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Objectives

Understand & project:

Landscape Conditions

Freshwater Habitat

Salmon & Trout

Approach

1. Develop & apply watershed condition metrics

2. Model relationships among salmonids, their freshwater habitats, and landscape features

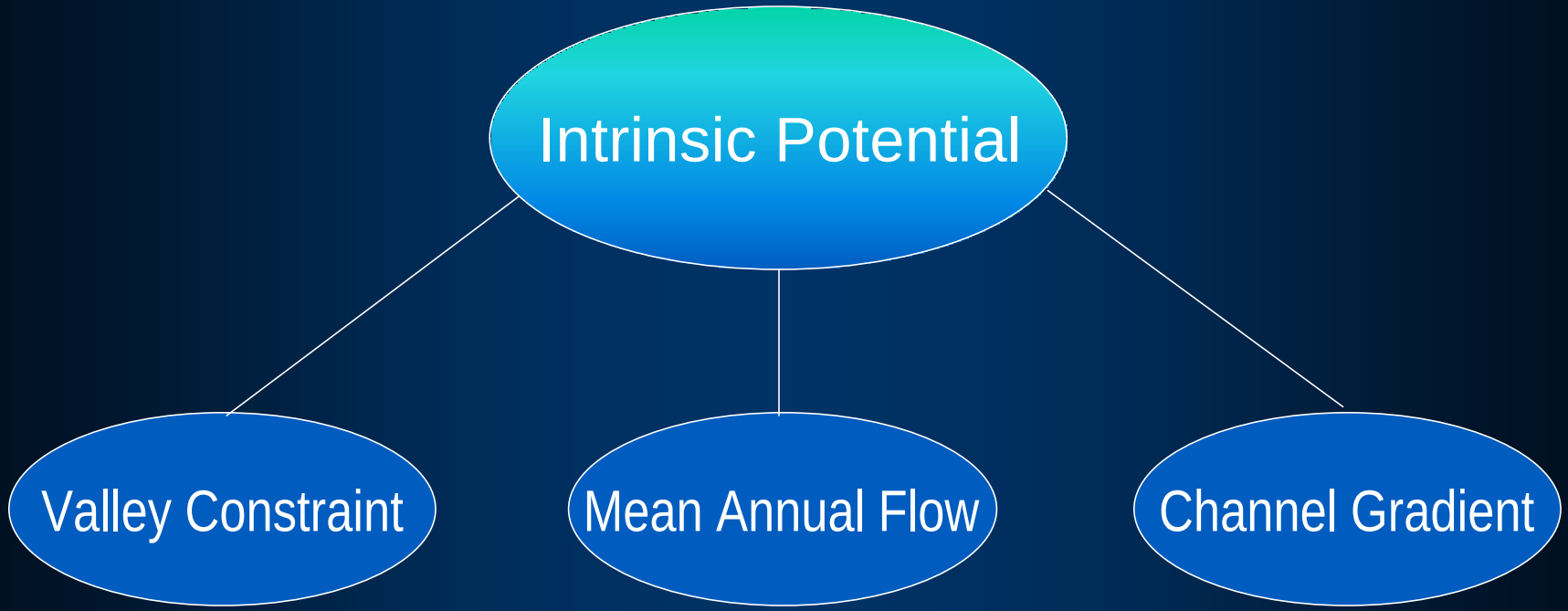
Approach

1. Develop & apply watershed condition metrics
   - Intrinsic potential
   - Management influences on streams

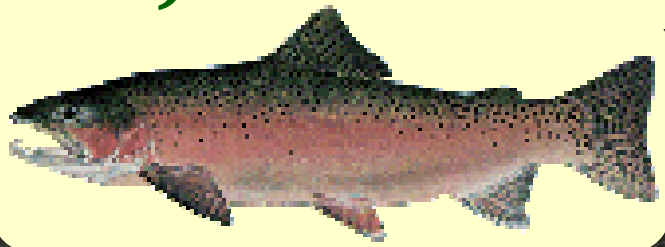
2. Model relationships among salmonids, their freshwater habitats, and landscape features

Intrinsic Potential

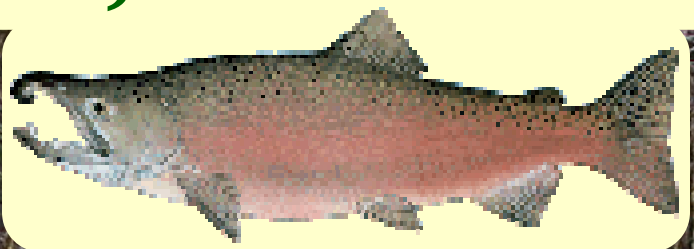
- Describes capacity to provide high quality habitat
- Attributes are static over long time frames
- Values of attributes are species specific



