



Habitat and Biodiversity Modelling in the Timber Supply Review

Robson Valley TSA

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Habitat Modelling

- Habitat Branch looking for a way to characterize broad ecosystem changes throughout the forested areas of BC

The Timber Supply Review

- In BC, one process— the TSR:
 - systematically covers the province at regular intervals
 - models all Crown forest

Timber Supply Review (TSR)

- supports allowable annual cut determination
- required in every management unit (TSA or TFL) every 5 years
- focused on
 - timber supply
 - socio-economic analysis
 - environment treated as a constraint
- forecast over 250 years

Does Environmental Analysis belong in TSR?

- Forest Act mandates an examination of short and long-term implications to the province
- Attorney General's office advised that TSR is an appropriate place for an Environmental Analysis (alongside the Socio-economic Analysis)

Opportunity

- Establish an Environmental Analysis as a standard component of the TSR
- Timber supply analysts report on environment
- Result: regular updates on condition and forecast of some environmental indicators linked to base case timber supply forecast

Prototype of Environmental Analysis

- Robson Valley Enhanced Forest Management Pilot Project (EFMPP)
- Funded by Forest Renewal BC
- Presented Environmental Analysis under “short and long-term implications” at the determination meeting

Objectives of Environmental Analysis Prototype

- Design a methodology that could report on ecosystem level structure
- Use data currently available in the TSR timber supply analysis
- Ensure that methodology was extensible to the whole province

Selection of Indicators

- Workshop to discuss appropriate indicators and available data
- Age class distribution of forest types is an accepted measurable surrogate for ecosystem diversity
- Age class (old and early forests) distribution chosen for prototype

Environmental Analysis: The Vision

- Ecosystem level indicators, e.g.:
 - seral stage distribution: old, mature, early
 - representation - inventory type groups
 - road density
 - riparian condition
- Species level indicators, e.g.:
 - ungulate winter range
 - species at risk
 - special habitats

Environmental Analysis: Prototype

- Ecosystem level indicators (examples)
 - **seral stage distribution: old forest, early seral**
 - representation - inventory type groups
 - road density
 - riparian condition
- Species level indicators (examples)
 - ungulate winter range
 - species @ risk
 - special habitats

Assumptions

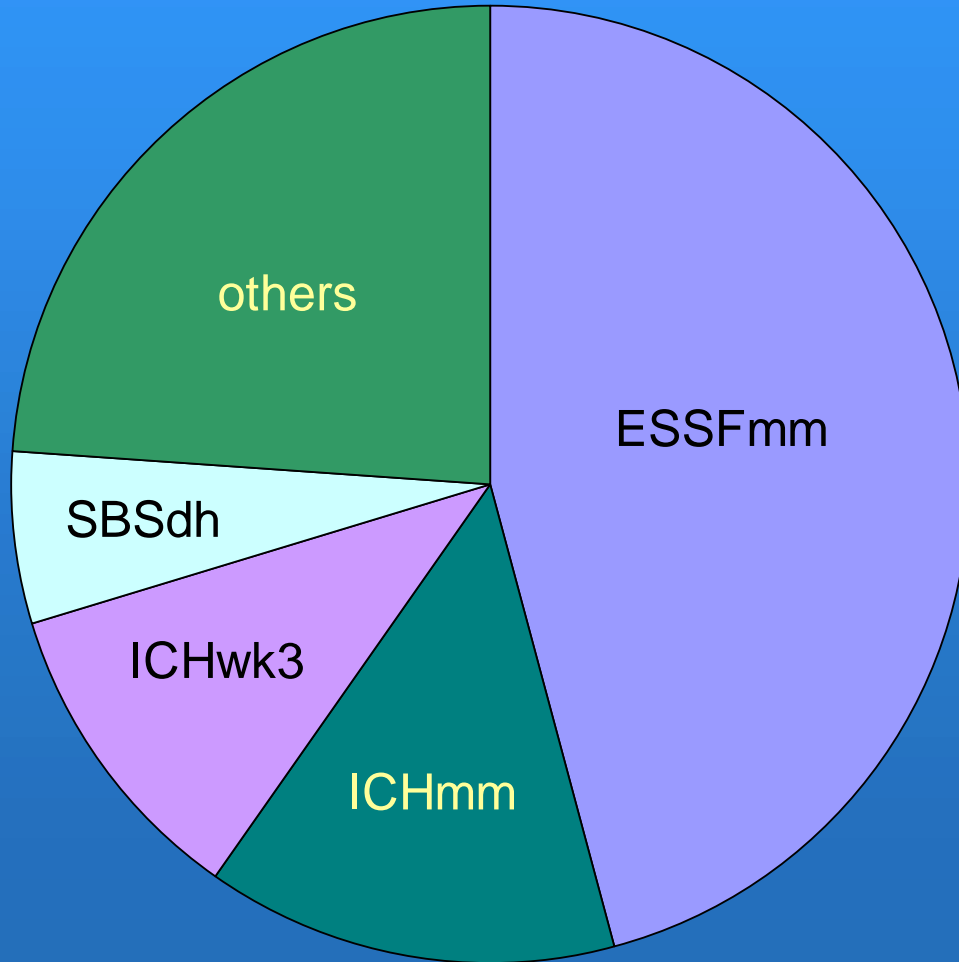
- From the Biodiversity Guidebook:
the more managed forests resemble forests that were established after natural disturbances, the greater the probability that biodiversity will be maintained (BC Government 1995)
- Operable and inoperable forest contributes to biodiversity
- Inoperable forest cycles in response to natural disturbances (fire, wind, insects, etc.)
 - fire suppression acknowledged

