

**National Fish and Wildlife Foundation
Final Programmatic Report**

Project Name/Number: Molokai Community-Based Invasive Species Control #2008-0061-001

Recipient Organization/Agency: Department of Land and Natural Resources, State of Hawaii,
Aquatic Invasive Species Team

Recipient Organization Web Address:

Date Submitted: June 3, 2011

1) Summary of Accomplishments

The Molokai Community-Based Invasive Species Control restoration project has brought awareness to the local community regarding invasive alien algae and should prevent the community from planting/spreading these species. The result of the community's awareness will lead to fewer intentional introductions, decrease spreading and prevent further ecosystem degradation. We conducted educational activities with many public and private agencies that have now incorporated alien algae education and removal events into their curriculum and/or work plans. Outreach activities inspired multiple youth groups to produce a Public Service Announcement regarding alien algae. Twenty nine tons of alien algae was removed from Molokai's near shore habitat as a result of five community-based clean up events. One hundred percent of the algae was processed and recycled/utilized as mulch fertilizer. Our community education and training supplied the community with the ability to continue on with the alien algae mitigation work after the projects completion. The AIS team presented an exhibit at Molokai's Earth Day, passed out outreach materials and shared project results to over a thousand members of the public. The AIS team collaborated, trained, and identified a local non-profit that is adopting the Manini (mechanical algae removal barge) and related restoration activities and will apply them to the historic and culturally significant fishponds on Molokai.

For the Kane'ohe Bay amendment, accomplishments include upgrades to the SuperSucker Junior to enable it to be utilized in the bay for invasive algae removal. A floating sea urchin nursery tank was built within the larger hatchery system. The native sea urchin culture and outplanting was used after algae removal by the SuperSucker. Finally, targeted outreach was conducted via the creation and printing of brochures and shirts.

2) Project Activities & Results

Activities	Project Outputs	Post-Project Outcomes	Indicator	Baseline Value	Predicted Value of Project Output	Predicted Value of Post-Project Outcome
Aide CTAHR in preparation of site for the processing of alien algae *	Processing location for and utilization of alien algae	No reintroduction of removed alien algae fragments*	Pounds of algae processed	none	400 pounds of alien algae	over 400 pounds
Hold educational workshops*	Initiate awareness and interest	Increase community and government organization collaboration efforts *	# people at educational workshops	0	25	over 25
	Initiate awareness and interest	Prevent the further spread of alien algae	# intentional introductions of alien algae (after workshops)	none	NA	NA
	Acquire volunteers for cleanup training events *	Community participation and support/stewardship*	# volunteers signing up cleanup events	none	25	<25
Hold community clean-up events*	Increase community awareness and interest	Practical training in alien algae removal for the community				
	Decrease alien algae populations *	Maintain low alien algae percent cover & improve habitat for native species	# of participants at cleanup events	0	25	over 25
Monitor alien algal populations at locations selected for removal events*	Habitat data pre and post removal events*	Maintain low alien algae percent cover & improve habitat for native species	Percent coverage of alien algae at removal sites pre- and post-removal	0	Decreased percent coverage of alien algae	Decreased percent coverage of alien algae
Seek organization interested in adopting this management tool for future implementation *	Identify key organizations interested in collaborating efforts *	Community participation and support/stewardship* Maintain low alien algae percent cover & improve habitat for native species	areas "adopted" by a group for longer-term maintenance of alien algae (implementation of this management tool)	none	4	<4

Activities and Results:

Activity 1: Site preparation for the processing of alien algae

Molokai held their first sustainability conference in the summer of 2009. After being present at the preconference ceremonies the AIS team realized that it was the perfect time for the AIS team to introduce the Molokai Community-Based Invasive Species Control restoration project. The theme of the conference was designed to bring the Molokai community together to learn about ways to create a more self-sufficient and sustainable future for the Island. The sustainability conference and the Molokai project shared the objective of enabling the community to conserve their resources. Both were done in hopes that the community may sustain, restore and preserve their resources, culture and simply their way of island life.

