Meeting Summary

SOUTH FLORIDA ECOSYSTEM RESTORATION TASK FORCE
SCG SPONSORED
RECOVER PUBLIC ENGAGEMENT WORKSHOP

DAY 2, JULY 20, 2023
9:00 AM - 5:00 PM

South Florida Water Management District
3301 Gun Club Road
West Palm Beach, Florida 33406
Building B-1 Auditorium

Participant lists are available at the end of the document.

Welcome and Introductions

Adam Gelber, OERI thanked everyone for participating. This is a Science Coordination Group (SCG) sponsored workshop to support RECOVER. This workshop is being held in response to a formal request by RECOVER made to the Task Force, Working Group and SCG. The purpose of this workshop is to gather science and monitoring information to support future Monitoring and Assessment Plans (MAPs). Angela Dunn, SCG Vice Chair is participating virtually and will help facilitate the workshop.

Angela Dunn, SCG Vice Chair thanked Adam for leading the workshop in person and welcomed everyone. RECOVER reports to SCG quarterly and MAP is an important piece of CERP.

Adam Gelber, OERI explained there are several speakers this morning including, Gina Ralph, Fred Sklar, Laura Brandt, Ramon Martin, Stephanie Verhulst, Melody Hunt. If there is time after the individual presentation, we will open it up for a couple of questions, otherwise the first Q&A session directly follows the presentations. Carrie Beeler, OERI will provide an overview of the workshop public engagement process and procedures.

Workshop Procedures (Presentation)

Carrie Beeler, OERI noted that RECOVER and SCG both have a long history supporting restoration science and coordinating. The Plan for Coordinating science outlines the ways that SCG coordinates science, and this workshop is one of those ways described. This is a two-day workshop. The first day covered both the Northern Estuaries and Southern Coastal Systems and the second day will cover Lake Okeechobee and Greater Everglades. There are two opportunities for stakeholder engagement each day. The first is after the morning presentations and the second is after the breakout groups briefings. All attendees are automatically muted and are in listen only mode. Attendees online will use the "raise hand feature" and be called on one at a time and unmuted by staff. If time allows, questions and discussion can occur directly following presentations. This meeting is being recorded and available on our website and YouTube channel, along with all the materials provided today.

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Lake Okeechobee Hypothesis Clusters Overview ([Presentation](#))
Therese East, SFWMD

Native Vegetation Mosaic Hypothesis Cluster
Working Hypotheses: Restoration and storage projects outside of Lake Okeechobee will allow for better control of lake stage, allowing it to be maintained within a defined ecologically beneficial envelope and eliminating extreme high and low stages, which would promote a diverse mix of native vegetation communities and maximize areal coverage. Management activities independent of CERP restoration to adequately control exotic vegetation will allow native emergent and submerged species to maintain maximal areal coverage more consistently. Reestablishment of the emergent and submerged vegetation mosaic and appropriate water levels will serve to minimize physical damage due to storms.
MAP Monitoring: SAV – annual grid and spring and fall transect surveys (SFWMD), EAV – aerial imagery and sentinel sites (SFWMD)
Key Uncertainties: Storage Capacity, Sediment Composition and Transport, Climate-related Events

Macroinvertebrate Hypothesis Cluster
Working Hypotheses: Eutrophication in Lake Okeechobee has resulted in a macroinvertebrate community composition dominated by pollution-tolerant taxa. Macroinvertebrate assemblage is more diverse and contains more taxa that are pollution intolerant in regions of the lake underlain by sand and peat sediment than in areas underlain by mud sediments. Adverse changes in macroinvertebrate communities result in negative cascading impacts on fish and other higher-trophic level organisms that utilize them as a food source. Macroinvertebrate densities and assemblage structure reflect changes in the plant community structure.
MAP Monitoring: Benthic Macroinvertebrates – pelagic, nearshore, and littoral sites, different sediments, spring and fall (FWC)
Key Uncertainties: Water Quality Improvement Projects and Management Activities

Native Fish Hypothesis Cluster
Working Hypotheses: A productive and healthy littoral and limnetic fishery requires suitable habitat for foraging, spawning and shelter (refuge from predators) and abundant food. Decreases in nutrient loads and improvements in water quality will result in increased fish diversity and a shift from less desirable rough fish to more desirable game fish.

