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Flood case study: Stillwater, Nevada

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Nevada is a desert and the driest state in the union. Its evaporation rate usually exceeds its precipitation rate. Following a lengthy drought in the 1970s, northern Nevada enjoyed three years of above average precipitation. Between 1982 and 1984, both the Humboldt and Carson Rivers emptied enormous amounts of water into the Humboldt Basin and Carson Sink (all rivers save two in Nevada empty into interior basins rather than drain into an ocean). To save farms and homes in the Lovelock community along the Humboldt, state agencies breached a natural dike between the Humboldt Basin and Carson Sink.

This action flooded the Carson Sink. Excess water flowed from the Humboldt and other drainages into the Carson Sink, the lowest point in northwestern Nevada - below 39,360 feet (1,200 m) in elevation. The Carson Sink contains the Stillwater Marsh that is important habitat for waterfowl. In prehistoric times, the marsh probably contained 79,000 acres (31,600 ha) of fresh water. In 1982, prior to spring runoff, the marsh had stood at an all-time low of 8,500 acres (3,400 ha) of water. By the summer of 1984, over 220,000 acres (88,000 ha) were flooded. The vegetation in the marshes died; so did the fish and the birds. Dikes were breached, nesting areas vanished.

The flooding also affected hundreds of prehistoric archaeological sites within the marsh. The Stillwater Marsh is a National Register District located 10 miles (16.1 km) northeast of Fallon, a community in northwestern Nevada. The US Fish and Wildlife Service manages this area of the Carson Sink as the Stillwater Wildlife Management Area. The archaeological district encompasses almost 42,000 acres (16,800 ha). Little was known about the area when it was nominated to the National Register of Historic Places in 1975 other than that 'Indian campsites' were present. The Register nomination describes the presence of "arrowheads, grinding stones, beads and other artifacts". In 1975, the US Fish

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and Wildlife Service was unaware of any burials (Stillwater Marsh National Register Nomination). By 1982, archaeologists had recorded approximately 85 sites in this archaeological district but this information was based on surface survey. Archaeologists did not know what lay beneath the surface.

In 1986, the flood water began to recede. US Fish and Wildlife Service employees began to note the appearance of human bones on exposed ground in the marsh and contacted the State Historic Preservation Office. Over 45 new archaeological sites and over 125 burials were uncovered as the water evaporated. These sites averaged 246 feet (75 m) by 131 feet (40 m) and contained a dense scattering of archaeological materials: flaked stone, ground stone, fire cracked rock, clam shells, animal bones, human burials, house floors, cache pits and midden. For the most part, the sites were located on what had been islands in the marsh in prehistoric times (Fagan & Raymond 1987, pp. 27-28). The find was unprecedented and unexpected in the Great Basin. Open stratified sites in this number and density had not been discovered in northern Nevada prior to 1986. These sites had not been visible previously. They had stood under 7.8 inches (20 cm) to 19.5 inches (50 cm) of sediments prior to flooding. So invisible were they that numerous archaeological surveys in the area during the 1970s failed to reveal their presence.

Impacts

The sites were heavily impacted. Firstly, wind and wave action had stripped 7.8 inches (20 cm) to 19.5 inches (50 cm) of sediments from the sites that had existed on islands within the marsh. Waves mechanically eroded sites, particularly those with northern and western exposures. During the winter, wind-driven ice scoured the edges of sites. The heavy mineral content of the water saturated both human and animal bone, corroding them beyond recognition as soon as they were exposed at the surface (Fagan & Raymond 1987, pp. 38-45). Exposure of artifacts left the sites vulnerable to pot hunters who sought to collect relics and skeletons as trophies.

Immediate effects to response

The federal agency was immediately hampered by a lack of personnel. Only five full-time employees, none of them archaeologists, managed the 163,000 acre (65,200 hectares) management area. They also lacked information about the exact location of sites and the nature of sites. Another factor hampering response was access. Some sites were accessible only by airboats which were few in number at the reserve. Funding for site treatment also was not available. Fish and Wildlife Service employees at the management area contacted the State soon after they realized they could not manage the situation.

