

Monroe County Canal Management Master Plan

Phase 1 Summary Report



Overview

- Monroe County in association with AMEC was awarded a Grant from DEP to complete a Phase 1 Canal Management Master Plan
- The scope was to develop a basic conceptual framework for canal restoration and management including prioritization and development of feasible strategies to improve water quality
- Phase I included only a subset of canals due to the 3 month schedule required to complete the project within the fiscal year funding cycle
- Conceptual designs and cost estimates developed for the top 3 priority canals and funding sources identified



- Many canals do not meet the State's minimum water quality criteria and are a potential source of nutrients and other contaminants to near shore waters designated as Outstanding Florida Waters
- Implementation of waste water treatment and storm water management systems will reduce loadings to the canals but will not completely eliminate the impaired water quality conditions
- The Canal Management Master Plan is needed to develop a prioritization for canal restoration and develop feasible strategies to improve the water quality in the artificial canals in the Florida Keys

Task 1.1 and 1.2: Summarize Available Information & Identify Data Deficiencies

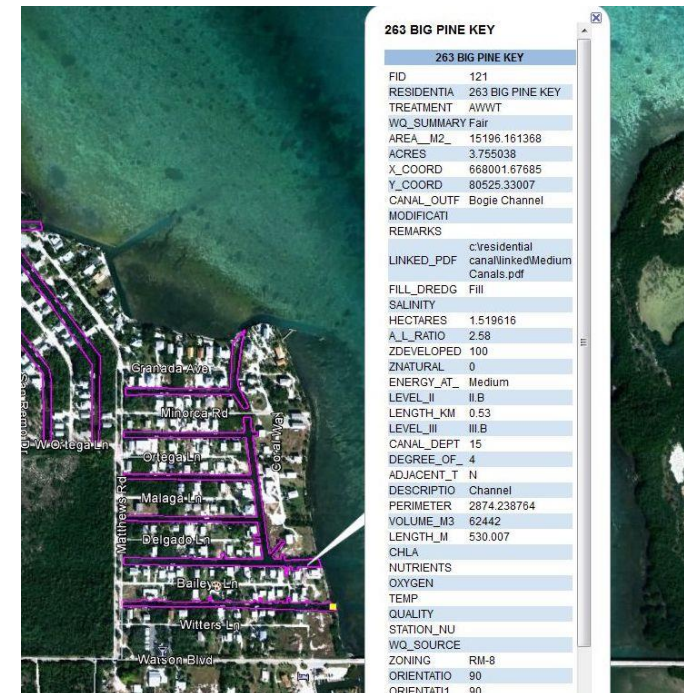
- Collate publications relevant to canal management and restoration
- Identify data deficiencies in the GIS database
 - Depth information for the canals
 - Organic material characterization and thickness
 - Canal specific water quality data



GIS Database Update



- Converted previous database to ArcGIS 10
- Re-digitized canal features using 6-inch resolution aerials (FDOT 2006)
- Inventoried canals that had been deleted, added, or modified
- Incorporated water quality data (STORET & FKNMS)
- Incorporated permitted water quality improvements (FDEP)
- Identified waste water treatment coverage (FDEP & POTWs)
- Utilized GIS database as a Centralized Data Storage for CMMP



Task 1.3: Develop Overall Objectives Statement of CMMP

The objective of the CMMP is to provide an ecologically sound and economically feasible funding and implementation strategy for improving and managing the environmental quality of canal systems in the Florida Keys. The plan will provide flexible and cost-effective solutions that improve canal management practices throughout the Keys and satisfy the existing and future needs of the community. It must address affordability and equity issues, reflect key stakeholder concerns, and satisfy environmental and regulatory criteria and guidelines.



Task 2 and 3: Identification of Canal Management Issues and Goals

Water Quality – Eutrophication and DO-Related Issues

- Restore and maintain water quality conditions in canal systems to levels that are consistent with the State water quality criteria for Class III waters

Water Quality – Organic Material (e.g. Weed Wrack)

- Reduce the entry and accumulation of seagrass leaves and other ‘weed wrack’ in affected canals.

Sediment Quality

- Reduce the incidence of anoxia and problematic sulfide levels and sediment toxicity in affected canals

Habitat Quality

- Protect aquatic and benthic canal habitats that currently support native flora and fauna, and improve water and sediment quality in other canals to levels that are capable of supporting them

Public involvement

- Create and maintain a constituency of citizens involved in the canal management process.



