Science-based Ecosystem Approaches under Canada's Wild Salmon Policy (WSP)

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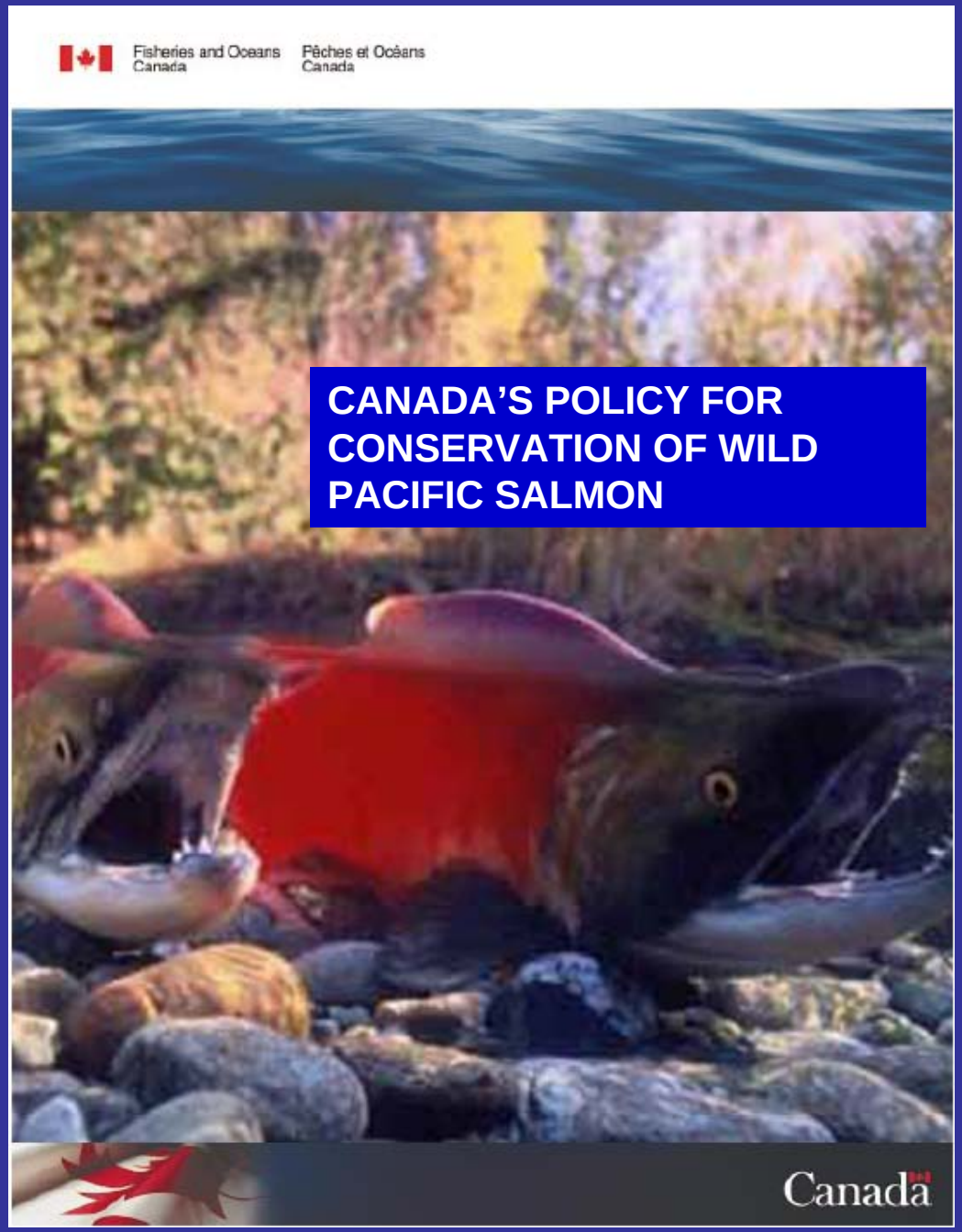
PICES 19
Portland USA

