

Sage-Grouse Habitat Requirements



Jeff Beck

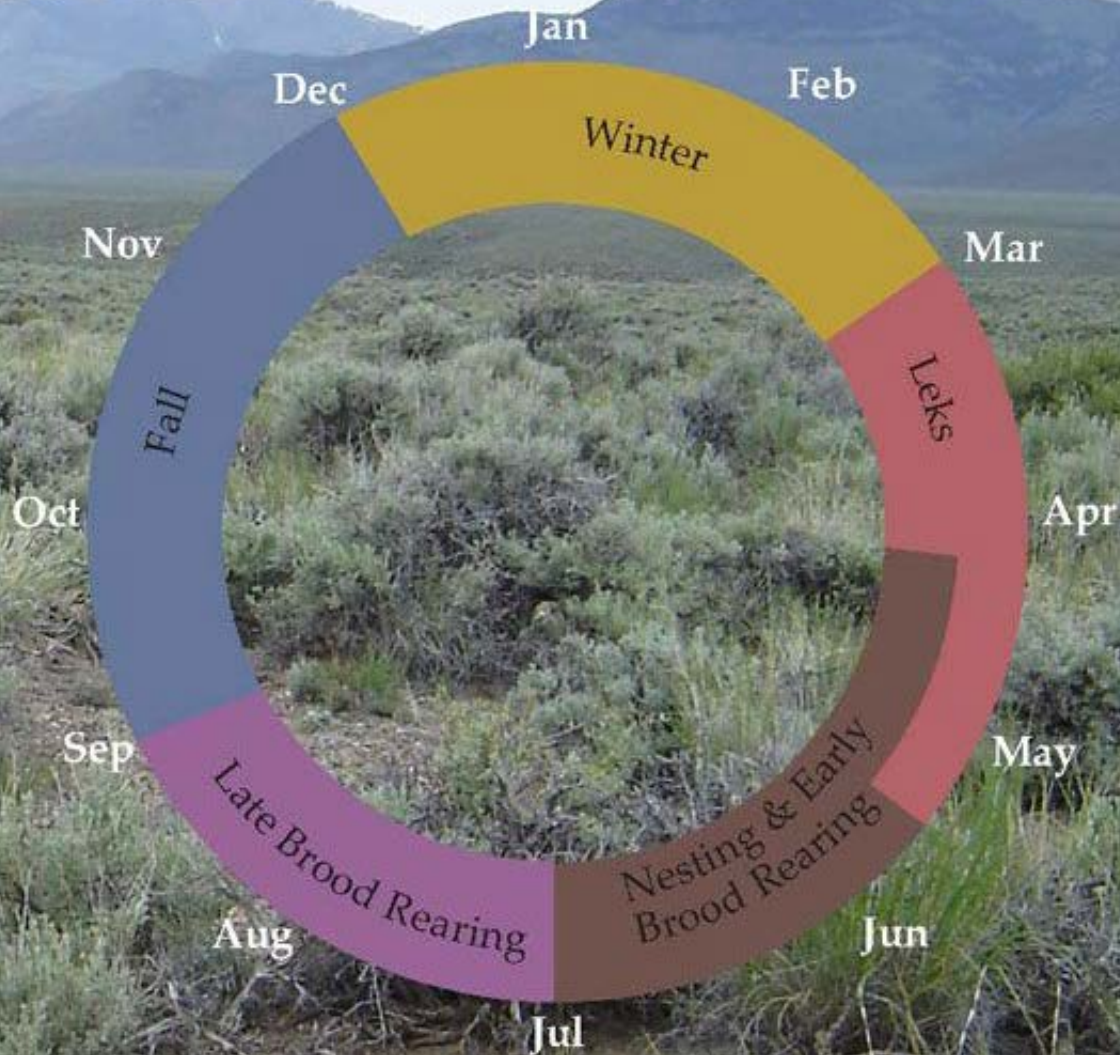
**Ecosystem Science and Management
University of Wyoming**



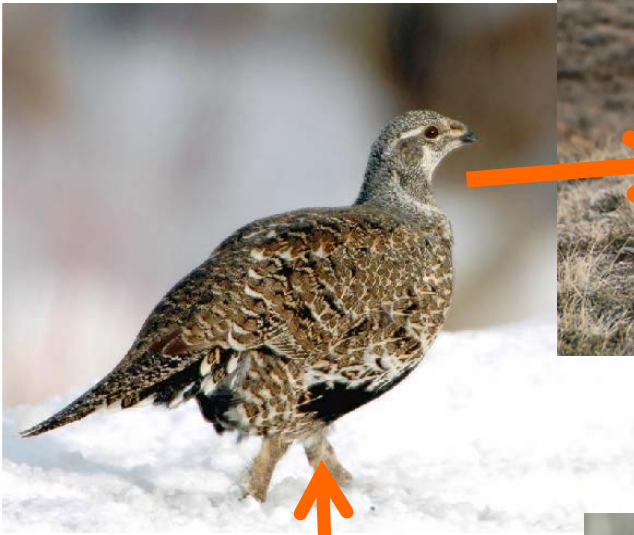


General Habitat Use Periods

Use periods may vary based on elevation, location, and annual weather conditions



Winter



Lek



Life Cycle

Early Brood-Rearing



Nesting



Late Brood-Rearing

Landscape-Scale Species

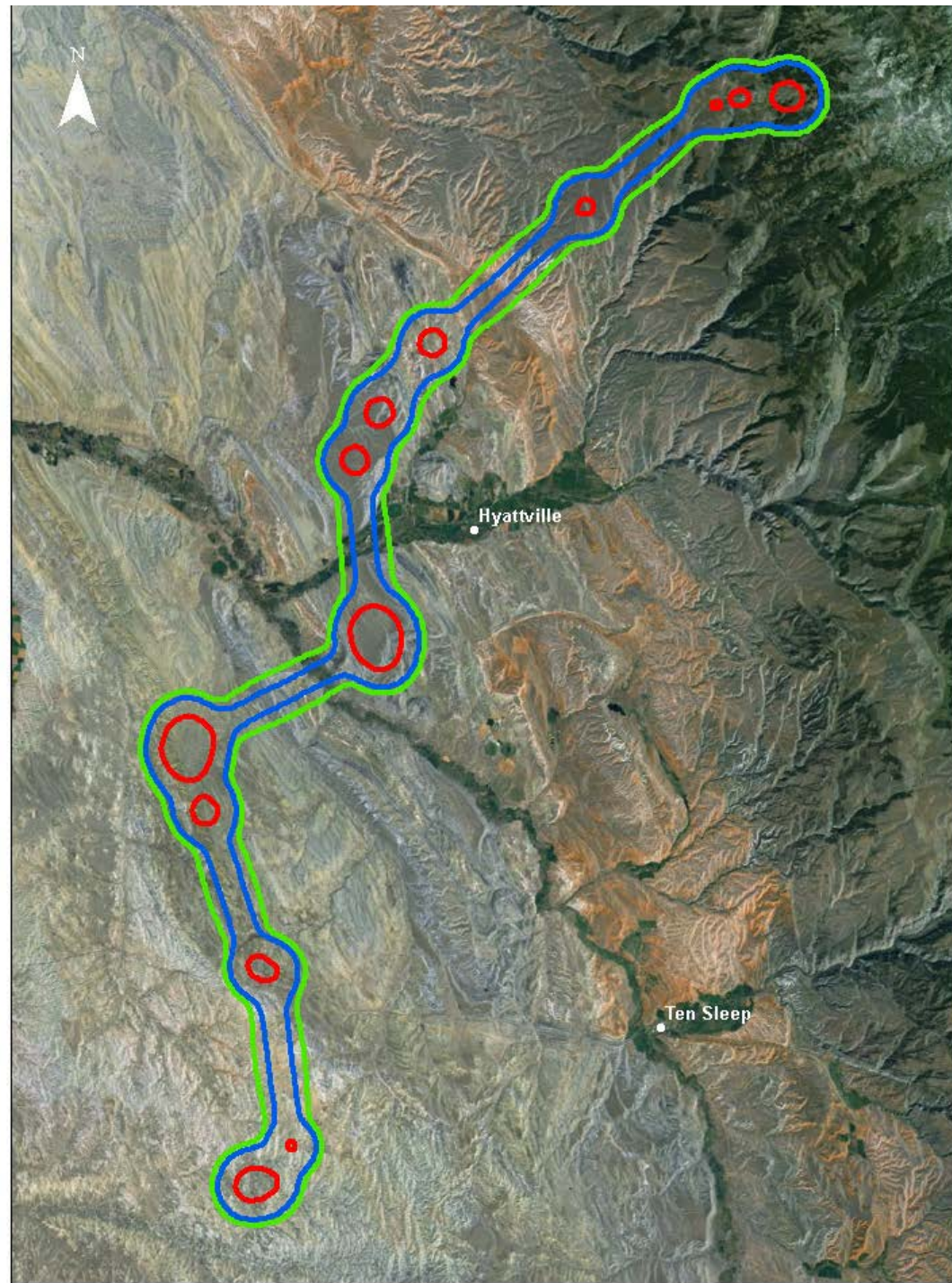
- Movements within breeding habitat can be >25 km, and seasonal ranges can be >80 km apart (Connelly et al. 1988, Holloran and Anderson 2005)

Home Range Size (reported in Schroeder et al. [1999] - BNA)

