

IRL SWIM's contribution to the development of IRL North FS performance measures

Purpose:

- Review and present IRL SWIM objectives that can serve as IRL North FS performance measures
- Review other recommended targets and performance measures for reasonableness and applicability to the IRL North FS project

Assumptions:

1. Page 25 of the North FS PMP defines targets and performance measures the following way: "Targets for restoration will be explicitly defined upfront, and will provide the basis for the selection and definition of performance measures (the metric by which restoration alternatives will be evaluated)".
2. One guiding principle of the IRL North FS is to build upon existing restoration and management plans, thus IRL SWIM Plan objectives, targets, or performance measures are potential candidates for adoption by the North FS
3. However, not all SWIM Plan performance measures need to be considered for the North FS.
 - a. If a targeted resource will be affected by North FS projects, then relevant SWIM targets or performance measures should be considered.
 - b. If a targeted resource will not be affected or the certainty that it will be affected is very low, then the SWIM target or performance measure may not be applicable and should not be considered (although it could still be included as a performance *indicator*).
4. If either the SWIM Plan, CCMP, or the North FS does not address specific resources then targets and performance measures addressing these resources should not be required (e.g., none of the plans address Opossum pipefish or its habitat; therefore no targets or performance measures should be required). However, these resources should not be negatively impacted as a consequence of any plan implementation and could still be considered as performance indicators.
5. Based on the IRL South FS experience, it appears that performance measures can be revised during the study period. Therefore, it is recommended that provisional PLRGs and other preliminary SWIM targets be considered, particularly if they are to be revised/finalized by the end of the study period. In fact, this assumption leads to a suggested rule that can govern whether a performance measure is a measure or remains as a measure (see below).

Some Rules to Consider:

Performance measures ...

- Can be preliminary, subject to revision, but must be final by end of North FS
- Should have a responsible agency identified by the end of the North FS that will conduct the measurement, or that performance measure will be eliminated or considered a performance indicator
- Must be measurable (numeric) and documented

DRAFT Targets and Performance Measures

Seagrasses

Seagrass Coverage

Target: Increase coverage of beds of *Halodule*, *Ruppia*, *Syringodium*, *Thalassia*, and the three *Halophila* species, including *H. johnsonii*, in the IRL to depth of 1.7 m (5 ft 7 in).

Performance Measure: Encourage establishment of seagrass coverage from near-shore shallows (at the Mean Lowest Low Water elevation line) to a **maximum depth of 1.7 m (5 ft 7 in) with the highest diversity of seagrass species possible** based on the known geographic range of each of the seven seagrass species in the IRL North FS area (*Halodule wrightii*, *Syringodium filiforme*, *Thalassia testudinum*, *Ruppia maritima*, *Halophila engelmannii*, *Halophila decipiens*, *Halophila johnsonii*).

Performance Measure: The *potential seagrass acreage target* is based on a maximum depth of 1.7 m (5 ft 7 in) to which seagrass can grow in the IRL system. At 1.7 m depth, referenced to NAVD88, potential seagrass coverage in the IRL North FS area is estimated at 102,251 acres. In the Central IRL and southernmost segment of Banana River, where the water quality enhancement work of the North FS will be concentrated, seagrass coverage to 1.7 m depth is estimated at **26,430 acres**.

The latter estimate (Central IRL + southern Banana R.) is broken down by segment and provided in Table 1.

Performance Measure: An *historic seagrass restoration target* is established, based on interpretation of aerial photos of IRL bottom features, and is defined as that area in which seagrass was mapped in any year. For most of the North FS area, the most extensive coverage occurred in 1943. The historic seagrass coverage target for the North FS area is ~64,000 acres. In the Central IRL and southernmost segment of Banana River, where the water quality enhancement work of the North FS will be concentrated, historic seagrass coverage is estimated at **14,489 acres**.

The latter estimate (Central IRL + southern Banana R.) is broken down by segment and provided in Table 1.

