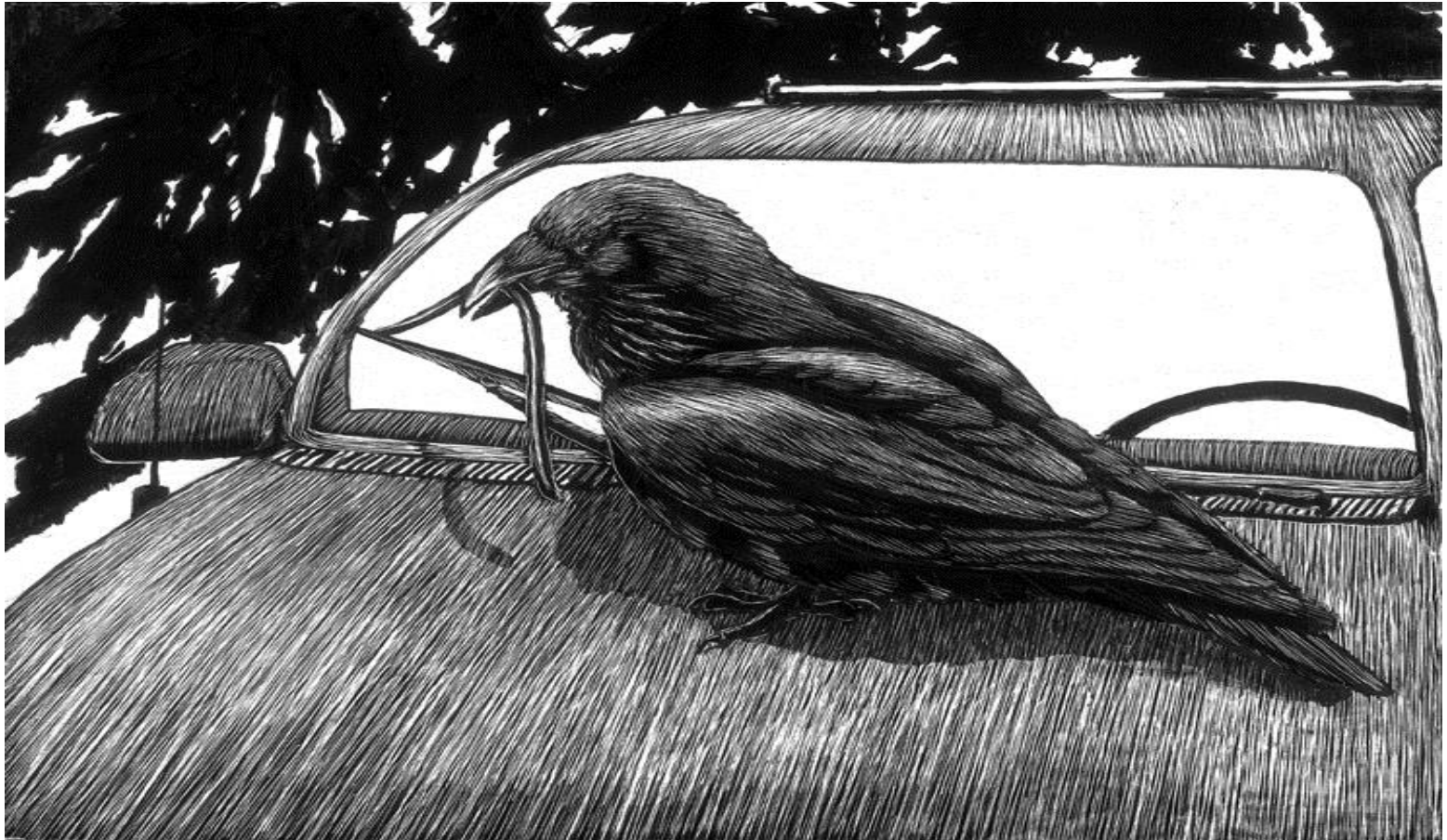


Corvids and Recreation

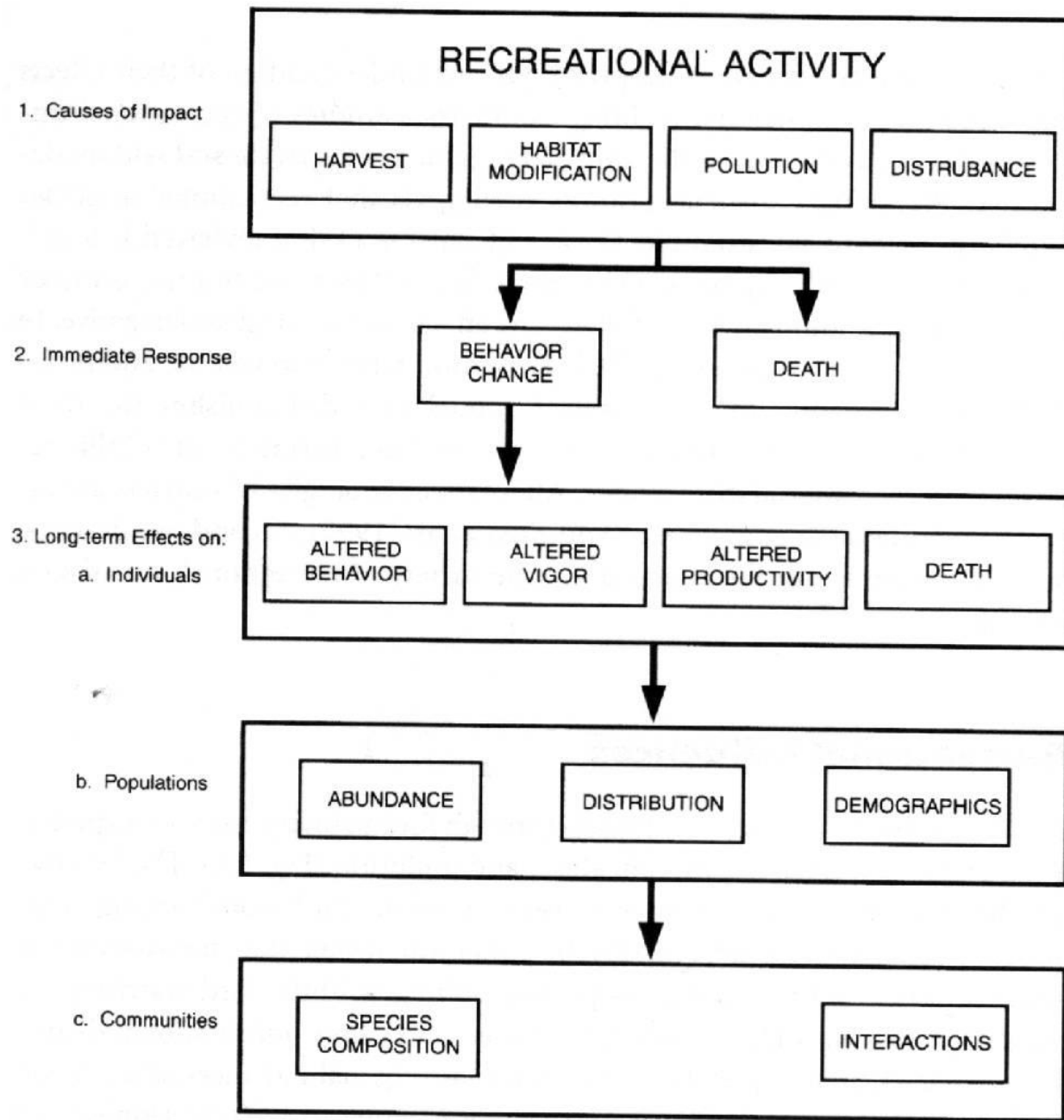


John Marzluff

School of Environmental and Forest Sciences

University of Washington, Seattle

corvid@uw.edu



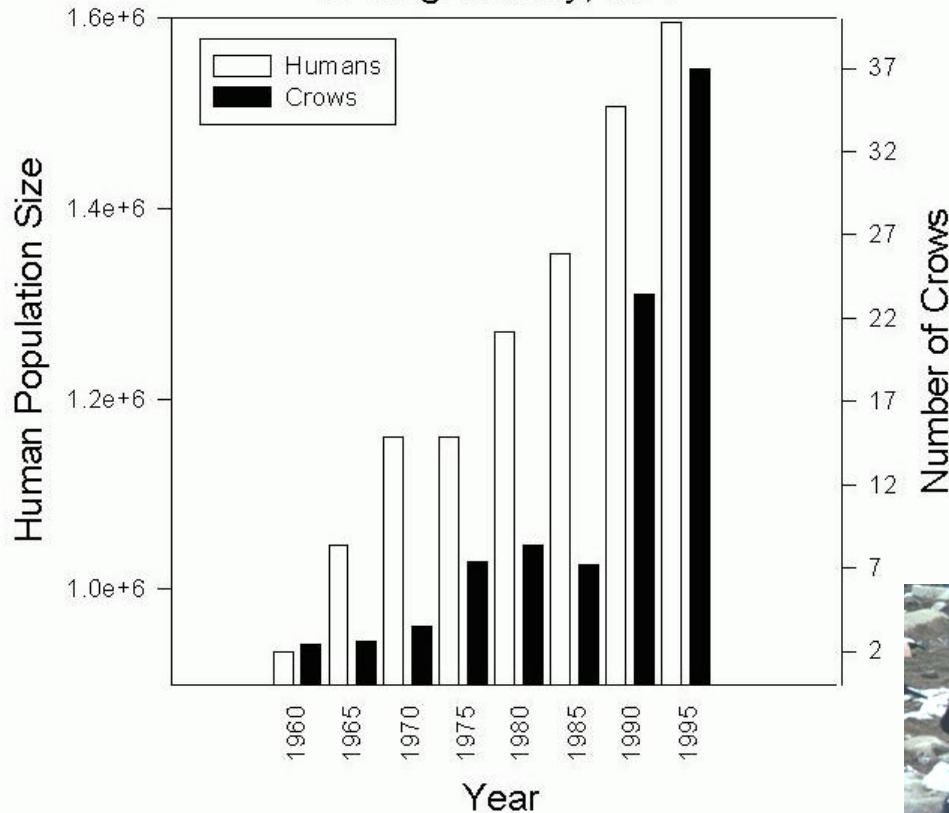
Relationship
between
recreation
and wildlife
(Knight & Cole 1995)

Many Corvids are Increasing in Response to Human Settlement, Agriculture, Recreation, and Resource Use

- Russia Jay, Magpie, Carrion Crow (Konstantinov 1996)
- Italy Jackdaw (Fraissinet 1989)
- UK Magpie (Eden 1985)
- Western US Magpie, Raven, American Crow (Marzluff et al. 1994)
- Washington American Crow, Raven (Withey, Neatherlin, Marzluff)
- California Raven, Steller's Jay, American Crow
- Pennsylvania American Crows (Hogrefe and Yahner 1998)

