American Water Resources Association
2009 SUMMER SPECIALTY CONFERENCE
Adaptive Management of Water Resources II
June 29 – July 1, 2009
Snowbird, UT

Tuesday, June 30
10:30 AM – 12:00 Noon
Session 19: Adaptive Management of Wetlands

1. Assessing the Hydrological Effects of Drainage Ditch Management – A Case Study from Northwest Minnesota - Phil Gerla, University of North Dakota and The Nature Conservancy, Grand Forks, ND (co-authors: Andrew Austreng, Kelsey Snyder)

Drainage ditches in both agricultural and urban areas can cause irreversible environmental degradation or damage that is costly to mitigate. Obsolete ditches and poorly designed clean-outs may adversely affect conditions both up- and down-gradient. Application of analytical tools such as numerical modeling and field monitoring, however, can provide data to guide best management practice. Recently deepened and widened ditches affect the hydrology of a large sedge-sphagnum wetland in northwestern Minnesota, as revealed by water level measurements, in-situ hydraulic conductivity tests, numerical modeling, and vegetation mapping. At the site, about 3.5 feet of permeable, peat-rich soil overlies clay till. Disturbed and compacted spoil along the ditch is about fifty times less permeable than the peat and creates a discontinuous barrier to groundwater flow. Near-continuous water level monitoring indicates that the ditch has a strongly asymmetrical hydrological effect. Compacted spoils on one side of the ditch curtail drainage, but loose, scattered spoil on the other side does not impede flow. Water levels monitored during the early and late times of the ice-free season show that the ditch effectively drains the wetland's margin, although most drainage that occurs during the summer season is lost to evapotranspiration. Model results suggest that the ditches influence wetland conditions to a maximum distance of about 350 feet. Willows, shrubs, and herbaceous weeds have adapted to the disturbed soils and hydrology on the wetland side of the berm, and increased evapotranspiration and water level variability. Options for ditch management include no action, continued maintenance, ditch plugs, or complete ditch filling. Simple removal of trees and shrubs along the wetland side of the berm would decrease evapotranspiration and improve hydrological conditions in the wetland. Ditch plugs would permit the ditch to continue to partially function, do little to improve wetland hydrology, and exacerbate invasive vegetation. If the ditch were filled along its entire reach, it would greatly diminish the conveyance of water away from the wetland and provide conditions favoring the re-establishment of sedge and other native wetland species. Nonetheless, it would need to be done carefully and aggressively managed to mitigate the spread of invasive weeds.

2. Adaptive Management on the Legacy Nature Preserve - Eric McCulley, SWCA, Inc., Salt Lake City, UT

The Great Salt Lake Ecosystem contains a complex mosaic of habitats that are primarily controlled by the amount and timing of seasonal precipitation and snowmelt. Our team of researchers has developed an adaptive management approach to water management that is intended to optimize wetland quality through mimicking natural cycles of flooding and drawdown in shallow playas and grassland ponds within the historical Jordan River floodplain in Davis County, Utah. We developed a bathymetry model for the Jordan River floodplain in an area, which was historically inundated by Great Salt Lake during wet climatic periods in the Great Basin. To optimize habitat quality for nesting and migratory shorebirds and other water-associated birds, water timing and amount has been controlled to provide a late spring drawdown, which in turn draws salts to the soil surface and keeps playa substrates at the proper salinity for macroinvertebrate productivity. Through study of duration of drawdown and other factors such as soil salinity, we have developed a management strategy to maintain soil salinity at appropriate levels to accomplish specific habitat goals.

3. Environmental and Hydrologic Consideration for East of National Everglades Park Hydration - Xuheng Kuang, M. ASCE, Tampa, FL (co-author: Steve Johnson)

WRScompass was selected by South Florida Water Management District (SFWMD) to do the design for C-111 Spreader Canal Phase I Project, initially authorized one of Comprehensive Everglades Restoration Plan projects under Water Resources Development Act of 2000 (WRDA 2000). One of the main purposes of the C-111 project was to improve hydration of East portion of the National Everglades Park (NEP) near C-111 Canal, because Central & South Florida (C&SF) fresh water has been flowing unused to the ocean and the gulf and making the National Park drought. The project includes a south component and a north component with two pump stations, a 1,500 ac-ft above grade pond detention area, and couple of water delivery canals which need to improve and redesign. This paper presented the engineering background and all environmental issues that affect civil design of the project including water quality, water conservation, farmland and habitats preservation, groundwater impact and ecosystem restoration. Hydrologic considerations include soil hydraulic conductivity, seasonal high water table, and other parameters' sensitivity analysis. Pumping flow from C-111 coupled with four different storm events of 25-yr/24-hr event, 100-yr/72-hr event, Hurricane Storm event (100-yr/24-hr 38.7 in of rainfall) and PMP event (100-yr/6-hr of 38.7 rainfall) were modeled under dry, wet and saturated conditions. Civil Designs including canal alignment, channel and spillway dimension and bottom elevation were optimized based on the modeling results.