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Tools to Evaluate the Effects of Climate Change in CERP

Committee on Independent Scientific Review of Everglades Restoration Progress (CISRERP)

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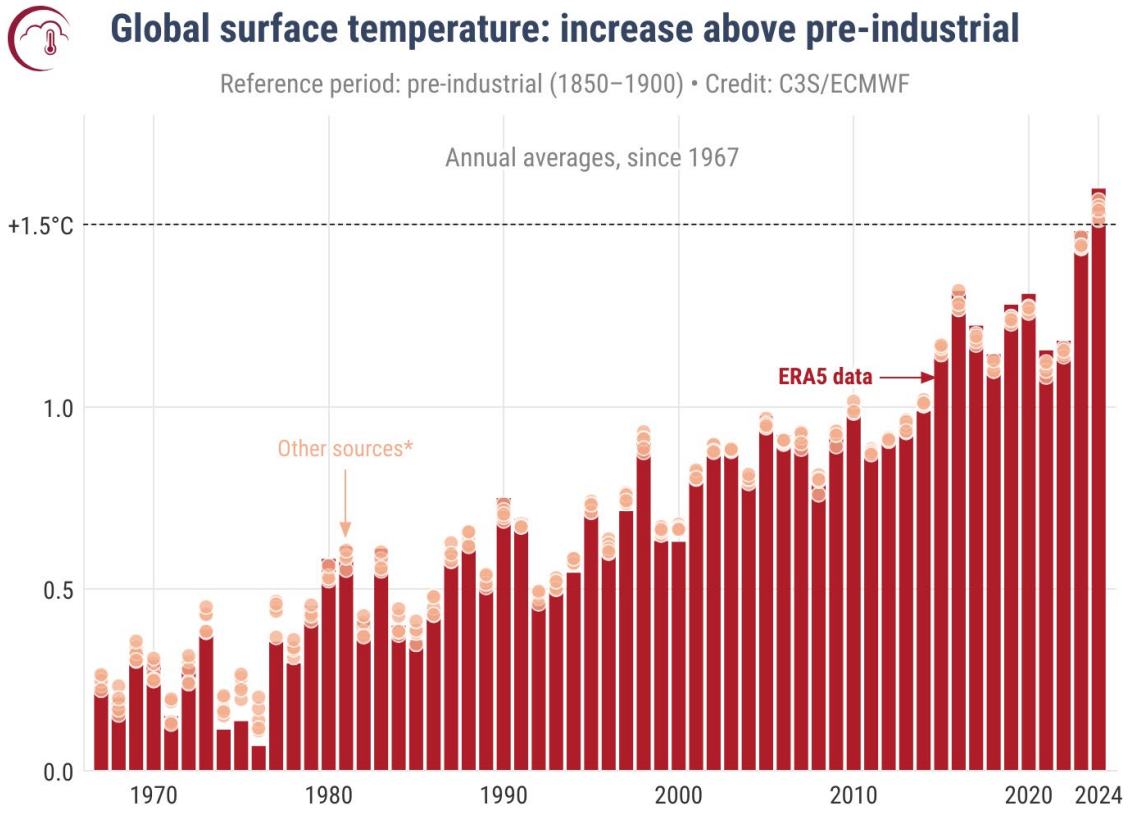
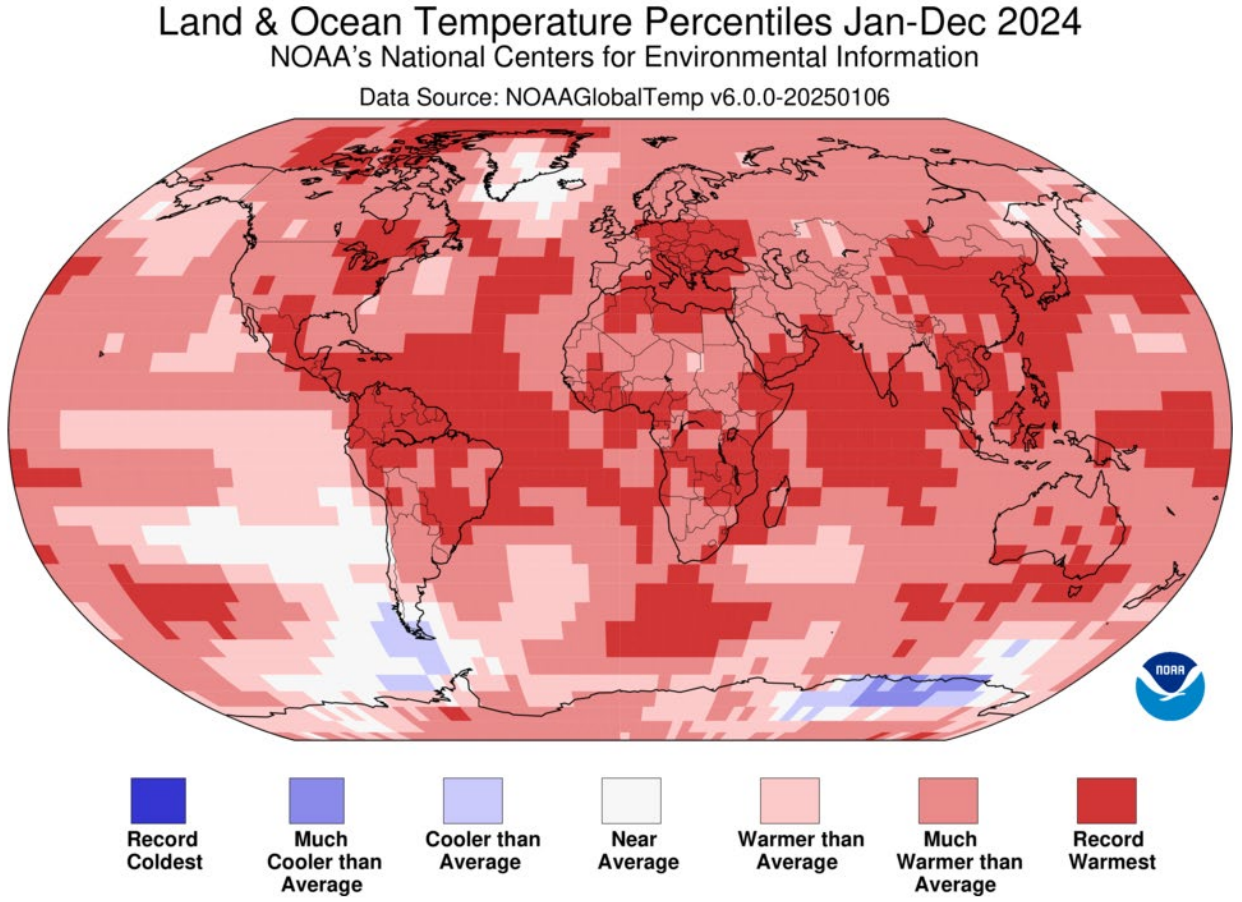
Need for climate change planning in CERP:

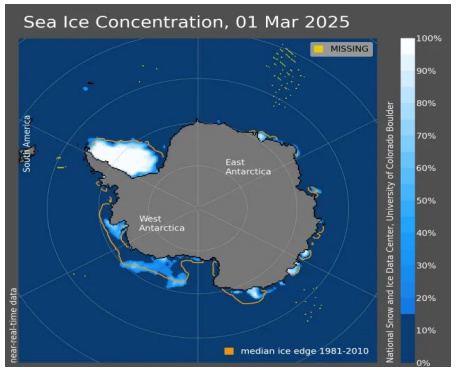
Increase in global temperature

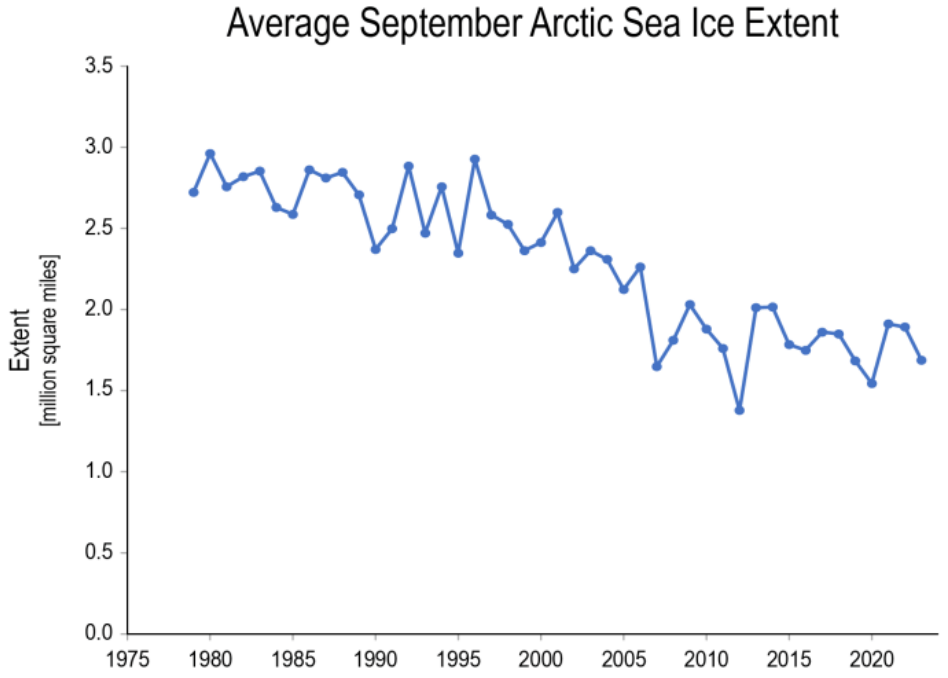


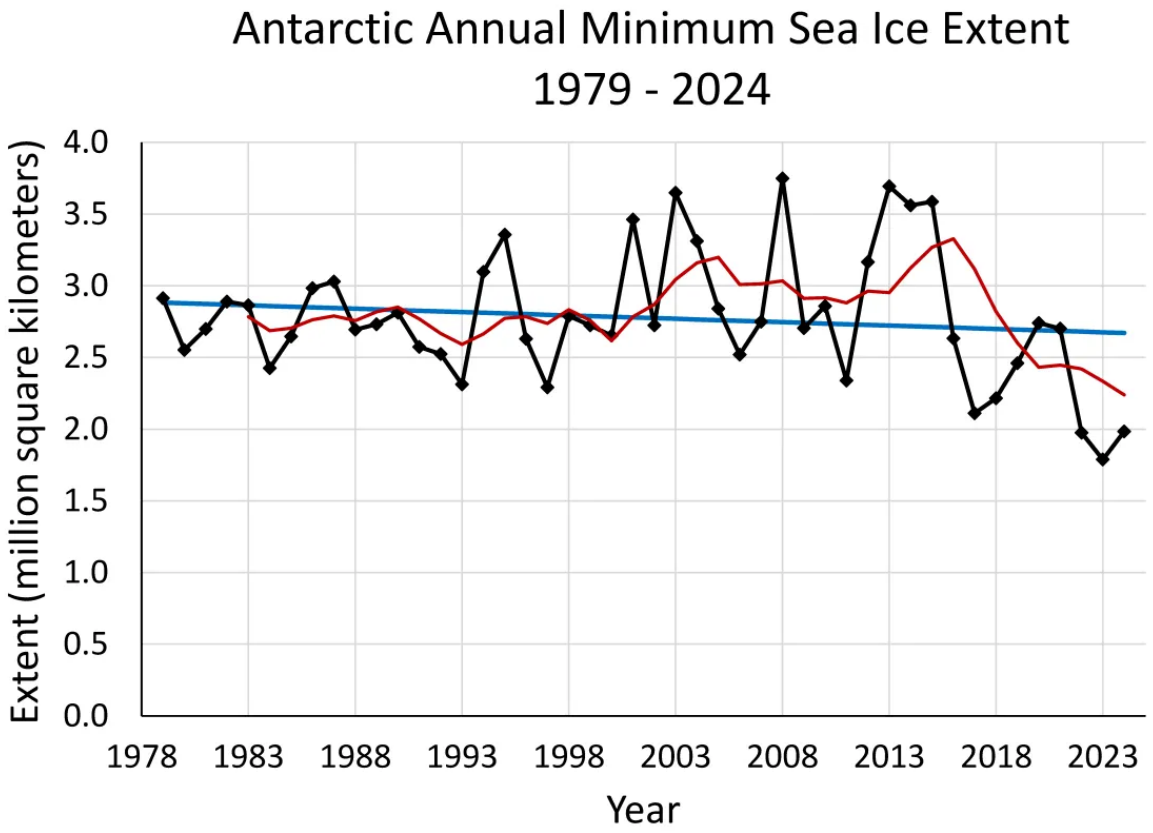


Need for climate change planning in CERP:

Reduction in sea ice



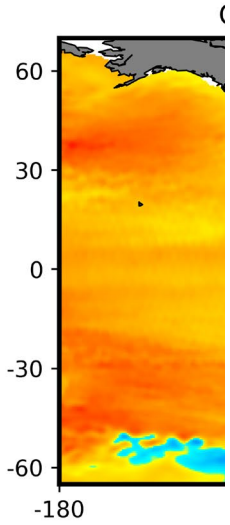


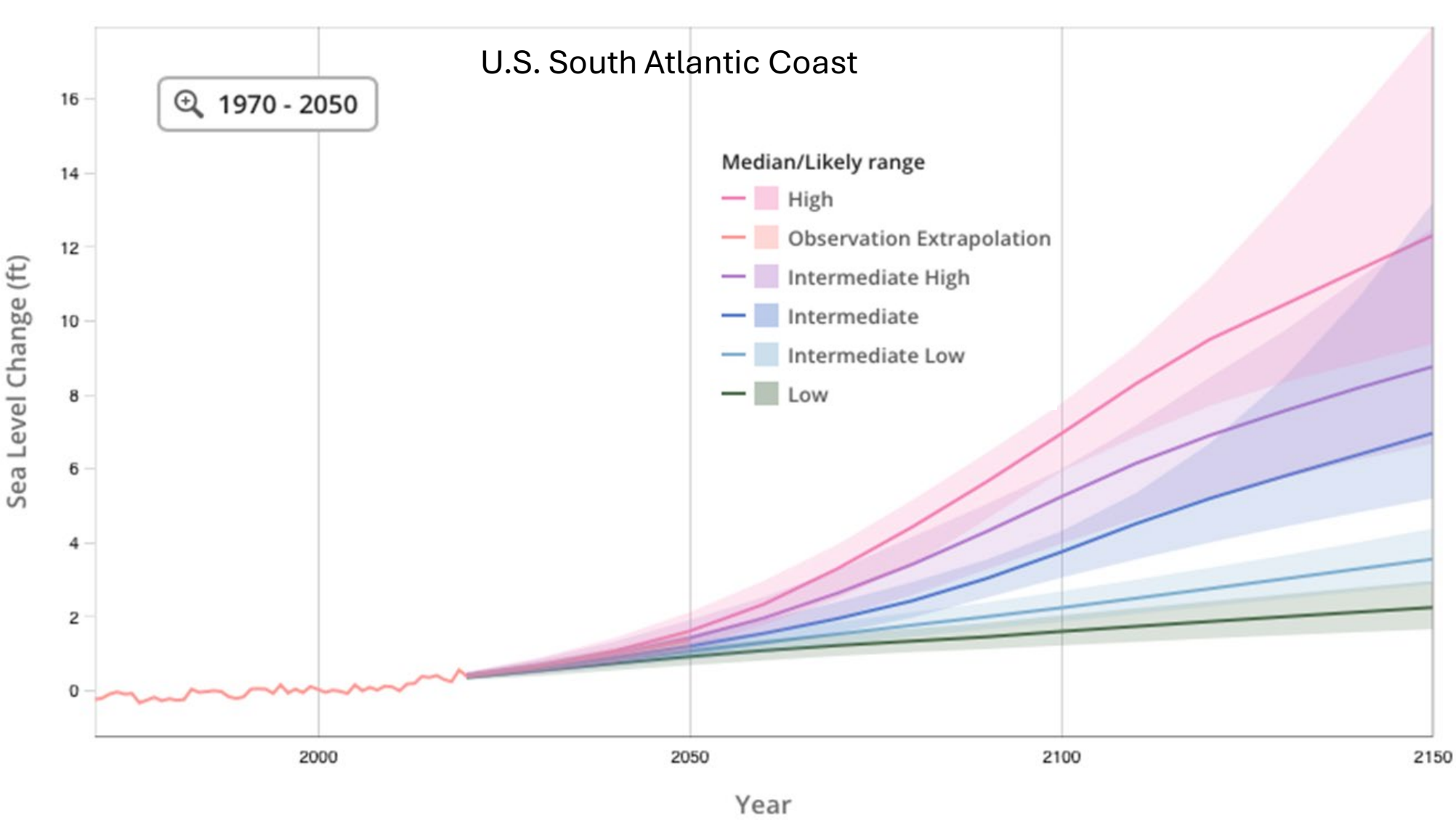


Credit: National Snow and Ice Data Center

Need for climate change planning in CERP:

Sea-level rise





Data source: Sa

Need for climate change planning in CERP:

Changes in Precipitation

Extreme precipitation events

Hollywood, Florida, just north of Miami, on Wednesday, June 12. Photo: Joe Raedle/Getty Images

Everglades summer thunderstorm. Photo: NPS.

