Use of open science to inform restoration projects in estuaries: A Tampa Bay example

Marcus W. Beck[1], Ed Sherwood, Kirsten Dorans, Jessica Renee Henkel, Kathryn Ireland, Patricia Varela

[1]Southern California Coastal Water Research Project, Costa Mesa, CA
marcusb@sccwrp.org, Phone: 714-755-3217

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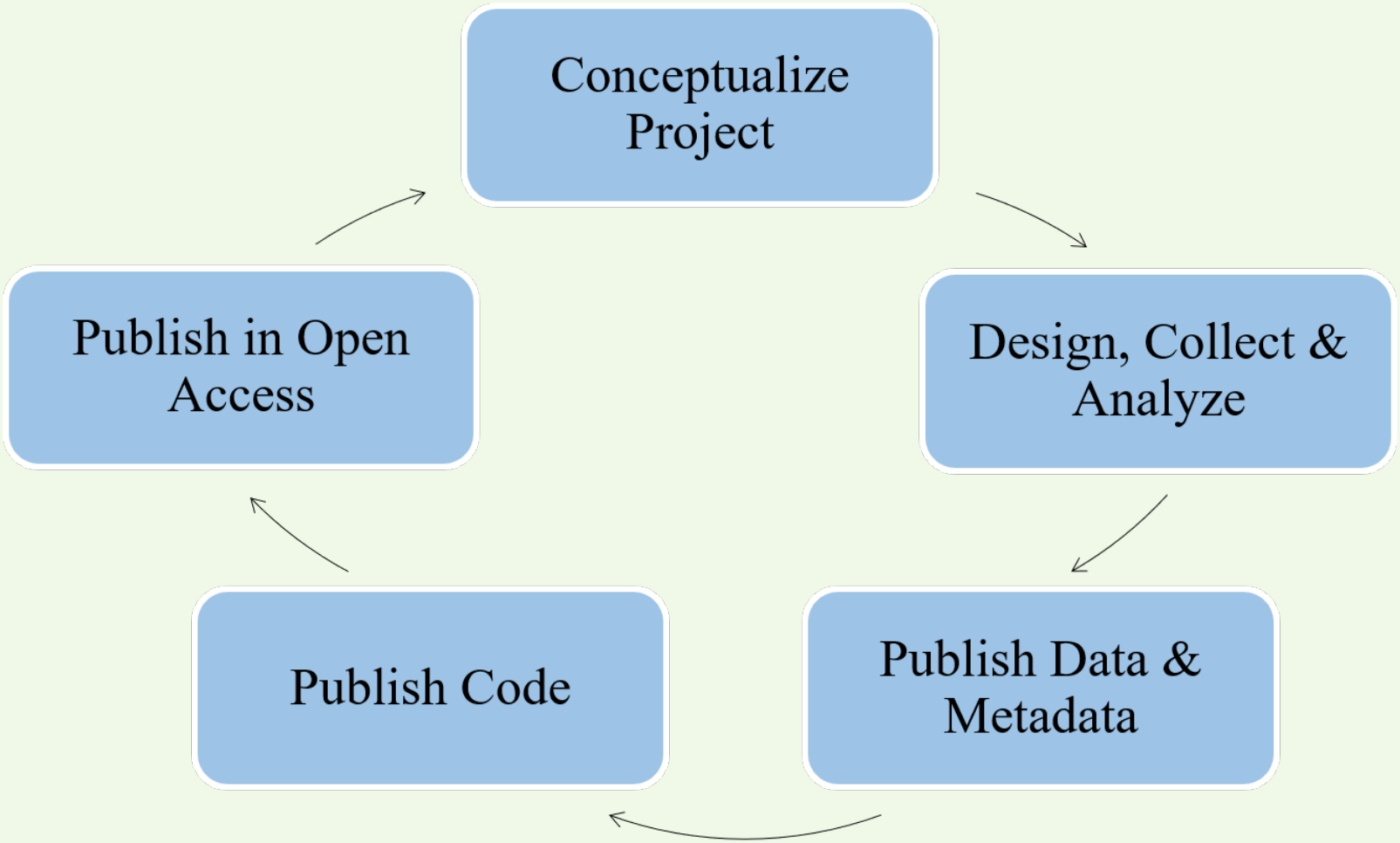
Open science workflow



