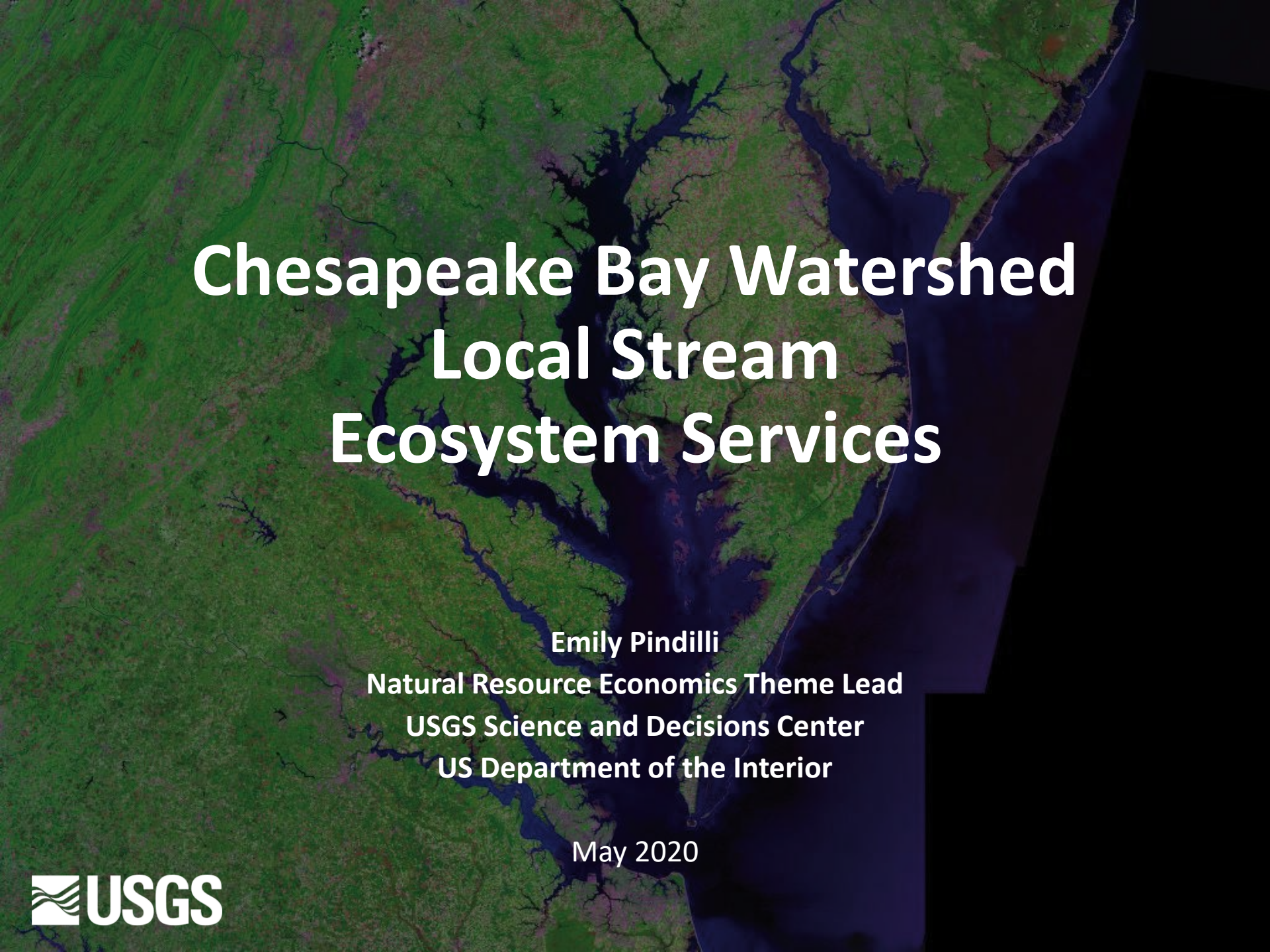

Chesapeake Bay Watershed Local Stream Ecosystem Services

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USGS

Introduction

- USGS Chesapeake Bay science provides an understanding of the ecosystem in the greater watershed, local streams and rivers, and the Bay
- The ecosystem provides benefits to humans in terms of ecosystem services
- Studies of ecosystem services provided by the Bay are well documented
- Less is known about ecosystem services in local streams and rivers

