Assisted Migration Best Management Practices for Riparian Restoration Projects

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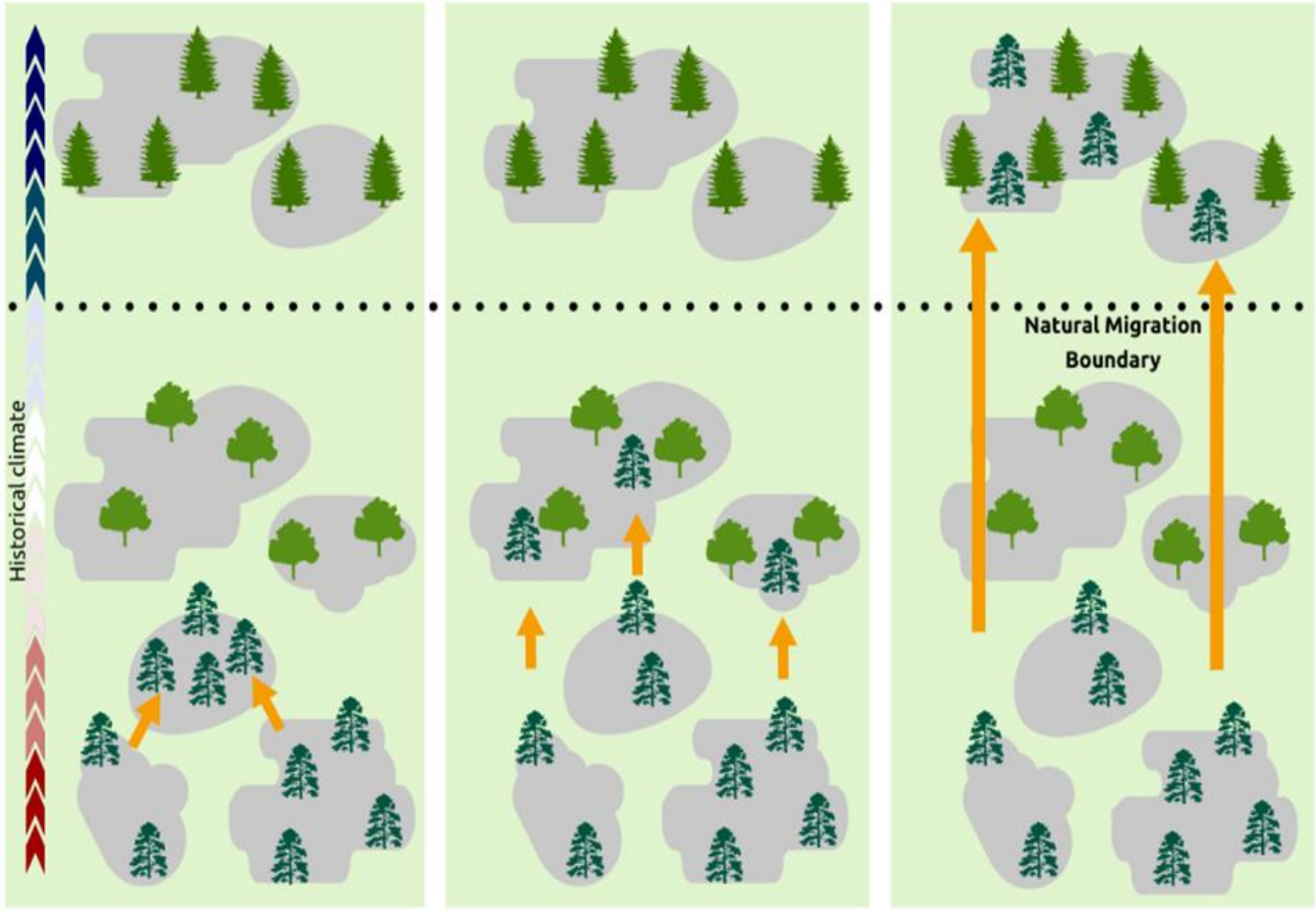
Assisted Migration - Definitions