Potential consequences of climate change on CERP

Modify hydrologic processes

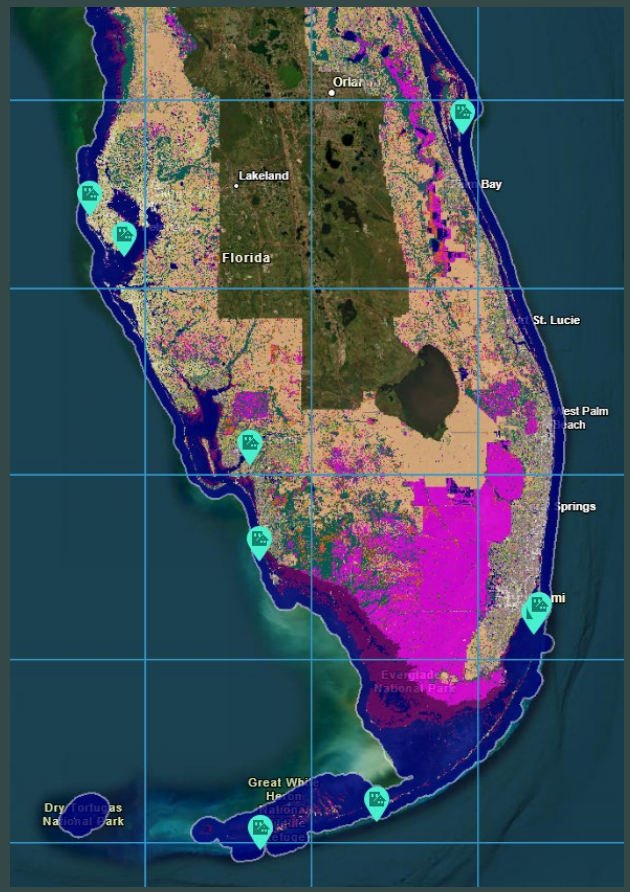
- Wetter or drier than predicted or planned for

Changes in ecosystem extent and productivity

Changes in species abundances

Salt-water intrusion

Peat collapse



Opportunities to incorporate climate change into CERP: Tools

1. Temperature and precipitation scenarios
2. Dynamic sediment accretion modeling for sea-level rise effects
3. Climate considerations in ecological models
4. System operating manual updates in light of climate change as a form of adaptive management

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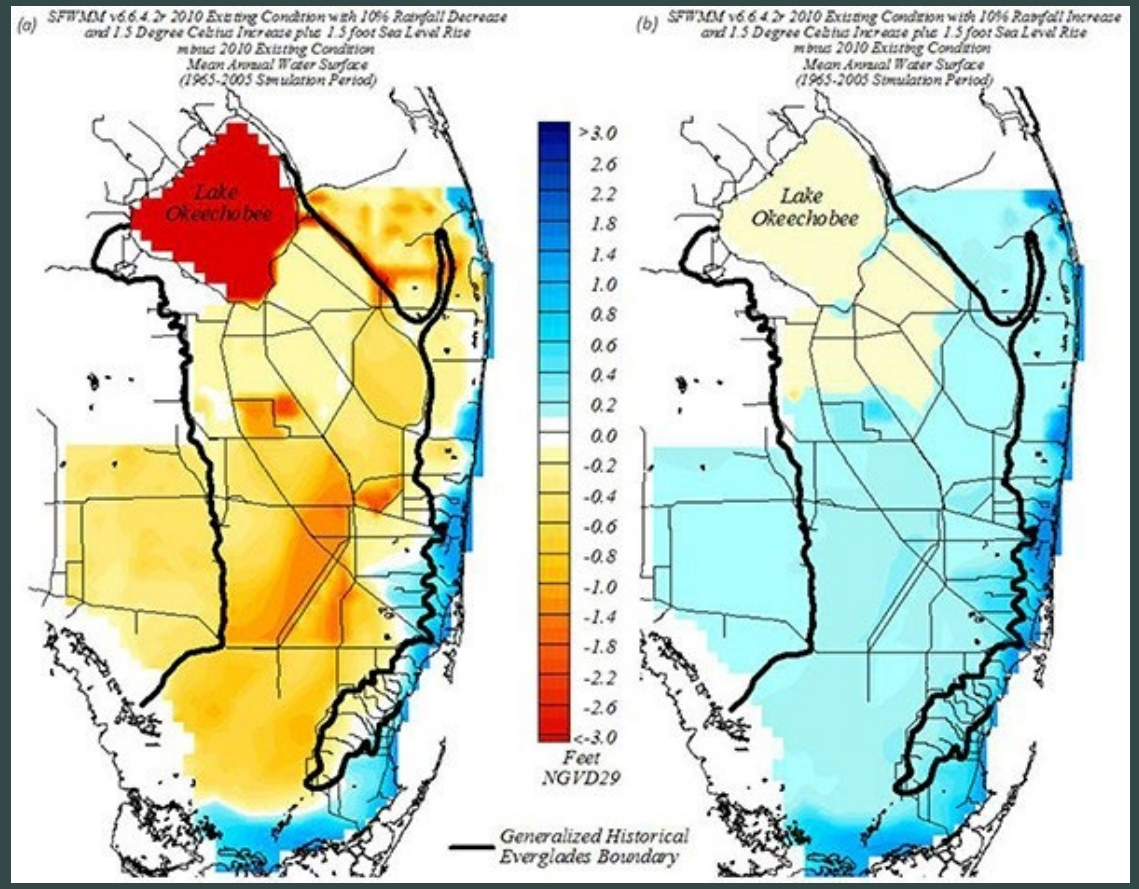
Climate scenarios for restoration planning and management

