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The
Resiliency
of the
Western
Pond
Turtle

WESTERN POND

BASKING IN THEIR OWN RESILIENCY



Photo © Sarah Anne Bettelheim

Story by Matthew Bettelheim

TURTLES



Biologists consider the western pond turtle, right, a priority species. The Pacific Coast native often competes for habitat with the more aggressive red-eared slider, at left. Western pond turtles nest less frequently and lay fewer clutches of eggs than the non-native sliders.



California's Only Remaining Native Freshwater Turtle

More than a century ago in the ghostly waters of the San Joaquin Valley's Tulare Lake, a massive population of western pond turtles thrived within the environment of marshes and sloughs of its shores. Considered at the time the largest freshwater lake in the western United States, early newspaper accounts recalled the tales of pioneers and how they described the abundance of the native turtles, saying that when flushed, "they popped into the water in a solid mass, making a roar like the surf on a beach."

With the passing of Tulare Lake by the early 1900s due to agricultural interests redirecting water for cotton and safflowers, so too passed the estimated

millions of western pond turtles that trod its tule tangles. These days, it is becoming harder to find robust populations of western pond turtle, the Pacific Coast's only native freshwater turtle.

Recently, a team of scientists returned to a camp on the shoreline of a vernal lake in Lake County, about 250 miles north of the once-grand Tulare Lake. Here, somewhere deep in the lake's boggy depths, a more modest assemblage of western pond turtles has persisted for untold years. By early June the lake's open water has receded from the winter's highpoint and in this sodden inner sanctum, turtles forage, mate and bask unperturbed. The team is there when the females hazard dry land to nest, moving with surprising speed as they storm the summer shores with resolve and fidelity. It

appears their urge to nest outweighs their need for concealment. Now, more than ever, every nest counts.

Western pond turtles were formerly abundant enough that they provided a reliable food source for some American Indians. In Lake County, the Clear Lake Pomo "turtled" by startling basking turtles from their perches into nets set below the water's surface. They also dined on turtle eggs wrapped in grass and baked in ashes. But shortly after the arrival of settlers, an industrial-scale harvest arose in California to collect western pond turtles for soups and stews. The popularity of the western pond turtle on pioneers' menus likely stemmed from East Coast colonists' desire for another turtle, the diamondback terrapin. In San Francisco, one author deemed diamondbacks "the inevitable

Male western pond turtles are identified by their pointed snout and pale, unmarked neck. The detailed speckles and marbling patterns characteristic of western pond turtles often become obscured by mud and algae, especially following a period of hibernation spent muddied-up in a lakebed.

THE DEPARTMENT OF FISH AND GAME, WITH SPECIES EXPERTS, IS DEVELOPING A CONSERVATION STRATEGY FOR THE HEALTH OF THE WESTERN POND TURTLE.

THE STRATEGY WILL PROVIDE AN ENCYCLOPEDIA REVIEW OF THE TURTLE, IDENTIFY CONSERVATION AND RESEARCH NEEDS, AND FOCUS RESEARCH AND PUBLIC ATTENTION ON THE SPECIES.

Photo © Sarah Anne Bettelheim

Water Turtle

stuffing of the ‘upper crust.’” By 1863, California markets had accepted western pond turtles as a terrapin substitute and enterprising market hunters harvested them with traps and quarter-mile-long nets. The turtles were shipped in barley sacks to exclusive clubs, hotels and restaurants, Chinese clientele, and venues like San Francisco’s *entrepôt* of foods, the California Market, described in 1867 by Santa Barbara attorney Jarrett T. Richards as a “great bazaar of flesh and fowl and game.”

By the 1880s, California market hunters captured several thousand terrapin annually. The markets peaked in 1899 with a record 53,935 western pond turtles. Shortly thereafter, collection of terrapin started to fall, according to commercial market receipts and

fish-tickets tracked in *California Fish and Game*, the Department’s quarterly scientific journal. The drop in numbers stretched from the early part of the new century, through World War I and past Prohibition—alcohol served as a crucial element in terrapin recipes. But the main cause of the decline was that the population of western pond turtles was being affected.

In 1992, a trio of herpetologists petitioned the U.S. Fish and Wildlife Service to list the western pond turtle as threatened or endangered. The formal request described the population in a “general state of decline through most of its range.” The petition blamed the decline on aquatic and terrestrial habitat degradation and loss, the spread of exotic predators and epidemic disease. The state’s

population growth—and associated urban and industrial development—significantly reduced the quality and amount of both aquatic and terrestrial habitat types. By the 1990s, for example, more than 90 percent of California’s historical wetlands—crucial turtle habitat—had disappeared while the incidence of predatory eastern bullfrogs and largemouth bass increased. The federal government rejected the petition, explaining its substantiating information was largely anecdotal. In its 1994 review of the status of California’s amphibians and reptiles, the Department of Fish and Game recognized the turtle as a species of special concern, a designation indicating increased management is necessary to avoid having to list an animal as threatened or endangered.