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Study Objective

- The current ecosystem services study is focused on services at the local stream and river scale
- The study will specifically link USGS science in the system to ecosystem services and their values
- The study will be designed to support management decisions
  - A primary objective is to consider ecosystem service co-benefits to local populations of BMPs designed to support Bay water quality

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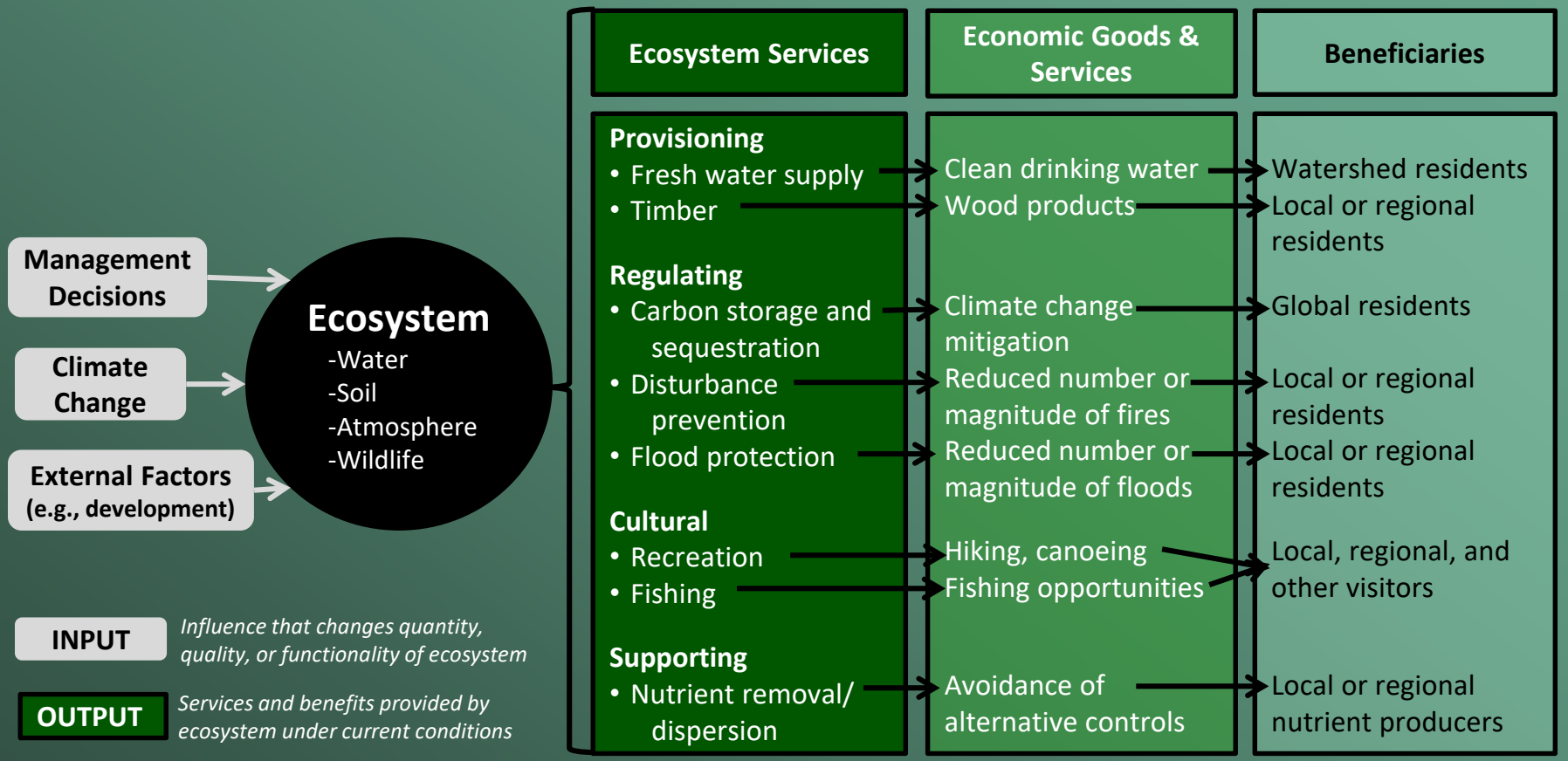
Ecosystem Services Framework