While the Molokai project emphasis was marine habitat restoration, the AIS team designed the project to benefit the terrestrial environment concurrently. Preliminary experiments have been conducted around the world and in Hawaii regarding the mulch/ fertilizer potential of algae species. It was our goal to not only to remove detrimental alien algae from near shore habitats and culturally significant fishponds, but to recycle and utilize this biomass on land where it could have a beneficial effect.

One of our project activities was to aide the College of Tropical Agriculture and Human Resources (CTAHR) Molokai extension office in preparing the site for alien algae to be dropped off, processed, and experimented with. The AIS team provided 12,000 pounds of alien algae to the extension office/farm to be processed and distributed to local farmers. The AIS team identified multiple facilities and groups interested in the processing and the utilization of the removed algae. CTAHR along with Hawaiian Learning Center, Ka Honua Momona Int, and several local organic farmers accepted, processed and utilized one hundred percent of the alien algae that was removed during these community clean up events.

Result:

In addition to CTAHR, the AIS team identified multiple locations and methods for processing and recycling the alien algae as mulch fertilizer. Five alien algae community clean-up events were responsible for removing approximately 29 tons of alien algae and significantly reduced the alien algae biomass within the removal areas. The team exceeded our goal of removed alien algae by 145 percent by removing roughly 58,000 pounds. Removed invasive species included *Gracilaria salicornia*, *Acanthophora spicifera*, *Rhizophora mangle* propagules. Approximately eighty percent of removed biomass was *G. salicornia*, the main targeted species.

Removal Sites & removed algae totals: Keawanui Fishpond (10,000 pounds), Kaunakakai Harbor (17 tons), Kaloko eli Fishpond (8,820 pounds), Ualapue Fishpond (7,500 pounds). Total: approximately 29 tons of alien algae removed.

Activity 2 & 3: Held Educational Outreach & Alien Algae Removals

Educational Outreach and Workshops held at: Keawanui Fishpond, Kaunakakai Harbor, Kalokoeli Fishpond, Ualapue Fishpond (locations along southern Molokai).

The main focus of the Molokai Community-Based Invasive Species Control Project was to educate the community about the ecological harm that invasive alien algae could have on their resources and teach, train and leave the community with the tools to combat and control these invading algae populations. Community based alien algae cleanup events were organized to incorporate community, public and private organizations/groups to collaborate efforts and help mitigate alien algae. There were a total of five alien algae community cleanup events conducted during this restoration project. Four locations along southern Molokai were chosen to conduct these alien algae removal events. Removal locations include Keawanui Fishpond, Kalokoeli Fishpond, Ualapue Fishpond (a national historic landmark) and Kaunakakai Harbor. Events were approximately a week in duration at each location.

This project has helped enable the community to preserve their resource, culture and way of life. The AIS team accomplished this goal by developing a series of educational programs and workshops on how to prevent the further spread of invasive alien algae and how to minimize already established populations along southern Molokai. Educational outreach material was developed and distributed to the community. Outreach materials included an alien algae handout, project t-shirt, and a project poster board that was presented to the community at Molokai's 2010 Earth Day calibration event. Education and participation in these workshops and cleanup events increased the community's involvement which will help prevent the further spread of invasive alien algae and help minimize established populations.

Educational Outreach Material

Project brochures were designed and distributed to the local community. The project handout introduces the Molokai Community-Based Invasive Species Control project to the community and explains why there is a need for alien algae mitigation. Many images are used within the document to depict the effects alien algae have on marine ecosystems. Pictures and descriptions of the alien algae species found on Molokai are featured in this handout. This brochure provides the community with preventative measures on how to avoid the spread of invasive alien algae and other invasive species.

The AIS team designed alien algae community clean up event posters and advertised events in the local newspaper. Removal event flyers were posted around the community inviting the general public to volunteer their services and join in on the restoration efforts at the selected sites for alien algae removal events. The team also had many articles in the local news paper (The Molokai Dispatch) advertising upcoming community clean up events, workshops, and removal event results (removed algae totals) from prior events.

