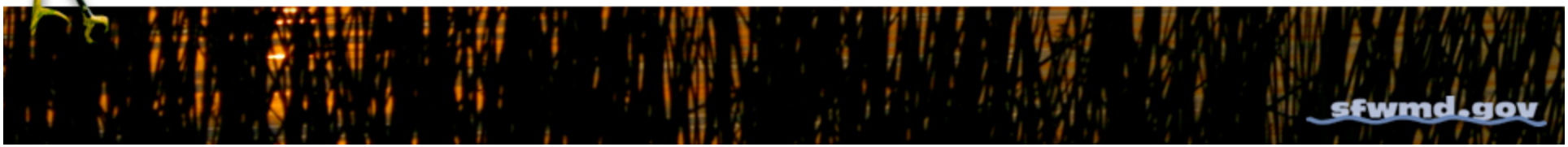
SOUTH FLORIDA WATER MANAGEMENT DISTRICT

Kissimmee Basin Water Reservations

Lawrence Glenn, Kissimmee Director

July 9, 2009 Governing Board Meeting (Item #)



Two-Part Update

July 2009

- **Overview of Water Reservations**
- **Summary of Technical Analysis**

August 2009

- Policy Concepts
- What's Next?

Overview of Kissimmee Basin Water Reservations

- Reservation of water for the protection of fish and wildlife (s. 373.223(4), F.S.)
  - Water in such locations, quantities, and seasons
  - Withholds reserved water from allocation to users
  - Subject to periodic review for changed conditions
  - Existing legal uses protected unless contrary to the public interest
  - Reservation rule does not direct operations, but operations do affect water availability

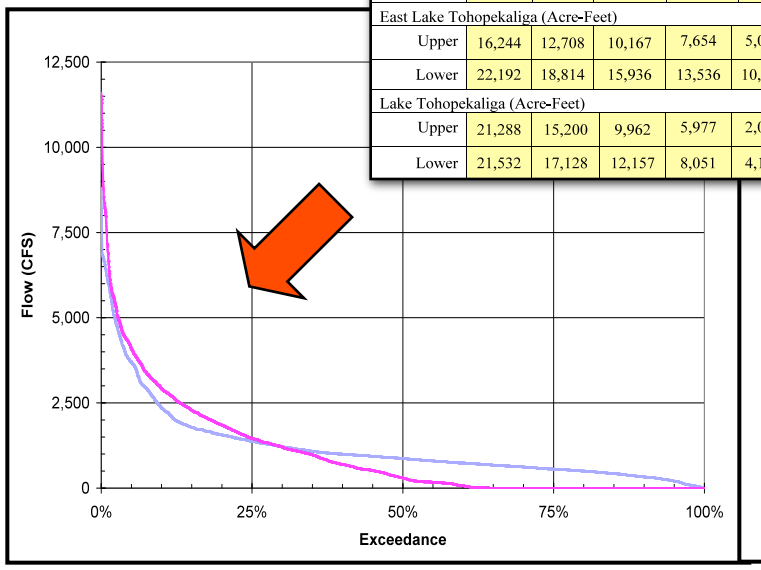
Overview of Kissimmee Basin Water Reservations

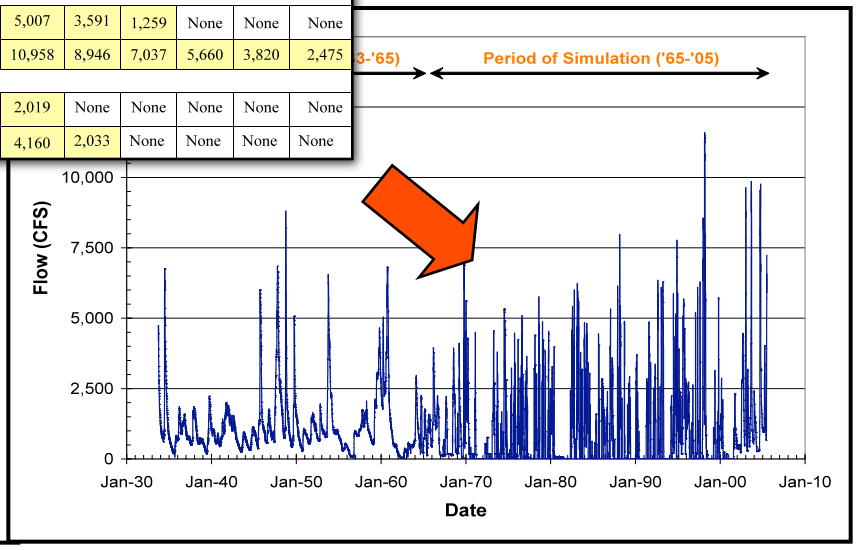
- Based on best available information
- Governing Board given discretion
  - 'In the judgment' of the Governing Board
  - Balancing of agency missions
  - Water for protection of fish and wildlife is not a unique answer
    - Biologic diversity
    - Hydrologic variability

Presentation Outline

- Overview of Water Reservations
- **Summary of Technical Analysis**

Threshold	Frequency of Events 5%	10%	15%	20%	25%	30%	35%	40%	45%	50%
Lakes Myrtle Joes and Preston (Acre-Feet)										
Upper	241	106	None	None	None	None	None	None	None	None
Lower	460	347	261	188	153	None	None	None	None	None
Lakes Hart and Mary Jane (Acre-Feet)										
Upper	2,212	1,507	1,038	342	None	None	None	None	None	None
Lower	2,212	1,507	1,050	647	334	None	None	None	None	None
East Lake Tohopekaliga (Acre-Feet)										
Upper	16,244	12,708	10,167	7,654	5,007	3,591	1,259	None	None	None
Lower	22,192	18,814	15,936	13,536	10,958	8,946	7,037	5,660	3,820	2,475
Lake Tohopekaliga (Acre-Feet)										
Upper	21,288	15,200	9,962	5,977	2,019	None	None	None	None	None
Lower	21,532	17,128	12,157	8,051	4,160	2,033	None	None	None	None





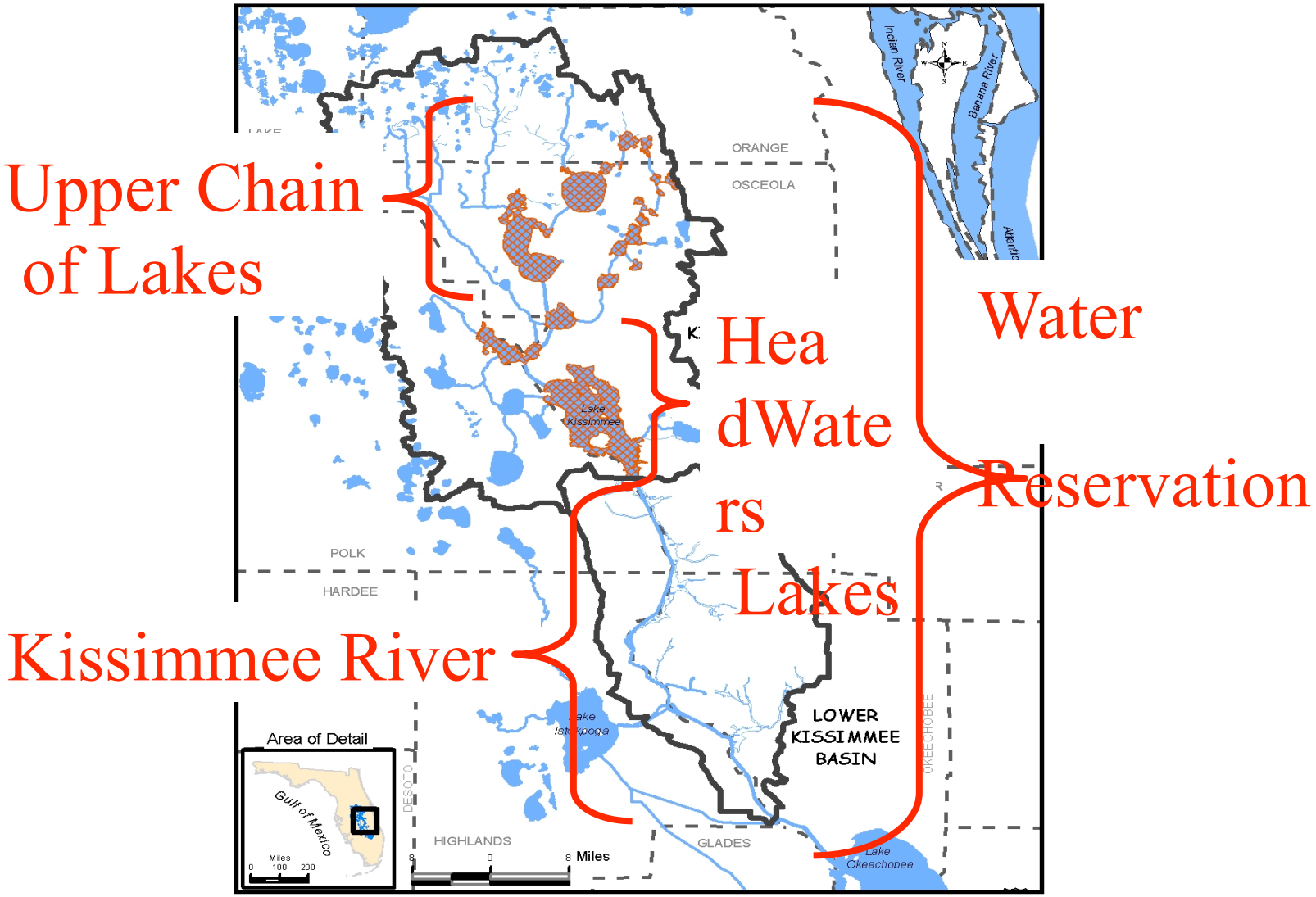
Objectives of Technical Team

- Determine water bodies to be protected
- Identify fish and wildlife species
- Establish linkages between hydrology and fish and wildlife requirements
- Develop performance measures
- Calculate Reservation Time Series (water required by fish and wildlife)

