ROI with Relation to Large Artificial Reef Systems in Japan

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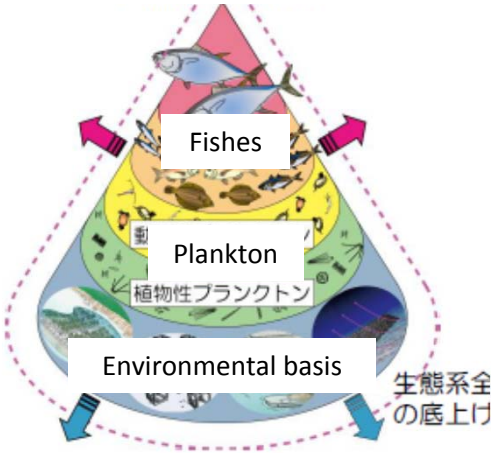
1. OKABE CO., LTD.
2. Water gremlin Company

Fishery environment improvement project in Japan

The project creates suitable living environment/ecosystem benefiting the life cycle of aquatic creatures

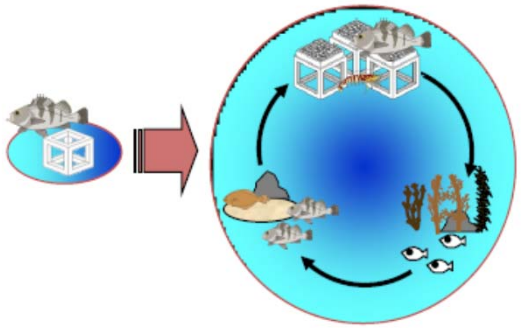
Thinking about environmental basis

Ecological pyramid

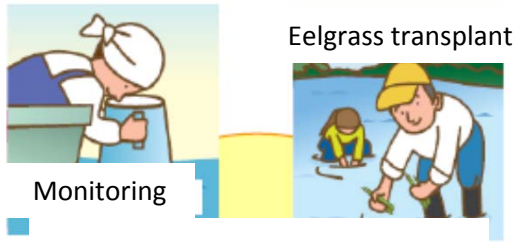


Concentration on space or environment

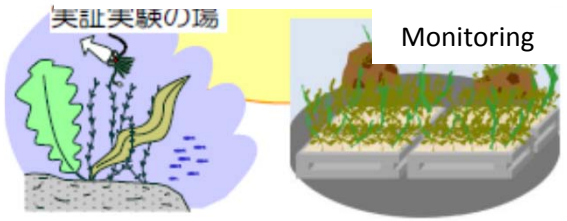
Life cycle



Change of resources and environment



System management



http://www.jfa.maff.go.jp/j/gyoko_gyozyo/g_thema/pdf/suisankankyouseibi_gaiyou.pdf

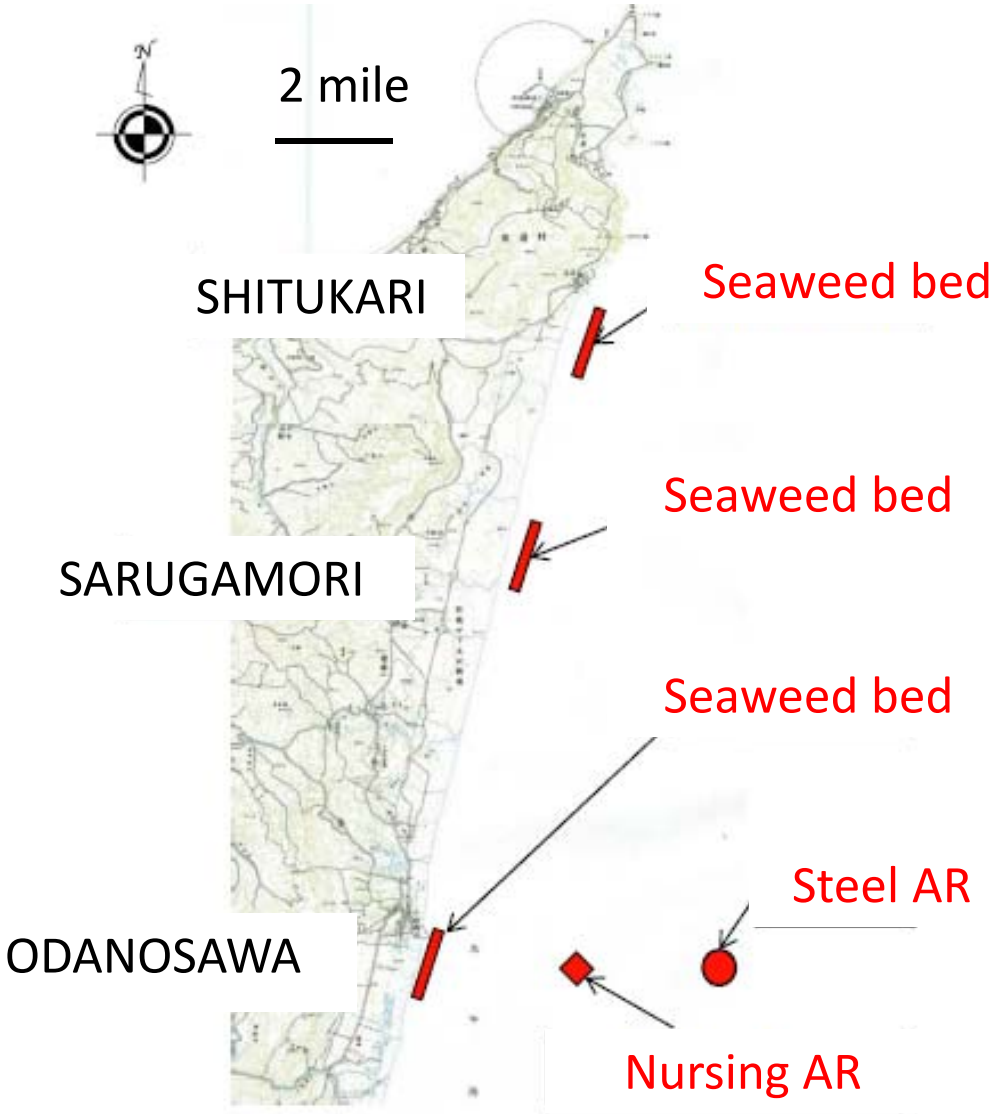
The government and prefectures develop a master plan for each individual area of the sea and record the benefits of the project with monitoring techniques.

Project example in Japan

Aomori prefecture （Goldeye rockfish, *Sebastes thompsoni*）
Seaweed bed, nursery AR, and steel AR

http://www.amgyoren.or.jp/index.php

Aomori project

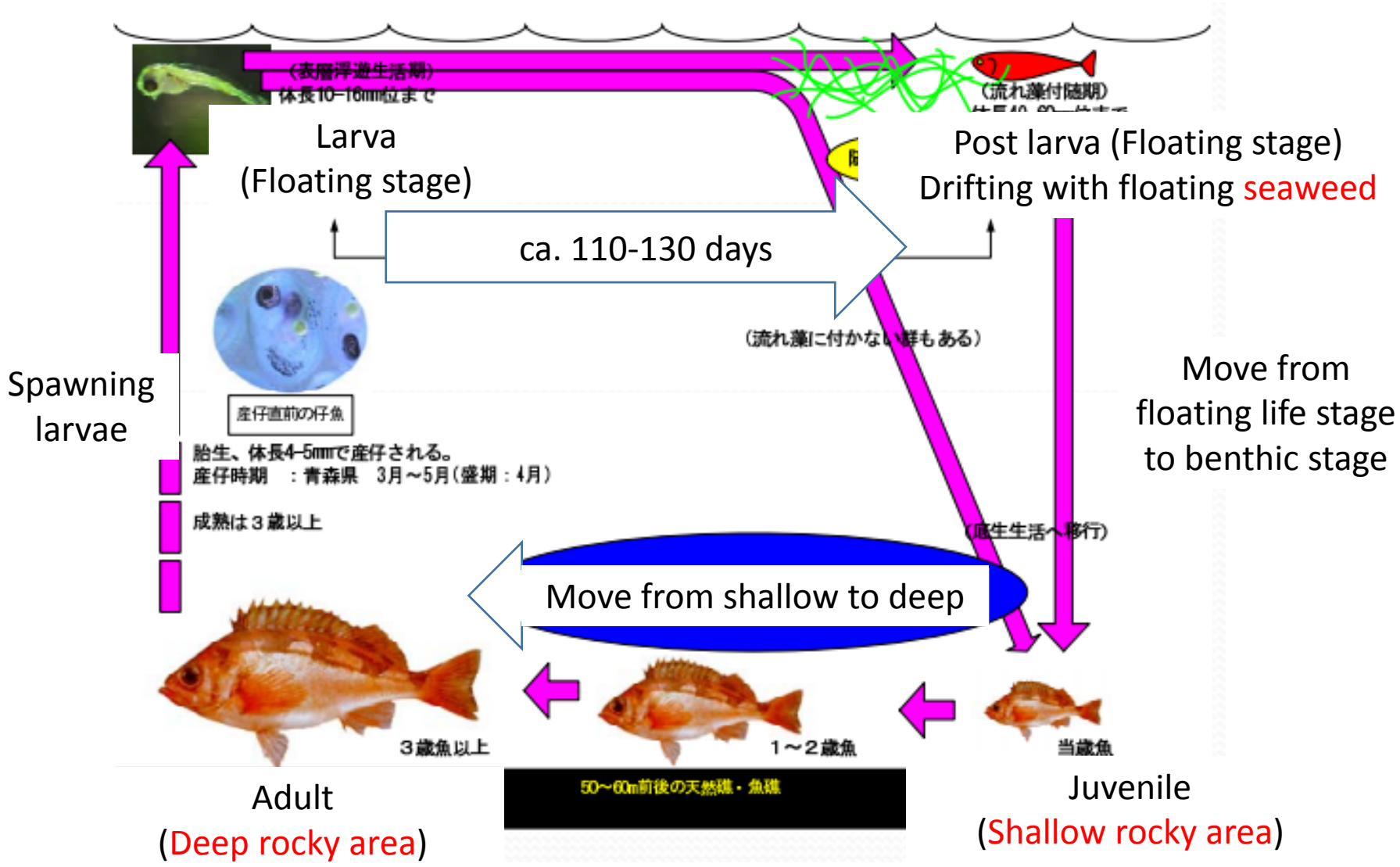


Project volume and cost

- Seaweed bed, (155.2 ac)
- Nursing AR, (7.4 ac)
- Steel AR, (1,046,200 ft^3)
- Total cost, $ 16.62 million

http://www.jfa.maff.go.jp/j/gyosei/assess/hyouka/h25/jizen2/pdf/07taiheiyouhokubu.pdf

Life cycle of goldeye



Modified from Aomori pref. (http://www.jfa.maff.go.jp/j/study/keikaku/)

Three stages of development of AR reef project

Seaweed bed (rocks)
(Shallow water)

Nursing AR (concrete block)
(Middle water)

Large steel AR
(Deep water)

Seaweed bed (rocks)

21m (68.9 ft.)

List of benefit factors in Japan

1 Effect of cost reduction of aquatic product
2 Effect of increase of catching opportunity
3 Effect of maintenance and increase of fisheries resources
4 Effect of adding value for catches
5 Effect of improvement of fisheries working environment
6 Effect of improvement of living environment
7 Effect of industry other than fisheries
8 Effect of protection of life and property
9 Effect of counterplan of refuge, rescue, and disaster
10 Effect of maintenance and restoration of aquatic environment
11 Effect of improvement of scenery
12 Effect of protection and succession of local culture
13 Effect of improvement of convenience about facility user

http://www.jfa.maff.go.jp/j/gyoko_gyozyo/pdf/sub7921.pdf (jn Japanese)

Three factors in the project

Effect of maintenance and increase of fisheries resources

Before development

After development

Benefit

Increase fish catch

Disadvantage

Expenses about increase catch volume

Benefit

=(Catch volume)×(Price)-(Expenses)

Effect of maintenance and increase of fisheries resources

Annual benefit (B) = Q × P - C

Q: Prospective catch

P: Average unit price

C: Annual expense about increase catch volume

P: Average unit price

The average unit price is calculated by past 5 years or the price of recent.

C: Annual expense about increase catch volume

C = (production amount after development
× fisheries expense ratio after development)
−
(production amount before development
× fisheries expense ratio before development)

Prospective catch around seaweed bed and nursing AR

Seaweed bed, nursing AR

Food supply

Shelter

Sample of seaweed bed, nursing AR

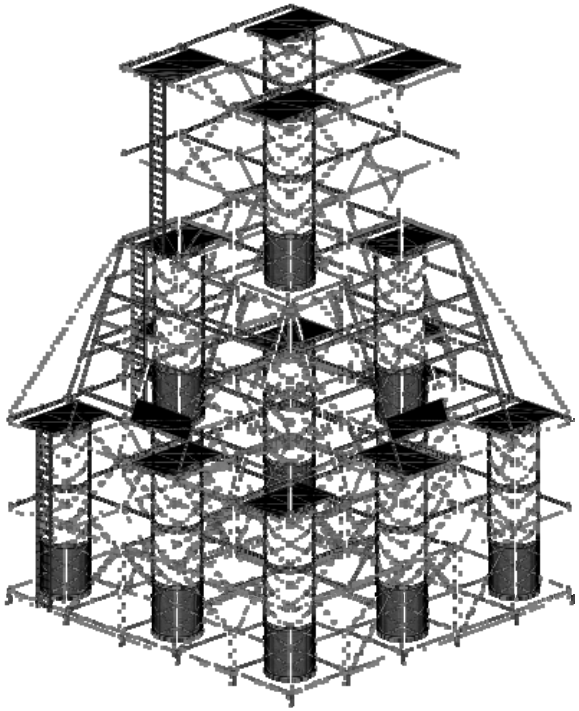
Actual survey (number of fish)

× survival rate × catch rate × body weight

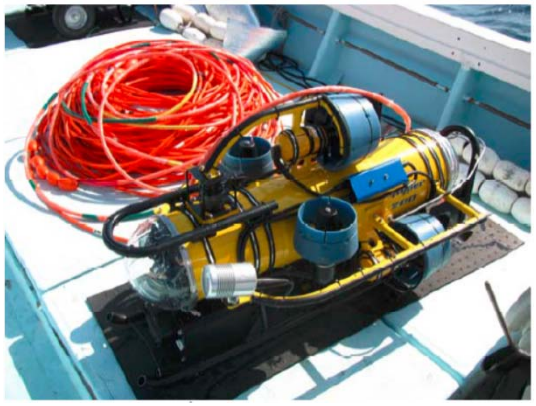
Prospective catch

Prospective catch around gathering AR

Estimation of number
of fish by several methods



Two examples

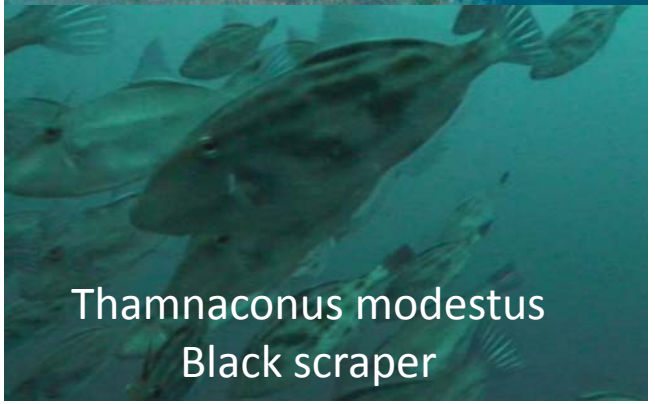


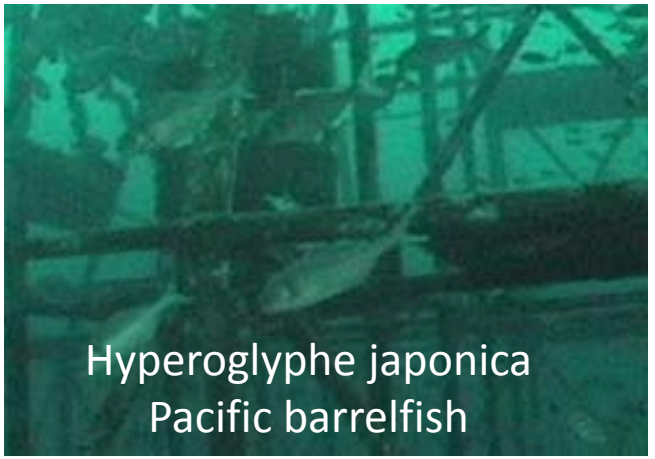
ROV
(video survey)

Gill net
(actual catch survey)

Example of number estimation of steel AR using ROV

OKI Is., Shimane Pref. AS21M		Date	6-Jul-10	
Method : ROV		Time	14:30-15:30	
Depth : 276 ft.		Sediment	Sand	
Name	Number	Size (in.)	Estimation (lb.)	
			weight	total
Epinephelus septemfasciatus	7	10-12	0.84	5.94
Sebastiscus marmoratus	25	8-12	0.59	14.96
Scorpaenopsis cirrhosa	1	8	0.33	0.44
Monocentris japonica	6	5-7	0.17	1.1
Cookeolus japonicus	4	12-14	0.9	3.52
Oplegnathus fasciatus	25	12-16	2.18	49.5
Oplegnathus fasciatus	3	18-22	5.41	16.28
Oplegnathus fasciatus	5	8-10	0.62	3.08
Sebastes thompsoni	30	8-10	0.53	15.84
Sebastes schlegelii	3	18-22	3.78	11.44
Zeus faber	3	10-14	1.03	3.08
Thamnaconus modestus	500	10-14	0.68	341
Trachurus japonicus	100	8-12	0.35	35.2
Hyperoglyphe japonica	150	20-22	5.94	891
Paralichthys olivaceus	1	24	7.61	7.7
Total	863		1,400	





Example of number estimation of steel AR using gill net

IKOKUMA, Aomori Pref. AS21M		Date	15-May-04
Method : Gill net		Time	One day
Depth : 278 ft.		Sediment	Sand
Name	Number	Size (in.)	Estimation (lb.)
			weight
Lophiomus setigerus	10	24-28	60.5
Hexagrammos otakii	15	11-16	13.8
Sebastiscus marmoratus	25	8-12	8.8
MIicrostomus achne	5	10	1.7
Eopsetta grigorjewi	10	9-10	2.8
Sebastes thompsoni	10	8-9	3.3
Sardinops melanostictus	15	18-22	0.8
Pleurogrammus azonus	75	8-10	17.1
Squalus acanthias	5	8-10	2.2
Physiculus maximowiczi	240	18-22	220
	410		331

Calculation of benefit of increase resources

Effect of seaweed bed (rock) development to goldeye

A	Increase production volume based on growth effect by unit area of seaweed
	0.10268 kg/m^2 (ca. 0.02lbs/ft^2)
	(from report of Prefecture survey)
B	Area of development seaweed bed
	53,935m^2 (ca. 580,551ft^2)
	(Area of development seaweed bed 72,030m^2 (ca. 775,324ft^2) × estimated seaweed cover degree 60%)
C	Unit price
	698 yen/kg (ca. $2.78/lbs)
	(from report of Prefecture survey, during 2008-2012)
D	Expenses about fisheries
	1,159 thousands yen (ca. $ 10,150)
	(loading fee 5.0%, standard rates of variable cost 25%)
Annulal benefit is calculated by following formula;	
(A×B×C)/1000-D = 2,706 thousands yen (ca. $ 23,700)	

Calculation of benefit of increase resources

Nursing AR (concrete block) to goldeye

A	Increase volume of protection and nursery effect by a cubic meter of nursery reef AR	
	0.608kg/m^3 (0.04lbs/ft^3)	
		(from Prefecture and National Research Institute of Fisheries Engineering surveys)
B	Development volume	
	18,639m^3 (658,230ft^3)	
C	Unit price	
	698 yen/kg (ca. $2.78/lbs)	
		(from report of Prefecture survey, during 2008-2012)
D	Expenses about fisheries	
	2,373 thousands yen (ca. $20,800)	
		(loading fee 5.0%, standard rates of variable cost 25%)
Annual benefit is calculated by following formula;		
A×B×C/1000-D = 5,537 thousands yen (ca. $ 48,500)		

Calculation of benefit of increase resources

Steel AR to goldeye

A	Annual landing volume	
	30,986 kg (=a×b×c/100) (ca. 68,312lbs)	
	a	Basic unit of AR; 2.24kg/m^3 (ca. 0.14lbs/ft^3)
	b	Development volume (artificial reef and nursery reef); 48,264m^3 (ca. 1,704,427ft^3)
	c	Landing volume ratio of goldeye in local fishing port
B	Unit price	
	698 yen/kg (ca. $ 2.78/lbs)	
		(from report of Prefecture survey, during 2008-2012)
C	Expenses about fisheries	
	6,488 thousands yen (ca. $ 56,900)	
		(loading fee 5.0%, standard rates of variable cost 25%)
Annulal benefit is calculated by following formula;		
A×B/1000-C = 15,140 thousands yen (ca. $ 132,800)		

Quantity survey of aquatic creatures in the project

Nursing and steel AR

Flounder, halibut

Greenling

Rockfishes

Spear squid (nursing AR)

Abalone, sea urchin (seaweed bed)

http://sekainoumi.blog54.fc2.com/

Effect of industry other than fisheries (distribution industry)

Before development

Benefit

Price difference between local and central market

http://www.tsukijihasegawa.com/

Disadvantage

Expenses about increase shipping volume

After development

Benefit

=(Increase-shipping volume)×(Price difference)

-(Expenses)

Effect of industry other than fisheries (distribution industry)

Annual benefit (B) = A × (B-B1) –C or = Q × (P-P1) ×D

A: Increase-shipping volume
B: Price of central market
B1: Price of local market
C: Annual expense about increase shipping volume
D: Income ratio

A	Increase-shipping volume	
	47,856kg (ca. 105,504lbs)	
B	Value of central market	
	1,291 yen/kg (ca. $ 5.15/lbs)	
		(from average price of TSUKIJI central market)
C	Value of local market	
	698 yen/kg (ca. $2.78/lbs)	
		(from report of Prefecture survey, during 2008-2012)
D	income ratio	
	30%	
		(Government report in 2009)
Annual benefit		
(A×(B-C)×D/100)/1000 = 22,170 thousands yen (ca. $197,200)		

Effect of maintenance and restoration of aquatic environment

Before development

Benefit

Disadvantage

Purification of marine organic matter (N, P)

No expenses

After development

Benefit

=(Purification volume of organic matter)
×(Purification costs)

Effect of maintenance and restoration of aquatic environment

Annual benefit (B) =A×B×C

A×B: Purification volume of organic matter based on increase of seaweed bed

C: Sewage cost of equivalent to purification volume of organic matter

A	Nitrogen content ratio of kelp (Laminariales) of wet weight	
	1.30%	
B	Increase volume of kelp	
	142,388kg (ca.313,911lbs)	
C	Cost of sewage treatment of nitrogen	
	19,605 yen/kg (ca. $ 78.17/lbs)	
Annual benefit		
A/100×B×C/1,000 = 36,289 thousands yen (ca. $ 323,000)		

B/C table in Aomori project

Present value after 30 years Discount rate: 4%			
Main effects	Present value of benefit and cost		
Effect of maintenance and increase of fisheries resources	1,302,206 (11.4)		thousand yen (million $)
Effect of industry other than fisheries	336,119 (2.94)		thousand yen (million $)
Effect of maintenance and restoration of aquatic environment	550,177 (4.81)		thousand yen (million $)
Total benefit	2,188,502 (19.2)		thousand yen (million $)
Total cost		1,671,230 (14.6)	thousand yen (million $)
Cost-benefit analysis (B/C)	1.31		
Effect expected from B/C			
Branding of rockfishes and spear squid for central market by stable supply			

Citations and copyrights

This presentation is based on following files (All are Japanese);

- http://www.jfa.maff.go.jp/j/gyosei/assess/hyouka/h25/jizen2/pdf/07taiheiyouhokubu.pdf
- http://www.jfa.maff.go.jp/j/gyoko_gyozyo/pdf/sub7921.pdf
- http://www.jfa.maff.go.jp/j/gyoko_gyozyo/g_thema/pdf/suisankankyouseibi_gaiyou.pdf

The above PDFs are available at the site of Fisheries Agency.
(http://www.jfa.maff.go.jp/)

This presentation is translated based on above files by OKABE CO., Ltd.

Thank you

FL Fish & Wildlife Conservation Commission:

Overview and Implementation of Florida's Reef Fish Monitoring in the U.S. South Atlantic

Russell Brodie

February 7, 2017

Recent Atlantic Red Snapper Assessments and Regulations

- 2008 (SEDAR 15): Indicated stocks were undergoing overfishing and were overfished
- January 2010: emergency rule implementing the full recreational/commercial closure of Atlantic Red Snapper harvest
- 2010 (SEDAR 24): Confirmed the stocks overfished and overfishing status
  - Maintained full recreational/commercial closure of Red Snapper harvest
  - Limited recreational/commercial seasons in 2012-2014
- 2016 (SEDAR 41): Indicated that RS continues to be overfished and that overfishing is occurring
  - Estimated abundance at age and total estimated abundance increasing in recent years; Truncation of older age classes
- All SEDAR's called for more fisheries-independent surveys

FIM in the South Atlantic

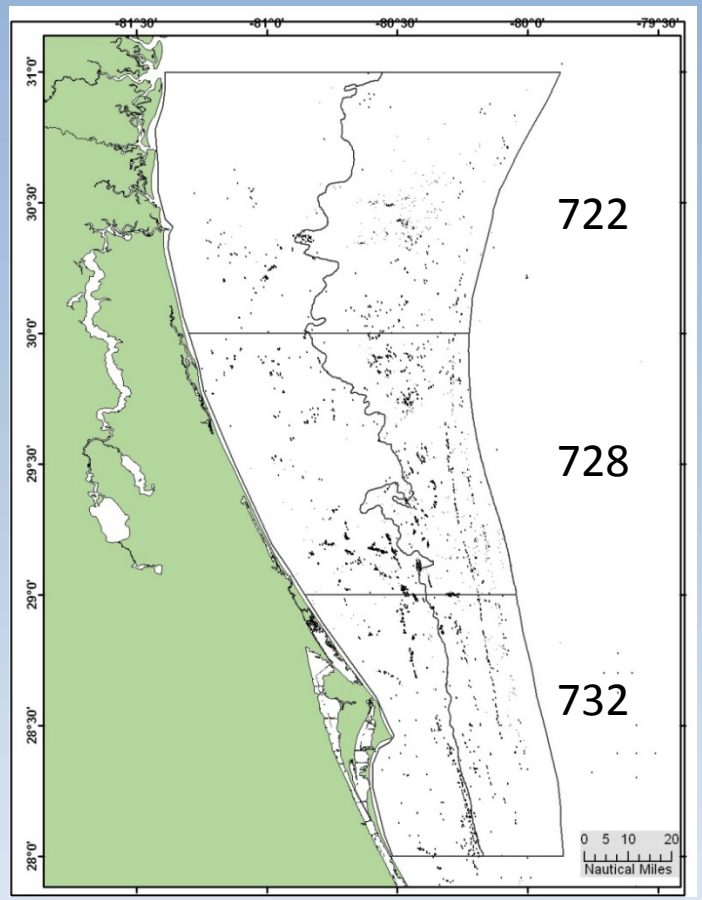
- 2011 - Present Cooperative Red Snapper Tagging study
  - Angler based (+3,500 tagged; ~300 returns; ~8% return rate)
- **2012 CRP Hooked-Gear Survey**
- 2014/15 CRP Spawning Aggregation Survey
  - Red Snapper, Gag, Scamp
  - Hydroacoustics, video cameras, hooked-gear
- **2015-2017 MARFIN Juvenile Red Snapper Study**
- 2016 CRP Red Snapper Selectivity Study
  - Chevron traps, hooked-gear, stereo-video cameras
- **Outstanding Proposals**

Hooked-Gear Study (CRP)

The utility of a hooked-gear survey in developing a fisheries-independent index of abundance for Red Snapper along Florida's Atlantic coast

Methods:

- Habitat based sampling
  - SEFIS, SA-SEAMAP, MARMAP, USGS, industry partners
  - Divide universe into 0.3 x 0.1 nm grids
- Stratification
  - NMFS statistical region (722, 728, 732)
  - Depth (0-30 m and 31-200 m)
- 128 stations per stat zone
  - Stratified by depth
    - 12 shallow stations/month
    - 20 deep stations/month
- April – July (October)

