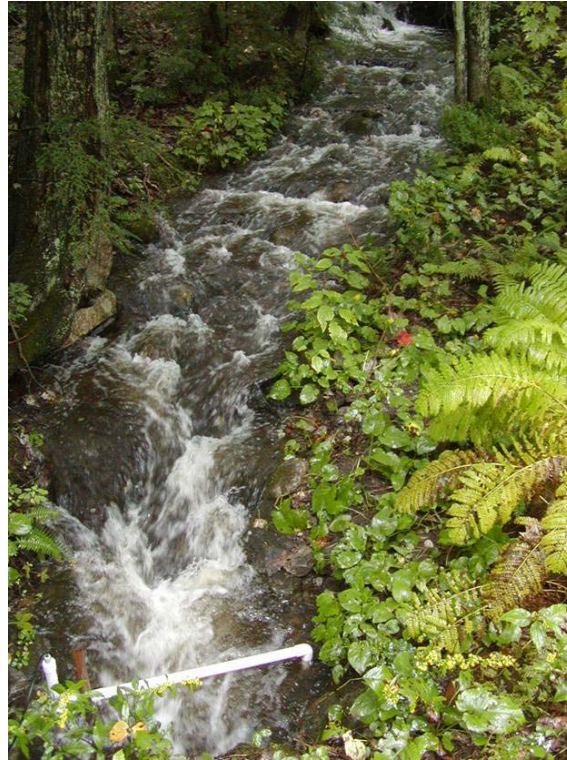Ben Letcher

USGS, Conte Anadromous Fish Research Center, Turners Falls, MA

Keith Nislow

USFS, Northern Research Station, Amherst, MA
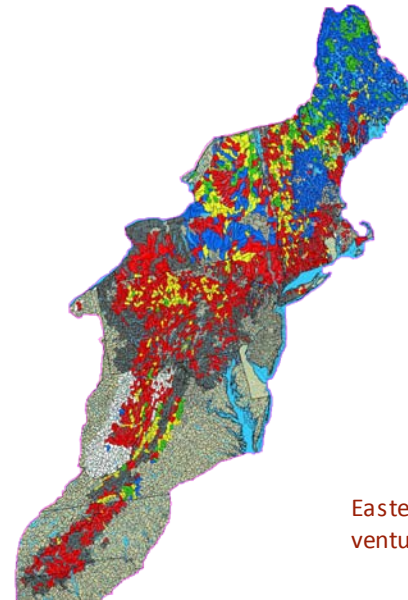
SALMONID (BROOK TROUT) POPULATION PERSISTENCE
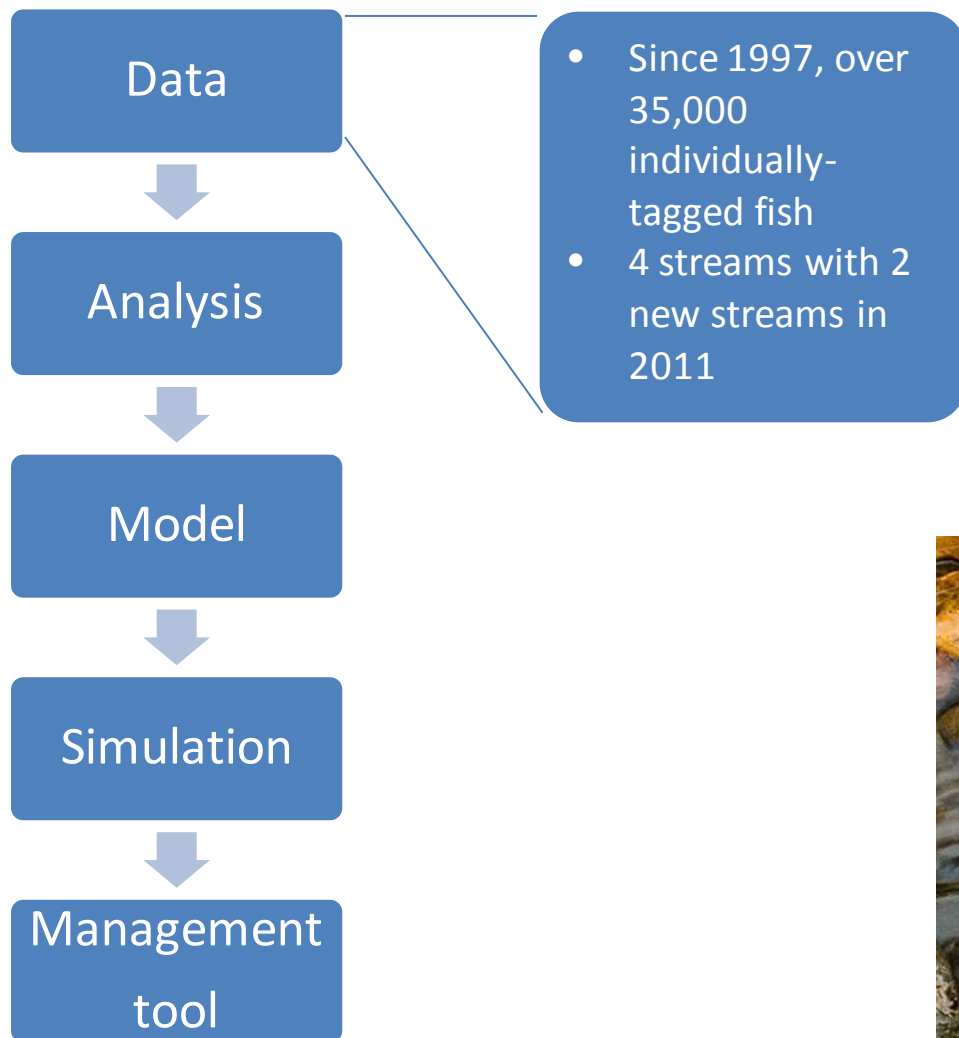
Development of a DSS

