Assessing Oil and Gas Platforms for Settlement of Jellyfish Polyps in the Northern Gulf of Mexico

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Jellyfish Blooms: Sting People

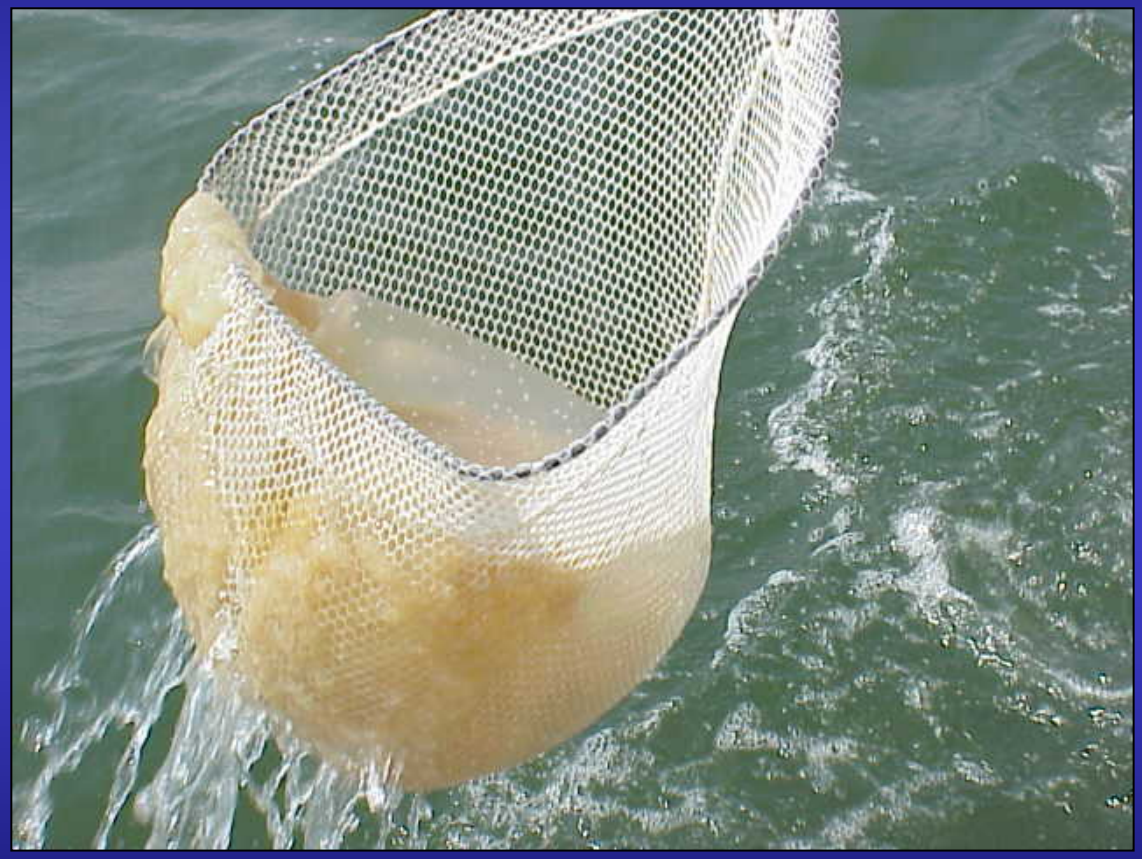
Purple jellyfish