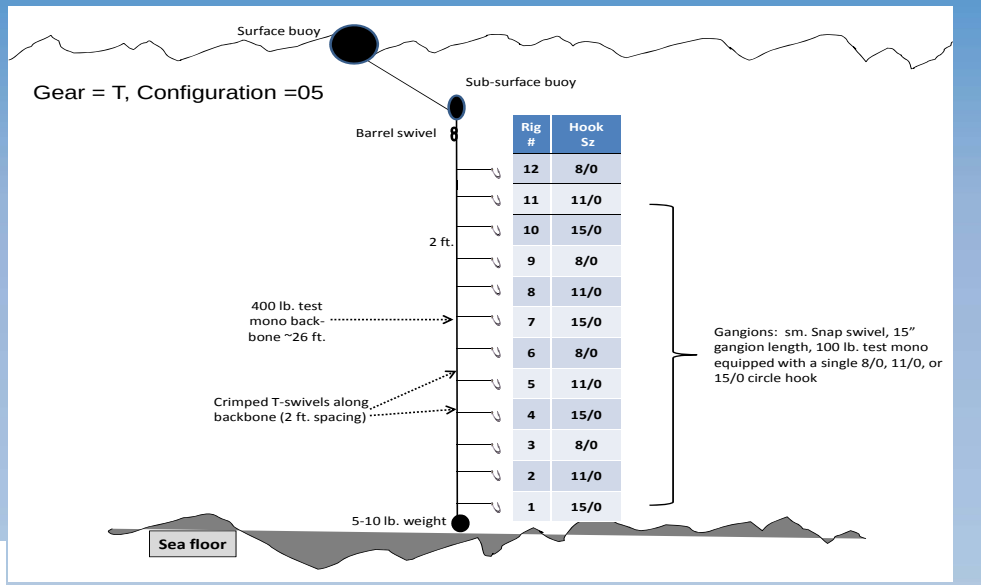


Hooked Gear Study (CRP)

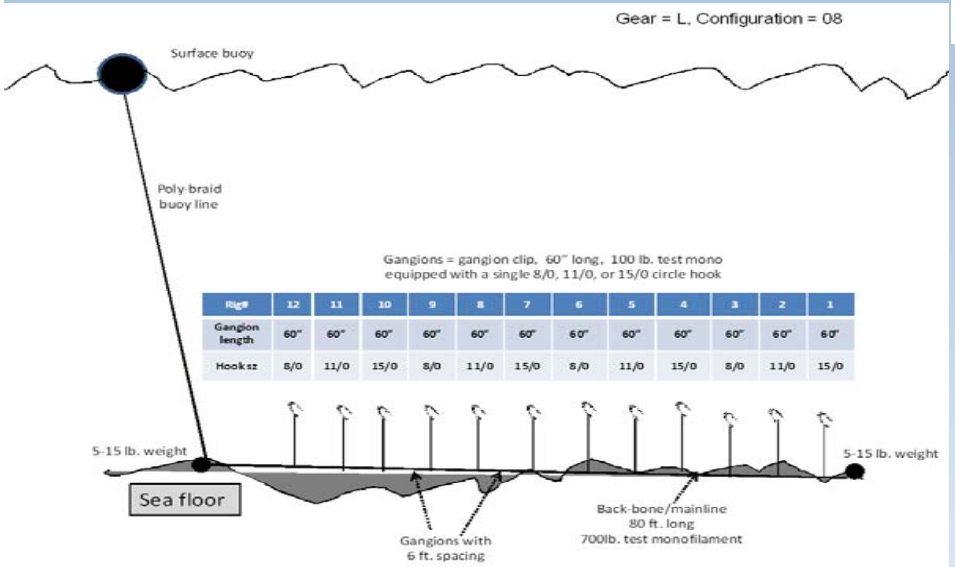
Hooked Gears

Passive

- Vertical longline



Rig #	Hook Sz
12	8/0
11	11/0
10	15/0
9	8/0
8	11/0
7	15/0
6	8/0
5	11/0
4	15/0
3	8/0
2	11/0
1	15/0



Rig#	12	11	10	9	8	7	6	5	4	3	2	1
Gangion length	60"	60"	60"	60"	60"	60"	60"	60"	60"	60"	60"	60"
Hook sz	8/0	11/0	15/0	8/0	11/0	15/0	8/0	11/0	15/0	8/0	11/0	15/0

Passive

- Horizontal longline

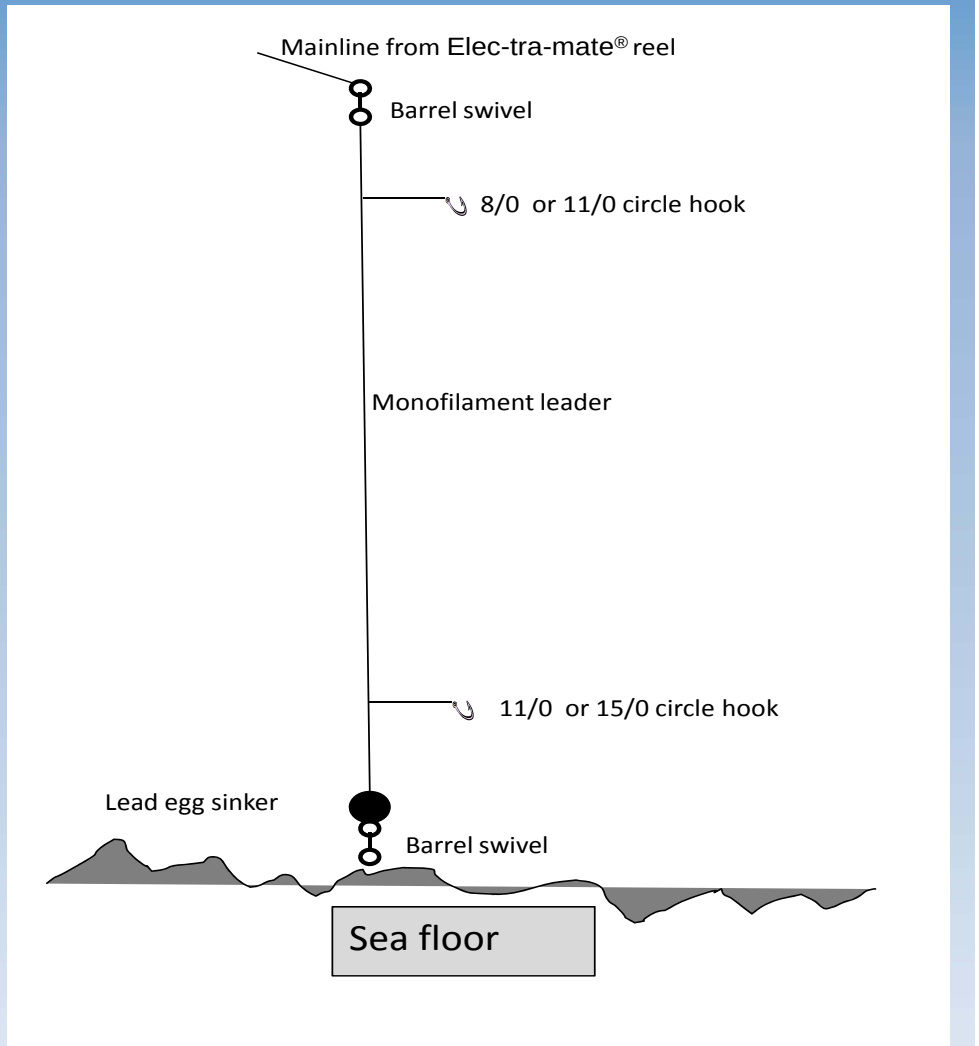
Hooked Gear Study (CRP)

Hooked Gears

Active

- Electric reels on traditional fishing rods
- 4 Anglers
- Simultaneous 2-minute timed-drop
- Total of 10 timed drops

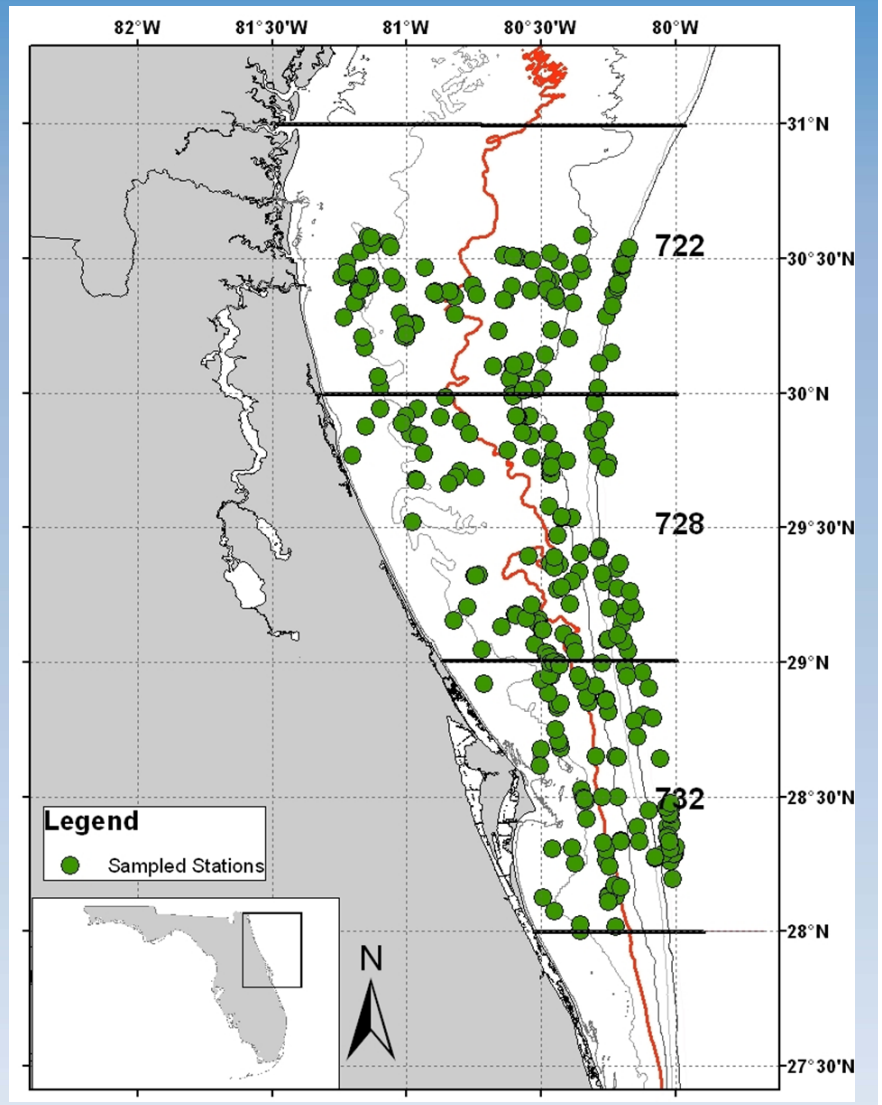
Repetitive Timed-Drop (RTD)



Hooked Gear Study (CRP)

Summary of Sampling Effort

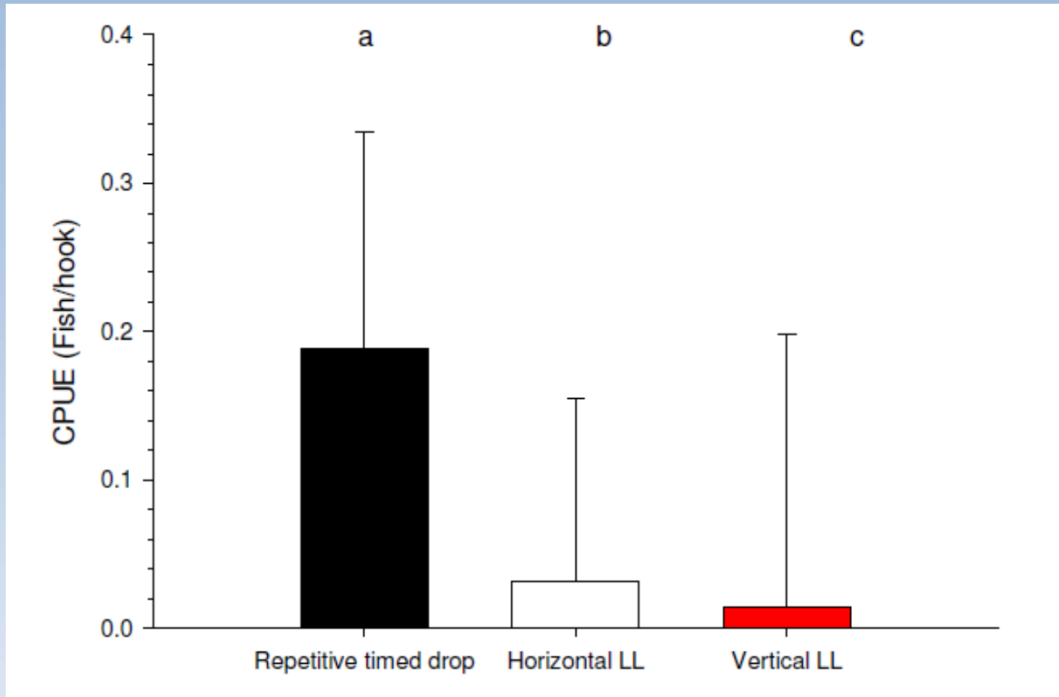
- 364 stations sampled
- ~80-sea days
- 5,690 individuals caught (71 species)
- 1,294 RS



Hooked Gear Study (CRP)

Red Snapper by Gear

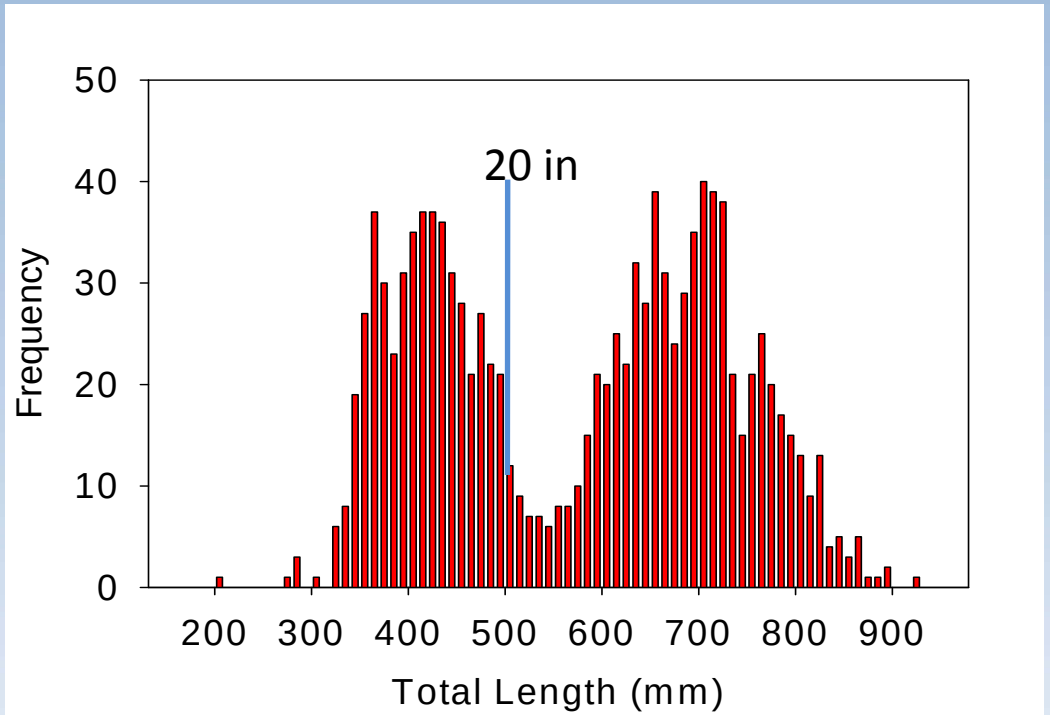
Zone	RTD	HLL	VLL
722	201	20	10
728	435	47	30
732	496	34	21
Total	1,132	101	61



Hooked Gear Study (CRP)

Length Summary

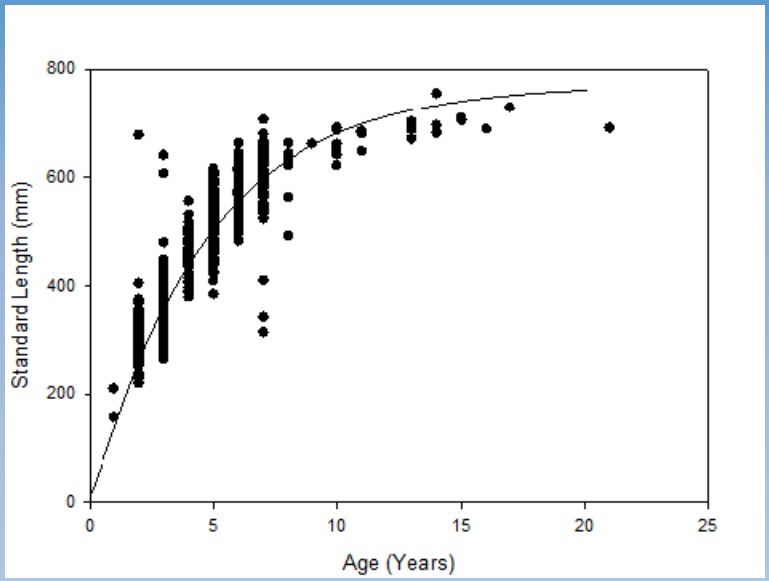
	All	Shallow	Deep
Mean	574 mm	566 mm	585 mm
Median	602 mm	590 mm	617 mm
Range	207 - 925 mm	207 - 925 mm	307 - 888 mm

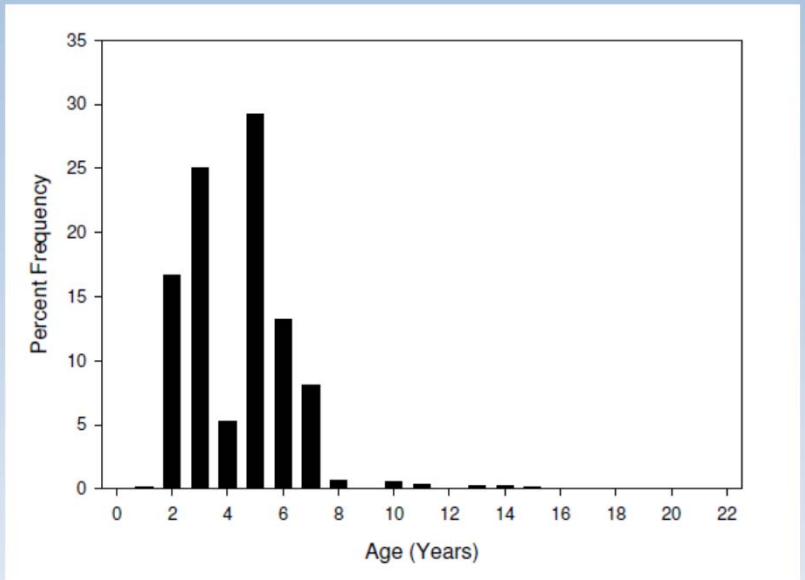


Hooked Gear Study (CRP)

Length-at-Age

- 1,307 Red Snapper aged
- Mean age = 4.39 years
- Max age = 21 years



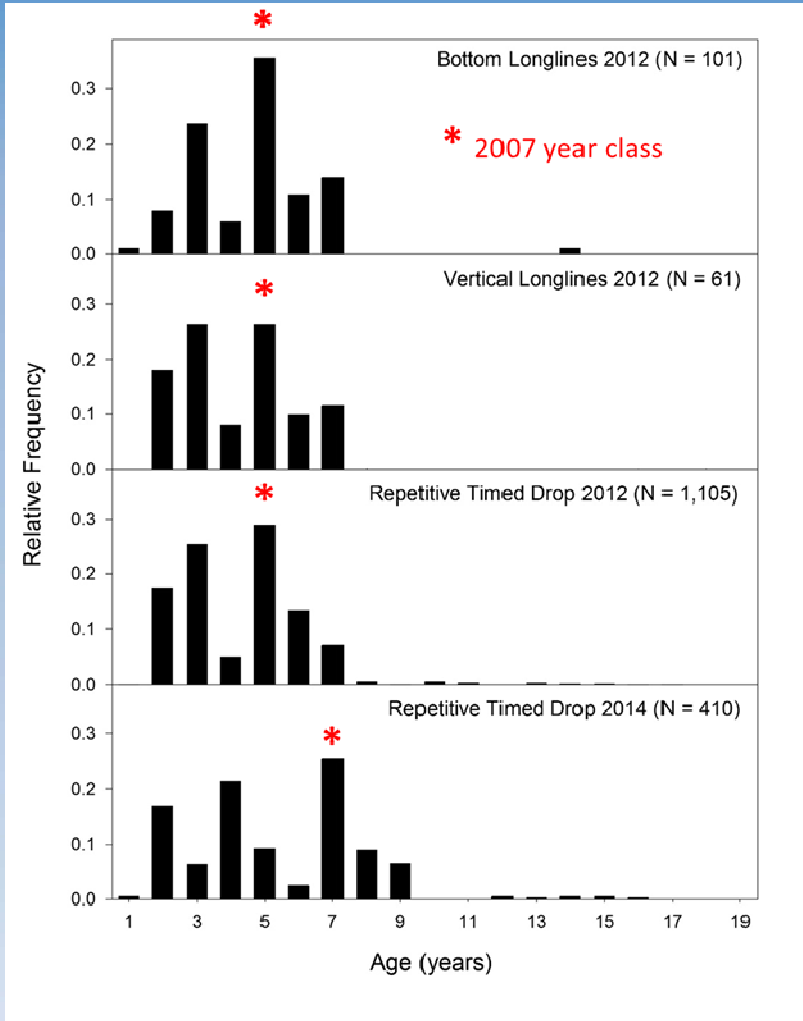


- Bimodal
- Peaks at 2-3 years and 5-6 years
- Younger fish in southern zone (732)

Hooked Gear Study (CRP)

Conclusion

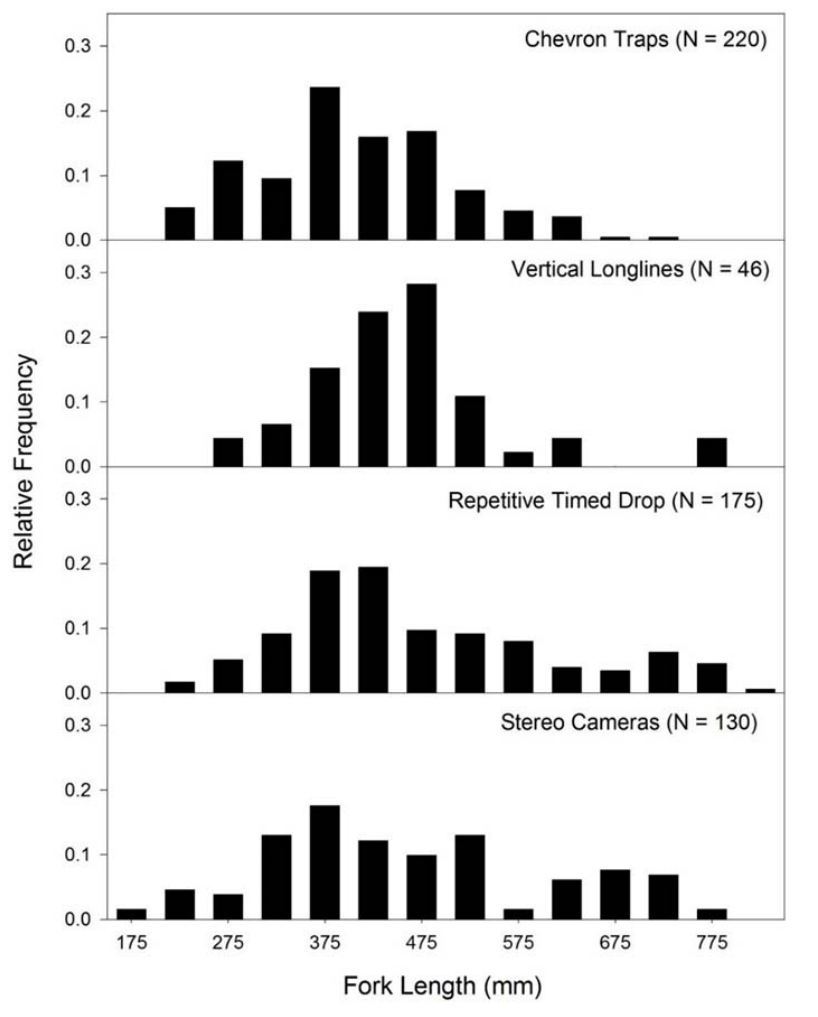
- Great potential for hooked-gear methods
- Focused efforts developing RTD methods
  - Number of fish collected
  - Logistical concerns with BLL and HLL gears
  - Ability to track age classes through time



Hooked Gear Study (CRP)

Conclusion

- Further supported by GOM preliminary data
- Shows RTD gear has similar length frequency to stereo cameras
  - Which should be the least selective gear
- Assignment of selectivity (domed vs. flat-topped) has been a major point of discussions during recent assessments



Historical Juvenile Red Snapper Records

Very limited historical data regarding Juvenile RS in the SA

Number of records of Red Snapper <150 mm TL and similar-sized individuals of other species from fishery-independent surveys in Atlantic waters from North Carolina to Florida, 1982-2013.

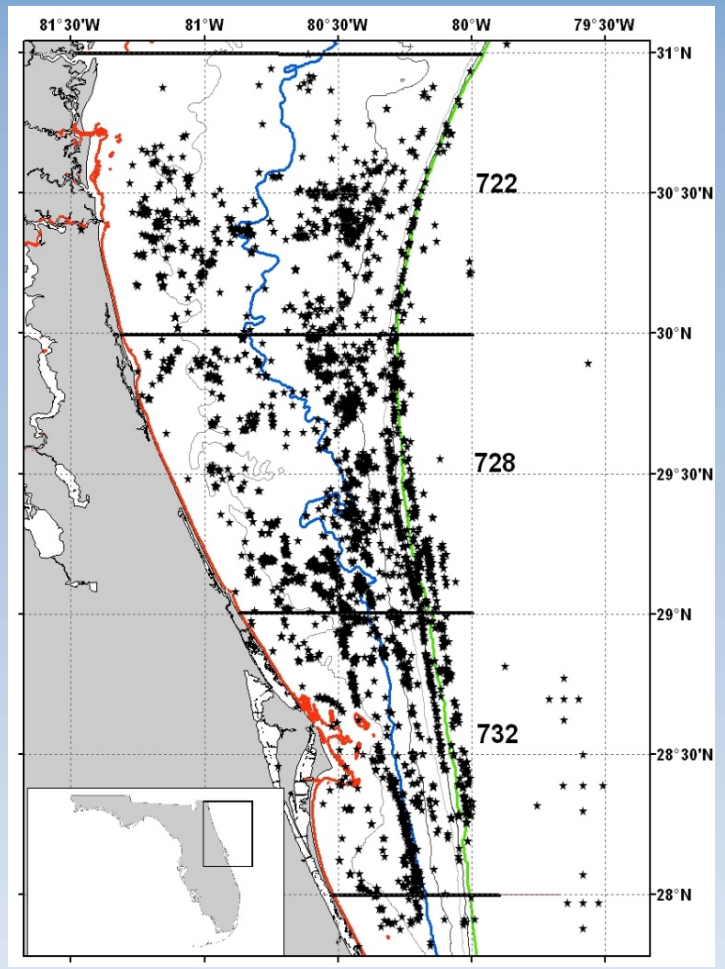
Source	Survey depth (m)	Survey times	Red Snapper ≤150 mm TL	Other species ≤150 mm[a]
SEAMAP-SA coastal trawl survey	5–9 (historically to 14)	Spring, summer, fall	5	33,501 TL
MARMAP trawl survey	20–200	Summer, fall, early winter	82	529,439 TL
SEUS chevron trap survey	15–100	Spring, summer, early fall	0	48,169 TL
NEFSC trawl survey	5–500	Spring and fall	6	71,429 TL
North Carolina estuarine surveys	<10	Spring, summer, early fall	4	[b]
South Carolina estuarine surveys	<10	Spring, summer, fall, winter	0	18,558 SL
Georgia estuarine surveys	<10	Spring, summer, fall	0	876,110 TL
Florida estuarine surveys	<10	Spring, summer, fall, winter	0	1,019,046 SL
Total			97	2,596,252

Data Source: R. Rindone; Modified from Rindone et al. 2015

Juvenile Red Snapper (MARFIN)

A pilot study for developing fisheries-independent indices of abundance for juvenile (age 0-1) Red Snapper in the U.S. South Atlantic

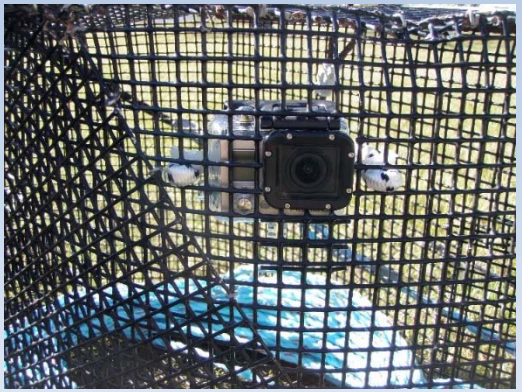
- 3-year grant (2014-2017)
- 2 full sampling seasons
  - July through October 2015/2016
- Trawls (GOM SEAMAP)
  - 112 trawl sites per year
  - Low-relief, soft bottom/shell habitat
- Traps (Z-trap)
  - 60 trap sites per year
  - Low-high relief hard bottom habitat areas not accessible to trawling
    - Includes artificial habitats (<30m)



Juvenile Red Snapper (MARFIN)

Sampling Gears

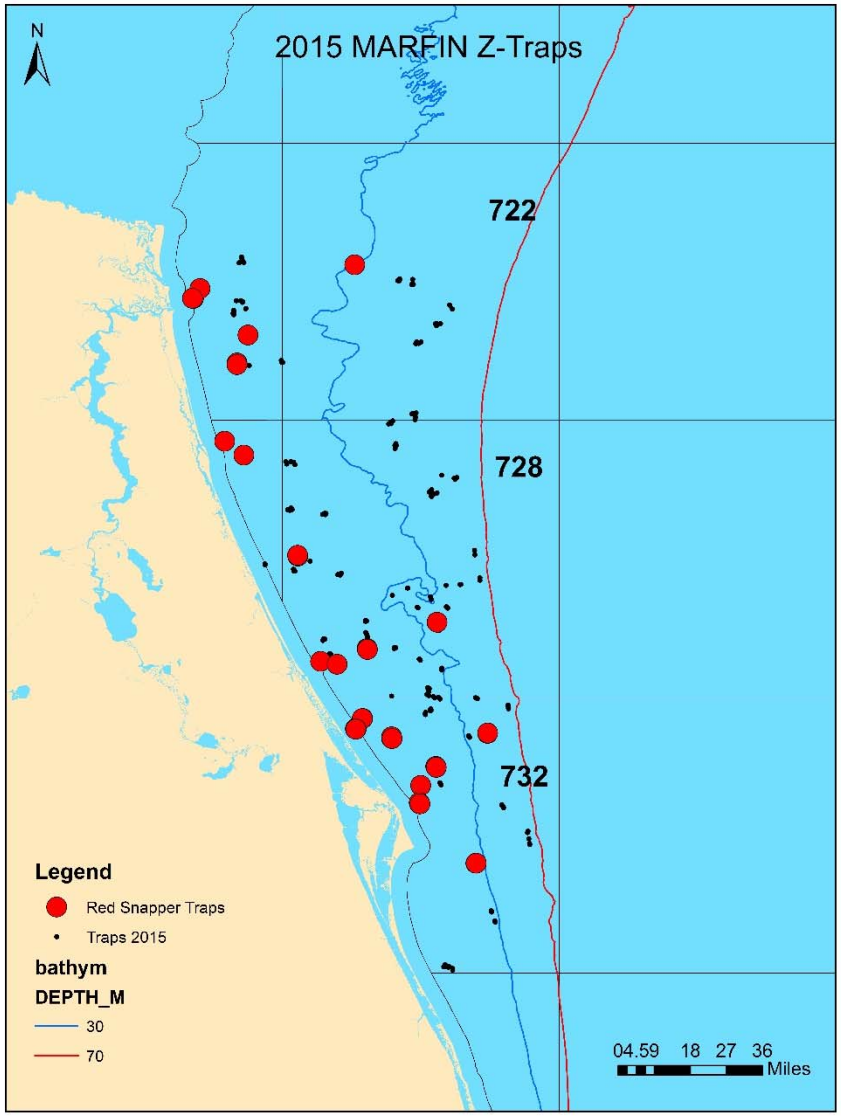
- Trawls
  - 42’ (12.8 m) semi-balloon trawl (stern trawls)
  - Tow 30 minutes
  - Tow speed 2.5-3 knots
  - Same as GOM SEAMAP
- 1.2 m Antillean-style Z-trap
  - 0.4m X 0.5m X 1.2m (H*W*L)
  - GoPro mounted in trap
- Up to 6 traps set per station
  - Within 1 mile radius
  - All traps > 100m apart
  - Baited with *Boston Mackerel* spp.