Reservation Water Bodies

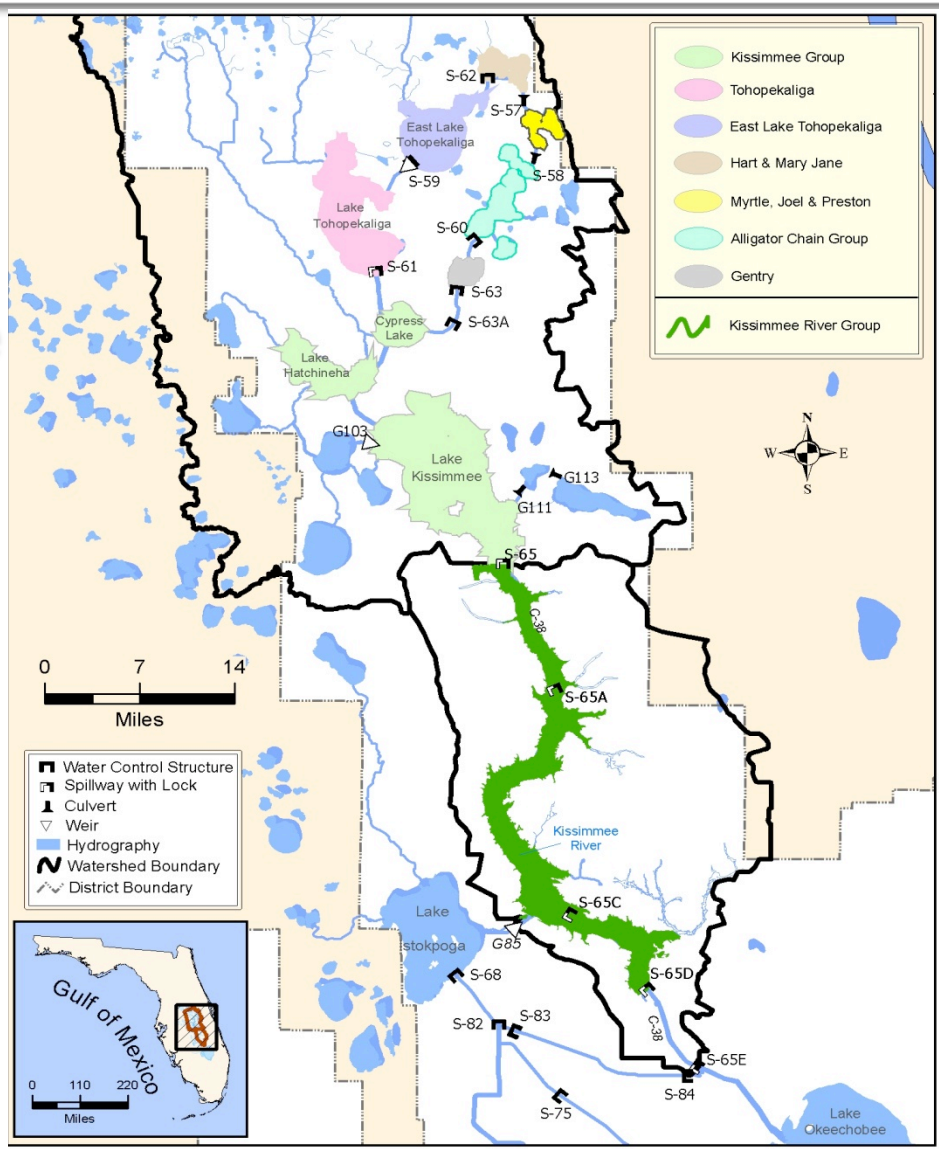
Kissimmee River and Floodplain

Interconnectedness of Kissimmee Basin



Reservation Water Bodies: Kissimmee River and the Chain of Lakes

- 7 lake management areas (19 lakes)
- Restored Kissimmee River and floodplain (S-65 to S-65E)
  - 103 miles of River and floodplain
  - 27,000 acres wetland habitat



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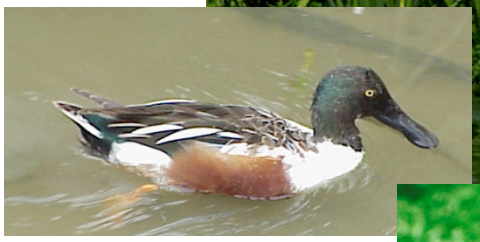
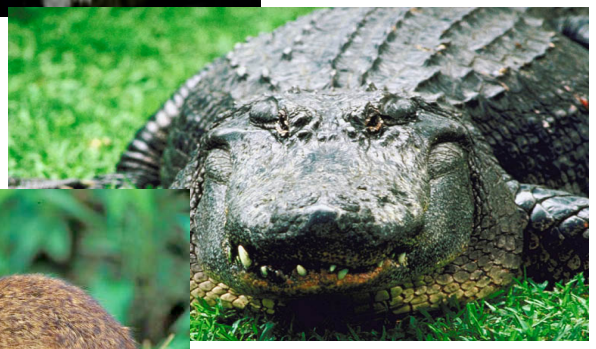
Fish & Wildlife of the Kissimmee River and Floodplain

- Fish Community
  - 52 species of fish use the river channel or floodplain
- Water birds
  - 68 species of wetland dependant birds
  - 14 species of wading birds including Federally endangered wood stork
  - 16 species of ducks
- Amphibians and Reptiles – 24 species
- Mammals – 4 species wetland river/dependent

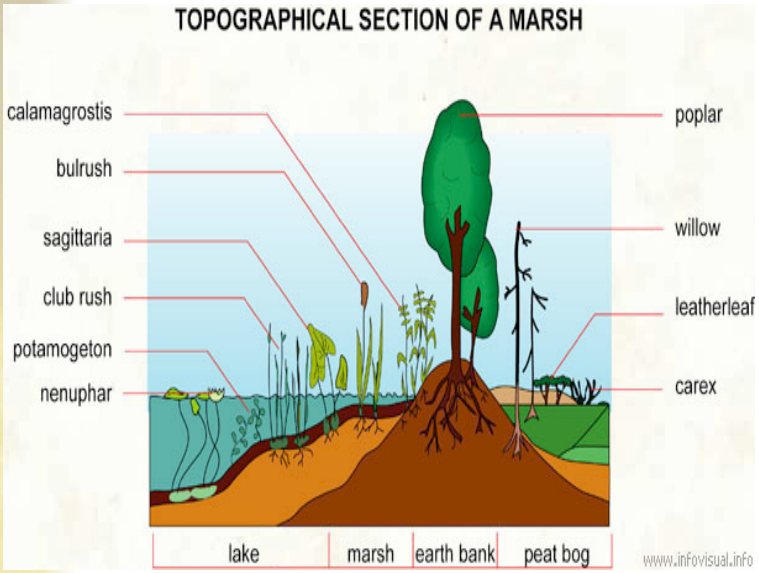


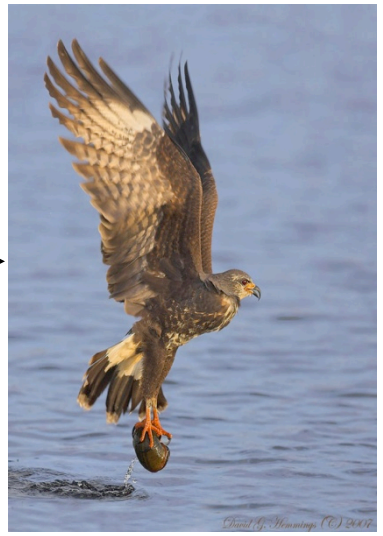
Fish & Wildlife of the Kissimmee Chain of Lakes

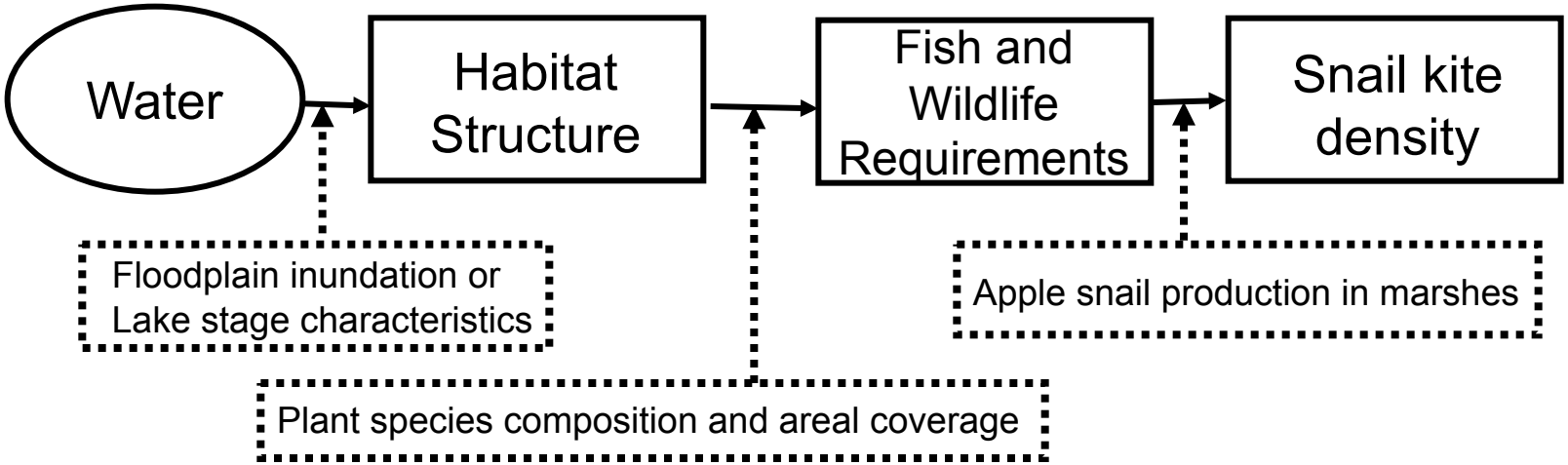
- Fish Community
  - 45 species total
- Water Birds
  - 10 species of wading birds, 3 important rookeries, waterfowl
- Threatened and Endangered Species
  - snail kites, wood storks, sandhill cranes, bald eagles
- Amphibians and Reptiles - 33 including the American Alligator
- Mammals – 4 species



