

Mammalogy

Texas Master Naturalists
El Camino Real Chapter
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Unit Goals

- Become familiar with the common native Texas mammals in your ecoregion
- Demonstrate knowledge about the general characteristics of the 3 major subclasses of mammals
- Discuss basic principles of mammal behavior, physiology, and ecology and relate these principles to environmental adaptations
- Demonstrate familiarity with the 10 orders of mammals found in the state
- Discuss the diversity and distribution of mammals in Texas and an understanding of the role of mammals in Texas ecosystems
- Demonstrate knowledge of estimating/measuring animal populations
- Demonstrate knowledge of methods for trapping, marking, monitoring, and observing mammal populations
- Understand threats to mammals in Texas

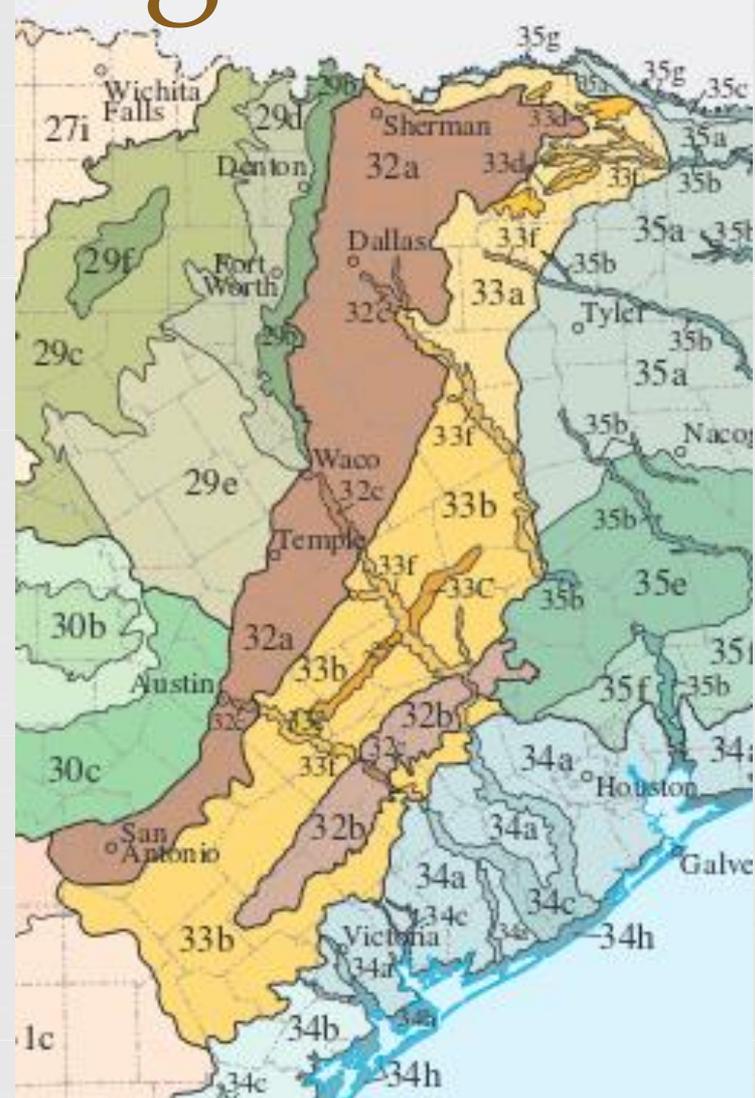
Terrestrial Ecoregions

32 Texas Blackland Prairies

- a) Northern Blackland Prairie
- b) Southern Blackland Prairie
- c) Floodplain and Low Terraces

33 East Central Texas Plains

- a) Northern Post Oak Savanna
- b) Southern Post Oak Savanna**
- c) San Antonio Prairie
- d) Northern Prairie Outliers
- e) Bastrop Lost Pines
- f) Floodplains and Low Terraces**



Mammalogy

- Natural History
- Taxonomy and Systematics
- Anatomy
- Ethology (Behavior)
- Ecology
- Wildlife Management

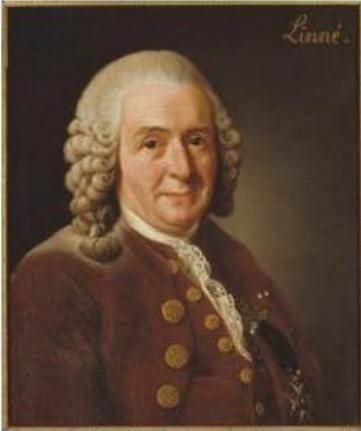
In Texas:

97 Genera

181 Species



Carl Linnaeus



Carl von Linné, Alexander Roslin, 1775
(oil on canvas, Gripsholm Castle)

Born 23 May 1707^[note 1]
Råshult, Stenbrohult parish
(now within Älmhult
Municipality), Sweden

Linnaean Classification

Kingdom	Animalia
Phylum	Chordata
Class	Mammalia
Order	Rodentia
Family	Heteromyidae
Genus	<i>Dipodomys</i>
Species	<i>compactus</i>



Dipodomys compactus
Gulf Coast kangaroo rat

Common characteristics of mammals

- Hair/Fur- to aid in internal temperature control
- Mammary Glands- nourishment of young
 - Latin for “breast”
- Ability to give birth to live young (almost)
- Teeth
- Four-chambered Heart

3 subclasses

☞ Monotremes

Prototheria

oviparous

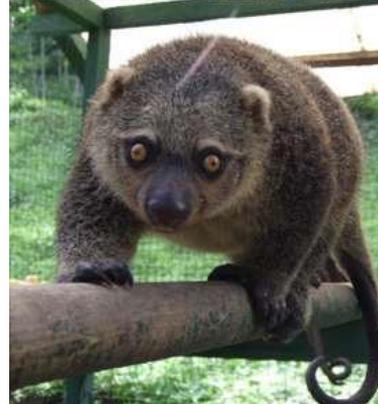
☞ Marsupials

Metatheria

marsupium

☞ Placentals 160mya

Eutheria “true beasts”



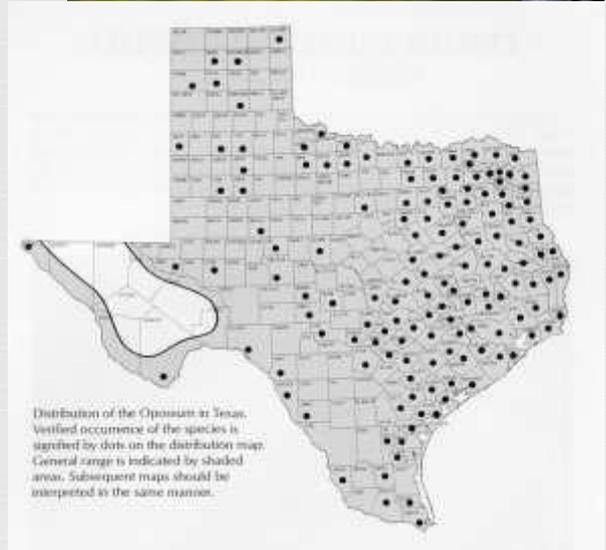
10 Mammal Orders

1. Didelphimorphia (American opossums): Gk. “two” “wombs”
2. Chiroptera (bats): Gk. “hand” “wing”
3. Xenartha (armadillos, sloths): Gk. “strange” “joints”
4. Lagomorpha (rabbits): Gk. “hare” “from”
5. Rodentia (rats, mice, beavers): L. “to gnaw”
6. Carnivora (cats, dogs, skunks, raccoons, bears): L. “flesh” “to devour”
7. Artiodactyla (even toed ungulates): Gk. “even” “finger”
8. Insectivora (shrews, moles): L. “insect” “to devour”
9. Sirenia (manatees): Gk. mythology
10. Cetacea (whales, porpoises): L. cetus, Gk. ketos

Didelphis virginiana

Virginia Opossum

- Scaly, prehensile tail; 5 toes each foot, big toe on hind foot opposable
- Diet: Highly omnivorous, eat carrion and insects
- Habitat: Variable, prefer wet habitats
 - swamps and rivers
- Only marsupial north of Mexico



Nine-Banded Armadillo

Dasypus novemcinctus

Very Little Hair, Bony Carapace
Water:

- Known to walk underneath water
- Tires Easily when swimming
- Inflate Themselves to increase Buoyancy

Gives birth to identical quadruplets

- Young are born with eyes open
- Walking with a few hours
- Precocial Young versus Altricial

30 or 32 peg like teeth

Burrows are dependent on soil conditions

- Sandy soils
- Caves and Crevices

Food: Mostly insects (some eggs)



Insectivora

Most primitive placental mammals (170 mya)

Shrews & moles not strictly insectivorous

Family= Soricidae (Shrews)

4 Species in Texas

Use burrows only for sleeping

Small body size, high metabolic rate, spend much time actively foraging

Some species have poisonous salivary secretions to subdue prey

Nocturnal; most terrestrial, moist habitats

Front feet "normal" - not paddle shaped

Eyes small but functional

Family= Talpidae (moles)

1 Species in Texas

Fossorial (L. "digger")