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Study Approach: Phase I

- Initiated in FY20
- Conceptual Model Development
  - Develop an ecosystem services conceptual model for local stream scale
- Feasibility Study
  - Assess feasibility of conducting an ecosystem services assessment using USGS science at the local scale
  - Builds on previous work in Chesapeake watershed
- Outcome
  - Detailed research plan for ecosystem services studies prioritized by feasibility and impact

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Study Approach: Phase II

- FY21 and beyond

- Pilot Studies
  - Detailed analysis of quantity and value of select ecosystem services
  - Services determined in Phase 1 (adaptable as new data/priorities arise)

- Scaling
  - Extrapolating pilot studies from single to multiple sites

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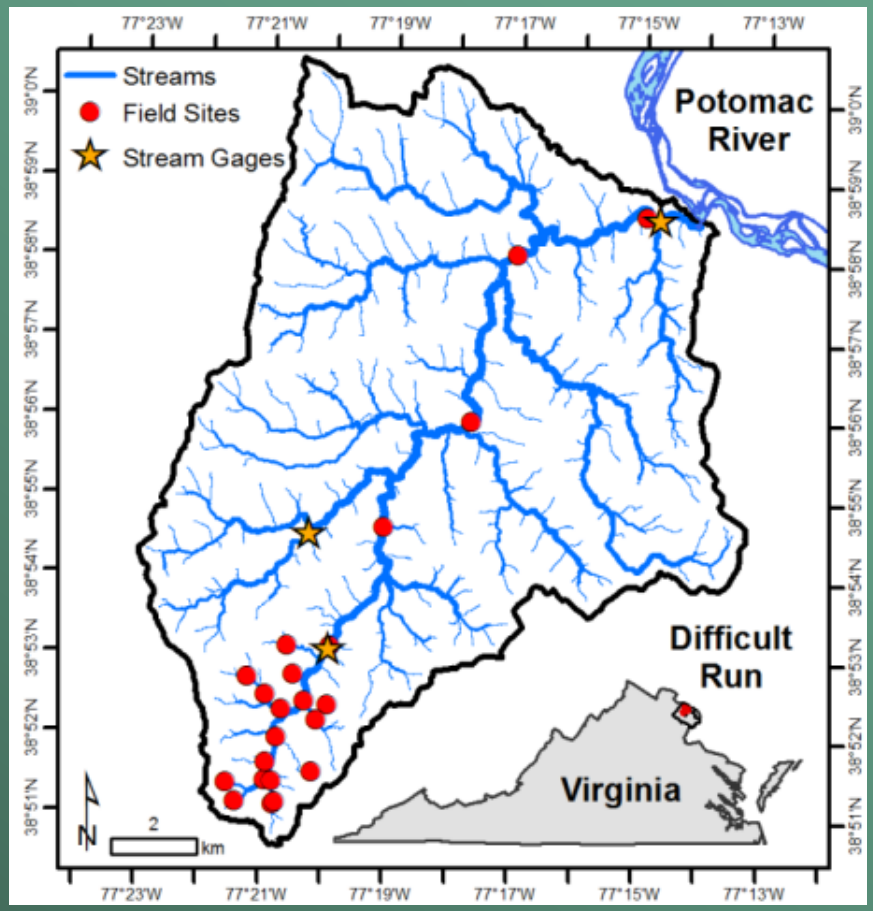
Ecosystem Services Example

Floodplain Ecosystem Services in Difficult Run, VA

Difficult Run Ecosystem Service Assessment

- Physical Science
  - LiDAR data and field data used to assess net nutrient retention
  - Other floodplain metrics
- Ecosystem Service Assessment/Valuation
  - Nutrient retention
  - Flood mitigation



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Nutrient Retention Ecosystem Service Values

