Adapting Annually: Establishing a Rhythm for Flow Actions to Benefit Delta smelt

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Delta Smelt and Adaptive Management

Challenges:

- Short-life cycle – a lot can go wrong quickly
- Gaps in knowledge, e.g., spawning, movement
- Very limited detection

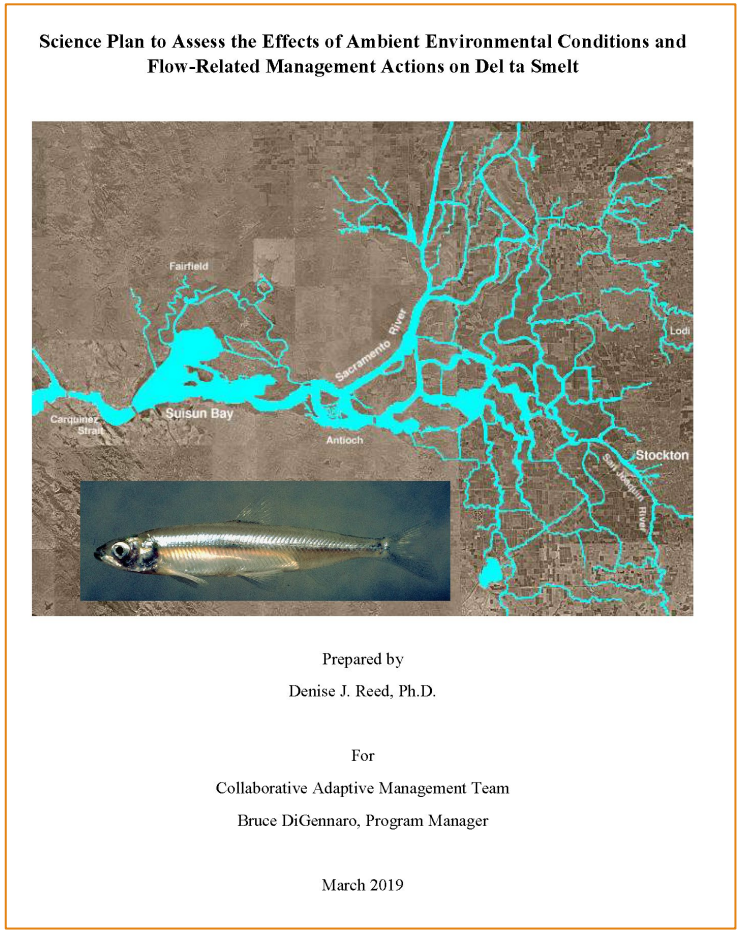
Opportunities:

- Deployment of cultured fish to increase understanding
- Ongoing research on foodweb
- Multiple management actions being planned and implemented

Science Plan to Assess the Effects of Ambient Environmental Conditions and Flow-Related Management Actions on Delta Smelt

Focus

- Increased understanding of mechanisms by which abiotic and biotic conditions affect Delta Smelt including the role of ambient conditions and flow-related management actions.



