RISK ASSESSMENT

&

SPOTTED OWL RESPONSE TO SILVICULTURE

In

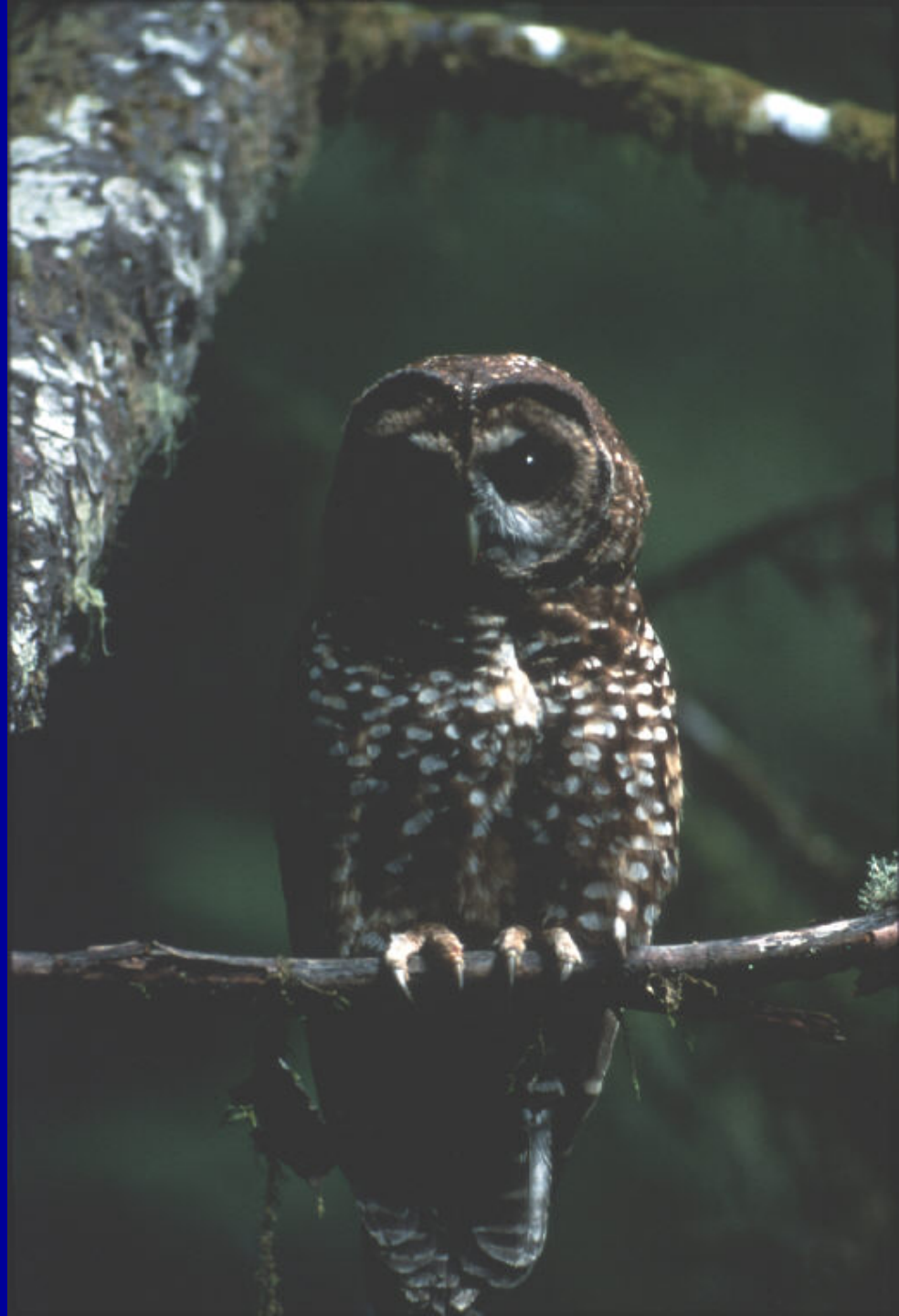
MIXED-CONIFER FORESTS

LARRY L. IRWIN

DENNIS F. ROCK

SUZANNE L. ROCK

NCASI



Cooperators

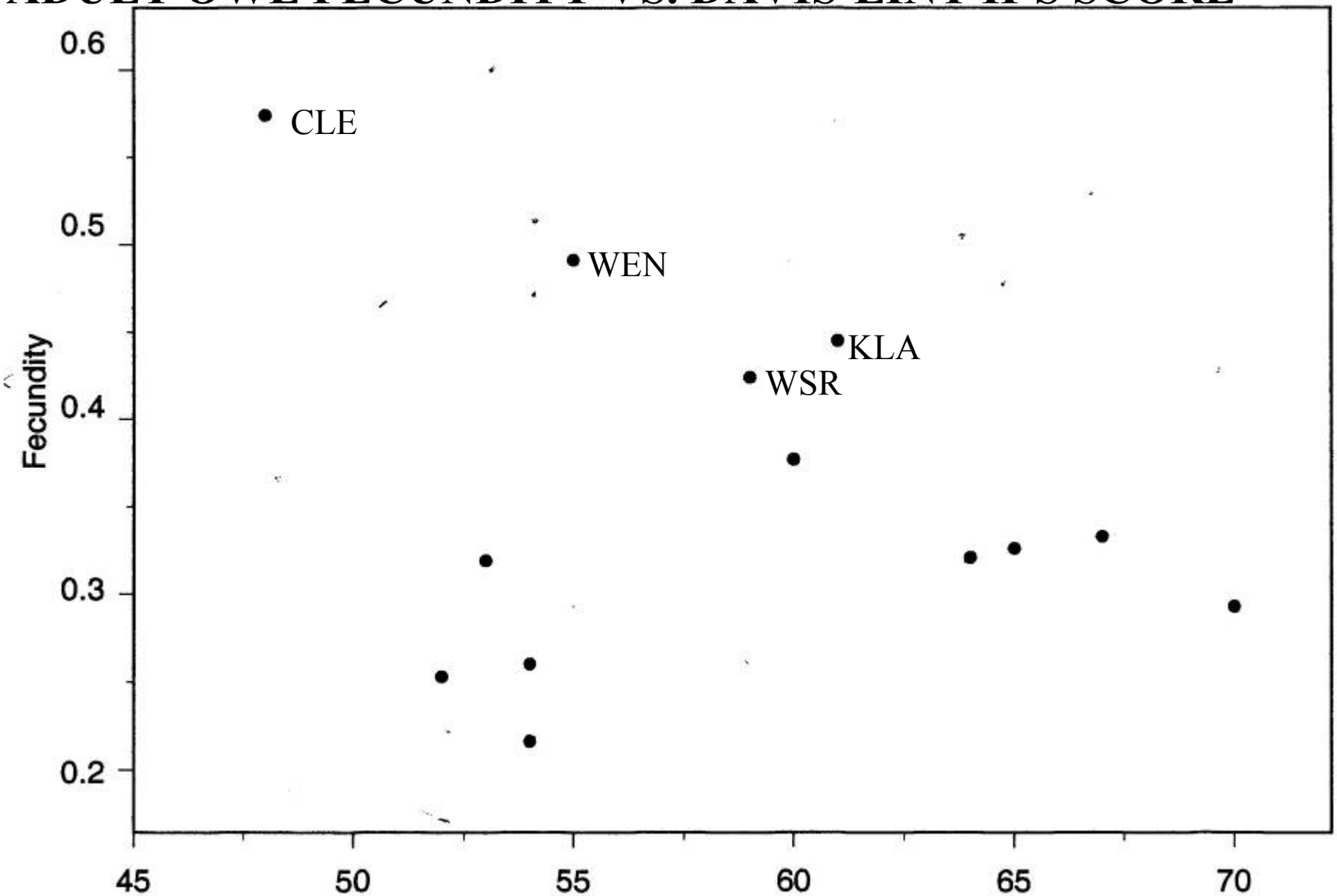
- BLM
- FWS
- OR Dept. Forestry
- US Timberlands
- Weyerhaeuser
- The Timber Co.
- Sierra Pacific Ind.
- Starker Forests
- AFRC
- OFIC
- Giustina
- Simpson

USFS **NPS**
Cal.Dept. Forestry
Boise Cascade
Fruitgrowers Supply
Campbell Group
Mendocino Redwood
Plum Creek Timber
Longview Fibre
WFPA
NCASI
Roseburg For. Prod.
FOREST CAPITAL

LANDSCAPE STRATEGY REQUIRES IMPROVED UNDERSTANDING OF NSO HABITAT SELECTION

“HABITAT ISSUE” REMAINS UNSETTLED

ADULT OWL FECUNDITY VS. DAVIS-LINT H-S SCORE



% Area w/Suitability Score > 40 (Based on Observations of Owls)

LIMITED EXPERIENCE

WITH OWL

RESPONSES TO HABITAT

CHANGES

FROM FUEL TREATMENTS OR THINNING

GOALS

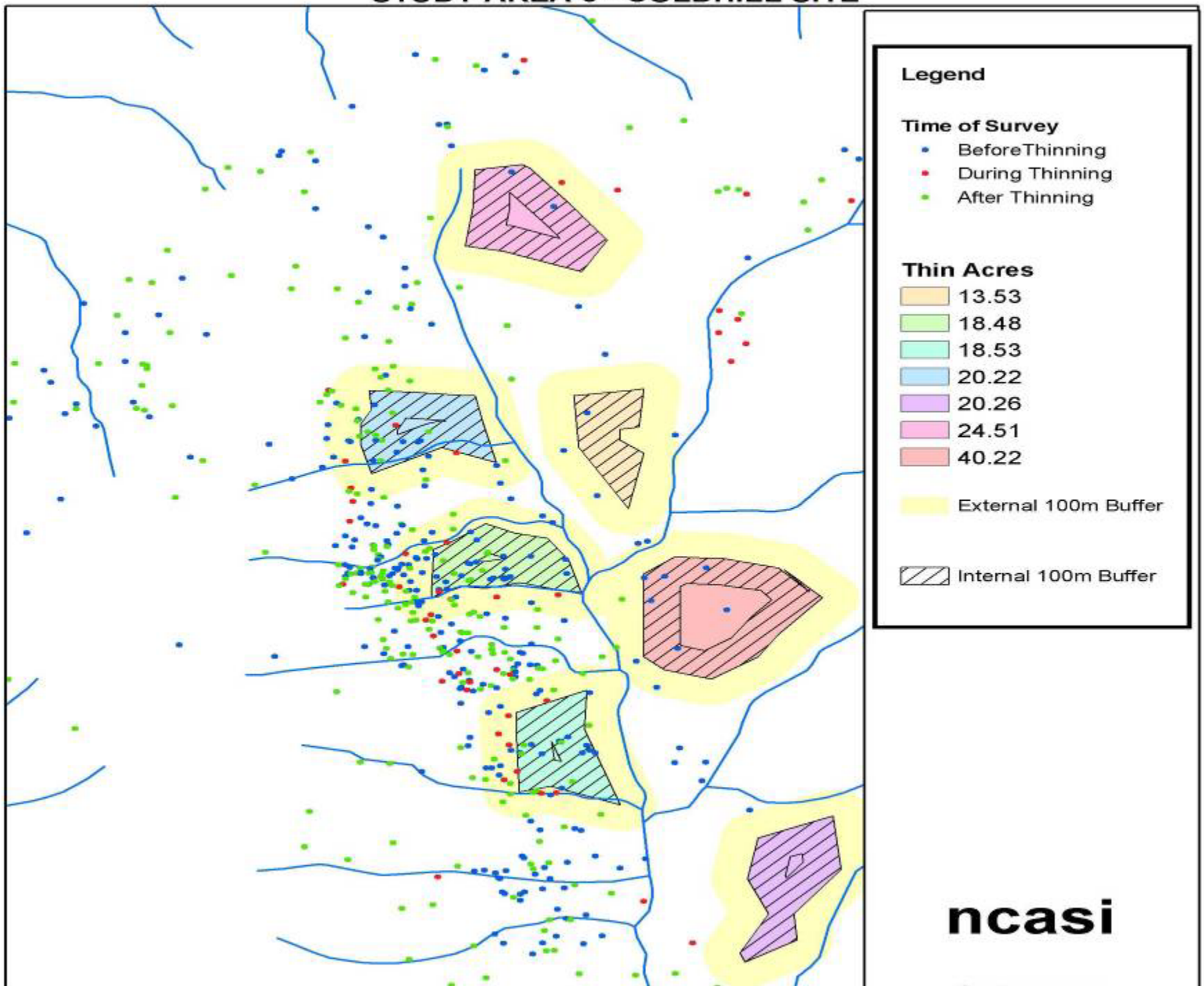
1. EVALUATE OWL RESPONSE TO THINNING
2. MODEL OWL HABITAT SELECTION USING STRUCTURE & COMPOSITION
3. DEVELOP A RISK ASSESSMENT TOOL