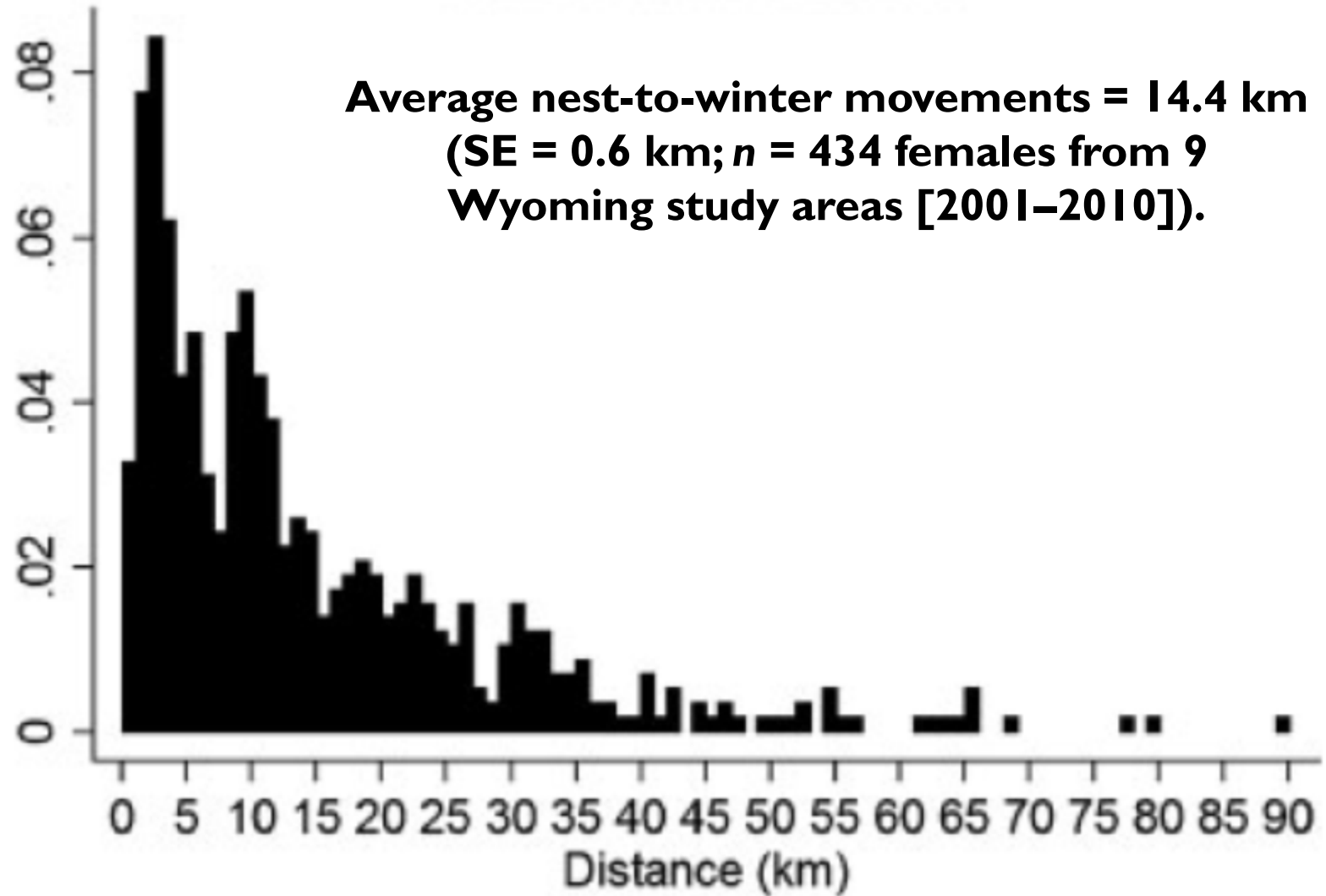
- **Annual range:** can be >2,700 km²(Leonard et al. 2000, Holloran and Anderson 2005)
- **Breeding range:** up to 28.6 km²(Connelly 1982, Bradbury et al. 1989a, Hofmann 1991, Schroeder et al. 1999)
- **Summer range:** up to 25.9 km²(Oakleaf 1971, Wallestad 1971, Connelly 1982, Bradbury et al. 1989a, Hofmann 1991, Schroeder et al. 1999)
- **Autumn range:** 22.5–44.2 km²(Connelly 1982, Hofmann 1991)

Summer-to-Winter Migration

- 21 days to travel ~60 km in October 2011. Based on 114 locations from a GPS-marked female in eastern Bighorn Basin, Wyoming
- Estimate of probability of occurrence
 - Green = 99%
 - Blue = 95%
 - Red = 50%



Nest to winter locations



Fedy et al. (2012) for Wyoming

Nesting Habitat

Horizontal Structure



Vertical Structure



Table 3. Characteristics of sagebrush rangeland needed for productive sage grouse habitat.

	Breeding		Brood-rearing		Winter ^e	
	Height (cm)	Canopy (%)	Height (cm)	Canopy (%)	Height (cm)	Canopy (%)
Mesic sites ^a						
Sagebrush	40–80	15–25	40–80	10–25	25–35	10–30
Grass–forb	>18 ^c	≥25 ^d	variable	>15	N/A	N/A
Arid sites ^a						
Sagebrush	30–80	15–25	40–80	10–25	25–35	10–30
Grass/forb	>18 ^c	≥15	variable	>15	N/A	N/A
Area ^b		>80		>40		>80

^a Mesic and arid sites should be defined on a local basis; annual precipitation, herbaceous understory, and soils should be considered (Tisdale and Hironaka 1981, Hironaka et al. 1983).

^b Percentage of seasonal habitat needed with indicated conditions.

^c Measured as “droop height”; the highest naturally growing portion of the plant.

^d Coverage should exceed 15% for perennial grasses and 10% for forbs; values should be substantially greater if most sagebrush has a growth form that provides little lateral cover (Schroeder 1995)

^e Values for height and canopy coverage are for shrubs exposed above snow.¹

Connelly et al. (2000)

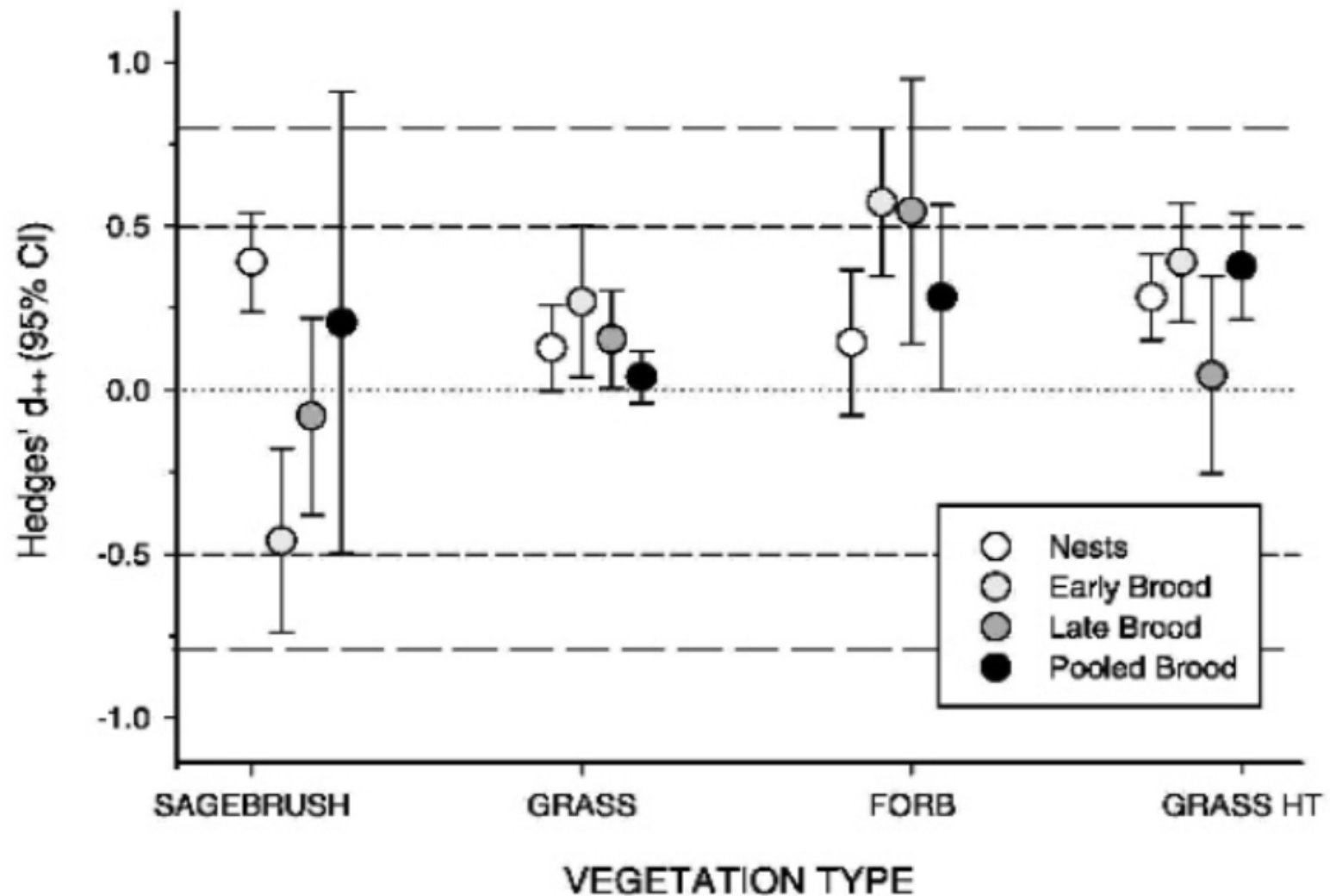
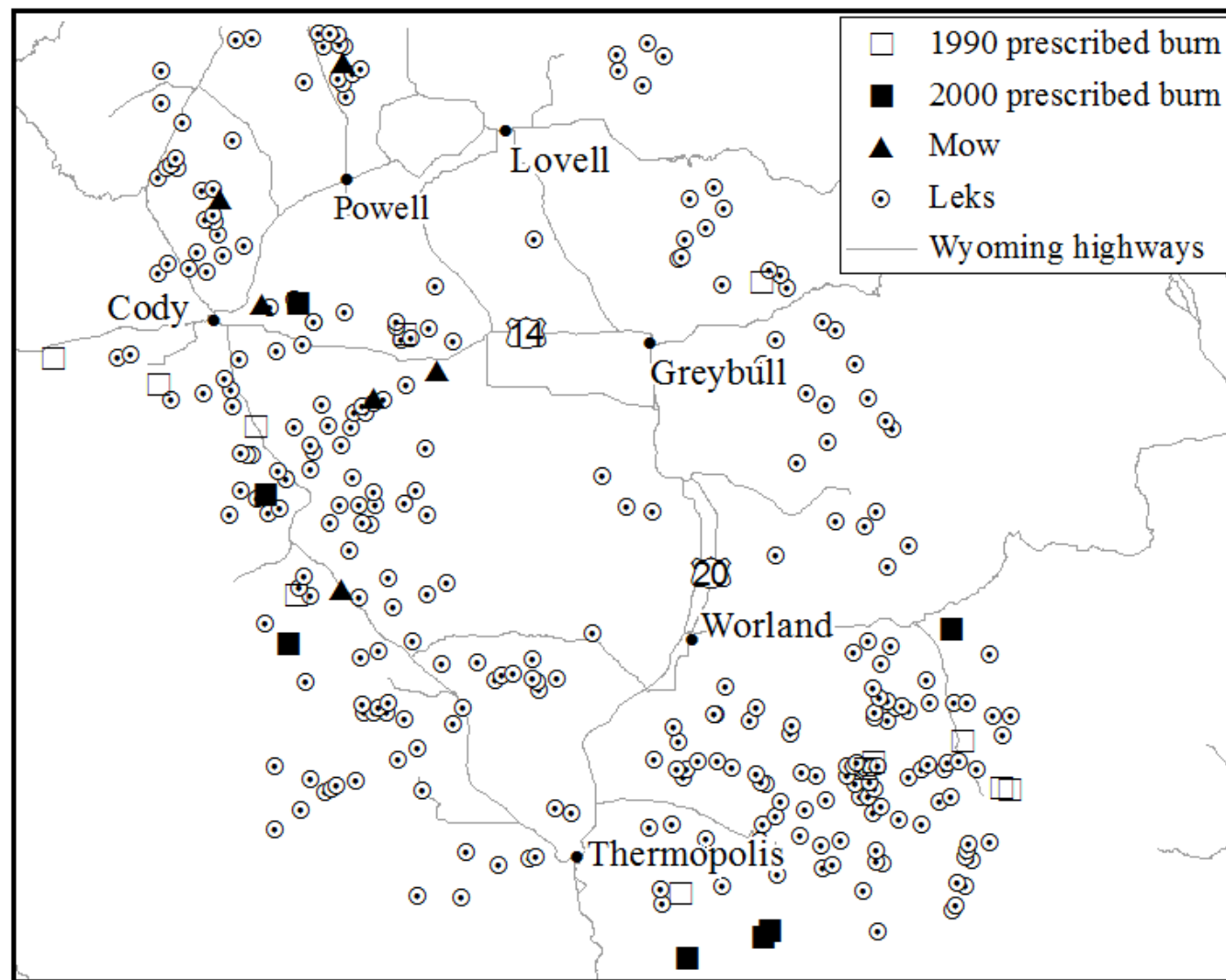
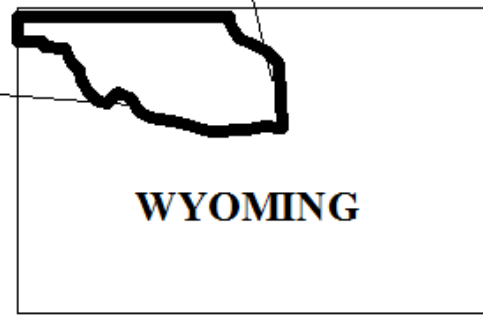