High Gradient, Constrained Reaches

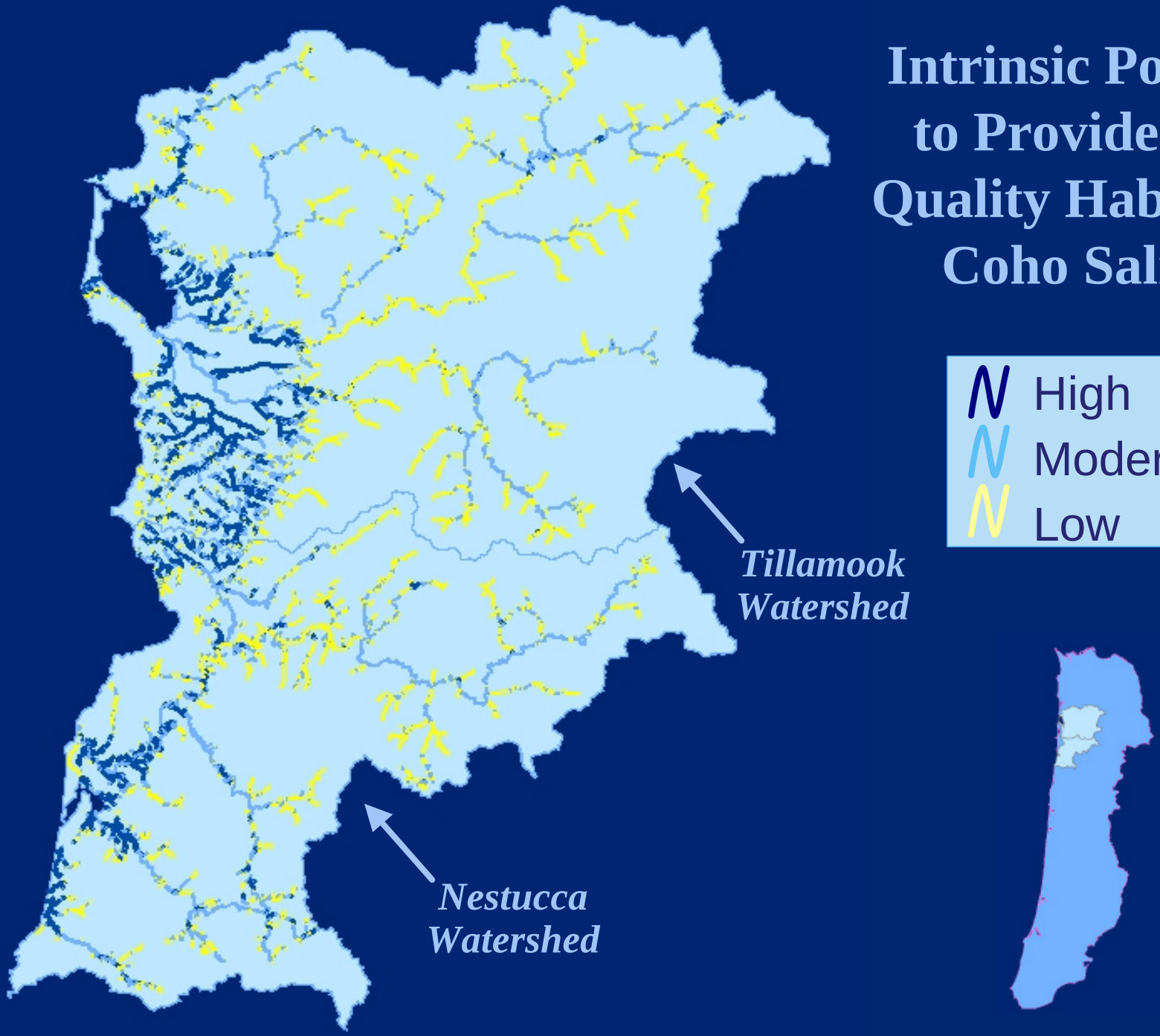


Low Gradient, Unconstrained Reaches

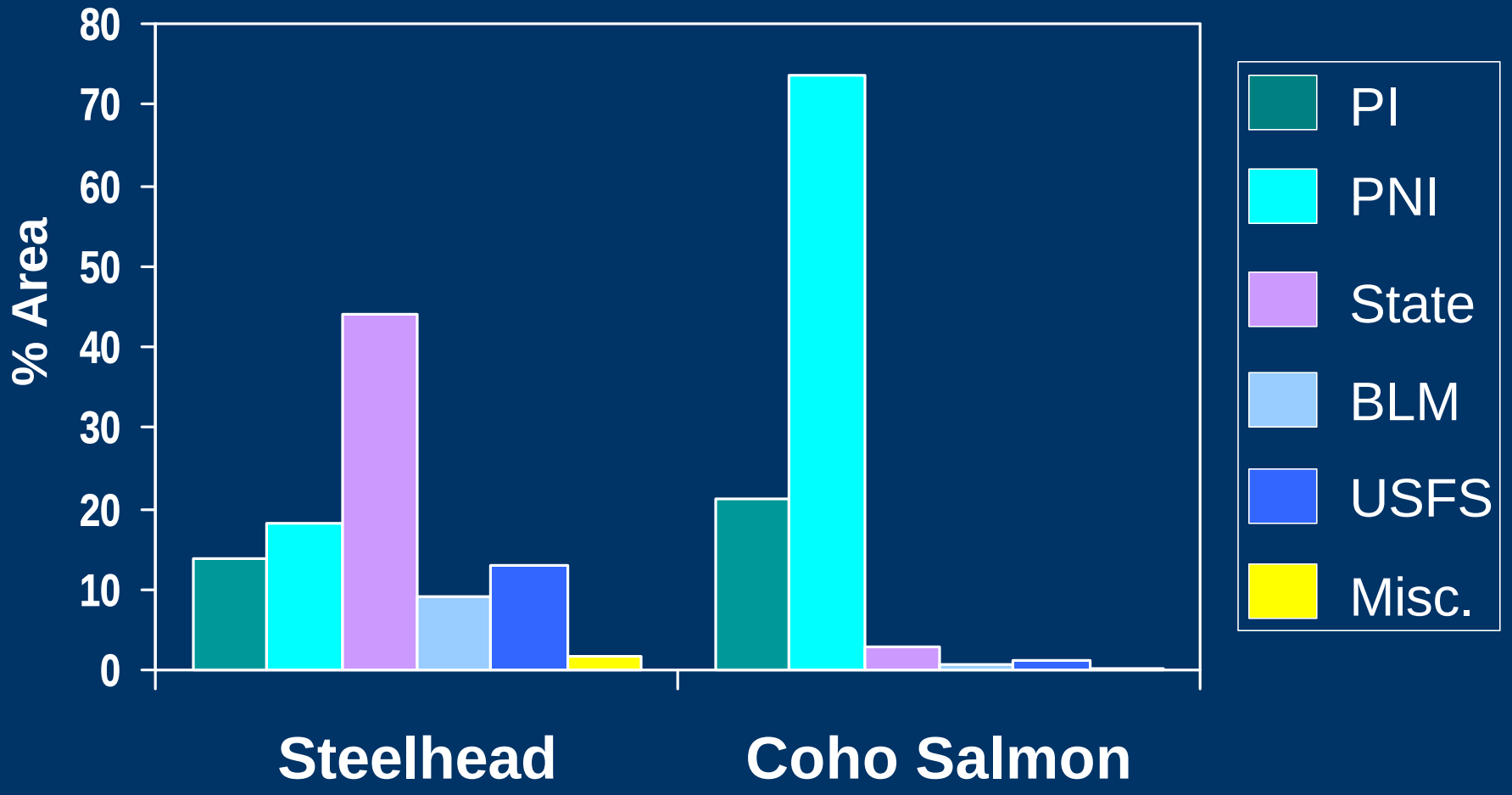


Intrinsic Potential to Provide High Quality Habitat for Steelhead

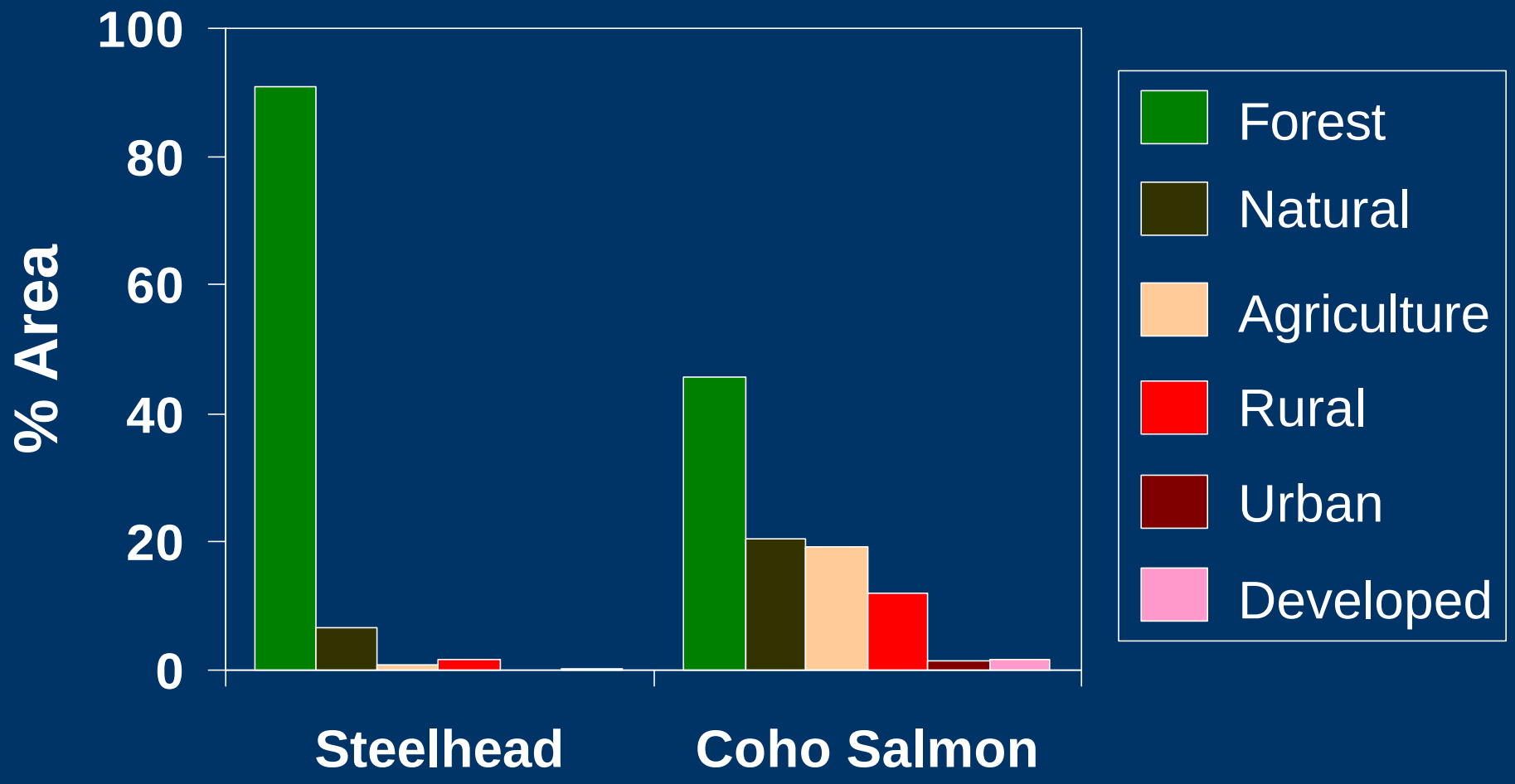
Intrinsic Potential to Provide High Quality Habitat for Coho Salmon



