TECHNICAL WORKING GROUP MEETING NO. 7

Marathon Government Center
2796 Overseas Highway, Room 104

November 2, 2007 ❖ 9:30 am – 1:30 pm

Agenda

I. Welcome
II. Water Quality Targets & Modeling Results
III. Canal Models
IV. Documents Overview
V. Identified Management Activities and Reductions
VI. Critical Stakeholder Decisions
V. Next Actions
VII. Action Items & Next Meeting

WATER QUALITY TARGETS & MODELING RESULTS

- Management Condition Milestones
- Water Quality Targets
- Results

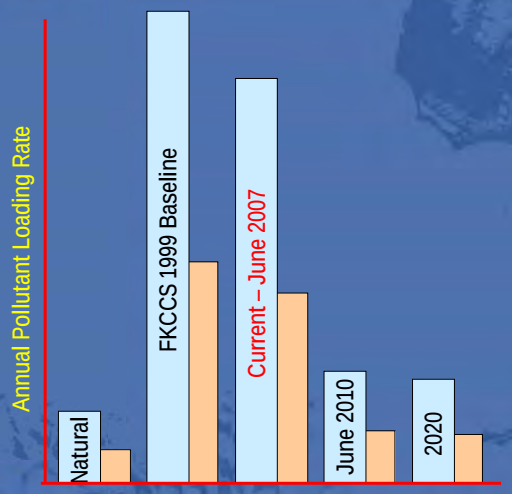
Scott McClelland
CDM

Management Action Milestones

- Natural Conditions
- 1999 – Baseline
- 2007 – Current Conditions
- 2010 – Ch. 99-395 Wastewater Compliance
- 2020 – Additional Stormwater Facilities

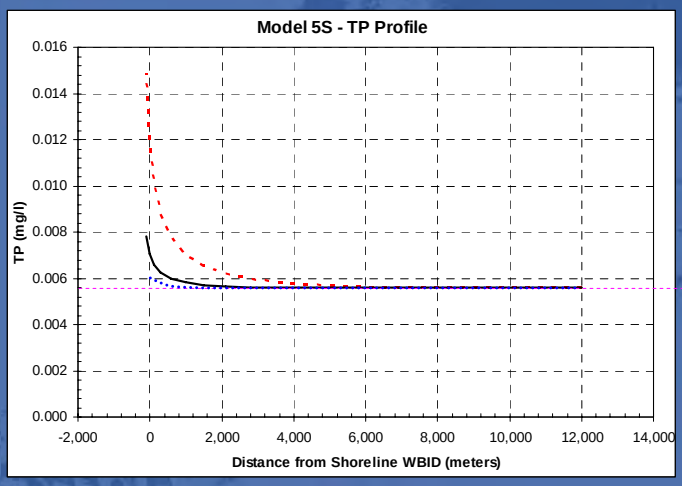
Natural Conditions is based on Urban Land Uses Converted to Forested/Wetlands

FKRAD

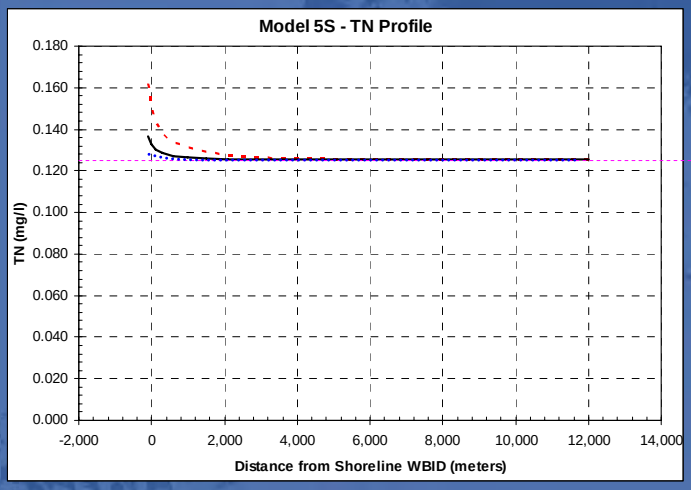


- Without a Hard WQ- or LR-Based Target, How Much is Enough?
- What Will the Existing Models Support?
- What Target Will Satisfy EPA Region IV?

