

Environmental concerns with 3M Plan

Bruce A. Roundy

- Criteria for assessment
 - Judge Estes 2013 remand of NSE ruling 6164 P 23
 - “..a definition of an unreasonable adverse effect, i.e. a trigger, a standard, a threshold must be defined.” (p 23)
 - “Define standards, thresholds, or triggers, so that mitigation of unreasonable effects from pumping of water are neither arbitrary nor capricious in Spring Valley...”
 - 3M Plan p 1-2
 - “Identifies hydrologic and environmental monitoring activities, investigation and mitigation triggers, and management and mitigation actions to avoid unreasonable effects from SNWA GDP pumping in Spring Valley...”
 - “..unreasonable effects are...”
 - “cause elimination of habitat types...from groundwater discharge area;”

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SNWA Monitoring, Management, and Mitigation Plan for Spring Valley, Nevada

June 2017

3M Plan habitats

- Mesic habitat
 - “Spring, seep, pond, wetland/meadow, marsh, stream components” p 2-44
 - Should also include McLendon’s grasslands (Exh 037, 2011)
 - Provides majority of ranch’s forage on 4,670 deeded acres
 - Water availability through summer supplemented by runoff, irrigation, springs, groundwater subirrigation from Cleve and other creeks
 - Upper elevations: sprinkler or flood irrigated
 - Lower elevations: limited summer flood irrigation; spring-fed subirrigated; winter flood irrigated
 - Lowering of watertable 4 ft below ground surface dries up most subirrigated areas (McLendon Exh 037, 2011)
 - Complex patterns of topography, clay, gravel deposits interact with water sources to affect water availability
 - Effects of SNWA pumping on water availability uncertain