MAP Monitoring: Fishery – pelagic trawls, nearshore electrofishing, annually in fall (FWC)

Key Uncertainties: Exotic Species, Fishing Pressure, Climate Change, Management Activities

Phytoplankton Hypothesis Cluster
Working Hypotheses: Restoration in the watershed will result in reduced external nutrient loading, improving water quality, thereby decreasing algal blooms. Restoration would result in a shift to phosphorus (P)-limitation and improved light conditions thereby decreasing

cyanobacterial bloom frequency and severity. Restoration would increase the coverage, distribution, and community structure of SAV and associated epiphytes, affecting phytoplankton biovolume and resulting in fewer algal blooms.

MAP Monitoring: Algal Blooms and Associated Toxins – lake wide, bimonthly sampling (May – Oct), monthly sampling (Nov – Apr) (SFWMD and FDEP)

Key Uncertainties: Internal Loading, Climate Change, Land Development

Avian Hypothesis Cluster
Working Hypotheses: Long term hydrological patterns can influence wading bird and snail kite productivity by affecting the distribution and composition of vegetation available for nesting substrate and foraging habitat. Rapid seasonal fluctuations of water levels can influence prey densities and availability as well as predator access to the nests and nesting colonies.
MAP Monitoring: Wading Bird Nesting – aerial surveys, monthly from Dec to June (FAU), Wading Bird Foraging -aerial surveys, bimonthly from Dec to June (SFWMD)
Key Uncertainties: Exotic Species, Climate Change, Management Activities

Q&A
Jeff Kline, Everglades National Park: Given that the tilapia population is the largest fish population in the Lake right now, do you have a link (or an uncertainty) of tilapia to SAV to indicate the ability to disturb substrate in nesting or at least graze off SAV? Therese East not specific to exotics. We just put out a paper about SAV effects of the large-mouth bass and black croppy. I understand that they dig into the sediment and release nutrients. That is a good question, and this may be something we need to add to our linkage.

Mike Deuver, Consultant WMD: In SW Florida having issues with woody vegetation invasion in the marshes. Are you having problems there and the solution is fire management, is that happening? Therese East said it is not a problem in Lake Okeechobee. We would like to see more around the Lake but do have cattail. We have a performance measure for woody vegetation, and we have not met it. We also have 730 acres/sq Kilometers to work with.

Sarah Newton SFWMD: preferred SAV species and which is most abundant. Therese East good question and when we had none, we would take anything. We have many species, and all are low in abundance. We would like vascular species. Hydrilla is preferred within reasonable abundance. We will take anything on the lake at least 35,000 acres.

Jessica Fair, USACE: any links to Tilapia and the more nutrients. Therese East no links to where the nutrients come from. One question we are looking at, can we do fish Management -take out Tilapia and Gizzard shad (sediment disturbances) bioturbation. We have not gotten into a lot of exotic fish species our link just says nutrients. Fisharvesting could be explored.

Nate Norm, FIU: working on that question in STA Tilapia is eliminating SAV…Tilapia questionable if they are quite herbivorous, they may be damaging or stopping them from growing.

Eric Suarez FWC: working on reducing woody encroachment of Willow in Holyland would like to get together and we can talk about success.

Ronda Roff, Sierra Club SW FL.: It is interesting that FWC meeting two days -testimony to stop herbicide. What studies are you working on related to spraying for nutrient cycle as result of spraying. Bi product of glyphosate is phosphate. Is it being studied and how? Therese East noted they have only done seedbank studies. Results did not show adverse long-term effects. FWC is doing macroinvertebrates study and we would like to see in marsh, is looking at how macroinvertebrates are affected by herbicides. Rhonda- nutrient cycling is very interesting to me. Therese East said she does not know of any. Christa Zweig, SFWMD, noted that Sue Newmann looked at Phosphorous in WCA 2A from glyphosate-nutrient cycle from district findings noted that glyphosate didn't contribute much.