Ecosystem Basis of Analysis

- Analysis based on biogeoclimatic ecosystem classification (BEC) variants
- Timber supply model distinguishes the landbase at the variant level
- Robson Valley has 13 variants
- Examined 4 variants representing 76% of crown forest and 84% of timber harvesting land base

Variants in the Robson Valley

% of crown forest



FSSIM

- Forest Service Simulator
- Model used in Timber Supply Analysis
- Operable land base: harvesting converts older forests into early forests
- Inoperable land base: no natural disturbances modelled – forest ages forever

Modelling Natural Disturbance in Inoperable Areas

- Will tend toward age class distribution predicted by mean natural disturbance interval in each variant
- There was less old forest in the inoperable area than was calculated
- Therefore old forest was allowed to age until its area matched the calculated level

Mean Natural Disturbance Intervals (MNDI)

Variant	NDT	BGB-MNDI (calculated old %)	New info-MNDI (calculate old%)
ICHwk3	1	250 (37)	600 (66)
ESSFmm	2	200 (29)	400 (54)
ICHmm	2	200 (29)	200 (29)
SBSdh	3	125 (33)	100 (25)

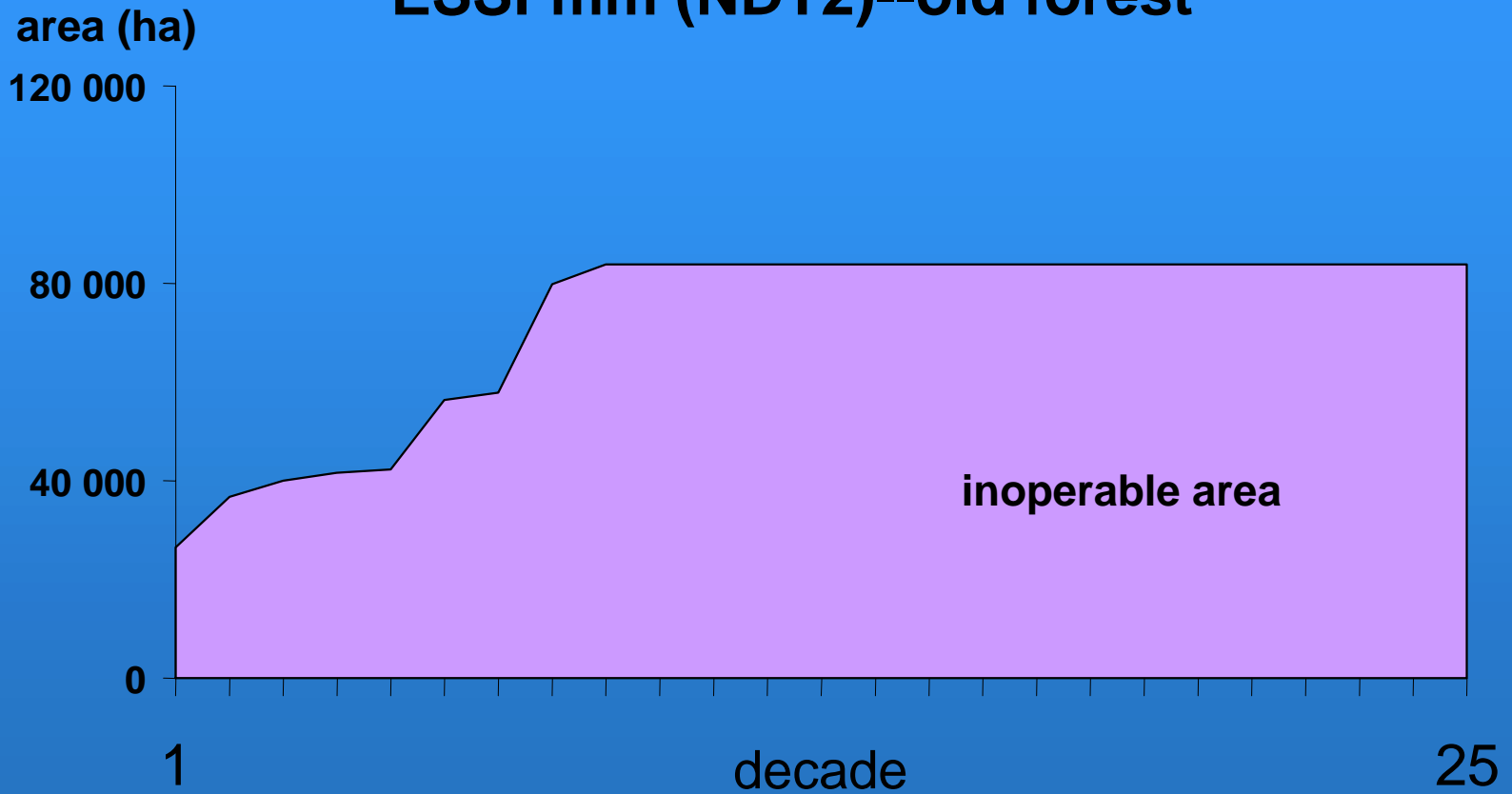
FSSIM - Environmental Indicators Database (EID)

