

WORKSHOP ON WATERSHED RESERVOIRS: LOCATIONS, EFFECTS AND SOLUTIONS

*APRIL 13-15, 2009
CHARLOTTE HARBOR EVENT AND CONFERENCE CENTER
PUNTA GORDA, FLORIDA*

*HOSTED BY THE
CHARLOTTE HARBOR NATIONAL ESTUARY PROGRAM*



Harns Marsh, Lee County. Photograph provided by the East (Lee) County Water Control District

The **CHARLOTTE HARBOR NATIONAL ESTUARY PROGRAM** is a partnership of citizens, elected officials, resource managers and commercial and recreational resource users working to protect the ecological integrity of the greater Charlotte Harbor watershed. A cooperative decision-making process is used within the Program to address diverse resource management concerns in the 4,700-square-mile study area.

THE CHNEP WISHES TO THANK THE FOLLOWING PEOPLE FOR THEIR GENEROUS CONTRIBUTIONS TOWARD MAKING THIS WORKSHOP POSSIBLE:

Sponsors

CF Industries (\$1,500)
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Leroy Crocket	Wayne Daltry	Peter Doering	Sid Flannery
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Peer Reviewers

Dr. Ernst Peebles, USF College of Marine Sciences
Mr. Arturo Torres, USGS Florida Integrated Sciences Center
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**WORKSHOP ON WATERSHED RESERVOIRS:
LOCATIONS, EFFECTS AND SOLUTIONS
APRIL 13-14, 2009
CHARLOTTE HARBOR EVENT AND CONFERENCE CENTER
PUNTA GORDA, FLORIDA**

PURPOSES, OBJECTIVES AND OUTCOMES

Workshop Purposes:

- Begin a process to bring public and private stakeholders together to inform and educate the community regarding reservoirs within the CHNEP watershed.
- Provide a forum for exchange of technical information between scientists and citizens about the locations, purposes, designs, benefits, impacts, alternatives and solutions for existing and proposed reservoirs on the natural environment in the CHNEP watershed.
- Implement the CHNEP CCMP Priority Action HA-K: Identify the hydrologic and environmental benefits and impacts of surface water reservoirs on estuaries within the CHNEP watershed.

Workshop Objectives:

- Facilitate understanding of current natural resource and human water budget needs and their relationship to reservoirs within the CHNEP watershed.
- Facilitate understanding of the locations, purposes, designs and management alternatives of existing and proposed reservoirs within the CHNEP watershed.
- Facilitate understanding of potential individual and cumulative habitat, water quality and hydrological benefits and impacts of existing and proposed reservoirs within the CHNEP.
- Develop recommendations for needed changes in reservoir research, review criteria, policies, public outreach and implementation strategies within the CHNEP watershed.

Workshop Outcomes (to be available on the CHNEP website at www.chnep.org):

- Background information about reservoirs within the CHNEP to review before the workshop.
- Bibliography of suggested references relating to reservoirs.
- Maps of existing and proposed reservoirs within the CHNEP Watershed.
- List of purposes, designs and management options for reservoirs within the CHNEP Watershed.
- List of current studies, methods and models used to evaluate benefits and impacts of reservoirs.
- List of types of benefits and impacts of reservoirs on habitats, water quality and hydrology.
- List of sum of cumulative benefits and impacts of reservoirs within the CHNEP watershed.
- Lists of current processes and criteria used to evaluate current and potential effects of reservoirs.
- List of criteria needed to enhance evaluation of reservoirs, and ideas for implementing criteria.
- List of research needed to enhance design, management and evaluation of reservoirs, and ideas for implementing research.
- List of policy changes needed to ensure reservoirs are consistent with CHNEP CCMP, and ideas for initiating policy changes.
- List of public outreach strategies needed to enhance understanding of reservoirs, and ideas for implementing outreach strategies.
- List of remaining questions and problems, and ideas for solving.
- Final Report of workshop technical presentations and facilitated discussions, available Fall 2009.

WORKSHOP GUIDELINES
FOR SHAPING SHARED UNDERSTANDINGS AND SOLUTIONS

Facilitators' Roles:

- The facilitators will guide discussions and seek consensus on workshop insights.
- The facilitators will maintain a record of group's products.

The Participants' Roles:

- Share in keeping to the agenda.
- Be focused and concise – balance participation.
- Ask questions and verify assumptions.
- Express and acknowledge differing views – no attacks or stereotyping.
- Seek shared understandings and consensus on workshop insights.
Make sure recording is accurate.
- Take notes and e-mail additional comments after the workshop.

Brainstorming Guidelines:

- Generate as many ideas as possible.
- Do not discuss or evaluate ideas until the end.
- Suggesting ideas does not imply a commitment to them.
- Innovative ideas are encouraged.
- Contribute one new idea at a time to the group list.

The Name Stacking Process:

- Facilitator asks who wants to speak on the topic, participants raise their hand.
- Facilitator assigns each person a number based in the order they observed person wishing to speak.
- Facilitator calls on each person based on that order.
- Facilitator may interrupt the stack (change the speaking order) in order to promote discussion on a specific issue or, to balance participation and allow those who have not spoken on an issue an opportunity to do so before others on the list who have already spoken on the issue.

AGENDA SUMMARY

DAY 1: MONDAY APRIL 13, 2009

- 8:00 a.m.** *Coffee and Registration*
- 8:15 a.m.** **Welcome, Introductions, Review Agenda and Workshop Ground Rules**
Welcome and Introductions
Dr. Lisa Beever, Director – Charlotte Harbor National Estuary Program
Review Workshop Agenda and Ground Rules
Dr. Tom Taylor – Florida Conflict Resolution Consortium/USF
Mr. Rafael Montalvo – Florida Conflict Resolution Consortium/UCF
- Session 1:** **Where are the Existing and Proposed Reservoirs within the CHNEP Watershed and what are the Habitat Effects?**
- 8:45 a.m.** **Reservoir Overview: Water Budgets, Landscape Patterns, Plans**
Dr. Lisa Beever, Director – Charlotte Harbor National Estuary Program
- 9:10 a.m.** **Overview of Potential Habitat Effects Associated with Reservoirs**
Dr. Joan Browder, Research Ecologist - NOAA National Marine Fisheries Service
Note: Dr. Browder’s presentation relates to Session 4: Benefits and Impacts of Reservoirs, but it is given here to accommodate scheduling conflicts.
- 9:35 a.m.** **Surface Water Resource Planning within the SWFWMD's Regional Water Supply Plan: Only the First Step**
Mr. Brian Armstrong, P.G. – SWFWMD Water Supply and Resource Development
- 10:00 a.m.** **Facilitated Exercise 1: Review and refine maps and lists of existing and proposed reservoirs within CHNEP watershed. Identify key insights from presentations.**
- 10:30 a.m.** *Break*
- Session 2:** **What are the Purposes, Designs and Management Options for Reservoirs within the CHNEP Watershed?**
- 10:45 a.m.** **Water Storage Considerations: A Case Study of an Alternative Design Plan**
Mr. Church Roberts, Ecologist – Johnson Engineering, Inc.
- 11:10 a.m.** **The Role of Agricultural Reservoirs in Watershed Management**
Mr. Bill Orendorff, Manager – SWFWMD Facilitating Agricultural Resource Management Program
- 11:35 a.m.** **Design and Construction of Reservoirs in South Florida**
Mr. Carl W. Christmann, P.E. – BCI Engineers and Scientists, Inc.
- Lunch and** **Key Note Speaker** (*Lunches are available for purchase on site or at nearby restaurants.*)
- 12:00 a.m.** **Lunch**
- 12:30 p.m.** **“Water Sustainability and the Future of Florida”**
Ms. Cynthia Barnett, Journalist – Florida Trend Magazine