Figure 2-1
Spring Valley Examples of the Six Biomes

McLendon 2011, Exh 037

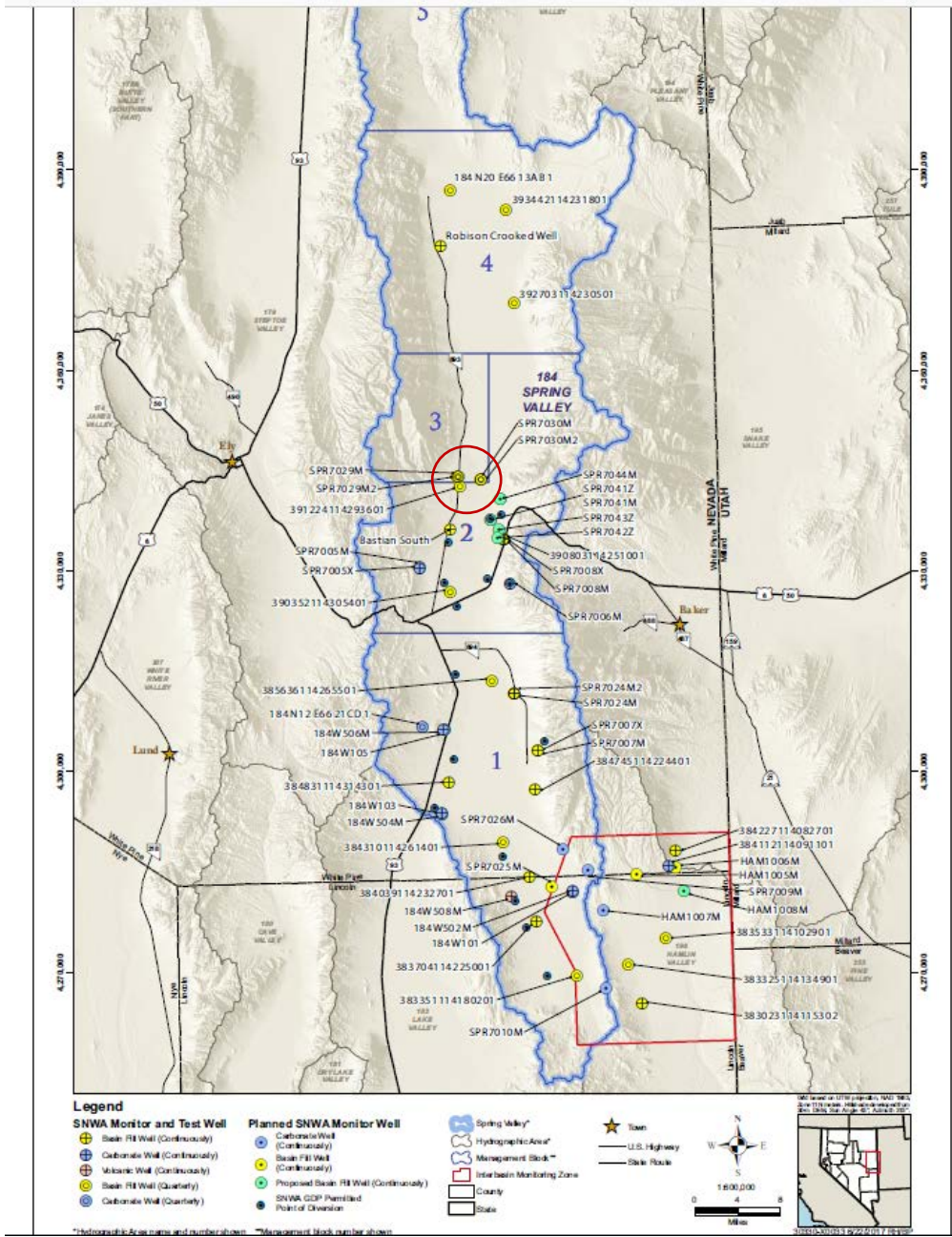
Mesic habitat

- 3M Plan Approach

- “Avoid or eliminate conflicts with senior water rights that support mesic habitat...” (3M Plan p 3-31)
 - 12 spring vested senior water right claims < 3 miles from SNWA POD (3M Plan Tables 2-2; Table B-3, p 2-25)
 - 8 stream water rights not considered in hydraulic connection with SNWA GDP aquifer
- “Changes in water levels at the sentinel wells are used to trigger investigation, monitoring, and management actions for the senior water rights in Block 3... and mesic habitat.” 3M Plan p. 2-45.
- Investigative trigger when spring flows or well levels are below the 99.7% lower control limit for 6 continuous months (3M Plan Table 3-3)
- Mitigation trigger when below the +10 permitted diversion rate for 6 continuous months (3M Plan Table 3-3)
- Mitigation only after water deficiencies determined to be from SNWA pumping (3M Plan p 3-2)

- Concerns

- Shallow and deep groundwater connections are uncertain, yet 3M Plan asserts in numerous places that no hydraulic connection exists between shallower water rights and deep aquifer
- Cleveland ranch mesic habitats are in Blocks 2 and 3 within <3 to 10 miles of SNWA PODS; water monitoring is limited in Block 3
- Lag period in trigger activation and mitigation will result in loss of growing season(s) production of forage for ranch, leopard frog, and other wildlife habitat
- Long-term effects of loss of water availability for 1 or more seasons are uncertain



Legend

Basin RR Well (Continuously)	Carbonate Well (Continuously)	Spring Valley*	Town
Carbonate Well (Continuously)	Basin RR Well (Continuously)	Hydrographic Area*	U.S. Highway
Migrate Well (Continuously)	Proposed Basin RR Well (Continuously)	Management Block**	State Route
Basin RR Well (Quarterly)	SNWA GDP Permitted Point of Diversion	Interbasin Monitoring Zone	County
Carbonate Well (Quarterly)		State	State

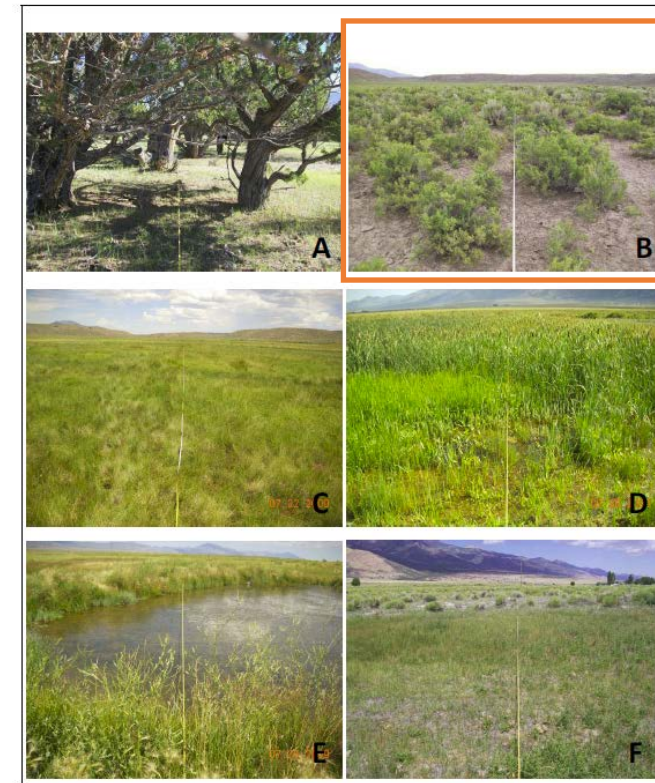
*Hydrographic Area names and number shown. **Management Block number shown.