Jellyfish Blooms: Clog Fishing Gear

Jellyfish Blooms: Eat Eggs and Larvae of Fish

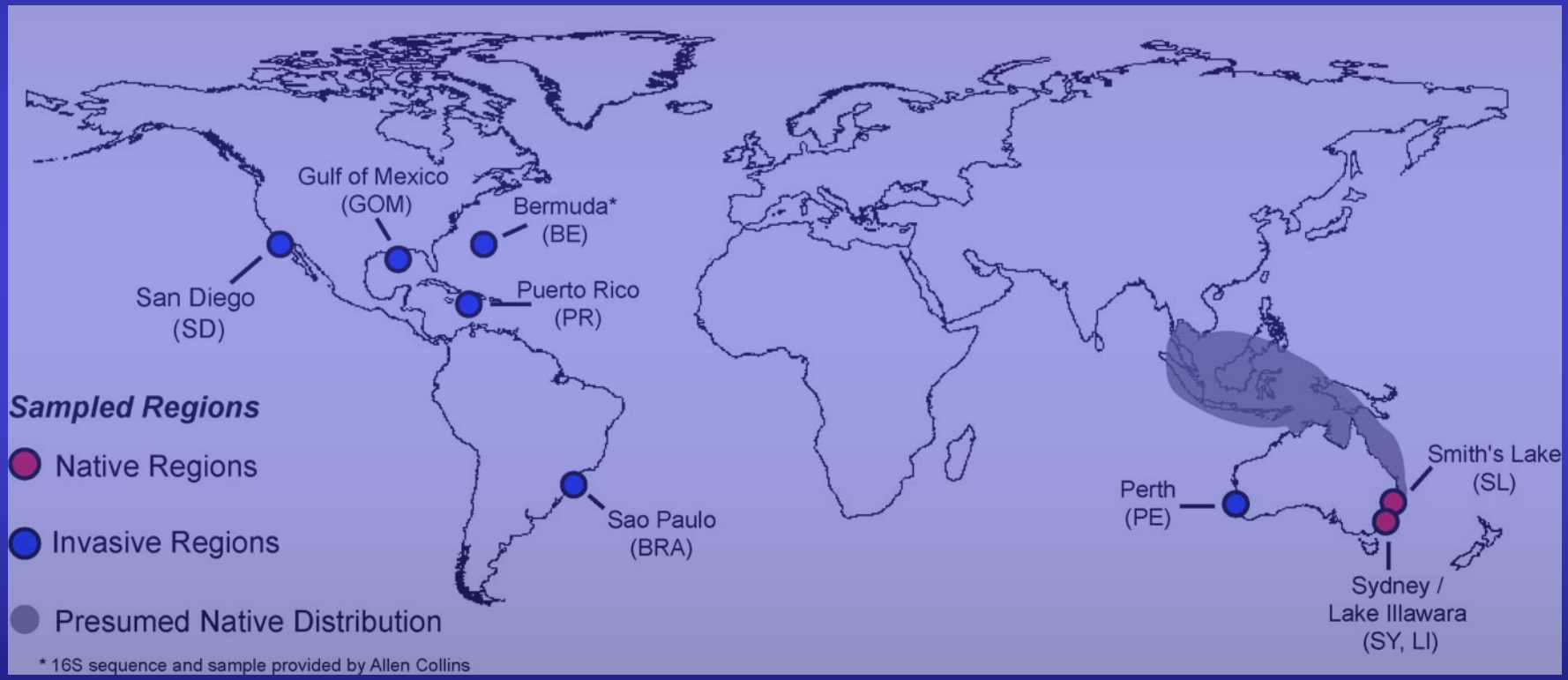
Aurelia aurita
Moon jellyfish

“Australian spotted jellyfish”
Phyllorhiza punctata

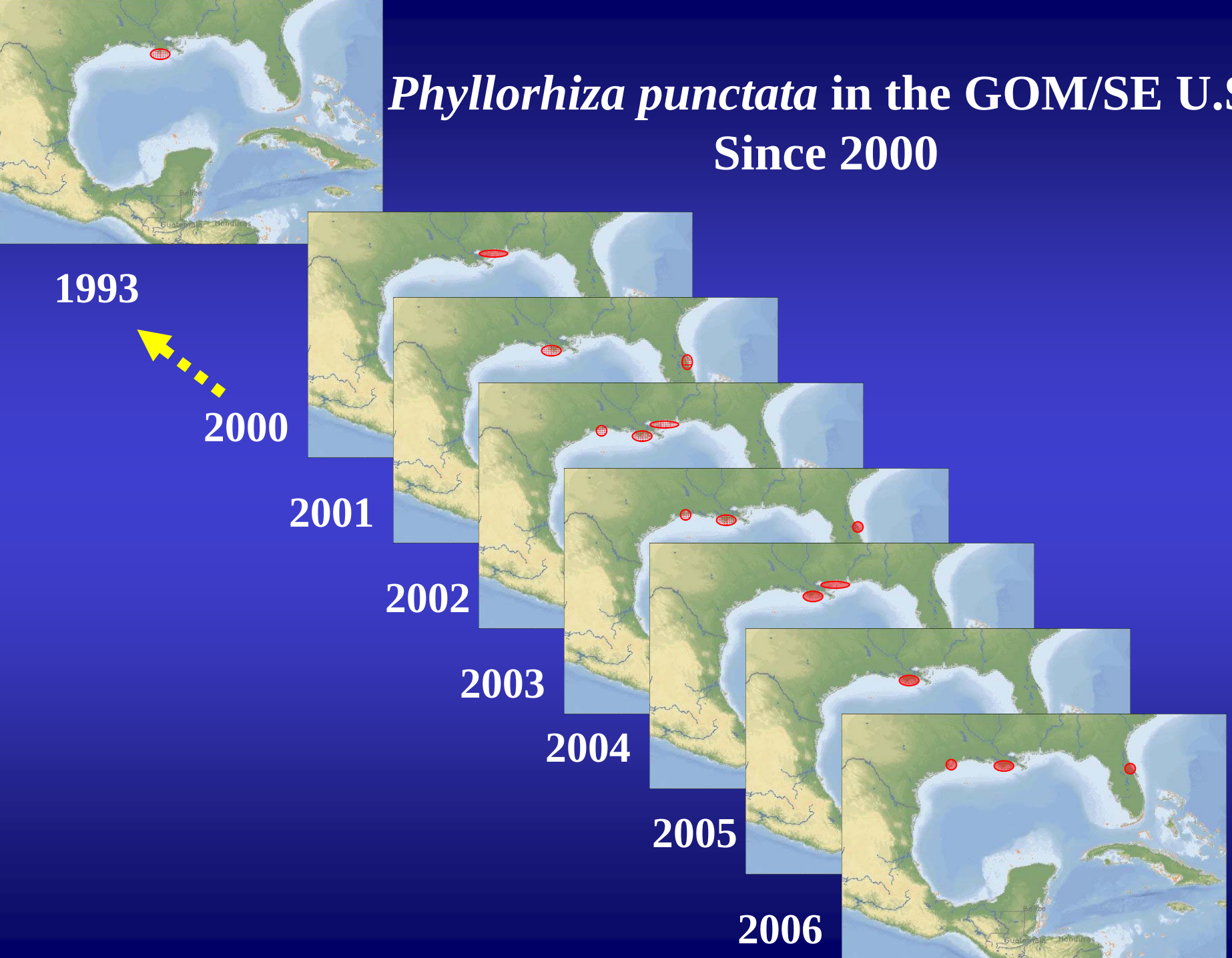


