Quantifiable Objectives

Rainbow River Surface Water Improvement and Management (SWIM) Plan

A Comprehensive Conservation and Management Plan

November 2015

Table 1: Quantifiable Objectives

Water Quality	Target
Water clarity in the river	>100 feet[1]
Nitrate concentration in the springs and river	<0.35 mg/L[2]
Water Quantity	
Minimum flows for the springs and river system	>95%[5]
Natural Systems	
Coverage of desirable submerged aquatic vegetation in the river	>65%[4]
Coverage of invasive aquatic vegetation (hydrilla/filamentous algae) in the river	<10%[4]

[1] Based on Anastasiou 2006 and average river-wide data presented in Table 3
[2] FDEP 2013 – Nutrient TMDL for Rainbow Springs Group and Rainbow Springs Group Run
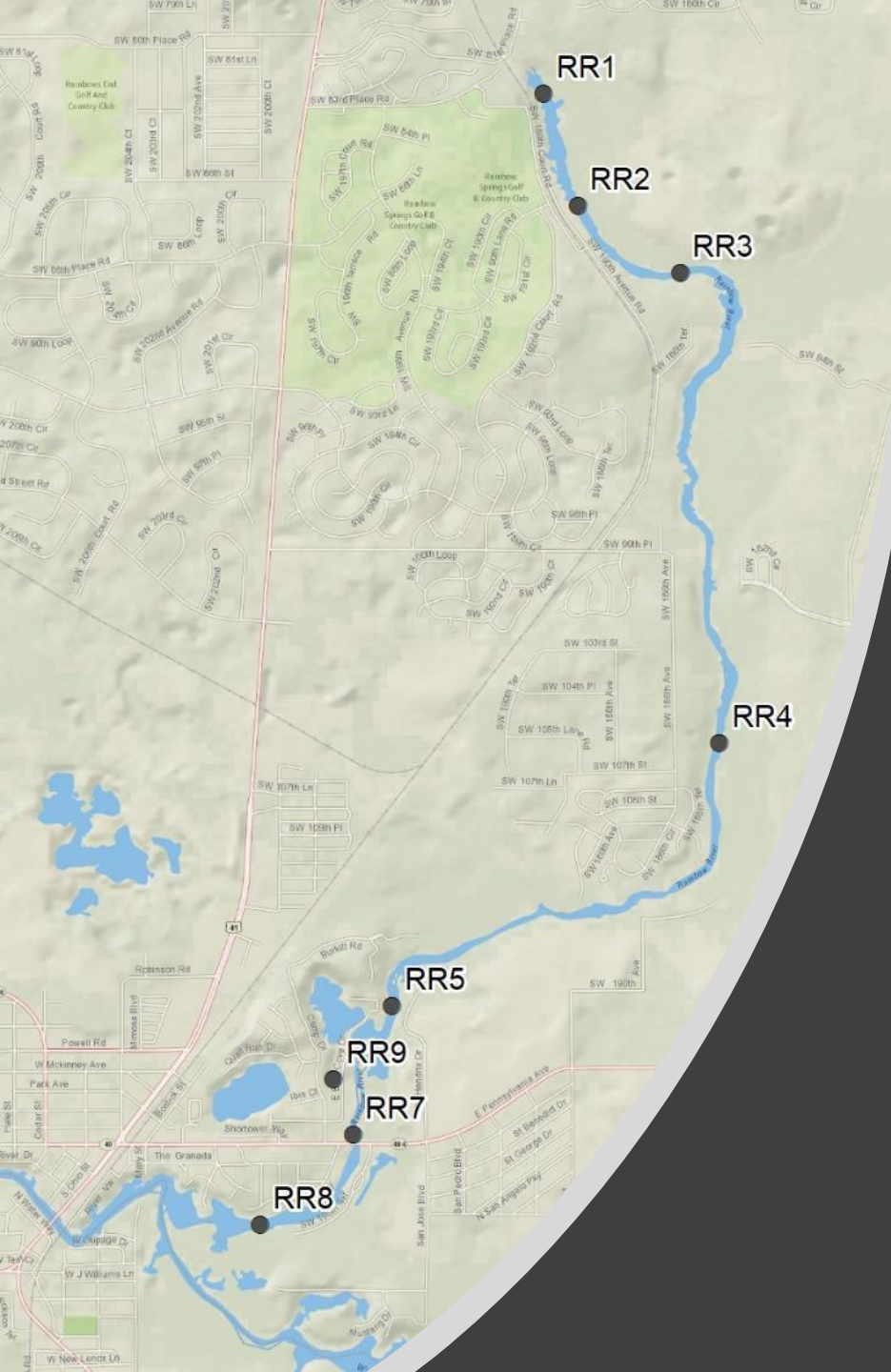[3] SWFWMD 2015 Minimum Flows and Levels Priority List and Schedule
[4] Based on data presented in Table 4 from the 2011 Rainbow River vegetation evaluation (Atkins and DCWI 2012)
[5] **SWFWMD 2017 Recommended Minimum Flow for the Rainbow River System**