Fish & Wildlife Linkages to Hydrology







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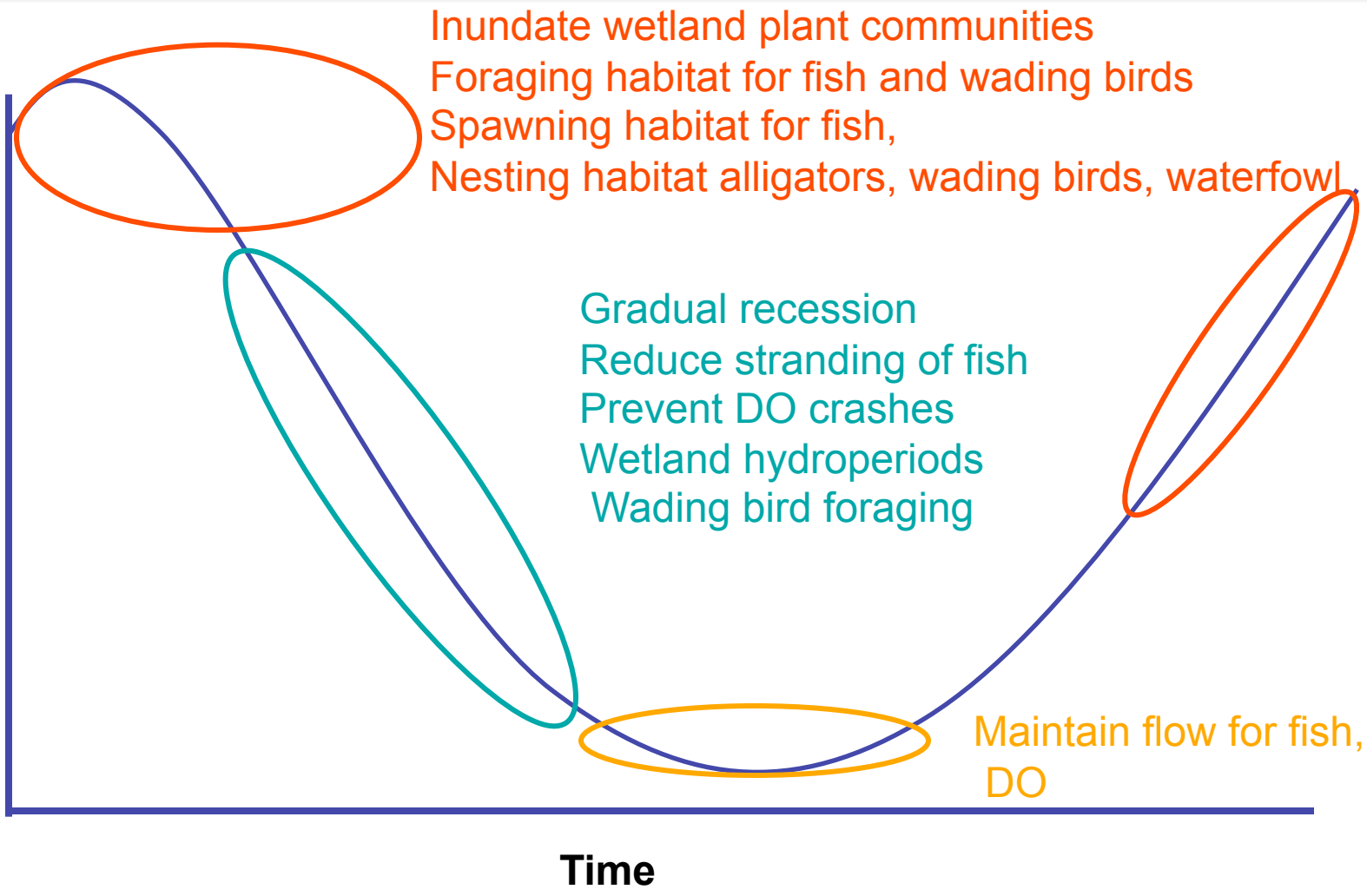
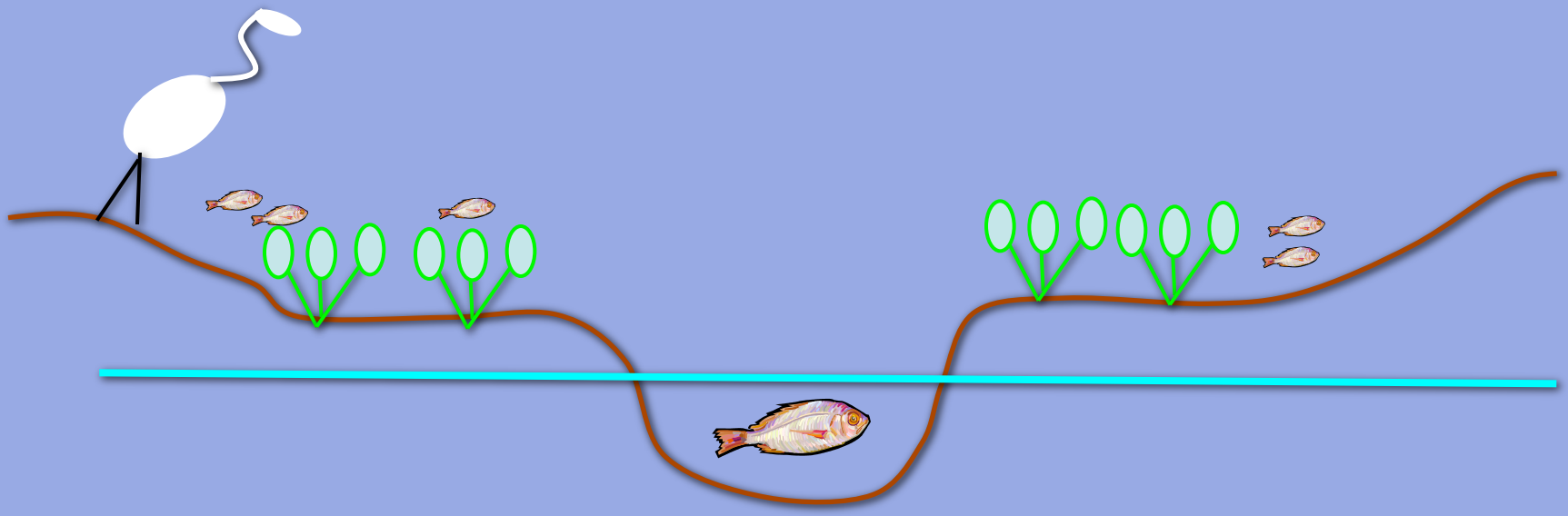
Fish and Wildlife Linkages to Kissimmee River Hydrograph