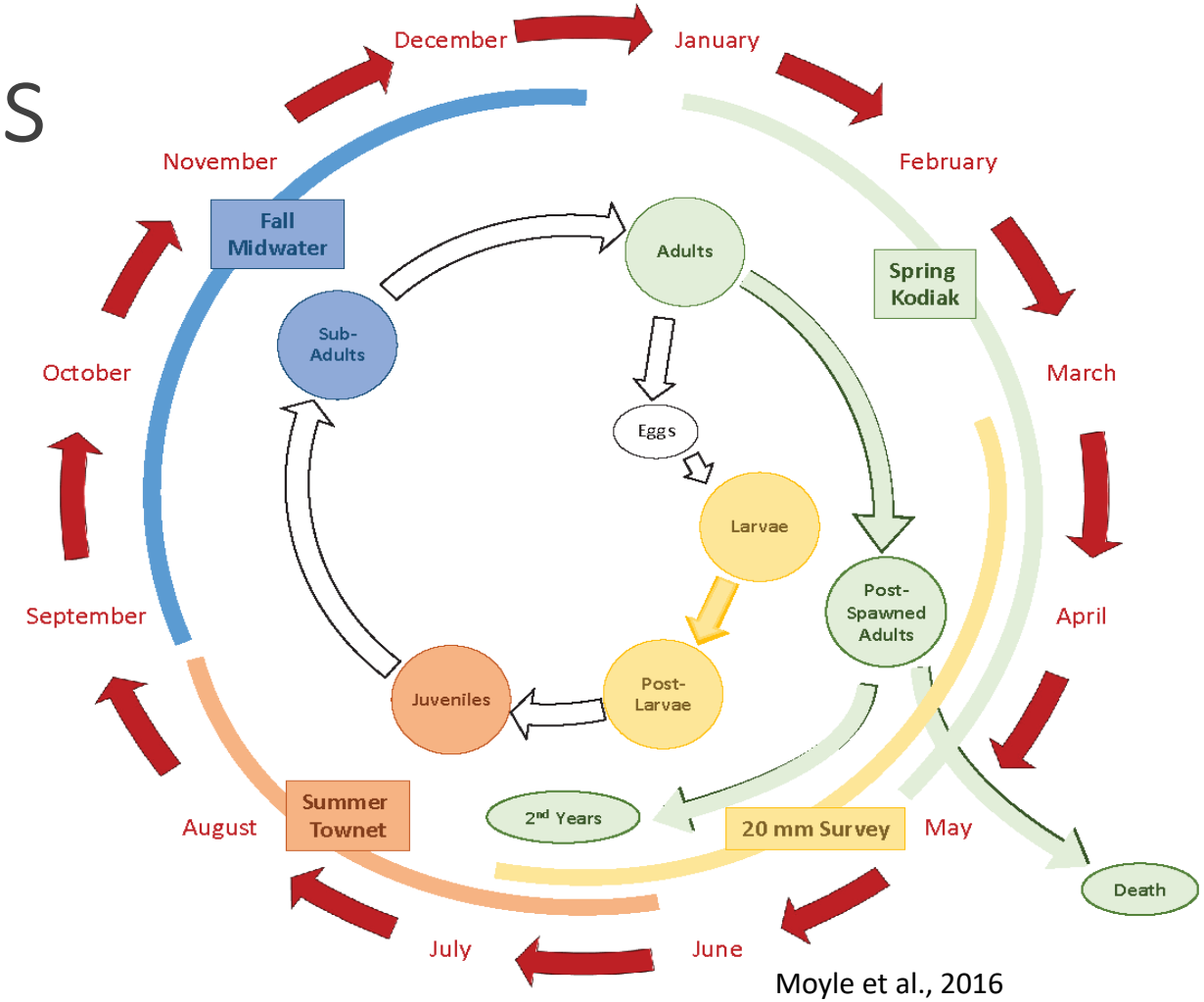
Flow-Related Management Actions

Examples:

- North Delta Foodweb
- Operation of Suisun Gates
- Summer-Fall Habitat

Specifics vary from year to year

Antecedent conditions, e.g., warm summer, can influence outcomes



Moyle et al., 2016

Annual Decisions on Management

Year Type	Suisun Gates	Yolo Bypass Flow Pulse	Flood and Drain Managed Wetlands	Roaring River	Outflow Augmentation (Spr/Summ)	Fall Outflow action	Ambient Conditions
Wet			X	X		X	X
Above Normal		X	X	X	X	X	X
Below Normal	X	X	X	X	X		X
Dry	X	X	X	X	X		X
Critical			X	X			X

Using Science in Adaptive Management

Need to ***predict***, in advance, the consequences of taking a management action

Surveys and monitoring are used to ***detect*** change in the natural system.

Increased ***understanding*** and building an expanded knowledge base so that future actions can be planned and implemented