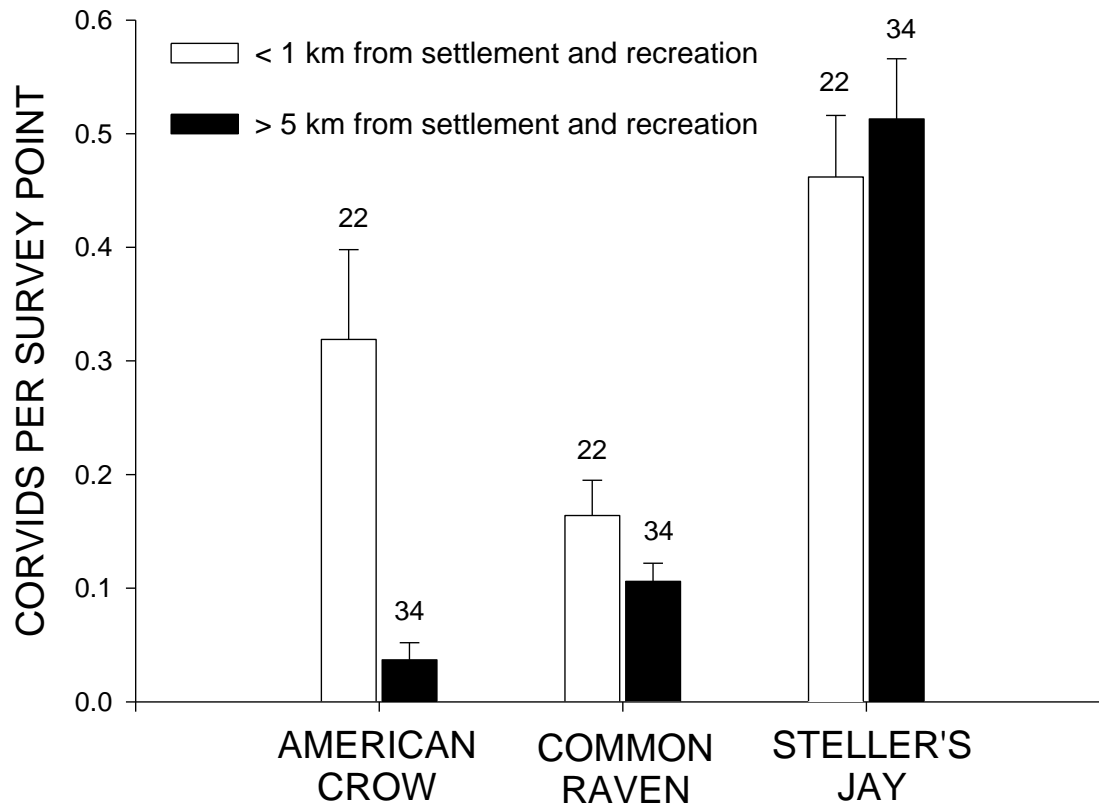
Increases are Associated with Anthropogenic Changes

Growth of Human and Crow Populations in King County, WA



(Marzluff et al. 2001)

A Detailed Example From The Olympic Peninsula

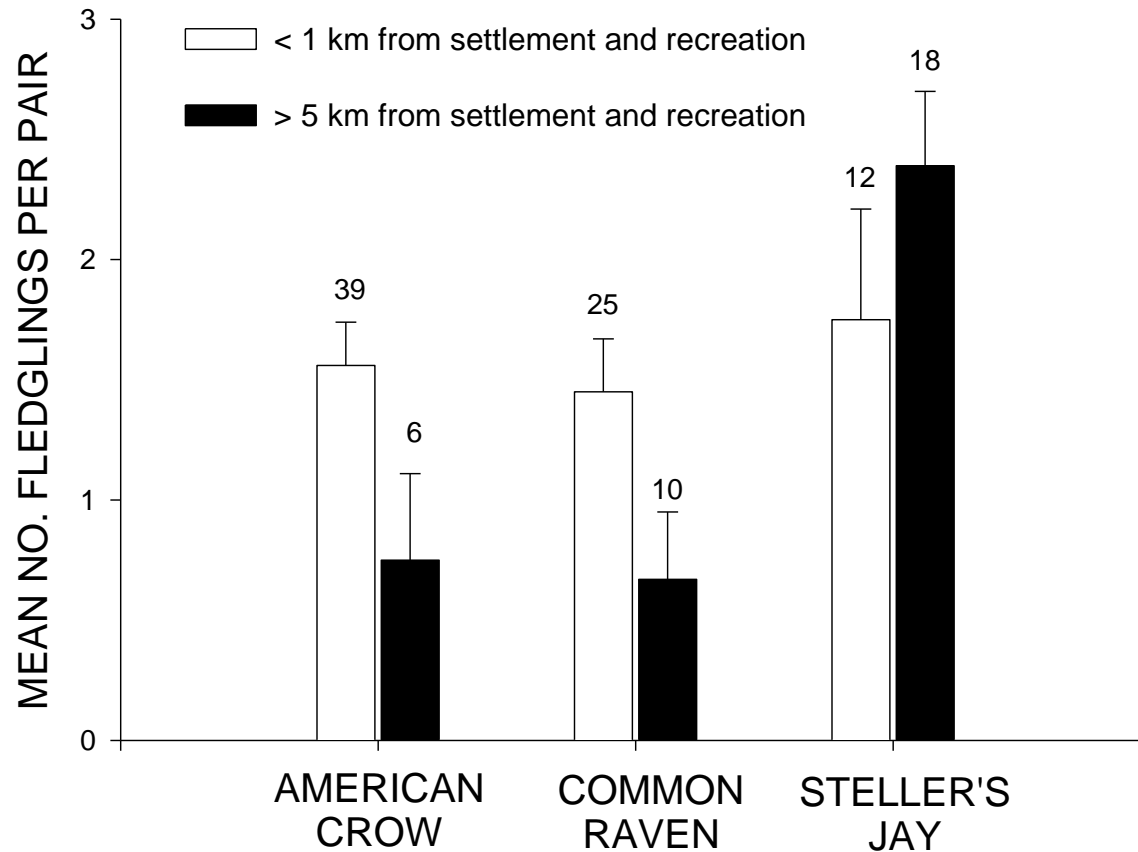


- Long-term Study
- Demographic and Behavior
- Extensive Radio-tagging

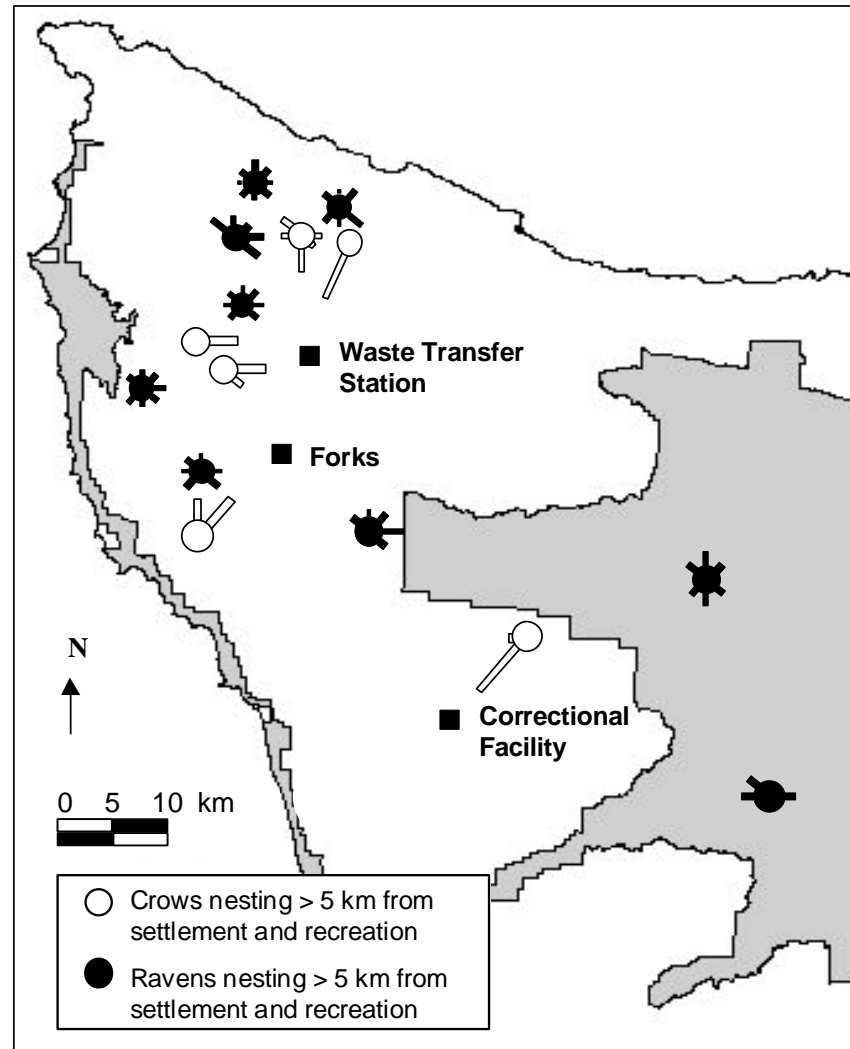


(Marzluff and Neatherlin 2006)