Simulated Results



Simulated Results



Setting of Nutrient Targets

- Resource-Based Targets ?

Setting of Nutrient Targets

- Resource-Based Targets – No Go

Florida Keys Reasonable Assurance Documentation

Setting of Nutrient Targets

- Resource-Based Targets – No Go
- Insignificant-Increase Targets Within 100m WBID
  - Within 95% Confidence Interval for Boundary Concentration Data ?

Florida Keys Reasonable Assurance Documentation

Setting of Nutrient Targets

- Resource-Based Targets – No Go
- **Insignificant-Increase Targets Within 100m WBID**
  - Within 95% Confidence Interval for Boundary Concentration Data – **No Go**

Florida Keys Reasonable Assurance Documentation

Setting of Nutrient Targets

- Resource-Based Targets – No Go
- **Insignificant-Increase Targets Within 100m WBID**
  - Within 95% Confidence Interval for Boundary Concentration Data – **No Go**
  - Within Percentage Increase of Boundary Condition Concentrations?

Florida Keys Reasonable Assurance Documentation

Setting of Nutrient Targets

- Resource-Based Targets – No Go
- **Insignificant-Increase Targets Within 100m WBID**
  - Within 95% Confidence Interval for Boundary Concentration Data – **No Go**
  - Within Percentage Increase of Boundary Condition Concentrations – **No Go**

Florida Keys Reasonable Assurance Documentation

Setting of Nutrient Targets

- Resource-Based Targets – No Go
- **Insignificant-Increase Targets Within 100m WBID**
  - Within 95% Confidence Interval for Boundary Concentration Data – **No Go**
  - Within Percentage Increase of Boundary Condition Concentrations – **No Go**
  - Within Percentage Increase of Natural Condition Concentrations ?

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Setting of Nutrient Targets

- Resource-Based Targets – No Go
- Insignificant-Increase Targets Within 100m WBID
  - Within 95% Confidence Interval for Boundary Concentration Data – **No Go**
  - Within Percentage Increase of Boundary Condition Concentrations – **No Go**
  - Within Percentage Increase of Natural Condition Concentrations – **No Go**

Setting of Nutrient Targets (continued)

- Insignificant-Increase Targets Within 500m WBID ?
  - 10 µg/l Increase Above Natural TN Concentration
  - 2 µg/l Increase Above Natural TP Concentration

Setting of Nutrient Targets (continued)

- **Insignificant-Increase Targets Within 500m WBID – YES! YES!!**
  - 10 µg/l Increase Above Natural TN Concentration
  - 2 µg/l Increase Above Natural TP Concentration
- **Redefine WBID from 100 meters to 500 meters (Requirement)**
  - 1999 Baseline > Targets
  - 2015 Projected w/Mgmt Activities < Targets