High Intrinsic Potential by Land Ownership Tillamook and Nestucca Watersheds

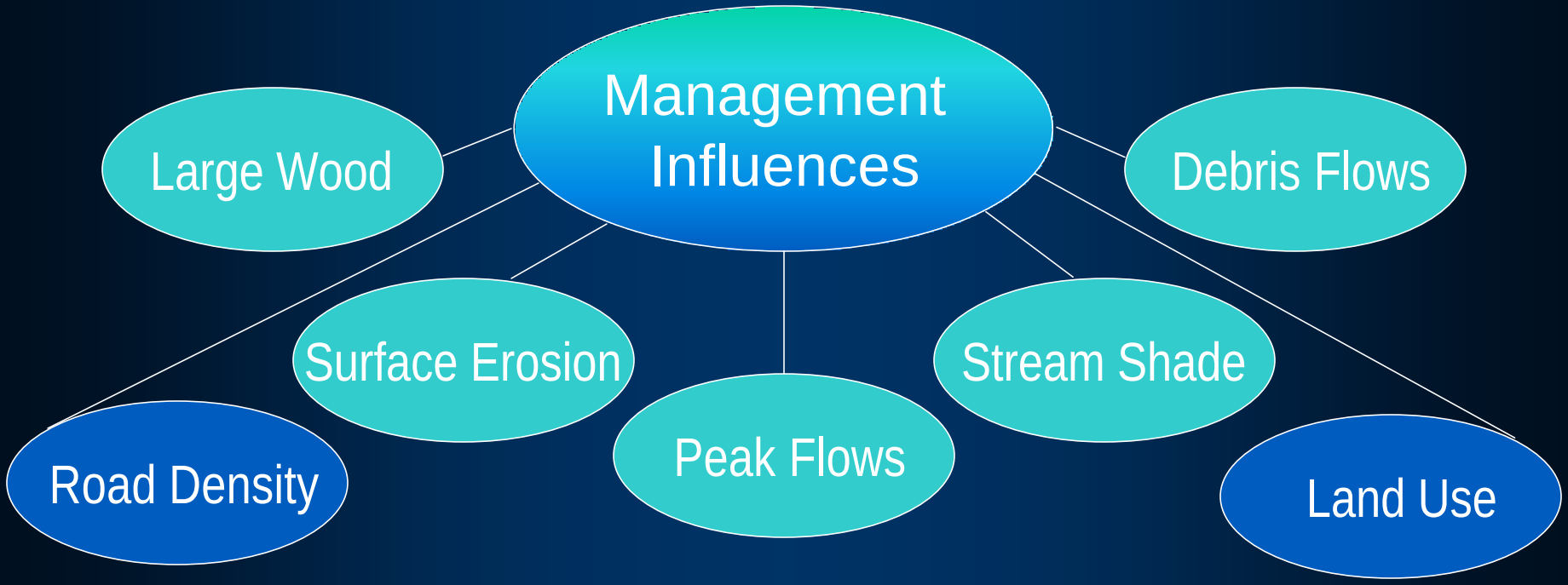


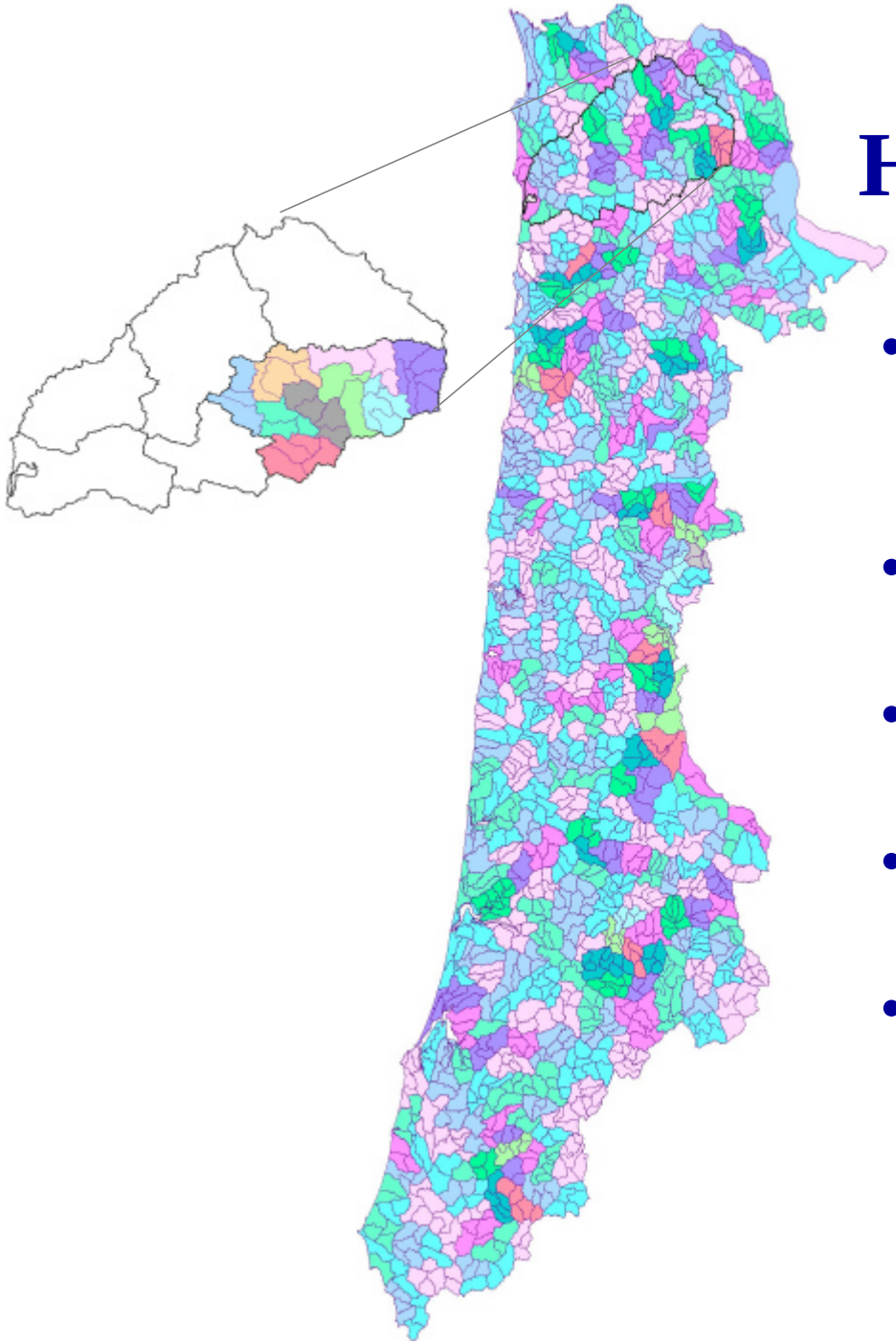
High Intrinsic Potential by Current Land Use Tillamook and Nestucca Watersheds



Management Influences

- Describe possible effects of landuse on streams
- Attributes dynamic over short time frames
- Most attributes are based on forest cover classes

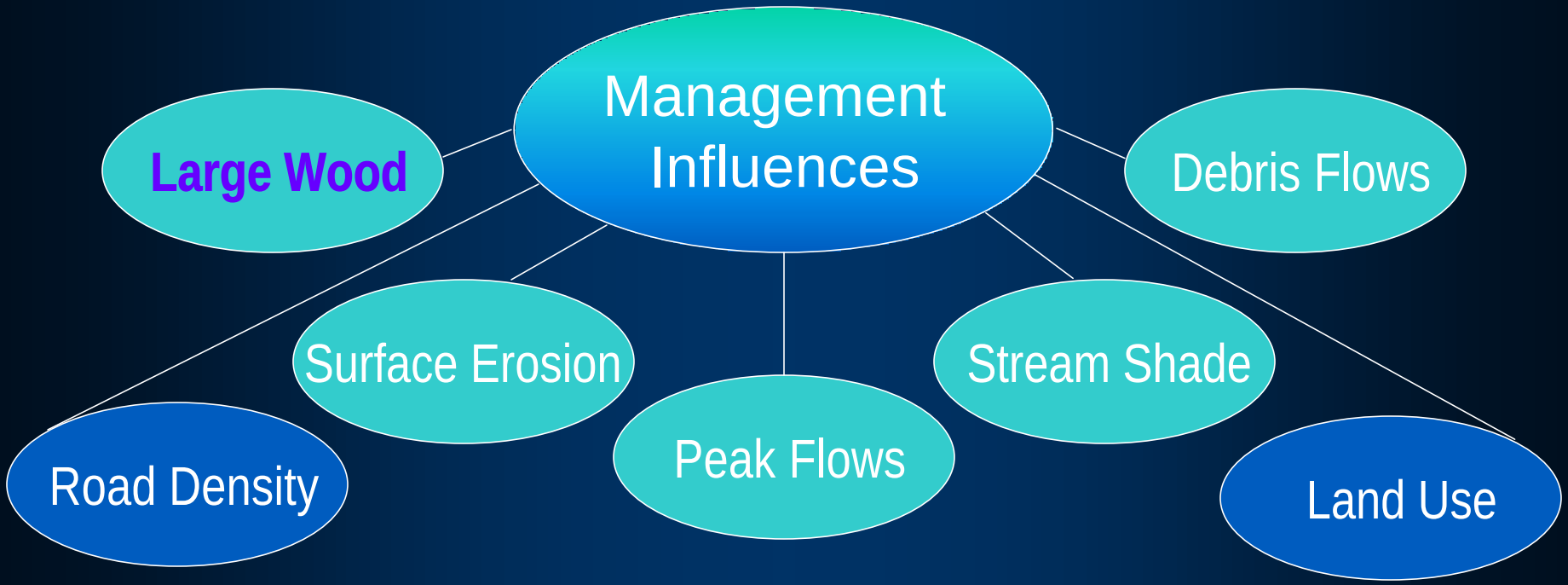




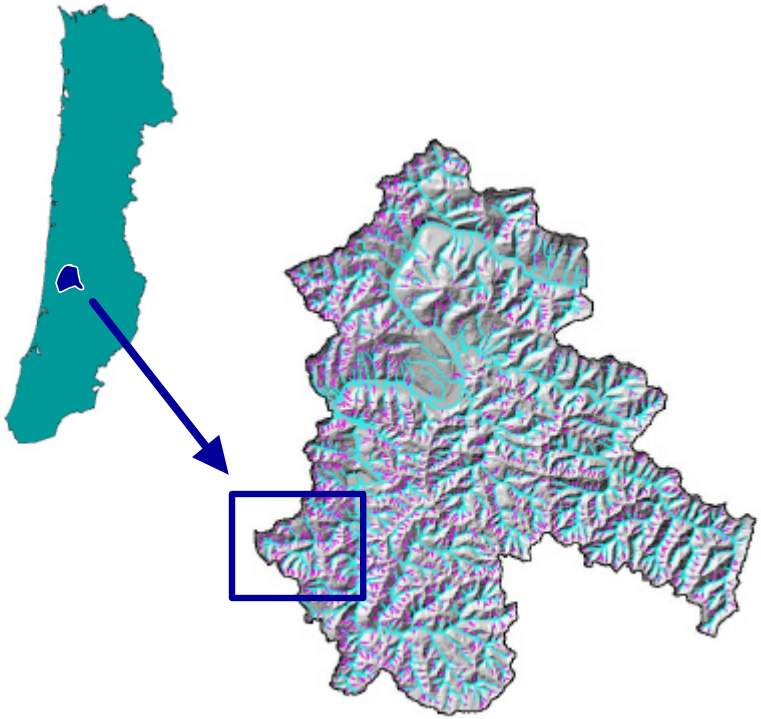
6th and 7th Field Hydrologic Units (HUs)

