

# Introducing Conceptual Models

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# Why Build A Conceptual Model?

- Clarifies relationships between conservation targets, threats, opportunities, actions
- Clarifies your understanding about how a project or program will work
- Helps identify key resources, processes for measurement
- Helps with management indicator selection

# Two Key Information Needs For Management

- **Status Measures** – “How is a (species, ecosystem, resource) doing?”
- **Effectiveness Measures** – “Did / will our actions have the desired effect?”

Conceptual models can help with both needs

# Conceptual Models

- Very Simple – box-and-sticks diagrams
- Very Complex – detailed maps of how the world works, or how a project or program might affect the world
- Qualitative
- Quantitative

Different types of model are appropriate for different management scenarios

# Conceptual Models

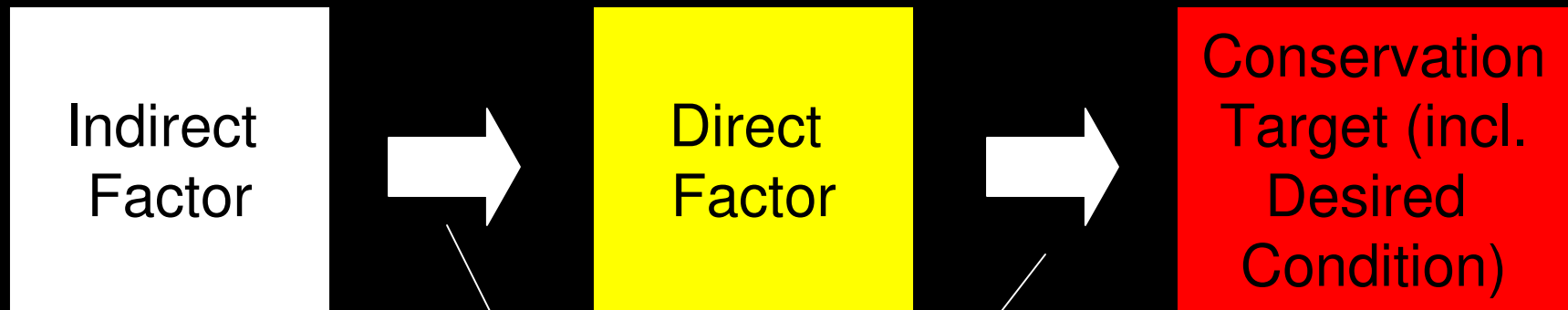
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Different types of model are appropriate for different management scenarios

# Starting to Build

- Start by identifying a **target** (species / ecosystem type / conservation area)
- Determine **desired condition** for target
- Identify **factors** affecting target, both positive factors (**opportunities**) and negative factors (**threats, obstacles**)
- Determine which factors **directly** affect target and which are **indirect** (i.e., act on or through other factors to affect target)