Greater Everglades Hypothesis Cluster Overview (Presentation)
Jenna May, USACE and Tasso Cocoves, USACE

Greater Everglades Predator-Prey Interactions of Wading Birds and Aquatic Fauna Forage Base Hypothesis Cluster

Working Hypotheses: Restoration of hydrologic conditions consistent with the understanding of pre-drainage conditions is expected to reestablish aquatic prey densities and prey availability across the landscape that will, in turn, support the return of large, successful wading bird nesting colonies to the southern Everglades (from observations of super colonies in 2018 and 2021). Crayfish availability in the marl prairies is influenced by chronic droughts and lengthened hydroperiod, which are expected to increase crayfish production and availability for breeding wading birds in the southern Everglades. Nutrient enrichment causes an elevation in periphyton nutrient content, a reduction in the proportion of calcareous floating and epiphytic periphyton mats, and a replacement of oligotrophic species by non-mat forming filamentous species. Shortened hydroperiods cause a reduction in the proportion of diatoms and green algae and an increase in calcareous blue-green algae, possibly reducing food value of periphyton, and affecting overall productivity of the Everglades.

MAP Monitoring: Wading bird breeding activity (colony size, location, success), Aquatic fauna (wet/dry season abundances), Periphyton (wet season composition and edibility)

Key Uncertainties: Invasive species – Asian Swamp Eel, Burmese Python, African Jewelfish, Climate change – Saltwater intrusion from SLR, precipitation pattern

Interrelationships of Sheet Flow, Water Depth Patterns, Oligotrophic Nutrient Status, and Landscape Patterns Hypothesis Cluster

Working Hypotheses: Canal- Marsh Interactions Hypothesis: Canal-marsh interactions have altered or eliminated sheet flow and related natural system hydrologic and landscape characteristics throughout the Everglades. Canals do not support biological mechanisms that reduce nutrient levels to their historic oligotrophic status. Canal backfilling combined with resumption of natural volume, distribution, and spatial distribution of freshwater delivery is expected to restore sheet flow, sustain pre-drainage landscape characteristics, and reduce downstream nutrient concentrations.

Re-oligotrophication: Hypothesis Regions of the Greater Everglades with legacy high nutrient, altered landscapes will require active and passive management techniques to restore ridge-slough landscape functionality, in addition to reductions in external loads and concentrations. • Accretion and Microtopography Hypothesis Sheet flow interacts with hydroperiod, water depth, fire, and nutrient dynamics to maintain organic soil accretion and loss in a state of dynamic equilibrium. The dynamics of accretion and peat oxidation is predominately controlled by hydroperiods and the exclusion of peat fires from pre-drainage landscapes. GE Interrelationships of Sheet Flow, Water Depth Patterns, Oligotrophic Nutrient Status, and Landscape Patterns Hypothesis Cluster 13

Working Hypotheses: Surface water and Groundwater Nutrients and Organic Carbon Hypothesis Surface and groundwater nutrients and organic carbon have a major influence on landscape patterns of soil chemistry and peat stability as well as periphyton and vegetation composition, density, and productivity.

Increased sheet flow and altered inflow sources will cause local and regional ecological changes due to elevated mineral and nutrient supply.

Periphyton Hypothesis: Periphyton mat structure and community composition is slowly shifting in the Everglades due to increasing volumes of water into the Greater Everglades and rapidly shifting in areas near nutrient point sources and of legacy nutrients.

Tree Island Hypothesis: Vulnerability of tree island productivity and diversity varies spatially due to regional hydrologic legacy. Tree island vulnerability increases with shallower elevation gradients and impoundment.

Elevation Gradients Hypothesis: Non-linear elevation breaks and slopes (topographic contours that do not progress smoothly or that exhibit abrupt changes) affect landscape patterning and vegetation communities. Non-linear elevation breaks and slopes control water movement on the

landscape and landscape hydrology. GE Interrelationships of Sheet Flow, Water Depth Patterns, Oligotrophic Nutrient Status, and Landscape Patterns Hypothesis Cluster

MAP Monitoring: Soil Nutrient Concentration, Periphyton – structure, composition, and nutrient composition, Southern Marl Prairie Landscape Patterns – community structure and composition and soil characteristics, Ridge and Slough Landscape Patterns – elongated directional patterns, topographic relief, soil/peat depth, veg community structure and composition.

Key Uncertainties: Impact of legacy nutrients within and downstream of structures. Re-establishment of ridge and slough patterns with hydrology restoration. Invasive and non-native species impacts and management.