Three Types of Assisted Migration

Assisted Migration - Approaches

- Species Rescue Perspective
- Ecosystem Services Perspective

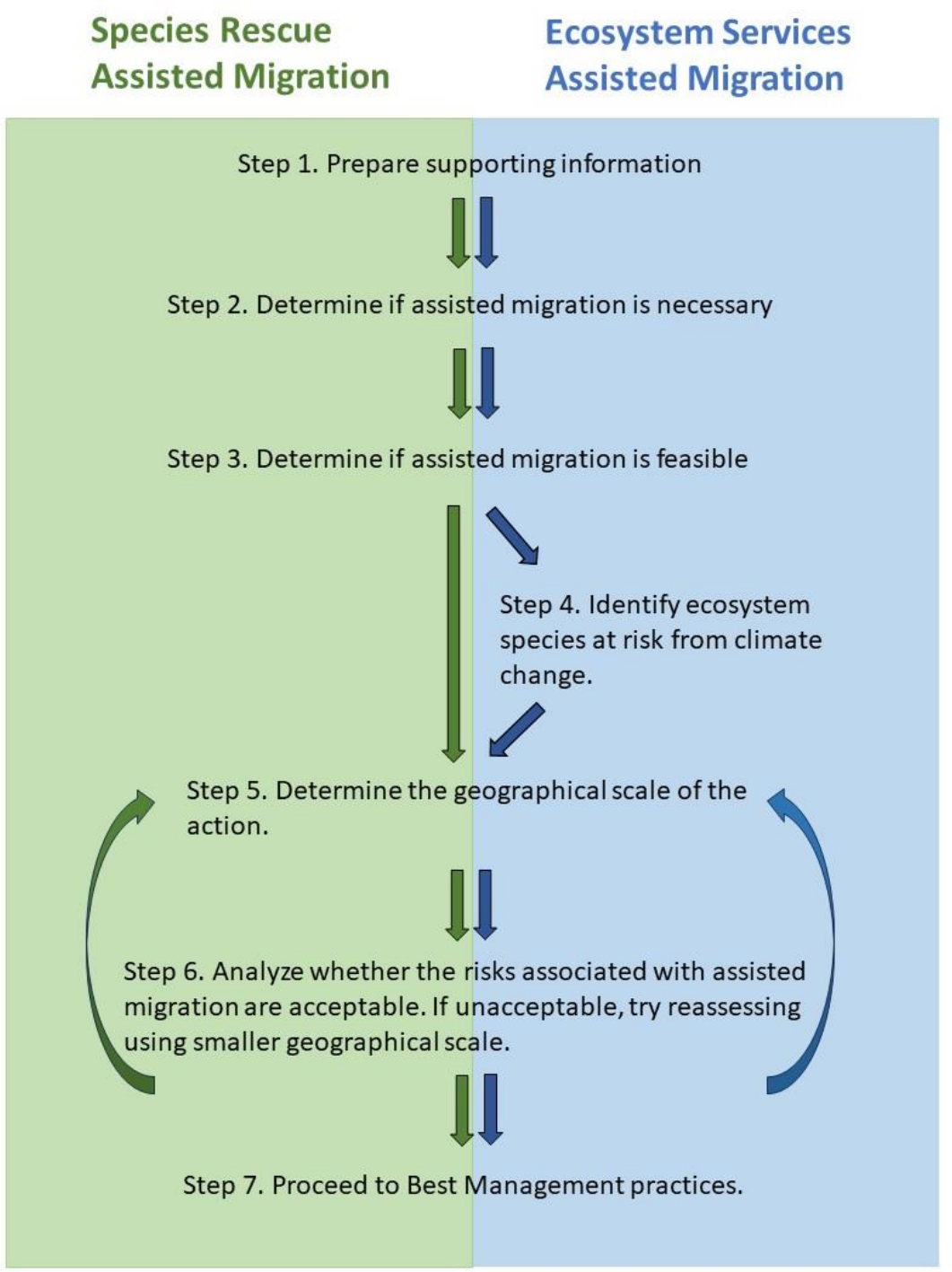
Assisted Migration - Theory

- Climate shapes plant phenology, morphology, and growth
- Plants can migrate, but not fast enough to keep up with future climate change
- Plants will suffer with altered growing seasons

Assisted Migration – Risks

- Poor survival
- Introduction of invasive plant genotypes or species
- Introduction of invasive pests or pathogens
- Poor community structure
- Genetic alteration of existing population
- Risks increase with the distance that plants are moved
- Risks to doing nothing