Rainbow River
P108 Surface WQ Stations

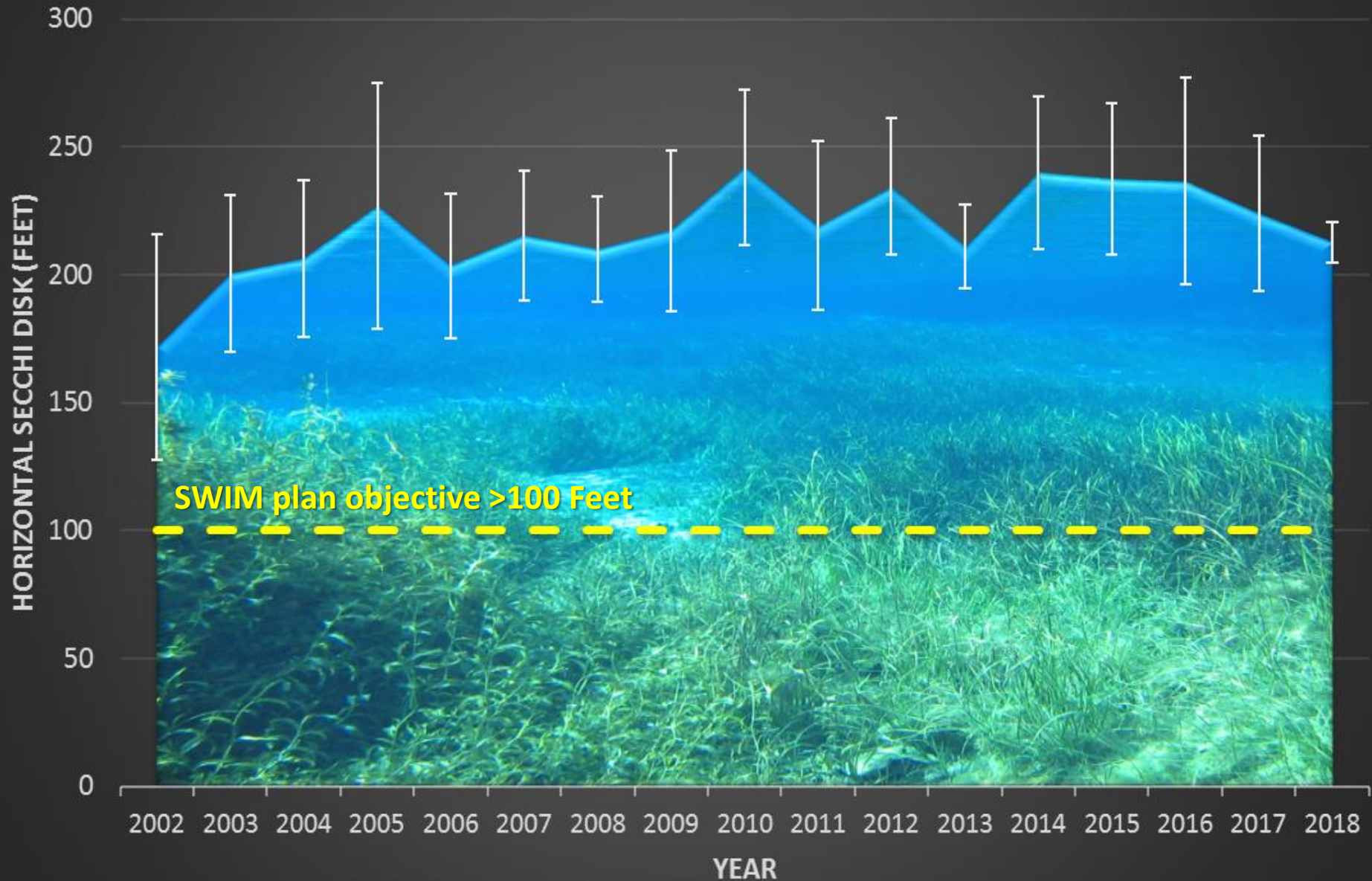| Laboratory Parameters:	Field Parameters:
Ammonia	Secchi (Vertical)
Calcium	Secchi (Horizontal)
TOC	Specific Conductivity
Chlorophyll a	pH
Chlorophyll b	DO
Chlorophyll c	Temperature
Pheaophytin	Total Depth
Color	
Iron	
Magnesium	
Nitrate+Nitrite	
Total Nitrogen	
Orthophosphorus	
Total Phosphorus	
Potassium	
TSS	
VSS	
Sodium	
Turbidity	

