SEPTEMBER 2024

IEP Food Web Synthesis Team

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Delta Stewardship Council

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Department of Water Resources

Delta Science Program

DELTA STEWARDSHIP COUNCIL

Delta ISB Food Webs Review

"An improved mechanistic understanding of food webs is essential for predicting the impacts of biophysical drivers (e.g., climate, flow, nutrients, contaminants, invasive species) and management actions (e.g., habitat restoration) on individual fish species as well as on ecosystems…"

August 31, 2024

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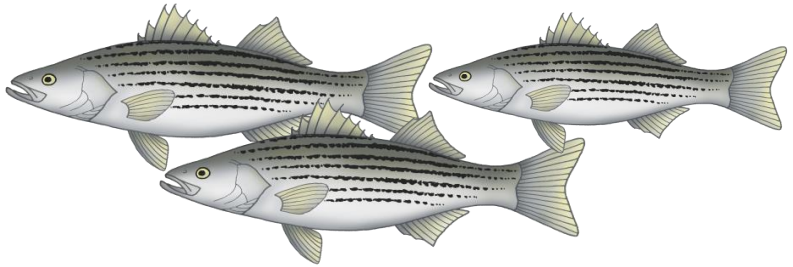
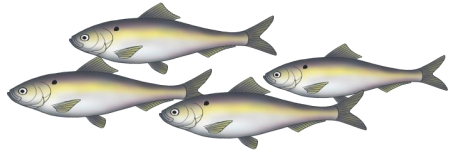
Top-down control

Predator

Prey

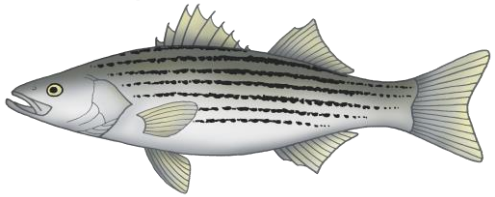
Many predators

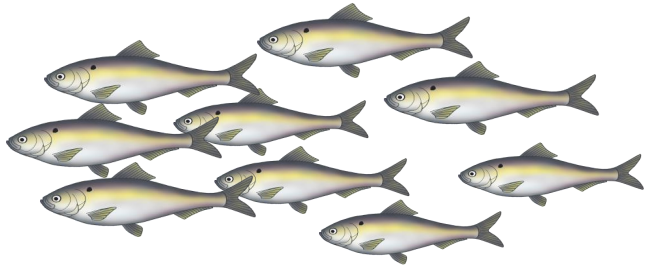




vs.

