Welcome to the Conservation Lecture Series

https://www.wildlife.ca.gov/Conservation/Lectures

Questions? Contact Margaret.Mantor@wildlife.ca.gov

CDFW Conservation Lecture Series

The Conservation Lecture Series is organized by CDFW's Habitat Conservation Planning Branch. The lecture series is designed to deliver the most current scientific information about species that are of conservation concern.

Below is a list of lectures and speakers for the Conservation Lecture Series. Lectures are open to anyone who is interested in participating. Participants may attend in-person or remotely via webinar. Please be sure to register for each class. Lectures are recorded and posted for those unable to attend the day of the event. Visit the archive page to see recordings of past lectures.

Subscribe to receive email updates and invitations to upcoming lectures.

Upcoming Lectures

Coming Soon

American Badgers - August 6, 2015, 1:00-3:00 pm. Presented by Dr. Jessie Quinn

The American badger (*Taxidea taxus*) is a Species of Special Concern in California. Funded by a grant from the CDFW Resource Assessment Program (RAP) Dr. Jessie Quinn studied the population distribution, movement behavior, and pathogen and rodenticide exposure in collaboration with the UC Davis Wildlife Health Center, with support from the OSPR Marine Wildlife Veterinary Care and Research Center. She completed a Species Status Report for the American badger for CDFW in 2009, and more recently completed a book chapter on pathogens and parasites in American badgers that will be included in the upcoming text *Badgers of the World*. Dr. Quinn's lecture will discuss the natural history of the species in California, potential threats to populations, and results of her research.

Location: Natural Resources Building, First Floor Auditorium

1416 Ninth Street, Sacramento, 95814

The Wildlife Society (TWS) Upcoming Events

Videos and Past Lectures

- Design Validation Monitoring Klamath Watershed (D.J. Bandrowski, Aaron Marin, and Rocco Fior)
- Dogs Moving Conservation Forward (Dr. Deborah (Smith) Woollett and Aimee Hurt)
- Black Swans, Brown River (Dr. Viers)
- White-Nose Syndrome in Bats (Wyatt)
- Invasive Watersnakes (Dr. Todd)
- Tricolored Blackbird (Dr. Meese)
- Bighorn Sheep (Dr. Villepique)
- Vegetation and Flora of a Biodiversity Hotspot (Dr. Ayres)
- FoothillYellow-legged Frog (Dr. Kupferberg)
- Spartina and California Clapper Rails (Dr. Strong)
- Townsend's Big-eared Bat (Dr. Johnston)
- California Red-Legged Frog (Alvarez)
- Salmon in the Yolo Bypass (Jeffres)
- White Abalone (Dr. Aquilino)
- Amargosa Vole (Dr. Foley)
- Desert Tortoise (Jones)

Lecture Schedule

Metrics and Approaches for Quantifying Ecosystem Impacts and Restoration Success **Dr. Zan Rubin**	**September 24, 1:00-3:00, Sacramento**
San Joaquin Kit Fox **Dr. Brian Cypher**	**October 6, 1:00-3:00, Fresno**
Process-based Stream Restoration to Help Farmers and Fish: Why California Needs 10,000 More Dams **Dr. Michael Pollock**	**October 13, 1:00-3:00, Sacramento**
Development of multi-threaded wetland channels and the implications for salmonids and ecosystem rehabilitation **Lauren Hammack**	**November 19, 1:00-3:00, Sacramento**

American Badgers (*Taxidea taxus*) in California

Jessie Quinn, Ph.D.

UC Davis Wildlife, Fish and Conservation Biology Dept.

Great Ecology

Overview

1. The global badger
2. Natural history
3. The American badger in California
   - Population distribution
   - Ranging behavior
   - Threats
   - Management
   - Conservation status

“He seemed, by all accounts, to be such an important personage and, though rarely visible, to make his unseen influence felt by everybody about the place.”

-Kenneth Grahame, *The Wind in the Willows*

American badger (*Taxidea taxus*)

European badger (*Meles meles*

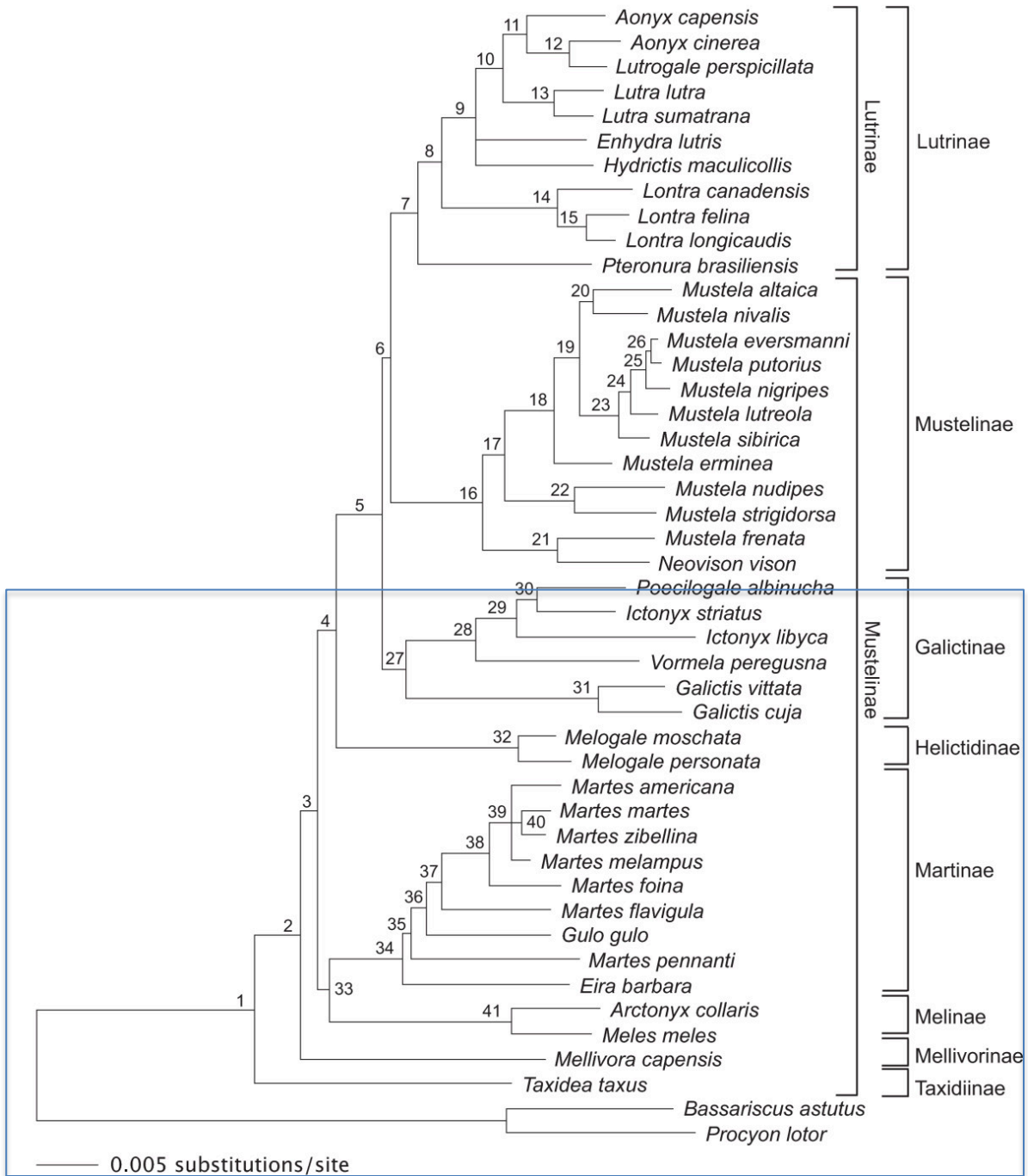
Asian badger (*Meles leucurus* sp.)

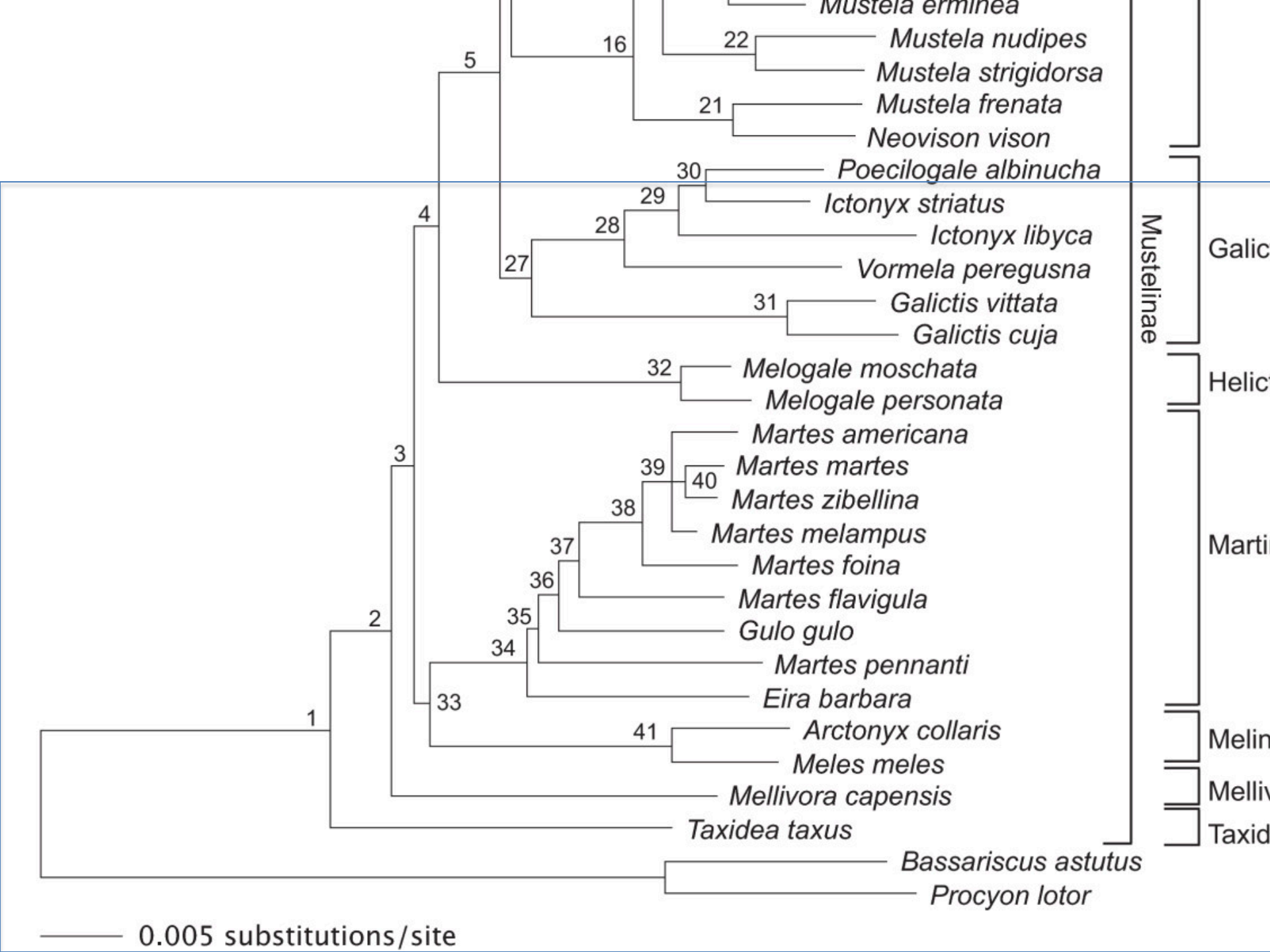
Honey badger (*Mellivora capensis*)

Hog badger (*Arctonyx collaris*)

Stink badgers (*Mydaus sp.*)