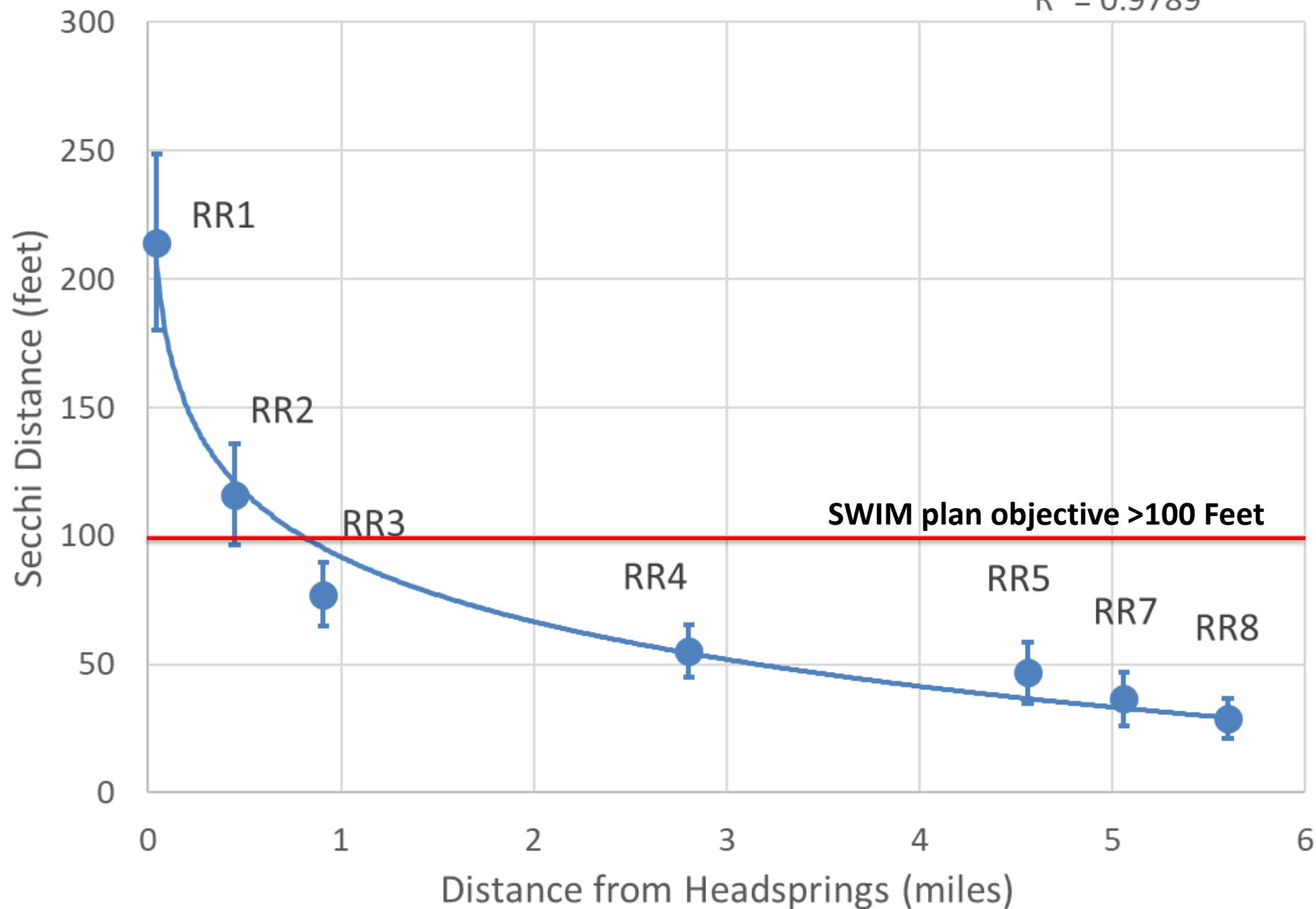# Water Quality Objective – Water Clarity