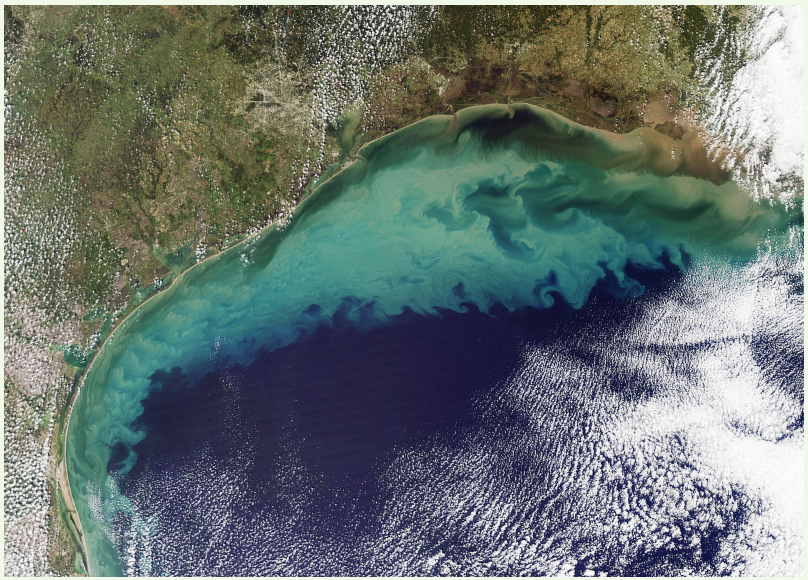
Modified from Hampton et al. 2015. The Tao of open science for ecology. Ecosphere 6(7):1-13.

Final thoughts

Open Science for Synthesis: Gulf Research Program

July 10 - July 28, 2017
NCEAS, Santa Barbara, CA

NCEAS
National Center for Ecological Analysis and Synthesis



Open science workflow

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`https://nceas.github.io/oss-2017/lessons.html`

- Collaboration modes and technologies, virtual collaboration
- Data management, preservation, and sharing
- Data manipulation, integration, and exploration
- Scientific workflows and reproducible research
- Programming using agile and sustainable software practices
- Data analysis and modeling
- Communicating results to broad communities

Today's talk

Our experience using the open science workflow to inform restoration projects in estuaries

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- ***Develop*** a Bayesian Decision Network with empirical observations to evaluate likelihood of potential outcomes

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Can we use disparate data to prioritize future restoration projects aimed at improving water quality?

- ***Synthesize*** data in space and time to evaluate cumulative effects of restoration projects
- ***Develop*** a Bayesian Decision Network with empirical observations to evaluate likelihood of potential outcomes
- ***Apply*** the Decision Network to guide expectations for future restoration projects

Tampa Bay - from gross to less gross

Past:

- Mid-1970s N load 8.2×10^6 yr^{-1} [Greening and Janicki, 2006]
- Elevated chl-a concentrations
- Increased occurrence of HABs