Examples

- Scenarios from latest climate models (GCM) – e.g., duration and frequencies of storm events
- Future rainfall change factors
- "Climate stress testing"



Source: J. Obeysekera, SFWMD, pers. comm. 2014

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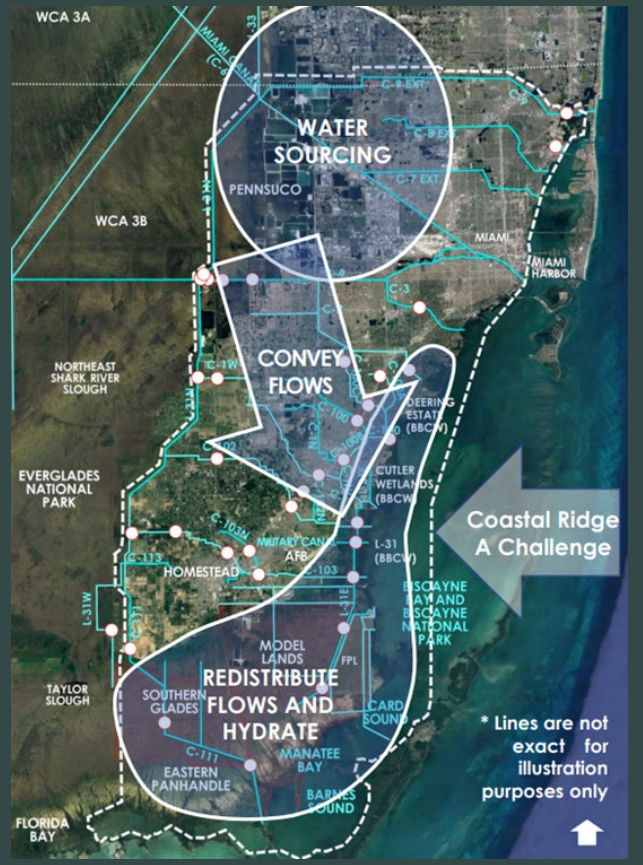
Sediment accretion modeling for restoration decision making in light of sea-level rise

Biscayne Bay and Southern Everglades Restoration (BBSEER)

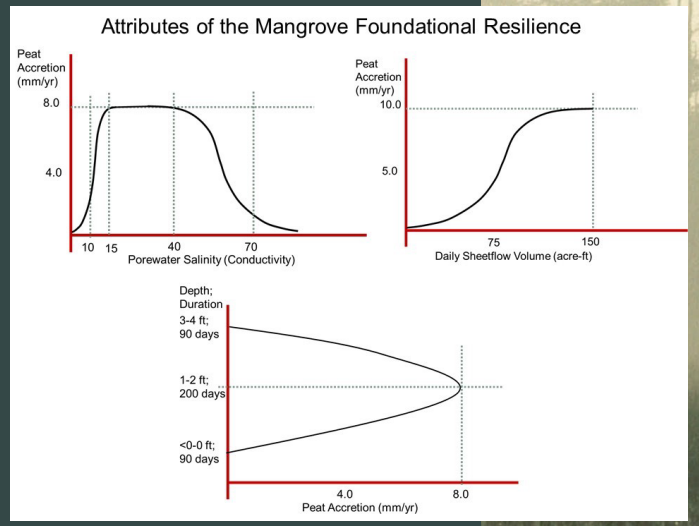
- Enhanced accretion rate in coastal ecosystems

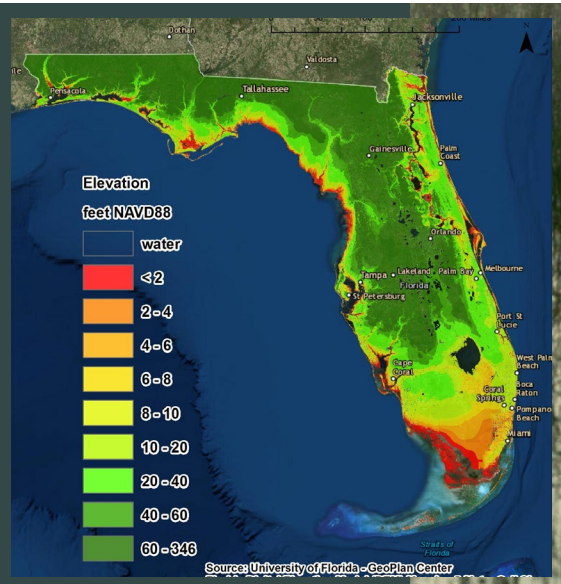
Build upon existing approximated models:

- Current measured accretion rates
- Current DEM, integrated model inputs of hydrology and salinity, and SLR
- Calibration using field data and literature values



Source: USACE and SFWMD, 2023b





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Models for assessing ecological responses to climate change

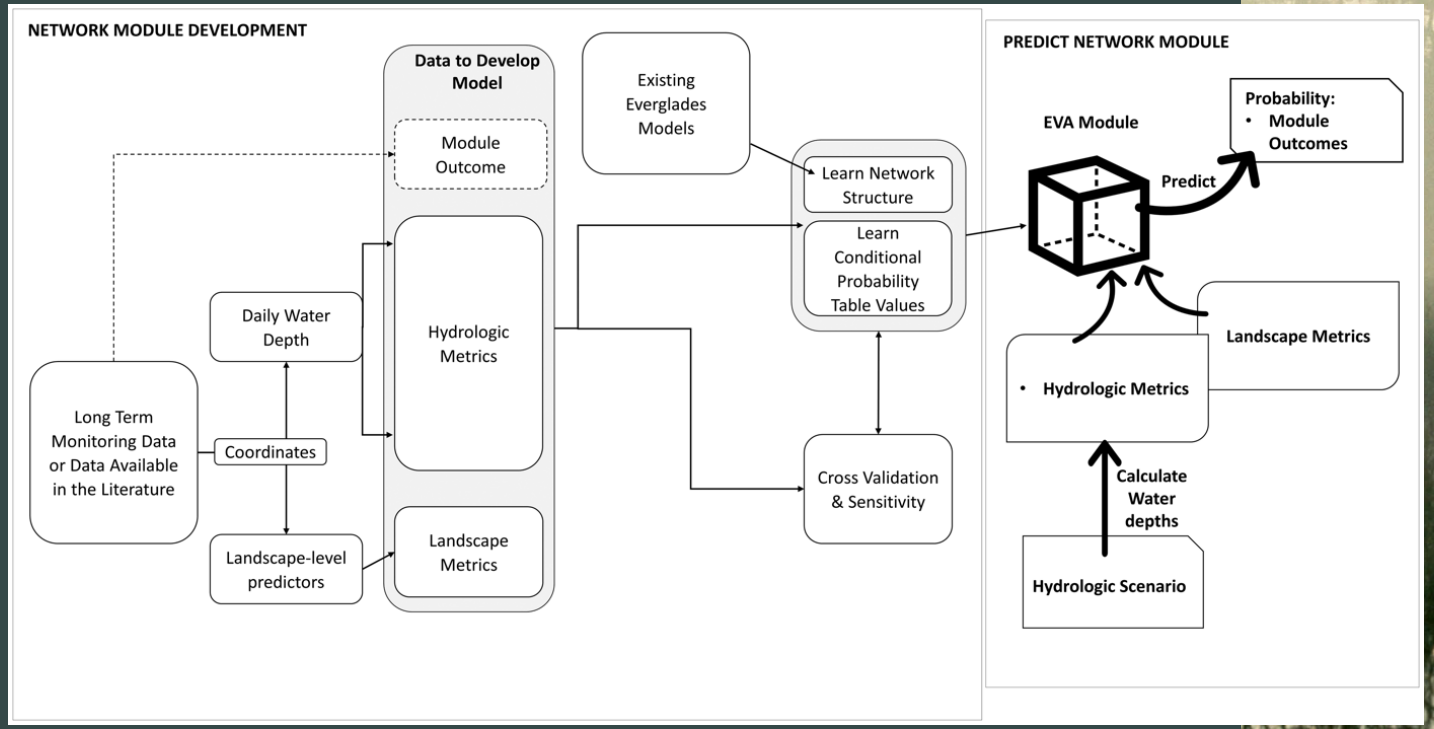
Joint Ecosystem Modeling (JEM) can incorporate climate change impacts

