Appendix F3.7

Aquatic Biological Resources

Appendix F3.7

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Table F3.7-1
Aquatic Species in the Project Study Area

Table F3.7-1 Aquatic Species in the Project Study Area

Aquatic Species	Status	*Las Vegas Valley[1]	*Garnet Valley[2]	*Hidden Valley (North)[2]	*Coyote Spring Valley[2]	*Pahranagat Valley[2]	*Delamar Valley[2]	*Dry Lake Valley[2]	*Cave Valley[2]	Kane Springs Valley[2]	Pahroc Valley[2]	White River Valley[2]	Muddy River Springs Area[2]	Lower Moapa Valley[2]	California Wash[2]	Black Mountains Area	*Lake Valley[3]	Patterson Valley[3]	Spring Valley (basin #201)[3]	Eagle Valley[3]	Panaca Valley[3]	Lower Meadow Valley Wash[3]	Dry Valley[3]	Clover Valley[3]	Rose Valley[3]	*Steptoe Valley[4]	*Snake Valley[5]	*Spring Valley (basin #184)[5]	*Hamlin Valley[5]	Fish Springs Flat[5]	Tule Valley[5]	Pine Valley[5]	Wah Wah Valley[5]	Deep Creek Valley[5]
Fish																																	
Big Spring spinedace (*Lepidomeda mollispinis pratensis*)	FT, NVP																				S		S										
Bluegill (*Lepomis macrochirus*)	GF	S												S																			
Bonneville cutthroat trout (*Oncorhynchus clarki utah*)	GF, BLM, USFS, NVP, UTSC, CA																									S	RS	S					S
Brook trout (*Salvelinus fontinalis*)	GF																S									RS	S	ES					
Brown trout (*Salmo trutta*)	GF											S							S	S						RS	RES	ES					
Bullhead species (*Ameiurus* spp.)	GF					S						S		S						S													
Channel catfish (*Ictalurus punctatis*)	GF	S												S													S				S		
Green sunfish (*Lepomis cyanellus*)	GF	S				S																											
Hiko White River springfish (*Crenichthys baileyi grandis*)	FE, NVP					S																											
Lahontan cutthroat trout (*Oncorhynchus clarki henshawi*)	GF, FT, NVP, USFS																										S						
Largemouth bass (*Micropterus salmoides*)	GF	S				S						S		S						S			S		S	S							
Least Chub (*Iotichthys phlegethontis*)	C, UTSC, CA																										S			S			
Meadow Valley Wash Desert sucker (*Catostomus clarki* ssp.)	BLM, NVP																		S	S	S	S	S	S									
Meadow Valley Wash speckled dace (*Rhinichthys osculus* spp.)	BLM																		S	S	S	S	S	S									
Moapa dace (*Moapa coriacea*)	FE, NVP												S																				
Moapa speckled dace (*Rhinichthys osculus moapae*)	BLM, NVP												S	S	S																		
Moapa White River springfish (*Crenichthys baileyi moapae*)	NVP												S																				

Table F3.7-1 Aquatic Species in the Project Study Area (Continued)

Aquatic Species	Status	*Las Vegas Valley[1]	*Garnet Valley[2]	*Hidden Valley (North)[2]	*Coyote Spring Valley[2]	*Pahranagat Valley[2]	*Delamar Valley[2]	*Dry Lake Valley[2]	*Cave Valley[2]	Kane Springs Valley[2]	Pahroc Valley[2]	White River Valley[2]	Muddy River Springs Area[2]	Lower Moapa Valley[2]	California Wash[2]	Black Mountains Area	*Lake Valley[3]	Patterson Valley[3]	Spring Valley (basin #201)[3]	Eagle Valley[3]	Panaca Valley[3]	Lower Meadow Valley Wash[3]	Dry Valley[3]	Clover Valley[3]	Rose Valley[3]	*Steptoe Valley[4]	*Snake Valley[5]	*Spring Valley (basin #184)[5]	*Hamlin Valley[5]	Fish Springs Flat[5]	Tule Valley[5]	Pine Valley[5]	Wah Wah Valley[5]	Deep Creek Valley[5]
Moorman White River springfish (*Crenichthys baileyi thermophilus*)	NVP											S																					
Mottled sculpin (*Cottus bairdii*)	NLD																									ES							
Pahranagat roundtail chub (*Gila robusta jordani*)	FE, NVP					S																											
Pahranagat speckled dace (*Rhinichthys osculus velifer*)	BLM, NVP					S																											
Pahrump poolfish (*Empetrichthys latos*)	FE, NVP	S																									S						
Preston White River springfish (*Crenichthys baileyi albivallis*)	BLM, NVP											S																					
Rainbow trout (*Oncorhynchus mykiss*)	GF					S						S					S		S	S	S	S	S	S	S	RS	RES	ES				S		S
Redside shiner (*Richardsonius balteatus*)	NLD																									ES							
Relict dace (*Relictus solitarius*)	BLM, NVP																									S		ES					
Sacramento perch (*Archoglites interruptus*)	GF																										S						
Speckled dace (*Rhinichthys osculus*)	NLD																										ES						
Utah chub (*Gila atrairai*)	NLD																										ES	S					
Utah sucker (*Catostomus ardens*)	NLD																										ES						
Virgin River chub (*Gila seminuda*)	NVP												S	S	S																		
White crappie (*Pomoxis annularis)*	GF					S														S			S		S								
White River desert sucker (*Catostomus clarki intermedius*)	BLM, NVP											S																					
White River mottled sculpin (*Cottus bairdi*)	NLD											S																					
White River speckled dace (*Rhinichthys osculus* spp.)	BLM											S																					
White River spinedace (*Lepidomeda albivallis*)	FE, NVP											S																					

Table F3.7-1 Aquatic Species in the Project Study Area (Continued)

Aquatic Species	Status	*Las Vegas Valley[1]	*Garnet Valley[2]	*Hidden Valley (North)[2]	*Coyote Spring Valley[2]	*Pahranagat Valley[2]	*Delamar Valley[2]	*Dry Lake Valley[2]	*Cave Valley[2]	Kane Springs Valley[2]	Pahroc Valley[2]	White River Valley[2]	Muddy River Springs Area[2]	Lower Moapa Valley[2]	California Wash[2]	Black Mountains Area	*Lake Valley[3]	Patterson Valley[3]	Spring Valley (basin #201)[3]	Eagle Valley[3]	Panaca Valley[3]	Lower Meadow Valley Wash[3]	Dry Valley[3]	Clover Valley[3]	Rose Valley[3]	*Steptoe Valley[4]	*Snake Valley[5]	*Spring Valley (basin #184)[5]	*Hamlin Valley[5]	Fish Springs Flat[5]	Tule Valley[5]	Pine Valley[5]	Wah Wah Valley[5]	Deep Creek Valley[5]
White River springfish (*Crenichthys baileyi baileyi*)	FE, NVP					S																											
Invertebrates																																	
Bifid duct springsnail (*Pyrgulopsis peculiaris*)	P, BLM, UTSC																										S	S					
Blue Point springsnail (*Pyrgulopsis coloradensis*)	P															X																	
Butterfield springsnail (*Pyrgulopsis lata*)	P											S																					
California floater (*Anodonta californiensis*)	BLM, UTSC																										S						
Camp Valley springsnail (*Pyrgulopsis montata*)	P																				S												
Cloaked physa (*Physella megalochlamys*)	UTSC																										S						
Corn Creek Springsnail (*Pyrgulopsis fausta*)	NLD	S																															
Emigrant springsnail (*Pyrgulopsis gracilis*)	P											S																					
Flag springsnail (*Pyrgulopsis breviloba*)	P							S				S																					
Flat-topped Steptoe springsnail (*Pyrgulopsis planulata*)	P																									S							
Grated tyronia (*Tyronia clathrata*)	P, BLM, NVP					S						S	S																				
Hamlin Valley springsnail (*Pyrgulopsis hamlinensis*)	P, UTSC																											S					
Hardy springsnail (*Pyrgulopsis marcida*)	P, NVP								S			S																					
Hubbs springsnail (*Pyrgulopsis hubbsi*)	P					S																											
Lake Valley springsnail (*Pyrgulopsis sublata*)	P																S																
Landyes springsnail (*Pyrgulopsis landeyi*)	P, BLM																									S							
Longitudinal gland springsnail (*Pyrgulopsis anguina*)	P, UTSC																										S						
Moapa pebblesnail (*Pyrgulopsis avernalis*)	P												S																				

Table F3.7-1 Aquatic Species in the Project Study Area (Continued)

