

North and Central Coast Land Use Plan Summary:

some pieces of the adaptive
management puzzle

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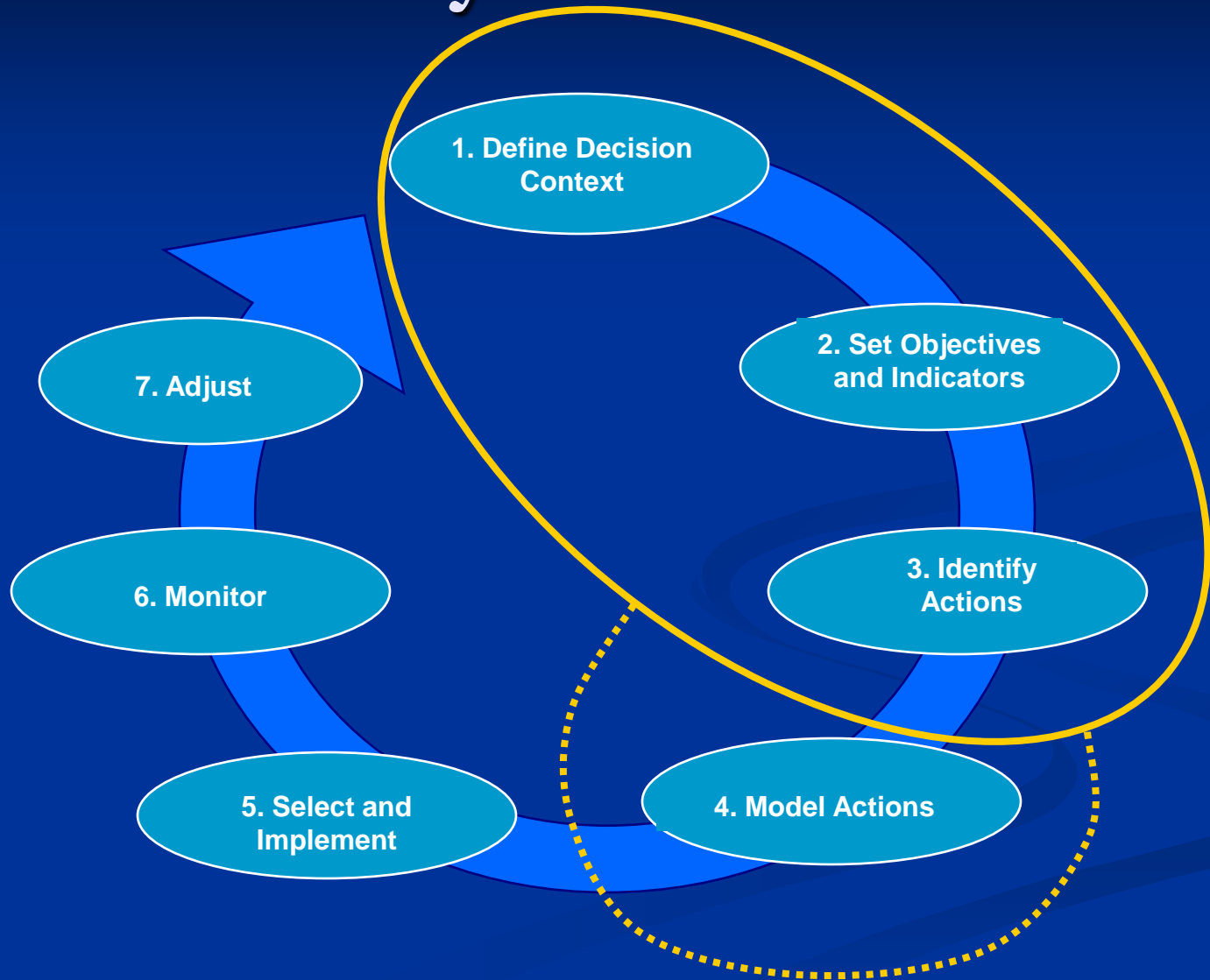
Purpose

- Summarize objectives, goals, strategies, indicators and targets related to both ecological integrity and human well-being.
 - Daft Ministerial Orders
 - First Nation and Provincial Gov. agreements
 - EBM Handbook
 - Land and Resource Management Plans

Content/Scope

- Ecological integrity
 - terrestrial ecological integrity, hydroriparian, rare and focal species, ...
- **Human well-being**
 - economic growth, employment, sustenance, community spirit, traditional/cultural activity, ...
- Resources
 - timber, mining and energy, tourism and recreation, cultural resources, ...

