

What we will cover today

Resource (Habitat, Food) Use and Selection

- 1. Terminology**
 - 2. Habitat and Food**
 - 3. How to obtain Resource Selection**
 - 4. Future of Resource Selection Studies**
-

(Important) Terminology

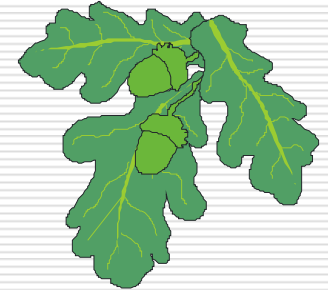
Use

Selection

Choice

Preference

Avoidance



e.g. of a Resource

Use

A resource that is used, e.g. where animals are located
or what they feed/prey on

Choice

An active process of choosing any item

Selection

An active process of choosing one item over another one,
e.g. food, habitat, mates, or anything else that is 'limited'

Preference

An active process of choosing one item over another one,
e.g. food, habitat, mates, or anything else, given that
it is equally available

Avoidance

An active process of not choosing one item over another one, e.g. food, habitat, mates, or anything else, given that it is equally available



Let's apply these concepts to wildlife and real life...

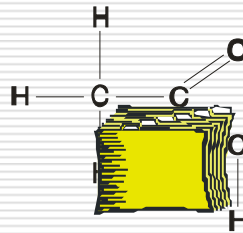
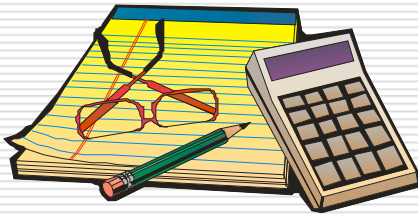


The Management link



Wildlife is managed for habitat preference !

Wildlife is managed for food preference !



Habitat

Location where an animal spends time and fulfills all of its life needs



Habitat Use

“Habitat that is used”

= Locations where animals are found in a given habitat

(no selection, no preference)

Measuring Habitat Use

Direct: Observation
Capture
Radio-telemetry

Indirect: Track Counts
Pellet Counts
Browsed Twigs
Prey

Representative Measurements of Habitat Use

Transects or Plots (direct or indirect)

Telemetry

Random or equal survey effort design

(=> what happens if non-representative samples are obtained....)

PS. Disturbance

Measuring Food Use

Post-Ingestion Samples

Carnivores: -kill sites
-behavior towards potential prey items

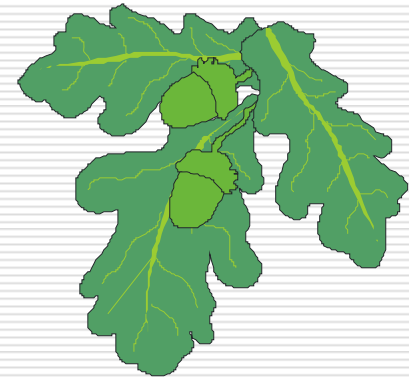
Herbivores: -browsing sites
-behavior towards potential food items

Measuring Food Use

Grasses and Forbs

Browse

Fruits and Seeds



Measuring Dietary Overlap

Percent overlap

Spearman's Rank Correlation

Morisita Index

Simplified Morisita Index

Horn Index

Hurlbert Index

Habitat Preference and Avoidance

“Preferred Habitat is used more than it is available”

“Avoided Habitat is used less than it is available”

= > needs to know available habitat

= > needs to know used habitat

= > needs to know habitat and its 'classes'

Measuring Habitat Preference

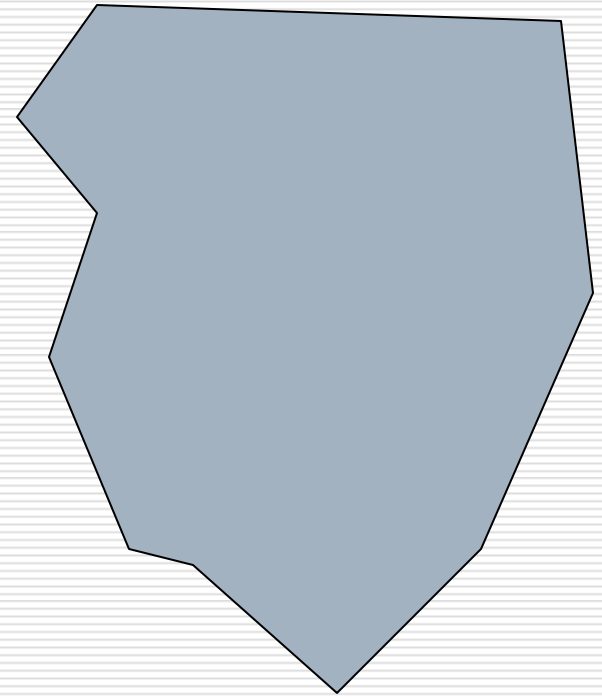
- determine what's used
- determine what's available
- relate and compare used vs. available
- express as index or other

PS. Scale issues

Run different scenarios

What's available ?

- everything ?
- within population range ?
- within home range ?
- within 'reach' ?
- blocked by predators
- seasonal ?
- daily ?