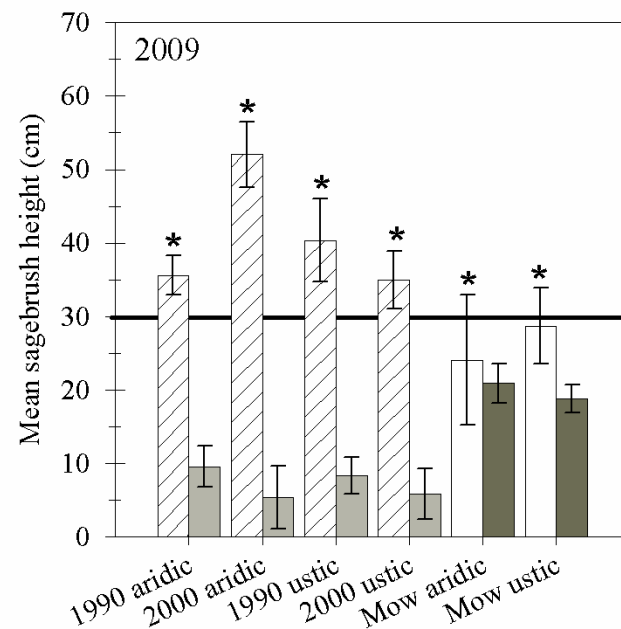
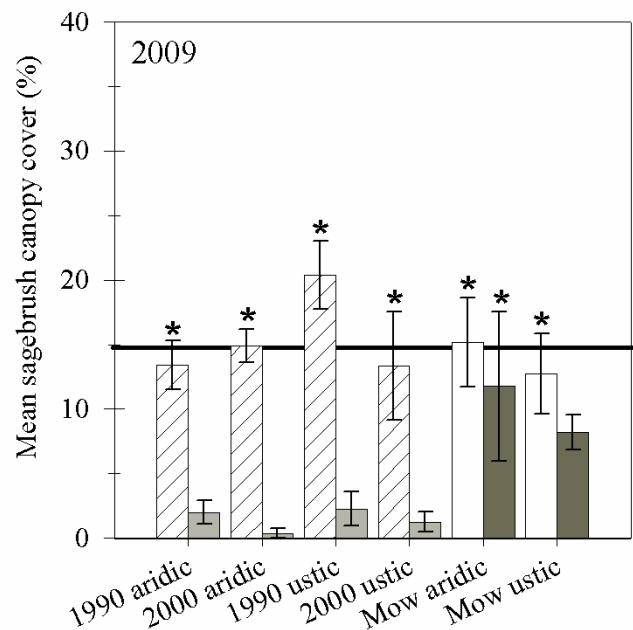
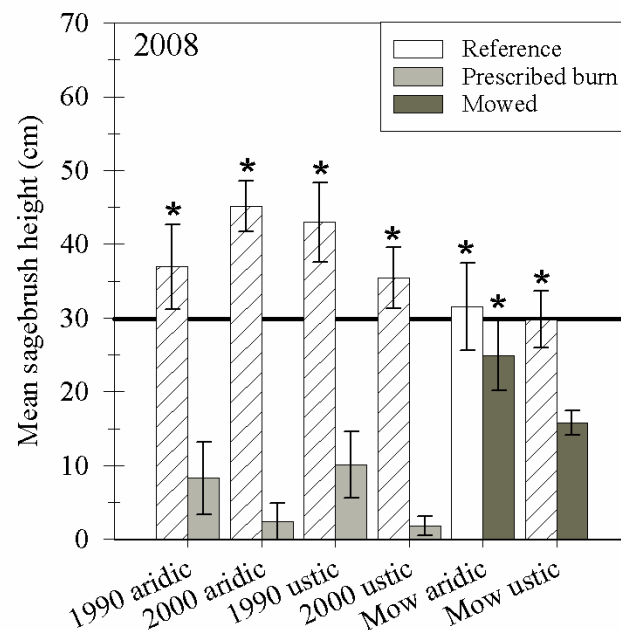
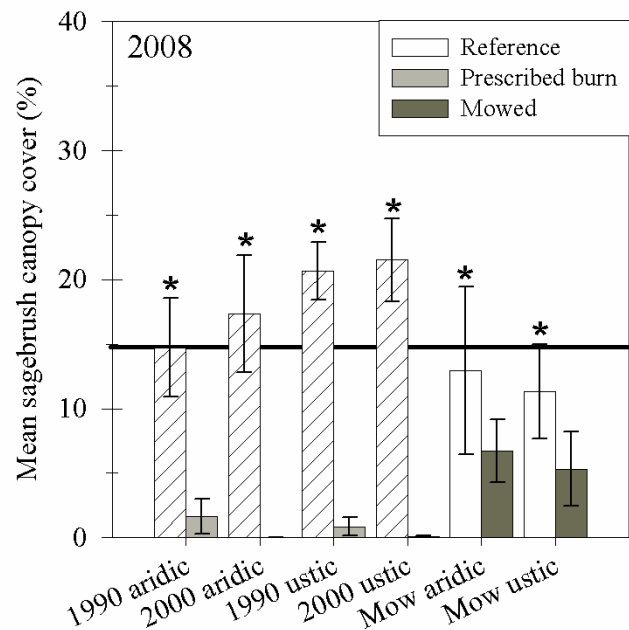
Figure 1 from Hagen et al. (2007)



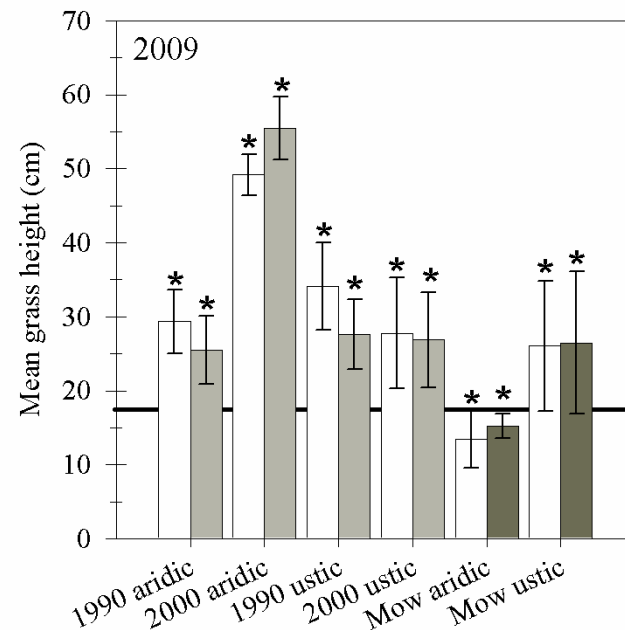
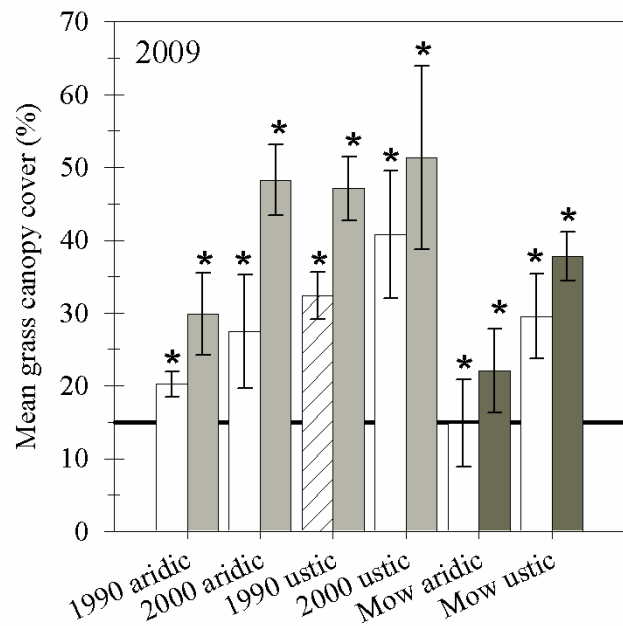
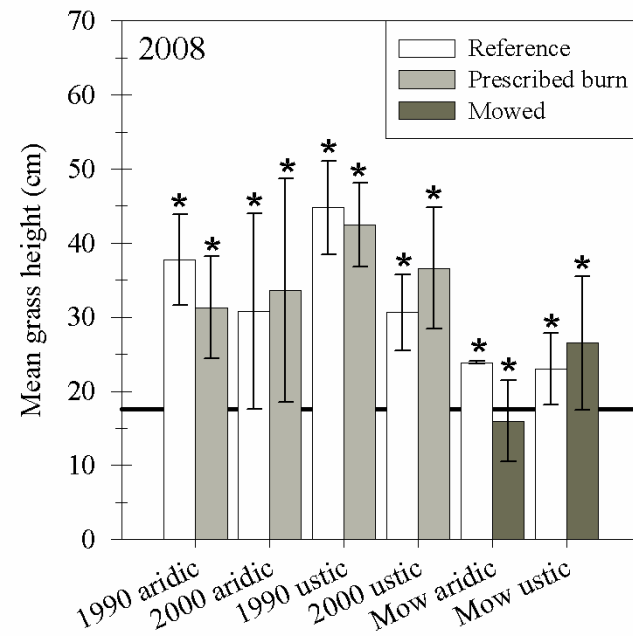
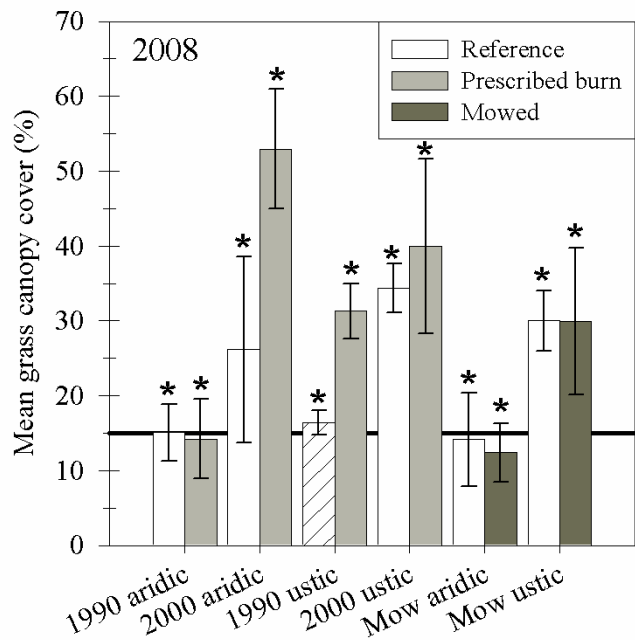
0 20 40 80 Kilometers