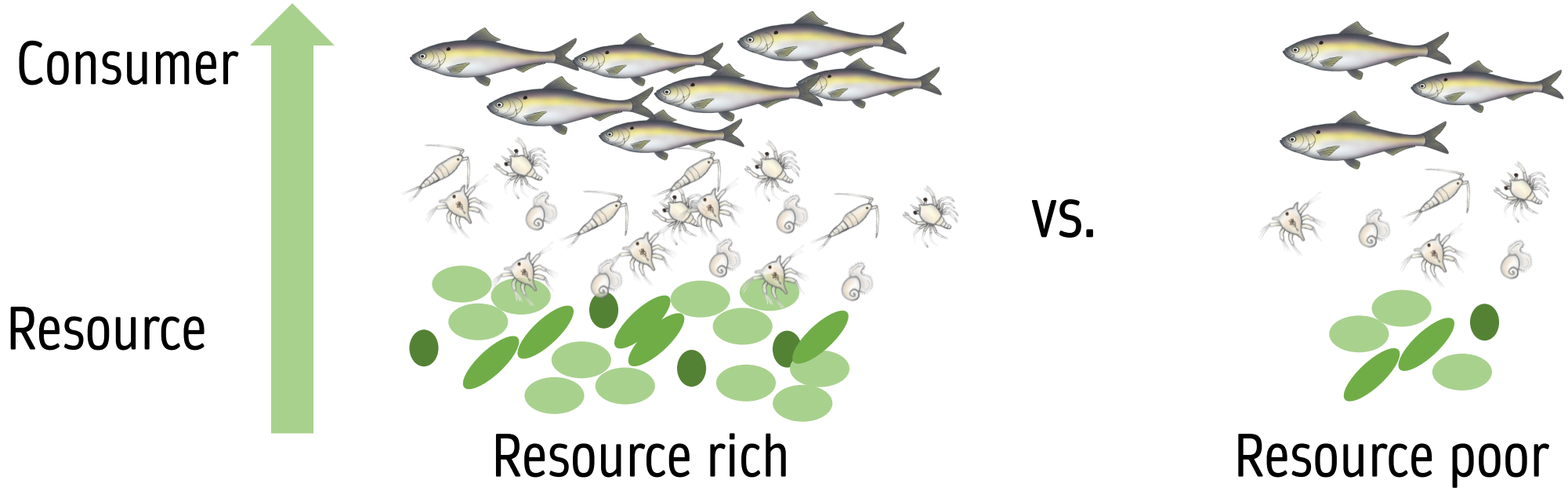
Few predators





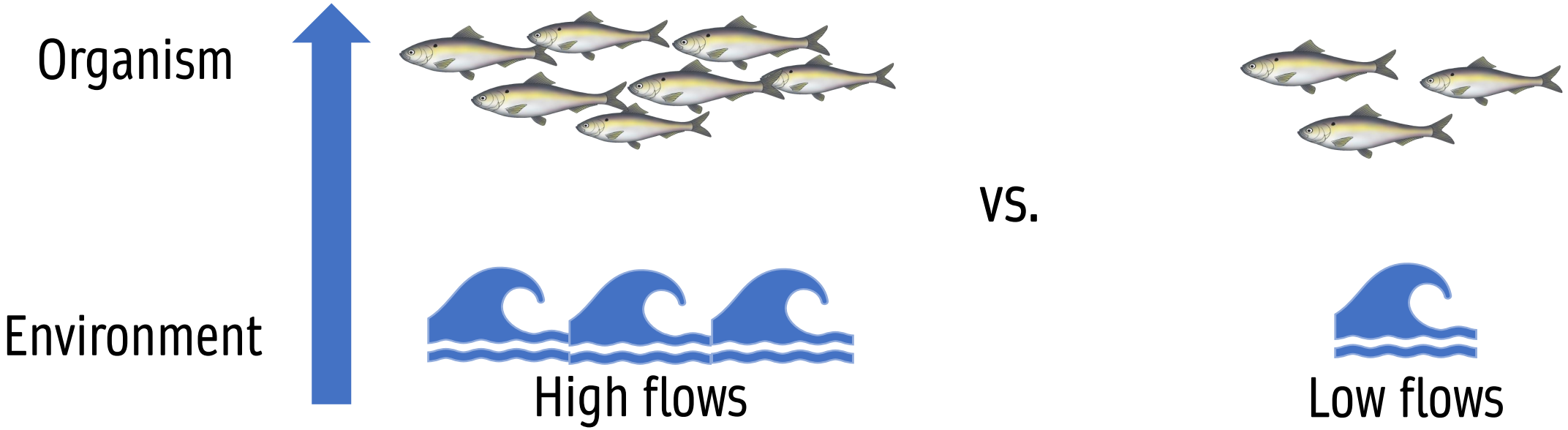
The number of predators controls the number of prey through direct consumption

Bottom-up control



The availability of food resources controls the number of consumers that can eat and survive

Environmental control

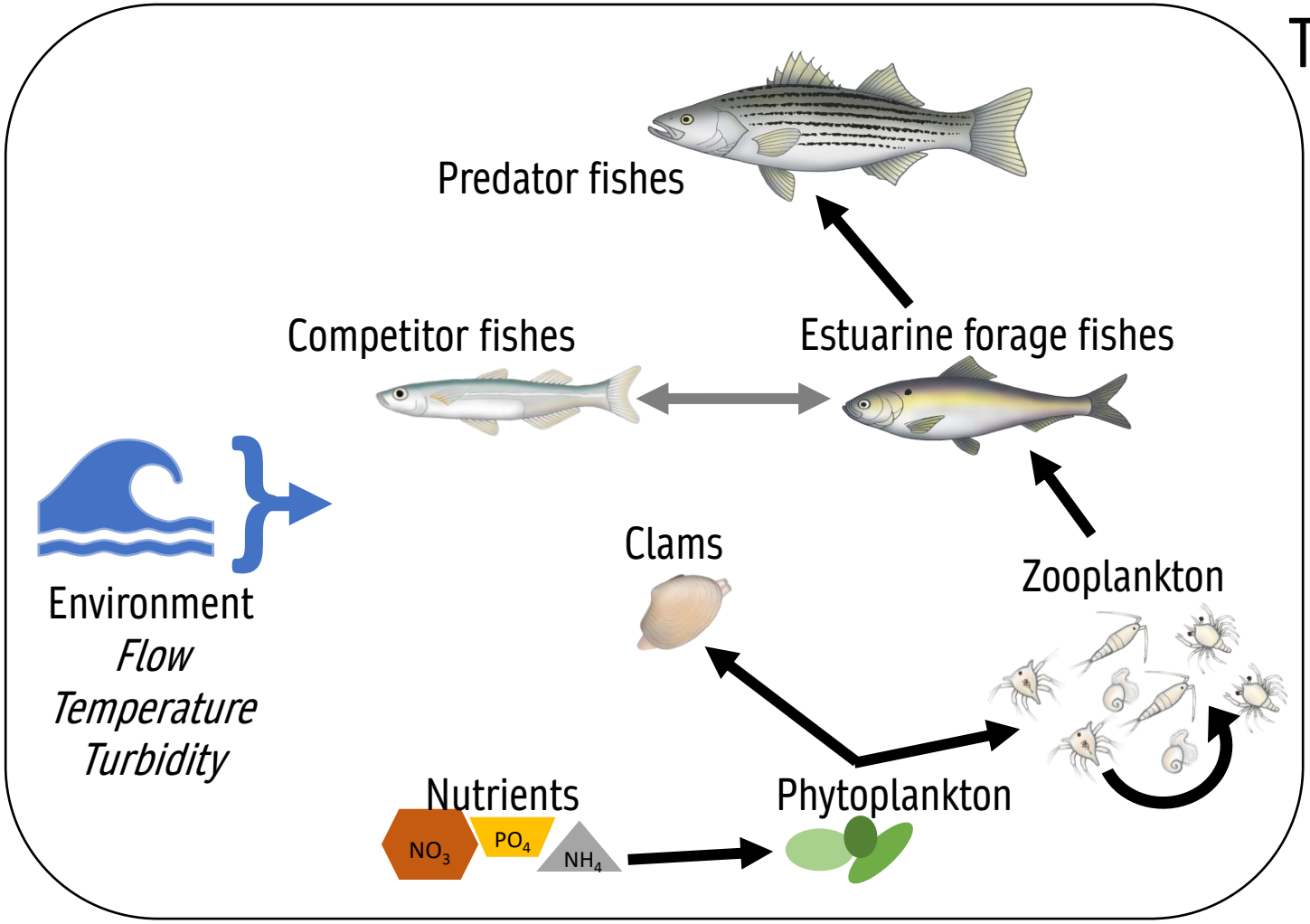


Prevailing environmental conditions directly control the number of organisms based on physiology or behavior

All in one food web model!