Scalopus aquaticus

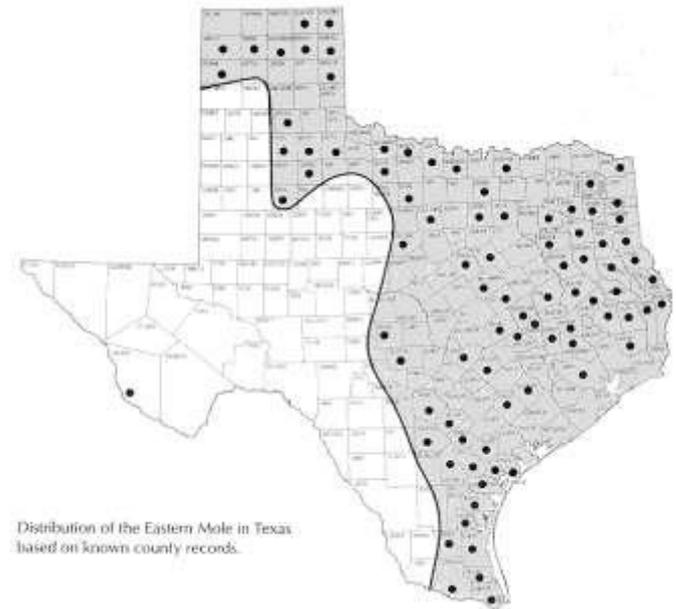
Eastern Mole

Size: 110 to 170mm

Front feet broad and paddle shaped; Eyes non-functional; Short, sparsely haired tail

Diet: primarily earthworms. It also eats insects and their larvae, some vegetation, Each day this mole eats 25 to 100% of its own weight

Habitat: Restricted in distribution by soil; Shallow burrows for feeding, deep for raising young

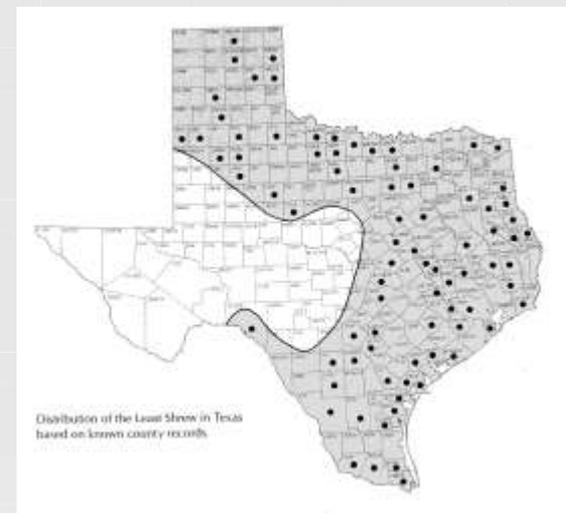


Cryptotis parva – Least Shrew

Habitat: Inhabits grasslands and fields. Uses runways of cotton rats

Diet: wide variety of invertebrates, including insects and bugs, earthworms, and snails and slugs. These animals seem to have a habit of opening the abdomens of grasshoppers and crickets and eating the internal organs. Most foraging done on surface

Sociable, in contrast to most shrews



Leptonycteris nivalis

Mexican long-nosed bat

Distribution in Texas:
Limited to Big Bend

Habitat: agave and desert scrub-woodlands

Diet: nectar, pollen of flowers, esp. century plant

Pelage: drab brown, tipped silver-white



Endangered Species 1988

Tadarida brasiliensis

Brazilian Free-tailed Bat

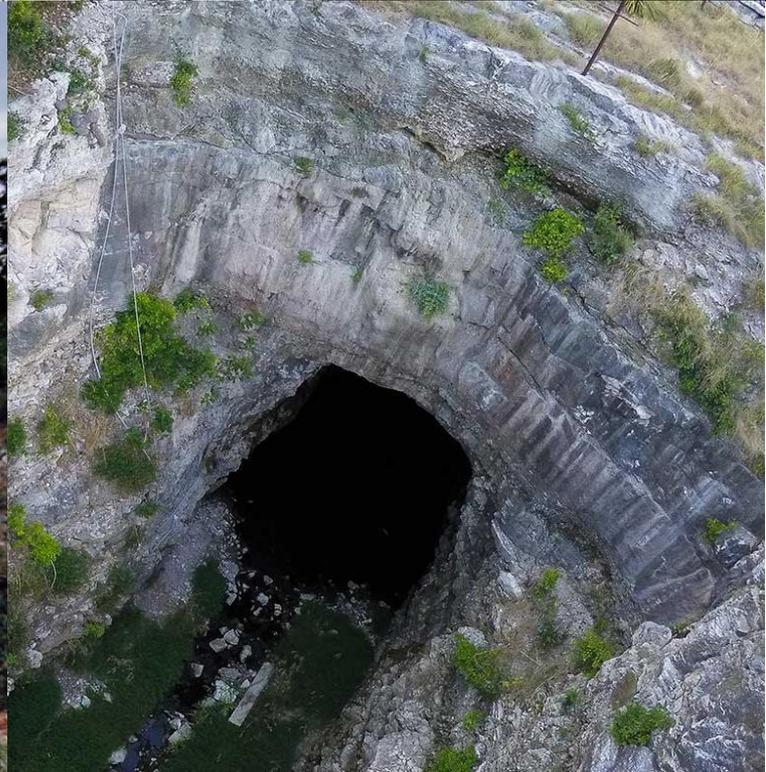
Distribution: entire state,
migratory

short, velvety, reddish to black-
colored fur

broad ears not joined at midline
1/3 length end of its tail free

tend to roost w/
Myotis velifer (cave myotis)





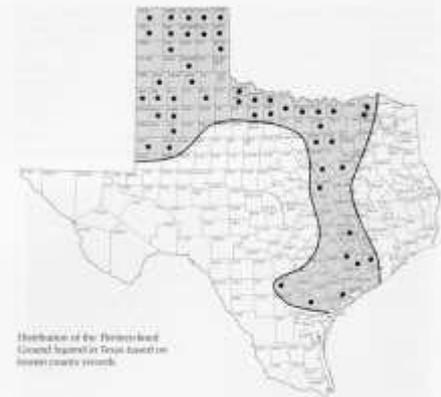
Spermophilus tridecemlineatus

Thirteen-lined Ground Squirrel

13 alternating stripes on back;
White eye ring

Diet: Omnivorous. Animal matter consumed includes insects, occasional small vertebrates, bird eggs and carrion.

Habitat: Open areas with short grass and well-drained sandy or loamy soils for burrows.
Human landscapes



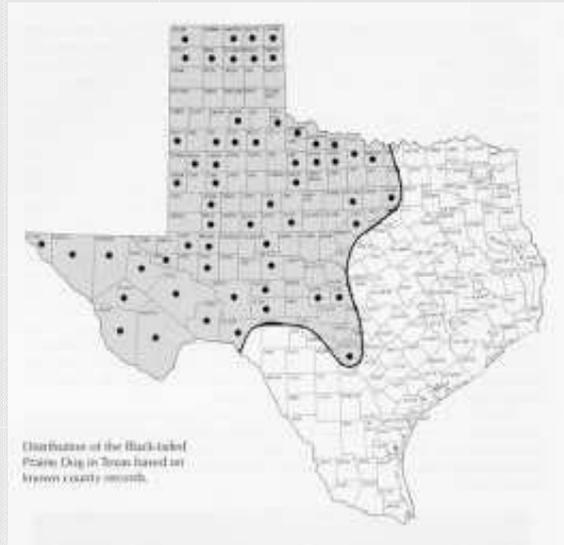
Cynomys ludovicianus

Black-tailed prairie dog

ID: Black tail tip, heavier body build than other rodents

Habitat: open, level, arid, short- grass plains. Never in moist areas

Diet: Eats weeds and grasses



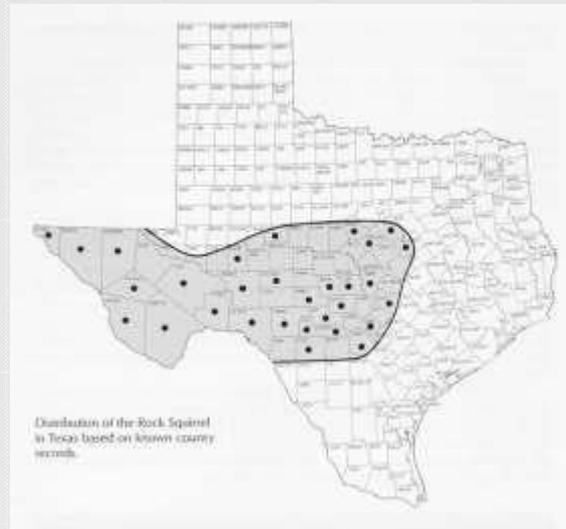
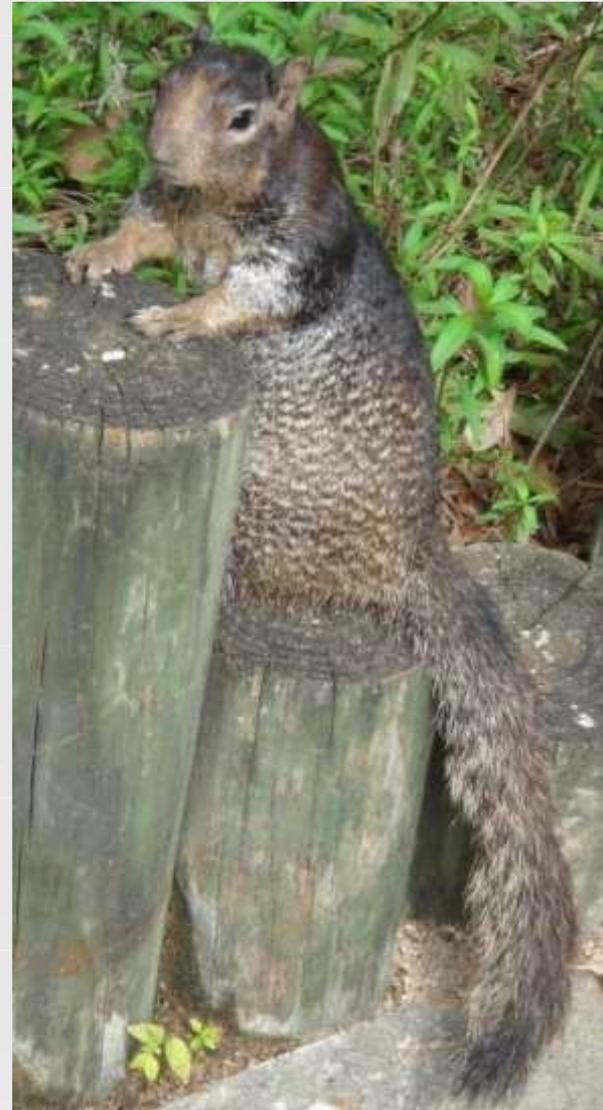
Spermophilus variegatus