- **Net fluvial nitrogen load 57,307 ± 15,305 kg-N/yr**

- **Annual value for sediment-bound N retention: $727,226 ± 194,220**

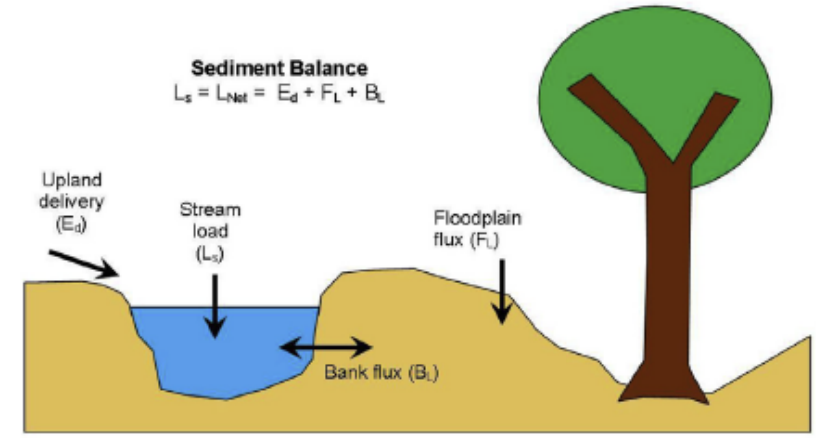

Fig. 2. Components of the sediment balance include upland delivery (E_d), floodplain flux (F_L), and bank flux (B_L). The sum of these three components should equal the in-stream load (L_s).

- **See Hopkins et al, 2018 at https://doi.org/10.1016/j.jenvman.2018.05.013**

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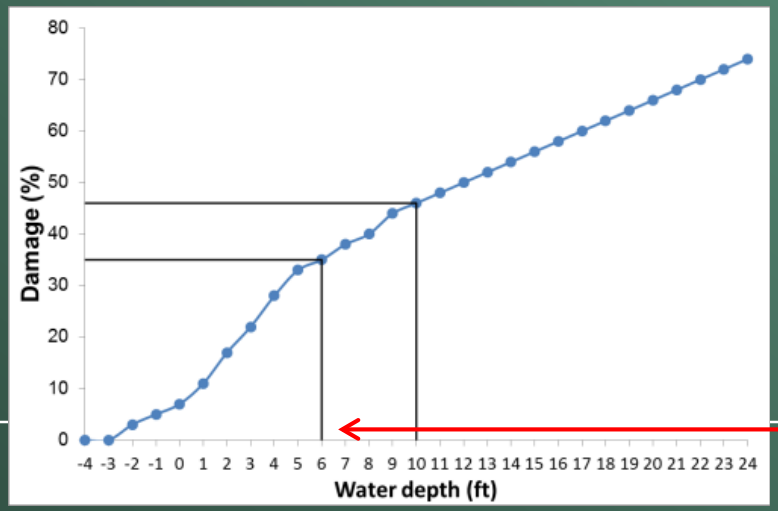
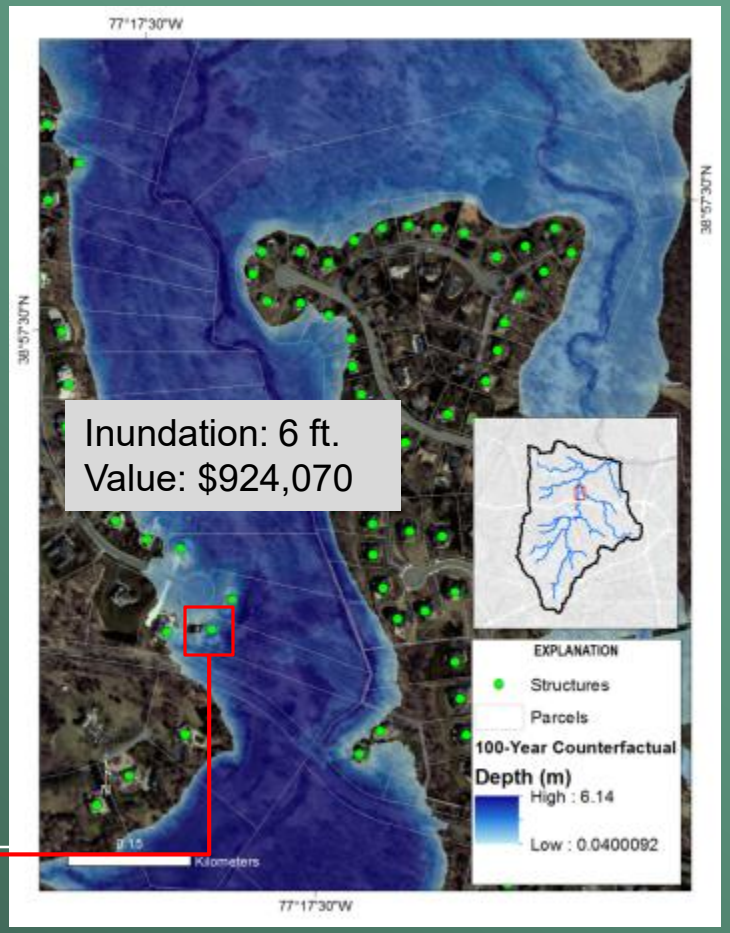
Flood Mitigation Ecosystem Service Values