In Southern California, where



Photo © Sarah Anne Bettelheim

A researcher uses radio-telemetry to track a tagged western pond turtle. The radio device allows tracking from a distance so as not to disturb females during nesting. The females are especially wary during nesting forays and, if interrupted, may abandon their attempt and return to the water.

western pond turtles are regarded by some as on the verge of disappearance, DFG biologists consider them a priority species. Associate fisheries biologist Tim Hovey canvases huge parts of the state to locate healthy populations. He found one population that had taken up residency in a side-channel fed by flows from an upstream water treatment plant. Western pond turtles don't normally do well in suburban edges, so the number of pond turtles found recently in isolated pockets and on construction sites comes as a surprise to Hovey.

"They just turn up when contractors are digging ditches or plowing through

Other threats to the western pond turtle include non-native pet turtles, like red-eared sliders. Sliders—the original dime-store turtle—are often released into the wild once the adorable hatchlings grow into adult turtles.

streams," Hovey explains.

While this resiliency is good news, stressors like predatory bullfrogs,

largemouth bass, channel catfish and other exotic fish species—prevalent in most Southern California waters—still threaten the turtle's persistence. Too, during heavy rains western pond turtles get flushed downstream, a problem exacerbated when well-meaning citizens rescue them. If people hold western pond turtles in captivity before turning them over to a rehabilitation center, the risk of illness increases and scrambles any chance of returning them to the wild.

California's sole remaining native freshwater turtle is the western pond. Although the Sonoran mud turtle formerly occurred along the west side of



Photo © Matthew Bettelheim

Typically, western pond turtles warm themselves by perching on emergent logs and rocks. This male has found an exposed root-wad to bask. If spots are unavailable, western pond turtles will sometimes float at the water surface or just beneath a concealing mat of algae to soak in the sun's warmth.



Sonoma State University associate professor **Nicholas Geist** determines the carapace length of a female western pond turtle. At right, female western pond turtles leave the water to nest between April and August, excavating pear-shaped nest chambers in the ground that can hold between one and 13 porcelain-white eggs. Hatchlings emerge between 80 to 110 days later.

Photo © Sarah Anne Bettelheim

the Lower Colorado River, the species was lost because of changes in the habitat. Other threats to the western pond turtle include non-native pet turtles, like red-eared sliders. Sliders—the original dime-store turtle—are often released into the wild once the adorable hatchlings grow into adult turtles.

“Once we find adult sliders, we usually find all life stages,” says Hovey. Adult sliders are an indicator of a healthy population of exotics capable of reproducing. Compared to our native turtle, sliders grow larger, are more aggressive when basking, lay larger clutches more often and bring with them exotic pathogens and diseases. “They out-compete and push the western pond turtle out.”

Because of the international food and pet trade, red-eared sliders are in the wild on every continent and subcontinent except Antarctica. In 1997 alone, turtle farms in Louisiana exported more than 8.7 million red-eared sliders to international food and pet markets. These same farms also supply the domestic pet trade, though

Although they spend a lot of time in the water, both sexes migrate to drier, upland areas to shelter during winter.

numbers are hard to come by. Imported amphibians and reptiles are sometimes illegally released into the wild, where they can spread disease to, and compete with, native species.

As an attempt to help conserve remaining turtles, DFG contracted with species experts in 2008 to develop a conservation strategy for the western pond turtle. Targeted for school kids, graduate students and consulting biologists, the strategy will provide an encyclopedic review of the turtle, identify conservation and research needs and standardize survey and monitoring guidelines to focus research dollars and public attention on the species. The document is scheduled for release this summer.

“It’s a charismatic species,” explains DFG’s Betsy Bolster, a staff environmental scientist and statewide coordinator for amphibian and reptile conservation. “We chose the turtle because both conservation biologists and the general public are interested in it. There’s pretty good information that it was declining and we wanted to forestall that.”

It’s for that very reason the team of scientists are researching western pond turtles on the shore of the vernal lake in Lake County. The team is camped at the undisclosed location on an ecological reserve co-managed by DFG and The Nature Conservancy. Researchers await the arrival of gravid female turtles.