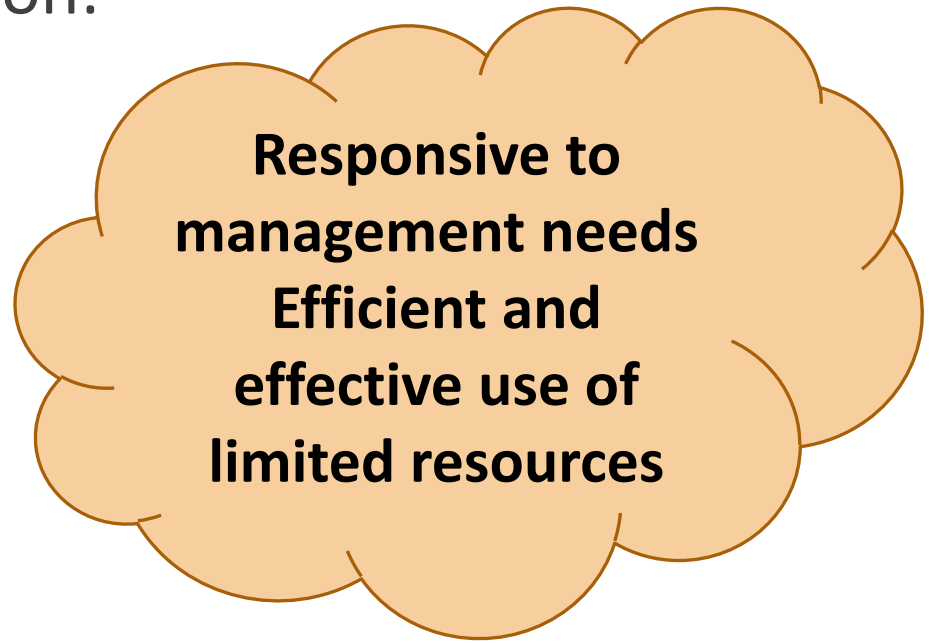
Science in Support of Delta Smelt

Generates timely, usable information:

- Data products
- Synthesis reports
- Model predictions
- Knowledge ‘updates’

Uses best practices

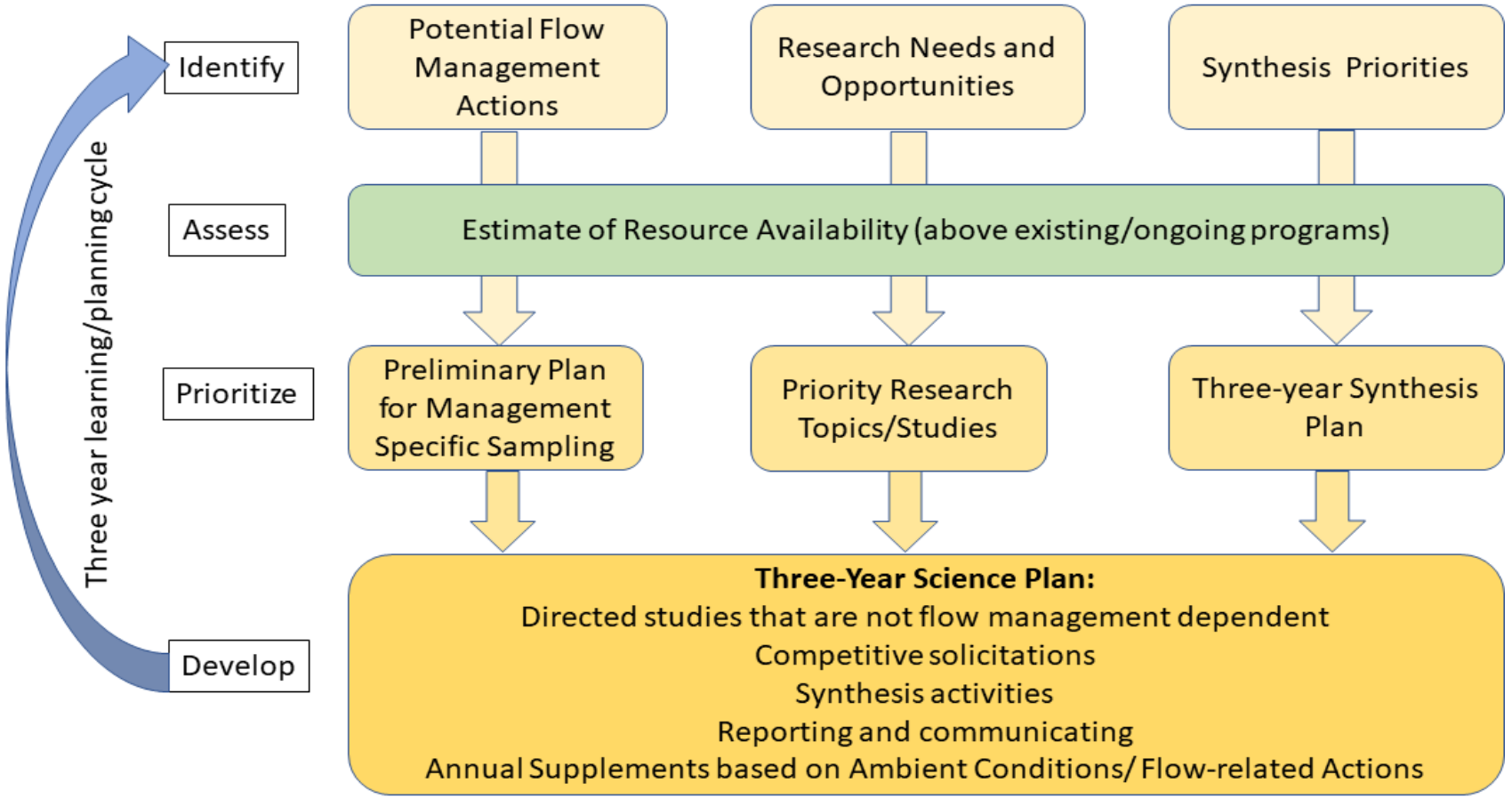
- QA/QC
- Open data
- Data management/archiving
- Peer review



