

U.S. Virgin Islands Lionfish Response Plan Update Forums and Planning Workshops Summary October 2013

Public forums and planning workshops were held on both St. Croix and St. Thomas over four days from October 22nd to 25th to gather stakeholder input and to guide the update of the 2009 territorial Lionfish Management Plan. This plan addresses the potential ecological and economic threat posed by invasive lionfish with specific strategies for removal, education and outreach, research and monitoring, marketing and communications. The plan was designed to establish agreed-upon goals and objectives, and to build a framework for meeting these objectives through coordination among organizations, agencies, businesses and individuals. Since the creation of the original response plan, the severity of the lionfish invasion has worsened, local circumstances have changed, and researchers, managers and citizen groups are more organized and knowledgeable about what is working and what is not. A survey questionnaire and a series of public forums and planning meetings provided an opportunity to review collective knowledge and recent research and to build upon the collaborative process to update and revise the original plan. The major findings and proposed goals, objectives and strategies are outlined below. Survey responses and public comments were used to identify current work and gaps for each objective and are also included in tables below.

MAJOR FINDINGS

- Localized and frequent removal by spearing or otherwise capturing lionfish seems to be effective at keeping lionfish numbers low at popular dive sites and near dive moorings.
- A handful of fishermen have started to successfully sell lionfish in local markets and to key interested restaurants
- Ciguatera testing reveals that although up to 40% of lionfish tested have been shown to harbor the neurotoxin, prevalence does not seem to be any worse than other reef fish known to be ciguatoxic, and no known case of poisoning from eating lionfish has yet occurred in the Caribbean. Promoting sale and consumption of lionfish by fishermen who already know hotspots of ciguatera in territorial waters increases the success of developing a safe and reliable market for lionfish.
- Overall patterns of occurrence of lionfish reveal the invasion may have reached its peak and even decreased on St. Croix's reefs with St. Thomas and St. John expected to soon follow.
- However, lionfish are still found in higher numbers at particular sites, at depth and following storm events. Further studies may reveal the cause of these patterns of recruitment, migration and/or habitat preferences.

PRIORITY STRATEGIES for the NEXT FIVE YEARS:

- Improve effectiveness of removal by coordinated spearfishing and trap fishing
- Explore other effective methods for control and marketing
- Facilitate use of recent research and monitoring to guide control and removal efforts
- Incentives for spear fishermen and recreational divers to kill lionfish are being explored, recognizing subsidies for SCUBA air fills, equipment or fuel is not sustainable in the long-run.
- Build a framework for communication and information-sharing among organizations, agencies, businesses and individuals
- Generate uniform messages to be used in education and outreach

*****All goals, objectives, and strategies outlined in this summary are still in DRAFT form and can still be revised*****

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Table 1. Lionfish response plan public forums and planning meetings.

LOCATION	MEETING TYPE	DATE	ATTENDANCE	AGENDA
St. Croix The Nature Conservancy's Estate Little Princess	Public forum	Tuesday October 22, 2013 4:00-7:00pm	37 CORE, CRABBS, dive operators, volunteers, researchers, media and representatives from Delegate Christiansen's office	<ul style="list-style-type: none"> • Dr. William Coles - Introduction • Jeanne Brown - Survey results • Dr. Bernard Castillo II - Presentation of ciguatera research • Public comments and questions
St. Croix The Nature Conservancy's Estate Little Princess	Planning workshop	Wednesday October 23, 2013 10:00am – 3:00pm	12 CORE, DPNR Div. of Fish and Wildlife, NOAA, NPS, TNC, recreational divers	<ul style="list-style-type: none"> • Goal of the lionfish control plan • Objectives of the updated plan • Priorities and strategies
St. Thomas Univ. of the Virgin Islands Conference Room 203	Public forum	Thursday October 24, 2013 4:00pm-7:00pm	22 CORE, DPNR Div. of Fish and Wildlife, DPNR CZM, The Nature Conservancy, University of the Virgin Islands, Dive operators, volunteers	<ul style="list-style-type: none"> • Dr. William Coles - Introduction • Jeanne Brown - Survey results • Nikita Thompson - Abundance and size distribution of lionfish in the VI • Dr. Rick Nemeth - UVI current research • Public Comments and Questions
St. Thomas DPNR Conference Room	Planning workshop	Friday October 25, 2012 10:00am-3:00pm	8	<ul style="list-style-type: none"> • Prioritizing strategies and integrating information from the public forums

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GOAL

TO PREVENT LIONFISH FROM NEGATIVELY IMPACTING LOCAL FISHERIES AND MARINE ECOSYSTEMS, AND ENDANGERING PUBLIC SAFETY.