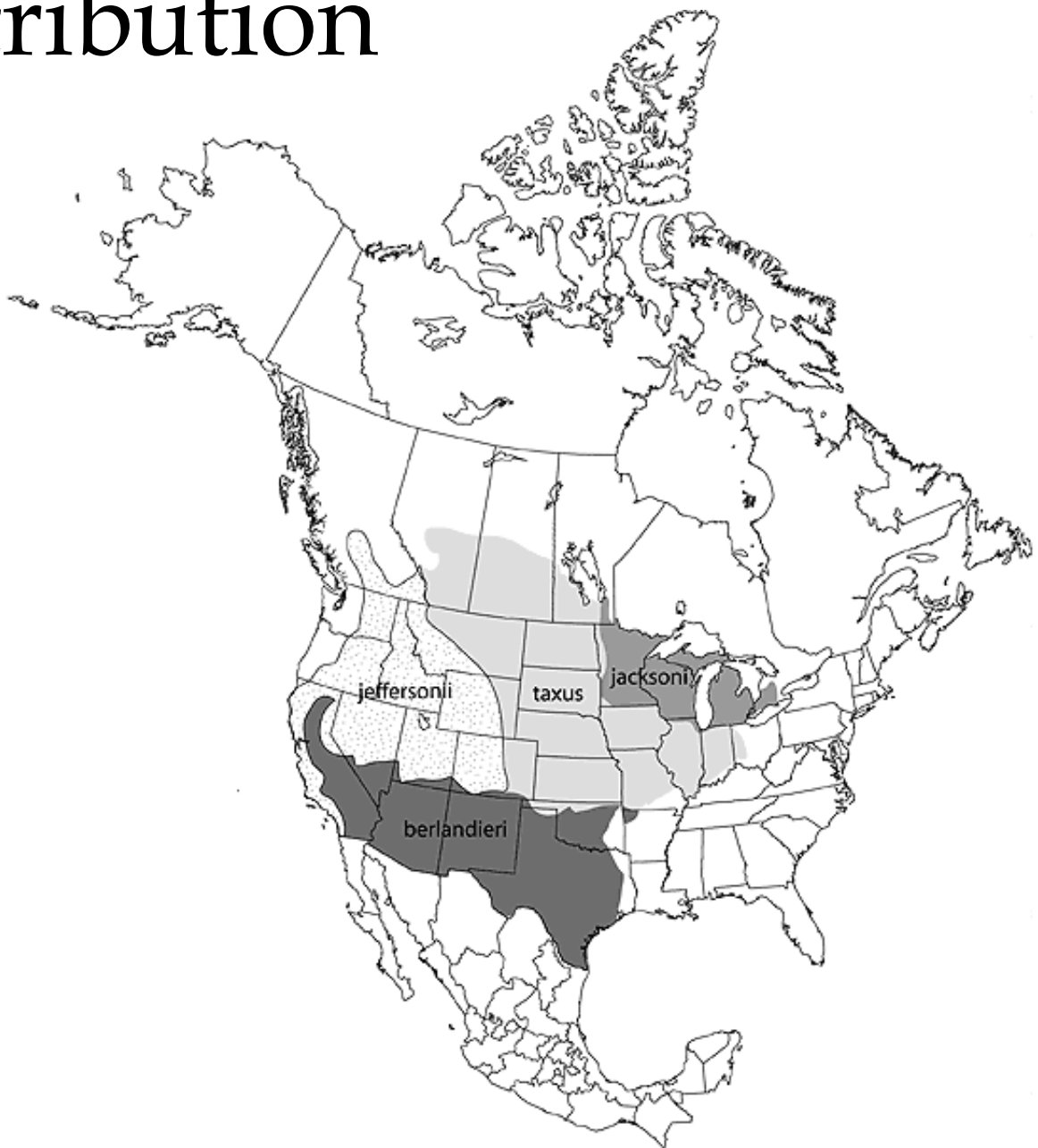
Ferret badgers (*Melogale sp.*)


Aonyx capensis
Aonyx cinerea
Lutrogale perspicillata
Lutra lutra
Lutra sumatrana
Enhydra lutris
Hydrictis maculicollis
Lontra canadensis
Lontra felina
Lontra longicaudis
Pteronura brasiliensis
Mustela altaica
Mustela nivalis
Mustela eversmanni
Mustela putorius
Mustela nigripes
Mustela lutreola
Mustela sibirica
Mustela erminea
Mustela nudipes
Mustela strigidorsa
Mustela frenata
Neovison vison
Poecilogale albinucha
Ictonyx striatus
Ictonyx libyca
Vormela peregusna
Galictis vittata
Galictis cuja
Melogale moschata
Melogale personata
Martes americana
Martes martes
Martes zibellina
Martes melampus
Martes foina
Martes flavigula
Gulo gulo
Martes pennanti
Eira barbara
Arctonyx collaris
Meles meles
Mellivora capensis
Taxidea taxus
Bassariscus astutus
Procyon lotor
Lutrinae
Mustelinae
Lutrinae
Mustelinae
Galictinae
Helictidinae
Martinae
Melinae
Mellivorinae
Taxidiinae
0.005 substitutions/site


Mustela erminea
Mustela nudipes
Mustela strigidorsa
Mustela frenata
Neovison vison
Poecilogale albinucha
Ictonyx striatus
Ictonyx libyca
Vormela peregusna
Galictis vittata
Galictis cuja
Melogale moschata
Melogale personata
Martes americana
Martes martes
Martes zibellina
Martes melampus
Martes foina
Martes flavigula
Gulo gulo
Martes pennanti
Eira barbara
Arctonyx collaris
Meles meles
Mellivora capensis
Taxidea taxus
Bassariscus astutus
Procyon lotor
16
22
5
21
30
29
4
28
27
31
32
3
39
40
38
37
36
35
2
34
33
1
41
Mustelinae
Galic
Helict
Marti
Melin
Melliv
Taxid
0.005 substitutions/site

Distribution

- *Taxidea taxus*
- U.S., Canada, Mexico
- Grasslands, open habitat, friable soils
- Semi-fossorial
- Carnivorous
- Solitary



Life history

- Females weigh ~7 kg, males up to 15 kg
- 1-4 kits per year
- Polygamous
- Delayed implantation
- Live ~10 years

Community ecology

- Few predators
- Cooperative hunting?
- Burrows
  - used by other species
  - 1,100-1,700 burrows annually
  - Significant landscape feature

Movements

- Movements vary
  2 km^2 ⟶ >500 km^2
  ↓
  100 km dispersal

  Utah, Texas, Idaho, Ohio
  Illinois, British Columbia
  Wyoming, Washington
  California, Colorado

- Move up to 20 km/night

- Use new dens nightly

Movements

Factors influencing movement…

- Season
  - Males' home ranges larger in breeding season
- Prey
  - Home ranges larger where prey is patchier

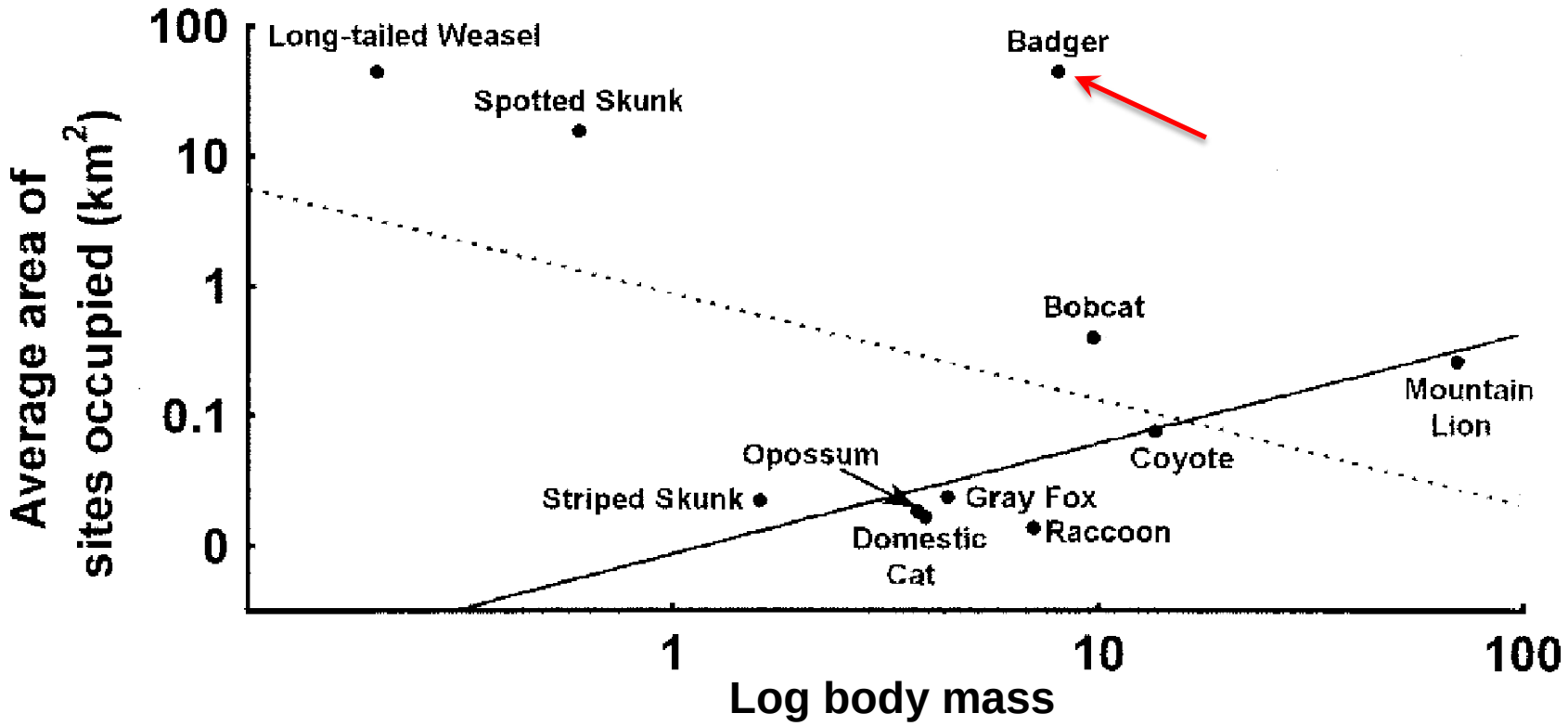
Conservation

- Furbearing species
- Nuisance species

Conservation

- Low reproductive rate
- High rates of juvenile mortality
- Wide-ranging
- Sensitive to the effects of habitat fragmentation

Conservation



Crooks, 2002

Conservation

Tallgrass Prairie Preserve, OK

Simulation models of brine spills affected:

- Population size
- Persistence
- Ability of females to find mates
- Ability of males to maintain quality habitat