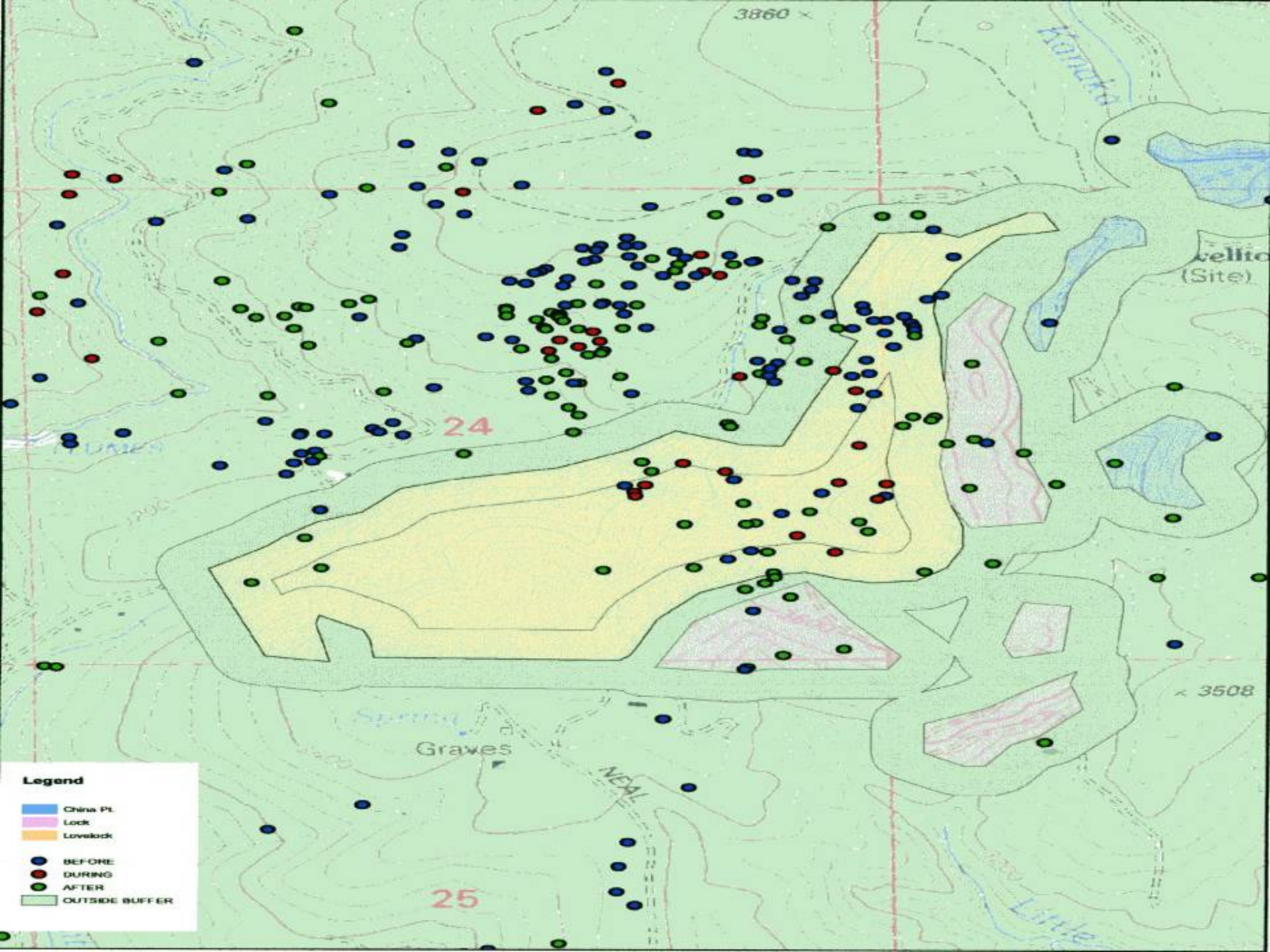
CASE-STUDY RESPONSES TO SILVICULTURE

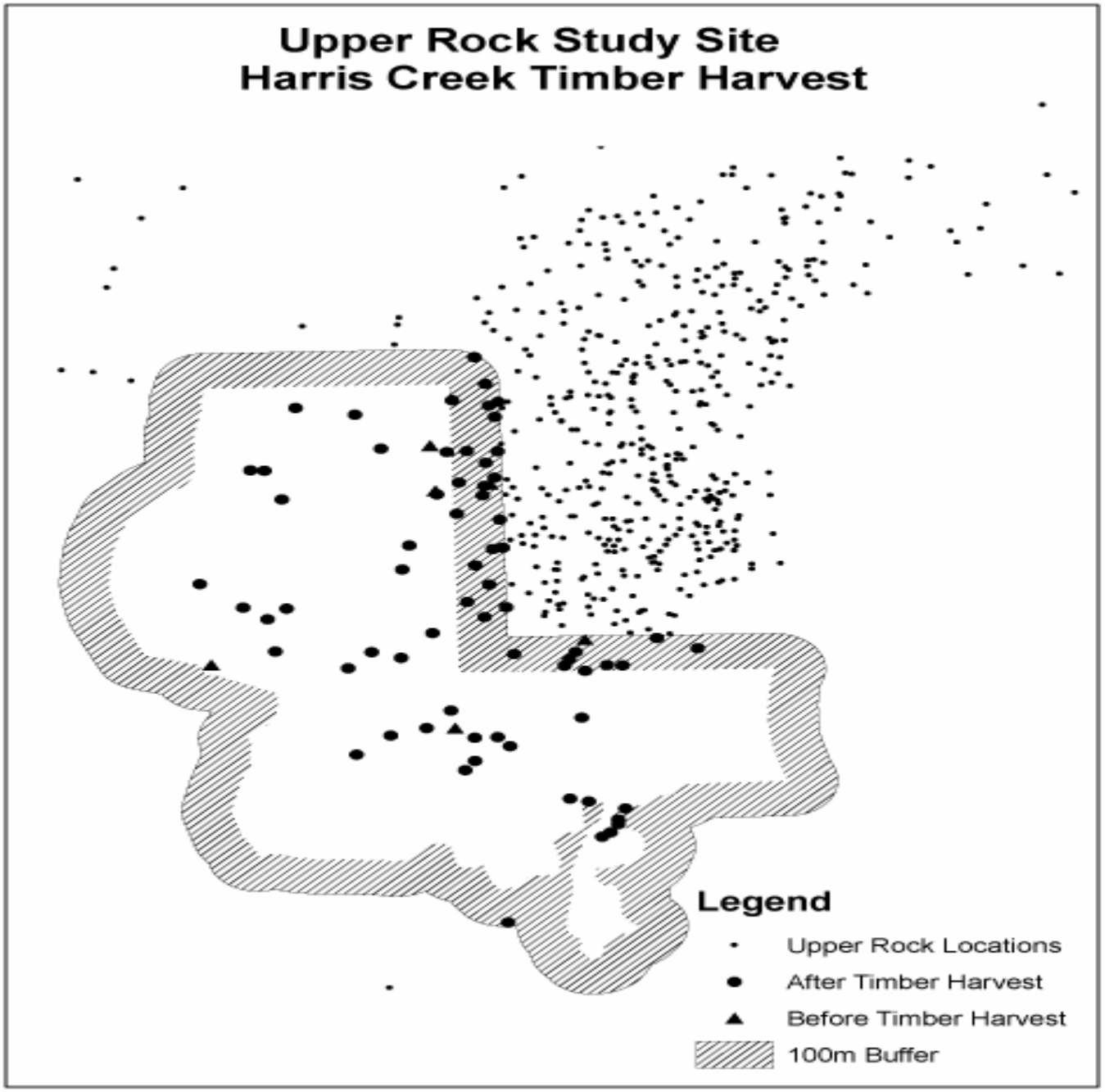
(Approx. 20% of 1,000-ac areas; ~ 100-120 Sq. ft/ac)