WYOMING

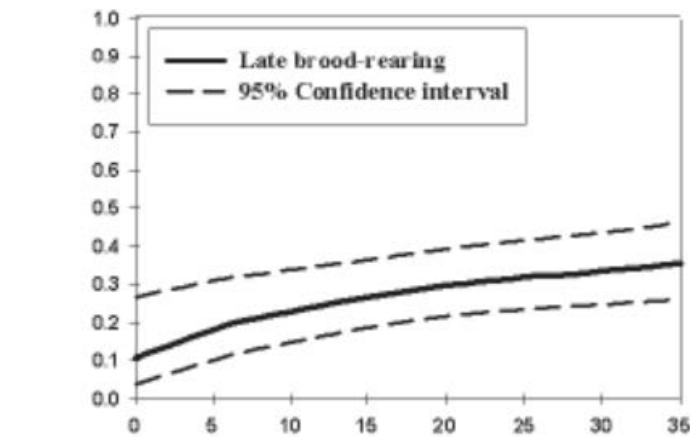
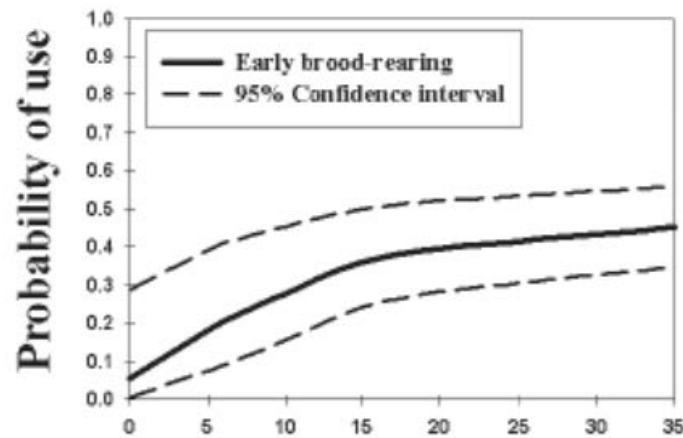
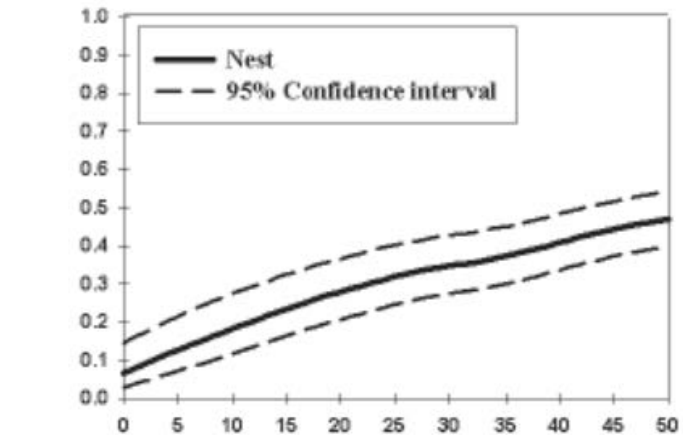
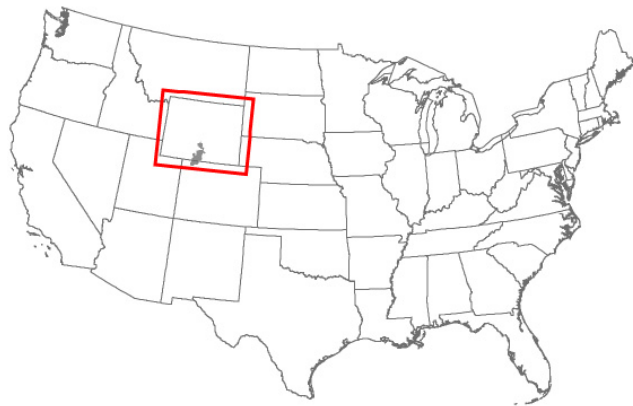


Hess and Beck (2012)

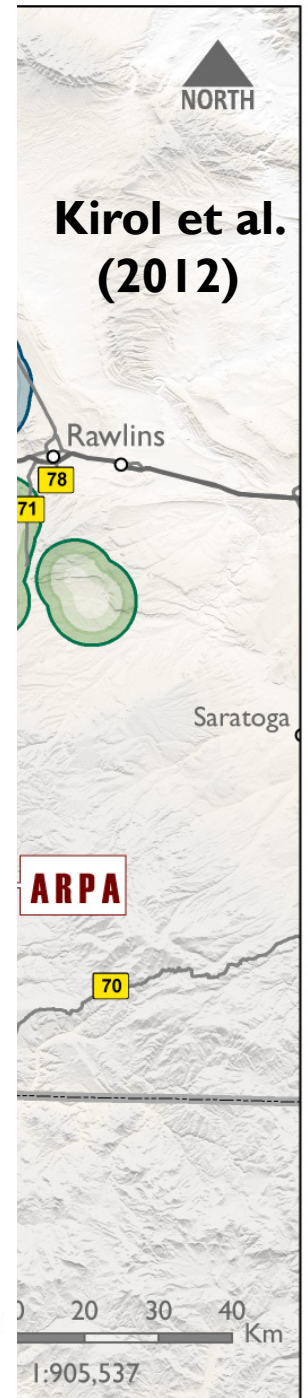


Hess and Beck (2012)

Sage-Grouse Study Areas



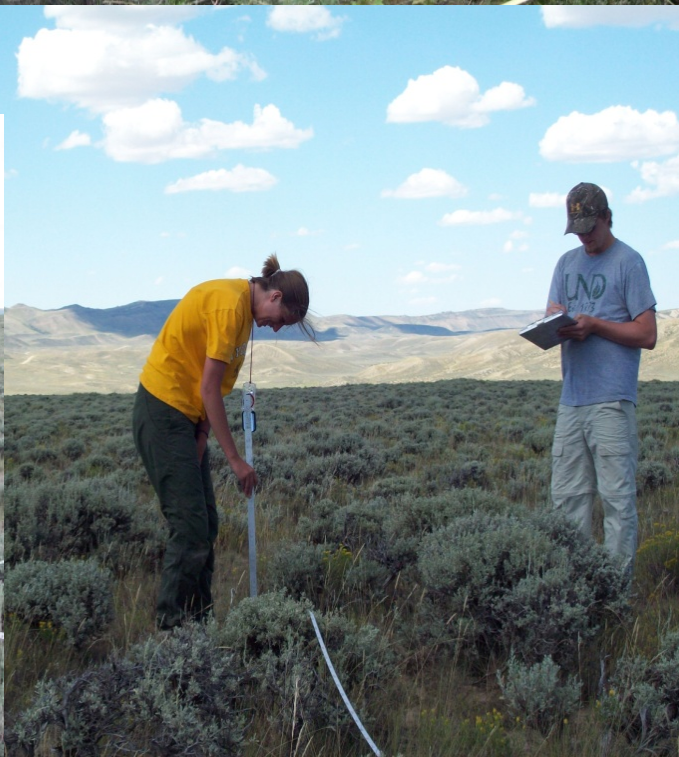
Sagebrush canopy cover (%)