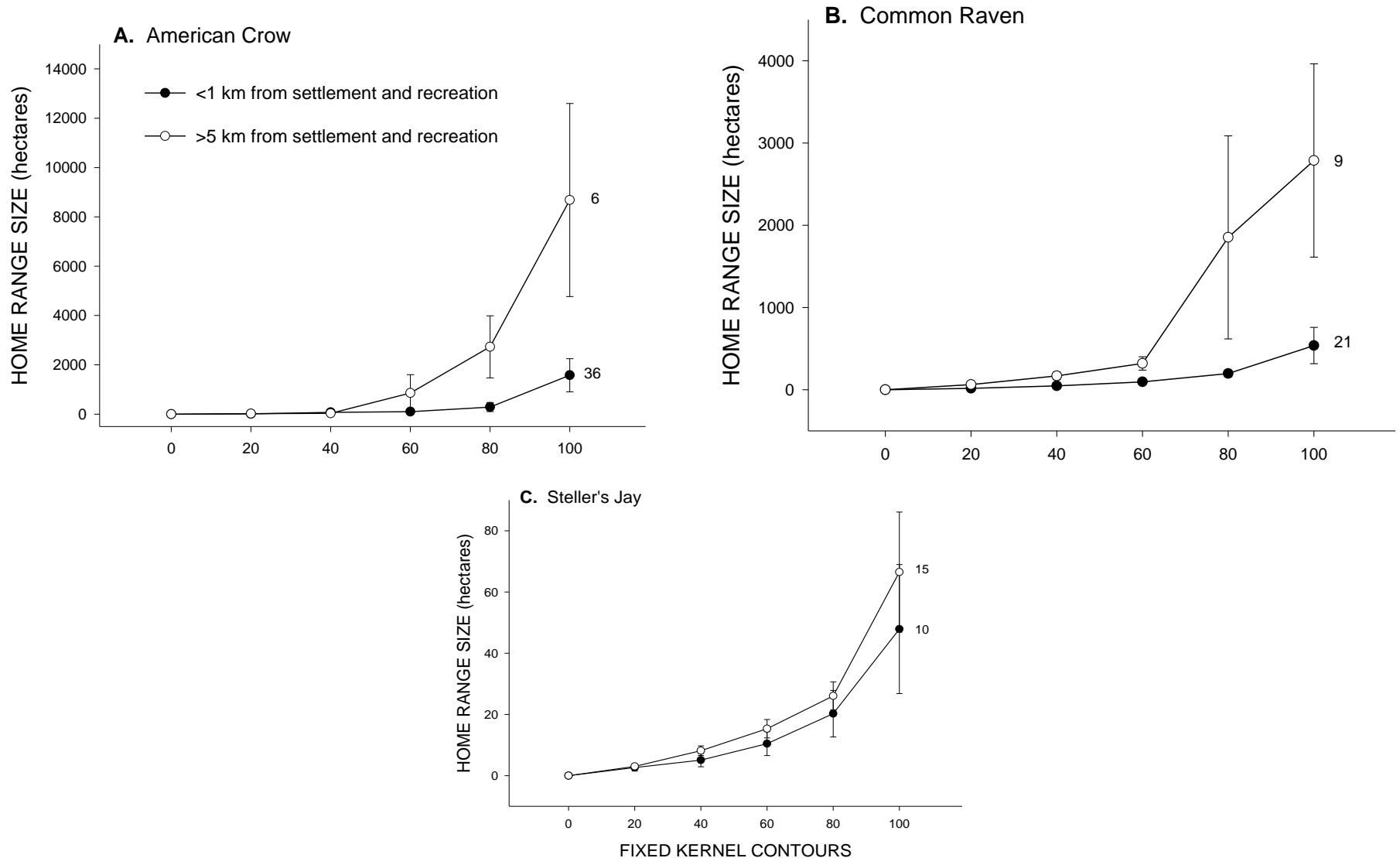
Crows and Ravens Benefit from Anthropogenic Food



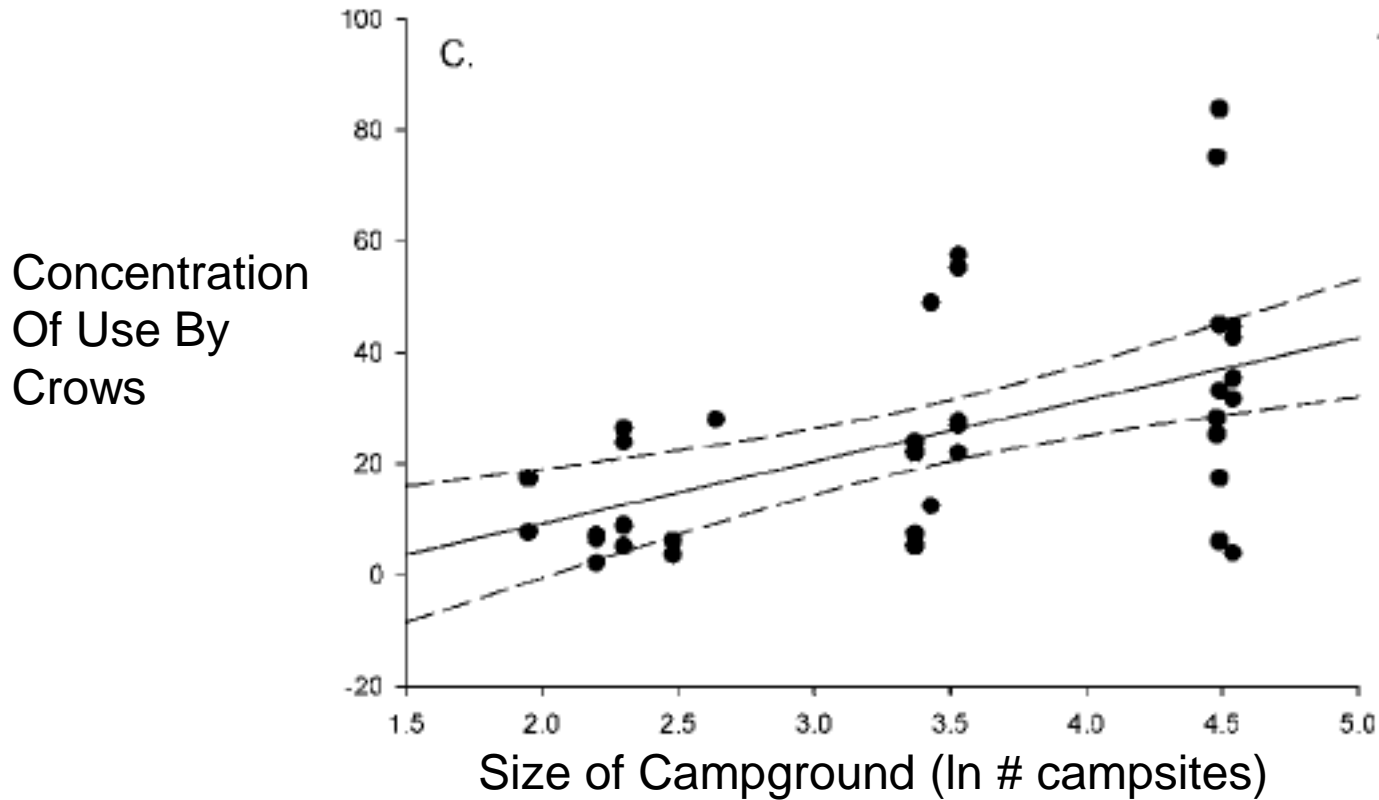
Being Near Anthropogenic Food Means You Don't Have to Travel



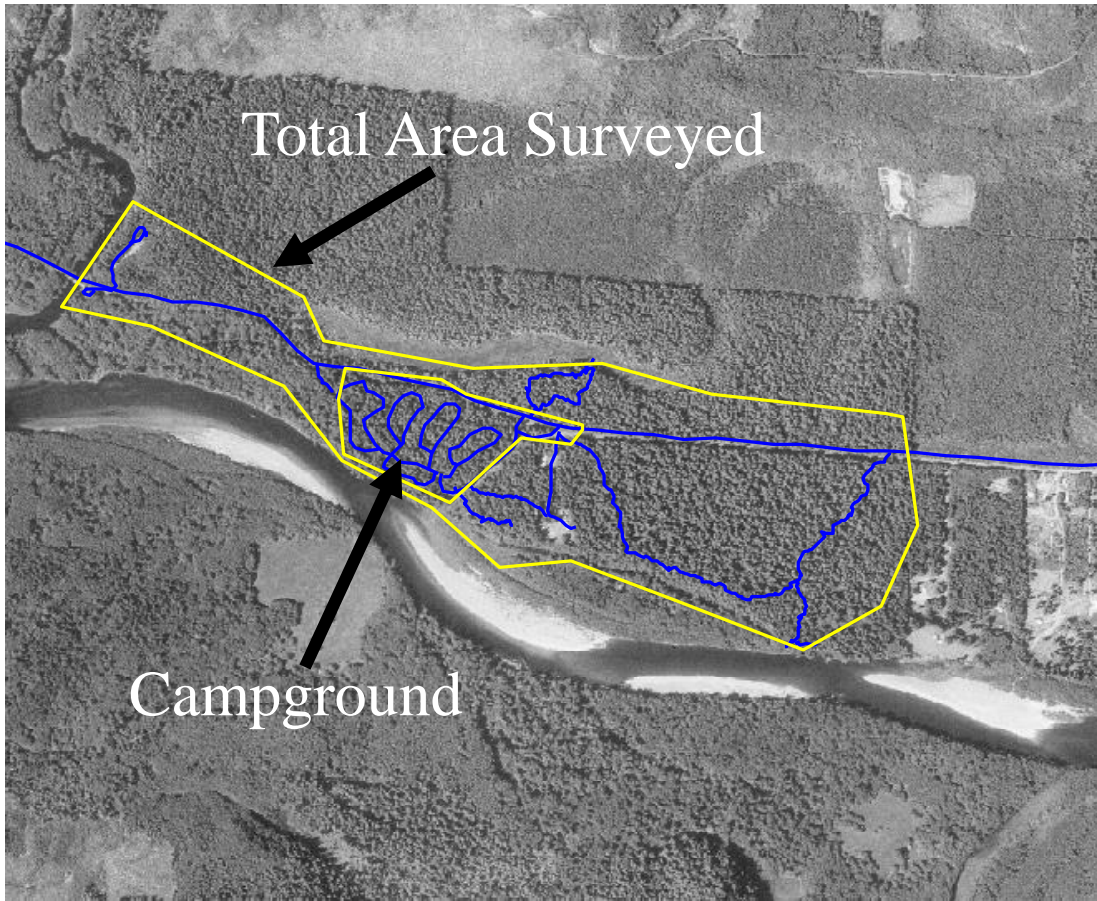
Reduced Travel Allows Increases in Density (reduced home range size)