Modeled relationships:

- Environment
- Direct interaction
- Other interaction



Hot off the press…

ARTICLE

ECOLOGY
ECOLOGICAL SOCIETY OF AMERICA

Evaluating top-down, bottom-up, and environmental drivers of pelagic food web dynamics along an estuarine gradient

Tanya L. Rogers[1] | Samuel M. Bashevkin[2] | Christina E. Burdi[3] | Denise D. Colombano[4] | Peter N. Dudley[1,5] | Brian Mahardja[6] | Lara Mitchell[7] | Sarah Perry[8] | Parsa Saffarinia[9]

https://doi.org/10.1002/ecy.4274

Food web models in the Delta

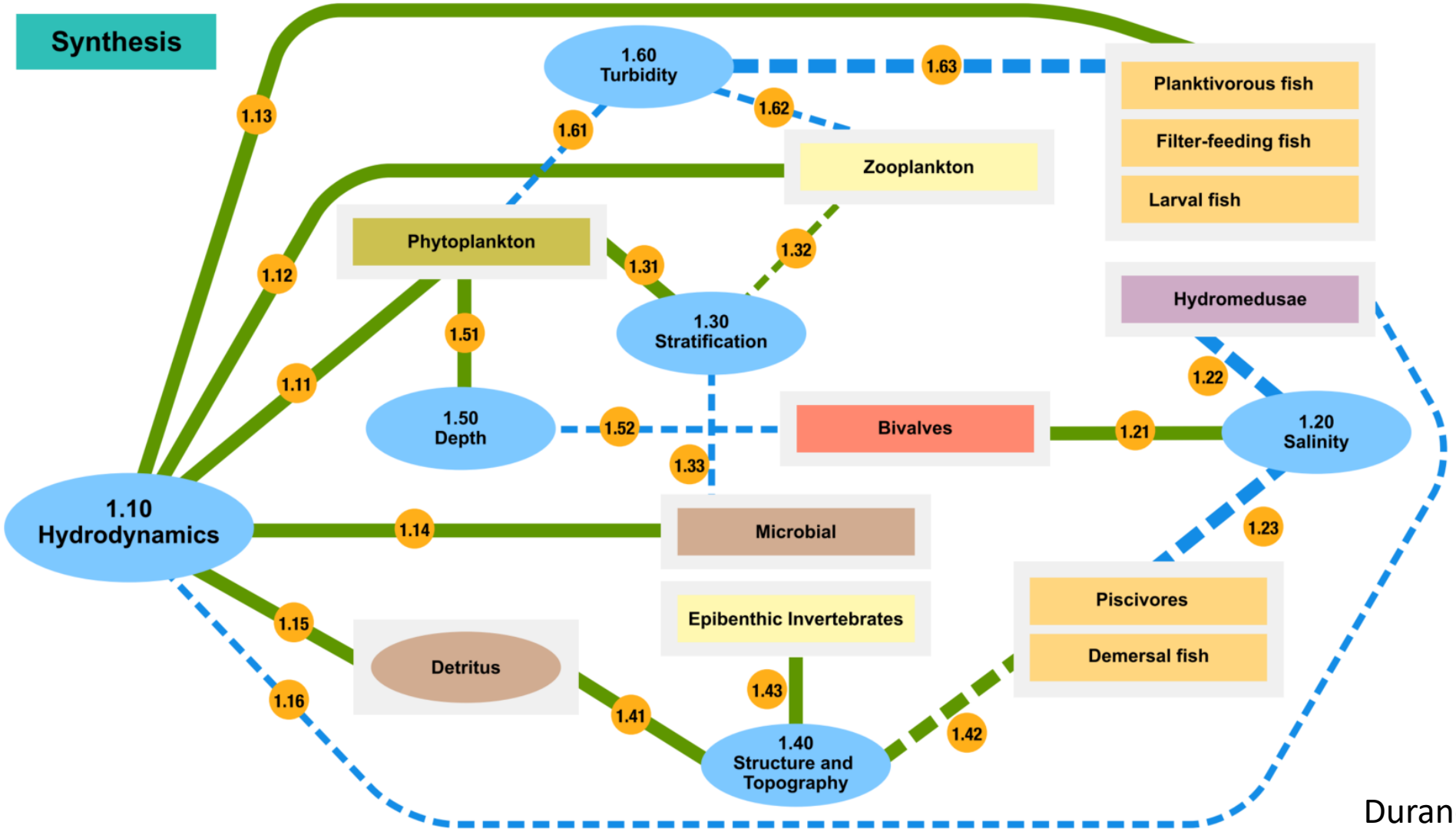
Qualitative models of food web connections

Quantitative models:

Specific connections in the food web

Quantitative models: Whole food web

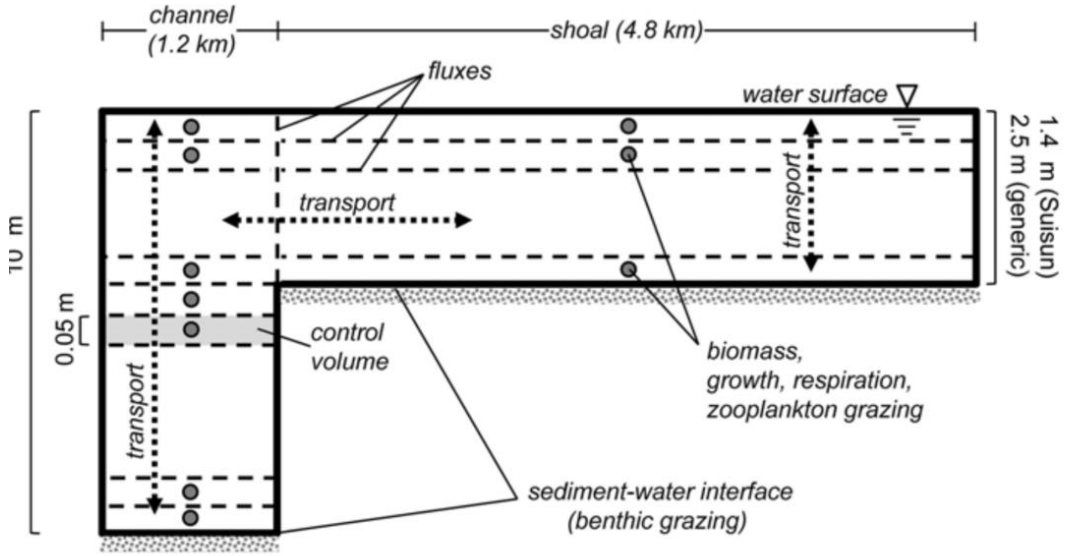
Qualitative model

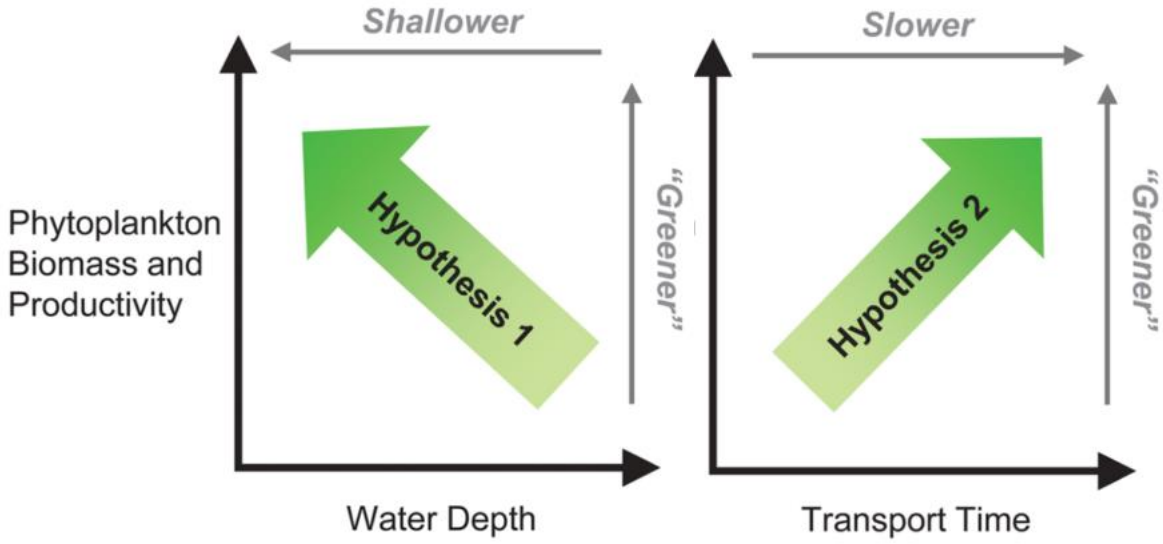


Durand 2015

Quantitative model

Bottom-up drivers of the pelagic food web





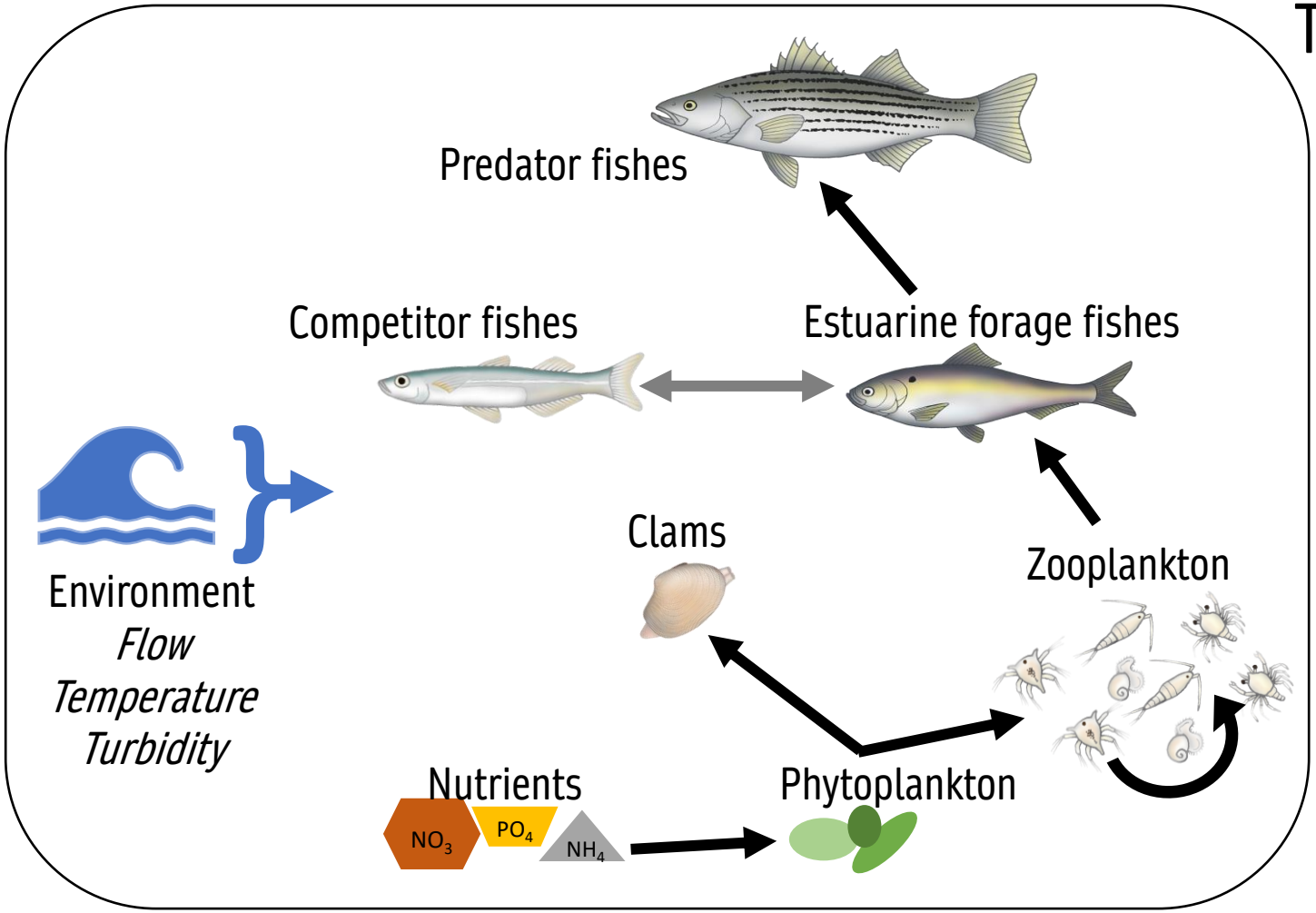
Lucas et al. 2012, 2016; Lucas and Thompson 2009; Kimmerer and Thompson 2014

Quantitative model

Whole food web (pelagic)

Modeled relationships:

- Environment
- Direct interaction
- Other interaction



Management need: Tidal wetland food webs?