Fish and Wildlife in Kissimmee River



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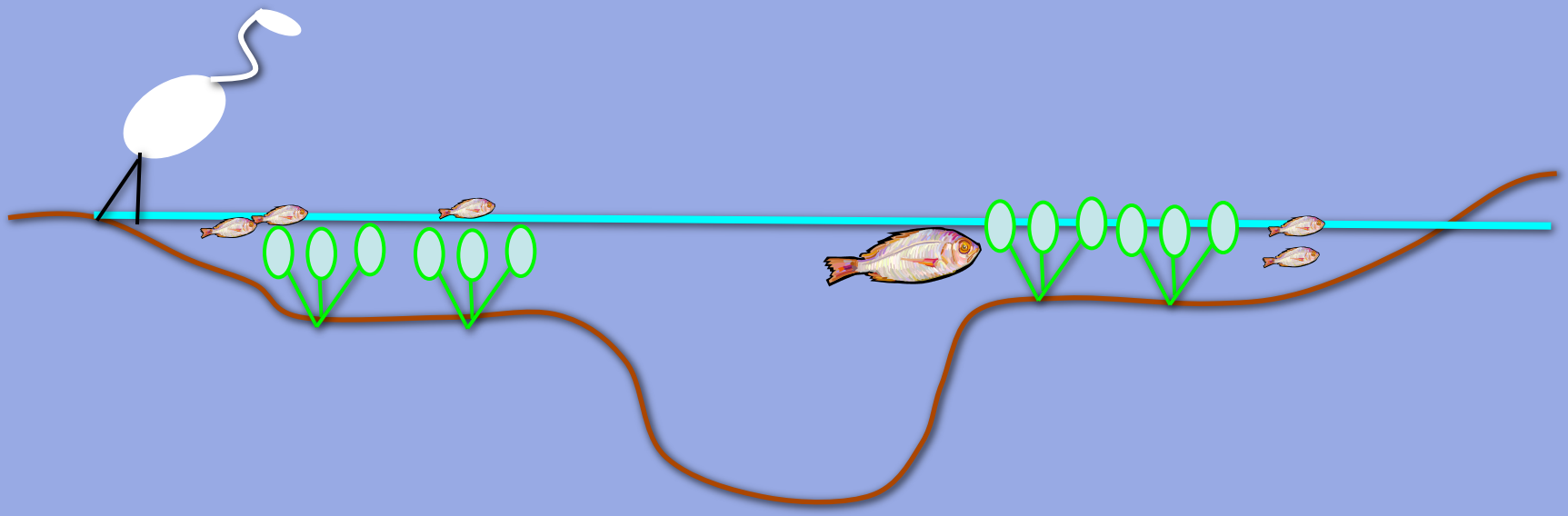
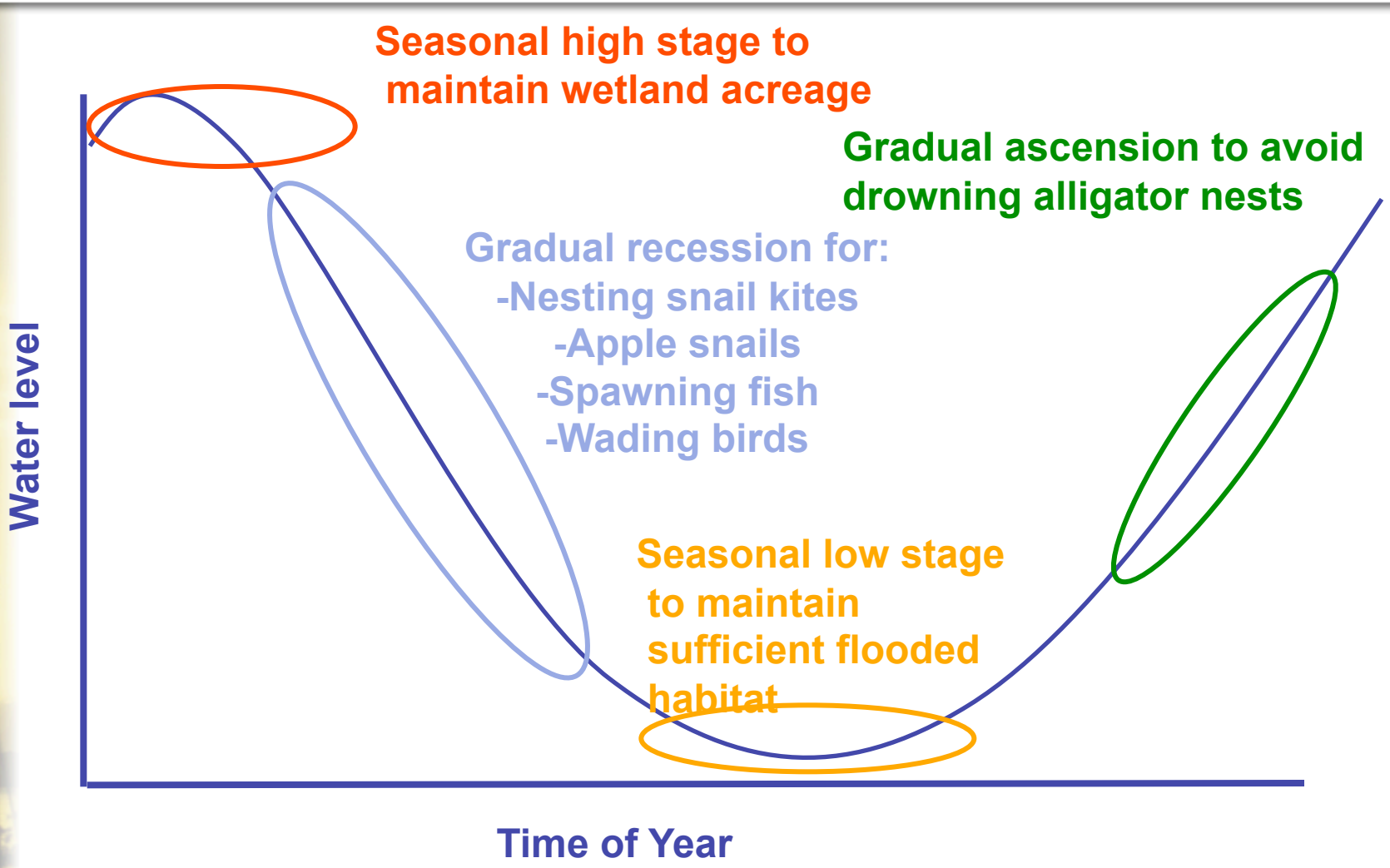
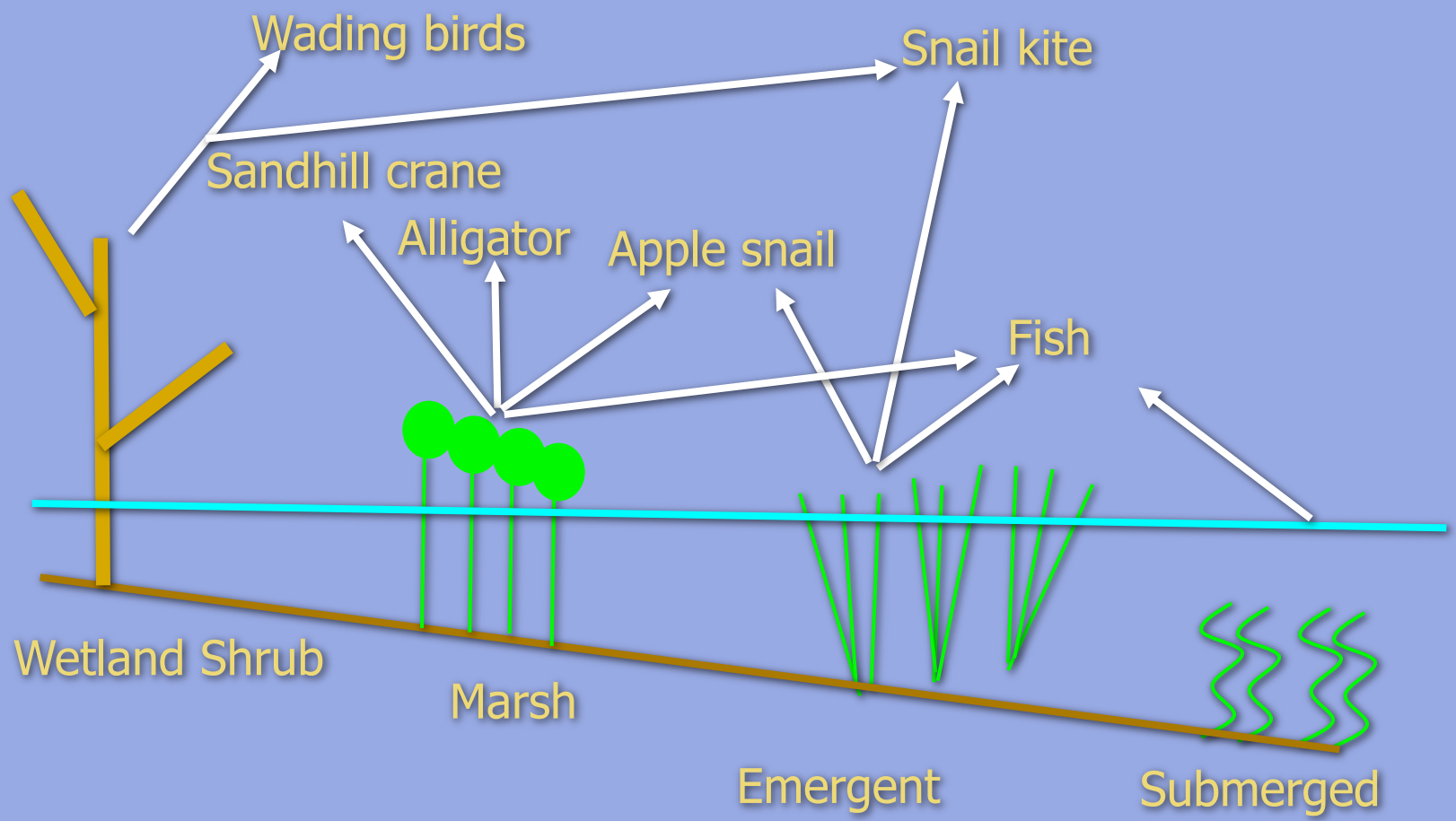