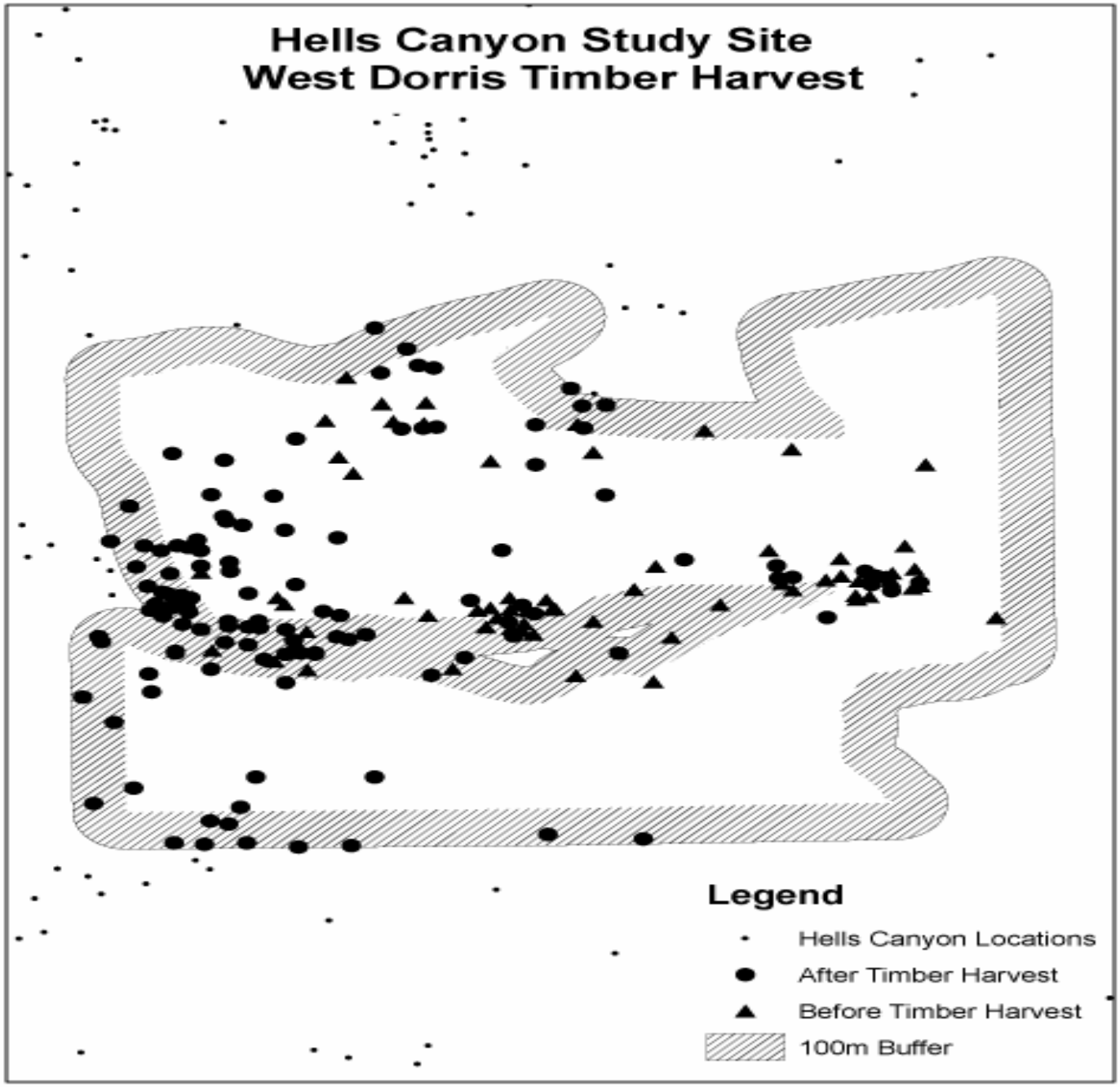
Radio-Tracking

STUDY AREA 6 - COLDHILL SITE



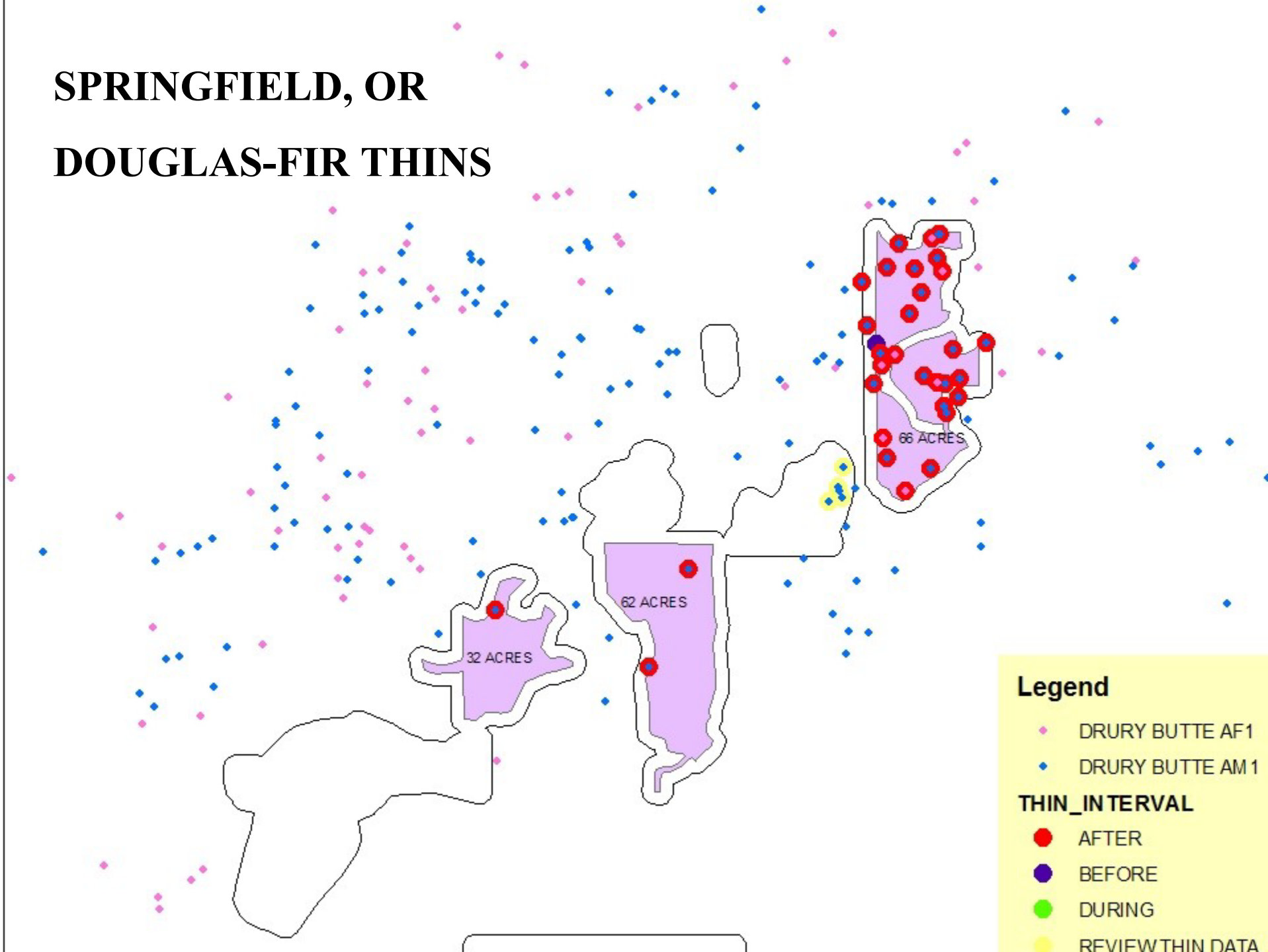

3860
Konko
(Site)
24
3508
Graves
NEAL
25
Legend
China Pt.
Lock
Lovelock
BEFORE
DURING
AFTER
OUTSIDE BUFFER


Upper Rock Study Site
Harris Creek Timber Harvest
Legend
Upper Rock Locations
After Timber Harvest
Before Timber Harvest
100m Buffer


Hells Canyon Study Site
West Dorris Timber Harvest
Legend
Hells Canyon Locations
After Timber Harvest
Before Timber Harvest
100m Buffer

SPRINGFIELD, OR

DOUGLAS-FIR THINS



CASE-STUDY OBSERVATIONS (16)

1. Owls didn't leave (1 left in fall, returned in spring)
2. Home ranges didn't change
3. Frequent-use areas usually didn't change
4. Increased use in some units after thinning
5. Edges seemed to be used during treatments
6. Location may be important. More-detailed analysis soo

Current Understanding of Habitat Selection

Supported by Stand-level

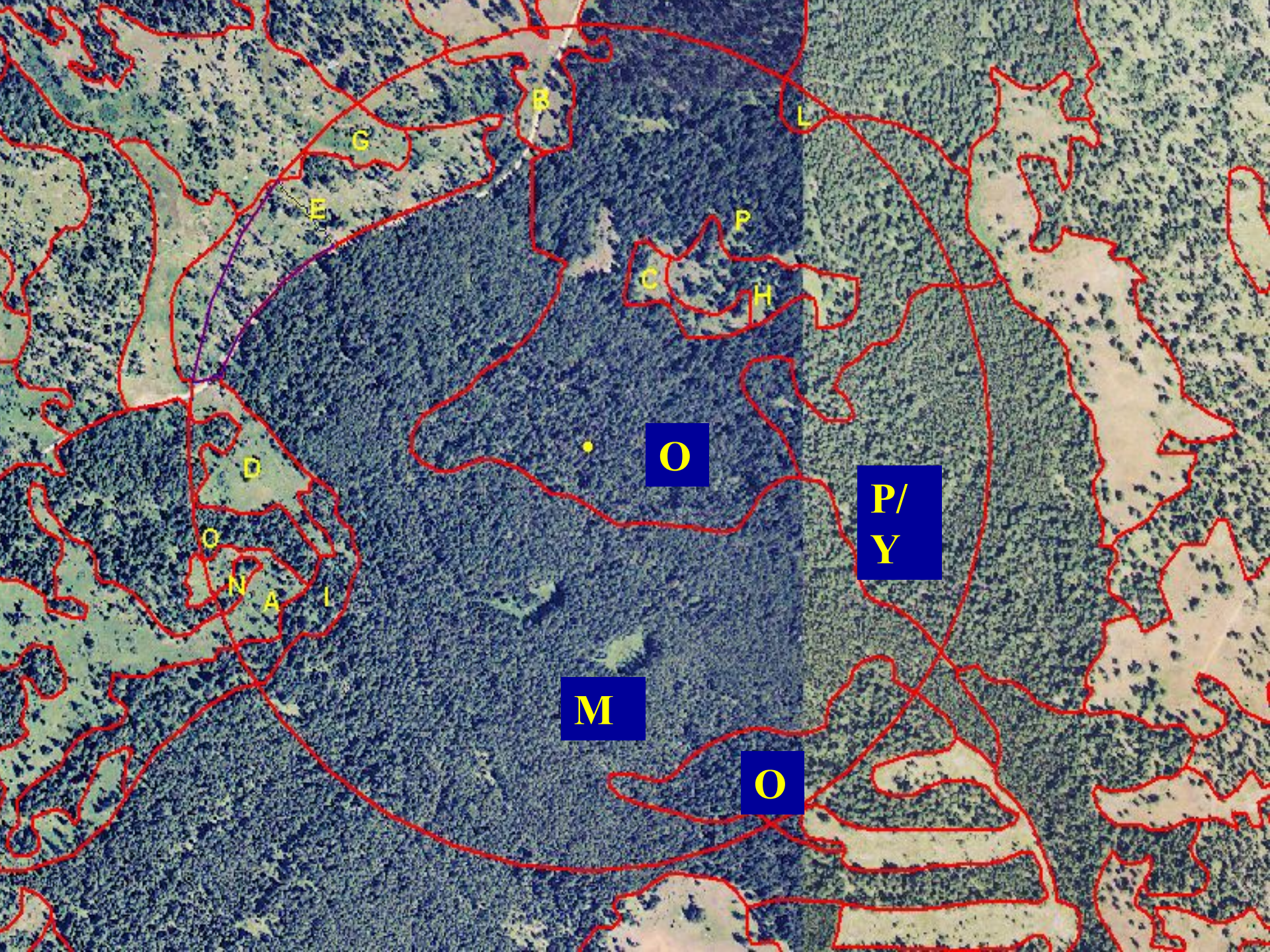
View of Seral Stages

Or Cover Types

Studies Identified:

Type(s) Used > Available

Type(s) Used > Other Types


B
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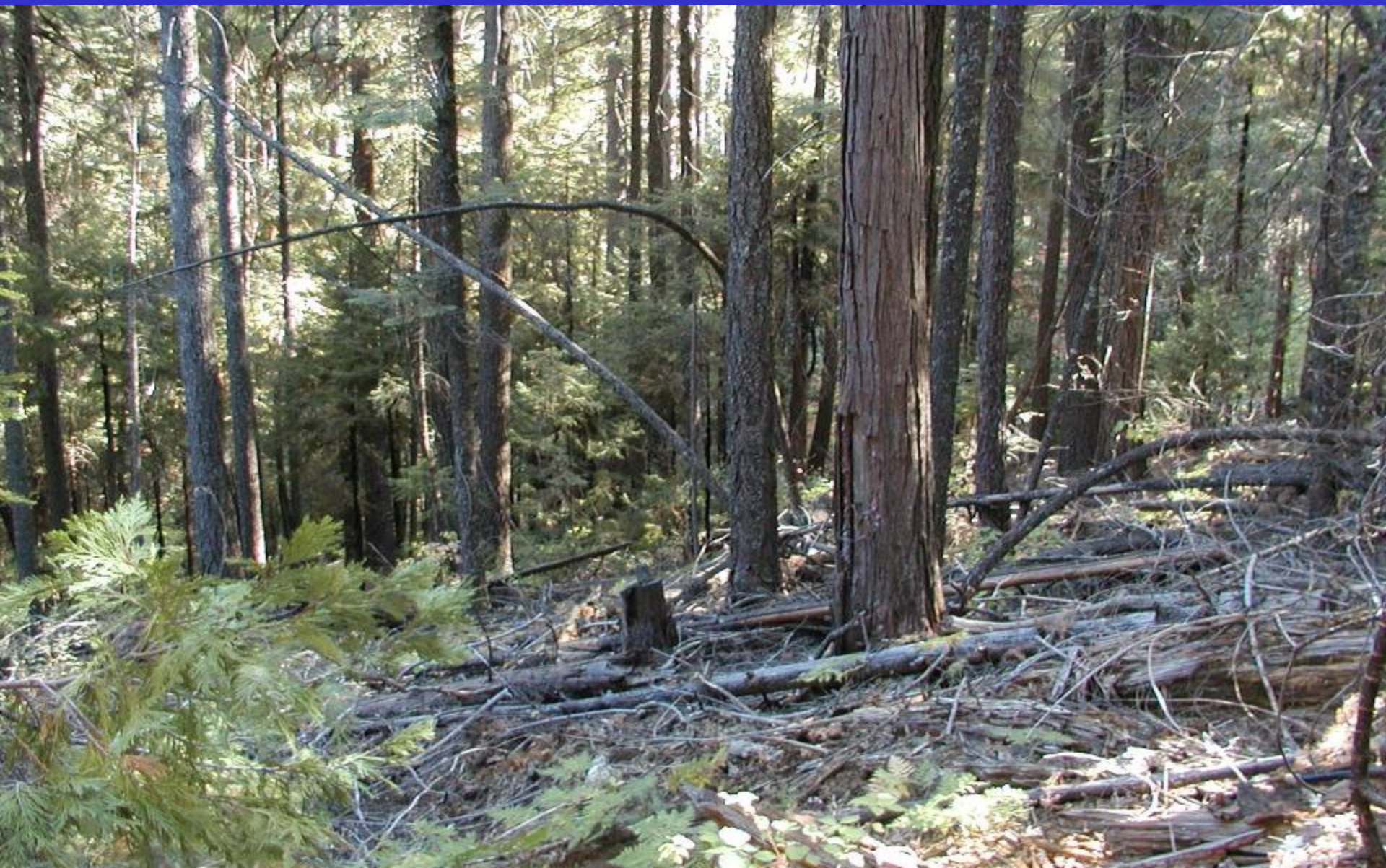
CHOICES MADE AT SCALE OF A PATCH--

PATTERNS OF USE & HOME RANGES "EMERGE"



MULTI-VARIATE APPROACH:

VEGETATION

Structure and Composition

PHYSICAL FEATURES

Riparian zones, Slope, Aspect

MEASURED PATCH-SCALE

VARIATION

Geo-referenced Inventory Plots

DO PATCH-LEVEL CONDITIONS MATTER TO OWLS?

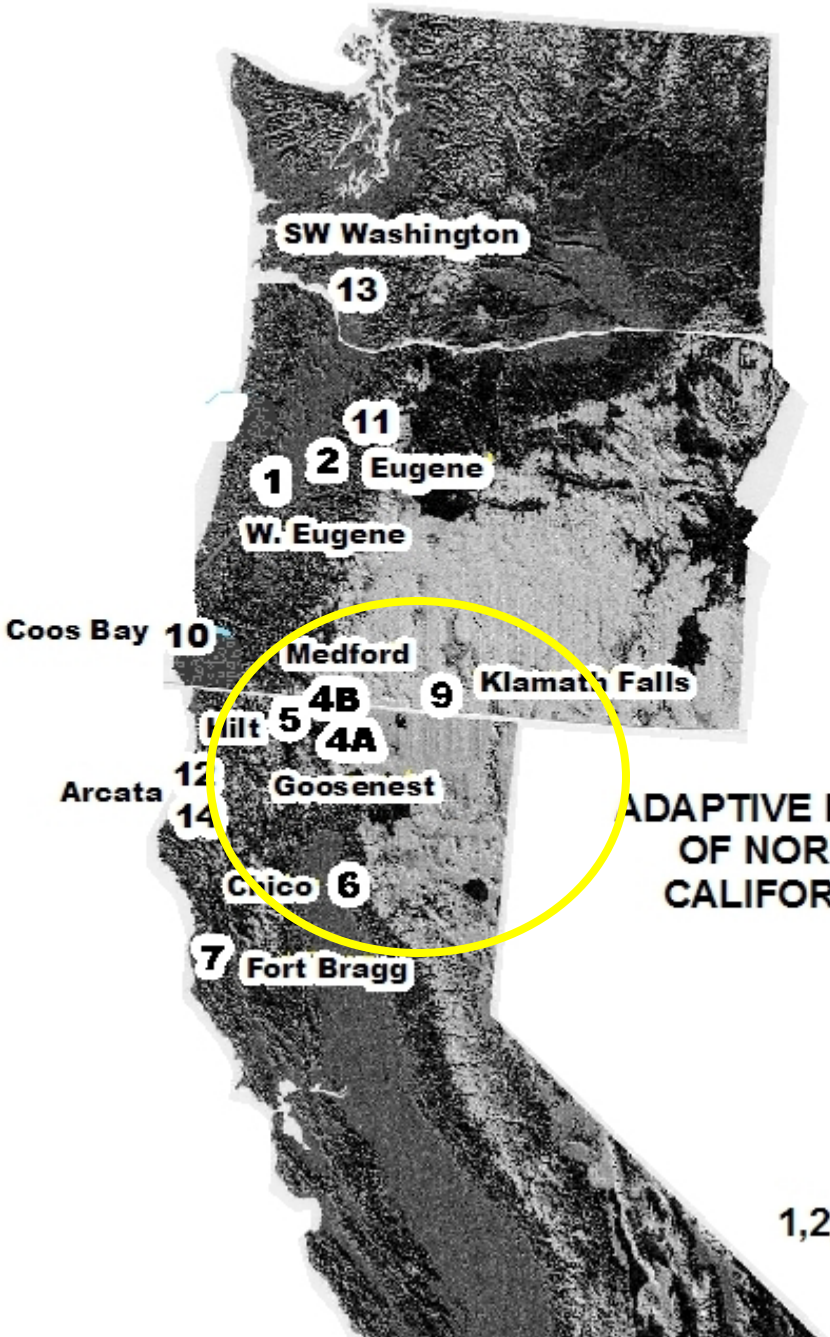
IF SO, HOW TO "SCALE UP"?

~ 250 OWLS

RADIO-TAGGED

~ 35,000 TELEM POINTS

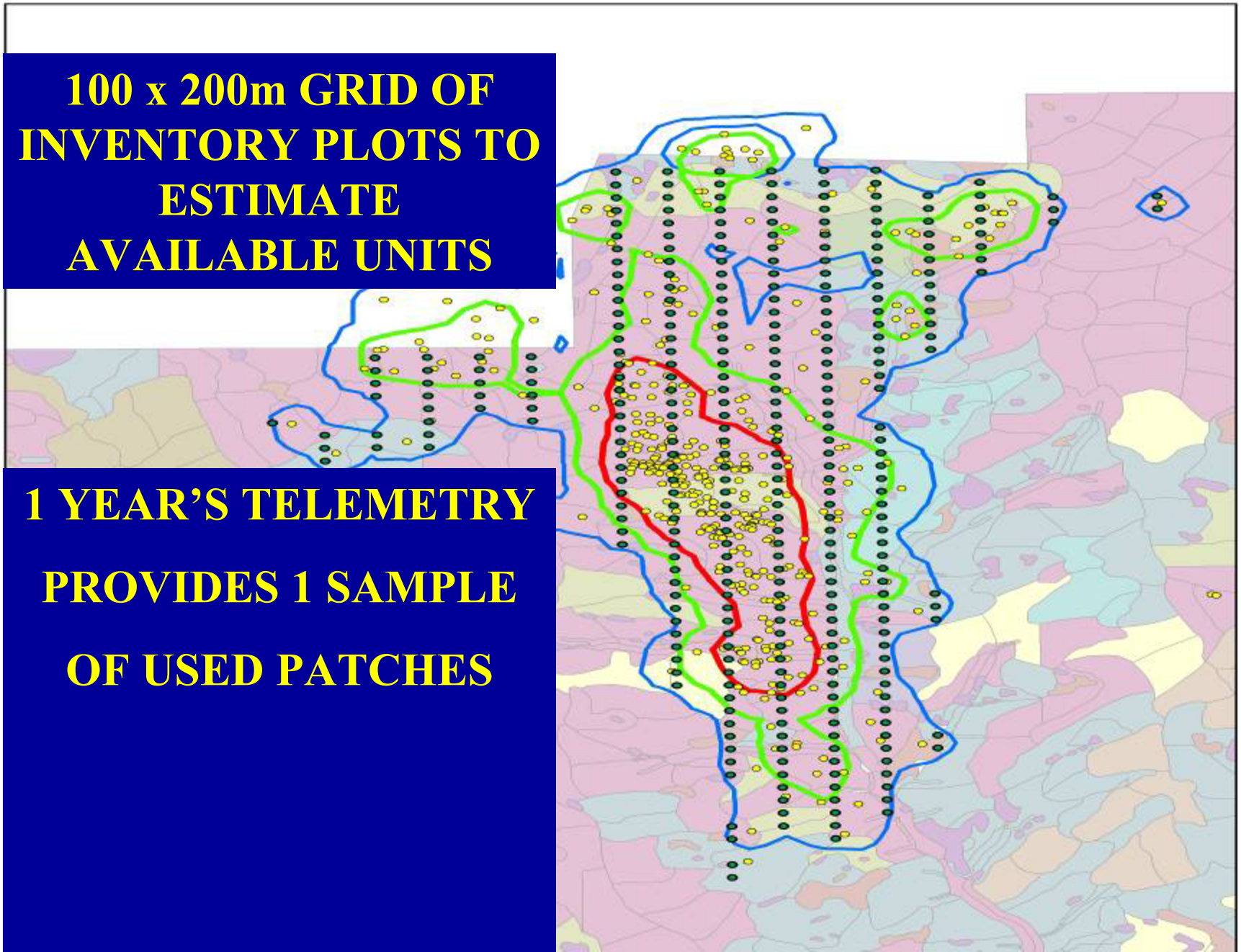
~ 70,000 HAB. PLOTS



ADAPTIVE MANAGEMENT MONITORING OF NORTHERN SPOTTED OWLS, CALIFORNIA SPOTTED OWLS AND BARRED OWLS

Existing Study Areas
1,2,4a,4b,5,6,7,9,10,11,12,13,14

100 x 200m GRID OF INVENTORY PLOTS TO ESTIMATE AVAILABLE UNITS



1 YEAR'S TELEMETRY PROVIDES 1 SAMPLE OF USED PATCHES

OBJECTIVE: RESOURCE SELECTION FUNCTION (RSF)