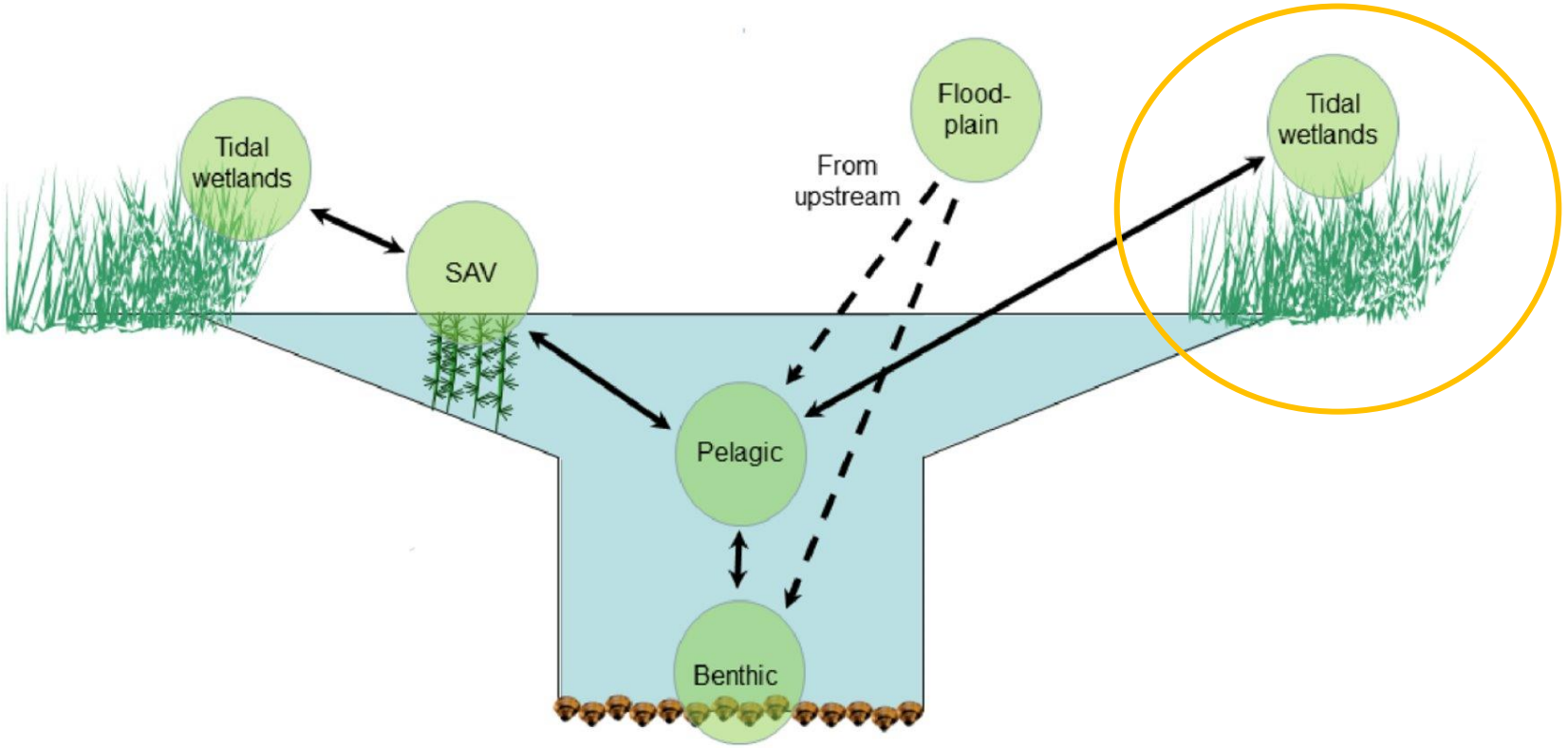


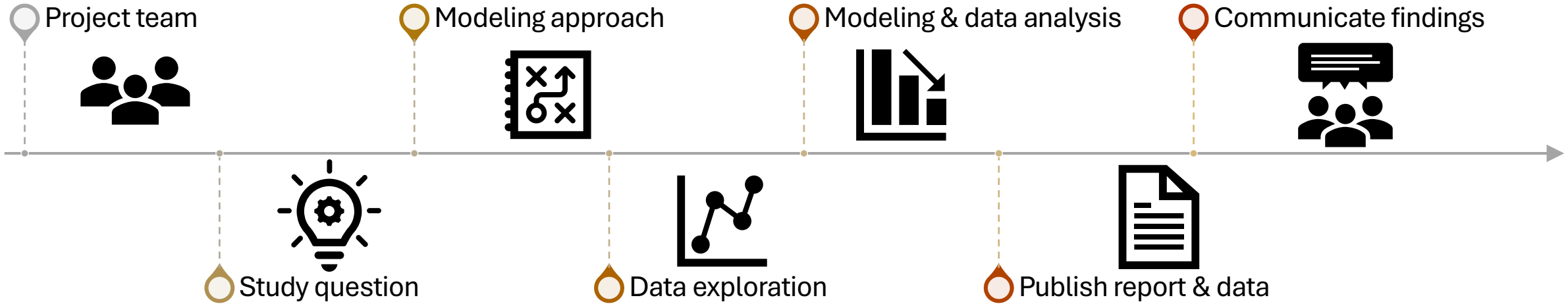
Figure 3 Conceptual framework for the discussion of habitat-specific food webs. The circles filled with green indicate habitat-specific food webs discussed in this paper. The solid black arrows represent hypothetical two-way exchanges between food webs. The dotted lines indicate one-way exchange of floodplains with downstream food webs. For simplicity, not all possible food webs or arrangements are shown.