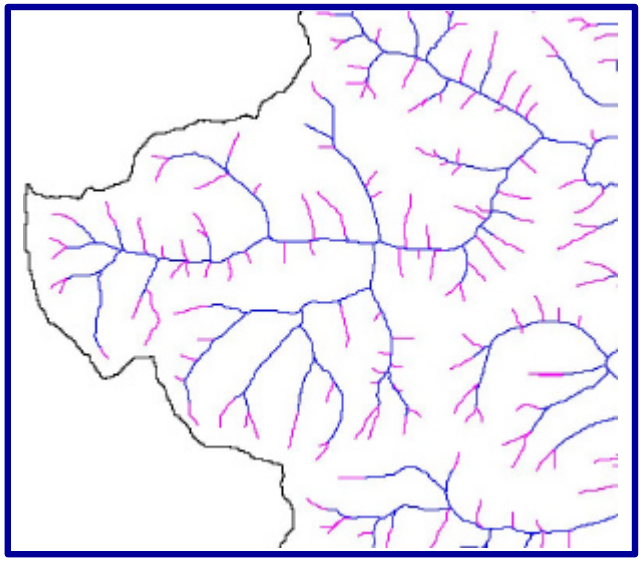
- Generated with 10 m DEMs using established guidelines
- Consistent drainage areas
- Match tributary junctions
- Attributed with basin type
- Upstream HUs identified

Management Influences

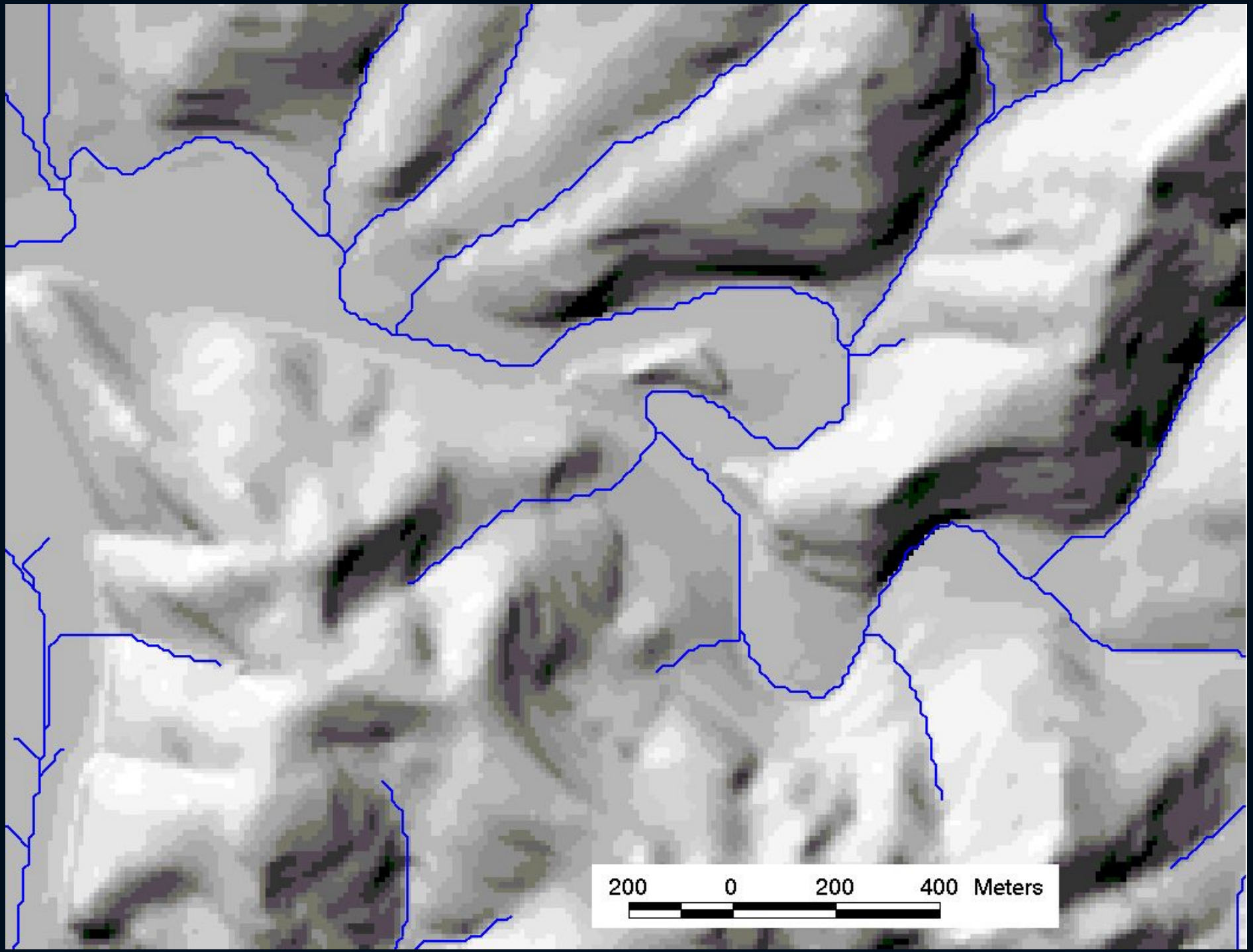


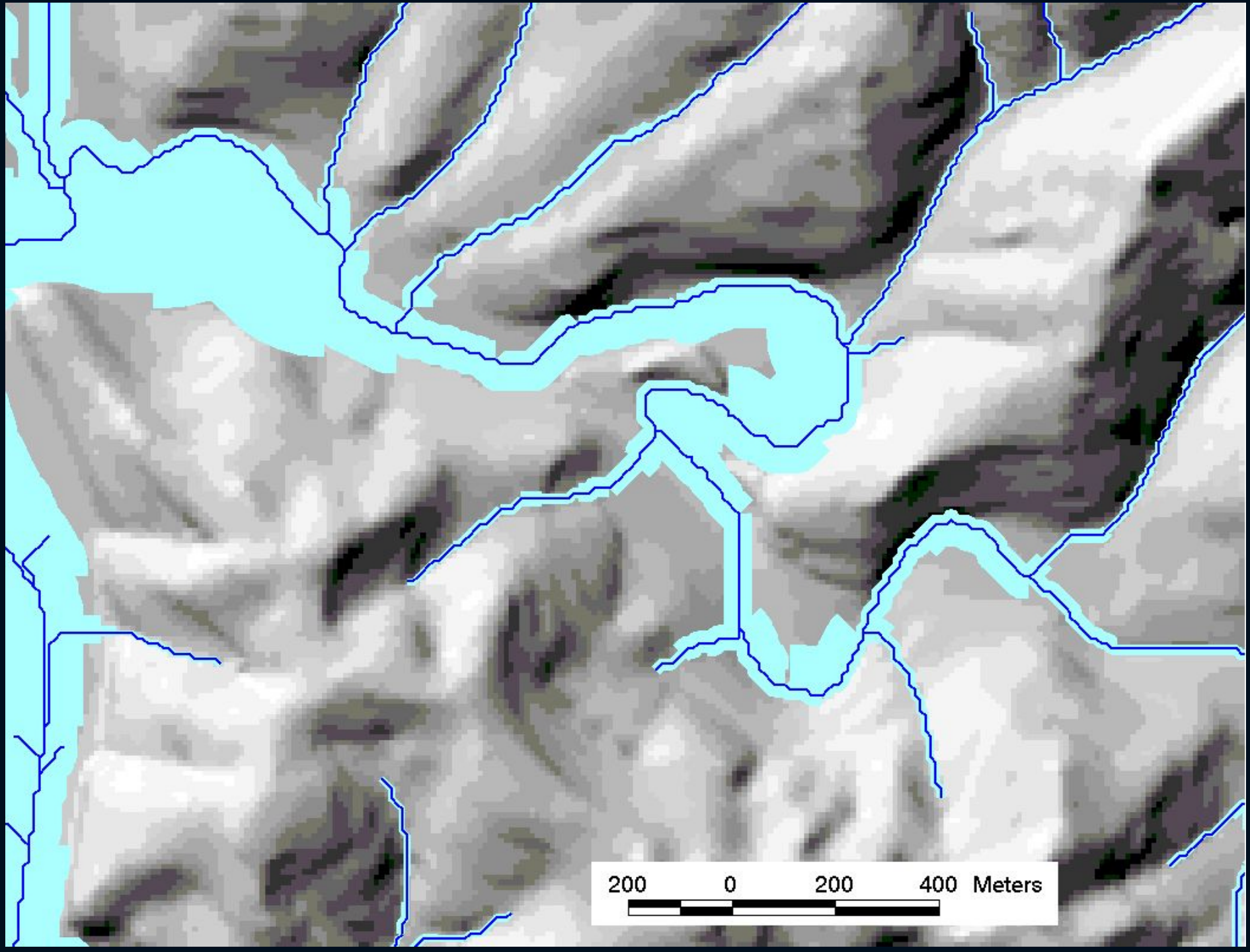
Modeled Stream Network





- Derived from 10 m DEMs & a process-based model
- Complete coverage
- Drainage density & spatial extent accurately represented given DEM limitations
- Empirically-calibrated attributes including mean annual flow, stream gradient, valley width, & periodicity