3M Plan Fig 2-1

Shrubland habitat

- Dominant on main SNWA discharge area and Bastian Creek, Cleveland Ranch and Negro Creek BLM grazing allotments used by Cleveland ranch
- Facultative phreatophytes (don't depend on, but may use shallow groundwater): greasewood, rabbitbrush, big sagebrush, saltgrass, sacaton
- Non-phreatophytes: black and bud sagebrush, winterfat, shadscale, grasses that depend on annual precipitation only
- Low forage production compared to mesic habitats (7.8 acres required to support a cow for a month)
- Livestock mainly graze grasses
- Localized areas of higher forage and stock watering associated with springs, especially in Block 2

Potential Effects of Change in Depth to Water on Vegetation in Spring Valley, Nevada



Note: (A) woodland, (B) shrubland, (C) grassland, (D) wetland, (E) aquatic, (F) early-seral

Figure 2-1
Spring Valley Examples of the Six Biomes

McLendon 2011, Exh 037

Shrubland habitat

- 3M Plan Approach

- Monitor and protect senior water rights (3M Plan p 3-34)
- Maintain shrub cover at or above low density shrubland threshold level (3M Plan p 3-34)
 - Low density \leq 20% cover and medium density $>$ 20% cover (Marshall et al. 2017, Exh 507, p 5-3)
- Investigation triggered when NVDI or percent live shrub cover falls below 95% lower cover control limit (3M Plan Table 3-7, p 3-39)
- Mitigation when these values fall below low-density lower cover control limit for 5 consecutive years (3M Plan Table 3-7, p 3-39)
- Mitigation involves weed control, seeding, transplanting, grazing management, supplemental watering (3M Plan Table 3-7, p 3-39)

- Concerns

- Thus SNWA accepts that pumping will convert some medium to low density shrublands
 - It must to capture phreatophytic ET
 - 3M Plan doesn't quantify the area that will change from medium to low density shrublands; BLM allotments are mainly medium –density shrubland
- A lag time in determining drawdown effects on springs and wells (groundwater) may cost some seasons of localized high forage production and stock water which support grazing
- Drawdown could require ranch to haul stockwater (20 LDS water rights in Block 2 3M Plan Table B2)
- Herbaceous forage restoration will require irrigation in this 8-10 inch precipitation zone