- Session 2:** **Continued**
- 1:15 p.m.** **Design and Construction of Earthen Reservoirs in Florida (1967-2007)**
Dr. John Garlanger – Ardaman and Associates
- 1:40 p.m.** **Capture and Storage of Surface Water in the Peace River Basin: Above-ground vs. Underground Storage**
Mr. Peter J. Schreuder, CEO, Hydrologist – Schreuder, Inc.
- 2:05 p.m.** **Ecoreservoirs Program: EAA A-1 and C-43 CERP Alternatives**
Mr. Forest Gray Michael, Florida Landscape Architect
- 2:30 p.m.** **Facilitated Exercise 2:** Refine lists of purposes, designs and management options for reservoirs within the CHNEP watershed. Identify suggestions for balancing environmental and human uses.
- 3:00 p.m.** **Break**
- Session 3:** **What are Current Studies, Methods and Models Used to Evaluate Benefits and Impacts of Reservoirs?**
- 3:15 p.m.** **Using Hydrologic and Ecological Information to Develop Withdrawal Schedules for In-stream Impoundments and Off-stream Reservoirs in the SWFWMD**
Mr. Sid Flannery – SWFWMD
- 3:40 p.m.** **C-43 West Basin Storage Reservoir: An Acceler8 Project's Development Process, Potential Environmental Benefits, and Calculated Impacts**
Ms Sandy Scheda, President – Scheda Ecological Associates
- 4:05 p.m.** **Physicochemical Factors Affecting Near-Bottom Dissolved Oxygen Concentration in Reservoirs in Southwest Florida**
Mr. John Cassani – Lee County Hyacinth Control District
- 4:30 p.m.** **Facilitated Exercise 3:** Refine lists of studies, methods and models used to evaluate benefits and impacts of reservoirs and identify gaps in data and methods. Formulate suggestions for modeling and measuring effects.
- Day 1 Summary: What are the Technical and Facilitated Lessons Learned and Questions Remaining?**
- 5:00 p.m.** **Synopsis of Key Technical Points from Day 1**
Dr. Ernst Peebles, Biological Oceanographer – USF College of Marine Sciences
Mr. Arturo Torres, Chief – USGS FISC Special Studies Section
Dr. Sam Upchurch, Geologist – SDI Environmental Services, Inc.
- 5:15 p.m.** **Brief Concluding Thoughts from Participants**
Mr. Tom Taylor – Florida Conflict Resolution Consortium/FSU
Mr. Rafael Montalvo – Florida Conflict Resolution Consortium/UCF
- 5:25 p.m.** **Adjourn for the day**
- 5:30 p.m.** **Social Gathering (at a location to be announced.)**

AGENDA SUMMARY

DAY 2: TUESDAY APRIL 14, 2009

8:00 a.m. *Coffee and Registration*

8:15 a.m. *Welcome and Summary of Day 1*

Welcome and Introductions

Dr. Lisa Beever, Director – Charlotte Harbor National Estuary Program

Review Workshop Agenda and Ground Rules

Mr. Tom Taylor – Florida Conflict Resolution Consortium/FSU

Mr. Rafael Montalvo – Florida Conflict Resolution Consortium/UCF

Synopsis of Main Points from Day 1

Dr. Ernst Peebles, Biological Oceanographer – USF College of Marine Sciences

Mr. Torres, Hydrologist – USGS FISC Special Studies Section

Dr. Upchurch, Geologist – SDI Environmental Services, Inc.

Session 4: *What are the Types of Potential Benefits and Impacts of Reservoirs?*

8:40 a.m. **Potential Hydrologic and Water Quality Effects of Reservoirs**

Mr. George Kish, Hydrologist – USGS Hydrologic Investigations Section

9:20 a.m. **The Use of Off-Stream Reservoirs Combined with Percent Flow Withdrawal Schedules to Reduce Downstream Estuarine Impacts**

Dr. Ralph Montgomery – PBS&J

9:45 a.m. **Ecological Monitoring at the C.W. Bill Young Regional Reservoir**

Mr. Christopher Shea, Wetland Scientist – Tampa Bay Water

10:10 a.m. *Mini Break*

10:20 a.m. **An Examination of the Ecological Health of Wetlands in Proximity to a Public Supply Off-Stream In-ground Reservoir in DeSoto County, Florida**

Mr. Jeffrey L. Clark, PMP – EarthBalance

10:45 a.m. **Facilitated Exercise 4: Refine a general list of benefits and impacts of reservoirs on hydrology, water quality and habitats.**

11:15 a.m. *Mini Break*

Session 5: *What is the Sum of the Potential Cumulative Benefits and Impacts of Reservoirs within the CHNEP Watershed?*

11:25 a.m. **Dead Zones, Stagnation and the Water Crisis: Watershed Effects on Estuarine Communities**

Dr. Ernst Peebles, Biological Oceanographer – USF College of Marine Sciences

Lunch and **Poster Session** (*lunches are available for purchase onsite or at nearby restaurants*)

11:50 a.m. **Poster: When a Pile of Dirt is So Much More - Dam Safety Design Criteria**

Ms. Becky J. Hachenburg, P.E. – MWH Americas, Inc.

- Session 5:** **Continued**
- 1:00 p.m.** **Linking Ecological Restoration with Water Supply Development using Off-Stream Reservoirs in Southwest Florida**
Dr. Dave Tomasko, Senior Program Manager – PBS&J
- 1:25 p.m.** **Environmental and Water Supply Benefits of an Off-Stream Reservoir System at the Peace River Water Supply Facility**
Mr. Samuel S. Stone, Environmental Affairs Coordinator – PRMRWSA
- 1:50 p.m.** **Site Evaluation Study for Potential Raw Water Off-Line Regional Reservoir Storage Facility**
Mr. Gary Wantland, P.E., Principal – MWH Americas, Inc.
- 2:15 p.m.** **Facilitated Exercise 5:** Assemble a comprehensive list of potential cumulative benefits and impacts of reservoirs within the CHNEP watershed. Identify possible strategies for coordinated planning and review.
- 2:45 p.m.** **Break**
- Session 6:** **What Processes and Criteria are Used to Evaluate Current and Potential Benefits and Impacts of Reservoirs within the CHNEP Watershed?**
- 3:00 p.m.** **Overview of FDEP Regulations and Criteria Used to Evaluate Proposed Reservoir Projects**
Ms. Elizabeth Gillen, Environmental Manager – FDEP ERP
- 3:20 p.m.** **Considerations in the Evaluation of Environmental Resource Permit and Water Use Permit Applications for Borrow Pit Construction in the Southwest Florida Water Management District**
Ms. Jennifer Brunty, PhD, Senior Environmental Scientist – SWFWMD
- 3:40 p.m.** **Overview of USACE Regulations and Criteria Used Evaluate Proposed Reservoir Projects**
Ms. Susan Blass or Mr. Skip Bergman – USACE (invited)
- 4:00 p.m.** **Facilitated Exercise 6:** Refine a list of processes and criteria used to review proposed reservoirs. Identify gaps and suggest ways to improve regulations.
- Workshop Summary: What More is needed to Assure that Existing and Potential Reservoirs don't adversely Affect the CHNEP Watershed?**
- 4:30 p.m.** **Concluding Comments from Peer Reviewers**
Dr. Ernst Peebles, Biological Oceanographer – USF College of Marine Sciences
Mr. Torres, Hydrologist – USGS FISC Special Studies Section
Dr. Upchurch, Geologist – SDI Environmental Services, Inc.
- 4:45 p.m.** **Concluding Comments from Facilitators**
Mr. Tom Taylor – Florida Conflict Resolution Consortium/FSU
Mr. Rafael Montalvo – Florida Conflict Resolution Consortium/UCF
- 5:00 p.m.** **Concluding Comments from Workshop Participants**
- 5:15 p.m.** **Thank You and Adjourn the Workshop**
Dr. Lisa Beaver, Director – Charlotte Harbor National Estuary Program

9:10 a.m.

