

UCBEC and Adaptive Management

CBRAC

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Restoring
Ecosystem Function

Greg Utzig
Kutenai Nature
Investigations Ltd.
Nelson, BC CANADA
g13utzig@telus.net
www.kootenayresilience.org

Outline

Columbia Basin Ecosystems

- UCBECC – what is it?
- What are we about?
- What are we doing?
- What is Adaptive Management?

Upper Columbia Basin Environmental Collaborative (UCBEC)

A collaboration between:

- ” Provincial Organizations
 - . Sierra Club of BC
 - . BC Naturalists
- ” Regional Organizations
 - . Yellowstone to Yukon (Y2Y)
 - . Wildsight
- ” Local Organizations
 - . Friends of Kootenay Lake (FoKL)
 - . North Columbia Environmental Society (NCES)

Columbia River Roundtable Membership

- ” Regular consultation with:
 - . US ENGOs, BC First Nations, US Tribes



Basin Components

Treaty Dams/ Reservoirs

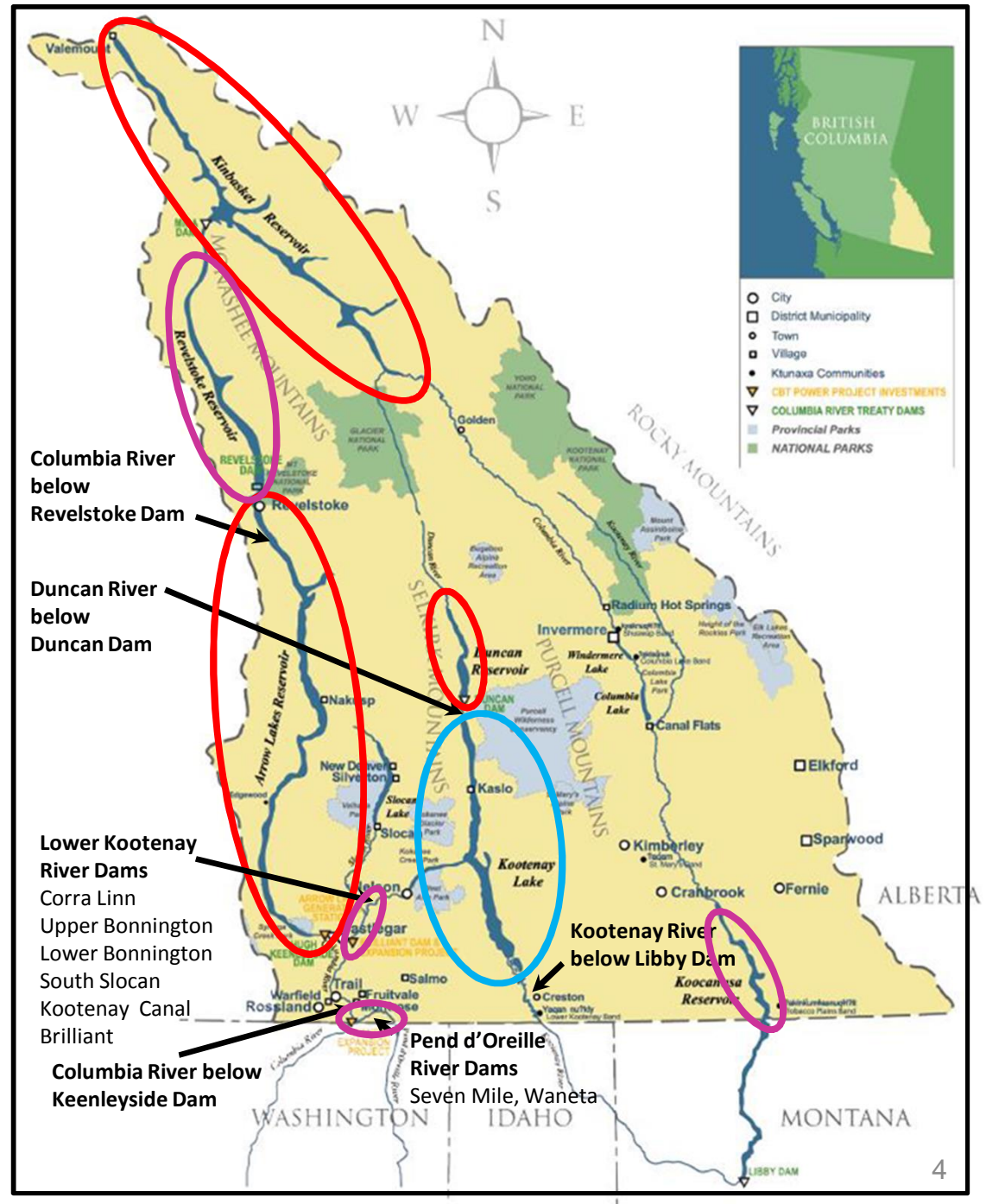
- “ Keenleyside/ Arrow Lakes
- “ Mica/ Kinbasket
- “ Duncan

Non-Treaty Dams/ Reservoirs

- “ Revelstoke
- “ Libby/ Kooconusa
- “ Lower Kootenay River Dams
- “ Pend d'Orielle Dams

Affected Lakes/ Rivers

- “ Kootenay Lake
- “ Kootenay River (lower/ upper)
- “ Duncan River
- “ Columbia (above/ below Arrow)
- “ Pend d'Orielle River



Our Concerns



Habitat Losses

- “ Terrestrial Uplands
- “ Riparian
- “ Wetlands
- “ Large Rivers
- “ Low Gradient Streams
- “ Lakes

Lost Primary Productivity

- “ Carbon sequestration

Non-Treaty Issues:

- “ Further Habitat Losses
- “ Further Productivity Losses
- “ Non-Treaty Storage Operations
- “ Seasonal/ Daily River Flows
- “ Anadromous Fish Blockages

Columbia River Treaty:

- “ Reservoir Flooding
- “ Storage Operations

Other Related Threats:

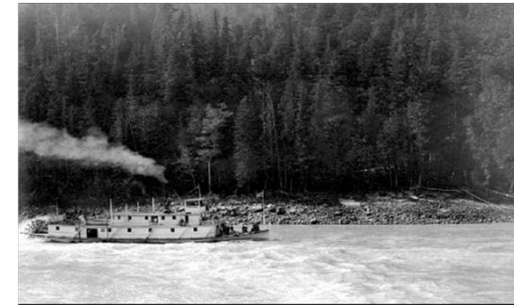
- “ Non-Treaty Dams (Libby, Revelstoke)
- “ Non-Treaty Storage Agreements (NTSAs)
- “ Lower Kootenay River Dams
(Fortis, Columbia Power Corporation, Teck, BC Hydro)
- “ Pend d'Oreille Dams
- “ Peaking Operations
- “ Downstream Dams . e.g. Grand Coulee
- “ Governance Models



Minimal Pre-Dam Impact Assessments

Effects on Fish and Game Species
of Development of
Duncan Dam
for Hydro-electric Purposes

by
G. R. Peterson and I. L. Witbler



Effects on Wildlife

Waterfowl and aquatic fur bearer habitat will be completely removed from the Duncan drainage. Migration habitat will be removed for about 50,000 ducks, 5,000 geese, 1,000 swans and other waterfowl and wetland species. At present little basis exists for an accurate estimate of beaver and muskrat resources of the Duncan drainage, but about 1,000 beaver and 2,000 muskrat may be displaced.