Rock Squirrel

ID: Bushiest tail of any ground squirrel; Grizzled black and grey ; White crescents above and below eyes; Large head

Diet: oak acorns, wild sumac berries, cherries, wild plums, wild rye, assorted grasses, walnuts, pine nuts, mesquite, juniper berries, currants, cacti, and agave, grasshoppers, young turkey

Habitat: Rocky canyons, cliffs, hillsides



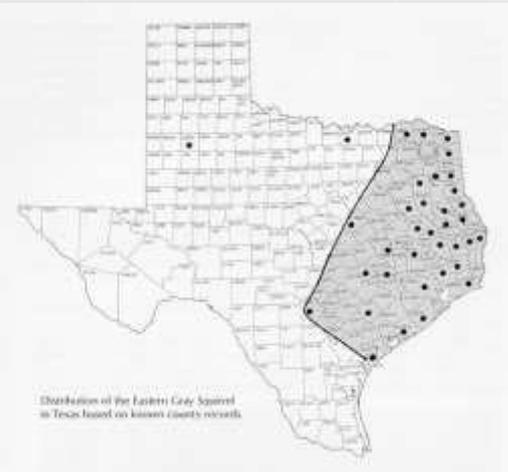
Sciurus carolinensis

eastern gray squirrel

ID: Gray tone to back; Under parts are white or gray; Ears with white spot at base

Diet: nuts, flowers and buds of more than 24 species of oaks, 10 species of hickory, pecan, walnut and beech tree species

Habitat: mature continuous woodlands of greater than 40 hectares with diverse understory vegetation.



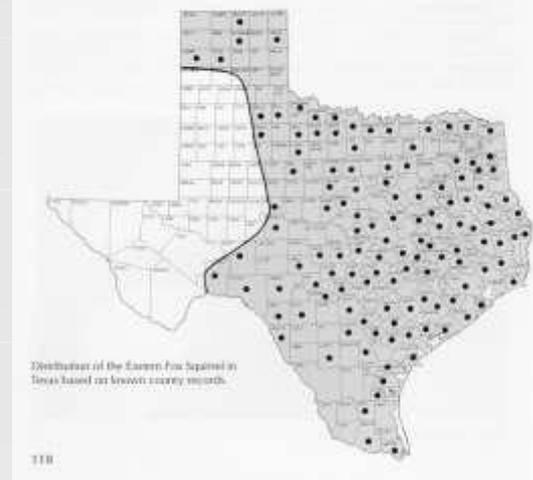
Sciurus niger

eastern fox squirrel

ID: Buff underparts; Brown-gray upperparts; Tail 1/2 of length and cinnamon with black; Feet cinnamon

Diet: vegetative matter to insects, moths, beetles, bird-eggs, and dead fish

Habitat: diverse array of deciduous and mixed forest. Use hollow trees as dens



Glaucomys volans

eastern flying squirrel

ID: Large black eyes;
Flattened, bushy tail;
Membrane connecting
front and hind legs;
Brownish buff pelage

Diet: Omnivorous

Habitat: woodlands. They
seem to prefer seed-
producing hardwoods,
particularly maple,
beech, hickory, oak, and
poplar; live in holes in
stumps



Castor canadensis

American beaver

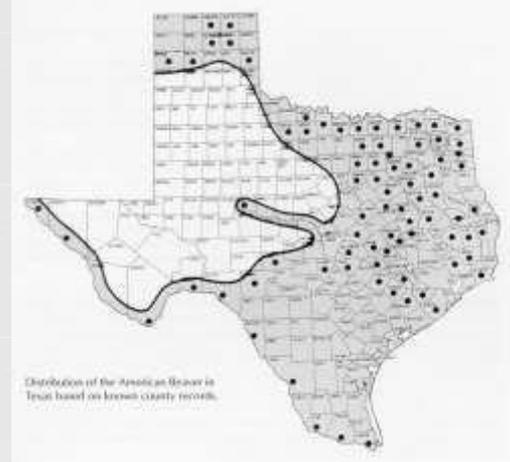
ID: Flat, paddle-shaped tail;
Pelage brown; Hind feet
are webbed; Incisor teeth
are large, orange and
ever-growing

Diet: Eat leaves and inner
bark

Habitat: Prefers Willow and
Aspen trees; Builds dams
and lodges. Lives in a
variety of rivers and
lakes - nocturnal

Dams and water offer
Protection

A keystone Species





NOV 21 2008

Myocastor coypus - nutria

Originally restricted to Central and Southern South America - introduced to USA

Large, brown, aquatic rodent;

Rounded tail

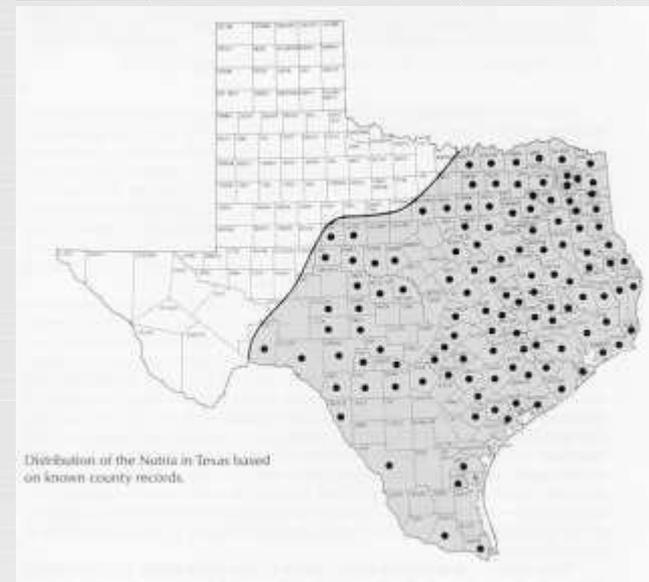
Ears and eyes are small

Webbed hind feet have 5 toes

Thick soft under fur - overlain with long coarse guard hairs

Habitat: inhabit marshes, lake edges, and sluggish streams, especially in areas with emergent or succulent vegetation along the banks. Burrows into banks

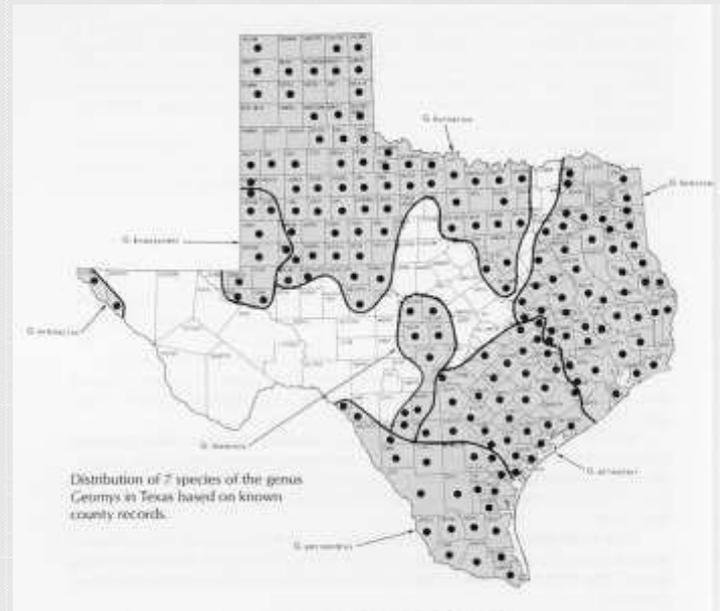
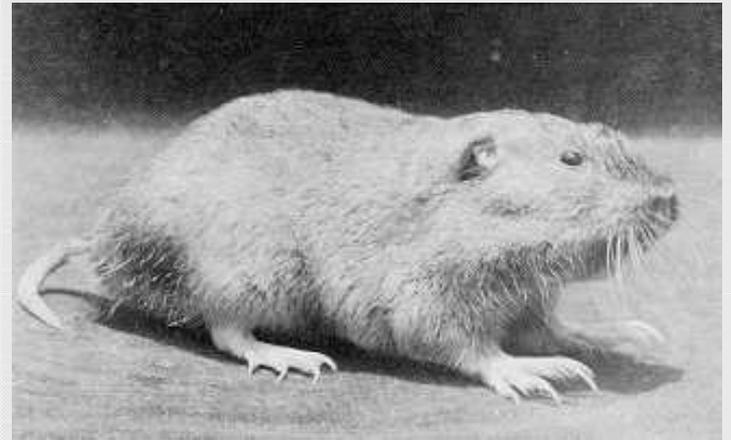
Eats and rests on platforms above dense vegetation; Nocturnal feeder on plants



Geomys spp.