Aquatic Species	Status	*Las Vegas Valley[1]	*Garnet Valley[2]	*Hidden Valley (North)[2]	*Coyote Spring Valley[2]	*Pahranagat Valley[2]	*Delamar Valley[2]	*Dry Lake Valley[2]	*Cave Valley[2]	Kane Springs Valley[2]	Pahroc Valley[2]	White River Valley[2]	Muddy River Springs Area[2]	Lower Moapa Valley[2]	California Wash[2]	Black Mountains Area	*Lake Valley[3]	Patterson Valley[3]	Spring Valley (basin #201)[3]	Eagle Valley[3]	Panaca Valley[3]	Lower Meadow Valley Wash[3]	Dry Valley[3]	Clover Valley[3]	Rose Valley[3]	*Steptoe Valley[4]	*Snake Valley[5]	*Spring Valley (basin #184)[5]	*Hamlin Valley[5]	Fish Springs Flat[5]	Tule Valley[5]	Pine Valley[5]	Wah Wah Valley[5]	Deep Creek Valley[5]
Moapa Valley springsnail (*Pyrgulopsis carinifera*)	P, NLD												S																					
Moapa Warm Springs riffle beetle (*Stenelmis moapa*)	BLM												S																					
Neretiform Steptoe Ranch springsnail (*Pyrgulopsis neritella*)	P, NLD																									S								
Northern Steptoe springsnail (*Pyrgulopsis serrata*)	P, NLD																									S								
Pahranagat naucorid bug[7] (*Pelocoris shoshone shoshone*)	BLM					S							S																					
Pahranagat pebblesnail (*Pyrgulopsis merriami*)	P, NLD					S						S																						
Pyrgulopsis protea	Not known																													S				
Pyrgulopsis species[8]	Not known																										S			S	S			
Southeast Nevada springsnail (*Pyrgulopsis turbatrix*)	P	X																																
Southern Steptoe springsnail (*Pyrgulopsis sulcata*)	P, BLM																									S								
Spring Mountains springsnail (*Pyrgulopsis deaconi*)	P, BLM, NVP	S																																
Sub-globose Snake springsnail (*Pyrgulopsis saxatilis*)	P, UTSC																										S							
Sub-globose Steptoe springsnail (*Pyrgulopsis orbiculata*)	P, BLM																									S								
Transverse gland springsnail (*Pyrgulopsis cruciglans*)	NVD																									S								
Utah physa[6] (*Physella utahensis*)	UTSC																													S[6]				
White River Valley springsnail (*Pyrgulopsis sathos*)	P											S																						
Amphibians																																		
Arizona toad (*Bufo microscaphus*)	BLM, UTSC	S													S							S	S	S										
Columbia spotted frog (*Rana luteiventris*)	NVP, UTSC, CA																										S				S			S
Northern leopard frog (*Rana pipiens*)	P, BLM, NVP					S						S					S										S	S		S				
Relict leopard frog (*Rana onca*)	C, NVP, CA															S																			

Table F3.7-1 Aquatic Species in the Project Study Area (Continued)

Aquatic Species	Status	*Las Vegas Valley[1]	*Garnet Valley[2]	*Hidden Valley (North)[2]	*Coyote Spring Valley[2]	*Pahranagat Valley[2]	*Delamar Valley[2]	*Dry Lake Valley[2]	*Cave Valley[2]	Kane Springs Valley[2]	Pahroc Valley[2]	White River Valley[2]	Muddy River Springs Area[2]	Lower Moapa Valley[2]	California Wash[2]	Black Mountains Area	*Lake Valley[3]	Patterson Valley[3]	Spring Valley (basin #201)[3]	Eagle Valley[3]	Panaca Valley[3]	Lower Meadow Valley Wash[3]	Dry Valley[3]	Clover Valley[3]	Rose Valley[3]	*Steptoe Valley[4]	*Snake Valley[5]	*Spring Valley (basin #184)[5]	*Hamlin Valley[5]	Fish Springs Flat[5]	Tule Valley[5]	Pine Valley[5]	Wah Wah Valley[5]	Deep Creek Valley[5]

*A basin that has ROW and / or groundwater exploratory area(s).

[1] Las Vegas Wash Flow System.

[2] White River Flow System.

[3] Meadow Valley Wash Flow System.

[4] Goshute Valley Flow System.

[5] Salt Lake Desert Flow System.

[6] Potential occurrence near Fish Springs was based on shells. Identification was not confirmed.

[7] Taxonomic studies by Polhemus and Polhemus (2002) indicate that *Pelocoris shoshone shoshone* is *P. biimpressus shoshone*.

[8] Collected from Tule Springs; potential new species.

R = Species is present in the ROW; E = Species is present in one or more of the groundwater exploratory areas; and S = reasonable expectation of occurrence in basin based on best available knowledge by wildlife management agencies.

Status: FE = Federally endangered; FT = Federally threatened; C = candidate; P = petitioned for federal listing; BLM = BLM sensitive species; NVP = Nevada Protected; NLD = No special status but species has limited distribution in Nevada; UTSC = Utah Special Concern; CA = Conservation agreement species; USFS = Forest Service sensitive species; and GF = game fish species.

Other Species Mentioned in Section 3.7

Fish

Shortfin molly (*Poecilia Mexicana*)

Western mosquitofish (*Gambusia affinis*)

Amphibians:

- Arizona toad (*Bufo micorscaphus*)
- Bullfrog (*Rana catesbeiana*)
- Great Basin spadefoot toad (*Spea intermontana*)
- Pacific chorus frog (*Pseudacris regilla*)
- Red-spotted toad (*Bufo punctatus*)
- Tiger salamander (*Ambystoma tigrinum*)
- Western Woodhouse's toad (Bufo woodhousii woodhousii)

Invertebrates:

- Brine shrimp (*Artemia* spp.)
- Fairy shrimp (*Anostraca* spp.)
- Fingernail clam (*Pisidium* sp.)
- Freshwater limpets (*Ferrissia* sp.)
- Planorbid snails (*Gyraulus* sp.)
- Red swamp crayfish (*Procambarus clarkii*)
- Red-rimmed melania snail (*Melanoides tuberculata*)
- Tadpole shrimp (*Triops* or *Lepidurus* spp.)

Table F3.7-2
Game Fish Species in the Region of Study

Table F3.7-2 Game Fish Species in the Region of Study

Waterbodies in Hydrographic Basins Inhabited by Game Fish Species[1]	Game Fish Species													
	Bullhead Species	Channel Catfish	Green Sunfish	Bluegill	Largemouth Bass	Cutthroat Trout	Bonneville Cutthroat Trout	Lahontan Cutthroat Trout	Rainbow Trout	White Crappie	Brook Trout	Brown Trout	Trout Hybrids	Sacramento Perch
*Las Vegas Valley[2]														
Floyd Lamb State Park Pond		X	X	X	X				X					
Lorenzi Park Pond		X			X				X					
Sunset Park Pond		X		X	X				X					
*Pahranagat Valley[3]														
Nesbit Lake	X				X									
Upper Pahranagat Lake	X		X		X					X				
White River Valley[3]														
Adams-McGill Reservoir					X				X					
Cold Springs Reservoir	X				X				X					
Dacey Reservoir					X				X					
Haymeadow Reservoir	X				X				X					
White River									X			X		
Ellison Creek									X					
Forest Home Creek												X		
Lower Moapa Valley[3]														
Bowman Reservoir				X	X									
Muddy River	X	X			X									
*Lake Valley[4]														
Geyser Creek									X		X			
North Creek									X		X			
Spring Valley (basin #201)[4,7]														
Eagle Valley Reservoir									X			X	X	
Meadow Valley Wash/ Camp Valley Creek									X			X		
Eagle Valley[4,7]														
Meadow Valley Wash									X			X		
Panaca Valley[4,7]														
Meadow Valley Wash									X					
Eagle Valley Reservoir									X					
Dry Valley[4,7]														
Echo Canyon Reservoir					X				X	X				
Lower Meadow Valley Wash[4,7]														
Meadow Valley Wash									X					
Rose														
Echo Canyon Reservoir					X				X	X				
Clover Valley[4]														
Clover (Big Springs) Creek									X					
*Steptoe Valley[5]														
Bassett Lake					X									
Berry Creek									X			X		
Big Indian Creek									X		X			
Bird Creek									X		X			
Cave Creek									X		X	X		

Table F3.7-2 Game Fish Species in the Region of Study (Continued)

Waterbodies in Hydrographic Basins Inhabited by Game Fish Species[1]	Game Fish Species													
	Bullhead Species	Channel Catfish	Green Sunfish	Bluegill	Largemouth Bass	Cutthroat Trout	Bonneville Cutthroat Trout	Lahontan Cutthroat Trout	Rainbow Trout	White Crappie	Brook Trout	Brown Trout	Trout Hybrids	Sacramento Perch
Cave Lake									X		X	X		
Cherry Creek									X					
Comins Lake					X				X			X		
Duck Creek					X				X		X	X		
Duck Creek Reservoir									X			X		
East Creek									X					
Egan Creek									X					
Goshute Creek							X							
Mattier Creek									X		X			
Monte Neva Hot Springs				X	X									
North Creek									X					
Steptoe Creek									X		X	X		
Steptoe Ranch					X									
Tailings Creek											X			
Timber Creek									X		X			
Willow Creek									X			X		
*Snake Valley[6]														
Baker Creek									X		X	X	X	
Baker Creek – South Fork							X							
Baker Lake								X			X			
Basin Creek							X							
Big Wash							X							
Birch Creek							X							
Cottonwood Creek							X							
Deadman Creek							X							
Deep Canyon Creek							X							
Granite Creek							X		X					
Hampton Creek							X							
Hendry's Creek							X							
Indian Farm Creek							X							
Lehman Creek									X		X	X	X	
Mill Creek							X							
North Fork of Birch Creek							X							
Pruess Lake		X			X						X			X
Red Cedar Creek							X							
Rowland Spring											X			
Sacramento Pass Pond									X					
Silver Creek†						X			X		X	X	X	
Silver Creek (Second Fork)											X	X	X	
Silver Creek Reservoir									X			X		
Smith Creek							X							
Snake Creek (mainstem)									X		X	X		
Snake Creek, North, Middle, and South Forks							X				X			
South Fork Big Wash							X							

Table F3.7-2 Game Fish Species in the Region of Study (Continued)