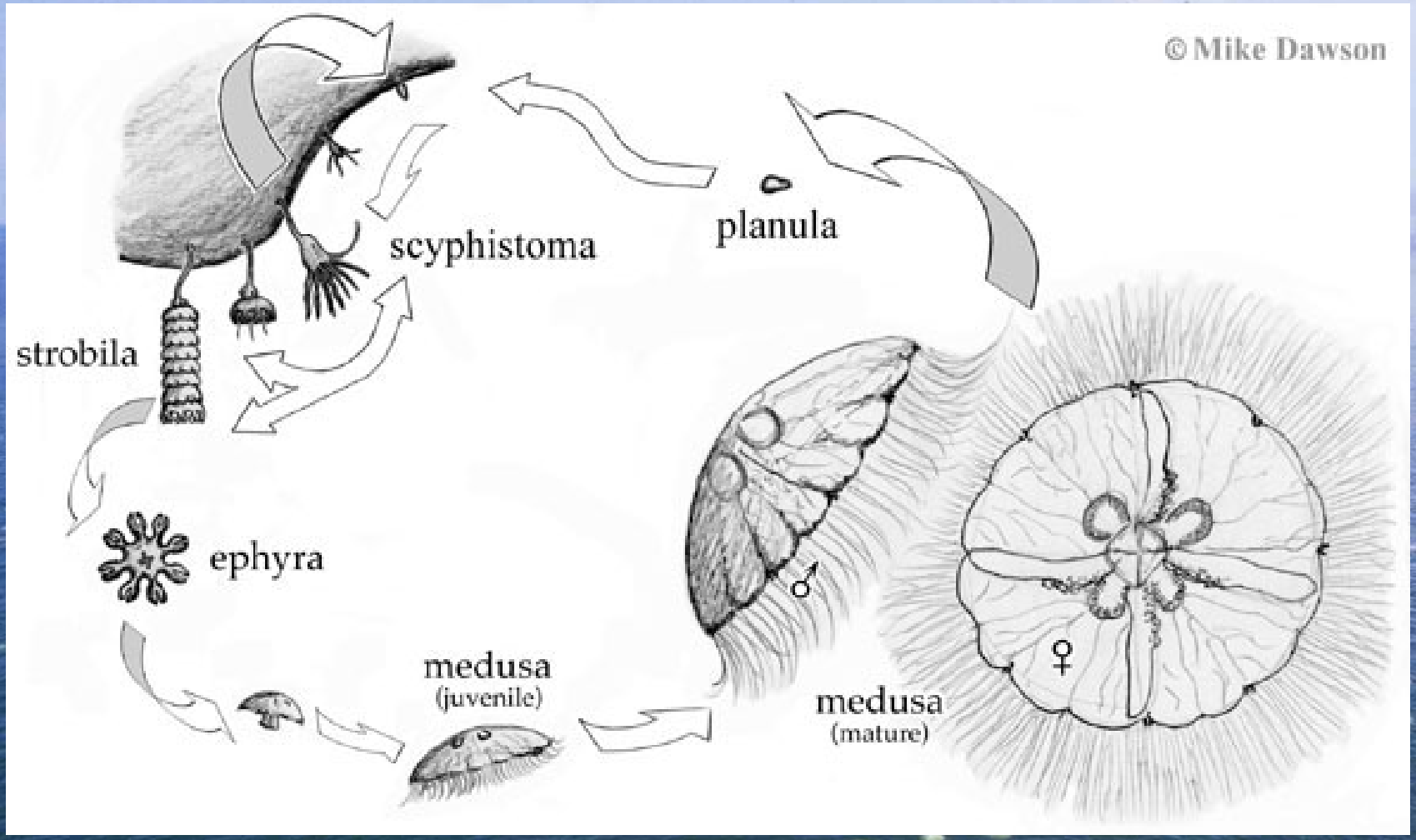
Lake Borgne, Louisiana
Summer 2000

Records of *Phyllorhiza* Invasions and Native Ranges



Phyllorhiza punctata in the GOM/SE U.S. Since 2000

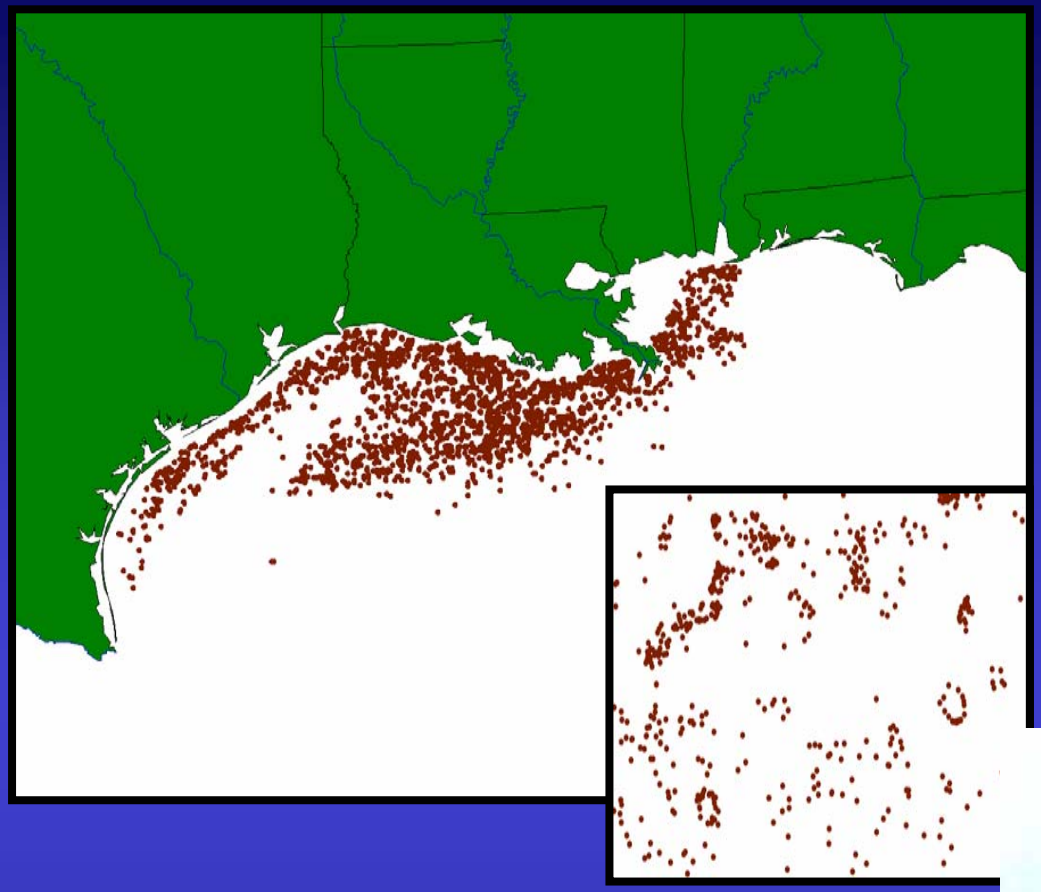




- **Complex life-history**
