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# The Desert Sun

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## MAMMOTH FIND

Among fossils at solar project site are those from behemoth that once roamed region

By K Kaufmann  
The Desert Sun

The trail is faint — a layer of prehistoric soil, a few fragments of ivory, thousands of years old. Mammoths, not woolly, but 12 feet tall at the shoulder, with wildly curving ivory tusks, may once have roamed what is now the desert east of the Coachella Valley, but more than 10,000 years ago was a wetter and possibly greener expanse of land.

"They were about the same size, maybe a little heftier than African elephants today," said John Harris, chief curator of the Page Museum at the La Brea Tar Pits in Los Angeles, where entire mammoth skeletons have been reconstructed.

"They probably had smaller ears," he said. "They had sloping backs, the heads were the highest part, and they were adapted to feed on grass, but they probably ate anything they wanted to."

The fragments are part of a major discovery of hundreds of prehistoric fossils unearthed on the site of BrightSource Energy's proposed Rio Mesa solar project, 13 miles southwest of Blythe, a city of 20,000 on Interstate Highway 10, just west of the Colorado River and the border with Arizona.

Please see MAMMOTH, A7



The reconstituted skeleton of a Columbian mammoth at the La Brea Tar Pits. COURTESY PHOTO



This abraded fragment of mammoth ivory fossil was found at the Rio Mesa Solar Electric Generating Facility site. COURTESY PHOTO

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### MAMMOTH FACTS

■ The earliest mammoths, which lived in Northern Africa, died out there 3-4 million years ago. By that time, the animals had spread to Europe and from there, about 1.8 million years ago, across the Bering Strait to North America.

■ In North America, mammoths evolved through the Pleistocene Age, from 40,000 to 11,000 years ago, and eventually could be found across the country. The Imperial mammoth was the largest, measuring up to 16 feet at the shoulder and weighing in at 13 tons.

■ The Columbian mammoth evolved later in the Pleistocene and was slightly smaller, about 12 or 13 feet tall at the shoulder. Many of the mammoth fossils found in Southern California, such as those at the La Brea Tar Pits, are thought to be Columbian mammoths.

■ Woolly mammoths first emerged in Europe and migrated across the Bering Strait much later than the other mammoths, about 35,000 to 18,000 years ago. They were also smaller, only 9 feet to 10 feet tall.

■ Mammoths died out across Europe and North America at the end of the Pleistocene Age, about 12,000 to 10,000 years ago, possibly from a combination of factors — climate change, hunting and competition with other large mammals for decreasing food supplies as the weather warmed. The fossil record shows that small populations survived on northern islands, in Alaska and the Arctic, as late as 1700 B.C.

Source: University of California Museum of Paleontology

# MAMMOTH

Continued from A1

The company had hoped to have the project approved by June 2013, but that date could be at risk as state officials are requiring additional tests to determine the scope and significance of the find.

The more than 740 fossils discovered at the site to date range from the ivory fragments and teeth of now-extinct prehistoric horses to hundreds of desert tortoise fossils, including rare eggshell fragments carbon-dated at up to 13,700 years old.

Fossils of smaller animals, such as rabbits, sidewinders and kangaroo rats also have been found, said Casey Weaver, an engineering geologist for the Energy Commission, the state agency overseeing the permitting process.

"There are fragments that have come out of the paleosol (ancient soil) that have been blown around," said Weaver, who has visited the site and seen some of the fossils.

"There are some very small, little white flecks; there are bones. They have found a complete fossilized tortoise with eggs in a burrow. They found badger heads."

Experts such as Harris have yet to examine the fossils, but say the discovery could open a new window on the dramatic climate changes that occurred more than 10,000 years ago as the last glaciers of ice ages receded and the Earth warmed.

Equally important the fossils could also help provide a better understanding of the climate change under way in our own time.