Juvenile Red Snapper (MARFIN)

Preliminary Data – Traps (2015)

- 86 Stations Completed
- 400 Individual Trap sets
  - 317 Selected
  - 83 Directed
- 251 Associated GoPro Videos
- 111 RS Collected (1 YOY?)
  - Size range (124 – 329 mm SL)



Juvenile Red Snapper (MARFIN)

Preliminary Data – Traps (2015)

Species	Total
Tomtate	4896
Black Seabass	2418
Sand Perch	1056
Bank Seabass	131
Red Snapper	111
Vermilion Snapper	101
Slippery Dick	54
Whitespotted Soapfish	40
Gray Triggerfish	39
Longspine Porgy	31

- 9,030 Individuals (34 species)
- Top 3 species (>92% of total catch)
- Select Species (~30% of total catch)

Juvenile Red Snapper (MARFIN)

Preliminary Data – Trawls (2015)

- 93/112 Selected Stations Completed (83%)
- 4 cruises during Aug/Sep (R/V Georgia Bulldog)
  - 18 Sample Days
  - Last cruise cut short (weather)
- 83 RS collected
  - 1 – 43 per net
  - Size range: 34 – 101 mm SL
  - All collected in <22 m depth (16-18 m)

Juvenile Red Snapper (MARFIN)

Preliminary Data – Trawls (2015)

- 96,080 fish and invertebrates collected (~280 taxa)
- 959 Diet Samples
- 1,050 Mercury Samples
- Many other “Select” species culled for life history

Juvenile Red Snapper (MARFIN)

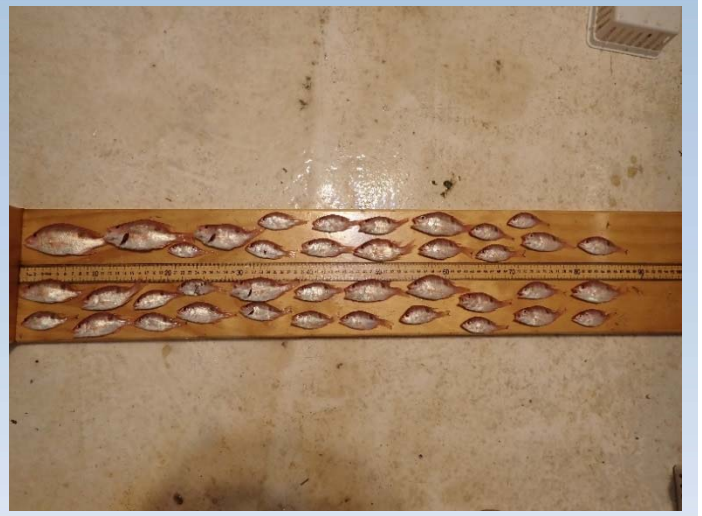
Preliminary Data – 2016

Traps:

- 73 Stations Completed
- 296 Traps set (173 GoPro Videos)
- 68 RS Collected
  - Size range: 121 – 341 mm SL

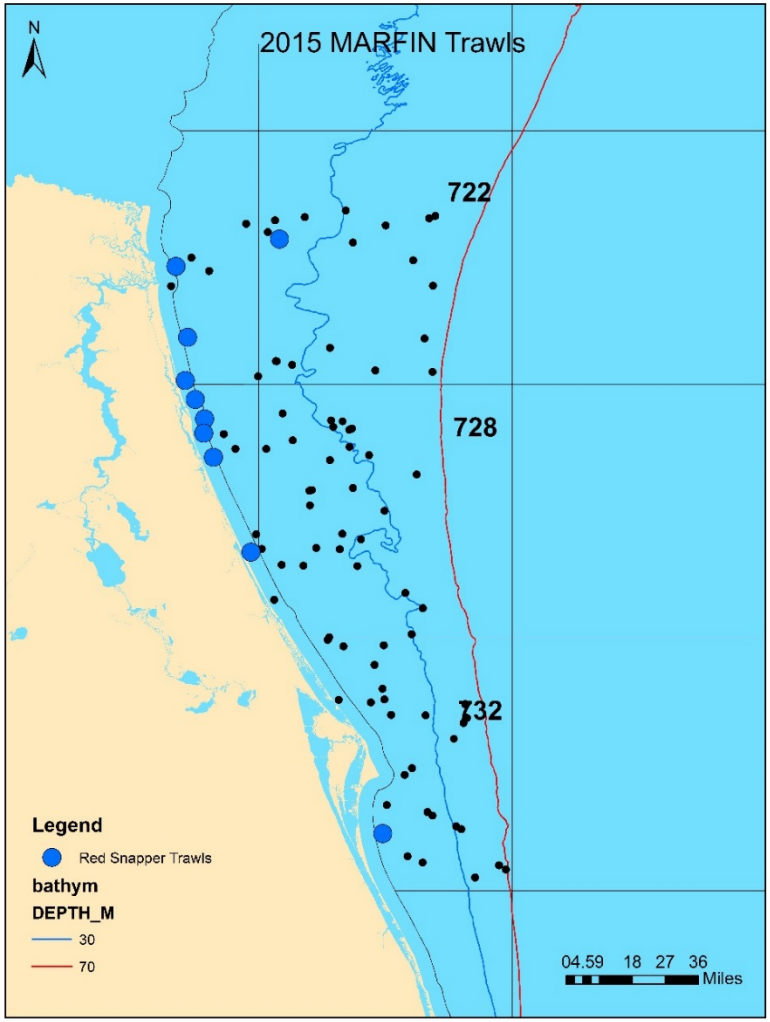
Trawls:

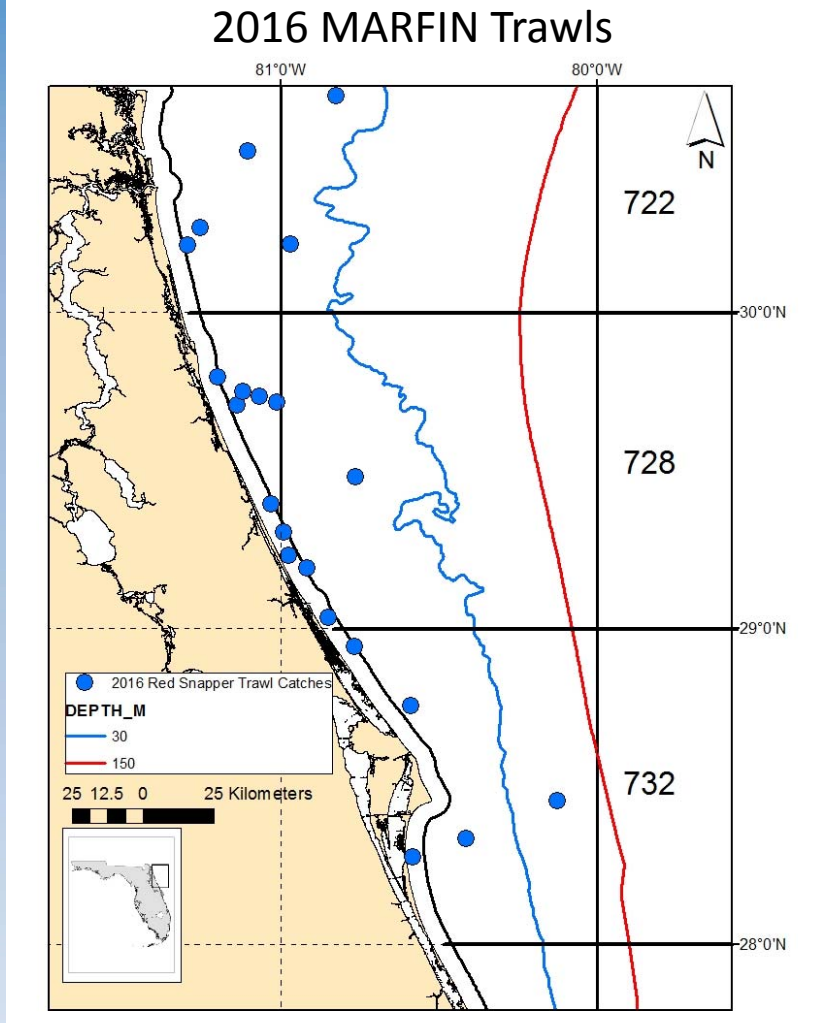
- 103 Stations Completed (92%)
  - 4 cruises during Aug/Sep
- 110 RS collected
  - 1 – 39 per net
  - Size range: 26 – 314 mm SL



Juvenile Red Snapper (MARFIN)

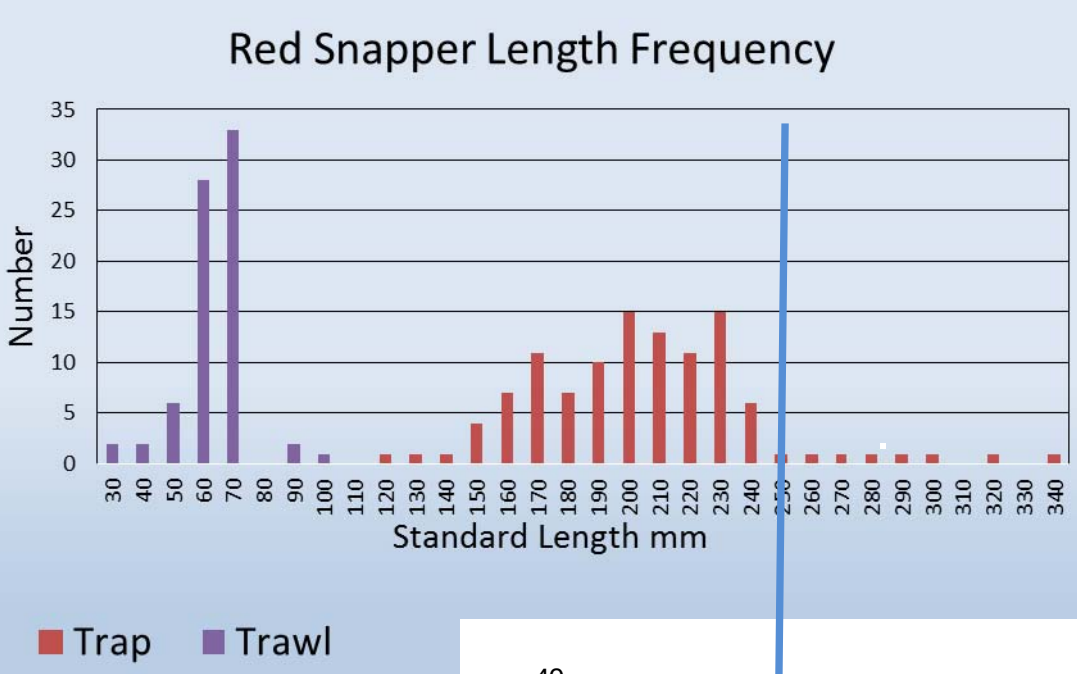
2015/2016 Red Snapper Trawl Catches

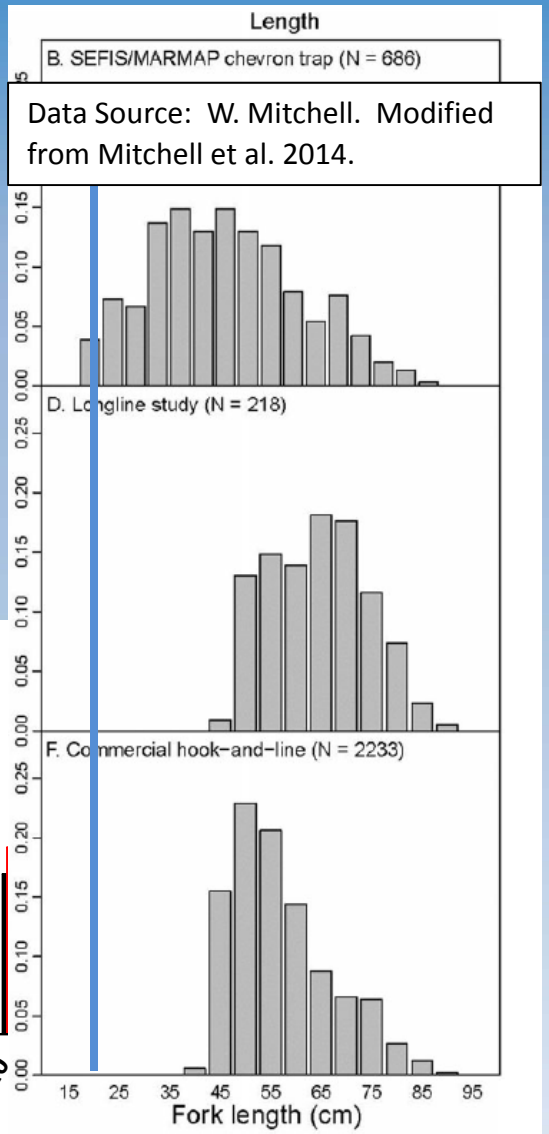




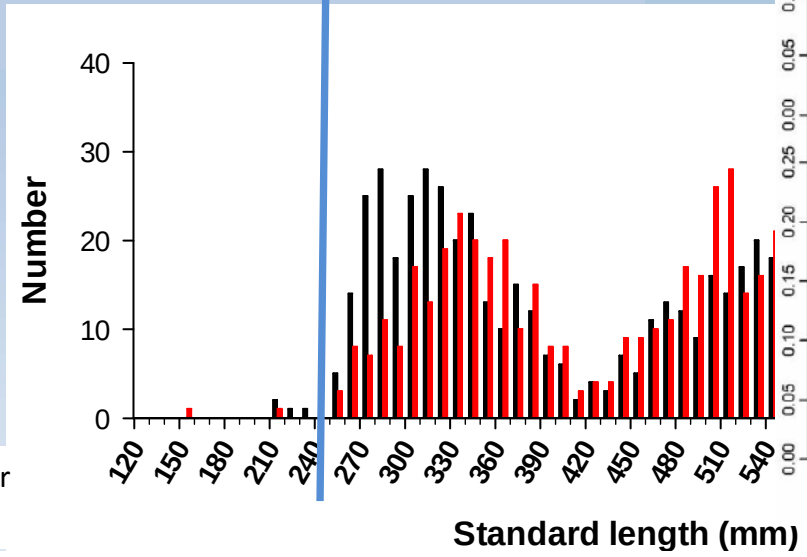
Juvenile Red Snapper (MARFIN)

2015 Red Snapper Length Frequency





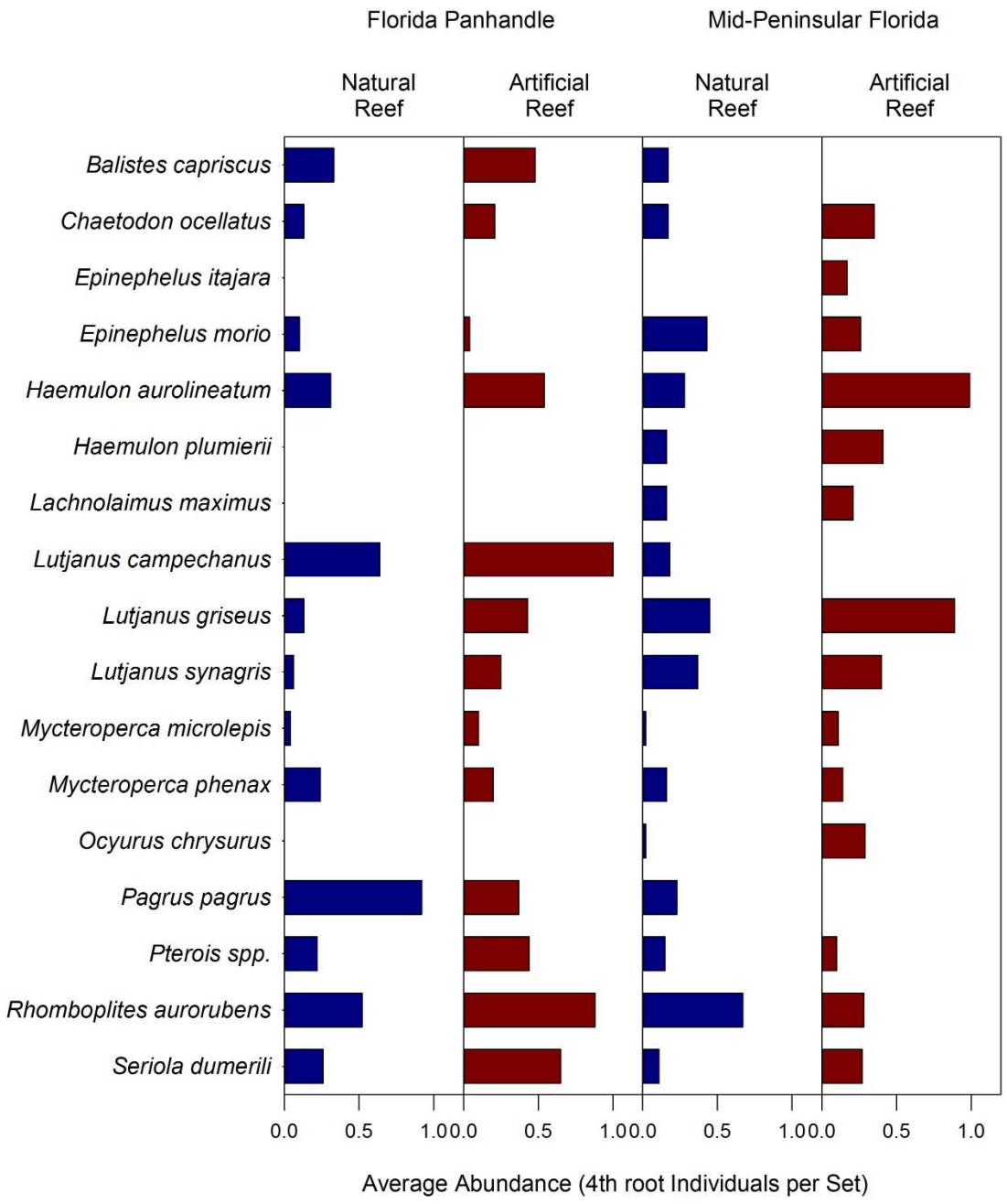
Data Source: W. Mitchell. Modified from Mitchell et al. 2014.



Data Source: 2012 FWC Hooked Gear Study, Grant# NA11NMF4540116

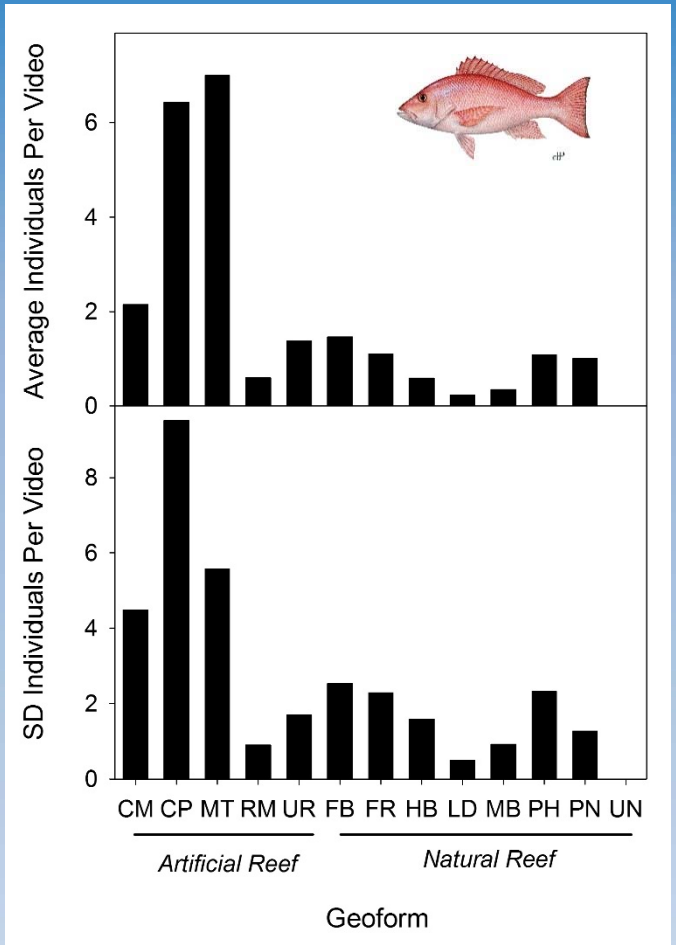
Submitted Proposals

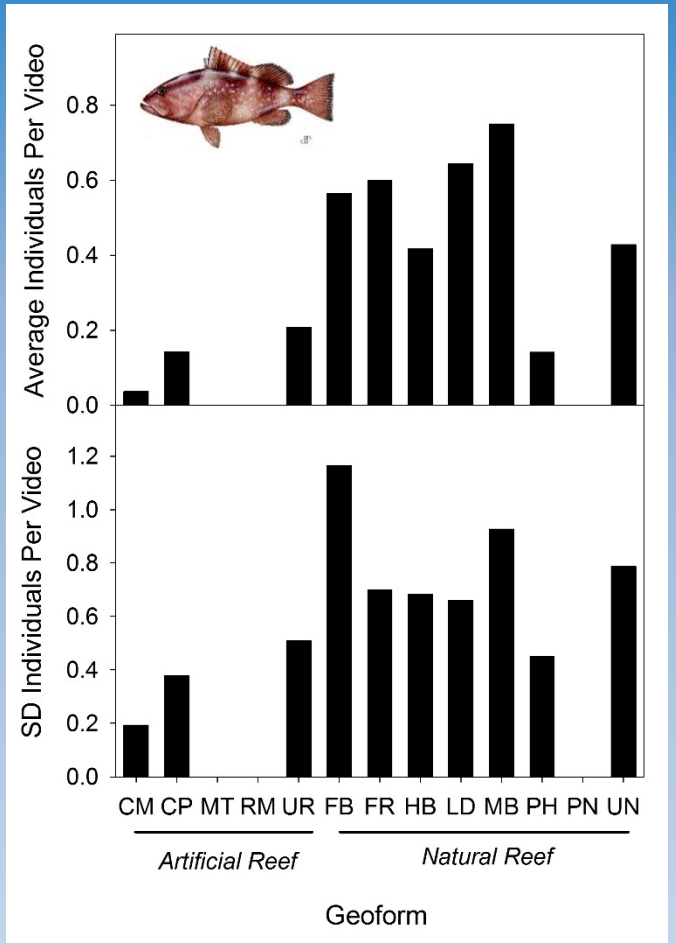
- CRP – *Is there evidence of the size and age composition of U.S. South Atlantic Red Snapper expanding under an ongoing fishing moratorium?*
- MARFIN – *Improving the utility of fisheries-independent hooked-gear methods in quantifying the relative abundance of Red Snapper and other reef fishes in the U.S. South Atlantic*.
- Saltonstall-Kennedy – *Evaluating the efficacy of incorporating artificial reef habitats into fisheries-independent surveys of Red Snapper and other reef fishes along Florida's Atlantic Coast.*



SIMPER (Managed Species +)

Implications – Survey Design





- Appropriate resolution of habitat stratification?
- Optimize our surveys for multispecies assessment needs

MARYLAND DEPARTMENT OF NATURAL RESOURCES FISHERIES SERVICE

MARI-Maryland Artificial Reef Initiative

Maryland Artificial Reef Program
2016 Summary

Michael Malpezzi, MD DNR Artificial Reef Coordinator

New Coordinator

- Started in in December 2015
- Now the full-time coordinator
- Part of MD DNR Aquaculture Division

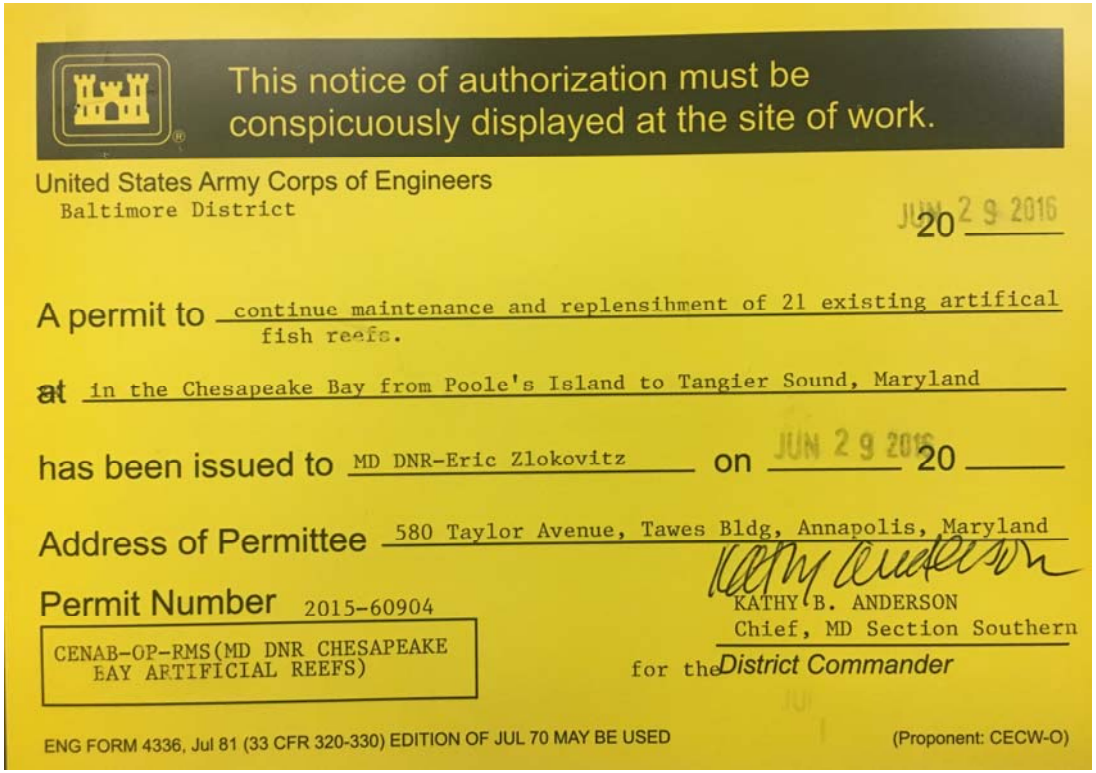
Erik Zlokovitz

December 2015

Michael Malpezzi

Permit Update

- Received 10-year Federal permit in June
- 21 sites in Chesapeake Bay
- Expires Dec. 31, 2026
- Ocean permits held by Town of Ocean City, some are up for renewal
  - More onerous historic preservation requirements than previous permits



This notice of authorization must be conspicuously displayed at the site of work.