Waterbodies in Hydrographic Basins Inhabited by Game Fish Species[1]	Game Fish Species													
	Bullhead Species	Channel Catfish	Green Sunfish	Bluegill	Largemouth Bass	Cutthroat Trout	Bonneville Cutthroat Trout	Lahontan Cutthroat Trout	Rainbow Trout	White Crappie	Brook Trout	Brown Trout	Trout Hybrids	Sacramento Perch
Spring Creek (tributary to Silver Creek)									X				X	
Strawberry Creek							X							
Trout Creek							X							
Tom's Creek							X							
Upper Snake Creek							X							
*Spring Valley (basin #184)[6]														
Bassett Creek									X					
Bastian Creek									X			X		
Cleve Creek									X			X		
Eightmile Creek									X					
Indian Creek									X					
Kalamazoo Creek									X			X		
Little Negro Creek									X					
McCoy Creek									X			X	X	
Meadow Creek												X		
Muncy Creek									X		X	X	X	
Negro Creek									X			X		
Odgers Creek									X					
Piermont Creek												X		
Pine Creek							X							
Ridge Creek							X							
Siegel Creek									X					
Shingle Creek									X			X	X	
Sunkist (North) Creek											X			
Swallow Spring									X					
Taft Creek, South Taft Canyon									X		X			
Vipont Creek, Stephens Creek									X					
Williams Canyon Creek									X				X	
Willard Creek									X				X	
Deep Creek Valley[6]														
Dad's Creek							X							
Fifteen Mile Creek							X							
Johnson Creek (South Fork)							X							
Sam's Creek							X							
Spring Creek							X							
Steve's Creek							X							

*A basin that has ROW and / or groundwater exploratory area(s).
† = Stream considered a possible reintroduction site for Bonneville cutthroat trout.
[1]Basins with no game fisheries: Garnet, Hidden Valley (North), Coyote Spring, Delamar, Dry Lake, Cave Valley, Kane Springs, Pahroc, Muddy River Springs, California Wash, Patterson, Hamlin, Fish Springs Flat, Tule, Pine, and Wah Wah.
[2]Las Vegas Wash Flow System.
[3]White River Flow System.
[4]Meadow Valley Wash Flow System.
[5]Goshute Valley Flow System.
[6]Salt Lake Desert Flow System.
[7]Drainages are part of Upper Meadow Valley.

Table F3.7-3
Game Fish Habitat Preferences and Spawning

Table F3.7-3 Game Fish Habitat Preferences and Spawning

Species	Habitat	Spawning	References
Rainbow trout (*Oncorhynchus mykiss*)	Optimum riverine habitat is characterized by clear, cold water with silt-free rocky substrate in riffle-run areas, abundant instream cover, and well-vegetated banks. Lake/reservoir habitat is characterized by clear water, cool temperatures, and available deeper water.	Spring, almost exclusively in streams.	Raleigh et al. 1984
Brown trout (*Salmo trutta*)	Riverine habitat consists of clear, cool to cold water; a relatively silt-free rocky substrate in riffle-run areas; mixture of pools, riffles and runs; well vegetated streambanks and abundant instream cover. Most cover-oriented of all trout species. Lake/reservoir habitat is the same as described for rainbow trout.	Fall, typically stream spawners.	Raleigh et al. 1986
Bonneville cutthroat trout (*Oncorhynchus clarkii*)	This cutthroat subspecies requires relatively cool, well oxygenated water with clean, well-sorted substrates. Stream resident fish usually spawn over coarse sand or small gravels.	Spring and early summer at higher elevations for stream spawners.	Lentsch et al. 2000
Lahontan cutthroat trout (*Oncorhynchus clarkii henshawi*)	Within the project region of study, this species occurs in Baker Lake in Snake Valley. Lake populations have adapted to a wide variety of habitat conditions.	Spring and summer.	USFWS 1995
Brook trout (*Salvelinus fontinalis*)	Habitat preferences are similar to other trout species except that they are quite adaptable to a headwater streams, and large rivers. Species is most commonly found in headwater streams.	Fall, stream spawners but utilize spring upwelling areas.	Raleigh 1982
Largemouth bass (*Micropterus salmoides*)	Riverine habitat preferences include large, slow-moving rivers or pools of streams with soft bottoms and some aquatic vegetation. Lake/reservoir habitat conditions include excessive shallow areas with submergent vegetation and some deeper water.	Spring, usually in lakes/reservoirs.	Stuber et al. 1982
Bullhead Species (*Ameiurus* spp.)	Habitat consists of ponds, small lakes, river backwaters, swamps, and impoundments with warm temperatures, slow currents, and mud-dominated substrates.	Spring and summer.	Sigler and Miller 1963
Sunfishes (*Lepomis* spp.)	Habitat consists of warmwater ponds, lakes, swamps, sloughs, and slow-moving streams and rivers. Species often are associated with aquatic vegetation and silt, sand, or gravel substrates.	Spring and summer.	Sigler and Miller 1963
White crappie (*Pomoxis annularis*)	Habitat consists of rivers, lakes, and reservoirs with preference for low velocity areas and backwater sections of rivers and cover consisting of aquatic vegetation, woody debris, and boulders.	Spring and early summer.	Edwards et al. 1982
Channel catfish (*Ictalarus punotatus*)	Habitat consists of streams, rivers, lakes, reservoirs, and ponds with clear to muddy conditions. Adults seek cover such as submerged woody debris and boulders during the day. Adults move to shallow water to feed at night.	Early spring through early summer.	Sigler and Miller 1963
Sacramento perch (*Archoplites interruptus*)	Habitat consists of vegetated areas in sloughs, ponds, and lakes.	Spring and summer.	University of California-Davis 2010

Table F3.7-4
Fish Species in Region of Study Spring and Ponds

Table F3.7-4 Fish Species in Region of Study Springs and Ponds

Basin/Spring	Species
Fish Spring Flat	
Crater Spring	Mosquitofish
Deadman Spring	Mosquitofish
House Spring	Mosquitofish
Lost Spring	Utah chub, mosquitofish
Middle Spring	Mosquitofish
Mirror Spring	Mosquitofish
North Spring	Utah chub
Percy Spring	Utah chub, mosquitofish
Pintail/Ibis Waterfowl Units	Mosquitofish
South Spring	Utah chub, mosquitofish
Thomas Spring	Utah chub, mosquitofish
Walter's Spring	Mosquitofish
Spring (#184)	
Keegan Spring Complex	Relict dace*
Minerva Spring Complex	Utah chub
Shoshone Ponds	Relict dace*, Pahrump poolfish*
Stonehouse Spring Complex	Utah chub
Swallow Spring	Rainbow trout
Snake	
Big Springs	Utah chub*, speckled dace*, redside shiner*, mottled sculpin*
Beck Springs North	Speckled dace
Bishop Springs/Foote Reservoir	Utah chub, speckled dace, least chub
Callao Big Springs	Utah chub, speckled dace, carp
Gandy Salt Marsh	Least chub*, Utah chub, speckled dace
Gandy Warm Spring	Speckled dace
Leland Harris Spring	Least chub*, Utah chub
Miller Spring	Utah chub
Rowland Spring	Rainbow trout
Stateline Spring	Utah chub, speckled dace, redside shiner, mottled sculpin
Twin Springs	Utah chub, speckled dace, largemouth bass, goldfish
Unnamed spring south of Knoll Spring	Goldfish
Steptoe	
Cardano/Murphy/Dolan Ranch springs	Relict dace*
Grass Springs/Lusetti Ranch Spring	Relict dace*, northern pike

Table F3.7-4 Fish Species in Region of Study Springs and Ponds (Continued)

Basin/Spring	Species
McGill/Dairy Ranch Springs	Convict cichlid, coi, goldfish, guppy, mosquitofish, relict dace*, sailfin molly
Monte Neva Hot Springs	Bluegill, largemouth bass
Steptoe Ranch Springs	Relict dace*, carp
Steptoe Valley Wildlife Management Area Springs	Relict dace*, Utah chub
Muddy River	
Apcar Spring	Moapa dace*, Moapa White River springfish*
Moapa National Refuge	Moapa dace*, Moapa White River springfish*
White River	
Arnoldson Spring	Preston White River springfish*, White River speckled dace*, guppy species
Baker Spring	White River speckled dace*
Butterfield Spring	White River speckled dace*, White River sculpin*
Camp Spring	White River speckled dace*
Cold Spring	Guppy species
Emigrant Springs	White River speckled dace*
Flag Spring Complex	White River spinedace*, White River desert sucker*, White River speckled dace*
Hot Creek Spring	Moorman White River spring fish*, mosquitofish
Indian Spring	White River spinedace*, Preston White River springfish*, White River desert sucker*, White River speckled dace
Lund Town Spring	White River desert sucker, White River speckled dace, guppy species
Moon River Spring	Moorman White River springfish*
Moorman Spring	Moorman White River springfish*
Nicholas Spring	Preston White River springfish*, guppy species
Preston Big Spring	Preston White River springfish*, White River speckled dace*
Tin Can Spring	White River speckled dace*
Pahranagat	
Ash Spring	White River springfish*, mesquitofish, shortfin molly, convict cichlid
Brownie/Deacon Spring	Pahranagat speckled dace*, mosquitofish
Cottonwood Springs	Pahranagat speckled dace*, largemounth bass, green sunfish, mosquitofish
Crystal Spring	Hiko White River springfish*, Pahranagat speckled dace, mosquitofish, shortfin molly, convict cichlid
Hiko Spring	Hiko White River springfish*, mosquitofish, shortfin molly, convict cichlict
Panaca	
Panaca Spring	Mosquitofish, shortfin molly

Sources: BIO-WEST 2009, 2007; ENSR/AECOM 2008.