OBJECTIVES

To reach this goal, strategies were identified for five areas of action:

1. *Control and removal of lionfish*
2. *Research and monitoring, data gathering and analysis*
3. *Marketing (commercial sale and dive tourism)*
4. *Education and outreach*
5. *Communication (internal/external)*

Control and Removal of Lionfish

Table 2. Control and removal of lionfish - objectives, strategies and priorities

Objective 1: CONTROL AND REMOVAL OF LIONFISH - Increase the amount of removal to suppress lionfish in certain areas by coordinating efforts and focus removal on sensitive/critical areas by applying the most safe and effective methods.	
Priority strategies for Objective 1	
Finalize permitting process for lionfish removals in protected areas STEER/STXEEMP	
Find certifying organization for lionfish removal course developed by CORE	
Additional strategies	
Removal teams	Dedicated response and removal team in partnership with CORE
	Explore possibility of leasing rotating fishing boats for control and removal
Location	Use current data and research to guide removal efforts and focus on ecologically significant areas
	Increase diver coverage, depth and area, through use of rebreathers or scooters etc.
Regulatory	Develop system to allow dock at Frederiksted pier
	Maintain existing moorings and install new moorings - U.S. Army Corps of Engineers permitting process
Incentives	Consider discounts for air fills or gas (such as CORE card membership discounts)
	Coordinate/support/sponsor dedicated lionfish derbies and incorporate lionfish into other derbies

USVI Lionfish Meeting Summary

Table 3. Control and removal of lionfish - Public comment and survey response summary

CONTROL	Gaps	Communications	Coordinated removal efforts	Need central website with removal information - use CORE website
				Removal frequency at popular sites - add filter by date on CORE website
		Funding	Equipment and gear	Discounts for spears, catch bags, boats, safety equipment, dive equipment, GPS
			Response team	Permanent, paid response and removal team
			Identify funding sources	Lease rotating fishing boats for removals
		Incentives	Tank fills, CORE member discounts	
			Pay fishermen expenses	They will donate their time
			Impact on native fish population	Educate fishermen and public on lionfish impacts
		Training	One recognized training course	John Rubattino - PADI course instructor, but not additional instructors allowed, go through another organization
				Dive shop liability
			Recreational divers	How to use spears, safely handle and dispose, safety and tech
		Regulations	Fishermen	How to handle lionfish; how to kill and dispose of quickly
			Permits	Required training
		Access	Feeding lionfish to sharks, eels	
			Moorings	Moorings allow access for removals - maintain existing and install new
	Dock at Frederiksted Pier		Allow docking at the Frederiksted Pier	
	Research and Monitoring	Deep water sites	Rebreather and deep dive training to reach deeper sites - Deep diver team has been established	
		Additional research to guide removal efforts	Nursery areas, movement, dispersal patterns etc.	
	What's working	Derbies	Trouble attracting participants	What incentives do participants want?
			Add lionfish to existing derbies	
Removal dives		Sites that are regularly maintained- fewer lionfish, smaller sizes		
		CORE's response hotline		
Trap fishing		Access and target deeper water		

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Research and Monitoring, Data Gathering and Analysis

Table 4. Research and monitoring, data gathering and analysis objectives, strategies and priorities

Objective 2: RESEARCH AND MONITORING, DATA GATHERING AND ANALYSIS -	
Improve our understanding of lionfish impacts, effectiveness of removal, and viability of commercial sale by regularly (bi-annually) examining the local and regional scientific (peer-reviewed) results with observational data and by concentrating the collection of removal and sighting data into one shared database.	
Priority Strategies Objective 2	
Ciguatera	Sustain high volume local ciguatoxin labs
	High resolution ciguatera distribution maps
	Identify funding sources – National Institutes of Health, Dept. of Agriculture, Dept. of Health, DPNR, UVI, Homeland Security
Invasion effects	Impacts on local fisheries and reef fish communities
Recolonization after removal	Sources and sinks
	Lionfish migration
	Effect of currents and hurricanes on movement
Additional Strategies	
Research to guide removal efforts	Which traps designs and bait are most effective
	Sources of lionfish recolonization after removal
	Document the benefits of moorings in lionfish removal efforts for the U.S. Army Corps of Engineers mooring maintenance and installation permitting process
	Additional studies on removal effectiveness, thresholds, removal frequency, and effort
Viability research	Feeding tarpon
	Farming of groupers, gobies and other important species
	Use as fertilizer
Coordination	Coordinate research and monitoring efforts though permits, reporting, increased communication or central website