- Developed by Habitat Branch and Cortex Consultants Inc.
- Input: FSSIM report showing area of each age class in each decade for each group
- Output: area in each seral stage in each decade

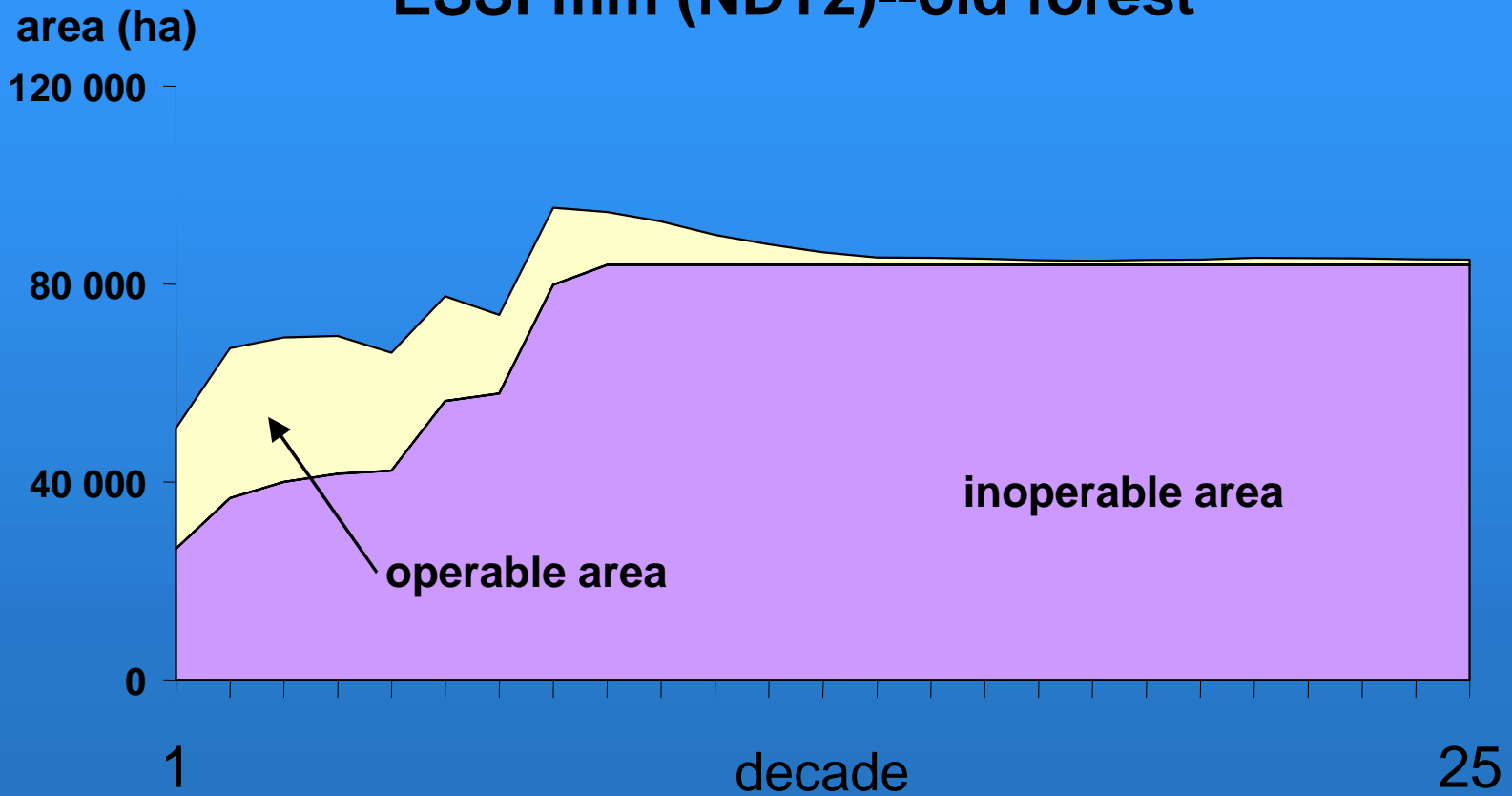
ESSFmm (NDT2)--old forest



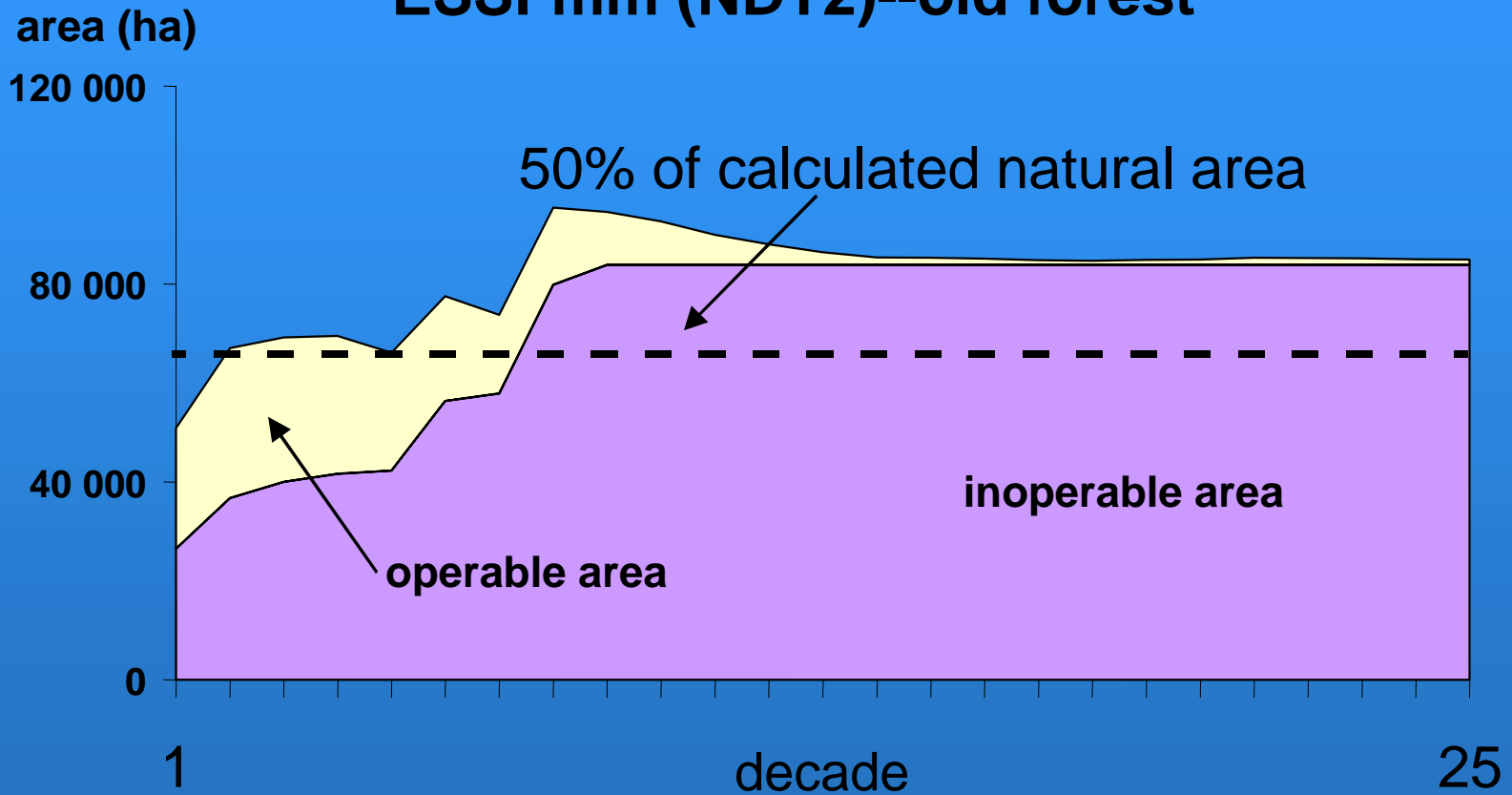
ESSFmm (NDT2)--old forest



ESSFmm (NDT2)--old forest