Mean Water Clarity Rainbow River

Rainbow River Headsprings
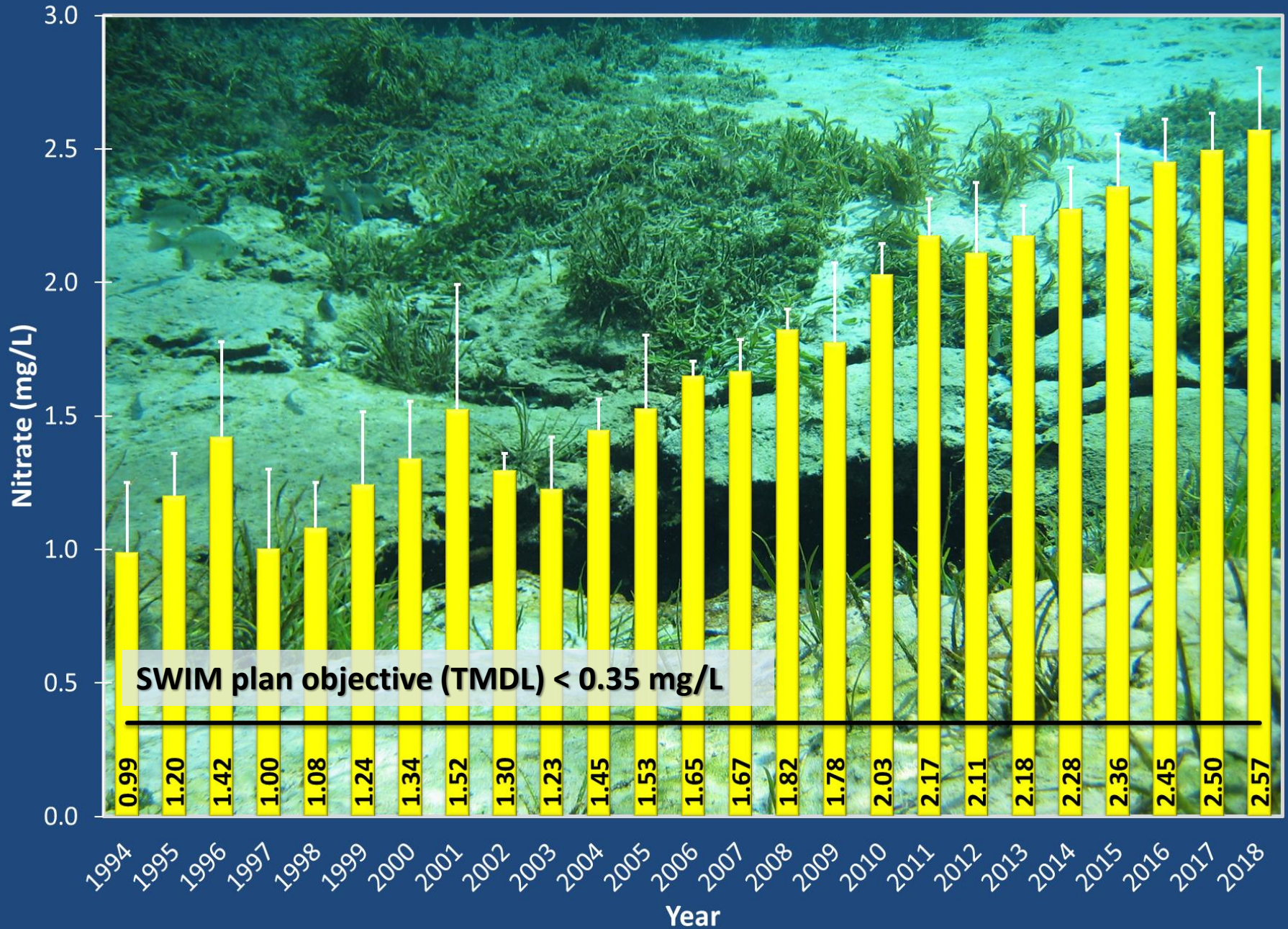Water Clarity (Feet)