United States Army Corps of Engineers
Baltimore District

JUN 29 2016 20

A permit to continue maintenance and replensihment of 21 existing artifical fish reefs.

at in the Chesapeake Bay from Poole's Island to Tangier Sound, Maryland

has been issued to MD DNR-Eric Zlokovitz on JUN 29 2016 20

Address of Permittee 580 Taylor Avenue, Tawes Bldg, Annapolis, Maryland

Permit Number 2015-60904

CENAB-OP-RMS(MD DNR CHESAPEAKE BAY ARTIFICIAL REEFS)

KATHY B. ANDERSON
Chief, MD Section Southern

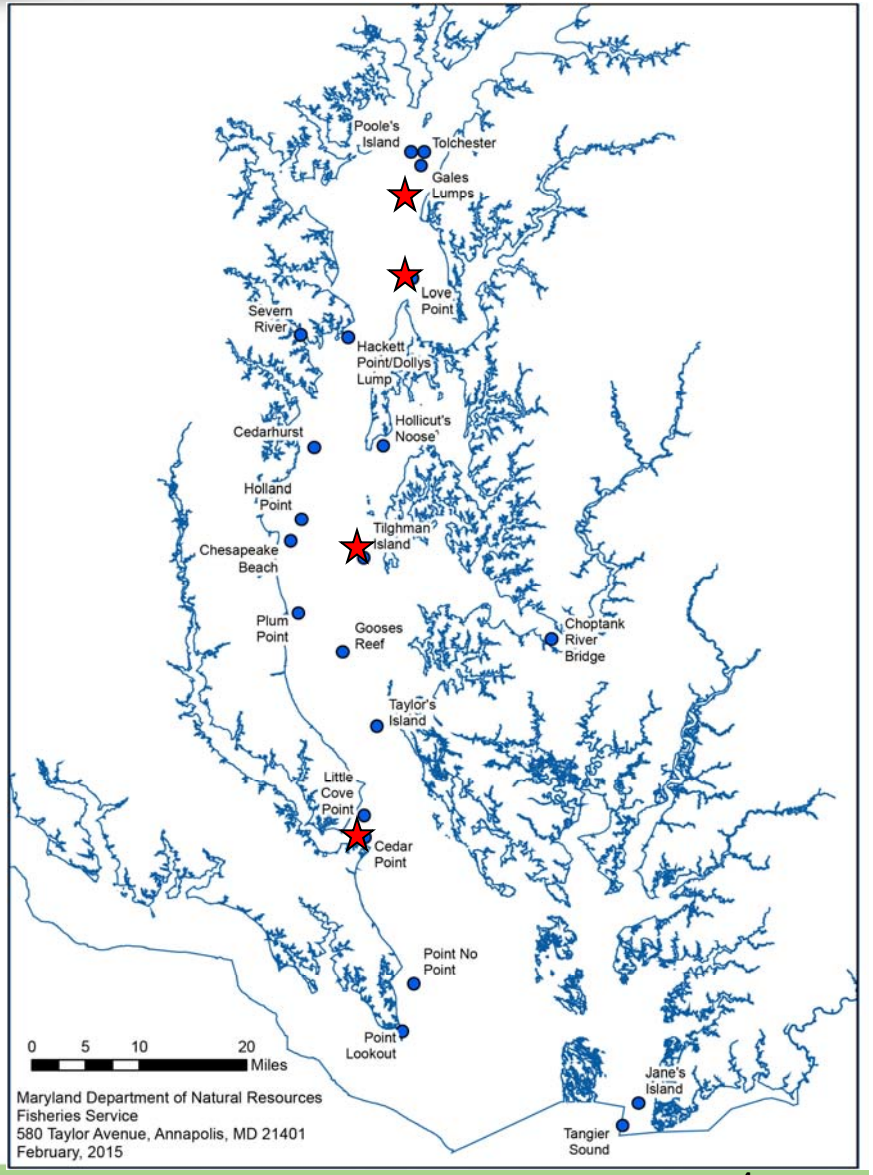
for the District Commander

ENG FORM 4336, Jul 81 (33 CFR 320-330) EDITION OF JUL 70 MAY BE USED

(Proponent: CECW-O)

2016 Deployments

- Nine deployments at four of our 22 sites
- 2,500 tons of concrete materials of opportunity
- 125 reef balls



2016 Deployments: Memorial Stadium

- Collaboration with MD Saltwater Sportfishing Association (MSSA) and Chesapeake Bay Foundation (CBF)
- 55 reef balls built by a variety of volunteers coordinated by MSSA
- 1.5-acre site with 360 reef balls (near capacity)

2016 Deployments: Love Point

- 550 tons of material from Marine Technologies dock removal project at Hart-Miller Island
- No cost to MARI

2016 Deployments: Love Point

- McLean Contracting deployed 540 tons of concrete
  - $18,000, $33/ton
- Deployment put on hold in 2015 when permits expired

2016 Deployments: Love Point

- 800 tons of road barriers from I-895 overpass demolition
- The first of ~5,000 tons of material from this project
- Love Point is one of our closest sites to Baltimore
  - Steady stream of material

2016 Deployments: Tilghman Island

- CCA, Carroll County Public Schools, CBF
- 70 reef balls (with spat) placed along southern edge of site
- Great publicity and public involvement

2016 Deployments: Cedar Point

- Concrete rubble (~600 tons) left over from Dominion/Taylor's Island project in 2015
- Deployed near western edge of site next to WW Bridge material
- Paid for by Dominion

Upcoming Projects: 2017 (and beyond)

Location	Partners	Material	Source	Timeframe
Tangier Sound	CCA/BCT, Rinker Materials	400 tons concrete pipe	Precast concrete rejects/seconds from Rinker Materials	February 2017
Plum Point	Exelon	500 tons steel baffle walls and concrete slabs	Dock renovation at CCNPP	March 2017
Love Point	Marine Technologies	1,000 tons concrete blocks and slabs	Pier removal, Dundalk Marine Terminal	February 2017
Love Point	McLean	~5,000 tons bridge deck slabs	I-895 Bridge renovations	March 2017
Various	MSSA, CCA, CBF	~300-400 reef balls	Volunteer groups	Summer 2017
Various	MTA	~50,000 tons bridge material	301 Bridge, Potomac River	2020+

Florida Artificial Reef Program:

Program Overview, Deployment Summary, Recent Trends

Prepared by Keith Mille

February 8, 2017

Florida Fish and Wildlife Conservation Commission

Division of Marine Fisheries Management

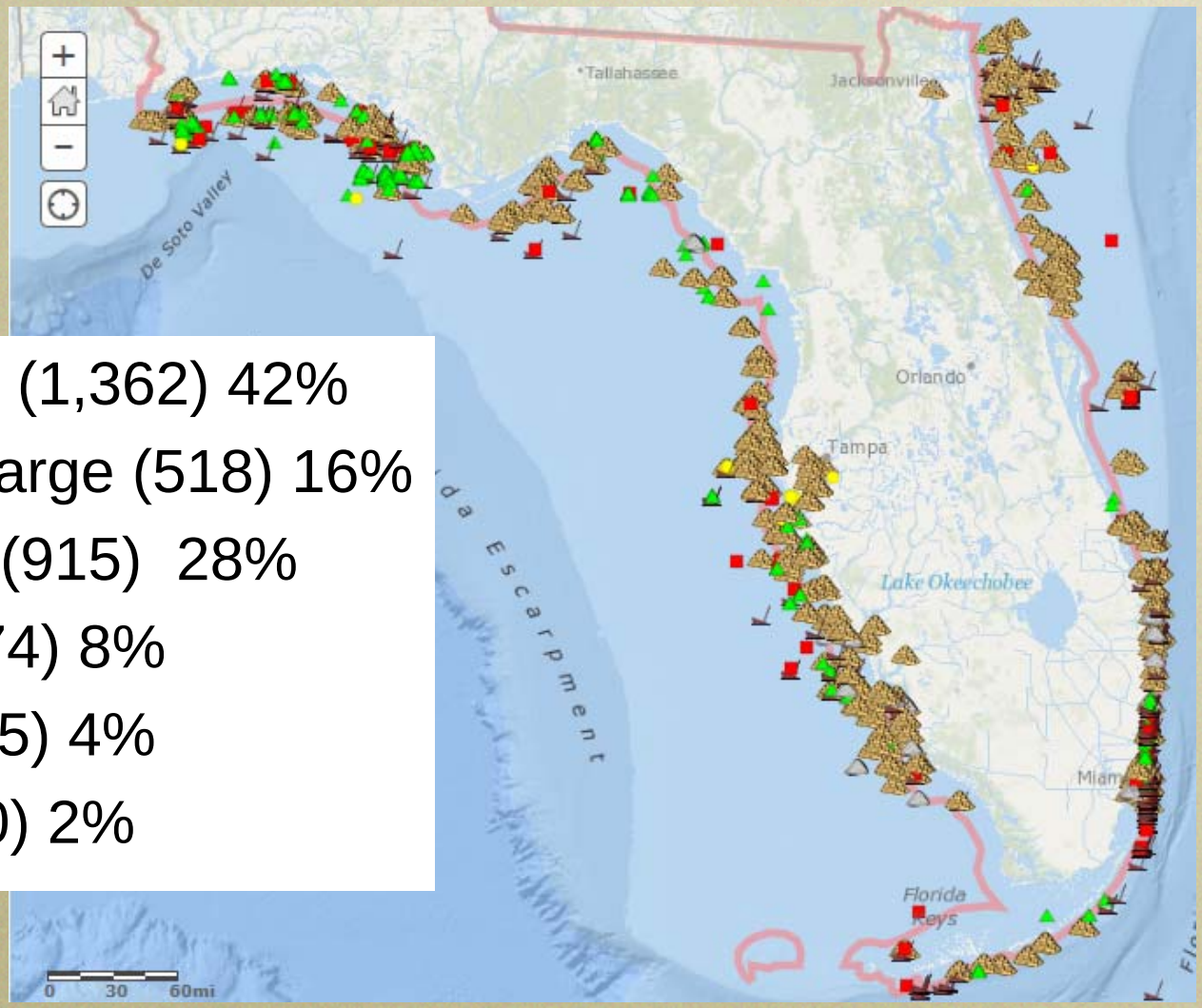
FL Artificial Reef Deployments
3,264 locations

http://arcg.is/1MxCd5y

During 2016: 115

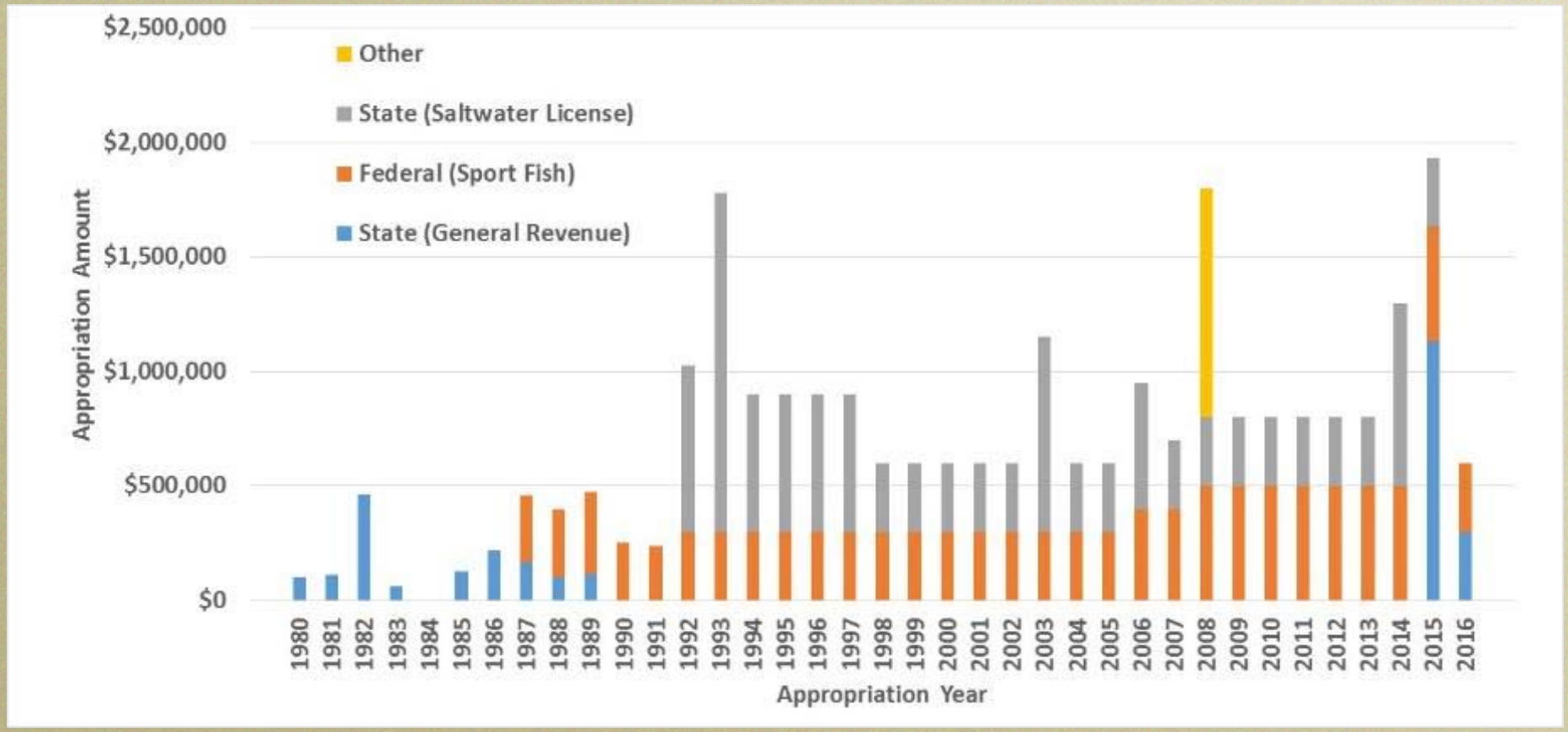
Atlantic: 28

Gulf: 87

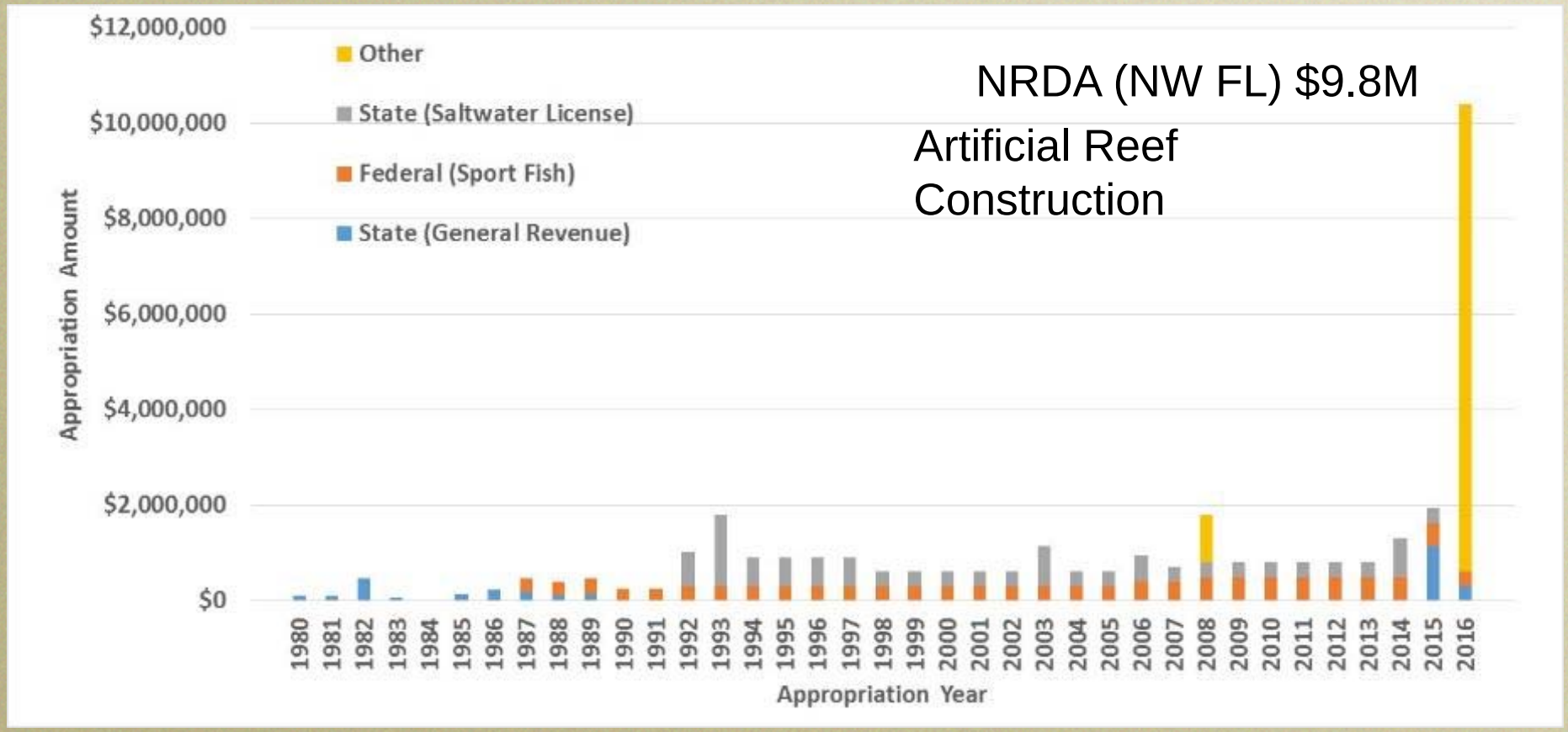


- Concrete (1,362) 42%
- Vessel/Barge (518) 16%
- Modules (915) 28%
- Metal (274) 8%
- Rock (115) 4%
- Other (80) 2%

State of Florida Artificial Reef Grants-in-Aid Program Funding



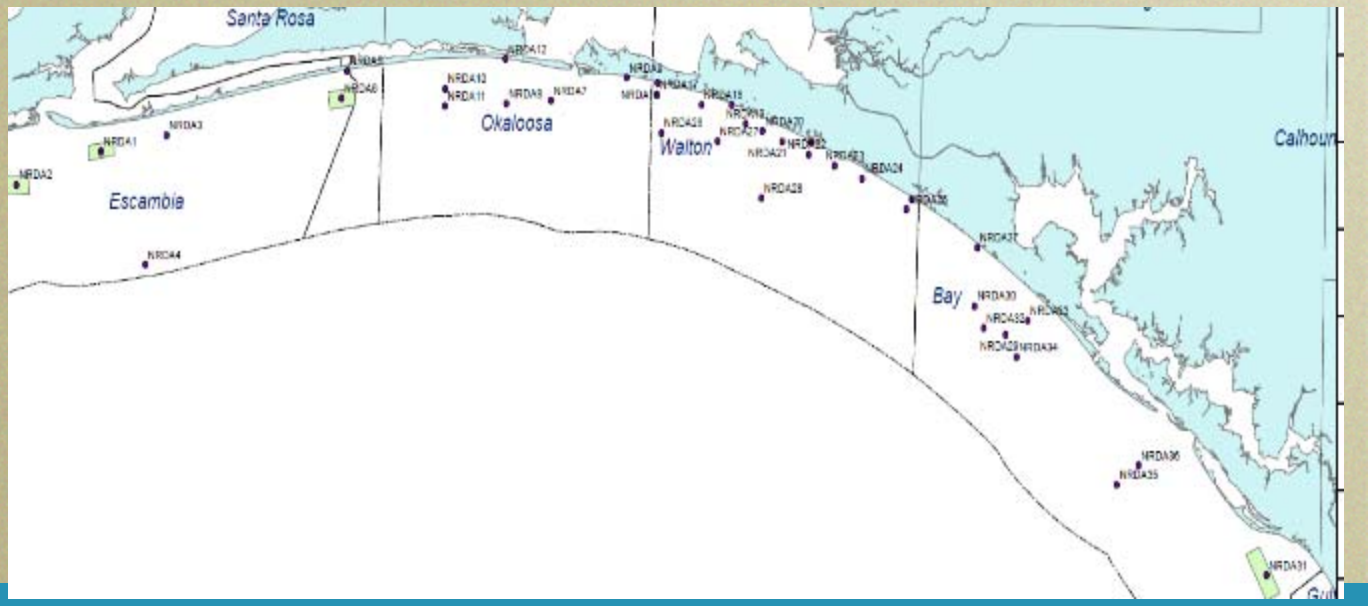
State of Florida Artificial Reef Grants-in-Aid Program Funding



Florida NRDA Artificial Reef Project: Five NW Florida Counties

Deepwater Horizon
Natural Resource Damage Assessment Trustees

- $11.4M ($9.8 Construction)
- In state waters only
- Multiple modular designs (snorkel, recreational fishing)
- Construction started September 2016
- Human use monitoring requirements



2016 Reef Project:
City of Mexico Beach

- 77 modules: four basic units
  - "Florida Limestone Reef" height 8 ft, width 10 ft, 3 tons
  - "Ecosystem Reef (discs)" height 3-5 ft, width 4 ft
  - "Grouper Ledge" height 3 ft, width 5 ft
  - "Super Reef"

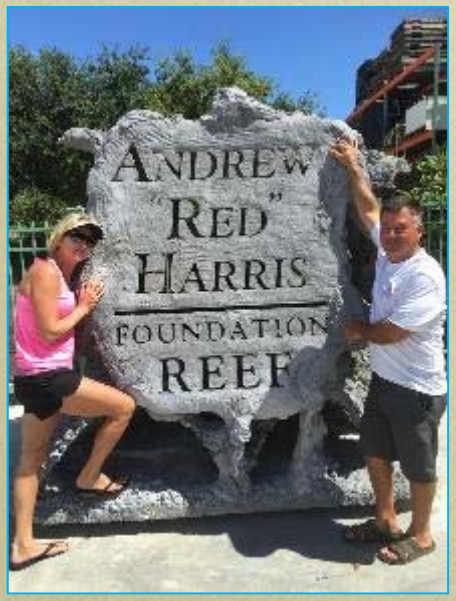
2016 Reef Project: Martin County

- 3,500 tons of various secondary use artificial reef material
- Material stockpiled at County landfill
- Cost was in trucking, offshore transport and deployment
- Sport Fish Restoration (SFR) & State funded
- County cash match

(State-wide: 14,655 tons)

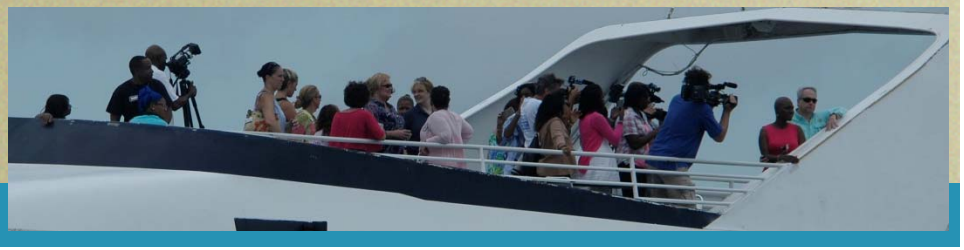
2016 Reef Projects: Palm Beach County

- 100 Modules:
  - “Coral Head” Modules
  - Cinderblock Modules
  - Florida Limestone
- 250 Tons of Limestone Boulders
- Private and FWC funded
- Highly accurate Lat/Long



Palm Beach: Andrea's Reef

- 6 concrete sculptures
- Mermaid modeled after local breast cancer survivor Andrea Torrente
- Built by Riviera Beach Maritime Academy students
- Depth 78 ft.



2016 Reef Project: City of Carrabelle

- Billy's Barge aka the "Anaconda" Barge
- Length: 110 ft
- Depth: 50 ft
- Organized by OAR and CCA
- Private Funds

- "Price's Point"
- Depth: 34ft
- Steel Cross Memorial Reef

Price's Point VIDEO

Billy's Barge VIDEO @20 se

2016 Reef Project: St Lucie County

- Tug Kathleen
- Length: 70 ft
- Depth: 140 ft
- Volunteer Labor
- Private Funds

Tug Kathleen VIDEO

2016 Reef Project: Palm Beach County

- “Ana Cecilia” Cargo Vessel
- Length: 170 ft
- 1.25nm from Lake Worth Inlet
- Depth: 87 ft
- Customs confiscated
- Memorial Plaques for “Lost at Sea”

Ana Cecilia VIDEO @14:00min

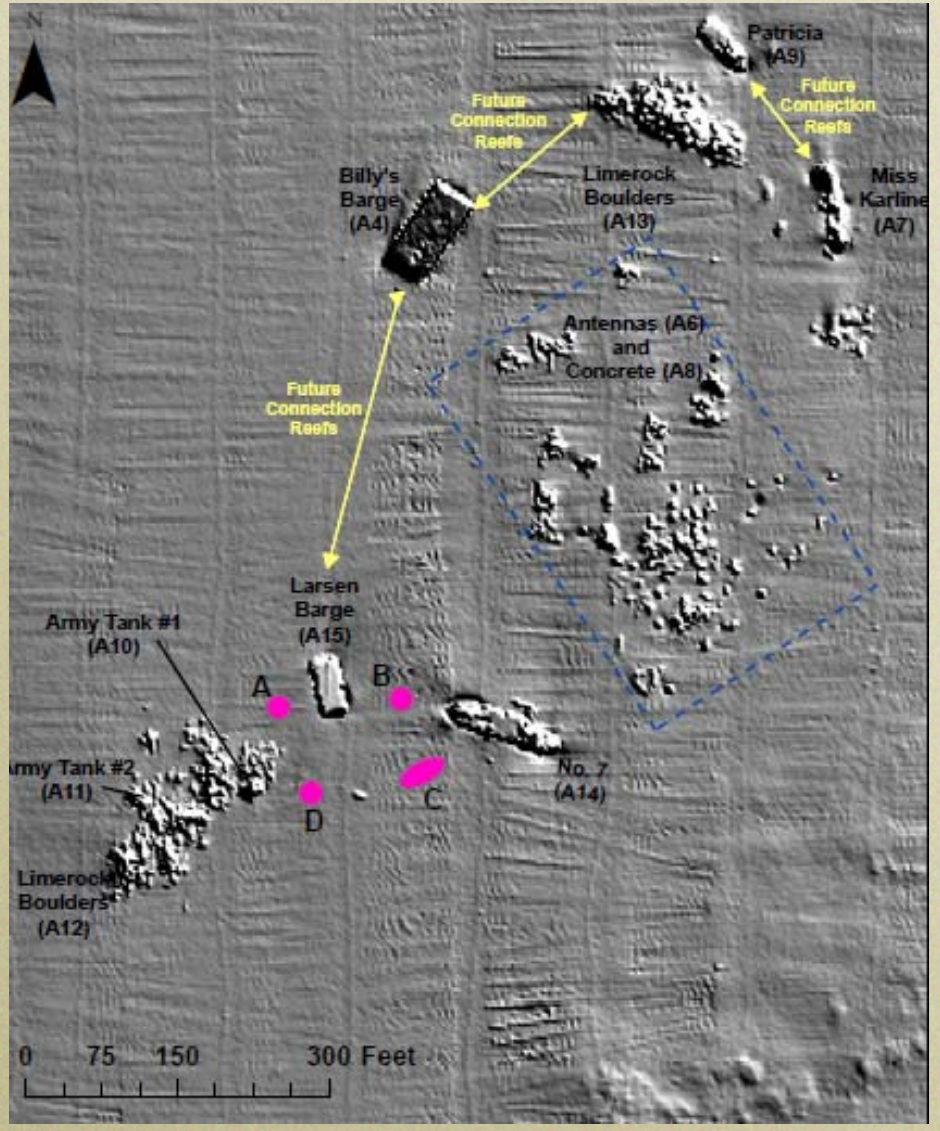
2016 Reef Project: Broward County

- “Lady Luck” Tanker Vessel
- Length: 324 ft
- 1.5nm off Pompano Beach
- Depth: 120 ft
- Unique Partnerships
- High Media Attention
- Deployment Planning

[Lady Luck VIDEO @50 sec]

2016 Reef Project: Miami-Dade County

- "Connectivity", or "Stepping Stone" reefs
- 4 Patch Reefs
- 930 Tons of Limestone Boulders



