The Casco Bay Regional Ocean Model
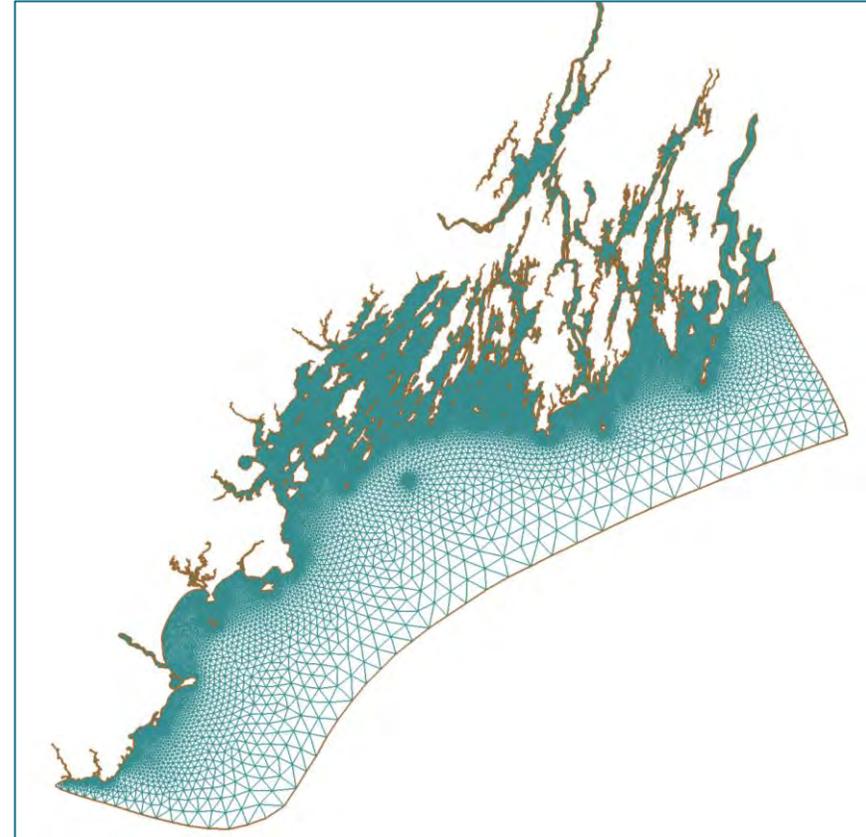
High resolution ocean model

Saco Bay to Boothbay

Daily three-day forecast
◦ Ocean height
◦ Wave height and period
◦ Currents (3-D, Surface and at depth)
◦ Salinity and temperature (Surface and at depth)

Predictions about every 10 meters inshore

Original motivation was for water quality

The "Model Grid" for the Casco Bay Model

https://www.cascobayestuary.org/casco-bay/modeling-casco-bay/

What Other Problems Can Models Help Solve?

Three community workshops

Focused on Portland Harbor
    Flooding
    Water Quality
    Port Activities

Follow-up interviews

Flooding at high tide during December 23, 2022 Nor'easter

Jane Ceraso

Casco Bay Estuary
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Many Possible Uses and Users