* = Denotes special status species (see **Table F3.7-1** for status).

Table F3.7-5
Perennial Lakes, Reservoirs, and Ponds Within the Region of Study

Table F3.7-5 Perennial Lakes, Reservoirs, and Ponds Within the Region of Study

Hydrographic Basin	Waterbody Name
Deep Creek	Sanford Reservoir
	Unnamed Waterbodies – 13
Wah Wah	Brimstone Reservoir
	Unnamed Waterbody – 1
Pine	CCC Reservoir
	Pine Grove Reservoir
	Unnamed Waterbodies – 7
Tule	Unnamed Waterbody – 1
Fish Springs Flat	Avocet Pool
	Curlew Pool
	Egret Pool
	Mallard Pool
	Pintail Pool
	Shoveler Pool
	Unnamed Waterbodies – 90
Spring Valley (#184)	Shoshone Ponds
Snake	Baker Lake
	Baker Reservoir
	Brown Lake
	Dead Lake
	Ecks Knoll Reservoir
	Foote Reservoir
	Johnson Lake
	Morman Gap Reservoir
	Mud Lake Reservoir
	Pruess Lake
	Sacramento Pass Pond
	Silver Creek Reservoir
	Stella Lake
	Teresa Lake
	Unnamed Waterbodies – 41
Steptoe	Bassett Lake
	Cave Lake
	Comins Lake
	Currie Ponds
	Duck Creek Reservoir
	French Lake
	Frenchy Meadows
	Monte Neva Hot Springs
	Steptoe Waterhole
	Willow Spring Reservoir
	Unnamed Waterbodies – 169
Rose	Echo Canyon
	Unnamed Waterbody – 1
Clover	Acoma Reservoir
	Culverwell Reservoir
	Jacks Canyon Reservoir
	Lafes Reservoir
	Rolling Hills Reservoir
	Unnamed Waterbodies – 8

Table F3.7-5 Perennial Lakes, Reservoirs, and Ponds Within the Region of Study (Continued)

Hydrographic Basin	Waterbody Name
Dry Valley	Unnamed Waterbody – 1
Dry Lake	Bullfrog Reservoir
	Middle Reservoir
	Point of Rock Reservoir
	Upper Reservoir
	Unnamed Waterbodies – 7
Lower Meadow Valley Wash	Unnamed Waterbodies – 3
Panaca	Unnamed Waterbodies – 32
Spring Valley (#201)	Adams Reservoir
	Eagle Valley Reservoir
	Unnamed Waterbodies – 73
Eagle	None
Patterson	Divide Reservoir
	Upper Patterson Reservoir
	Unnamed Waterbodies – 8
Lake Valley	Freshwater Lake
	Steward Reservoir
	Travis Reservoir
	Unnamed Waterbodies – 13
Black Mountains Area	Lake Mead
	Unnamed Waterbodies – 9
California Wash	Unnamed Waterbodies – 10
Lower Moapa	Bowman Reservoir
	Lake Mead
	Sheep Canyon Reservoir
	Unnamed Waterbodies – 12
Muddy River Springs Area	Unnamed Waterbodies – 4
White River	Adams McGill Reservoir
	Big Lake
	Cold Springs Reservoir
	Dacey Reservoir
	Forest Home Reservoir No. 4
	Hay Meadow Reservoir
	Little Lake
	Tule Field Reservoir
	Unnamed Waterbodies – 39
Pahroc	None
Kane Springs	None
Cave	Unnamed Waterbodies – 3
Delamar	Unnamed Waterbodies – 2
Coyote Spring	Unnamed Waterbody – 1
Pahranagat	Upper Pahranagat Lake
	Lower Pahranagat Lake
	Nesbitt Lake
	Unnamed Waterbodies – 3

Table F3.7-5 Perennial Lakes, Reservoirs, and Ponds Within the Region of Study (Continued)

Hydrographic Basin	Waterbody Name
Las Vegas	Cottonwood Lake
	Desert Willow Lake
	Mulberry Lake
	Searles Reservoir
	Tule Springs Lake
	Twin Lakes
	Unnamed Waterbodies – 148

Table F3.7-6
Habitat Requirements and Life History of Special Status Aquatic Species Potentially Occurring Within the Region of Study

Table F3.7-6 Habitat Requirements and Life History of Special Status Aquatic Species Potentially Occurring Within the Region of Study

Species	Habitat Requirements	Life History/Feeding
Fish		
Meadow Valley Wash Desert Sucker (*Catostomus clarkii* ssp.)	This species inhabits the Meadow Valley Wash drainage. On a species level, they are typically found in small to moderately large streams with pools and riffles; mainly over bottoms of gravel-rubble with sandy silt in interstices. Large adults occupy pools during the day, move to riffles at night and during periods of high turbidity. Young tend to congregate along bank in quiet water and then move to swifter water as they mature. Spawns in riffles.	Little information is available for this subspecies. Life history and feeding assumed to be similar to other desert suckers.
Utah sucker *(Catostomus ardens*)	This species occurs in Big Springs Creek in the Nevada portion of Snake Valley and Lake Creek in the Utah portion of Snake Valley. Species utilizes a variety of habitats including lakes, rivers, and creeks with realatively warm to cold water temperatures. Habitat characteristics also can vary in terms of current, bottom substrate, depth, and water clarity. Typically, this species occurs near areas with submerged algae and/or macrophytes.	Spawning occurs in spring and early summer.
White River Desert Sucker (*Catostomus clarkii intermedius*)	This sucker subspecies occurs in streams, springs, and springbrooks in White River Valley. Limited to isolated spring, stream and spring outflow systems in White Pine and Nye Counties, Nevada.	No specific life history information is available for this sub-species. Basic life history requirements are assumed to be similar to other desert suckers which inhabit isolated pond and spring outflow systems.
White River Sculpin (*Cottus* sp.)	This species has been collected in Butterfield Springs within the lower White River River system. Habitat characteristics included sandy gravel substrates and watercress vegetation.	Spawning typically occurs in the spring with adhesive eggs attached to rocks in a nest on the bottom of the waterbody.
Preston White River Springfish (*Crenichthys baileyi albivallis*)	This subspecies occupies the coolest headwater spring and outflow/springbrook habitats of any of the White River springfish. Restricted to thermal spring systems in upper White River Valley, White Pine County, Nevada. Able to survive extremes in temperature and dissolved oxygen. Temperature and minimum oxygen values vary considerably among spring habitats, from 21 °C (69.8 °F) and 3.3 ppm oxygen at Preston Big Spring to 37 °C (98.6 °F) and 0.7 ppm at Mormon Spring.	Spawning occurs in the in warm summer months.
White River Springfish (*Crenichthys baileyi baileyi*)	Habitat characteristics of Ash Springs include a large pool with depths ranging from approximately 1.6 to 6.6 feet, dense submersed aquatic vegetation, and sand and silt substrates. Adults prefer depths greater than 3.6 feet, while juveniles use shallower water (average of 2 feet).	Limited spawning information is available but indicators of spawning conditions were observed in the summer months. Springfish species often spawn twice per year.

Table F3.7-6 Habitat Requirements and Life History of Special Status Aquatic Species Potentially Occurring Within the Region of Study (Continued)

Species	Habitat Requirements	Life History/Feeding
Hiko White River Springfish (*Crenichthys baileyi grandis*)	This species occupies pools in Hiko and Crystal springs in Paharanagat Valley. Spring outflows and open water in pools and associated riparian/upland areas surrounding these surface water features are considered critical habitat.	Spawning is expected to be similar to other White River springfishes.
Moapa White River Springfish (*Crenichthys baileyi moapae*)	Habitat consists of vegetated warm springs and their outflows and marshes. In the Muddy River system, this subspecies occupies headwater spring and outflow habitats similar to those used by Moapa dace. Moapa White River springfish have evolved to tolerate high water temperatures and low dissolved oxygen levels.	Spawns in warm summer months.
Moorman White River Springfish (*Crenichthys baileyi thermophilus*)	Endemic to three thermal spring systems in upper White River Valley, Nye County, Nevada. This subspecies occupies the warmest headwater spring habitats of any White River springfish, and utilizes outflow/springbrook habitats downstream to the lower limit of thermal tolerance. Species is able to survive extremes in temperature and dissolved oxygen.	Spawns in warm summer months.
Pahrump Poolfish (*Empetrichthys latos*)	This species occurs in three ponds supported by two man-made artesian wells at the Shoshone Ponds Area in White Pine County. Poolfish are found at a refuge in Corn Creek Springs and an irrigation reservoir fed by Sandstone Spring in Clark County. Habitat consists of shallow springs and their outflow areas. Larger individuals occur in deeper water. Young fish tend to use shallow areas with vegetation.	Spawning can occur throughout the year, but peak activity is expected to be in the spring months.
Utah chub (*Gila atrairai*)	Species utilizes a wide variety of habitats including springs, irrigation ditches, ponds, and streams within the Fish Springs Flat, Snake, and Spring Valley basins. Habitat characteristics typically include dense vegetation, low to moderate current, and varying types of substrates.	Spawning occurs during late spring and summer at depths less than approximately 2 feet.
Pahranagat Roundtail Chub (*Gila robusta jordani*)	The current distribution of this species is limited to Pahranagat Creek in White River Valley. Adult and juveniles typically inhabit pools below riffle areas, but adults also utilize deeper areas with flow. Chub larvae occur in quiet water near the water's surface. Adults also exhibit seasonal changes in habitat use with summer consisting of deeper and slower water in comparison to spring and winter.	Spawning has been observed in January through March over gravel substrates.
Virgin River Chub (*Gila seminuda*)	This species occurs in the Muddy River and mainstem portion of the Virgin River in Utah and Nevada. Adults and juveniles are typically associated with deep runs or pool habitats with varying stream velocities and over sand substrates with adjacent boulder cover.	The species spawns during late spring and early summer over gravel or rock substrate.