Why bother?



Outline

■ The LUP Summary (abridged)

- Terminology
- Methods
- Results
- Observations

Summary

■ Post hoc reconstructed decision models

- Ecological integrity example
- Human well-being example

Model

Terminology

- Objectives: an end to be achieved
- Strategy: a means to achieve an end; an action that can be implemented to influence outcomes towards a specific end

Strategy = **implementation indicator** + target

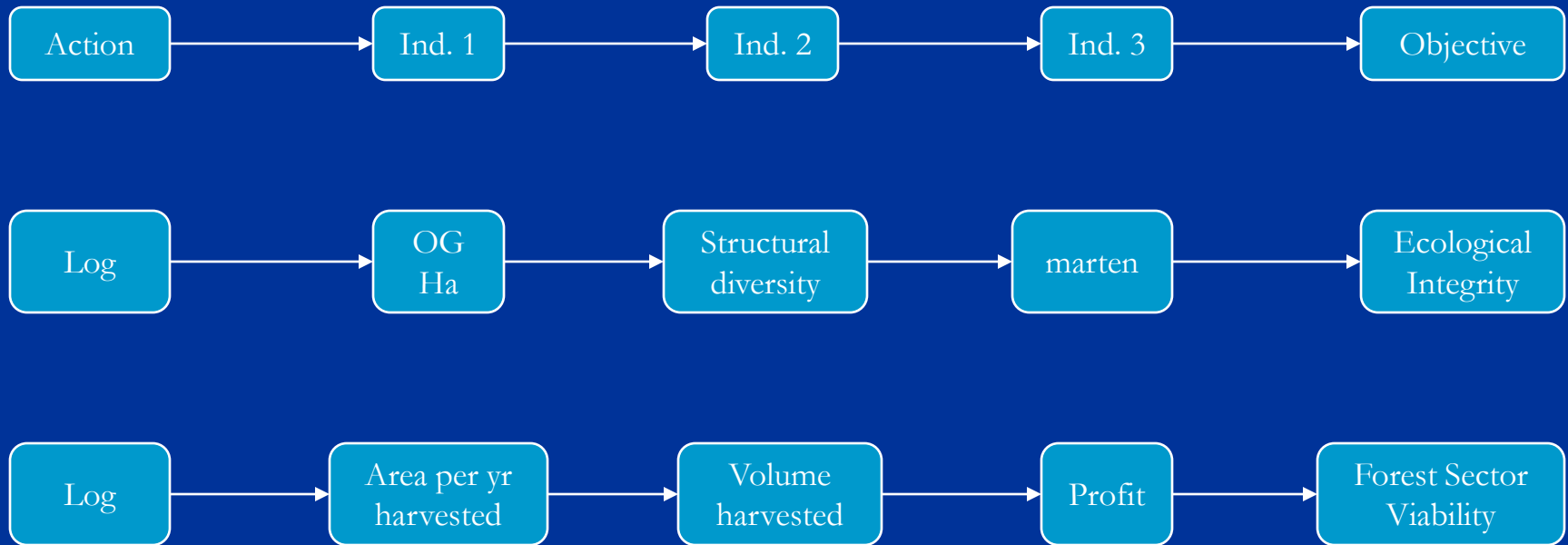
- **Implementation indicator**: metric that links with an objective and is affected by management
- **Target**: a specific quantitative state of an implementation indicator
- Effectiveness indicator: metric linked closely to an objective; useful for assessing change in objective condition

Summary

Indicator continuum

Implementation

Effectiveness



Summary

Methods

- Compile and condense

Summary

Results

Compile

No objectives for critical habitat in MO1 or MO2.

Retain 90% of the critical grizzly bear habitat identified in Schedule 2 (MO1 p12), [where] “critical grizzly bear habitat” means 100% of class one habitat and 50% of class two habitat (MO1 p2)

Protect sensitive grizzly bear habitat (MO2 p12), [where] “sensitive grizzly bear habitat” means the Class 1 habitat identified on Schedule 2 (MO2 p3).