# Use Arrows to Show Causal Links



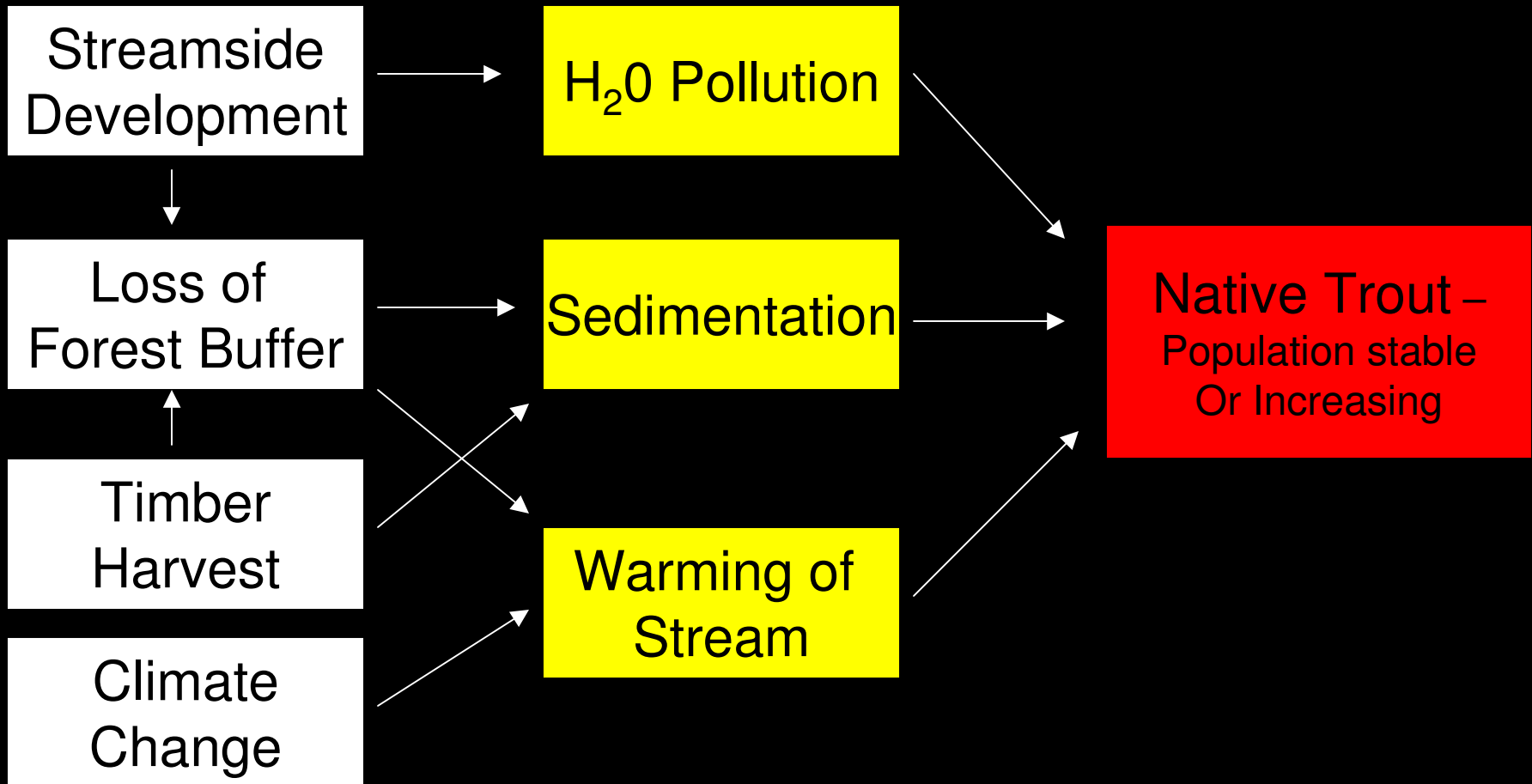
Causal Linkages

# A Simple Example

Indirect  
Factors

Direct  
Factors

Conservation  
Target



# Some Tips on Modeling

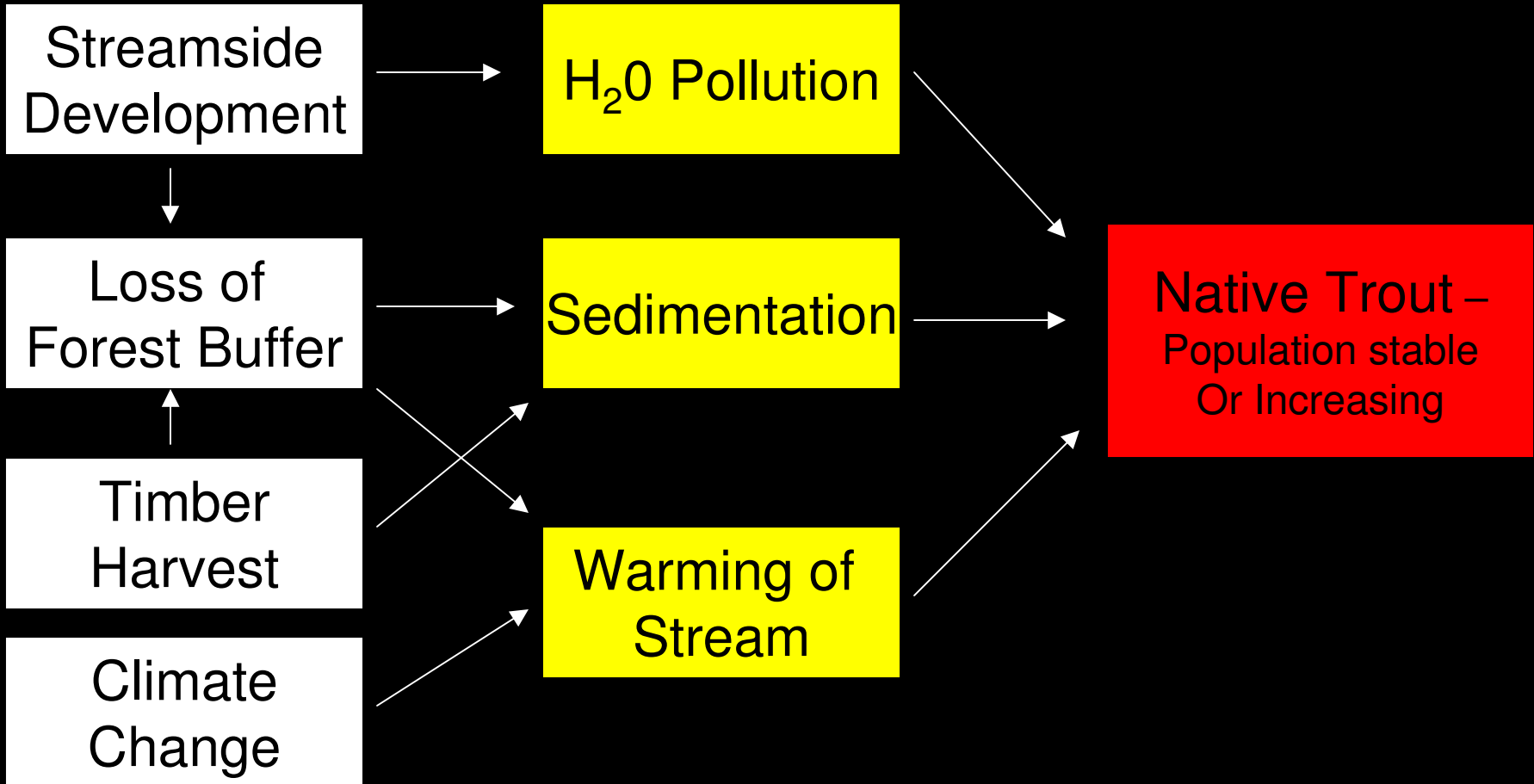
- Comprehensive, not exhaustive
- Tailor to your specific management situation (scope, scale, etc.)
- Try to include all major factors affecting the target
- Complex causal linkages are possible; a single indirect factor can affect multiple direct factors
- Interactions between direct factors also possible.