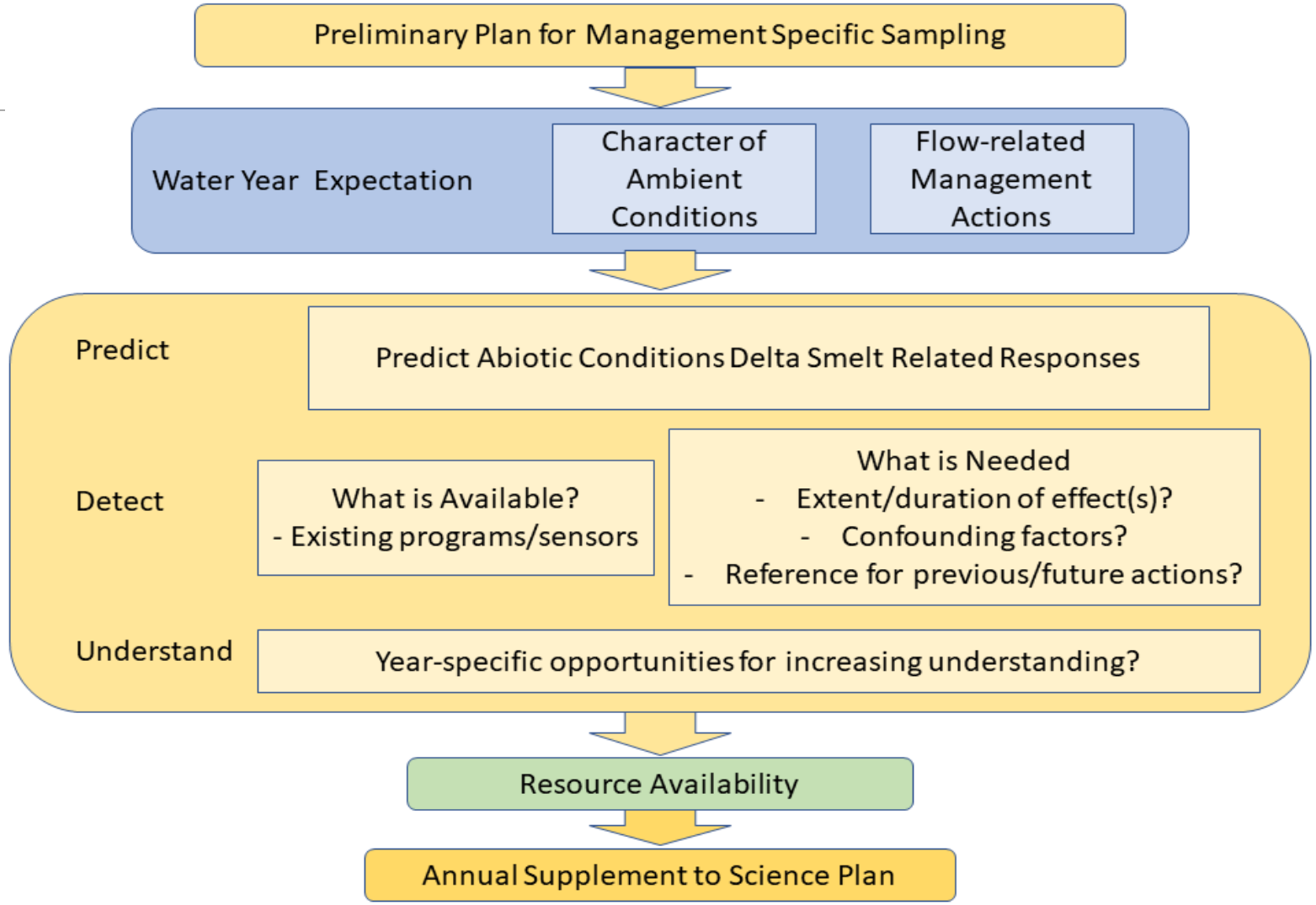
Programmatic Approach

- Three-year Science Plan developed on the basis of:
  - Proposed management actions
  - Research Needs and Opportunities
  - Synthesis Priorities
- Annual Supplements:
  - Preliminary Plan for management action specific sampling
  - Water year expectations
  - Need/Opportunity to Predict, Detect and Understand
  - Resource Availability