- **Medusa stage is transient, polyps permanent**
- **Polyps almost always require a solid, stable substrate**

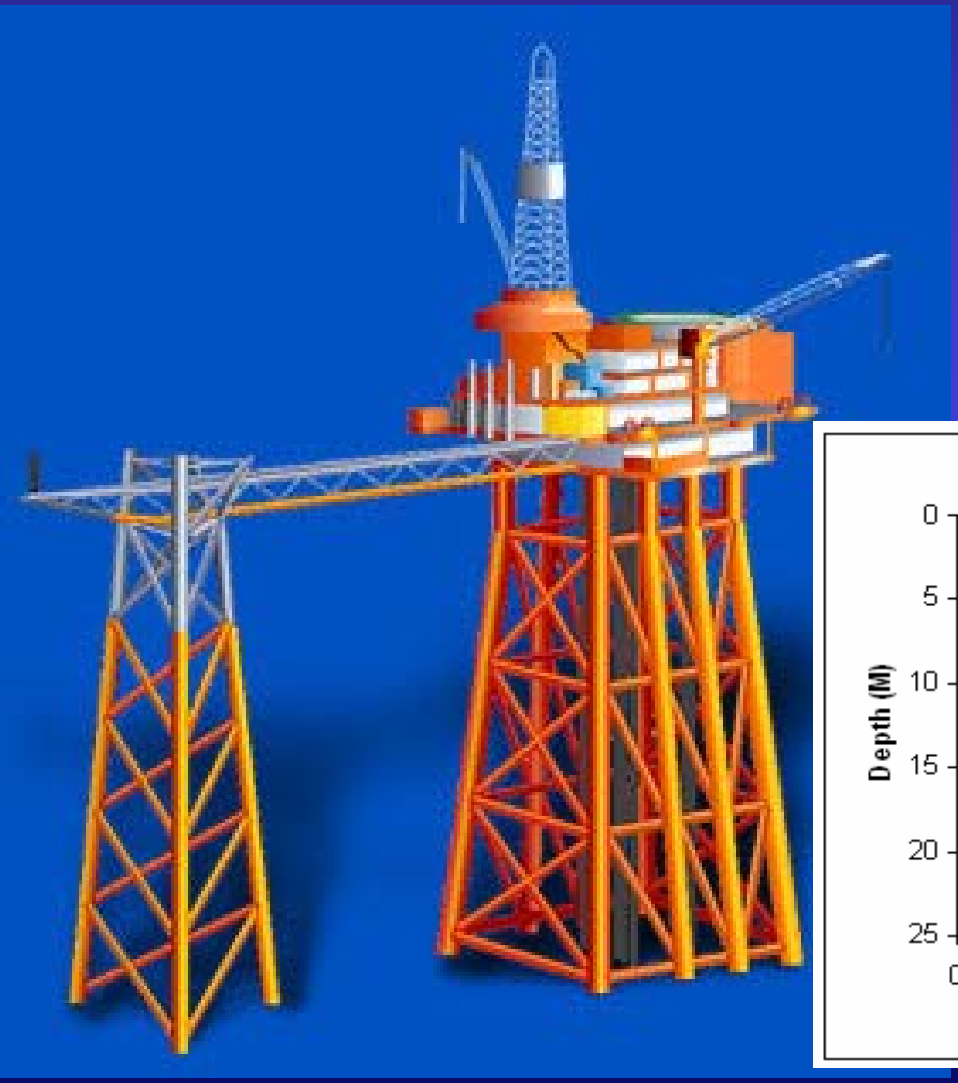
What is the availability of hard substrate for polyp attachment in the northern Gulf of Mexico?