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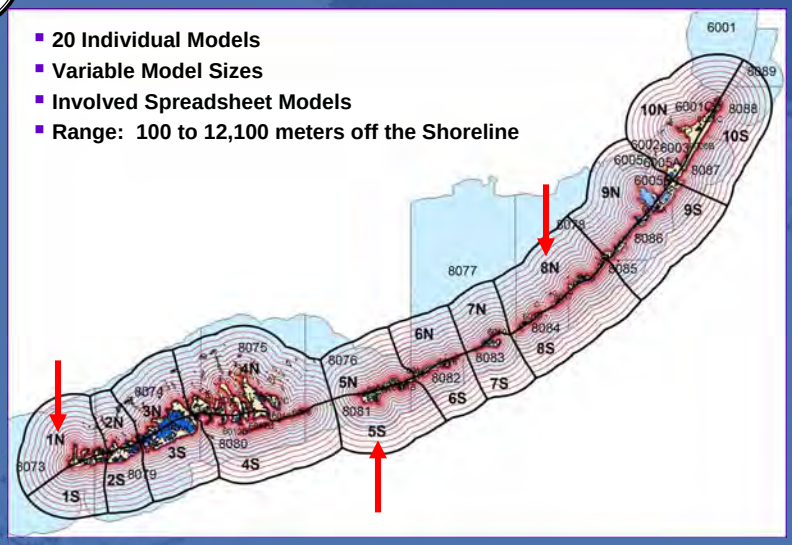
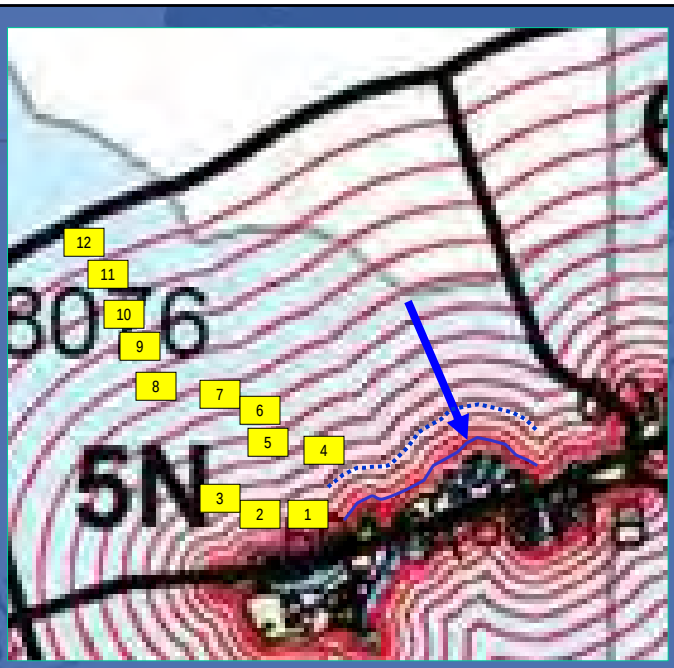
WBID Models in the Keys

- **20 Individual Models**
- **Variable Model Sizes**
- **Involved Spreadsheet Models**
- **Range: 100 to 12,100 meters off the Shoreline**



Florida Keys Reasonable Assurance Documentation



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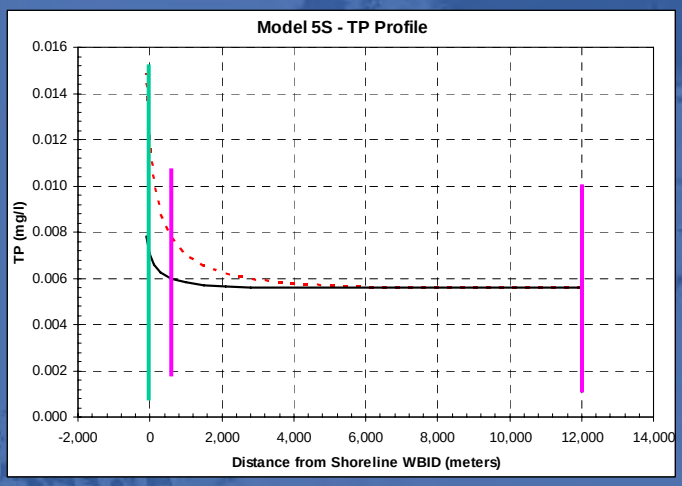
Simulated Results



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Model Results - TN

Community	Model	Natural Condition (µg/l)	1999 Baseline 100 m (µg/l)	2015 Projected 100 m (µg/l)	2015 Projected 500 m (µg/l)	TN Target (µg/l)	Boundary Condition (µg/l)
Key West	1N	169	315	184	172	179	168
	1S	132	275	169	140	142	130
Boca Chica	2N	203	277			213	194
	2S	132	185			142	123
Saddlebunch	3N	208	211			218	204
	3S	135	150			145	127
Big Pine	4N	215	227			225	210
	4S	131	140			141	131
Marathon	5N	216	251	225	217	226	215
	5S	127	163	137	129	137	125
Marathon	6N	239	258	250	240	249	238
	6S	125	140	137	128	135	125
Layton	7N	389	400	396	391	399	389
	7S	117	119	118	116	127	115
Islamorada	8N	756	782	763	756	766	754
	8S	114	144	119	115	124	114
Key Largo	9N	730	738	731	730	740	729
	9S	114	133	118	114	124	112
Ocean Reef	10N	336	348	340	326	346	321
	10S	126	140	132	120	136	116