Pocket gophers

- First upper cheek-tooth is constricted (hour-glass shaped)
- Last upper molar is larger than other molars
- Two grooves in incisors
- Fossorial
- Fur-line cheek pouches
- Lips close behind incisors
- Claws on forefeet (larger) and hindfeet for digging
- 9 Species in Texas
- *G. attwateri* and *G. breviceps*



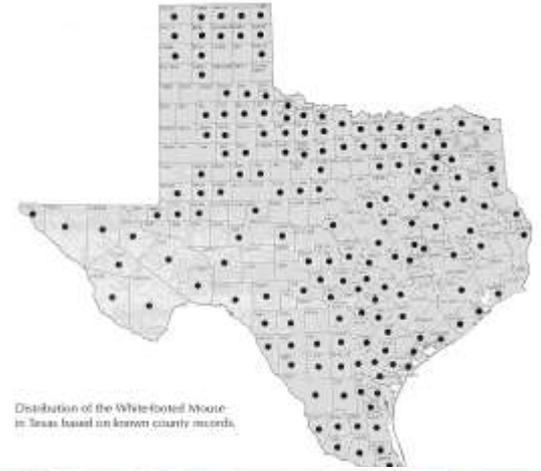
Peromyscus leucopus

White-footed mouse

Distribution: Statewide

ID: Rufous mixed with grey/brown above w/ darker stripe on mid-back; sides paler and underparts and feet white. Ankle slightly brownish. Tail short and sparsely haired, indistinctly bi-colored, small tufts

Habitat: Highly variable and numerous in range. Most common and widespread of all *Peromyscus*



Roof Rat

Rattus rattus

Distribution: Found on all continents of the earth by introduction through human travel overseas

ID: Scaly tail, dark, longer than head and body. Brownish-grey above, grey belly

Habitat: Frequents urban areas



Norway Rat

Rattus norvegicus

Size: Larger than *Rattus rattus*

ID: Tail shorter than head and body. Scaly tail, different from woodrats

☞ Introduced; Widespread through U.S. in urban and field



House Mouse

Mus musculus

Distribution: Introduced and widely distributed over Texas, particularly in human dwellings

ID: Small, nearly unicolored greyish-brown. Has distinct notch in the cutting surface of upper incisor. Ears large and mostly naked. Tail dusky and unicolored (Scaly) (might be a little paler below)



Lepus californicus

Black-tailed jackrabbit

ID: Long eared, top of tail black

Habits: Active at twilight foraging into night

Diet: grass and herbaceous veg.

Habitat: desert scrubland, prairies, farmlands, and dunes. Many different vegetation types are used, including sagebrush-creosote bush, mesquite-snakeweed and juniper-big sagebrush.

Distribution: statewide
except Big Thicket

Young are precocial

HARE



Sylvilagus floridanus

Eastern cottontail

ID: dense, buffy brown underfur and longer, coarser gray- and black-tipped guard hairs cover the back of the eastern cottontail. Its rump and flanks are gray, and it has a prominent brownish-red patch on its nape. The ventral surface is white.

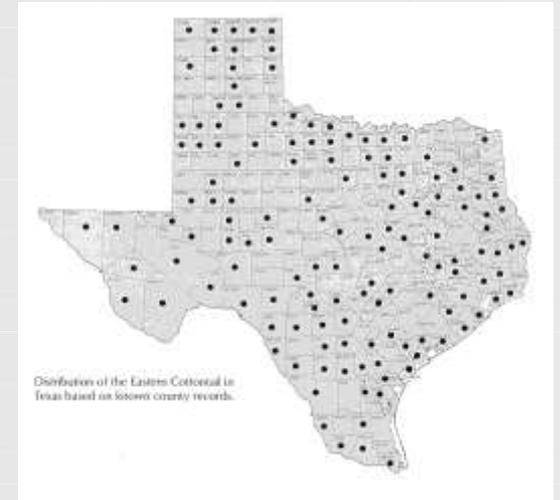
Habitat: “edge” environments, meadows, orchards, farmlands, hedgerows and areas with second growth shrubs, vines and low deciduous trees.

Diet: varies due to season

Distribution: throughout Texas

Skull: Auditory bulla small and smooth

Young are altricial



Coyote

Canis latrans

Similar to red wolf but smaller, narrower muzzle and paler in color

Diet: Prey mostly small birds and rodents, carrion of large game in winter, will eat vegetation

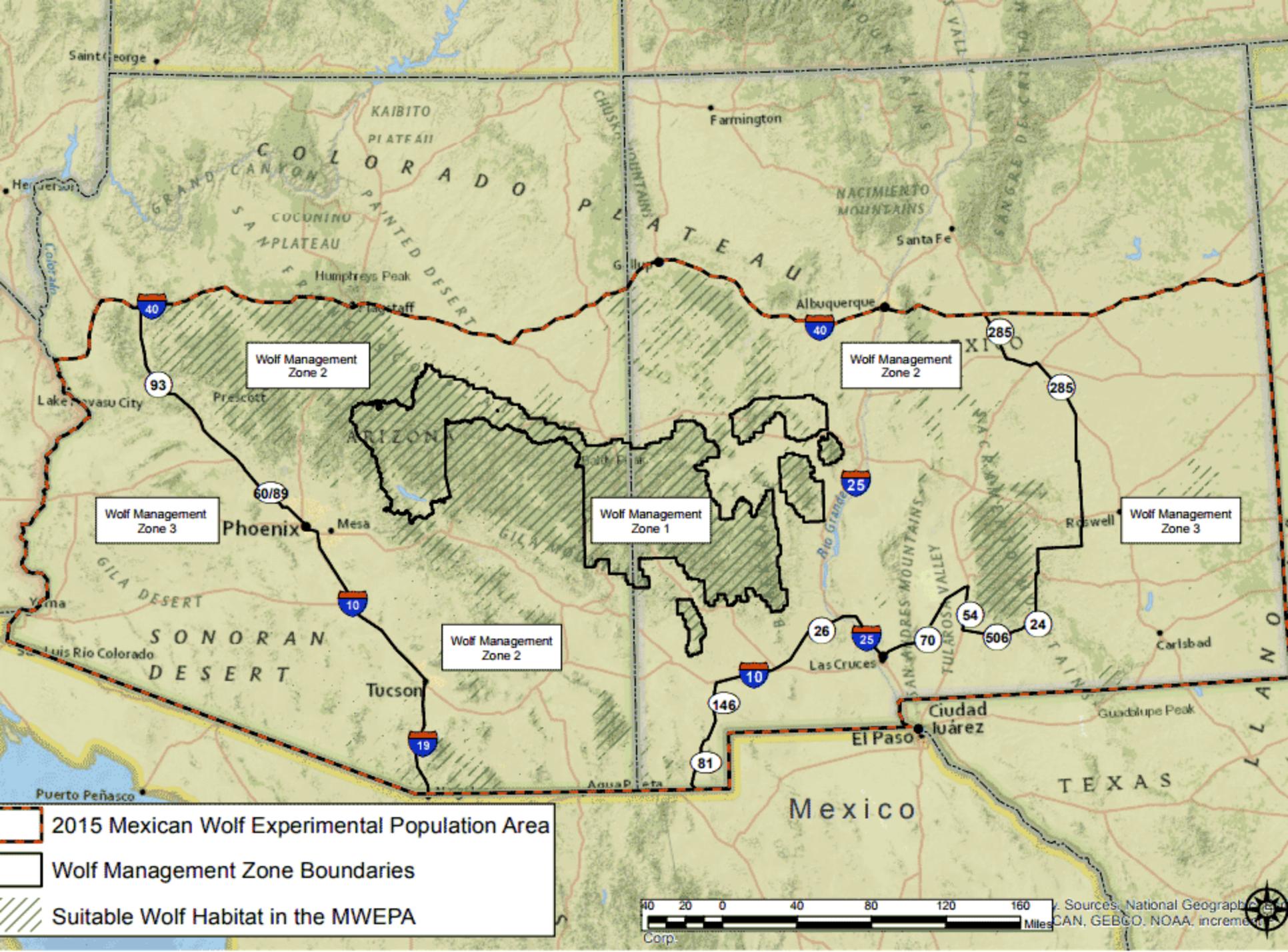
Habits: Mostly crepuscular activity

Habitat: Highly variable

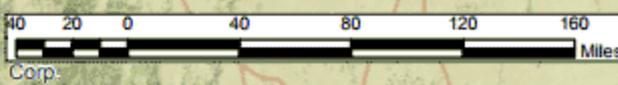
Distribution: Common statewide

Top Predator?





2015 Mexican Wolf Experimental Population Area
 Wolf Management Zone Boundaries
 Suitable Wolf Habitat in the MWEPA

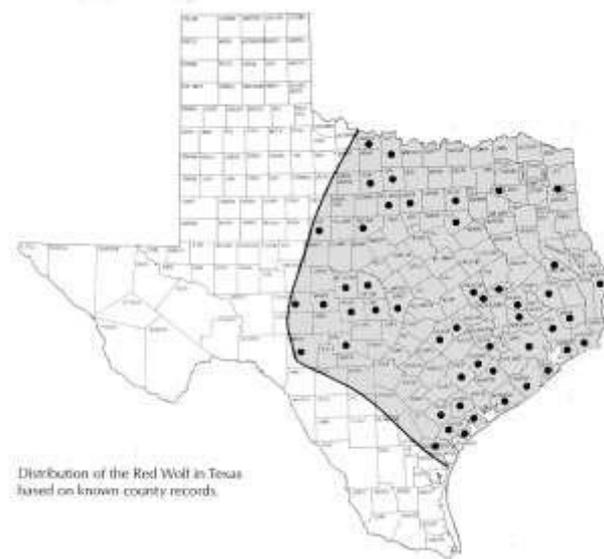


Sources: National Geographic
 CAN, GEBGO, NOAA, increment
 Corp.