A focus on increased temperature on Everglades biota

Mechanistic niche models with species distribution models

Monitoring and field data to support models

Integration – EVA framework



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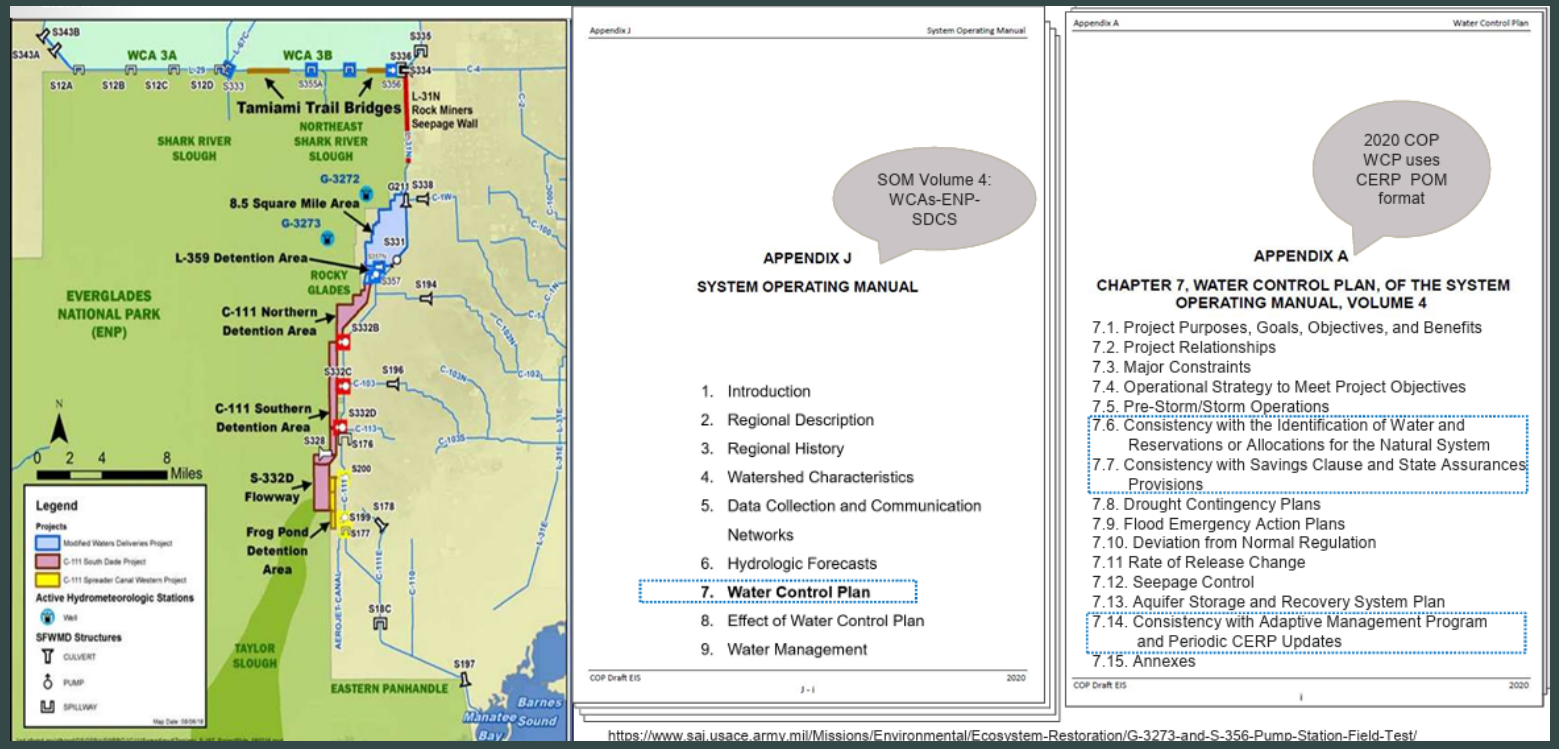
Application of climate tools for adaptation of operations

Regular updates to System Operating Manuals and other operational plans



https://www.saj.usace.army.mil/Missions/Environmental/Ecosystem-Restoration/G-3273-and-S-356-Pump-Station-Field-Test/

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Conclusions

- A strategy to understand the impacts of climate change with a **curated set of scenarios** used consistently across planning and restoration implementation
- A dynamic model that predicts coastal wetland elevations through time informed by empirical data to provide accurate predictions of coastal restoration outcomes and guide investment decisions
- Existing ecological models used to a greater extent and further developed to anticipate the effects of climate change, including temperature, on the wildlife indicators of Everglades restoration success
- A more cohesive integration of ecological and physical modeling and monitoring that draws together existing data, models, and efforts to understand and mitigate the effects of climate change
- Regular revisions to the System Operating Manuals and other operational plans

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