The evaluation of the changes to fish, wildlife, and recreation now presented cannot be considered complete.

Mica

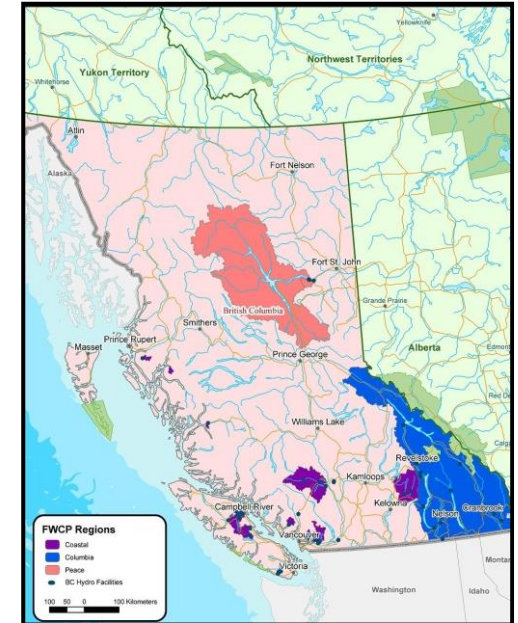
TABLE 5
WILDLIFE CHANGES DUE TO RESERVOIR

Species	Estimated Population	Anticipated Losses	Remnant Population
Moose	2,000	70 %	600
Elk	300	40	180
Deer	800	50	400
Caribou	500	10	450
Goat	1,000	0	1,000
Black Bear	3,000	70	900
Grizzly Bear	100	30	70
Wolf	100	70	30
Cougar	25	50	12
Snowshoe Hare	?	50	?
Coyote	?	70	?
Lynx	?	40	?
Bobcat	?	10	?
Ruffed Grouse	?	70	?
Franklin Grouse	?	30	?
Blue Grouse	?	10	?
Ptarmigan	?	0	?
Squirrel	?	20	?
Marten	?	20	?
Weasel	?	50	?
Muskrat	4,000	100	Nil
Beaver	3,000	90	300
Mink	2,000	80	400
Fisher	1,000	20	800
Otter	300	80	60
Wolverine	1,000	10	900
Osprey	14	90	2
Bald Eagle	?	70	?
Peregrine Falcon	?	100	Nil

