	Objective and Project Description	**Cost**	**2004/2005**	**2005/2006**	**2006/2007**	**Status Report 2007**
	I. Develop a research, monitoring and evaluation component for the Oculina Evaluation Plan	Staff time	X			**1**
	1. Will Oculina thicket habitat recover throughout the Oculina Experimental Closed Area without human intervention? What time frame will be needed for significant recovery? Will it be necessary to introduce artificial substrate to serve as an initial settlement surface? (TO BE COMPLETED BY YEAR 3)	$25-50K per year if using ROV			X	
	Objective 1: Identify coral/fish recruitment pathways and compare settlement, growth, and survival rates on artificial substrate relative to settlement, growth, and survival rates on nearby unconsolidated coral rubble.			X---	X	**0.5**
	Objective 2: Model biophysical, chemical, and physiological characters. Previous studies have shown the benthic environment of the Oculina reefs to be very dynamic and widely fluctuating due to upwelling events and meandering of the Florida Current.			X---	X	**0**

	2. Determine and monitor the effect of the Oculina Experimental Closed Area on fish distribution and status? (TO BE COMPLETED BY YEAR 10)	$143K per year				
	Objective 1: Assess spawning aggregations of fishery species.			X		**0**
	Objective 2: Track fish movement			X		**0**
	Objective 3: Identify Oculina Experimental Closed Area fish population demographics					**0.5**
	Objective 4: Determine pre-closure distribution of dominant harvested species in and outside the reserve areas, in order to provide historical context for subsequent assessments. Review landings; spill over effects (i.e., identify benthic and juvenile pathways, upwelling events, spill-over between deep and shallow reefs)	TBD				**0**
	Objective 5: Determine age distribution, nursery grounds, migratory patterns, and mortality rates for dominant harvested fish stocks.	$50K per year				**0**
	3. What is the population structure of corals? (TO BE COMPLETED BY YEAR 10)	TBD				
	Objective 1: Research population genetics of Oculina varicosa			X---	-----	**0**
	Objective 2: Identify cross-shelf relationships between shallow and deep Oculina varicosa populations.	TBD				**0**
	Objective 3: Biogeography	TBD		X---	-----	**0**

	4. What are the stressors affecting the Oculina Experimental Closed Area? (TO BE COMPLETED BY YEAR 10)					
	Objective 1: Identify natural and anthropogenic stressors (i.e., disease, gear impacts, poaching, enforcement)	TBD		X		**0**
	Objective 2: Determine the frequency and severity of sedimentation induced by benthic storms.	TBD				**0**
	Objective 3: Identify physiological tolerances of the coral to environmental stressors	TBD				**0**
	5. What are the key trophodynamic functional groups? (TO BE COMPLETED BY YEAR 5)			X---	-----	
	Objective 1: Identify food web structure and dynamics	$80K		X---	-----	**0.5**
	6. Develop index of physical and chemical parameters that characterize a healthy Oculina coral ecosystem. (TO BE COMPLETED BY YEAR 10)					
	Objective 1: Develop index for coral health (including structural damage, recruitment, genetics, physiology, life history)	$20K				**0**
	Objective 2: Develop index of community health for entire biota incl. coral (biodiversity, richness, biocomplexity).	$20K				**0**

	Objective 3: Determine indicator species that are intimately tied with Oculina (invertebrates or vertebrates)	$10K		X---	---X	**0.5**
	Objective 4: What is the age of the coral substrate, and geological formations (last 15,000 years) (Death rates)? Also look at associated mollusks and other biota and their changes.	$25K				**0.5**
	Objective 5: Are paleo-data (age) associated with past climate and oceanographic conditions?	$15K				**0**
	Objective 6: Are there other paleo-data from elsewhere in the world that will give perspective on Oculina growth? (ice cores, deep-water sediment cores)?	$10K				**0**
	7. Conduct research on coral feeding ecology (TO BE COMPLETED BY YEAR 10)	$20K per year				
	Objective 1: Define feeding dynamics					**0.5**
	Assessment Planning Projects					
	1. What is the effect of management measures in the Oculina Experimental Closed Area on the status of fishery stocks? (HIGHEST PRIORITY TO BE COMPLETED BY YEAR 10)	$300K				