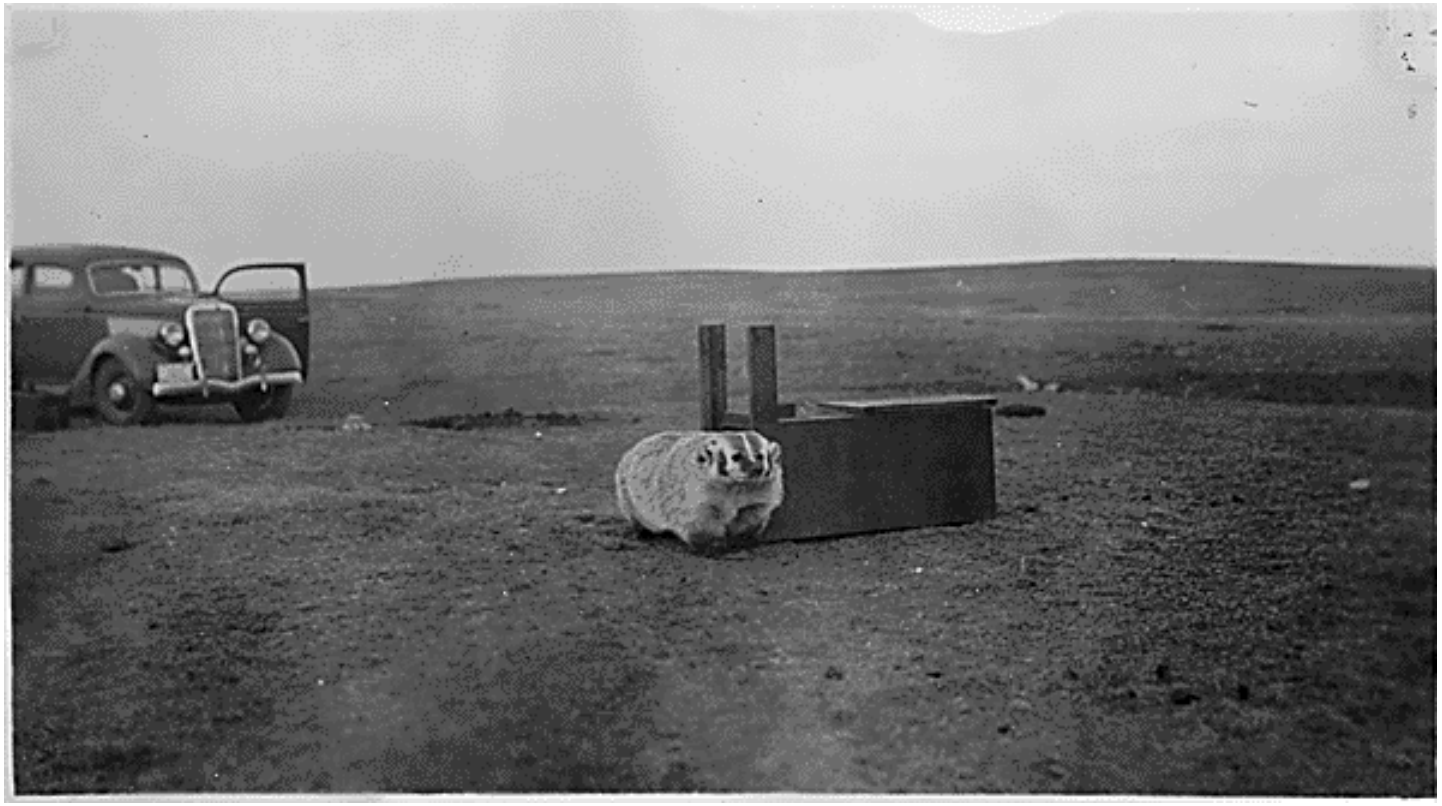
Jager et al., 2006

Conservation

- Species of special concern
  - Canada (*taxus*)
  - Arkansas
  - Washington
  - Indiana
  - California
- Endangered
  - Canada (*jeffersonii, jacksonii*)

Badgers in California

Joseph Grinnell, Joseph S. Dixon and Jean M. Linsdale



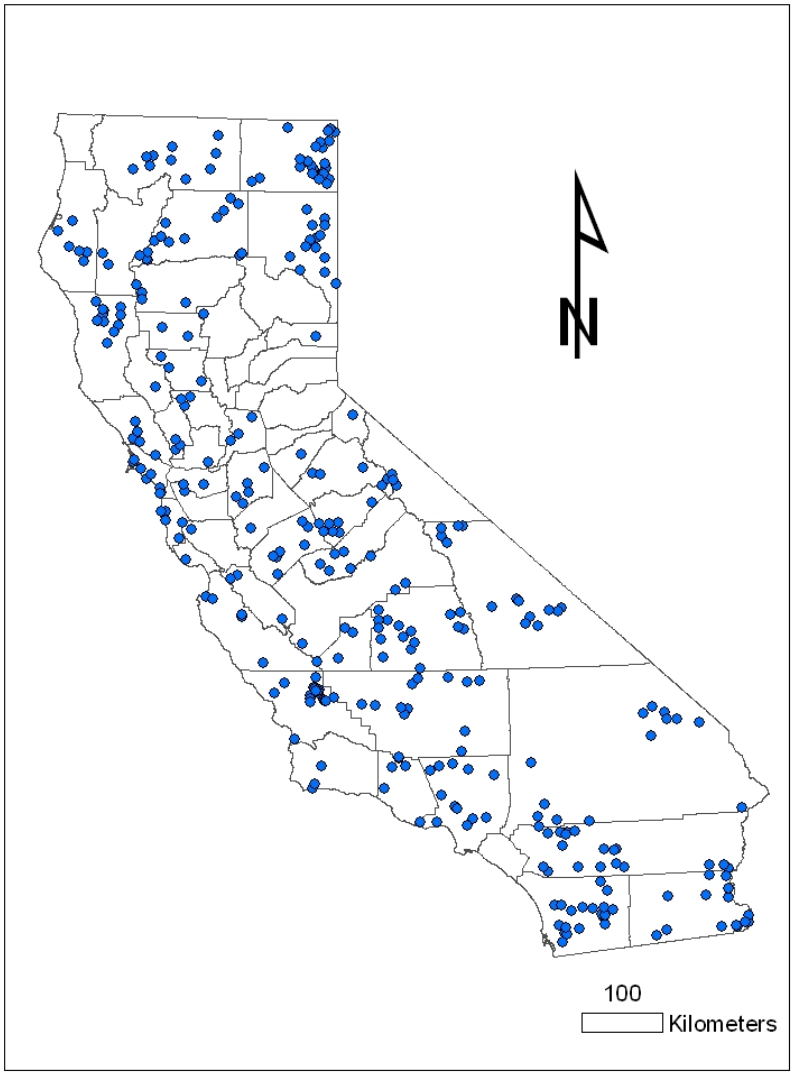
Research

- CDFG / UCD Wildlife Health Center Resource Assessment Grants Program 2003-2007
- GOAL: Evaluate conservation status of badgers in California by assessing vulnerabilities in
    - Population distribution
    - Behavioral ecology
- PRODUCT:
    - Species status report
        - Literature review
        - Data

Badger population distribution

Historic sightings

- Populations declined 50-90% mid-1800s to 1930s
- Became rarer across their range 1940 -1985
- Listed as “furbearer” in 1957

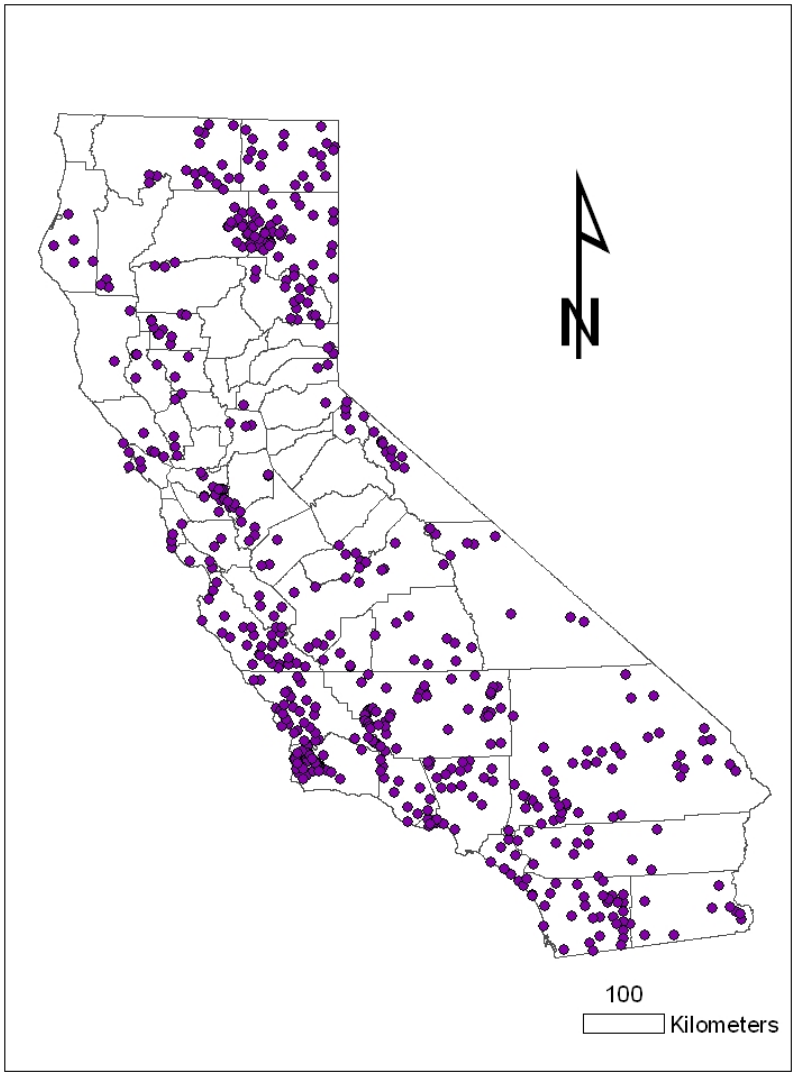


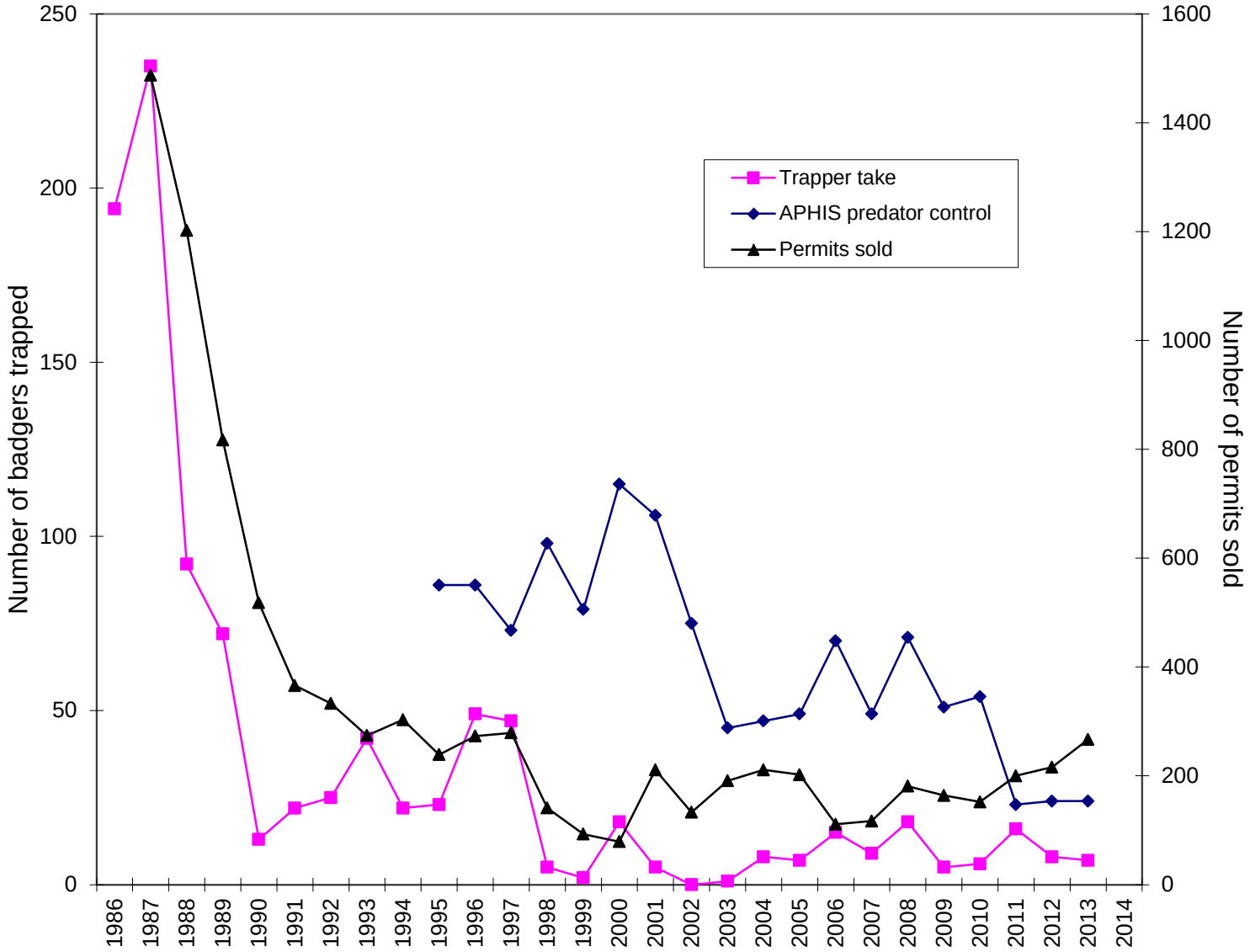
Pre-1965

Modern sightings

- Heightened restrictions in 1981
- CDFG assessment 1985
- Listed as Species of Special Concern 1986
- 1978 – 1987 USDA

