

Recent decisions protect resources at Lake Mead

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NEGOTIATED SETTLEMENTS IN 2001 AND 2002 involving the National Park Service, Bureau of Land Management, and U.S. Fish and Wildlife Service resulted in agreements with water developers in the watersheds of the Virgin and Muddy Rivers to protect resources administered by the Department of the Interior from impacts attributed to pumping groundwater. These agreements are supported by a series of decisions made by the Nevada State Engineer.*

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The watersheds in question include a large area of eastern and southeastern Nevada, which drains generally southward toward the Colorado River at Lake Mead. Groundwater flows among the area's 29 hydrographic basins through a system of aquifers. This system has been termed "The Colorado Regional Ground-Water Flow System of Nevada" or simply the "Colorado System" by the United States Geological Survey (USGS).

Many water resources associated with the Colorado System can be seen at Lake Mead National Recreation Area (Nevada), including tributary streams that flow into the lake, and springs that discharge on lands adjacent to the shores of the lake. The Virgin and Muddy Rivers flow through the park into the lake's Overton Arm. Eight named springs and additional seeps occur on lands on the west side of the Overton Arm, including the large-volume, warm-water Rogers and Blue Point Springs.

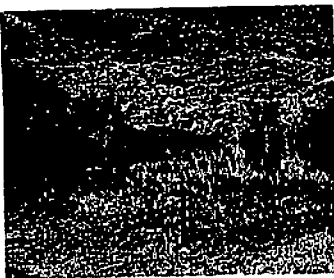
Since 1989, applications for groundwater rights in desert basins near the park increased beyond previously determined rates of sustainable yield. The effect of extensive groundwater pumping on stream flows, spring flows, and associated plants and animals is unknown. In response to this uncertainty, the National Park Service is participating in the Nevada water rights permit process to ensure that park water rights are fully considered in water allocation decisions. The National Park Service is also assisting the state engineer by gathering scientific information to improve understanding of impacts from pumping.

Why is the National Park Service concerned about groundwater far from the park boundary? Groundwater withdrawals have the capacity to intercept the sources of rivers and springs that flow into Lake Mead National Recreation Area. However, without adequate scientific information, it is difficult to understand the sustainability of large groundwater withdrawals from the Colorado System and the effects that groundwater development will have on park resources. Because the state engineer allocates water basin by basin, approved developments could change the direction and magnitude of interbasin flow, disrupting the discharge of groundwater to streams and springs.

To address this problem the National Park Service and the U.S. Fish and Wildlife Service are developing a three-dimensional groundwater flow model. Intended for use in estimating the potential effects of groundwater pumping in southern basins of the lower Colorado System on the resources of the Moapa National Wildlife Refuge and Lake Mead National Recreation Area, the model encompasses an area of approximately 300 square miles across 10 hydrographic basins. Model development, begun in 2001, is aided by ongoing cooperative studies with the USGS and Southern Nevada Water Authority to investigate the system's complex hydrogeologic framework, improve water budget estimates, and incorporate groundwater pumping data.

Until sufficient information can be gathered regarding the long-term implications of groundwater removal, the state engineer has carved out a conservative middle ground to address both water resource protection and the possible development of additional groundwater. The state engineer, in several decisions issued in 2001 and 2002, concluded that "only by gradual, staged development can the additional science be obtained which will allow a better understanding of the ... aquifer(s) and the effect new appropriations will have on interbasin flows and the direction of groundwater movement." The agreements between the National Park Service and the water developers implement this strategy through monitoring, management, and mitigation provisions.

Limiting additional development and encouraging early detection of impacts further the understanding of the hydrogeologic complexity of the lower Colorado System and aquifer responses to pumping. This information will be