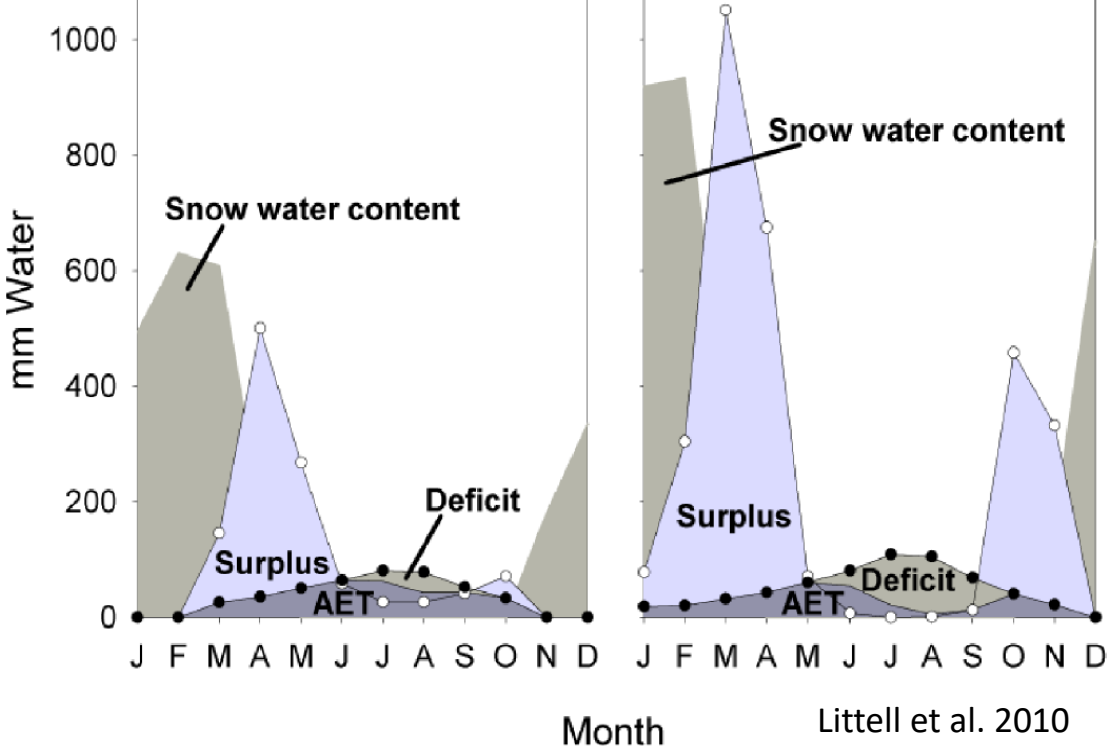
Assisted Migration – Decision Tree



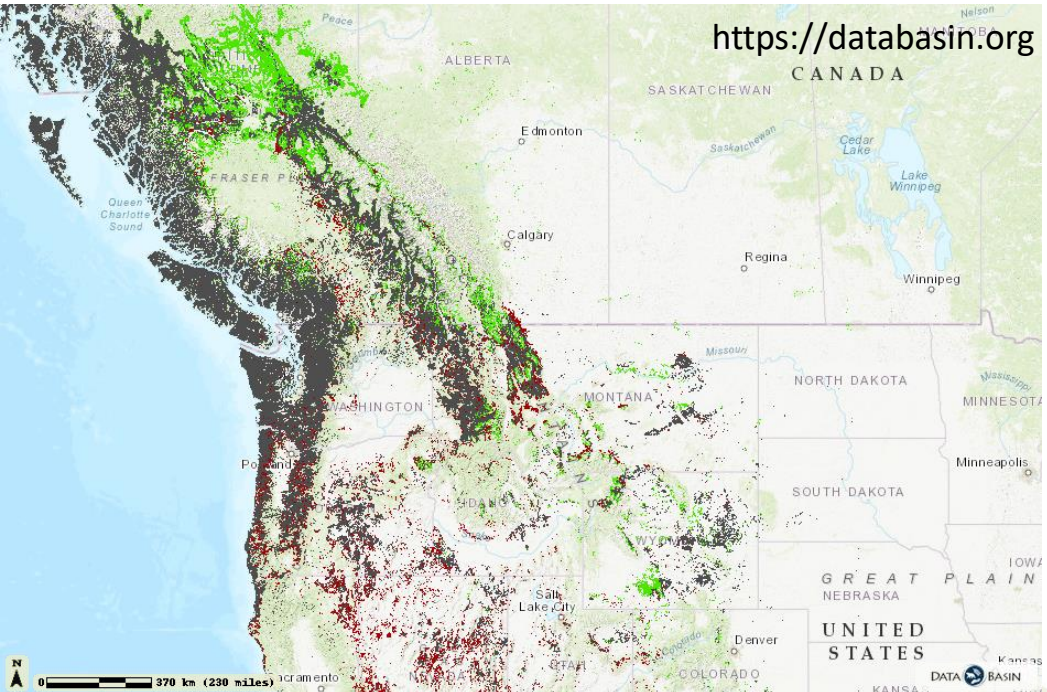
Case Study: Milltown Restoration Site, South Fork Skagit River, Washington