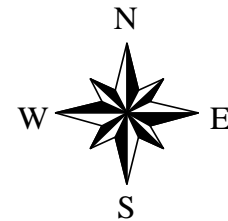
Campground Size Matters



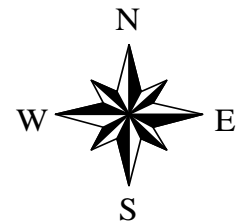
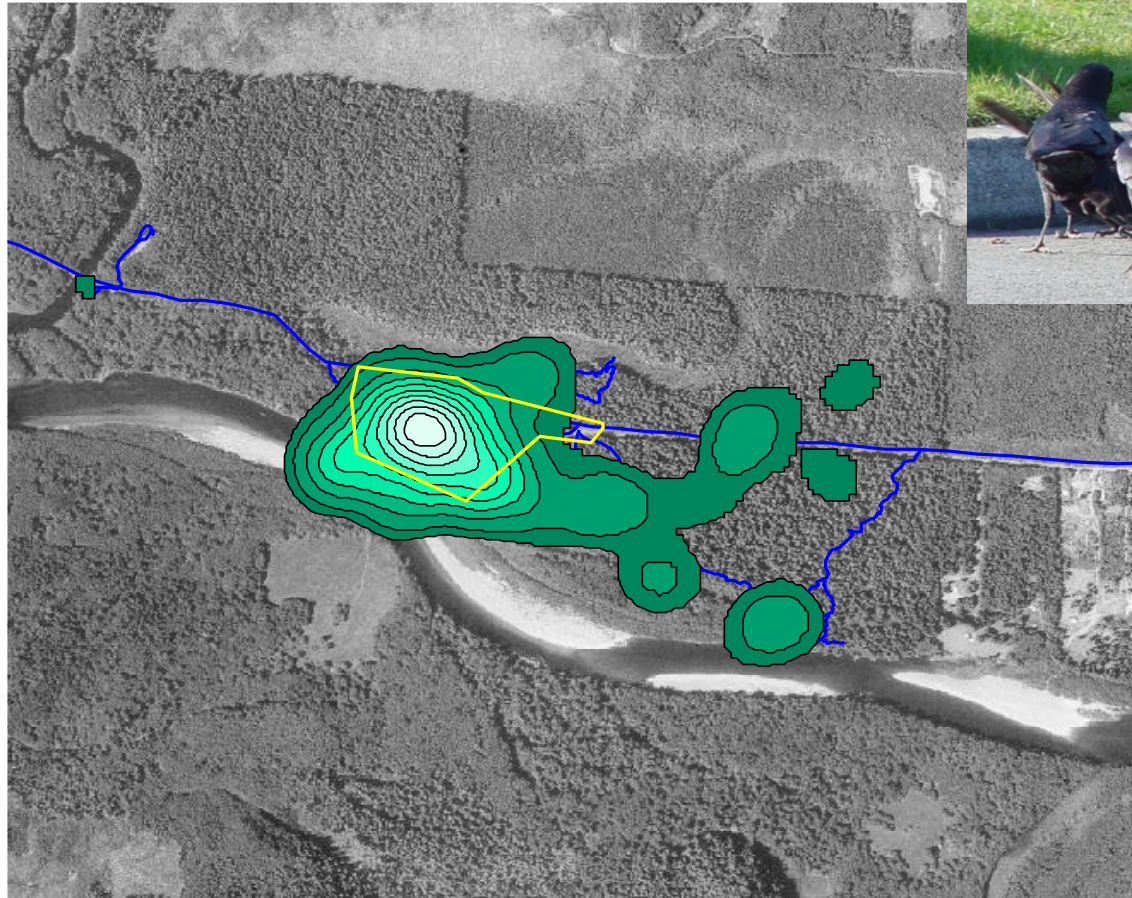
Corvids and Others