MODEL → VALUES PROPORTIONAL TO PROBABILITY OF SELECTION OF A RESOURCE UNIT (…HERE, PATCH)

TOOLS → IMPROVED CONSERVATION & HABITAT ASSESSMENTS

DISCRETE-CHOICE RSF

- Combine Individ. Samples → **Σ** Population level

- ***EST. PROB. (Patch Selection)| CONDITIONS***

→SPATIALLY EXPLICIT PREDICTIONS

FACTORS MEASURED

ABIOTIC ENVIRONMENT

TOPOGRAPHY (Water), ELEVATION,

ROADS, NEST DISTANCE, SLOPE, ASPECT

VEGETATION

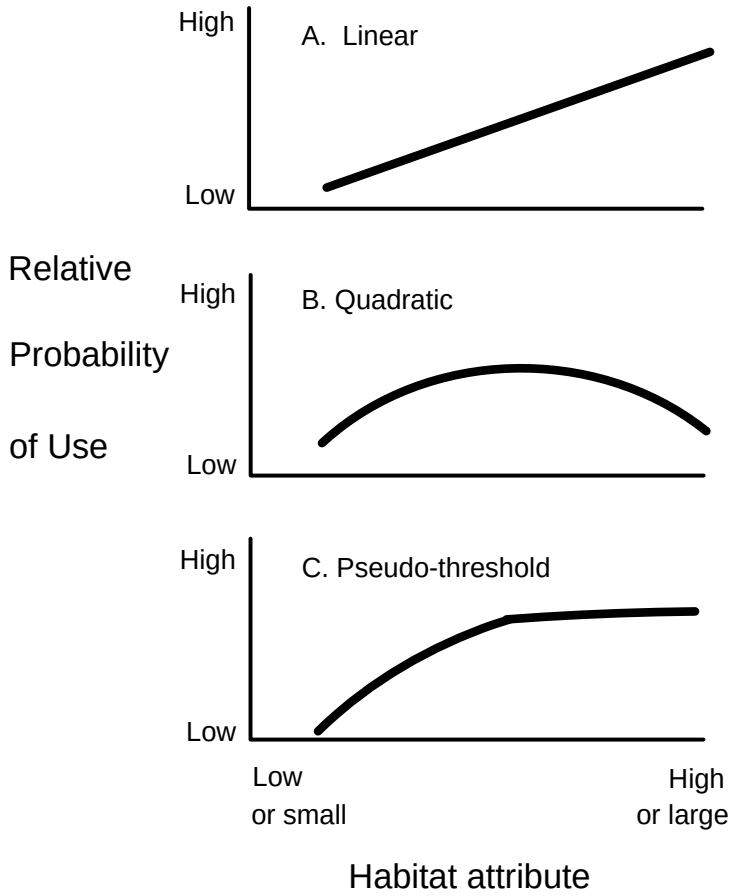
TPA, BASAL AREA, CAN. COVER %,

QMD, TPA x Diam Class, TPA & BA by Species

UNDERSTORY SHRUBS, SNAGS, LOGS

Model Selection Among Candidates

Figure 1. Possible relations between habitat selection and habitat attributes



Factors Influencing Selection of Nest Sites

May Differ from Those Influencing Selection of Further Away

REPEATED PATTERNS: 5 AREAS (4MC)

DISTANCE TO NEST (-)

TOPOGRAPHIC POSITION (Lower; RMZ)

ASPECT (N/E in Driest Areas)

FIR BASAL AREA {Total & Trees > 26”} Qd or Pseud.

PONDEROSA PINE BA (-); S. PINE & CEDAR (+)

HARDWOODS (+), UNDERSTORY SHRUBS (+)

WINTER—LOW BASAL AREA (SHRUBFIELDS)

BA TREES > 26-in * DIST. NEST (-)

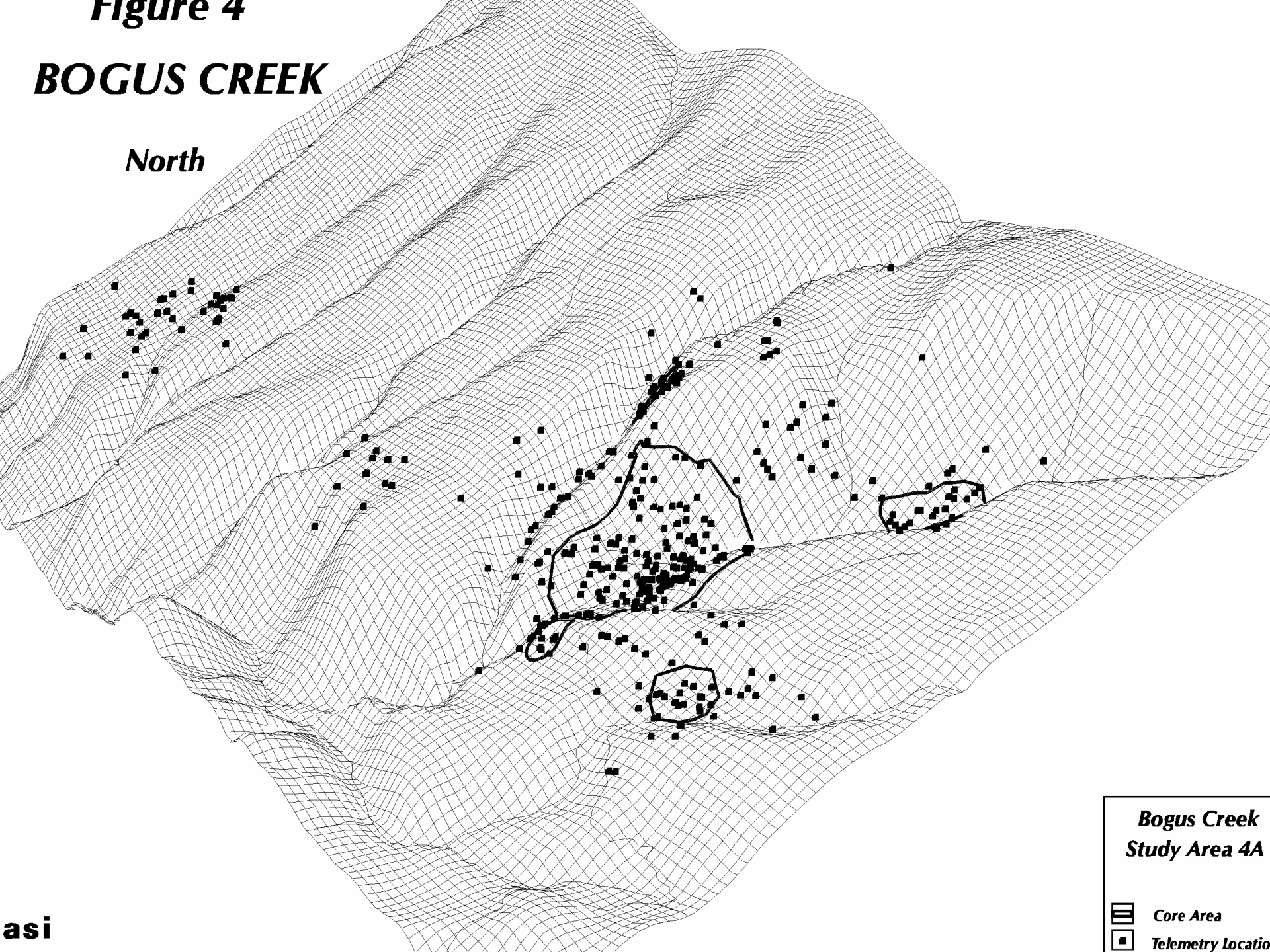
SMALLER DIAM. TREES, CWD, SNAGS (nsd)

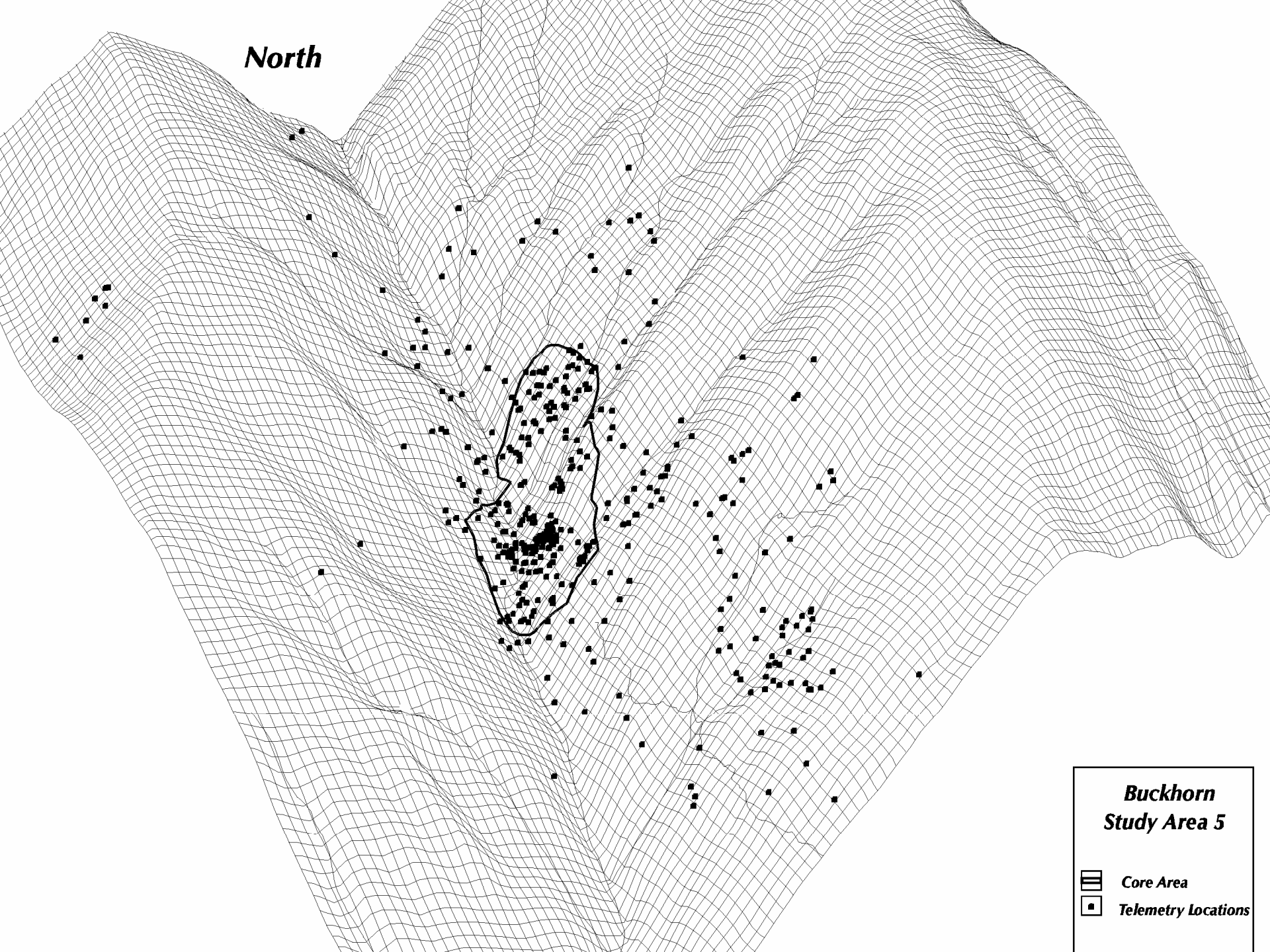
	STUDY AREA			
	YREKA	MEDFORD	CHICO	K-FALLS
NEST DIST.	-2.4	-7.7	-15.8	-3.2
STREAMS	-7.3	-9.4	- 3.2	-2.1
ASPECT	-0.1	0.0	-2.0	-1.8
LRG BASAL	6.0*	3.9*	3.8	2.6*
LRG BASAL^2	-2.7	-1.5	0.2	-0.9
LRG * NEST-D	-3.7	-3.6	- 3.9	-1.9
SHRUB DENS	4.4	2.7	--	2.9
P. PINE BASAL	-1.9	-1.8	-2.0	1.2
HardWood BA	1.0	0.6	4.7	5.3