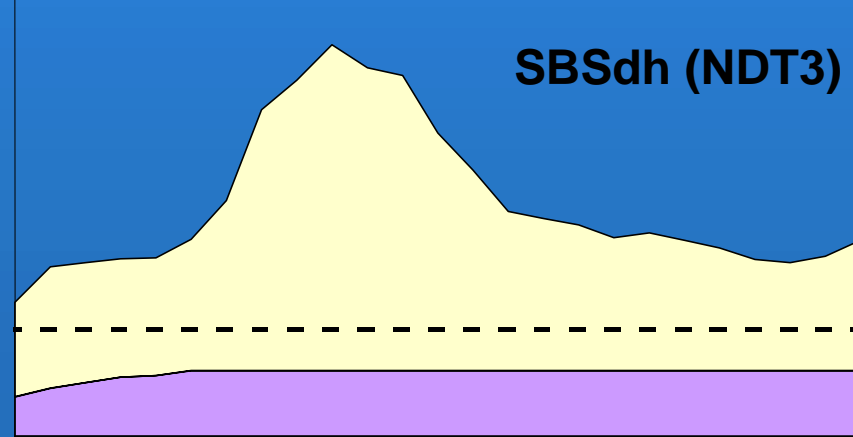
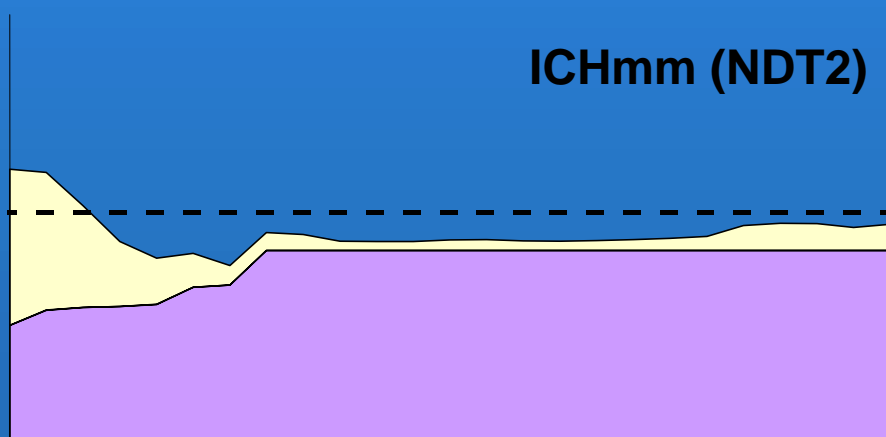
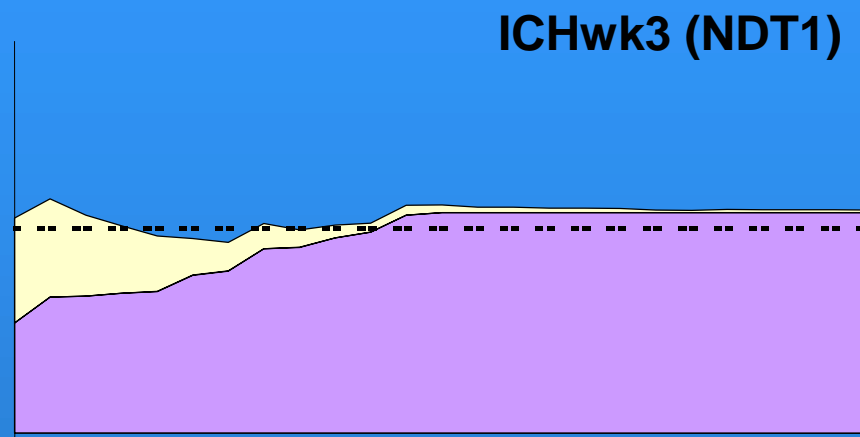
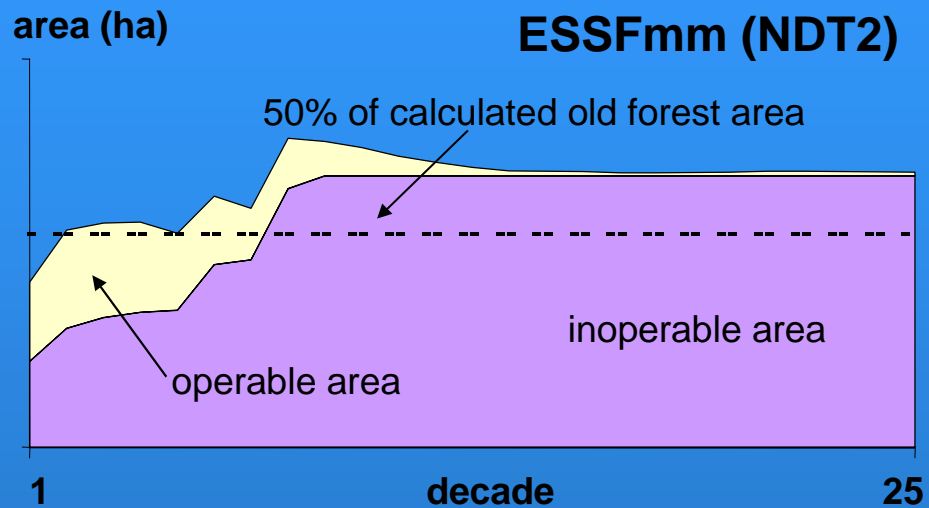
ESSFmm (NDT2)--old forest