Previous Alien algae removal events within the state of Hawaii have passed out alien algae t-shirts to volunteers for community clean up events. Project shirts brought about a lot of awareness and attention to the issue of alien algae. Realizing the success and advertising abilities of the shirts, the AIS team designed and printed Molokai project t-shirts. These "Malama

(translate: to take care of) Molokai” t-shirts were worn by the AIS team and project volunteers as well as distributed to community members, students and teachers that came out to the community cleanup events, workshops, and Earth day exhibit. The alien algae t-shirts are walking poster boards/advertisements for the restoration project which increased public awareness regarding these detrimental species.

The “Malama Molokai” project t-shirt was designed to have a Hawaiian saying on the back. The Olelo Noeau (Hawaiian saying) chosen for the design; ‘A ‘ohe hana nui ke alu ‘ia translates to “No task is too big when done together by all”. Seeing the youth work alongside elders removing invasive species within a fishpond assured the AIS team that we had chosen the perfect saying for the project outreach material.

Earth Day Event Exhibitor (outreach activities)

The AIS team presented an exhibit at Molokai’s 2010 Earth Day event, passed out educational outreach material and shared project results to over a thousand members of the general public. Outreach material included the “Malama Molokai” project t-shirts and alien algae brochures. The AIS team presented a poster board highlighting project accomplishments, removal locations, amounts of alien algae removed and who participated/collaborated in the efforts. The poster board also included information and steps that members of the general public can do to stop the spread of alien algae. Additional information was included regarding several invasive species that are affecting Molokai’s marine resource (Mangroves and alien Jellyfish). The team also presented project results and revealed the new home of the Manini (mechanical herbivore).

The Earth Day festivities included an environmental Public Service Announcement (PSA) contest. The AIS teams educational workshops and *Gracilaria salicornia* (commonly referred to as Gorilla Ogo) removal activities inspired multiple classes at Kilohana Elementary School to create a PSA regarding Gorilla Ogo (*G. salicornia*) which was submitted into the contest. One of Kilohana Elementary School’s Gorilla Ogo PSA’s won third place in the contest. Link to newspaper article: <http://themolokaidispatch.com/earth-day-psa-winners>

The Hawaiian Learning Center (HCL) at Keawanui Fishpond: Alien Algae Education & Removal Event

Collaborating organization: Hawaiian Learning Center (HLC)
July13-17 2009

The first alien algae removal event was conducted in July, 2009 at Keawanui Fishpond with assistance from the Hawaiian Learning Center employees and volunteers. The team held an alien algae educational workshop at the Hawaiian Learning Center training employees and volunteers how to identify alien algae species and mechanically remove alien algae via the Manini. The team also experimented with different manual removal techniques at the pond. Staff of the Hawaiian Learning Center introduced the AIS team to a historical/traditional practice used by the Hawaiians to remove algae from there ponds long ago. The AIS team experimented with this practice. This method can be compared to racking leaves, but in this case algae. The AIS team removed ten thousand pounds of the alien algae species *Acanthophora spicifera*, commonly referred to as prickly seaweed, from the pond in one week of removal activities. After the AIS

teams interaction with the HLC they have incorporated alien algae education and restoration activities into their cultural stewardship program.

Kalokoeli Fishpond: Alien Algae Education & Removal Event

Collaborating organization: Ka Honua Momona Int (KHM).

February 16-19, 2010.

A local nonprofit organization based out of Molokai, Ka Honua Momona Int., provided a gathering place (One Ali Fishpond) for groups interested in invasive species education and volunteering for February's alien algae removal event at Kalokoeli Fishpond. To start off the week's education and restoration activities, the AIS team held an alien algae presentation and introduction to the Manini at One Ali Fishpond. The audience consisted of members/staff from KHM, O Hina I Ka Malama a Hawaiian Immersion High School class (22 students), Kualapuu Kindergarten class (18 students), interns from Ululani Organic Farms (7 individuals), the University of Hawaii's Keahola (STEM) Program which promotes Science, Technology, Engineering & Math Education and community volunteers. All groups received outreach material which included Malama Molokai project T-shirts and brochures.

The Hawaiian High School immersion classes, Ululani Organic farm interns, volunteers from the Molokai Invasive Species Committee (MoMISC) along with community volunteers were responsible for removing over four thousand pounds of alien algae biomass from within Kalokoeli Fishpond. The students from the college STEM program were inspired by alien algae removal efforts at the fishpond so they volunteered a few hours and manually removed hundreds of pounds of alien algae from the pond. The kindergarten class was given an alien algae presentation, an introduction to the Manini and hands on introduction with alien algae.