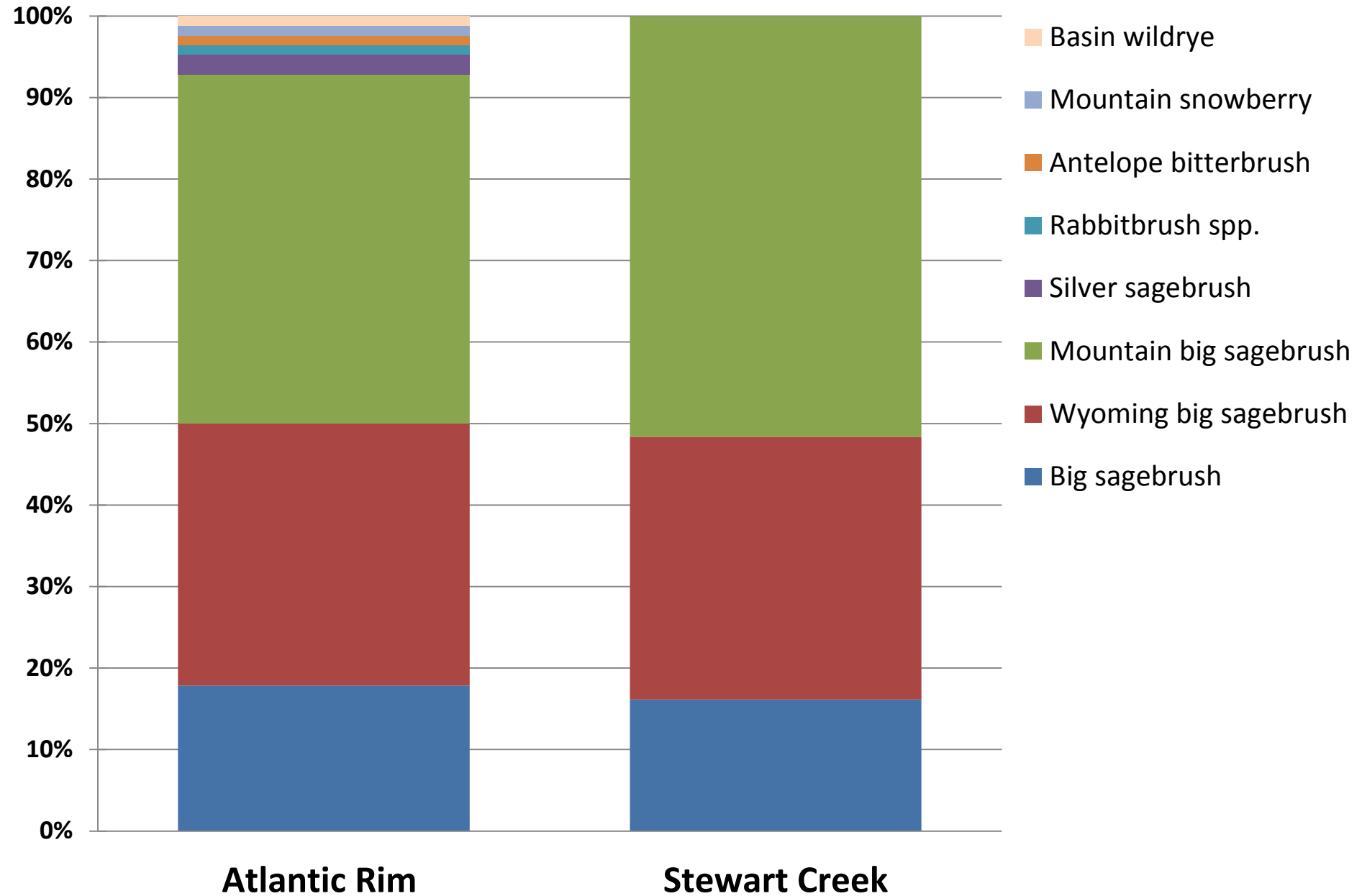
Kirol et al.
(2012)

ARPA



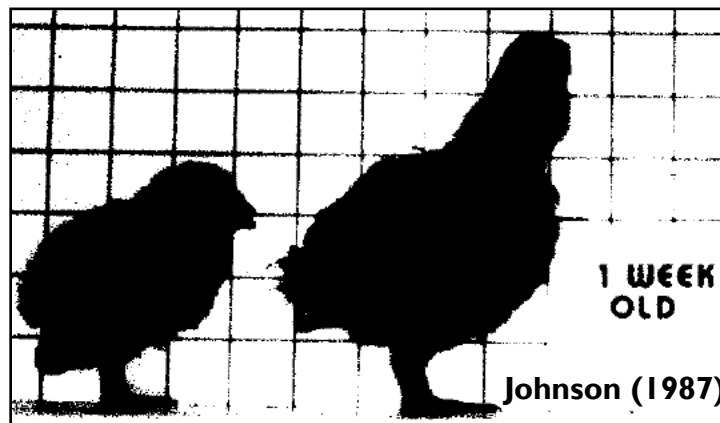


Nest Shrubs





Early Brood-Rearing Habitat

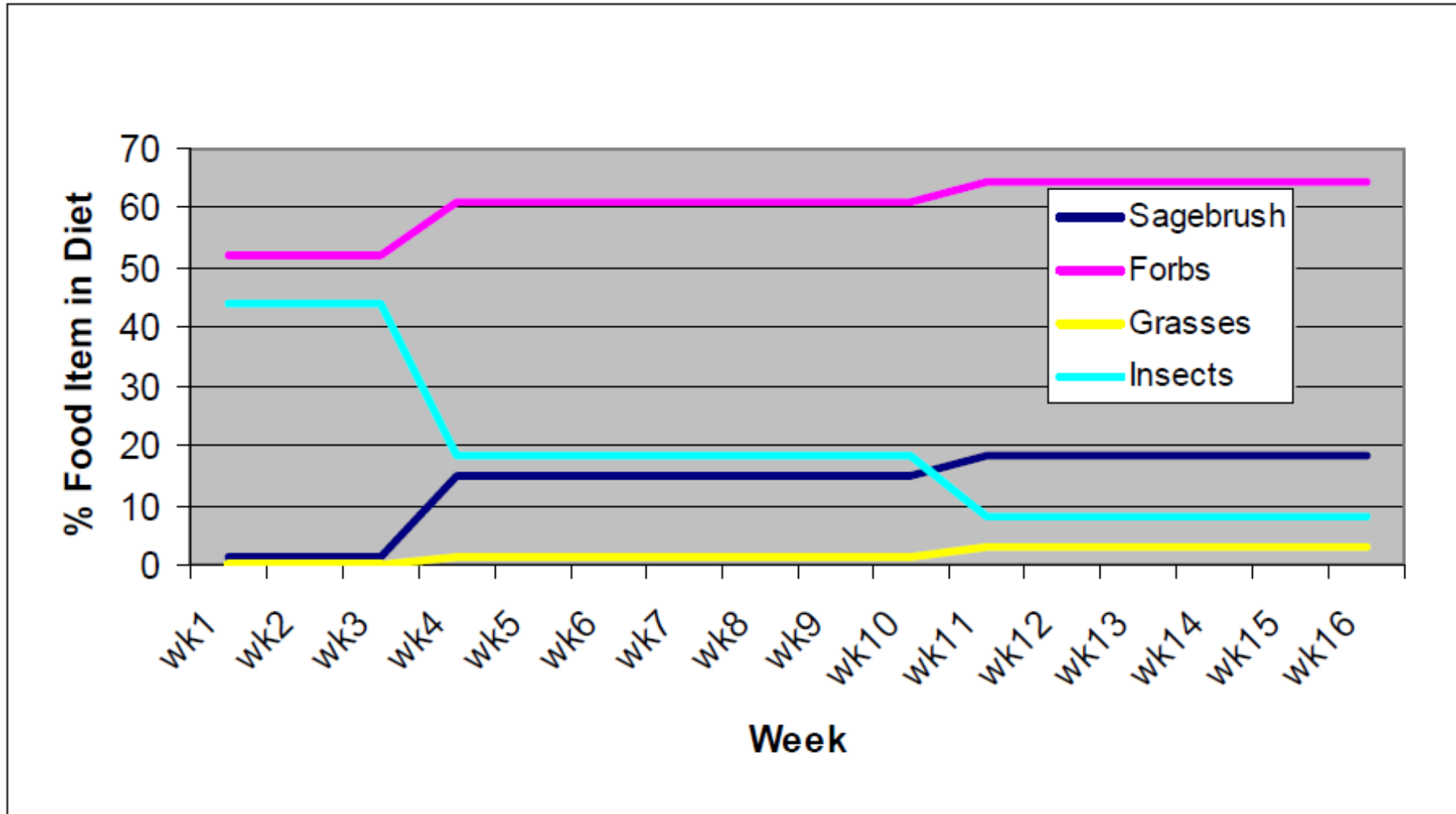


Early Brood-Rearing Diet

- Chicks dependent on insects ($\geq 75\%$ of diet) during first 2 weeks (Patterson 1952)
 - Ants (Hymenoptera)
 - Beetles (Coleoptera)
 - Grasshoppers (Orthoptera)

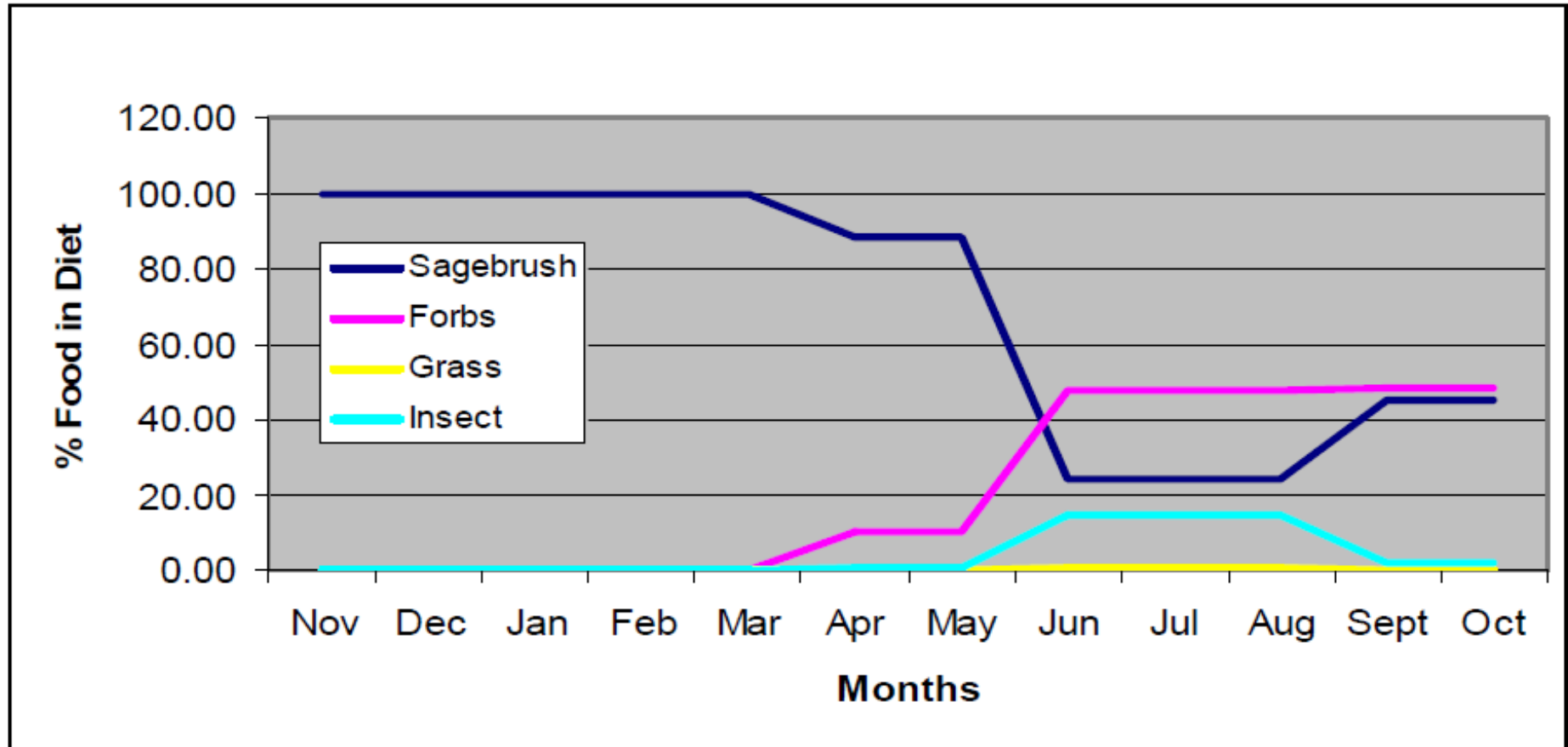


Juvenile Sage-Grouse Weekly Diets



Dahlgren (2007)

