Laulima: Community Partnership in Mapping Invasive Algae Along Moloka ‘ i's Southern Shoreline

Tucker, K.[1], Lager, D[1], Dibben-Young, A[2], Neilson, B.[1]

[1]Hawaii Department of Land and Natural Resources, Division of Aquatic Resources, USA [2] Nene o Molokai

Introduction

Photo 1: Aerial imagery of a Hawaiian loko i‘a with a high concentration of Gorilla Ogo along with Mangrove along the pohaku walls. (Credit: DLNR/DAR

Spanning miles along the southern shoreline of Moloka'i, several species of well-established invasive algae including Gracilaria salicornia (Gorilla Ogo), Acanthophora spicifera (Prickly Seaweed) and Hypnea musciformus (Hookweed) have become dominant benthic features on reef flat habitats. Invasive algae species impact reef ecosystems by overgrowing native algae and corals (Russel 1983, Conklin and Smith 2005, Martinez et al 2011). Small pieces (0.5cm) of both G. salicornia and H. musciformus have the ability to regrow rapidly, allowing for their rapid distribution around large reef areas. Moreover, A. specifera has been found to have most widespread distribution throughout the Hawaiian archipelago (Smith et al. 2002). Moloka‘i boasts one of the longest contiguous fringing reef in the United States. Recognizing the threat of invasive algae to their marine resources, local community members initiated an effort to develop an invasive algae management plan. Community members, conservation groups, managers, researchers, and practitioners were brought together to increase understanding of the distribution and spread of invasive algae for future management efforts on the south shore of Moloka‘i. With the cooperation of a diverse group of stakeholders, we were able to efficiently conduct a large-scale project.

The goals of this project were to:

1) Map invasive algae species distribution
2) Map additional coastal features including sediment type, depth, and mangrove presence
3) Train volunteers on the identification of invasive algae and use of handheld GPS units
4) identify areas of critically high invasive algae cover that are impacting aquatic resources for future removal efforts

(Photo: A pohaku wall of a Hawaiian loko i‘a overgrown with mangrove trees located in the Punakou area (Credit: DLNR/DAR).

Methods

Photo 3: Surveyors recording sediment depth and presence of invasive algae. The dark clumps shown are mats of Gorilla Ogo (Credit: Colleen Uechi [Molokai Dispatch]).

- Survey teams formed a grid of surveyors placed 50 ft apart, and walked the shoreline
- Every 50 feet, a GPS point was taken by each surveyor who then recorded the following.
  - Presence of invasive algae, by species, on a scale of 0-3 (absent to high abundance) at each GPS point recorded
  - Presence or absence of any mangrove trees in the area
  - Sediment type and depth

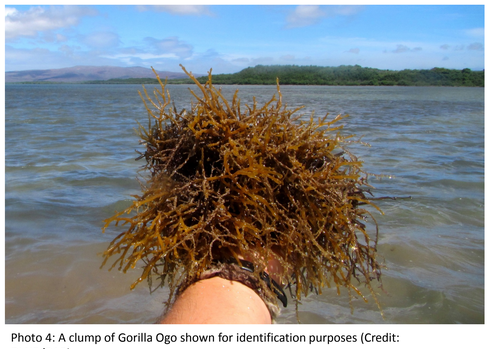

Photo 4: A clump of Gorilla Ogo shown for identification purposes (Credit: DLNR/DAR).

Invasive Algae Distribution Analysis:

- Location data from the GPS units were downloaded and linked with the corresponding algae cover, mangrove, and sediment data
- ArcGIS was used to calculate coverage data as well as produce distribution maps

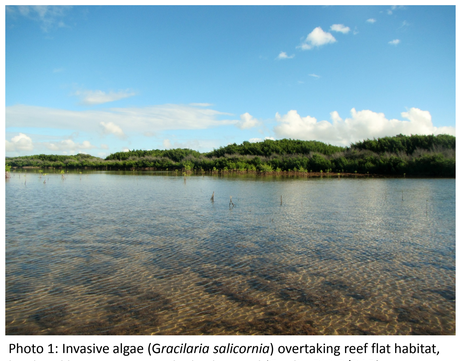

Photo 1: Invasive algae (*Gracilaria salicornia*) overtaking reef flat habitat, bordered by mangroves in the background (Credit: DLNR/DAR).

Results

- Over 2,800 acres were surveyed along 30-miles of shoreline
- Over 40 local volunteers were trained on invasive algae identification and GPS mapping techniques.
- Two and half weeks of surveys were performed at low tide
- All three invasive algae tended to be found in high concentrations in similar areas

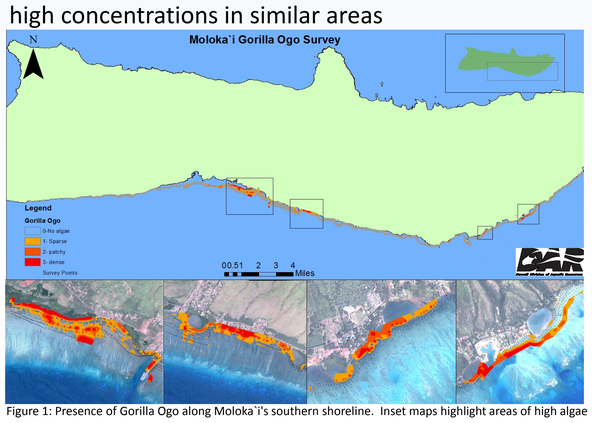

Figure 1: Presence of Gorilla Ogo along Moloka`i's southern shoreline. Inset maps highlight areas of high algae coverage.