Post-1965

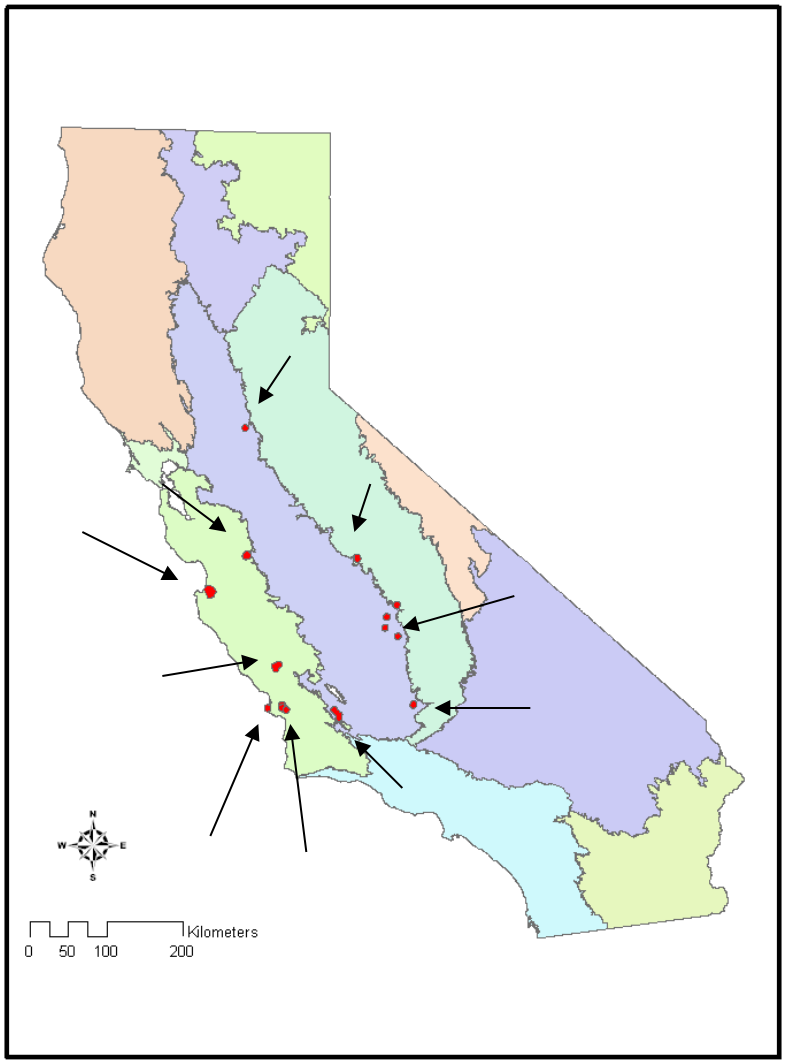




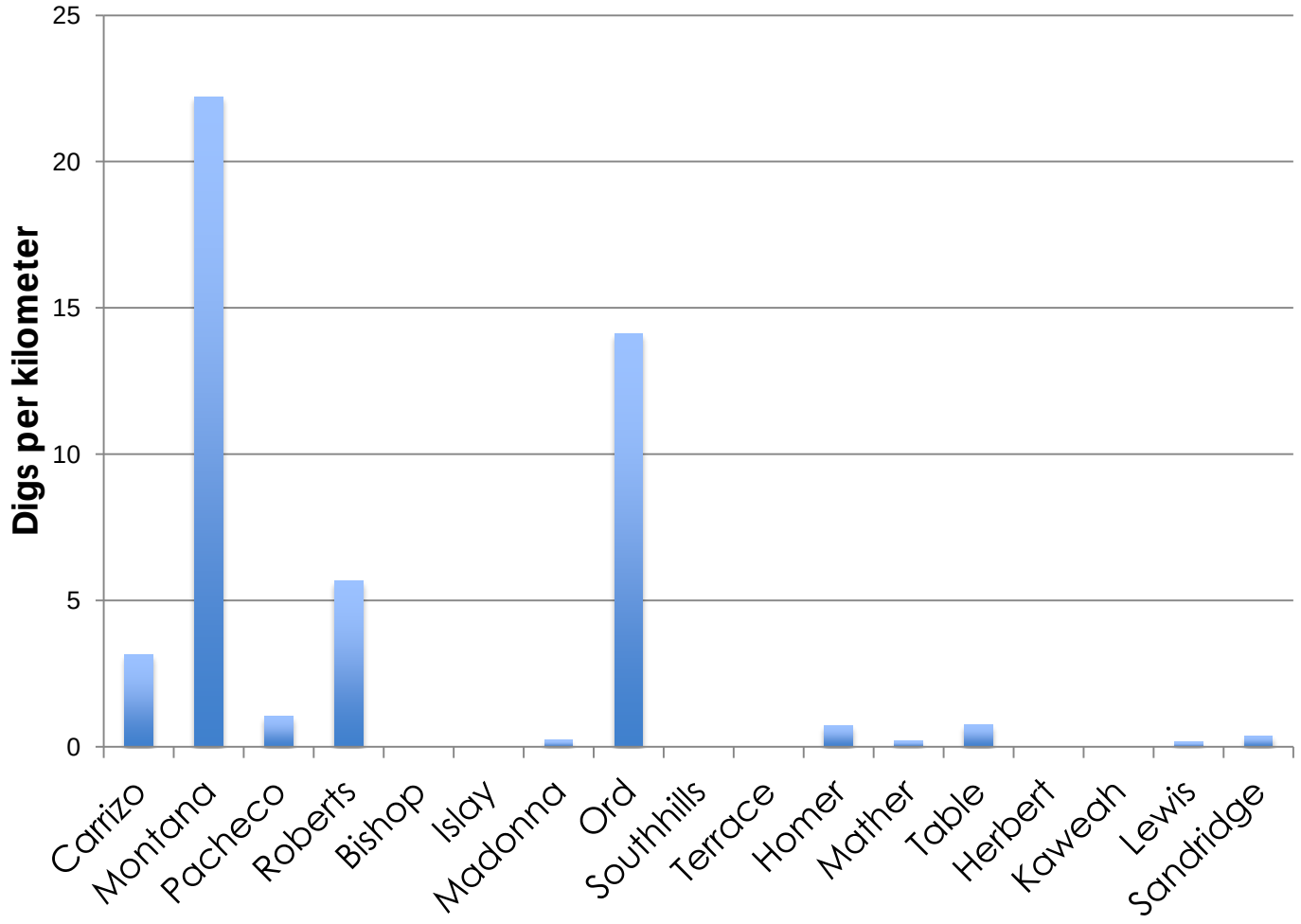
Number of badgers taken as reported by CDFW-licensed trappers, USDA-APHIS Wildlife Services, and number of permits sold by CDFW

Activity index

- Sites
  - 10 contiguous
  - 7 fragmented
- Methods
  - Transects
  - Dens
  - Hunting holes



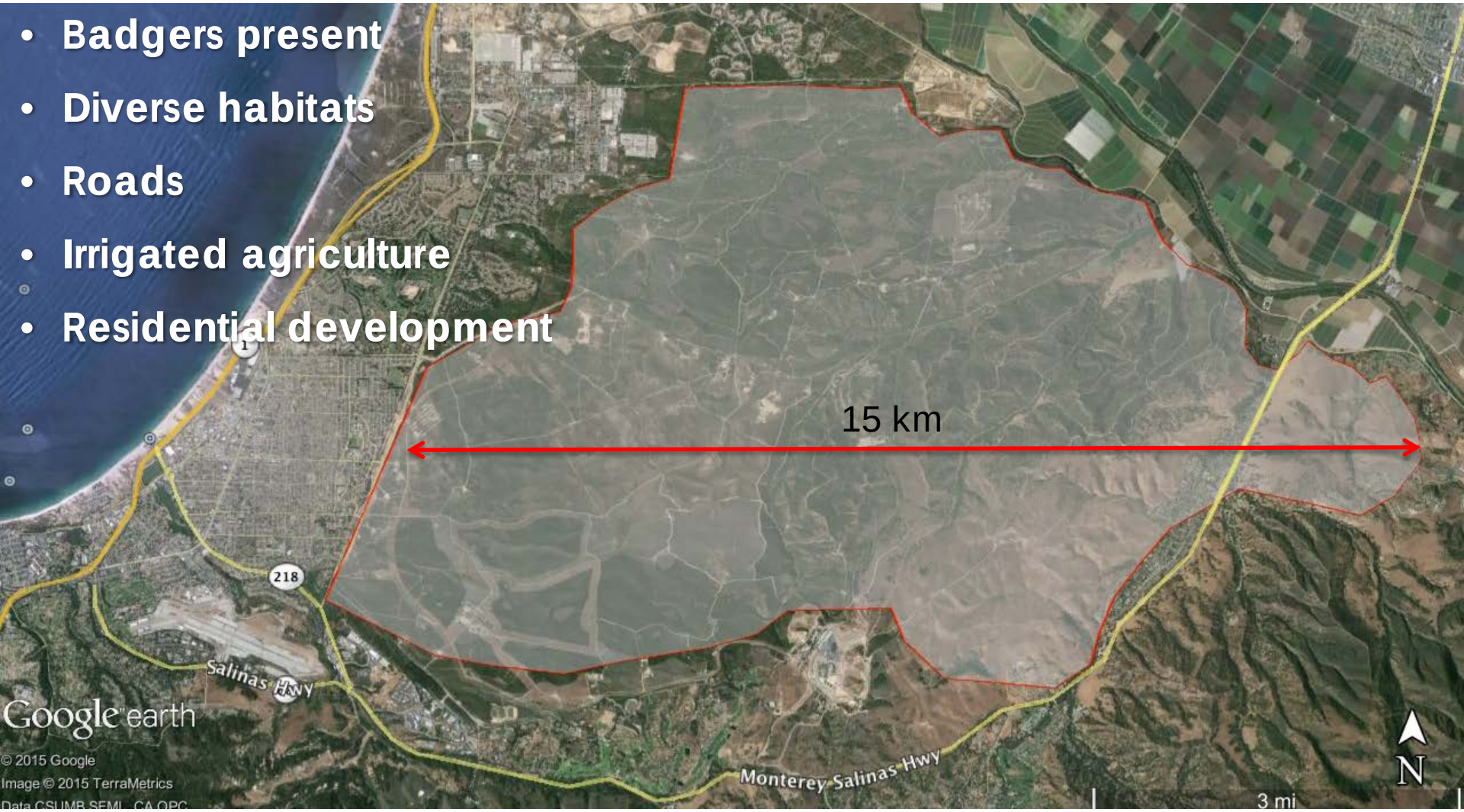
Activity index



Habitat Use Study

- Monterey County, California
- Fort Ord Public Lands
- UC NRS Fort Ord Natural Reserve
- Private properties
- *Total area ~20,000 acres (150 km²)*