Florida Keys Reasonable Assurance Documentation

Model Results - TP

Community	Model	Natural Condition (µg/l)	1999 Baseline 100 m (µg/l)	2015 Projected 100 m (µg/l)	2015 Projected 500 m (µg/l)	TN Target (µg/l)	Boundary Condition (µg/l)
Key West	1N	9	50	11	9	11	9
	1S	6	48	11	7	8	6
Boca Chica	2N	11	31			13	10
	2S	7	20			9	5
Saddlebunch	3N	11	12			13	10
	3S	7	11			9	6
Big Pine	4N	10	13			12	9
	4S	5	8			7	5
Marathon	5N	8	16	10	8	10	8
	5S	6	15	8	6	8	6
Marathon	6N	9	14	10	9	11	8
	6S	5	9	8	6	7	5
Layton	7N	11	14	12	11	13	11
	7S	6	6	6	5	8	5
Islamorada	8N	9	16	11	9	11	9
	8S	6	14	10	6	8	6
Key Largo	9N	8	10	8	8	10	8
	9S	6	10	6	5	8	5
Ocean Reef	10N	8	11	9	7	10	6
	10S	7	11	9	6	9	6

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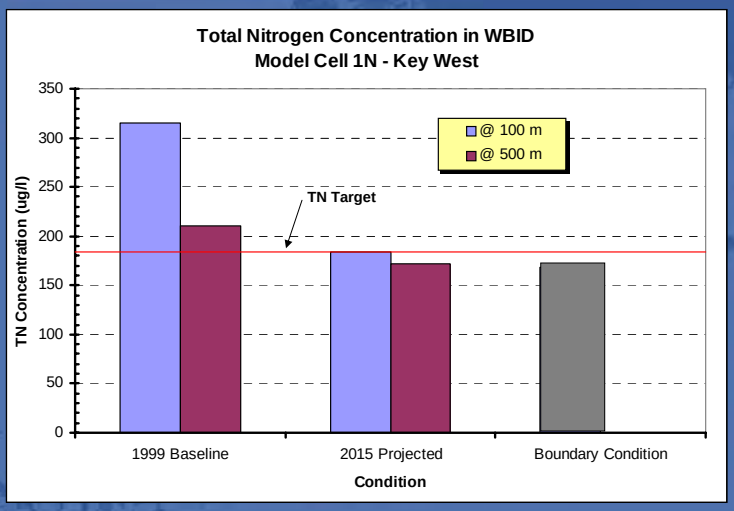
Model Results – Example 1N



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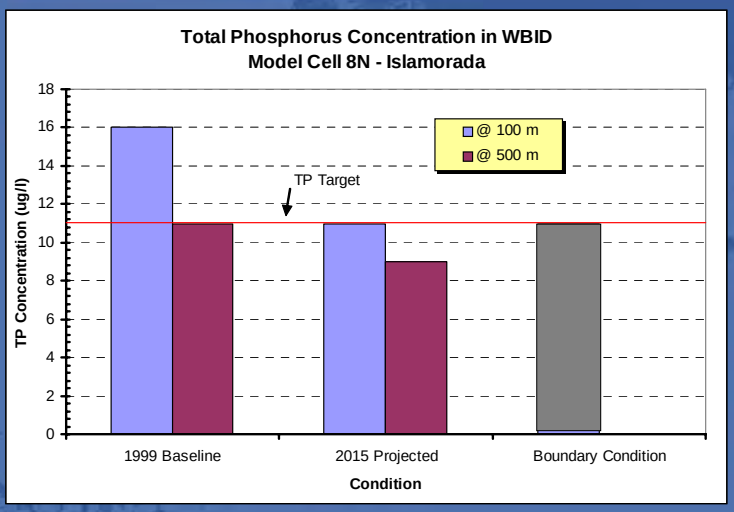
Model Results – Example 8N