"The last time it was as warm as it is now, or the sea level was as high, was 125,000 years ago," said Jere Lipps, director of the Cooper Archeological and Paleontological Center in Orange County. "At that time sea level was 8 meters higher (than now), which was 30 feet."

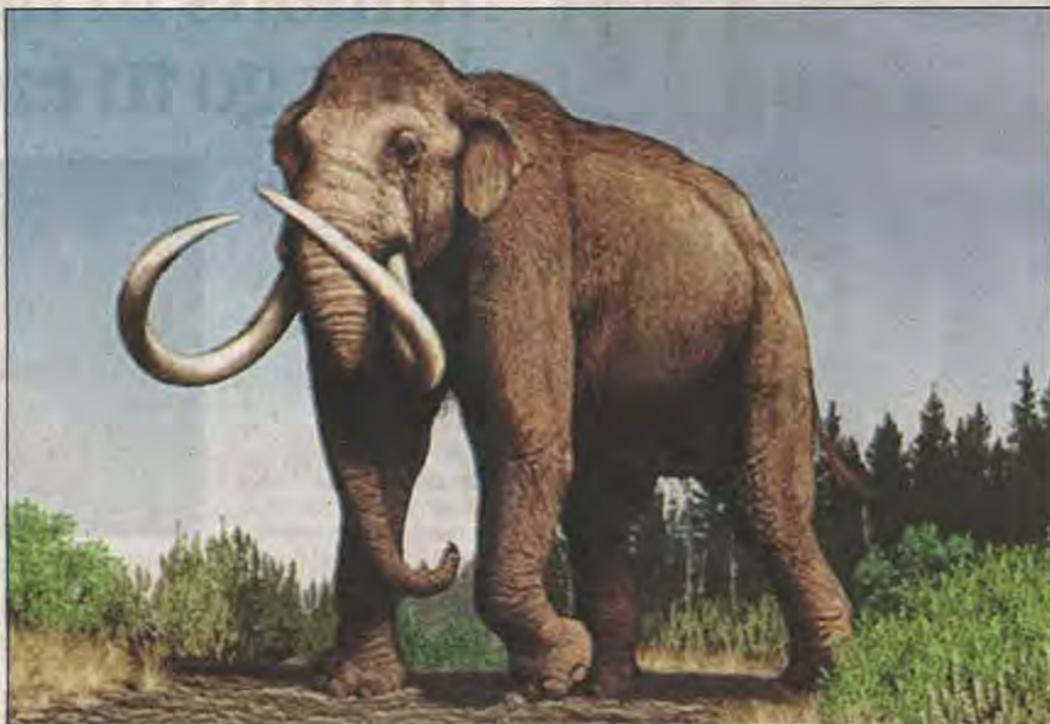
"These fossils could be important in that regard, trying to figure out what's going on in the desert," he said.

## Path to discovery

Exactly when the fossils could be available to scientists or the public won't be determined for months, or even years, but there seems to be little doubt of their significance.

The first bone fragments were discovered when consultants for BrightSource did a preliminary paleontological survey of the site early in 2011. The company did not publicize the find or mention its significance at the time.

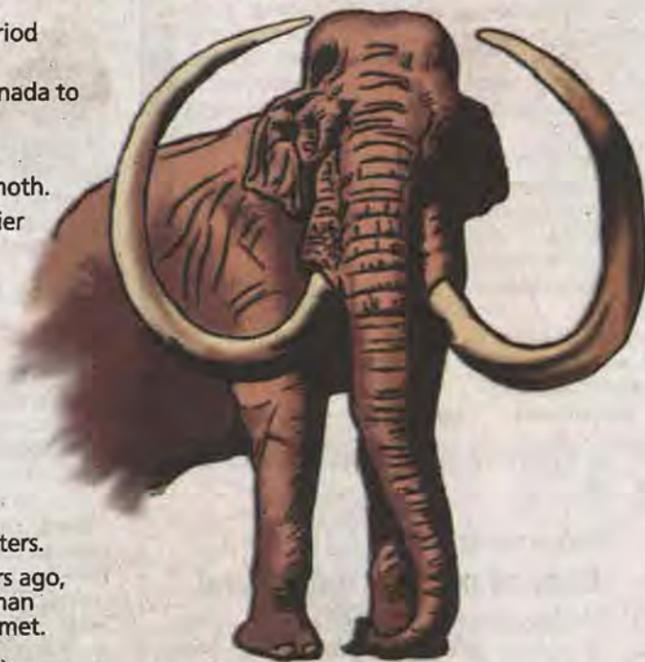
As noted in the company's permit application for Rio Mesa, submitted in October 2011, the importance of fossils is typically rated either under a classification system developed by the Society of Vertebrate Paleontology or one from the Bureau of Land Management.