The alien algae education and removal events conducted at Kalokoeli Fishpond were successful outreach events. The muddy conditions at the pond did not hamper the positive hardworking efforts of the volunteering groups. The combined total from the week long removal efforts at Kalokoeli Fishpond resulted in removing over 8,820 pounds of alien algae and invasive mangrove propagules from within the removal area.

Kaunakakai Harbor: Alien Algae Education & Removal Event

Collaborating organizations: Ka Honua Momona Int., Maui Division of Aquatic Resources (DAR) Coral Reef Monitoring Team

Two events: August 24-28, 2009 & January 4-8 2010.

Two separate community-based invasive alien algae outreach and removal events took place at Kaunakakai Harbor, both events were a week in duration. The first event was held in August 2009 and the second event took place four months later in January 2010. The harbor was a perfect location to conduct public outreach activities, because it is a heavily utilized recreational area by the general public. The AIS team spoke with local residents about the negative ecological impacts that invasive species such as Gorilla Ogo and mangroves have on near shore habitats including their culturally significant fishponds. Outreach materials were distributed to interested community members. After the AIS team educated the public about alien algae, many

community members shared useful knowledge of the history of alien algae on Molokai. The combined total of removed alien algae from both harbor events resulted in removing approximately seventeen tons of alien algae from within the removal area at the harbor.

The AIS team received assistance from Maui's Division of Aquatic Resources (DAR) Coral Reef Monitoring Team and Ka Honua Momona's staff, and volunteers for the week long alien algae removal event held at Kaunakakai Harbor in August. The AIS team conducted educational conversations with hundreds of curious community members. A handful of the community members volunteered their services at the removal event. The team passed out approximately three hundred Malama Molokai project t-shirts to community members that came down to the harbor to learn about invasive alien algae or lend a helping hand in efforts. A total of fourteen thousand pounds of alien algae was removed during this week long event at Kaunakakai Harbor. The removed alien algae was transported to CTAHR and a local organic farmer (Joe Kennedy) that processed and utilized one hundred percent of the removed algae biomass.

The team returned to Molokai four months after the first removal was conducted at Kaunakakai Harbor. An alarming amount of alien algae biomass and mangrove propagules were observed washed up on the beach. There was visibly more biomass in January than there was in August. The AIS team decided to conduct an additional removal event at this location. Unfavorable weather and tidal conditions did not allow the use of the Manini. Strong Kona (southwest) winds caused murky, zero visibility, blown out conditions which may have explained the large amount of alien algae beach drift that accumulated on shore. Extreme low tidal conditions combined with poor environmental conditions restricted the AIS team to manual removal as the sole removal method utilized during the event. The Manini was parked by the removal area and used as an educational tool during outreach activities. In one week of effort the AIS team, KHM and community volunteers manually removed over ten tons of alien algae and a minimal of one thousand invasive *Rhizophora mangle* (Red mangrove) propagules from within the harbor area. A quarter of the propagules had already established into the substratum.

Ualapue Fishpond: Alien Algae Education & Removal Event
Collaborating organizations: KIRC, KHM Int., Kilohana Elementary
March 22-25, 2010

The AIS team conducted invasive species education and removal activities with an entire Elementary School grades k-6. Students attended Kilohana Elementary School, east Molokai (120 students). A team consisting of three representatives from the Kahoolawe Island Reserve Commission (KIRC), Ocean Crew volunteered their services and expertise for four days of education and alien algae removal activities at the pond with Kilohana Elementary School. Field trips included students walking five minutes to Ualapue Fishpond where the AIS team held educational workshops and removal activities. Kilohana Elementary School students removed approximately 7,500 pounds of invasive alien algae species *G. salicornia* and *A. spicifera* and broke thousands of mangrove propagules during their alien algae removal week at Ualapue Fishpond. The majority of the removed alien algae was delivered to a eastside farm where it was to be used as mulch and tilled into the soil. The rest was dropped off at KHM's alien algae

processing location. Students from Kilohana Elementary School will be experimenting with the mulch fertilizer capabilities of the alien algae for a summer school project.