Study Site


Badgers present
Diverse habitats
Roads
Irrigated agriculture
Residential development
15 km
1
218
Salinas Hwy
Monterey Salinas Hwy
Google earth
© 2015 Google
Image © 2015 TerraMetrics
Data CSUMB SFML, CA OPC
3 mi
N

Study site

Methods

10 badgers

- 6 females, 4 males

Methods

- Radio-locations (night): minimum 1/animal/week
- Den locations (day): goal of 1/week
- Continuous tracking (night): 1/animal/month

Habitat preference

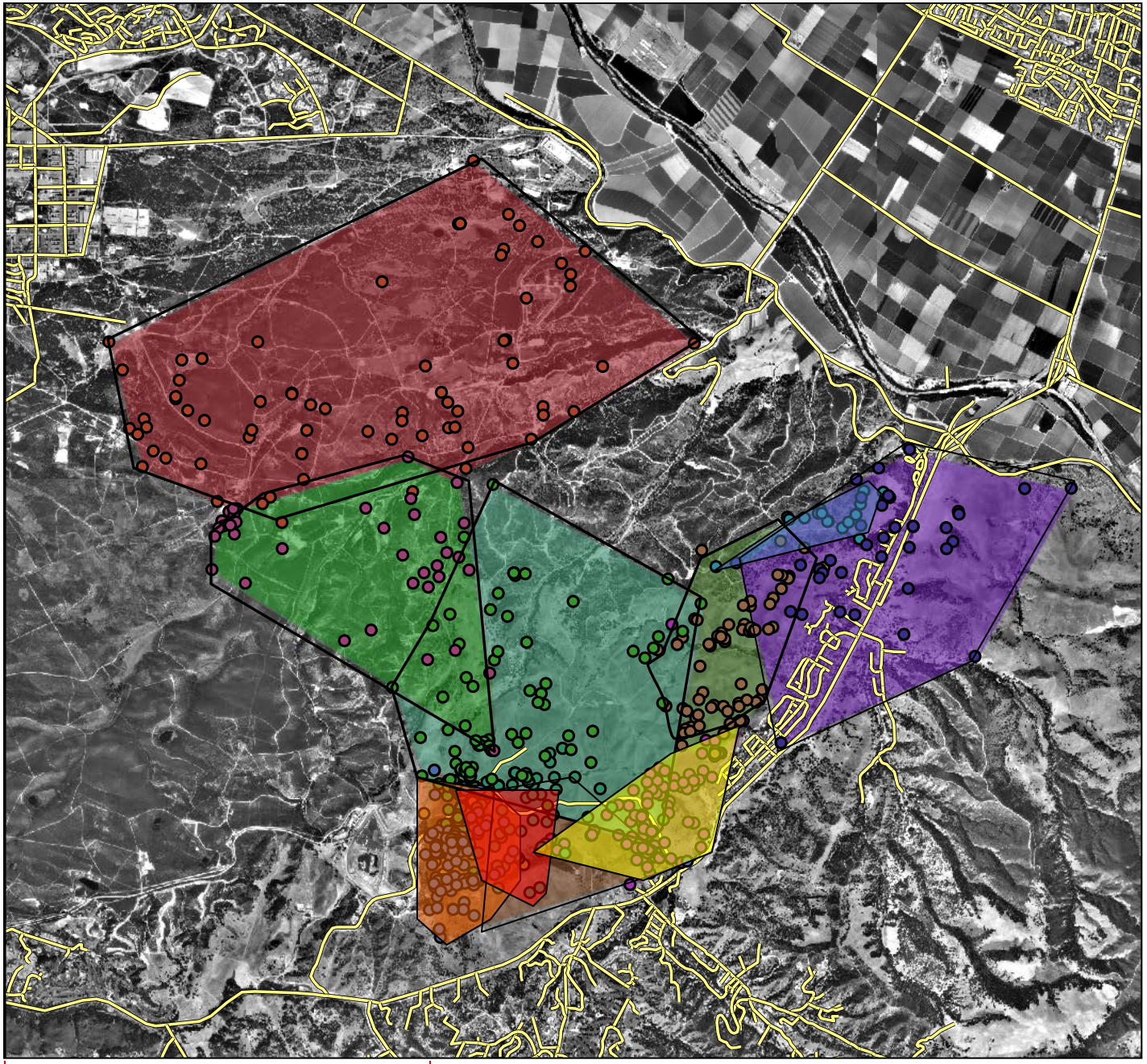
- Locations within home range compared to home range composition (3rd order)
- Composition of home range compared to composition of study site (2nd order)
- Dens and active animal locations

Habitat preference

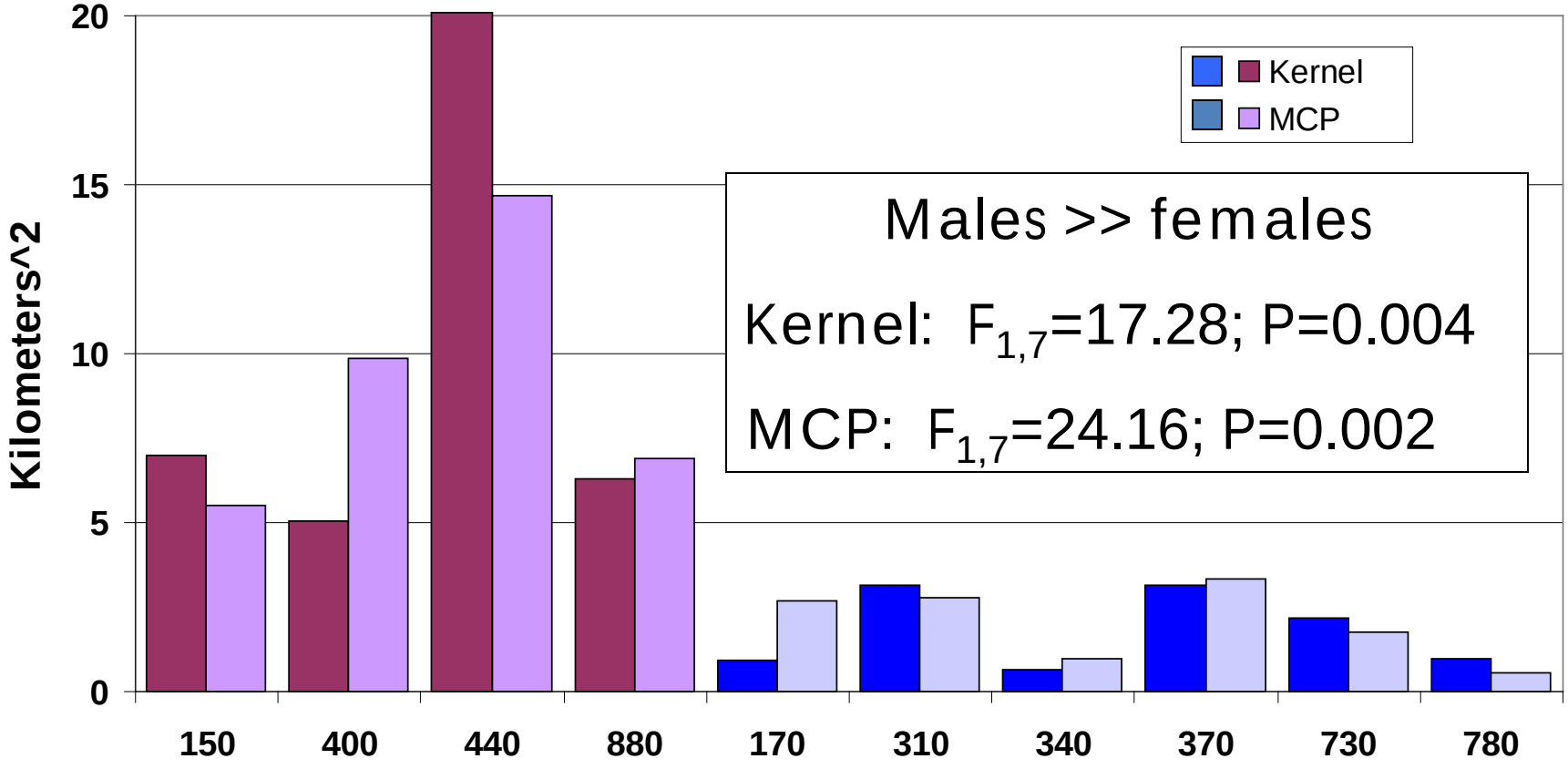
- Vegetation type
  1. Annual grasslands
  2. Native grasslands
  3. Oak woodlands
  4. Riparian/marsh
  5. Maritime chaparral
  6. Urban
  7. Agriculture

- Soil type
  1. Sandy
  2. Loams
  3. Sand/loam mixes
  4. Clays
  5. Badlands
  6. Xeronthents (eroded soils)