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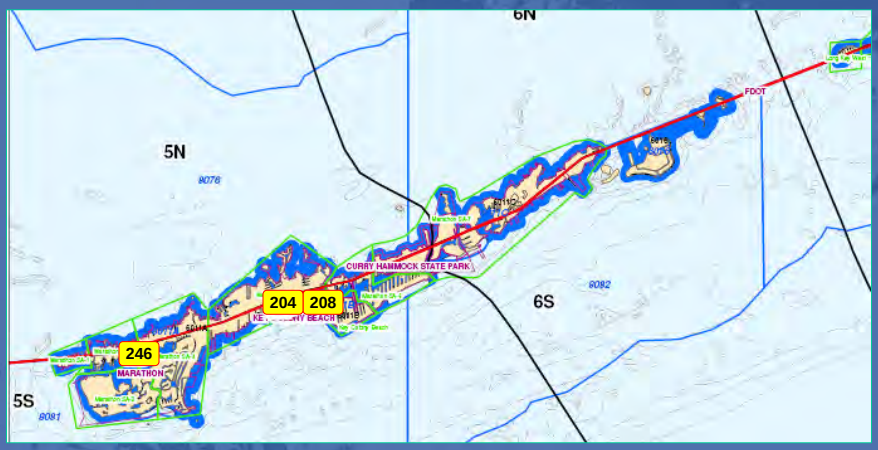
CANAL MODELING

- Original FKCCS Canal Models
- FKRAD Canal Models
- Model Results

Steve Lienhart
URS

FKCCS Canal Models

Middle Keys Canal Models



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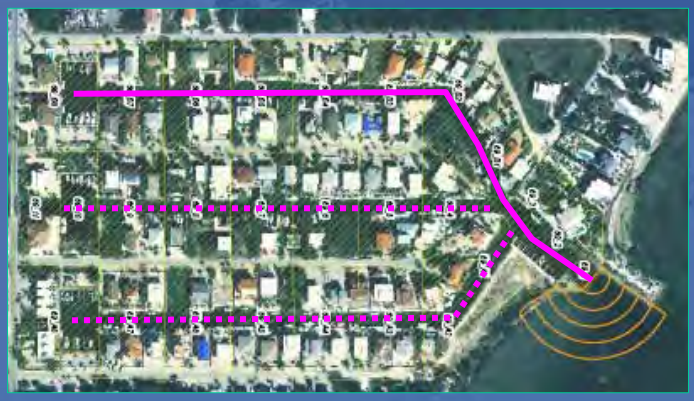
Simple Configuration
Canal 288