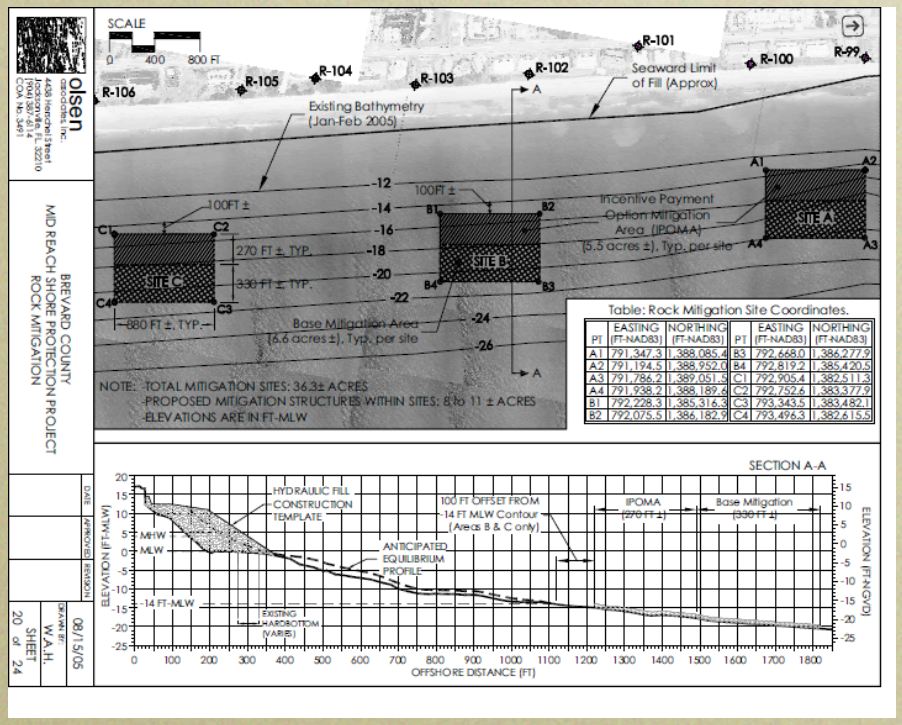
Anchorage Artificial Reef Connection Project (Miami-Dade, 2016)

2016 Reef Project: City of St. Marks

- 101 Modules
- 25 Patch Reefs
- Depth: 18-21 feet

2017 Mitigation Artificial Reefs: Brevard County

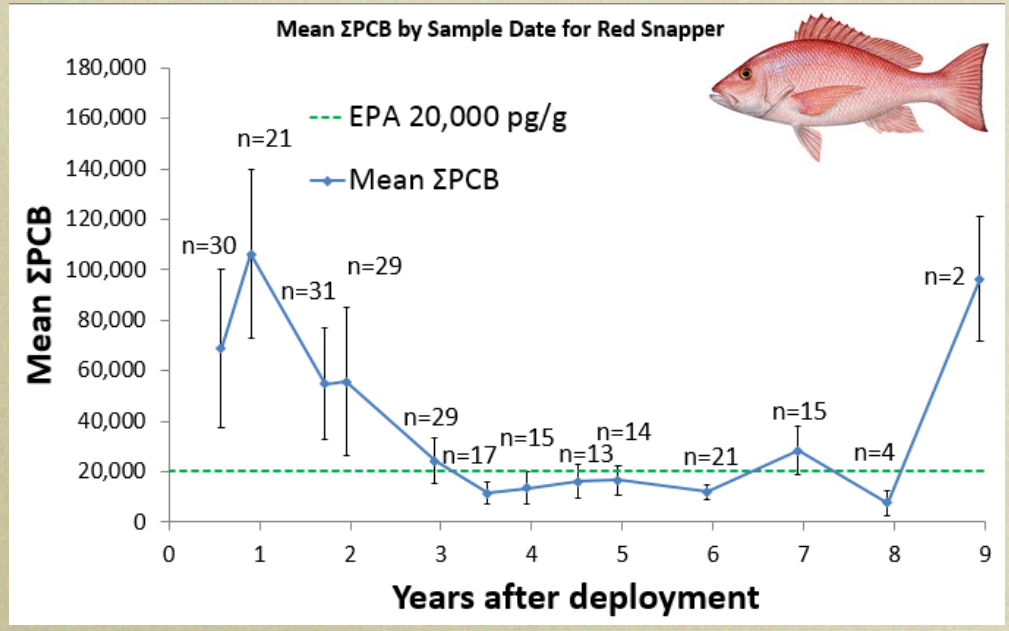
- Brevard Mid-Reach
- 1,620 Articulated concrete mats with coquina-rock surface
- Depth: 14-16 ft. MLW
- Footprint: 4.8 acres
- Cost: $13.2M
- Construction start: April 2017



2016 Procurement Challenges

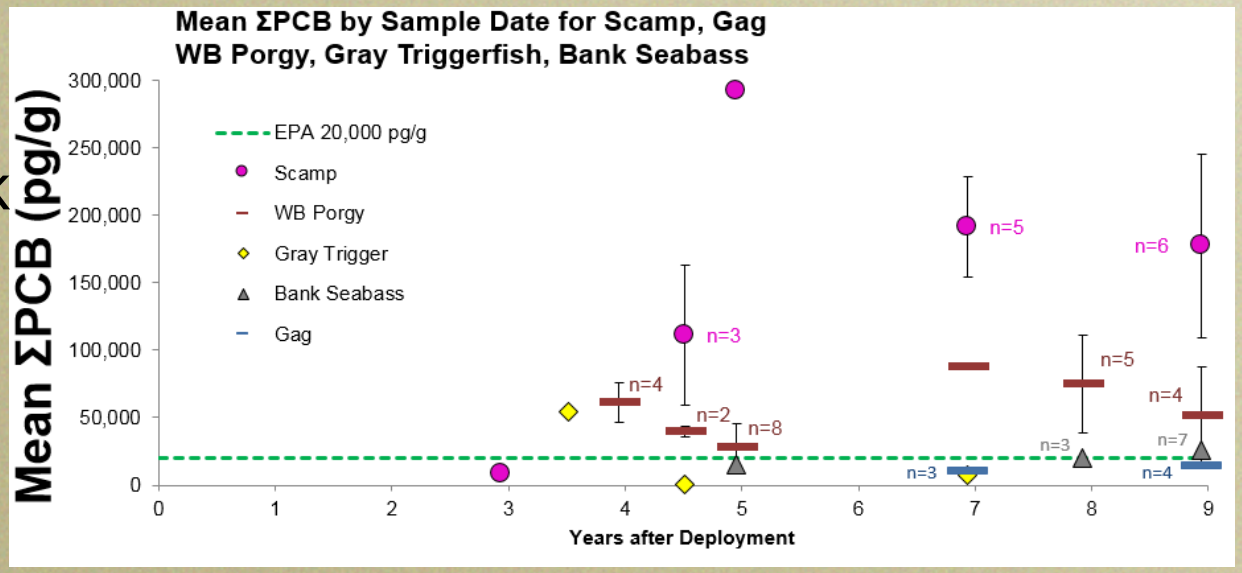
- Increased Accountability and Transparency
  - Florida Accountability Tracking System (FACTS)
  - USFWS Tracking and Reporting Actions for the Conservation of Species (TRACS)
  - State of Florida Certified Contract Manager (FCCM) Training
  - Risk Assessments
  - Audits
- Shift in Materials
  - Reduced availability of secondary use material
  - Preference for limestone
  - More modules, increased accuracy: not based solely on price
- Small vendor pool
  - Single or no responses
  - Cost analysis

Oriskany Reef Fish PCB Monitoring



June 27, 2016 FDOH released consumption "guidelines"

- Bank Seabass: two meals per week
- Scamp Grouper: one meal per week



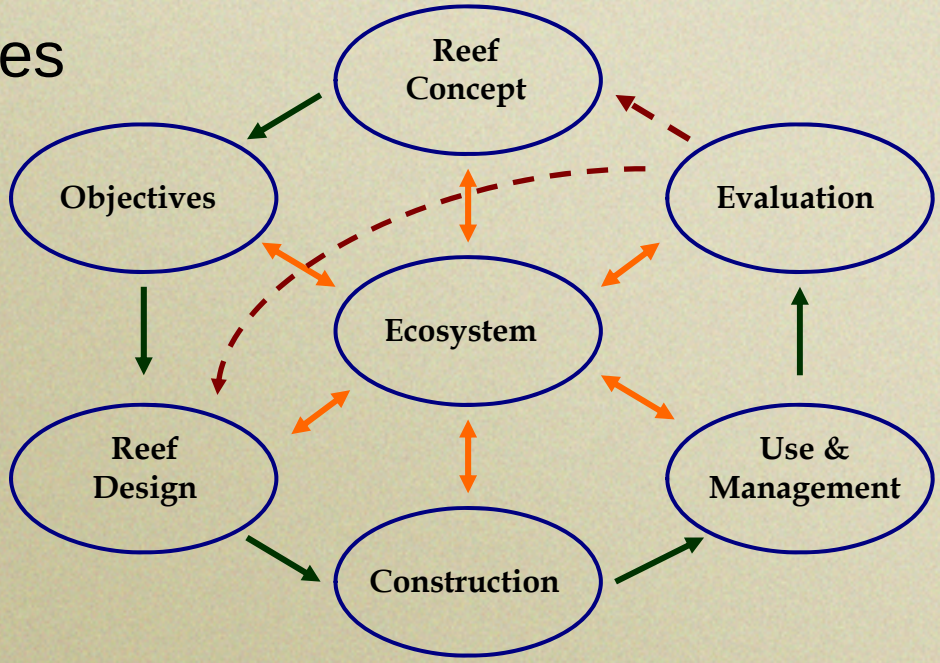
Save the Dates!

- February 22, 2017, Crestview, FL
  - NW Florida Artificial Reef Workshop
- August 20-24, 2017, Tampa
  - AFS 2017 National Meeting, Hosted by FWC
  - Seeking Exhibitors and Sponsors
  - Artificial Reef Symposium
  - Abstracts due March 17, 2017
- September 11-13, Terengganu, Malaysia
  - 11th International CARAH
- September 21, 2017, Palmetto, FL
  - SW Florida Artificial Reef Workshop

Questions?

Program Planning and Partnerships

- Workshops and Conferences
- Grant Applications



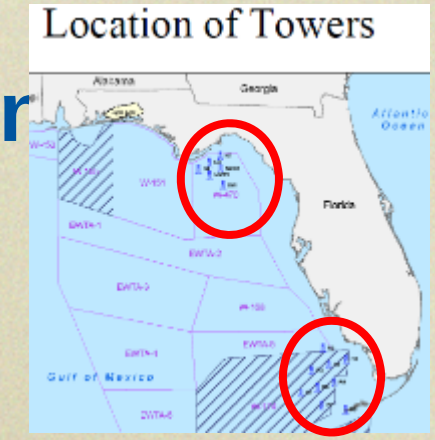
https://www.flseagrant.org/fisheries/artificialreefs/summit/

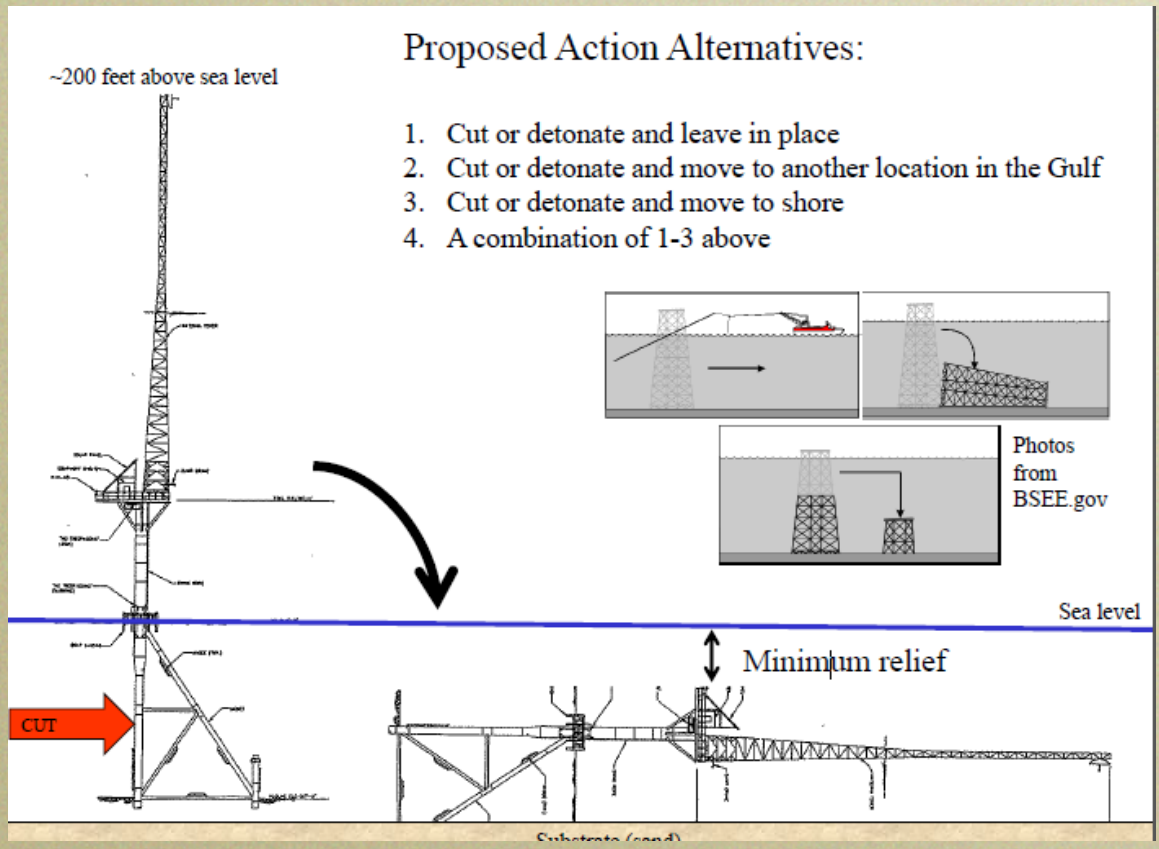
2016 Reef Project: Escambia County

- Tug Ocean Wind
- Length: 88 feet
- 10 nm SE of Pensacola Pass
- Depth: 83 feet
- Contracting challenges

Tug Ocean Wind VIDEO

Air Combat Maneuvering Instrumer (ACMI) towers Decommissioning





Recent Trends

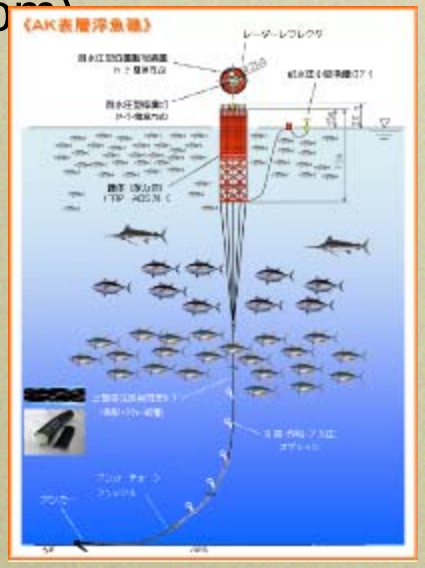
- Deep-water artificial reefs

Oculina coral transplant modules (1996-1998)

OceanGate sub (2014)

National Update

- March 14-15, 2016 GSMFC-ASMFC Artificial Reef Committee
  - Rigs-to-Reefs
  - Historic Preservation Office Requirements
  - 2016 National Saltwater Artificial Reefs Workshop (NOAA & ASMFC)
  - Revisions to Guidelines for Marine Artificial Reef Materials
  - Revisions to SAFMC Habitat Document: Artificial Reef Section
  - Japanese Modular Designs (



2015 Reef Project: Rapa Nui Reef

- Not FWC or County Funded
- 150 ft. barge, 15 Moai statues
- Private $500K public art donation

FWC Artificial Reef Team Changes

Jon retired Dec. 31, 2015, after 23 years with the Florida Artificial Reef Program and 33 years of service with the state of Florida.

Dixie County Artificial Reef Monumen
January 31, 2016

Welcome Christine Carpenter, FWC

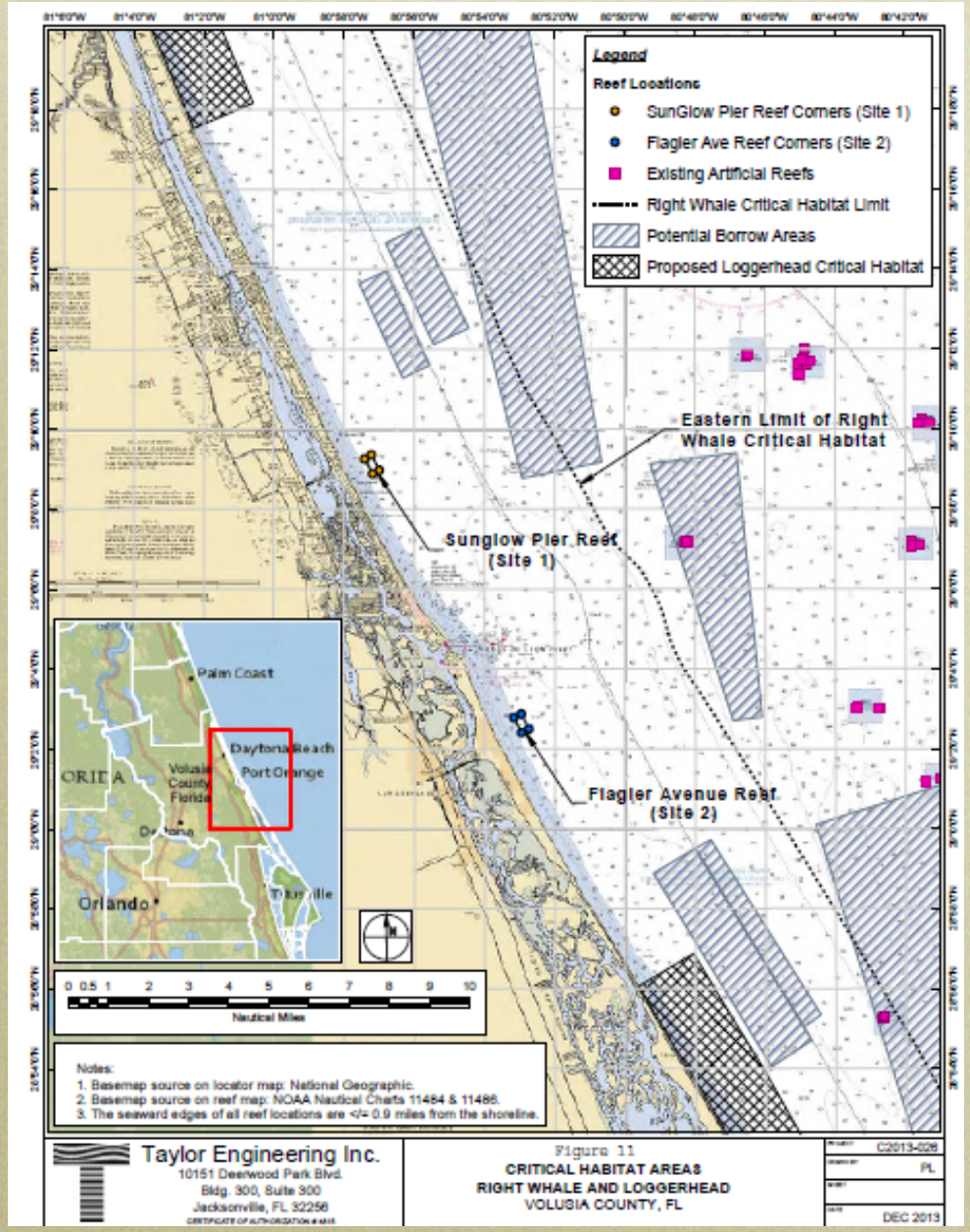
Joined the FWC Artificial Reef Program as a Fisheries Biologist IV on July 14, 2016

Current Artificial Reef Program Status

- Program continues a successful 36 year partnership with local coastal governments
- Coastal governments hold artificial reef permits issued by the U.S. Army Corps of Engineers and Florida Department of Environmental Protection
- Artificial Reefs range in depth from 4 feet to 414 feet (average depth 65 feet)

Recent Trends

- Increased interest in placement in state waters
  - Ease of access
  - Take advantage of less stringent state regulations (e.g. red snapper)



Volusia Nearshore Reefs (Daytona Beach, 2015 and 2016)

Recent Trends

- Artform and “novelty” reefs

Atlantis Memorial Reef (Miami, 2007)

Andrea’s Reef (Palm Beach, 2016)

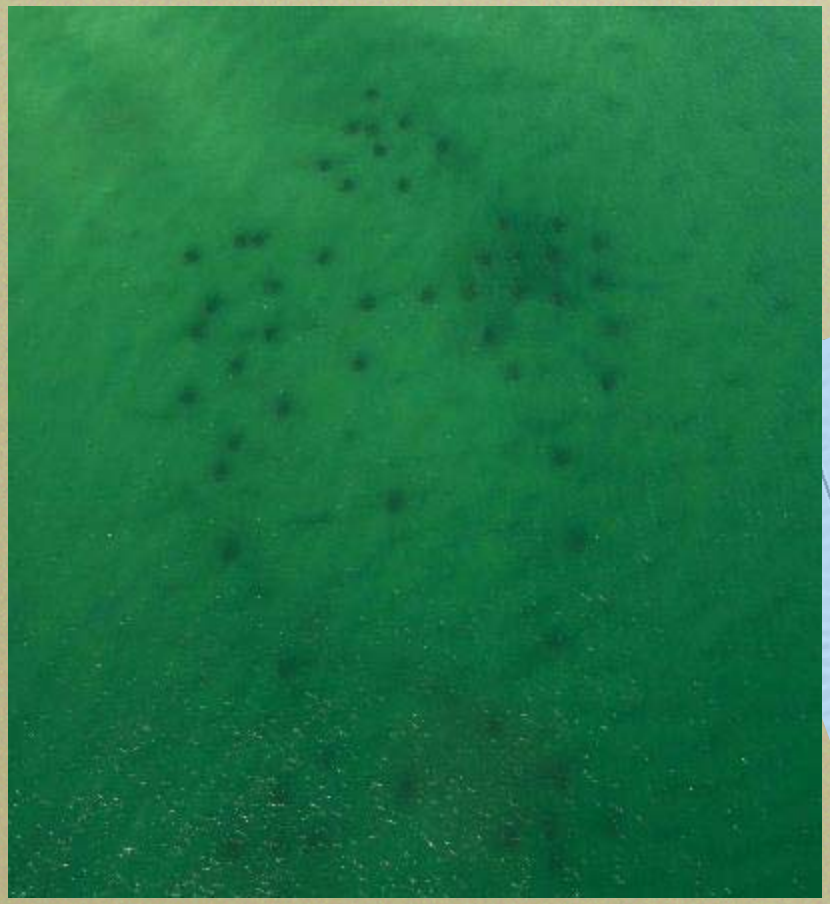
John C. Leone Reef (Jacksonville, 2015)

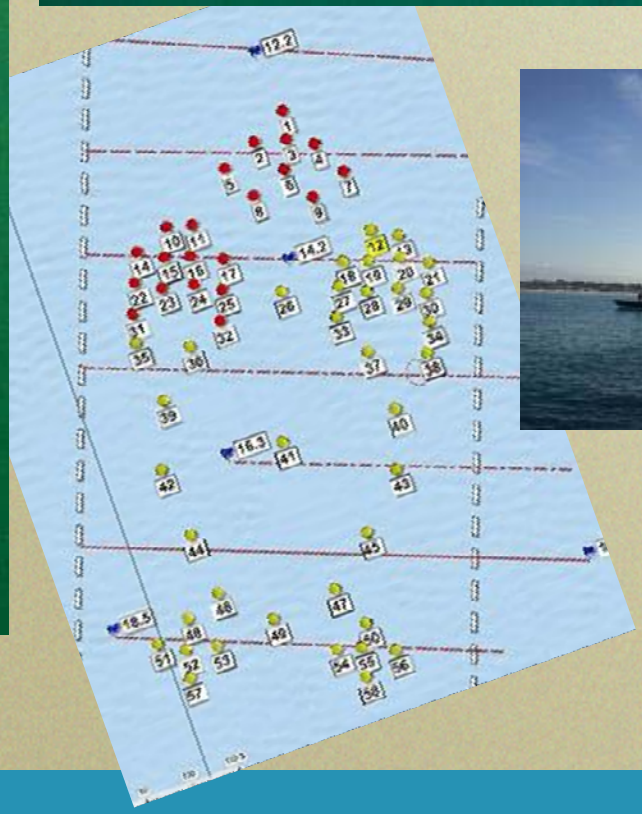
Blue Heron Bridge Snorkel Trail Hammerhead Statues (Palm Beach, 2015)

Rapa Nui Reef (Deerfield Beach, 2015)

Recent Trends

- Artform patterns
  Walton County 2015





Video

Recent Trends

- Marine Debris

Entangled marine turtle (Jacksonville, 2015)

Tenneco Tower Ghost Net (Ft. Lauderdale, 2013)

MONOFILAMENT RECOVERY AND RECYCLING

SEAFAN
Southeast Florida Action Network
We're All Connected – Keep It Protected

SEAFAN Report Form

FLORIDA FISH AND WILDLIFE CONSERVATION COMMISSION

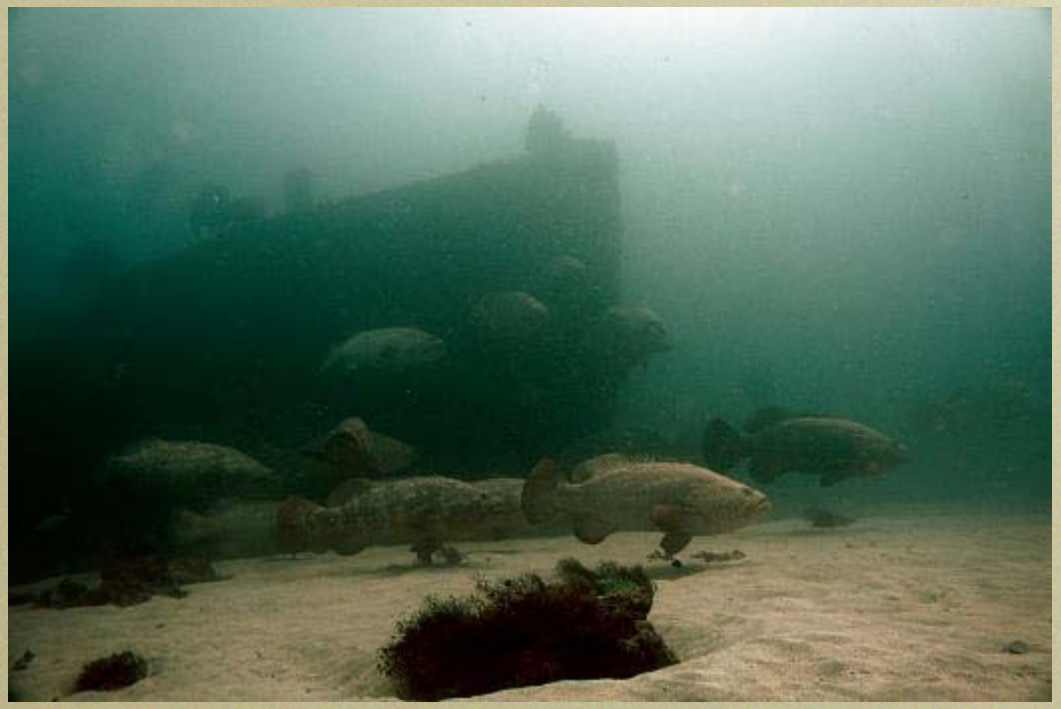
Recent Trends

- Estuarine deployments
  - Reefs under docks
  - Filling dredge holes
  - Oyster reefs
  - Riverine reefs

Blue Heron Bridge, Palm Beach County

Recent Trends

- Goliath Grouper: habitat and controversy

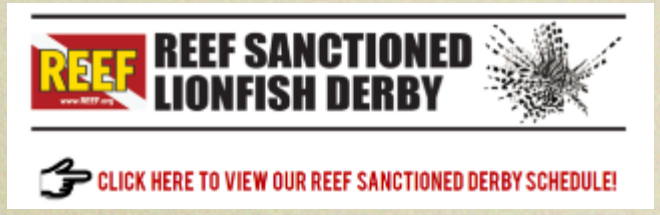


Esso Bonaire Reef, Palm Beach County (Mike Phelan, 2012)

Tunnels Reef, Palm Beach County (Mike Phelan, 2012)