Since 2008, Dr. Nicholas Geist, an associate professor at Sonoma State University has turned the lakeshore into a living laboratory focused on nesting western pond turtles and the mechanics of temperature-dependant sex determination. Like most turtles, sex ratios are determined during incubation by the temperature of the eggs.

Geist says preliminary lab data

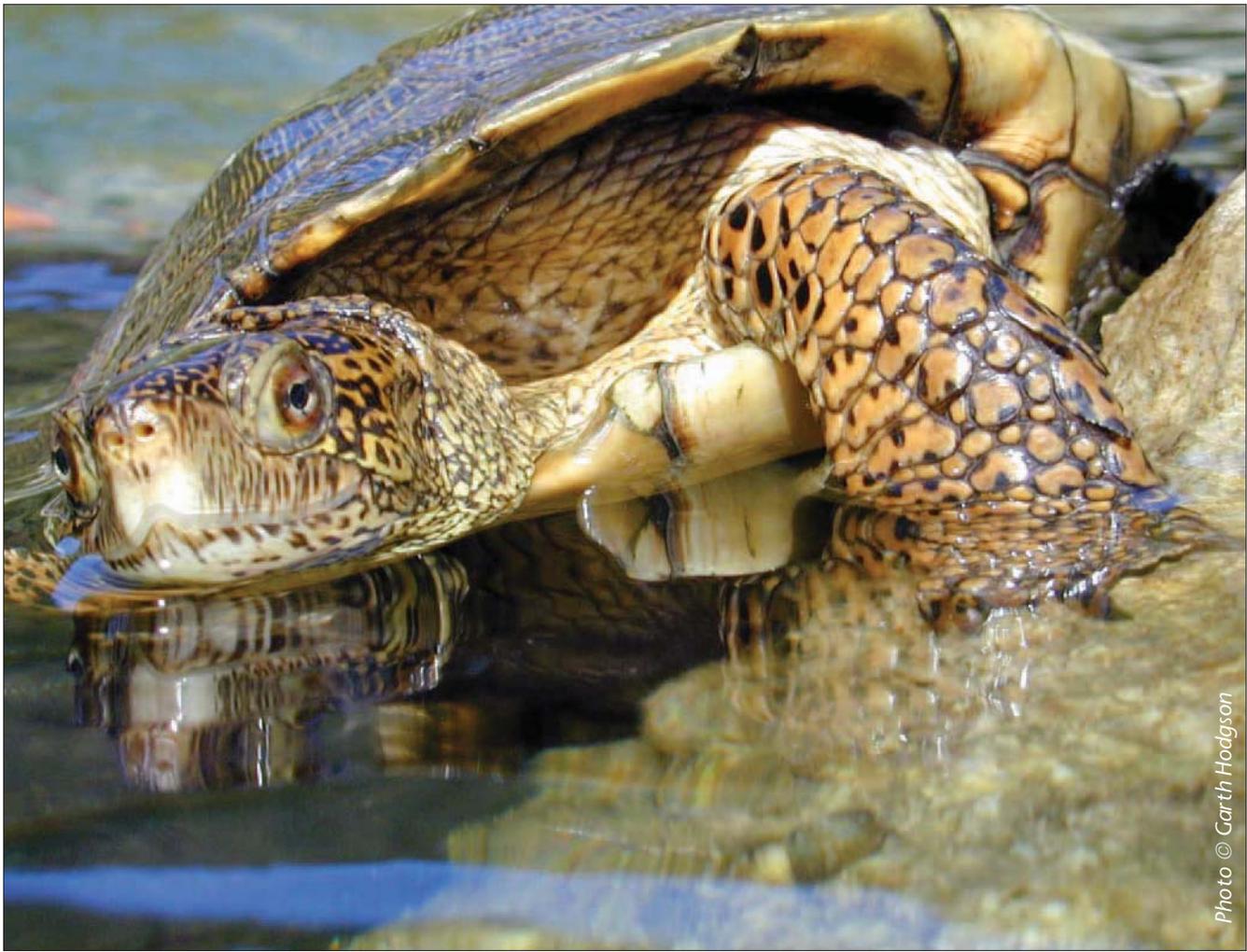


Photo © Garth Hodgson

Helping California's Native Turtles

Conservation Groups Call 2011 'Year of the Turtle'

California's declines in its native turtle populations are not unique. Worldwide, turtles are disappearing faster than any other animal group, says Betsy Bolster, DFG staff environmental scientist and statewide coordinator for amphibian and reptile conservation. Turtle conservation groups have designated 2011 as the Year of the Turtle to call attention to this issue. To learn more, visit www.parcplace.org/yearoftheturtle.htm.