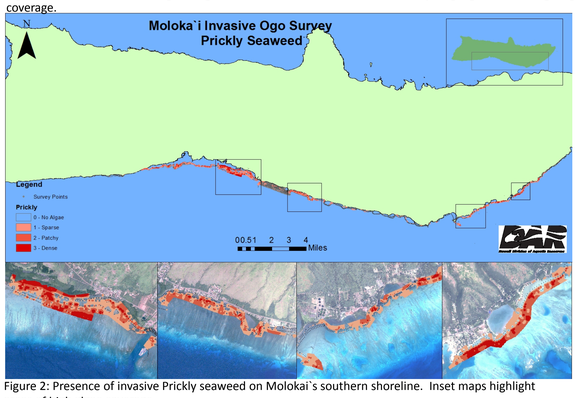

Figure 2: Presence of invasive Prickly seaweed on Molokai`s southern shoreline. Inset maps highlight areas of high algae coverage.

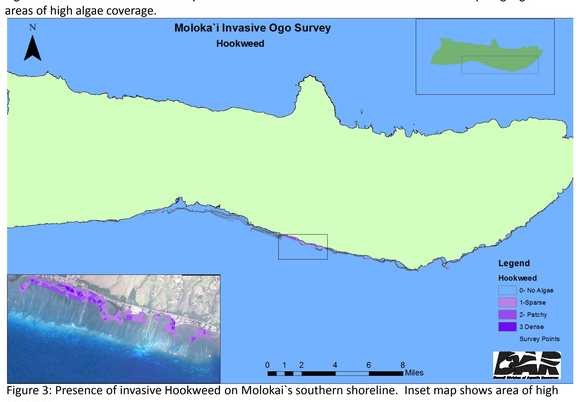

Figure 3: Presence of invasive Hookweed on Molokai`s southern shoreline. Inset map shows area of high coverage.

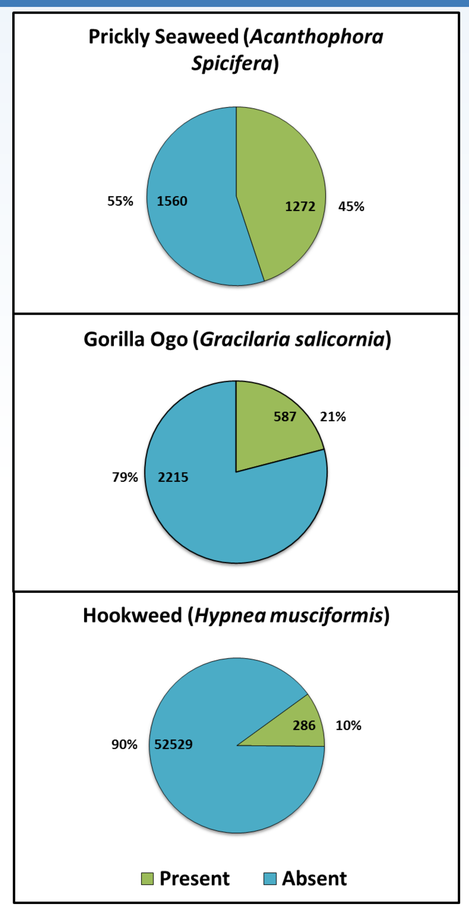

Figure 4: Invasive algae cover (acres and percent) surveyed along south Moloka`i shoreline.

- Prickly Seaweed (*A. specifera*) was the most prominent invasive algae (1272 acres) accounting for 45% of the survey area covered
- Gorilla Ogo occurred in 587 acres, 21% of the survey area.
- Finally Hookweed was found in 10% of the survey area, 286 acres

Photo 6: Left to Right: Surveyors discuss and get ready to head out into the water to map invasive algae, surveyors measuring out distance between teams, and a surveyor monitoring (Credit: DLNR/DAR).

Moving Forward

Photo 8: Community members learning how to conduct surveys in teams during low tide (Credit: DLNR/DAR).

The biggest positive outcome of this collaborative project was bringing
together a wide range of participants and establishing a new partnership to help implement invasive algae management in Moloka‘i.

The highest densities of invasive algae were found around fishponds and mangroves. Using the data from this project, a plan is underway to help prioritize removal of the densest sections of algae and begin restoration of reef flat habitats. Algae will be hand-removed and taken to composting sites. Native collector urchins, (*Tripneustes gratilla*) may be used as a bio-control, which has been successfully utilized on Oahu.

In addition to future algae surveys on the southern shoreline of Moloka‘i, fish and urchin surveys will be necessary to assess the herbivore community to further understanding of the spread of invasive algae.

Further Information

http://dlnr.hawaii.gov/ais/

Kendall.l.tejchma@Hawaii.gov

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Acknowledgments

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