- See Lawrence et al, 2019 at https://doi.org/10.1016/j.jenvman.2018.10.023
- Floodplain volume: 6,063,657 m^3
- Annual value of flood mitigation: $73,412



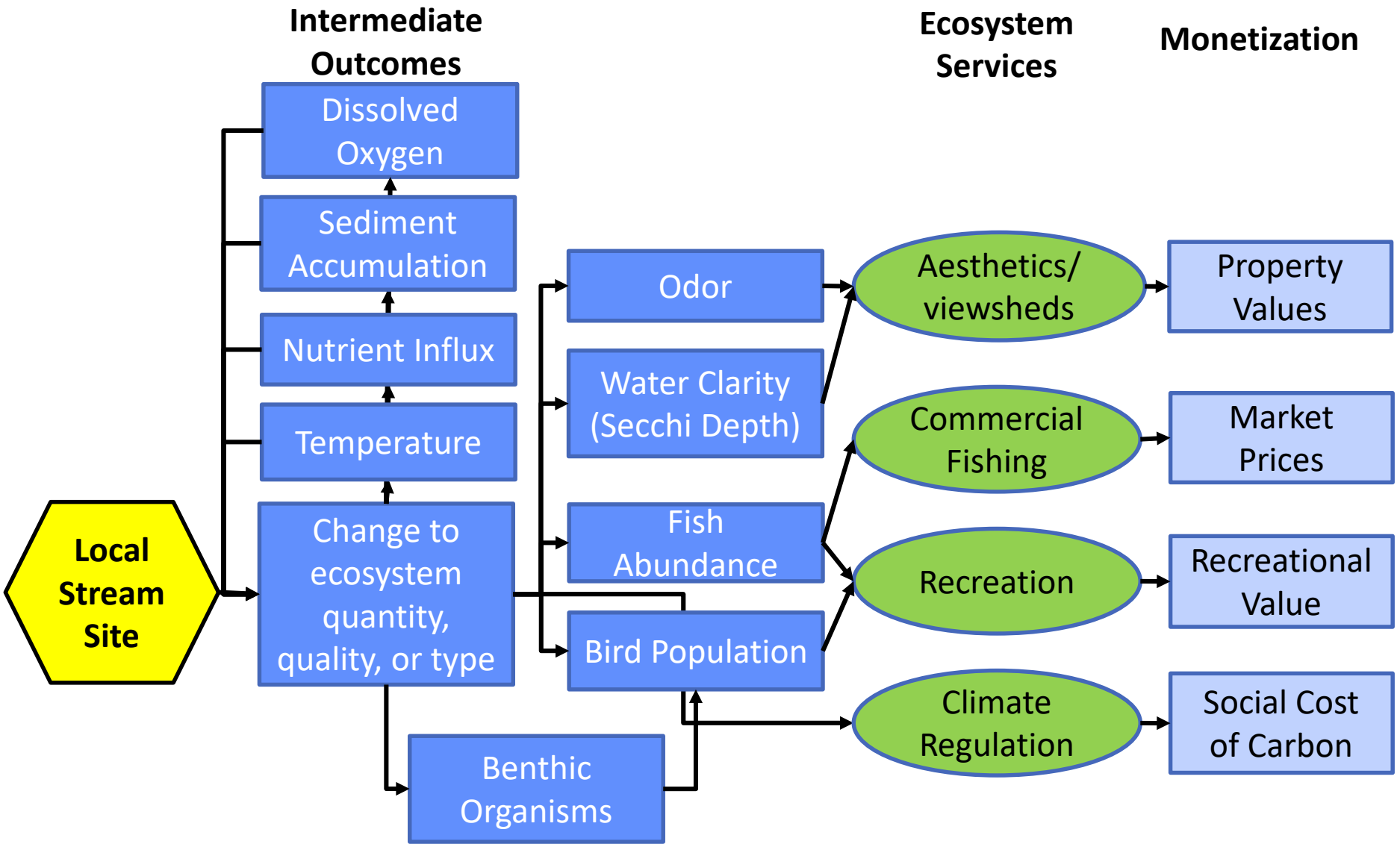


Basemap imagery from ESRI and Digital Globe data
Value based on Fairfax County assessed building estimate