Red Wolf

Canis rufus

- Slender and long-legged
- Resembles coyote; Slightly larger and darker
- Formerly ranged throughout East Texas
- Hybridization with coyotes – more social and nocturnal
- Brush, forest, coastal prairies
- Extirpated from Texas
- FWS and TPWD Endangered



Former Range

Common Gray Fox

Urocyon cinereoargenteus

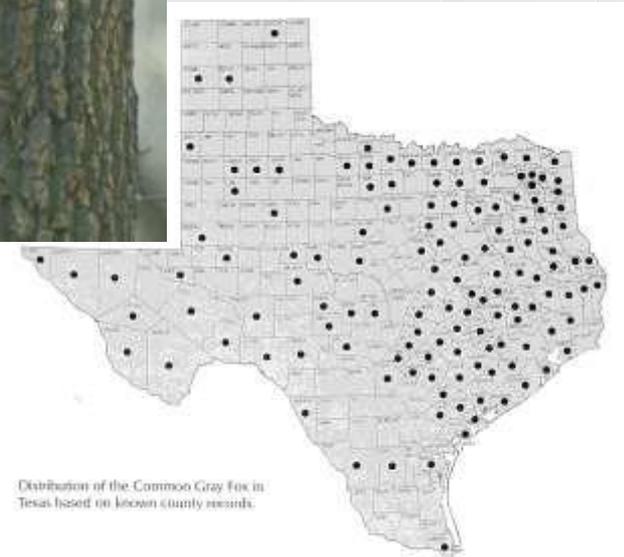
ID: Gray upper, red-brown legs.

Diet: varies seasonally, most important is small mammals

Habitat: uplands and bottomlands; edge species

Distribution: Found statewide, greater in eastern regions

Habits: Adept climbers, can leap branch to branch



Red Fox

Vulpes vulpes

ID: Similar size to gray fox, but very different color and cranial traits. Thick bushy, white-tipped tail. Forelegs feet to elbow black

Diet: small rodents, rabbits, insects, fruit

Habitat: mixed woodland uplands interspersed with farms

Distribution: Relatively common throughout except extreme west and south

Notes: Introduced to state in 1895 for sport

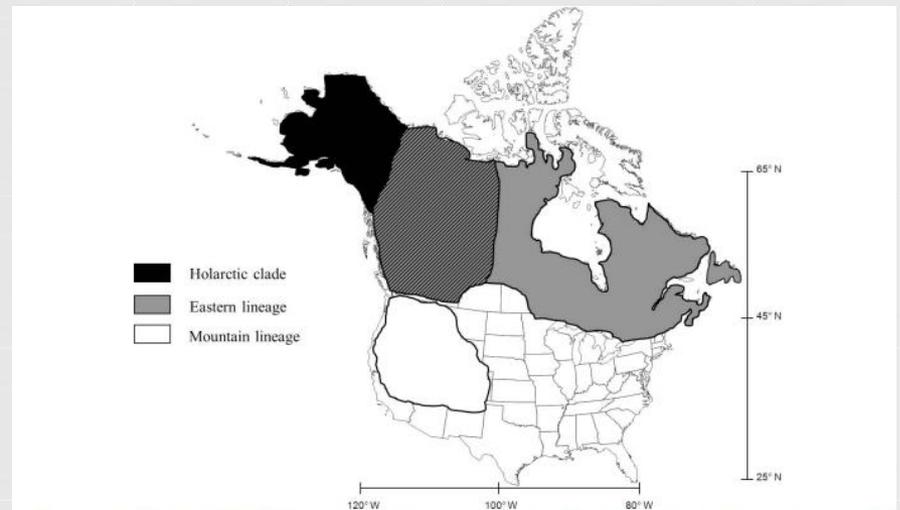


FIG. 1.—Approximate geographic distribution of North American red fox mitochondrial DNA lineages prior to European settlement modified from Aubry et al. (2009). The Eastern and Mountain lineages together comprise the Nearctic clade, which is restricted to North America. The

Mountain Lion

Puma concolor

ID: unspotted body with long, black-tipped tail (>1/2 body). Small rounded ears w/ no tufts. Tawny above, whitish below

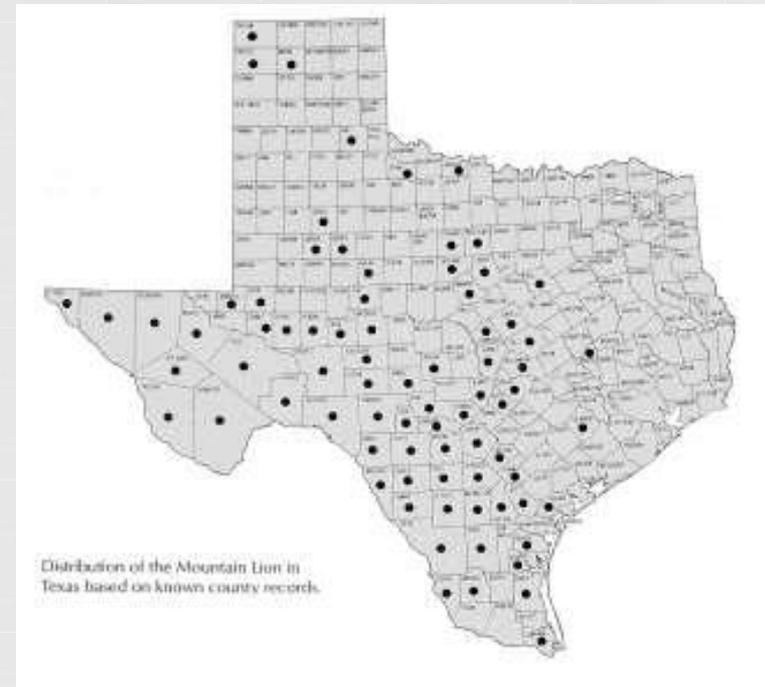
Habitat: Rocky habitats preferred (Trans Pecos, Rio Grande Plains), avoids shrubless desert & ag areas

Diet: deer and medium sized mammals

Distribution: once state-wide, now in desert regions of Trans-Pecos and some parts of Edwards Plateau

Habits: Solitary except during breeding; kits spotted. Adept climbers

Notes: TX only state not regulated; also called cougar, puma, panther, etc.



Bobcat

Lynx rufus

Medium-sized, tail short – black above white below. Upper reddish brown streaked with black. Lower whitish spotted black. Ears tufted. Head with ruff.

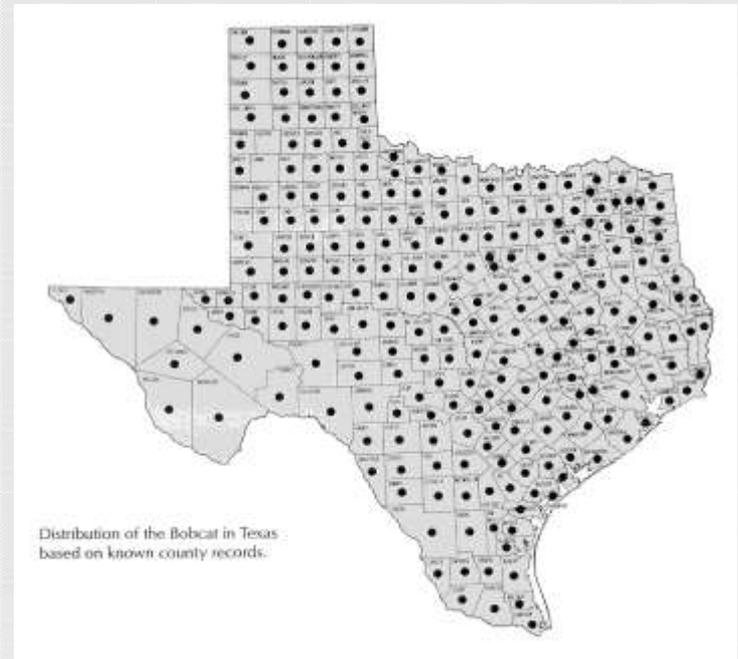
Ranging throughout U.S.

Habitat usually wooded.

Primarily nocturnal. Very adaptable.

Can be fairly long lived; 12-13 yrs.

Eats rabbits, squirrels, rats, mice.



Ocelot

Leopardis pardalis

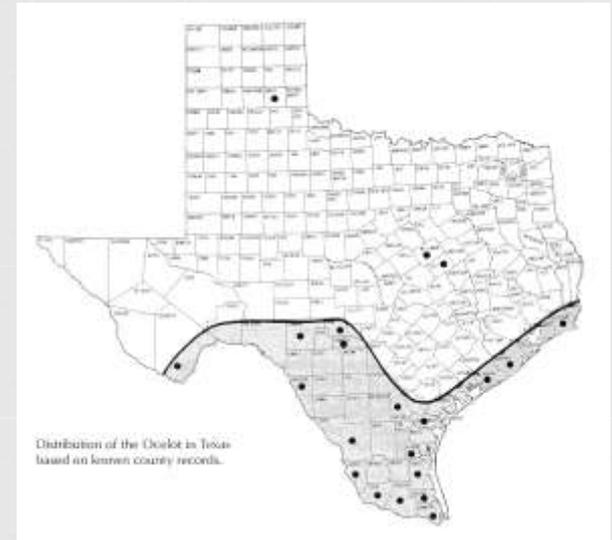
ID: spotted & blotched, smooth coat. Larger than margay w/ more robust skull

Distribution: Neotropical, once ranged through TX to AR, now only 4 counties of Rio Grande Valley

Habitat: dense shrub, mostly tropical

Habits/Diet: Nocturnal, feeds mostly rodents

Notes: endangered, listed state and federal



From records, now only found in 4 border counties

How to tell an ocelot from a bobcat:



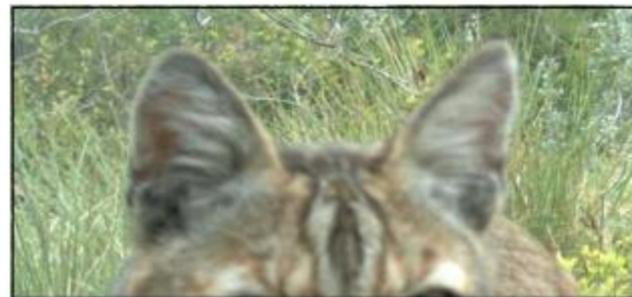
Typical coat pattern of an ocelot



Typical coat pattern of a bobcat



Rounded ears on ocelot



Pointed and tufted ears on bobcat



Long, ringed tail on ocelot



Short, bobbed tail on bobcat



American Black Bear

Ursus americanus

Size: Medium-sized, 100-150 kg

ID: brown or black. Face profile straight (not concave like grizzly)

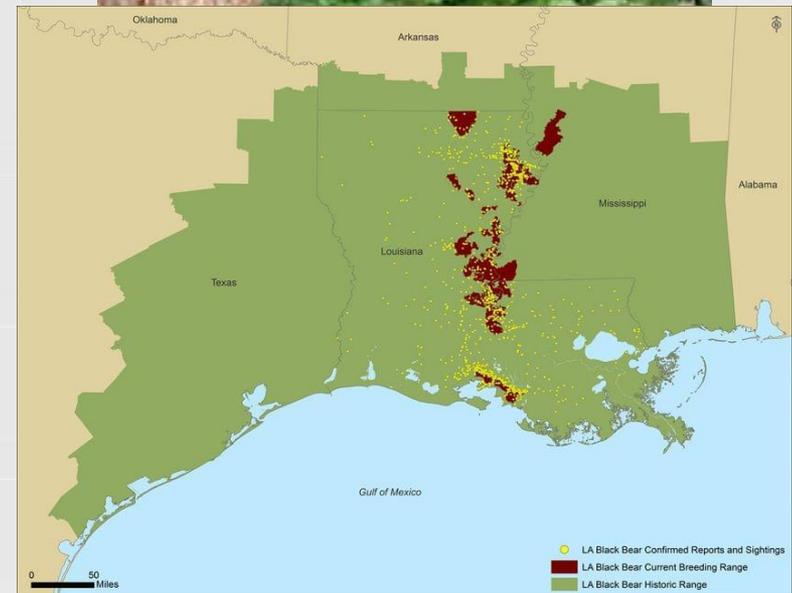
Distribution: Formerly widespread through TX, now primarily Trans-Pecos, recent reports of them in Big Thicket (from LA populations)

Diet: highly varied

Habits: Exhibits winter lethargy in winter. Curved claws for climbing, though spend most time on ground

Notes: TPWD list threatened, though #'s growing

Louisiana black bear, *Ursus americanus luteolous* was recovered



Common Raccoon

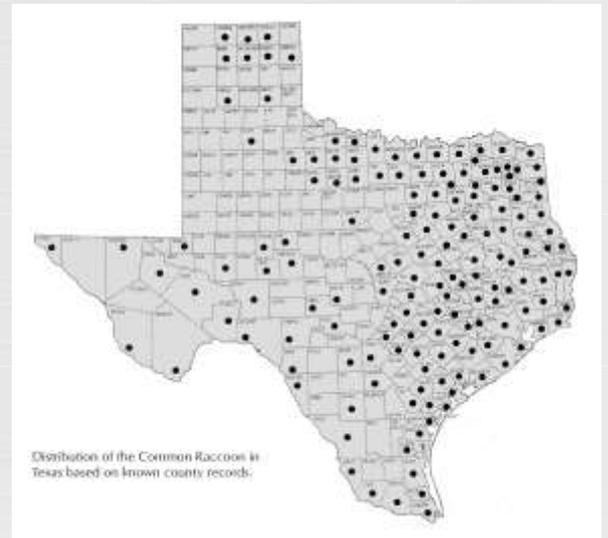
Procyon lotor

ID: Gray to blackish grizzled pelage with distinctive dark mask and ringed tail. Teeth more flattened for crushing, not for cutting as in dogs and cats

Diet: Omnivorous

Distribution: Found statewide, especially near water

Habitat: broadleaf woodlands, although they are rather common in the mixed-pine forests of southeastern Texas



Black-footed Ferret

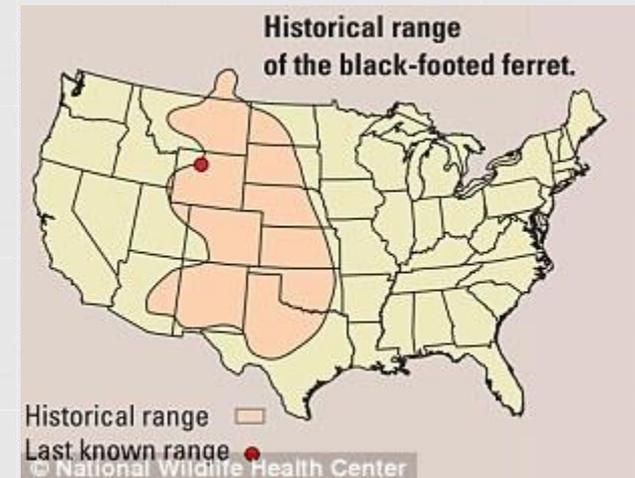
Mustela nigripes

Historically distributed in NW
1/3 TX, Panhandle, Trans-
Pecos, and part of Rolling
Plains

Now survives only in captivity and
some recently reintroduced areas
in western states.

Closely associated with prairie dog
towns, a main source of food.

Fleas spread sylvatic plague
Endangered



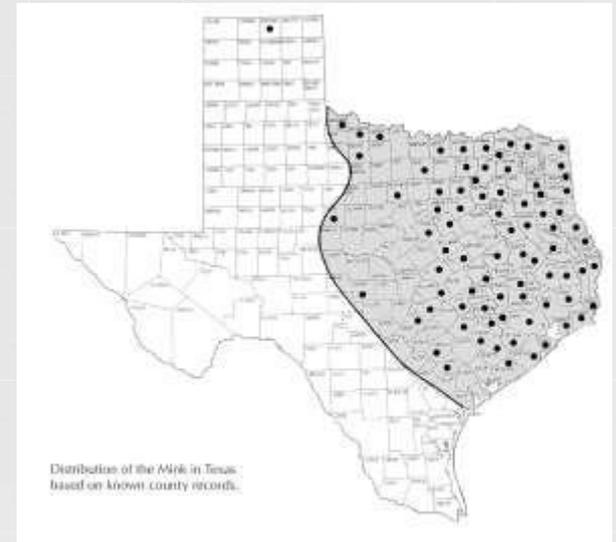
Mink - *Mustela vison*

ID: Slender, weasel-like carnivore. Dark brown, feet and tip of tail nearly black. Underparts paler and have a white chin patch. Tail long and moderately bushy

Distribution: Eastern one-half of the state.

Habits: Nocturnal, semi-aquatic

Diet: wide variety of animals which they usually capture and kill including aquatic birds, mammals, frogs, etc.



American Badger

Taxidea taxus

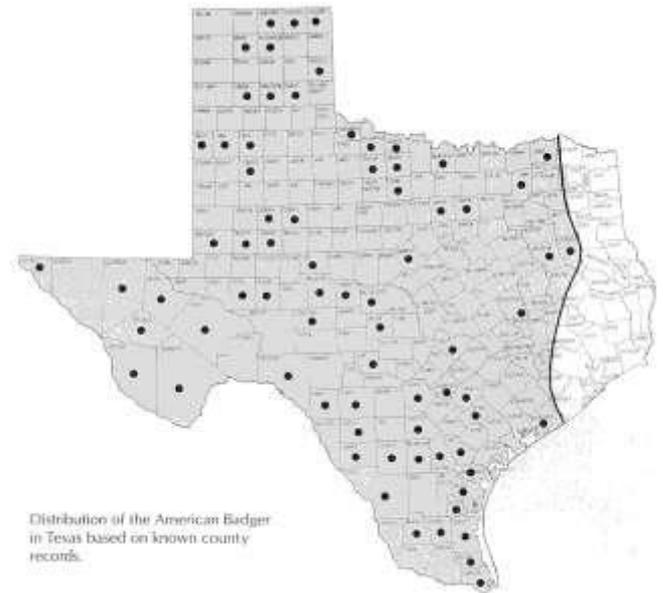
ID: Short, broad bodied carnivore with short legs and long front claws used for digging. Long pelage, grizzled grayish-yellow, distinct white stripe from nose, over head to shoulders. Underparts are yellowish-white. White crescent behind the eyes and around the ears surrounds a dark spot on the face.

Distribution: Not extreme East Texas

Habitat: Generally occur in areas inhabited by ground squirrels and prairie dogs, a main source of food.

Diet: mostly ground squirrels

Habits: Usually solitary



River Otter

Lontra canadensis

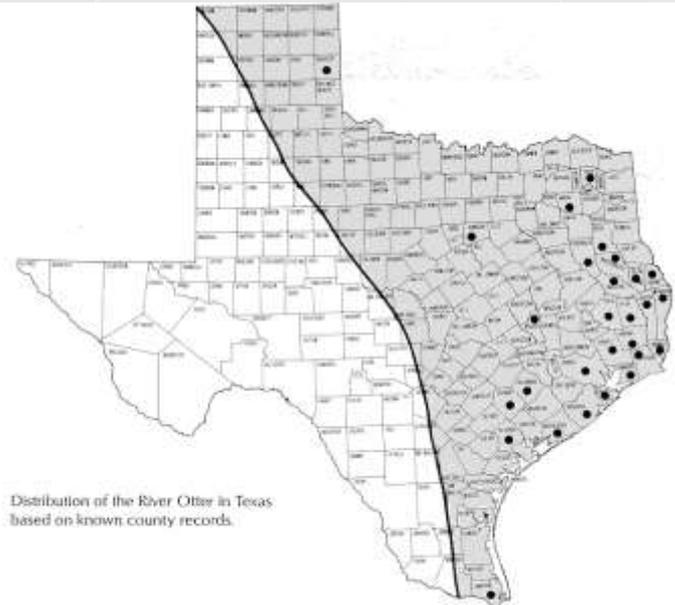
ID: Large, dark brown, slender body and long, thick tapered tail. Adapted for aquatic lifestyle: an oily, waterproof coat, webbed toes, and small external ears.



