

Caribbean Spiny Lobster: Confronting the Challenges of Developing a Sustainable Aquaculture Industry in The Bahamas

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Introduction

Aquaculture: Aquaculture is the cultivation of marine species for food. This method of fishing is a new prospective outlet for increasing global fishery production, due to the more traditional method of capture fisheries becoming stagnant in nature resulting in inefficiencies in global production. In contrast, production of global fisheries through aquaculture continues to increase. Looking specifically at the Caribbean Spiny Lobster, there has only been small growth in crustacean aquaculture, but there is significant room for increased production.

Background: The Caribbean Spiny lobster has a high demand globally. In the Bahamas it is valued highly as \$15 a pound and is the only large-scale commercial fishery in the country. Of all the fish exported, this species of lobster makes up 95% of the export value. Many people in the Bahamas are involved with some stage of the lobster fishery and rely on the industry for employment. Because of the importance of the lobster industry, it is heavily exploited and overfished. Attempts to use capture fishery methods to meet this high demand could put the lobster population and surrounding ecosystems at risk due to unsustainable practice. This makes aquaculture an appealing option to supplement the fishery production without adding competition to the existing fishing industry. The *Panulirus argus* species has a very low survival rate in the wild due to their complex life cycle. Only about 3% of larval and post-larval lobsters survive to adulthood where they could then be fished using capture methods. Collecting them as pueruli, or small post-larval lobsters, and growing them in wet labs, presents the possibility of producing more lobsters than would naturally survive in the ocean without affecting the marine ecosystems.

Discussion

Our data shows that pueruli were collected at multiple different collectors placed in different sites throughout and around Cape Eleuthera. Each site with the exception of the Schooner Cays site had some level of pueruli collection and thus our first hypothesis, that artificial collectors can successfully collect pueruli in various marine habitats, can be proved true. Our data also shows that the only collector that captured all stages of pueruli was collector number 1 at the Kemps Creek collector site. The highest rate of collection also occurred at Kemps Creek, which is a nursery habitat, and thus our second hypothesis, that nursery marine habitats will induce the highest number of pueruli settlements, can also be proved true.



Collector Deployment

Questions and Objectives

This research focused on assessing the feasibility of Caribbean Spiny Lobster pueruli collection utilizing artificial collectors in South Eleuthera. Pueruli are tiny little baby lobsters just about the size of your pinky finger nail. The first hypothesis was that artificial collectors can successfully collect *P. argus* pueruli in varied marine habitats. The second hypothesis is that nursery marine habitats with visible populations of *Laurencia spp.* will induce the highest number of pueruli settlements.

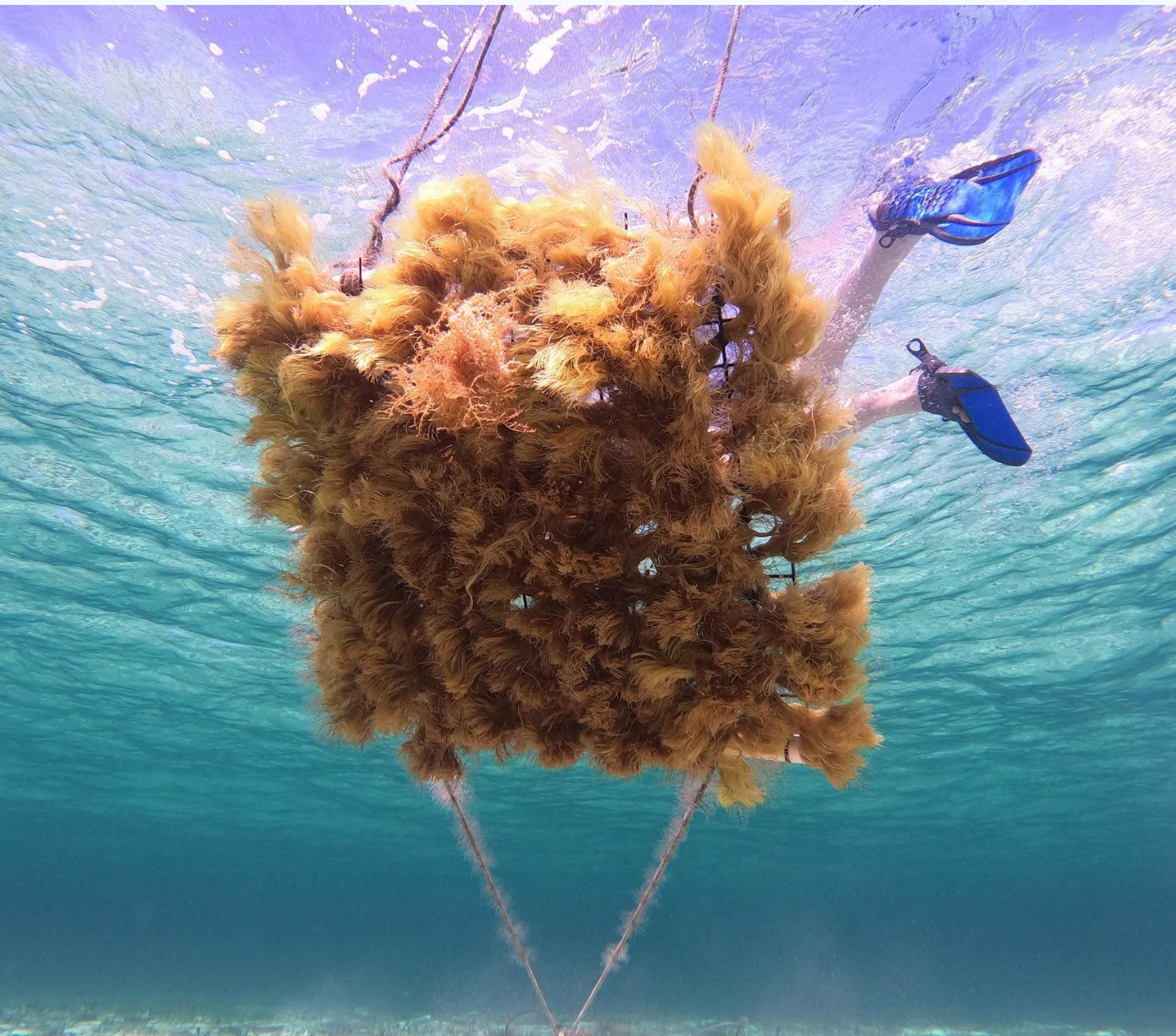
Assess the feasibility of Caribbean Spiny Lobster pueruli collection utilizing artificial collectors in South Eleuthera