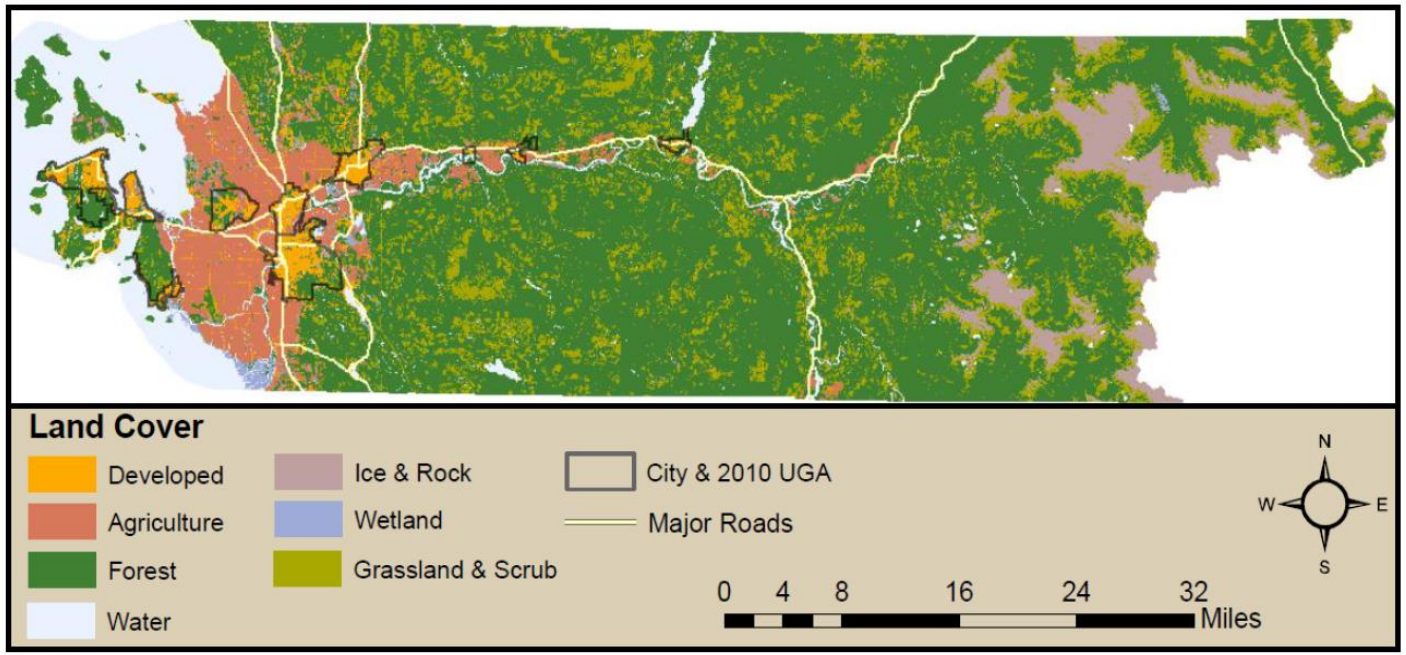
Step 1: Gather background information

- Ethical considerations
- Ecological issues
- Organizational considerations



Littell et al. 2010