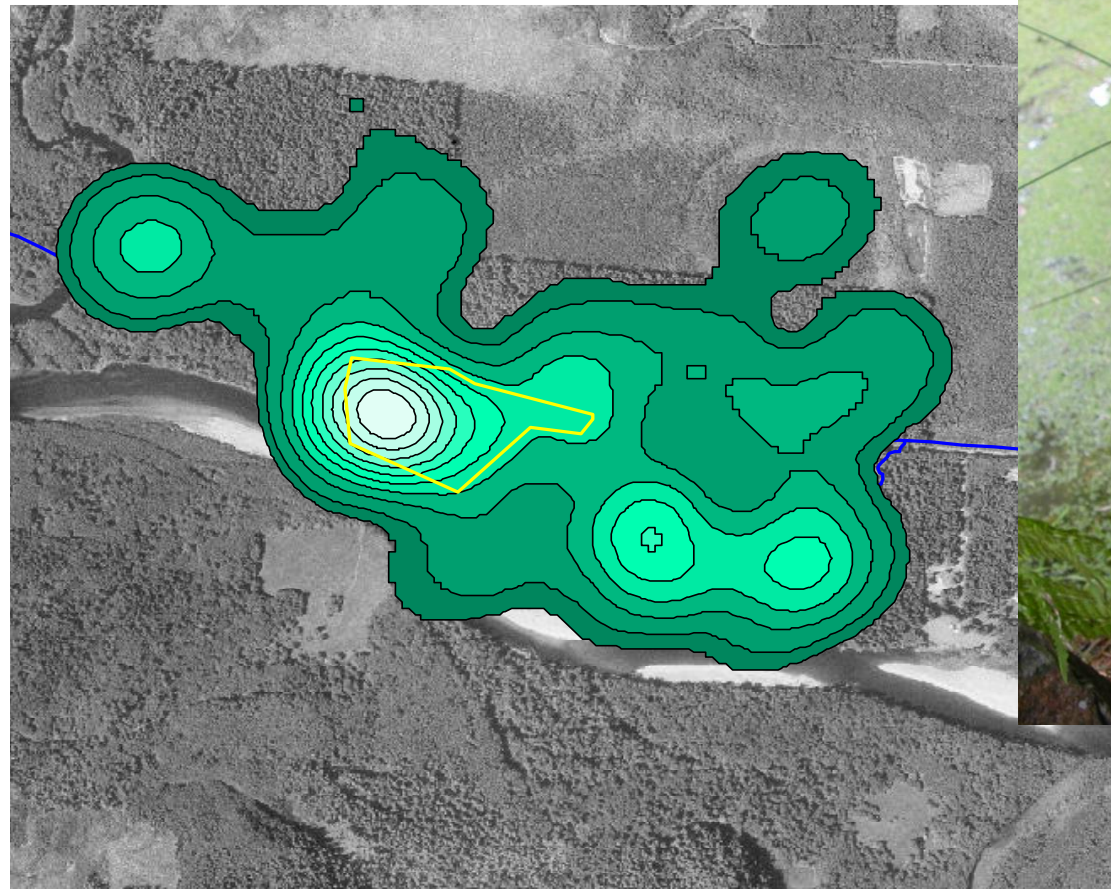
0.5 0 0.5 1 Miles



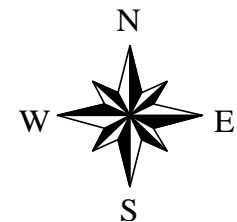
Relative Use of Area by American Crows



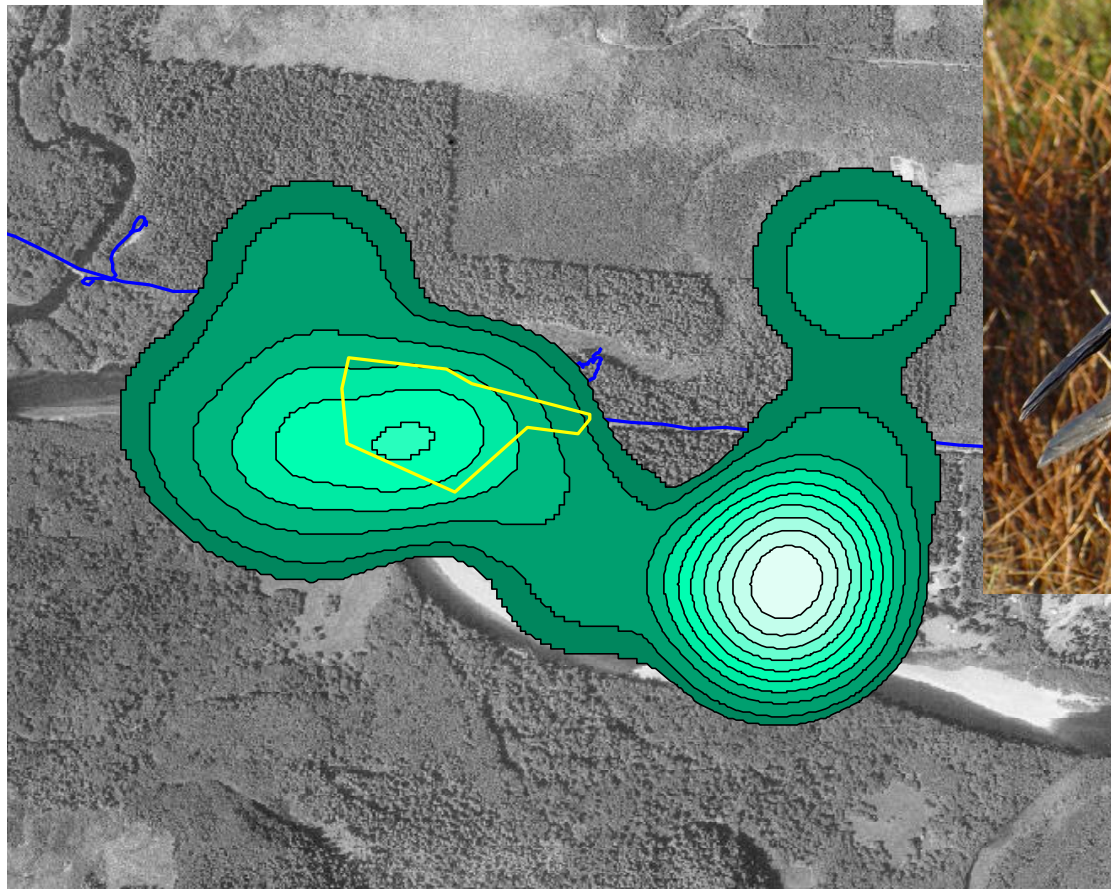
Relative Use of Area by Steller's Jays



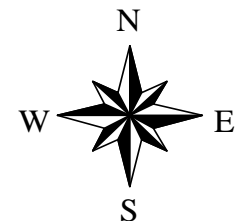
0.5 0 0.5 1 Miles



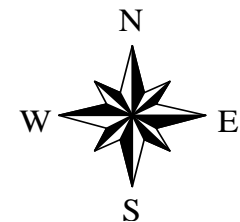
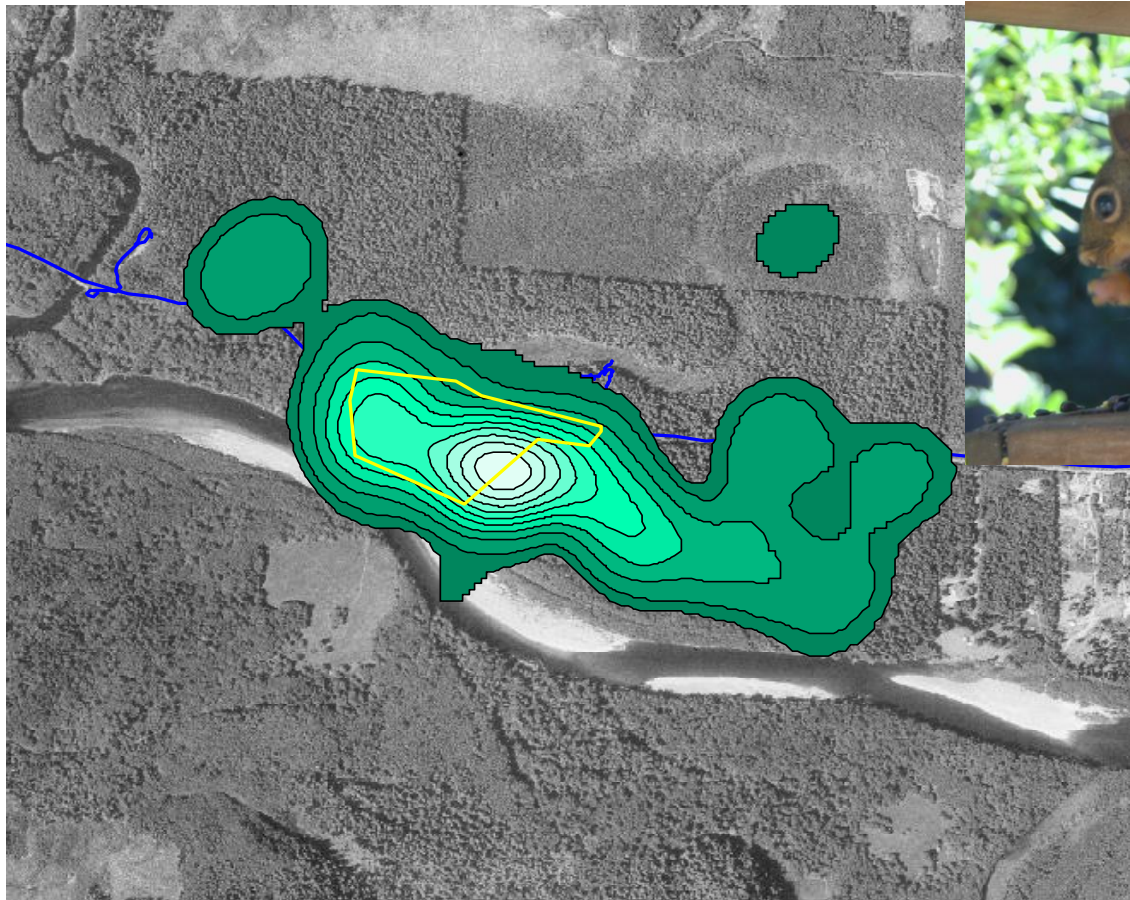
Relative Use of Area by Common Ravens



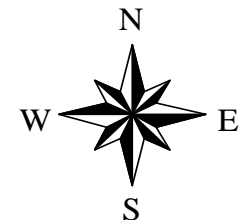
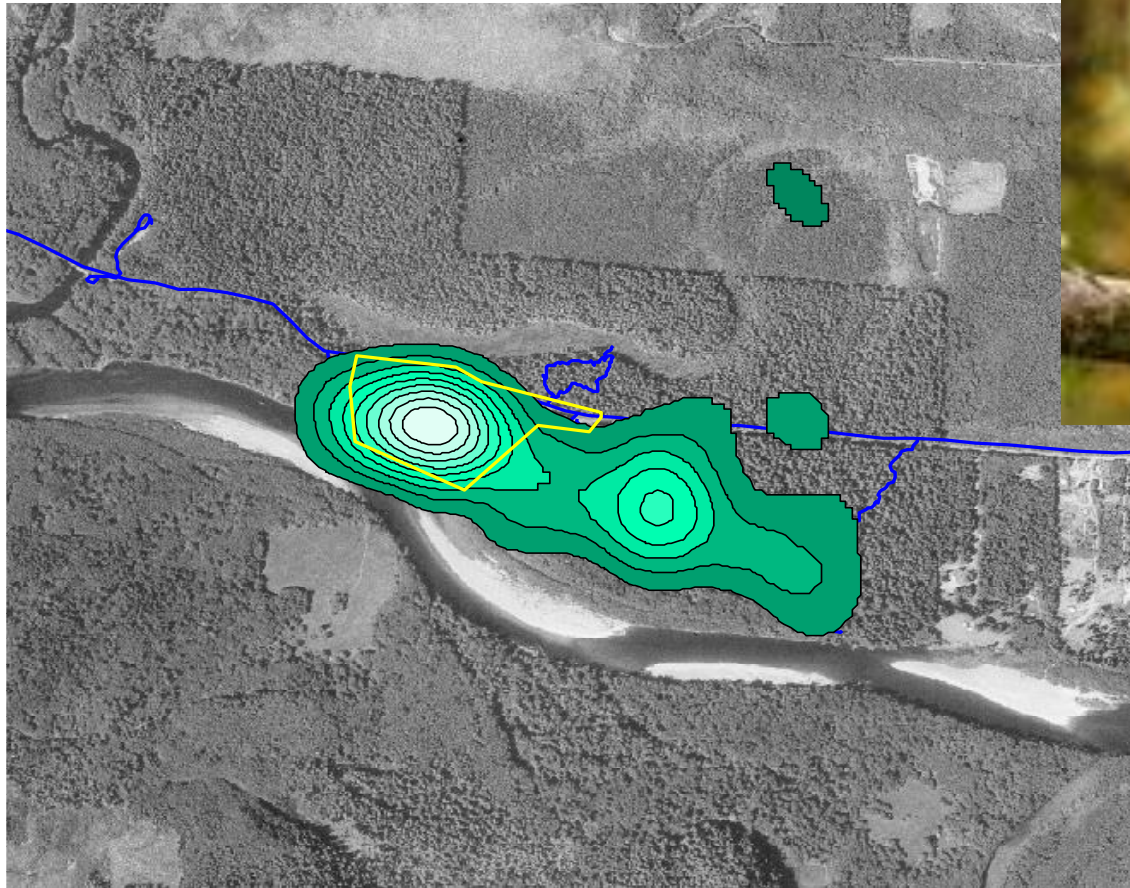
0.5 0 0.5 1 Miles



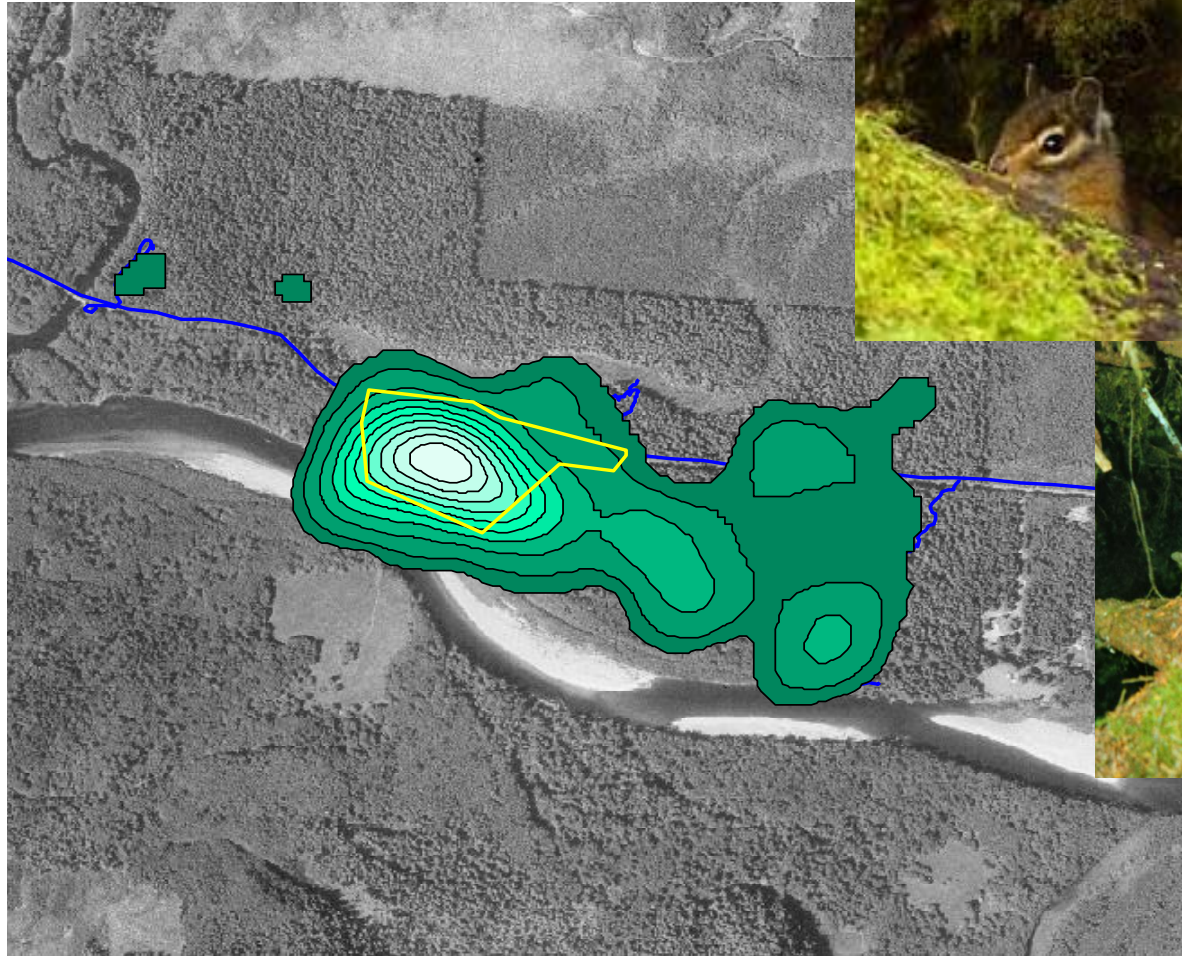
Relative Use of Area by Douglas Squirrels



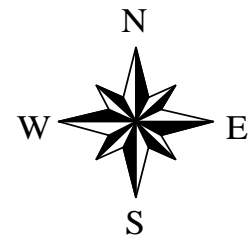
Relative Use of Area by Townsend's Chipmunks



