Probable Effects of Proposed Groundwater Pumping by Southern Nevada Water Authority in Spring, Cave, Dry Lake and Delamar Valleys, Nevada on Spring and Wetland-Dependent Biota.

June 29, 2011

Prepared for the Office of the Nevada State Engineer
on behalf of
Great Basin Water Network

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The probable hydrologic consequences of approving the Southern Nevada Water Authority's ("SNWA's") groundwater applications in Spring Valley and in Cave, Dry Lake, and Delamar Valleys have been examined and modeled by Myers (2006, 2007). I provided my expert opinion of the probable effects of SNWA's proposed groundwater development on native fish, snails, and some other wetland dependent biota in the affected area in my reports for the State Engineer's previous hearings on these applications. (Deacon 2006, 2007), and am updating my opinion, on the basis of those analyses, my own research, a review of the literature, materials admitted in the Nevada State Engineer's previous hearings on these applications, and an evaluation of information contained in the following numbered U.S. Fish and Wildlife Service exhibits submitted to the Nevada State Engineer prior to the Spring Valley water rights hearings: FWS 2035, 2036, 2037, 2038, 2039, 2042, 2043, 2044, 2046, 2047, 2048, 2049, 2063, 2064, 2065, 2066, 2067, 2068, 2069, 2070, 2071, 2072, 2073, 2074, 2075, 2076, 2077, 2078, 2079, 2080, 2081, 2082, 2083, 2087, 2088, 2089, 2090, 2091, 2092, 2093, 2098.

Myers has considerably amplified his analyses in subsequent studies (Myers 2011) and the BLM's Draft Environmental Impact Statement (DEIS) for SNWA's groundwater development and pipeline project contains additional analysis showing broadly similar hydrologic impacts of SNWA's proposed pumping in these valleys (BLM 2011). The conclusions and expert opinions in my 2006 and 2007 evidentiary reports, and in my verbal testimony before the Nevada State Engineer during the two previous hearings, have been reinforced by these more recent hydrologic analyses. So, those conclusions and expert opinions remain pertinent and valid, and are intended to be a part of my testimony for consideration by the Nevada State Engineer in this rehearing of the SNWA applications for water rights in Spring, Cave, Dry Lake, and Delamar Valleys. This report offers additional perspective in light of Myers' and the BLM's more recent analyses.

Myers (2011) concluded that approval of SNWA's groundwater applications in Spring Valley would substantially lower the groundwater table in Spring and Hamlin Valleys, dry springs and wetlands throughout Spring Valley, decrease interbasin flow to Snake and Tippet Valleys, and draw substantial amounts of groundwater from Steptoe Valley. The groundwater system would not come to equilibrium for thousands of years regardless of whether pumping occurred for the full application amount or was reduced to less than one third of that amount, and also regardless of whether pumping was from the locations identified in the applications or from locations more

evenly distributed throughout Spring Valley. In Snake Valley, flow from Big Spring would be reduced by up to a third, and require a long time to recover following cessation of pumping.

Deacon (2006, Table 1) identified fish and snail species from Spring and Snake Valleys potentially susceptible to adverse effects from the proposed SNWA groundwater development project. Myers' (2011) analysis shows that most spring and wetland habitats for species listed in Table 1 (Deacon 2006) are likely to dry. Populations dependent on those habitats would therefore disappear. In addition, the substantial amounts of groundwater drawn from Steptoe Valley would place some populations of the endemic relict dace (*Relictus solitarius*) in jeopardy. The relict dace, a genus endemic to only four valleys in central Nevada, is listed in the Nevada Natural Heritage Database as globally imperiled, and by the U.S. Fish and Wildlife Service as a species of concern.

Myers (2011) further concluded that approval and utilization of the SNWA groundwater applications in Cave, Dry Lake and Delamar Valleys would result in a rapid decline and, following cessation of pumping, a slow recovery of discharge from regional springs in the White River Flow System. Lag time for recovery of spring discharge would generally be more than twice the pumping time. Regional springs showing a decline or cessation of flow include those in White River Valley, Pahranagat Valley, Muddy River headwaters springs, some springs in Railroad Valley and Panaca Warm Spring. Approval and utilization of the SNWA applications, along with continued utilization of existing water rights would cause flow in the White River Flow System to cease.

Myers (2011) more recent analysis of the effect of the SNWA groundwater applications in Cave, Dry Lake and Delamar Valleys on the regional aquifer supports generalizations made in his earlier analysis (Myers 2007). This in turn supports the conclusions in my earlier report (Deacon 2007) that approval of the SNWA applications would result in adverse effects to the wetland dependent biota in portions of Railroad Valley, most of White River Valley, Pahranagat Valley, the Muddy River, Panaca Warm Spring, and Meadow Valley Wash. These adverse effects would also extend westward where they would be amplified by additional SNWA groundwater development projects in Three Lakes Valley, Tikapoo Valley, and Indian Springs Valley. With this amplification, measurable adverse effects to spring and wetland dependent biota would extend to Ash Meadows.