Courtesy R. Rippingale

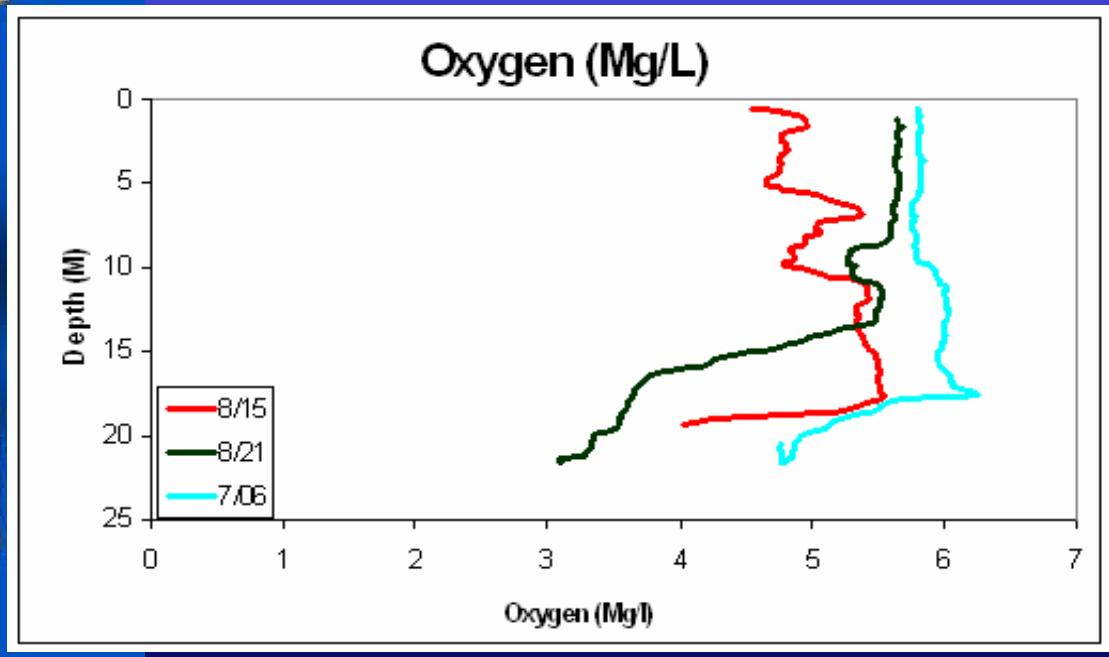


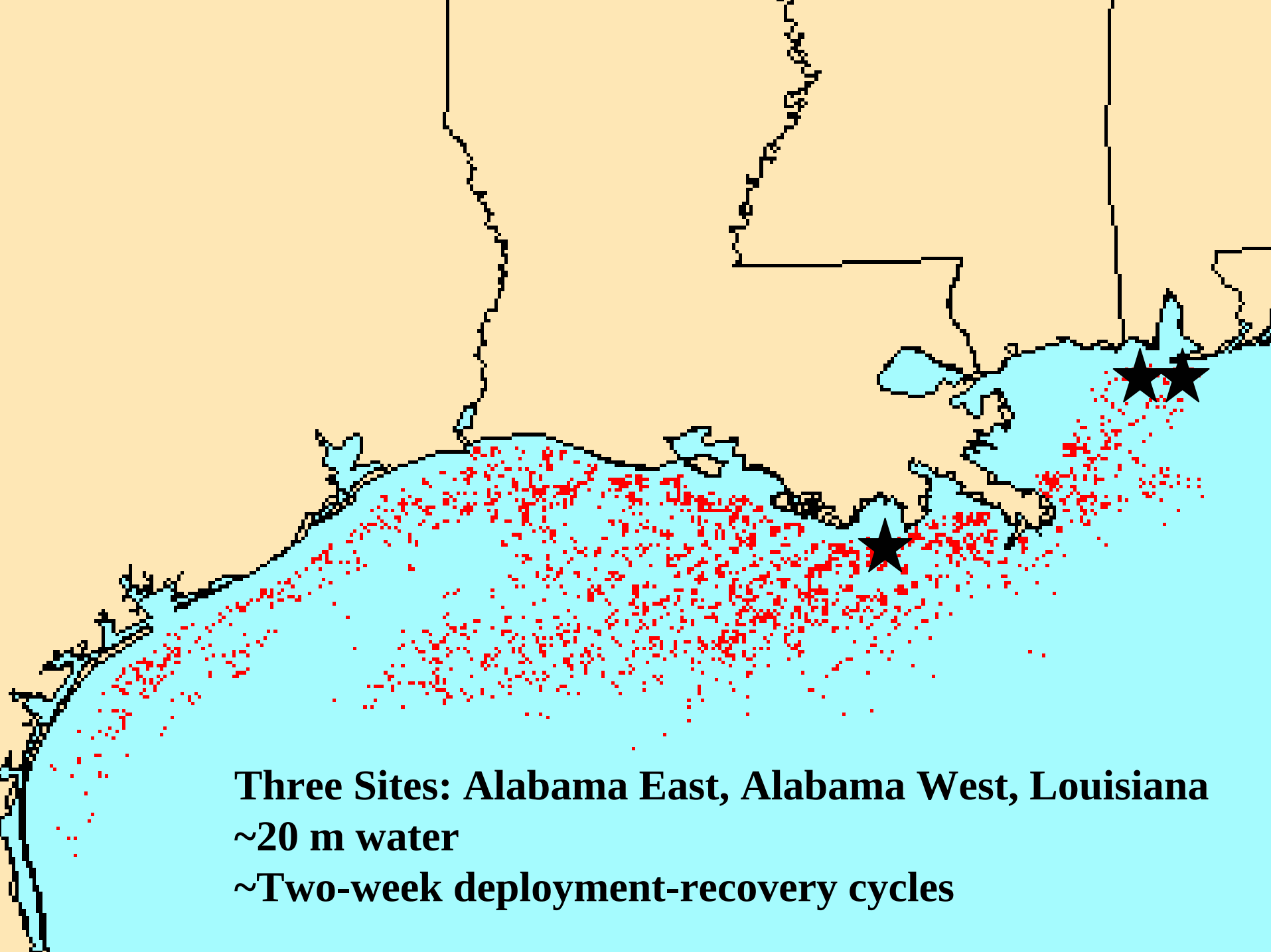