- Slope
  – 0-5%, 6-10%, 11-30%, 31-50%, >51%


5 km

Results: Home range size



Kernel mean = 12.92

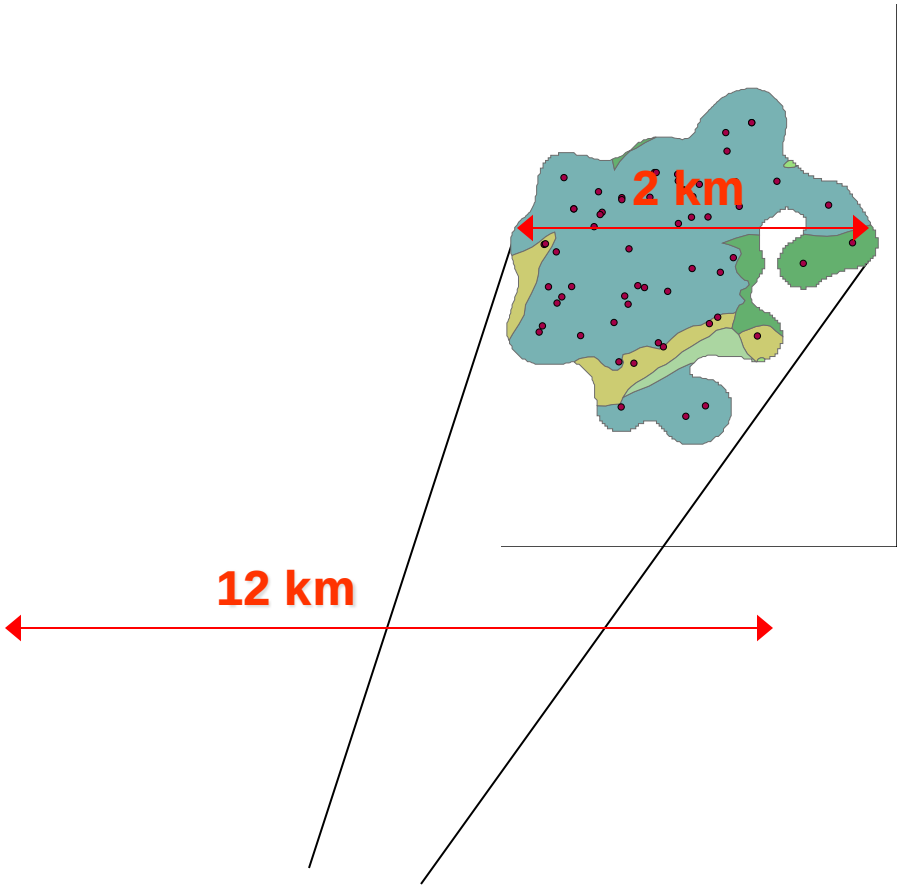
MCP mean = 11.23

Kernel mean = 2.59

MCP mean = 1.94

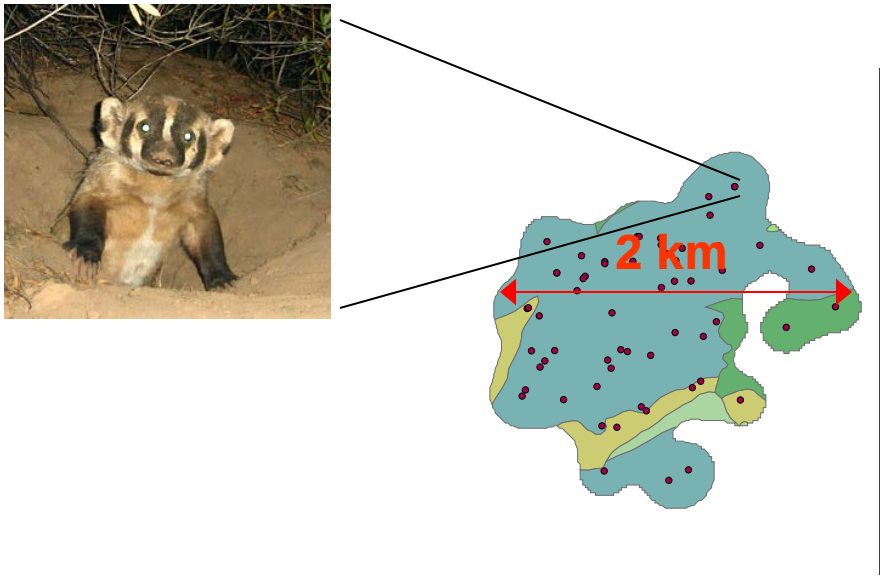
Results: 2nd order habitat selection

- All locations
  - Preferred annual grassland, oak woodlands, scrub
  - Avoided urban, maritime chaparral, and agriculture
  - Preferred sandy, loamy-sandy, and loamy soils
  - Avoided clays



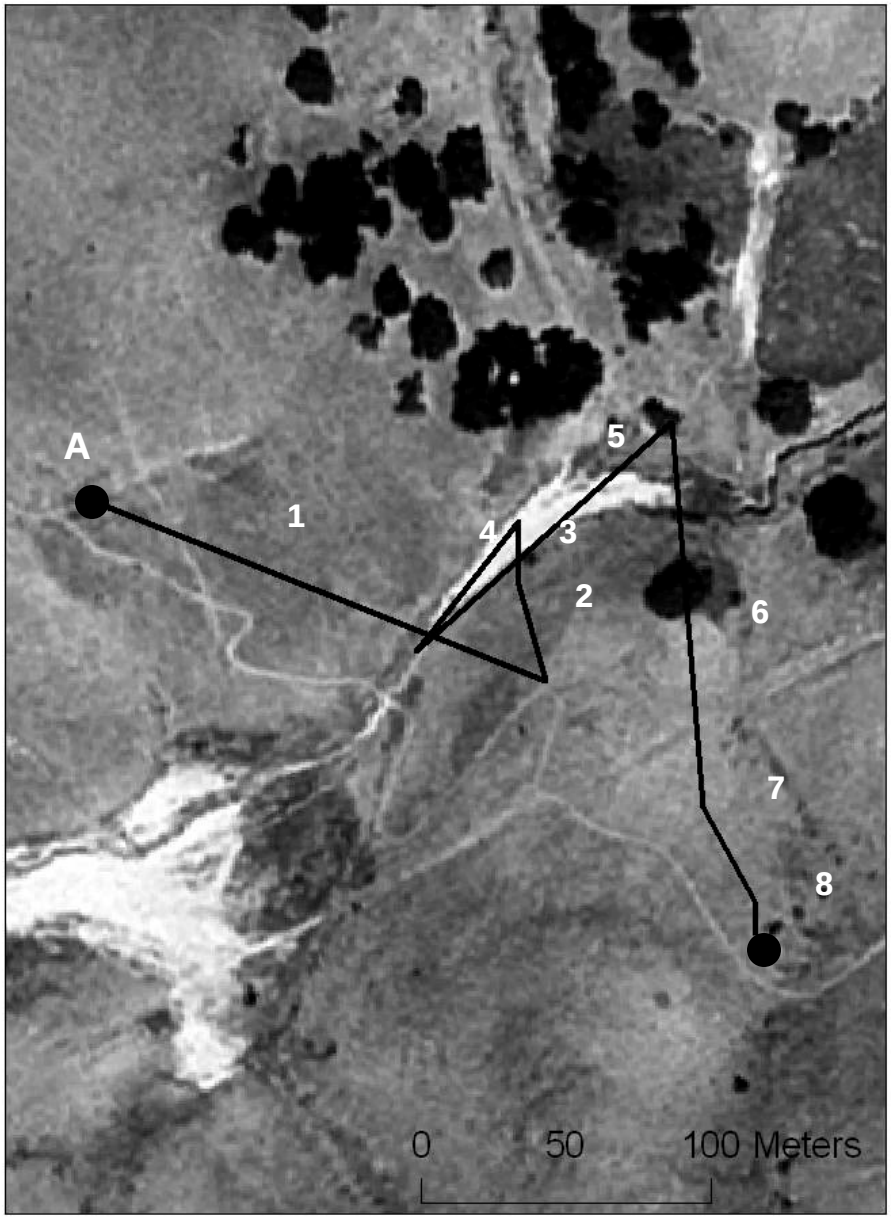
Results: 3rd order habitat selection

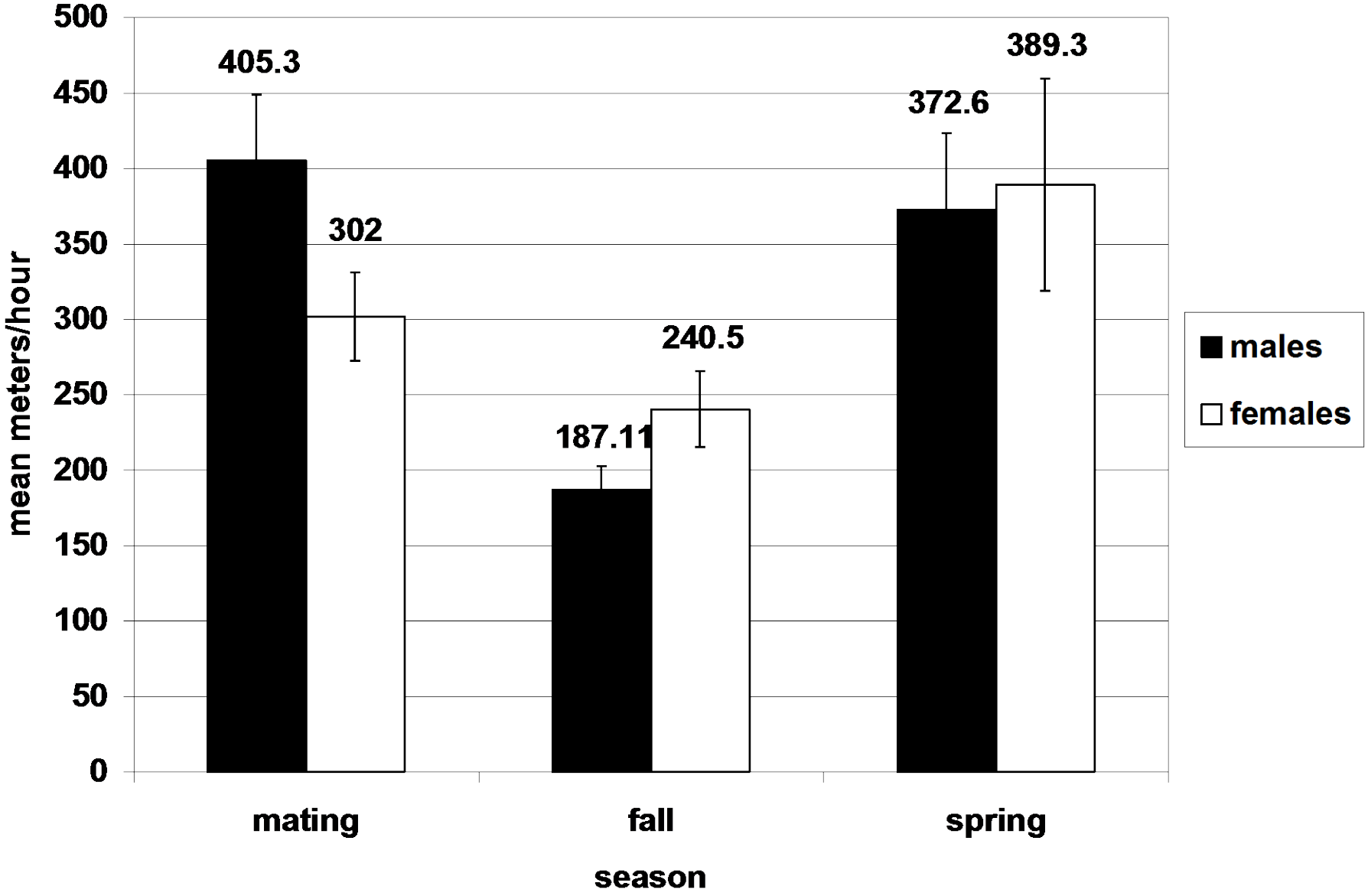
- Active locations
  - no preference detected
- Den locations
  - Preferred coastal sage scrub, grassland
  - Least preferred urban and wetland
  - no preference for soil type
  - Intermediate slopes



Movement paths

- 60 tracking sessions
  - 4 to 24 segments
- Calculated
  - Path complexity
  - Travel speed
- Analyzed complexity & speed by
  - Vegetation type
  - Sex
  - Season (mating, fall, spring)




500
450
400
350
300
250
200
150
100
50
0
mean meters/hour
405.3
302
187.11
240.5
372.6
389.3
mating
fall
spring
season
males
females