The ivory fragments found at the Rio Mesa solar project site may have come from a Columbian mammoth like the one shown here in an artist's depiction.

## Facts about the Columbian mammoth:

- Existed during the Pleistocene Period (11,000-40,000 years ago).
- Occupied North America from Canada to central Mexico.
- Weighed 5.5 to 11 tons.
- May have been the largest mammoth.
- Male tusks were longer and heavier than those of females.
- Roamed throughout Southern California and elsewhere in North America and south to Central America.
- Eventually were hunted by humans.
- Swam well.
- Lived to be 55-70 years old.
- Common causes of death; starvation, accidents, killing by hunters.
- Became extinct about 13,000 years ago, likely due to climate change or human hunters. Some have suggested a comet.



Fred W. Figueroa, THE DESERT SUN

SOURCES: San Diego Zoo, La Brea Tar Pits



This badger skull and mandible fossil were unearthed at the Rio Mesa site. COURTESY PHOTO

cility is certified as a federal repository.

The Western Science Center in Hemet is the officially designated repository for fossils found on county or private land in Riverside, but assistant curator Darla



Other finds at Rio Mesa include teeth from a Western horse, a species which died out at the end of the Pleistocene Age. The fossil pictured above was found at the La Brea tar pits. COURTESY GEORGE C. PAGE MUSEUM

# Desert projects hit many hurdles

By K Kaufmann  
The Desert Sun

The discovery of hundreds of prehistoric fossils at BrightSource Energy's Rio Mesa project is the latest instance of utility-scale solar projects in the California desert running into unexpected and often expensive environmental challenges.

The large solar projects east of the Coachella Valley and elsewhere in the desert have faced construction stoppages triggered by dozens of desert tortoises, and the unearthing of potentially important tribal artifacts.

They have also faced outbreaks of canine distemper among desert kit foxes, sudden floods and lawsuits from environmental groups arguing that the projects, most of which are on public land, pose too great a threat to rare and unique desert species, and habitats, as well as tribal sacred sites.

Oakland-based BrightSource hit its first snag when its first big project in Southern California at Ivanpah ran into trouble with desert tortoises.

The 392-megawatt project, on the California border near Las Vegas, had started construction in 2011 when dozens of desert tortoises, many more than had been anticipated, were found on the site, triggering an ultimately unsuccessful law suit by the Western Watersheds Project, an environmental group.

The Bureau of Land Management put a hold on some construction at the site from April to June last year while the company came up with a new plan for protecting and relocating the tortoises, including an onsite nursery for female tortoises and hatchlings.

The solar thermal project, with its three soaring towers surrounded by thousands of reflecting mirrors or heliostats, is now halfway through construction, employing more than 2,000 workers.

The mirrors concentrate and reflect sunlight onto a boiler at the top of the towers, heating fluids that turn into steam and power a turbine generator.

The 500-megawatt Rio Mesa project will use the same technology, but will only have two towers.

NextEra Energy's 250-megawatt Genesis project, 25 miles west of Blythe, has also had its share of environmental mishaps.