Task 4: Develop an Initial Short-list of Priority Sites for Restoration

Two groups of canals were selected for detailed evaluation:

1. Eighteen canals in subdivisions that were identified as water quality problem areas by a working group convened by the South Florida Water Management District in 1996; and
2. Canals identified as having water quality problems associated with weed wrack. Five canals within this group were selected to provide additional geographic coverage across all of the Keys.



Develop an Initial Short-list of Priority Sites for Restoration

Subdivision Identified as Priority Water Quality Problem Area by SFWMD (1996) Working Group	Priority Canal Identified During Site Visit
LAKE SURPRISE/SEXTON COVE	24 ¹ KEY LARGO
CROSS KEY ESTATES	45 KEY LARGO
WYNKEN, BLYNKEN AND NOD	78 ROCK HARBOR
HAMMER POINT PARK	93 TAVERNIER
CONCH KEY	164 CONCH KEY
LITTLE VENICE	196 MARATHON
LITTLE VENICE	200 MARATHON
PORT PINE HEIGHTS	238 BIG PINE KEY
BOOT KEY HARBOUR	243 MARATHON
KNIGHT'S KEY CAMPGROUND	252 MARATHON
DOCTOR'S ARM	258 BIG PINE KEY
DOCTOR'S ARM	266 BIG PINE KEY
TROPICAL BAY	277 BIG PINE KEY
EDEN PINES COLONY	278 BIG PINE KEY
SANDS SUBDIVISION	286 BIG PINE KEY
CUDJOE GARDENS	329 CUDJOE KEY
BAYPOINT SUBDIVISION	433 SADDLEBUNCH KEYS
GULFREST PARK	437 BIG COPPITT

Table 1. Group 1 (SFWMD 1996) canals evaluated using site visits during Task 4.

Note: ¹ Canal ID number from project geodatabase



Develop an Initial Short-list of Priority Sites for Restoration

Canal ID
163 ¹ LONG KEY/LAYTON
223 MARATHON
261 NO NAME KEY
307 SUGARLOAF KEY
471 KEY HAVEN

Table 2. Group 2 Canals with elevated weed wrack evaluated using site visits during Task 4 which provided additional geographic coverage across the keys .

Note: ¹ Canal ID number from project geodatabase



Ranking of Canals for Prioritization for Restoration



Scoring Criteria Were Developed and Applied to the Short-List of Priority Canals

- Severity of problem (scored 0 to 10)
- Potential to provide improvement in water, sediment and habitat quality within the canal (scored -10 to +10)
- Potential to provide improvement in water, sediment and habitat quality within the halo or nearshore zone (scored -10 to +10)
- Public benefit – number of users affected (scored -10 to +10)
- Public funding support (scored -10 to +10) – removed from Phase I - assumed public funding potential was likely equal for all canals
- Likelihood of receiving external funding support (e.g., grant-based) (scored 0 to 10) – 12 canals without WWT systems were removed
- Availability of data to prepare project designs and grant proposals (scored 0 to 10)
- Project implementability (scored 0-10)

Subdivision Name	GIS Canal Number	Potential Restoration Technologies	Overall Task 5 Score
Wynken, Blynken and Nod	78	Primary=weed wrack loading prevention; secondary=backfilling	45.3
Cross Key Estates	45	Backfilling and/or pumping to increase circulation	41.6
Marathon	223	Weed wrack loading prevention	39
Bay Point	433	Culvert maintenance (plus evaluation of adequate culvert size)	37.8
Little Venice	200	Circulation pump	35.6
Gulfrest Park	437	Circulation pump	32
Boot Key Harbor	243	Increase in circulation by pumping or culvert. Depth information will be required to evaluate if backfilling is appropriate.	32
Little Venice	196	Backfilling	30.1
Key Haven	471	Circulation pump (reduction in stormwater loading is also appropriate)	26.8
Lake Surprise - Sexton Cove	24	Culvert to Lake Surprise	26.7
Hammer Point	93	Backfilling	25.8

Table 5.1. Task 5 Canal Prioritization List (higher overall score = higher priority).