Distribution: Eastern TX near lakes, larger streams, marshes, bayous and brackish inlets.

Habits: Expert swimmers and divers

Diet: feed primarily on crayfish, fish, etc.



Eastern Spotted Skunk

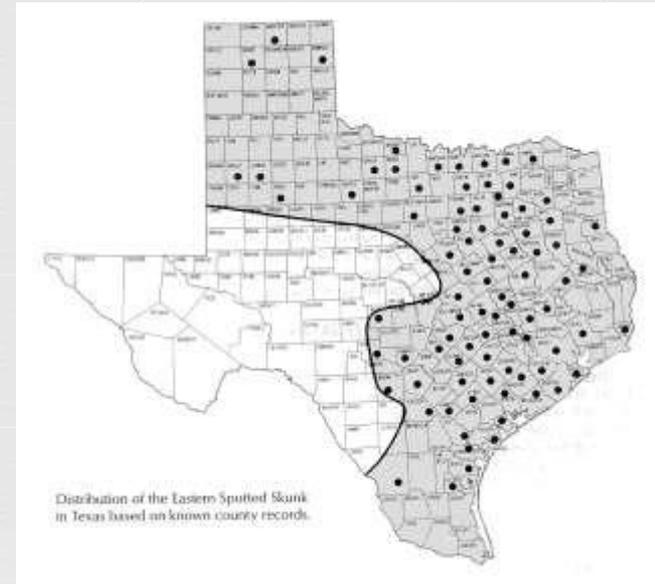
Spilogale putorius

Previously one species w/ Western Spotted Skunk; now 2 spp. based on genetics.

ID: Black pelage more extensive than Western, w/ small white spot on forehead, one in front of each ear. Many thin white stripes on back, tail all black except small white tip.

Distribution: Eastern half of TX. Prefer areas with much cover, especially riparian woodlands.

Diet: many pests and rabbits - excellent rat-catchers



Striped Skunk

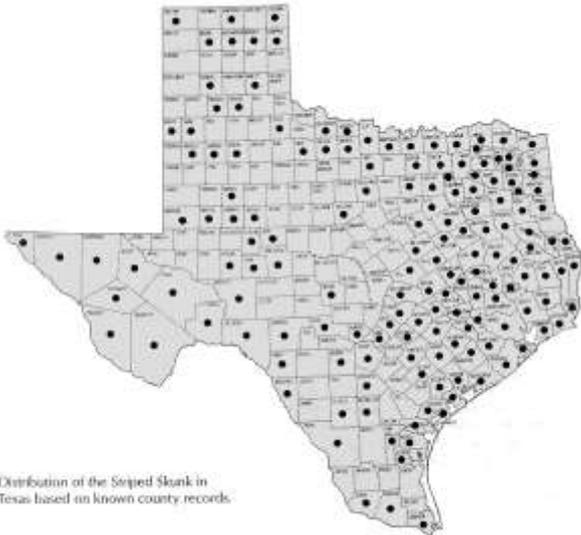
Mephitis mephitis



Size: Medium sized skunk,
ID: 2 dorsal white stripes that meet in a V on the nape. Stripes vary in size and shape; skunks may appear all white, all black or spotted. Amount of white in tail also variable.

Distribution: Most common skunk in NA, found throughout TX

Habitat: Woody or brushy areas, associated farmlands.



Sus scrofa

feral pig/hog

Descendants of domestic stock and European wild hogs

Habitat: timbered areas with some clearings; areas with leaf litter for foraging

Tail coiled or straight. Vary in color depending upon their ancestral stock: brown, black, red, white, combo, w/ or w/o spots.

Skull: steeply elevated cranium, long rostrum, no bony ring around eye socket. Canines curl as they grow – heavy impact on native wildlife.



Pecari tajacu

Collared Peccary

Pig-like w/ 4 hoofed toes on front, 3 on hind. Relatively small hooves.

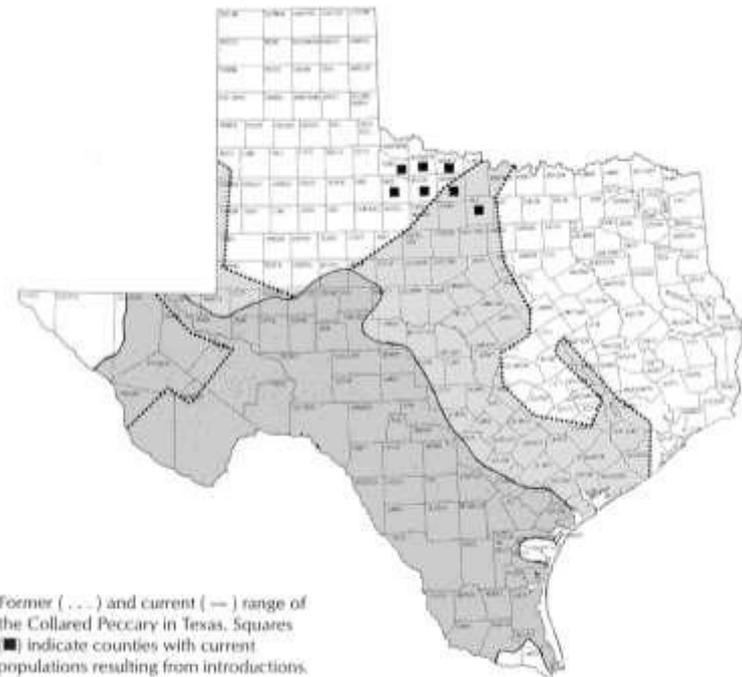
Harsh pelage, grizzled gray-black, white ring around the shoulders and black dorsal stripe.

Distinct scent gland on rump;
Fewer tail vertebrae than pigs.

Young are red-yellowish brown w/ black dorsal stripe. Canines straight in skull

dense brushy semi-desert, chaparral

Herbivore, not known for grubbing



Cervidae

Antlers composed entirely of bone, grow from pedicles connected to the frontal bone.

Antlers start w/ layer of velvet that is very vascular and nested with nerves that supplies the antler with nutrients

Shed annually

Ruminants



Bovidae

Largest family of artiodactyla: 137
worldwide, 5 in North America, 2 in
Texas (native)

Both males and females have horns

Horns formed from inner core of bone
derived from the frontal bone, then
sheath of keratinized tissue.

Horns usually grow continuously
and never shed.

Usually 4 toes on each foot

Ruminants



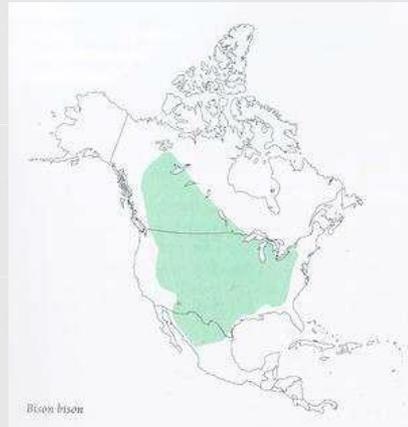
Bos bison

Distribution: Historically ranged the western 2/3 of the state.

ID: Head heavy, w/ short curved black horns.

Diet: Grazers of open prairies

Habits: Gregarious, daily activities much like those of domestic cattle.



Antilocapridae

Pronghorn (*Antilocapra americana*) is only species in this family.

Not a true antelope but has been placed into this family as it has characteristics of both cervids and bovids.

Horns in both sexes, but the sheaths are shed yearly.