Deacon (2007) identified 157 endemic wetland species (20 listed by USFWS as endangered or threatened) likely to be adversely affected by the reduced spring discharge and wetland area caused by the proposed SNWA groundwater project. Principal mechanisms by which diminished spring flow would adversely affect spring and wetland dependent species were described (Deacon 2007). Table 2 of that report identified five bird and one mammal species also likely to be adversely affected by the reduced wetland area that would result from approval by the Nevada State Engineer of the SNWA groundwater applications. All six of these species are protected under NRS § 501 and are listed in the Nevada Natural Heritage Database. Four of them are listed under provisions of the Federal Endangered Species Act. Subsequent to my 2007 testimony, the Center for Biological Diversity submitted a formal petition to the U.S. Fish and Wildlife Service to list 42 species of springsnails under provisions of the Endangered Species Act (CBD 2009). The principal reason for the requested listing was the habitat loss and degradation that would

result from the proposed SNWA groundwater development project. Many of the species in the petition were also listed by Deacon (2007).

The effects on surface water habitats of the SNWA groundwater applications in Spring Valley, and in Cave, Dry Lake and Delamar Valleys described by Myers (2011) are supported by groundwater modeling done by BLM for its DEIS (BLM 2011). For example, the following statements are found in the Executive Summary:

"Game fish, native fish, special status species and other aquatic species would be adversely affected by flow reduction." DEIS at page 57.

"Pumping by alternatives could adversely affect two federally listed fish (Pahrump poolfish and White River spinedace), northern leopard frog, and special status fish and invertebrate species (springsnails and freshwater mussel, California floater). Pumping by all alternatives would conflict with recovery or conservation management objectives for the two federally listed species, northern leopard frog, and Bonneville cutthroat trout." DEIS at page 58.

"Pumping by all alternatives could adversely affect three federally listed birds (southwestern willow flycatcher and yellow-billed cuckoo), greater sage-grouse (federal candidate), and other special status bird and bat species, pygmy rabbit, and invertebrates. Pumping by all alternatives could conflict with recovery or conservation management objectives for the federally listed species…..Water level reductions in the Baking Powder Flat, Shoshone Ponds, and Lower Meadow Valley Wash Area of Critical Environmental Concern could adversely affect the resources being protected by the Area of Critical Environmental Concern designation and potentially compromise the objective of the designation." DEIS at page 59.

"All of the groundwater development alternatives are expected to result in substantial reduction in flow (or potentially eliminate discharge) at Big Springs (Figure ES-42). Reductions of flow at Big Springs would reduce flows in Big Springs Creek, and reduce flows to Lake Creek and into Pruess Lake." DEIS at page 68.

Monitoring, Management, and Mitigation

During my testimony at the February 4-15, 2008 SNWA water rights hearing for Cave, Dry Lake, and Delamar Valleys, I noted that the stipulated agreements between SNWA, U.S. Fish and Wildlife Service and other federal agencies established cooperative Monitoring, Management and Mitigation programs unlikely to prevent loss of biodiversity in areas affected by the SNWA groundwater project. This is true because the agreements are structured so that final or controversial decisions are to be made by management personnel (at both SNWA and the federal agencies), not by scientific personnel. Management personnel are employed to implement the policies of their employer, not primarily to protect the interests of biodiversity. (For example, primary responsibilities for SNWA management people are to deliver water to Southern Nevada and federal agency managers are responsible for implementing the policies of the federal administration in charge at any one particular time.)

Following the Cave, Dry Lake, and Delamar Valley hearing, a second major problem demonstrating that the Monitoring, Management and Mitigation programs cannot succeed in the

long run has been identified and analyzed, initially by Bredehoeft and Durbin (2009), and more recently by Walton (2011). Bredehoeft and Durbin (2009) call it the "Time to Full Capture Problem," and Walton (2011) refers to it as the "response time." This problem, a consequence of the physics controlling function of groundwater aquifers, demonstrates that monitoring as described in the stipulated agreements and in the BLM DEIS, can identify problems for surface waters that will only get worse before they can get better. That will mean a long-term declining biodiversity in those habitats as a consequence of the mechanisms described in Deacon (2007).

Conclusions:

Aquatic dependent species occupying surface water habitats in Spring and southern Snake Valleys will be adversely affected or eliminated if groundwater development of the magnitude requested by SNWA is permitted. Indeed these results can be expected from as little as one third of the magnitude requested, regardless of whether the pumping is evenly distributed or located as proposed by SNWA.

Aquatic dependent species occupying surface water habitats in White River Valley, Pahranagat Valley, headwaters springs and streams of the Muddy River, Panaca Warm Springs, some springs in Eastern Railroad Valley, some springs in Steptoe Valley, and springs and streams in the Ash Meadows National Wildlife Refuge will experience population decline or extinction. Indeed, all spring and wetland dependent species native to the areas mentioned above will experience decline or extinction.

The proposed SNWA groundwater project will increase risk to survival of at least 20 threatened or endangered species listed under the Endangered Species Act, 42 species of springsnails that have been petitioned for listing under the Endangered Species Act, and 157 species listed in the Nevada Natural Heritage Database. In other words, permitting as little as a third of the amount of groundwater pumping for which SNWA has applied would result in widespread environmental damage in both the four targeted valleys and in downgradient valleys within hydrologically connected interbasin flow systems.

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