Fish and Wildlife Linkages to Lake Hydrographs

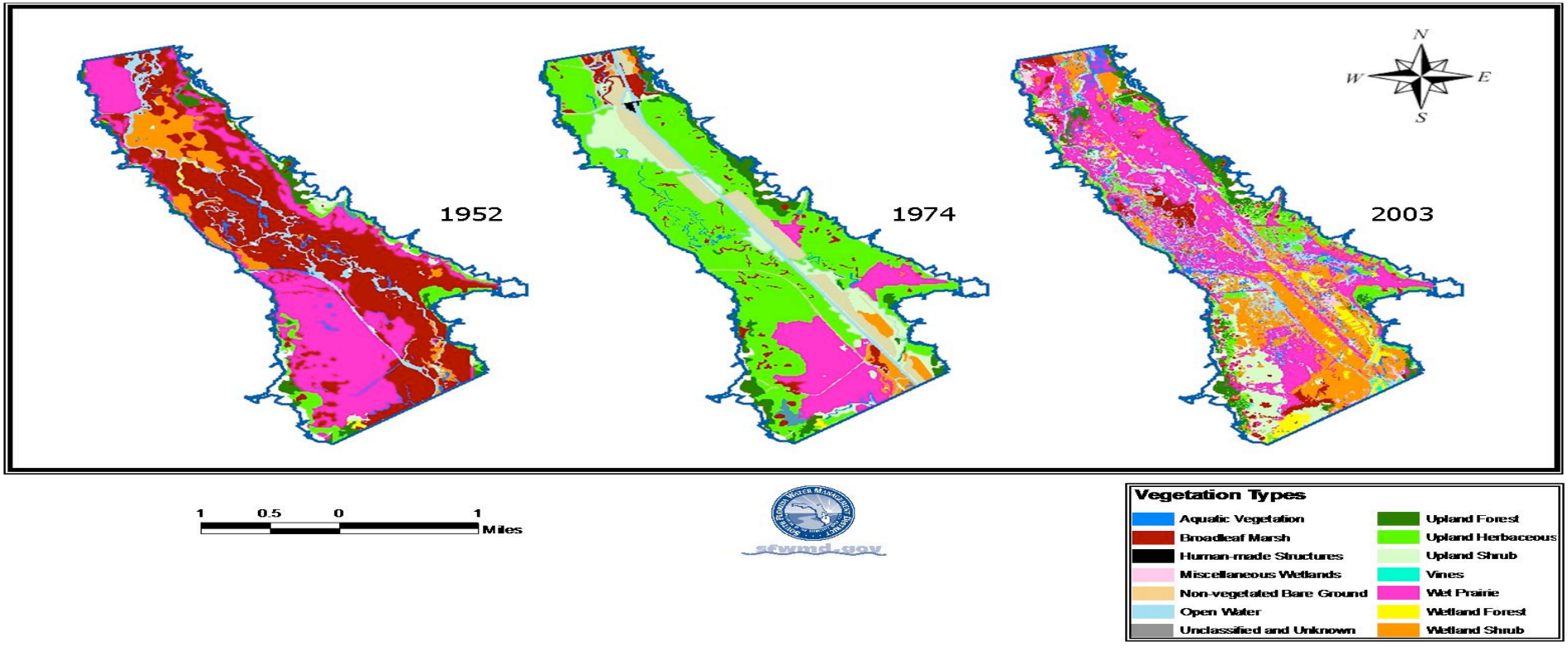


Fish and Wildlife in Lakes



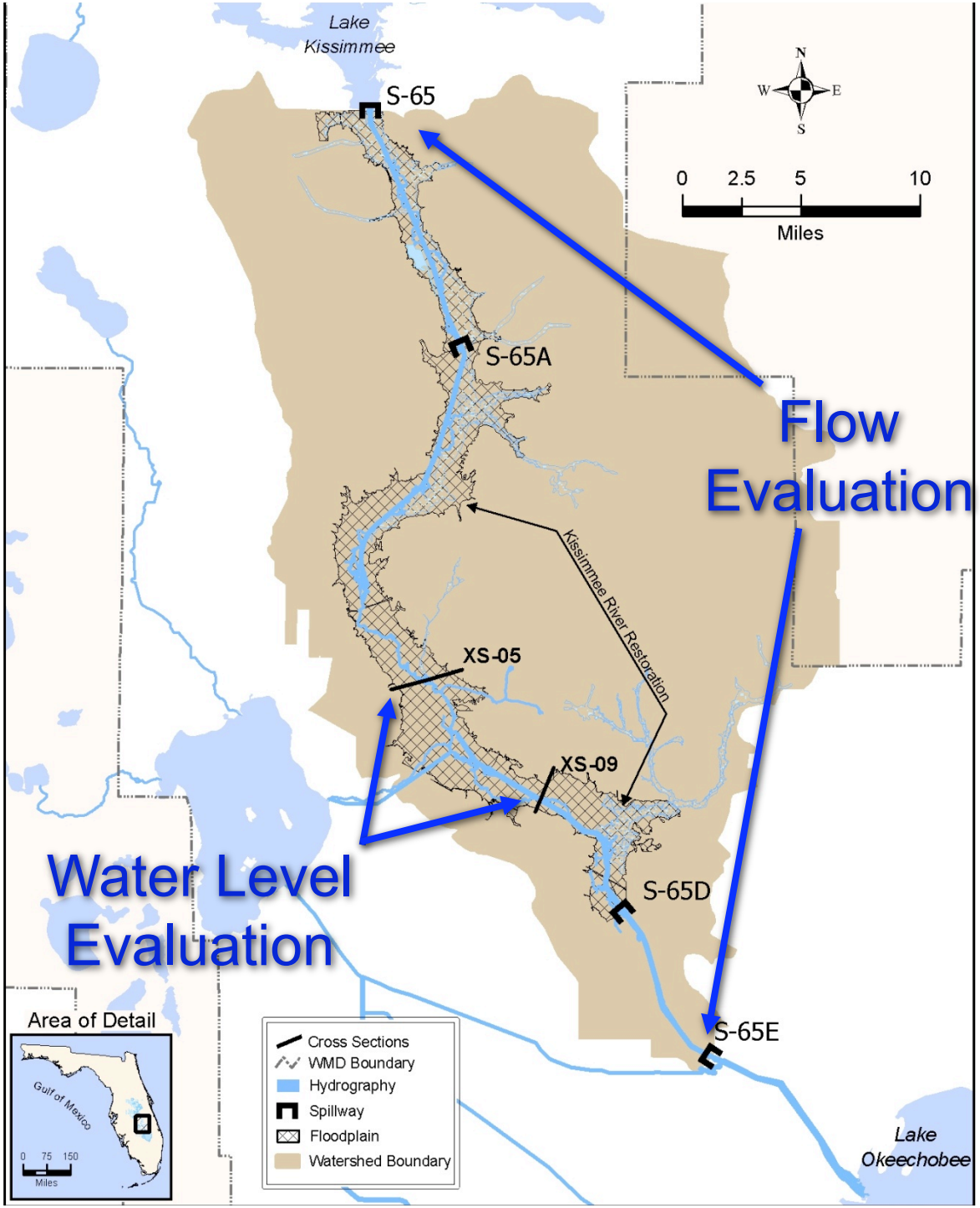
Kissimmee River Performance Measures

For most species, hydrologic requirements are related to maintaining a mosaic of wetland plant communities, especially Broadleaf Marsh, on the river floodplain and inundating the floodplain so that fish and wildlife species have access



Kissimmee River Performance Measures

- Kissimmee River Flow
  - Seasonality
- Stage Hydrograph/Floodplain Hydroperiod
  - Hydroperiod for Broadleaf Marsh
  - Intra- and Inter-annual variability of water levels
- Water Level Recession
  - Rate of water level decreases
  - Frequency of large water level reversals



Evaluation Locations for the Kissimmee River

Lake Performance Measures

- One performance measure for each reservation water body
- The performance measure is represented as an annual hydrograph
- Hydrograph represents the upper threshold for water levels needed to protect fish & wildlife

Lake Performance Measure Hydrographs Were Created From Two Points

Summary of All Performance Measures

- Performance Measure Hydrographs were developed for each of the eight reservation water bodies
- These hydrographs protect:
  - Seasonal and interannual variation in water levels that is required to maintain healthy plant and animal communities
  - The full extent of aquatic vegetative habitats that support fish and wildlife
  - Wildlife resources that are found on specific reservation water bodies

Developing Target Time Series

+/-

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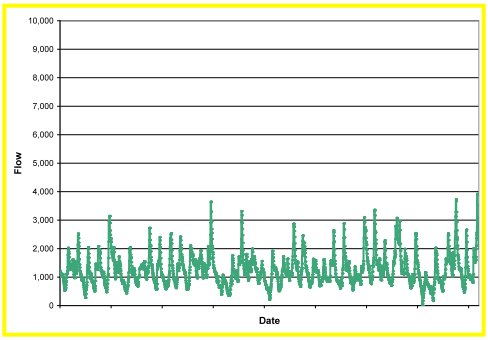

With Project Base Conditions

Performance Measures

Water Required for the Protection of Fish & Wildlife

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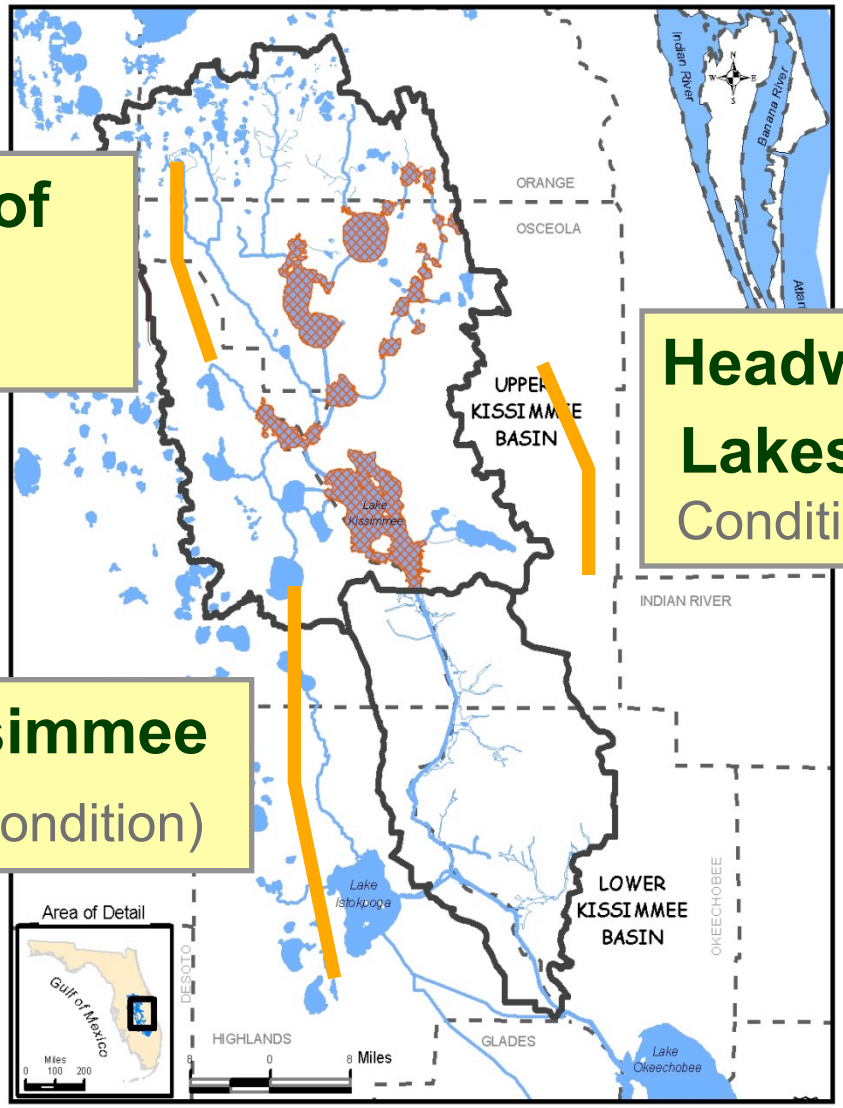
Foundational Assumptions of the Kissimmee Basin Water Reservations