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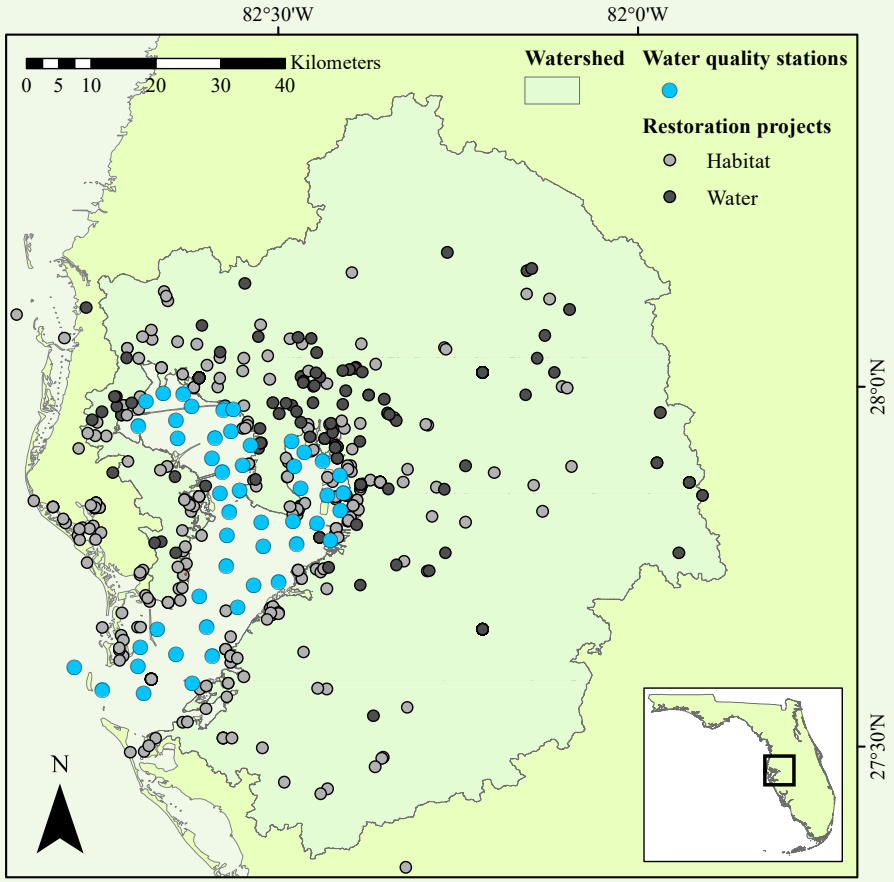
Present:

- 2016 seagrass at 17k ha [Sherwood et al., 2017]
- Reductions in nutrient load, chlorophyll
- Increase in water clarity [Morrison et al., 2006, Beck et al., 2017]

Tampa Bay - open data sources



- *Water quality* monitoring dataset - 1974 to present, 500 obs. per site

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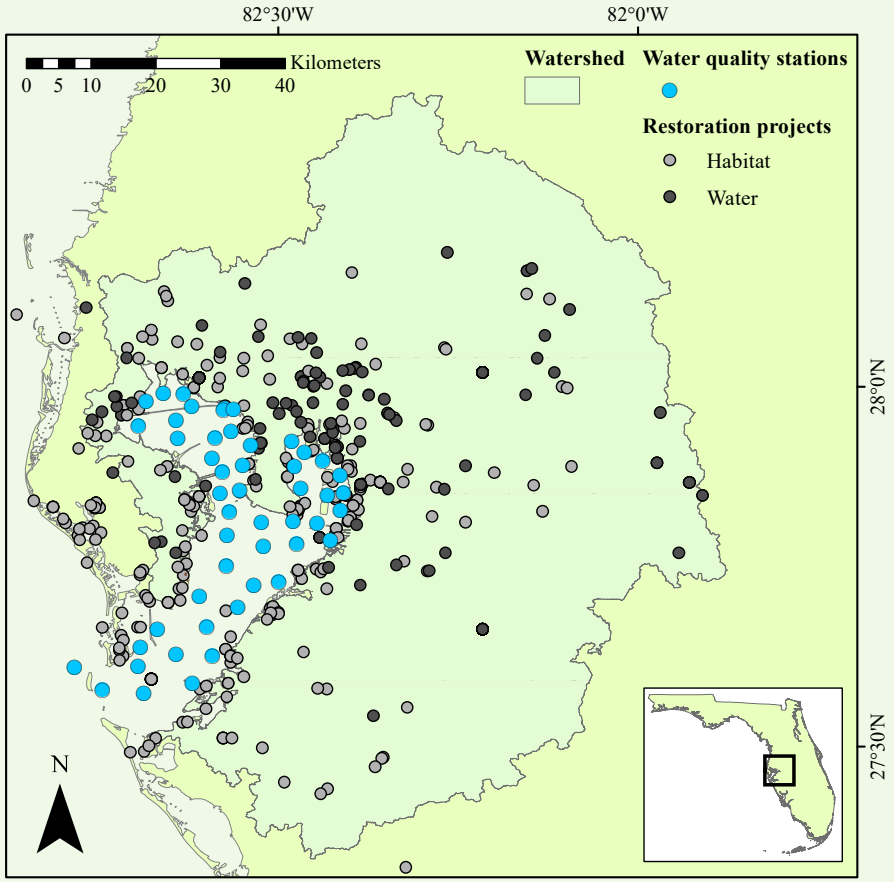