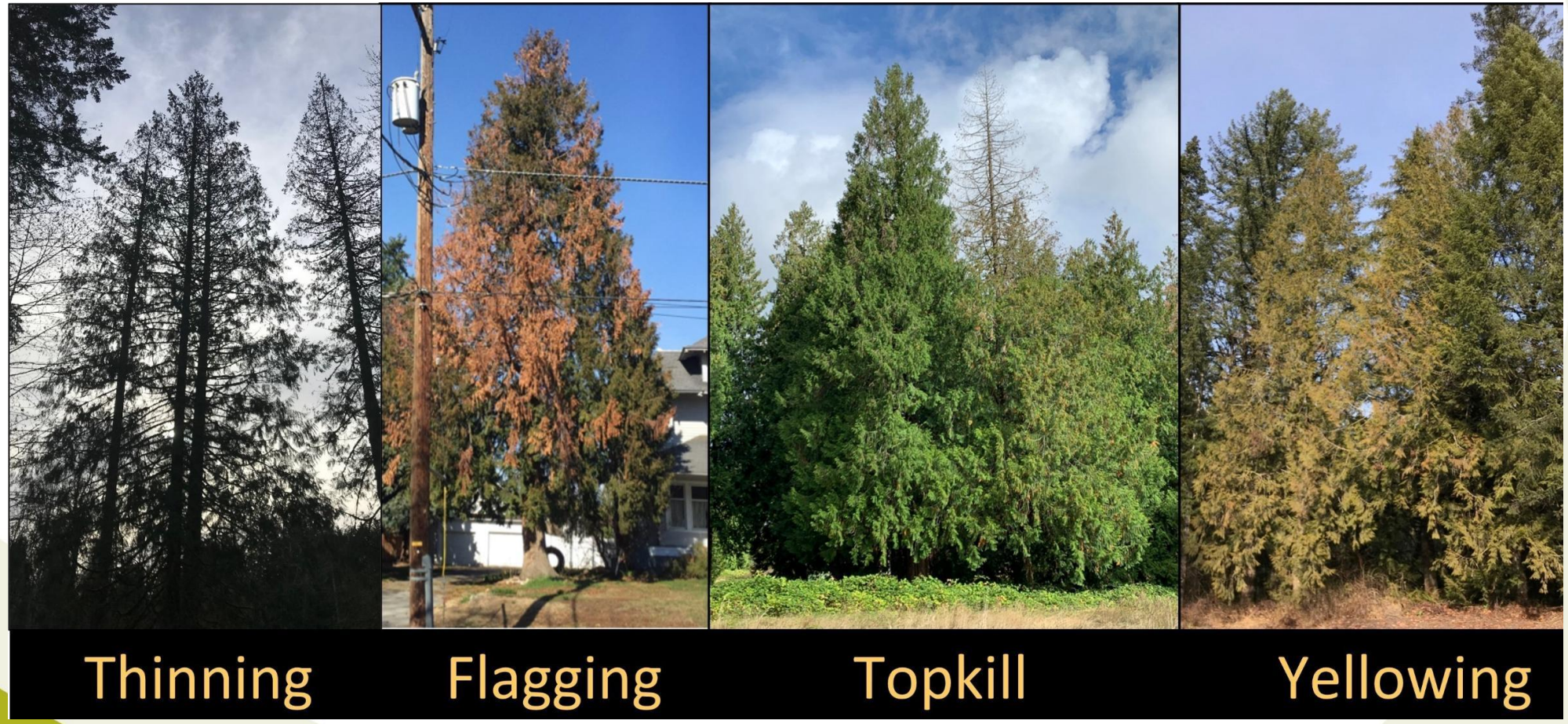




Step 2: Determine if Assisted Migration is Feasible

- Determine the timeframe
- Find the plant materials
- Analyze the costs
- Determine whether stakeholders are supportive