Overview of Potential Habitat Effects Associated with Reservoirs

Dr. Joan Browder, Research Ecologist – NOAA National Marine Fishers Service

75 Virginia Beach Dr.

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Key Biscayne, FL 33149

(305) 361-4478

Notes:

Facilitated Exercise for Session 1 – 10:00 a.m.

A. Are there any additional current or proposed reservoirs in the CHNEP watershed that you are aware of (refer to the maps)? Please record as much information as possible about additional reservoirs on the maps and the table below.

Location	Managed by	Purposes	Type	Size or Volume
Existing:				
In Construction or Planning:				
Potential or Proposed:				

Purposes: water supply, flood control, stormwater, rock mining, phosphate mining, recreation, other.

Type: above ground, in ground, below ground (aquifer), in-stream, off stream, other.

Size or Volume: estimate if known.

B. What are your key insights from this session?

Session 2: What are the Purposes, Designs and Management Options for Reservoirs within the CHNEP Watershed?

Abstracts for Session 2

10:45 a.m. Water Storage Considerations: A Case Study of an Alternative Design Plan

Mr. Church Roberts, Ecologist – Johnson Engineering, Inc.

Ms. Jaime Greenawalt Boswell, Ecologist – Johnson Engineering, Inc.

Mr. Lonnie Howard, P.E. – Johnson Engineering, Inc.

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Abstract: Water storage, supply, and quality are some of the most critical issues facing Southwest Florida, as well as countless other places throughout the world. The water supply needs have been rising rapidly with human population growth, agriculture and industrial demands. Additionally, implementation of minimum flows and levels regulations requires water supply to meet environmental demands. Land use changes within the Charlotte Harbor National Estuary Program area have altered the historic natural water storage throughout the watersheds, and reduced the natural capacity for nutrient reduction. The majority of reservoirs are designed to provide a water storage facility to meet current and projected water supply and storage needs for municipal and industrial demands. Reservoir design considerations may also include flood control, restoring and maintaining water quality, conserving fish and wildlife, protecting threatened and endangered species, and providing recreation. Other considerations include construction and operation cost and materials.

The majority of reservoirs are designed for in-stream storage, although in Florida off-stream reservoirs are currently favored to reduce in-stream water quality and habitat impacts. An alternative option is the restoration of natural water storage within the watersheds. Although in most cases current land use will preclude this option, there are areas within the Charlotte Harbor National Estuary Program which could be used for storage. Johnson Engineering designed an alternative water storage facility, Tippen Bay, which we will present as a case study on design considerations.

The Tippen Bay facility was designed and is proposed to store water in the Prairie Creek sub-basin of the Peace River watershed. The facility would create a 6100 acre footprint on 20,000 acres of land in southeast DeSoto County and northeast Charlotte County, currently under private ownership. The design of this facility was based on the historic water storage capacity, and hydroperiod analyses of 30 years of water level and flow data. Modeling using this data indicates the ability to mimic natural scenarios through the use of water control structures. The restoration capacity of this facility would result in a self-mitigating project, with no net wetland impacts, while providing significant woodstork foraging base. The system is modeled to reduce nutrient loading, thereby providing improved water quality downstream. A major benefit of this alternative approach is the use of a gravity fed system which is not reliant on energy consumption. With the rapidly developing demand for reduction in energy consumption and greenhouse gas emissions, energy consumption is likely to play a bigger role in project evaluation in the near future.

Notes:

11:35 a.m. *Design & Construction Issues for Reservoirs in South Florida*

Dr. Les Bromwell, Sc.D., Principal Engineer – BCI Engineers and Scientists, Inc.

Presented by Mr. Carl W. Christmann, P.E. – BCI Engineers and Scientists, Inc.

2000 E. Edgewood Drive, Suite 215 Lbromwell@bcieng.com

Lakeland, FL 33803

(863) 667-2345

Abstract: Florida's geologic and hydrologic settings provide many challenges for constructing safe and efficient water storage facilities. But given Florida's ever-increasing demands for fresh water, additional storage of generally abundant rainwater must be provided. Large-scale reservoirs generally require earth dams to provide impoundment. For many reasons, such dams have been rare in south Florida's past. The relatively flat topography of south Florida does not offer many opportunities for in-stream dam construction. Suitable natural materials for construction are frequently limited to fine sands, which are not the best dam building materials. Geologic conditions, including high porosity and potential sinkholes, can limit site selection, as can wetlands, existing infrastructure, and land availability. All of these limitations can make reservoirs expensive, difficult to permit, and challenging to design and build.

Nonetheless, the imperative to conserve fresh water in order to provide adequate supplies for restoring and maintaining healthy habitat, and meeting supply needs for domestic consumption, agriculture and industry, require a variety of engineered systems, including surface reservoirs, ground water reservoirs, waste water recovery, and desalination. In this mix, surface reservoirs are generally the least expensive and most effective means of capturing and storing much of the 1.7 billions gallons of fresh water discharged to tide every day in south Florida.

The need for additional storage of rainwater was recognized in the planning of the Comprehensive Everglades Restoration Program (CERP), which has been termed "Re-engineering Water Storage in the Everglades" by the National Academy of Sciences. The Corps Central & South Florida Project, initiated following disastrous hurricanes in 1947, has constructed over 1800 miles of levees and canals, and more than 200 water control structures in south Florida. The net result is over-drainage, severe environmental degradation, and inadequate water supplies for humans, animals, and plants. To begin correcting the problem, CERP calls for 14 major new reservoirs, plus numerous smaller impoundments. These reservoirs will store excess stream/canal flows during the rainy season, and release water to filter marshes (Stormwater Treatment Areas) to help restore the natural system's water quality and hydroperiod.

The history of reservoir construction in south Florida will be discussed, along with examples of inadequate engineering and resulting failures. Site-specific examples of design challenges and how they were met will be presented. These include the Lake Manatee Dam and Reservoir, FPL Indiantown Reservoir, Tampa Bay Water Reservoir, and several CERP reservoir projects including Ten Mile Creek, Loxahatchee L-8, C-44, EAA, and Acme Basin B. The presentation will also include innovative reservoir applications including those located in former phosphate and limestone mines. All of the case studies are from the author's own engineering involvement.

Finally the paper will look to the future to discuss the role of reservoirs in providing long-term water supplies for the future growth and environmental health of south Florida.