Proactive land stewardship is one way to protect and conserve the western pond turtle. Here are tips to help give California's native pond turtle a leg up:

OFFSHORE EMERGENT features like tree falls, woody debris, rocks or tules provide ideal basking habitat; in the absence of natural substrates, consider basking platforms such as rafts that can be anchored at depth on a swivel to keep them free-floating.

NESTING HABITAT—Typically slopes facing south and west should remain sparsely vegetated up to 500 feet from the water's edge and free from artificial irrigation (eggs can explode when wet).

MANAGE URBAN PREDATORS; raccoons, skunks and wild boar are known predators of turtle nests and hatchlings.

REMOVE NON-NATIVES and exotics like bullfrogs, bass and red-eared sliders that eat or compete with native species.

DEEP WATERS provisioned with submerged tree roots provide refugia to escape predators.

SHALLOW WATERS provide warm nursery grounds for hatchlings.

SIGNS AND BROCHURES should remind visitors to leave land-bound pond turtles alone—it could be a female looking to nest.

Field Guide to the Western Pond Turtle (*Clemmys marmorata*)



General Field Markings

Shell Coloration:
carapace scutes (plates) marbled
dark brown / yellow-olive



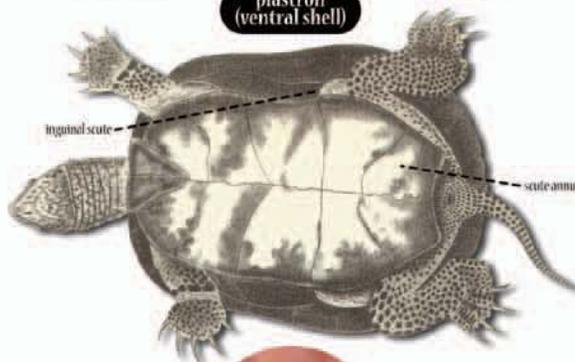
Skin Coloration:
marbled dark-brown / yellow-olive
cream / light-yellow



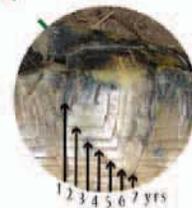
Inguinal Scute:
enlarged in
"C. m. marmorata"
(reduced/absent
in *"C. m. pallida"*)



plastron
(ventral shell)



Scute Annuli:
growth rings
form annually
for up to 16 yrs



Female



flecked throat
blunt snout

Male



light throat
pointed snout



1-13 hard, porcelain-white eggs / 31-38 mm long

flat plastron



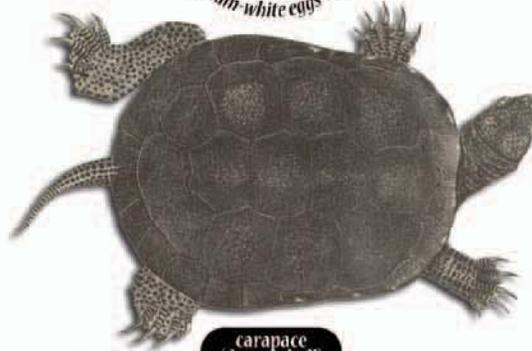
concave plastron



narrower/shorter tail
cloaca positioned before
carapace edge



carapace
(dorsal shell)



thicker/longer tail
cloaca positioned after
carapace edge



confirm embryos develop into females at warmer temperatures within a narrow range just below a lethal threshold. Outside of the thermosensitive period—the point of sex-determination—eggs can tolerate extreme temperatures. “You can broil the hell out of them as long as you cool them down at night,” he jokes.

Still, under warming climate conditions, increased ambient temperatures prolonged during the thermosensitive period could shift the ratios from females to nest failure, further decimating future turtle generations.

Although they spend a lot of time in the water, both sexes migrate to drier, upland areas to shelter during winter. But females will leave the water to lay their eggs. They dig a pear-shaped nest chamber in barren grasslands using their hind legs before carefully arranging up to 13 porcelain-white eggs. When finished, they plug the chamber with hard-packed soil.

Because turtles are skittish and cryptic nesters, Geist’s team of researchers and graduate students are employing a combination of tree blinds, radio-

telemetry and turtle-like resolve to locate nest sites.

The project has evolved into an experimental turtle head-start program—the process of collecting turtles eggs from the wild, hatching and rearing the young in captivity and then releasing them to the wild—to increase the young turtles’ chances of survival. With the help of the Oakland and San Francisco zoos, hatchlings raised under ideal conditions attain the size of 2-to-3-year-old turtles in only 10 months. That makes them large enough to avoid most predators.