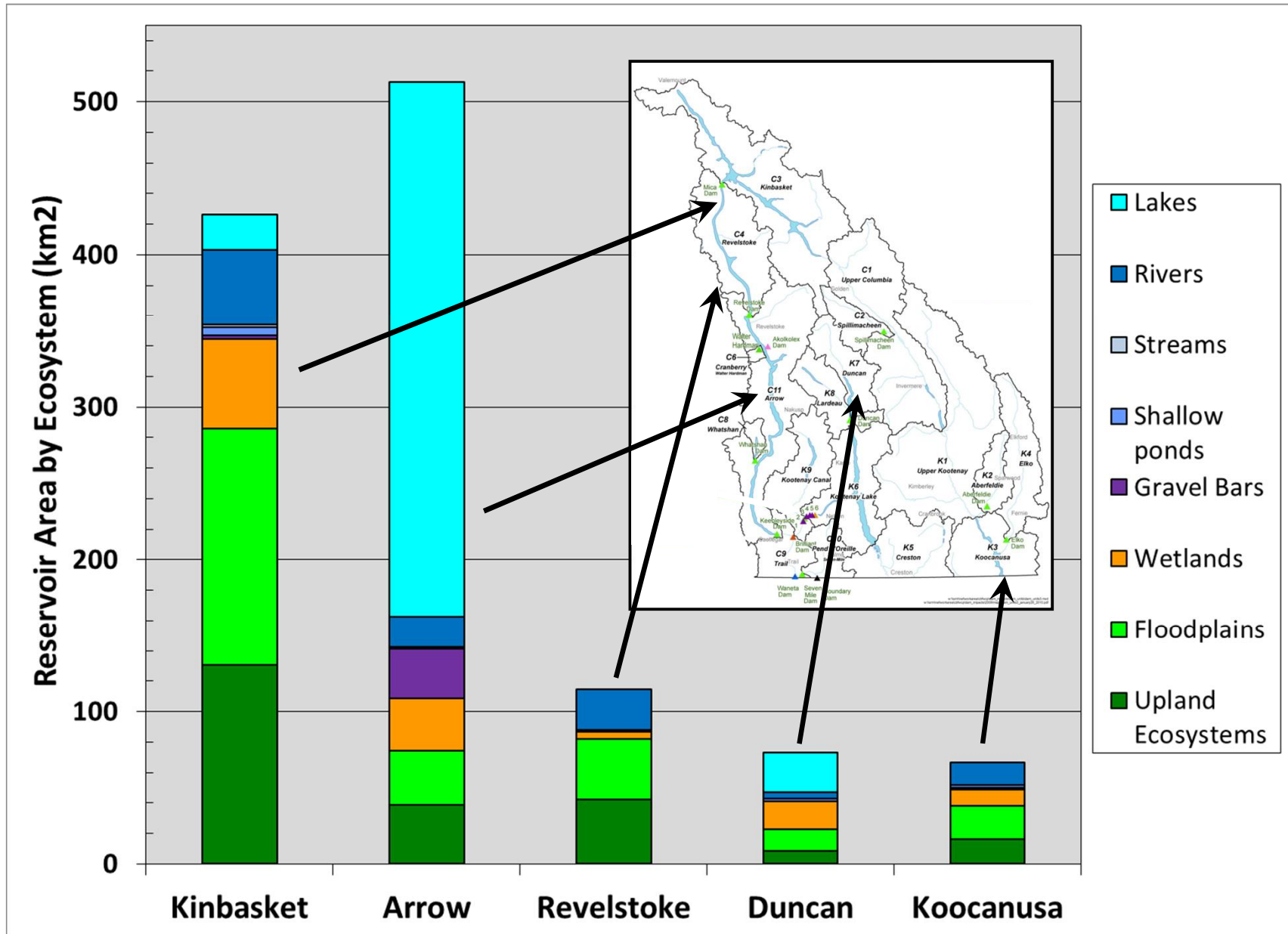
A4 - 26

Dam Impacts Project

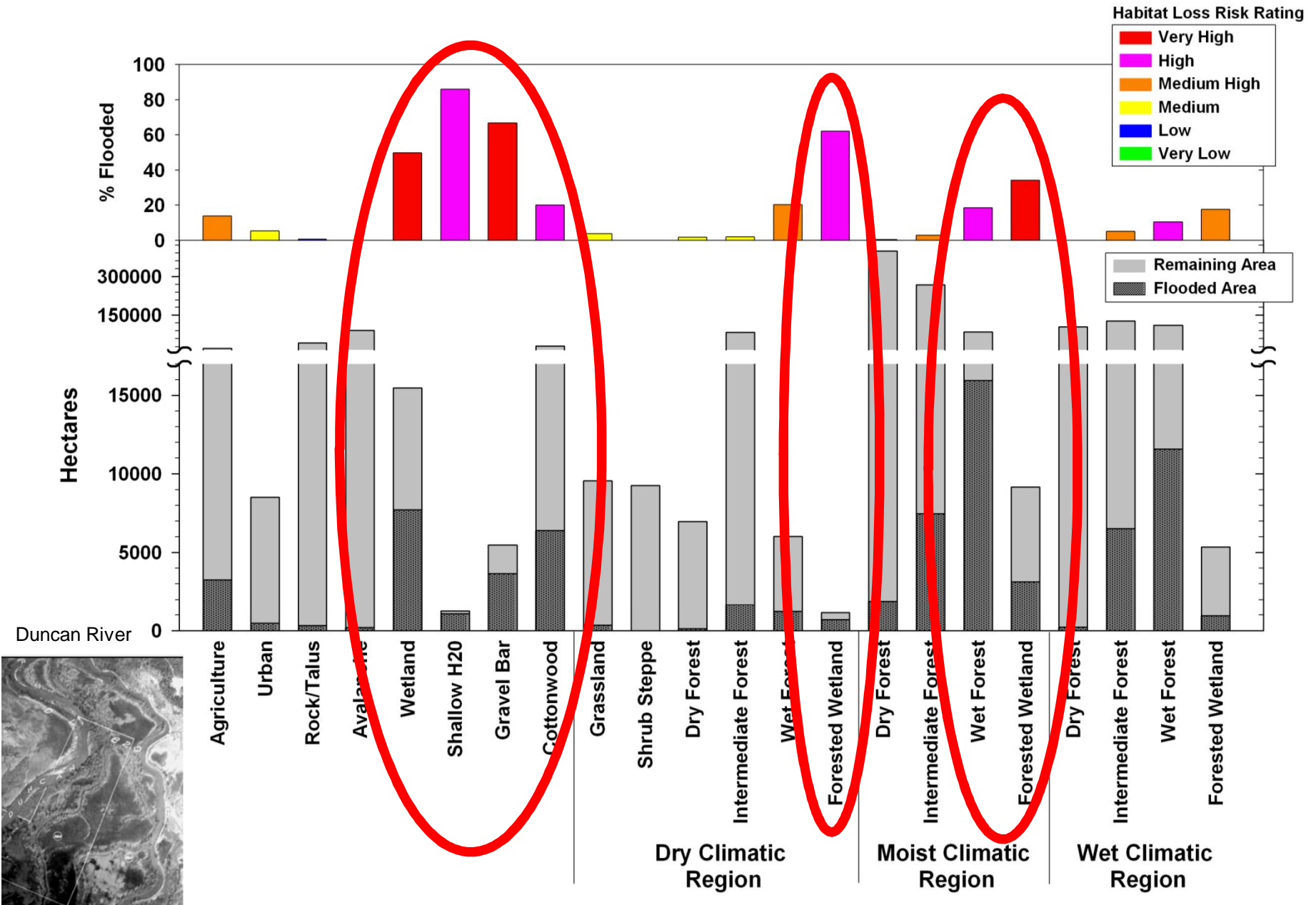
- “ Initiated by BC Fish and Wildlife Compensation Program–Columbia Basin in 2005 – completed in 2011
- “ Objectives
 - Update our understanding of the impacts of dam construction
 - Assist in prioritization of compensation options
 - To support ongoing strategic and program planning
 - Facilitate in reporting the progress in addressing the impacts