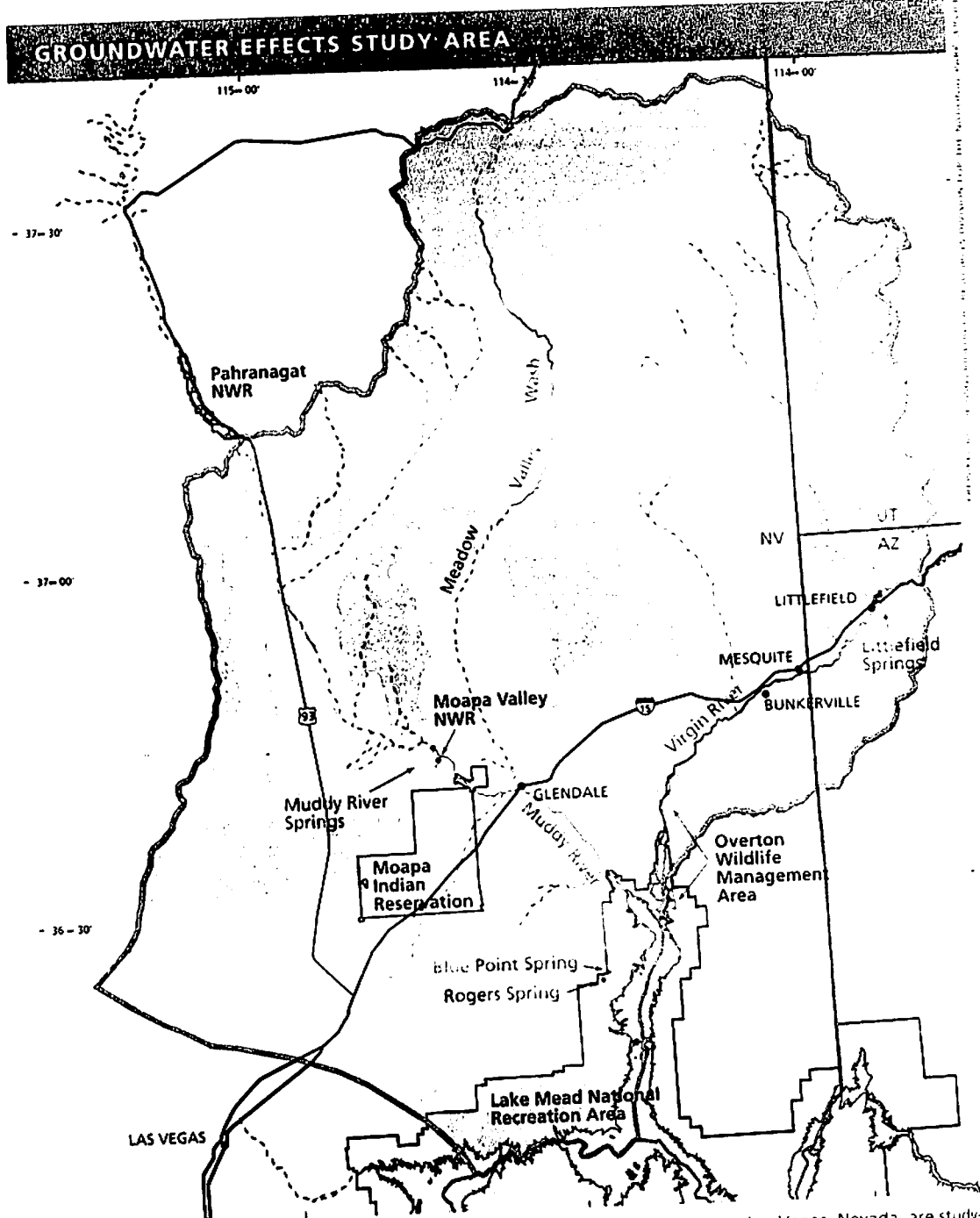
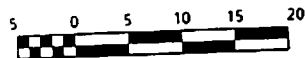
Springs and streams at Lake Mead National Recreation Area diversify the desert landscape, supplying scarce water to wildlife and vegetation. Some of these water resources are fed by aquifers extending far beyond park boundaries, and may be vulnerable to groundwater pumping to meet growing human needs in the Las Vegas area.

*State Engineer's Ruling Nos. 5008, 5115, 5167, and 5181 and State Engineer's Order No. 1169.

Legend

- Intermittent stream
- Perennial stream
- Study area
- Consolidated rock
- Basin fill
- Spring

Miles



The National Park Service, U.S. Fish and Wildlife Service, and water developers near Las Vegas, Nevada, are studying a 300-square-mile area to gain a better understanding of the effects of groundwater pumping on water resources in Lake Mead National Recreation Area and Moapa National Wildlife Refuge.

used to refine the groundwater flow model, giving the National Park Service and other Department of the Interior bureaus the opportunity to create a very powerful tool for estimating the effects of any existing or proposed groundwater withdrawals from the system. It also can be used to illustrate the time it will take for water levels to recover after pumping ceases. This tool and the results that can be generated with it are

proving very useful. To date, the model has been used in negotiating settlement of protests, in constraining adaptive groundwater management options, and as evidence in an administrative hearing before the state engineer. It also demonstrates the National Park Service's commitment to cooperate, consult, and coordinate science-based decision making to ensure protection of park water rights and resources. ■

Map--Geology modified from Plume and Carlton (1988). Base modified from USGS digital data, 1:100,000 and USGS GAP Analysis data.

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