Task 5: Short List of Restoration Projects

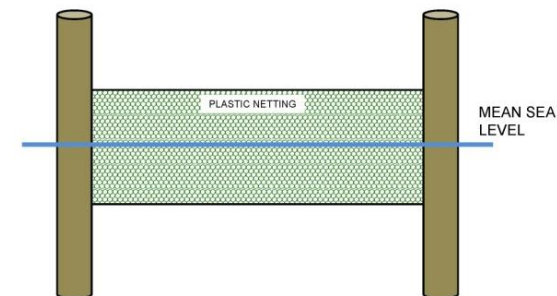
The three top ranked sites were selected for engineering evaluation of restoration options. These canals included:

1. Wynken, Blynken and Nod, Rock Harbor – GIS Canal Number 78, MM 96
2. Cross Key Estates, Key Largo – GIS Canal Number 45, MM 106
3. Marathon – GIS Canal Number 223, MM 51 NW of Marathon County Airport



Detailed Engineering Evaluation of Restoration Projects

- Description of project area
- Impairments addressed by restoration
- Remedial technology evaluation
- Selection of preferred alternative
- Description of conceptual design
- Cost estimate
- Potential benefit of proposed restoration project
- Potential grant opportunities



Wynken, Blynken and Nod, MM 96 Restoration Options

Water quality issues

- Prevention of weed wrack from entering canal
- Removal of accumulated organics
- Reduction in canal depth to eliminate the deep stagnant water column

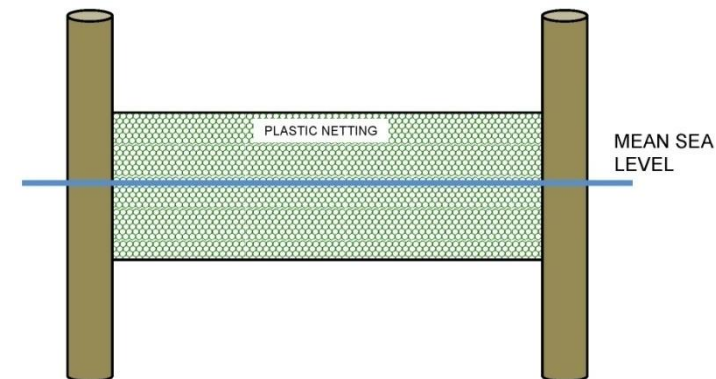
Conceptual Design

- **Weed wrack gate** – combination barrier and bubble air curtain (estimated cost \$52,000)
- **Removal of organics** (estimated cost \$306,000)

Additionally Evaluated

- **Backfilling** (estimated cost \$1,054,000)
- **Pumping** (estimated cost \$50,000)