- Linear Channel
- Simple Geometry
- 1,328 LF Longest Travel Path

Florida Keys Reasonable Assurance Documentation

Moderately Complex Configuration
Canal 69



- Trifurcated Channel
- Simple Geometry
- 1,875 LF Longest Travel Path

Florida Keys Reasonable Assurance Documentation

Complex Configuration
Canal 339

- Multiple Branched Channel
- Complex Geometry
- 2,650 LF Longest Travel Path

Florida Keys Reasonable Assurance Documentation

Computational Example
Canal 50

- Linear Channel
- Simple Geometry
- 1,600 LF Longest Travel Path

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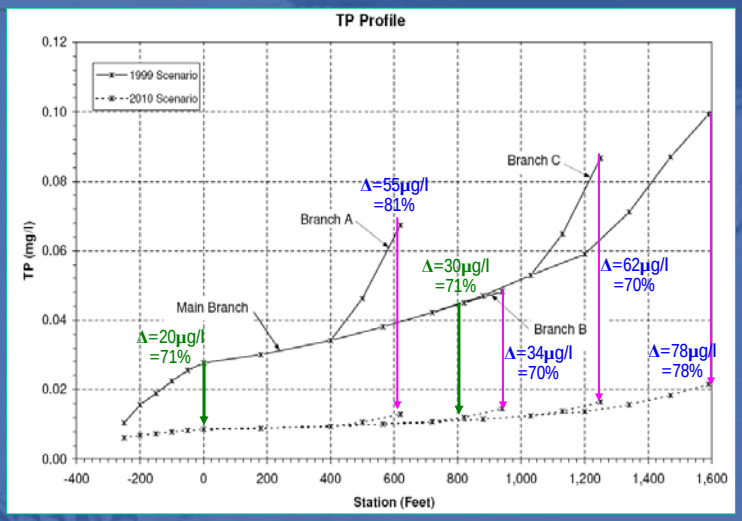
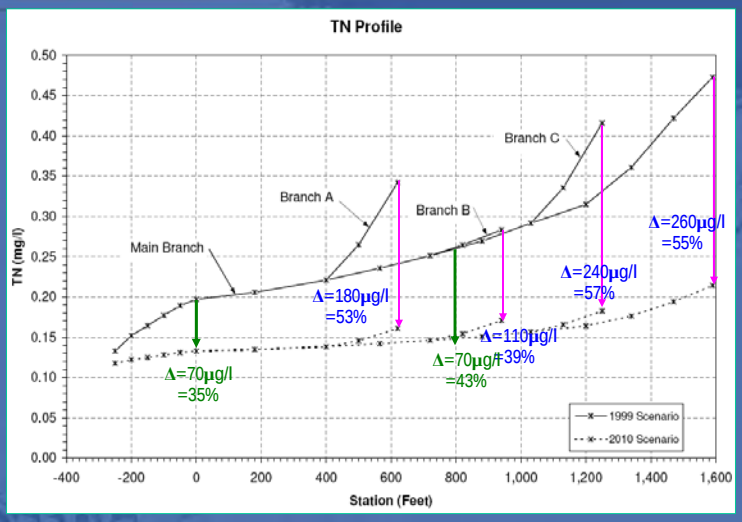
Canal 50 Model Profile



Florida Keys Reasonable Assurance Documentation

Canal 50 Model Profile



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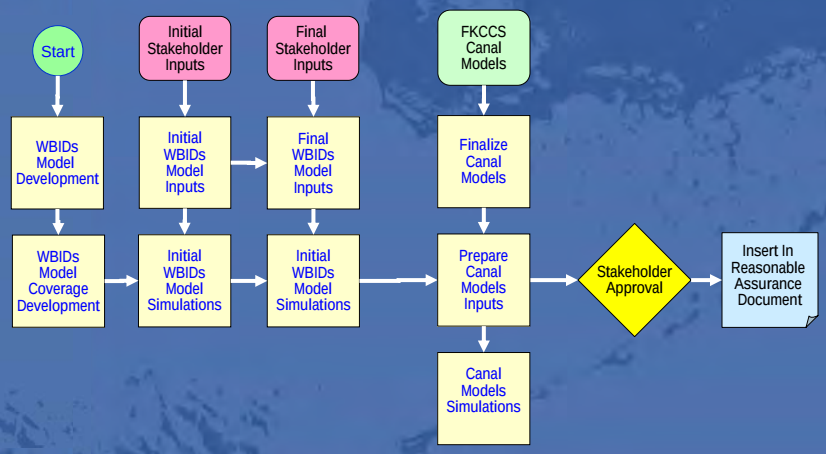
Modeling Process



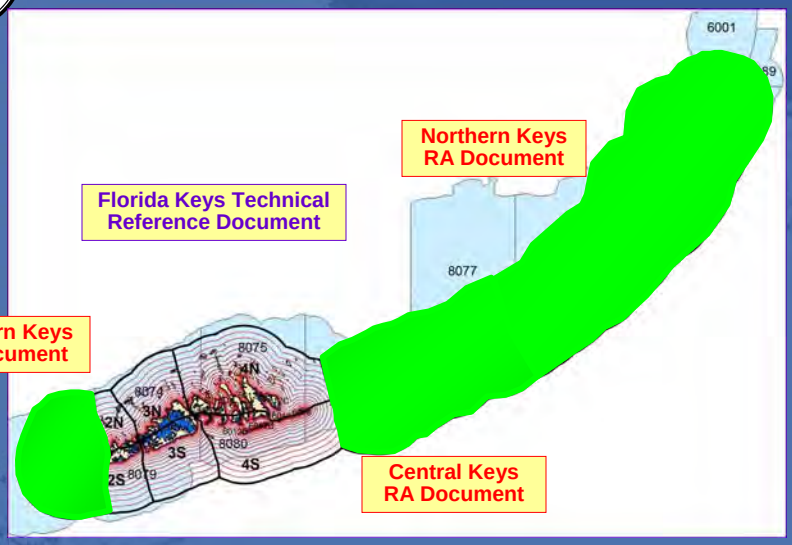
Florida Keys Reasonable Assurance Documentation

