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Stone basins may be Miwok salt 'factory'

David Perlman, Chronicle Science Editor
Wednesday, December 30, 2009

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(12-30) 14:57 PST SAN FRANCISCO -- Somewhere in the Sierra Nevada, a granite terrace the size of a football field holds hundreds of mysterious stone basins representing what geologists believe is one of the earliest known "factories" created and used by ancient Miwok Indians to make tons of salt to trade with tribes up and down California.

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James G. Moore, a geologist with the U.S. Geological Survey in Menlo Park, learned of the strangely pitted terrace from detailed maps made more than a century ago and hiked the region in May to study what he determined were clearly hand-hewn objects.

He examined 369 of the circular artifacts only a few yards from two streams of saltwater fed by a nearby spring and a lake that was equally salty.

Moore and his colleague at the USGS, Michael F. Diggles, believe the circular basins were handmade by the Miwok people in an impressive display of early

technology. They have published a detailed account of their findings in an official Geological Survey report, but because the area is now an "archaeologically sensitive" site and its location protected by law, Moore is permitted only to say that the basins are in a canyon somewhere within the Stanislaus National Forest.

"This is quite likely to give us new insights into the lives of the Miwok people in the Sierra," said Kent G. Lightfoot, a UC professor of anthropology and a specialist in the history and culture of California's Native Americans.

Creating the basins

Records show that early American Indians, including the Miwok people, lived for thousands of years as hunter-gatherers in that area of the Sierra, Moore said, and it is filled with evidence of old settlements, with abundant middens, arrowheads and small stone tools. But learning how long ago the basins were carved awaits high-tech dating.

The basins average more than a yard in diameter and are more than 2 feet deep.

To create them, Moor and Diggles said, Miwok tribe members built fires on the granite surface that heated the stone until it fractured. They then crumbled and pounded the fractures with stone tools and removed the debris, inch by inch, until the basins were formed.

Diggles estimated it took Miwok workers nearly a year to complete a single one. He calculated that each fire used to dig a single layer of rock deepened the granite by no



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more than a centimeter. The process, he said, must have been repeated 100 times to make a single basin.

Similar granite basins were discovered in 1891 by Henry W. Turner, a geologist exploring California's mountains in what is now Sequoia National Park, Moore said in the Geological Survey report. Moore has examined those, too.

"I think of them as the Machu Picchu of North America," Moore said. Machu Picchu is the ancient city of stone in the Peruvian Andes, abandoned by the Incas nearly 500 years ago.

3 tons of salt a year

Salt springs are extremely rare in the Sierra Nevada, but Moore said the salt in the nearby streams probably comes from a layer of ancient marine sediment formed many millions of years ago when the area was covered by an ocean.

He said he believes the Miwok people carried water from the streams in watertight woven baskets, poured it into the basins and let it evaporate in the summer heat until the dry salt could be scooped out. The salt content of the water and the rate of water flow indicate that the two streams probably yielded about 3 tons of salt each year, Moore said.

The people of the area, he said, "had a large and valuable surplus to trade with other tribes - an early example of commerce by hunter-gatherer people."

Chemical analysis of the water also shows high levels of arsenic - 170 times higher than the maximum allowed in drinking water by the Environmental Protection Agency, he said. It is unknown whether arsenic made its way into the salt.

"Salt was an important commodity for Native Americans," UC Berkeley's Lightfoot said. "It is certainly possible that salt harvested from these basins could have been traded to other native groups in California and the Great Basin (east of the Sierra).

"Further work will be needed to develop a solid chronology for the basins."

This article has been corrected since it appeared in print editions.

E-mail David Perlman at dperlman@sfgate.com.

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If someone were to ask me where and in what time I could live in the past, I would certainly consider being a California-dwelling Indian about, oh, say 1,000 years ago. It's hard to imagine a more ideal time and place to live: Abundant and varied food, terrific climate, physically stunning, a long-evolved culture and community of people who were in complete harmony with nature. Of course, let's not kid each other- these were tribal cultures and prone to violent clashes with neighboring tribes, but whatever- it had to have been, overall, a damn fine existence for humans. Or so I would think.

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comparing some holes in the rock to machu picchu is a little like comparing a chalked hop scotch game on a sidewalk to the coliseum in rome, either that or mr. moore has never been out of the state.