Jim Irvine
Kim Hyatt
Janelle Curtis &
Ray Lauzier

Fisheries & Oceans Canada
Pacific Biological Station
Nanaimo BC



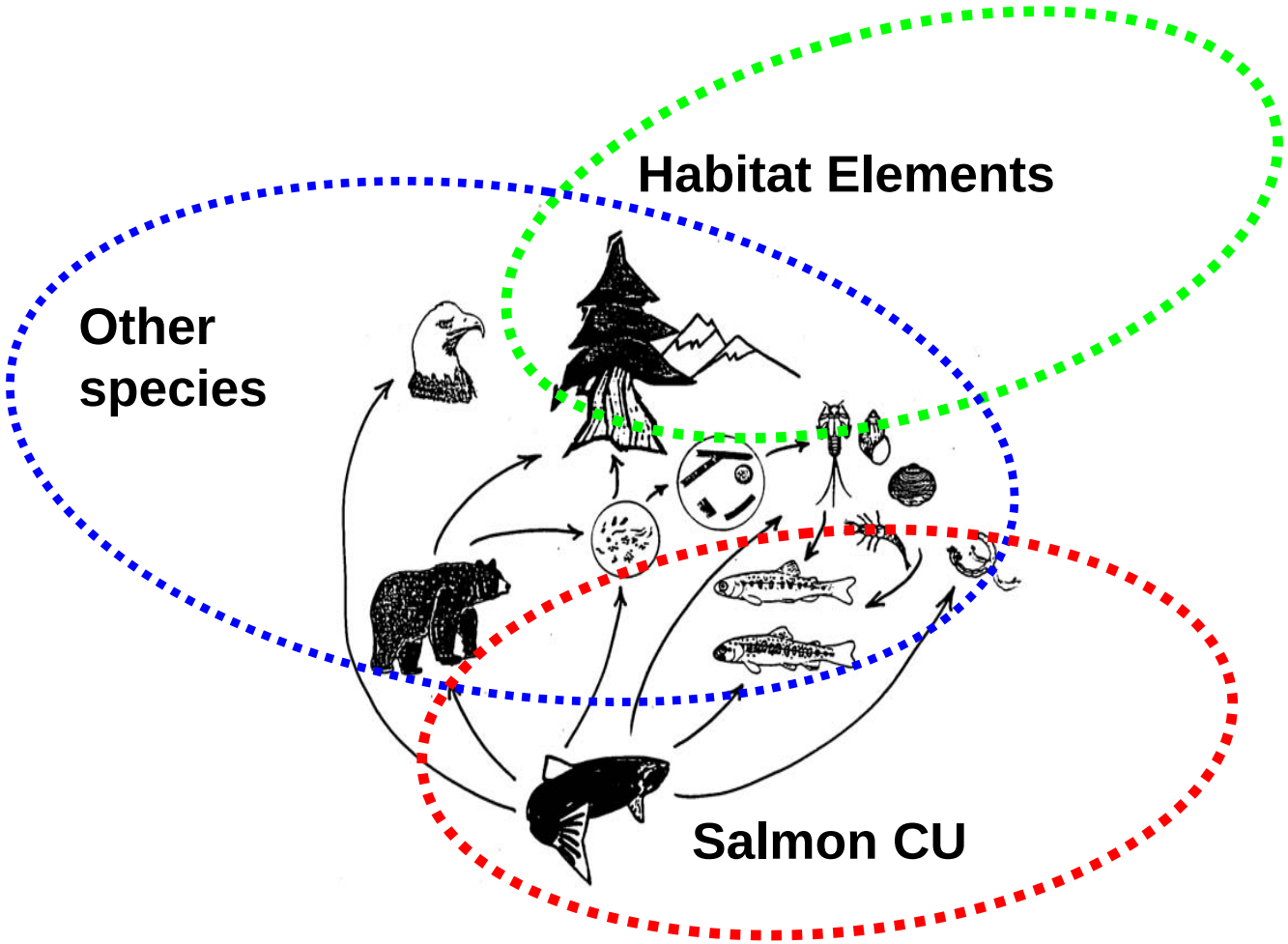
Presentation Objectives

- Review ecosystem-based management (EBM) under the WSP
- Identify next steps