Notes:

12:30 p.m. ***Water Sustainability and the Future of Florida***
Ms. Cynthia Barnett, Journalist – Florida Trend Magazine
www.CynthiaBarnett.net

Notes:

1:15 p.m. ***Design and Construction of Earthen Reservoirs in Florida (1967-2007)***
Dr. John E. Garlanger, P.E. – Ardaman & Associates, Inc.
Mr. Thomas J. Leto, P.E. – Ardaman
8008 South Orange Ave. jgarlanger@ardaman.com
Orlando, FL 32809 (407) 855-3860

Abstract: The Florida Phosphate Industry has been constructing earthen reservoirs for water storage and clay settling/disposal for more than 70 years. During the first 35 years of operation, the perimeter dams for the clay settling areas were simply overburden spoil (primarily silty sand) cast up in windrows and shaped to provide a crest road. The spoil windrow was excavated down to natural ground at one or two locations to install an outlet pipe for the decant structure(s). Little or no engineering was performed. Between 1936 and 1969, there were 32 reservoir failures. The first rule regulating the design and construction of earthen dams used in phosphate mining and processing operations was adopted by the state of Florida in 1969 after a reservoir failure near Brandon, Florida turned the Alafia River brownish-white 3.2 kilometers into the Gulf of Mexico. The rule was subsequently modified in 1972 after a reservoir failure occurred near Fort Meade and again in 1999 after a reservoir failure occurred near Hopewell. All of the reservoirs constructed after 1969 were engineered.

The authors' firm has investigated, designed, monitored construction, and inspected more than 120 earthen reservoirs constructed in Florida after 1967. The paper describes the advances that have been made during the past 40 years in the investigation, analysis, design, construction and inspection of the embankment dams surrounding these reservoirs. The lessons learned in the phosphate industry have and should be applied to other earthen reservoirs constructed in Florida and elsewhere.

Notes:

1:40 p.m. *Capture & Storage of Surface Water in the Peace River Basin – Above-ground vs. Underground Storage*

Mr. Peter J. Schreuder, P.E. – Schreuder, Inc.

110 W. Country Club Drive

Tampa, FL 33612

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(813) 932-8844

Abstract: In 1976 the U.S. Army Corps of Engineers (USACE) together with the Southwest Florida Water Management District (SWFWMD) funded studies to determine the projected water demands for the years 1985 and 2035 and to create plans to manage the water resources in the SWFWMD area to meet these demands. As project manager for the USACE Mr. Schreuder evaluated the feasibility of constructing 23 potential surface water reservoir sites in the Peace River and the Myakka River Basins.

In 1994, Schreuder, Inc. was asked by the Florida Institute of Phosphate Research (FIPR), an independent State agency, to assess the possibility of using old mine pits created by the phosphate mining process prior to mandatory reclamation as surface-water reservoirs. After a preliminary one-year study it was determined that the use of mine pits as in-ground off-stream surface water reservoirs was not practical and not environmentally beneficial. This preliminary investigation led to fourteen subsequent years of research, which culminated in the development of the Aquifer Recharge & Recovery Program (ARRP) concept.

The ARRP concept uses wetlands to improve water quality and sand filtration to remove suspended particles and microorganisms. Eight years of research under actual field conditions have shown that effluent and even industrial wastewater can be naturally treated to meet primary drinking water standards. The naturally treated water can then be recharged into the Floridan aquifer for storage and can be retrieved at a different time and at a different location. The ARRP concept can be used to increase the availability of future ground water supplies to meet future demands, while at the same time providing a net environmental benefit to the Floridan aquifer even in the most restricted Water Use Caution Areas. This is made possible by the SWFWMD, which will allow ninety percent (90%) of the cumulatively recharged volume of water to be withdrawn from the Floridan Aquifer at a later date and different location. The ARRP concept does require the use of a reservoir to store surface water run-off during high flow events. From these reservoirs surface water can be discharged at a predetermined rate to the wetland/filtration system that optimizes the natural water treatment capacity of tailing sands and wetlands. A comparison of traditional in-stream storage reservoirs and off-stream reservoirs demonstrates the advantages of the ARRP concept.

Notes:

2:05 p.m. *Ecoreservoir Program – EAA A-1 and C-43 CERP Alternatives*
Mr. Forest Gray Michael, Florida Landscape Architect
130 North Center Street #3 michaelplanning@gmail.com
Winter Park, FL 32789 (407) 340-5051

Abstract: The recently developed Ecoreservoir Program is a “public betterment” of the currently outdated, financially and ecologically unsustainable CERP concrete reservoir design. The 2008 application of the USACE, FDEP, SFWMD best practices, with other innovations relative to riparian greenways and communities, formed the innovative Ecoreservoir Program. Substantial construction and O&M savings, community, commerce, ecological, water storage and quality benefits, for the estuaries per CERP, and ecotourism are now achievable in affordable increments. Ecoreservoirs correspond with the CERP, SRDA, GAO and Northern Everglades Caloosahatchee River Watershed Protection Plan per Florida Statute being addressed by the 2009 Legislature.

C-43 West Reservoir CERP

Current EAA A-1 Reservoir: 6 X 3 mile rectangular reservoir; 21 mile 38 ft. tall breachable levee; 18 mile canal; 200+ concrete areas; escalating cost from \$355 million (2007) to \$700 million range (2008); no water quality; large pump stations; high O&M, energy and capital costs.

Ecoreservoir Lakes Betterment: Providing the same water storage and cfs plus water quality; including “Lake LaBelle” (C-43 Reservoir hybrid) and historic Lake Hicpochee/Disston Island; community; commerce; jobs; plus 11,000 acres of panther habitat restoration.

EAA A-1 Reservoir CERP

Betterment: River of Grass Restoration Reserve (Chain of Lakes)

Current EAA A-1 Reservoir: (On hold)

Ecoreservoir Betterment: The US Sugar acquisition provides 1,000,000 acre-feet water storage with the Ecoreservoir chain of Lakes approach, plus water quality to genuinely restore the historic River of Grass. Cities benefit from new water front development revenue; jobs; ecotourism; agricultural land se-asides; 100% habitat restoration; navigation; recreation and increased Glades quality of life.

Economic Concept: Co-use Everglades Restoration funds to invest in the region’s communities with new commerce and jobs, lake front development areas to include privately financed marinas, houses, recreation, lodging, conferencing, farms parks and neighborhoods. Affordable phases result in quicker jobs for locals and lower construction and O&M costs for restoration. Provide green inland logistics integrated with the cities for commuting and enhancements. Use some US Sugar land to trade with agreeable landowners to establish a more efficient River of Grass Reserve flow-way and boating channel.

Education and Recreation: A 100 mile Chain of Lakes/Ecoreservoirs for fishing, hiking, bicycling, paddling, hunting, pleasure craft, education, water front parks and birding; an 80 – 100 mile boat channel; a restoration, education and interpretation center to highlight the connection of Lake Okeechobee and the River of Grass.

Ecology and Sustainable Carbon Usage: A 100 mile Flow-way/Chain of Lakes/Ecoreservoirs stores and filters water with lower energy consumption; plus 180,000 acres of new wildlife habitat; not all lakes will be hydrated year round similar to others in Florida, although lakes at each community will be hydrated year round for economic benefits.

Notes:

Facilitated Exercise for Session 2 – 2:30 p.m.

A. In the full group, refine the lists of possible purposes, types, designs and management options of reservoirs, including:

Purposes: water supply, flood control, stormwater, rock mining, phosphate mining, agriculture, resource restoration, recreation, other.

Types: above ground, in ground, below ground (aquifer), in-stream, off stream, other.

Design considerations: volume, in-take and out-fall, environmental effects, safety, other.