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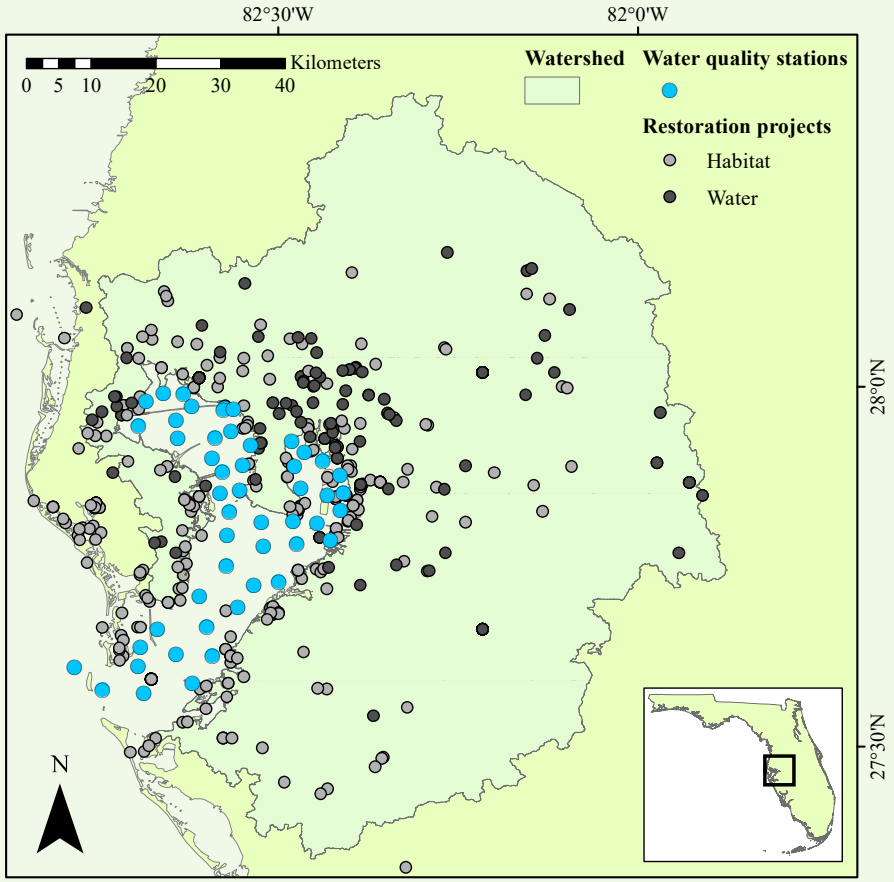