Over 100 people took part in workshops, interviews and meetings

Resilience Planning

Energy

Emergency Response

Aquaculture

Harbor Design

Fishing

Urban Design

Marine Resources

Port Safety

Water Quality

Marine Business

Recreation

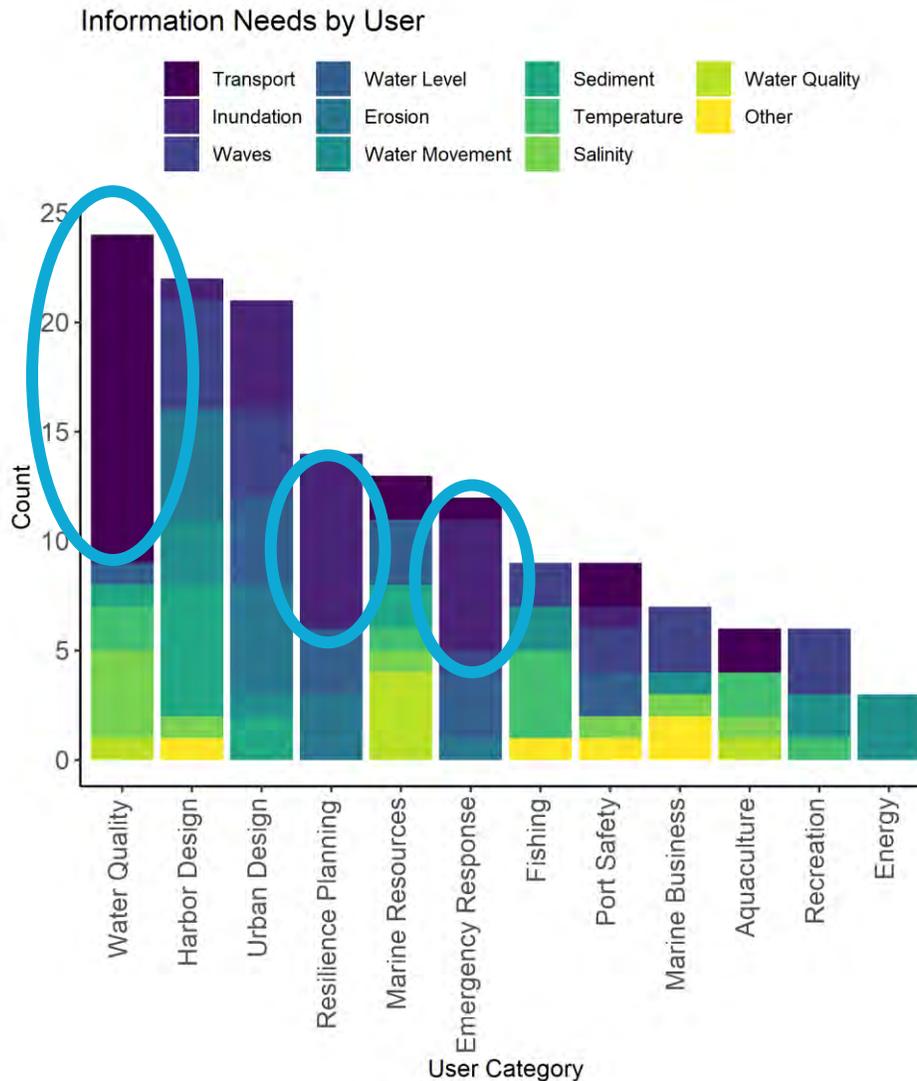Casco Bay Estuary
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Information Needs by Uses

Based on analysis of workshop comments

Frequency of comments coded by user groups and types of information requested

Water quality, sea level rise, and coastal hazards came up most often in the conversation

Different uses require different information

Information Needs by User

Legend:
Transport, Inundation, Waves, Water Level, Erosion, Water Movement, Sediment, Temperature, Salinity, Water Quality, Other

User categories (x-axis): Water Quality, Harbor Design, Urban Design, Resilience Planning, Marine Resources, Emergency Response, Fishing, Port Safety, Marine Business, Aquaculture, Recreation, Energy

Y-axis: Count (0–25)

X-axis: User Category

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Lots of Complexity….

Users

- Coastal Design
- Planning
- Disaster Preparedness
- Emergency Response
- Environmental Management
- Landowners
- Marine Harvesters
- Aquaculture
- Recreation
- Tourism

Data Needs

- Water Level / flooding
- Waves
- Current Velocity
- Pollutant Transport
- Salinity / Temperature
- Shoreline Erosion
- Sediment Transport
- Water Quality / Acidification
- Habitat Suitability