Upper Chain of Lakes (Current Condition)

Headwaters Lakes (Future Condition)

Restored Kissimmee River (Future Condition)



sfwmd.gov

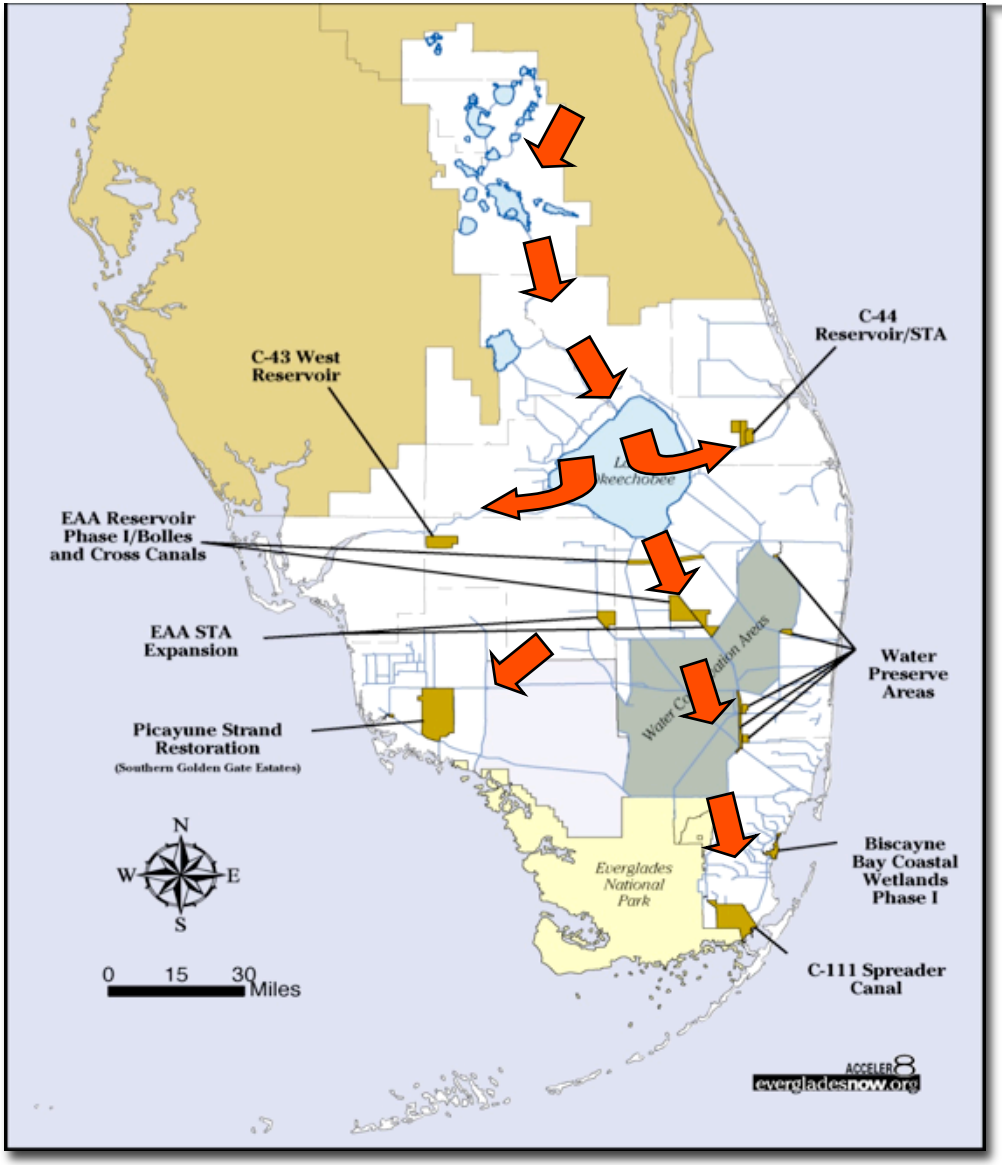
Kissimmee Model Tools

- Mike She/11 from Kissimmee Basin Modeling and Operations Study
  - Surface and ground water integrated
  - Evaluates both flows and stages (Daily)
- Well-calibrated and reproducible
- Peer reviewed
- Peer review comments incorporated and undergone a rigorous re-calibration process
- DLT Modeling Sub-committee involvement since conception

With Project Base Conditions

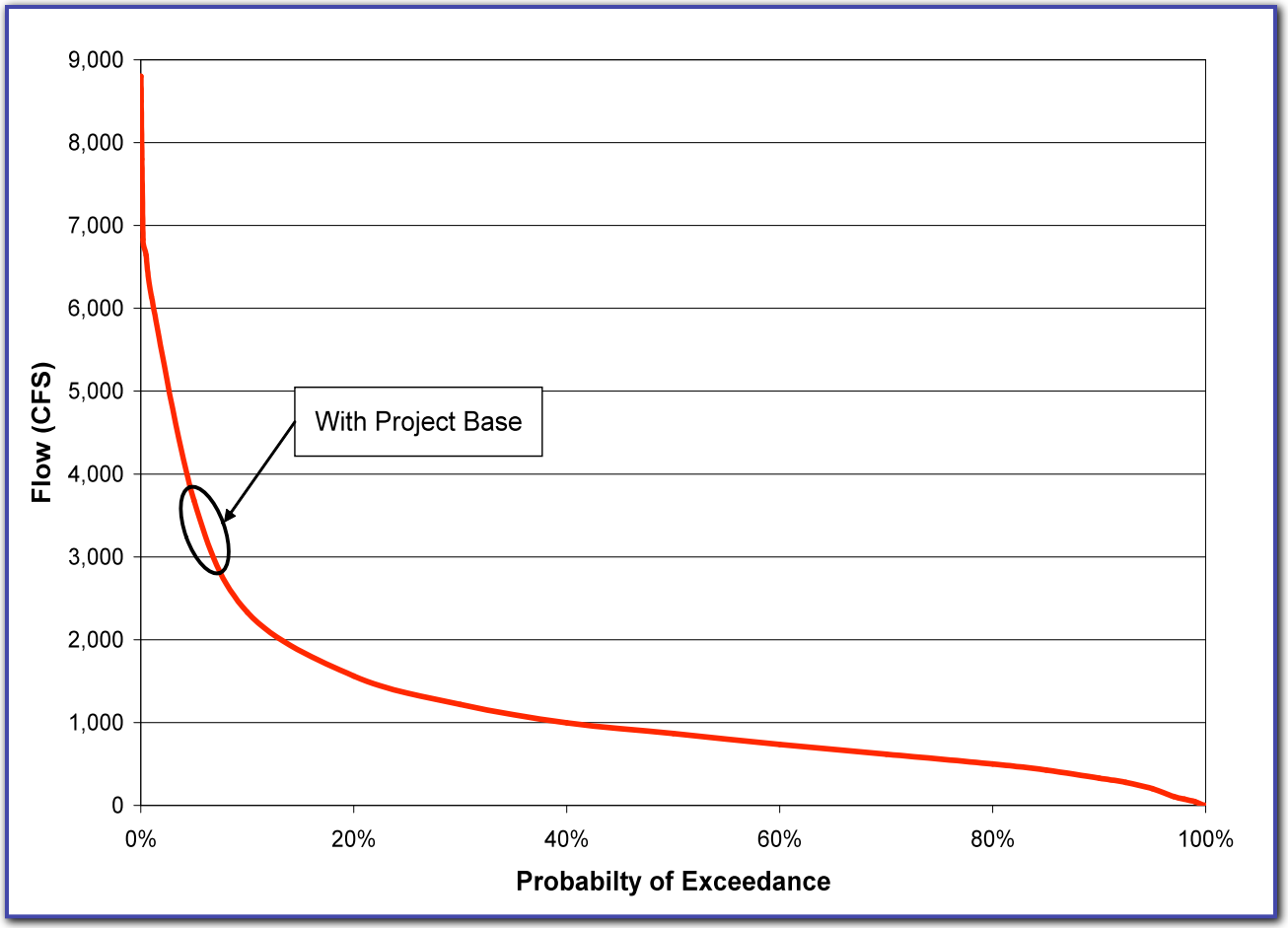
- 41-Year period of simulation (1965 – 2005)
- Historic Rainfall (1965 to 2005)
- Existing Land Use
- Year 2000 Reference Evapotranspiration
- Kissimmee River Restoration
  - Features Headwater Revitalization
  - Backfilled C-38 Canal
  - Restored Condition Infrastructure
- Existing Permitted Surface Water and Groundwater Uses as of August 2008