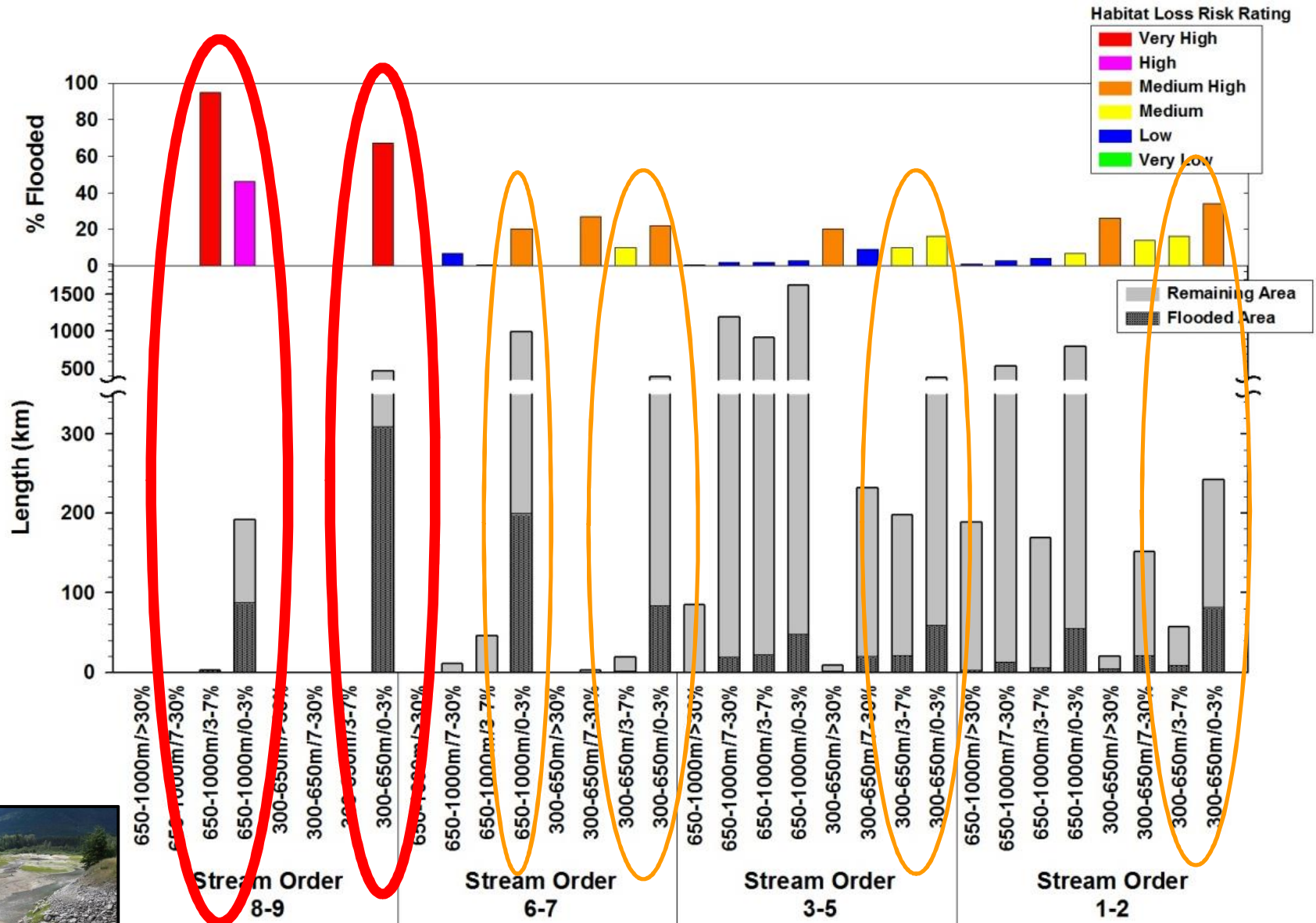
Area Flooded by Ecosystem



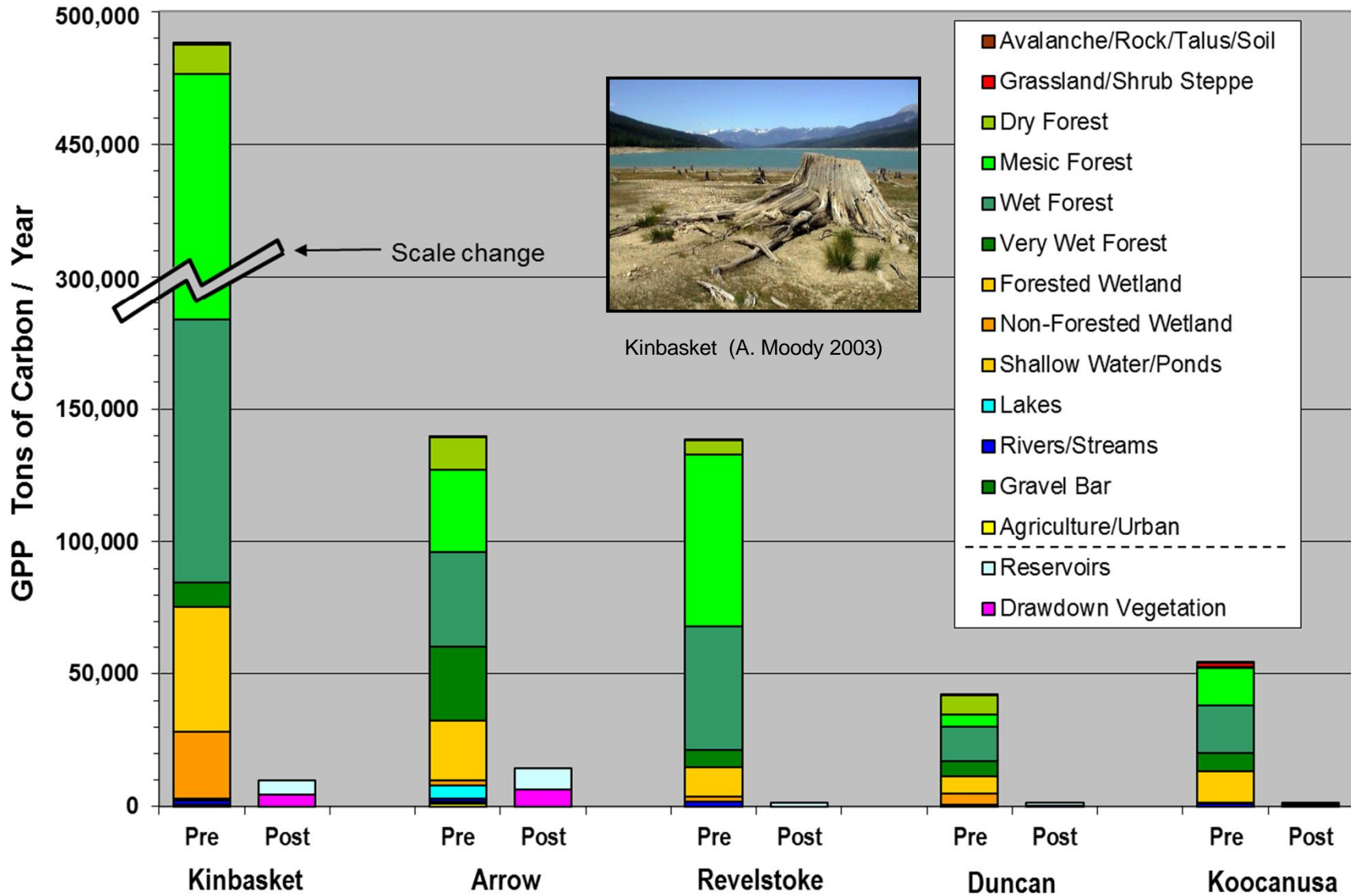
Terrestrial – Wetland Habitat Losses



River and Stream Habitat Losses



Primary Productivity Changes



UCBEC - What are we advocating?

- “ Increased emphasis on ecosystem function in all water management decisions
- “ Add ecosystem function as a third and equal purpose of the treaty
- “ Adjust the treaty governance to reflect the addition of a third purpose – e.g., add scientific expertise on ecosystem function and resilience to the operating entities
- “ Build flexibility into the treaty and NTSAAs to allow for active adaptive management to explore improving EF
- “ Ensure that ongoing adjustments to operations reflect the adaptive management monitoring results
- “ Improved trans-boundary local and regional participation in decision-making (Columbia and Kootenay systems)
- “ Increased funding for restoration/ compensation projects

UCBEC - What do we do?

- “ Preparation of discussion papers
- “ Past participation in EF Working Group/ Workshop
- “ Presentation to the Columbia River Symposium in Victoria, BC
- “ Presentation at the Lake Roosevelt Forum in Spokane, WA
- “ Presentation at the Pacific NW Economic Region in Spokane, WA
- “ Participation in One River – Ethics Matter Symposia
- “ Past participation in the International CB Modelling Working Group
- “ Direct discussions with BC Government at various levels
- “ Liaison with US ENGOs, Canadian FNs and US tribes
- “ Website for further information – www.kootenayresilience.org

What is Adaptive Management?