Timescales

- Forecast
- Present or Recent Past
- Extreme Event
- Probability / Risk

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Information Timescale

Forecast

- Tell me what is about to happen
  - Storm warnings
  - Wave forecasts

Present or Recent Past

- Tell me what just happened
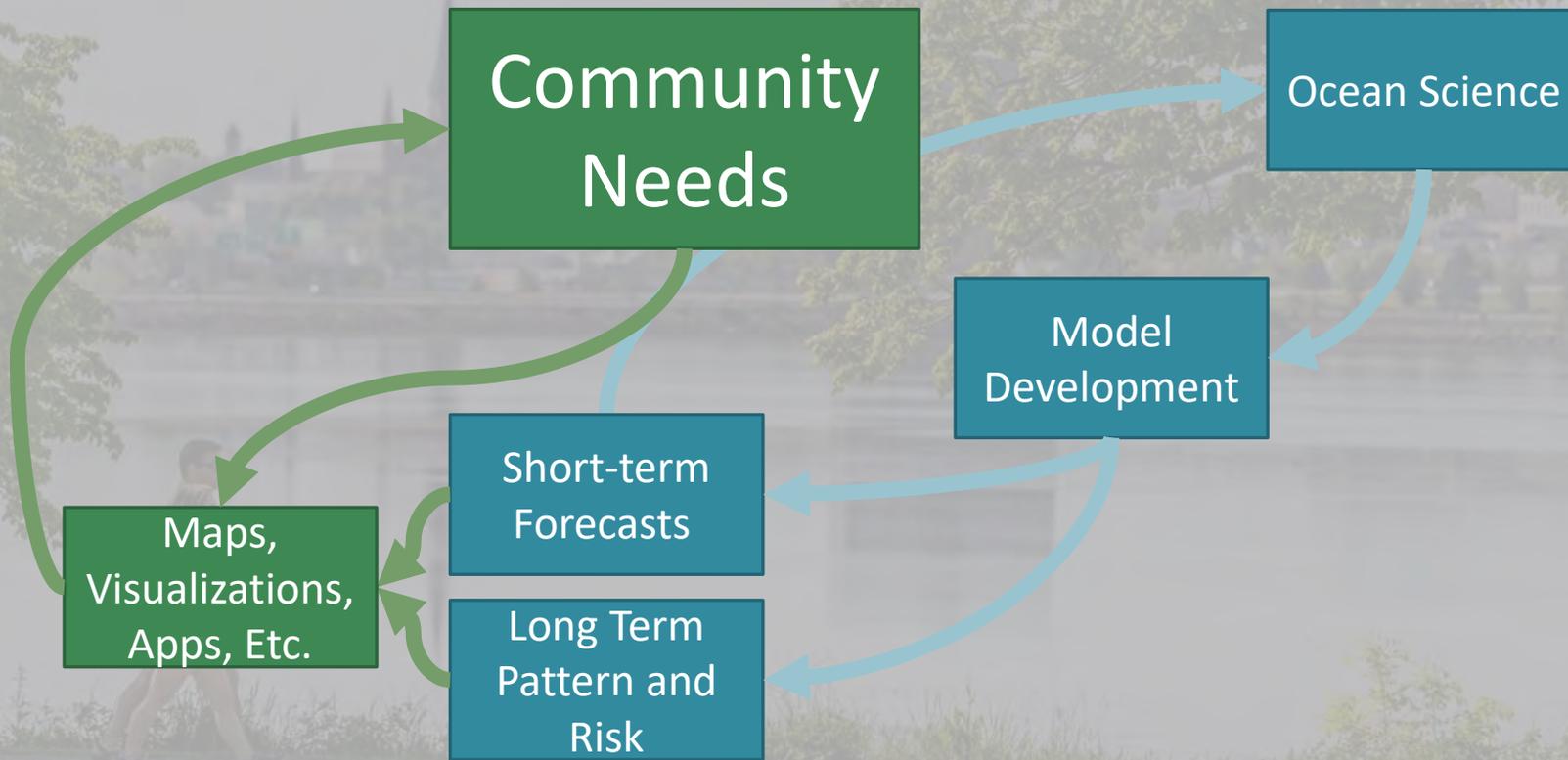 - Search and rescue
  - Accident investigation