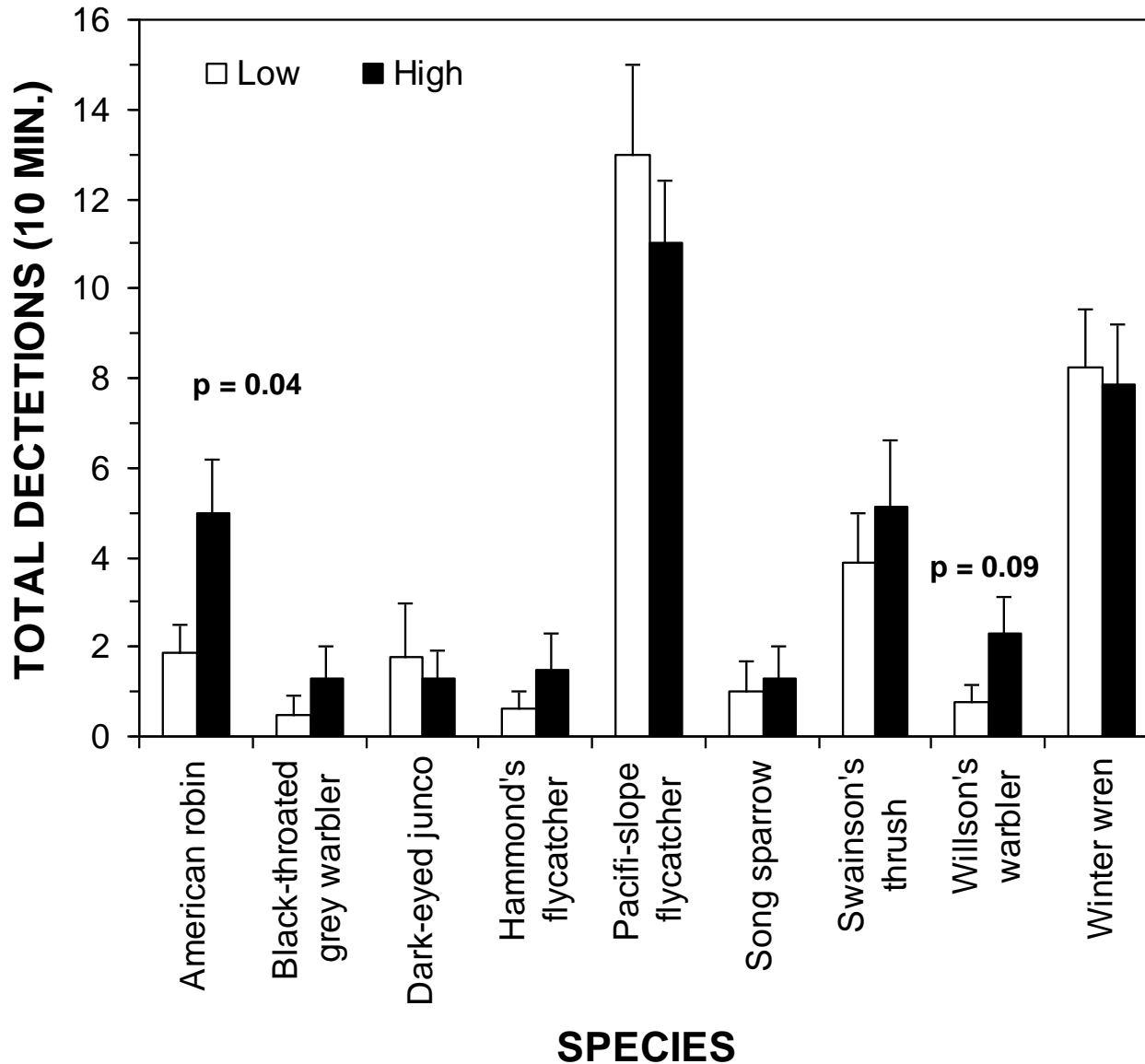
Relative Use by All Surveyed Predators



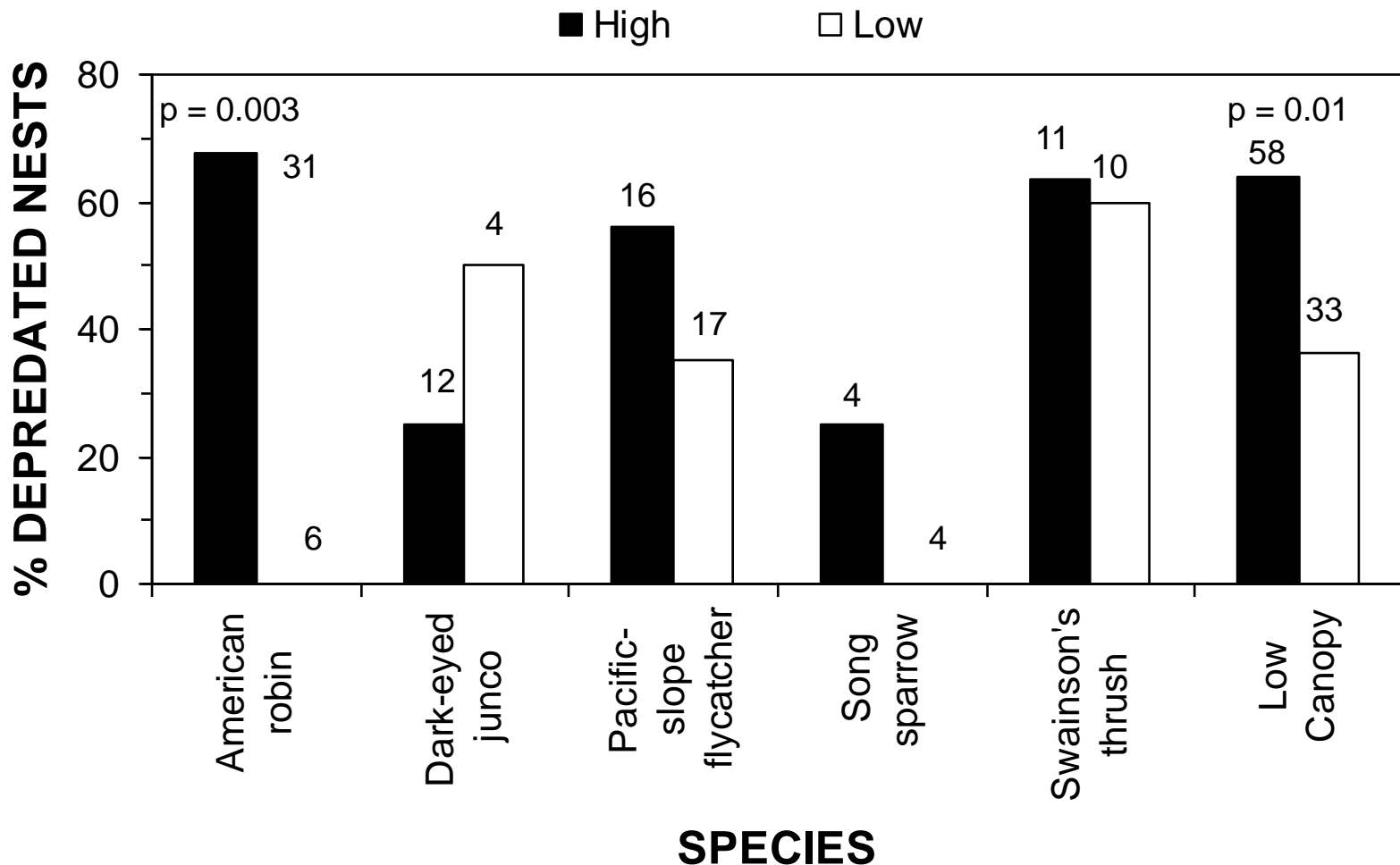
0.5 0 0.5 1 Miles



Songbird detections differ between low and high predation areas for some species but not for others

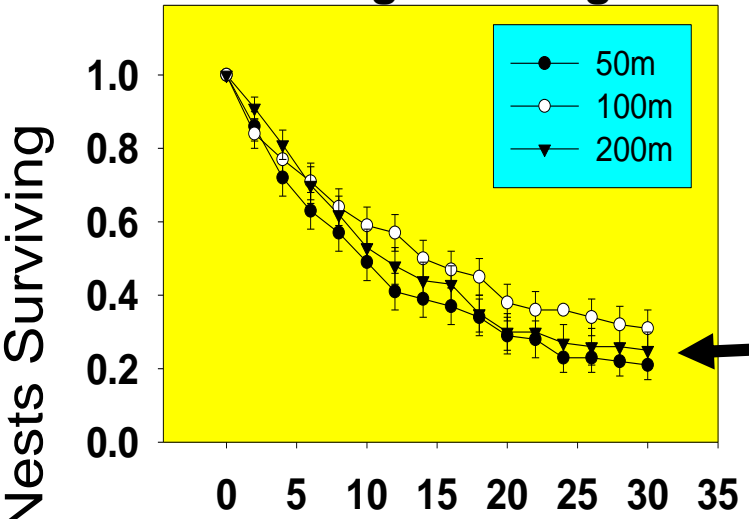


Nesting success differs for the American robin and subcanopy nesters



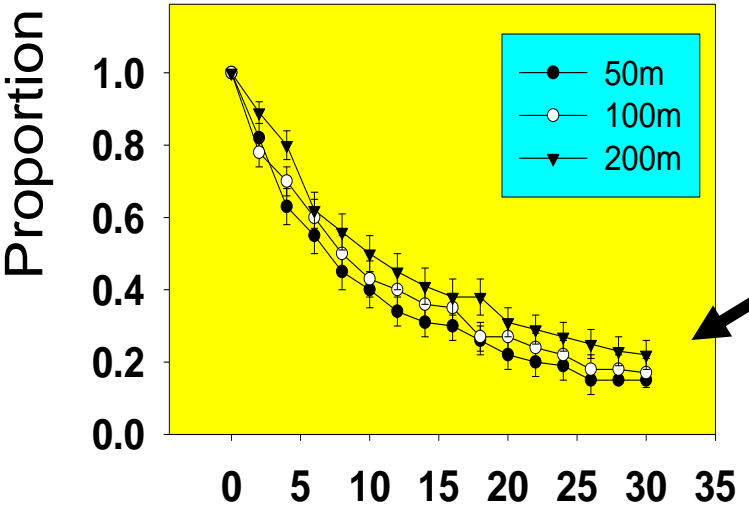
Some Effects are Subtle

Matrix of Regenerating Forest



– Predation is slightly slower and independent of distance from the forested stand's edge ($P = 0.62$) when the surrounding matrix is young forest