Brown et al. 2016

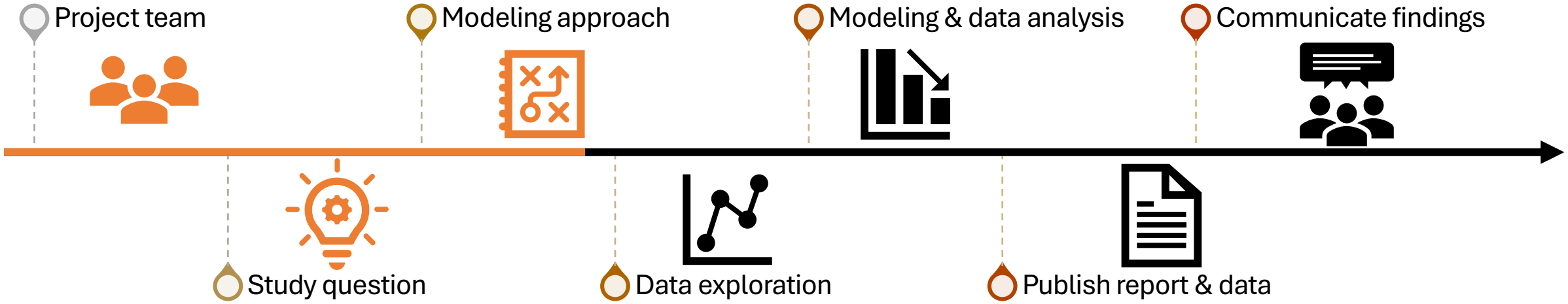
IEP Synthesis Resources

- Interdisciplinary research teams with diverse modeling expertise
- Project Work Team (PWT) groups as collaborative incubators
- Existing culture of collaboration, cooperation, and scientific integrity
- Data inventory and integrated datasets
- SharePoint, GitHub, and EDI collaborative platforms
- Direct connection to resource management agencies

Our process


Project team
Study question
Modeling approach
Data exploration
Modeling & data analysis
Publish report & data
Communicate findings

Our progress



How could this plug into the Collaboratory?

Researcher profiles

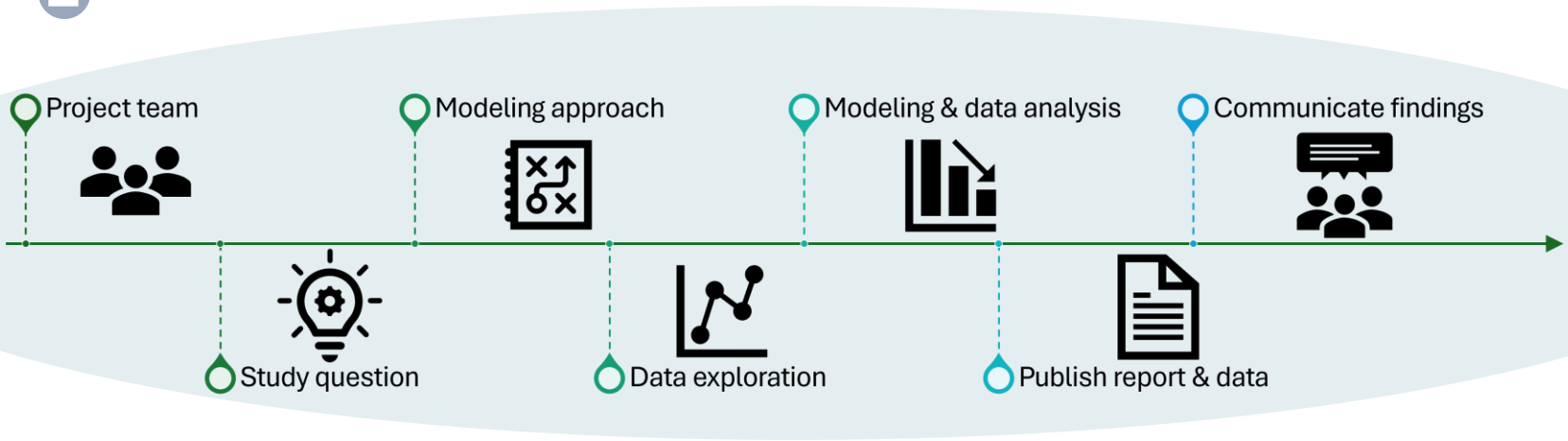
Networking coordination

Team facilitation

Publication library

Learning materials and training modules

Best practices and protocols



Model inventory

Integrated model framework

Cloud computing

Data library and integrated datasets

Data science training and workshops

Data visualization assistance

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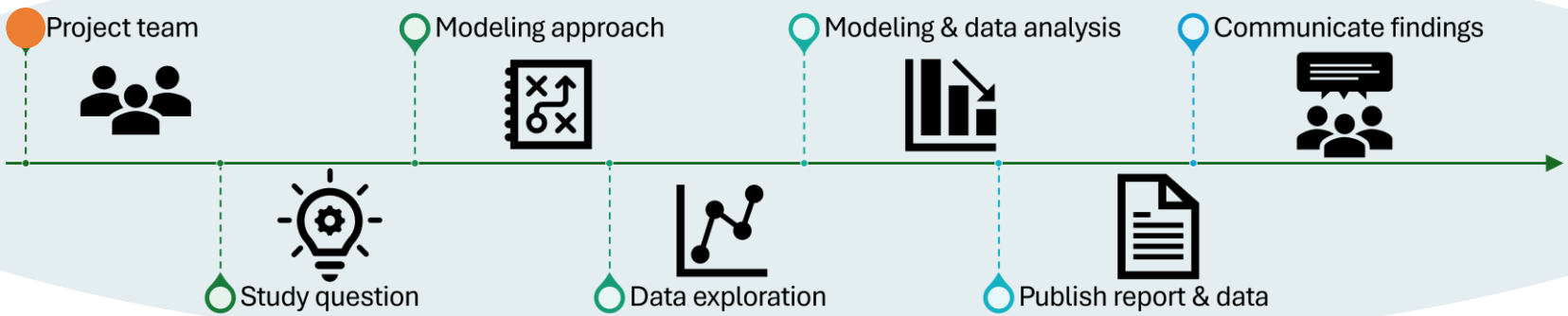