Beyond natural hard bottom … the potential role of artificially placed substrate.

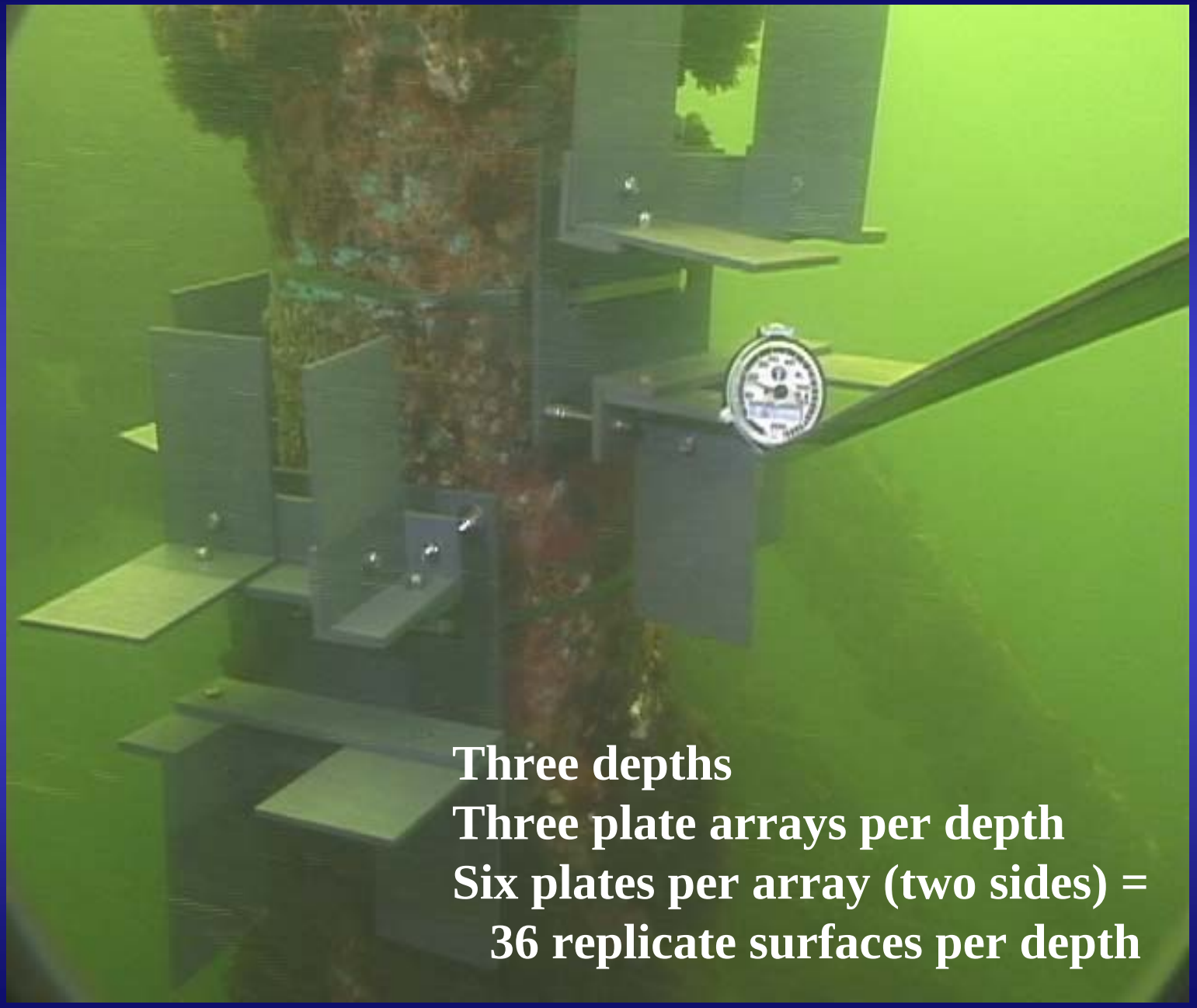
Why Platforms?