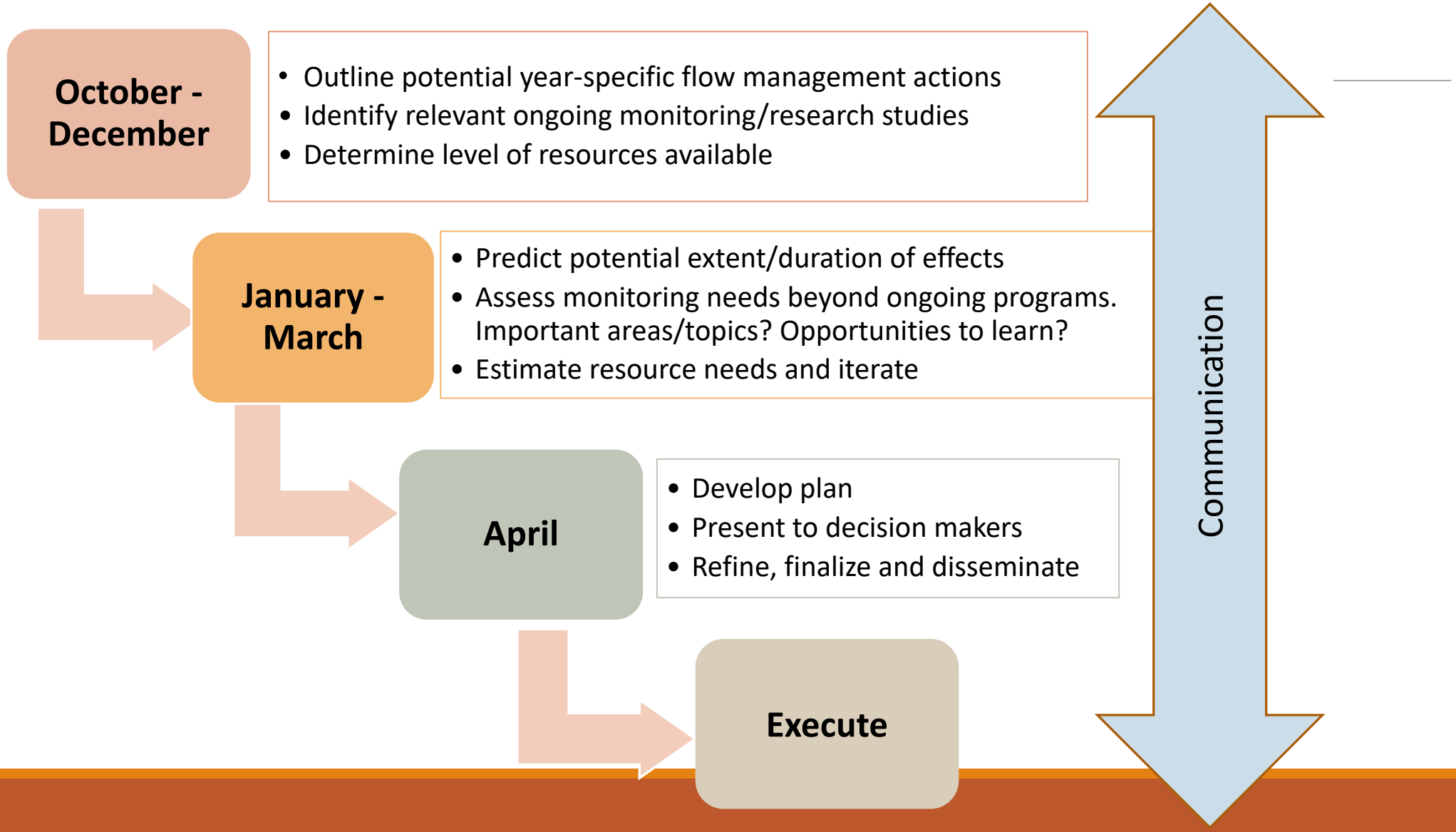
Three-Year Science Plan



Annual Supplement



Annual Planning



Implementation Challenges

- Tough to learn from year to year
  - Sample processing
  - Making sense of the data takes time
- Requires intense coordination and communication
  - Scientists and managers
  - Flow management actions are just some of the moving parts everyone is dealing with
- Resources required for action-specific monitoring/learning

What Could Help?

- Dedicated staffing
  - Someone whose job it is to track information generated, potential management actions, etc.
- Process-based predictive tools
  - Improved predictions in advance of actions
  - Comparison to ‘no-action’ conditions
- ‘Detecting effects’ in different ways
  - Less specific information but available more quickly

QUESTIONS?