ESRM 350

Habitat Use

Autumn 2016

“When you come to a fork in the road, take it”

- Yogi Berra

Wildlife: The Basic Needs

- All animals must negotiate the physical environment
  - i.e., be able to meet the challenge of thermoregulation
- As heterotrophs, animals need
  - **Food** for growth, maintenance
  - **Water** (sometimes obtained exclusively from food)
  - **Rest** (often involves finding shelter/cover)
    - not necessarily sleep

A resting mallard duck (*Anas platyrhynchos*), half awake to danger

Rattenborg et al. (1999). Half-awake to the risk of predation. *Nature 397(Feb. 4):397.*

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- Collectively, these needs dictate how animals use their surroundings (i.e., dictate **habitat use**)

The Habitat Concept

- Crucial to our understanding of the distribution, abundance, and behavior of wild animals
- Cornerstone of wildlife conservation and management

What is Habitat?

- Term used in a variety of ways*
  - The place where an organism lives
  - A geographical area
  - An area supporting a particular type of vegetation (e.g., a wetland)
  - These definitions are incomplete, in some cases can even hinder wildlife conservation
    - don't specify what animals need to survive

*Hall et al. (1997) *Wildlife Society Bulletin*

What is Habitat?

- Competing definitions also counterproductive
  - Hinder sharing of information, communication among ecologists
  - Confuse the voting public
  - Create legal messes (how are courts to define habitat if we can't?)

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What is Habitat?

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  - Create legal messes (how are courts to define habitat if we can't?)
- There is need for a *unified* definition

Hall et al. (1997) *Wildlife Society Bulletin*

Unified Definition of Habitat

any area offering the resources and conditions that promote occupancy by a species

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Unified Definition of Habitat

any area offering the resources and conditions
that promote occupancy by a species

- Definition
  - more than floristic (plant) composition; resources include food, cover, shelter, other factors influencing occupancy
  - conditions (climate, terrain must be livable)
  - species-specific
    - tied to needs of specific wildlife species

Hall et al. (1997) *Wildlife Society Bulletin*

Unified Definition of Habitat

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- Means that habitat is not always “wilderness”
  - human activity can both create and destroy habitat (e.g., creates habitat for crows)

American crow
(*Corvus brachyrhynchos*)

Unified Definition of Habitat

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that promote occupancy by a species

- Provides basis for explaining **why** animals are in some areas, not others
  - area provides the *necessary resources and conditions* for a species, or does not
  - knowing why animals are in certain areas provides a basis for effective policy decisions
    - otherwise, we are just guessing

Photo by J. Bolis

Habitat Use

The way an animal *uses* the collection of physical features and resources in a habitat

Hall et al. (1997) *Wildlife Society Bulletin*

Habitat Use

The way an animal *uses* the collection of
physical features and resources in a habitat

- Conditions (physical features) and resources are
  - spatially variable
  - take time to use
    - i.e., more intense use = more time allocated
- Thus, habitat use is a measure of how much time animals allocate to particular locations across the landscape
  - "It's all about time budgets" (Carl Walters)
  - we quantify habitat use as a time profile
    - amounts of use