Alligator Density and Body condition in Relation to Hydrologic Patterns and Artificial Canal Habitats Hypothesis Cluster

Working Hypotheses: Changes in density, body condition, reproduction, growth, and survival of American alligators (Alligator mississippiensis) over time are due to alterations of hydrologic conditions (e.g., depth (maximum, minimum, range), hydroperiod), which influence habitat suitability and prey densities across all life history stages. Heterogeneity of topography and landscape features (deep sloughs, higher ridges, tree islands, alligator holes) support healthy alligator and prey populations. These aspects of hydrology, landscape complexity, and prey availability have direct, measurable effects on alligator density, body condition, reproduction, growth, and survival. Sea level rise is expected to result in change in location and spatial extent of suitable habitat.

MAP Monitoring: Alligators (relative density, body condition)

Key Uncertainties: Climate change effects on alligator biology (metabolism, nesting, etc.) Relationship of alligators to landscape and hydrologic conditions has been measured during degraded conditions and may not be the same in restored conditions. Role of STAs and FEBs to alligator populations and condition. Effect of extreme events and their frequency on alligator populations at local and regional scales

Public Engagement & Comment
- Q&A Session In-person, and
- Q&A Session Virtual (via Zoom raise hand feature)

Adam Gelber, OERI called on commenters one at a time.

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Dan Scheidt, EPA, point of clarification REMAP is monitoring soil nutrient concentrations landscape wide through ENP and Big Cypress. Next sampling will be October 2023. Include nitrogen phosphorous as well as other media, periphyton, and vegetation.

Gina Ralph, RECOVER went over the breakout group directions.

Breakout Groups Briefings

Breakout Group Tasso Cocoves, USACE GE Trophic and Lake Okeechobee (Lake O) Avian

- There is a lot of monitoring wading Bird nesting.

Gaps

- Sampling in marsh for fish in littoral fringe
- Connection between water management to wading bird success and white ibis complicated due to foraging off lake.
- Invasive species not on diagram, vegetation, and fish for GE Trophic
- Lots of monitoring fish periphyton-lot of overlap spatially but temporal not synchronized.
- GE wide Wading Bird colony Monitoring, reconnaissance flights paired with SFWMD foraging surveys, stop at park then NPS covers it.
- Gap in understanding the Coastal ecotone hydrology.
- Aquatic prey monitoring need west Fl Bay to northern extent of ENP will be a gap after Aug 2024 when mod water monitoring concludes.
- GAP Foraging wading Birds throughout conduct the SFRS flights to better understand how wading birds are foraging.

Amanda Kahn, SFWMD Lake O Phytoplankton and Native Vegetation

- Gaps linkages of invasive fishes with nutrients and phytoplankton, sedimentation
- Exotic Fish foraging effects on vegetation
- Larval fish needs link.
- Nutrient in Lake cycling have information needs.
- Overlaps-Lake O communicate well-very coordinated.
- Have lots of monitoring including SAV and water management stations, included some Kissimmee/Chain of Lakes information.

Stephanie Verhulst, USACE native Fish and macroinvertebrates

- Work well together since Macroinvertebrates are prey for fish.
- Have good coverage for fish monitoring through littoral monitoring with FWC and DEP.
- Need more assessments of how invasive fish effect native fish and macroinvertebrates.
- 2 hypotheses in native fish-maybe HC could be expanded to incorporate the invasive fish (in diagram but not monitored or assessed)

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- Gap in sediment in ecological effects -more diversity and better macroinvertebrates with Sand and mud produced less diverse intolerant to pollutants.
- Macroinvertebrates monitoring talk about different taxa levels. Looked at scale and temporal scale of monitoring. Maybe updated surveys are needed since last time was 20 years ago.
- Fish Monitoring in Kissimmee River not included in our assessment-not sure if it should be part of Lake O or not.

Mike Simmons and Rodrigo Sedeno, USACE Alligator HC

- More synergy among different parameters.
- Monitoring actions not linked together most are abundance and biomass monitoring and not in other parameters.
- FWC monitors extensive Lake, Kissimmee Holey Land, ENP, and RECOVER MAP
- Not really any overlap
- Hypothesis 1 Basically need analytical coordination relationship between data collection sites.
- Hypothesis 2 is a synthesis gap.
- Growth and survival for Hypothesis 1 is needed, note that no HCs do this currently.
- Body Condition Gap in LNR, WCA 2, ENP and BICY
- H 3 for Prey: Need more information on large fish as prey
- Parking lot items
  - Missing Faunal Prey group in HC
  - Link to Predation needed.
  - Alligator in Predator Prey links focus on salinity stress and body condition
  - invasive link in predation -Alligator focus important stress on body condition –
  - CERP projects versus what RECOVER does need more focus on gators instead of habitat.
  - Review needed for 2nd and 3rd hypothesis.