Falk Huettmann View

“Computing Resource Preference is superior to Resource Use”

“Resource Preferences are more difficult to obtain”

“Resource Preferences require simple quantitative approaches”

“Resource Preferences can be more complex, e.g. field work, computation and conclusion”

= > training is required to deal with any of these, including its interpretation, implementation and application

= > part of the new wildlife management culture

Resource Selection Functions (RSF)

Resource Preferences can be summarized, quantified, with the help of Resource Selection Functions (RSFs), which are mathematical functions used to measure or predict habitat selection

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pres/abs ~ habitat1 + habitat2 + resource3 + resource4

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$$\text{pres/abs} \sim \text{habitat1} + \text{habitat2} + \text{resource3} + \text{resource4}$$

An example:

$$\text{pres/abs} \sim 0.4 + 0.3 * \text{habitat1} + 10 * \text{habitat2} - 3.2 * \text{resource3} - 01. * \text{resource4}$$

For more details see Manly et al. (2002)

Management Implications of Resource Use and Selection

Resources are managed for 'what wildlife requires'

=what wildlife wants in terms of resources (habitat and food)

Habitat Preferences need to be computed and implemented
into the management and legal framework!

=>Habitat Preferences require the use of a Geographic Information
System (GIS) + databases + RSFs

Forage Site Selection by a Pair of Northern Spotted Owls

- Determine a random sample of sites used by a radio tagged pair of owls.
- Determine a sample of “available” foraging sites with a GIS.
 - Fit a “foraging site selection function” based on variables like:
 - habitat type (old growth forest, clearcut, etc.)
 - distance to nest
 - density of roads
 - etc.



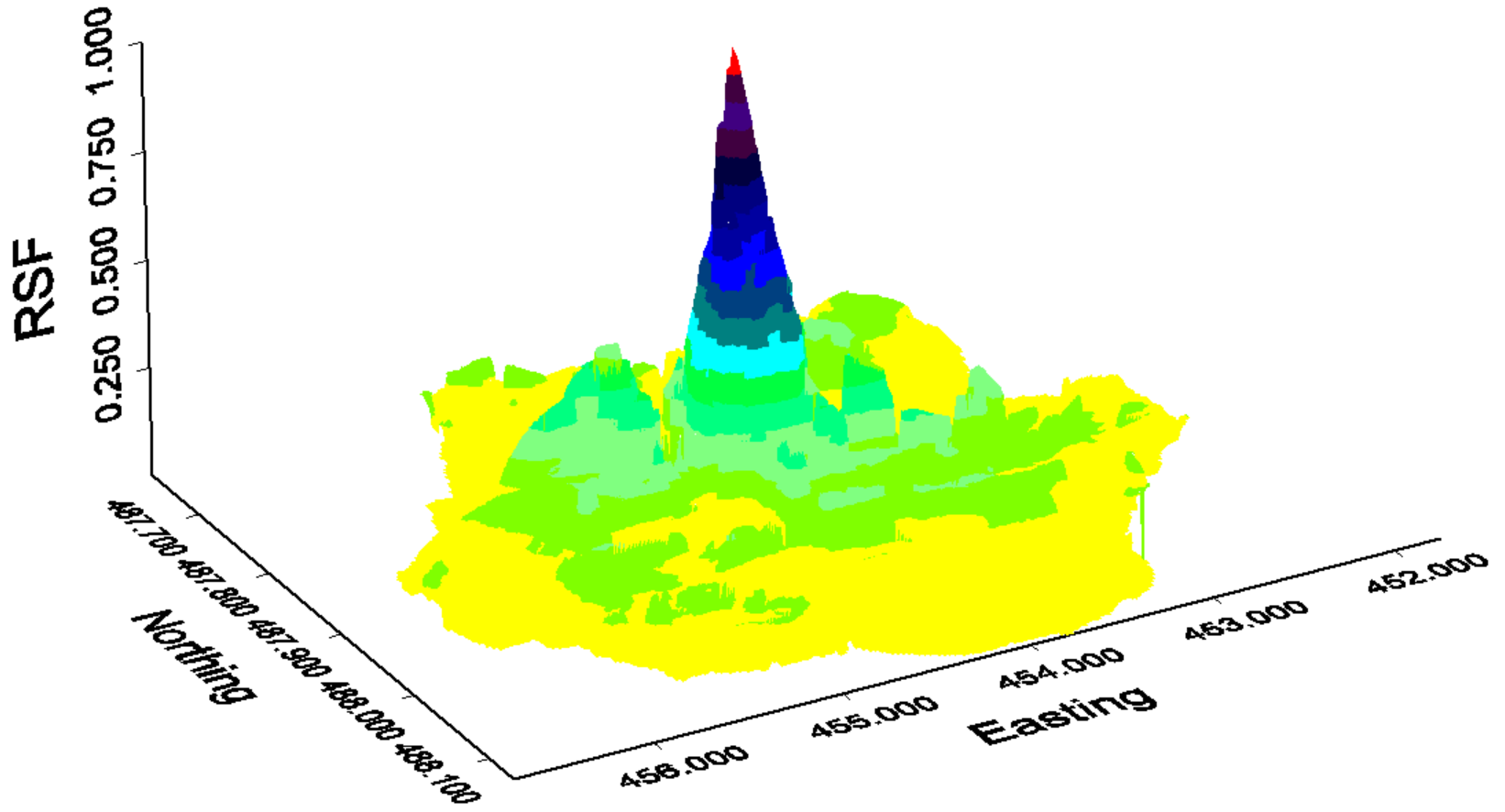
Results: Models

- Top models (hypothetical):