Table 5. **Research and monitoring, data collection and analysis - Public comment and survey response summary**

RESEARCH & MONITORING	Important research questions	Ciguatera	Local levels and hotspot
			Are people being affected by ciguatera poisoning from consumption of lionfish?
		Distribution, abundance and movement	Habitat types, depths, food supply
			Highest densities of juvenile lionfish
			Egg movement, migration, sources and sinks
			Recolonization after removals
			Are they moving deeper when the water is warmer?
		Natural population controls	What are the population control in their native range?
			Are there natural predators here?
			Impacts of feeding lionfish to sharks, eels, etc.
		Growth and reproductive biology	Growth rates
			Reproductive biology
			Reproductive frequency
		Invasion Impacts	Which fisheries/invertebrates/resources are most affected?
	Lionfish stomach content analysis to determine target prey species		
	Removal effort and effectiveness	Trap types and bait - why are some traps catching more lionfish?	
		Focused removals in priority areas such as nurseries, spawning areas, high tourism sites etc.	
		Removal frequency - how often do lionfish need to be removed for different desired management outcomes?	
	Current research and monitoring	University of the Virgin Island	Rick Nemeth PhD - diet, distribution, abundance
			Tyler Smith PhD - Territorial Coral Reef Monitoring Program
			Bernard Castillo II PhD - CTX extraction lab, ciguatera toxicity research and testing
			Jennilee Beth Robinson PhD - susceptibility to marine parasites and immune response to parasite infestation
			Nikita Thompson, graduate student - abundance and size distribution
		Territorial	VI DPNR Div. Fish and Wildlife - William Coles PhD - tracks lionfish sighting reports and mentors student projects
National Park Service - BUIS Ciguatera Toxicity and Predation Impact Thresholds of Lionfish		Ian Lundgren - NPS Biologist	
		Stephanie Green PhD - Oregon State University	
		Lad Aakins - REEF	
		Bernard Castillo III PhD and Kynoh Reale-Munroe - UVI	
Other Universities	Paul Sikkell - Arkansas State University - lionfish parasites in the VI		
CORE	Online mapping tool displays sighting and control locations		

Education and Outreach

Table 6. Education and outreach objectives, strategies and priorities

Objective 3: EDUCATION & OUTREACH - Every year, awareness and engagement of the VI community through education and participation has increased so that 1000 people on each island have participated in some kind of removal, sighting, and/or consumption activity.	
Priority Strategies Objective 3	
Form subcommittees to further develop messages and strategies for each target audience	
Further develop DPNR and CORE approved trainings	
Additional Strategies	
Messaging	Make cultural connection
	Shift from “Danger! Warning!” to “Save our reefs”
	Develop consumer brochure that defines lionfish as venomous, not poisonous
	Develop comparison videos, for example, Bahamas vs. USVI
Avenues to disseminate information	Through VINE
	Lionfish first aid training course
	Recreational diver training course - PADI or CORE training
Coordination	Framework for communication and cooperation of education and outreach efforts
	Identify and apply for cooperative, joint funding
Methods to measure success	Exit interviews at dive shops
	Survey public at Ag Fair and other events
Multi-faceted approach	What can people do at beaches?
	What can recreational divers do?
	What can deep fishers/traps do?

Table7. **Education and outreach** - Public comment and survey response summary

OUTREACH & EDUCATION	Gaps	Fishermen	Need additional meetings to involve fishermen?
			Outreach - creating a market for lionfish
			Impacts of lionfish on local fisheries
		Hospitals	How to treat lionfish stings
		Legislators	What senators are interested in these issues?
		Public	Courses on how to fillet, clean and cook
			Encourage use of markers - way to involve public and reach audiences that don't dive or fish
			Ecological impact of lionfish invasion
			Make cultural connection - parrotfish (potfish)
		Schools	CORE does school lessons upon request
	Use Vine		
	Restaurants	Promote and educate	
		Trainings on safe handling and preparation	
	Divers	Pre-dive briefings	
	What is working	Radio and TV PSA	Discussions on the radio
		Outreach activities	Lionfish dissections
			Public presentations such as Rotary
			Dive shops educate and train customers
		Events	Derbies and tournaments
		Posters	CORE, DPNR and TNC all have posters
School activities		Visiting classrooms and giving presentations	
		Summer camps and mini-mester programs	
Fliers and brochures		CORE distributes fliers and brochures	
Legislation		Work with Senator Cole, Senator Jackson and Senator Malone on lionfish bill	