Phase I

Preliminary Conceptual Model

Local Stream Ecosystem Services Conceptual Model*

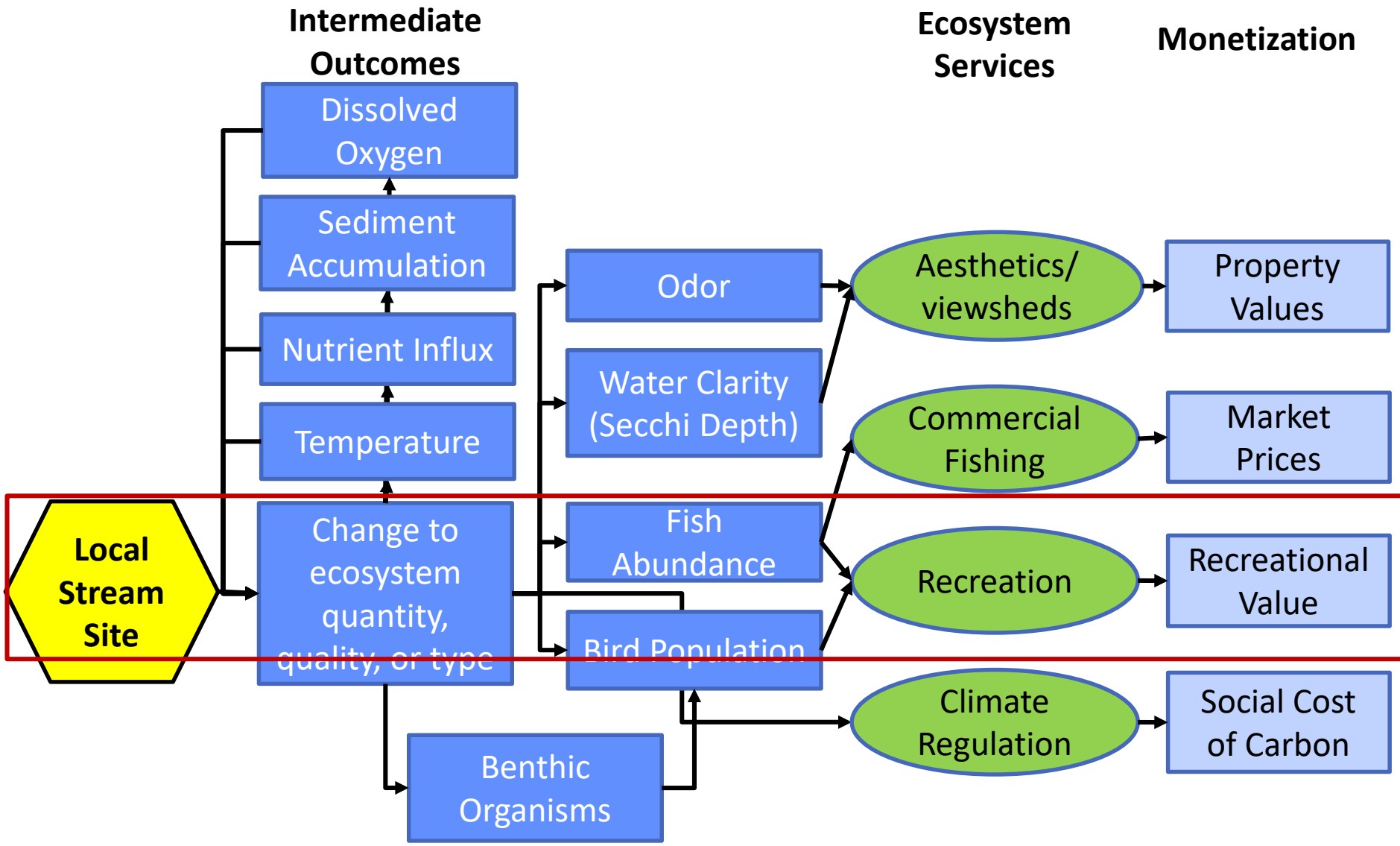


**Preliminary; do not cite or distribute; Pindilli, 2020*

Phase II

Potential Pilot Study I

Local Stream Ecosystem Services Conceptual Model*