Total Restoration Cost: \$408,000 – \$1,412,000



Wynken, Blynken and Nod, MM 96 Restoration Options



Marathon, MM 51 Restoration Options

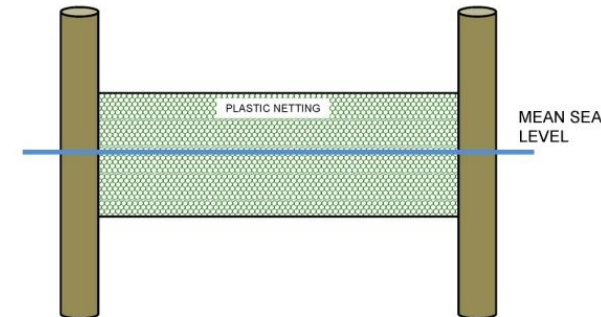
Water quality issues

- Prevention of weed wrack from entering canal
- Pumping to enhance circulation

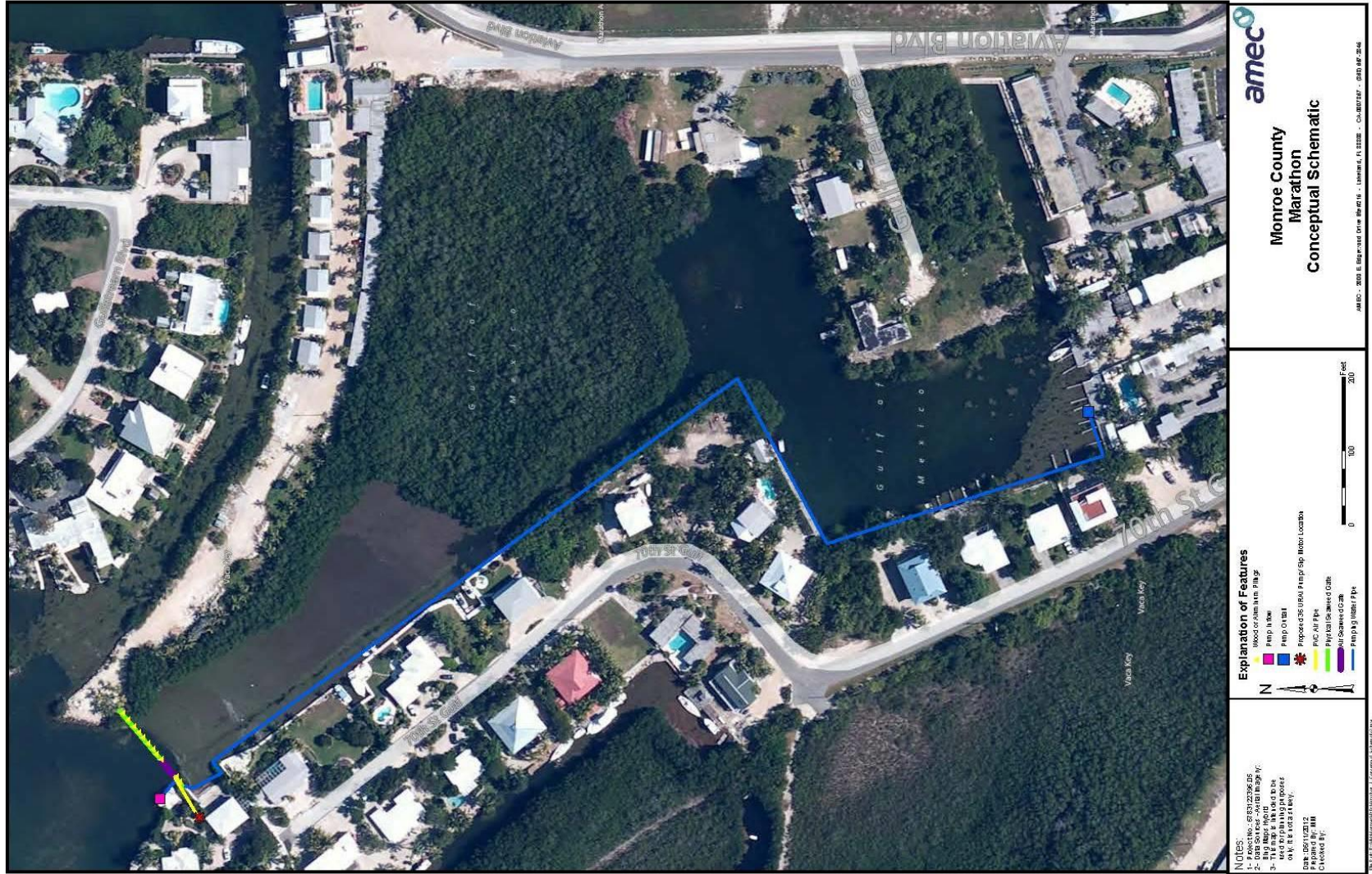
Conceptual Design

- **Weed wrack Gate** – combination barrier and bubble air curtain
 - Estimated cost \$70,000
- **Pumping** – pump water from canal mouth to canal end
 - Estimated cost \$97,000

Total Restoration Cost: \$167,000



Marathon, MM 51 Restoration Options



Cross Key Estates, MM 106 Restoration Options

Water quality issues

- Reduction in canal depth to eliminate the deep stagnant water column
- Removal of accumulated organics-rich sediments
- Pumping to enhance circulation