Human Activity Center in Matrix

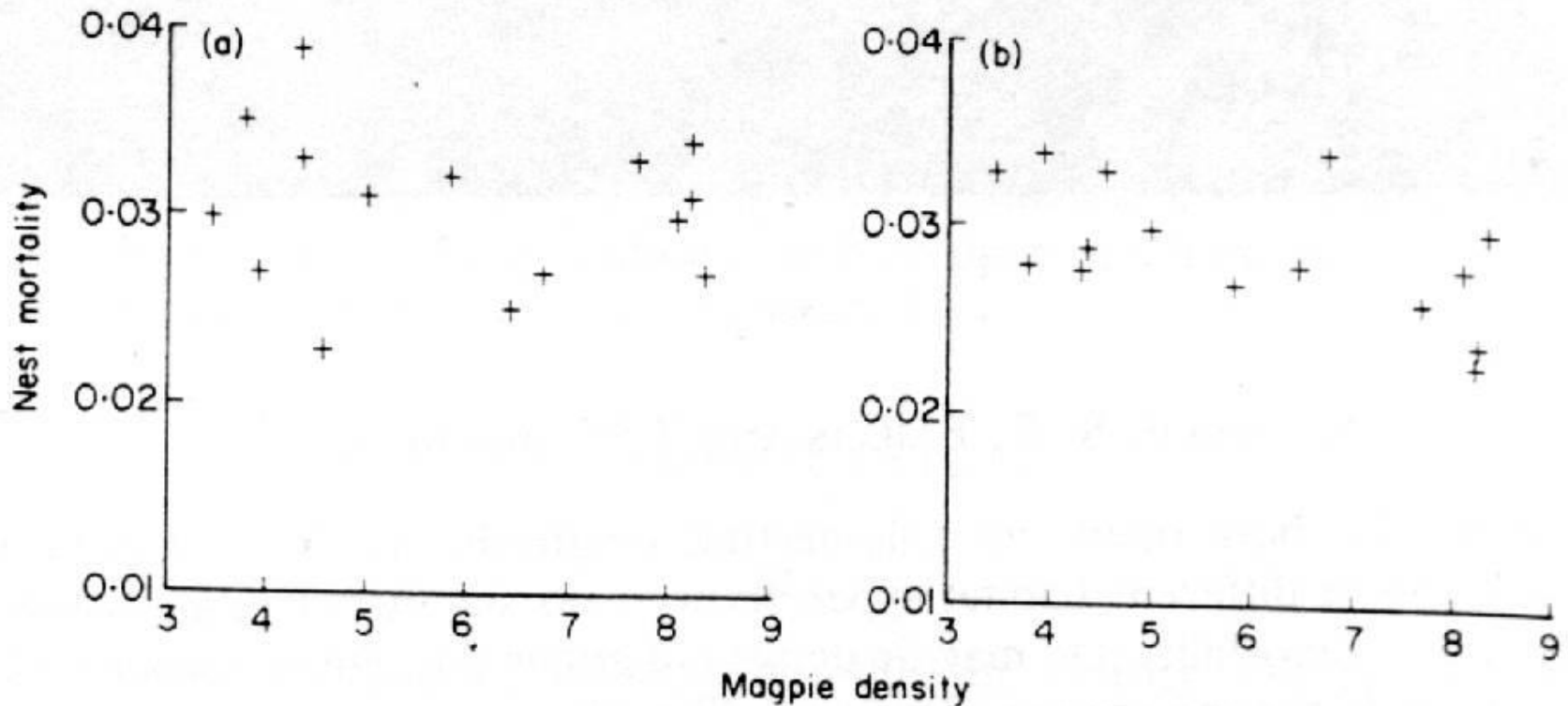


– Predation is rapid and dependent on distance from the forest edge ($P = 0.05$) when the forest abuts a human use area (campground, small town, etc.)

Days Since Nest Was Placed In Field

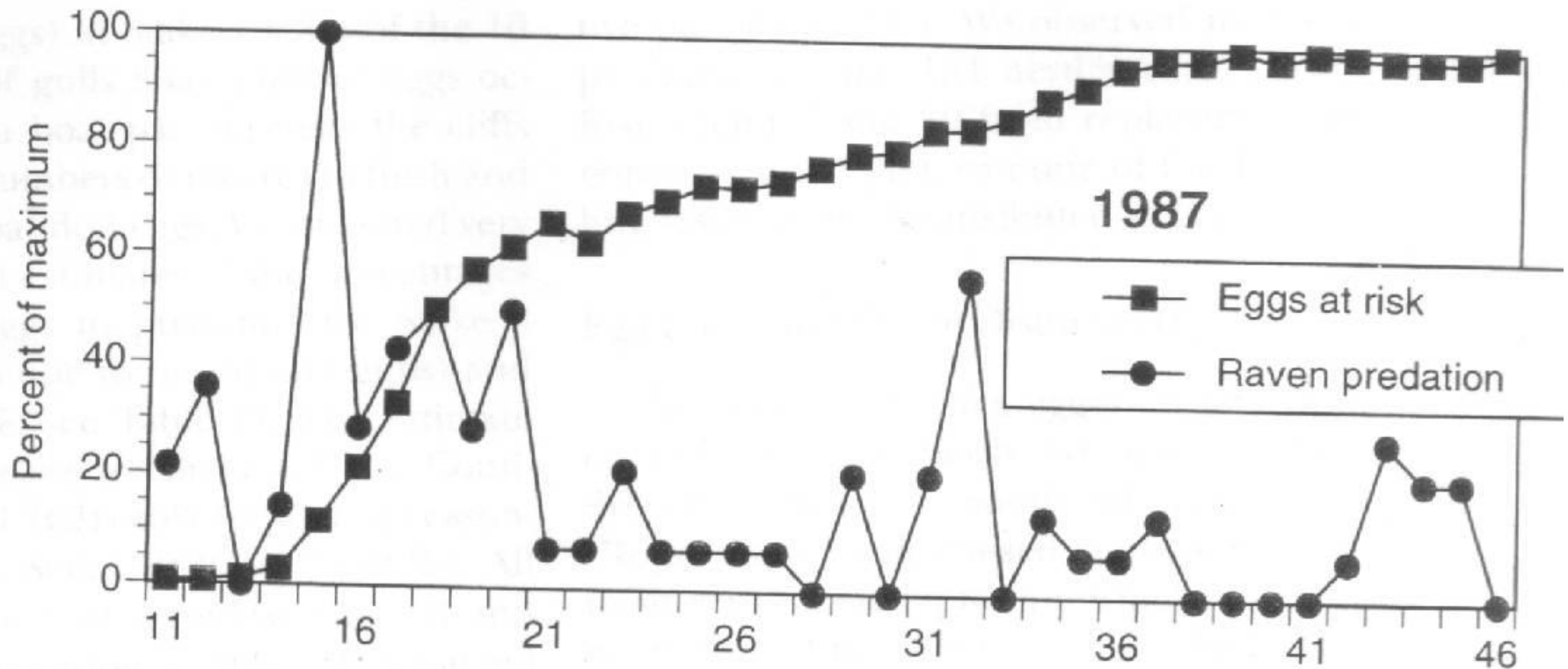
Some Density Increases are Inconsequential

Magpies and songbirds



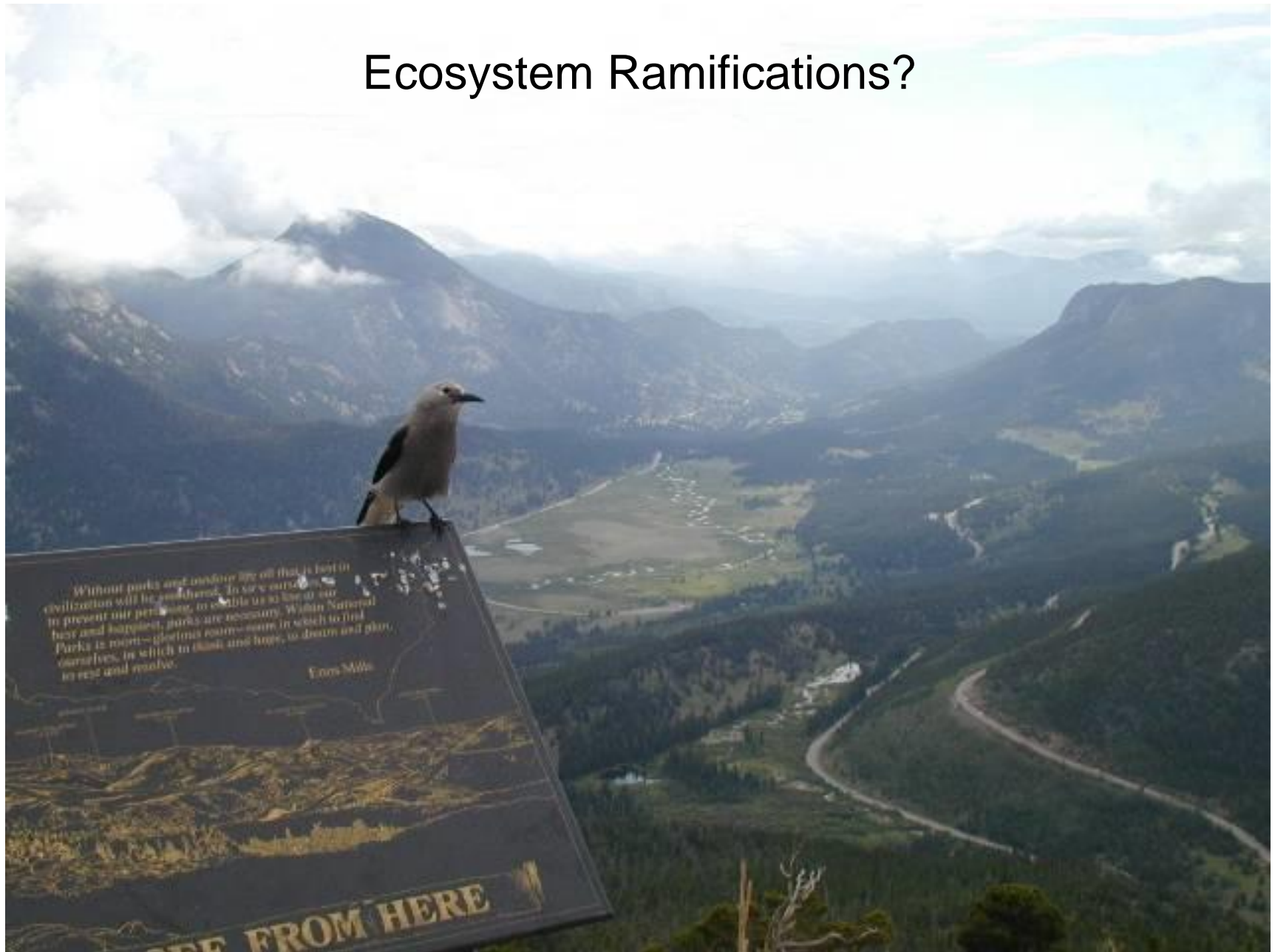
(Gooch et al. 1991)