•***Sensitive grizzly bear habitat may be altered or harvested... where alteration or removal is required for road access, other infrastructure, or to address a safety concern, and where there is no practicable alternative; before altering or harvesting sensitive grizzly bear habitat: (a) obtain from a registered professional biologist confirmation that the disturbance will not cause a material adverse impact to the sustainability of the sensitive grizzly bear habitat; (b) to the extent practicable, prepare and implement an adaptive management plan and monitor the ecological impacts of the proposed forest development; and (c) engage in information-sharing or consultation with the applicable First Nation, to consider the potential for adverse effects on any asserted or proven aboriginal rights or aboriginal title of the First Nation (MO2 p12).*

*Protect Grizzly bear Critical Habitat (TP pB9, GFN pF9); protect critical Grizzly habitat in identified Landscape Units (KNT pF10); protect Grizzly bear Critical Habitat in all landscape units where it appears by MOE (HFN pB9).
... maintain the quantity and quality of grizzly bear habitat [in] Somerville (MA pC1).*

[In the] North Coast...maximum 10% alteration of Grizzly bear Critical Habitat (this objective applies to the specified portion of the North Coast that is occupied by Grizzly Bear); [in the] Central Coast... protect Grizzly bear Critical Habitat by application of Identified Wildlife Measures and through application of landscape and stand level reserve design; “Critical Habitat” is defined as 100% of Class 1 habitat and 50% of Class 2 habitat (TP pB9, GFN pF9).

Default maximum 20% alteration on average of Class 1 habitat by landscape unit; risk managed [target to be] developed on a site specific basis (KNT pF10)

Default 0% alteration of Class 1 habitat [and additionally] for the specified landscapes... (the Ahta, Kakwaikon and Anhuhat-Kwalate that are within the Grizzly Bear Management Area)..., [maximum] 50% alteration of the Class 2 habitat; risk managed [target to be] developed on a site specific basis (HFN pB8).

***Default target may be exceeded if required for access or safety (HFN pB8).*

***Risk managed plans require RPBio sign-off (KNT pF10, HFN pB8).*

***The definition of “Critical Habitat” is as defined by the Ministry of Environment (MOE) in February 2005 (HFN pB8)*

•***Implement Management Objectives, Targets and Indicators from March draft of NCLRMP (MA pC1).*

...maintain the integrity of and linkage amongst critical habitats, including functional visual (security) and resting (bedding) cover (NC p112).....

[Implementation indicator is] amount of alteration of ground-verified critical habitats (NC p112).

○***Draft mapping of critical habitat exists; peer review and ground truthing of this mapping is required (NC p113)*

•***The size and configuration of the forested component of critical habitat are location dependant (NC p112).*

•***Where necessary...protect...natural drainage patterns..., the natural distribution of snow avalanching..., [the structure of critical habitats by preventing] windthrow [and] natural light levels.*

Grizzly-bear—critical habitat

Protect critical grizzly bear habitat (G2G).

This is a sub-objective of Protect known red- and blue-listed/regionally rare species and their habitats (EBMH).

Implementation indicator: % of Class 1 habitat protected.

- MO1 Target: 90% of habitat identified in Schedule 2
- MO2: 100% of habitat identified on Schedule 2, with exceptions for roads, infrastructure and safety.
- G2G (TP/GFN) Target for North Coast: 90% in the portion of the North Coast occupied by grizzly bears
- G2G (TP/GFN) Target for Central Coast: follow Identified Wildlife Measures and use landscape and stand level reserves in the Central Coast.
- G2G (KNT) Target: default of 80%, by landscape unit; risk-managed to be developed on a site specific basis.
- G2G (HFN) Target: default 100%; risk-managed to be developed on a site specific basis if necessary for access or safety.
- EBMH/LRMP Target: no target.

Implementation indicator: % of Class 2 habitat protected.