An important part of conserving the species hinges on the research and data gathering conducted in the field. Hovey’s canvass activities will help determine how precarious the turtles’ status has become in Southern California while the results from the Geist studies on nest site selection and hatchling growth should offer other conservation tools. Through DFG’s conservation strategy, the pieces can form the actions that will help the most. The hope of maintaining California’s western pond turtle in its native waters is

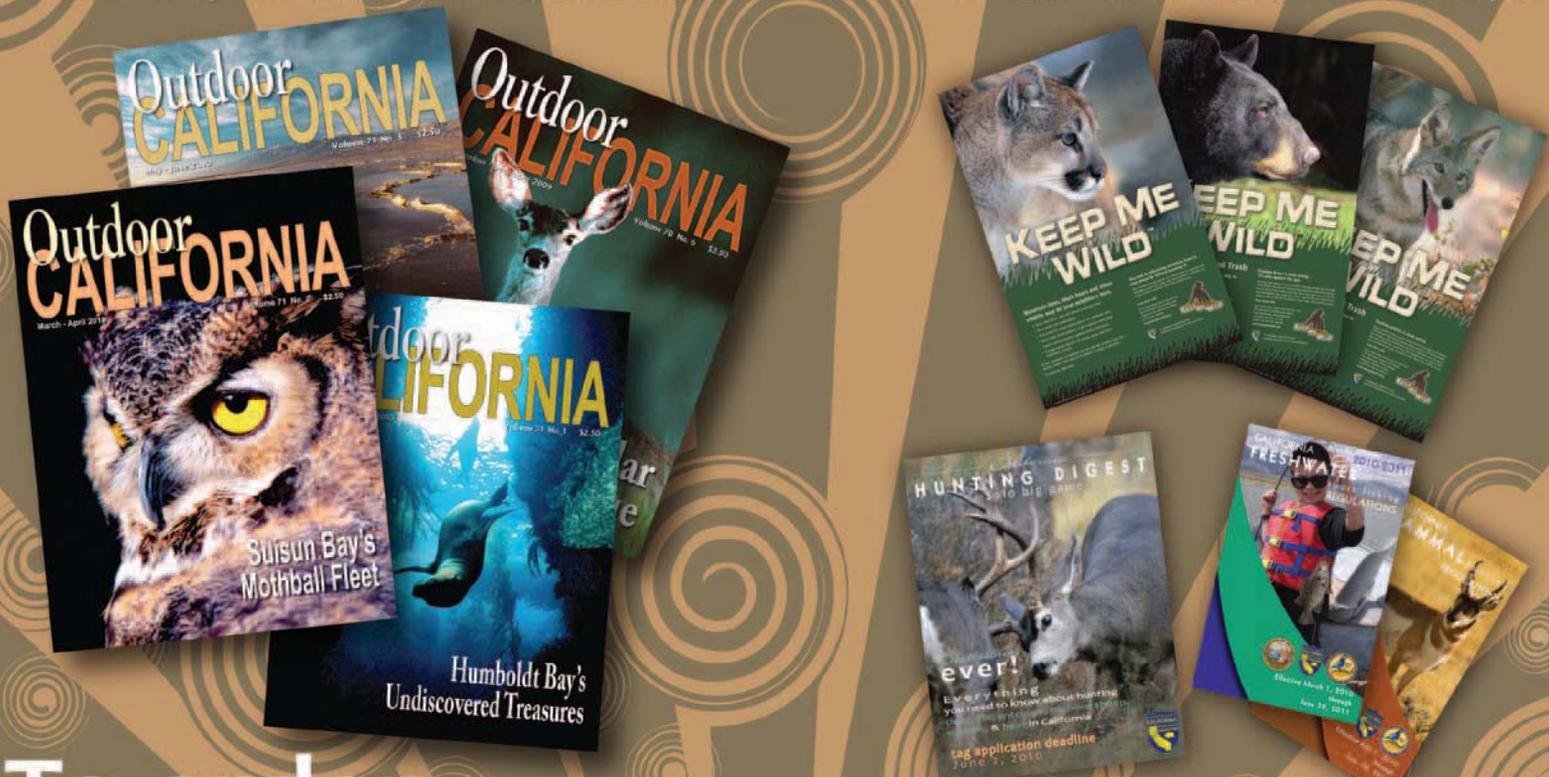
an ambitious but worthwhile goal. It is, after all, the state’s only remaining native freshwater turtle. 

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