Recent Trends

- Lionfish: removal activities

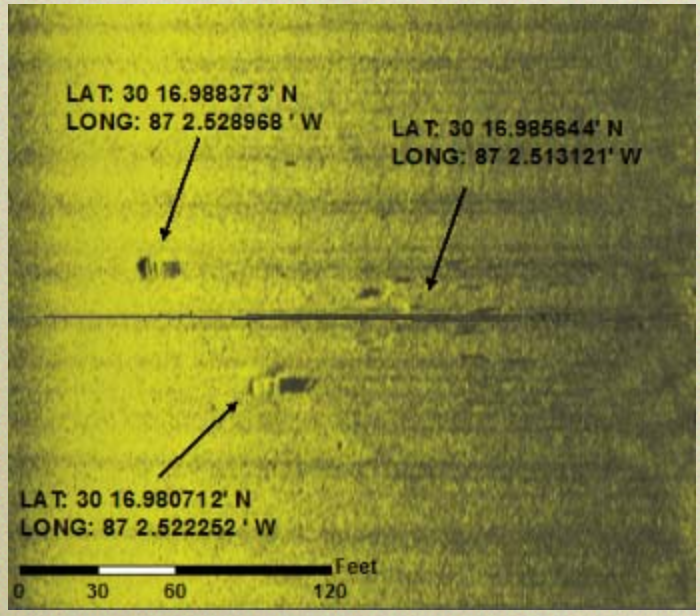


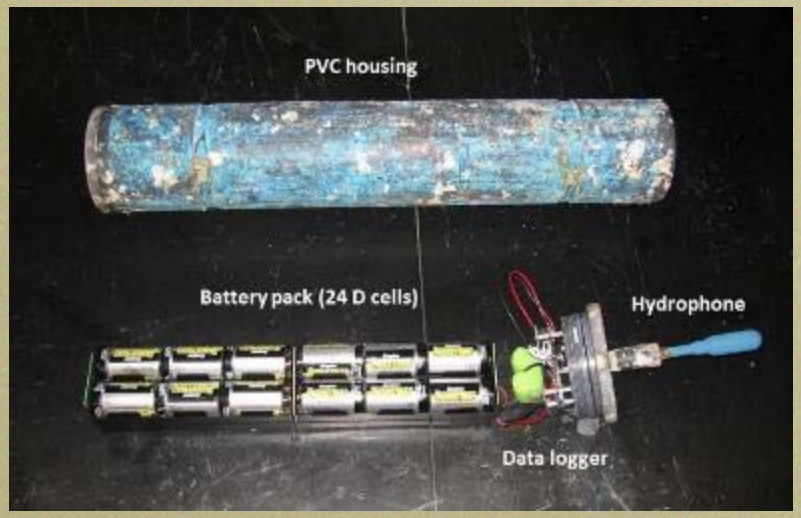
- Invasive sessile species
  - Tubastrea coral
  - Acorn Barnacle
  - Asian Green Mussel

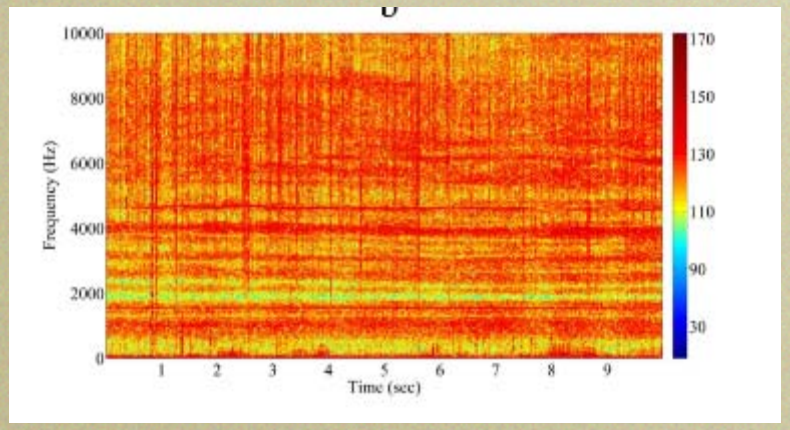
Duane (Key Largo, 2009)

Recent Trends

- Leveraging technology
  - Side scan sonar
  - Acoustic tracking
  - Acoustic listening
  - ROV
  - GIS geodatabases







Acoustic listening spectrogram (USF, 2015)

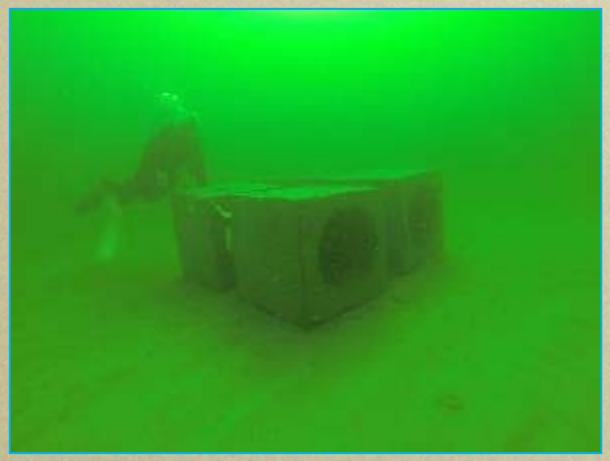
2016 Procurement Clarifications

- Marine Specialty Contractor License not applicable (Section 489.105, F.S.)
- Davis-Bacon Act not applicable (re: Federal Sport Fish Restoration Grant Funds)
- Performance and Payment Bonds not applicable (Section 287, F.S.)
- Consultants Competitive Negotiation Act not applicable (Section 287.055, F.S.)
  - Signed and sealed drawings not required

- Improved Insight
  - Request for Bids vs. Request for Proposals
  - Project Costs
  - Marine Services (Section 287) vs Construction (Section 255)

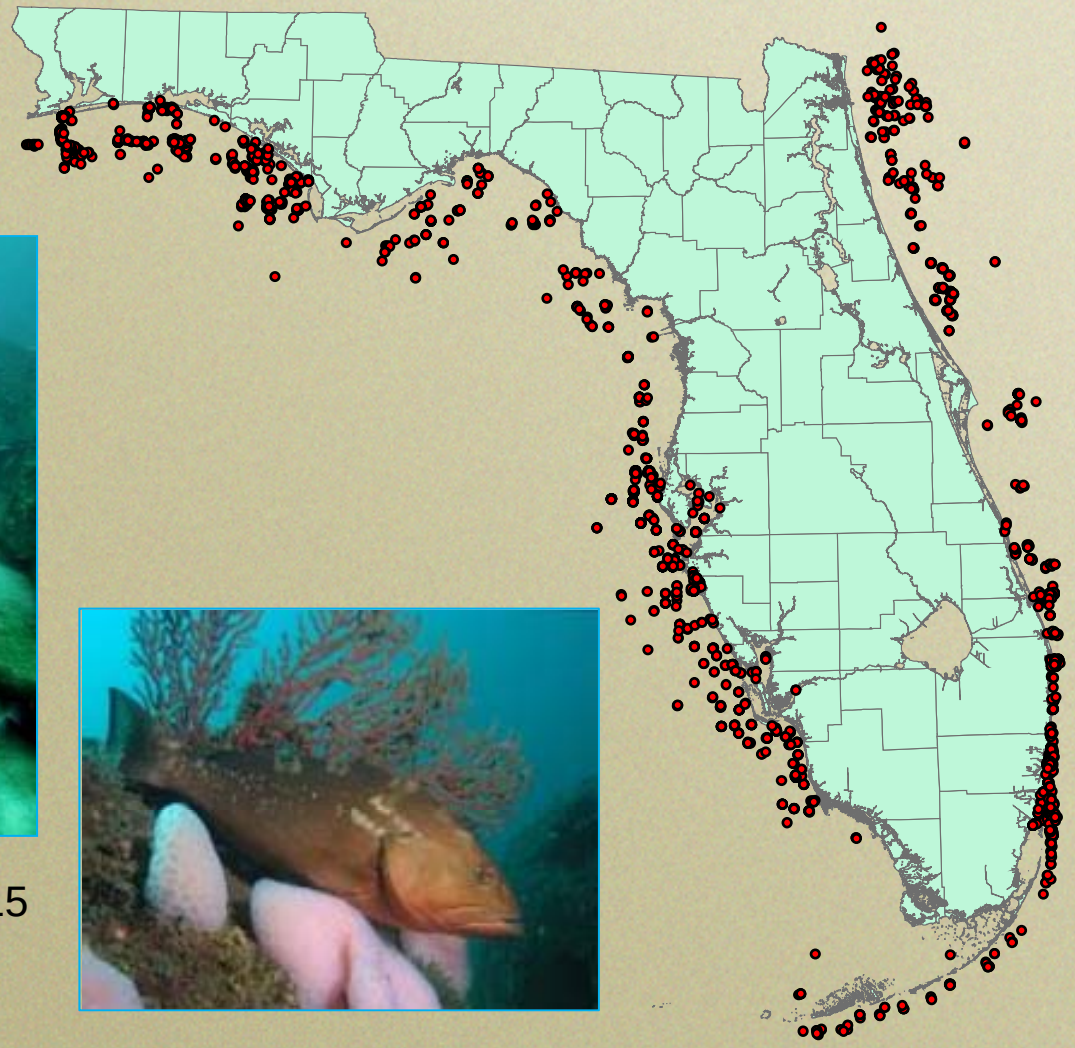
2016 Reef Project: Taylor County SFMA

- 300 cubes (75, 4-cube patch reefs)
- Depth 38 ft.



Statewide Artificial Reef Deployments
3,264 locations (as of December 31, 2016)

- Atlantic: 1,061
- Gulf: 2,203



During 2016: 115

- Atlantic: 28
- Gulf: 87

Texas Artificial Reef Program
2016 Overview

Texas Parks and Wildlife Department
Artificial Reef Program
J. Dale Shively

Artificial Reef Program

- Over 7,000 Acres
- 86 Established Reef Sites, 1 pending permit approval
- 148 Platform & 11 Component Donations
- Over 30 Platform Donations in Progress
- Rigs-to-Reefs Program Has Contributed $26 Million to Texas Artificial Reef Fund since 1990
- 11 Nearshore (in state waters) reefs
- 16 Ships-to-Reefs (large vessels)

OCS Block	Reef Sites
High Island	42
Galveston	7
Brazoria	6
East Breaks	3
Garden Banks	2
Matagorda Island	6
Mustang Island	11
North Padre	4
South Padre	5

Water Depth (ft)	Reef Sites
20 – 49	4
50 - 100	14
101 - 150	13
151 - 200	19
201 - 250	17
251 - 300	11
301 - 500	3
501 - 935	5

Nearshore Reefs & Public Reefing Program

Quarry Rocks

Concrete Culverts

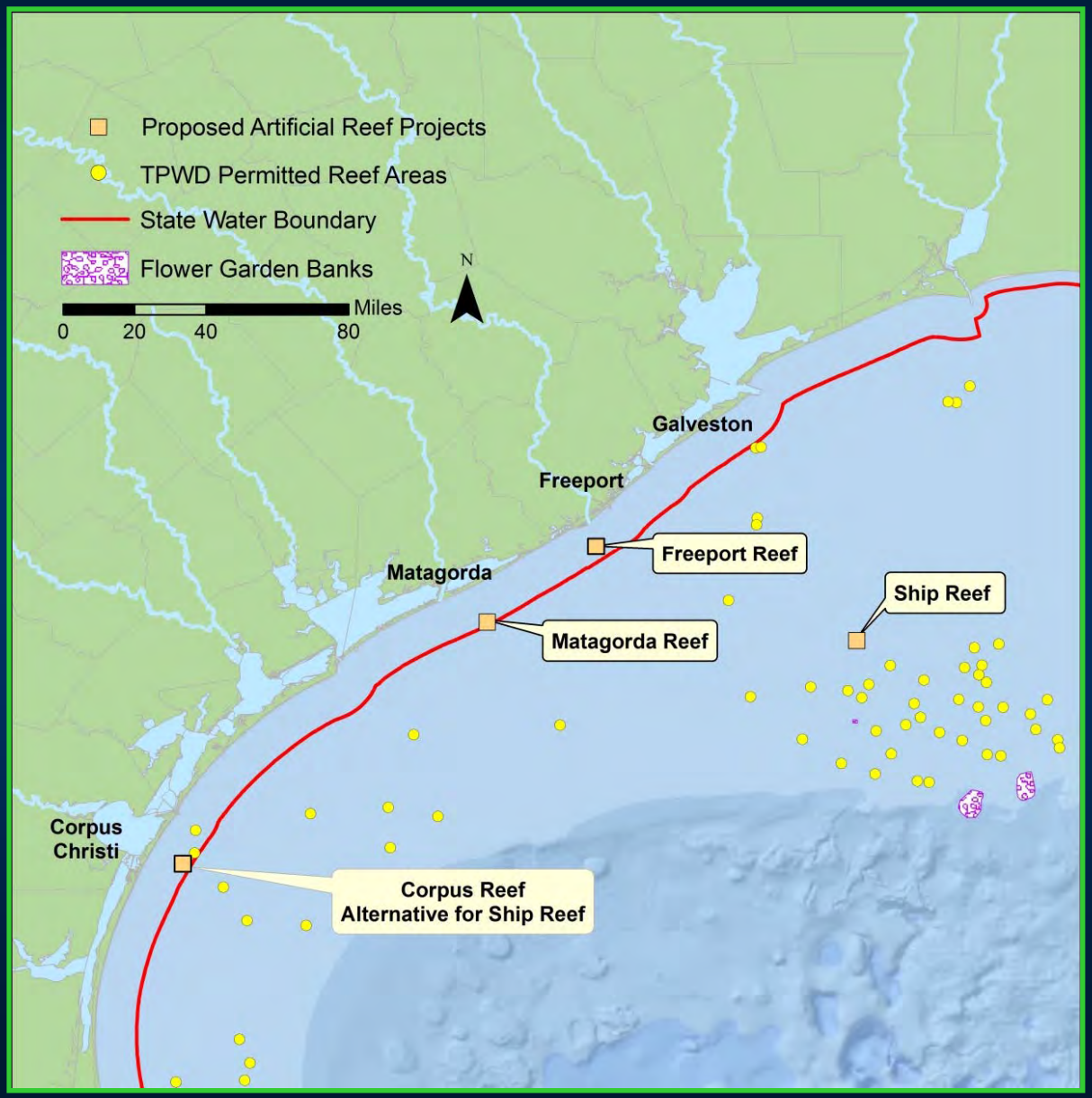
Reef Pyramids

Reef Balls

Bridges and Causeways

Texas
Sabine
Big Man Reef
Vancouver
Matagorda
Port O'Connor
Lonestar / Boatmans
Corpus Christi
Port Mansfield
Rio Grande Valley
Port Isabel
Gulf of Mexico
N
W
E
S

TPWD NRDA / Restore Act Projects



Freeport (Vancouver) and Matagorda Nearshore Reefs

- NRDA (Natural Resource Damage Assessment) funded projects
- $5 million
- Contract awarded to Callan Marine (Galveston)
- Reefing:
  - Freeport Reef: 800 reef pyramids
  - Matagorda Reef: 1,600 reef pyramids

NRDA Pyramid Deployments

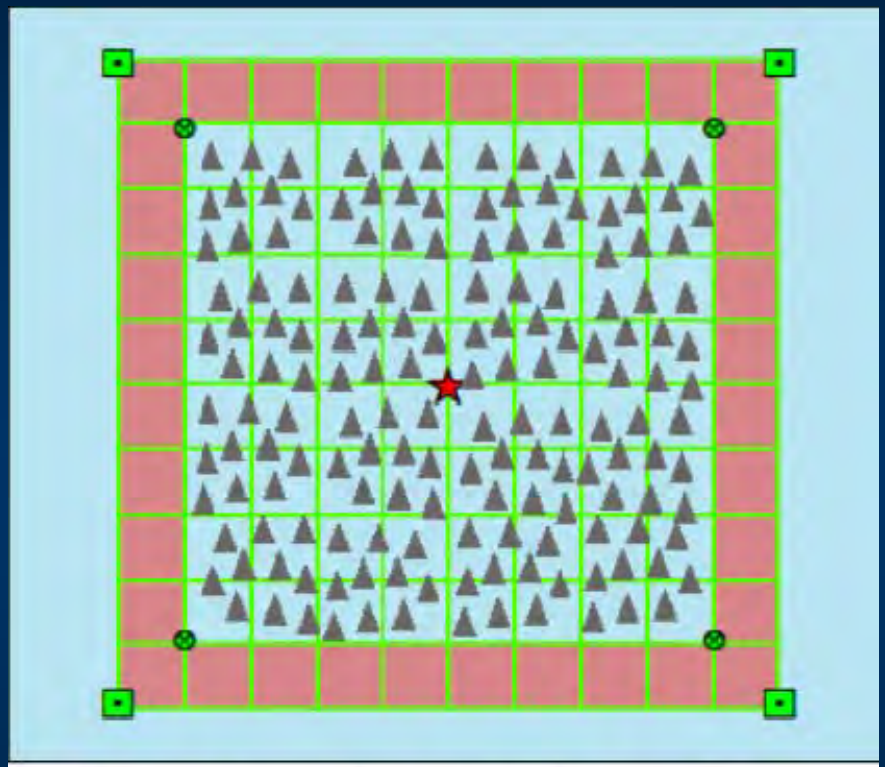
Vancouver Deployment December 2016

VOLVO

Final NRDA Pyramid Outcome

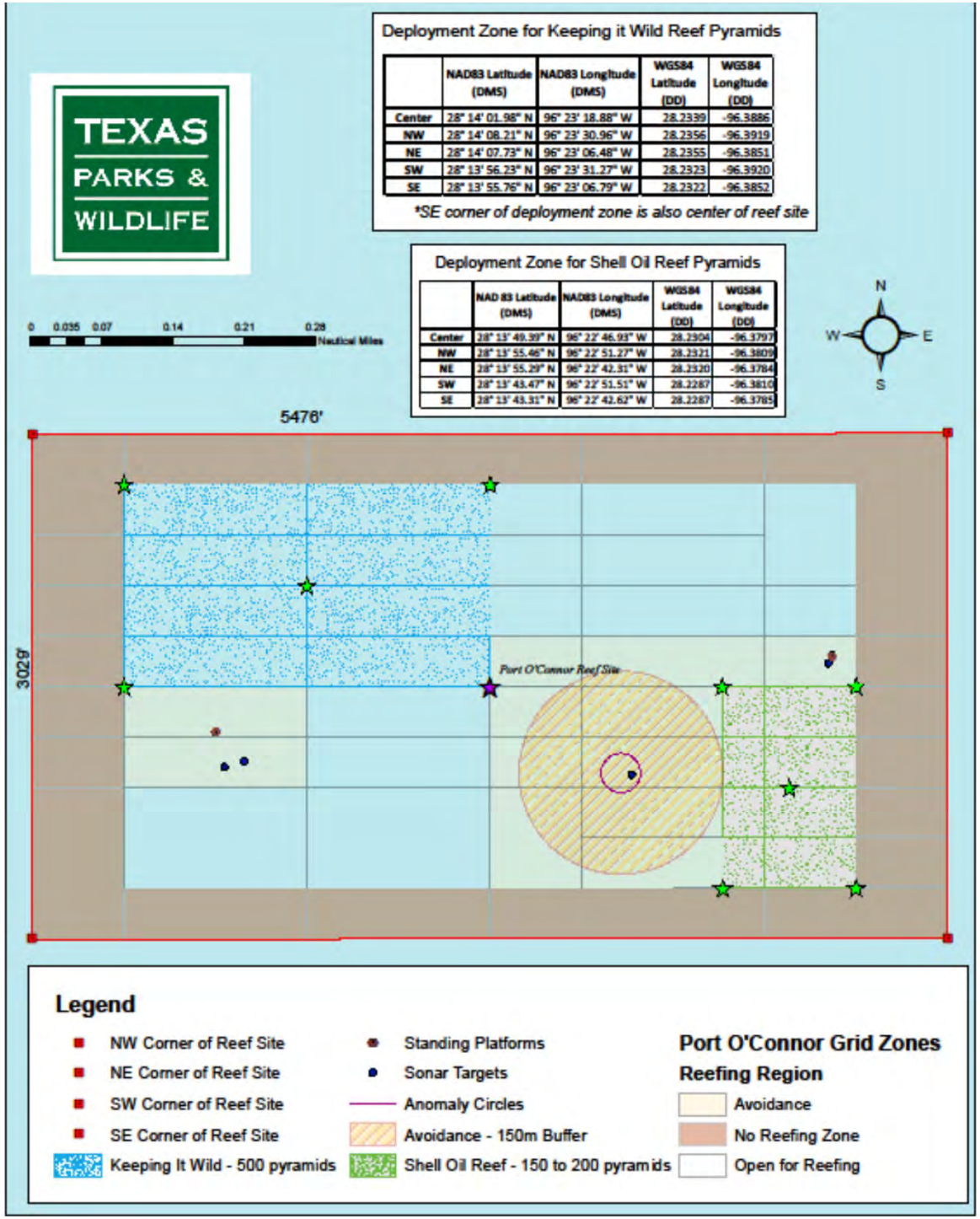
800 pyramid reefs will be placed in the reefing area of the George Vancouver Nearshore Reef Site.

each ▲ represents 10 pyramid structures



1600 pyramid reefs will be placed in the reefing area of the Matagorda Nearshore Reef Site.

each ▲ represents 10 pyramid structures



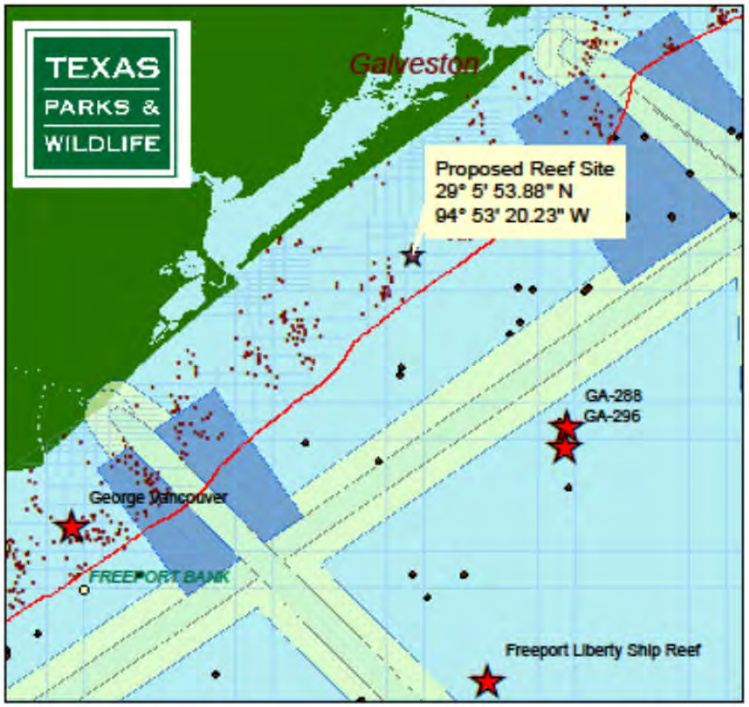
Port O'Connor Reef Site

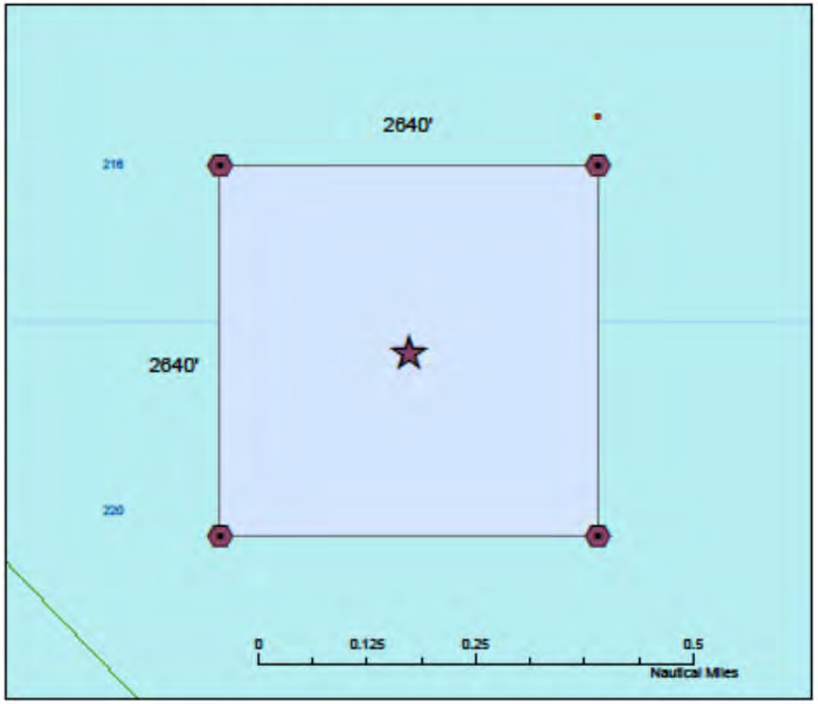
Funding:

- $600,000 committed from Texas Capital Campaign
- $400,000 TPWD Reef Program
- $100,000 CCA

Galveston- Big Man's Reef Site

Proposed Galveston Nearshore Reef Site (GA-220 N/2) - 160 Acres





Coordinates for the Proposed Galveston Nearshore Reef Site

	NAD83 Latitude	NAD83 Longitude	NAD27 Latitude	NAD27 Longitude	NAD83 SPSC X	NAD83 SPSC Y	NAD27 SPSC X	NAD27 SPSC Y
Center	29° 05' 53.88" N	94° 53' 20.23" W	29° 05' 53.01" N	94° 53' 19.51" W	3281039.128	13606351.955	3312631.485	482915.527
NW	29° 06' 07.40" N	94° 53' 34.58" W	29° 06' 06.53" N	94° 53' 33.86" W	3279719.122	13607671.968	3311311.485	484235.527
NE	29° 06' 06.48" N	94° 53' 04.83" W	29° 06' 05.61" N	94° 53' 04.12" W	3282359.148	13607671.969	3313951.485	484235.527
SE	29° 05' 40.36" N	94° 53' 05.88" W	29° 05' 39.49" N	94° 53' 05.16" W	3282359.135	13605031.941	3313951.485	481595.527
SW	29° 05' 41.28" N	94° 53' 35.62" W	29° 05' 40.41" N	94° 53' 34.90" W	3279719.108	13605031.941	3311311.485	481595.527

Geographic Coordinates (Degrees Minutes Seconds) and State Plane Texas South Central FIPS_4204 (feet) in NAD27 and NAD83

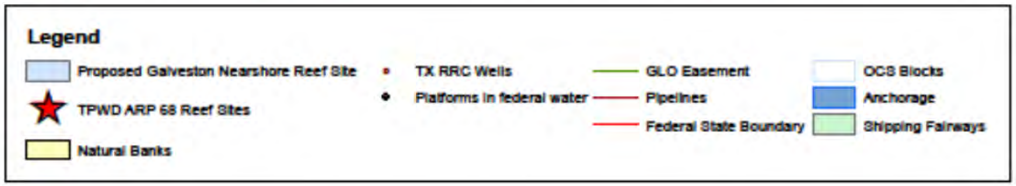
Water Depth: 48 ft

Estimated Substrate: Sand

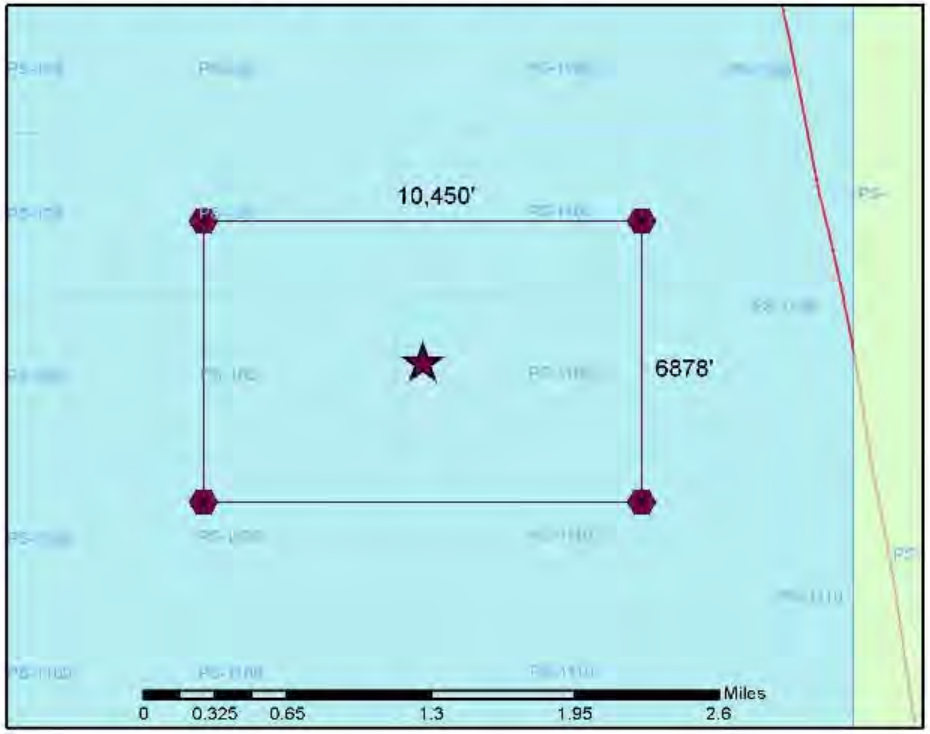
Nearest Point to Point Distances

Distance Offshore: 6.55 nm
Safety Fairways: 10.71 nm
Anchorage: 10.77 nm
Oil and Gas Pipelines or Easement: 1402.14 ft
State and Federal Boundary: 2.46 nm
Obstruction or Platforms: 350.14 ft

