

Flow-ways - Allowed to go dry

Purpose and General Description: Above ground shallow storage and conveyance feature that can operate like a floodplain (wetting only occurs during extreme weather events) or like a flowing wetland system that is allowed to go dry during dry weather conditions.

Physical Description: Typical configuration assumed four (4) foot maximum water depth above grade; embankments less than or equal to nine (9) feet in height with three horizontal to one vertical (3H:1V) side slopes. Embankments are earthen with no armor and vegetated slopes. Features include inflow pump station or gravity structure, distribution canal, collection canal, outflow pump station or gravity structure and seepage canals (or utilize existing canals) for seepage management. All features evaluated had no internal levees, no internal structures, and no internal vegetation maintenance.

General Description of Operations: These features can be designed and operated several different ways. Desired benefits will dictate design and operational intent. One example of a dry flow-way is one that operates primarily as a floodplain, whereby when flows are available and exceed existing canal capacity, water overflows the canal banks into the bermed flow-way. Water from the flow-way is stored and then discharged to downstream stormwater treatment areas (STAs) for treatment prior to delivery to the Everglades. Other flow-ways will operate like a flowing wetland system with the associated water quality and wildlife habitat conditions similar to the historic River of Grass that go dry during natural dry weather conditions.

Hydrologic Performance: Flow-ways are intended to create hydrology more consistent with the historic River of Grass within the feature footprint as well as to downstream water bodies. Flow-ways can use gravity or pump inflows, but flow-ways using gravity flows that are not reservoir assisted will experience hydraulic limitations and may not be able to deliver flows consistent with the performance target time series downstream. Since the flow-ways have unmanaged vegetation within them, the density of the vegetation could impact the ability of water to flow. This may require greater water depths on the upstream end of the flow-way away from the interior canal (if present) in order to drive the desired water flows to the discharge end of the flow-way necessary to release the quantity of water desired at the time it is required.

Flow-ways that are allowed to go dry will provide better hydrologic performance with regards to achieving downstream restoration targets than flow-ways that are maintained wet. Since water depths are shallow with emergent vegetation, these features can experience higher ET losses, and in certain locations seepage losses, than deeper storage features.

Water Quality Performance: High uncertainty in predicting total phosphorus (TP) water quality performance. There is a lack of South Florida data on the ability and effectiveness of this type of feature to reduce TP concentrations. Current water quality analysis assumes these features have minimal operational management and minimal vegetation management. Therefore, flow-ways provide less treatment compared to a Stormwater Treatment Area (STA). Analysis assumes that flow-ways may not be able to sustain a long-term positive phosphorus removal rate if allowed to go dry. If optimal treatment performance is preferred then flow-ways will have to remain wet. Flow-ways that are allowed to go dry are assumed to have no

phosphorus removal. Therefore, discharges from flow-ways must receive further treatment in an STA prior to discharge to the Everglades.

Environmental / Ecological Advantages or Benefits: Flow-ways are intended to restore and expand the spatial extent of habitats and landscapes more consistent with the historic River of Grass in addition to providing benefits to downstream water bodies and habitats.

Environmental / Ecological Impacts or Concerns: Ensuring that flow-ways do not interfere or compete with ability to achieve restoration benefits to the existing natural system (e.g., Everglades Protection Area) and to the Everglades. Specifically, need to ensure that providing restoration of farm lands within the Everglades Agricultural Area does not take precedence over the restoration of and the continued viability of the existing natural areas in the Everglades. If flow-ways are allowed to go dry in order to provide downstream hydrologic performance/benefits, this could impact the ecology and habitats within the footprint. If these features are successfully managed or operated to encourage wildlife utilization, additional regulatory constraints related to wildlife protection may emerge (i.e. the Migratory Bird Treaty Act, Endangered Species Act, etc.). As a result, these features could be subjected to operational constraints in order to protect wildlife, which could greatly limit operations and associated benefits to the natural system.

Economic / Recreational Advantages or Benefits: Flow-ways will provide recreational opportunities similar to other wetland habitat. Flow-ways as shallow storage features have a lower cost per acre-foot of storage than deep storage features due to the smaller embankment heights and no internal embankments.

Economic / Recreational Impacts or Concerns: If these features are allowed to go dry in order to provide downstream hydrologic performance/benefits, there will be an impact on the availability and quality of recreational opportunities. Relative to storage capabilities, flow-ways have a significantly larger land acquisition requirement than deep reservoirs. These land requirements are so high that it may be impractical to acquire all of the lands required to meet the performance targets if all storage was contained in shallow features.

O&M Considerations (if any): Vegetation management, particularly removal of exotic species will be a major consideration for this feature as well as maintaining the exterior embankments. If the flow-ways are dry for an extended period of time, there is an increased possibility of muck fires occurring within the flow-ways.

Uncertainty Concerns: Hydraulic uncertainties exist with regard to flow-ways. Hydraulics will be highly dependent on vegetation type and density, topography, features upstream and downstream, and operations. High uncertainty related to TP water quality performance also exists. High uncertainty of vegetation types that will grow and habitat types that will develop in areas previously impacted by agricultural production and significant soil subsidence and oxidation.