Field trips also included an Aquatic Invasive Species (AIS) presentation, Manini demonstration, an opportunity to manually remove alien algae via scoop nets and snapped/broke mangrove propagules. Snapping mangrove propagules will assure that the propagule will die and not take root. The practice of propagule snapping is a fun and helpful exercise that the students can do to help ensure that these mangroves do not invade the entire fishpond and crumble their fishpond walls. All students had an introductory lesson to invasive species and then interacted with species that they learned about. The team provided both native and invasive algae species to be compared and contrasted. Kilohana students sorted through the by-catch from collected alien algae and returned creatures back into the fishpond. Creatures were used as a native and invasive species identification lesson. By-catch included juvenile native and invasive fish species, various crabs, sponges, tunicates and sea stars.

Result:

The AIS team achieved the main goal of educating the community about invasive alien algae by developing a series of educational programs and workshops on how to prevent the further spread of invasive alien algae and how to minimize already established populations along southern Molokai. The community was educated about the ecological harm that these invasive species could have on their resources. The team also trained the community in current methods on how to combat and control these invading algae populations in order to help them to preserve their resources, culture and way of life. The team greatly exceeded our expectations on the amount of people we educated and the amount of community participation we had at the clean up events. Most groups we educated about alien algae ended up volunteering for a community alien algae cleanup events. The AIS team is confident that Molokai's community is aware of the ecological damage that alien algae can have on their resources without intervention. This education will prevent community members from planting/spreading these invasive alien algae species which will lead to fewer intentional introductions.

This project's mitigation plan will temporarily decrease alien algae biomass in selected removal areas. Our community outreach (education and training) will supply the community with the ability to continue on with the alien algae mitigation work after the projects completion. Community groups are fluent in mechanical and manual methodologies that will reduce the alien algae biomass affecting their cultural significant fishponds and coral reef ecosystems. After being presented with alien algae education and removal activities, many community, public and private organizations have incorporated some kind of alien algae education and/or mitigation practices into their fishpond outreach activities. Ka Honua Momona has adopted the Manini and will use it regularly in their fishpond education and restoration activities within the two fishponds they care-take along southern Molokai.

The community has already started to apply "removed" alien algae biomass to their crops and experimental gardens as mulch fertilizer. Many organic farmers plan on gathering washed up alien algae along the shore and taking it home for farming applications. The local community is sold on the idea of removing this harmful algae species from their reef and then utilizing it in a beneficial manner on land.

Most importantly this project has encouraged community stewardship. Education and participation in these workshops and cleanup events increased the community's involvement that will help prevent the further spread of invasive alien algae and help minimize established populations. This project has enabled the community to preserve their near shore resources by providing them with the education, tools, and experience to take matters into their own hands and work together. 'A 'ohe hana nui ke alu 'ia translates to "No task is too big when done together by all".

Activity 4: Monitor alien algae populations at removal locations & project discrepancies

Due to financial difficulties in the State of Hawaii, The Department of Land and Natural Resources placed a restriction on all state travel during the second phase of the project. All travel plans to Molokai had to be canceled. The AIS team tried to negotiate an exception for the travel to Molokai due to the fact that travel expenses were provided by federal funds (NFWF) not State in this circumstance. The AIS team was overwhelmed with support from the local community on Molokai regarding the restoration projects return. A representative of both the local community and scientific community on Molokai wrote a letter of support to local government representatives supporting and encouraging the continuation of the project. In order to avoid these restrictions and ensure the future of the grant the AIS team contracted the money through the University of Hawaii. After the money was contracted through the UH, the AIS team were able to continue travel to Molokai and fulfill the project/grant.

The States travel restrictions resulted in the AIS team losing valuable time. Trips had to be cut down from two weeks to one week durations and prevented the AIS team from conducting the anticipated monitoring scheme designed specifically for the project. The baseline survey for percent coverage of invasive algal species within the first location selected for removal was conducted pre removal. The AIS team was not able to return to Molokai for four months post removal efforts. Literature suggests that the first few months after the removal events are the most critical months to document alien algae re-growth. The team conducted a visual post survey that reconfirmed the literature results.