Table 1. Seagrass Coverage Targets by Segment, Southern Banana River and Central IRL

	Potential Coverage (acres)	Historical Coverage (acres)
Segments		
BR7 Satellite Beach	786	649
IR9-11 Eau Gallie	2,074	2,543
IR12 Melbourne/Palm Bay	1,218	661
IR13 Malabar/Grant	2,799	1,459
IR14 Sebastian	5,664	3,746
IR15 Wabasso	3,563	864
IR16-20 Vero Beach	4,540	2,416
IR21 Vero Shores	1,809	1,387
IR 22 Indrio/N. Ft. Pierce	3,977	764
Totals	26,430	14,489

Seagrass Light Requirement

Target: Increase water clarity and solar light penetration to enable the growth of diverse and healthy seagrasses to a depth of 1.7 m.

Performance Measure: The amount of solar light required at the target depth of 1.7 m is estimated to be 32% of the sub-surface light (light that has penetrated the air-water interface). At this time, this is a preliminary estimate and should be considered as a preliminary performance measure.

Water & Sediment Quality

Pollutant Loadings

Target: Reduce loadings of nutrients (nitrogen and phosphorus), suspended solids, and other “optical” pollutants from North FS-selected watersheds that will help achieve the seagrass coverage and light performance measures in areas of the IRL affected by these watersheds.

Performance Measure: Provisional pollutant load reductions goals or PLRGs have been established for the major watersheds in the North FS area. For the watersheds of the Central IRL and southernmost segment of Banana River, where the water quality enhancement work of the North FS will be concentrated, provisional PLRGs are provided in Table 2.

Table 2. Provisional “Allowable” Loading Rates for TN, TP, and TSS based on 1943 Land Use, by Segment, Within the Southern Banana River and Central IRL

	TN (total lb/yr)	TP (total lb/yr)	TSS (total lb/yr)
Segments			
BR7 Satellite Beach	106,989	7,020	1,146,101
IR9-11 Eau Gallie	79,250	6,200	972,000
IR12 Melbourne/Palm Bay*	1.9 – 4.9 lb/ac/yr	0.2 – 0.6 lb/ac/yr	32 – 63 lb/ac/yr
IR13 Malabar/Grant	90,550	6,593	1,090,600
IR14 Sebastian	397,700	34,140	4,519,000
IR15 Wabasso	17,400	2,900	241,200
IR16-20 Vero Beach	346,600	43,940	4,887,000
IR21 Vero Shores	5,320	818	101,500
IR 22 Indrio/N. Ft. Pierce	T.B.D.**, SFWMD	T.B.D., SFWMD	T.B.D., SFWMD
Totals	T.B.D.	T.B.D.	T.B.D.
* Segment IR12 includes Crane Creek and Turkey Creek sub-basins, which constitute the majority of that segment’s watershed. Reduction targets for those sub-basins were established by criteria other than calculation by the Pollutant Load Screening Model. The target ranges above encompass the Turkey and Crane Creek’s targets and the estimated 1943 loading rates for other areas within segment IR12.			
** To Be Determined			

Salinity/Hydrology

Target: Manage freshwater discharges to reduce undesirable salinity fluctuations in order to ensure a healthy and diverse assemblage of seagrasses, shellfish and other species at representative sites within the IRL North FS area. The watershed areas of focus are within the Central IRL, particularly the “interbasin diversion” watersheds: Crane Creek, Turkey Creek, and Sebastian River.

Performance Measure: Maintain IRL surface and bottom salinities above 20 ppt at some distance from the mouth of Crane Creek, especially during hard clam spawning seasons (March/April and September/October) and throughout as much of the seagrass growth season as is practical (March – August).

Performance Measure: Maintain IRL surface and bottom salinities above 20 ppt at 500 m from the mouth of Turkey Creek, especially during hard clam spawning seasons (March/April and September/October) and throughout as much of the seagrass growth season (March – August) as is practical.

Performance Measure: Hydrologic criteria are developed for C-1 Canal discharges to Turkey Creek. These criteria are as follows:

Storm Criteria¹:

- Prevent discharges greater than 400 cfs from occurring more frequently than once every 2 years (mean annual)
 - *A 70% reduction in the peak discharge generated by the mean annual, 24-hour storm [down to 440 cfs from an estimated 1,490 cfs and from the SJRWMD permit threshold of 3,000 cfs]*
 - *A 65% reduction in the runoff volume generated by the mean annual, 24-hour storm event*
- Prevent discharges greater than **700 cfs** from occurring more frequently than once every 5 years
- Prevent discharges greater than 2000cfs from occurring more frequently than once every 10 years
 - *A 40% reduction in the peak discharge generated by the 1-in-10 year return frequency storm [down to about 2,400 cfs from an estimated 4,200 cfs (Adkins, 1996)]*