200 0 200 400 Meters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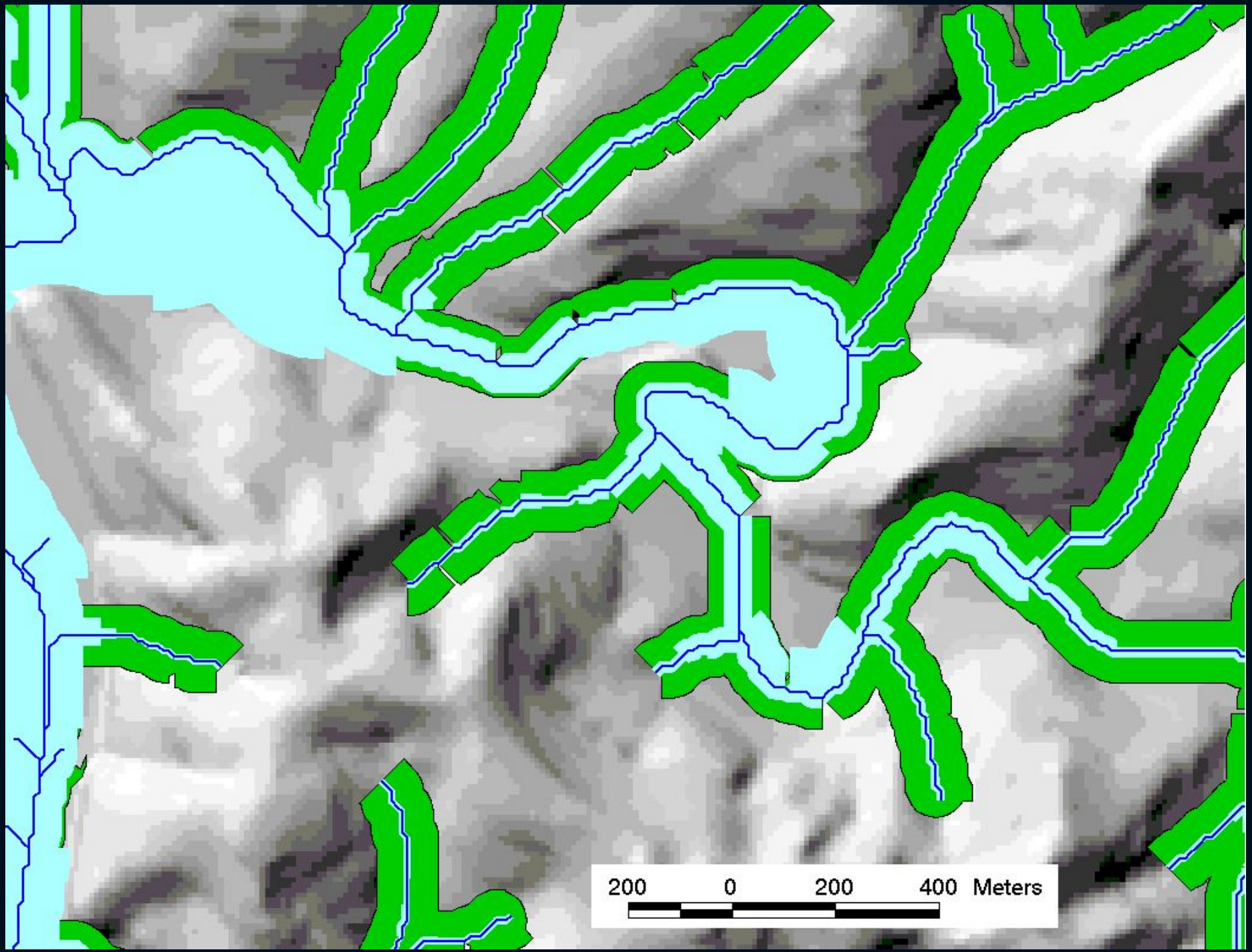
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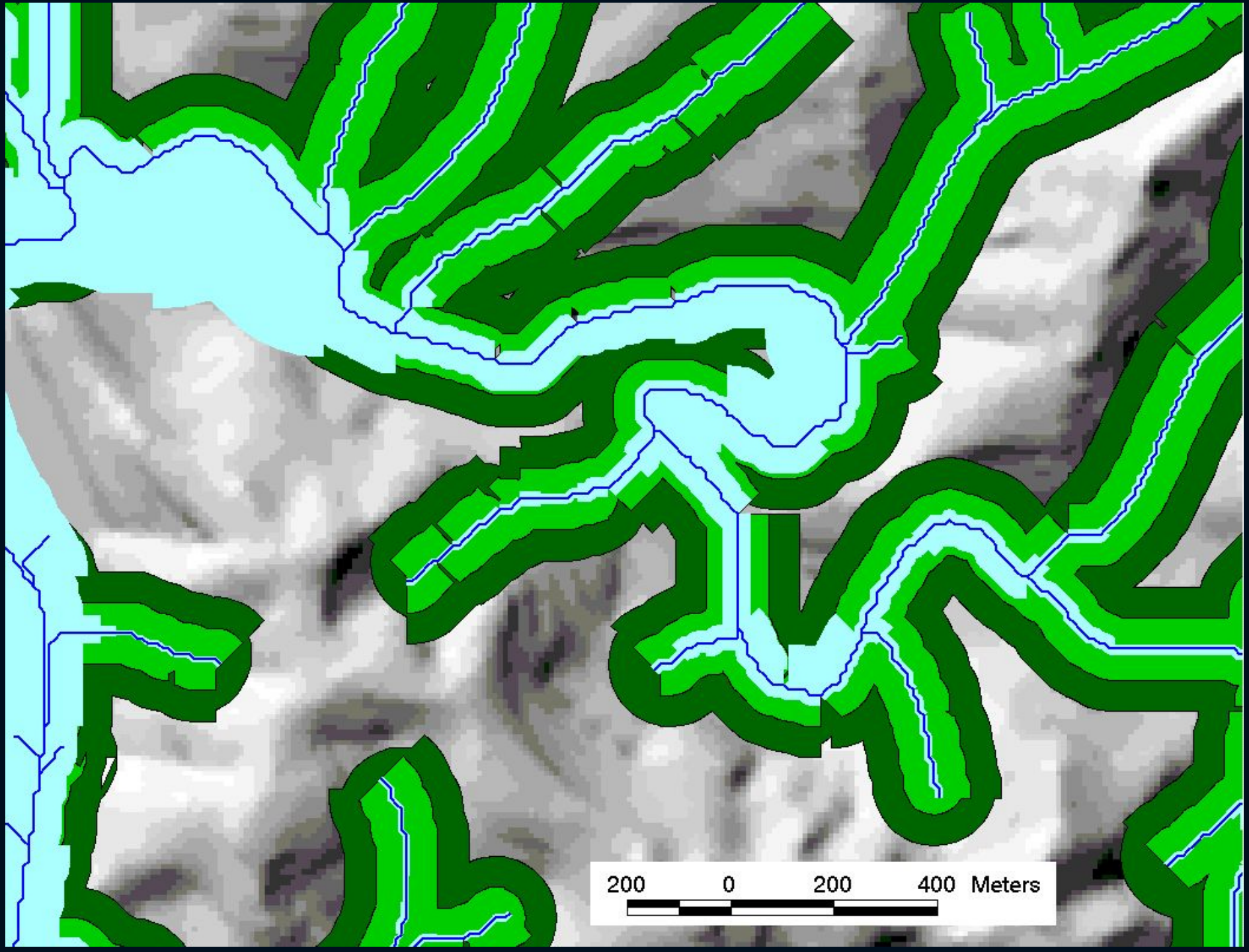
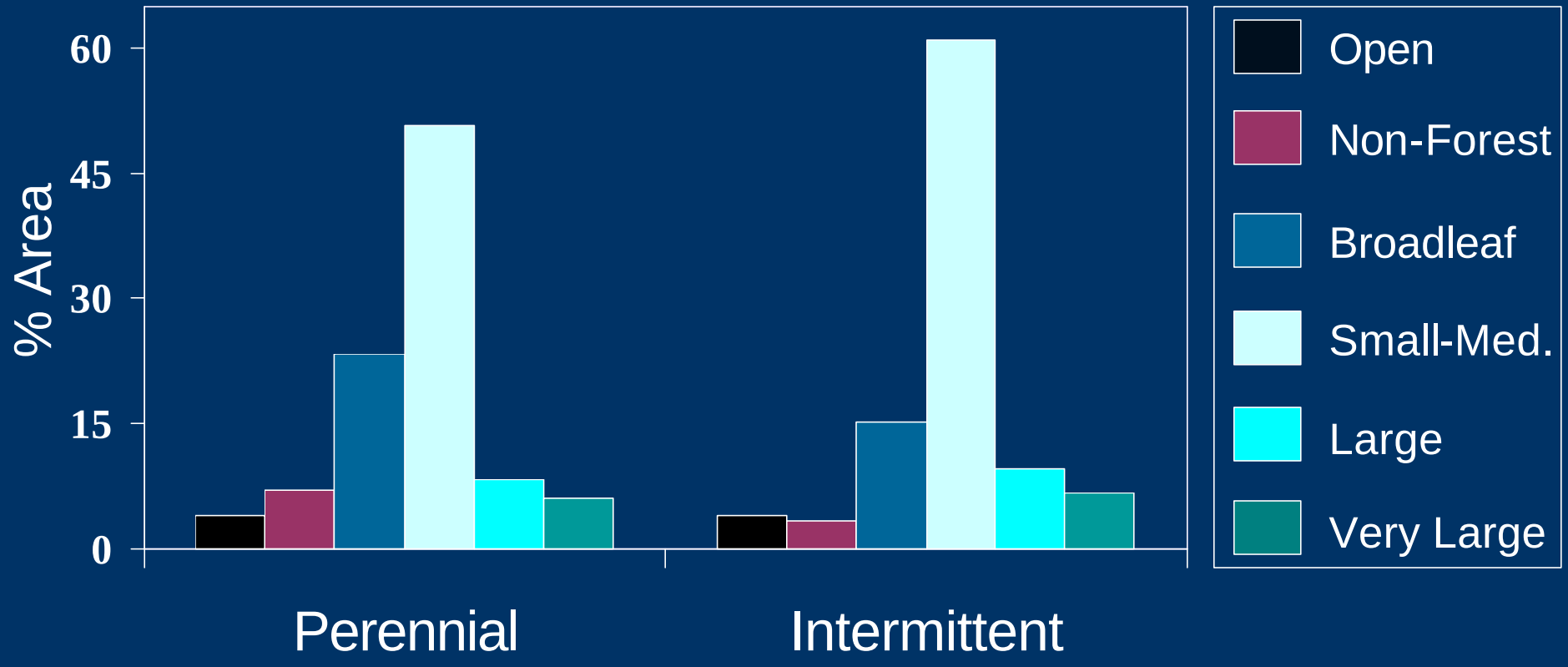
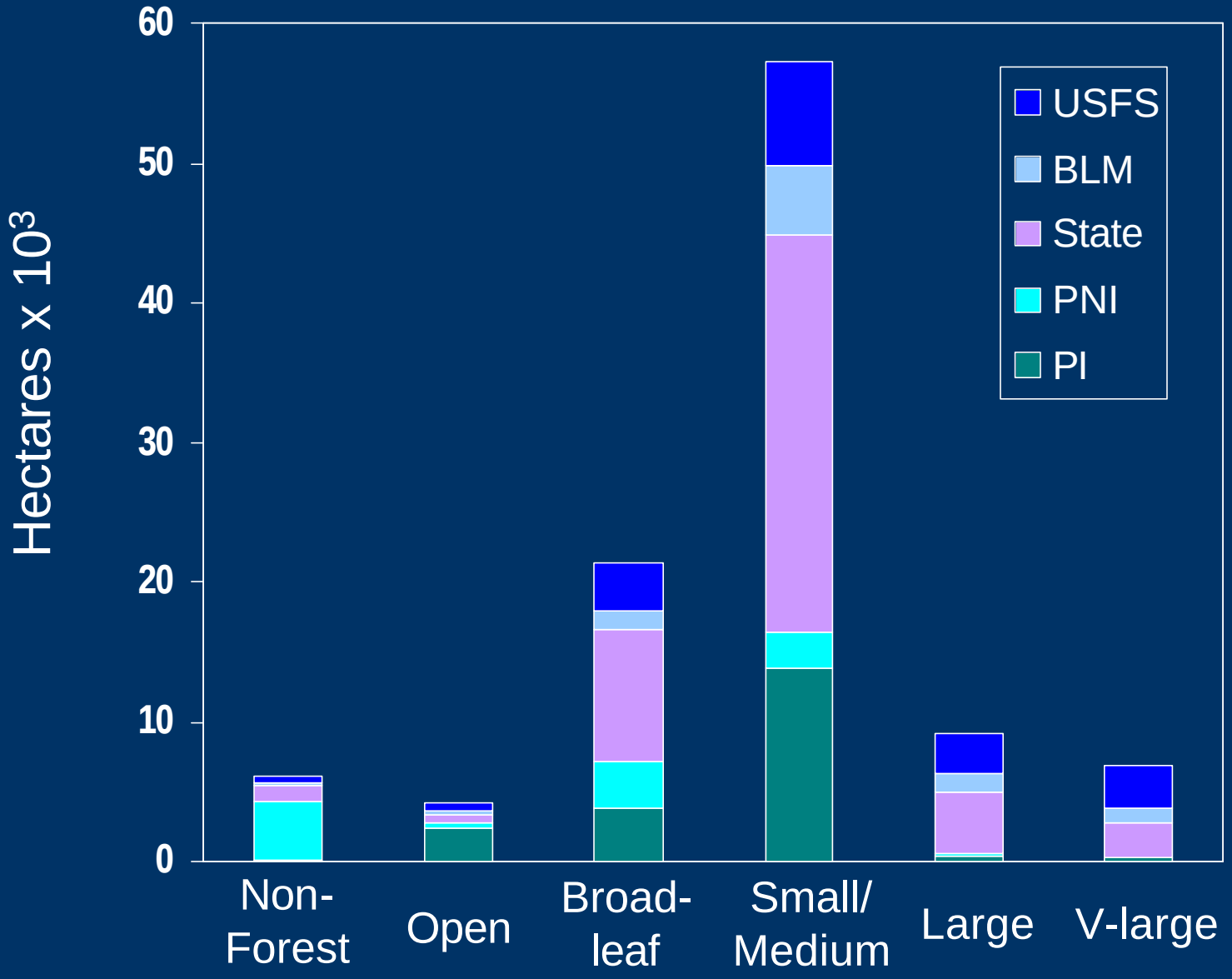

