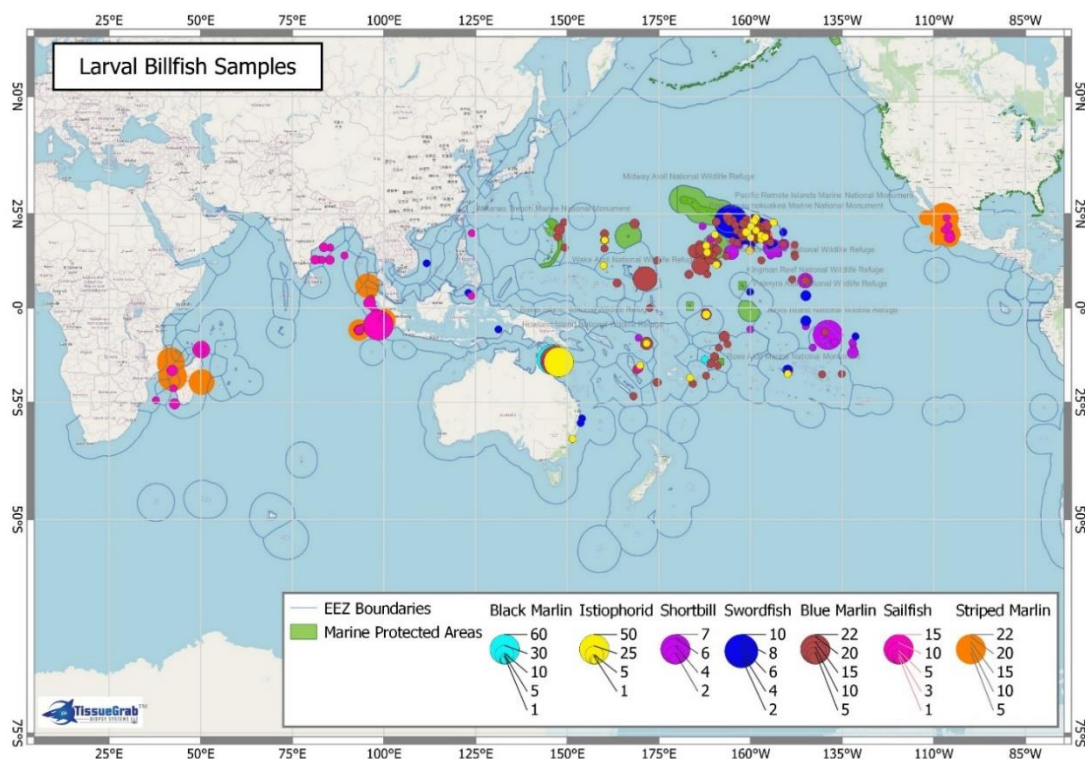
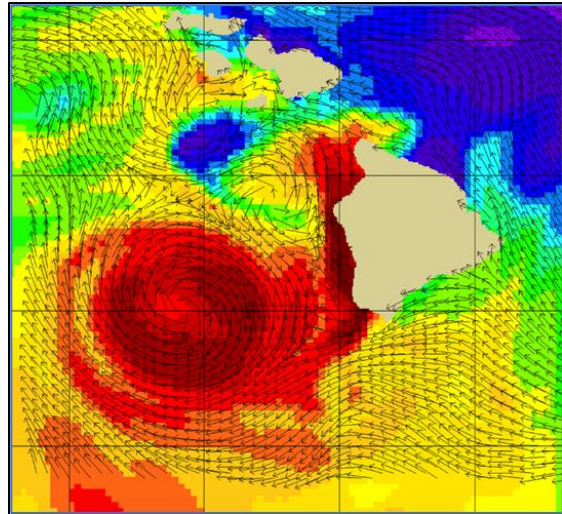
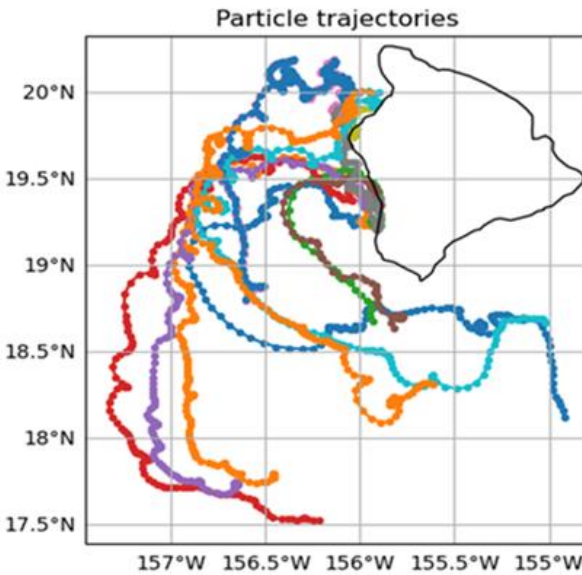