After returning from our four month delay the AIS team visually observed that the invasive algae's biomass had re-grown to original levels. The AIS team was unable to document the alien algae's re-growth rate, but we obtained important information on the species swift recovery time. This information provided the team with enough information to make assumptions about the species speedy re-growth. The AIS team was still able to make an educated guess on how often removal event should take place in order to keep alien algae population at a minimal level. Visual observations lead the team to suggest conducting alien algae removals every three to four months dependent on the environmental conditions and potentially the time of year. Our project results suggests that removal events temporarily decreased alien algae biomass within the selected removal area and that it will take continual removal efforts to control this species.

Result:

Travel constraints restricted the team from conducting the anticipated monitoring scheme although the team was able to provide information on the effectiveness of mechanical and manually removing alien algae. The team reduced alien algae biomass within the sites selected for the removal events. The AIS team also determined how often removal events must take

place in order to maintain a controllable alien algae population. This was our teams anticipated outcome. The series of removal events has allowed the team to make educational recommendations on how future removal events should be efficiently conducted. Thus far, recommendations include a combination of manual and mechanical removal methodologies, frequent maintenance/removal events (every few months), a favorable low tide, and the efforts of the community as a whole.

Activity 5: Manini (alien algae management tool) adoption and implementation

The AIS Team has selected Ka Honua Momona Int. (KHM) a local nonprofit organization on Molokai to adopt and implement the Manini. We have worked closely with KHM throughout the duration of the project. The AIS team has conducted alien algae removal events, workshops, training events, and held meetings as well as stored the Manini and related supplies at KHM's facility. One of KHM's board members was selected to serve as the projects Molokai technician position. This individual is now trained and experienced in alien algae identification, Manini operations, manual removal techniques, and alien algae processing.

Along with our organizations collaborations, the AIS team feels that KHM's non profit organization strives to achieve similar objectives. The mission of KHM is to model and educate sustainability mauka to makai (translation: mountain to the sea). They accomplish there mission by perpetuating traditional knowledge and stewardship and implementing modern science and technology. This organization has already implemented our alien algae education and removal activities into there restoration practices and educational events within two culturally significant fishponds they care take along southern Molokai.

Result:

This project has provided the community with a tool and protocol (recovery plan) to manage invasive alien algae within near shore marine habitats along southern Molokai. The AIS team has also identified an organization eager to implement long-term stewardship of this restoration project. Ka Honua Momona has already included alien algae education and removal activities to there work plans, curriculum and educational fieldtrips. KHM is willing to loan out the Manini to interested community members, groups or organizations interested and willing to apply/use the Manini to remove and control alien algae species from within near shore habitats and most importantly their culturally significant fishponds along southern Molokai. KHM will continue on with the coral reef restoration process that the AIS team initiated. They have the education, tools (Manini), training and ability to do so.

Additional Products:

Invasive Jellyfish Removal (*Cassiopea sp*)

In effort to gain project and community support the AIS team collaborated with The Molokai Invasive Species Committee MoMISC and the States Harbors Divisions Harbor Master and conducted an invasive jellyfish removal project. Several collaborated removal efforts resulted in removing over three hundred and fifty non-native jellyfish (*Cassiopea sp.*) from within the Kaunakakai Harbor area, near one of the selected sites for an alien algae removal

event. This removal project was deemed necessary to remove these stinging jellies from this site due to the public safety concern when we hold our community clean-up events at this location. Removal events reduced the risk of members of the general public being stung by these jellyfish during our community clean up events. No stings were documented during our community clean up events, the AIS team would like to contribute this to our jellyfish removal activities in the harbor area.