Hall et al. (1997) *Wildlife Society Bulletin*

Habitat Use

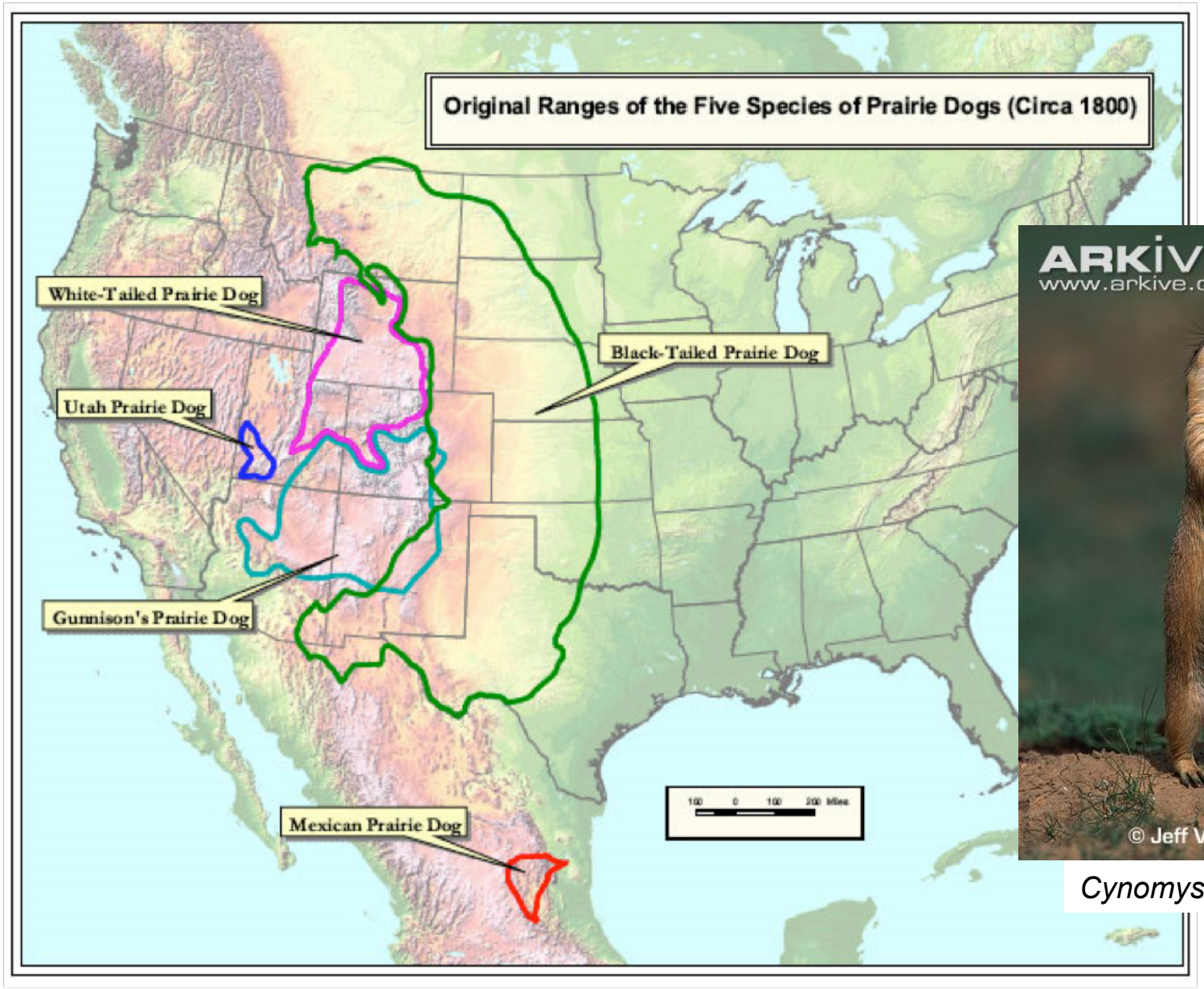
The way an animal *uses* the collection of physical features and resources in a habitat

- We can measure habitat use for
  - Individuals (or social groups)
  - Populations (averaged across constituent individuals)
  - Species (overall tendencies)
- We can quantify habitat use for
  - all activities combined
  - particular behaviors
    - e.g., foraging habitat use

Habitat Use is Hierarchical

- **First-order** habitat use
  - Pattern of use by a species at a global spatial scale that defines its geographic range (macro-scale habitat use)