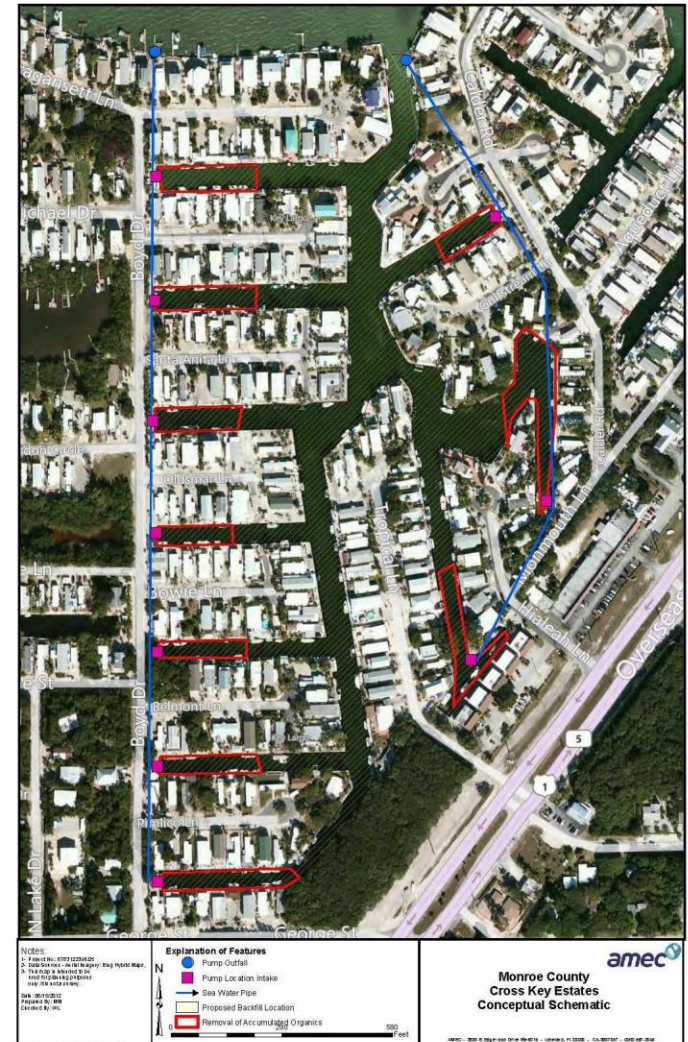
Technology evaluation

- **Backfilling**
 - Estimated cost \$4,700,000
- **Hydraulic removal of organics**
 - Estimated cost \$1,220,000
- **Pumping** – pump water from end of each canal finger (10) to canal mouth
 - Estimated cost \$164,000