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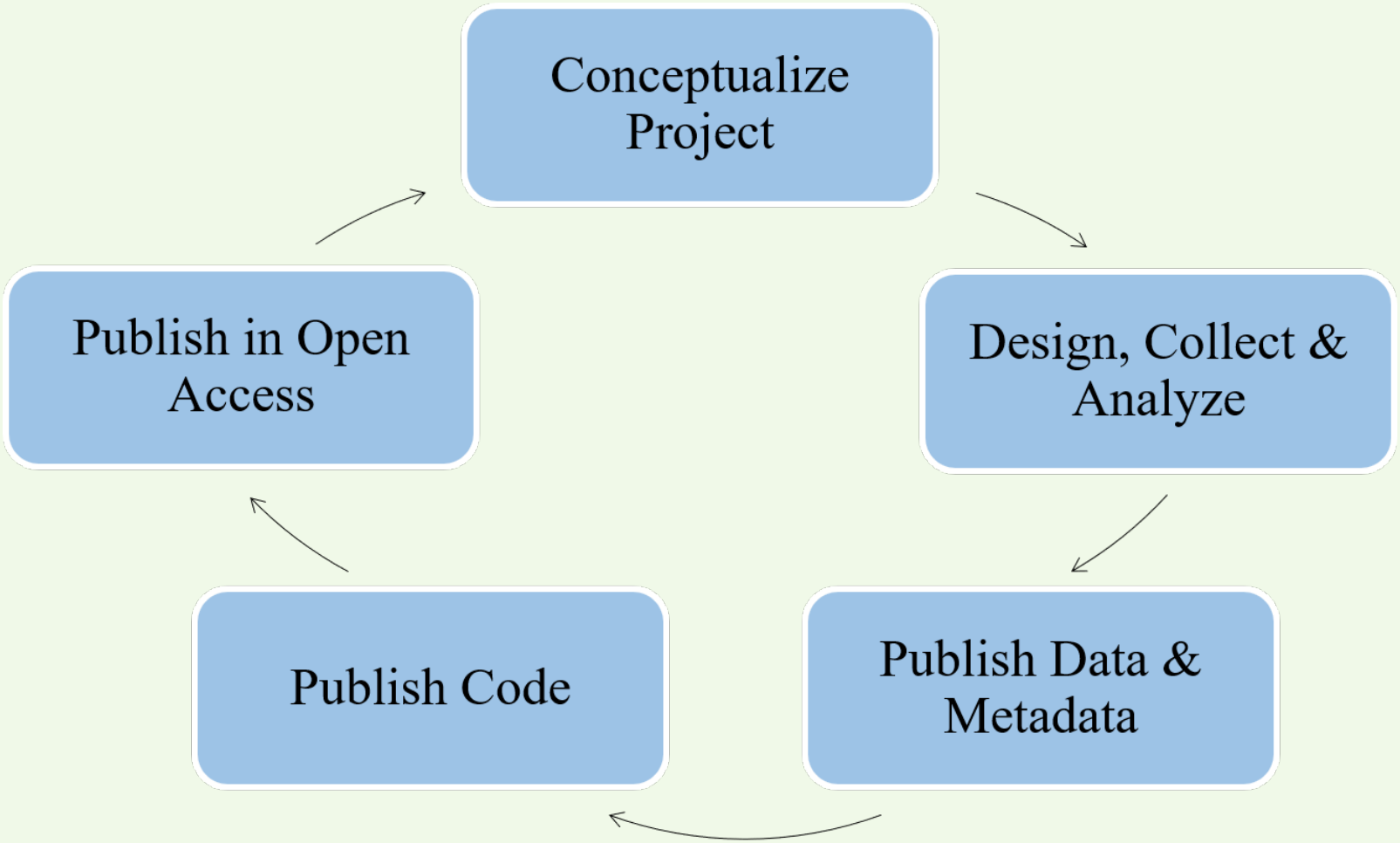
Despite considerable ***investments*** in restoration, ***effectiveness evaluation*** continues to elude practitioners at geographic scales

[Diefenderfer et al., 2016]

Data munging with open source tools

Empirical relationship fed into decision support tool

Open science workflow



Modified from [Hampton et al., 2015]

Open science workflow

What aspects of our project used and benefitted from open science?

- Early idea conception
- Long distance collaboration
- Transparent and reproducible analysis

Teach a scientist to fish...

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