Distance from San Luis Pass: 12.16 nm
Distance from Galveston Jetties: 16.74 nm



Proposed Rio Grande Valley Nearshore Reef Site (PS-1105) - 1650 Acres



Coordinates for the Proposed Rio Grande Valley Nearshore Reef Site

	NAD83 Latitude	NAD83 Longitude	TX SP South X	TX SP South Y
Center	26° 16' 42.19" N	97° 02' 59.27" W	1459446.10	16629255.03
NW	26° 17' 17.06" N	97° 03' 55.97" W	1454245.68	16632716.58
NE	26° 17' 15.33" N	97° 02' 01.32" W	1464682.12	16632662.48
SE	26° 16' 07.31" N	97° 02' 02.58" W	1464646.45	16625793.45
SW	26° 16' 09.03" N	97° 03' 57.22" W	1454210.14	16625847.55

Geographic Coordinates (Degrees Minutes Seconds) and State Plane Texas South FIPS_4205 (feet) in NAD83

Water Depth: 64 ft

Estimated Substrate: Sand and Silty-Sand

Legend

- Proposed Rio Grande Valley Nearshore Reef Site
- TPWD ARP 71 Reef Sites
- Federal and State Platforms
- GOM Pipelines
- Federal State Boundary
- Natural Banks
- State and Federal OCS Blocks
- Anchorage
- Shipping Fairways
- Fairways Buffer

Nearest Point to Point Distances

Distance Offshore: 7.4 nm
Safety Fairways: 3.4 nm
Anchorage: 7.7 nm
Oil and Gas Pipelines or Easement: 8.4 nm
State and Federal Boundary: 1.7 nm
Obstruction or Platforms: 11.3 nm

Distance from Port Isabel Jetties: 13.9 nm

RGV Reef
“Scratch and Dent Sale”

Ships-to-Reefs

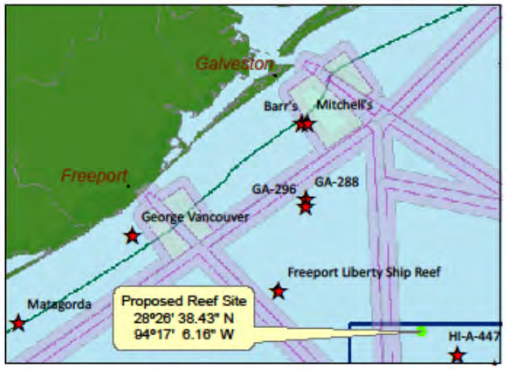
- 1960s: 3 Barges
- 1970s: 12 Liberty Ships,
  T2 Tanker – V.A. Fogg
- 1980s: Barge
- 1990s: Tugboat, Navy Barge
- 2000s: Tugboat, Hopper Barge, Shrimp Boat, 473’ Texas Clipper, 155’ MV Kinta S

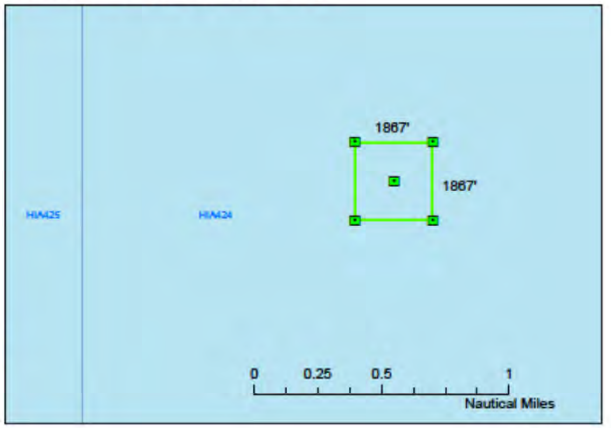
NRDA Project: HI-A-424

All remediation completed

Waiting on Weather Window DEC 2016

Proposed Ships-to-Reef Location - HI-A-424 - 80 acres





Nearest Point to Point Distances:
Distance Offshore: 57.6 Nautical Miles
Safety Fairways: 5.89 Nautical Miles
Oil and Gas Pipelines: 2.95 Nautical Miles
State and Federal Boundary: 47.6 Nautical Miles
Obstruction or Platforms: 9.69 Nautical Miles

	NAD 83 Latitude	NAD 83 Longitude	NAD 27 Latitude	NAD 27 Longitude	NAD 83 SPSC_X	NAD 83 SPSC_Y	NAD 27 SPSC_X	NAD 27 SPSC_Y
Center	28°26' 38.43" N	94°17' 6.16" W	28°26' 37.50" N	94°17' 5.52" W	3483339.947	13375925.997	3514930.211	252492.894
NW	28°26' 48.04" N	94°17' 16.18" W	28°26' 47.11" N	94°17' 15.54" W	3482406.537	13376859.407	3513996.818	253426.287
NE	28°26' 47.29" N	94°16' 55.29" W	28°26' 46.36" N	94°16' 54.65" W	3484273.357	13376859.407	3515863.611	253426.298
SE	28°26' 28.83" N	94°16' 56.13" W	28°26' 27.89" N	94°16' 55.49" W	3484273.357	13374992.587	3515863.604	251559.501
SW	28°26' 29.57" N	94°17' 17.03" W	28°26' 28.64" N	94°17' 16.39" W	3482406.537	13374992.587	3513996.811	251559.490

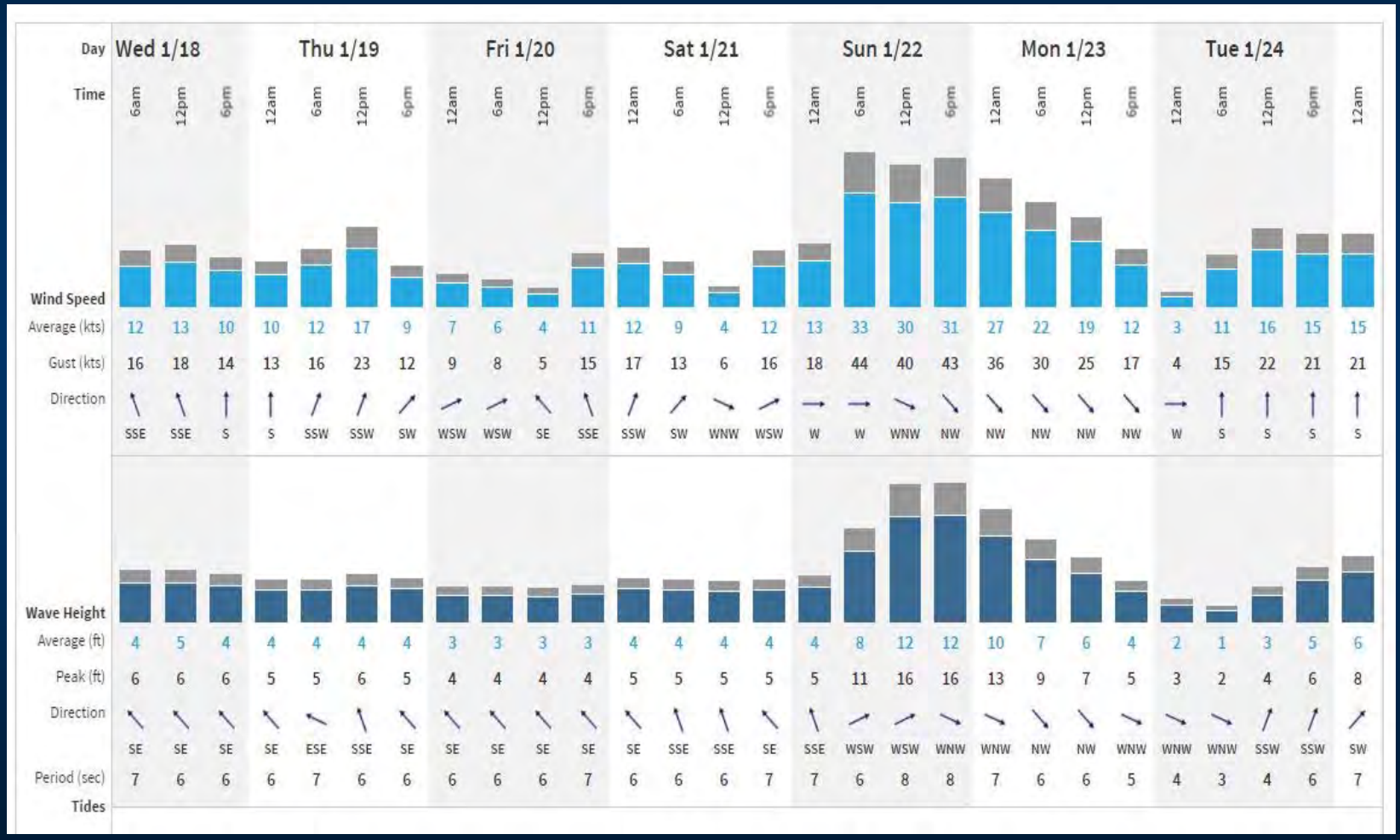
Geographic Coordinates (Degrees Minutes Seconds) and State Plane Texas South Central FIPS_4204 (feet) in NAD27 and NAD83.

TEXAS PARKS & WILDLIFE

Legend
- TPWD ARP 66 Reef Sites
- HI-A-424
- Fairways
- 2 NM Fairway Buffer
- Anchorages
- Natural Banks
- TX State/Federal Line
- Reef Planning Zones

N

Can We Do It?



Day	Wed 1/18			Thu 1/19				Fri 1/20				Sat 1/21				Sun 1/22				Mon 1/23				Tue 1/24				
Time	6am	12pm	6pm	12am	6am	12pm	6pm	12am	6am	12pm	6pm	12am	6am	12pm	6pm	12am	6am	12pm	6pm	12am	6am	12pm	6pm	12am	6am	12pm	6pm	12am
Wind Speed																												
Average (kts)	12	13	10	10	12	17	9	7	6	4	11	12	9	4	12	13	33	30	31	27	22	19	12	3	11	16	15	15
Gust (kts)	16	18	14	13	16	23	12	9	8	5	15	17	13	6	16	18	44	40	43	36	30	25	17	4	15	22	21	21
Direction	SSE	SSE	S	S	SSW	SSW	SW	WSW	WSW	SE	SSE	SSW	SW	WNW	WSW	W	W	WNW	NW	NW	NW	NW	NW	W	S	S	S	S
Wave Height																												
Average (ft)	4	5	4	4	4	4	4	3	3	3	3	4	4	4	4	4	8	12	12	10	7	6	4	2	1	3	5	6
Peak (ft)	6	6	6	5	5	6	5	4	4	4	4	5	5	5	5	5	11	16	16	13	9	7	5	3	2	4	6	8
Direction	SE	SE	SE	SE	ESE	SSE	SE	SE	SE	SE	SE	SE	SSE	SSE	SE	SSE	WSW	WSW	WNW	WNW	NW	NW	WNW	WNW	WNW	SSW	SSW	SW
Period (sec)	7	6	6	6	7	6	6	6	6	6	7	6	6	6	7	7	6	8	8	7	6	6	5	4	3	4	6	7
Tides																												

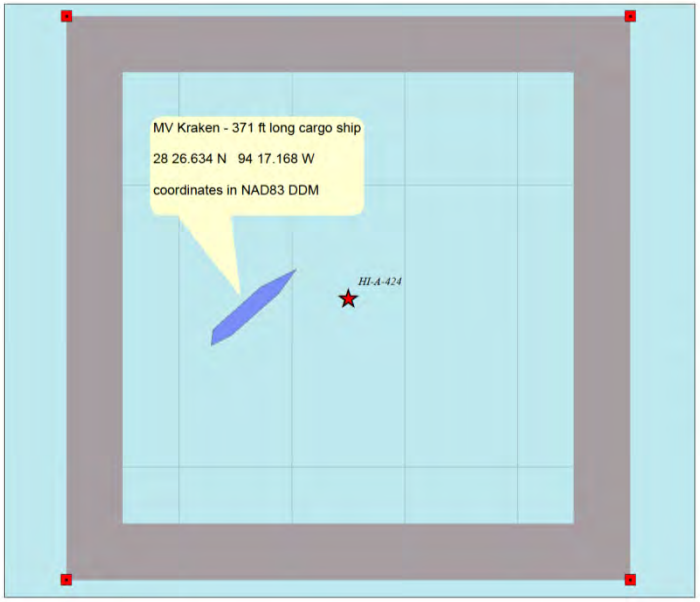
RELEASE THE KRAKEN

KRAKEN RELEASED
20 JAN 2017

Kraken Angle Measurement

Texas Parks and Wildlife Department
Artificial Reef Program
HI-A-424 Reef Site - Kraken Deployment

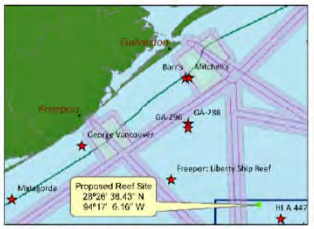
Deployed: 20 January 2017

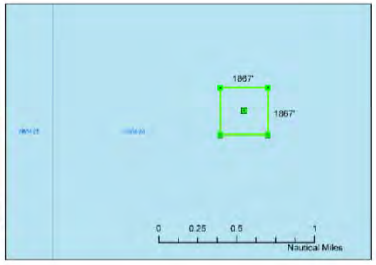


HI-A-424 Reef Site
1867' x 1867'
80 Acres
Average Depth - 140'

Nearest Point to Point Distances:

Distance Offshore: 57.6 Nautical Miles
Safety Fairways: 5.89 Nautical Miles
Oil and Gas Pipelines: 2.95 Nautical Miles
State and Federal Boundary: 47.6 Nautical Miles
Obstruction or Platforms: 9.69 Nautical Miles





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NE	28°28' 47.29" N	94°16' 55.29" W	28°28' 46.36" N	94°16' 54.65" W	3484273.357	13376556.407	3515863.611	253426.298
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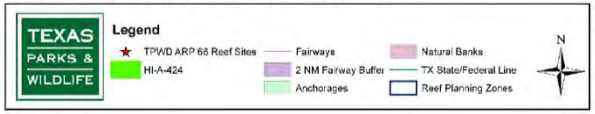
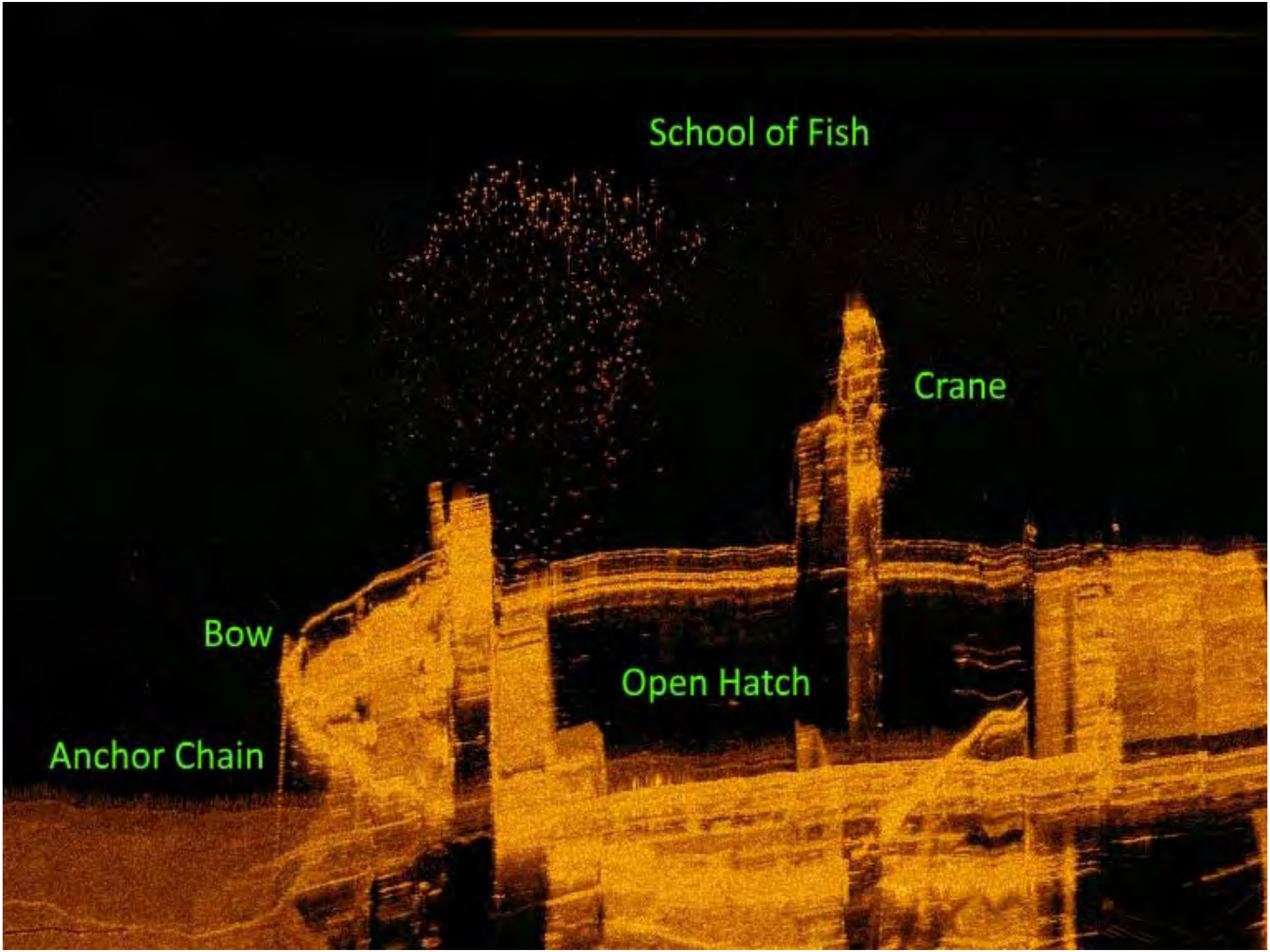
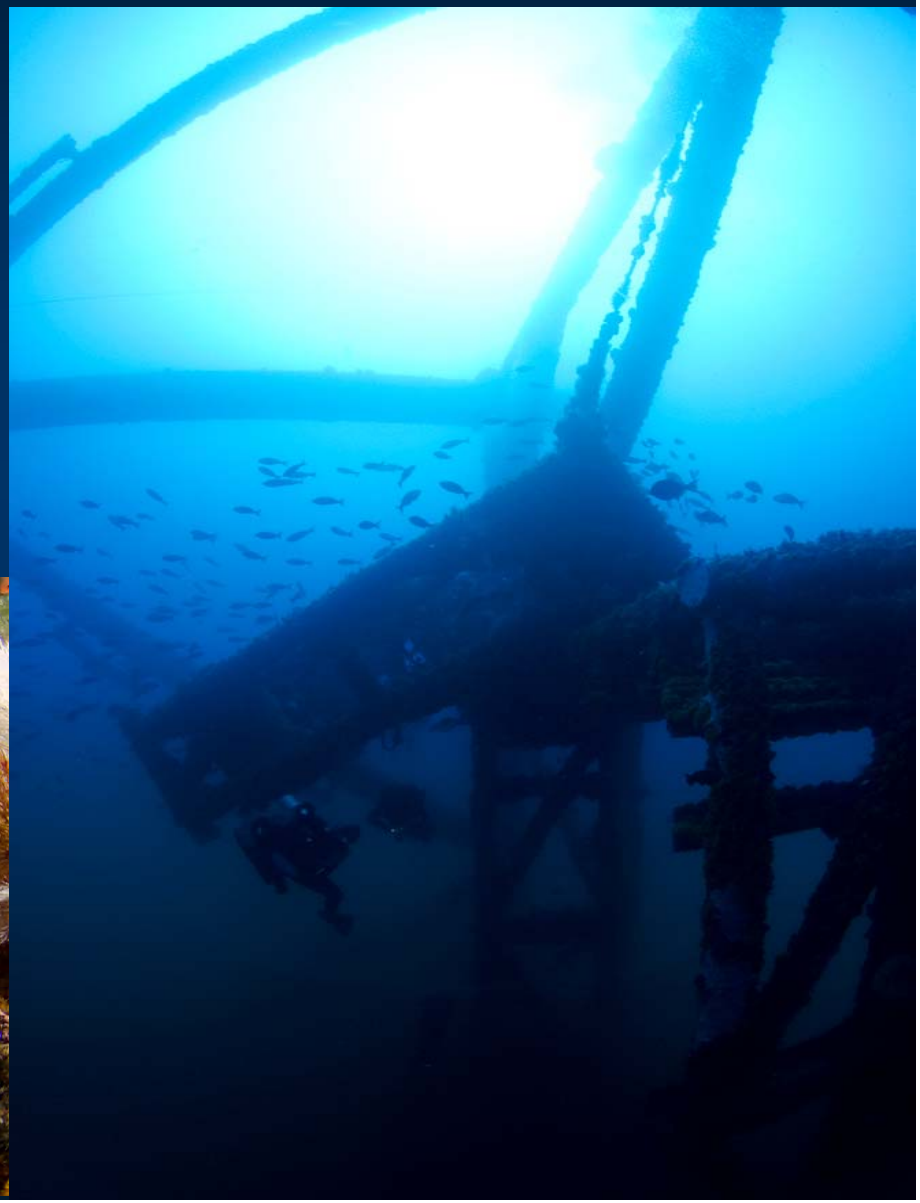
SW	28°28' 28.52" N	94°17' 17.03" W	28°28' 28.04" N	94°17' 16.39" W	3482466.537	13374992.587	3513998.811	251558.490

Geographic Coordinates (Degrees Minutes Seconds) and State Plane Texas South Central FIPS_4204 (feet) in NAD27 and NAD83