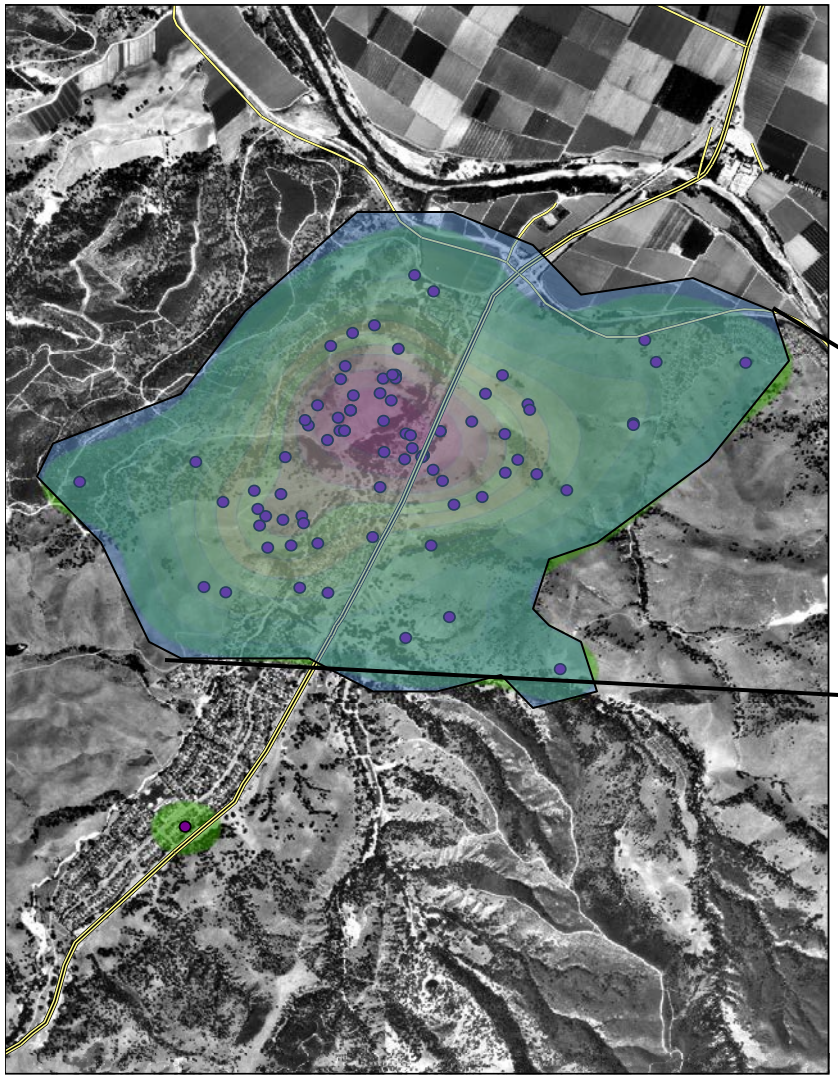
Habitats selected for movement

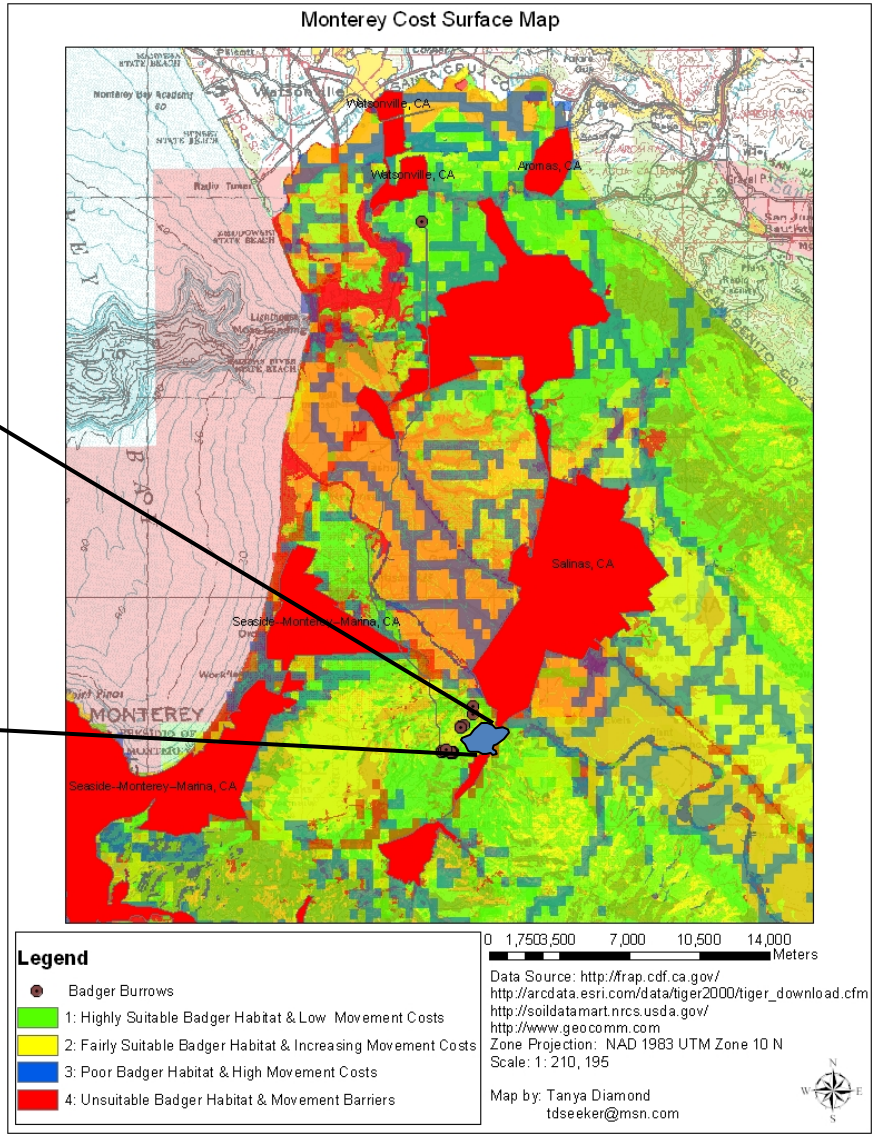
- Path complexity not affected by sex, season or vegetation type
- Males' travel speeds varied by vegetation type in the spring and the winter, but not the fall
  - Individual responses differed
- Females' travel speeds were not related to vegetation type
- *Males less selective of habitat in the breeding season?*

Management Implications

- Badgers use a mosaic of habitat types within their home range
- Planning for core habitat should be on the scale of 100 km^2
  - Area requirement for a *viable population* (?)
- Corridor habitat more flexible
  - Should be unobstructed particularly in spring and summer
  - 2 km maximum length ?
  - Use of sub-optimal habitat likely in the mating season

Regional connectivity analyses

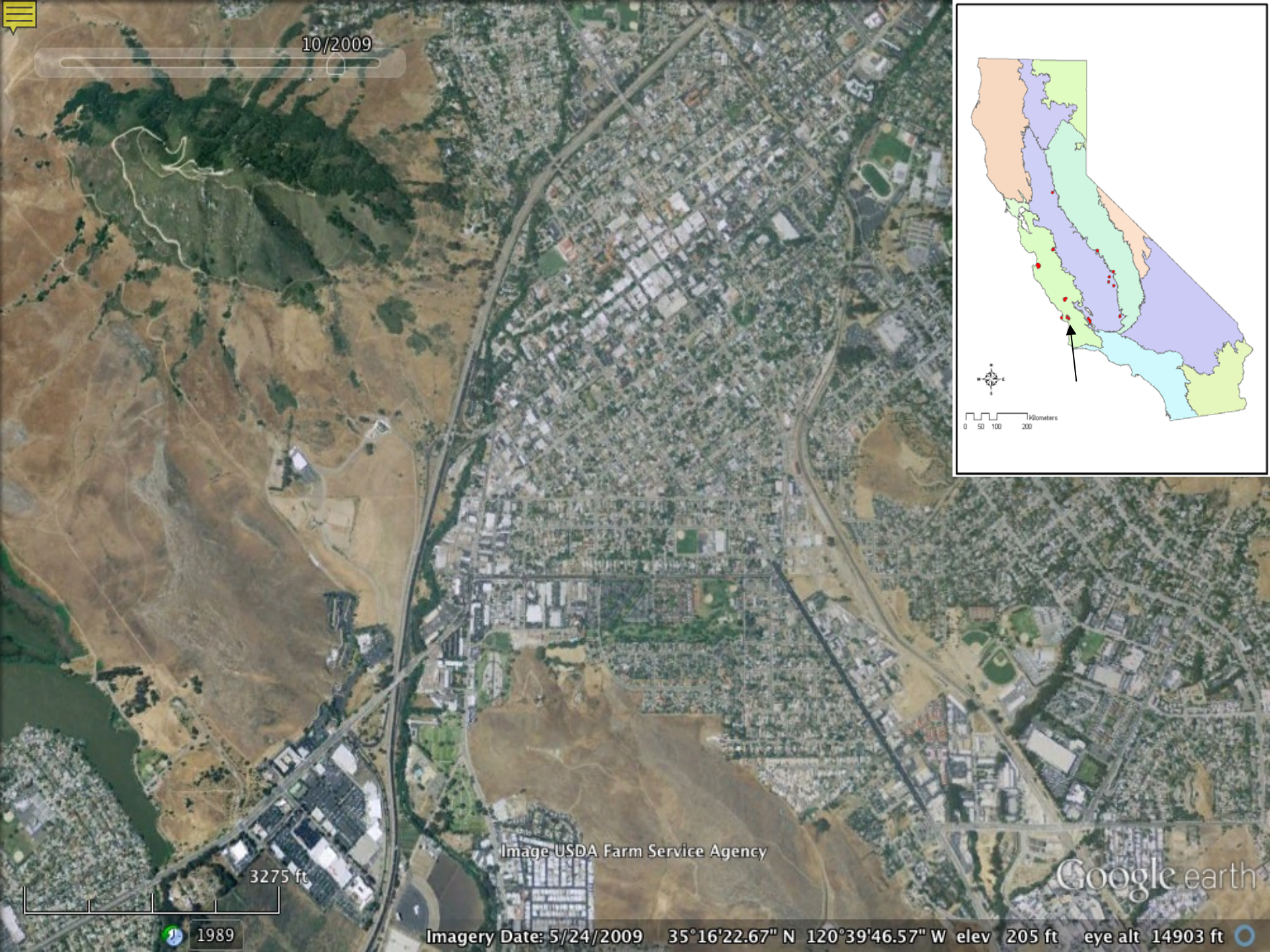




Health risks

Quinn, J.H., Y. Girard, K. Gilardi, Y. Hernandez, R. Poppenga, B. Chomel, J.E. Foley, C.K. Johnson. 2012. Pathogen and Rodenticide Exposure in American Badgers (*Taxidea taxus*) in California. J. of Wildlife Diseases 48(2):467-472.


10/20/2009
1992
2012
2776 ft
1992
Google earth
Imagery Date: 10/20/2009 35°18'18.95" N 118°47'50.51" W elev 711 ft eye alt 12792 ft
Kilometers
0 50 100 200


10/2009
Image USDA Farm Service Agency
3275 ft
Google earth
1989
Imagery Date: 5/24/2009 35°16'22.67" N 120°39'46.57" W elev 205 ft eye alt 14903 ft
Kilometers
0 50 100 200


0 50 100 200
Kilometers
© 2013 Google
2497 ft
Google earth
1994
Imagery Date: 6/15/2011 36°06'33.07" N 119°01'49.67" W elev 974 ft eye alt 11749 ft

Disease surveillance criteria

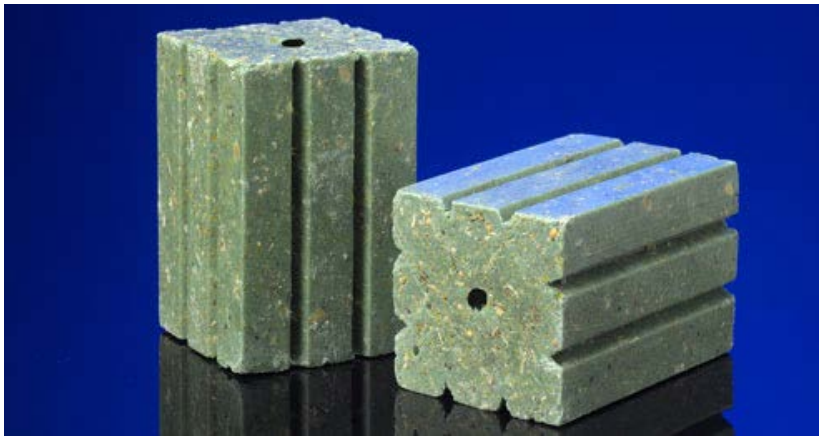
- Result from exposure to domestic species
- Risks to livestock and public health
- Risks to/from other wildlife species

Diseases of concern

- Canine distemper (Williams et al. 1988, Goodrich et al. 1994).
- Plague (Smith 1994, Salkeld and Stapp 2006)
- Toxoplasma gondii (Marchinondo et al. 1976)
- Paratuberculosis (*Mycobacterium avium ssp. paratuberculosis*)
- Parvovirus
- Lyme (*Borrelia burgdorferi*)
- Anaplasma (*Anaplasma phagocytophilium*)
- Tularemia (*Francisella tularensis*)
- *Bartonella sp.*

Risk of secondary poisoning

- Chlorophacinone, and diphancinone. coumachlor, and warfarin



- Brodifacoum, bromodiolone, difethialone.