# Example, Again

Indirect  
Factors

Direct  
Factors

Conservation  
Target



# Selecting Status Indicators For Targets

- “How is a (species, ecosystem) doing?”
- Desired Condition statements are first step:
  - How would I measure each element of the Desired Condition?
  - How would I know whether the target is at or exceeds desired condition?
- Also consider measurements of key factors, if these are not already in Desired Condition
- Some status measures are straightforward (G rank, population size, ecosystem extent)

# Selecting Status Indicators For Targets - 2

- Detailed knowledge of species biology, population dynamics, ecosystem processes can be helpful, as can more detailed and specialized models
- Demographic parameters or process rates may be more important as status indicators than “counting things”
- Input from species/ecosystem experts can be helpful

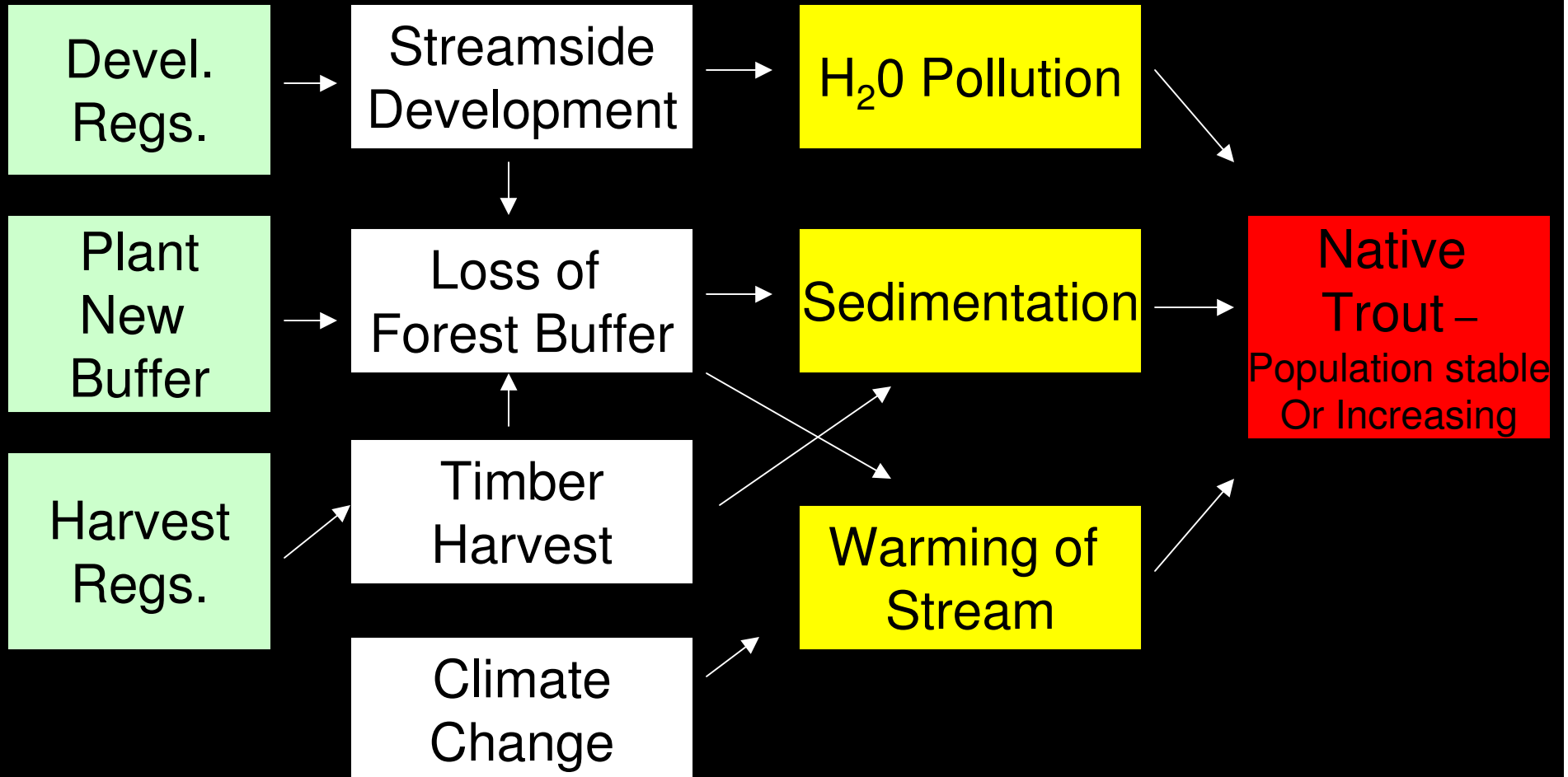
# Selecting Performance Indicators

From Conceptual Models  
To Causal Chains

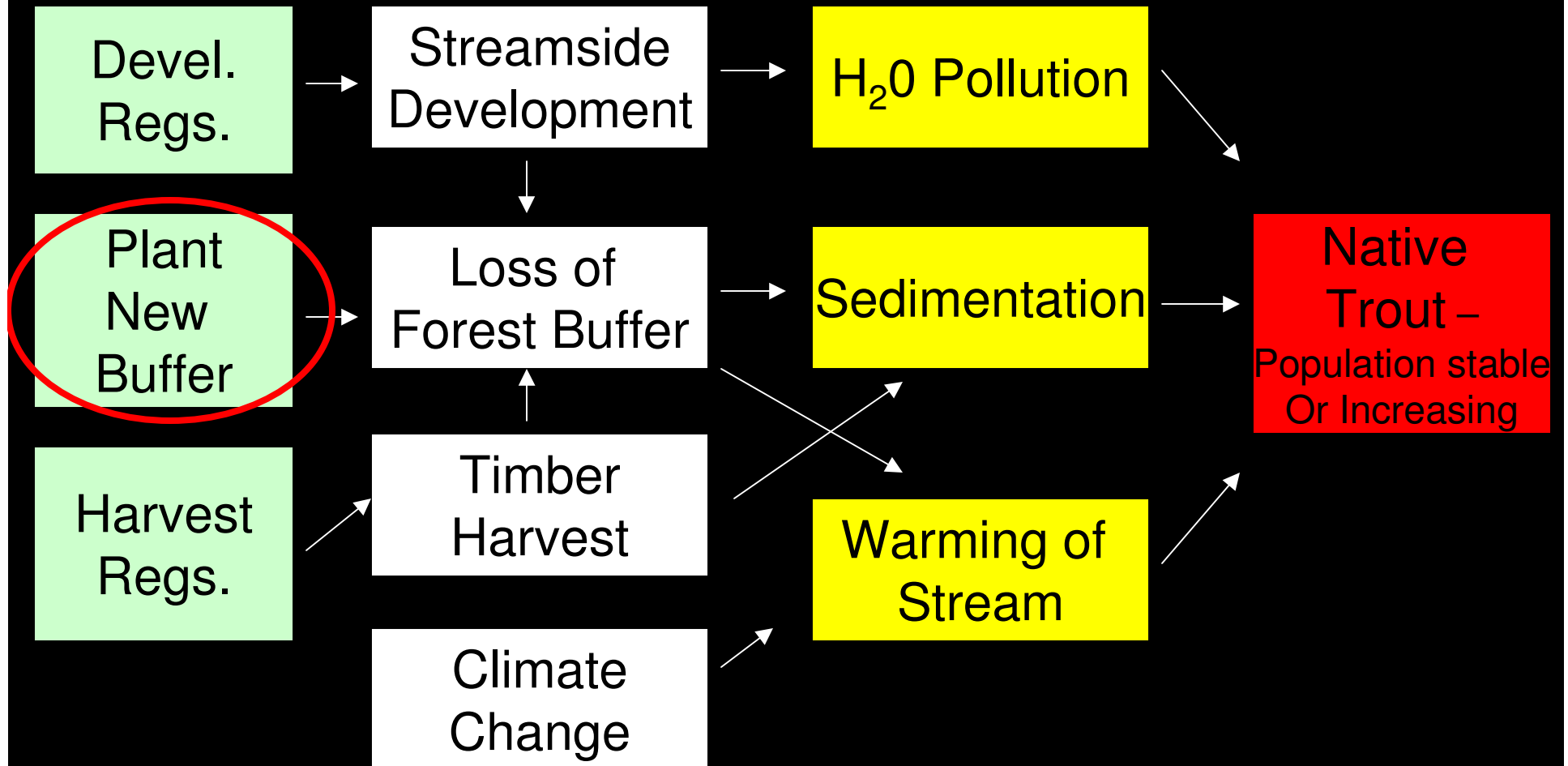
# Adding Actions to the Model

- Start by adding in conservation activities that you think will benefit the target
- Show causal linkages between activities and factors, target
- Activities usually map to one or more of the direct or indirect factors
- For example:

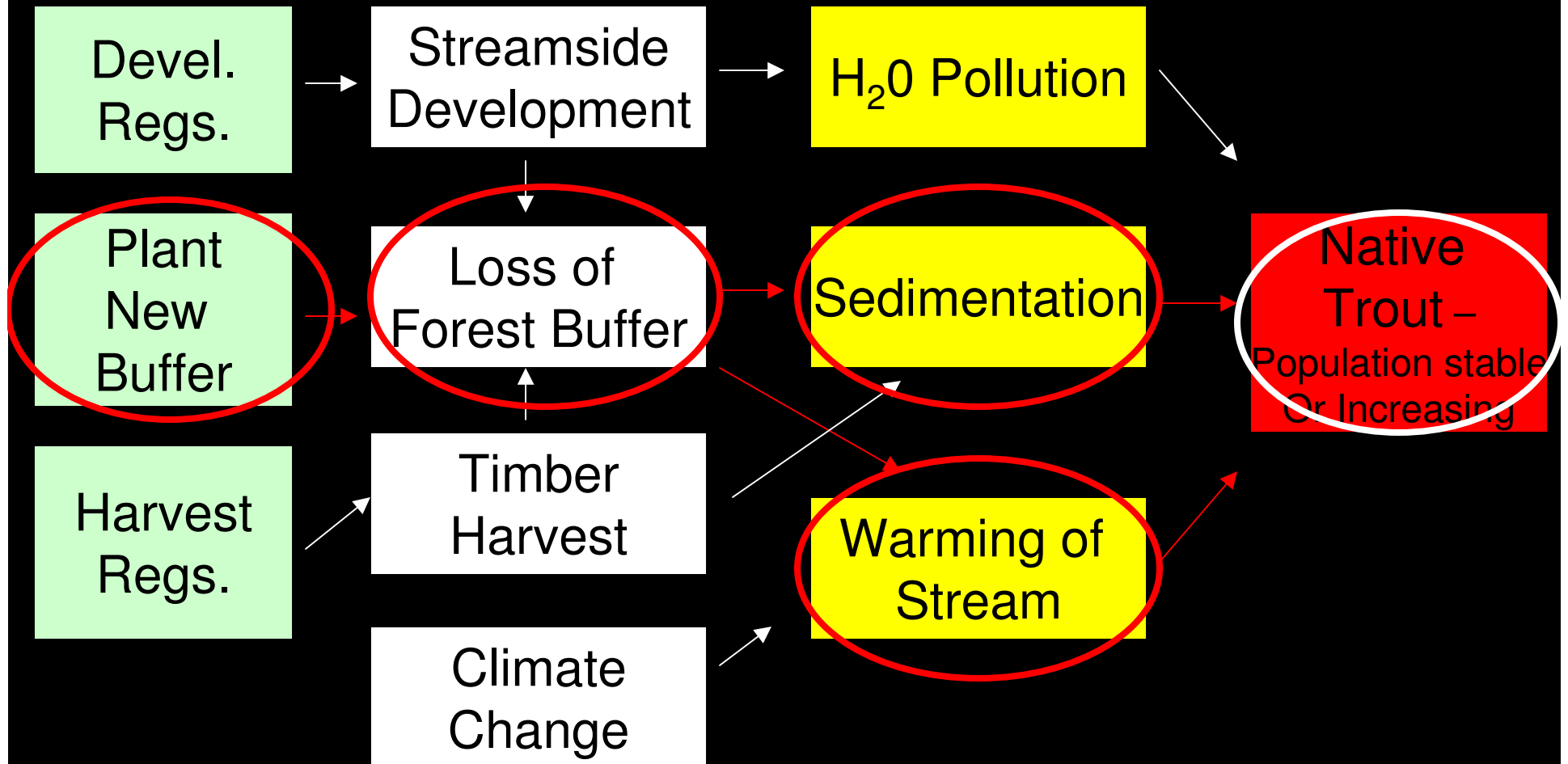
# Conceptual Model, With Actions



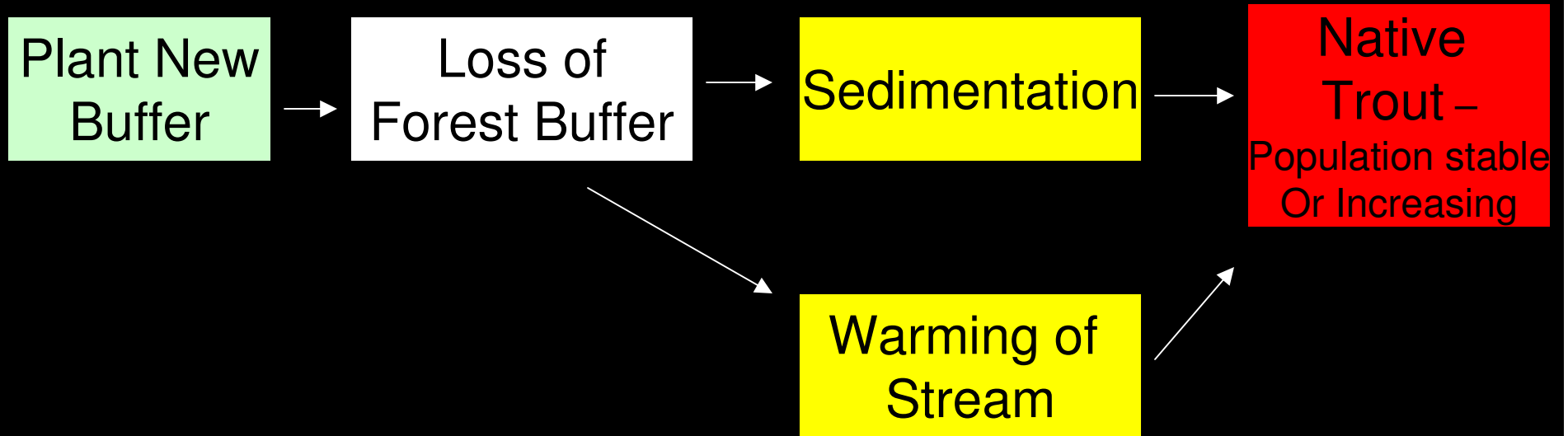
# Select an Action



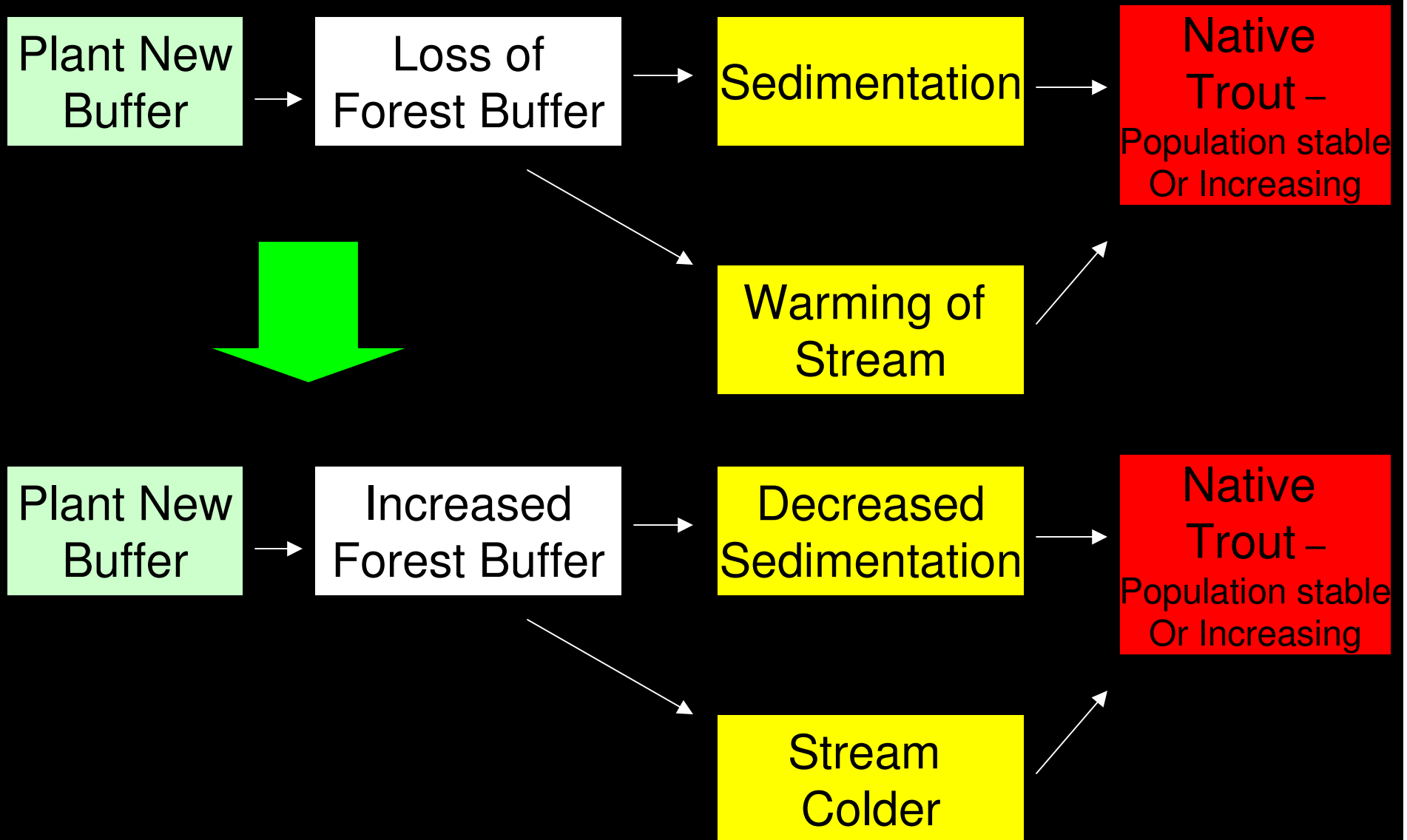
# Follow Causal Link(s) to the Target



# Convert Factors into Results



# Convert Factors into Results



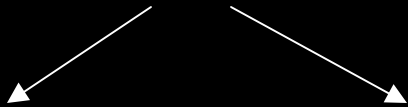
# Review the Causal Chain

- Do the steps make logical sense?
  - If not, edit and revise until you are comfortable with the sequence and logic
- Are there steps that are missing?
  - If yes, add additional steps, using “what happens next” as key question
  - Better to be explicit and detailed here – spell out all of the steps between actions and anticipated outcomes
- Is there scientific evidence that links the proposed actions with the desired outcomes?

Plant New  
Buffer

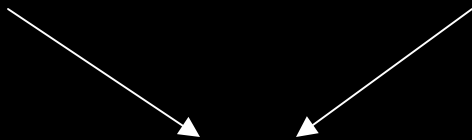


Increased  
Forest Buffer

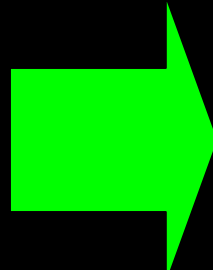


Decreased  
Sedimentation

Stream  
Colder



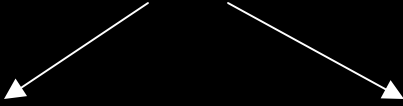
Native  
Trout –  
Population stable  
Or Increasing