OVERVIEW OF FKRAD DOCUMENTS

- Southern, Central, Northern RADs
- Organization of Documents

Scott McClelland
CDM

Three Document Scenario



RAD Document Organization

- Executive Summary
- Background
- Description of Impaired Waters
- Description of Water Quality Targets
- Description of Proposed Management Activities
- Schedule to Achieve WQ Targets
- Procedures for Monitoring and Reporting Results
- Proposed Corrective Actions
- Exhibits

Florida Keys Reasonable Assurance Documentation

RAD Document Organization

- Executive Summary
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- Description of Impaired Waters
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Florida Keys Reasonable Assurance Documentation

Technical Reference Document Organization

- Governing Regulations
- Water Quality
- Living Resources
- Stakeholder Summaries
- Management Practices (General)
- Models and Simulations
- Public Involvement Program
- References/Bibliography

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IDENTIFIED MANAGEMENT ACTIVITIES AND ESTIMATED NUTRIENT REDUCTIONS

- Wastewater Treatment
- Stormwater Management
- Status of WBID Models

Steve Lienhart
URS Corporation

Florida Keys Reasonable Assurance Documentation

Generic Management Actions

Wastewater Management Practices	Stormwater Management Practices	Regulatory Programs
▪ Elimination of Cesspits ▪ Centralized Wastewater Services ▪ Upgraded Privately Owned Wastewater Systems ▪ Class V Deep Injection Well for Disposal of Wastewater Effluent (Replacing Existing Ocean Outfall) ▪ Marine Pump-Out Service for Moored Boats to Reduce Illicit Discharges	▪ Retrofitting Existing Drainage Systems with Stormwater Treatment prior to Outfall to Halo Zone Waters ▪ Retrofitting Existing Drainage Systems with Stormwater Treatment and Stormwater Disposal Wells (No Direct Outfall to Halo Zone) ▪ Incorporation of Treatment Components in New Transportation Projects	▪ Designation as an "Area of Critical State Concern" ▪ Local Development and Redevelopment Regulations ▪ Enforcement of Chapter 99-395 Requirements by FDEP and FDOH
Refer to Exhibit 3	Refer to Exhibit 4	Refer to Appendix A

Baseline Loading

BASELINE ANNUAL NUTRIENT LOADINGS

WBID	Estimated Annual Wastewater Load (lbs/year)		Estimated Annual Anthropogenic Stormwater Load (lbs/year)	
	Total Nitrogen	Total Phosphorous	Total Nitrogen	Total Phosphorous
6014A-N	107,871	34,283	12,589	1,790
6014A-S	62,442	18,797	10,838	1,687
6014B-N	9,191	2,754	3,482	518
6014B-S	23,100	8,775	4,368	625
TOTALS	209,218	64,609	31,277	4,620

Source: Florida Keys Carrying Capacity Study, Deliverable 8, Water Module, CCIAM GIS coverages for wastewater management practices and land uses

Table 4-2
CENTRAL KEYS AREA MANAGEMENT ACTIONS

Management Action	EDUs Served	% of Total EDUs (10,993 EDUs)	Area Served (Acres)
IMPLEMENTED/OPERATIONAL MANAGEMENT ACTIONS			
▪ Elimination of Cesspits*	0		
▪ Elimination of Septic Tank Systems**	281		
▪ Centralized Wastewater System with BAT Treatment Facilities	625	5.69%	
▪ Centralized Wastewater System with AWT Treatment Facilities	204	1.86%	
▪ Localized Stormwater Treatment Systems			29.56
PLANNED FUTURE MANAGEMENT ACTIONS			
▪ Elimination of Cesspits*	2,502		
▪ Elimination of Septic Tank Systems**	4,835		
▪ Elimination of Private WWTPs***	3,601		
▪ Centralized Wastewater System with BAT Treatment Facilities	543	4.95%	
▪ Centralized Wastewater System with AWT Treatment Facilities	10,191	92.71%	
▪ Localized Stormwater Treatment Systems			5,366.15

* Conversion to ATUs or Centralized Wastewater Services
** Connection to Central Sewer System and Formal Abandonment of Septic Tank System
*** Connection to Central Sewer System with BAT or AWT Treatment