- MO1 Target: 45% of habitat identified on Schedule 2.
- MO2 Target: no target.
- G2G (TP/GFN) Target for North Coast: 45% in the portion of the North Coast occupied by grizzly bears
- G2G (TP/GFN) Target for Central Coast: follow Identified Wildlife Measures and use landscape and stand level reserves in the Central Coast.
- G2G (KNT) Target: default of 40%, by landscape unit; risk-managed to be developed on a site specific basis.
- G2G (HFN) Target: default 50% for specified landscapes; risk-managed to be developed on a site specific basis if necessary for access or safety.
- EBMH/LRMP Target: no target.

Assessment or plan: Ground-verified critical habitat maps (NC).

Employment

Improve prospects for employment in the Plan Area (G2G).

Implementation indicator: # of conservation officer positions.

•LRMP (NC) Target: more than current number.

Implementation indicator: # of monitoring support positions.

•LRMP (NC) Target: more than current number.

Implementation indicator: # of protocols with First Nations addressing employment.

•LRMP (NC) Target: more than current number.

Assessment or plan: report outlining potential for local employment from monitoring (NC).

2	<i>Improve prospects for employment in the Plan Area(s) (TP pC5, HFN pC5, KNT pG5, GFN pG5).</i>	<p>No strategies.</p> <ul style="list-style-type: none">•<i>Upward trend in employment levels in First Nation and Plan Area(s) communities (TP pC5, HFN pC5, KNT pG5, GFN pG5); no net job loss in LHAs and a lower unemployment rate in LHAs (in 2011 vs 2006 census year) (TP pC5, HFN pC5, KNT pG5, GFN pG5); downward trend in unemployment levels in First Nation and Plan Area(s) communities (TP pC5, HFN pC5, KNT pG5, GFN pG5); downward trend in EI claim rates in LHAs (TP pC5, HFN pC5, KNT pG5, GFN pG5); downward trend in [long-term EI] claim rates in LHAs (TP pC5, HFN pC5, KNT pG5, GFN pG5).</i>•<i>Upward trend in tourism... forest sector... [and] shell fish aquaculture... employment in First Nation and Plan Area(s) communities (TP pC4, HFN pC4, KNT pG4, GFN pG4).</i>
3	<i>Community working population has opportunity to engage in meaningful employment (EBMH p33) Increase the number of jobs in the LRMP area (NC p176). There is a fair distribution of resources, benefits...[to] Coastal communities (CC p51) People and households achieve income levels and benefits (i.e. the national average or better), which meet or exceed their needs and secure their material wellbeing (CC p50).</i>	<p><i>Increase number of local conservation officers (NC p176). ... pursue opportunities for community involvement in monitoring (NC p177). ○Identify... opportunities for community involvement in monitoring (NC p177).</i></p> <ul style="list-style-type: none">•<i>Achieve and maintain national average employment levels in plan area communities, within 5 years (CC p50); achieve “no net job loss” or net job increase (CC p50); phase in EBM to create new employment and new economy (CC p50).</i>•<i>Increase employment levels from resource activities for local residents and First Nations (CC p51).</i> <p><i>Apply targeted interventions to increase employment opportunities in First Nation communities (NC p178). Negotiate protocols [with First Nations] (NC p178).</i></p>