General WSP EBM Approach

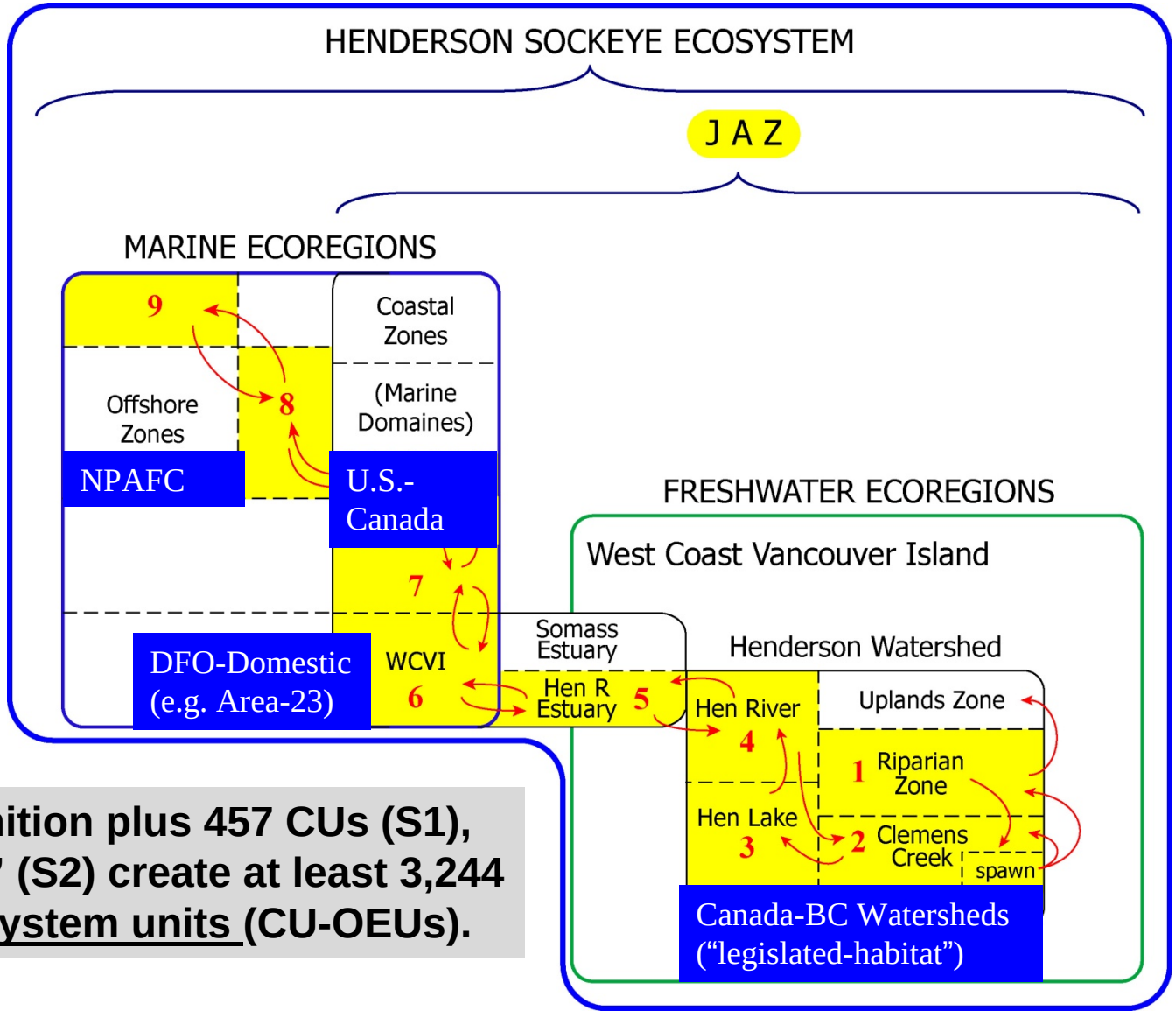
1. Define Operational Ecosystem Unit
2. Determine Preferred Reference State
3. Identify Sector Specific Objectives
4. Identify Indicators
5. Develop benchmarks
6. Monitor & assess
7. Categorise Status