Total Restoration Cost: \$6,084,000

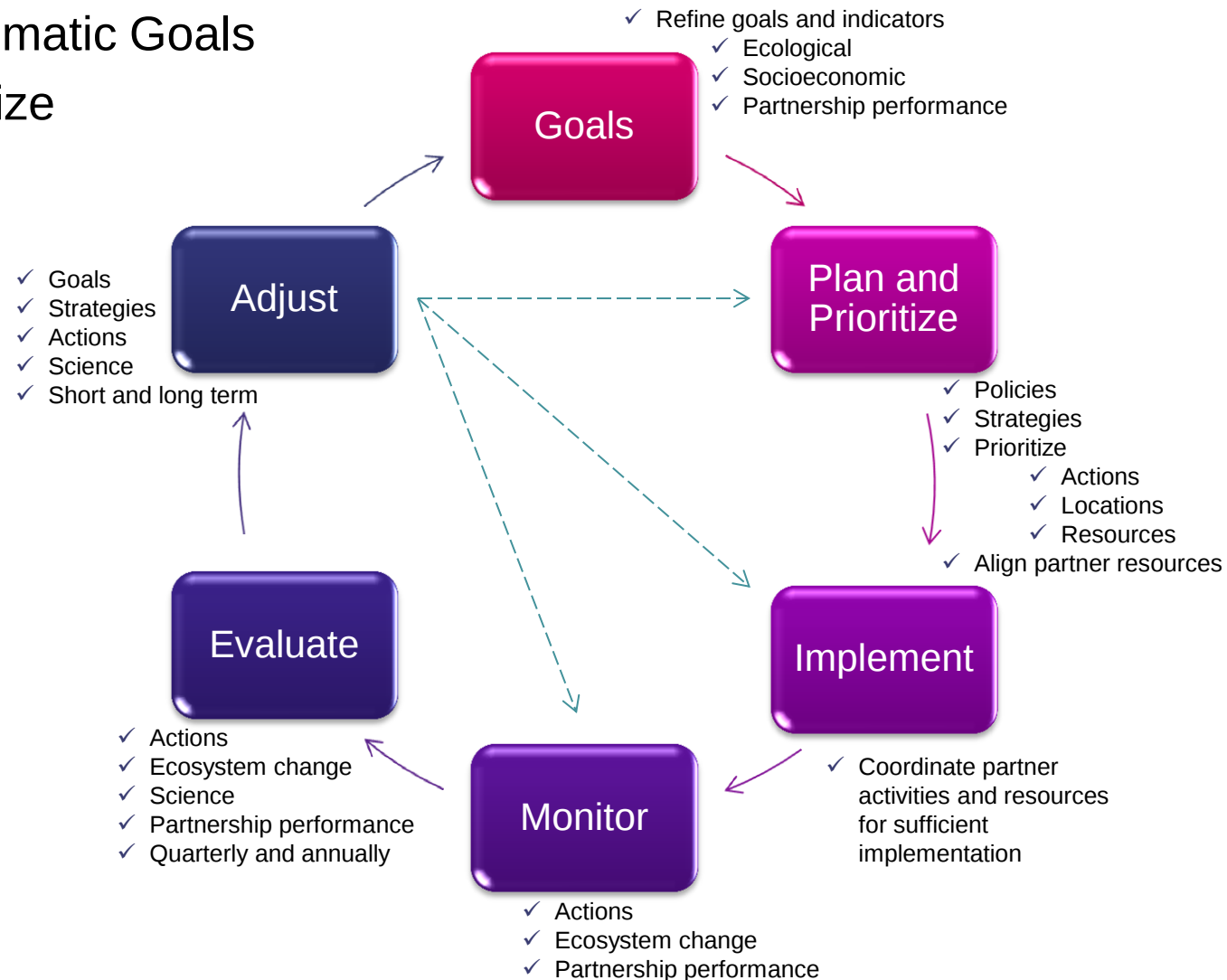
Conceptual design

- No preferred alternative is presently offered for this canal system. Lack of engineering design data, uncertainty in the design assumptions, and high estimated costs are the basis for this decision.



Task 6: Develop an Adaptive Management Process

- Define Programmatic Goals
- Plan and Prioritize
- Implement
- Monitor
- Evaluate
- Adjust



Grant Opportunities



Grant Program	Agency	Deadline*	Required Minimum Match	Project Objective	Required Project Stage	Typical Grant Funding Amounts	Notes
Section 319	EPA/FDEP	May, 2013	40%	Reduce Non-point pollution	Conceptual	No cap, several millions	More restrictions, need extensive benefit for WQ, multiple projects possibly
TMDL	EPA/FDEP	Mar/Jul/ Nov 2012/2013	50%	Reduce Non-point pollution	60% Design / Permitted	No cap, several millions	More restrictions, need extensive benefit for WQ, multiple projects possibly
South Florida Coastal Program	USFWS	April, 2013	0% required (>0% encouraged)	Habitat Restoration	Conceptual		
Community-Based Matching Grants Program	TNC / NOAA	April, 2013	50%	Habitat Restoration	Conceptual	\$20,000 - \$250,000	Need to show habitat benefit, possibly suitable for some dredging
National Coastal Wetlands Conservation Grant Program	USFWS	June, 2013	50%	Habitat Restoration	Conceptual	Up to 1 million	Need to show habitat benefit
Urban Waters Small Grants**	EPA	January, 2013	\$2,500	Water Quality Improvement	Conceptual	< \$60,000	Demo projects; weed gates an option
RESTORE Act of 2012	EPA	NA	0%	Restoration and protection of natural resources	NA	Dependent upon fines levied	Restoration projects weighed toward ecosystems

Notes: * 2013 deadlines are estimated and programs resources are not guaranteed

** This grant applies only if project is considered a demonstration

Recommendations for Next Steps

- **Prepare grant application packages for pilot testing of technologies identified during Phase I CMMP completion**
 - WBN and Marathon restorations
 - Includes weed gate, organics removal, pumping, backfilling
 - Estimated cost \$575,000 - \$1,579,000
 - Section 319 Grant
 - Need 40% match
 - Non-standard project – will need pre-sell
 - Restore Act of 2012
- **DEP Funding**
 - Install Weed Gates in two Doctor's Arm canals
 - Estimated cost \$100,000
- **Canal bathymetry surveys (\$70,000)**



Recommendations for Next Steps

■ Complete Canal Management Master Plan for entire Keys utilizing recently awarded EPA grant funds

- Update priority management issues and goals
- Perform site visits to each canal
- Update GIS database for all canals
- Develop estimated restoration costs (but not full conceptual designs)
- Prepare Keys-wide priority ranking list

■ Develop local participation

- Develop technology templates through pilot testing funded through grants
- Set up work shops or other communications to disseminate information
- Set up a County program for homeowner participation for developing restorations and identifying funding sources



Questions?