Summary

Condense

Compile

Results

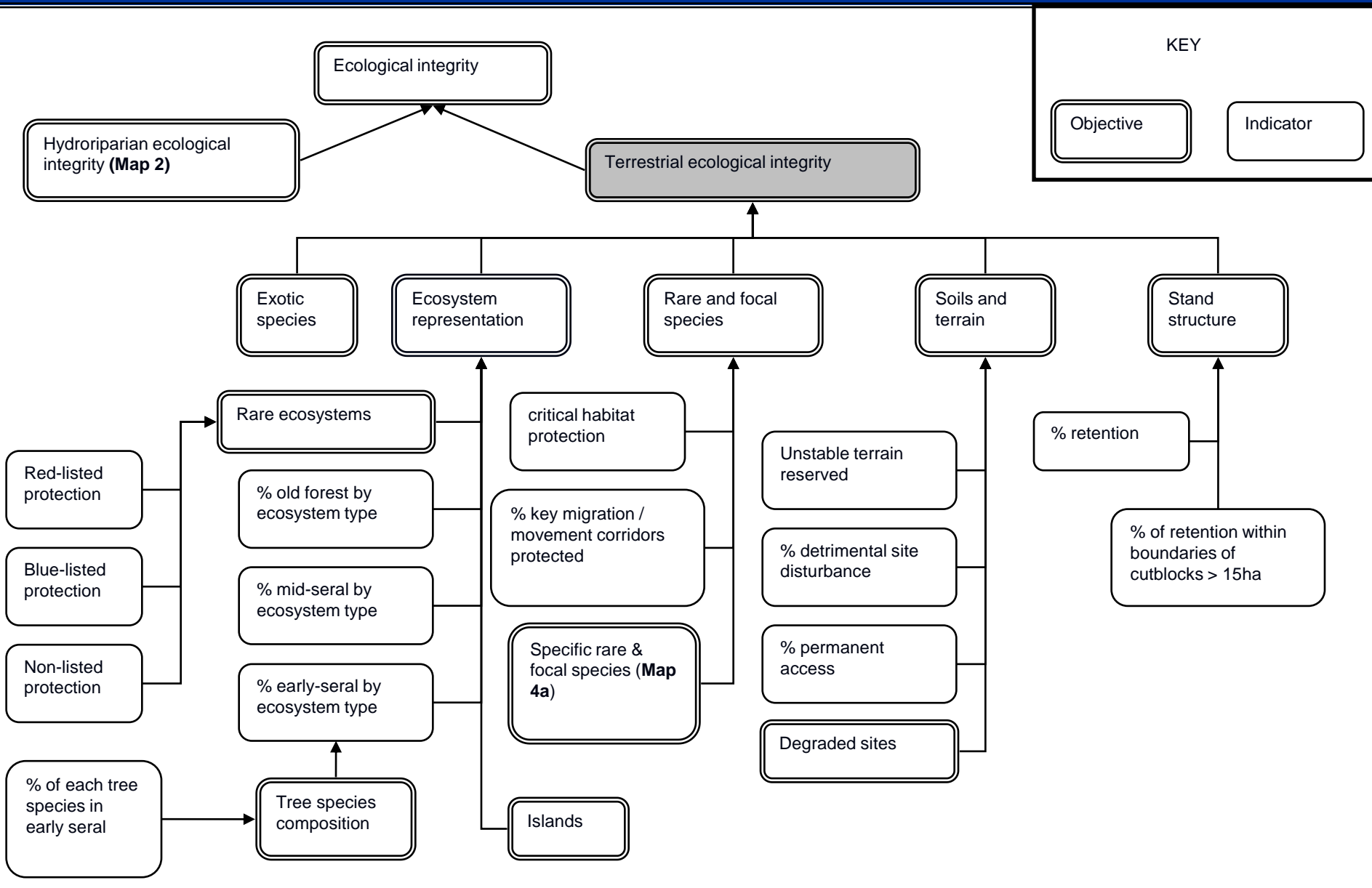
Element and objective	Implementation indicator	MO target	G2G target	EBMH target	Other target
Ecosystem representation Maintain the natural diversity of species ecosystems and seral stages.	% of natural abundance of old forest ^[1] per ecosystem type ^[2] .	•30% for common and very common ecosystems; 70% for modal, rare and very rare (LU scale).	•same as MO	•30% per watershed; 50% per landscape; 70% per territory/subregion	•30% for common and very common ecosystems; 70% for modal; 90 % for rare and very rare (landscape scale; NCAIP)
	% of mid-seral forest ^[3] in each ecosystem type.	•< 50% per LU, if practicable	•< 50% per LU	•<50% per watershed	•< 50% (CCAIP, NCAIP)
	% of early-seral forest ^[4] in each ecosystem type	•< 50% per LU (MO1)	•same as MO1 (TP, GFN)	•no target	•no target

^[1] Old forest is >180 yr (MO2, June KNT, HFN) or >250 yr (MO1, EBMH).

^[2] Ecosystem type may be defined by BEC site series (field verified or predicted) or by some equivalent ecosystem surrogate representing the full range of site conditions.