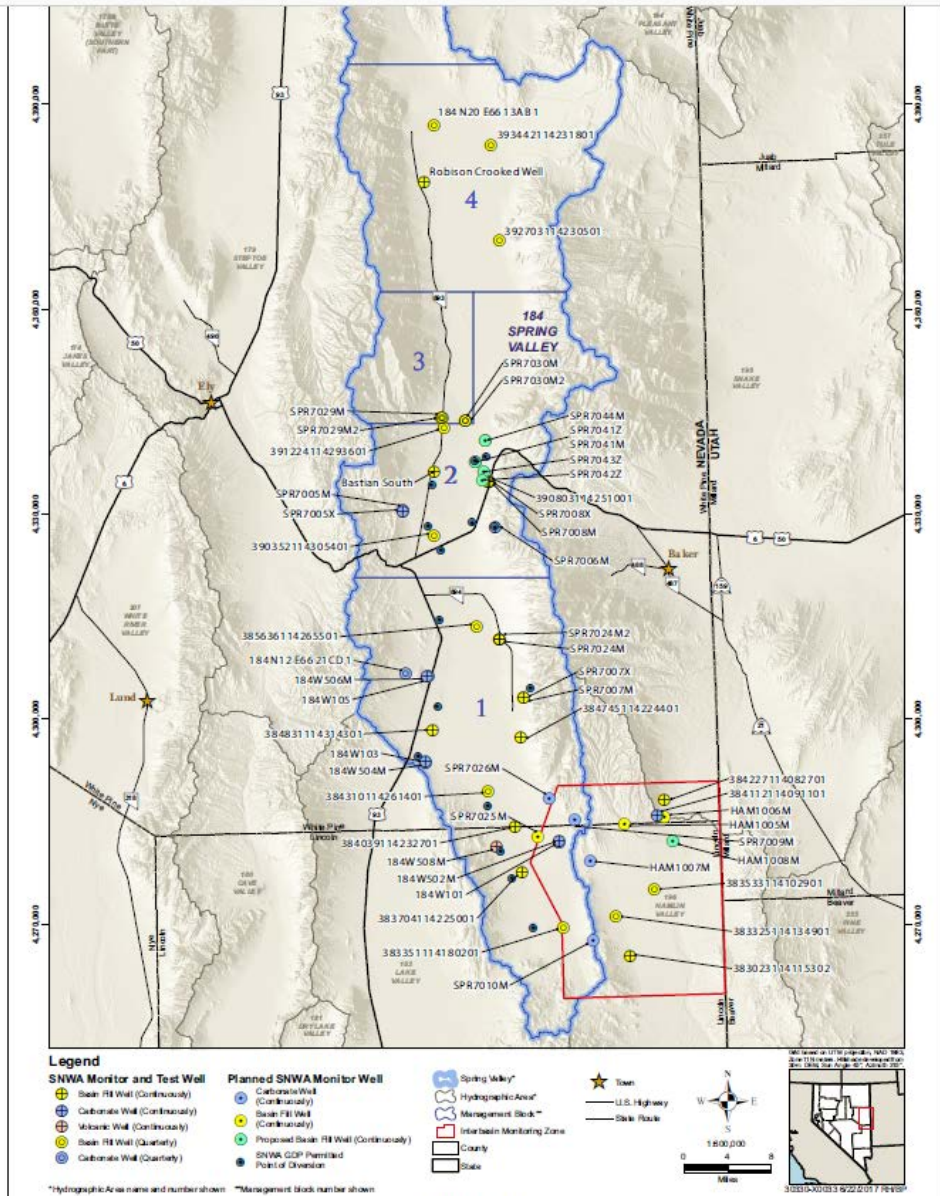


Figure 2-1
Spring Valley 3M Plan Monitor Well Network Locations

3M Plan Fig 2-1 monitoring wells

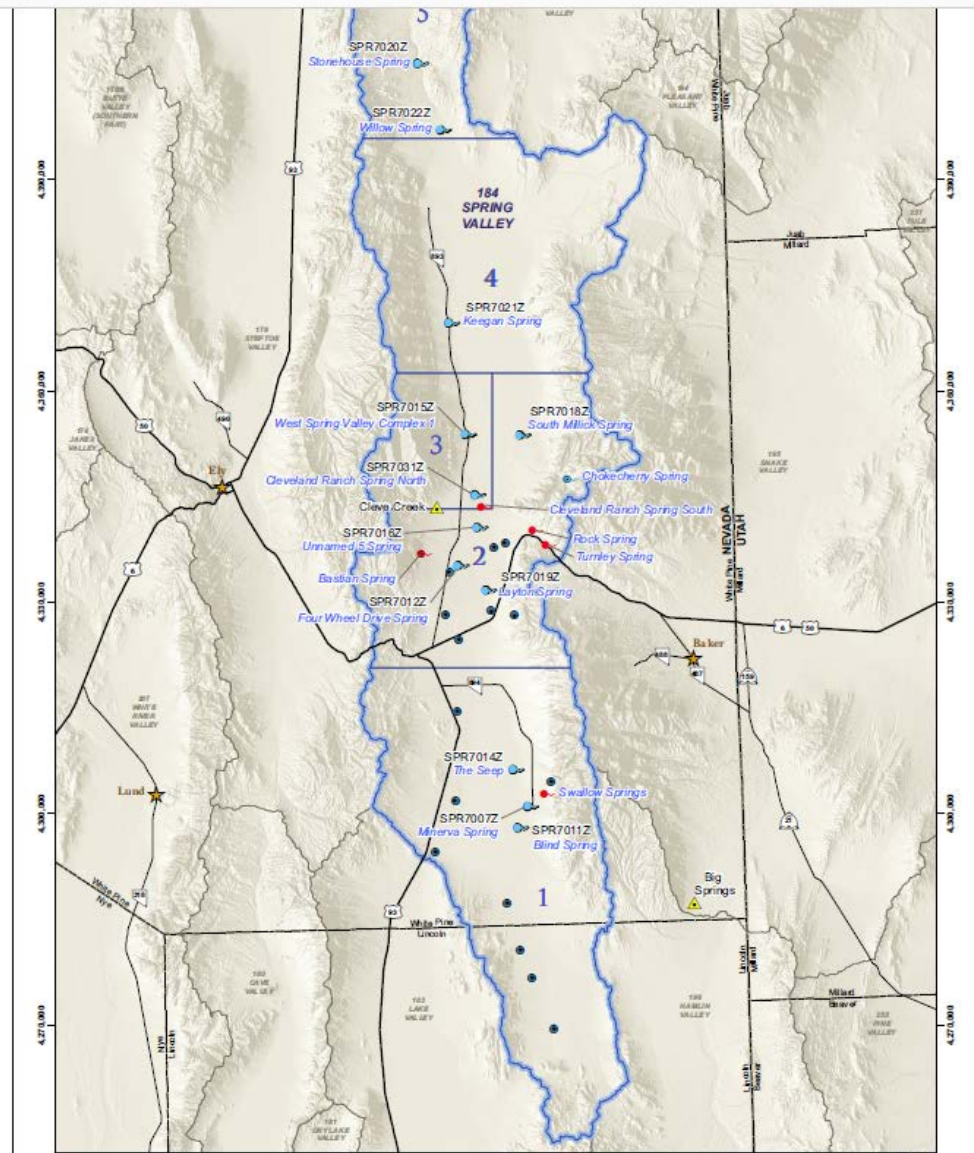


Figure 2-2
Spring Valley 3M Plan Monitoring Springs and Streams

3M Plan Fig 2-2 monitoring springs and streams

Terrestrial woodland habitat

- Main concern is “Swamp Cedar” Area of Critical Environmental Concern (ACEC) as designated by BLM for unusual location and cultural resources (3M Plan p 3-41)
- Forest of Rocky Mountain juniper considered dependent on water that is supplemental to natural precipitation; has juvenile recruitment; mature tree roots can be 10 m deep and groundwater lower than that would be expected to decouple from roots (McLendon 2001 Exh 037, p 3-18).
- 1,500 acres of this woodland (40%) in the discharge area in Block 2 is within designated ACEC (3M Plan Exh 037 p3-41, Marshall et al 2017 Exh 507, p 6-114)
- 3M Plan stated objective is to “..avoid the unreasonable effect of elimination of terrestrial woodland habitat from the Spring Valley groundwater discharge area..” (3 M Plan Exh 037 p 3-41, Marshall et al. 2017, Exh 507, p-6-115) and to “...verify that a viable tree population is maintained.. and that tree cover remains at or above the threshold..” (3M Plan p 2-48, 3-41)



Figure 2-1
Spring Valley Examples of the Six Biomes

McLendon 2011, Exh 037

Rocky Mountain juniper ACEC

- 3M Plan Approach

- Monitoring (3M Plan p 2-48 to 2-51)
 - Aerial-imaged tree cover and NVDI
 - 3 piezometers
 - Nested deeper well and precipitation gage