Extreme Events

- Tell me what will happen if a big storm hits
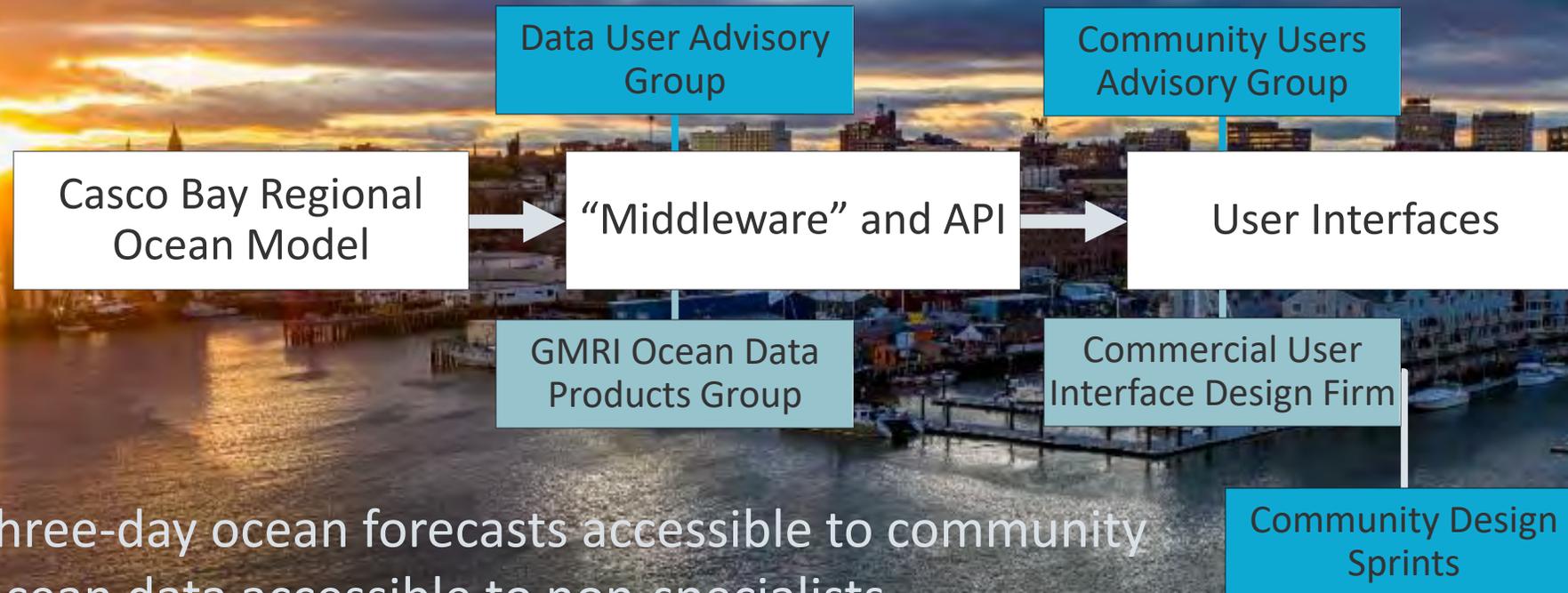 - Harbor and urban design
  - Resilience planning