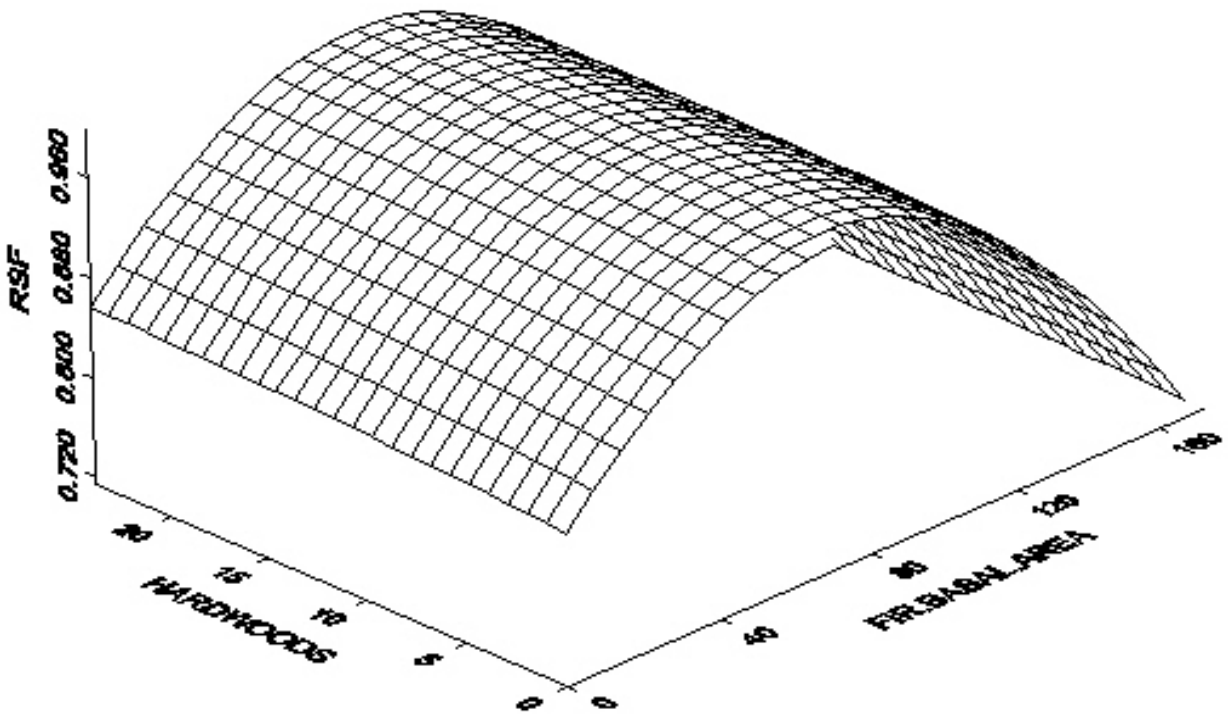
* Pseudo-threshold was competing model; Sugar Pine (+), Incense Cedar

Figure 4

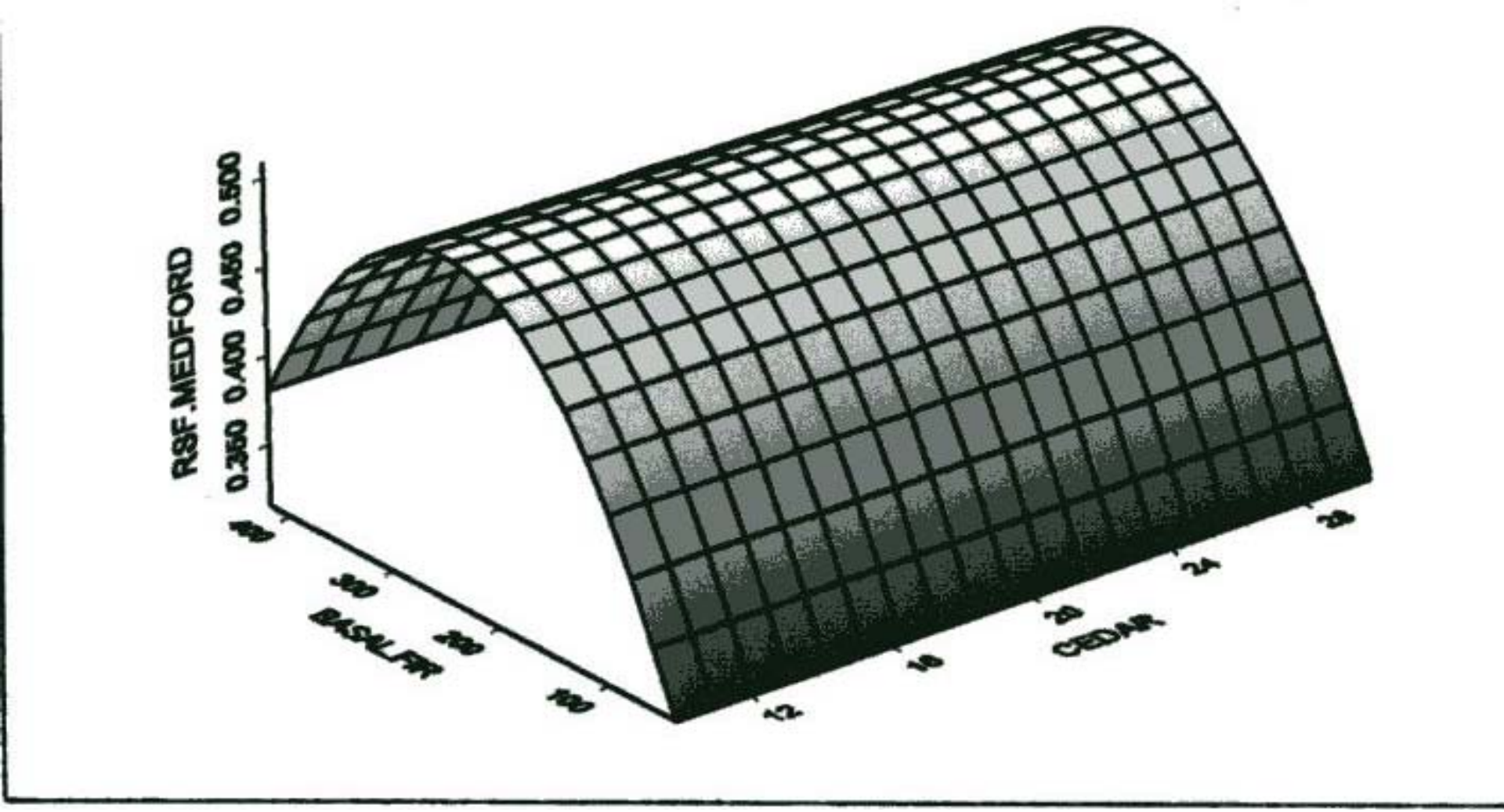
BOGUS CREEK




North
Buckhorn
Study Area 5
Core Area
Telemetry Locations

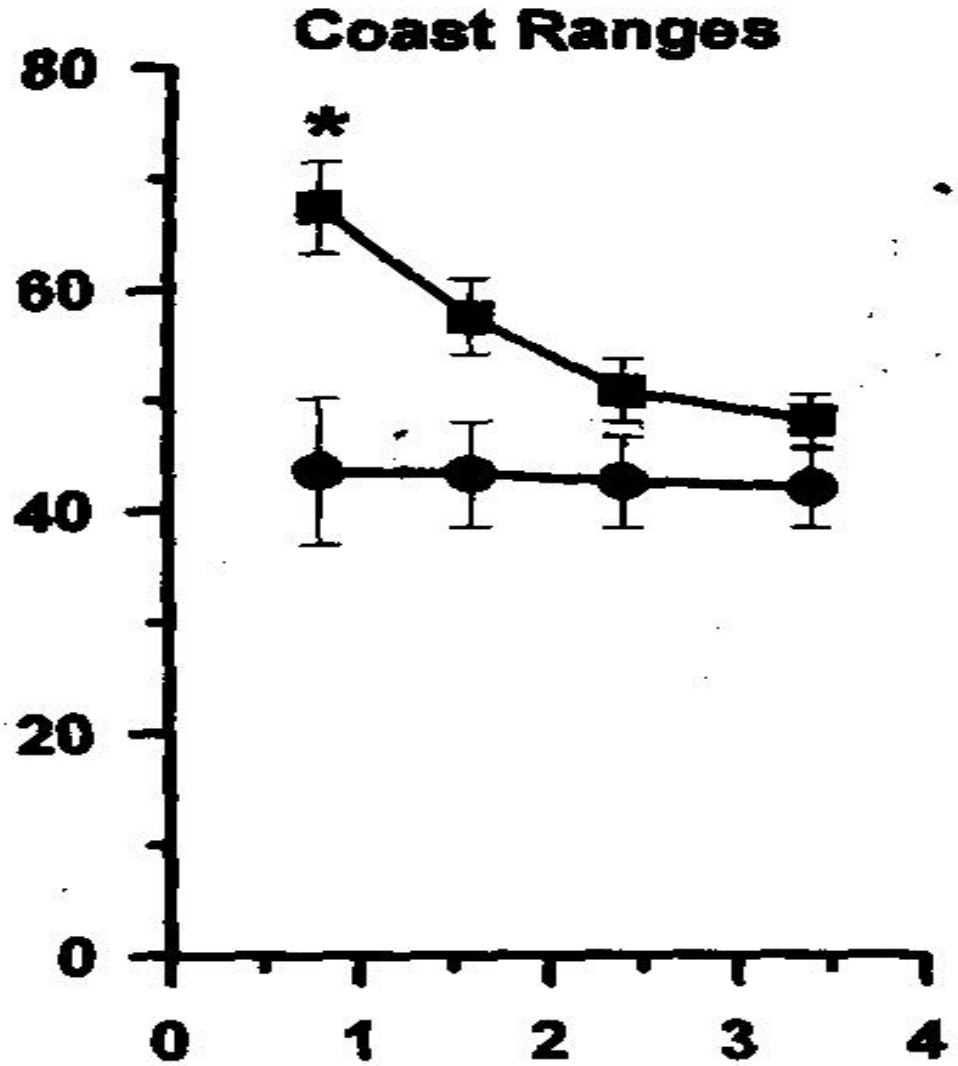


RSF for CASPO, Including Basal Area of Hardwoods and FIR Trees)