Johnson (1980) *Ecology*

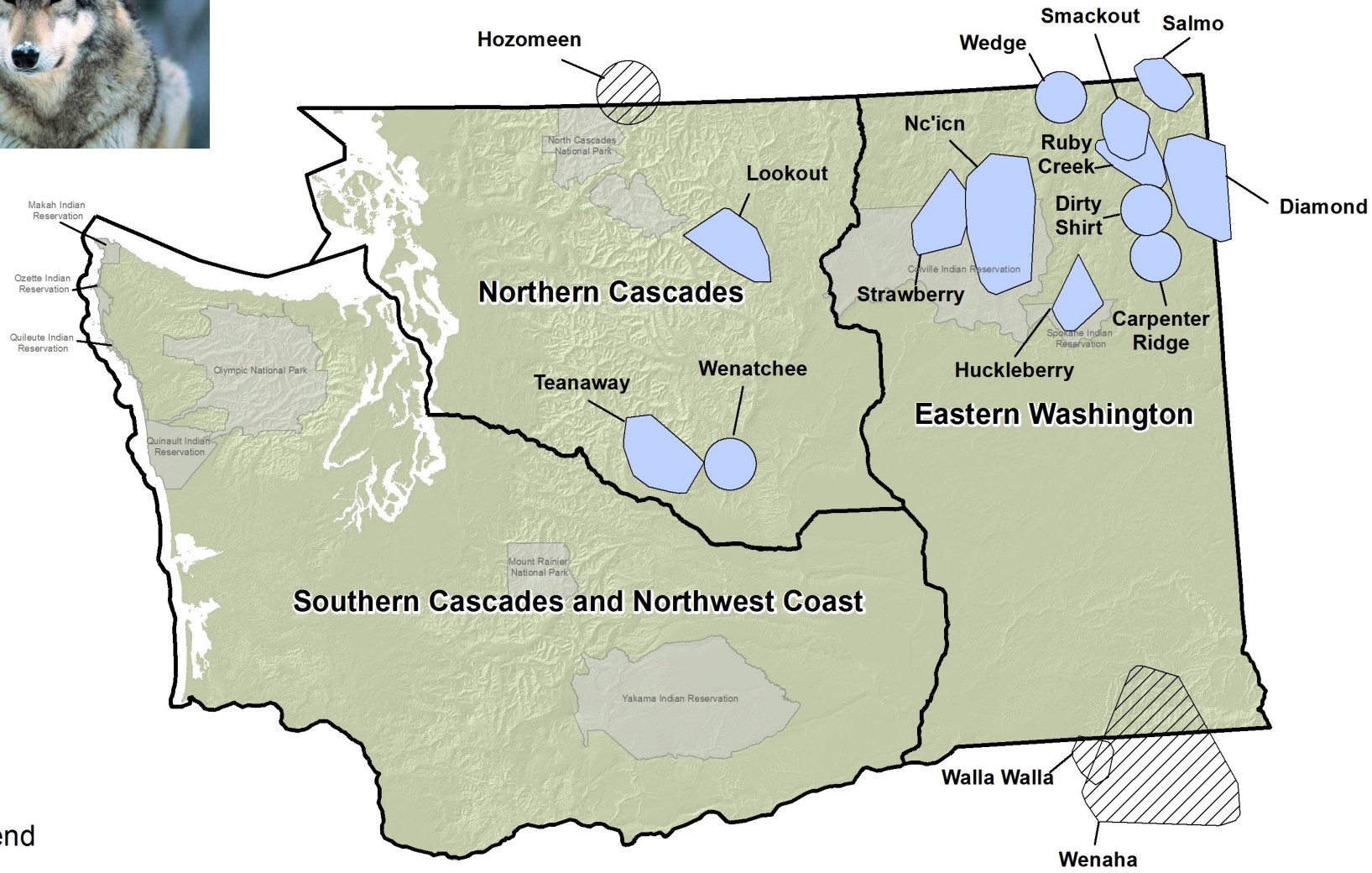


Cynomys ludovicianus

Habitat Use is Hierarchical

- **Second-order** habitat use
  - Pattern of use at the landscape spatial scale that determines the home range of an individual or social group

Johnson (1980) *Ecology*



Legend

- Confirmed pack*
- Border pack that dens outside Washington
- Wolf Recovery Region

* Packs represented by polygons are packs that had collared wolves and the polygon is the estimated pack range. Packs represented by circles are packs that did not have collared wolves and the circle is a generic representation of the pack location.