Marketing

Table 8. Marketing objectives, strategies and priorities

Objective 4: MARKETING - Increase the demand for lionfish products, such as food fish for homes and restaurants and jewelry or agricultural products so that 20 new fishermen have begun to sell lionfish each year.	
Priority Strategies Objective 4	
Commercial fishing license exemption for lionfish	Approach FAC with institutional license exemption for invasive species
	Draft 1 page statement with ideas, options, transparencies, number of fish/month
	DPNR and CORE draft letter
	Annual review/evaluation of exemption effectiveness
	Use funding from licenses to sponsors and events tastings
	Collect letters of support from dive operations, including their costs
	Coordinate with sustainable seafood program (Kemit and Lia)
If no action on commercial fishing license lionfish exemption within 3 months, explore co-op or fishermen partnerships	
Coordinate with the sustainable seafood "reef responsible" program to promote fishermen that are removing and selling lionfish	
Additional Strategies	
Explore viability	Promote lionfish consumption at restaurants
	Developing a local market
	Promoting lionfish among cruise ships tourists
Organize tastings, promotional events, and trainings at fish markets, Ag Fair, Carnival etc.	

Table 9. **Marketing** - Public comment and survey response summary

MARKETING	Gaps	Consumption	Incentives	Incentives for fishermen to start selling lionfish with hope that it will then become self-supporting	
			Allow recreational divers to sell lionfish	Commercial fishing license exemption for lionfish - submit to FAC - institutional license	
				Partner with commercial fishermen or create a co-op (recreational divers aren't as familiar with ciguatera hotspots, so ciguatera distribution map needs to be developed)	
			Encourage restaurants to sell lionfish	Education and training on handling and prep Education on ciguatera	
		Other commercial uses	Viability of other commercial uses	Organic fertilizer, feed for aquaculture, jewelry	
		Dive tourism	Dive operators	Marketing and liability considerations	
		Outreach and training	Outreach opportunities	Ag fair, Taste of St. Croix, utilize Sustainable Seafood project, fish markets Social media, outreach to local schools	
				Training	How to handle and prepare lionfish
		Ciguatera concerns	Strong public association between lionfish and ciguatera	Need public outreach and education with unified message Additional research into hotspots	
			Ciguatera high capacity lab for testing	Bernard Castillo II has lab at UVI on STX	
		What's working	Consumption	Availability in local markets	Some fishermen have had success selling lionfish
				Serving lionfish at restaurants	Several local restaurants sell lionfish appetizers and entrees
	Dive tourism		Dive operators	Market for divers to come down and hunt lionfish	
	Derbies or hunts		Lionfish derbies or inclusion in other derbies	Dive equipment as prizes, boat repair and maintenance	

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Communications – internal/external

Table 10. Communications (internal/external) objectives, strategies and priorities

Objective 5a: COMMUNICATIONS- INTERNAL - Improve communications and sharing of observations so that the active lionfish committee is making progress on strategies outlined in this management plan and getting the message to partners, media and legislators.	
Objective 5b: COMMUNICATIONS - EXTERNAL - Improve communications with neighboring islands by sharing new knowledge and observations from USVI by communicating regularly on regional list serves (GCFI/CAMPAM, UNEP/SPAW’s lionfish email list).	
Priority Strategies Objective 5	
Form subcommittee to further develop strategies	
Coordinate with Virgin Islands Marine Advisory Service (VIMAS)	
Additional Strategies - Internal	
Planning group	Quarterly planning and coordination calls or web-ex
	Submit accomplishments before the meeting for participants to review
	Report what happened and what is planned next
Public	Bi-annual public meetings
	Quarterly newsletter
	Recognition for accomplishments through PSA or announcements
	Develop channels for disseminating ciguatera research
Additional Strategies - External	
Develop down island contacts and communications	
Utilize list serves, such as Gulf and Caribbean Fisheries Institute's CAMPAM	

Table 11. **Communication** - Public comment and survey response summary

COMMUNICATIONS - INTERNAL/EXTERNAL	Gaps	Role of each organization	Who takes the lead? How do we define roles? Who are we as a planning group?
		Communication between groups	How to disseminate information and share information? - Bi-annual or quarterly meetings
		Central site for research and information	Student projects, current research, monitoring & removals - CORE website

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