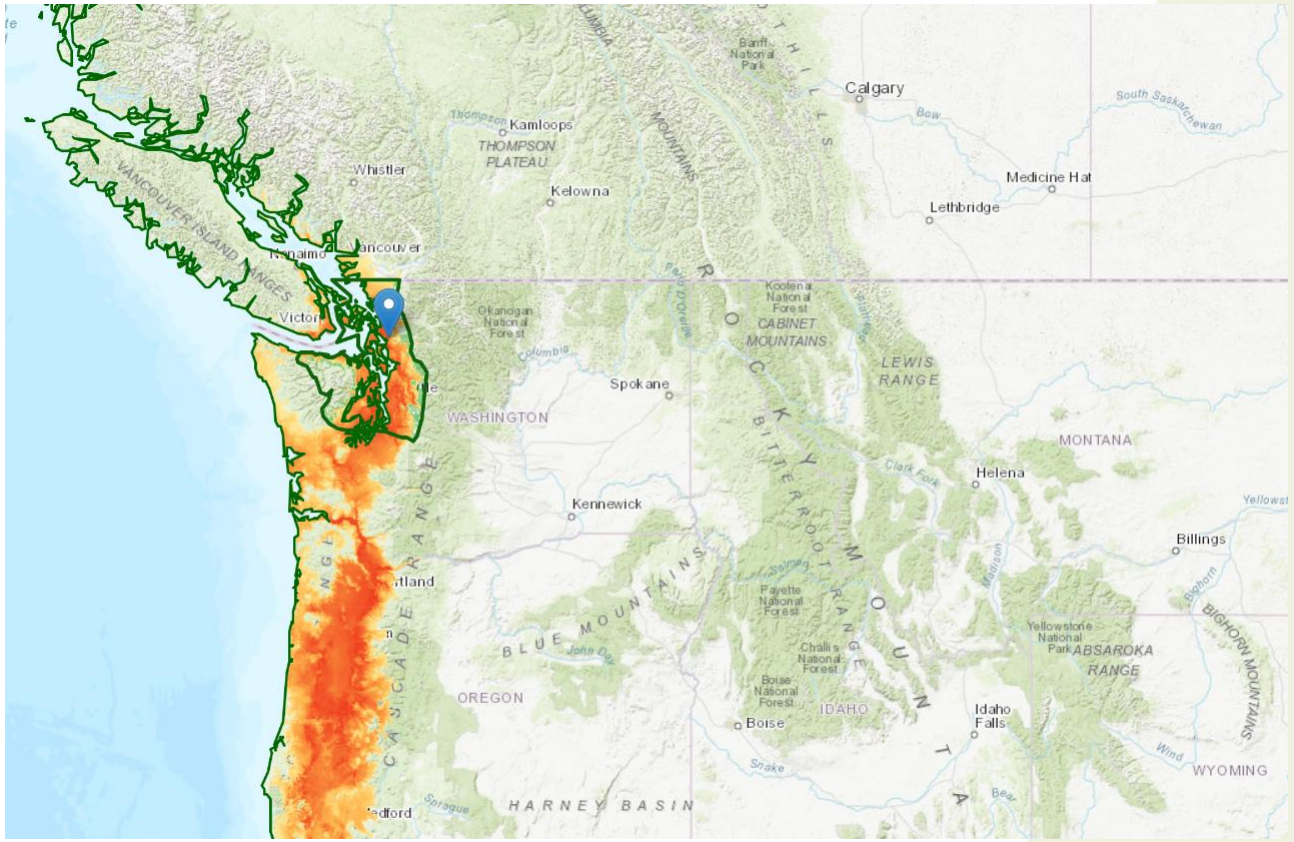
Step 4: Identify species at risk from climate change



https://storymaps.arcgis.com/stories/1405dab5f59246aa83849ec43f72b15a

Step 5: Determine the geographical scale of the action

- Seedlot selection tool



(https://consbio.org/products/projects/seedlot-selection-tool).
Planting site climate: 2071-2100.