***Gracilaria salicornia* Distributional Survey: April 2010**

While conducting outreach activities with the community the AIS team obtained information regarding a potential undocumented population of *G. salicornia* along the southern coastline. Due to speculation of a population the AIS team conducted a *G. salicornia* distributional survey in April 2010. The AIS team surveyed and documented a population of *G. salicornia* at a south western location (location name Palaau). The AIS team has identified this to be the most western boundary population of *G. salicornia*. During the algal survey the AIS team also identified a new invasive jellyfish (*Cassiopea spp.*) population at a local shrimp farms drainage canal. The AIS team made a recommendation to eradicate the jelly population. Population exceeded a thousand individuals

Floating Nursery System for native sea urchins: 2011

While alien algae can be effectively removed by hand, sustained reduction requires either repeated manual effort or natural control by native grazers. Since native grazers are depleted in much of the state including Kane’ohe Bay, a project is underway to culture and out-plant native sea urchins to facilitate control of invasive algae on the patch reefs of the bay. The DAR hatchery used the funds from this project to build two sizes of floating nursery tanks for juvenile urchins. Prior to the use of these tanks, it was difficult to clean the waste from the urchin tanks, which resulted in increased biological oxygen demand on the system. The new floating tanks are smaller containers that can be utilized in any of the hatchery system tanks, and have screens that allow waste to fall out for cleaning. The new floating nursery tanks have significantly increased the survival of juvenile urchins.

Upgrades to SuperSucker Junior: 2011

Algae removal in Kane’ohe Bay relies almost exclusively on the SuperSucker Senior barge. This project provided funds to enhance the SuperSucker Junior with additional safety equipment and floatation, which will allow it to be employed in the bay. With both barges working together, there will be a considerable increase in the amount of invasive algae that can be removed per day.

Kane’ohe Bay Invasive Algae Outreach: 2011

Alien algae has been spread in Hawaii primarily through human-mediated transport. To combat this and to raise awareness of the threat that invasive algae poses to coral reefs, a brochure was created and printed for distribution to local dive shops.

Alien algae in Kane’ohe Bay is an issue with a multitude of contributing factors, including overfishing, land-based nutrients and sedimentation, and lack of community awareness. There are several state, federal, NGO, and community groups that are working individually on projects that each will hopefully increase the ecosystem health of the bay. To tie together all of these

partners, an overarching logo “Kokua Kane’ohe Bay” was created and printed onto sun-protection shirts for distribution to the key partners working on land/sea restoration in the area.

3) Lessons Learned

The Molokai community was very receptive and appreciative to the project and our goals. Similar projects can be successfully implemented in culturally sensitive communities. Integration into the community was the most critical part of this project. Education and outreach became the number one priority of the project. Monitoring must be conducted on a monthly basis within the first four months being a priority. The community accepted alien algae education, removal methodologies, training, and tools (Manini) with open arms. The Molokai community would have been less likely to spread this detrimental species knowing what they know now after our interaction. After this project’s completion the Molokai community would not allow an intentional introduction of this alien algae species. Outreach activities with the school children seem to be a very effective way to distribute information about alien algae.

4) Dissemination

Highlights of Project in the Media (Newspaper articles)

Scott, Susan. (2011, February 14) Sea Urchins the Perfect Janitors to Keep Kaneohe Coral Clean, *Star Advertiser*.

Shikina, Rob. (2011, January 30). Sea Urchins Bread to Clean Up Reef, *Star Advertiser*.

Fujimori, Leila. (2010, August 30). Sea Urchins Tested as Algae Removers, *Star Advertiser*.

Cluett, Catherine. (2010, April 30). Earth day PSA Winners. *Molokai Dispatch*.

Walsh, Cecile. (2010, February 10). The Gorilla Ogo Removal Team Is Back! *Molokai Dispatch*.

Murphy, Dan. (2009, September 3). Removing the Beast. *Molokai Dispatch*.

Walsh, Cecile. (2009, August 20). Alien Algae Invasion: Battling Gorilla Ogo; Molokai Community –Based Invasive Species Control Project. *Molokai Dispatch*.

Kelsey, Melissa. (2009, July 23). Stinging Intruders. *Molokai Dispatch*.

Presentations

Walsh, Cecile (Presenter) Removing Invasive Alien Algae on Molokai:
A Community-Based Approach
2009 Hawaii Conservation Conference

Hawaii in a Changing Climate: Ecological, Cultural, Economic, and Policy Challenges and Solutions. Hawaii Convention Center, Honolulu, HI. July 28-30

Walsh, Cecile (Presenter) Invasive Alien Algae in the Main Hawaiian Islands. Hilo Bay Watershed Advisory Group. Mokuapapa Discovery Center, Hilo, HI. Thursday, July 9, 2009

This presentation reviewed current issues regarding invasive alien algae species in various areas around the main Hawaiian Islands with an emphasis on the Molokai Community-Based Invasive Species Control project.