Table F3.7-6 Habitat Requirements and Life History of Special Status Aquatic Species Potentially Occurring Within the Region of Study (Continued)

Species	Habitat Requirements	Life History/Feeding
Least Chub (*Iotichthys phlegethontis*)	This species is native to the Bonneville Basin, Utah. Habitat consists of slow rivers, clear creeks, springs, ponds, marshes, and alkaline springs. Typically occurs in moderate-dense submergent and emergent vegetation over bottom of clay, silt, mud, and peat substrates. Species occurrence in Snake Valley waterbodies shows that they can survive in isolated springs with high salinity and temperatures.	Spawns in late spring and early summer. Females spawn intermittently over breeding period. Spawning may involve movements from spring to marsh environments. Sexually mature within one year. Young feed primarily on microcrustacea. Adults eat larger invertebrates, algae, and diatoms.
White River Spinedace (*Lepidomeda albivallis*)	The present distribution is limited to Flag Springs and the upper portion of Sunnyside Creek in White River Valley. Characteristics of springs inhabited by this species include clear, cool water temperatures; open pools with aquatic vegetation; and bottom substrates consisting gravel, sand, and mud substrates.	Limited information is available but spawning is suspected to occur in the summer months.
Big Spring Spinedace (*Lepidomeda mollispinis pratensis*)	Habitat characteristics of occupied habitat in Condor Canyon (Meadow Valley Wash) include depths of 1 to 3 feet and moderate to slow stream velocities. Bottom substrates usually consist of silt/sand or gravel.	Limited information is available but spawning is suspected to occur in the spring months.
Moapa Dace (*Moapa coriacea*)	The types of habitat used by this species in Warm Springs include spring pools, spring outflows, and the mainstem portion of the Muddy River.	This species spawns throughout the year with peak activity occurring in the spring months.
Bonneville Cutthroat Trout (*Oncorhynchus clarkii utah*)	Within the region of study, this species occurs in the Snake, Steptoe, and Spring valleys in Nevada and Deep Creek Valley in Utah. Species prefers small headwater streams; with pool to riffle habitat and slow, deep water with vegetated streambanks for shade, bank stability, and cover.	Spawns in spring (April through mid-July depending on the stream elevation). Spawning habitat consists of relatively cool, well oxygenated water with well sorted gravels and limited fine sediments. Fry generally move to stream margins when current is slow, and young of age 0 and age 1 may occur in complex pool habitats from summer through winter and in runs in summer. Species feeds mainly on aquatic insects, terrestrial insects that fall into the water, and fishes. Incidence of fishes in the diet increases with size.
Relict Dace (*Relictus solitarius*)	Species is endemic to eastern Nevada. Refugia and introduced populations occur in Spring Valley. Habitat consists of springs, spring-fed streams, ponds, intermittent lakes and marshes, with mud or gravel substrates. Species typically concentrates in well-vegetated pools where banks are undercut.	Spawning apparently is prolonged, occurring at least from late June to late-September. Opportunistic feeder with amphipods and gastropods being the main food items; also eats insects, ostracods, and leeches.
Speckled dace (*Rhinichthys osculus*)	This species occurs in Big Springs Creek in the Nevada portion of Snake Valley and Lake Creek in the Utah portion of Snake Valley. The species uses a variety of habitats in the creeks and is abundant near the spring source (Big Springs) in Big Springs Creek.	Spawning and life history is similar to the other dace subspecies.

Table F3.7-6 Habitat Requirements and Life History of Special Status Aquatic Species Potentially Occurring Within the Region of Study (Continued)

Species	Habitat Requirements	Life History/Feeding
Moapa Speckled Dace (*Rhinichthys osculus moapae*)	This subspecies is endemic to the Muddy River watershed in Nevada. Habitat consists of springs and springbrooks, marshes, rivers and streams occurs in riffles, runs, and pools in streams. Usually found in shallow water in streams, often congregates below riffles and eddies.	The speckled dace is one of the most morphologically (and ecologically) variable fishes in western North America. Speckled dace are an omnivorous benthic feeder, feeding on drift in mid-water or rarely at the surface. The diet consists mostly of benthic insects, also includes other invertebrates, algae, and detritus. Young feed mainly on zooplankton.
Meadow Valley Speckled Dace (*Rhinichthys osculus* ssp.)	This subspecies is endemic to the Muddy River watershed in Nevada. On a species level, occurs in many kinds of habitats: riffles, runs, and pools of cool flowing headwaters, creeks, and small to medium rivers with mostly rocky substrates; large and small lakes (rarely); warm, permanent and intermittent streams; and outflows of desert springs; usually found in shallow water (averaging about 1.6 feet deep or less); in streams, often congregates below riffles and eddies. Young tend to occupy edges of streams in slower, shallow water. Larger adults generally are in relatively quiet water where cover (e.g., overhanging trees, deadfalls, boulders) is available.	The spawning is expected to be similar to other dace subspecies described above. Speckled dace are an omnivorous benthic feeder, feeding on drift in mid-water or rarely at the surface. The diet consists mostly of benthic insects, also includes other invertebrates, algae, and detritus. Young feed mainly on zooplankton.
White River Speckled Dace (*Rhinichthys osculus* ssp.)	This subspecies is endemic to the White River system in Nevada. Habitat requirements are expected to be similar to Meadow Valley speckled dace.	Spawning and feeding habits are expected to be similar to other dace subspecies.
Pahranagat Speckled Dace (*Rhinichthys osculus velifer*)	This species is endemic to the Pahranagat Valley, Nevada. This subspecies is only known to occur in Brownie and Deacon springs within the region of study. This species also has recently been documented at Cottonwood Spring. Habitat consists of springs and springbrooks, marshes, rivers, and streams.	Speckled dace can reproduce throughout the year, and will proliferate under favorable conditions.
Redside Shiner (*Richardsonius balteatus*)	Species occurs in a variety of habitats including creeks, rivers, ponds, lakes, irrigation canals, ditches, sloughs, and warm springs in Snake Valley. It prefers cool water with varying current, water clarity, and bottom substrates. It often is associated with algae or aquatic vegetation.	Spawning occurs during the spring or early summer.
Invertebrates		
California Floater (*Anodonta californiensis*)	In Nevada, this species occurs only in Elko County, Utah. California floater has been recorded in several counties including Tooele and Millard. The California floater exists in shallow muddy or sandy habitats in larger rivers, reservoirs, and lakes.	Appropriate host fish species must be present for reproduction. Floater embryos develop into larvae, which are released by the female and attach to a host fish. The full range of host fish are not known, but they may parasitize native minnows as well as the nonnative mosquitofish. This species is a filter-feeder.
Pahranagat Naucorid Bug (*Pelocoris shoshone shoshone*)	Little information is available on the habitat requirements for this species. Found in springs and springbrooks in the Pahranagat Creek drainage in White River Valley.	Little information is available on the life history of this species.

Table F3.7-6 Habitat Requirements and Life History of Special Status Aquatic Species Potentially Occurring Within the Region of Study (Continued)

Species	Habitat Requirements	Life History/Feeding
Cloaked Physa (*Physella megalochlamys*)	Habitat consists of ephemeral and permanent ponds and marshes. It prefers aquatic environments with a fine mud bottom.	Little information is available on the life history of cloaked physa.
Utah Physa (*Physella utahensis*)	This species occurs in Nevada and Utah. Populations occur in small pools associated with springs. The substrates of the pools are variable, ranging from fine silt to rocks. The degree of vegetation is variable, including areas with no vegetation and areas with exceptionally dense patches of plants.	Little information is available on the life history of Utah physa.
Longitudinal Gland Pyrg (Springsnail) (*Pyrgulopsis anguina*)	This species is known to occur from Big Springs and an unnamed spring north of Big Springs in Snake Valley in White Pine County in Nevada and from Clay and Stateline springs in Snake Valley in Millard County, Utah. Habitat consists of warm, flowing springs and vegetation consisting of watercress, Baltic rush, and muskgrass.	Most hydrobioid snails are oviparous (lay eggs outside the body), with females depositing small egg capsules, either singly or (rarely) in strings, on the substrate. The reproductive period is not known for this species.
Moapa Pebblesnail (*Pyrgulopsis avernalis*)	Species occurs in the Muddy River Basin at Moapa Springs, Apcar Springs, Cardy Lamb Spring, Muddy Spring, and springs west of Muddy Spring. The species prefers gravel, depths of approximately 11 to 16 inches, and velocities exceeding 1.6 feet/sec.	Same information as listed for longitudinal gland springsnail.
Flag Pyrg (*Pyrgulopsis breviloba*)	Species occurs in Meloy Spring in Dry Lake Valley and at Flag Springs in the White River Valley. These springs and springbrooks have a maximum depth of 1 to 30 inches. Habitat vegetation includes rushes, bulrushes, spikerushes, and watercress.	Same information as listed for longitudinal gland springsnail.
Moapa Valley Pyrg (*Pyrgulopsis carinifera*)	Species occurs in the Upper Muddy River watershed at Apcar Springs, Muddy Spring, springs west of Muddy Spring, and at a spring in Moapa Valley National Wildlife Refuge. Habitat cosnsists of springs with depths from 4 to 12 inches and incised, unarmored banks. This species is found in mean water column velocities from 1 to 1.3 feet/sec. It prefers gravel, avoids sand/coarse particulate organic matter, and avoids fines and cobbles. It is associated with vegetation such as velvet ash, mesquite, salt cedar, fan palm, saltgrass, and perennial herbs.	Same information as listed for longitudinal gland springsnail.
Blue Point Pyrg (*Pyrgulopsis coloradensis*)	Species occurs only in the Black Mountains Basin at Blue Point Spring. Habitat conditions in this spring reflect a small thermal environment.	Same information as listed for longitudinal gland springsnail.
Transverse Gland Pyrg (*Pyrgulopsis cruciglans*)	This species is endemic to the Spring and Steptoe valleys and the Southern Great Salt Lake Desert in Nevada. Habitat consists of springs and springbrooks.	Same information as listed for longitudinal gland springsnail.