Overall goal

→ Understand how populations work

→ What affects local <u>population persistence?</u>

→ Endpoint – probability of persistence after x years

  ◻ Body size distributions

→ Develop DSS tool for managers
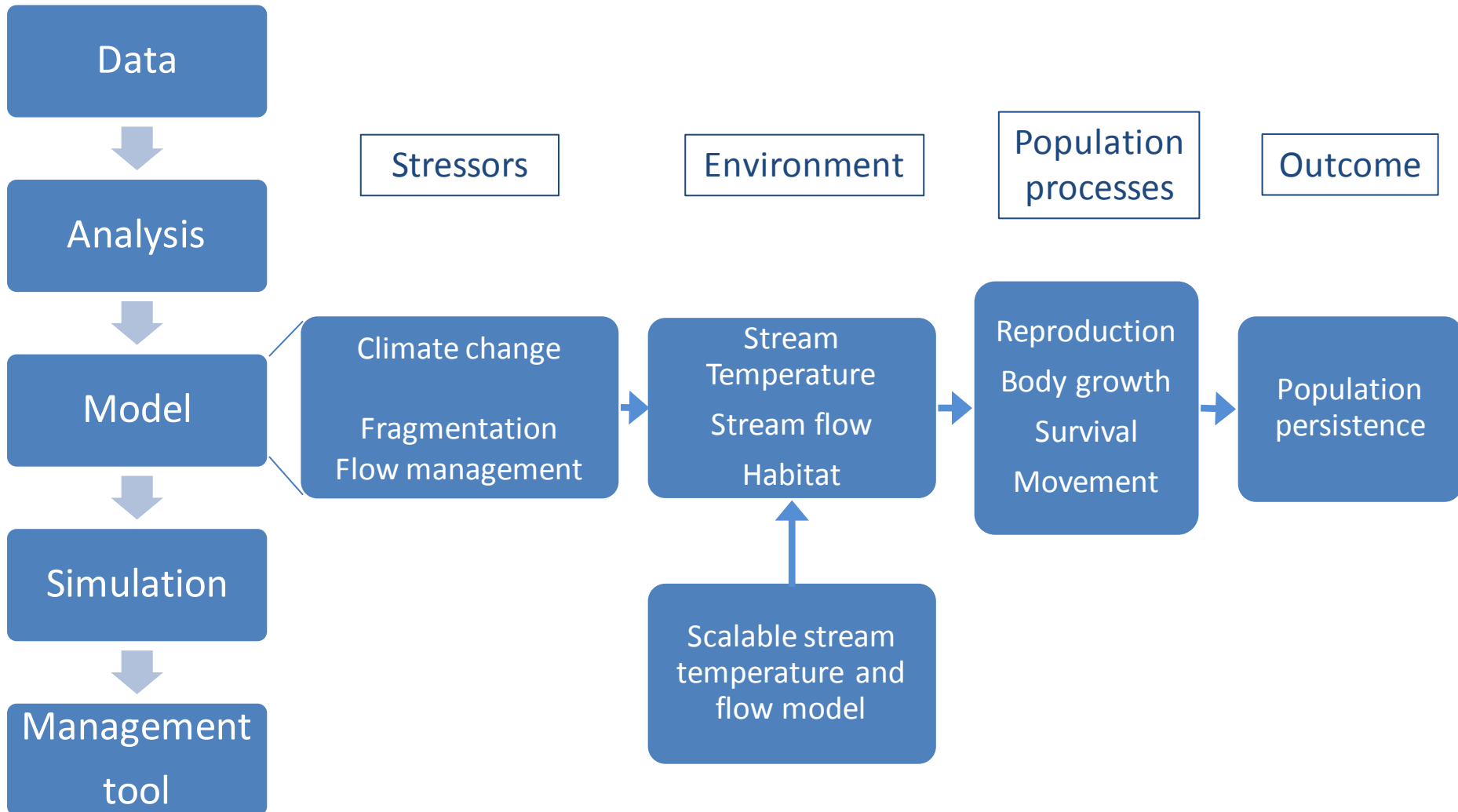
  ◻ Probability of population persistence under varying management scenarios