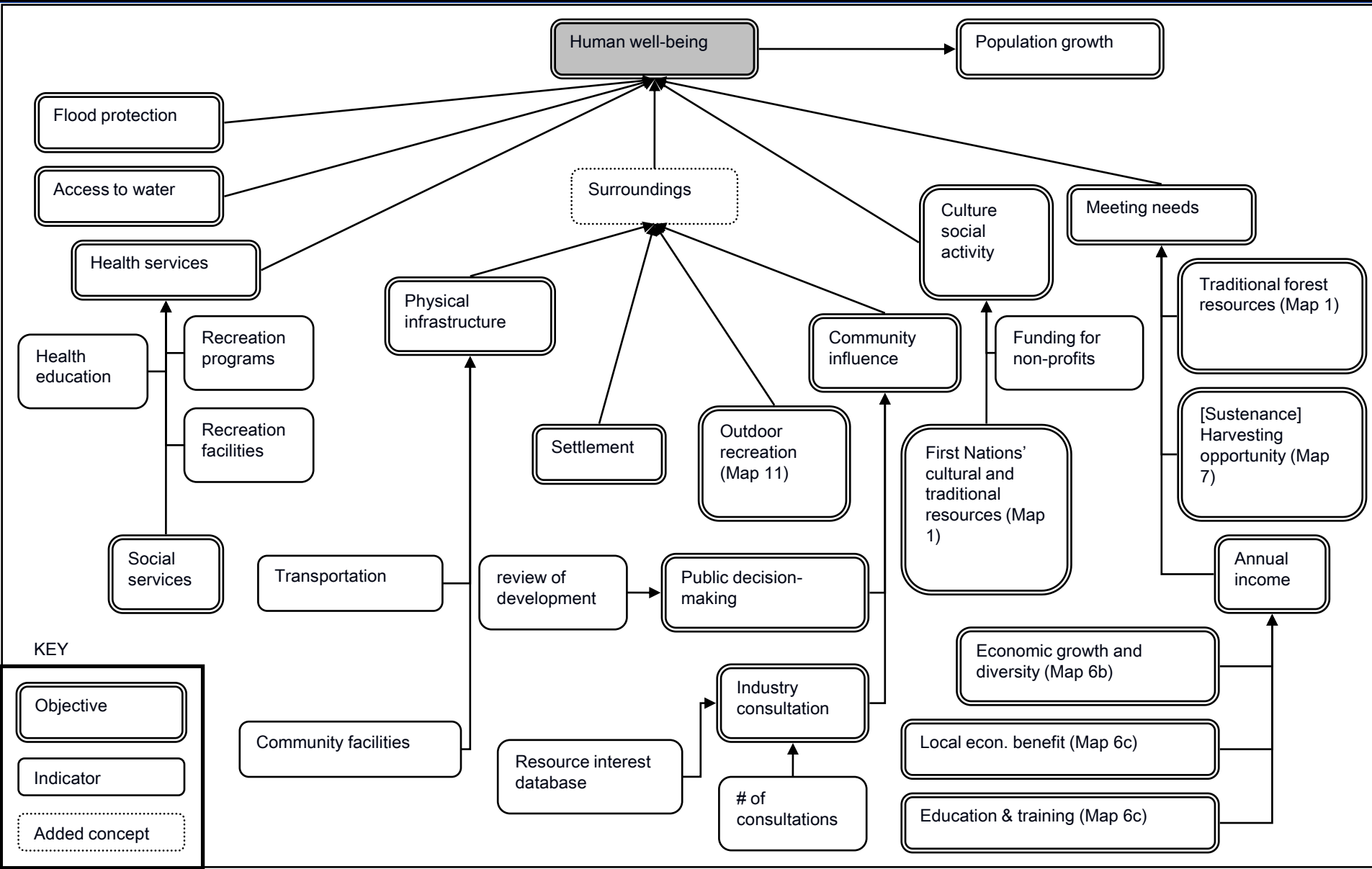
^[3] Mid-seral forest is < 80 yr old in the CWH, < 100 yr old in the ICH and < 120 yr old in the ESSF and MH (MO).