** Packs may be removed from map due to natural breakup of the pack, lethal control, or no longer detected.

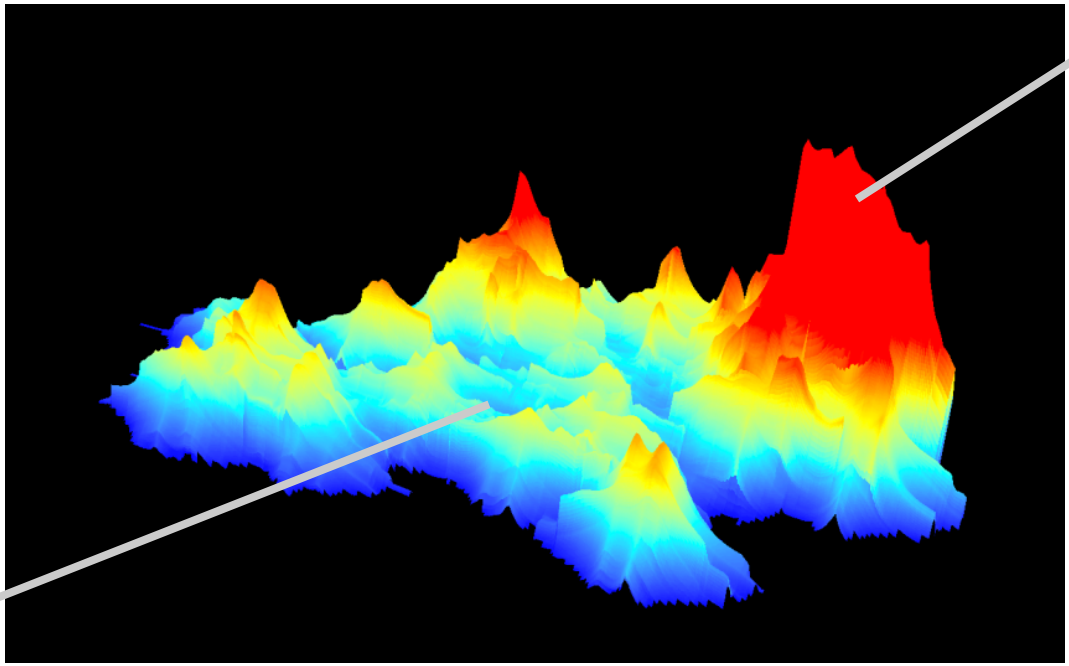
Date: 3/6/2014

Habitat Use is Hierarchical

- **Third-order** habitat use
  - Pattern of use of resources and conditions within an individual's (or social group's) home range
  - Most commonly studied
  - Can be averaged to describe population, species patterns

Johnson (1980) *Ecology*

Utilization Distribution Within the Home Range



Marzluff et al. (2004) *Ecology*

Habitat Use is Hierarchical

- **Fourth-order** habitat use
  - Fine-scale pattern of use of resources and conditions by an individual (or social group) at particular locations within the home range
    - For example, use of certain plants but not others by a wildebeest at a feeding site

A blue wildebeest (*Connochaetes taurinus*) foraging on the African savannah

Johnson (1980) *Ecology*

In Focus: Research Methodology

- Habitat use studies employ a variety of approaches
  - direct observation
  - tracking (or by noting other animal signs such as calls and feces)
  - VHF telemetry
  - Satellite telemetry

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- An emerging technique
  - **animal-borne video cameras**


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