Mean Flow Criteria²:

- Reduce mean base flows by 50%
- Reduce wet season (June – October) mean flows to less than or equal to 75 cfs. The avg. wet season max. flow should not exceed 100 cfs and the avg. wet season min. flow should not fall below 38 cfs (to protect the oligohaline characteristics of the Turkey Cr. Sanctuary)³
- Reduce the dry season (November – May) mean flows to less than or equal to 46 cfs. The avg. dry season max. flow should not exceed 58 cfs and the avg. dry season min. flow should not fall below 25 cfs (to protect the oligohaline characteristics of the Turkey Cr. Sanctuary)

¹ The storm criteria also serve the salinity target of 20 ppt near the mouth of Turkey Creek and helps maintain the salinity wedge in the creek. Storms of a return-frequency magnitude greater than 1-in-5 years would probably violate the 20 ppt target, but that is quite acceptable. Presently, the target is violated nearly every year for days to weeks at a time.

² Mean flow or base flow criteria are considered primarily as a means to reduce pollutant loads. Base flows from C-1 contribute the majority of pollutant loading to Turkey Creek; as much as 75% of the annual TSS load, over 90% of the annual TN load, and 85% of the annual TP load. Therefore, it is imperative to reduce the base flow to a reasonable level to effect significant reductions in annual pollutant loads. This target also serves to stabilize the salinity regime in the IRL and the salinity wedge in the creek.

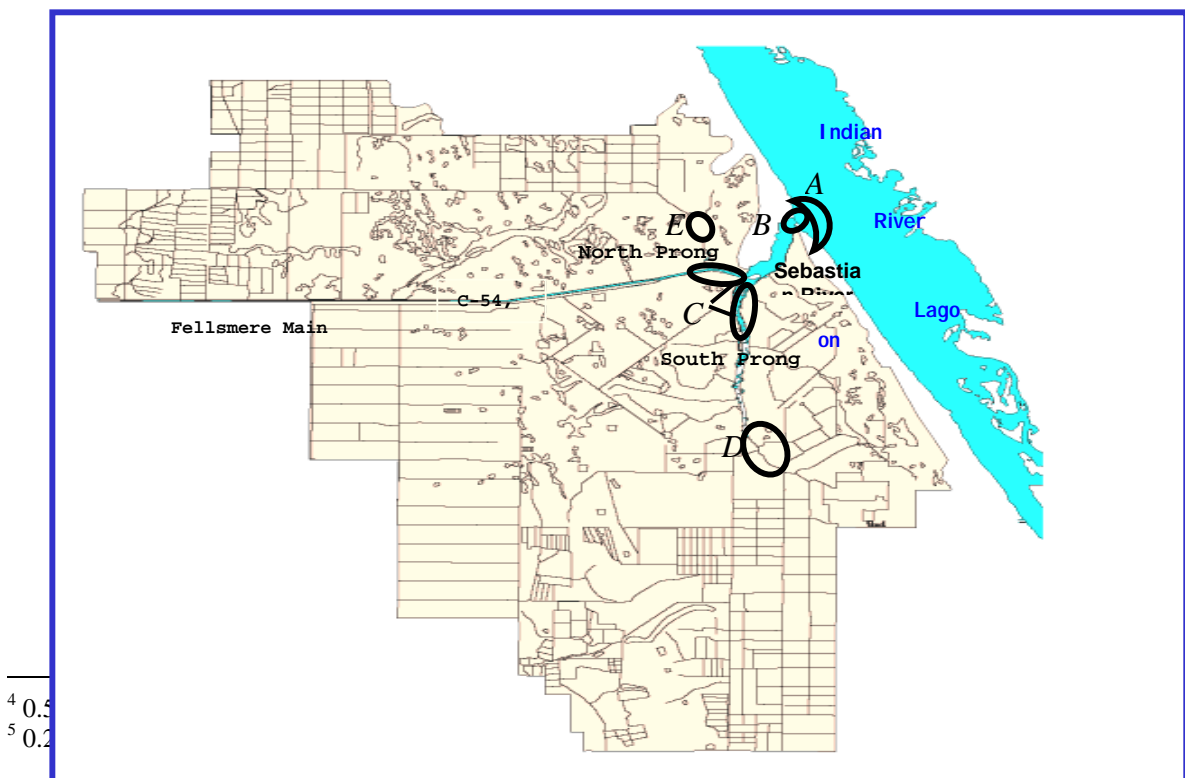
³ Minimum flow criteria (dry and wet seasons) were developed with the aid of the Turkey Creek/IRL hydrodynamic and salinity model developed by FIT (Zarillo and Surak, 1995). SJRWMD staff (Peter Sucsy and Fred Morris, 1997) applied the model to determine minimum discharge levels required to prevent salinity intrusion upstream to Turkey Creek Sanctuary. The SJRWMD also took into account the proposed dredge depths in the lower reach of the creeks to establish new creek bathymetry for the model run.