Secondary poisoning- precedents

- San Joaquin kit fox
- Mountain lion
- Gray fox
- Bobcat
- Heermann's kangaroo rat
- Red-tailed hawks
- Red-shouldered hawks
- Golden eagle
- American kestrel
- Barn owl
- Great horned owl
- Turkey vulture
- Cooper's hawk
- Pacific fisher
- etc…

Secondary poisoning- precedents

- Notice Intent to Cancel Registration of and Notice of Denial of Applications for, Certain Rodenticide Bait Products (40 CFR § 164.21(a))

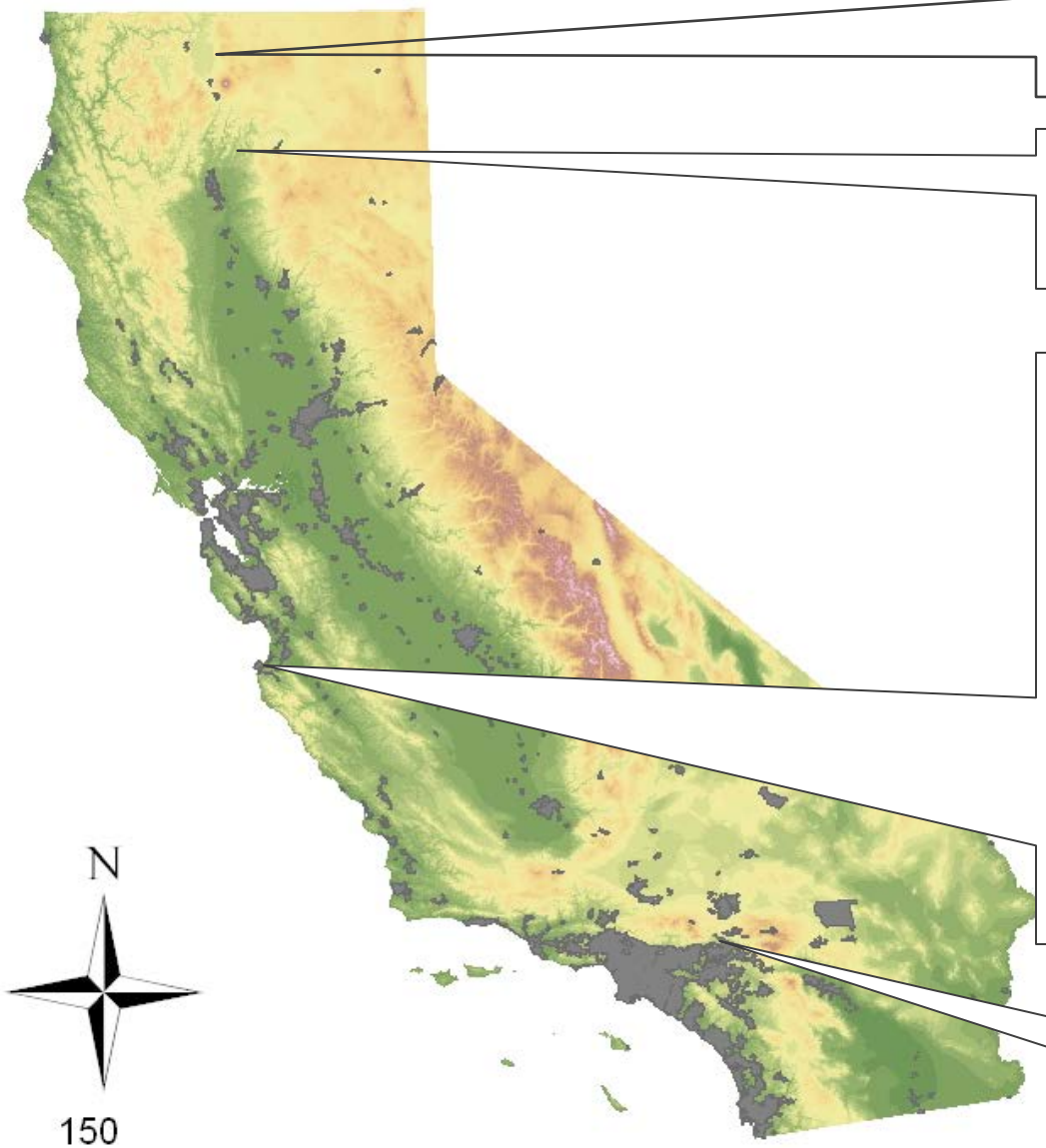
- California Department of Pesticide Regulation designated 2nd generation anticoagulants as restricted materials

Because life is good.

Methods

- Samples
  - Captured badgers (Northern CA)
  - Road killed badgers (Northern CA and LA county)
- Tests
  - Serologic tests
  - Tissue samples
    - Small intestine
    - Colon
    - Liver

Results: disease



No. 12
- Not tested

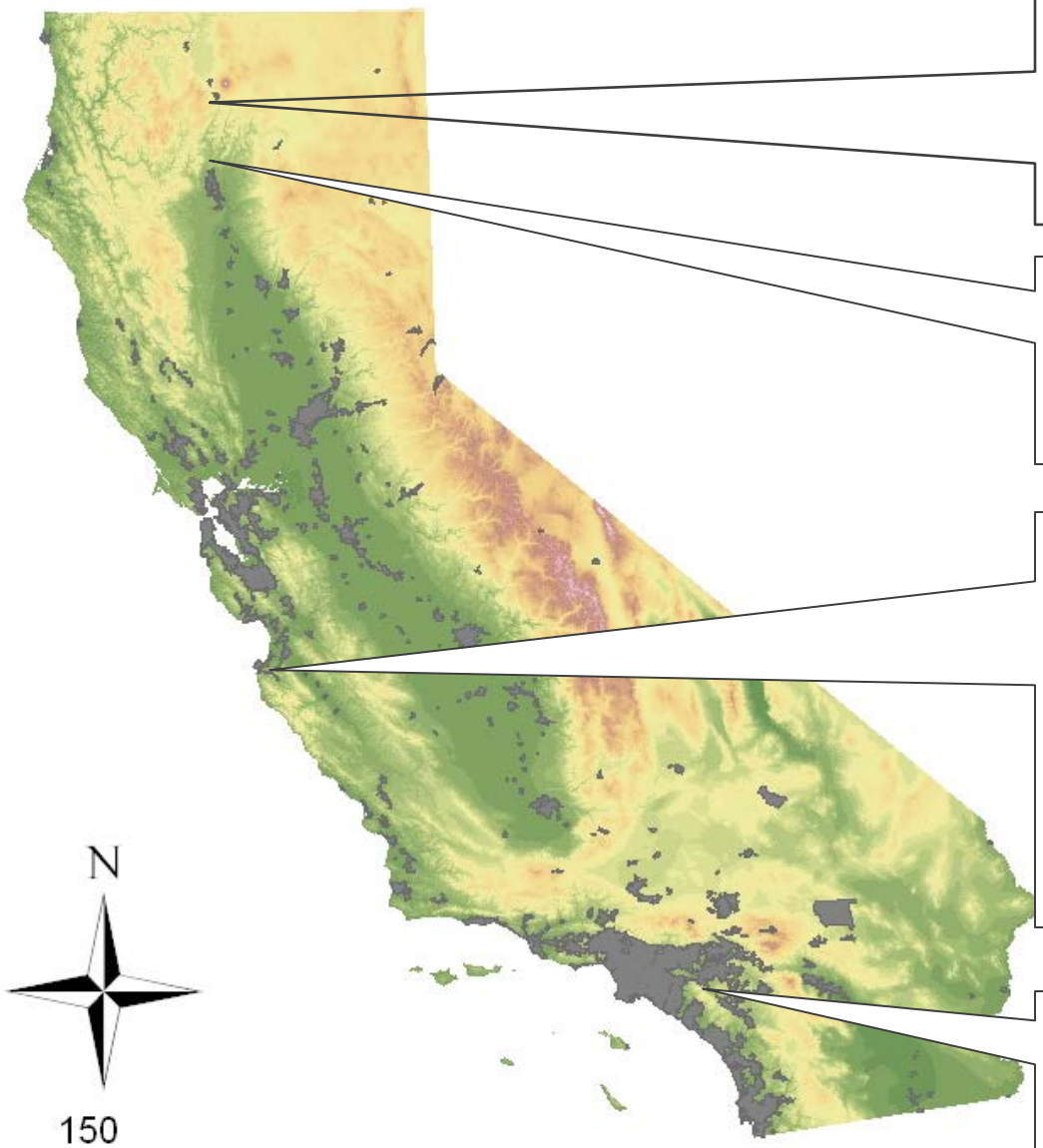
No. 13
- Not tested

No. 14
- Not tested

No. 1: CDV
No. 2: *Toxo, Bartonella sp.*
No. 3: CDV
No. 4: CDV, *Toxo, Bartonella sp.*
No. 5: CDV, *Bartonella spp.*
No. 6: CDV, *Toxo,* CDV, *F. tularemia*
No. 7: CDV, *F. tularemia*
No. 8: CDV, *Anaplasma sp.*
No. 9: CDV, ***Toxo****, F. tularermia*
No. 10: *Toxo*

No. 11: Not tested

Results: SGACs



No. 11
- Brodifacoum (0.55 ppm)
- Bromadiolone (0.12 ppm)

No 13
- Brodifacoum (0.09 ppm)
- Trace bromadiolone

No. 14
- Trace bromadiolone

No. 1, 2, 3, 4, 6, 7, 8, 10 sera
- No rodenticide detected

No. 5 tissue
- No rodenticide detected

No 9 tissue
- No rodenticide detected

No. 11: Trace brodifacoum

Implications

Rodenticides:

- DPR review of risks to wildlife
- Rural badgers, urban exposure
- Rural badgers, rural exposure
- Continued surveillance

Next Steps

- Actionable data
  - Monitoring
  - Population structure
  - Demographics
    - Reproduction
    - Survival
    - Mortality
  - Risks

Next Steps

Pathogens and parasites in American badgers (*Taxidea taxus*). J.H. Quinn, M. A. Gabriel, and C.K. Johnson. In Proulx and San (eds.). Badgers of the World, Alpha Wildlife Press, Sherwood Park, Ontario, Canada.

Next Steps

Maria J. Santos, Jessica Quinn, Luis Miguel Rosalino, Filipa Loureiro, Margarida Santos-Reis and Susan L. Ustin. **Synergistic phenology between American and European badgers and their habitat in Mediterranean-type climates.** *In prep*

CDFW Species Status Report *In review*

Project Funding

- CDFW/UC Davis Wildlife Health Center Resource Assessment Program
- American Museum of Natural History
- American Wildlife Research Foundation
- The Western Section of the Wildlife Society
- American Society of Mammalogists
- The Chuck Haugen Conservation Fund
- UC Davis Jastro-Shields Research Grant
- UC Davis Ecology Graduate Group

Thank you

Field assistants:

Geriann Albers, John Clare, Johanna Davis, Bruce Delgado, Tanya Diamond, Jessica Dunlap, Mark Elbroch, Janel Fishpaw, Jessica Gist, Kimberley Greeson, Andrew Hida, Daniel Jackson, Tammy Jakl, Marina Kasa, Courtney McSherry, Mary Paul, Patt Quinn-Davis, Dairen Simpson, Alyssa Stark, Nicole Tautfest, Brett Williams, Topo

Collaborators:

Sue Campbell, Bruce Delgado, Tanya Diamond, Dave Jessup, Eric Loft, Mike Murray, Steve Torres, Amy Wells

Cooperators:

Sierra Foothills Conservancy, Sequoia Riverlands Trust, Sacramento Valley Conservancy, Pacheco State Park, BLM Carrizo Plain Natl. Monument, US Army National Guard Camp Roberts, City of San Luis Obispo, NPS Point Reyes National Seashore, Big Sur Land Trust, Las Palmas Development, UCNRS, BLM Fort Ord Project Office, Avian & Exotics Veterinary Clinic, CDFW Marine Wildlife Veterinary Care and Research Center


jessiequinn@gmail.com

What does a badger burrow look like?