Table F3.7-6 Habitat Requirements and Life History of Special Status Aquatic Species Potentially Occurring Within the Region of Study (Continued)

Species	Habitat Requirements	Life History/Feeding
Spring Mountains Pyrg (*Pyrgulopsis deaconi*)	This species is endemic to the drainages of Las Vegas and Pahrump valleys in the Spring Mountains. Specifically, it is found at Red Spring, Willow Spring, and Kiup Spring. It also inhabited a spring at Manse Ranch, but has since been extirpated from that site. This species prefers permanent, artesian springbrooks that are unpolluted, highly oxygenated, with high mineral content. Habitat conditions include waterbody lengths of 162 to 488 feet, width of 1 to 3.3 feet, and a depth of 1.5 to 2.8 inches, with emergent vegetative cover.	Same information as listed for longitudinal gland springsnail.
Corn Creek Pyrg (*Pyrgulopsis fausta*)	This species is endemic to Corn Creek Springs in the Las Vegas Wash. This is a small thermal spring system.	Same information as listed for longitudinal gland springsnail.
Emigrant Pyrg (*Pyrgulopsis gracilis*)	This species is endemic to Emigrant Spring in the White River Valley. This small springbrook has a depth of approximately 1 inch.	Same information as listed for longitudinal gland springsnail.
Hamlin Valley Pyrg (*Pyrgulopsis hamlinensis*)	This species occurs at unnamed springs east of White Rock Cabin Springs in Hamlin Valley, Utah. This springbrook has an elevation of 7,085 feet with a rocky substrate and low conductivity.	Same information as listed for longitudinal gland springsnail.
Hubbs Pyrg (*Pyrgulopsis hubbsi*)	This species is endemic to Hiko Spring and Crystal Spring in the Pahranagat Valley. However, it may have been extirpated at Hiko Spring. These springs range from 5 to 9 feet in depth. Vegetation present includes from spikerush, bulrush, horsehair algae, and saltgrass.	Same information as listed for longitudinal gland springsnail.
Toquerville Pyrg (*Pyrgulopsis kolobensis*)	This species occurs in numerous springs within White River, Clover, Meadow Valley Wash, Deep Creek, Tule, Spring (#184), Snake, and Steptoe valleys.	Same information as listed for longitudinal gland springsnail.
Landyes Pyrg (*Pyrgulopsis landyei*)	This species is endemic to the Spring and Steptoe valleys in Nevada. Habitat consists of springs and springbrooks. It is endemic to a small springbrook located north-northwest of Steptoe Ranch.	Same information as listed for longitudinal gland springsnail.
Butterfield Pyrg (*Pyrgulopsis lata*)	This species is endemic to Butterfield Springs in the White River Valley. This small springbrook has a maximum depth of 1 inch.	Same information as listed for longitudinal gland springsnail.
Hardy Pyrg (*Pyrgulopsis marcida*)	This species is endemic to seven springs in the Cave and White River Valley watersheds. It occurs in Hardy Springs, Emigrant Springs, Butterfield Springs, Arnoldson Spring, and Ruppo's Boghole in the White River Valley. It occurs at Silver Springs and at the unnamed springs at Parker Station in Cave Valley. Spring depths range from 0.5 to 39 inches. Vegetation includes spikerush, Kentucky bluegrass, watercress, and asters.	Same information as listed for longitudinal gland springsnail.

Table F3.7-6 Habitat Requirements and Life History of Special Status Aquatic Species Potentially Occurring Within the Region of Study (Continued)

Species	Habitat Requirements	Life History/Feeding
Pahranagat Pebblesnail (*Pyrgulopsis merriami*)	This species occurs at Ash Spring in the Pahranagat Valley and Hot Creek Spring, Moon River Spring, and Moorman Spring in White River Valley. These are thermal springs with depths ranging 0.1 to 16 feet. Vegetation includes bulrush, muskgrass, horsehair algae, spikerush, and Yerba mansa.	Same information as listed for longitudinal gland springsnail.
Camp Valley Pyrg (*Pyrgulopsis montana*)	This species is endemic to an unnamed, montane springbrook in the upper Camp Valley of the Meadow Valley Wash.	Same information as listed for longitudinal gland springsnail.
Neretiform Steptoe Ranch Pyrg (*Pyrgulopsis neritella*)	This species occurs at two thermal springbrooks north of Steptoe Ranch in Steptoe Valley.	Same information as listed for longitudinal gland springsnail.
Sub-Globose Steptoe Ranch Pyrg (*Pyrgulopsis orbiculata*)	This species is endemic to a spring at Steptoe Ranch and a spring north northwest of Steptoe Ranch.	Same information as listed for longitudinal gland springsnail.
Bifid Duct Pyrg (*Pyrgulopsis peculiaris)*	This species occurs at an unnamed spring at Big Springs Creek in Snake Valley and at Rock, Turnley, and Woodsman springs in Spring Valley (#184). However, it may be extirpated at Turnley Spring. These habitats are springbrooks with moderate to high conductivity and elevations from 6,094 to 7,400 feet. Vegetation at these sites includes watercress, Baltic rush, and water parsnip.	Same information as listed for longitudinal gland springsnail.
Flat-topped Steptoe Pyrg (*Pyrgulopsis planulata*)	This species is endemic to a small, thermal springbrook northwest of Clark Spring in the Steptoe Valley.	Same information as listed for longitudinal gland springsnail.
White River Valley Pyrg (*Pyrgulopsis sathos*)	This species occurs at Flag, Camp, Arnoldson, Preston Big, and Lund springs and possibly at Nicholas Spring. Habitat includes springs and springbrooks with depths of 0.1 to 3 feet and vegetation that includes spikerush, Kentucky bluegrass, asters, rushes, bulrush, watercress, and reedgrass.	Same information as listed for longitudinal gland springsnail.
Sub-Globose Snake Pyrg (*Pyrgulopsis saxatilis*)	This species occurs in the Snake Valley at Warm Springs, Gandy Warm Springs, and Gandy Warm Creek. These are large, thermal springbrooks with moderate conductivity and an elevation of 4,875 feet.	Same information as listed for longitudinal gland springsnail.
Northern Steptoe Pyrg (*Pyrgulopsis serrata*)	This species occurs at Twin Springs and springs south of Currie and at Indian Ranch Spring and Indian Creek in Steptoe Valley. This species also occurs at 10 springs in the Northern Steptoe Valley. Many of the above springs are longer and narrower springbrooks with greater discharge than the average of springs in the vicinity. The vegetation at these springs include *Carex* and *Juncus* species. One spring this species inhabits is a shallow, forested springbrook.	Same information as listed for longitudinal gland springsnail.

Table F3.7-6 Habitat Requirements and Life History of Special Status Aquatic Species Potentially Occurring Within the Region of Study (Continued)

Species	Habitat Requirements	Life History/Feeding
Lake Valley Pyrg (*Pyrgulopsis sublata*)	This species is endemic to Wambolt Springs in the Lake Valley watershed. This spring is broad and shallow with a maximum depth of 4 inches. Vegetation includes watercress, mare's tail, spikerush, and Nebraska sedge.	Same information as listed for longitudinal gland springsnail.
Southern Steptoe Pyrg (*Pyrgulopsis sulcata*)	This species occurs in two spring complexes in the Steptoe Valley. These complexes are located north of Grass Springs and a spring. One of these complexes is a small, marshy springbrook.	Same information as listed for longitudinal gland springsnail.
Southern Bonneville Pyrg (*Pyrgulopsis transversa*)	This species is endemic to Utah. Habitat consists of springs and springbrooks.	Same information as listed for longitudinal gland springsnail.
Southeast Nevada Pyrg (*Pyrgulopsis turbatrix*)	This species occurs at Willow Spring and Cold Creek Spring in Indian Springs Valley; La Madre Spring, Lost Creek Spring, Willow Spring in Las Vegas Valley; Lost Canyon Spring in Red Rock Wash; Horseshutem Springs in Pahrump Valley; Grapevine Springs in the Amargosa Flat and at Cane Spring in the Frenchman Flat Basin. Some of these populations may have been extirpated. Habitat is highly oxygenated, unpolluted, perennial springs with high mineral content. These springs are at 4,358 to 5,499 feet in elevation with depths ranging from 1 to 6 inches.	Same information as listed for longitudinal gland springsnail.
Moapa Warm Springs Riffle Beetle (*Stenelmis moapa*)	This species is endemic to the Warm Springs area along the Muddy River in Clark County, Nevada and occurs in Ash Spring in Pahranagat Valley and Hot Creek nad Moorman springs in White River Valley. Habitat consists of outlet streams including warm temperature springs in swift, shallow water; gravel substrates, vegetation, and bare tree roots in the Warm Springs area, Clark County, Nevada. It is adaptable with habitats ranging mostly on the hot side (83° to 96°F), but it occurs downstream to 75°F.	No information is available on the life history of this species.
Grated Tryonia (*Tryonia clathrata*)	This species is endemic to Nevada. Habitat consists of springs and springbrooks.	Little is known about the life history of this species.