Some Prey Can Swamp Predators



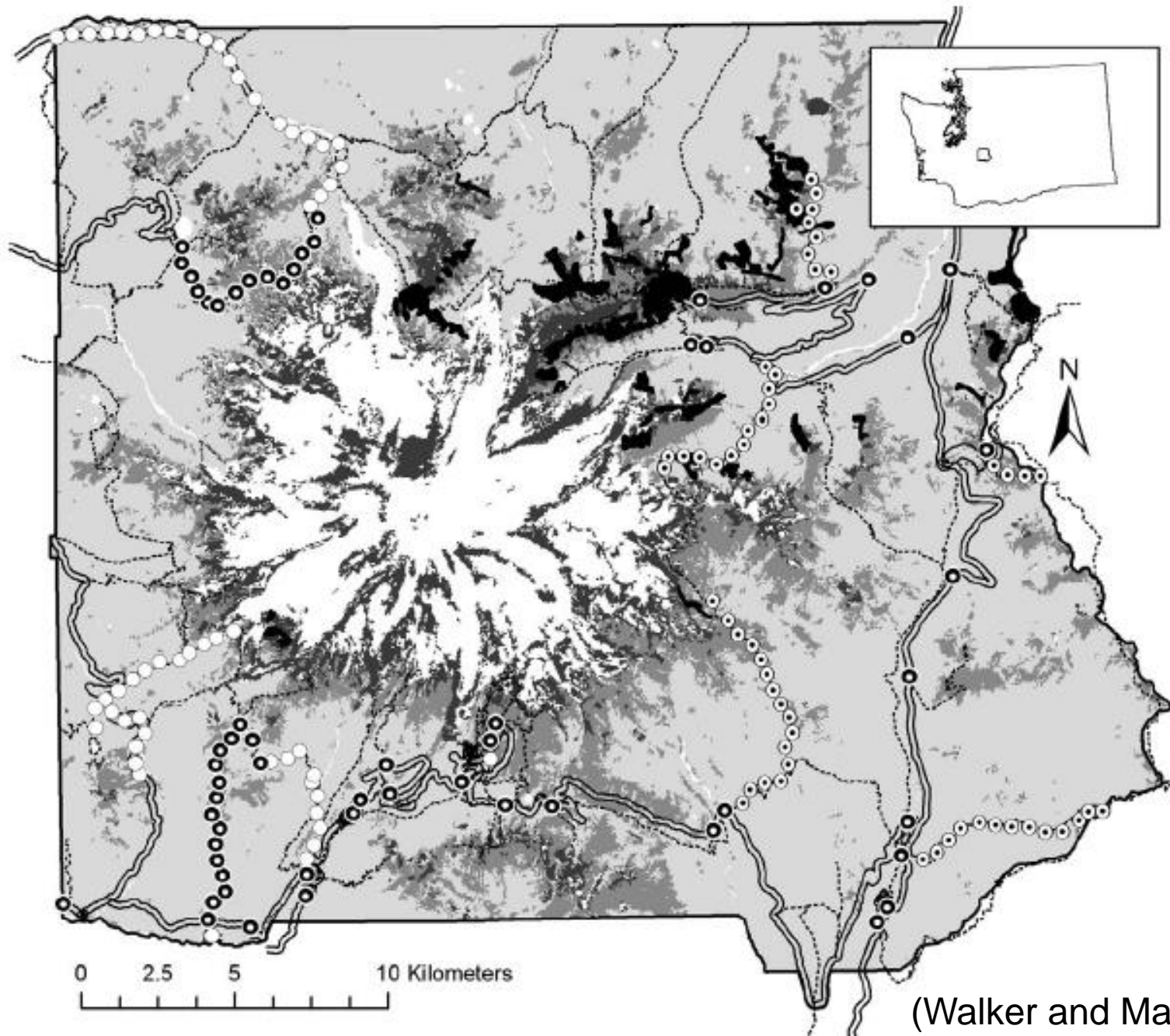
Ravens can't keep up with Murre Eggs because Raven territoriality precludes large populations and synchronous breeding by Murres floods the colony with eggs in a short period of time. (Schauer and Murphy 1996)

Ecosystem Ramifications?



(Tomback et al. 1990)

(lightshedder.com)



(Walker and Marzluff 2015)

TABLE 3. Vegetation and landscape features, recreation, and food availability associated with habitat use of 4 corvid species in Mount Rainier National Park, Washington, USA, 2009–2010. Full specifications of all competitive models for each species are provided in Appendix Tables 7–9.

Species	Model set	Variables in competitive models
Steller's Jay	Landscape	Edge Density (5 km), ^a Elevation, ^a Patch Richness (5 km), ^a Canopy Cover, Percent Forest (5 km)
	Recreation	Zone Type, ^a Average Number of Visitors, ^a Distance to Campground
	Food	Food Availability
Gray Jay	Landscape	Elevation, ^a Forest Structure, Patch Richness (5 km), Percent Forest (5 km)
	Recreation	Zone Type, ^a Average Number of Visitors, ^a Distance to Campground
	Food	Food Availability
Common Raven	Landscape	Edge Density (2 km), ^a Percent Forest (2 km), ^a Forest Structure
	Recreation	Road Length (2 km), ^a Average Number of Visitors, ^a Distance to Campground, ^a Zone Type
	Food	Food Availability ^a
Clark's Nutcracker	Landscape	Distance to Whitebark Pine, ^a Edge Density (2 km), ^a Forest Structure, ^a Elevation, ^a Patch Richness (2 km) ^a
	Recreation	Average Number of Visitors, ^a Zone Type ^a
	Food	Food Availability ^a

^a Variable included in the top model.

TABLE 3. Vegetation and landscape features, recreation, and food availability associated with habitat use of 4 corvid species in Mount Rainier National Park, Washington, USA, 2009–2010. Full specifications of all competitive models for each species are provided in Appendix Tables 7–9.

Species	Model set	Variables in competitive models
Steller's Jay	Landscape	Edge Density (5 km), ^a Elevation, ^a Patch Richness (5 km), ^a Canopy Cover, Percent Forest (5 km)
	Recreation	Zone Type, ^a Average Number of Visitors, ^a Distance to Campground
	Food	Food Availability
Gray Jay	Landscape	Elevation, ^a Forest Structure, Patch Richness (5 km), Percent Forest (5 km)
	Recreation	Zone Type, ^a Average Number of Visitors, ^a Distance to Campground
	Food	Food Availability
Common Raven	Landscape	Edge Density (2 km), ^a Percent Forest (2 km), ^a Forest Structure
	Recreation	Road Length (2 km), ^a Average Number of Visitors, ^a Distance to Campground, ^a Zone Type
	Food	Food Availability ^a
Clark's Nutcracker	Landscape	Distance to Whitebark Pine, ^a Edge Density (2 km), ^a Forest Structure, ^a Elevation, ^a Patch Richness (2 km) ^a
	Recreation	Average Number of Visitors, ^a Zone Type ^a
	Food	Food Availability ^a

^a Variable included in the top model.

TABLE 3. Vegetation and landscape features, recreation, and food availability associated with habitat use of 4 corvid species in Mount Rainier National Park, Washington, USA, 2009–2010. Full specifications of all competitive models for each species are provided in Appendix Tables 7–9.

Species	Model set	Variables in competitive models
Steller's Jay	Landscape	Edge Density (5 km), ^a Elevation, ^a Patch Richness (5 km), ^a Canopy Cover, Percent Forest (5 km)
	Recreation	Zone Type, ^a Average Number of Visitors, ^a Distance to Campground
Gray Jay	Food	Food Availability
	Landscape	Elevation, ^a Forest Structure, Patch Richness (5 km), Percent Forest (5 km)
Common Raven	Recreation	Zone Type, ^a Average Number of Visitors, ^a Distance to Campground
	Food	Food Availability
	Landscape	Edge Density (2 km), ^a Percent Forest (2 km), ^a Forest Structure
Clark's Nutcracker	Recreation	Road Length (2 km), ^a Average Number of Visitors, ^a Distance to Campground, ^a Zone Type
	Food	Food Availability ^a
	Landscape	Distance to Whitebark Pine, ^a Edge Density (2 km), ^a Forest Structure, ^a Elevation, ^a Patch Richness (2 km) ^a
	Recreation	Average Number of Visitors, ^a Zone Type ^a
	Food	Food Availability ^a

^a Variable included in the top model.

TABLE 3. Vegetation and landscape features, recreation, and food availability associated with habitat use of 4 corvid species in Mount Rainier National Park, Washington, USA, 2009–2010. Full specifications of all competitive models for each species are provided in Appendix Tables 7–9.

Species	Model set	Variables in competitive models
Steller's Jay	Landscape	Edge Density (5 km), ^a Elevation, ^a Patch Richness (5 km), ^a Canopy Cover, Percent Forest (5 km)
	Recreation	Zone Type, ^a Average Number of Visitors, ^a Distance to Campground
Gray Jay	Food	Food Availability
	Landscape	Elevation, ^a Forest Structure, Patch Richness (5 km), Percent Forest (5 km)
Common Raven	Recreation	Zone Type, ^a Average Number of Visitors, ^a Distance to Campground
	Food	Food Availability
	Landscape	Edge Density (2 km), ^a Percent Forest (2 km), ^a Forest Structure
Clark's Nutcracker	Recreation	Road Length (2 km), ^a Average Number of Visitors, ^a Distance to Campground, ^a Zone Type
	Food	Food Availability ^a
	Landscape	Distance to Whitebark Pine, ^a Edge Density (2 km), ^a Forest Structure, ^a Elevation, ^a Patch Richness (2 km) ^a
	Recreation	Average Number of Visitors, ^a Zone Type ^a
	Food	Food Availability ^a

^a Variable included in the top model.

Solutions?



Individual Actions and Behaviors

Our presence always has the potential to affect the behavior and possibly the density of nest predators, especially those with which we have a long evolutionary relationship, like corvids. Workers, recreationists, and residents may reduce their effects on predators by:

- Keeping a clean camp, worksite, and yard
- Not feeding wildlife; even bird feeders can be detrimental in and around recreation areas
- Keeping pet and livestock food unavailable to other animals by putting out only what can be immediately consumed
- Covering compost
- Burying or removing offal resulting from fishing and hunting
- Hazing corvids when they start to congregate around human activities

Local Scale Habitat and Predator Management

At the local scale, managers should strive for a small and balanced predator community and healthy prey populations. This can be done by:

- Removing availability of anthropogenic foods associated with home, recreation and work settings
- Removing anthropogenic nesting opportunities
- Maintaining ability of potential prey to defend themselves
 - Large colony size, nesting associates, alternative prey availability
- Possibly reducing natural foods that support key predators (berries in clearcuts immediately post harvest)
- Aversively condition, lethal control or nest site protection in extreme cases
 - Better to teach than to kill

Landscape Scale

Managers should strive for creating uniformity and reducing supplemental foods. This can be done by:

- Reducing edge, decreasing patchiness, and homogenizing landscapes
- Removing anthropogenic sources of food, especially at settlements and recreation and work sites, within 2 - 30km (average corvid travels) of important nesting habitat
- Reducing anthropogenic sources of food associated with dumps, recreation sites, and settlements within 30km (common travel distances of wide-ranging corvids such as ravens) of important nesting habitat
- Reducing the diversity and abundance of natural food, including native berries, nuts and seeds (acorns), and carrion (road kills and hunter-produced offal such as deer gut piles)
- Reducing anthropogenic nesting sites such as towers and power poles which may facilitate raven incursions into sites without trees or cliffs

Promoting Coexistence

- Requires:
 - Information on response of wildlife to recreation
 - » Site-specific
 - » Species-specific
 - » Time-specific
- Provides:
 - An ideal opportunity for experimentation and adaptive management
 - » Before-After-Control design
 - » Help us learn more about the interaction with wildlife populations and communities
- Benefits from:
 - Stakeholder participation
 - » Recreationists value wildlife
 - » Engaging them in the solution may result in better approaches and respect for needed regulations

A Different World



Reprints Available

- University of Washington Avian Conservation Lab
- <http://www.sefs.washington.edu/research.acl/>