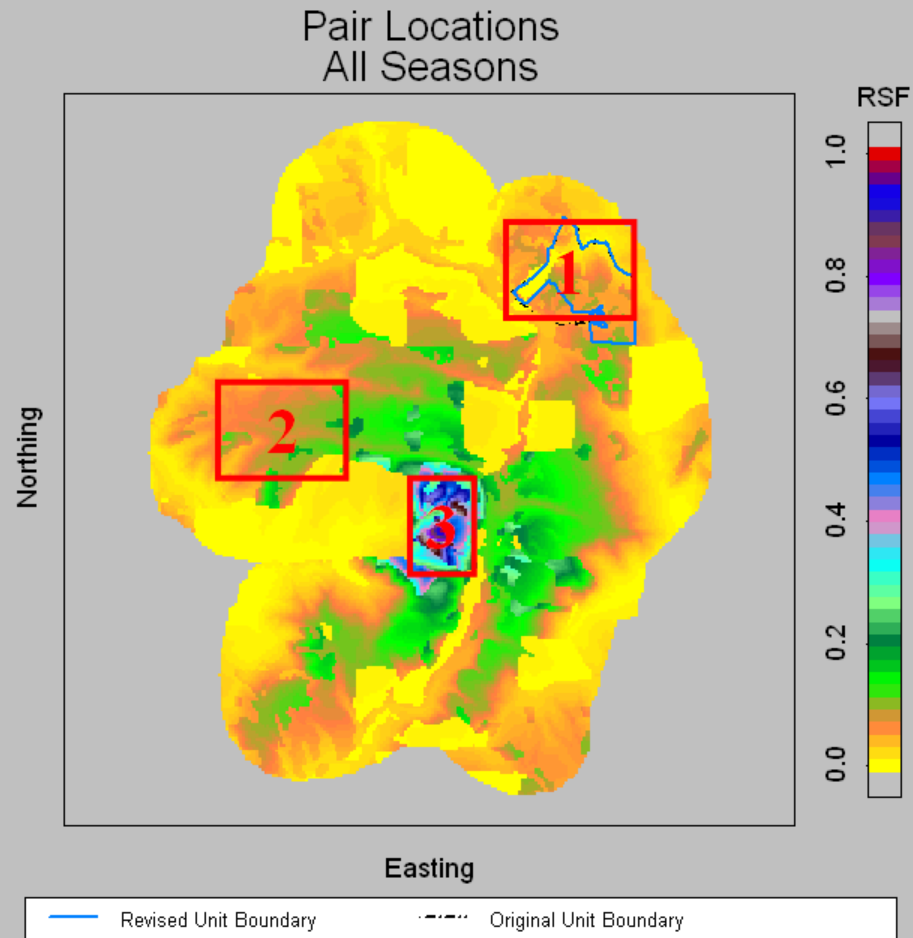
Model	Δ AIC Weight	Estimated Model
1	0.84	$\log(\text{rsf}) = -9.27189 - 3.01369(\text{distance to nest}) + 1.51901(\text{distance}^2) - 0.32094(\text{distance}^3) + 2.82074(\text{old growth}) + 233634(\text{Veg type}) - 0.0044442(\text{elevation} * \text{veg. type}) - 0.0000060880(\text{elevation}^2)$
2	0.16	$\log(\text{rsf}) = -9.92060 - 1.03806(\text{distance to nest}) + 2.93168 (\% \text{ old growth}) + 2.33310 (\text{Veg. type}) + 0.010597 (\text{elevation}) - 0.0041887(\text{elevation} * \text{veg. type}) - 0.0000060658(\text{elevation}^2)$



Pair Locations All Seasons



Candidate Units to Clearcut



How to evaluate Habitat Preferences ?

A key process for quality wildlife studies and towards an increased acceptance of the wildlife & habitat topic, worldwide.

Habitat Evaluation

Frequently done through:

-Habitat Use

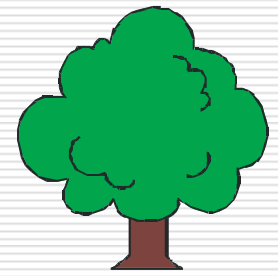
-Animal Density

-Animal Diversity

-Animal Fitness (=Offspring)

-Animal Health





Habitat Evaluation

Topics of consideration:

- Which habitat features to measure
 - Which animal features to measure
 - Which organism group to focus on
 - Measurement Scales
-

The Future of Resource Use Studies

- importance increasing
- high quality research design (transects * telemetry)
- digital
- GIS
- databases
- quantitative
- more objective and less political
- in favor of wildlife and habitat



End of Session

Any Questions ?