RSF for Medford & Yreka

Total Basal Area



Why is Selection for Patches w\Large Trees reduced w/Distance from Nest? Owl Sites vs. Random Landscape Locations, W. OR Meyer et al. 1998. Wildlife Monograph

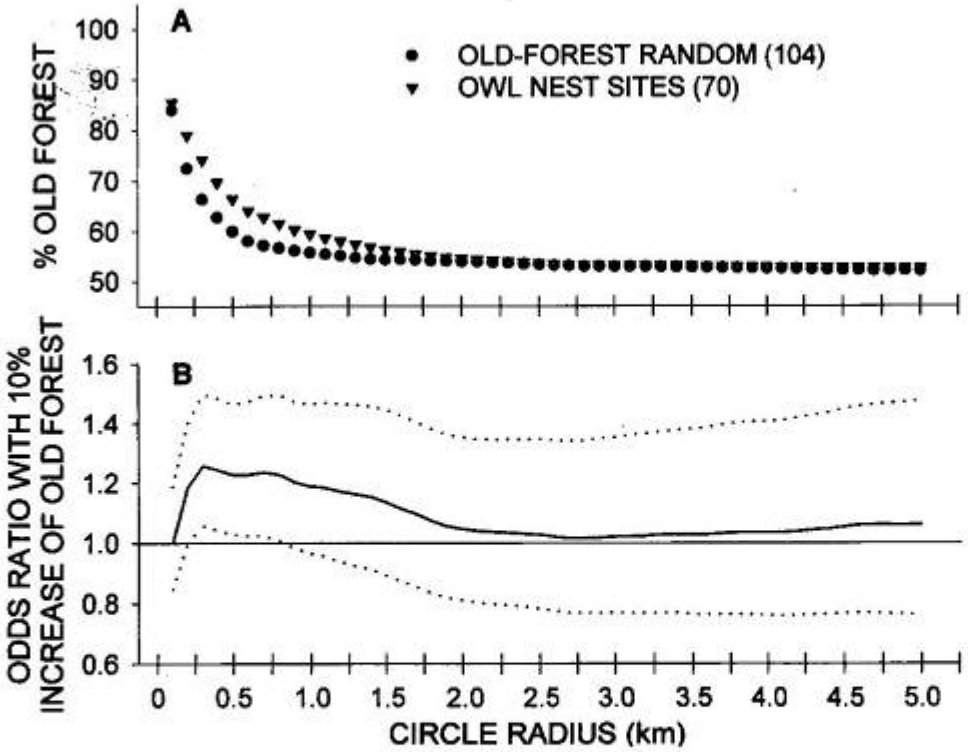
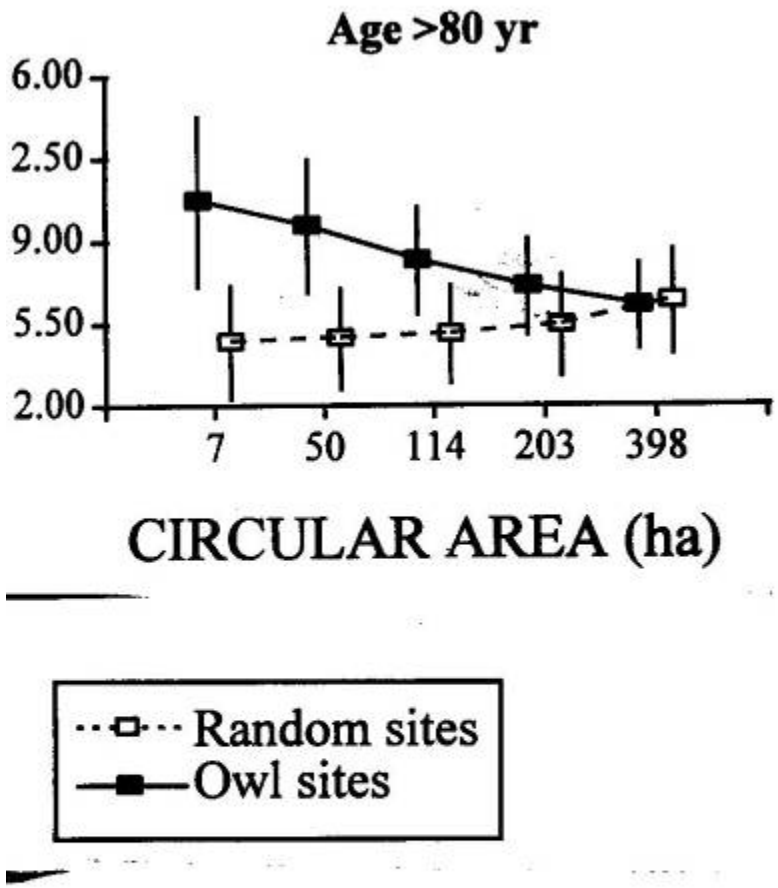


Fig. 2. Old forest in 50 concentric circle-plots around northern spotted owl nest sites and old-forest random points in the central Cascade Mountains, Oregon, 1987–95. (A) Percentage of old-forest, and (B) odds associated with a 10% increase of old-forest = $e^{(10)\beta}$. The dotted lines in (B) indicate 95% confidence intervals.


Age >80 yr
6.00
2.50
9.00
5.50
2.00
7
50
114
203
398
CIRCULAR AREA (ha)
Random sites
Owl sites

WHAT THINGS MATTER TO OWLS?

RSF SUMMARY

- **SIZE & DENSITY MATTER (NON-LINEAR)**
- **SCALE OF VIEW MATTERS**
- **TREE SPP. COMPOSITION MATTERS**
- **UNDERSTORY SHRUBS MATTER**
- **LOCATION MATTERS**
  - **(ABIOTIC FACTORS)**

OPT/THRESHOLD BASAL AREA + SHRUBS + HARDWOODS + RESPONSES TO THINNINGS SUGGEST … HABITAT QUALITY MAY BE ENHANCED

RSF MODEL APPLICATIONS

- **Estimate Short-term Site-specific Risk of Changing Tree Density & Composition.**
- **Estimate Risk Across Landscape Under Alternative Strategies.**
- **Predict Long-term Risk Over Time, Via Inventory, FVS**
- **Link with Fire Risk Models**

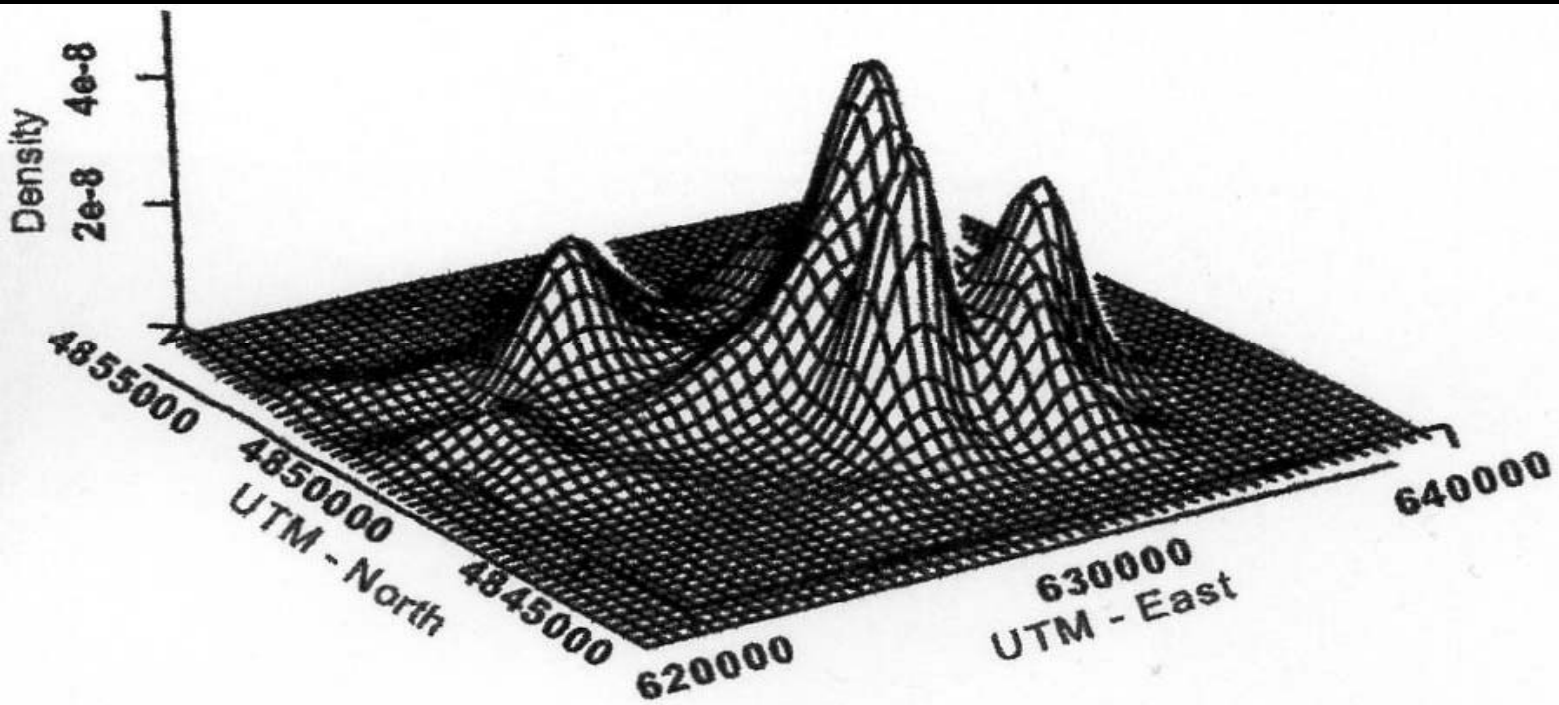
EXPONENTIAL RSF:

$$e^{(z^*)}, \text{ where } z^* = \beta_1 \text{DistNest} + \beta_2 \text{DistWater} + \beta_3 \log(\text{Agte26}+1) - \beta_4 \text{SHRUBS} + \cdots$$