Table F3.7-6 Habitat Requirements and Life History of Special Status Aquatic Species Potentially Occurring Within the Region of Study (Continued)

Species	Habitat Requirements	Life History/Feeding
Amphibians		
Arizona Toad (*Bufo microscaphus*)	Within the region of study, this species is primarily limited to Clark and Lincoln counties in Nevada. Habitat consists of Mojave rivers and streams, lakes and reservoirs, springs and springbrooks, mesquite bosques and desert washes, and desert washes.	Life history information for Nevada populations largely lacking. In west-central Arizona, breeding occurred February-April, independent of rainfall, and usually occurred for a total of a few weeks each year. In southwestern Utah, breeding peaks in June. At higher elevations, breeding may extend to July or perhaps August. Eggs are deposited in flowing or shallow quiet waters of perennial or semipermanent streams or shallow ponds. Inactive in cold temperatures. Diet includes: snails, crickets, beetles, ants; sometimes cannibalizes newly metamorphosed individuals. Larvae probably eat algae, organic debris, and plant tissue.
Columbia Spotted Frog (*Rana luteiventris*)	Within the region of study, this species occurs in Tule, Snake, and Deep Creek valleys. Habitat consists of rivers and streams, wet meadows, springs and springbrooks, marshes, lakes, and reservoirs. The species is highly aquatic; rarely found far from permanent quiet water; usually occurs at the grassy/sedgy margins of streams, lakes, ponds, springs, and marshes. The species may disperse into forest, grassland, and brushland during wet weather, and traverse uplands to reach wintering sites. It uses stream-side small mammal burrows as shelter. Overwintering sites in the Great Basin include undercut stream banks and spring heads.	Breeds usually in shallow water in ponds or other quiet waters. Though movements of up to 4 miles have been recorded, these frogs generally stay in wetlands and along streams within 0.6 mile of their breeding pond. Frogs in isolated ponds may not leave those sites. This species feeds on a wide variety of insects as well as different mollusks, crustaceans, and arachnids. Larvae eat algae, organic debris, plant tissue, and minute organisms in water.
Relict Leopard Frog (*Rana onca*)	Habitat consists of isolated springs and associated outflow streams in Black Canyon below Hoover Dam and the Overton Arm of Lake Mead. They are active year-round, and are most often observed in shallow water along channel or pool margins.	Breeding has been documented in September, November, and late January through March. Eggs are attached to vegetation near the bottom of shallow, low-velocity pools. Larval leopard frogs are primarily herbivorous; the food preferences of adult relict leopard frogs are likely similar to other leopard frogs. Metamorphosed northern leopard frogs eat various small invertebrates obtained along water's edge or in nearby meadows or fields; rarely eats small vertebrates. Larvae eat algae, plant tissue, organic debris, and probably some small invertebrates.

Table F3.7-6 Habitat Requirements and Life History of Special Status Aquatic Species Potentially Occurring Within the Region of Study (Continued)

Species	Habitat Requirements	Life History/Feeding
Northern Leopard Frog (*Rana pipiens*)	Within the region of study, this species occurs in Fish Springs Flat, Snake, Spring (#184), Lake, and Pahranagat valleys. Habitat consists of marshes, lakes and reservoirs, wet meadow, rivers and streams, springs and springbrooks. Water bodies usually are permanent water with rooted aquatic vegetation. In summer, this species commonly inhabits wet meadows and fields. Overwintering habitat usually consists of underwater areas.	Eggs are laid and larvae develop in shallow, still, permanent water (typically), generally in areas well exposed to sunlight. Generally eggs are attached to vegetation just below the surface of the water. In Nevada, eggs are probably laid mainly in early spring at low elevations, in late spring in the mountains. Breeding often peaks when water temperatures reach about 50 °F (10 °C). Aquatic larvae usually metamorphose in summer, may overwinter in some areas. Metamorphosed frogs eat various small invertebrates obtained along water's edge or in nearby meadows or fields; rarely eats small vertebrates. Larvae eat algae, plant tissue, organic debris, and probably some small invertebrates.

Sources: Stebbins 1954; NatureServe 2007; Sigler and Sigler 1987; Sutter et al. 2005; USFWS 1998, 1995, 1980; Wildlife Action Plan 2006.

Table F3.7-7
Special Status Fish, Amphibian, and Springsnail Occurrences in Springs and Streams

Table F3.7-7 Special Status Fish[1], Amphibian, and Springsnail Occurrences in Springs and Streams

Valley/Spring or Stream Name	Species or Groups
Deep Creek	
Spring in Spring Creek	Springsnails[2]
Lower Sanford Spring	Springsnails
Springs in West Deep Creek	Springsnails
Unnamed wetlands in valley floor	Columbia spotted frog, springsnails
Tule Valley	
Coyote Springs	Columbia spotted frog
Painter Spring	Springsnails
Sinbad Spring	Springsnails
South Tule Spring	Columbia spotted frog
Tule Springs	Columbia spotted frog, springsnails
Willow Spring	Columbia spotted frog
Hamlin Valley	
Unnamed spring complex east of White Rock Cabin Springs	Springsnails (Hamlin Valley pyrg)
Fish Springs Flat	
Crater Spring	Northern leopard frog, springsnails
House Spring	Northern leopard frog, springsnails
Lost Spring	Utah chub, northern leopard frog, springsnails
Mallard Pool	Springsnails
Middle Spring	Springsnails
Mirror Spring	Springsnails
North Spring	Utah chub, springsnails
Percy Spring	Utah chub, northern leopard frog, springsnails
Pintail/Ibis Waterfowl Units	Least chub, northern leopard frog
South Spring	Utah chub, northern leopard frog, springsnails
Thomas Spring	Utah chub, springsnails
Spring Valley (#184)	
Blind Spring	Northern leopard frog
Cedar Springs	Northern leopard frog
Cleveland Ranch Springs/Wet Meadows	Northern leopard frog
Springs in Cleve Creek	Springsnails
Keegan Ranch North and South Springs	Relict dace, northern leopard frog
McCoy Creek Ranch Wet Meadows	Northern leopard frog
Minerva Spring Complex	Utah chub, northern leopard frog, springsnails
North Millick Spring	Northern leopard frog
O'Neal/Frog Pond	Northern leopard frog
Osborne Spring	Springsnails
Rock Spring	Springsnails (bifid duct pyrg)
Shoshone Ponds	Pahrump poolfish, relict dace, northern leopard frog
South Millick Spring	Northern leopard frog
Spring Valley Creek (limited to Stonehouse Spring Complex area)	Relict dace
Stonehouse Spring Complex	Relict dace, springsnails
Turnley/Woodsman Spring	Springsnails (bifid duct pyrg)
Unnamed Minerva # 1	Utah chub, springsnails
Unnamed Minerva # 2 and 3	Springsnails
Unnamed spring east of Cleve Creek	Springsnails
Unnamed 5 Spring	Northern leopard frog, springsnails
West Valley Spring Complex 1	Northern leopard frog, springsnails
West Valley Spring Complex 5	Northern leopard frog
Willow Spring	Springsnails

Table F3.7-7 Special Status Fish[1], Amphibian, and Springsnail Occurrences in Springs and Streams (Continued)