Jenna May, USACE Landscape Patterns HC

- Monitoring product noted that there are 80-90 lines of data, cross walked and grouped into 8-9 groups. There was not a lot of overlap.
- Potential overlap on collection of water depth information. More discussion needed.

Gaps

- Flow information: changes in Northern 3A-and in ENP looking at connectivity of SRS and Taylor slough into Lozman slough.
- WQ and pore water information would be useful for areas expected to be affected by SL rise.
- Elevation data needed. LIDAR in Tree Islands capture changes.

- Collecting information, and map GERT panels
- Expand tree island monitoring so it is regionwide in are 3, 2b.
- Fire monitoring/mapping is occurring, but methods vary, need to see if we can match up.

4:40 PM: Public Engagement & Comment
- Q&A Session In-person, and
- Q&A Virtual (via Zoom raise hand)

Adam Gelber, OERI asked for comments and there were none.

Closing Comments

Adam Gelber, OERI noted that OERI will provide information to USACE. Gina thanked everyone for hanging in there, there is a lot of additional homework left to do. Will brief status to WG and SCG. Will send a survey looking for ways to improve.

Angie Dunn, SCG Vice Chair thanked everyone and noted she is looking forward to hearing report out.
James Erskine, WG Chair thanked Gina, the OERI team and the scientists.

Adam noted that September 6 and 7 is the next meeting of WG and SCG and the IDS Workshop and Coral Reef TF.

4:45 PM: ADJOURN

Attendees

Adam Brame	Becky Allenbach
Aimee Cooper	Benita Whalen
Alexandra Serna	BH Welch
Alicia Magloire	Bradley Cornell
Allyn Childress	Bud Howard
Alyssa Jordan	Charlette Roman
Anna Swigris	Chris Guth
Anteneh Abiy	Chris Decker
Ashley Wilson	Chris Madden
Barry Rosen	Christina Romagosa

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Cindy Thomas	Karen Bohnsack
Colin Saunders	Kellie Ralston
Craig Grossenbacher	Kelly Cox
Craig Van der Heiden	Khandker Ishtiaq
Curtis Szewczyk	Kira Allen
Dan Scheidt	Lee Killinger
Daniel Nelson	LeRoy Rodgers
Diamond Bergeron	Lyanne Mendez
Dong Yoon Lee	Mailin Sotolongo Lopez
E Ross	Marcia Steelman
Edward Perri	Mark Cook
Evelyn Gaiser	Matt Morrison
Fred Sklar	Meenakshi Chabba
Gareth Lagerwall	Melissa Nasuti
Gib Owen	Michael Duever
Gustavo Suarez	Mike Elfenbein
Harold Peterson	Mike Magley
Herve Jobert	Miles Meyer
Holly Milbrandt	Newton Cook
Holly Sweat	Nicole Penkowski
Irene Quincey	Nicole Niemeyer
Joan Browder	Nyla Pipes
John Bratton	Patricia Burke
John Kominoski	Paul Julian
John Galvez	Ramon Martin
Josh Wilsey	Rebecca Elliott

Rhonda Roff

Rolf Olson

Sandra Bogan

Sara Davis

Sarah Funck

Sean Sculley

Stephanie Romañach

Steve Davis

Sue Newman

Ted Lange

Theresa Strazisar

Veronica Harrell-James

Vicki Garcia

Victoria Baglin

Wes Brooks

Attended In Person:

Carrie Beeler

Gina Ralph

Adam Gelber

Kevin Burger

Marsha Bansee

Jose Cabaleiro

Michael Simmons

Ramon Martin

Andrea Atkinson

Jenna May

Rodrigo Sedeno

Therese East

Jessica Spencer

Sarah Newton

Wade Lehmann

Rolf Olson

Melody Hunt

Amanda Kahn

Jennifer Chastant

Daniel March

Carlos Coronado

Jay Sah

Bob Progulske

Laura Brandt

Mike Deuver