Two toes on each foot, no dewclaws

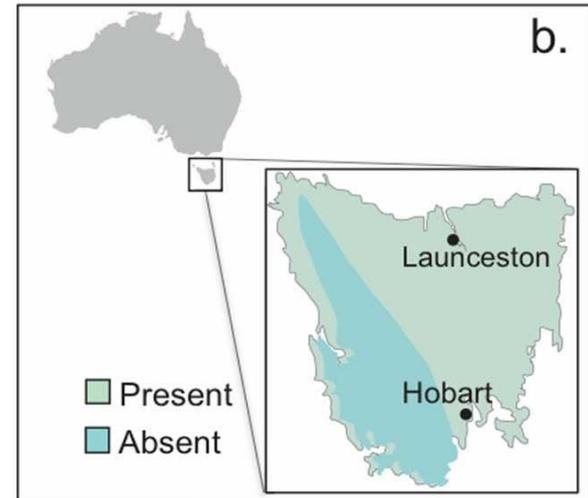
Ruminants



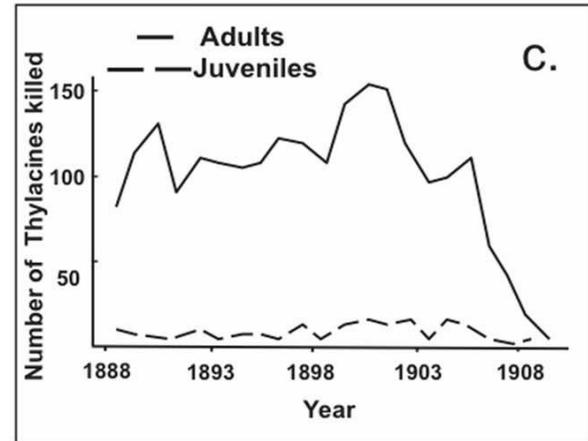
Thylacinus cynocephalus

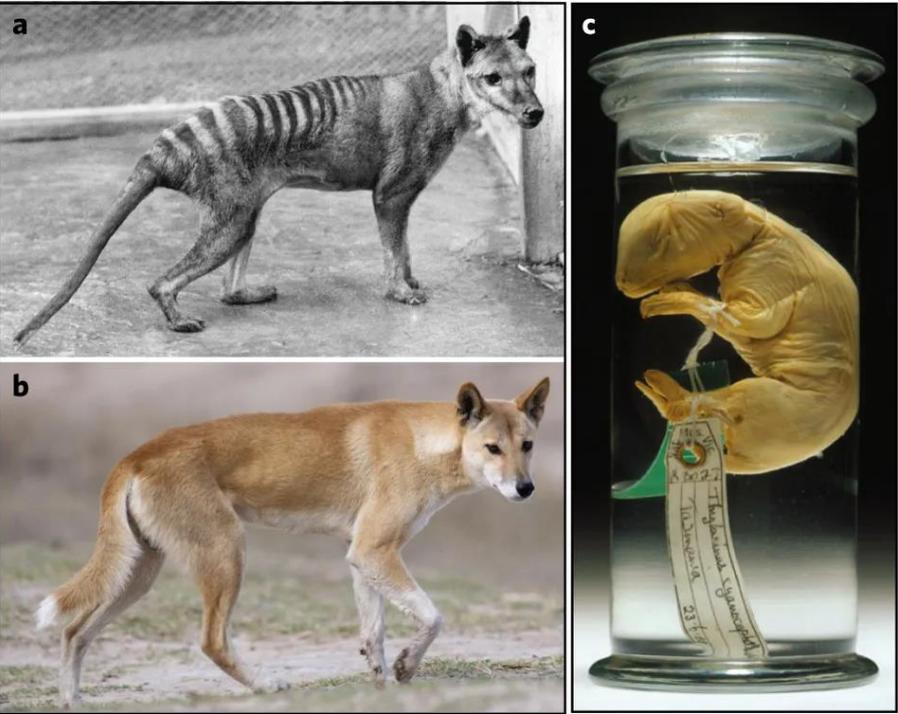
Thylacine “Tasmanian tiger”

Marsupial apex predator (kangaroos, rodents, birds) Nocturnal
Steep decline in diversity and Ne 70-120t ya
Significant bottleneck before aboriginals arrived 50t ya
Population on Tasmania isolated 14,000 ya
Extirpated from mainland Australia 3,000 ya
Introduction of dingos, habitat loss, fire
Bounty hunting 1890s-1900s (sheep)
Epidemic disease 1920s
Last known died 1936, declared extinct 1982

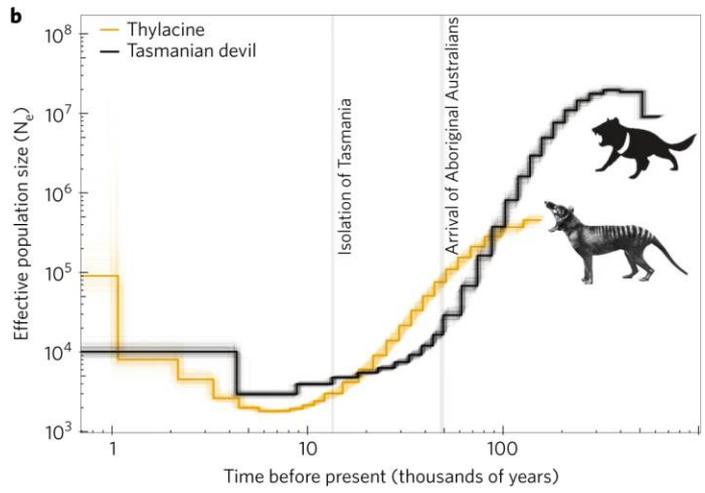
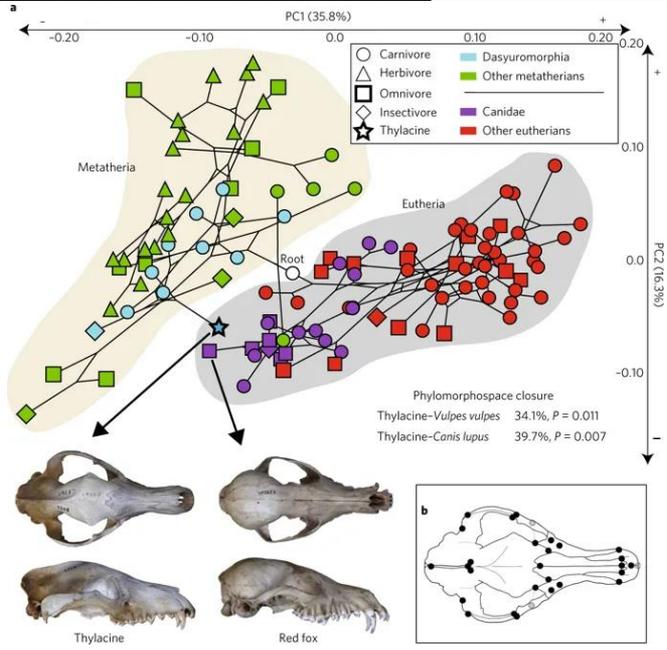
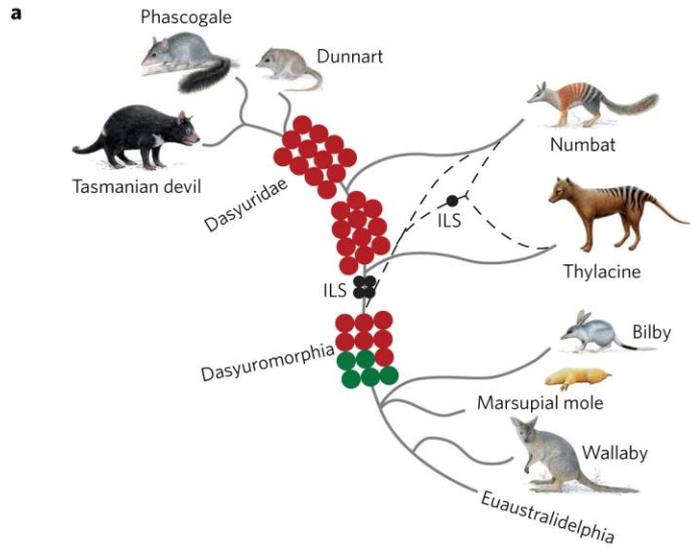


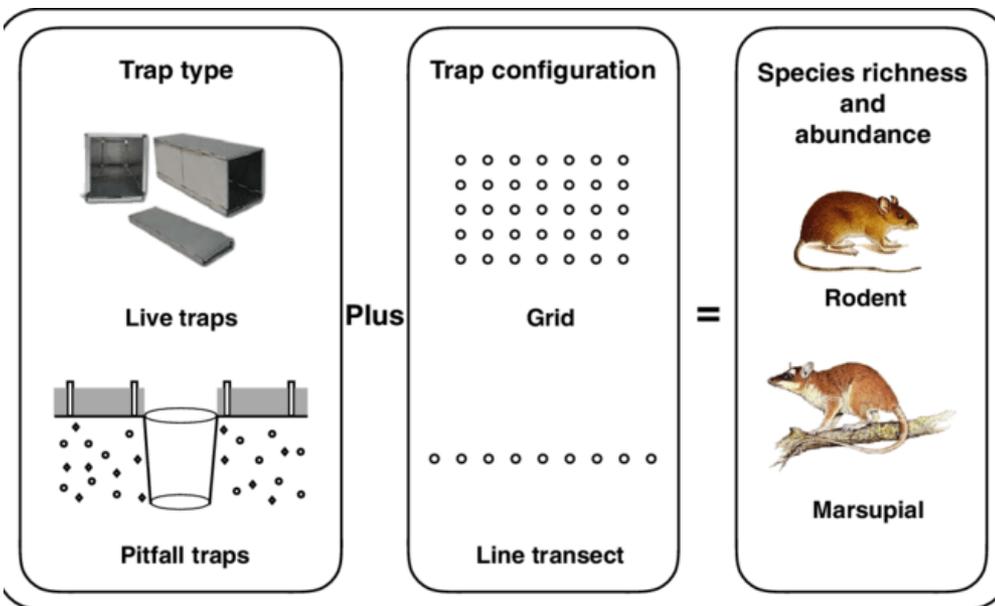
Tasmanian tiger, or thylacine
(*Thylacinus cynocephalus*),
with mouth agape





Feigin, C.Y., Newton, A.H., Doronina, L. *et al.* Genome of the Tasmanian tiger provides insights into the evolution and demography of an extinct marsupial carnivore. *Nat Ecol Evol* **2**, 182–192 (2018).
<https://doi.org/10.1038/s41559-017-0417-y>





Questions



Unit Goals

- Become familiar with the common native Texas mammals in your ecoregion
- Demonstrate knowledge about the general characteristics of the 3 major subclasses of mammals
- Discuss basic principles of mammal behavior, physiology, and ecology and relate these principles to environmental adaptations
- Demonstrate familiarity with the 10 orders of mammals found in the state
- Discuss the diversity and distribution of mammals in Texas and an understanding of the role of mammals in Texas ecosystems
- Demonstrate knowledge of estimating/measuring animal populations
- Demonstrate knowledge of methods for trapping, marking, monitoring, and observing mammal populations
- Understand threats to mammals in Texas