Important Variables

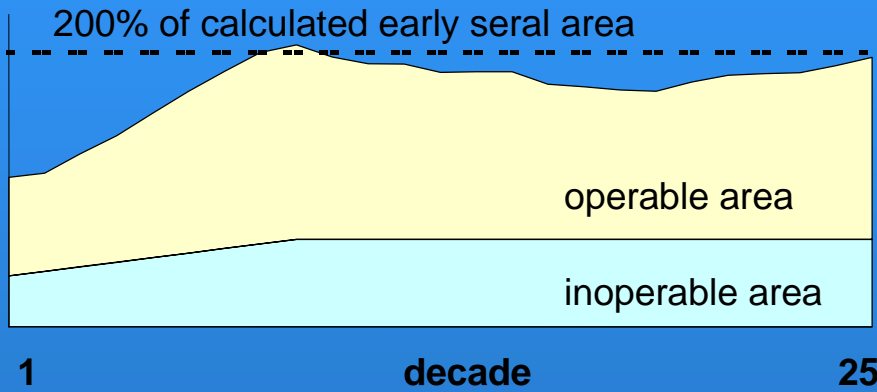
- % of variant that is unavailable for harvesting
- historic range of natural variability (mean)
- definition of old forest
- average harvest age in model

Old Forest Area

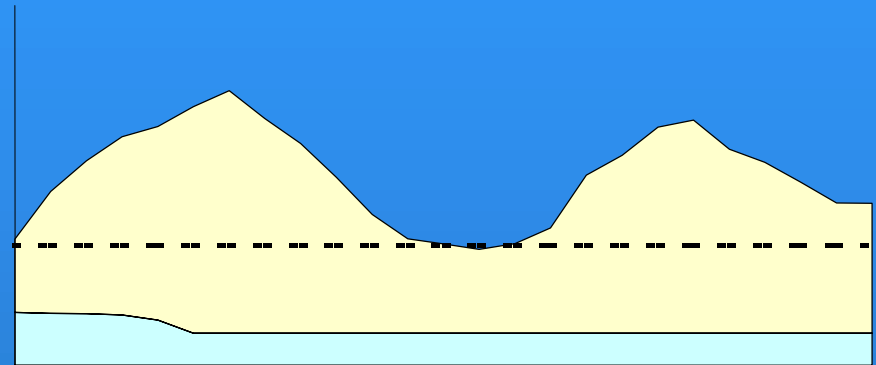


Early Seral Area

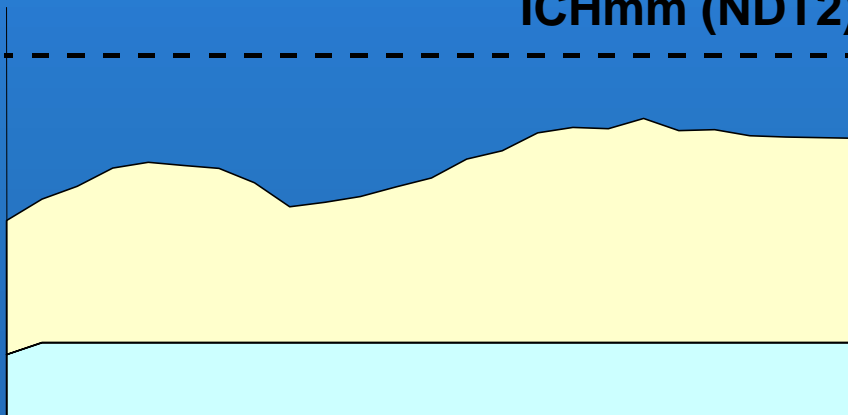
ESSFmm (NDT2)



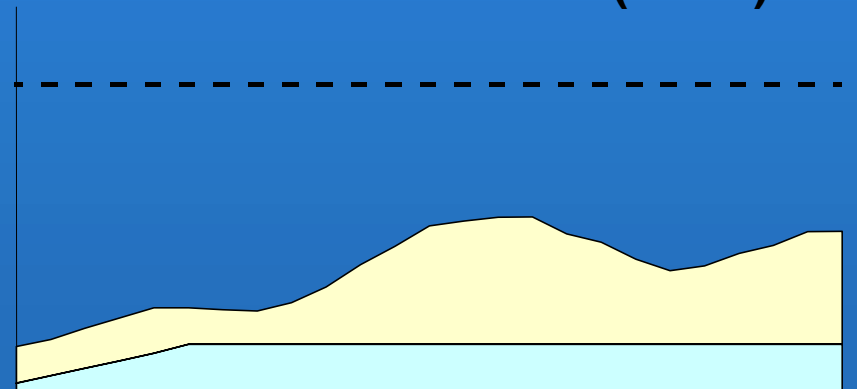
ICHwk3 (NDT1)