Rainbow River Secchi vs Distaance

$y = -36.32\ln(x) + 91.766$
$R^2 = 0.9789$

SWIM plan objective >100 Feet

RR1
RR2
RR3
RR4
RR5
RR7
RR8

Secchi Distance (feet)

Distance from Headsprings (miles)

Rainbow Springs Nitrate Concentrations

Nitrate (mg/L) (y-axis: 0.0, 0.5, 1.0, 1.5, 2.0, 2.5, 3.0)

SWIM plan objective (TMDL) < 0.35 mg/L

Year	Nitrate (mg/L)
1994	0.99
1995	1.20
1996	1.42
1997	1.00
1998	1.08
1999	1.24
2000	1.34
2001	1.52
2002	1.30
2003	1.23
2004	1.45
2005	1.53
2006	1.65
2007	1.67
2008	1.82
2009	1.78
2010	2.03
2011	2.17
2012	2.11
2013	2.18
2014	2.28
2015	2.36
2016	2.45
2017	2.50
2018	2.57

Year

Water Quantity
Quantifiable Objective

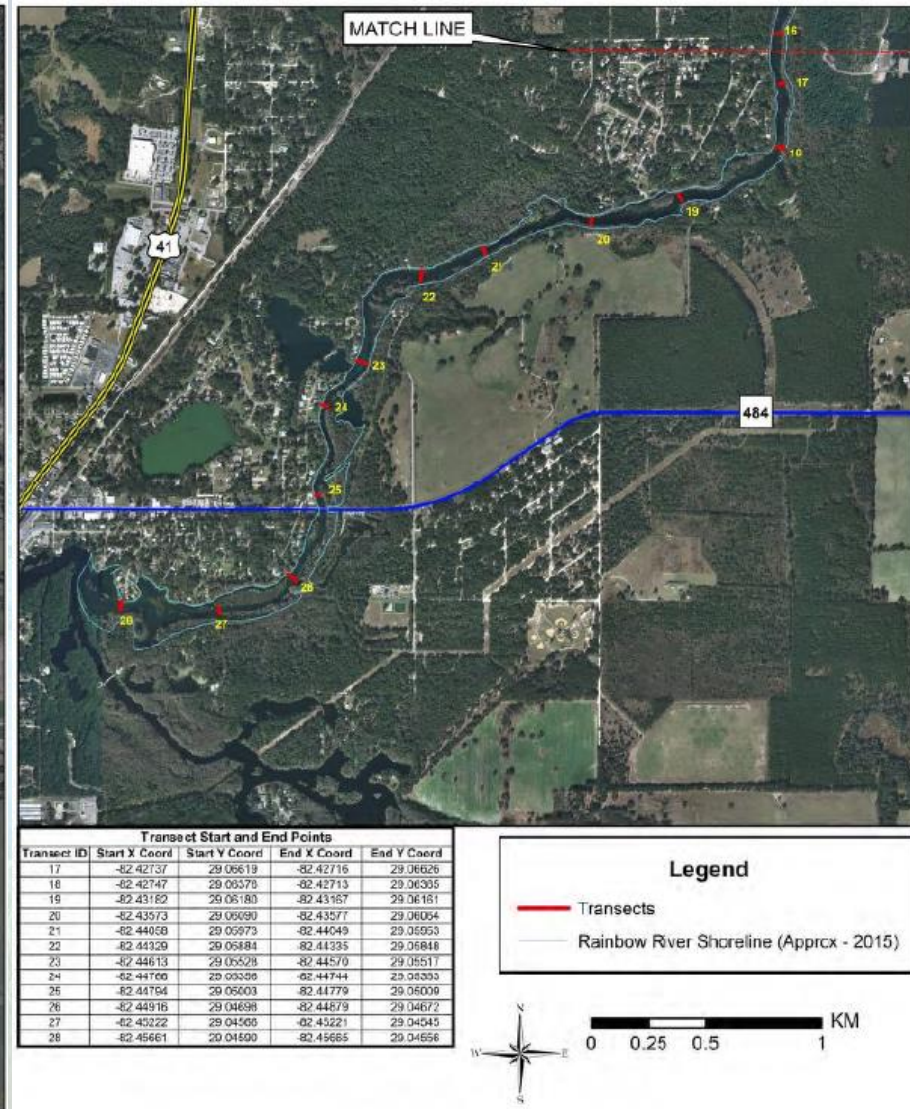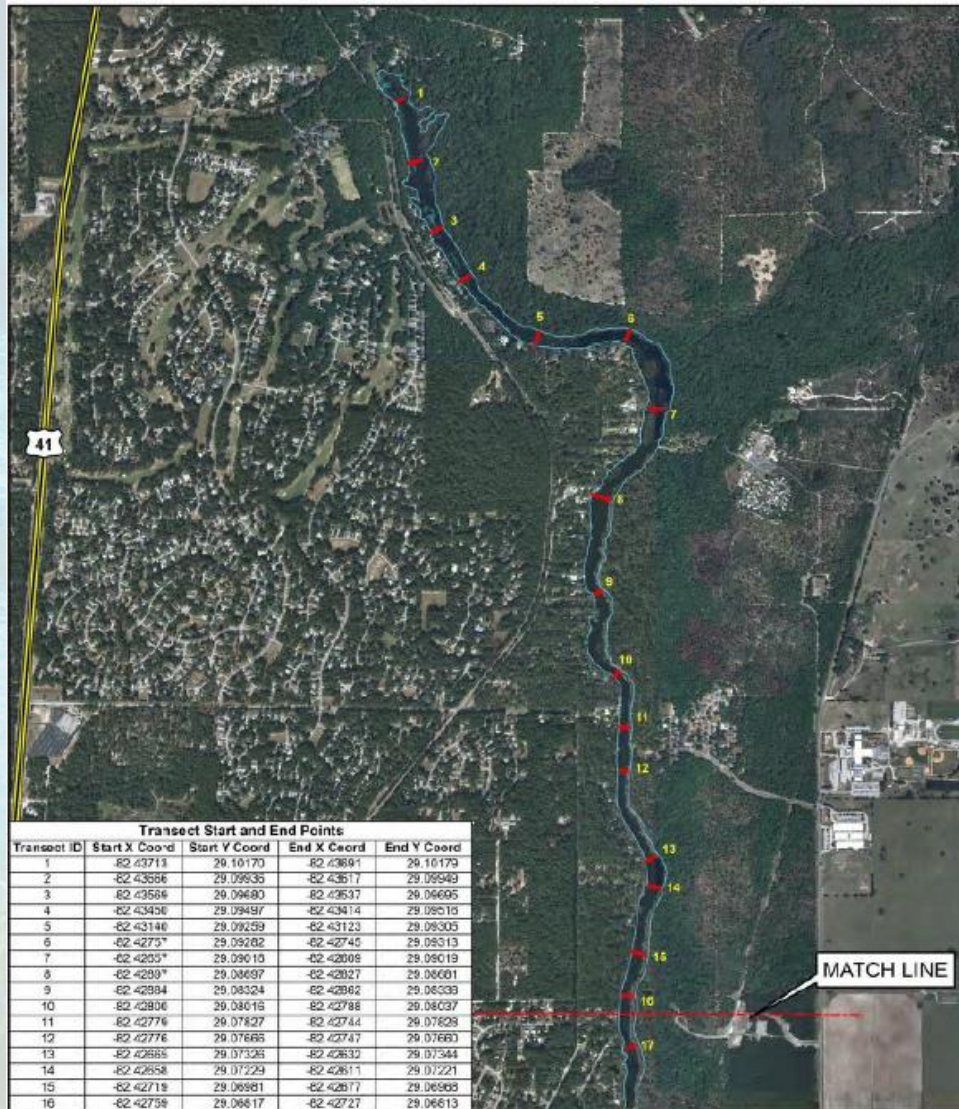- Minimum Flow for the River > 95% of Natural Flow