Wastewater BMPs

- **Treatment Methods**
  - WWTPs (Secondary, BAT, AWT)
  - On-Site (Cesspits, Septic Tanks, ATUs)
- **Effluent Disposal Methods**
  - Effluent Reuse (Irrigation Systems)
  - Shallow Injection Well (90 ± feet)
  - Deep Injection Well (2,000+ feet)
- **Marina/Boat Pump-Out**

Stormwater BMPs

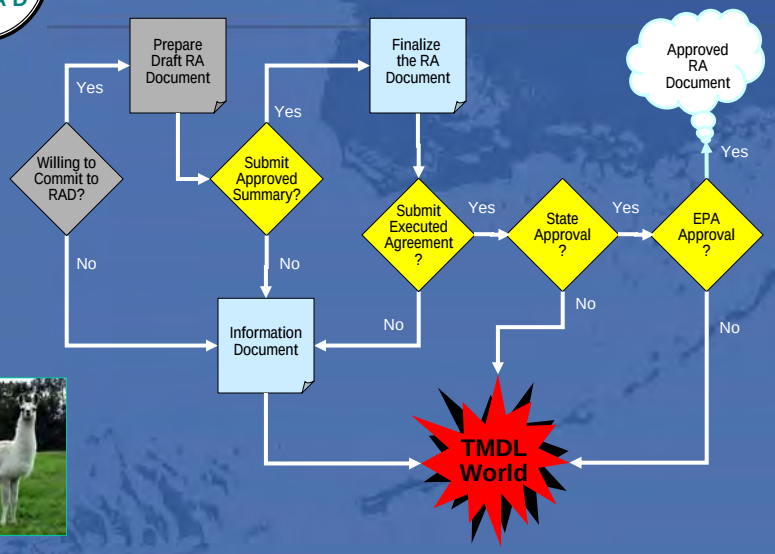
- Drainage Well Service Areas
- PLRs for Drainage Wells
- Nutrient Removal Rates
  - Local Testing Data
  - Conservative Assumption
    - Runoff Goes to Halo Zone (HaZo)
    - 10% Systematic Removal for TN and TP in all BMPs Prior to Disposal
    - All Effluent Goes into HaZo
- Disposal Methods

CRITICAL STAKEHOLDER DECISIONS

- Review of Documents
- Agreements/Resolutions/Letters of Commitment
- Final Documents

Scott McClelland
CDM

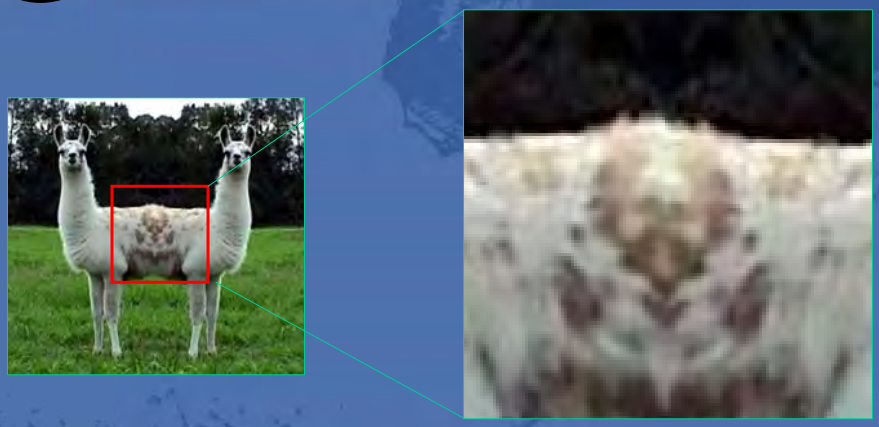
What Do We Do Now?



Action List

- CDM/URS to Provide Final Summaries with Loading
- CDM/URS Finalize Tech Ref Document
- Stakeholders Provide Initial Comments on RADs
- Stakeholders Finalize Commitments
- CDM/URS Finalize Documents
- CDM/URS Submit Final to Stakeholders, Then Formally to FDEP

Questions?



Alfred E. Newman