Adult Spiny Lobster

Methods

Artificial Modified Gusi Collectors were created using PVC pipes, wire, and polypropylene rope. The rope was frayed until it had a large surface area and resembled *Laurencia spp.*, or red algae, in which pueruli like to settle. This frayed rope was then weaved throughout the wire attached to the pipes. The collectors were deployed in sites around South Eleuthera, Bahamas, which have various bottom types, depths, and currents. There are currently collectors located at Deep Creek, Kemps Creek, Guard Shack, Waterpolo cut, and Schooner Cays. Two weeks after deployment, collectors were checked. This was the most important part of the process and must be done correctly to ensure accurate data. The collectors are detached from their position and gently placed in a mesh bag. It is then carried up to the boat to be shaken three times, followed by a three minute search conducted by two people to check for any pueruli or other settled marine life. Collectors are then placed back and checked again two weeks later.



Artificial Collector

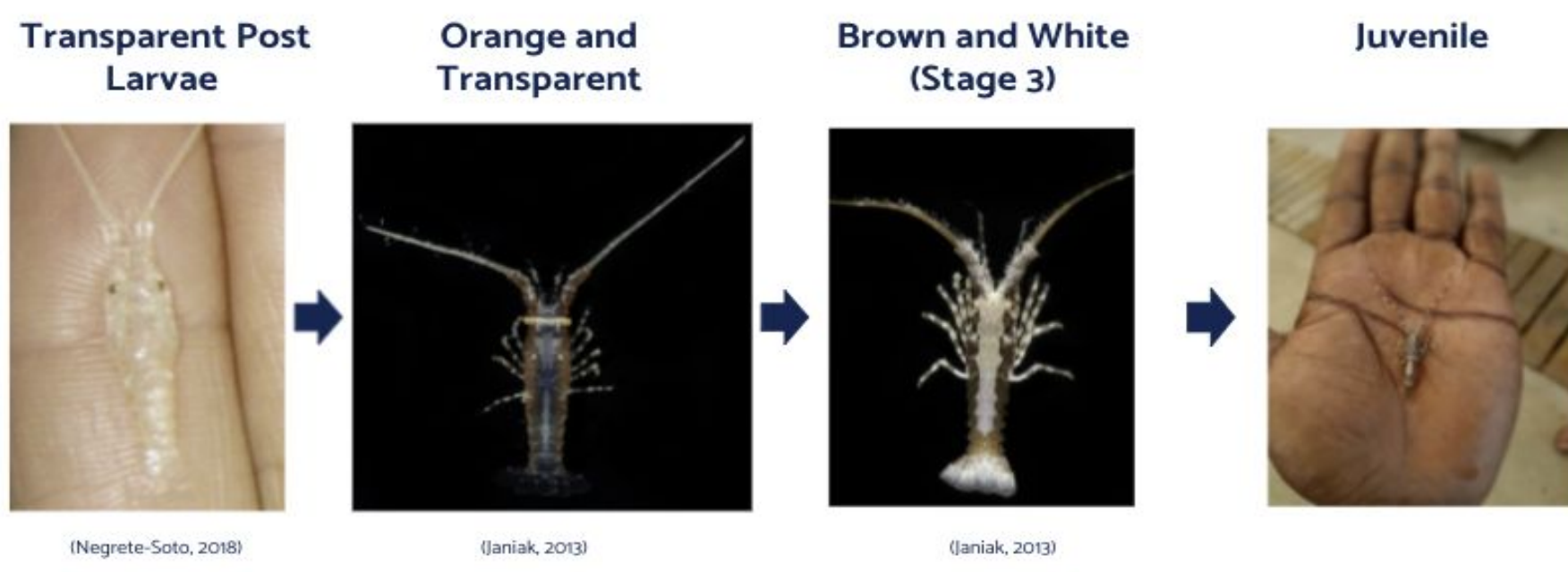
Results



The results of the pueruli collection over the past two months of research in Southern Eleuthera.