Natural Systems
Quantifiable Objectives

NATURAL SYSTEMS

- Coverage of Desirable SAV
  > 65% Coverage

- Coverage of Invasive SAV
  <10% Coverage

Rainbow River Submerged Aquatic Vegetation (SAV) Sampling Locations

SAV Percent Cover – August 2019
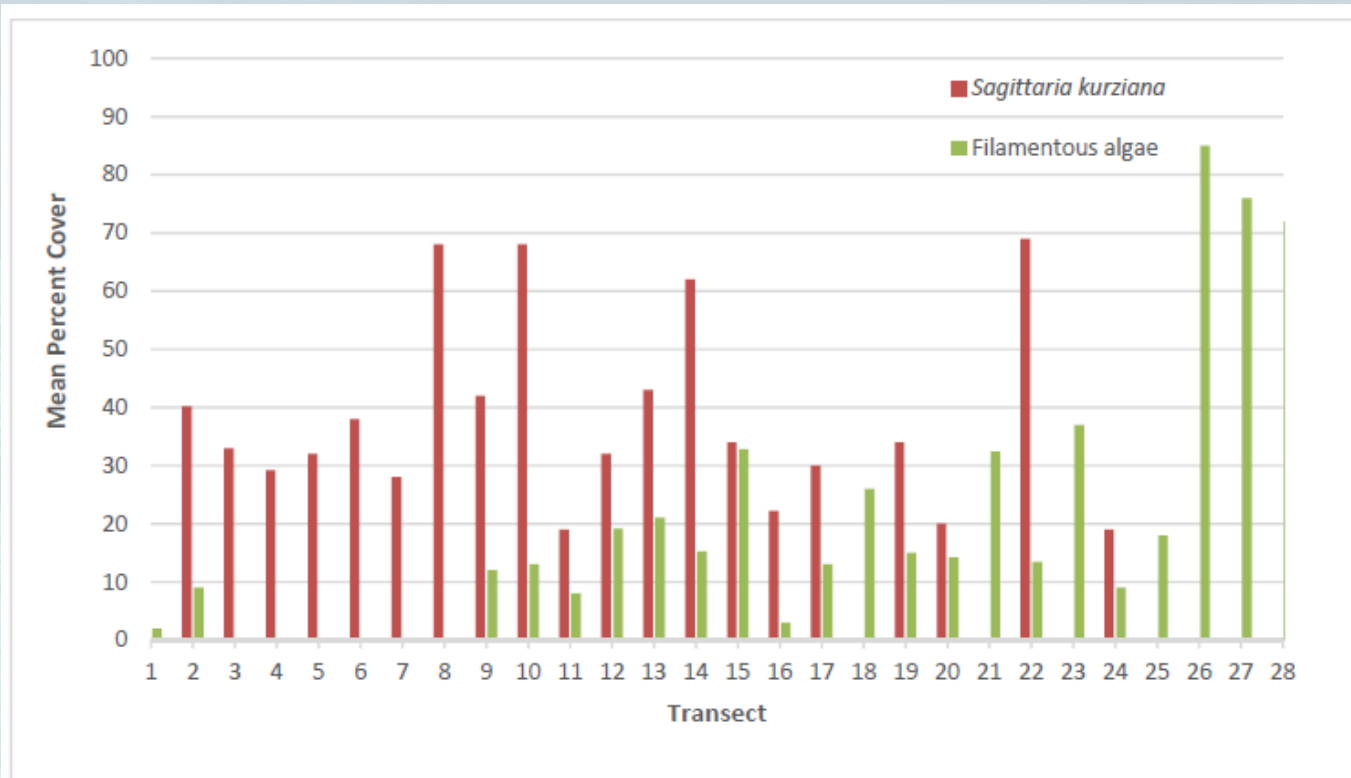## Water & Air Research, Inc. 2019

Figure 3-1. Mean (n = 5) percent cover for the two dominant species *Sagittaria kurziana* and filamentous algae by transect as measured in 0.25 m^2 quadrats at each of the five stations.

- Desirable SAV ≈ 57%
- Invasive (Hydrilla / Filamentous Algae) ≈ 32%

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Table 1: Quantifiable Objectives

Water Quality		Target
Water clarity in the river	*2018: 70 ft. ± 60 ft*	>100 feet[1]
Nitrate concentration in the springs and river	*2018: 2.6 ± 0.2 mg/L*	<0.35 mg/L[2]
Water Quantity		
Minimum flows for the springs and river system	*2018: 98%*	>95%[5]
Natural Systems		
Coverage of desirable submerged aquatic vegetation in the river	*2019: 57%*	>65%[4]
Coverage of invasive aquatic vegetation (hydrilla/filamentous algae) in the river	*2019: 32%*	<10%[4]

[1] Based on Anastasiou 2006 and average river-wide data presented in Table 3
[2] FDEP 2013 – Nutrient TMDL for Rainbow Springs Group and Rainbow Springs Group Run
[3] SWFWMD 2015 Minimum Flows and Levels Priority List and Schedule
[4] Based on data presented in Table 4 from the 2011 Rainbow River vegetation evaluation (Atkins and DCWI 2012)
[5] **SWFWMD 2017 Recommended Minimum Flow for the Rainbow River System**