200 0 200 400 Meters

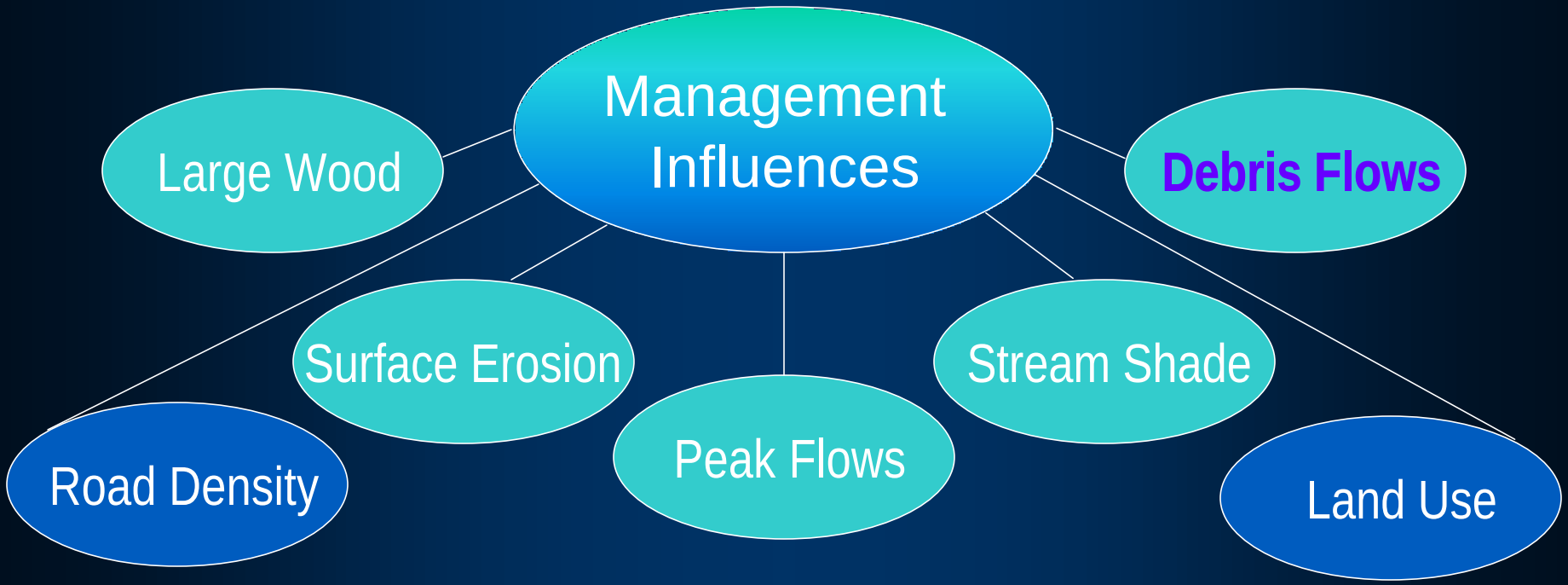
Current Streamside Forest Cover
Tillamook and Nestucca Watersheds