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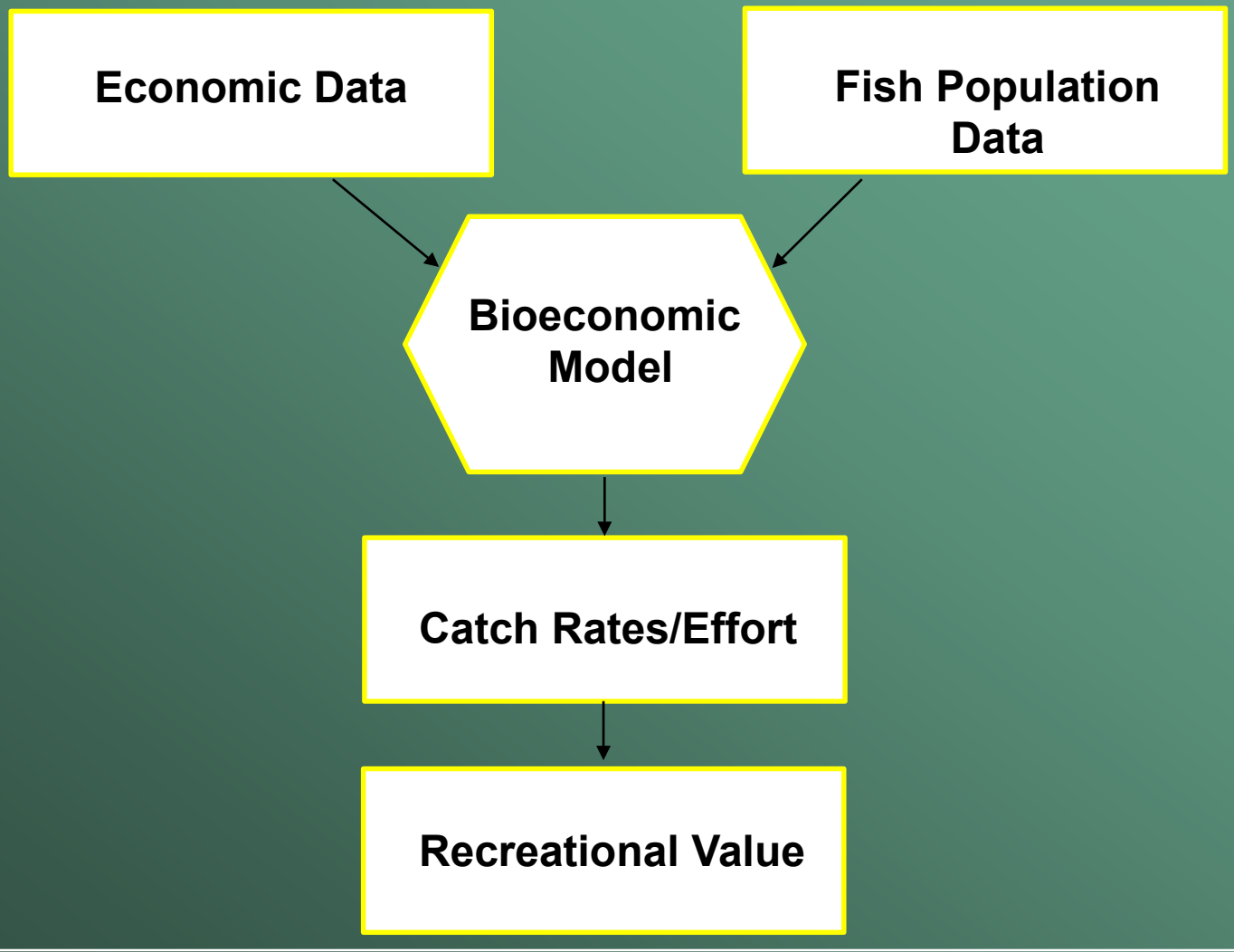
Bioeconomic Modeling for Recreational Fishing



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Questions???

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