 - 100 by 100 m ground plots for counting seedlings and saplings for 5 years prior to pumping to create baseline
- Triggers (3M Plan Table 3-8 p 3-45)
 - Investigation if tree cover falls within 5% of lower baseline
 - Mitigation if cover falls below lower baseline limit for 5 consecutive years and it is due to SNWA pumping
- Mitigation (3M Plan Table 3-8 p 3-46)
 - Seeding/planting
 - Use SNWA water to increase trees on its property and elsewhere
 - Modify grazing to protect tree establishment

- Concerns

- No mention of monitoring health or survival of mature trees except by cover measurements
- Without specific knowledge of ground water support (from shallow ground water, spring flow, or perched water tables), drawdown risks widespread mature tree mortality due to loss of water conduction in trees
- Maintenance of mature trees, not reforestation should be the goal in supporting the ACEC
- Loss of tree cover will most likely be due to tree mortality rather than canopy loss within individual trees
- McLendon (Exh_037, 2011) report observes that if all supplemental moisture was eliminated, trees “would not likely survive more than a few decades.”

Summary

- There is lack of agreement creating major uncertainty about connection of shallow water rights, shallow groundwater, and the deep aquifer that SNWA plans to pump
- If no connection how will SNWA pumping access ET in phreatophytic zone and avoid deep aquifer mining?
- Puts at risk senior water rights and environments supported by shallower groundwater
- Time lags in 3M Plan process could result in temporary dewatering and short to longer-term damage to water rights, ranch production, and habitats