A structured, iterative process of learning, monitoring and adapting management in the face of uncertainty

- “ Learning from doing
- “ Purposes:
 - . To increase understanding of how systems function
 - . To reduce uncertainty over time through monitoring
 - . To improve future management
- “ Active vs. Passive – proactive with new alternatives and a focus on learning vs. monitoring ongoing management

Adaptive Management



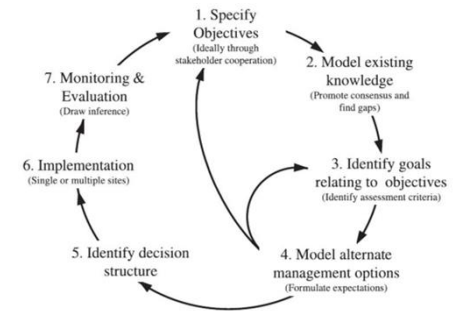
<http://www.conservationmeasures.org/>



<http://climateactiontool.org/content/use-threshold-based-adaptive-management-incorporate-ecological-thresholds-guide-coastal>

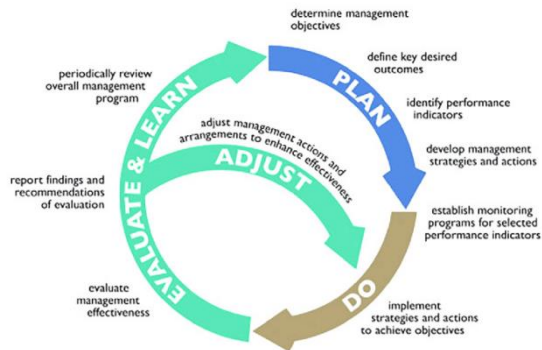


<https://www.assetmanagementbc.ca/framework/>



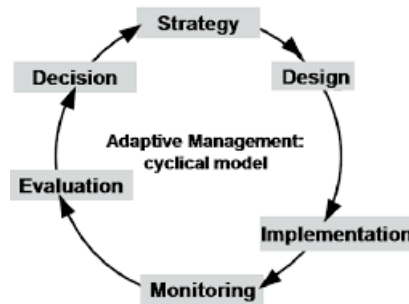
From: Schreiber et al. 2004, p.179

The adaptive management cycle

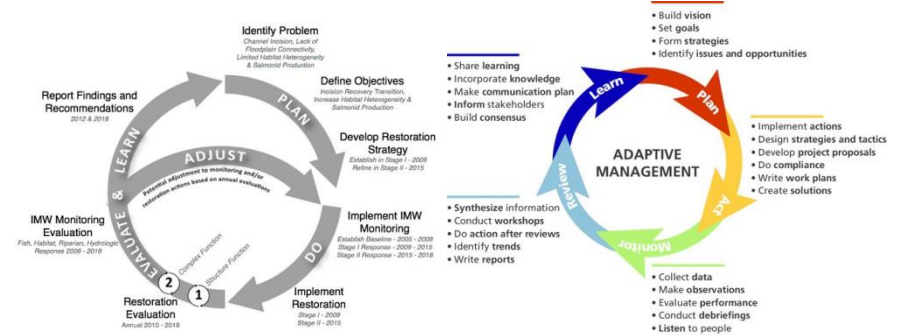


Source: DPIPNS 2014 after Jones 2005, 2009

2014; Jones 2005, 2009 Tasmania Parks and Wildlife Service (Department of Primary Industries, Parks, Wildlife and Heritage-DPIPWE)



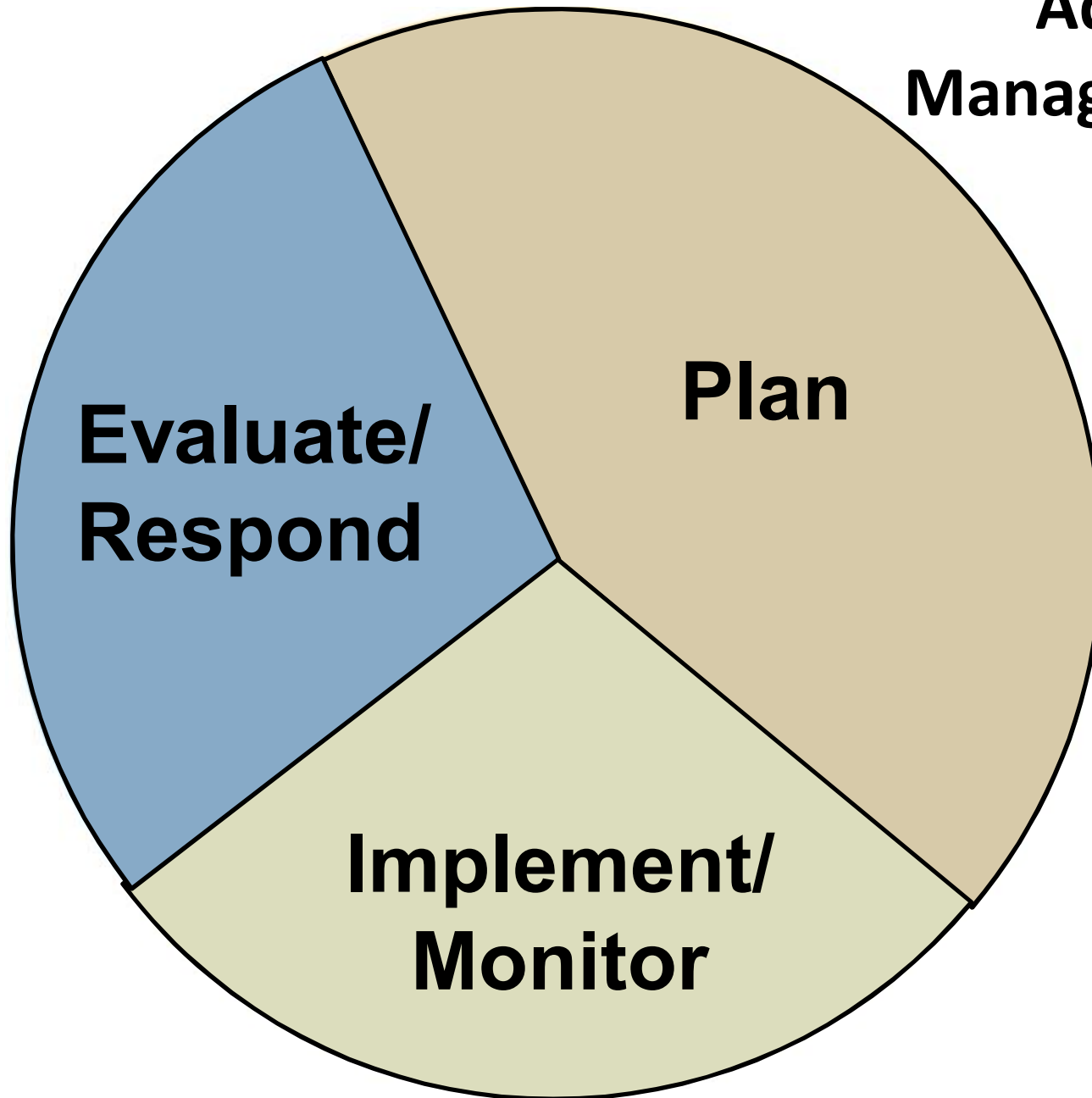
Google adaptive mgmt/



Technical Report for the Integrated Status and Effectiveness Monitoring Program and Columbia Habitat Monitoring Program BPA 2015 DOI: 10.13140/RG.2.1.1695.5920