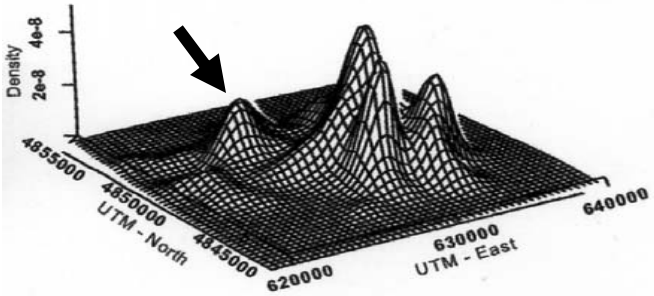
Scaled to 1.0

APPLY RSF TO GEO-INVENTORY (2-5ha Pixels)

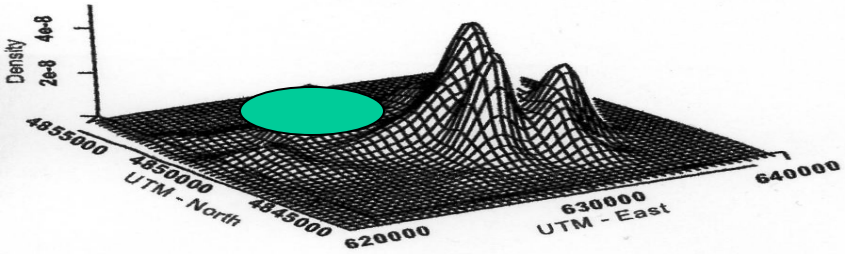
AVERAGE OF ALL PIXELS IS ESTIMATE OF NET "VALUE"



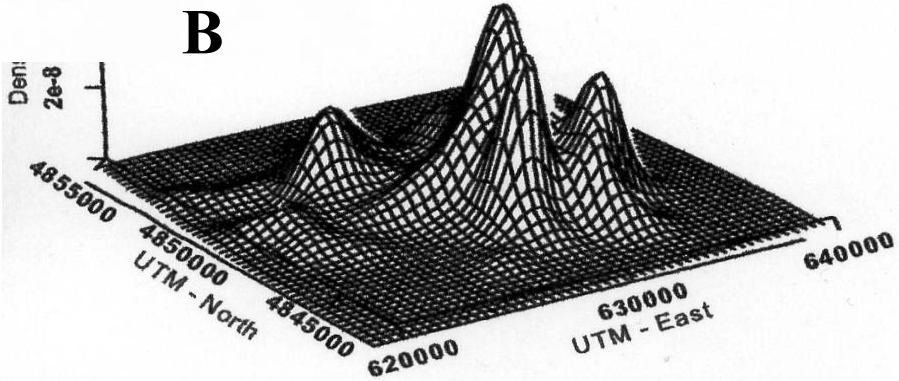
Depending on location, large clearcut would reduce net or overall value (A); positive habitat modifications should increase it (B).

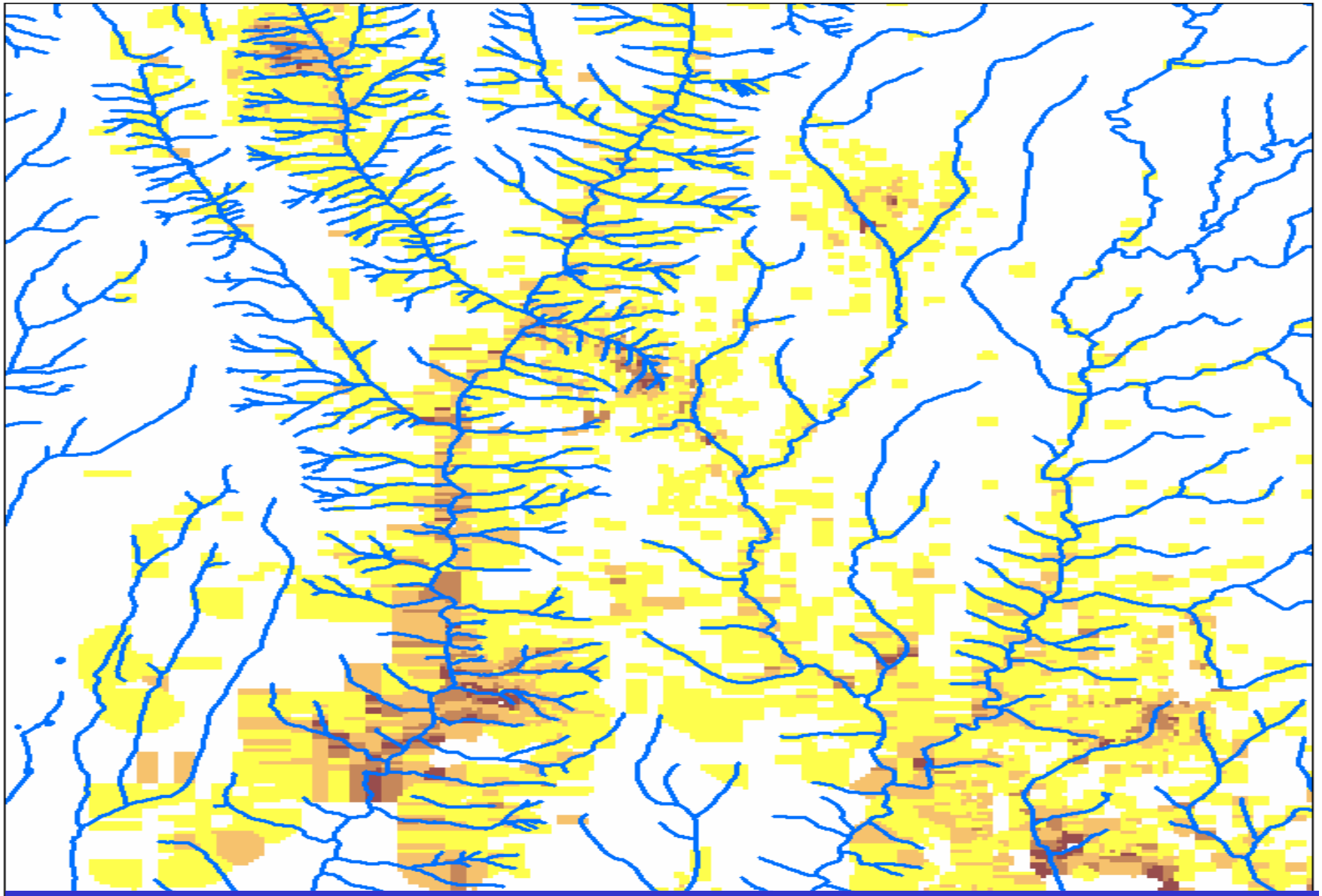


A



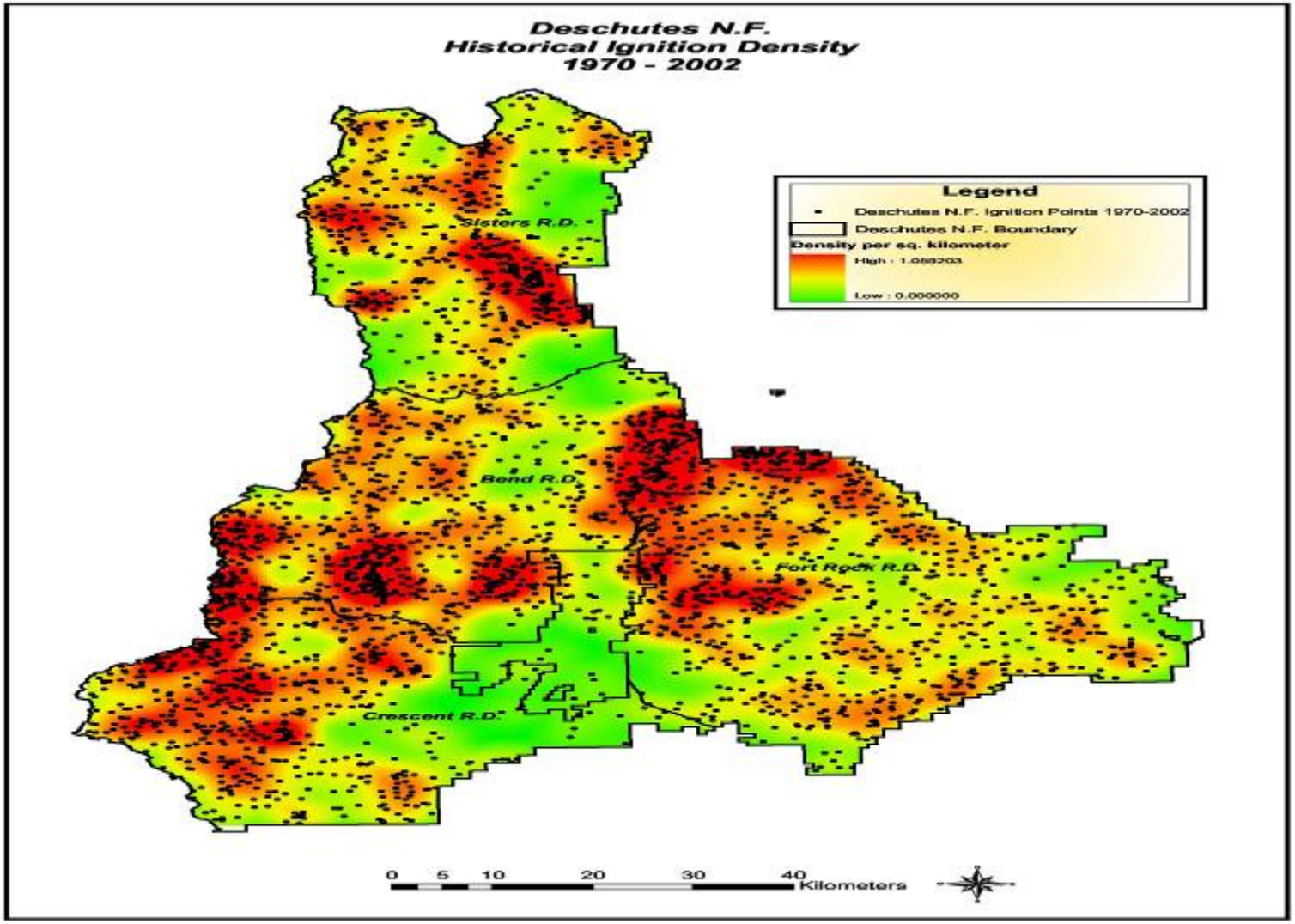
B





Use 2-5 acre pixels in GIS; Sum across plan area to Identify Possible Future Replacement Habitat; Grow via FVS

Overlay with Probability of Ignition & Fire spread



IMPLICATIONS

- 1. Owls may respond favorably to fuel treatments
- 2. Habitat Quality Multi-factored
  - Topography, Shrubs, Composition, Large Trees, Hardwoods
- 3. RSF → Improved assessment & conservation tool.
- 4. Extrapolations from patches to landscape.
  - (Stand may not be the correct unit)
- 5. Dynamic landscape? Embedded abiotic factors
- 6. May need different conditions close to nests
- 7. RSF may help in prioritization or identifying replacement

UNCERTAINTY:

BARRED OWL

SIZE OF NEST "CORE" 500ac?

WHY UNIMODAL W/LARGE TREES—facilitate prey capture?

IF YOU BUILD IT, WILL THEY COME?

WILL LIGHT-TOUCH FORESTRY DO THE TRICK?

FUTURE: “MANAGED” FIRE STARTS + SILVICULTURE ????