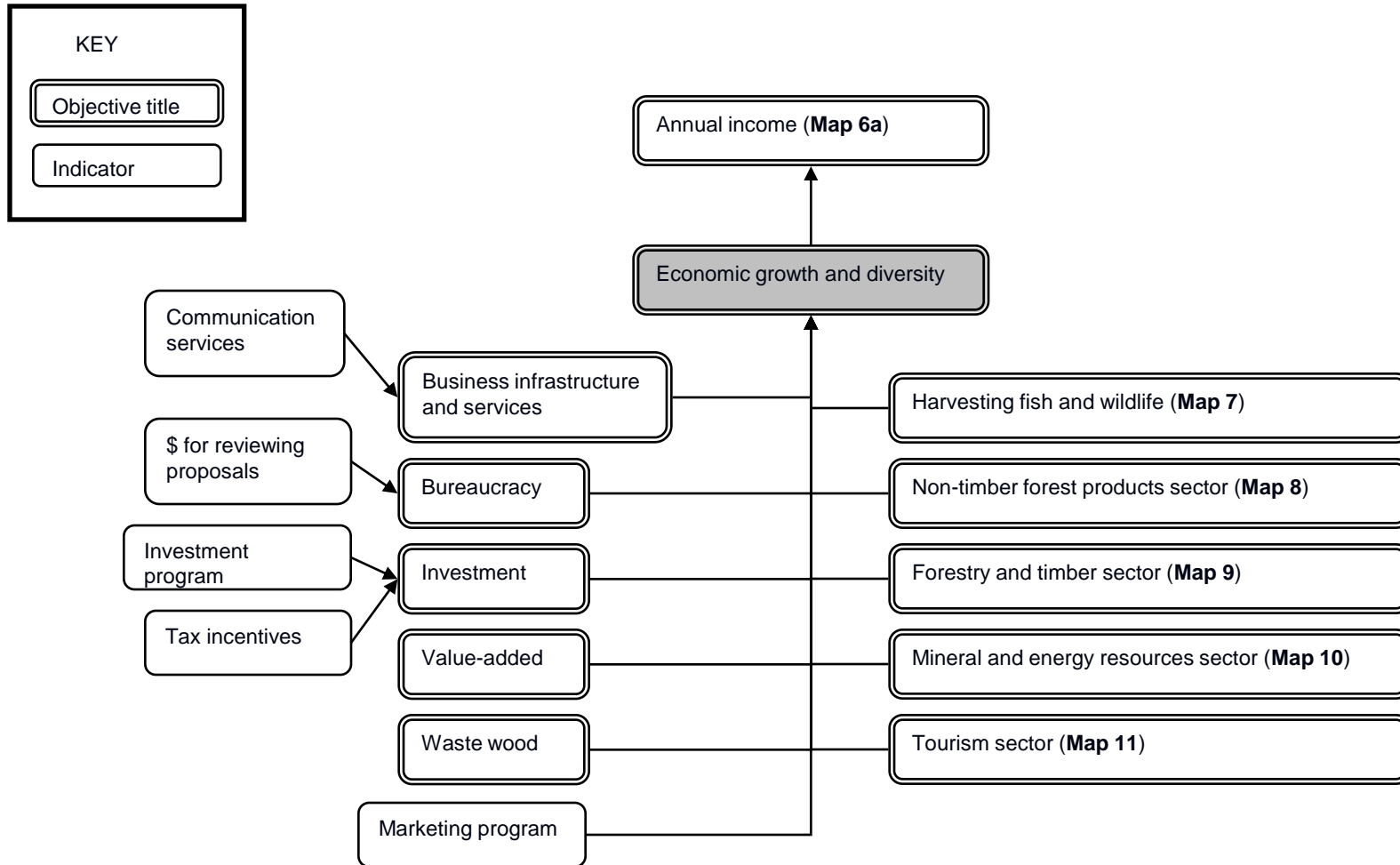
^[4] Early-seral forest is <40 yr old (MO).



Summary

Results





Observations

- Lots of text, lots of overlap, lots of content
- Good coverage with objectives
 - i.e., many important factors identified...but some gaps (specific rare and focal species, free ecological services)
 - However, factors that cannot be managed are missing (jurisdiction, natural)
 - However, no time frame
- Few HWB strategies except in LRMPs
- Missing or weak indicators, particularly in HWB (e.g., how do you control invasive species?, how do you stimulate investment?)
- Missing or weak targets (e.g., develop new health education programs)
- Inconsistent targets (e.g. 30% or 70% old seral)
- Typically, no documented rationale for indicators or targets
- No explicit relationships amongst objectives

The Basic Decision Model

Public values
define ends

Science
defines means

Happy ecosystems and people = f (good management)

How do we improve?