CERP Considerations

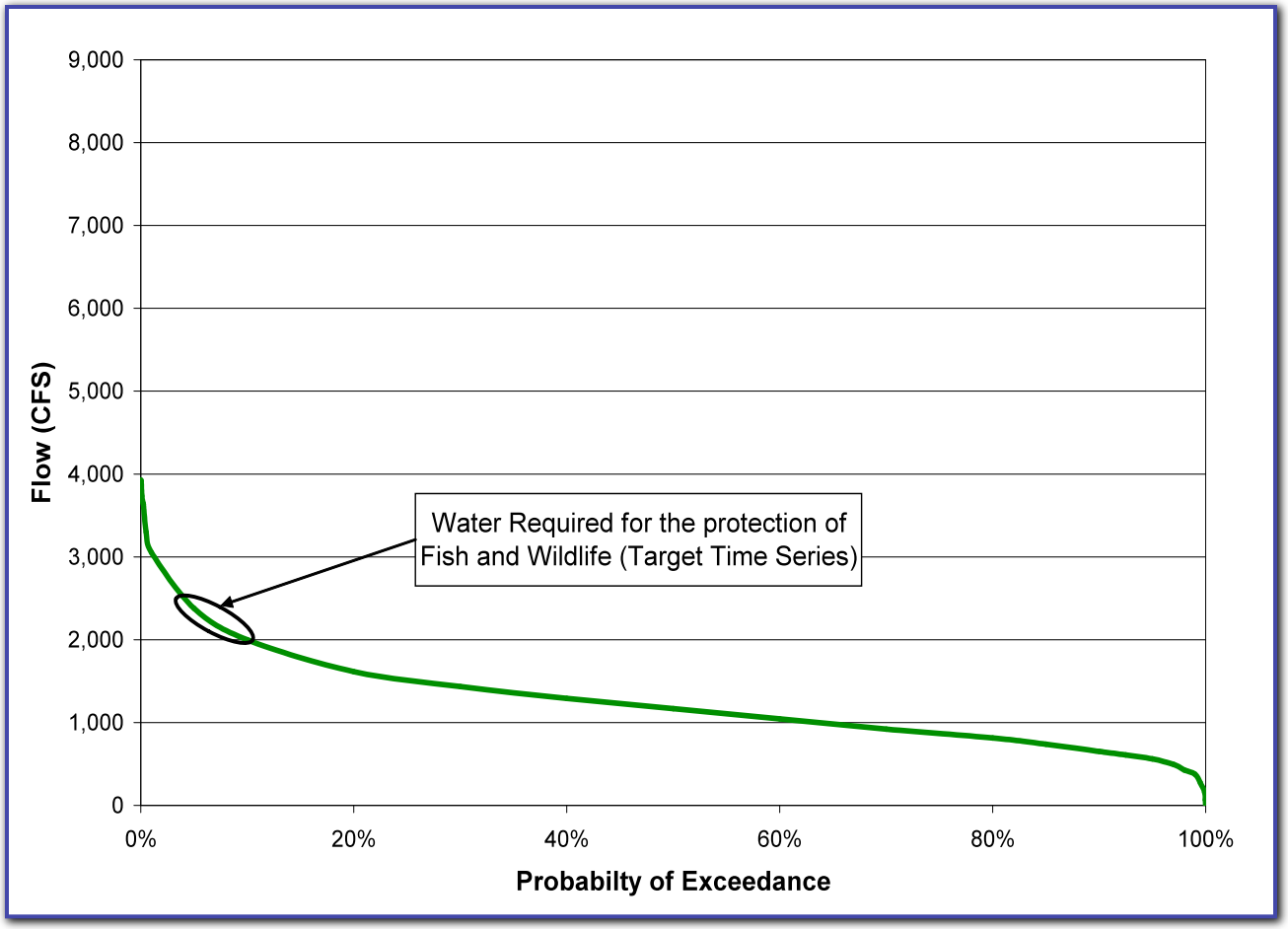


- Kissimmee River presumed to be a foundation project with flow available to CERP
- Reserving water protects water for CERP projects

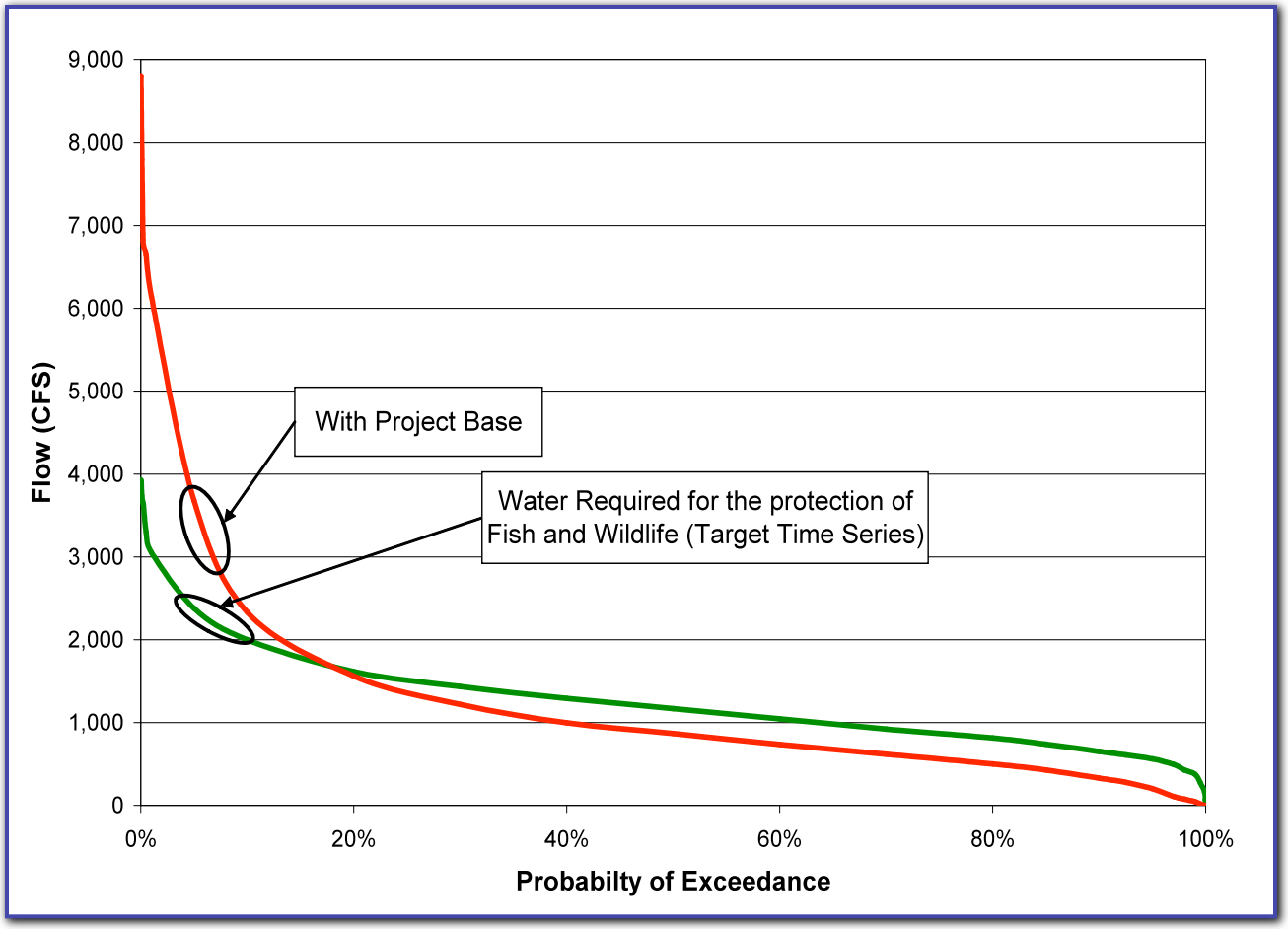
With Project Base Flow Probability Curve



Water Required for the Protection of Fish and Wildlife Probability Curve



Calculation of the Reservation Time Series



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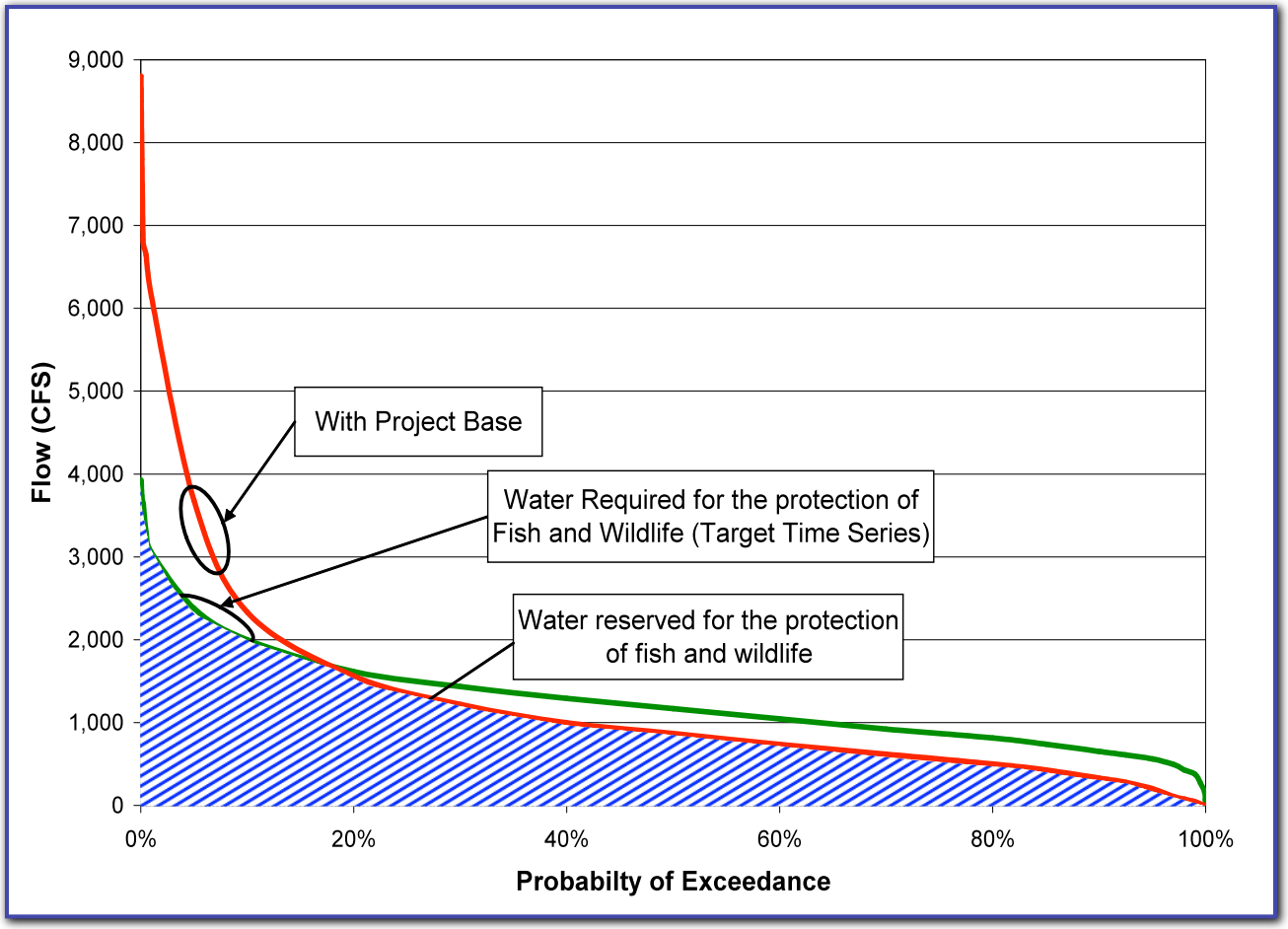