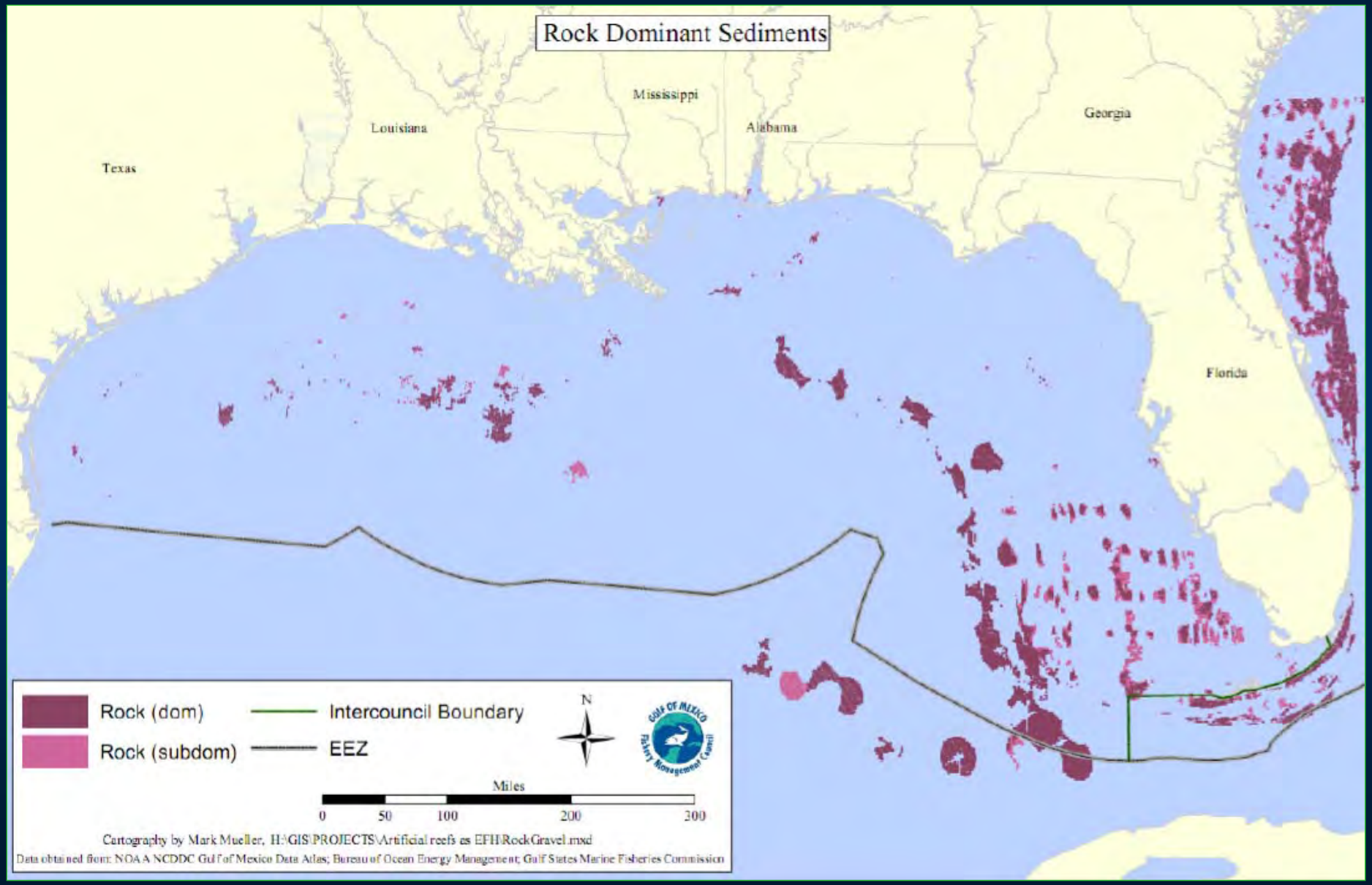



School of Fish
Crane
Bow
Open Hatch
Anchor Chain

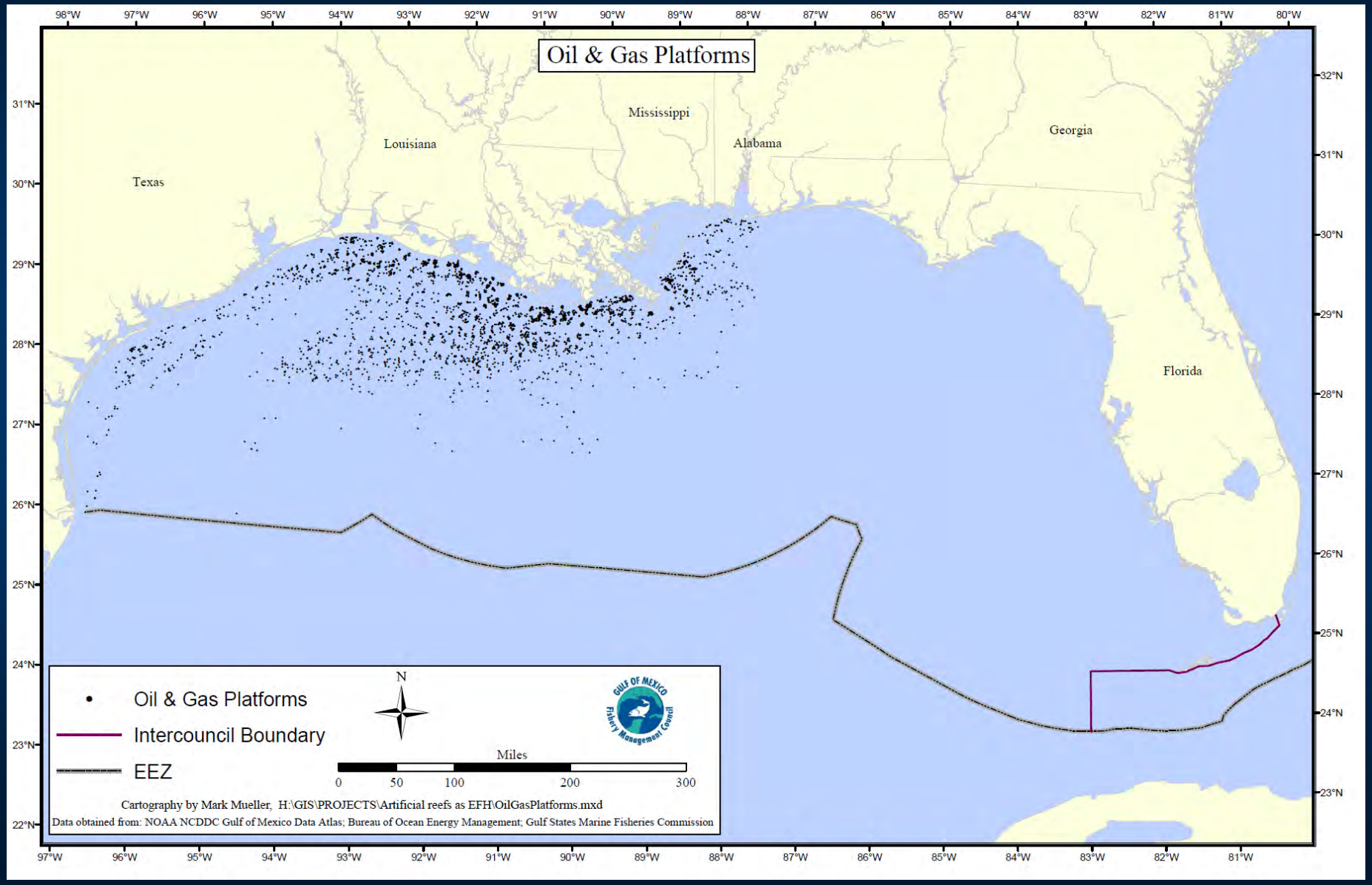
Rigs-to-Reefs Program



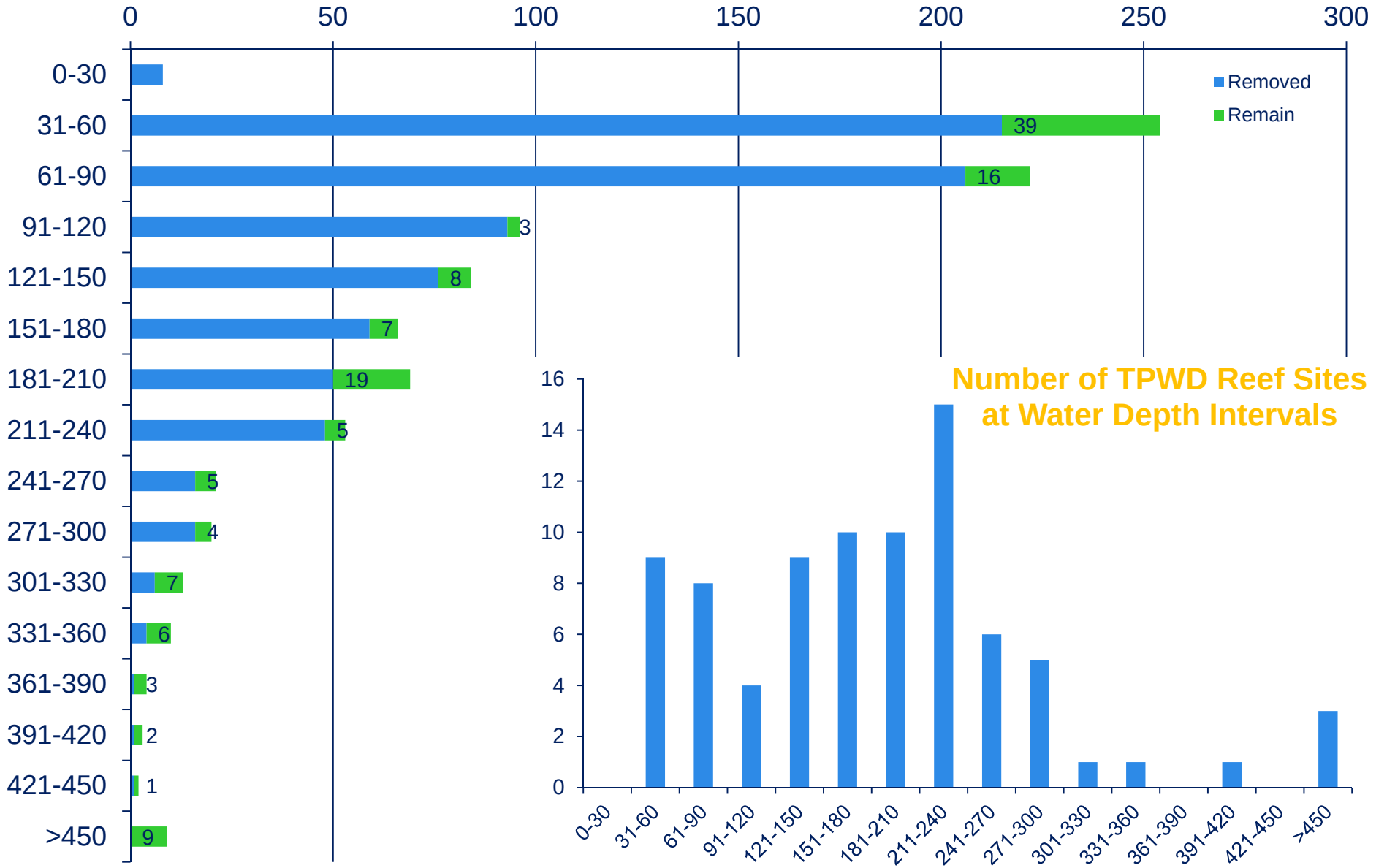
Natural Hard Bottom



Oil and Gas Platforms

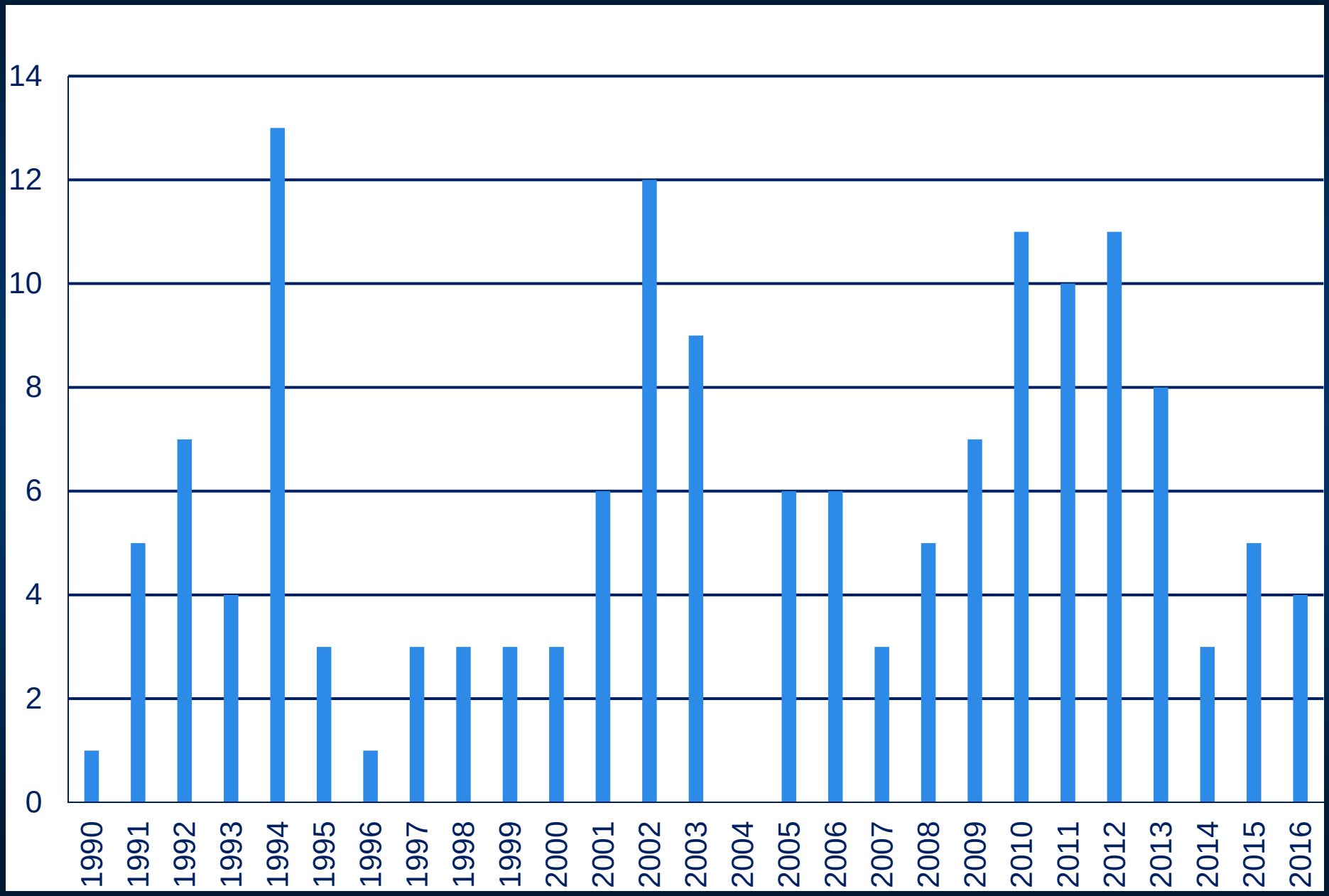


Proportion of Structures Removed v Structures that Remain at Various Water Depth Intervals

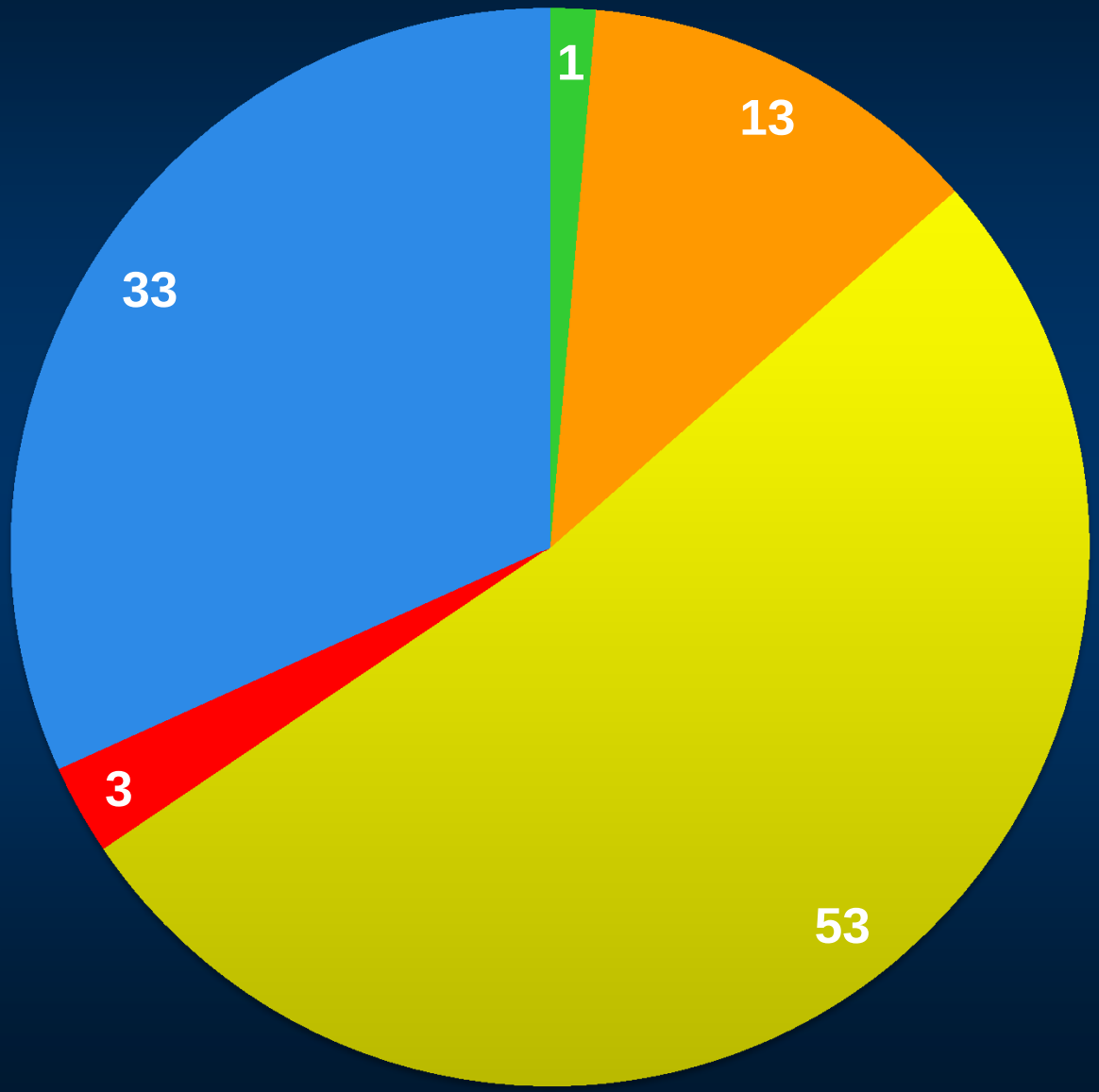


Number of TPWD Reef Sites at Water Depth Intervals

Reefed Oil and Gas Platforms



Sizes of Platforms in Program (%)



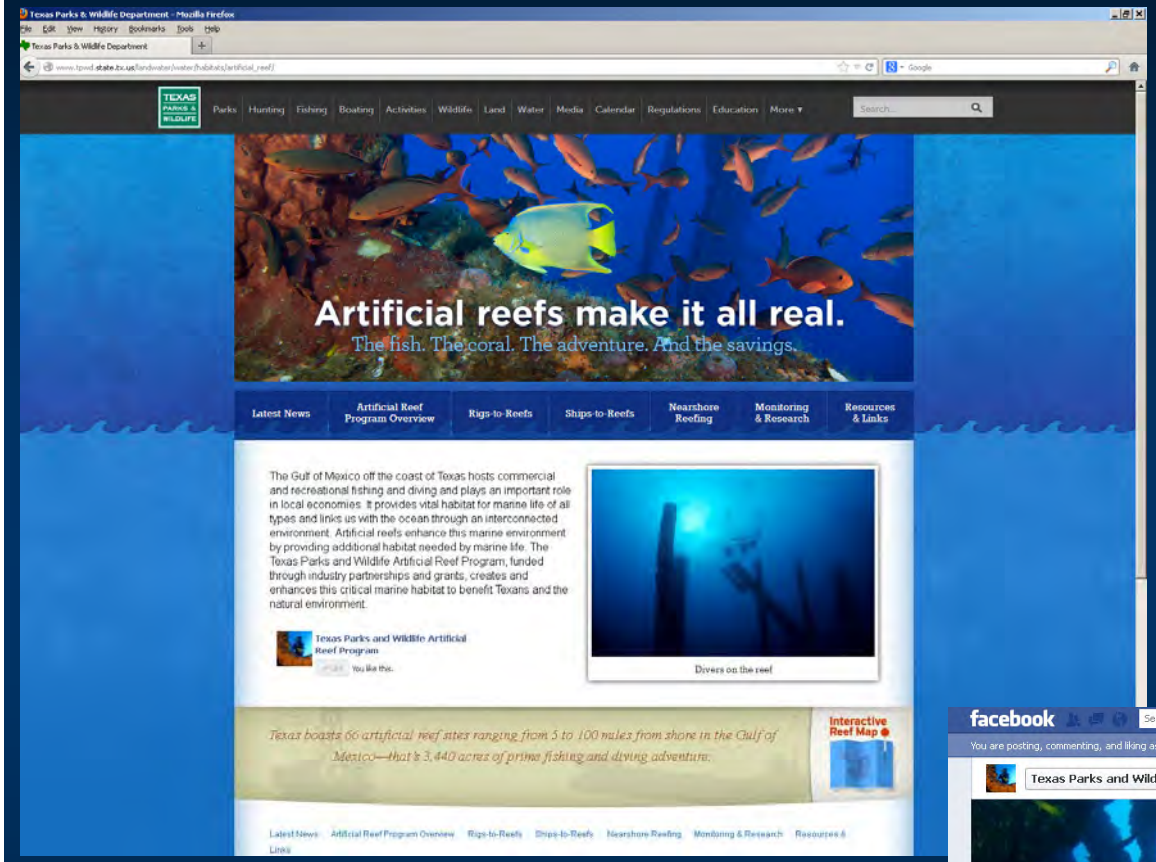
Do Artificial Reefs Work?

33” Red Snapper Off M/V Kinta Corpus Christi Nearshore Reef
3 JAN 2017

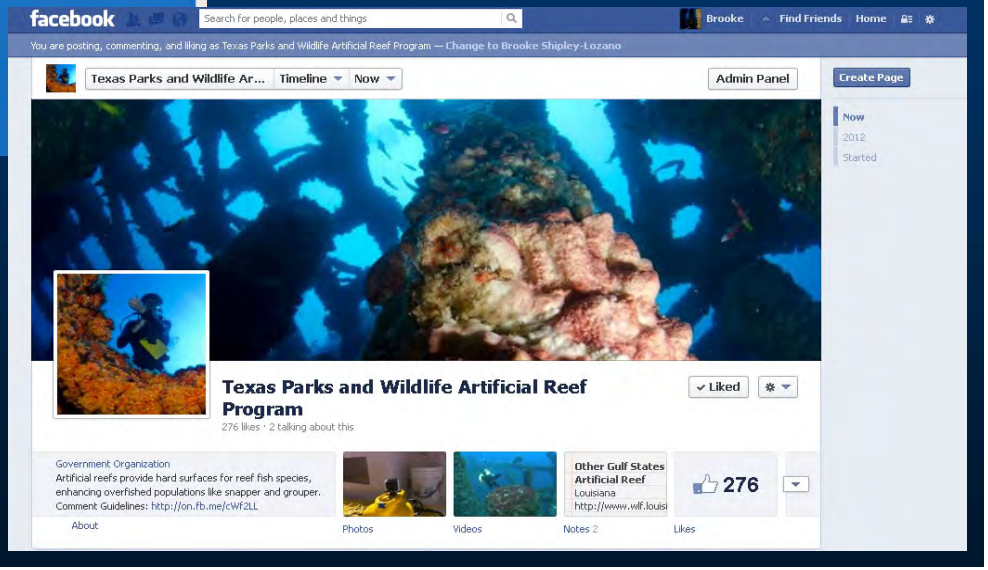
Ways to Get Involved or Assist

- CCA - Coastal Conservation Association
- SEA - Saltwater fisheries Enhancement Association
- Matagorda, Brazoria County Government
- Port Mansfield Reefing Community
- Cities of Corpus Christi and South Padre Island
- Friends of Rio Grande Valley Reef
- SALT – Sabine
- Private citizens
- TPWD Foundation

Public Outreach & Information



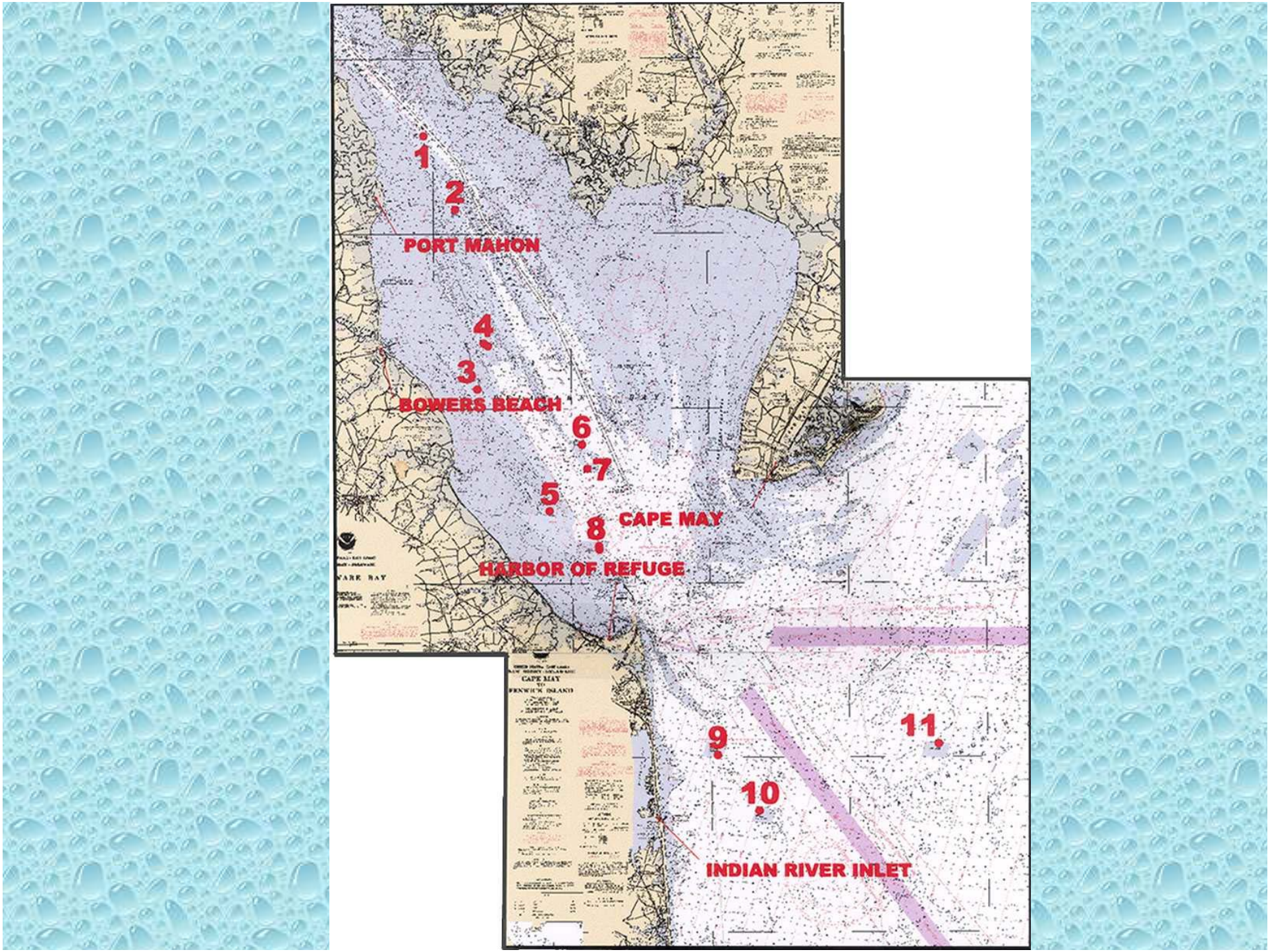
http://tpwd.texas.gov/socialmedia/



TEXAS
PARKS &
WILDLIFE

DELAWARE REEF PROGRAM

Recent Changes in “BANKED MATCH” FOR WALLOP-BREAUX (SFR) FUNDING


1
2
PORT MAHON
4
3
BOWERS BEACH
6
7
5
8
CAPE MAY
HARBOR OF REFUGE
9
11
10
INDIAN RIVER INLET

KERR CONCRETE PIPE
a division of Oldcastle Precast, Inc.
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Phone (609) 561-3400
(800) 642-3755
Fax (877) 561-5786

February 1, 2003

Delaware Department of Natural Resources
Division of Fish and Wildlife
PO Box 330
Little Creek, DE 19961

Attention: Jeff Tinsman

Kerr Concrete Pipe Company contributed 6600 tons of concrete pipes to the Delaware Reef Program between 1/1/2002 through 12/31/2002. The manufacturing cost of these products was $45 per ton for a total contribution of $297,000.

Sincerely,

Robert Berger

Hydro Conduit Division
800 Industrial Drive
Middletown DE 19709
302.378.8920
Fax 302.378.8923

Jeff Tinsman
Delaware Dept. of Natural Resources
Division of Fish and Wildlife
P.O. Box 330
Little Creek, DE 19961

Dear Jeff

In the year of 2002 Rinker Materials donated 2060 tons of Reinforced Concrete pipe to your reef project. The production cost including freight for this material is $164,800.

Sincerely,

Tim Meyer
General Manager

Example of how Donated Concrete Can be used to “Match” federal SFR funds

- 1. Your annual federal budget is $400K, You are paying $75/ton for concrete delivered to the site and the cost to produce the concrete is $45/ton.
- 2. You decide to deploy 3K tons of concrete at a cost of $225K. You have $175K in federal funds remaining.
- 3. The donated concrete generated $135K in match. $75K of this was match for the concrete. This leaves $60K in excess match.
- 4. This $60K will match the $175K of remaining federal funds. Which can be used to reef things which do not create their own match, like ships.

EEXS 246

MEMORANDUM

STATE OF DELAWARE

DEPARTMENT OF NATURAL RESOURCES

& ENVIRONMENTAL CONTROL

DIVISION OF FISH AND WILDLIFE

TO: Lynn Herman, Carla Cassel-Carter

FROM: Jeff C. Tinsman

SUBJECT: F-48 Match Account

DATE: May 15, 2002

Enclosed is a spreadsheet sent to me by Mike Zacchea of New York City Transit. This sheet summarizes the donation to the Reef Program based on the first 467 Redbird cars delivered to site #11 to date.

Clean up costs incurred by Transit in order to comply with the Coast Guard/EPA cleanup protocol come to $4,851. per car for a total of $2,265,417.

Transportation costs for delivery by Weeks Marine to site #11 were $4,845 per car for the first 13 deployments (403 cars) and $3,668. per car for deployments 14 and 15 (64 cars). The total contribution for transportation is $2,187,287.

Total contribution to the Delaware Reef Program, based on the first 467 cars is:

Clean-up	$2,265,417.
Transportation	$2,187,287.
Grand Total	$4,452,704.

Please credit the F-48 banked match account for this amount. If you have any questions, please contact me at your convenience.

& ENVIRONMENTAL CONTROL
DIVISION OF FISH AND WILDLIFE
89 KINGS HIGHWAY
DOVER, DELAWARE 19901

OFFICE OF THE
DIRECTOR

May 17, 2002

Mr. Vaughn Douglass
Federal Aid
U.S. Fish & Wildlife Service
300 Westgate Center Drive
Hadley, MA 01035-9589

Dear Mr. Douglass:

The Division of Fish and Wildlife has recently been the recipient of 467 subway cars delivered and deployed to Delaware's artificial reef sites. New York City Transit has paid for the entire cost of cleanup of the cars, transportation and deployment to the actual reef sites. Our request is that you review the $4,452,704 of in-kind match value and give us guidance on the following:

1. We would like approval to use these costs as in-kind match on Delaware's Federal Aid Project F-48-D (Artificial Reef Program).

2. Since this is a physical asset, we would like approval to use this as banked match that can be applied to future grant segments.

If you should have any questions, please do not hesitate to contact me at (302) 739-5296.

Sincerely,

Lynn A. Herman
Environmental Program Manager II

FISH AND WILDLIFE SERVICE
300 Westgate Center Drive
Hadley, MA 01035-9589

In Reply Refer To:
FWS/Region 5/MBSP-FA
FA - Delaware
F-48-D

May 28, 2002

Mr. Lynn Allen Herman
DE Div. of Fish and Wildlife
Dept. of Natural Resources
and Environmental Control
89 Kings Highway
Dover, DE 19901

Dear Mr. ~~Herman~~ Lynn:

We are in receipt of your letter dated May 17, 2002, concerning in-kind match value of 467 subway cars to be applied to Federal Aid Project F-48-D (Artificial Reef Program). The associated value of $4,452,704 may be used as the State's cost share for current and future annual grant agreements of F-48-D until exhausted. We understand that you have appropriate documentation to support this value as well as accounting procedures to determine existing balance of match available at any given time.

Sincerely,

Judy Drusar

for Robert J. Sousa
Chief, Division of Federal Aid

MEMORANDUM

STATE OF DELAWARE

DEPARTMENT OF NATURAL RESOURCES

& ENVIRONMENTAL CONTROL

DIVISION OF FISH AND WILDLIFE

TO: Lynn Herman, Carla Cassel-Carter, Pam Severson

FROM: Jeff C. Tinsman, Reef Program Coordinator

SUBJECT: F-48 Match Account

DATE: November 17, 2003

The "red bird" reef donations to the Delaware Reef Program have been concluded. Enclosed is the final accounting spreadsheet for the costs of cleaning and transporting all 619 of the "red bird" subway cars, donated to the Delaware Reef Program by New York City Metropolitan Transit. Based on previous correspondence with the U.S. Fish and Wildlife Service, this contribution has been approved as "Banked Match". The total is now $6,067,615. This total reflects the donation of the last 152 cars a donation valued at $1,373,472. This includes $815,936. in clean-up and $557,536. in transportation costs, which has been donated since the last accounting.

The spreadsheet was e-mailed to me by Michael Zacchea of NYCT. Do we need any more formalized correspondence to document this contribution, or is this sufficient?

Please adjust the "Banked Match" account to reflect this contribution of an additional $1,373,472. to the program.

Load	Date	# Cars	# Trucks	# Motors	Cost/Car	Total Cost
1	08/21/01	27	54	83	$4,845	$130,815
2	08/25/01	30	60	75	$4,845	$145,350
3	09/08/01	31	62	89	$4,845	$150,195
4	09/22/01	31	54	91	$4,845	$150,195
5	10/08/01	31	54	77	$4,845	$150,195
6	10/22/01	31	54	78	$4,845	$150,195
7	11/12/01	30	52	35	$4,845	$145,350
8	01/07/02	31	64	30	$4,845	$150,195
9	01/21/02	31	68	53	$4,845	$150,195
10	01/26/02	32	68	48	$4,845	$155,040
11	02/04/02	34	68	84	$4,845	$164,730
12	02/22/02	32	64	67	$4,845	$155,040
13	03/01/02	32	64	90	$4,845	$155,040
14	04/08/02	32	64	117	$3,668	$117,376
15	05/23/02	32	64	102	$3,668	$117,376
18	08/24/02	50	100	148	$3,668	$183,400
19	11/01/02	50	100	130	$3,668	$183,400
20	11/10/03	52	104	196	$3,668	$190,736
Transportation Costs		619	[redacted]			$2,744,823
Cleaning Costs		$5,368				$3,322,792
					Total Cost	**$6,067,615**

Tinsman Jeffrey (DNREC)

From: Severson Pamela G. (DNREC)
Sent: Tuesday, February 24, 2004 3:41 PM
To: Tinsman Jeffrey (DNREC)
Subject: RE: F-48 match account

Jeff:

Your In Kind balance is $7,344,391.35.

Pam.

968

Delaware Lost Assess to Banked Match in a 2016 Federal Audit

- 1.Loss of banked match will make large vessel projects much more challenging.
- 2. Concrete can generate match, but requires expenditure of about half the budget on concrete, leaving less for large vessel projects in the $200k-$1m range.
- 3. Potential solutions include structuring the large vessel preparation contract over several project years with threshold payments or attracting foundation or other private funding.
- 4. Delaware and NJ are currently reefing the Tamaroa, with the Annie E. Casey Foundation providing matching funds.