Definition : Ecosystems are groups of organisms and their environment, so a salmonid ecosystem, under WSP, consists of (1) a salmon CU, (2) associated habitat elements and (3) species that salmon interact with.



Salmon Ecosystem

Operational Ecosystem Units (OEU)

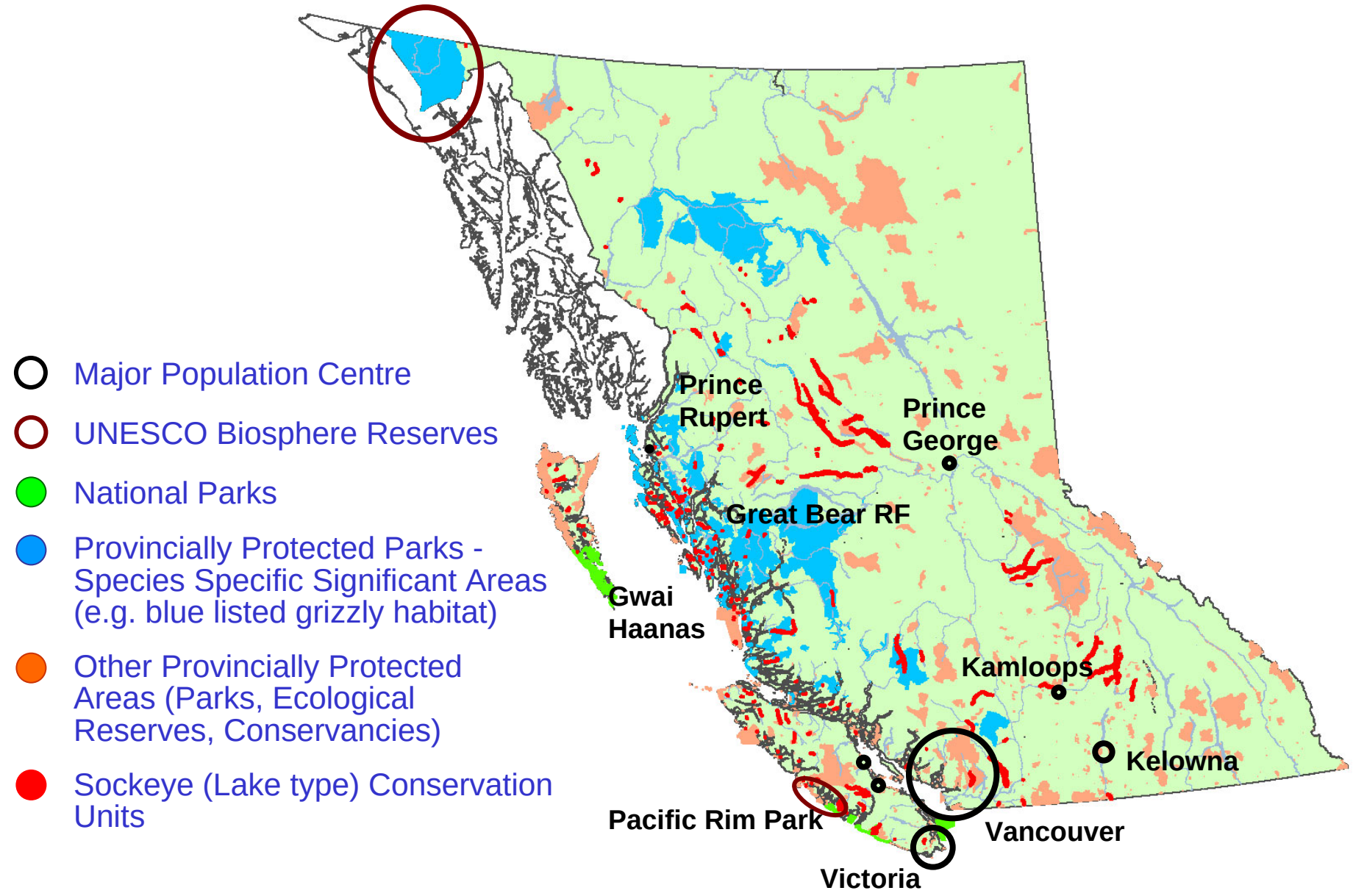


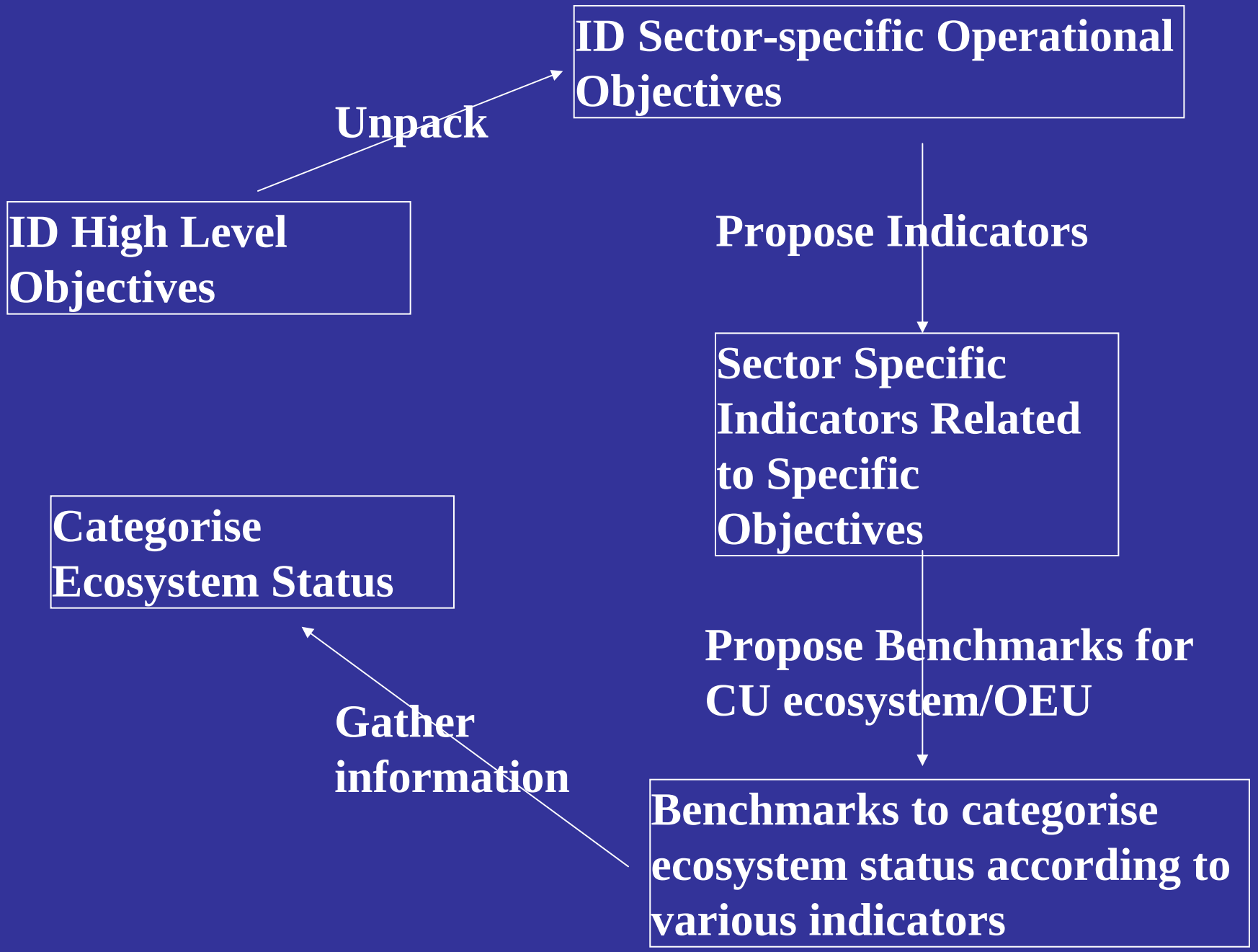
Our ecosystem definition plus 457 CUs (S1), & 4-8 habitat "types" (S2) create at least 3,244 CU-operational ecosystem units (CU-OEUs).