Adult Sage-Grouse Monthly Diets



Dahlgren (2007)

Late Brood-Rearing

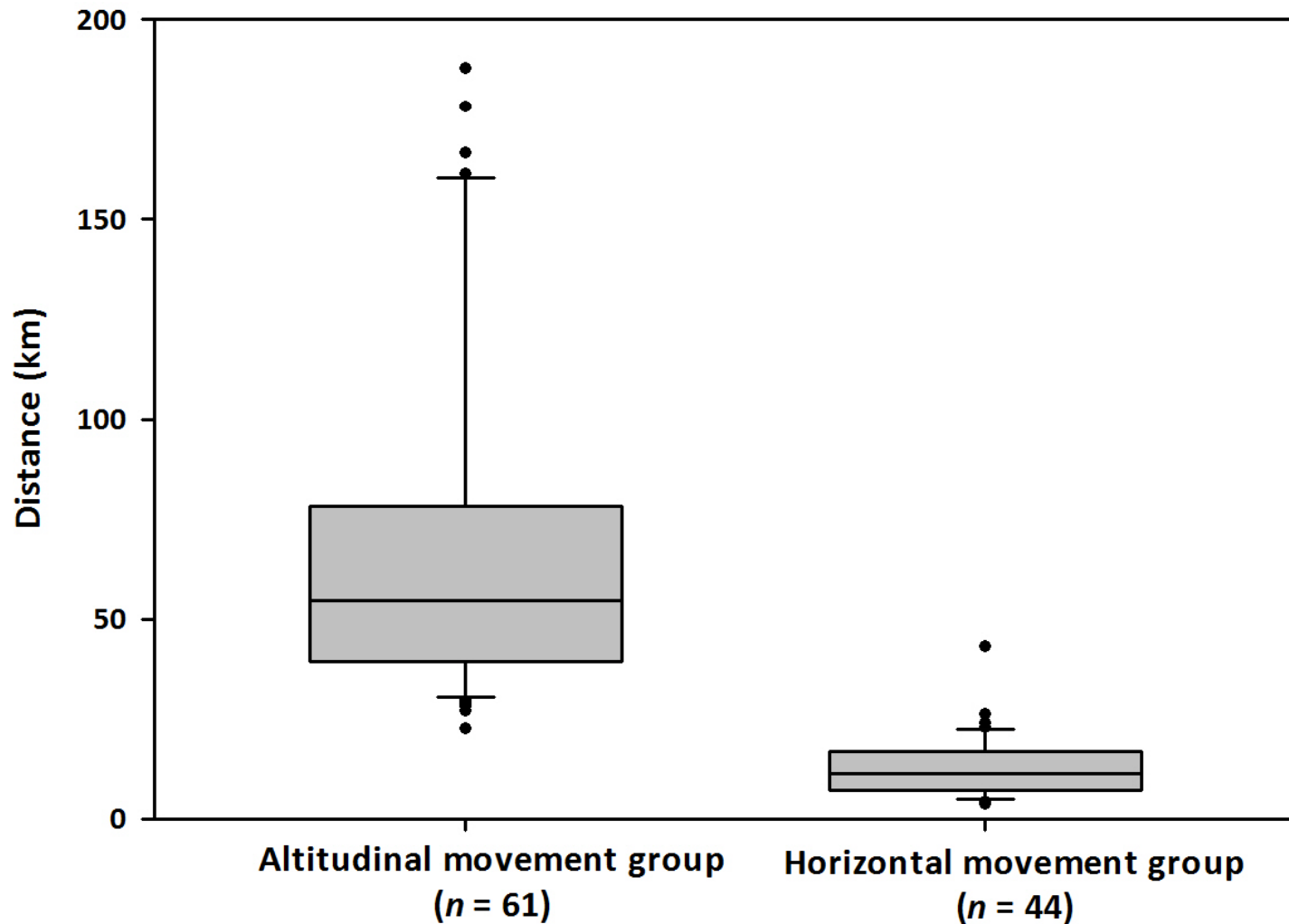
- As summers progress, hens with chicks move from nesting/early brood-rearing habitats to access mesic sites
- Higher elevations OR agricultural fields, wet meadows, and riparian areas near sagebrush cover
- Some sage-grouse have been known to travel as far as 80.5 km (50 mi) to access summer habitat



Courtesy C. Kirol



2011 Annual Movements – Bighorn Basin (from Aaron Pratt)



Harvest Data may provide insights to Annual Habitat Quality

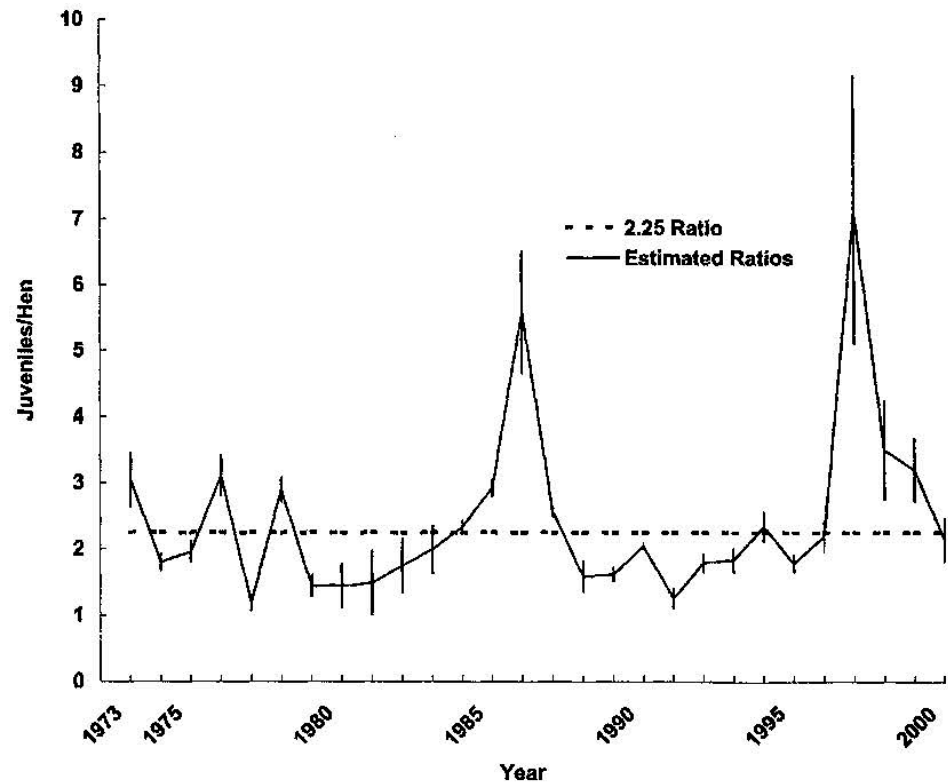


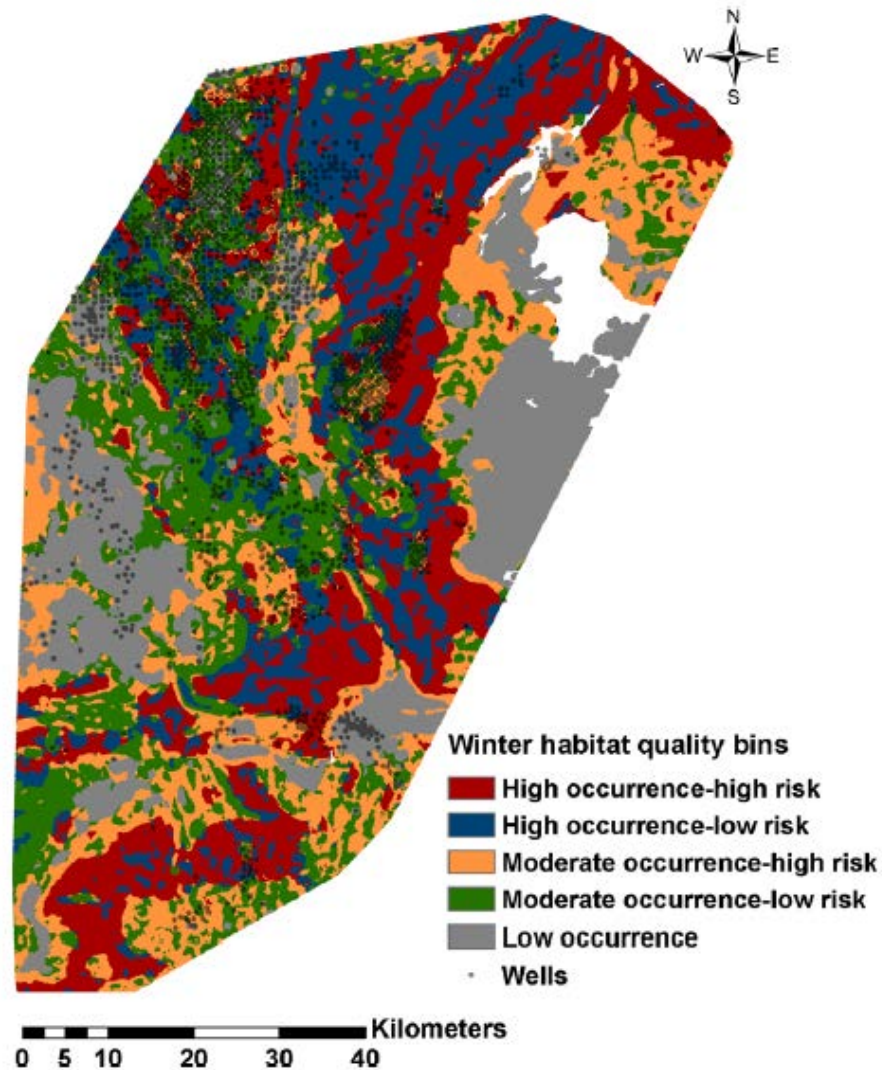
Fig. 3. Estimated ratios ($\bar{x} \pm s_{\bar{x}}$) of juveniles per adult hen (including yearling hens) Greater Sage-Grouse in the fall harvest from Box Elder, Rich, and Wayne Counties, Utah, 1973–2000. Estimated ratios compared to a ratio of 2.25 juveniles per hen, a level suggesting stable to increasing populations (Connelly et al. 2000a).