- Abundance
- High relief (sedimentation)
- Whole water column (T,S,O)




Three Sites: Alabama East, Alabama West, Louisiana
~20 m water
~Two-week deployment-recovery cycles


Three depths
Three plate arrays per depth
Six plates per array (two sides) =
36 replicate surfaces per depth

Video vertical member surface to seafloor
CTD profiles (T,S,O)
Manual scrapings at three depths
Plankton tows

Alabama (East) Polyp Settlement
(% plates)

Recovery date	Depth (m)	% plates w/ polyps			Temperature (C)	Salinity (ppt)	Dissolved oxygen (mg/L)
		Syphozoans	Anthozoans	Hydrozoans			
18 Jul	4.5	0	0	100	28.5	32.86	5.2
	10.5	0	0	100	27.9	33.18	5.3
	15.0	0	0	100	25.7	35.03	5.6
20 Aug	4.5	0	0	100	29.3	31.26	6.2
	10.5	0	0	100	29.3	34.02	6.2
	15.0	0	0	100	28.6	34.68	6.3
1 Oct	4.5	0	0	83	n.d.	n.d.	n.d.
	10.5	0	0	78	n.d.	n.d.	n.d.
	15.0	0	0	78	n.d.	n.d.	n.d.
8 Nov	4.5	0	0	100	21.9	35.07	7.5
	10.5	0	0	100	21.8	35.07	7.1
	15.0	0	0	100	21.8	35.07	7.1
10 Dec	4.5	0	0	94	21.1	35.79	8.2
	10.5	0	0	94	21.1	35.79	7.6
	15.0	0	0	100	21.1	35.79	7.4

Alabama (West) Polyp Settlement
(% plates)

Recovery date	Depth (m)	% plates w/ polyps			Temperature (°C)	Salinity (ppt)	Dissolved oxygen (mg/L)
		Syphozoans	Anthozoans	Hydrozoans			
9 Aug	5.5	0	0	0	28.7	31.06	5.2
	10.5	0	44	5.6	28.8	32.81	5.1
	15.0	0	28	0	28.9	33.01	5.2
18 Sep	5.5	0	100	0	28.6	31.26	4.8
	10.5	0	100	0	28.7	31.85	4.1
	15.0	0	100	61	28.7	32.10	4.5
26 Nov	5.5	n.d.	n.d.	n.d.	20.5	34.37	5.0
	10.5	0	0	100	20.5	34.75	5.3
	15.0	n.d.	n.d.	n.d.	20.5	34.8	4.9

Louisiana Polyp Settlement

(% plates)

Recovery date	Depth (m)	% plates w/ polyps			Temperature (°C)	Salinity (ppt)	Dissolved oxygen (mg/L)
		Syphozoans	Anthozoans	Hydrozoans			
30 Jul	5.5	0	0	0	30.0	30.12	4.8
	11.5	0	0	0	29.4	32.91	4.8
	18.0	0	83	0	27.8	35.29	5.0
7 Sep	5.5	0	0	100	29.9	30.22	6.9
	11.5	0	0	100	29.8	32.5	5.5
	18.0	0	100	100	28.2	35.08	0.1
23 Oct	5.5	n.d.	n.d.	n.d.	25.7	34.77	2.9
	11.5	0	0	100	25.7	34.78	3.1
	18.0	0	0	100	25.7	34.80	3.2
3 Dec	5.5	0	0	100	22.0	34.33	n.d.
	11.5	0	0	100	22.3	34.74	n.d.
	18.0	0	0	100	23.1	35.56	n.d.

