

## USFWS Comments

### G. Hydrologic Performance Measures

Improving the timing, quantity and duration of freshwater discharges is the primary mechanism controlling salinity patterns within Loxahatchee estuary. The targets are to rehydrate and restore key wetland habitat function, to cause a seaward shift in the current location of the mesohaline zone to restore freshwater floodplain function and quality, to reduce erosion and subsequent shoaling during high flow events, and to maintain or enhance the quality and function of the estuary.

*Comments: Provide detail in this section. Even if we are awaiting additional analyses to prescribe specific flow volumes of fresh water to the estuary, we should be able to state where the as yet unspecified flow volumes will be measured. This is a complex issue that cannot be summarized without quantifiable details and selected locations for monitoring for each stated target. Modeling is needed to select hydrologic targets for both the estuary and the river; separate models for the estuary and the river, and a combination for regional evaluation.*

*Key habitats will require site-specific VECs and monitoring protocols. For example, one key wetland system is the Loxahatchee Slough, an area composed of community types different than the estuary or river. Choosing appropriate VECs is important to judge restoration success. Identify key wetland habitats.*

*Monitoring locations must include historical data sites, ecotone zones, and locations expected to experience both rapid and long-term change to hydrologic modifications. Water quality should also be addressed in hydrologic performance measures.*

### H. Ecological Performance Measures

#### Acres and Quality of Freshwater Wetlands

Activities to rehydrate wetlands and to increase and maintain freshwater flows down riverine sections of the watershed should result in increased acreage or quality wetland and floodplain vegetation.

*Comment: Rehydration of wetlands requires correct seasonal timing, not simply to increase and maintain flows. Both short-term and long-term vegetation VECs are needed to assist the adaptive assessment process.*

#### Mesohaline Pattern and Stability

Performance measure involves measurements necessary to evaluate expected modified salinity envelope as determined by modeling.

*Comment: A 3-d model is needed to account for the salinity wedge and ground water influence, especially if any type of artificial salinity barrier, in addition to increased freshwater flows, will be determined to be necessary for restoration of the estuary.*

#### Freshwater and Estuarine Benthic Community

Increase species richness, abundance and diversity of benthic species to that typically found in a healthy aquatic system.

*Comment: Benthic VECs, especially sedentary species, can be excellent indicators of water quality. What location is considered a “healthy aquatic system” for comparison?*

### **Diversity, Abundance and Health of Seagrasses**

The performance measure for seagrass is cover and composition. The target is to reestablish seagrass beds in areas presently devoid of seagrass, to improve cover where currently inhibited, and to maintain existing cover in areas where grasses currently flourish.

*Comment: The title of this performance measure mentions diversity, but the target only discusses cover (abundance and health). Please add species diversity (alpha and beta) to the measure.*

### **Mangrove Distribution**

The performance measure for mangrove distribution is the percent of restored shoreline mangrove habitat, quality of habitat as defined by height, depth and density of fringing mangrove stands. Increase spatial extent of mangrove and emergent shoreline plant communities in those areas where salinity envelope is appropriate, and decrease mangrove invasion of areas where salinity intrusion was a result of prolonged decreased average flows.

### **Cypress Distribution**

The performance measure for cypress and freshwater floodplain plant distribution is the percent of restored floodplain, quality, depth and density of floodplain communities especially in areas where mangrove invasion has occurred due to prolonged lowered flows.

*Comment: The ability of cypress to regenerate is of primary importance for restoration. Seedling survival of cypress and other key freshwater VECs should be included in the performance measure.*

### **Sport and Commercial Fish Populations**

The performance measure abundance and species composition. [*Previous sentence is incomplete.*] The target is to increase the diversity and density of fish assemblages at benchmark locations. Increase representation of juvenile stages of reef and recreationally important fishes, including the silver snapper species (mutton, yellowtail and lane) parrot fish, gag grouper, sailors choice, snook, redfish, and spotted sea trout from present baseline conditions. Increase abundance of mullet, menhaden and anchovy based on catch per unit effort. Increase post-larval and juvenile densities of spotted seatrout in representative seagrass beds. Increase juvenile settlement rates of the common and fat snook at representative sites. Increase abundance of juvenile and adult redfish at representative sites.

### **Phytoplankton Community Composition and Water Quality**

Water quality performance measures for Lake Worth Lagoon include nutrients, algal bloom frequency, and water clarity (PAR). Historical background levels of surface water nutrient (total phosphorus and total nitrogen) concentrations and loads must be maintained or reduced. Frequency of algal bloom occurrences must not increase. Existing water clarity must be maintained or improved in those regions where reduced water clarity is limiting growth of

seagrasses. Reduce loads of nutrients, toxins, dissolved\_organic matter, and total suspended solids that originate from agricultural and urban land use practices and are exacerbated by regulatory and flood releases during wet periods, that are further exacerbated from the enlargement of the local drainage basins.

*Comments: Are other contaminants affecting Loxahatchee River (pesticides, herbicides, heavy metals, etc.)? Contaminant loading can be affected by change in hydrologic patterns, and should be monitored. This paragraph should refer to the Loxahatchee Estuary, not the LWL. The last sentence in this paragraph is too long and cumbersome.*

### **Oyster Distribution and Sediment Quality**

Restoration efforts and changes in water management practices may affect the conveyance of contaminants in sediments; therefore, toxicant concentrations is also a performance measure. The target is to decrease the geographic extent and concentration of sediment contamination and decrease the extent of unstable or muck sediments which inhibit formation of balanced benthic community.

*Comment: Sediment monitoring should occur both in the River and the Lagoon, using different VECs for the freshwater system (benthic inverts?). Timing of monitoring will be critical to track trends and identify recovery response times to stressors. The spatial extent, density and health of oyster beds should also be monitored.*