The project uses solar thermal technology with reflecting mirrors but not the tall boiler towers found at

of fossils is typically rated either under a classification system developed by the Society of Vertebrate Paleontology or one from the Bureau of Land Management.

Under both systems, the Rio Mesa find is considered highly significant, according to the application, which also included a preliminary plan for onsite monitoring to ensure careful excavation and preservation of any further finds.

But given the importance of the find, the Energy Commission requested additional tests, and only after six months of haggling and delays, did the company agree, submitting a plan last week.

At stake are potential delays that could cost millions.

BrightSource had power purchase agreements with both Southern California Edison and Pacific Gas & Electric for electricity from Rio Mesa, and company officials argued, to meet its contract obligations it needs final approval for the project no later than June 2013.

The prehistoric soil where the fossils were found covers one-third of the 3,805-acre site. Unknown is how deep the ancient fossils may lie.

"What they found is mostly this paleosol on the surface you can walk on," Weaver said. "What we don't know is its three-dimensional source. Where is it thick? What is its shape in three dimensions? That's what we're after."

The plan BrightSource submitted could provide those details with the excavation of 10 trenches and five bore holes on the site, to test how deep the ancient soils run and the potential for more fossil finds.

"We do not believe that fossils will have an impact on the project moving forward as scheduled," said Kristin Hunter, a company spokeswoman.

The company has committed to turning the fossils over to the San Bernardino County Museum in Redlands, which could occur later this fall, she said.

The San Bernardino museum was chosen, even though the fossils were found in Riverside County, because some of the fossils from Rio Mesa were found on federal land and the Redlands fa-

The Western Science Center in Hemet is the officially designated repository for fossils found on county or private land in Riverside, but assistant curator Darla Abigt said the museum's priority is ensuring the fossils will eventually be available for research.

"As long as the fossils are properly cared for, that's all we're interested in," she said.

### Bigger than mammoths

While the evidence of mammoths in the prehistoric desert may be the most compelling part of the Rio Mesa fossils, from paleontologists' point of view, the desert tortoise eggs could be the most important, especially the ones found "in situ," in burrows where they were laid.

Based on a literature search done by the BrightSource consultants, the fossilized desert tortoise eggs could be the first ever found in California, Weaver said.

"It's hard enough to find them today in situ," said Eric Scott, curator of paleontology at the San Bernardino County Museum. "To find fossilized ones is extremely cool and extraordinary."

Scott hasn't seen the Rio Mesa fossils yet, but he's already excited.

The mix of bones from large and small animals at the site — from mammoths to desert tortoises to kangaroo rats — is a clue to what the Colorado River basin and its surrounding mountains east of the Coachella Valley might have looked like at the end of the last ice age, he said.

"Imagine rivers and shallow lakes running through the area and lots of plant life packed in around the watering holes, and once you get away from that, you're still in a relatively desert environment," he said.

"You have the large animals that are presumably hanging close to the waterways and food; you have the smaller animals. The fossil record is probably reflecting you have multiple environments."

The prehistoric horses of the period, now extinct, would have looked pretty much like modern horses, he said, but the fossils might show more than one species.

"At many sites you can find three different species coexist-

Other finds at Rio Mesa include teeth from a Western horse, a species which died out at the end of the Pleistocene Age. The fossil pictured above was found at the La Brea tar pits. COURTESY GEORGE C. PAGE MUSEUM



Hundreds of prehistoric fossils — including this partial tortoise shell fossil — have been unearthed from ancient soil at the Rio Mesa Solar Electric Generating Facility.

COURTESY PHOTOS

ing; today you don't see that," he said. "To have two or three species coexisting and to have that pattern repeat throughout the American West, it argues for a different sort of biology. They are herd animals, but they are breaking up their environments in different ways."

Other experts say the desert areas were undoubtedly wetter and cooler than they are today.

"The dry lakes were still filled with water," said Lipps. "The valleys were filled with water, certainly the Salton Sea was filled with water at much higher levels. That was a previous, big fresh water lake."