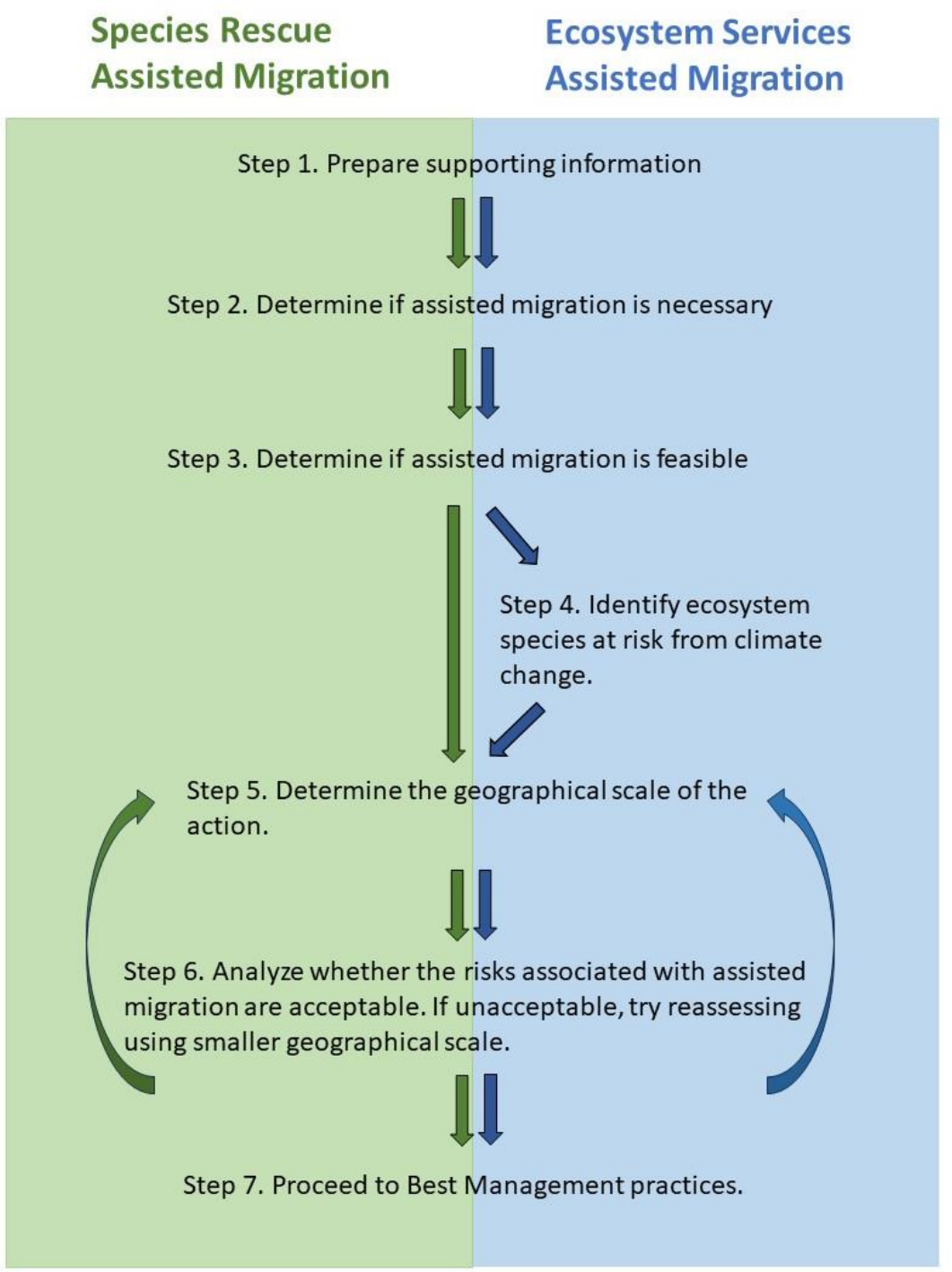
Step 6. Analyze whether the risks associated with assisted migration are acceptable

Risk	Confidence
Low	High
Moderate	Moderate
High	Low
Very High	

Section	Risk Criteria				
Risk of:	A	B	C	D	E
I. No action	No action to target	No action to recipient ecosystem			
II. Action to the target	Risk to relocated individuals	Risk to source population withstanding decrease in numbers	Risk of removing target will negatively impact key function in source ecosystem	Relocated population causing undesired evolution in target	Other: 1. Target not adapted to future climate. 2. Effect on supply chain
III. Action to non-targets	Risk of target transmitting novel disease or associated pest	Risk of competitive interaction negatively affecting abundance or distribution of non-targets	Risk of consumptive effects reducing the abundance or distribution of non-targets	Risk of driving undesired evolution in non-targets	
IV. Action to recipient ecosystem	Risk of indirect and negative impacts on ecosystem structure	Risk of changing ecosystem function			
V. Spread and invasion	Risk of invasion within the intended recipient ecosystem	Risk of invasion beyond the recipient ecosystem	Risk of irreversibility of the managed relocation action	Other	
VI. Adverse socio-economic values	Risk to a culturally or economically important species	Risk to a valued ecosystem service	Other		

Karasov-Olson et al. (2021) matrix to assess risk of assisted western red cedar population migration in lower Skagit River riparian restoration project

Assisted Migration – Decision Tree



Best Management Practices - Assisted population migration

- Focus on at risk species
- Choose seed over seedlings
- Include plants with different climatic tolerances
- Plan for difficulties in acquiring stock
- Detect, isolate, and eliminate pests
- Plan for poor performance
- Monitor plants


Questions?