Management Options: timing of withdrawal and release, release from top or bottom, other.

B. In small groups, identify general conclusions and suggestions for balancing environmental and human needs associated with reservoirs of different purposes, including:

Water supply:

Flood control:

Stormwater:

Rock mining:

Phosphate mining:

Agriculture:

Resource restoration:

Recreation:

Other:

Session 3: What are Current Studies, Methods and Models Used to Evaluate Benefits and Impacts of Reservoirs?

Abstracts for Session 3

3:15 p.m. Using Hydrologic and Ecological Information to Develop Withdrawal Schedules for In-stream Impoundments and Off-stream Reservoirs in the SWFWMD

Mr. Sid Flannery – SWFWMD

Mr. Mike Hyle – SWFWMD

Mr. Xinjian Chen – SWFWMD

Mr. Marty Kelly – SWFWMD

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Abstract: The Southwest Florida Water Management District has conducted, or required by permit, extensive studies of the ecological effects of water supply withdrawals for offstream reservoirs and impoundments within its jurisdiction. Three offstream reservoirs and six instream impoundments on creeks and rivers in the watersheds of Charlotte Harbor and Tampa Bay are currently used for water supply. All the in-stream impoundments were constructed prior to 1967, as management strategies since that time have emphasized offstream reservoirs due to their greatly reduced impacts to riverine and estuarine systems. Hydrobiological studies have been conducted for all of these nine water supply systems to quantify the ecological effects of withdrawals on their downstream estuaries. Water supply withdrawals are added back into the flow records for each creek or river to model salinity and a variety of hydrobiological variables under baseline conditions. The effects of various rates of withdrawal are then simulated to develop acceptable withdrawal schedules and limits. The District has established, or is in the process of establishing, minimum flow rules for all streams in the region that have offstream reservoirs or impoundments that are used for water supply.

The status of water supply regulations and completed and ongoing minimum flow studies on these creeks and rivers will be summarized, along with pertinent findings from District research on ecological relationships of freshwater flow with downstream natural systems. The District has applied the percent-of-flow approach to regulate diversions from unimpounded rivers such as the Peace, Alafia, and Little Manatee, by which withdrawals are regulated as a percentage of baseline flow. The percent-of-flow approach is also being used to establish minimum flows for the low-head impoundment on Shell Creek, and withdrawals from impounded Myakkahatchee Creek are similarly scaled to the rate of flow.

Notes:

4:05 p.m. *Physicochemical Factors Affecting Near-Bottom Dissolved Oxygen Concentration in Reservoirs in Southwest Florida*

Mr. John Cassani – Lee County Hyacinth Control District

Mr. Kevin Watts – Lee County Hyacinth Control District

Dr. Edwin M. Everham, III – Florida Gulf Coast University

Mr. David W. Ceilley – Florida Gulf Coast University

LCHCD - P.O. Box 60005

jcassani@comcast.net

Ft. Myers, FL 33906

(239) 690-5718

Abstract: Near-bottom dissolved oxygen concentration (NBDO) was monitored bi-monthly at one site for four years and 10 additional sites during late summer of 2007 and 2008 in Lee County, Florida to determine the influence of reservoir morphometry on NBDO dynamics. Maximum depth, surface to volume ratio, fetch distance, relative depth (Z_r) and specific conductance were assessed individually on NBDO using linear regression analysis. A significant ($p < 0.05$) inverse relationship ($r^2 = 0.549$) existed between NBDO and maximum depth during late summer of 2007 at eleven sites but not again in 2008 at the same sites, suggesting factors other than maximum depth may be important in regulating NBDO in relatively shallow reservoirs of coastal southwest Florida. Relatively strong but nonsignificant ($p < 0.08$) relationships occurred between NBDO and surface / volume ratio (direct relationship) and east-west fetch distance (inverse relationship) in 2007, but as with maximum depth, not again in 2008. Relative depth Z_r was found to be a poor predictor of NBDO in the reservoirs we sampled. An additional finding revealed that a narrow, more dense layer of water as measured by sharply elevated specific conductance near the soil water interface was negatively correlated with NBDO at two sites more proximal to the Gulf of Mexico and saltwater intrusion via groundwater is suspected to contribute to this condition. The influence of submersed aquatic vegetation (SAV) on NBDO was also examined at one site during four growth seasons, indicating the presence of extensive SAV may resist vertical mixing and contribute to relatively low NBDO. These findings will contribute a greater understanding of how reservoir morphometry in southwest Florida may affect NBDO which has a major influence on nutrient dynamics at the sediment water interface, the distribution of biota within reservoirs and the potential for affecting off-site waters resulting from reservoir discharge.

Notes:

Facilitated Exercise for Session 3 – 4:30 p.m.

- A. As the full group, compile lists of studies, methods and models used to estimate, measure and evaluate benefits and impacts of existing and proposed reservoirs, including: how water withdrawal and release quantities and scheduling are determined to minimize environmental impacts.**
- B. In small groups, identify gaps in existing studies, methods and models used to estimate, measure and evaluate benefits and impacts of reservoirs.**
- C. What general suggestions do you have for enhancing estimation, measurement and evaluation of the benefits and impacts of current and proposed reservoirs?**

Day 1 Summary: What are the Technical and Facilitated Lessons Learned and Questions Remaining?

- 5:00 p.m.** ***Synopsis of Key Technical Points from Day 1***
Dr. Peebles, Biological Oceanographer – USF College of Marine Sciences
Mr. Torres, Hydrologist – USGS Florida Integrated Science Center
Dr. Upchurch, Geologist – SDI Environmental Services, Inc.
- 5:15 p.m.** ***Brief Concluding Thoughts from Participants***
Mr. Tom Taylor – Florida Conflict Resolution Consortium/FSU
Mr. Rafael Montalvo – Florida Conflict Resolution Consortium/UCF

Notes:

Workshop on Watershed Reservoirs: Locations, Effects and Solutions
April 13-14, 2009 in Punta Gorda, Florida

Notes:

DETAILED AGENDA

DAY 2: TUESDAY APRIL 14, 2009

Session 4: What are the Types of Potential Benefits and Impacts of Reservoirs?

Abstracts for Session 4

8:40 a.m. *Potential Hydrologic and Water Quality Effects of Reservoirs*
Mr. George Kish, Hydrologist – USGS FISC Hydrologic Investigations Section
10500 University Center Dr. #215 gkish@usgs.org
Tampa, FL 33612 (813) 975-8620 Ext. 134

Notes:

9:20 a.m. *The Use of Off-Stream Reservoirs Combined with Percent Flow Withdrawal Schedules to Reduce Downstream Estuarine Impacts.*

Dr. Ralph Montgomery, Senior Scientist – PBS&J

Dr. Dave Tomasko, Senior Program Manager – PBS&J

Mr. Samuel L. Stone, Environmental Affairs Coordinator – PRMRWSA

19871 McGrath Circle

rtmontgomery@pbsj.com

Port Charlotte, FL

(941) 627-3401

Abstract: Historically, larger public drinking water supplies in southwest Florida relied on groundwater well fields or the construction of typical in-stream reservoirs (Hillsborough River, Lake Manatee, Shell Creek). However, by the late 1970s the lack of suitable locations and an increasing concern relative to the environmental impacts posed by in-stream structures began to lead both utilities and regulators to seek potential alternatives. In 1976, the Southwest Florida Water Management District granted a permit to construct a surface water treatment facility on the lower Peace River with the condition that adequate off-stream wet-season raw water storage be constructed to limit withdraws during seasonally drier periods. In 1988, the Peace River Facility's water use permit was modified to include a year round low flow cutoff, combined with a ten percent diversion schedule and a maximum cap on withdrawals. These changes to the Facility's permitted freshwater withdrawal schedule were designed to allow withdrawals to track actual natural variations in flows above the permitted threshold. An integral, critical component of such a variable schedule that matches withdrawals with actual changes in river flows has been the Facility's off-stream reservoir storage. An additional 6 billion gallon off-stream reservoir is scheduled for completion in mid-2009 to meet increasing regional demands.