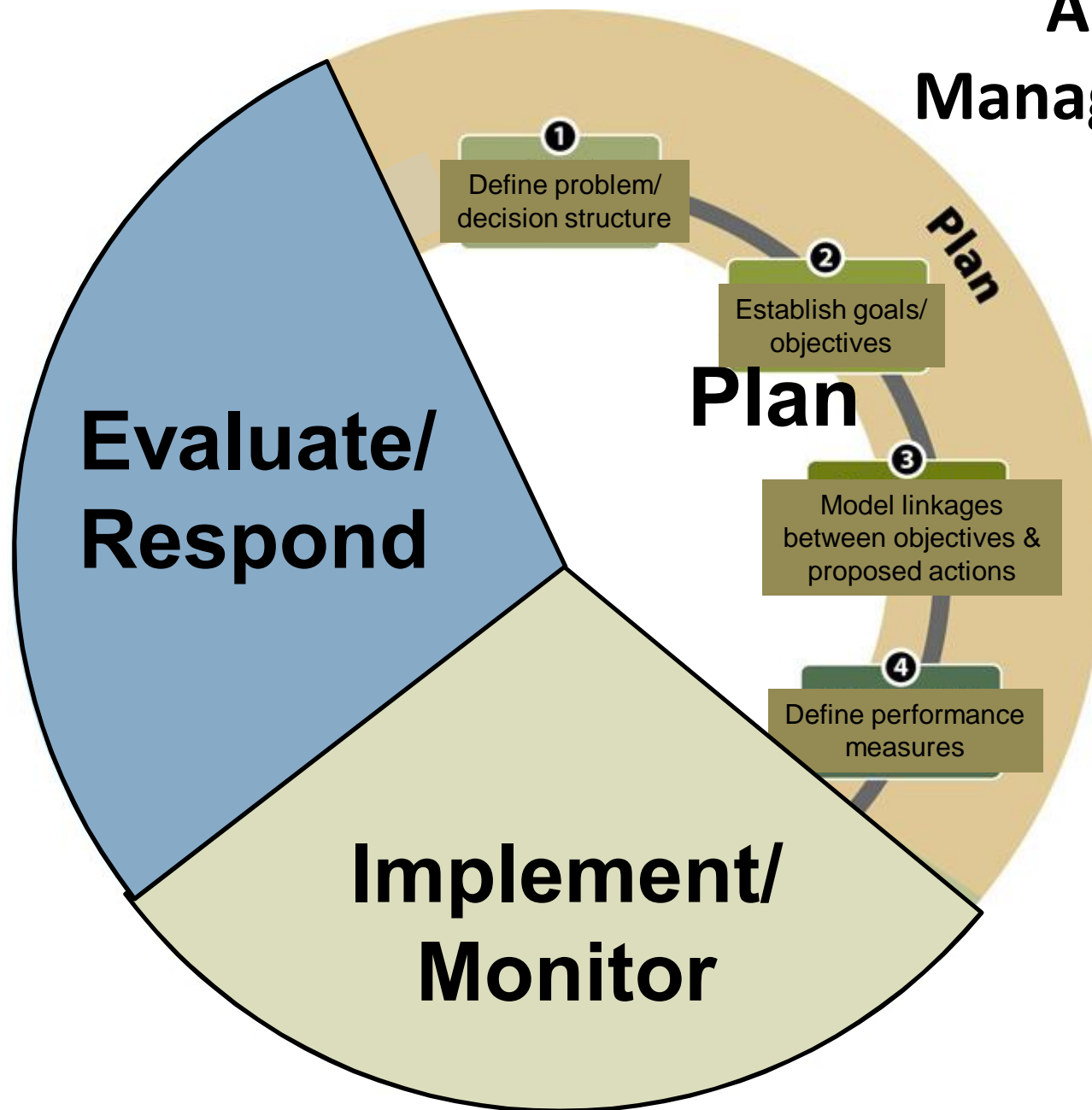
Resource Stewardship Division Rocky Mountain National Park 2016 Park Science 32(2):68-69