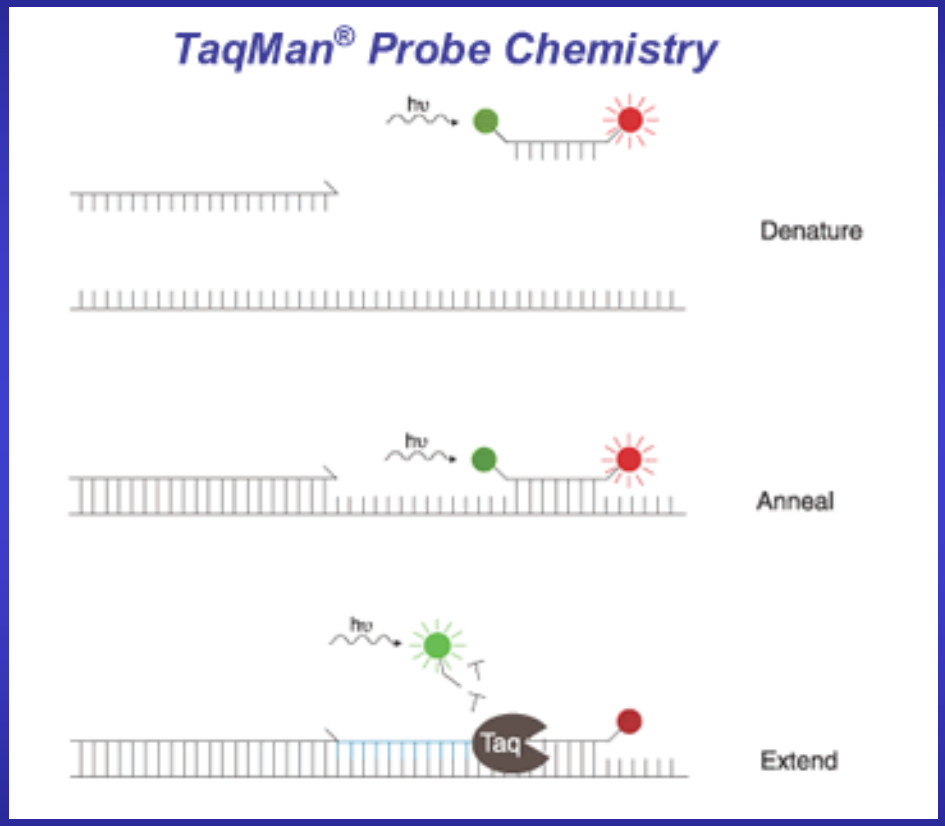
Exploring Negative Results

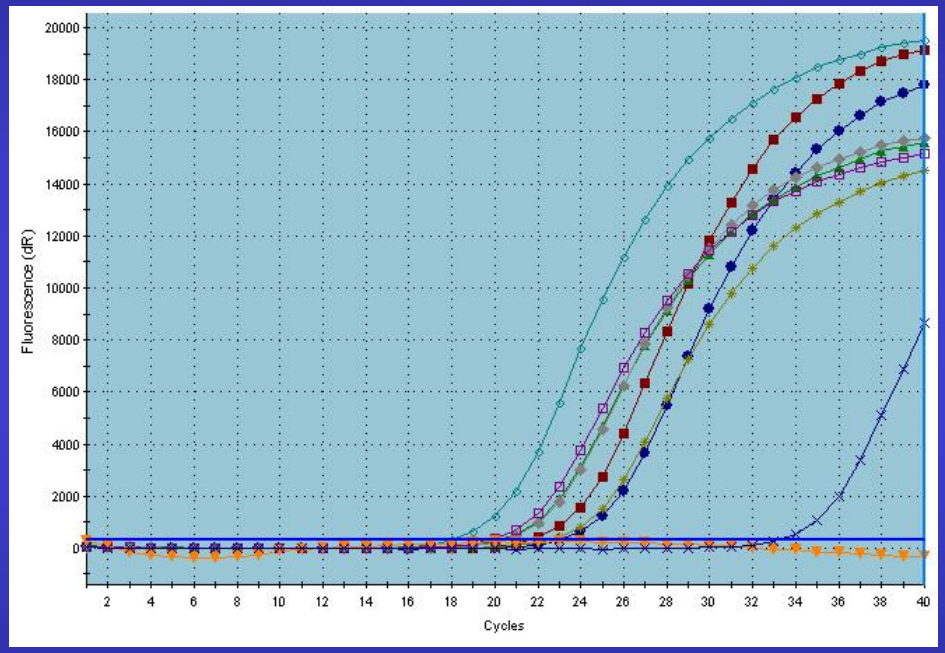
- **Hypotheses:**
  - **Structures/platforms not utilized as settlement substrate**
  - **Sampling coverage needs to be greater**
  - **Polyps too small or cryptic to be visually identified**

BIO-RAD
iQ5
BIO-RAD
BIO-RAD
iCycler
F1
F2
F3
F4
F5
iCycler
Workshop
Run Time Central
Data Analysis
Calibration
DELL

Molecular analytical techniques for ID of jellyfish polyps

Real-Time PCR





Can be used to estimate abundance (qPCR)

Conclusions

Lack of positive results reflects uneven distribution of polyps or inability to use visual techniques.

Non-visual techniques (i.e., genetic markers) have been developed to increase sample throughput and aid in positive identification.

Target south-central Louisiana for additional sampling effort.

Acknowledgments

DISL students and staff: D. Martin, H. Fletcher, J. Hill, A. Gunter and M. Dardeau; B. Ortman (USM); E. Burkhard; Louisiana Universities Marine Consortium, N. Rabalais.

Minerals Management Service Cooperative Agreement 1435-01-01-CA-31145