Wild Oceans Kona Project 2024 Update

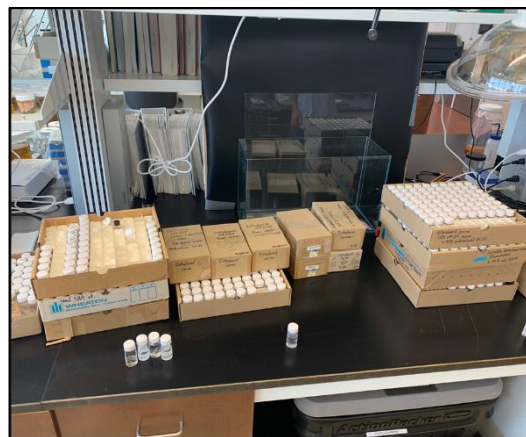
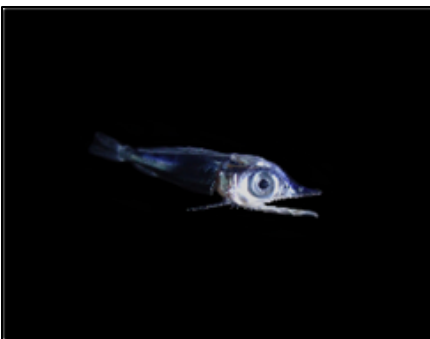
We have made great progress with the *Kona Project* over the past year and could not have done so without your generous support. Although he has encountered some unexpected delays, our lead Hawaii-based scientist, Dr. Mike Musyl, should be submitting his manuscript on Phase 1 for publication any time now. As you may recall from past correspondence, he has examined literature and historical data going back over 70 years in a meta-analysis to document larval *istiophorid* abundance patterns and habitat in the Pacific Ocean. The database we have compiled is the largest repository on the distribution of larval billfish (*istiophorids* and swordfish) in the Pacific. It has also served to identify several potential spawning and larval habitats (previously unknown) and it will act as a baseline for future studies. You can easily see from the chart below that the Hawaii zone is as important as we figured it would prove to be!



We have also completed the Phase 2 preliminary study with University of Hawaii scientist Dr. Yanli Jia. This part of the Project used information on larval billfish in terms of their age and spatial-temporal distribution compiled in Phase 1 as inputs to a particle tracking tool to simulate the movements of billfish larvae as they were carried by ocean currents during the lifetime of each sample. Velocity fields from an ocean circulation model provided the background flow environment. For each larval sample, tracking begins from the time and location of its capture, moves backward in time, and continues for a duration concordant with its estimated age. The end location was then considered its most likely spawning origin. The procedure that Dr. Jia established for tracking larval billfish movements worked well and is readily adaptable to conduct more simulations.



Preliminary tracks have shown that many billfish are spawned outside of the Kona Gyre, which *appears* to allow the fry to get through their most perilous first few days of life away from the Kona Coast where a feeding frenzy of the food chain is often active. It is possible that, before they are large enough to buck the currents but mobile enough to better elude predators, the currents sweep them into the slicks along the Kona Coast, known to be prime habitat for a number of larval pelagic species. We know of no other study that has documented this larval transport system, and analysis of new samples is expected to only increase findings like these. These models could have broad implications, especially the tracks generated by the more recently caught samples.



One of the unforeseen “discoveries” we made along the way was that about 1,800 larval billfish samples **were** more recently caught in the Hawaii EEZ than most that appeared in the meta-study. These 1,800+ samples were collected during 998 discrete surface tows aboard a NOAA research vessel from 1997-2018, but were sitting in a box at the PIFSC lab, never processed. Many of them were captured in the Kona lee of the Big Island and their tracks will be important as the current oceanographic models are more accurate. Once analyzed, they too can be added to the meta-study database.

It took some doing, but we have secured an agreement to do the analysis of these 1800+ samples and work has already begun. Specifically, the agreement allows us to fund a research technician at NOAA's Pacific Islands Fisheries Science Center for one year through a cooperative arrangement with the University of Hawai'i at Hilo. This will provide us with additional inputs to Dr. Jia's model and the opportunity to utilize velocity fields from the latest, state-of-the-art, ocean circulation models for improved estimates of spawning origins of larval billfish.

Preliminary counts show 726 of the 1888 larvae have already been identified to species including Blue Marlin (262), Spearfish (235), Swordfish (221), and Striped Marlin (8). With as many as 1162 larvae remaining to identify, this product will provide species-level IDs for all billfish larvae collected in the Hawai'i EEZ. It will be interesting to see if these species percentages remain constant on the remaining 1,162 larvae. Not many people knew that swordfish spawn here so heavily!



The results of this work will not only be used by us to expand both Phase 1 and Phase 2 of the Project but will be made available to the public for other research efforts. We are extremely excited about this discovery and the new partnership with NOAA and the University of Hawaii.

On the management side, we have also made progress through our Pacific Program Director Theresa Labriola's efforts this past year. She continues her engagement in both domestic and international billfish management. In addition to building coalitions to influence managers, this past year Theresa attended meetings of the Western Pacific Regional Fishery Management Council where she called for a catch limit on striped marlin and for managers to reduce overall catch. Internationally, the International Scientific Committee (ISC) completed their stock assessment for striped marlin which indicates the stock remains overfished and subject to overfishing. Theresa convinced the ISC to conduct research on boat-side strategies to reduce longline catch of striped marlin and improve post-release survivorship through gear alterations that will ultimately benefit all billfish species. For more information go to <https://wildoceans.org/kona-project/>.

Results from our work will be presented next October at the *International Billfish Symposium* that we are co-hosting in San Diego, CA. For more information on the symposium, visit <https://bfsymposium.org/>.