Reference States

1. **Historic, “natural” ecosystem**: state characterized by “unimpacted,” pre-industrialized conditions (< 1900s, *e.g*. Gwaii Haanas National Park)
2. **Current, but altered, ecosystem**: current state exhibiting acceptable range of conditions (*e.g*. Barkley Sound ecosystem with high salmon pdn, lwr Fraser ecosystem impacted by greater Vancouver)
3. **Future, altered ecosystem**: state reflecting movement towards desired range of conditions

De facto management zones & reference states




ID Sector-specific Operational Objectives
Unpack
ID High Level Objectives
Propose Indicators
Sector Specific Indicators Related to Specific Objectives
Categorise Ecosystem Status
Propose Benchmarks for CU ecosystem/OEU
Gather information
Benchmarks to categorise ecosystem status according to various indicators

ID High Level Objectives

Unpack →

Sector-specific Operational Objectives (i.e. fishing, habitat, & cultivation (i.e. enhancement & aquaculture)

NESTED ECOSYSTEM OBJECTIVES	UNPACKED OJECTIVES
Conserve Ecosystem Structure	1.0 Conserve ecosystem biophysical and biochemical structure 2.0 Conserve species (and CU) compositions within the salmonid community and the ecological community of species functionally associated with wild salmon (i.e. maintain diversity). 2.1 Conserve trophic structure (predator-prey relationships) of salmon-occupied ecosystems. 2.2 Conserve age/size structures of salmon populations
Conserve Ecosystem Function (i.e. Process)	3.0 Conserve the productive capacity of wild salmon ecosystems 3.1 Conserve multiple trophic-level processes (production, competition, energy transfer through predation and scavenging, decomposition and nutrient delivery at multiple trophic levels) that control the productive capacity of a given ecosystem for wild salmon and associated species. 4.0 Maintain ecologically sustainable fisheries.

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Unpacked Objective	Sector-specific Objectives (fishery)
2.1 Conserve trophic structure (predator-prey relationships) of salmon-occupied ecosystems by managing fisheries, habitat and enhancement activities so that the trophic structure remains within a specified (i.e. “preferred”) reference range.	2.1.1 Manage fisheries such that the trophic-level balance is maintained within the reference range 2.1.2 Maintain pelagic forage availability (Belgrano et al. 2006) 2.1.3 Reduce spatial and temporal concentrations of fishery impacts on forage fish (Belgrano et al. 2006) 2.1.4 Reduce removals of top predators (Belgrano et al. 2006)