Pattern, Risk or Tendency

- Tell me what is likely to happen
  - Pollutant transport
  - Shoreline erosion
  - Tidal statistics
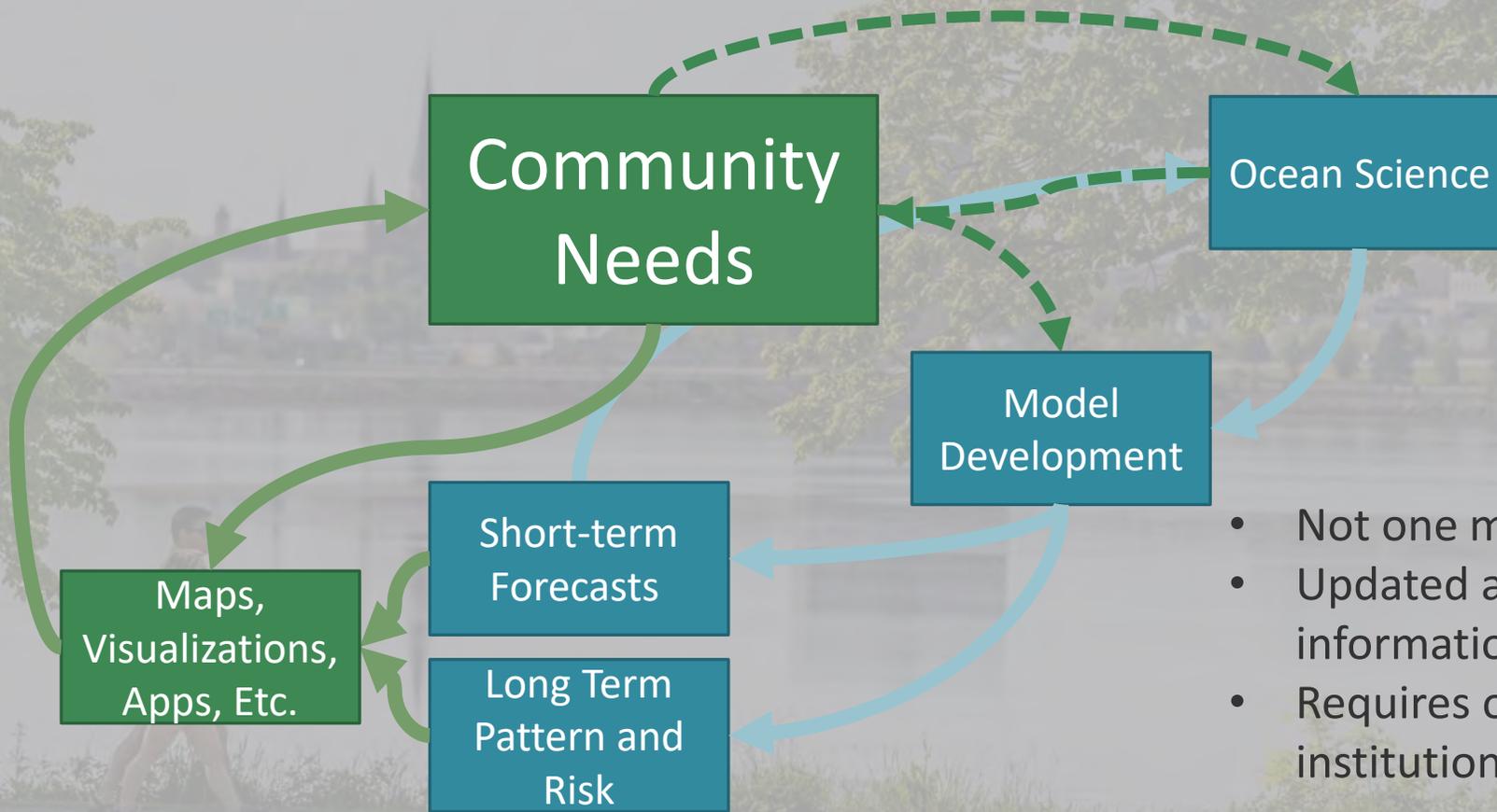
Community Centered Ocean Models

Community Needs

Ocean Science

Model Development

Short-term Forecasts

Long Term Pattern and Risk

Maps, Visualizations, Apps, Etc.

Jerry Monkman, ecophotography.com

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Co-Developing Model Interface Products

Data User Advisory Group

Community Users Advisory Group

Casco Bay Regional Ocean Model → "Middleware" and API → User Interfaces

GMRI Ocean Data Products Group

Commercial User Interface Design Firm

Community Design Sprints

Goals:
- Make three-day ocean forecasts accessible to community
- Make ocean data accessible to non-specialists

Community Centered Ocean Models

Community Needs

Ocean Science

Model Development

Short-term Forecasts

Long Term Pattern and Risk

Maps, Visualizations, Apps, Etc.

- Not one model or tool, but many
- Updated and extended with new information or as needs change
- Requires ongoing dialog, new institutions

Jerry Monkman, ecophotography.com

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Project Team and Funders

Thank You

Curtis Bohlen
Director, Casco Bay Estuary Partnership
curtis.bohlen@maine.edu
https://www.cascobayestuary.org