Performance Measure: Maintain IRL surface and bottom salinities above 20 ppt at 500 m distance from the mouth of Sebastian River, especially during hard clam spawning seasons (March/April and September/October) and throughout as much of the seagrass growth season as is practical (March – August). Additionally, other salinity targets for the River have been established, see Table 3.

Table 3. Preliminary salinity targets for six segments of the Sebastian River/IRL area (see Figure 1 below) for the wet (June – Nov.) and dry (Dec. – May) seasons.

Salinity target (by season)			
Lagoon or River Segment	Wet	Dry	Comments
A. Lagoon, 500 m from Mouth	min 15 ppt min 10 ppt	min 20 ppt min 15 ppt	Bottom ⁴ salinity, <5 consecutive days " " single occurrence, <1day
B. River Mouth	min 15 ppt min 5 ppt	min 20 ppt min 10 ppt	Bottom salinity, <5 consecutive days " " single occurrence, <1day
C. Middle Reach or Lower Prongs, just inside the N. & S. Prongs	min <6 ppt max 20ppt	min <6 ppt max 25 ppt	Surface ⁵ , <14 consecutive days Surface, to protect meso- to polyhaline habitats
D. Upper Reach, South Prong	max 4 ppt	max 4 ppt	Surface, to protect freshwater habitats, single occurrence, <1 day
E. Upper Reach, North Prong	max 4 ppt	max 4 ppt	Surface, to protect freshwater habitats, single occurrence, <1 day

Figure 1. Sebastian River/IRL and location of sites where preliminary salinity targets are established



DRAFT Targets and Performance Measures

Coastal Wetlands

Impounded Marshes

Target: Rehabilitate impounded marshes (restore tidal communication, as many natural wetland functions as possible) via reconnection to the IRL system to the maximum extent feasible.

Performance Measure: Reconnect remaining wetland impoundments identified in the IRL SWIM Plan update (2002), see Table 1.

Performance Measure: Acquire parcels identified under the Blueway project containing impounded wetlands that can be rehabilitated, see Table 2

Dragline-Impacted Marshes

Target: Rehabilitate drag-line impacted marshes via filling and grading of dragline ditches to appropriate wetland elevations to restore as many natural wetland functions as feasible.

Performance Measure: Rehabilitate dragline-impacted wetlands identified in the IRL SWIM Plan update (2002), see Table 3.

Performance Measure: Acquire parcels identified under the Blueway project containing dragline- impacted wetlands that can be rehabilitated, see Table 2.

Table 1. Impoundment acreage identified for reconnection

Sublagoon	Federal Impoundments	Other Impoundments	TOTAL ACRES
Mosquito Lagoon	1,631	25.2	1,656.2
Banana River	2,237	345.9	2,582.9
N & C IRL	4,583	890	5,473
TOTAL	8,451	1261.1	9,712.1

Table 2. Wetland parcel acreage identified for acquisition

Sublagoon	Impounded	Dragline Ditched	TOTAL ACRES
Mosquito Lagoon	25.2	590.6	615.8
Banana River	345.9	331.1	677
N & C IRL	879.4	289.1	1,168.5
TOTAL	1,250.5	1,210.8	2,461.3

Table 3. Dragline-impacted wetland acreage identified for rehabilitation

Sublagoon	Dragline Ditched Wetlands (acres)
Mosquito Lagoon	1,290
Banana River	430
N & C IRL	517
TOTAL	2,237