**Adaptive
Management
Cycle**
An
Example



Adaptive Management Cycle

An Example



Adaptive Management Cycle

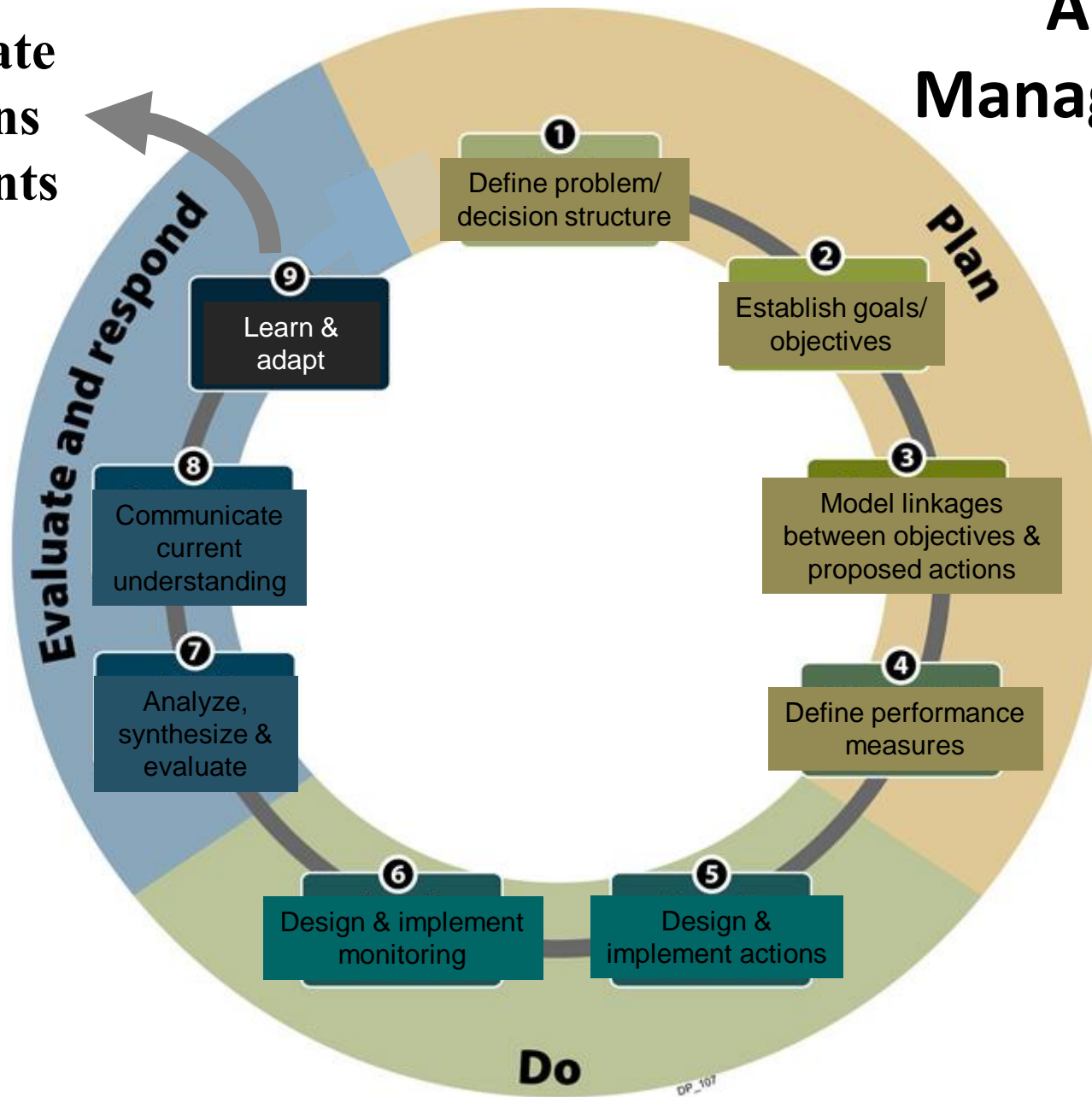
An Example



Adaptive Management Cycle

An Example

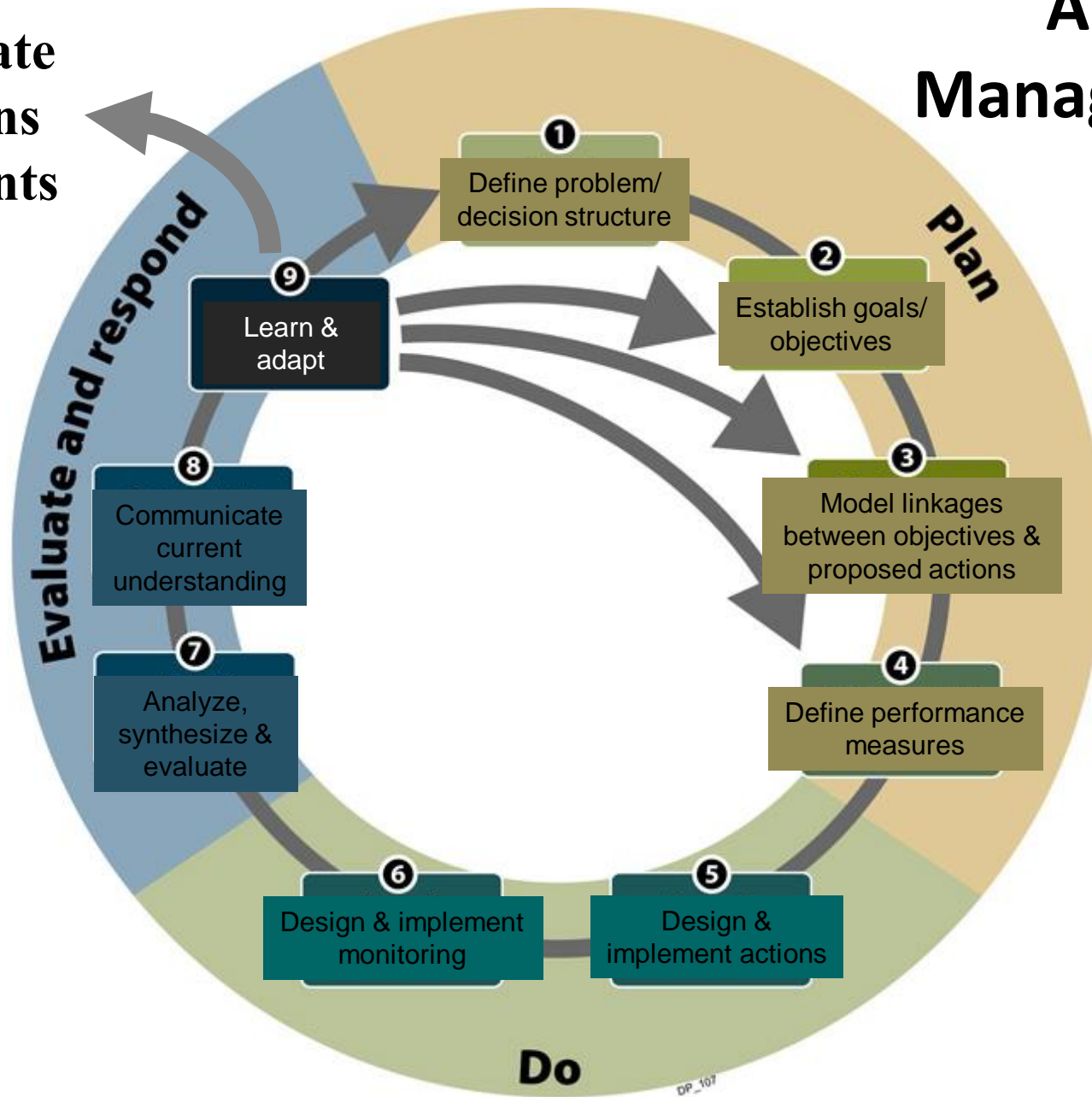
Appropriate Operations Adjustments



Adaptive Management Cycle

An Example

Appropriate Operations Adjustments

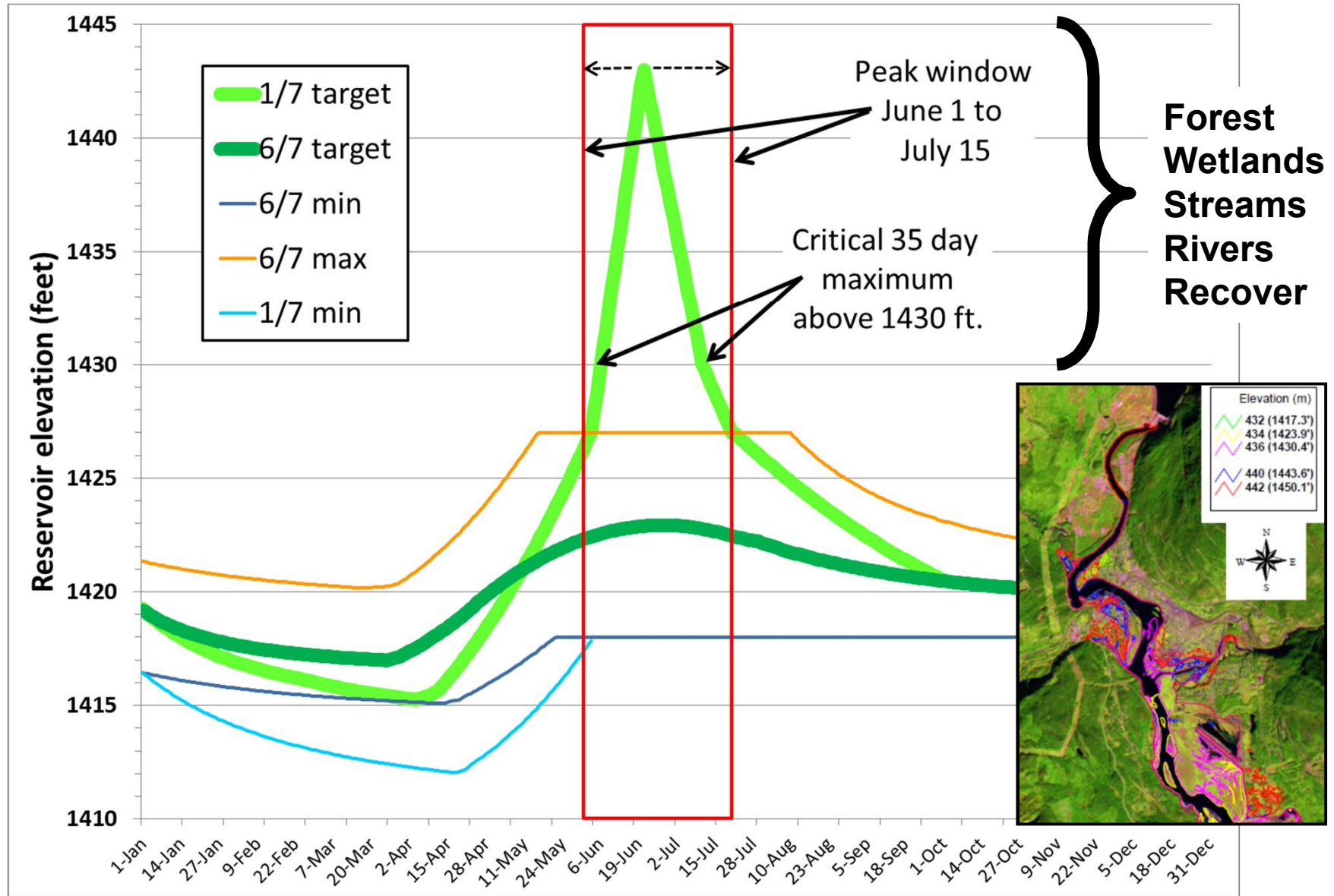


Keys to Success

- “ Wide and meaningful consultation with all stakeholders and knowledge holders
- “ Clear understanding of decision structure with endorsement/ commitment of key decision-makers
- “ Objectives, goals and actions are scale appropriate for the problem (spatial and temporal)
- “ Effective performance measures
- “ Well implemented monitoring program
- “ Effective communication of the results to the public and decision-makers

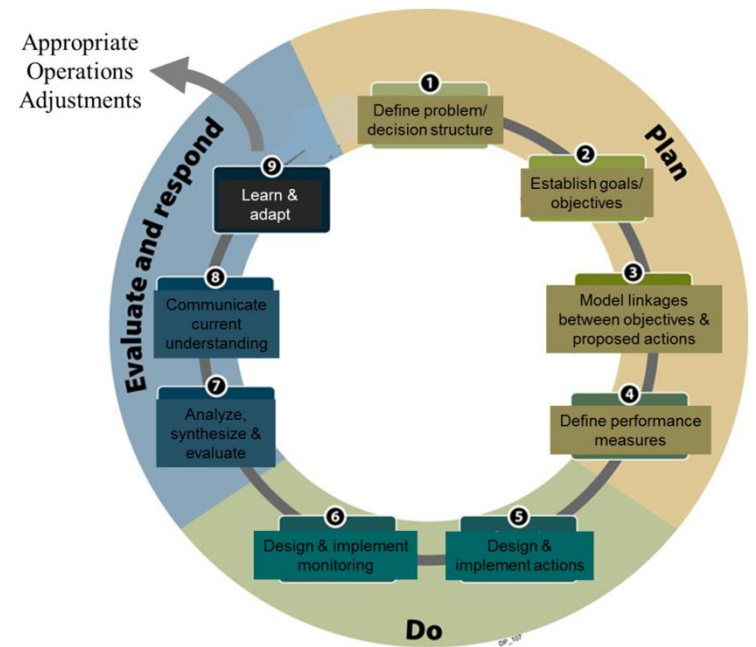
Due consideration of **climate disruption** and the potential for **“nonstationarity”**

Mid Arrow Scenario 3



Mid Arrow Example

1. **Problem** – lost habitats
Decision Structure – CRT entities/ BC Gov.
2. **Objectives** – restore habitats
3. **Objectives/Actions** – modeling of what operations hinder habitat restoration
4. **Performance Measures** – re-vegetation, stream channel stability
5. **Action** – Limit flooding in upper 2m to once in seven years and <35 days (alternatives in other reservoirs - different durations, different periodicity?)
6. **Monitoring** – periodic vegetation plots, stream channel assessments, reservoir productivity, reservoir fish, recreation; downstream impacts
7. **Analysis** - how many plots re-vegetated, species in plots, growth, stability of steam channels
8. **Communication of Results** - to public and decision-makers
9. **Adaption** – Long-term changes to reservoir management?



Past Adaptive Management and the Columbia Basin

- “ Bonneville Power Authority 2015 AM framework for monitoring stream habitat improvement projects
- “ Cosens and Williams 2012 – review of AM and governance of fisheries management in US CB
- “ US National Research Council 2004 Science Review of Army Corps of Engineers AM Water Mgmt. Projects
- “ Quigley et al 1997 – Adaptive Management of Ecosystems in the Columbia Basin
- “ McConnaha and Paquet 1996 – Review of AM fisheries project in US CB
- “ Taylor et al 1997 AM and BC Forest Management



Ecosystem Function Returning to the Columbia and Kootenay Rivers