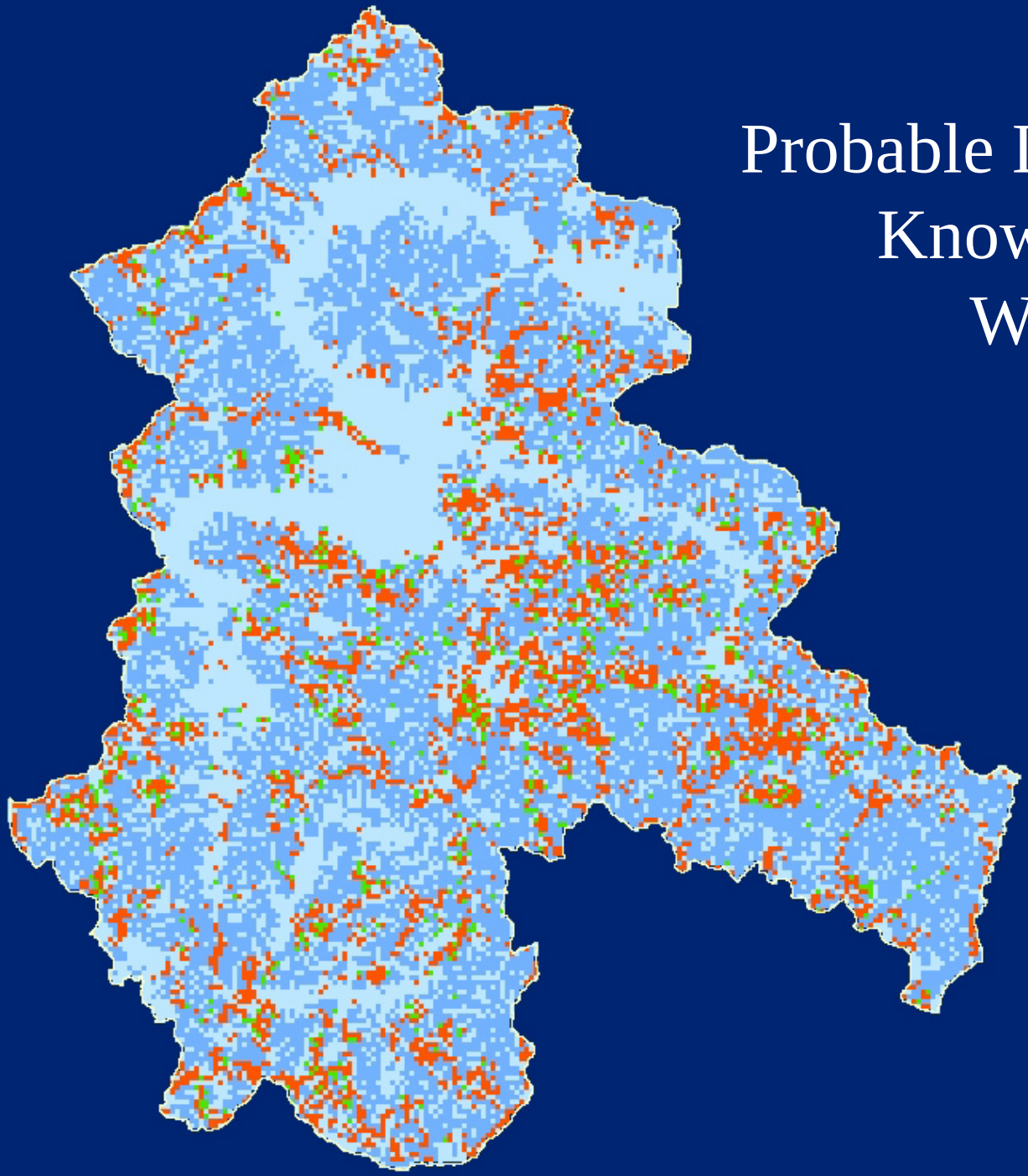


Current Streamside Forest Cover by Ownership
Tillamook and Nestucca Watersheds



Management Influences

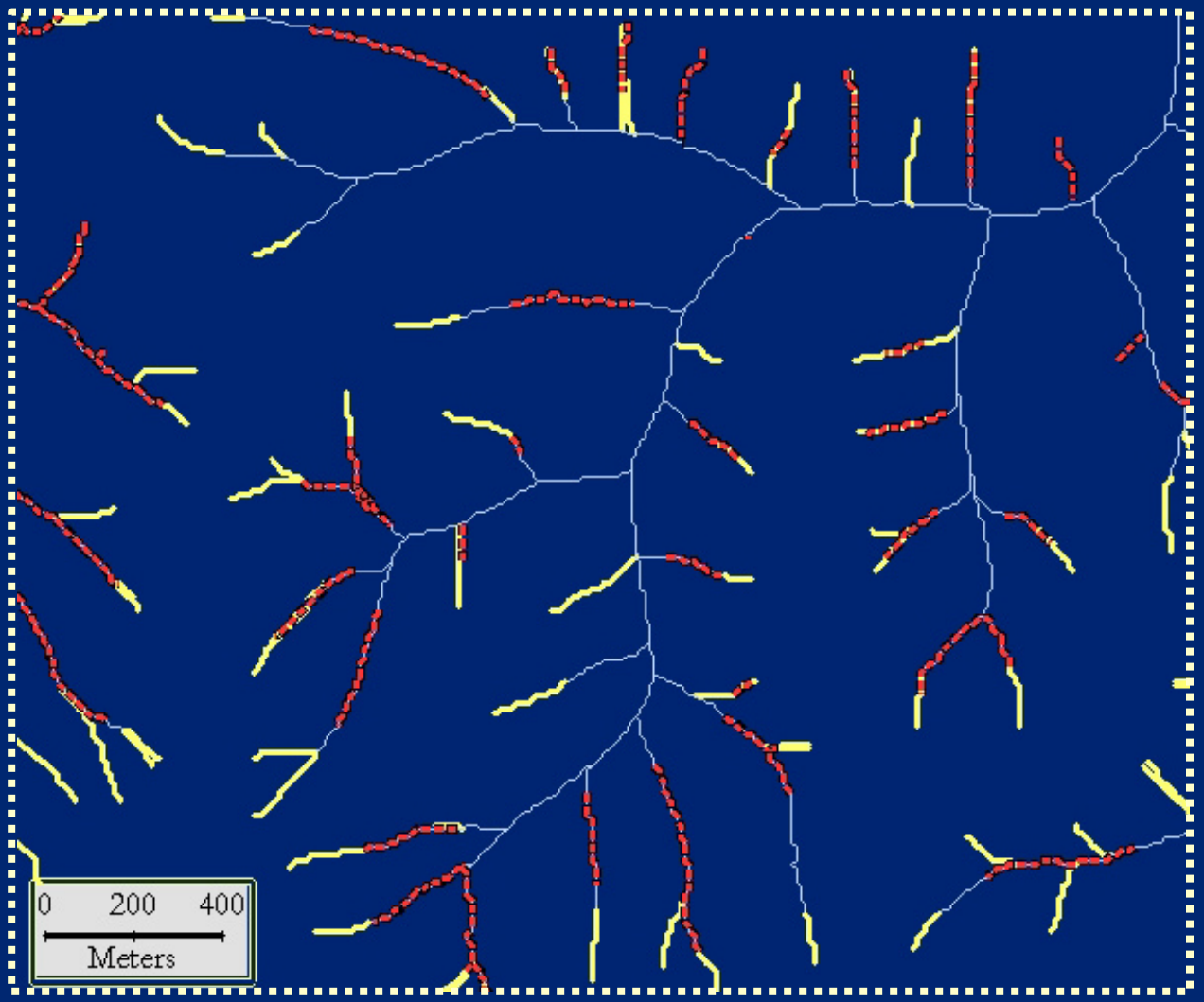




Current Probable Landslide Density Knowles & Sweet Watersheds

Zero
Low
Medium
High

Probability of Delivery From Debris Flows to Anadromous Fish-Bearing Channels

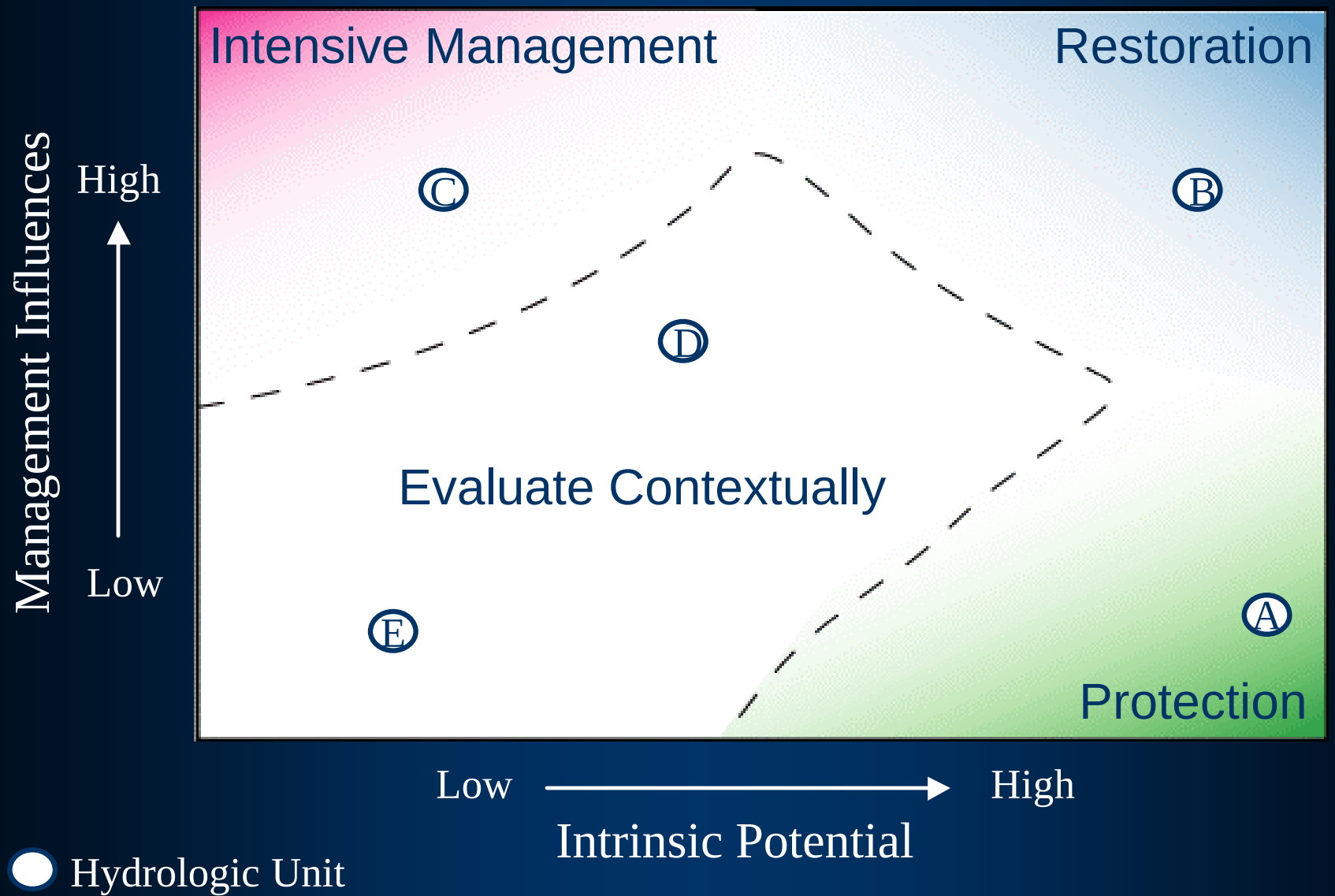


Med.-High Probability

Intermittent

Perennial

Tool for Prioritizing Hydrologic Units



Approach

1. Develop & apply watershed condition metrics
   - Intrinsic potential
   - Management influences on streams
2. Model relationships among salmonids, their freshwater habitats, and landscape features
   - Evaluate watershed condition metrics
   - Identify new relationships