Exhibitor/Outreach

DLNR Division of Aquatic Resources, Aquatic Invasive Species Team. *Molokai Invasive Species Control Project*. Molokai Earth Day Event. Mitchell Pauole Center, Kaunakakai, HI. April 16, 2010.

Stop Invasive Algae Brochures, printed and distributed to area dive and boating shops (2011)

5) Project Documents

Stop Invasive Algae Brochure (attached as a pdf)

Help Protect Hawaii

When Snorkeling...

- *Inspect all dive gear for seaweed fragments and discard them before you leave a site.
- *Dry your gear between uses.

When Fishing...

- *Inspect fishing gear after each use and discard seaweed fragments.

When Boating...

- *Inspect anchors, mooring lines, propellers, and bilge for seaweed.
- *Keep your hull clean.

Report Invasive Species Outbreaks...

- *Call Reef Check hotline at (808)953-4044 or report online at reefcheckhawaii.org.

*Learn more at:

http://hawaii.gov/dlnr/dar/coral/coral_las_ais.html

Invasive Species Management

Specially designed barges work in Kaneohe Bay to remove smothering seaweed and Gorilla ogo. Using suction pumps, divers vacuum alien algae off reefs onto the 'SuperSucker' barge. Algae is bagged as compost & donated to local farmers.



On a healthy reef, herbivores eat seaweeds and maintain low levels of invasive algae. Beginning in 2009, native Hawaiian collector urchins (*Tripneustes gratilla*) have been hatchery raised and transplanted onto affected reefs to graze down invasive algae.



STOP

THE INVASION



Invasive seaweed kills coral and reduces fish habitat

The coral reefs of Hawaii are home to over 5,000 species of marine plants and animals! Hawaiian corals grow in clear, low-nutrient, shallow water with access to sunlight. A healthy coral reef depends on many herbivores (fish and invertebrates) to graze down algae and maintain ecosystem balance. Human impacts like runoff, pesticides, overfishing, and invasive species introduction disrupt this balance and allow blooms of algae to overgrow coral. The loss of our reefs and the animals that depend on them impacts the quality of our island lifestyle.

Learning how to recognise invasive species, how to report them, and how to reduce the risk of spreading alien species are steps everyone can take to protect Hawaii's coral reefs.

Hawaiian coral reefs need your Kokuai!



INVASIVE ALGAE OF HAWAII

Gracilaria salicornia 'Gorilla ogo'



Grows in dense branching mats forming clumps in shallow water
ID Feature: Constricted nodules at tips
Found around O'ahu, South Molokai & in Hilo Bay on Hawaii

OUTCOMPETES NATIVE ALGAE AND CORAL

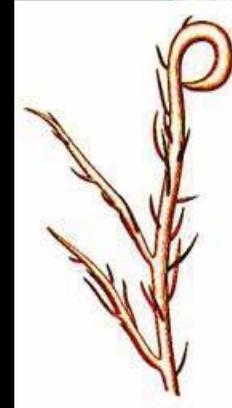
Avrainvilea amadelpha 'Leather mudweed'



Leathery clumps growing in mud and sand
ID Feature: Paddle-shaped 'leaves'
Found on Oahu's South shore and Kauai

COMPETES WITH NATIVE SEAGRASS, A PRIMARY DIET ITEM OF HAWAIIAN SEA TURTLES

Hypnea musciformis 'Hookweed'



Characteristic hooked branch tips tangle with other algae

ID Feature: Soft, wiry texture, red and purple color

Widespread throughout Main Hawaiian Islands

THOUSANDS OF \$\$ ARE SPENT PER YEAR REMOVING TONS OF SEAWEED FROM MAUI'S BEACHES

Kappaphycus spp. "Smothering Seaweed"



Grows in mounding mats, filling coral pukas, reducing habitat
ID Feature: Spikey branches, brittle plastic texture

Found **ONLY** on O'ahu windward coast

OVERGROWS CORALS AND KILLS BY SMOTHERING

Draft