Sage-Grouse and Winter

- Form gender-segregated flocks (Beck 1977)
- High adult (Connelly et al. 2000) and juvenile (Beck et al. 2006) survival
- Gain or maintain weight and fat (Remington and Braun 1988)
- Preference for sagebrush subspecies (Welch et al. 1991) and plants with high CP and low PSM's (Remington and Braun 1985, Frye et al. 2013)
- High sagebrush cover and moderate slopes (Eng and Schladweiler 1972, Doherty et al. 2008, Carpenter et al. 2010, Smith et al. 2014)





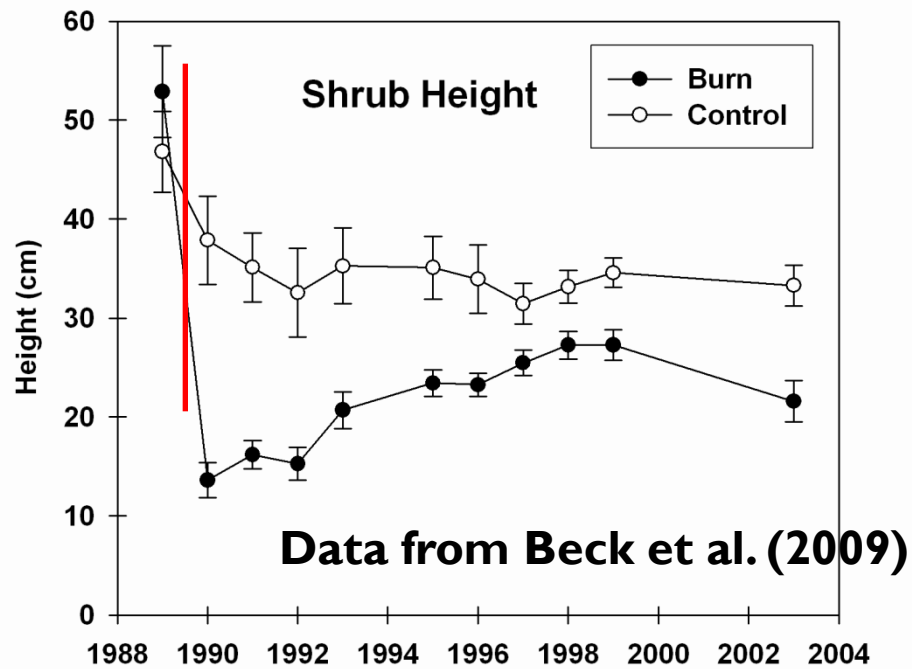
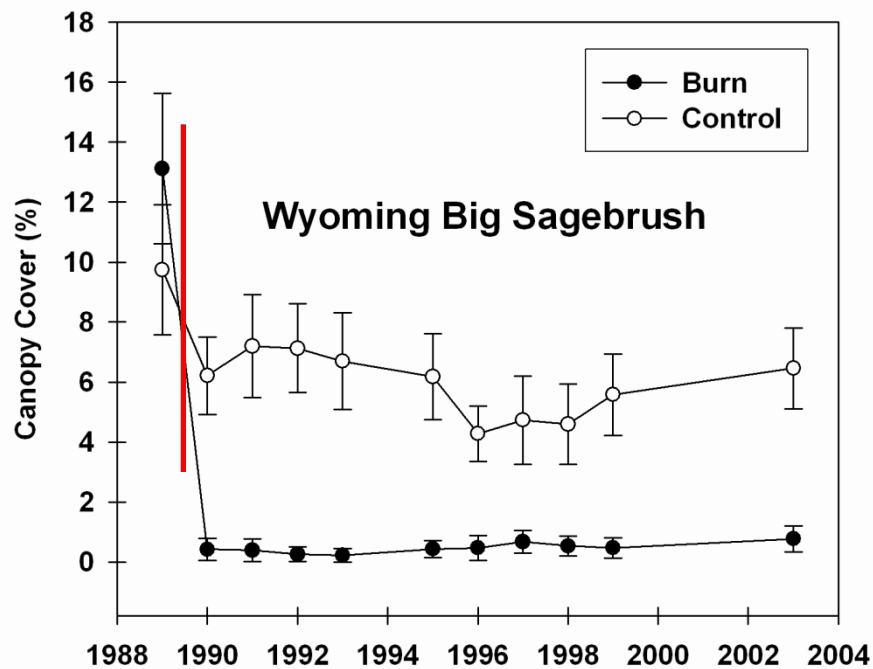
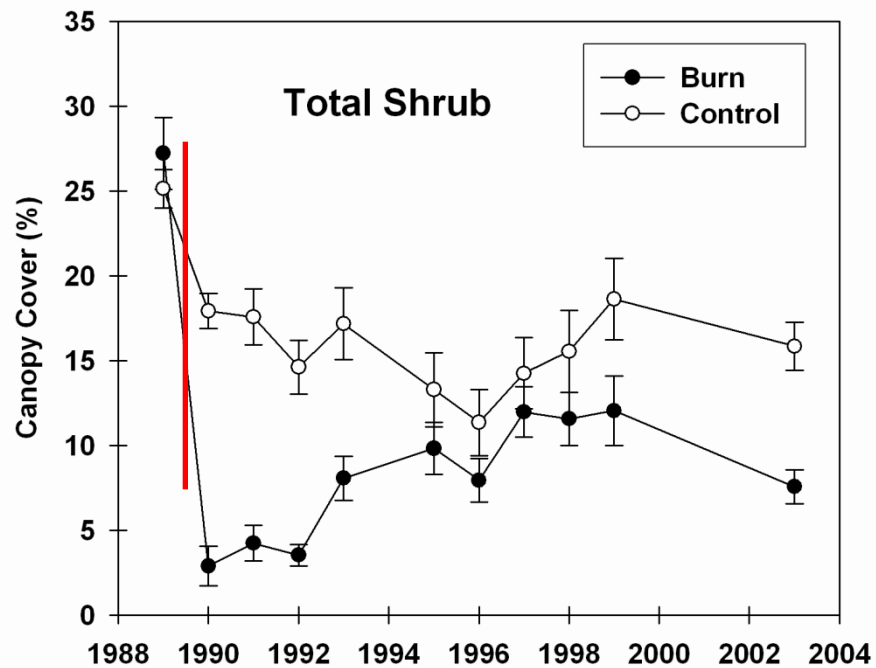
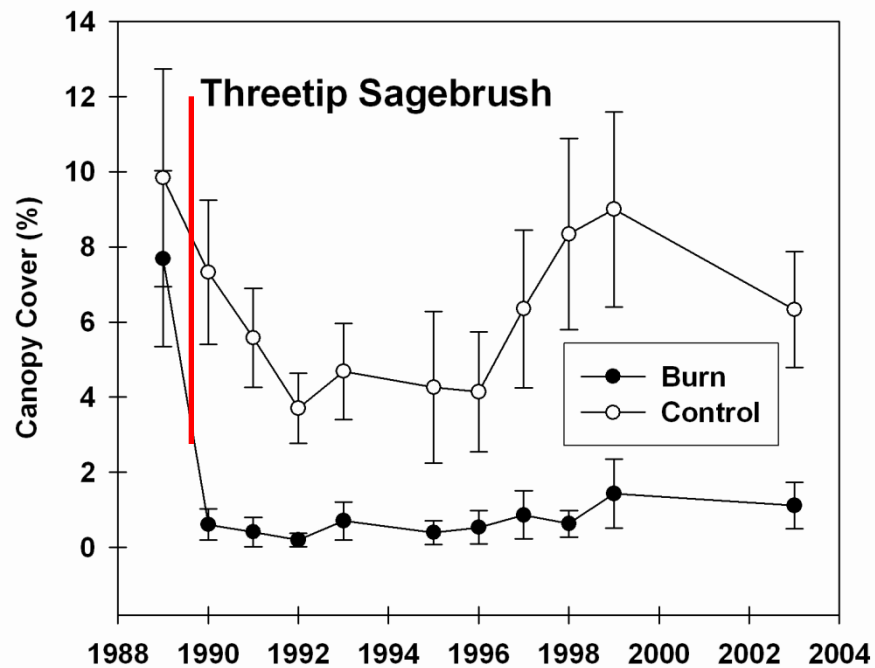
17.1% of Winter Habitat in Atlantic Rim, Wyoming across winters 2007–2008, 2008–2009, and 2009–2010 was **High-Occurrence-Low Risk** (Smith et al. 2014)

Fire and Big Sagebrush

- **Wyoming big sagebrush recovers after 50–120 years (Baker 2006)**
- **Composition changes (Bunting et al. 1987)**
 - Reduce woody cover and invasive herbs
 - Increase establishment and productivity of desirable herbs
 - Increase less desirable shrubs
- **Contributed to range-wide declines in sage-grouse (Connelly & Braun 1997)**







Big Sagebrush (Davies et al. 2011 and Beck et al. 2012)

- **Wyoming big sagebrush**
 - Warmer and drier sites in valleys and foothills
 - Greatly affected by invasive species and wildfire
 - Too much fire
- **Mountain big sagebrush**
 - Higher and more mesic sites
 - More herbaceous production
 - Conifer encroachment
 - Too little fire
 - Recovers quicker after disturbance