The US Fish and Wildlife Service did manage to come up with about US\$10,000 to fund a 'salvage plan' with the consent of the State Historic Preservation Officer and the Advisory Council on Historic Preservation. Given the small amount of funds, the agency relied on state archaeologists from the State Historic Preservation Officer, the Nevada State Museum and Nevada Department of Transportation as well as the director of the Churchill County museum and local volunteers to recover burials exposed more than 50% or that were not in original context, exposed animal bone at sites and artifacts that might prove attractive to relic

collectors. Such artifacts included portable grindstones and projectile points. The US Fish and Wildlife Service provided the transportation, by airboat. These were considered temporary measures until Fish and Wildlife Service could obtain additional funding. The Nevada State Museum staff cataloged, analyzed and curated the artifacts.

Damage occurred where sites had already eroded completely or corrosion of bone had already taken place. Pot hunters were one step ahead of archaeologists in many places. The long-term management of the archaeological district was still a problem.

Long-term recovery

After this initial data recovery, the US Fish and Wildlife Service faced two major tasks. One was to re-establish the marsh through repair of structures and revegetation. The other was the stabilization and protection of archaeological sites. The agency sought to collapse these into a single program but it needed to know more about the nature of the environment and the nature of the archaeology. Funding would have presented an insurmountable obstacle except for the attention the archaeological finds received. Interested members of the public and agency archaeologists kept the media informed about events at the Marsh, the marvelous nature of the finds, their importance to the local tribe and the threats presented by erosion and pot hunters. Letters to Nevada's congressional delegation helped place money where it was needed. The health of the marsh and the protection of archaeological sites were linked in this effort.

In 1987, the agency hired an archaeologist to work exclusively at the Stillwater Wildlife Management Area, to perform certain tasks agreed on by US Fish and Wildlife Service, the Nevada State Historic Preservation Officer and the Advisory Council on Historic Preservation. The archaeologist began by creating a database, accurately mapping and recording each known site in the management area. The US Army Corps of Engineers developed an action plan for stabilizing and protecting sites (Fagan & Raymond 1987). To understand the structure of the sites and develop a context for evaluating their research value, the agency contracted with a private consulting firm to conduct test excavations (Raven & Elston 1988). With the accumulation of this data, the US Fish and Wildlife Service was able to rank sites according to their ability to answer research questions and on immediate threats such as wind based erosion and relic collection. This allowed the Fish and Wildlife Service to set priorities for data recovery and other forms of treatment.

Implementation of the plan to re-establish the marsh and protect archaeological sites involved construction. The agency constructed new dikes and wave barriers around sites. Artificial nesting islands were constructed on the windward side of existing islands to serve as wind and water barriers to protect sites. Roads to vulnerable sites were closed. Priority was given to the revegetation of sites using shallow rooting plants to stabilize the soil.

At the same time, the US Fish and Wildlife Service initiated an ethnographic study to determine the kinds of resources and sites important to the Northern Paiute who inhabited the area (Fowler 1992). The agency also consulted with the Fallon Paiute-Shoshone Tribe to determine the disposition of the burials resulting in a memorandum of understanding. The recovered burials are interred in a crypt overlooking the marsh, secure from pot hunters.

It is opened every few years to inter additional burials or human remains that have eroded out of sites within the Marsh.

The National Park Service funded the development of a plan for the treatment of archaeological sites for both the Humboldt Basin and Carson Sink. The plan, drawing on work conducted by the US Fish and Wildlife Service and its consultants, identified research issues of importance to the area as a whole. The plan identifies significant sites and the data necessary to address important research questions (Elston, Raven & Baldrice 1992).

Preparedness

We know that flooding is likely to happen again; we know that these sites remain vulnerable. Excavation of all sites is impractical. The cost of data recovery is prohibitively high and the Fallon Paiute-Shoshone Tribe would prefer to see burials remain in place. However, US Fish and Wildlife Service and the State of Nevada are better prepared than we were in 1986. Maps and site records are on file at the Refuge and at the Nevada State Museum. Relationships with locals, the state and the tribe are in place, and the agency has a familiarity with the process to care for its cultural resources. We will be ready when flooding occurs again.

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