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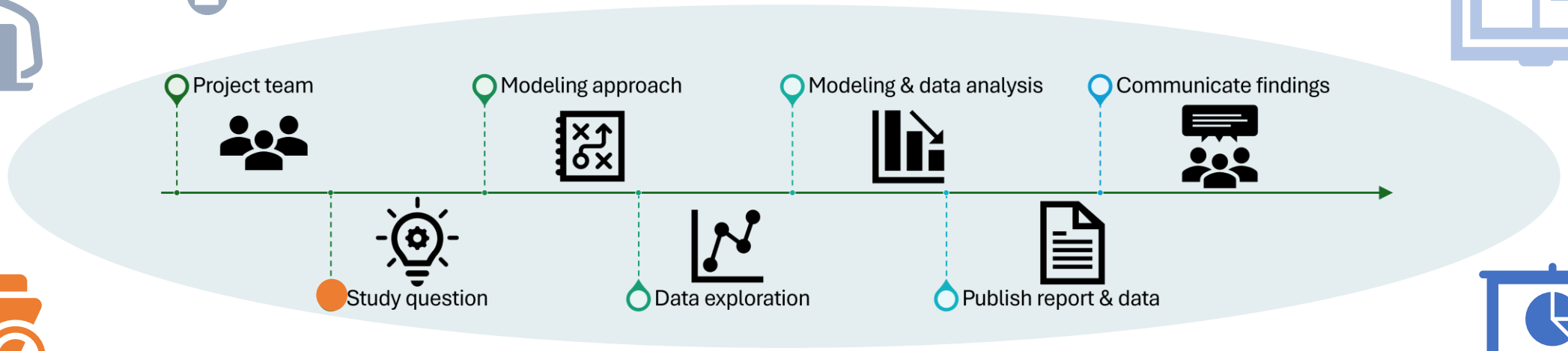

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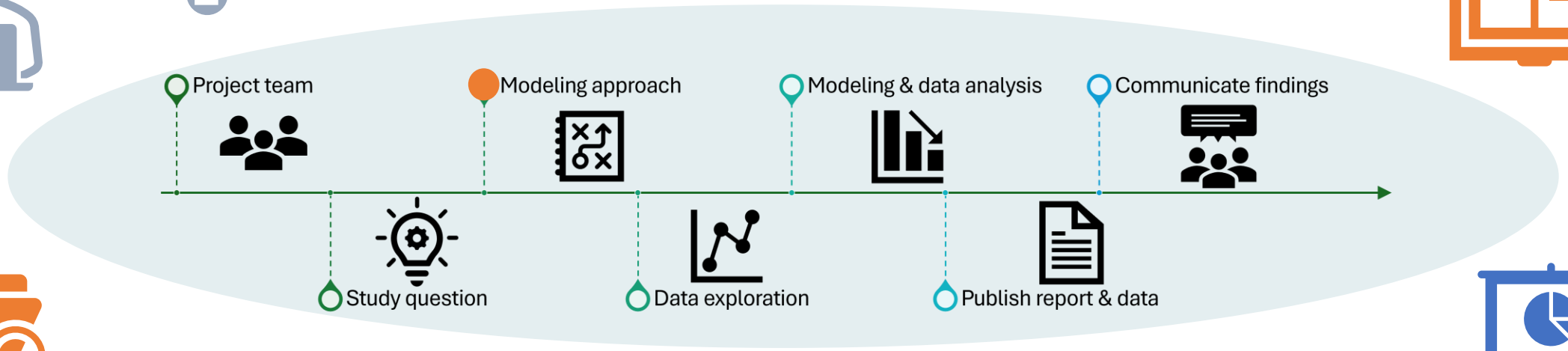

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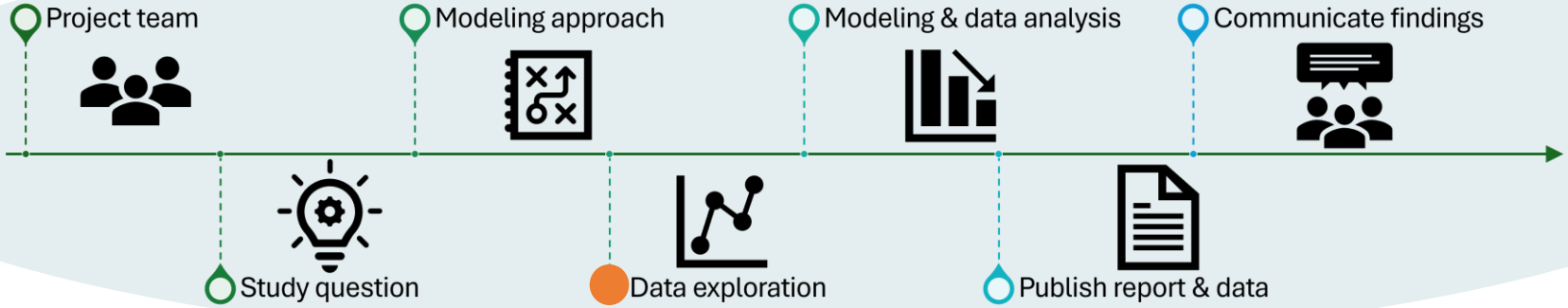