	Objective 1: Characterize (including distribution and abundance patterns, size and age distribution, spawning aggregation presence, sex ratios, etc) major fishery species within the Oculina Experimental Closed Area compared to reference sites.			X		**0.5**
	Objective 2: Characterize fish communities, inside and out, including habitat utilization patterns, trophic interactions, ontogenetic changes, predator-prey relationships, etc.			X		**0.5**
	Objective 3: Connectivity to the broader seascape (larval sources and sinks, spill-over effects)	$150K				**0**
	2. What and where are the major habitat types in the Oculina Experimental Closed Area, the Oculina Bank Habitat Area of Particular Concern and adjacent hardbottom areas? (HIGHEST PRIORITY TO BE COMPLETED BY YEAR 3)					

	Objective 1: Complete high definition bathymetric mapping 1) within the Oculina Experimental Closed Area; 2) coral areas adjacent to the Habitat Area of Particular Concern; 3) in Habitat Area of Particular Concern within coral zone 50-100 m; 4) soft bottom habitat east of the coral zone within the Habitat Area of Particular Concern and 5) suspected and known hard coral areas north and south of the Habitat Area of Particular Concern, specifically from Cape Canaveral to the north and from St. Lucie mound and Jupiter Inlet to the south	$300K-75K year 1, 125K year 2, 100K year 3		X (#1)	X (#3 & #4)	**0.5**
	Objective 2: Complete habitat characterization 1) within the Oculina Experimental Closed Area; 2) coral areas adjacent to the Habitat Area of Particular Concern; 3) in Habitat Area of Particular Concern within coral zone 50-100 m; 4) soft bottom habitat east of the coral zone within the Habitat Area of Particular Concern and 5) suspected and known hard coral areas north and south of the Habitat Area of Particular Concern, specifically from Cape Canaveral to the north and from St. Lucie mound and Jupiter Inlet to the south	Same as above		Same as above	Same as above	**0.5**
	3. What are the magnitude and causes of changes in habitat structure and functionality over time? (TO BE COMPLETED BY YEAR 3)				X	
	Objective 1: Determine causes and timing of coral death	$20K			X	**0**

	Objective 2: Origin and functional characterization of rubble zone	Cost associated with overall habitat charact. above			X	**0**
	4. How do oceanographic conditions and episodic events affect production, coral condition, reproduction and growth? (TO BE COMPLETED BY YEAR 10)	Cost associated with dev. of OOS capabilities				
	Objective 1: Quantify the extent, intensity and frequency of episodic events (upwelling, storms, etc)					**0**
	Objective 2: Assess the impact of episodic events (upwelling, storms, etc)					**0**
	Objective 3: Optimize design of restoration efforts			X		**0**
	Objective 4: Characterize impacts from anthropogenic sources of pollution (nutrients/sedimentation)					**0**
	TOTAL (level of completion)					**6**
						Total number of Research projects = 33

	= Projects intended to be ongoing 0 = Projects with no progress and are incomplete .5 = Projects in which some work has been done but are not fully complete 1 = Projects that are complete					
	Recent Publications (since 2007)	**Author/Entity**				
	Assessment of the Impacts of the Oculina Bank MPA and In-Depth Ethnographic Profile of the Fort Pierce, Florida Fishing Community	Ava Lassiter / Gulf & SA Fisheries Foundation, October 2011				
	Impacts of Bottom Trawling on a Deep-water Oculina Coral Ecosystem Off Florida	J.Reed, C.Koenig, A.Shepard / Bulletin of Marine Science 2007				
	Assessment of fish populations and habitat on Oculina Bank, a deep-sea coral marine protected area off eastern Florida	S.Harter, M. Ribera, A. Shepard, J. Reed / Fishery Bulletin 2009				
	CIOERT SEADESC II Report Extreme Corals 2011: SA Deep Coral Survey *Pisces* cruise	NOAA DSC R/T Program, NOAA OER (J. Reed, A. David, S. Harter)				