While the annual average hydrographs of stream flows in southwest Florida generally follow distinct patterns based on characteristically dry and wet seasonal rainfall patterns, the actual seasonal patterns and variability of flows within any given year can be extremely variable. This is clearly evident in comparisons of Peace River flows over the past 5-year (2004-2008) time interval. Within estuarine systems such as the lower Peace River/upper Charlotte Harbor, the overall relationships between such variability in freshwater inflows and the spatial and temporal dynamics of both physical habitat characteristics and the resulting structure of biological communities are complex and mediated through a number of intermediary processes.

Research by the Nature Conservancy has recently addressed the necessity of balancing the needs for surface water withdrawals for public supply with maintaining the magnitude and timing of ecological flows to protect estuarine biological communities. Key components of their recommendations center on maintaining periods of both maximum as well as minimum base flows, as well as protecting flows during periods identified as critical to specific estuarine biological resources.

Since 1976 the permit for the Peace River Water Treatment Facility has required the implementation of a hydrobiological monitoring program (HBMP) to both assess the overall "health of the harbor" by tracking the long-term changes in physical and biological characteristics, and evaluate the magnitude of potential changes due to Facility withdrawals relative to natural seasonal and longer term variations in freshwater inflows. The results of over 30-years of HBMP monitoring have clearly identified critical periods relative to estuarine production when the estuary has greater sensitivity to withdrawals, and conversely extended intervals when the potential impacts of withdrawals are greatly reduced. The use of off-stream reservoirs provides the Facility with the opportunity to harvest water from the river at the appropriate time and the appropriate quantities to reduce potential estuarine impacts.

Notes:

10:20 a.m. *An Examination of the Ecological Health of Wetlands in Proximity to a Public Supply Off-stream In-ground Reservoir in DeSoto County, Florida*

Mr. Jeffrey L. Clark, PMP – EarthBalance

2579 N. Toledo Blade Boulevard jclark@earthbalance.com
North Port, FL (941) 426-7878

Abstract: From 1998-2006, the Peace River Manasota Regional Water Supply Authority (Authority) conducted hydrologic and vegetative monitoring of five wetlands on the R.V. Griffin Reserve as part of the Peace River Facility Aquifer Storage and Recovery (ASR) wellfield system. The purpose of this project was to examine the ecologic effects of the ASR wellfield system operations on those wetlands. The conclusion of that program was that ASR operations did not negatively impact nearby wetlands.

The existing data were evaluated for possible wetland impacts from the existing off-stream in-ground reservoir operations. The monitored wetlands range in distance from 650 to 8,450 feet from the Authority's existing reservoir. Hydrologic monitoring data indicate an overall high correlation between water levels in reference and indicator wetlands (Pearson's $r \geq 0.85$). In addition, the water levels in the monitored wetlands generally correspond to the amount of rainfall, as well as to the length of time between rainfall events. Hydrographs illustrate the influence of rainfall on the groundwater levels in the monitored wetlands. No significant deviations from baseline hydrologic conditions were identified during the eight years of monitoring. However, regression analyses show that Wetland No. 117, which is the closest wetland to the reservoir, consistently has the weakest correlation with reference wetlands during the study. This weak correlation suggests that some other confounding factor may have influenced hydrologic levels in this wetland. Hydrographs of reservoir and wetland water levels were evaluated to determine if reservoir operations may have affected hydrologic conditions in Wetland No. 117. Annual vegetative monitoring events from 1998 to 2005 show a fairly consistent percent coverage by dominant wetland vegetation within each of the wetlands. Minor shifts were found, however, in species dominance toward shallower water vegetation in Wetland No. 117. This minor change in vegetation does not appear to have affected the general functions or habitat value of the wetland. The data suggest that minor ecological deviations observed in Wetland No. 117 are possibly due to its close proximity (650 feet) to the off-stream in-ground reservoir.

Notes:

Facilitated Exercise for Session 4 – 10:45 a.m.

A. As the full group, refine the list of types of potential benefits and impacts of reservoirs.

Measures/Criteria	Reservoirs	Freshwater	Estuarine
Sea grasses (area and density)			X
Mangroves (area, type, health)			X
Salt water marshes			X
Wetlands		X	X
Invertebrates		X	X
Fish	X	X	X
Water Quality (Wet and Dry Season)	X	X	X
Nutrients	X	X	X
Dissolved Oxygen	X	X	X
Turbidity	X	X	X
Fecal Coliform	X	X	X
Salinity			X
Water Quantity (Wet and Dry Season)		X	X
Water Timing (seasonal and storm event)	X	X	X
Water Velocity		X	

Workshop on Watershed Reservoirs: Locations, Effects and Solutions
April 13-14, 2009 in Punta Gorda, Florida

Notes:

Session 5: ***What is the Sum of the Potential Cumulative Benefits and Impacts of Reservoirs within the CHNEP Watershed?***

Abstracts for Session 5

11:25 p.m. Dead Zones, Stagnation and the Water Crisis: Watershed Effects on Estuarine Communities

Dr. Ernst Peebles, Biological Oceanographer – USF College of Marine Sciences

140 7th Ave. South

St. Petersburg, FL 33701

epeebles@marine.usf.edu

(727) 553-3983

Notes:

11:25 a.m. Poster: When a Pile of Dirt is So Much More – Dam Safety Design Criteria Memoranda

Ms. Becky J. Hachenburg, P.E. – MWH Americas, Inc.

100 S. Dixie Highway, Suite 300

West Palm Beach, FL 33401

becky.j.hachenburg@mwhglobal.com

(561) 650-0070

Abstract: Accomplishing the goals of the various impoundments identified in the Comprehensive Everglades Restoration Plan, regardless of size and water depth, requires a balance between sound engineering, dam safety, and cost optimization. An attribute that greatly affects this balance is the potential impact of heavy rains and cyclonic activity and how these are addressed by the project's design criteria for hazard potential classification, wind setup, wave run-up, precipitation storage, and allowable over wash rates. For large above-ground storage reservoirs, every foot in height of embankment adds as much as \$8 million to the specific project's cost. Although slight variations in design wind speeds, maximum precipitation, allowable over wash rates, and the combined affect of multiple variables may not seem significant, their impact often times can impact the project cost by millions of dollars. With no definitive technical guidance available for the State of Florida, MWH guided the South Florida Water Management District (SFWMD), US Army Corps of Engineers (USACE), and the Florida Department of Environmental Protection (FDEP) to jointly prepare a series of Design Criteria Memoranda (DCMs) to provide review of published technical guidance, including USACE engineering manuals, and interpretation of how these documents should be used with design development for multiple water storage reservoir characteristics. The DCMs were prepared to establish consistent guidance criteria across the different projects to facilitate owner review of design documents and designer preparation, to support the equal sharing of costs between the federal government and the state of Florida, and to facilitate review of designs by FDEP for construction permit issuance.