ICHmm (NDT2)

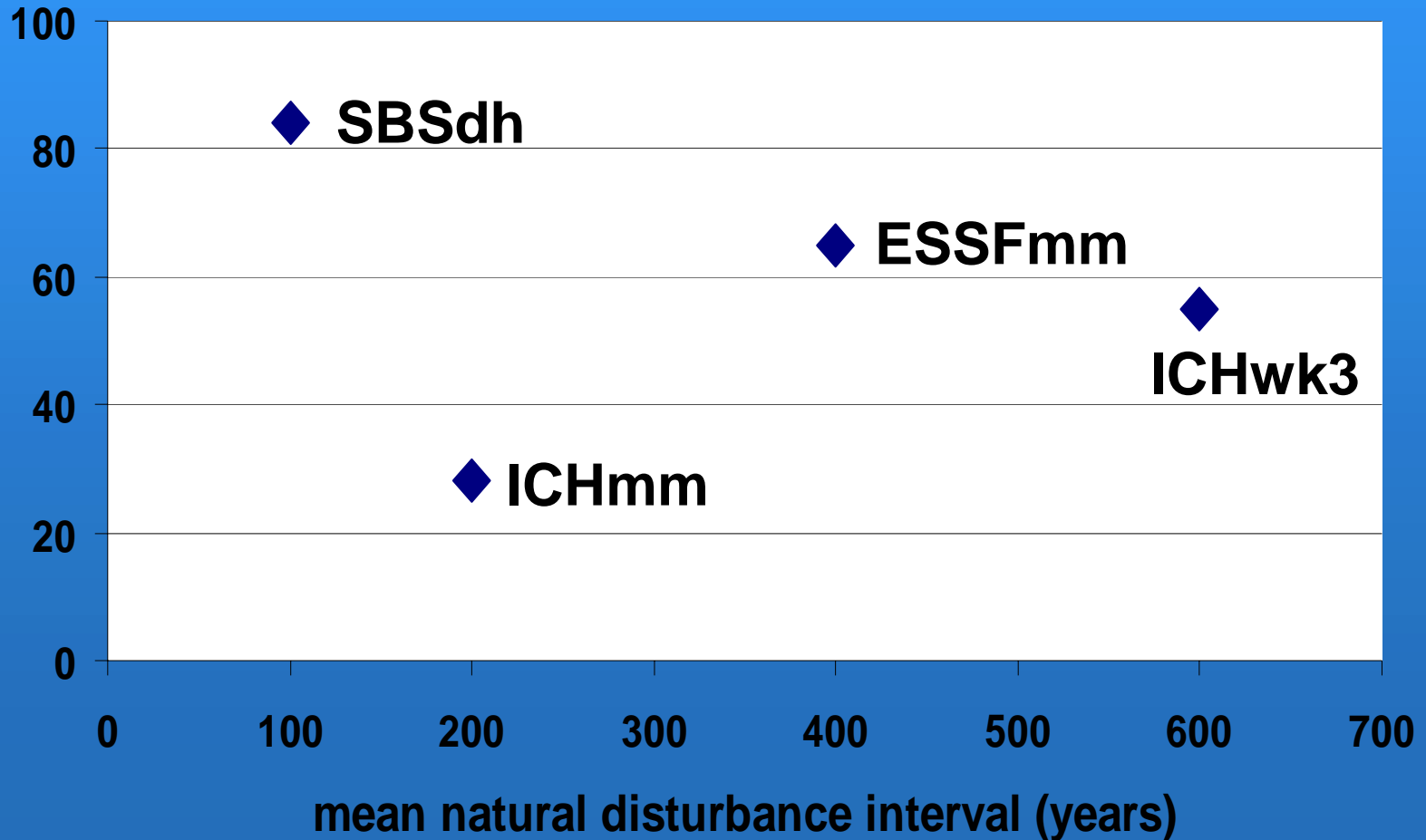


SBSdh (NDT3)