- This is the collection record of the different types of, and of how many pueruli were collected. The different types of pueruli recorded are represented by the different colors of the bars in the graph. This data was collected on, and three days after the day of the new moon.

Larval Stages



The different stages of pueruli that are found in the artificial collectors.

- Pueruli settle in the first (transparent post larvae) stage. They then molt and gain pigmentation as shown in the later stages.

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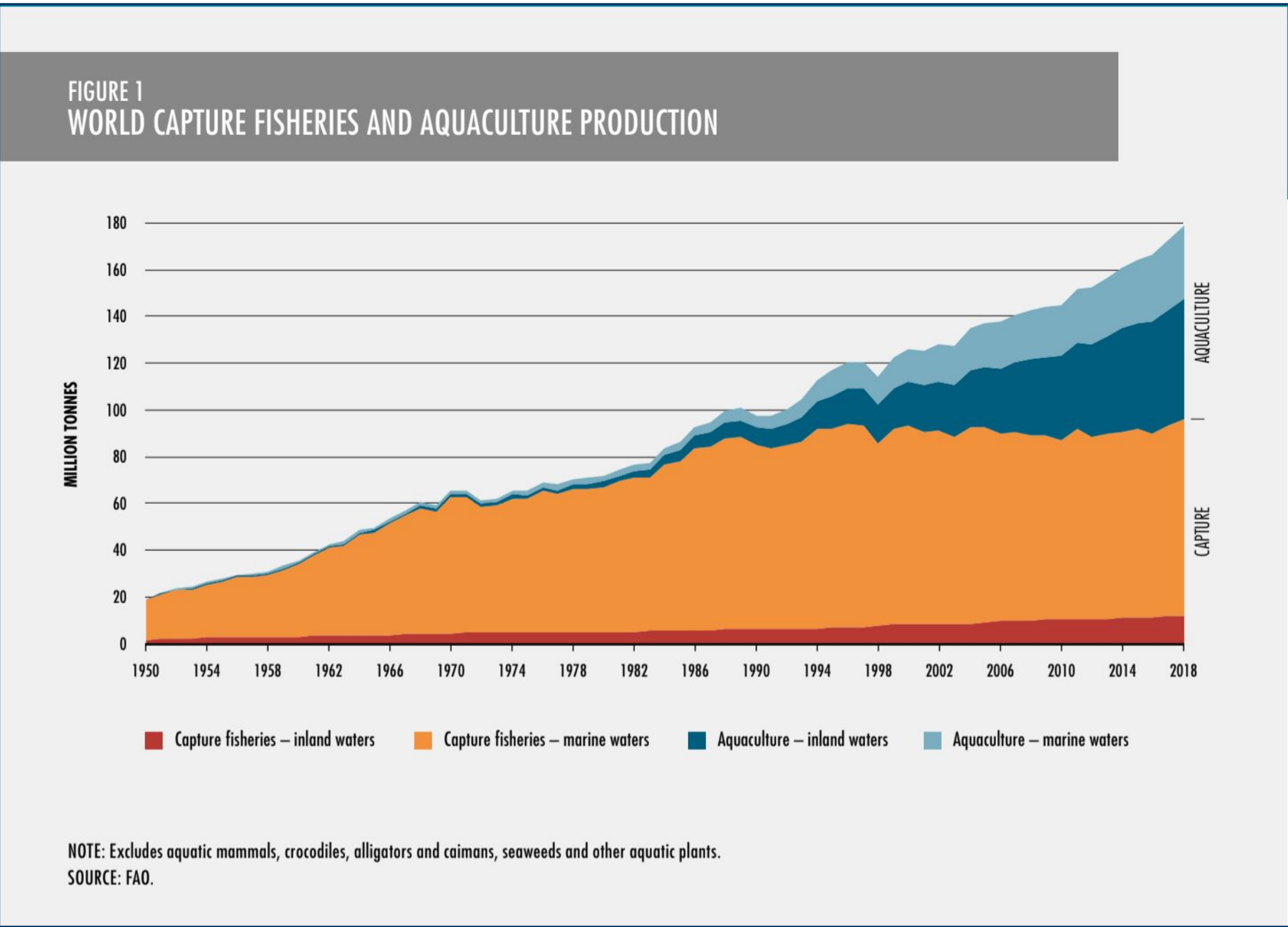
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Growth of Aquaculture Industry from 1950-2018 (FAO)



Collector Locations On S. Eluthra