Criteria were developed from Florida Statute 373, as well as Public Law 104-303, Section 215 of the National Dam Safety Program Act; federal agency guidelines (the US Army Corps of Engineers, the US Bureau of Reclamation, and the Federal Emergency Management Agency); and other recognized State Dam Safety Programs.

The MWH team served as the primary authors for criteria that focused on the critical areas of:

1. Hazard potential classification
2. Wind and precipitation design criteria for freeboard
3. Spillway capacity and reservoir drawdown criteria
4. Minimum dimensions of dams and embankments
5. Liquefaction analysis
6. Embankment instrumentation
7. Dam safety program

These DCMs have become the industry standard in Florida for reservoir/dam design and are being utilized by multiple Water Management Districts. This presentation will serve to provide an overview of the seven DCMs listed above and how this guidance should be stepped through when applying to water storage bodies in areas prone for cyclonic activity.

Notes:

1:00 p.m. *Linking Ecological Restoration with Water Supply Development using Off-Stream Reservoirs in Southwest Florida*

Dr. Dave Tomasko, Senior Program Manager – PBS&J Watershed Science & Assessment

Ms Pam Latham, Senior Scientist – PBS&J Watershed Science & Assessment

Dr. Ralph Montgomery, Senior Scientist – PBS&J Watershed Science & Assessment

Mr. Pete Putman, Senior Division Manager – Water West Florida

Mr. Mike Coates, Water Resources Division Manager – PRMRWSA

PBS&J/5300 W. Cypress Street DATomasko@pbsj.com

Tampa, FL 33607 (813) 281-8346

Abstract: The Peace River Manasota Regional Water Supply in cooperation with the Southwest Florida Water Management District are currently in the process of evaluating alternatives with regard to locating new off-stream reservoirs in the Upper Myakka, Cow Pen Slough and Shell Creek watershed to provide both hydrologic restoration and additional new regional water supplies.

The Upper Myakka River and Flatford Swamp, were identified more than 10 years ago as having impaired ecosystem functions, due in large part to an excess of fresh water. In Flatford Swamp, approximately 3,000 acres of dead and dying trees in this portion of the Upper Myakka River watershed are impacted by higher water levels and extended hydroperiods. These impacts are thought to be due to an increased amount of inflows associated with land use changes in the surrounding watershed.

Dona Bay's impacts are associated with excessive freshwater inflows from the expanded size of the Cow Pen Slough watershed, a finding first made more than 30 years ago. The contributing watershed increased in size due to historical large-scale drainage modifications for agricultural purposes.

In Shell Creek, a tributary to the lower Peace River, dry season flows have increased over historical levels, a phenomenon reported by scientists with the Southwest Florida Water Management District more than a decade ago. In contrast to Dona Bay and the Flatford Swamp, there does not appear to be a well-documented ecological problem in Shell Creek associated with excessive quantities of freshwater inflow. However, the augmentation of dry season flows by high conductivity water from upstream discharges has adversely affected the City of Punta Gorda's downstream drinking water quality behind the Shell Creek dam.

Despite findings, now 10 to 30 years old, that these systems either have an "excess" amount of flow (i.e., Flatford Swamp and Dona Bay) or that there appears to be a significant concern about declines in water quality (i.e., Shell Creek) the stresses to these systems continue.

Creating a nexus between the need for ecological restoration and new water supply development via the use of off-stream reservoirs resulting in hydrologic restoration was the focus of a recently completed study co-funded by the Peace River Manasota Regional Water Supply and the Southwest Florida Water Management District. Basic conclusions from this effort with regard to hydrology and water quality will be discussed.

Notes:

1:25 p.m. *Environmental and Water Supply Benefits of an Off-Stream Reservoir System at the Peace River Water Supply Facility*

Mr. Samuel L. Stone, Environmental Affairs Coordinator – PRMRWSA

8998 S.W. County Road 769

sspeariv@hughes.net

Arcadia, FL 34269

(863) 993-4565

Abstract: The Peace River Regional Water Supply Facility (PRF) supplies potable water to over 250,000 people over a four county region. The PRF uses surface water harvested from the Peace River as its source of supply. Withdrawals from the River are made on a flow-based diversion schedule, allowing harvest of only a small percentage of flow to meet public water needs while reserving the majority of flow to serve the needs of the estuary. During a typical annual dry season, and periodically for extended drought periods, the portion of flow available for harvest from the river is insufficient to meet public water demand. Under these circumstances the PRF is able to reliably meet this public demand through the use of off-stream reservoirs. The off-stream reservoir is filled by the harvesting of extra water, above daily public demand during the wet season and storing this river water in the reservoir for use during dry periods.

The Peace River is also subject to changes in water quality that can affect public water supply withdrawals. These changes in quality can be due to releases of poor water quality from up-stream lakes, storm water discharges or poor quality ground water discharges. In addition to water quality changes upstream, the PRF withdrawals can also be affected by conditions downstream. At lower flow conditions in the River saline waters from Charlotte Harbor can migrate upstream. The extent of saline water migration upstream can be exacerbated by wind and tide conditions. When such changes in water quality occur, the PRF is able to avoid these temporary poor water quality events by not pumping from the river and relying on the stored water in the off-stream reservoir to meet the public's need for water.

The Peace River flow into Charlotte Harbor varies greatly during the year. This natural variation in flow and the timing of that flow brings much needed nutrients to the estuary and results in the productivity that sustains Charlotte Harbor. Data from the Peace River Hydrobiological Monitoring Program (HBMP) shows that nutrients delivered to the estuary during low flows at the beginning of the wet season is the most productive and critical period for the estuary and that nutrients delivered later in the wet season is of less benefit due to highly colored water. The combination of the PRF permitted diversion schedule and the off-stream reservoir allows the facility to pump more water during high flows and pump little or no water during the more sensitive periods of low flow at the beginning of the wet season. This helps to protect and sustain the productivity of Charlotte Harbor.

The long record of operation at the PRF and data collected from the Authority's Hydrobiological Monitoring Program show that off-stream reservoirs at the PRF provide an environmental water reservation for Charlotte Harbor, protecting the downstream estuary while providing a high-quality, reliable water supply for the four county region.

Notes:

1:50 p.m. *Site Evaluation Study for Potential Raw Water Off-Line Regional Reservoir Storage Facility*

Mr. Gary Wantland, P.E., Principal – MWH Americas, Inc.

Mr. William Weber, P.E., Supervising Engineer – MWH Americas, Inc.

Ms Jimena Pinzon, Staff Engineer – MWH Americas, Inc.

Mr. Mike Coats, P.G. – PRMRWSA

MWH/1000 N. Ashley Dr. #1000 gary.wantland@mwhglobal.com

Tampa, FL33602 (813) 221-1981

Abstract: Regional water supply planning efforts in the southwest portions of Florida must consider long-term population growth combined with limitations on ground water resources in meeting the demand for future drinking water supply in an environmentally-sound and reliable way. Recent severe droughts are further stressing water sources. The Southwest Florida Water Management District has encouraged water suppliers (city / county governments and regional wholesale water suppliers) to develop alternative water supplies such as high flow surface water harvesting and off-line raw water storage. The Peace River Manasota Regional Water Supply Authority (Authority) is a regional water supply authority created in 1982 to provide water to Charlotte County, DeSoto County, Sarasota County, and the City of North Port (customers). The Authority will also provide water to Manatee County starting in 2017. The Authority is continuing to evaluate potential available water supplies that will allow them to meet existing and projected future water demands of their customers.