ARTRV



Basin big sagebrush



ARTRW



ARTRW



**Lower Elevations:
Cheatgrass Invasion
Increases Wildfires
and Leads to
Degraded
Communities**

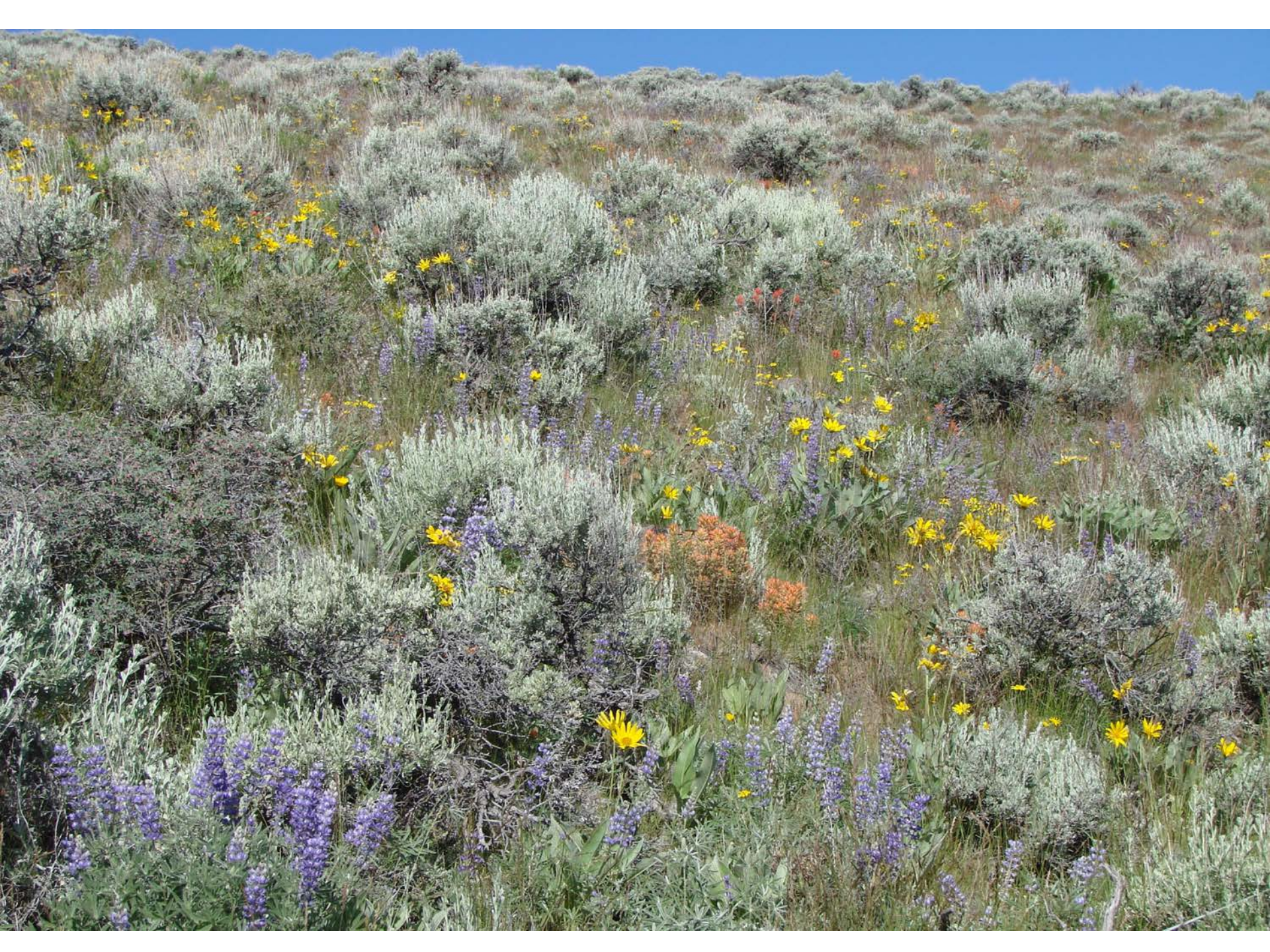


Higher Elevations: Fire Suppression Promotes Pinyon-Juniper Encroachment into Sagebrush



Courtesy Ashley National Forest





Conclusions

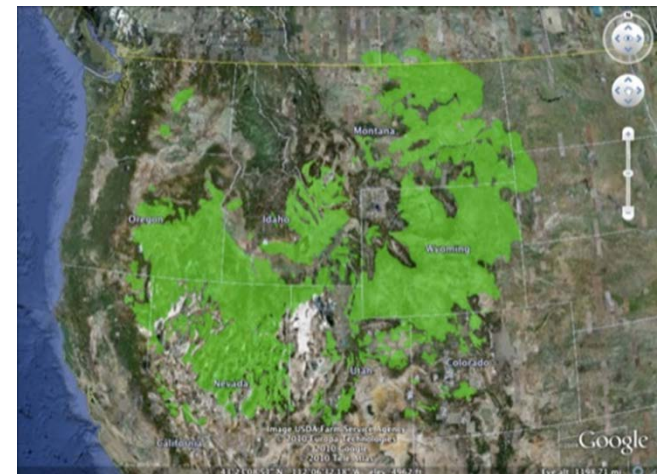
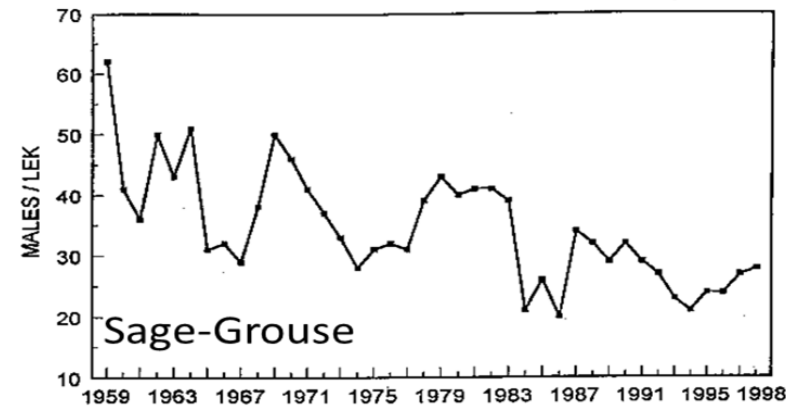
- Sage-grouse require large landscapes and often migrate to access seasonal habitats
- Large, continuous sagebrush habitats with areas of high cover and height of sagebrush are critical to all life stages
- Insects and forbs are critical foods for chicks. Sagebrush forms most of the sage-grouse diet for 8 months of the year
- Too much fire in low elevation sagebrush, in some places not enough fire in higher elevation sagebrush (conifer encroachment)

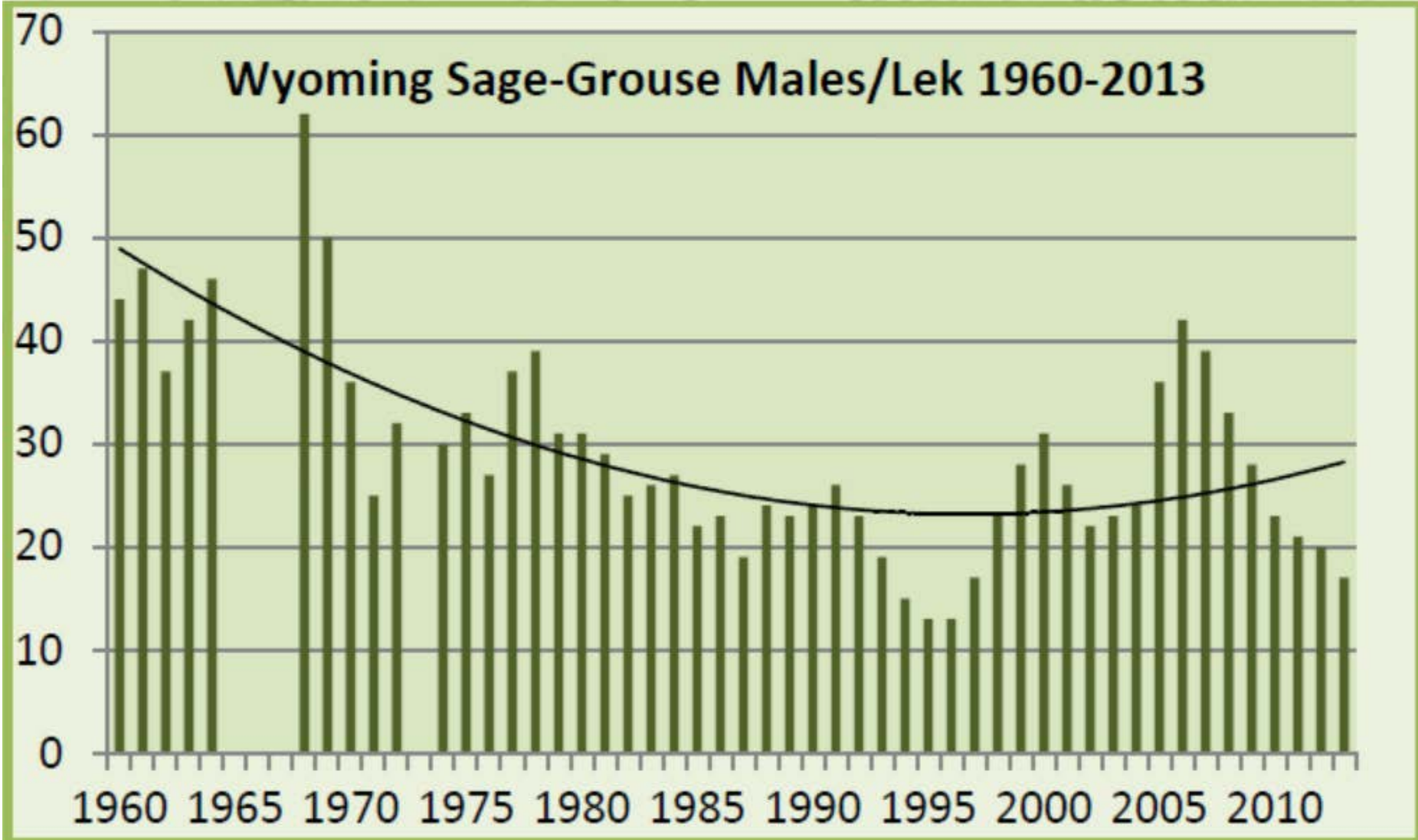
Questions?



- Distributed in sagebrush habitats in 11 states and 2 provinces
- Long-term declines of 17-50% across their distribution (Connelly et al. 2004, Garton et al. 2011)
- Considered for listing 7 times under the ESA of 1973, most recently in 2010, when the USFWS concluded that listing was warranted but precluded
- In 2008, Wyoming Governor's SGEO created "Core Areas" policy limiting development in high priority sage-grouse habitats

Status of Sage-Grouse





From 2014 WGFD Sage-Grouse Fact Sheet



Annual Behavior of Sage-Grouse (1999 BNA)

