

# A Waterless Habitat? Ornate Box Turtles on the Sand Hills of Colorado

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## Abstract

The Colorado Box Turtle Project is conducting a long-term study on a population of Ornate Box Turtles (*Terrapene ornata ornata*) on the sand hills of Weld County, Colorado, with 140 marked turtles. Lacking any natural standing water, the study site includes a water-pumping windmill sporadically operated and only rarely producing overflows. Given home range estimates of *T. o. ornata* in Nebraska, Kansas, New Mexico, Texas, and Iowa, and the distance from the windmill to where our turtles are found, use of this rare water source is unlikely. This supports the conclusion that *T. o. ornata* do not require standing water within their home range. Additionally, we provide information on one food choice, Prairie Spiderwort (*Tradescantia occidentalis*), a sub-succulent, perennial monocot that may provide an important hydration source in the absence of standing water. Comparisons of *T. o. ornata* ecology and natural history traits from different ecosystems provide insights as to how *T. o. ornata* adapts to a wide range of habitats. This is essential to informing conservation and preservation efforts of this species in Colorado and elsewhere in its natural range.

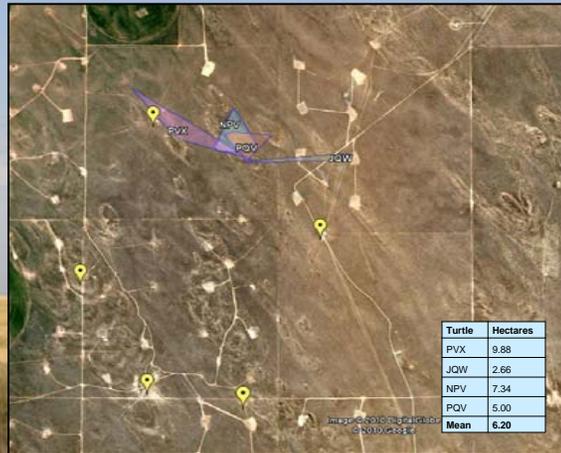
## Water Availability

•Within the 50 ha study site, there is a single water-pumping windmill. The surrounding area (~10 km<sup>2</sup>) contains another 4 windmills sporadically producing water accessible to turtles.

•Water-pumping windmills are operated to coincide with cattle grazing. Grazing rotation is dependent on forage availability and is thus unpredictable.

•95% of precipitation occurs April – October (Western Regional Climate Center) yet ephemeral puddles are rarer than agricultural runoff.

•Given our initial home range estimates and those from *T. o. ornata* in other states, water runoff from windmills is well outside the range of the vast majority of turtles on this site.



Study site with windmill markers and estimated home ranges calculated as minimum convex polygons (MCP).

## Prairie Spiderwort (*Tradescantia occidentalis*) as Hydration Source

•Prairie Spiderwort is a smooth, sub-succulent, perennial monocot up to 50 cm tall. Stems are often tufted, and when pulled apart, the copious mucilaginous slime inside forms what somewhat resembles a spider's web. These plants are known as "cow slobber" because of the gooey, stringy sap they produce.

•Ohio Spiderwort (*Tradescantia ohioensis*) has been listed as part of the floral community in *T. o. ornata* habitat in Iowa (Bowen et al. 2004) and Wisconsin (Doroff & Keith 1990).

•Ornate Box Turtles on the study site were directly observed eating Prairie Spiderwort (*T. occidentalis*) on 6 separate occasions from 2008-2010.

•Specimens of *T. occidentalis* were planted into two naturalistic box turtle habitats, each more than 60 m<sup>2</sup>. Wild-collected *T. o. ornata* readily ate this plant, often cropping it to the ground and inducing dormancy until the next growing season.



A wild male *T. o. ornata* eating Prairie Spiderwort (*T. occidentalis*).

## Methods

•Broad-area visual surveys were conducted on a study site of approximately 50 hectares of ranched sand hills from June-October 2007, March-September 2008, March-October 2009, March-July 2010.

•Morphometric data, including straight carapace length, maximum height, width at hinge, and mass are collected for each turtle; turtles are marked to identify recaptures.

•Temperature, humidity, and general weather is recorded along with surface temperatures of carapace and ground.

•Radio tracking of adult (>100mm SCL) box turtles began in May 2010 (n=4). Turtles are located every seven days. Data are incomplete due to predation.



Prairie Spiderwort, *Tradescantia occidentalis*

## Home Range Estimates, 1958-2006

State	Size	Date	Reference
WI	0.2 - 58.1 ha	1990	Doroff and Keith
IA	2.69 - 5.8 ha	2006	Bernstein et al.
KS	2.2 ha	1958	Fitch
KS	2.3 ha	1960	Legler
KS	.43 - 12.65 ha	1984	Rose
NE	.12 - 57 ha	1997	Claussen
NE	2.2 - 15.8 ha	1995	Trail
NE	4.6 - 36.4 ha	1995	Holy
NM	0.03 - 4.1 ha	1993, 1996	Nieuwolt
NM	0.08 - 16.4 ha	1993, 1996	Nieuwolt
NM	0.006 - 4.4 ha	1993, 1996	Nieuwolt

(Adopted from Dodd 2001, Redder et al. 2006, Bernstein et al 2006, and Rose 1984)

## Discussion

•Free water availability is historically scarce in the Colorado sand hills and the development of agricultural water sources is only a recent event in the evolution of *T. o. ornata*.

•Estimated home range sizes for Ornate Box Turtles precludes reliance on human-developed water sources. We hypothesize the metabolic cost of long treks for free water is too high, especially for smaller mass adults and juveniles.

•Understanding hydration sources and nutritional choices will assist management decisions in the conservation and preservation of this species.



Wild-collected *T. o. ornata* eat Prairie Spiderwort, *Tradescantia occidentalis*

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