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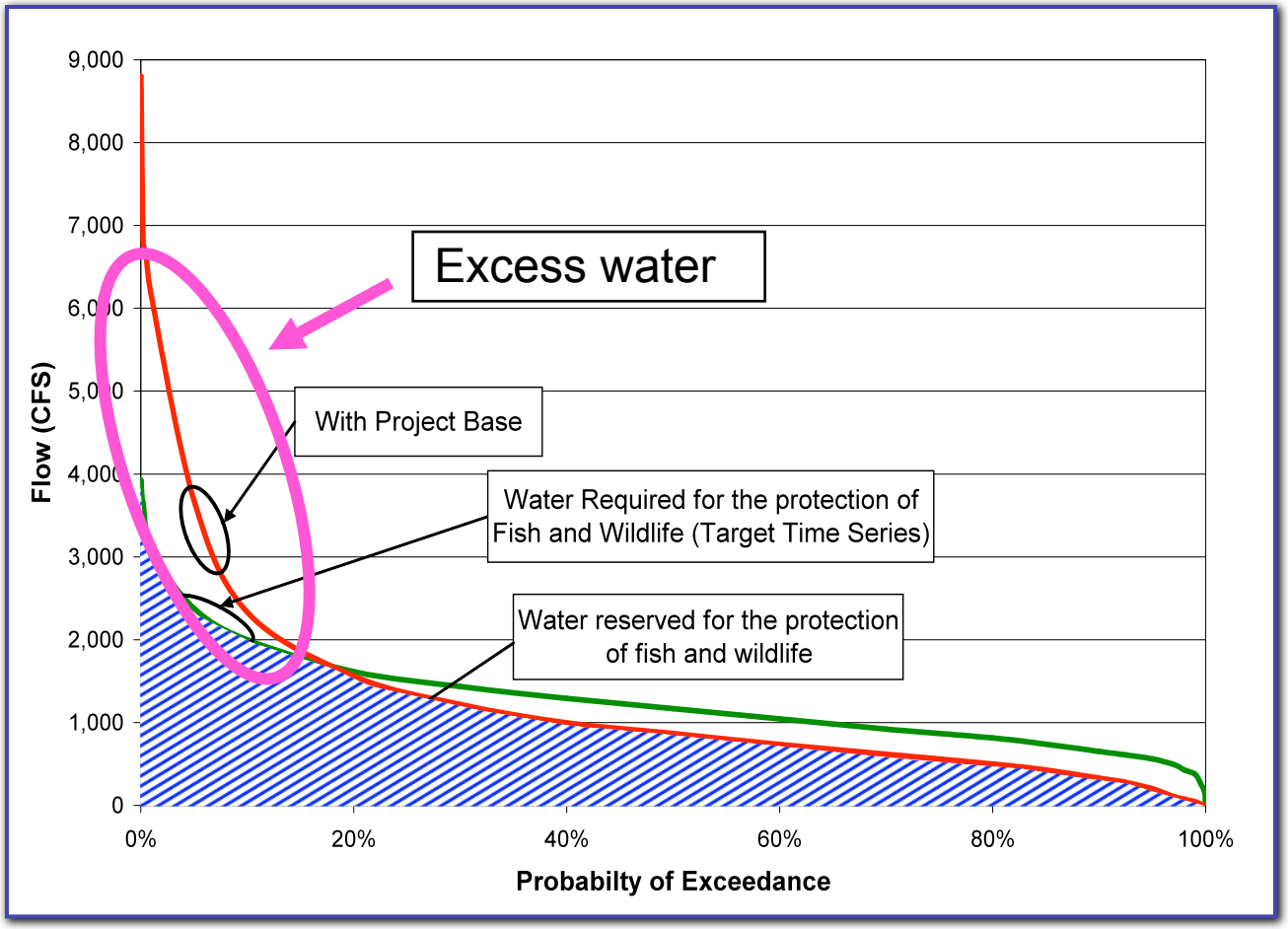
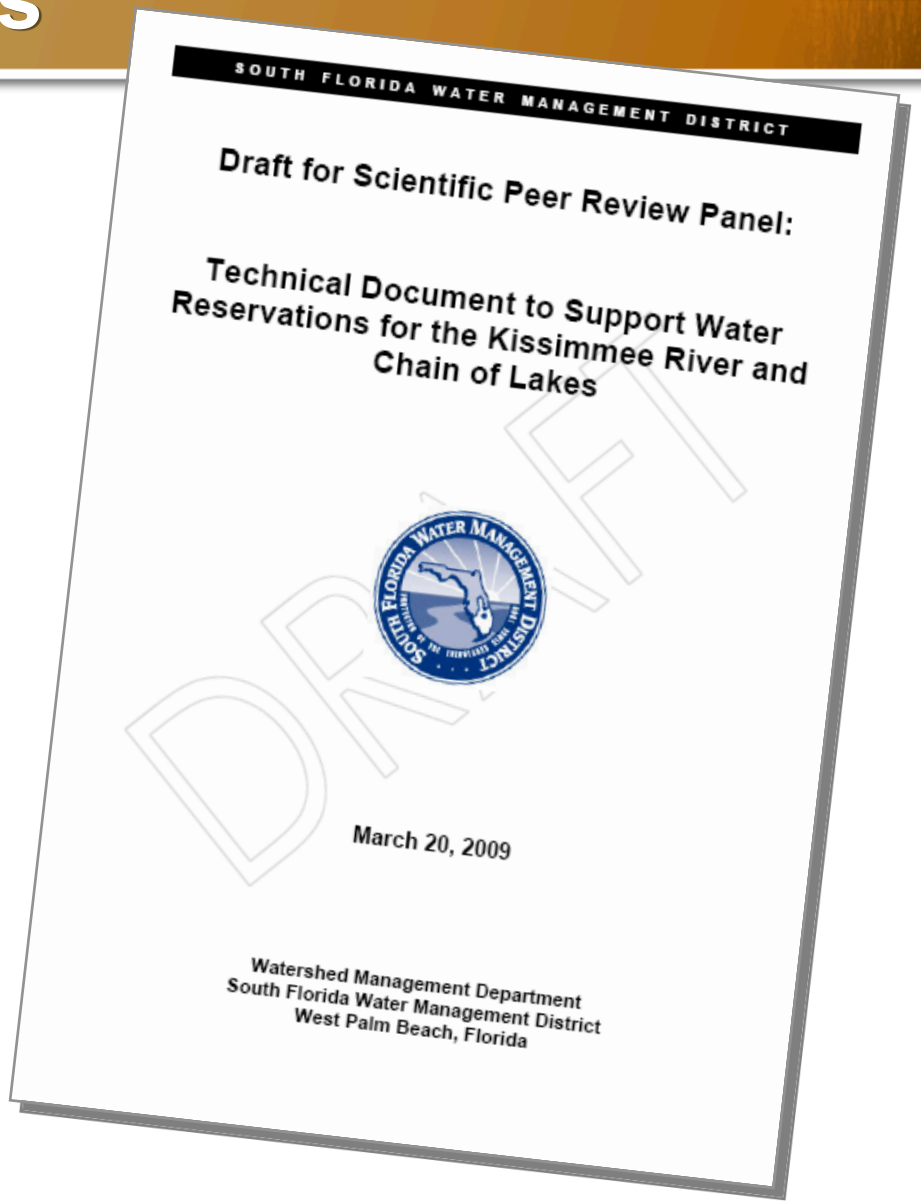


Technical Document to Support Water Reservations



Scientific Peer Review

- Conducted peer review to review all data, methodologies, analyses, and assumptions
- 5 nationally recognized experts representing:
  - Avian ecology
  - Aquatic vegetation / wetland ecology
  - Water resource engineering / modeling
  - Fisheries / limnology
  - Stream ecology

Scientific Peer Review

- Peer Review Panel's Findings:
  - Modeling sound
  - Biologic linkages to hydrology sound
    - Broadleaf marsh is appropriate surrogate
    - Lake littoral vegetation is appropriate surrogate
  - Approach to defining water for protection of fish and wildlife (performance measures) sound
  - "Above the bar"


Thank You