	Sub-lethal coral stress: Detecting molecular responses of coral populations to environmental conditions over space and time	S. Edge, T. Shearer, M. Morgan, T. Snell ; Aquatic Toxicology 2013				
	Nuclear sequences reveal mid-range isolation of an imperilled deep-water coral population	R. Eytan, M. Hayes, P. Arbour-Reily, M. Miller, M. Hellberg / Molecular Ecology 2009				

Notes from 2007 Report	**New developments**	**Status Report 2014**			
Completed					
225 large concrete reefballs deployed in 2000-2001 to measure coral settlement, growth, survival. Keonig submitted proposal in 2004 to use divers to survey equipment. Sufficient resources not available.	2008 field research was conducted to attempt to dive and assess transplant module growth/success. Divers sent down over 5-6 day period. Structures had moved. / 2011 Pisces fieldwork, during an ROV survey, scientists observed one module within the OECA (Chapman's Reef), transplanted corals had not survived, but new recruits to corals were there.				
No projects on table, no funding.	Florida Atlantic University has hired 2 physical oceanographers with this research focus. Look into grants, funding opportunities.				

Incomplete		Should remain a high-priority. Need to assess year-round and during known spawning events.			
Incomplete					
Reef fish characterization surveys 80% complete (Harter et.al)		Consider temporal appropriateness of surveys			
Group consensus (from 2007 report) was this objective may not be worthwhile; well-established that fisheries were once there, objective could be met through fishermen interviews		Ava Lassiter published report for Gulf & SA Fisheries Foundation in 2011: Assessment of the Impacts of the Oculina Bank MPA and In-Depth Ethnographic Profile of the Fort Pierce, Florida Fishing Community			
Nothing completed					
Incomplete		Sandra Brooke published report in 2008 XX			
Incomplete					

		Consider this objective as high priority. Since Evaluation Team last met, considerable research on sedimentation, temperature and other stressors and their detrimental affects to corals is being done./ John Reed paper on sub-lethal effects			
Low priority considering other research needs					
Low priority considering other research needs					
Low priority considering other research needs					
George et.al created a rudimentary model in 2006, further information is needed.					
Prohibitively expensive and logistically unfeasible.					
Prohibitively expensive and logistically unfeasible.					

Description of fauna associated with live Oculina colonies has been studied and status of current knowledge was published by Reed et.al (2005). Other habitats within OECA haven't been studied.					
Information on bioherm age was determined using a single core of an Oculina mound (Reed, 2002). Further info. needed, but low priority.					
Incomplete					
Incomplete					
Brooke, unpublished study. Field sampling and lab experiments are needed to complete this objective. Low priority.					

Reef fish characterization surveys 80% complete; 2005 transect data collected at 4 stations in OECA, 4 stations in HAPC, and 4 stations outside (inshore) of closed areas. SEADESC dive summaries being created.	S. Harter pointed out that SEFSC hasn't received funding to study the Oculina Bank since 2005. However, 5 ROV dives were made in 2011 on a deep coral cruise. *Pisces* Cruise report from July 2011 results need to be incorporated into the Research Team's report; include images from species inside of OECA; also species composition table				
Reef fish characterization surveys 80% complete; 2005 transect data collected at 4 stations in OECA, 4 stations in HAPC, and 4 stations outside (inshore) of closed areas. SEADESC dive summaries being created.	FY 14-16 CRCP coral grant objectives: conduct ROV dives inside OECA to complete a species and habitat characterization of the area.				
Unaddressed.					

See above; 2005 field survey (Harter et.al)	Same as above. Some of the objectives are repetitive.				
See above					
No funding. Low priority.					

Incomplete. Low priority.					
Unaddressed. Could be a long-term proposal with NSF IOOS funding entities.					
Incomplete					
Proposed a summary (literature review) of oceanographic characters unique to Canaveral and the HAPC; proposed array of echosounders to measure Gulf Stream fluctuations and also fixed buoys with bottom mounted at Jeff's Reef; a proposal submitted but not funded.					
Not logistically tractable.					