Evaluate Watershed Condition Metrics

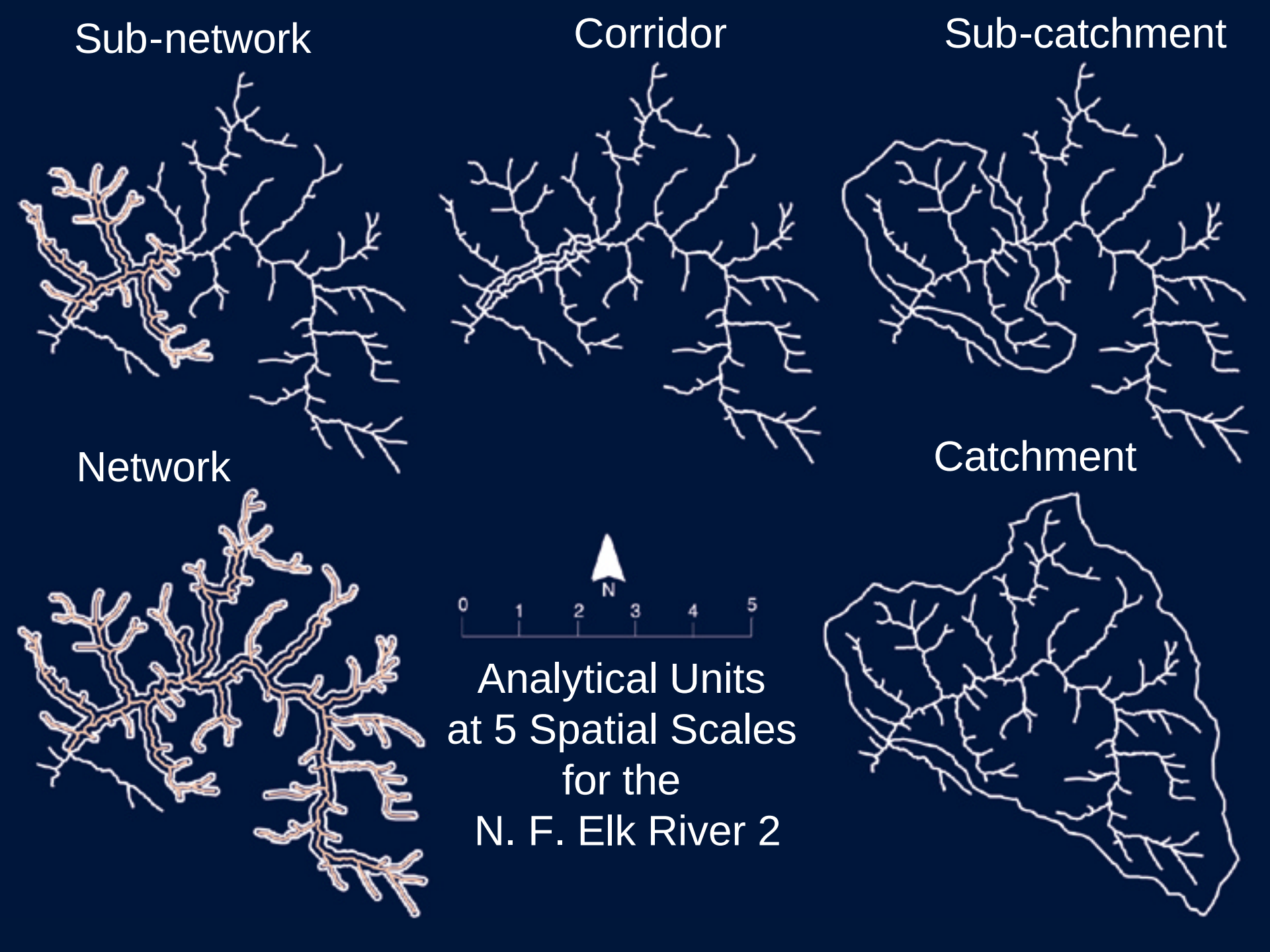
- Why?
  - Reflect our best understanding
  - Hypotheses about forestry effects on streams
- Develop statistical relationships with fish and habitat data
- Modify metrics if suggested

Identify New Relationships

- Channel unit feature
  - Mean density of wood in pools
- Landscape characteristics
  - Delineate analytical units for each surveyed reach at 5 spatial scales
  - Overlay analytical units onto landscape coverages
- Best subsets linear regression at each of the 5 scales

Five Spatial Scales

- Differed in extent upstream and upslope of surveyed reaches
- Designed to represent different source areas and processes for delivery of materials to surveyed reaches


Sub-network
Corridor
Sub-catchment
Network
Catchment
N
0
1
2
3
4
5
Analytical Units
at 5 Spatial Scales
for the
N. F. Elk River 2

Stepwise Regression Results for Large Wood Density

Corridor

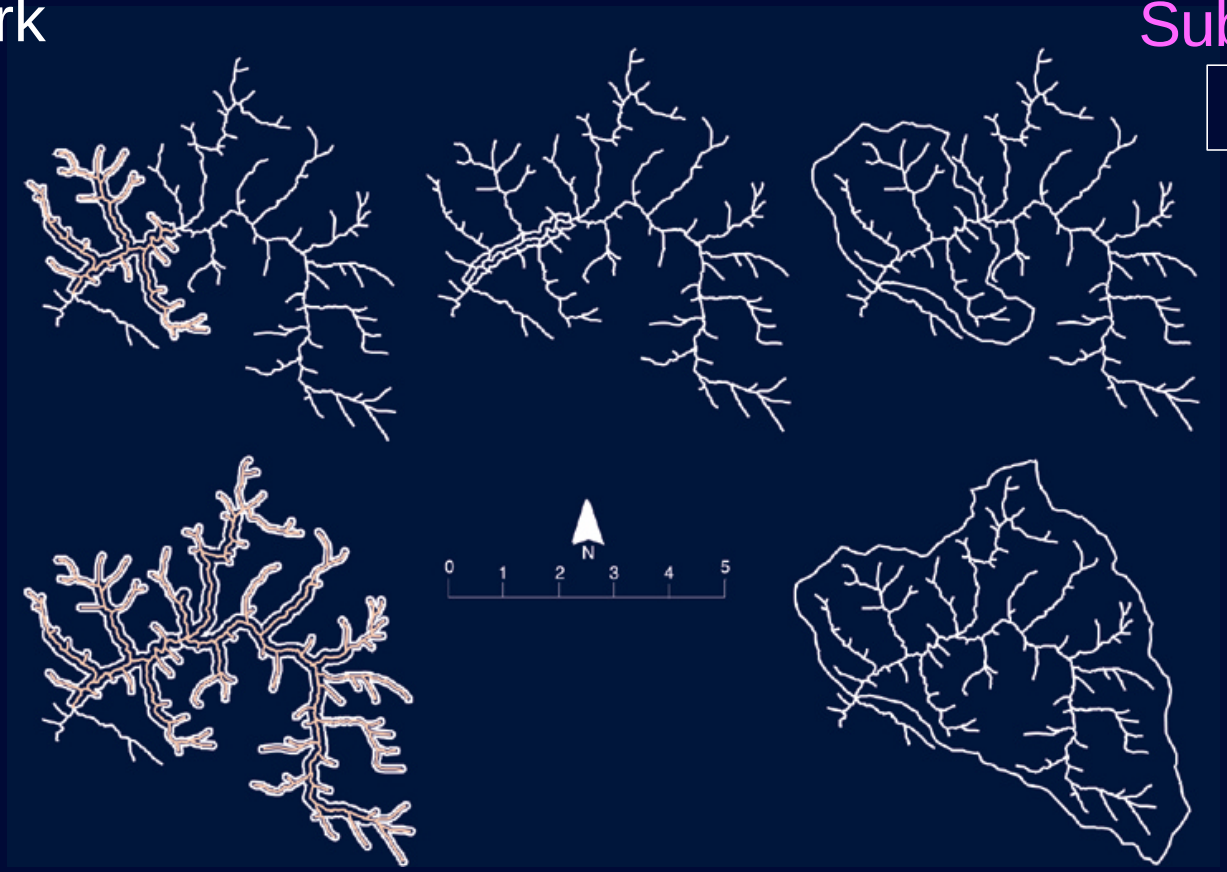
0.34 (0.03)

Sub-network

0.48 (0.01)

Sub-catchment

0.58 (0.002)



Network

0.41 (0.02)

Catchment

NS

+% Area M-VL Diameter Trees

- % Area Resistant Sedimentary Rocks

Adj. R^2 (P>F)

Relationships Between Landscape Characteristics and Large Wood Density

- Explained in part because:
  - Big trees on land provide large wood to channels
  - Fewer landslides reach streams in sedimentary rock types in Elk River

- Were strongest with landscape characteristics summarized for adjacent hillslopes and smaller streams in addition to fish-bearing reaches

Conclusions

Watershed condition metrics:

- High intrinsic potential for steelhead on public, forested land and for coho salmon on private lands with varying uses
- Intrinsic potential and management influence metrics can identify hydrologic units for protection or restoration

Modeling:

- Multi-scale analyses can suggest areas and processes most tightly coupled to stream habitat for evaluating watershed condition metrics & suggesting new relationships

Spatial data:

- Both approaches require consistent broad-scale data layers
- Results may be compromised by poor quality data such as the currently available road layer