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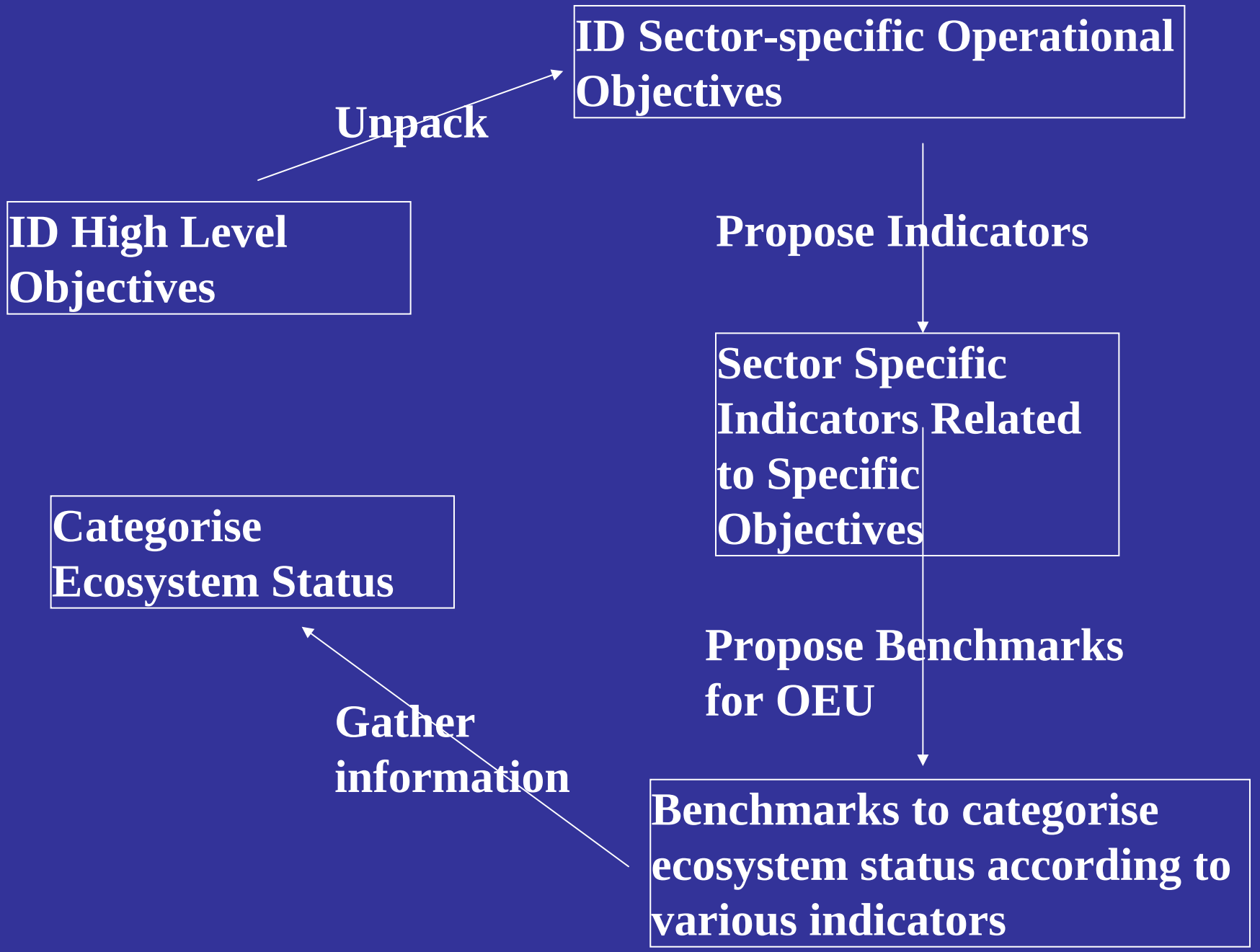
OPERATIONAL OBJECTIVES (PERTAIN TO FISHERY IMPACTS MANAGED BY DFO)	POTENTIAL INDICATORS
2.1.1 Manage fisheries such that the trophic-level balance is maintained within the reference range.	2.1.1.1 Estimated annual mean trophic level in wild salmon linked ecosystems (e.g. Kruse and Evans) 2.1.1.2 Fishing-in-Balance Index (FIB) (e.g. Pauly and Christensen 1995)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Progress and Next Steps

- Identified preliminary sector specific objectives for:
  - Fishery management
  - Habitat management
  - Fish cultivation (i.e. enhancement & aquaculture)
- Need to review these with 3 sectors
- Implementation pilot underway on WCVI