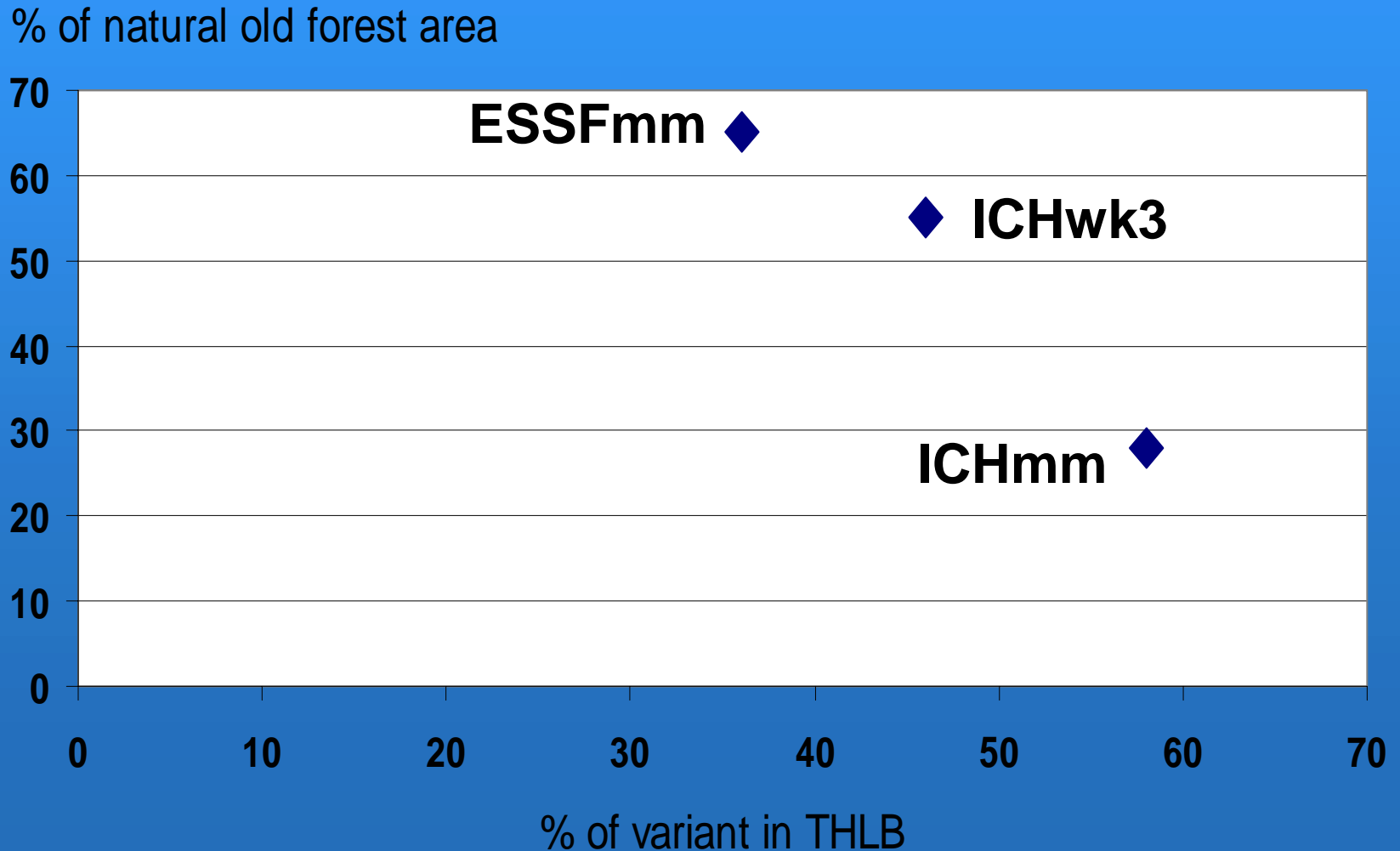


Natural disturbance interval and % of natural old forest area

% of natural old forest area



THLB composition and % of natural old forest area



What we learned in the Robson Valley

- SBSdh (NDT3) has the lowest risk to biodiversity of any variant
 - old forest younger than mean harvest age
- ICHmm (NDT2) has highest risk to old forest
 - 28% of expected level of old forest
 - Should we be concerned?
- ICHwk3 (NDT1) has greatest divergence from expected early seral
- A single management system is insensitive to ecosystem variability

Desired Management Response

➤ MOF

- defer or lower cut in ICHmm
- district staff acknowledge ecosystem differences
- look closely at ICHwk3-- partial cutting

➤ MELP

- attention to risk -- where are the thresholds?

Cautions for Modellers

- Non-spatial model - pattern also plays a role in biodiversity
- Environmental Analysis should have more than one indicator including
 - fine filter (single species)
 - coarse filter (habitat diversity, ecosystem indicators)
 - context (neighbouring management units)

Advantages of This Approach

- Consistent methodology over province
- Consistent with TSR and AAC determination
- Documents ecological uncertainty
- Results will direct research, inventory, policy changes needed before the next Timber Supply Review