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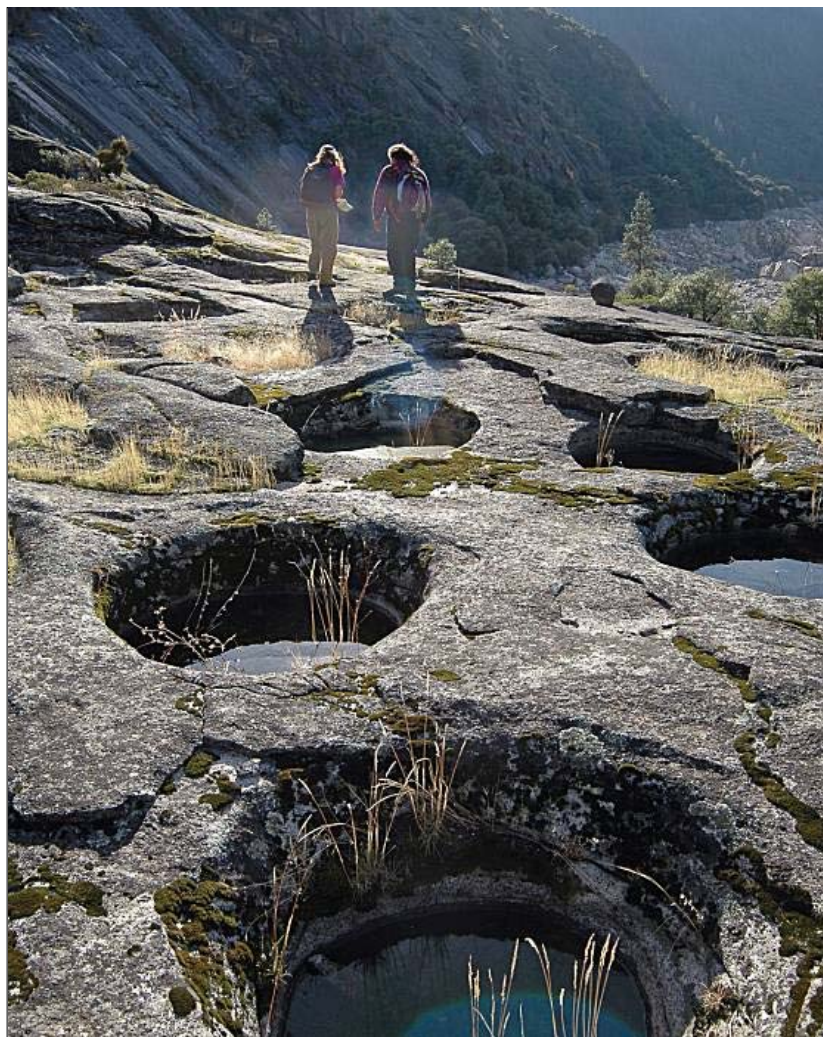
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Geologists say the Miwoks made these basins for salt.

Photo: US Geological Survey

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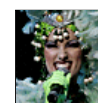
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The Miwoks created the basins, geologists say, to make salt by pouring water from nearby salty streams into the basins and letting the water evaporate.

Photo: US Geological Survey

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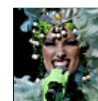
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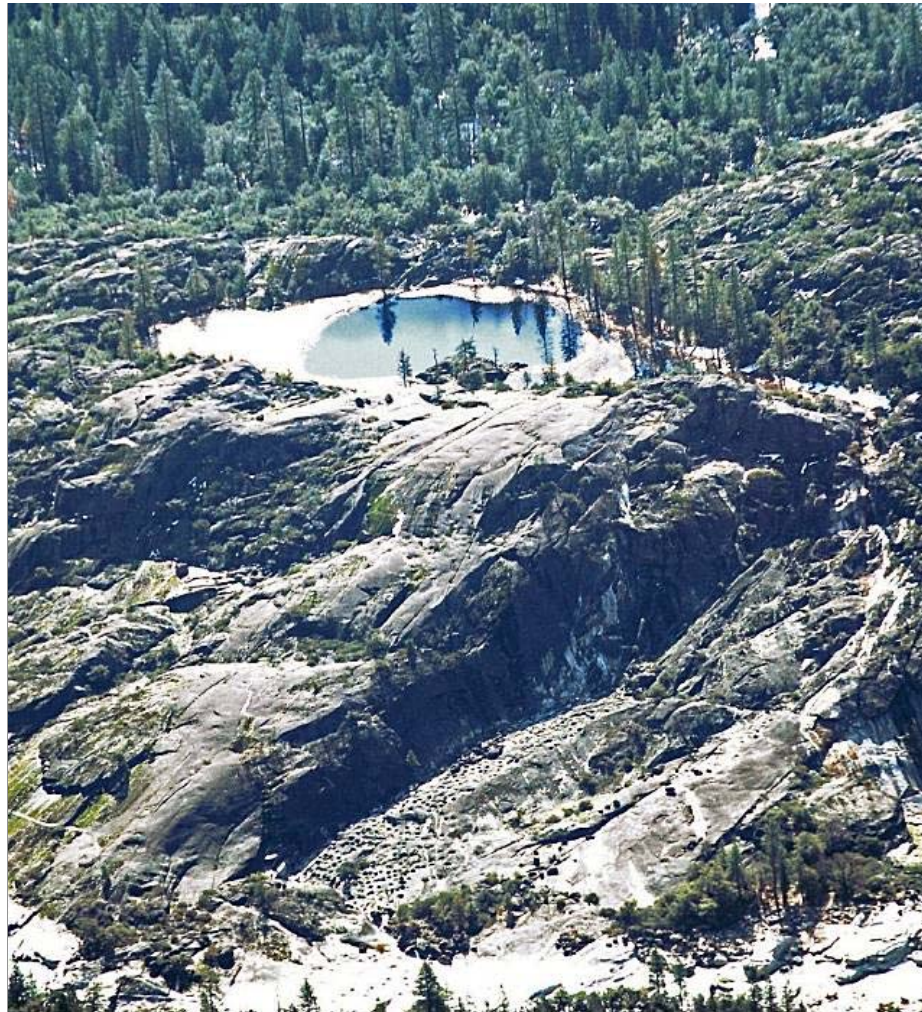
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An aerial view of hundreds of salt basins created in the Sierra by the Miwok Indian tribe to make salt for trade.

Photo: US Geological Survey

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An aerial view of the salt basins created in the Sierra by the Miwok Indian tribe to create salt for trade. Photo: US Geological Survey

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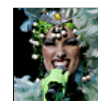
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