Eastern brook trout joint venture, 2007

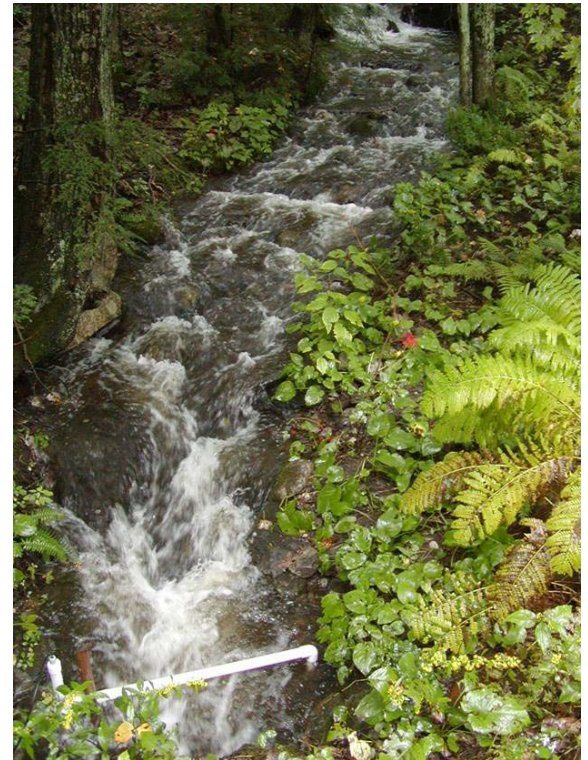# Approach

```
Data  →  • Since 1997, over
              35,000
              individually-
              tagged fish
  ↓         • 4 streams with 2
Analysis       new streams in
              2011
  ↓
Model
  ↓
Simulation
  ↓
Management
   tool
```

Approach

| Data | | Stressors | | Environment | | Population processes | | Outcome |

Data → Analysis → Model → Simulation → Management tool

Model branches to:

Stressors: Climate change / Fragmentation Flow management

→ **Environment:** Stream Temperature Stream flow Habitat

→ **Population processes:** Reproduction Body growth Survival Movement

→ **Outcome:** Population persistence

Scalable stream temperature and flow model → (feeds into Environment)

Approach

- Data
- Analysis
- Model
- Simulation
  - Capability to run model scenarios
  - Test management alternatives
- Management tool