Plant New Buffer

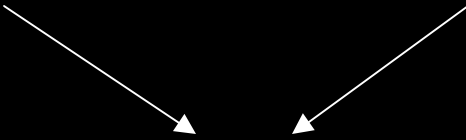


Increased Forest Buffer



Decreased Sedimentation

Stream Colder

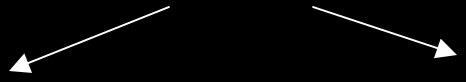


Native Trout -  
Population stable  
Or Increasing

Plant New Buffer



Increased Quantity  
Of Buffer



Run-off  
Absorbed

Trees  
Grow



Soil Erosion  
Checked

Stream  
Shaded



Less Sediment

Colder  
Stream



Better Spawning Habitat

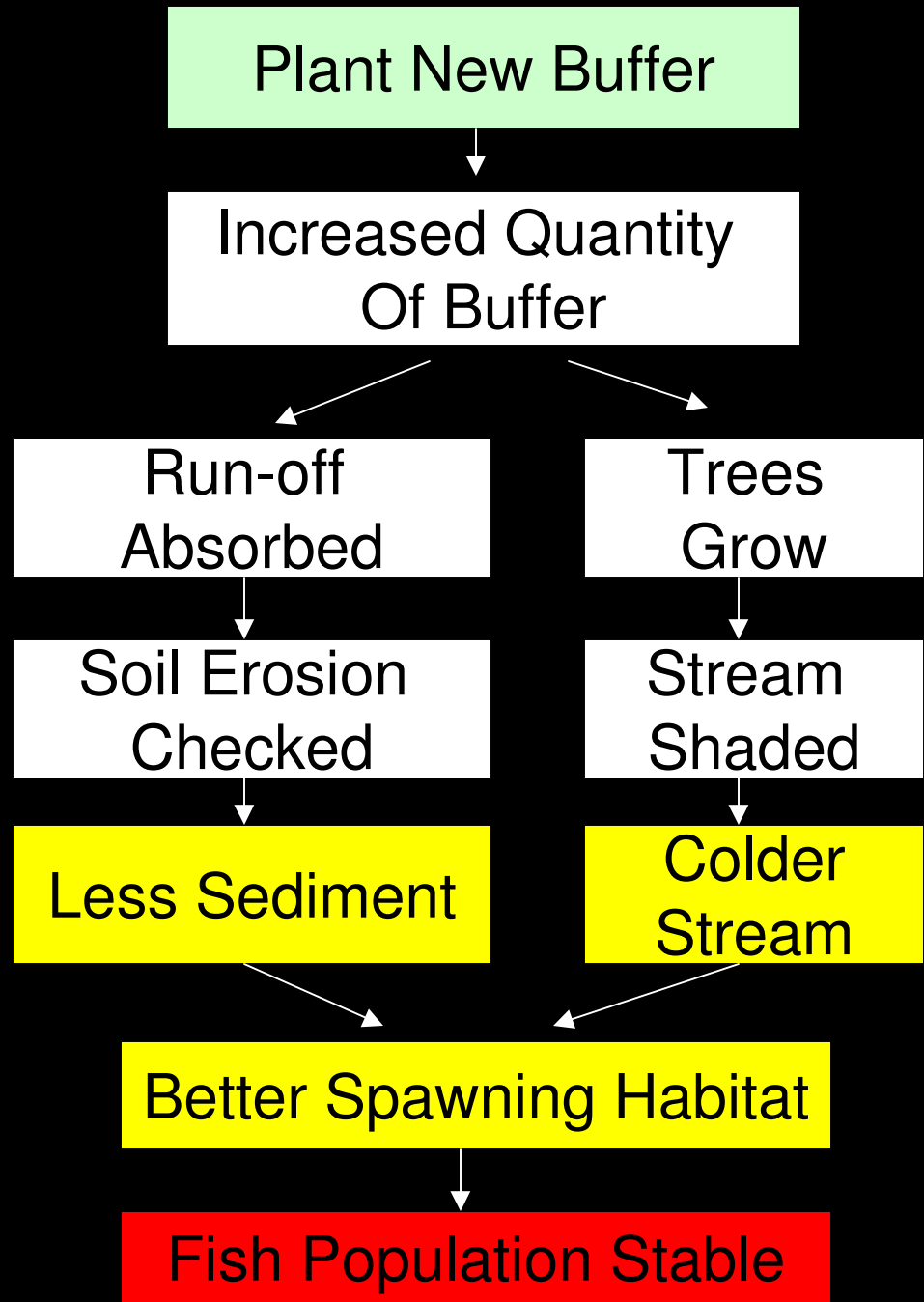


Fish Population Stable

# Selecting Indicators

Ask:

- “How would you measure this?” for each step along the detailed causal chain.
- “What information would tell me whether or not this step actually occurred as we thought it would?”
- “If I could only know one piece of information about this step, what would it be?”



Plant New Buffer

Miles of New Buffer Planted

Increased Quantity Of Buffer

Total Miles of Buffer In Watershed

Run-off Volume

Run-off Absorbed

Trees Grow

Forest Buffer Basal Area

Rate of Bank Erosion

Soil Erosion Checked

Stream Shaded

Canopy Cover Over Stream

Amount of Sediment

Less Sediment

Colder Stream

Water Temperature

Fish Population Size and Trends; Reproduction; Recruitment; etc.

Better Spawning Habitat

Amount of Stream Acceptable for Spawning: Temp., Substrate Type, Stream Flow, etc.

Fish Population Stable

# Choosing a Final Indicator Set

- Tell a story – indicators in combination with causal chain should help to explain your work
- Indicators that describe what you did (*outputs*) as well as indicators that measure what you hope will happen (*outcomes*)
- Both short-term and long-term indicators
- Indicators for which data are available
- Indicators for which scientific measurement protocols are available
- Cost of new / additional measurements

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# Next Steps

- Some indicators are easily measured (especially outputs – “what we did”)
- Others will require input on indicator design from taxon / ecosystem monitoring experts
- Existing data may be available
- Recommend obtaining expert guidance in developing new monitoring programs and approaches
- For reporting, use the causal chain plus indicator measurements to tell a story about what project did and why it is likely to achieve results

# Logic of Garden Club Visit

Give Presentation To Garden Club



Garden Club Members Identify  
SWAP-Compatible Activities



Garden Club Members Build,  
Install Bluebird Nest Boxes



Increased Nesting  
Habitat for Bluebirds



Increased Bluebird Populations

Create State  
Wildlife Plan

Engage  
Action Partners

Protect  
Habitat

Manage/  
Restore  
Habitat

Manage  
Rare Species

Reduce  
Human  
Impacts

Sustainable  
Ecosystems

Healthy  
Wildlife  
Populations