"It was an environment that was able to support big animals, lots of herbivores," Abigt said. "You have grasses and bushes and shrubbery and trees."

"The things being found are an indicator of how the climate has changed," she said.

Studying the fossils could reveal just how much the climate changed then — as the ice ages ended and temperatures warmed and stabilized — and its impact on animals.

That in turn could provide important clues for how animals and people may have to adapt to climate change now, Scott said.

The end of the ice ages saw a die-off of many large mammals,

### WHERE TO SEE FOSSILS

A number of museums within a few hours drive of the Coachella Valley have major collections of mammoth and other prehistoric fossils.

■ **The Western Science Center:** 2345 Searl Parkway Hemet; (951) 791-0033;

[www.westerncentermuseum.org](http://www.westerncentermuseum.org)

■ **San Bernardino County Museum:** 2024 Orange Tree Lane, Redlands; (909) 307-2669;

[www.sbcounty.gov/museum/](http://www.sbcounty.gov/museum/)

■ **George C. Page Museum at the La Brea Tar Pits:** 5801 Wilshire Boulevard, Los Angeles; (323) 934-7243; [www.tarpits.org](http://www.tarpits.org)

■ **Los Angeles County Natural History Museum:** 900 Exposition Boulevard, Los Angeles; (213) 763-3466; [www.nhm.org/site/](http://www.nhm.org/site/)

including mammoths and prehistoric horses. Scientists have a range of theories — loss of habitat due to climate change, hunting by humans — but have yet to find definitive evidence showing exactly what happened, he said.

He believes the extinction was caused in part by climate change and part by the spread of bison across the country at the end of the ice ages. Food became scarcer and animals such as mammoths and horses couldn't compete with the large, aggressive herds of bison for dwindling amounts of food.

Adapting to climate change today could be harder for animals who survived the previous cold and hot cycles simply by moving, he said.

"Living desert animals, like big horn sheep, their movement is limited by highways and cities and state boundaries," he said. "What they would have been able to do during the Ice Age, they may not be able to do (now)."

"Understanding what animals did during the Ice Age can better inform how we use land out in the desert today."

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west of Blythe, has also had its share of environmental mishaps.

The project uses solar thermal technology with reflecting mirrors but not the tall boiler towers found at Ivanpah and planned for Rio Mesa.

Not long after the project began construction about a year ago, state officials went on high alert when they discovered an unprecedented outbreak of canine distemper among desert kit foxes on the site.

Construction briefly slowed on the project as wildlife veterinarians from the California Department of Fish and Game started an emergency vaccination program and ordered NextEra to halt work and establish wide buffers around any kit fox burrows on the site.

Not long after that, in November 2011, workers at the site also unearthed tribal artifacts, grinding stones called metates and manos, and the BLM ordered a halt to work on the 200-acre parcel surrounding the find so further tests could be run.

Tribes in the area protested any work continuing around the find, arguing that any artifacts found in the ground should remain undisturbed.

But the BLM ordered careful excavations of the area around the discovery to begin in February this year, and a mitigation plan was developed. The BLM gave final approval for regular construction to proceed in the area in June.

The project got hit once again in August, when a desert downpour triggered a flash flood that washed out roads and damaged some of the mirrors, but caused no work stoppages, company officials said.

■ What the California Energy Commission, which is the lead agency for the permitting of Rio Mesa, will ask BrightSource to do to protect the fossils found there is still unknown.

BrightSource has argued that, unlike photovoltaic projects, installation of its heliostats requires much less grading on the site, reducing destruction of top soil and any fossils that might be buried there.

At Ivanpah, the desert scrub covering the site has been mowed to a height of about 12 inches under the heliostats, which should protect both any animals or fossils.

A beefed-up monitoring and mitigation plan appears likely. Energy Commission officials said a preliminary environmental report could be released later this month.