A rough answer to the correct problem is better than an accurate answer to the wrong problem.

Model

Reconstructed EI Decision model

Maintain EI

$$EI = f(TEI, HEI)$$

Maintain TEI

$$TEI = f(ExSp, EcoRep, RaSp, Soil, Struct)$$

Natural ecosystem diversity

$$EcoRep = f(Old, Mid, Early)$$

30 – 70% Old

Model

Missing Pieces (EI)

Climate
Change?

Maintain EI

$$EI = f(\text{TEI}, \text{HEI})$$

Maintain TEI

$$\text{TEI} = f(\text{ExSp}, \text{EcoRep}, \text{RaSp}, \text{Soil}, \text{Struct}) + \text{Other}$$

Natural ecosystem diversity

$$\text{EcoRep} = f(\text{Old}, \text{Mid}, \text{Early})$$

30 – 70% Old

$$\text{Old} = f(\text{initial old}, \text{logging}, \text{natural disturbance})$$

Left as an exercise for foresters

Model

Missing Pieces (IE 2)

Climate
Change?

Maintain EI

$$EI = f(\text{TEI}, \text{HEI})$$

Maintain TEI

$$\text{TEI} = f(\text{ExSp}, \text{EcoRep}, \text{RaSp}, \text{Soil}, \text{Struct}) + \text{Other}$$

Natural ecosystem diversity

$$\text{EcoRep} = f(\text{Old}, \text{Mid}, \text{Early})$$

30 – 70% Old

$$\text{Old} = f(\text{initial old}, \text{logging}, \text{natural disturbance})$$

Left as an exercise for foresters

Model

Implies that target old will achieve representation objective, but not an explicit function and thus cannot be improved (or otherwise evaluated). But see science compendium.

HWB Decision Model

- HWB = function of Human well-being, Flood protection, Domestic and industrial access to water, Health services, Cultural and social activity, Social services, Physical infrastructure, Settlement, Community influence, Industry consultation, Public decision-making, Meeting Needs, Annual income, Economic growth and diversity, Value added, Waste wood, Investment, Bureaucracy, Business infrastructure and services, Local economic benefit, Resource rent, Joint ventures, Resource/tenure allocation, Employment, Education and training

Model

Reconstructed HWB Decision Model

Achieve HWB

$$\text{HWB} = f(\text{H2O}, \text{HeSe}, \text{Surr}, \text{Cul}, \text{MN}, \text{Pop})$$

Adequate opportunity MN

$$\text{MN} = f(\text{Inc}, \text{SusHarv})$$

Meet financial needs

$$\text{Inc} = f(\text{EGD}, \text{LB}, \text{Edu})$$

Diversify economies

$$\text{EGD} = f(\text{Inv}, \text{Bur}, \text{Infr}, \text{NTFP}, \text{FP}, \text{ME}, \text{Tou}, \text{VA})$$

Promote investment

$$\text{Inv} = f(\text{attracting investment}, \text{tax incentives})$$

X\$ of tax incentives
(strategy)

Model

Missing Pieces (HWB)

Clean air?

Achieve HWB

$$\text{HWB} = f(\text{H2O}, \text{HeSe}, \text{Surr}, \text{Cul}, \text{MN}, \text{Pop}) + \text{Other}$$

Adequate opportunity MN

$$\text{MN} = f(\text{Inc}, \text{SusHarv})$$

Meet financial needs

$$\text{Inc} = f(\text{Econ}, \text{LocBen}, \text{Edu})$$

Diversify economies

$$\text{Econ} = f(\text{Inv}, \text{Bur}, \text{Infr}, \text{NTFP}, \text{FP}, \text{ME}, \text{Tou}, \text{VA})$$

Promote investment

$$\text{Inv} = f(\text{attracting investment}, \text{tax incentives})$$

X\$ of tax incentives
(strategy)

Weak indicator (not specific) and no target

Model

Where are we now?