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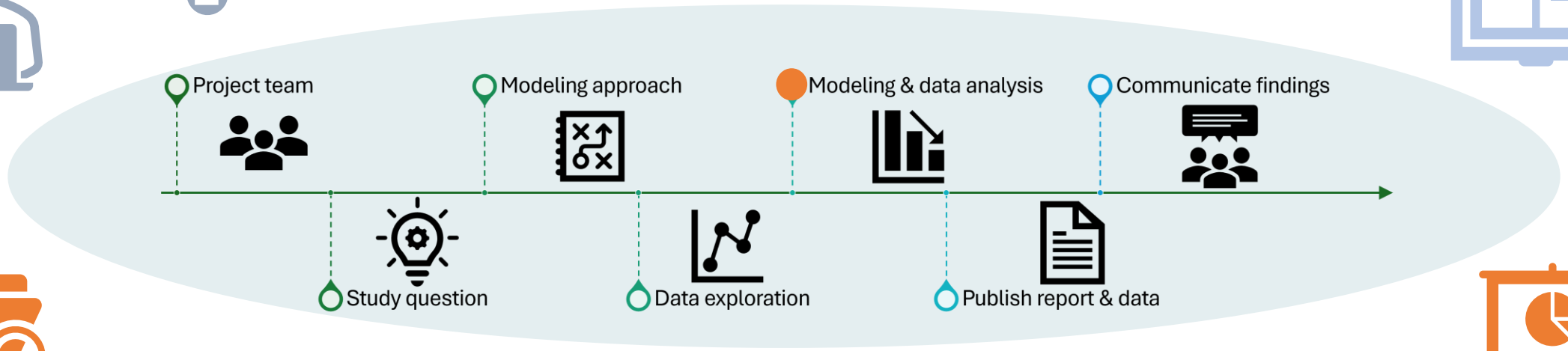

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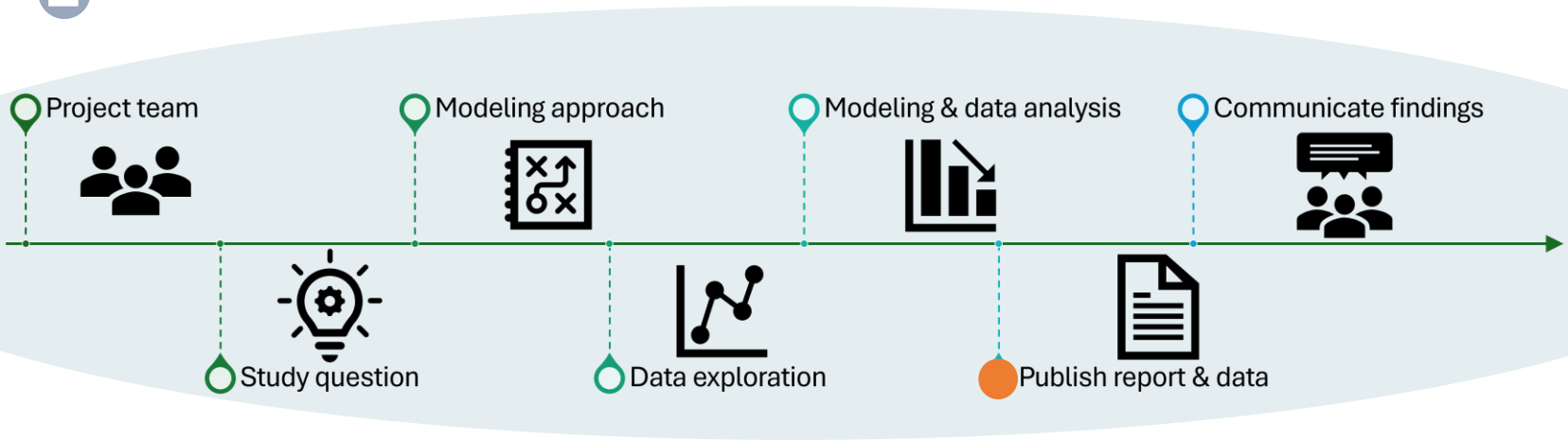

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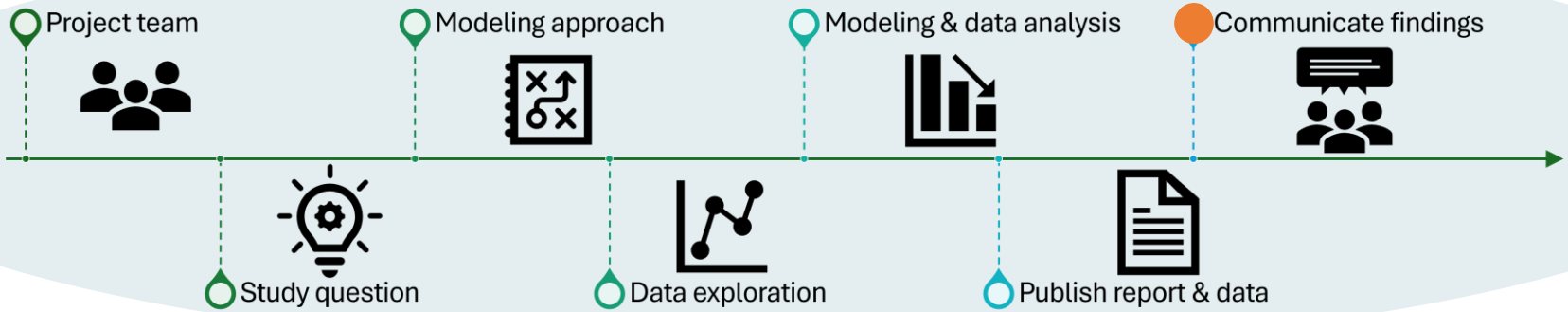

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