Approach

Data

↓

Analysis

↓

Model

↓

Simulation

↓

Management tool

- Decision support system for evaluating effects of management alternatives on local population persistence

- Map-based
- Input local conditions
  - Temp, flow, global climate change
- Input existing fish data
  - Abundance, body sizes, fish community
  - Model based on individual-based data will be 'fine-tuned' to local conditions
- Output
  - Effects of management alternatives
    - Probability of persistence after x years
    - Body size distributions
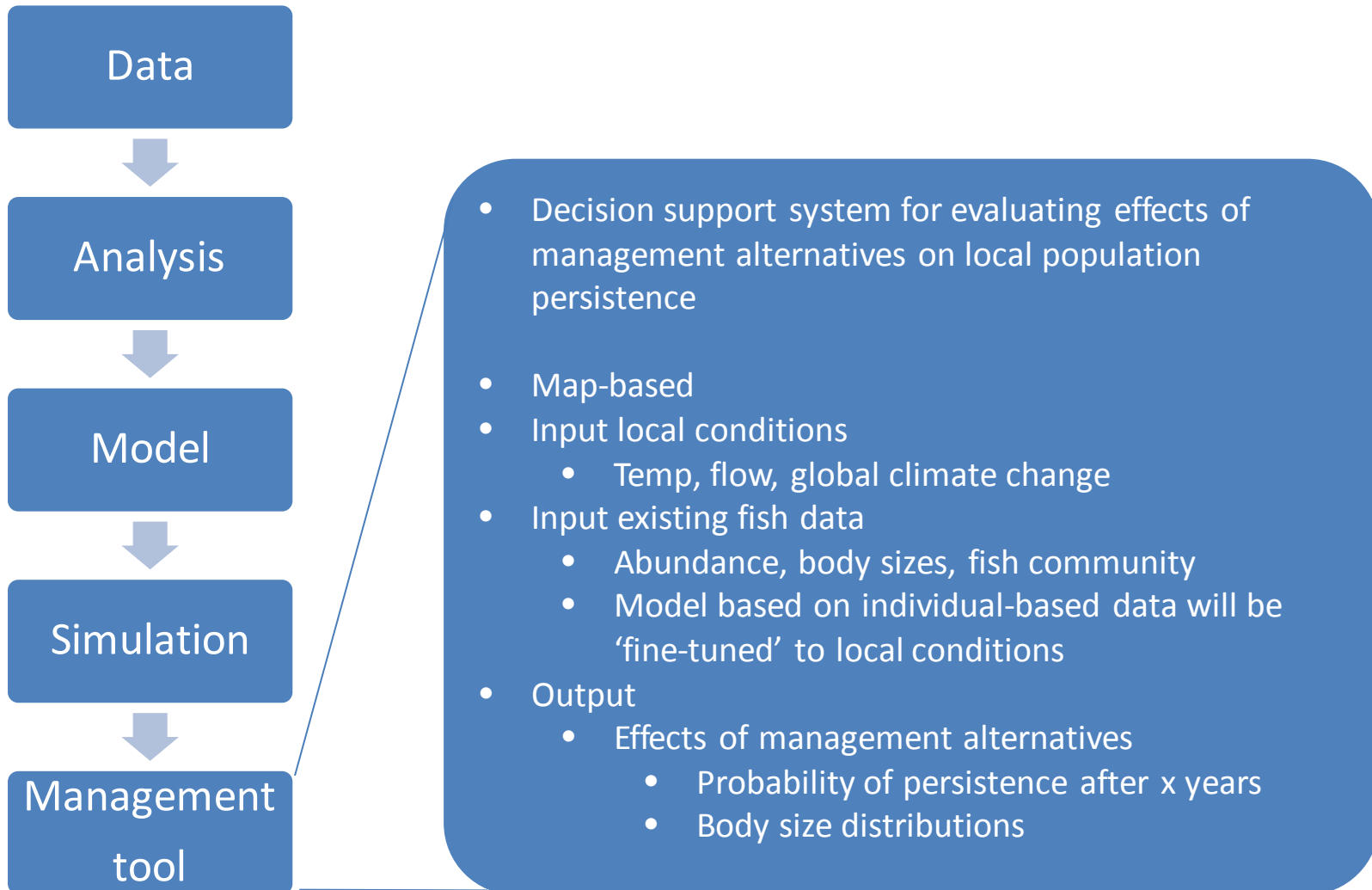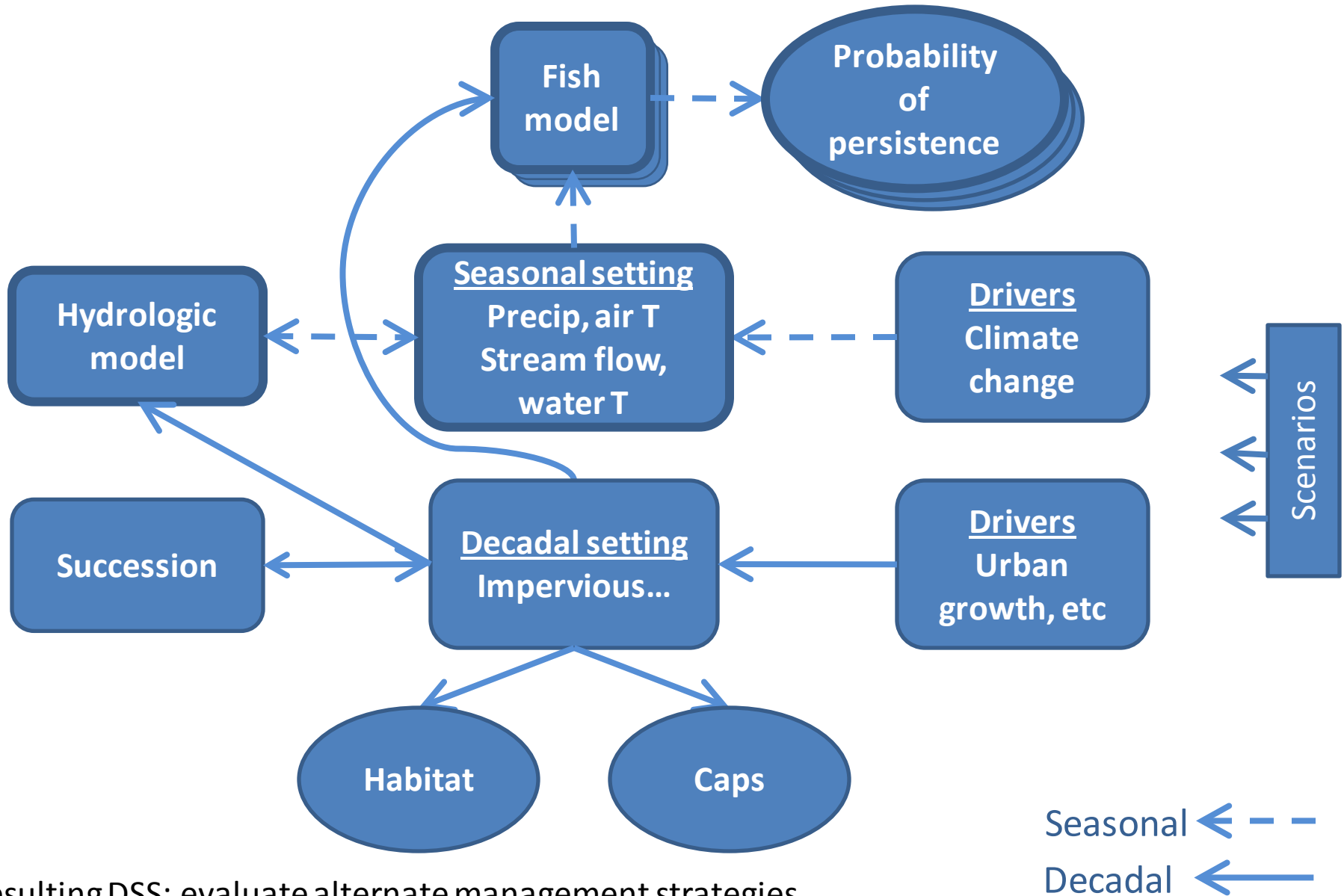
Links to Terrestrial project

Resulting DSS: evaluate alternate management strategies