recent or historical dredging was replaced
13 - Climate action	13.2 Integrate climate change measures into national policies, strategies and planning.	Preserves naturally stored carbon from the seafloor.	# km2 where recent or historical dredging was replaced
8 - Decent work and economic growth	8.5 By 2030, achieve full and productive employment and decent work for all women and men, including for young people and persons with disabilities, and equal pay for work of equal value.	Generates employment in areas where harvesting would have been inaccessible and preserves jobs where upcoming regulations may limit or ban dredging.	# jobs created or preserved

1.3.2 Further impact potential

- **Beyond the cutting-edge patented technology for sustainable seabed-harvesting:** Ava Ocean works to open up new ocean industries and improve sustainability in existing ones. Hence, they will contribute to job creation. Harvesting the Arctic scallop population in Norway alone can generate new employment opportunities for hundreds of people that would otherwise not find ocean related employment opportunities[21]. The technology also has the potential to preserve jobs in areas where upcoming regulation may limit or ban dredging. Ava Ocean closely monitors the stocks through different data sources, including submarine video monitoring Deep Vision camera mounted on the harvester, and uses advanced AI to monitor yield per field over time. Ava Ocean's harvesting methods could reduce fuel consumption by more than 50%, compared to dredging.

- **Further impact potential:** The sustainable seabed harvesting model for Arctic Scallops may potentially be adapted to several other species on the sea bottom, where current harvesting methods are both destroying seabed ecosystems and depleting vulnerable fish and shellfish stocks. This method could also be used to proactively address regulatory risks in other regions outside of Norway that are considering implementing seabed dredging bans. In recent news, the Scottish Government has announced an 11-week ban on trawling, dredging and creel fishing in the Clyde to help boost the recovery of dwindling cod populations[22].

[21] Norselab, Jan 2022
[22] The Scotsman, Jan 2022

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1.4 Net impact assessment

1.4.1 Company net impact assessment

The company's net impact modeling[23] as of December 2022 is illustrated below.

[23] Applying Norselab SDG-mapped value set

Key highlights from Upright's assessment include:

- Seabed harvesting creates emissions and has some impacts on biodiversity. However, Ava Ocean's technology is significantly better compared to traditional dredging, resulting in positive environmental impacts.
- Ability to create data and new information during the harvesting process shows positively in the knowledge dimension.
- Molluscs and echinoderms, similar to seafood in general, have good nutritional values. This shows positively in the nutrition impact category.

1.4.2 Industry peers assessment

Peer company	Main products	Net impact score	Adjusted net impact score[24]
Company A (NO)	Unprocessed farmed freshwater fish, Unprocessed farmed marine fish, Fish oils, Fish oil supplements, Unprocessed roe	+28%	**+31%**
Company B (NO)	Unprocessed wild marine fish, Unprocessed farmed marine fish, Fish oils, Fish feed, **Unprocessed wild crustaceans**	+28%	**+30%**
Company C (NO)	Unprocessed farmed marine fish, Unprocessed wild marine fish, Unprocessed roe, **Unprocessed wild crustaceans**, Unprocessed farmed crustaceans	+28%	**+30%**
Company D (NO)	Unprocessed farmed marine fish	+29%	**+32%**

1.5 EU Taxonomy assessment

Ava Ocean doesn't satisfy current criteria to contribute to climate change and climate adaptation in the latest EU Taxonomy. It is important to note however that the EU Taxonomy has not defined criteria for the seafood sector yet, with no clear ETA.

[24] Applying Norselab SDG-mapped value set

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1.6 Risks assessment

- **External risk: Safety at sea.** Despite greater awareness and improved practices, the number of accidents and deaths among fishers has risen consistently[25].
- **Regulatory risk: Dependency on Directorate of Fisheries.** There is a risk that the fishing quota allocated over the next five years may not be renewed or the decision could be reversed. This risk, however, is limited and marginal in the short term.

[25] Food and Agriculture Organization of the United Nations, 2020

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