The Authority recently undertook a feasibility study to evaluate potential alternative surface water supplies based on an examination of existing available water resources within the Upper Myakka (UM) and Shell-Prairie Creek (SPC) watersheds. The challenges associated with the development of these water supplies includes “flashy” stream-flow characteristics; wide, shallow water-bodies with relatively small volumetric stream flows; long distances from existing and near-term population centers; and potential water quality concerns. One component of that evaluation was the identification of potential locations for an off-line raw water reservoir. The work described in this presentation consists of a multi-phase, multi-step evaluation process used to identify, characterize, evaluate and rank potential off-line reservoir sites. Identification and evaluation of potential sites was completed using a screening process in which the search area was progressively narrowed based on a review of physical, environmental, land use, and land acquisition factors. The process used a series of coarse and fine level screenings to focus potential land acquisition activities on locations that were judged to be compatible with construction and operation of a reservoir

Key features of this analysis include;

- Development of geographic information system (GIS) maps to characterize selected features of the selected watersheds under consideration;
- Elimination of unsuitable areas within each watershed using an exclusionary process;
- Characterization and evaluation of each site using a pre-selected set of evaluation criteria;
- Ranking of sites using a weighted scoring methodology; and
- Development of relative site construction costs.

Site scores were established by the application of a judgment-based selection process using a relative / comparative scoring approach. Evaluation criteria used in the assessment of potential site suitability included present land use, long range planning, physical and geologic site conditions, environmental considerations, safety, engineering features and construction aspects as well as costs. Potential construction costs were developed consistent with the level of detail available for each site. In addition, cost estimates were developed for land acquisition, reservoir construction, environmental restoration, and mitigation. Selection of sites for further evaluation was based on a comparison/evaluation of the individual site rankings and relative cost factors. At the conclusion of this effort potential sites in each watershed were ranked in terms of preference for further investigation and possible acquisition for a potential new off-line reservoir location.

Notes:

Facilitated Exercise for Session 5 - 2:25 p.m.

A. On a geographic basis, what are the potential cumulative positive and negative effects of reservoirs in these areas:

Donna, Roberts and Lemon Bays

Peace and Myakka Rivers

Charlotte Harbor

Pine Island Sound and Matlacha Pass

Caloosahatchee River and San Carlos Bay

Estero Bay

B. Identify possible strategies for planning and review of cumulative effects of reservoirs.

Session 6: ***What Processes and Criteria are Used to Evaluate Current and Potential Benefits and Impacts of Reservoirs within the CHNEP Watershed?***

Abstracts for Session 6

3:00 p.m. ***Overview of FDEP Regulations and Criteria Used to Evaluate Proposed Reservoir Projects***

Ms. Elizabeth Gillen, Environmental Manager – FDEP ERP

2295 Victoria Ave. Suite 364

elizabeth.gillen@dep.state.fl.us

Fort Myers, FL 33901

(239) 332-6975

Notes:

3:40 p.m. ***Overview of USACE Regulations and Criteria Used Evaluate Proposed Reservoir Projects***

Ms. Susan Blass or Mr. Skip Bergman – USACE (invited)

1520 Royal Palm Square

Fort Myers, FL 33919

Susan.m.blass@usace.army.mil

(239) 334-1975 Ext. 30

Notes:

Facilitated Exercise for Session 6 - 4:00 p.m.

A. Based on the presentations, are there any gaps in existing review processes and criteria, and what are for improving agency review of reservoirs?

Types of reservoirs reviewed

Cumulative and secondary impacts

Criteria

Policies

Regulations

Others

Workshop Summary: What More is needed to Assure that Existing and Potential Reservoirs don't adversely Affect the CHNEP Watershed?

Concluding Comments

- 4:30 p.m.** ***Concluding Comments from Peer Reviewers***
Dr. Ernst Peebles, Biological Oceanographer – USF College of Marine Sciences
Mr. Torres, Hydrologist – USGS FISC Special Studies Section
Dr. Upchurch, Geologist – SDI Environmental Services, Inc.
- 4:45 p.m.** ***Concluding Comments from Facilitators***
Mr. Tom Taylor – Florida Conflict Resolution Consortium/FSU
Mr. Rafael Montalvo – Florida Conflict Resolution Consortium/UCF
- 5:00 p.m.** ***Concluding Comments from Workshop Participants***
- 5:15 p.m.** ***Thank You and Adjourn the Workshop***
Dr. Lisa Beever, Director – Charlotte Harbor National Estuary Program

Workshop on Watershed Reservoirs: Locations, Effects and Solutions
April 13-14, 2009 in Punta Gorda, Florida

Notes:

CHARLOTTE HARBOR WORKSHOP ON RESERVOIRS, APRIL 13-14, 2009 SURVEY

Thank you for participating in the Reservoir Workshop and for taking a few minutes to complete this survey. CHNEP hosts similar programs on a regular basis so your comments will help improve future programs. If you wish, write your comments on the other side of this page. Please place your completed form on the registration table or fax (239/338-2560) or mail your completed form to CHNEP, 1926 Victoria Ave, Fort Myers FL 33901.

1. How much of the two-day workshop were you able to attend? ___ all of it, ___ a portion of it
 2. How many days would you normally be able to attend a program such as this one? ___ half day, ___ full day, ___ two days, ___ three days, ___ more than three days
 3. Did you participate because of ___ work or ___ personal interest?
 4. What zip code do you **live** in? _____ and **work** in ? _____
 5. How did you find out about the workshop? ___ CHNEP material, ___ media, ___ another organization, please specify _____, other, please specify _____
 6. Was there one specific presentation at the event today that influenced your decision to come? ___ yes, ___ no
Please explain:
 7. Would you prefer these programs be offered ___ morning, ___ afternoon, ___ evening.
 8. What month(s) of the year would be best for you? (check all that apply)
___ Jan, ___ Feb, ___ March, ___ April, ___ May, ___ June, ___ July, ___ August, ___ Sept, ___ Oct, ___ Nov, ___ December
 9. What month(s) of the year would be worst for you? (check all that apply)
___ Jan, ___ Feb, ___ March, ___ April, ___ May, ___ June, ___ July, ___ August, ___ Sept, ___ Oct, ___ Nov, ___ December
 10. What day(s) of the week are best for you? (check all that apply)
___ Sunday, ___ Monday, ___ Tuesday, ___ Wednesday, ___ Thursday, ___ Friday, ___ Saturday
- Please rate the following three questions.
11. Facility: ___ excellent, ___ good, ___ fair, ___ poor Do you have any suggestions for another location?
 12. Food: ___ excellent, ___ good, ___ fair, ___ poor Do you have any suggestions?
 13. Schedule: ___ excellent, ___ good, ___ fair, ___ poor Do you have any suggestions?
 14. Before the workshop, how aware were you of the Charlotte Harbor National Estuary Program?
___ no awareness, ___ some awareness, ___ aware
 15. By attending the workshop, did you become more aware of the NEP? ___ yes, ___ no
 16. Did the workshop meet your expectations? ___ yes, ___ no
 17. Before the workshop, how aware were you of the concerns about the Charlotte Harbor estuarine system?
___ no awareness, ___ some awareness, ___ aware
 18. By attending the workshop, do you have more understanding of the issues of concern? ___ yes, ___ no
 19. What could have been done differently to make this a better event?
 20. What did you like about this workshop?
 21. What was the most interesting thing you learned?

Thank you!