Valley/Spring or Stream Name	Species or Groups
Snake Valley	
Beck Springs North	Columbia spotted frog, springsnails
Big Springs	Springsnails (longitudinal gland pyrg, bifid duct pyrg), redside shiner, speckled dace, mottled sculpin, Utah chub
Big Springs Creek	Springsnails (longitudinal gland pyrg), redside shiner, speckled dace, mottled sculpin, Utah chub, Utah sucker
Bishop Spring/Foote Reservoir Springs	Least chub, northern leopard frog
Caine Spring	Springsnails
Callao Big Spring	Springsnails
Clay Spring	Springsnails (longitudinal gland pyrg)
Cold Spring	Springsnails
Gandy Salt Marsh Middle	Columbia spotted frog, northern leopard frog, least chub, speckled dace
Gandy Salt Marsh North	Columbia spotted frog, northern leopard frog, least chub, springsnails
Gandy Warm Springs	Springsnails (sub-globose Snake pyrg)
Kious Spring	Springsnails
Knoll Springs	Springsnails
Leland Harris Springs	Least chub, Columbia spotted frog, springsnails
Miller Spring	Least chub, Columbia spotted frog, springsnails
Outhouse Spring	Springsnails
Outlet Spring	Springsnails
Pruess Lake	California floater
Redden Springs	Springsnails, California floater
Snake Creek	Mottled sculpin, redside shiner, speckled dace
Springs in Schell Creek	Springsnails
Springs in Snake Creek	Springsnails
Springs in Strawberry Creek	Springsnails
South Fork Big Wash	Redside shiner, mottled sculpin, speckled dace
Stateline Springs/Lake Creek	Springsnails (longitudinal gland pyrg), redside shiner, speckled dace, Utah chub, Utah sucker
Strawberry Creek	Redside shiner, mottled sculpin, speckled dace
Twin Springs	Least chub, Columbia spotted frog, northern leopard frog, springsnails
Warm Springs	Springsnails
Willow Patch Spring	Springsnails
Unnamed Big Spring # 1	Springsnails
Unnamed spring north of Big Springs	Springsnails (longitudinal gland pyrg)
Unnamed spring northeast of Snake Creek	Springsnails
Unnamed spring south of Caine Spring	Springsnails
Steptoe Valley	
Cordano/Murphy/Dolan Ranch Springs	Relict dace
Flat Spring	Springsnails
Grass Springs/Lusetti Ranch	Relict dace, northern leopard frog, springsnails (Southern Steptoe pyrg)
Springs north of Grass Springs	Springsnails
Indian Ranch (unnamed springs)	Springsnails (Northern Steptoe pyrg)
McGill/Dairy Ranch Spring	Relict dace
Murray Creek	Relict dace
Murray Creek/Georgetown Ranch	Relict dace
Steptoe Ranch Springs	Relict dace, springsnails (Landyes pyrg, neritiform Steptoe pyrg, sub-globose Steptoe pyrg)
Steptoe Valley Wildlife Management Area springs	Relict dace, Utah chub
Unnamed spring (east of Borchart Spring)	Northern leopard frog
Unnamed spring northwest of Clark Spring	Springsnails (flat-topped Steptoe pyrg)
Clover Valley	
Clover Creek	Meadow Valley Wash desert sucker, Meadow Valley Wash speckled dace
North Spring	Springsnails

Table F3.7-7 Special Status Fish[1], Amphibian, and Springsnail Occurrences in Springs and Streams (Continued)

Valley/Spring or Stream Name	Species or Groups
Dry Valley	
Upper Meadow Valley Wash	Meadow Valley Wash desert sucker, Meadow Valley speckled dace
Cave Valley	
Parker Station springs	Springsnails (Hardy pyrg)
Lower Meadow Valley Wash	
Lower Meadow Valley Wash	Meadow Valley Wash desert sucker, Meadow Valley Wash speckled dace
Panaca Valley	
Bennett Springs	Springsnails
Condor Canyon (Upper Meadow Valley Wash)	Big Spring spinedace, Meadow Valley Wash desert sucker, Meadow Valley Wash speckled dace
Highland Springs	Springsnails
Eagle Valley	
Eagle Valley Creek (Upper Meadow Valley Creek)	Meadow Valley Wash desert sucker, Meadow Valley Wash speckled dace
Spring Valley (#201)	
Camp Valley Creek	Meadow Valley Wash desert sucker, Meadow Valley Wash speckled dace, springsnails (Camp Valley pyrg)
Lake Valley	
Brown Springs	Springsnails
Wambolt Spring Complex	Northern leopard frog, springsnails (Lake Valley pyrg)
Geyser Spring	Northern leopard frog
Black Mountains Area	
Blue Point Springs	Relict leopard frog
Gnatcatcher Spring	Relict leopard frog
Rogers Springs	Relict leopard frog, springsnails
Lower Moapa Valley	
Muddy River	Moapa speckled dace
California Wash	
Muddy River	Virgin River chub, Moapa speckled dace
Muddy River Springs	
Apcar Spring	Moapa dace, Moapa White River springfish, springsnails
Cardy Lamb Spring	Moapa White River springfish, springsnails (Moapa pebblesnail, Grated tryonia)
Moapa National Refuge	Moapa dace, Moapa White River springfish, springsnails (Moapa pebblesnail, Moapa Valley pyrg, Grated tryonia Valley pyrg), Amagosa naucorid bug
Muddy River	Moapa dace, Moapa speckled dace, Virgin River chub
Oasis Spring	Springsnails (Grated tryonia)
White River Valley	
Arnoldson Spring	Preston White River springfish, White River speckled dace, springsnails (White River Valley pyrg, Hardy pryg)
Baker Spring	White River speckled dace
Butterfield Springs	White River speckled dace, White River sculpin, springsnails (Butterfield pyrg, Hardy pyrg)
Camp Spring	White River speckled dace, springsnails (White River Valley pyrg)
Ellison Creek	White River speckled dace
Emigrant Springs	White River speckled dace, springsnails (Emigrant pyrg, Hardy pyrg)
Flag Springs	White River spinedace, White River desert sucker, White River speckled dace, springsnails (White River Valley pyrg, Flag pyrg)
Hardy Spring	Springsnails (Hardy pyrg)
Hot Creek Spring	Moorman White River springfish, springsnails (Grated tryonia, Pahranagat pebblesnail)
Indian Ranch Spring	White River spinedace, Preston White River springfish, White River desert sucker, White River speckled dace, springsnails
Lund Town Spring	White River desert sucker, White River speckled dace, springsnails (White River Valley pyrg)

Table F3.7-7 Special Status Fish[1], Amphibian, and Springsnail Occurrences in Springs and Streams (Continued)

Valley/Spring or Stream Name	Species or Groups
Moon River Spring	Moorman W. River springfish, springsnails (Pahranagat pebblesnail)
Moorman Spring	Moorman White River springfish, springsnails (Grated tryonia, Pahranagat pebblesnail)
Nicholas Spring	Preston White River springfish, springsnails (White River Valley pyrg)
Oasis Spring	Springsnails (Grated tryonia)
Preston Big Spring	White River spinedace (critical habitat), Preston White River springfish, White River speckled dace, springsnails (White River Valley pyrg)
Ruppos Bog Hole	Springsnails (Hardy pyrg)
Silver Springs	Springsnails (Hardy pyrg)
Sunnyside Creek	White River spindedace, White River desert sucker, White River speckled dace
Tin Can Spring	White River speckled dace, springsnails
Unnamed near Highway 6	Springsnails
White River	White River desert sucker, White River speckled dace, northern leopard frog
Dry Lake Valley	
Meloy Spring	Springsnails (Flag pyrg)
Pahranagat Valley	
Ash Spring	White River springfish, springsnails (Grated tryonia, Pahranagat pebblesnail)
BLM Spring 33	Springsnails
Brownie/Deacon Spring	Pahranagat speckled dace, springsnails
Cottonwood Springs	Pahranagat speckled dace, springsnails
Crystal Spring	Hiko White River springfish, Pahranagat speckled dace, springsnails (Hubbs pyrg, Grated tryonia, Pahranagat pebblesnail)
Hiko Spring	Hiko White River springfish, springsnails (Pahranagat pebblesnail)
Hoyt Spring	Springsnails
Pahranagat Creek	Pahranagat roundtail chub, Pahranagat speckled dace, White River springfish, northern leopard frog, Pahranagat naucorid bug
L Spring	Northern leopard frog
Lone Tree Spring	Springsnails
Maynard Spring	Northern leopard frog (considered as trans-location site)
Las Vegas	
Corn Creek Springs	Springsnails (Corn Creek pyrg)
Harris Springs	Springsnails
LaMadre Spring	Springsnails
Lost Spring	Springsnails
Red Spring	Springsnails (Spring Mountains pyrg)
Willow Spring	Springsnails (Spring Mountains pyrg)
Wilson Spring	Springsnails

[1] The occurrence of Bonneville cutthroat trout is provided in **Table F3.7-2**.

[2] Special status springsnails are noted by species name in parentheses. As a group, springsnails are not considered a sensitive group.

Sources: Baker 2008; BIO-WEST 2009, 2007; Hershler 1998; Sada 2007; SNWA 2009; and NDOW shapefile for northern leopard frog (NDOW 2006a).

Table F3.7-8
Management Objectives Related to Water Use Effects for Sensitive Species with Conservation Agreements

Table F3.7-8 Management Objectives Related to Water Use Effects for Sensitive Species with Conservation Agreements

Species / Objective	Objective #	Source of Information
Bonneville cutthroat trout		
Manage for 191 conservation populations of BCT	I	Lentsch et al (2000)
Maintain or restore stream channel integrity, channel processes and the sediment regime (including the elements of timing, volume, and character of sediment input and transport) under which riparian and aquatic ecosystems developed.	II.A.2	
Maintain or restore instream flows to support healthy riparian and aquatic habitats, the stability and effective function of stream channels, and the ability to route flood discharges.	II.A.3	
Maintain or restore the natural timing and variability of in and out-of-channel stream flows.	II.A.4	
Maintain or restore riparian and aquatic habitats and conditions necessary to foster the evolution of distinct populations segments within specific geographic regions.	II.A.7	
Maintain or restore habitat to support populations of well-distributed plants, vertebrates, and invertebrates that contribute to the viability of riparain dependent communities.	II.A.8	
Eliminate and/or significantly reduce detrimental impacts associated with threats caused by other natural or human induced factors affecting the continued existence of the species.	II.E	
Manage for a minimum of 14 conservation populations of BCT in Nevada.	1	NDOW (2006b)
Eliminate the threats to BCT in Nevada that may warrant listing as a threatened or endangered species under the ESA.	2	
Enhance and/or restore connectedness and opportunities for migration to disjunct populations where possible. Migratory corridors should retain some degree of their natural physical and biological condition to enable migration and gene flow.	2.1	
Maintain and restore natural hydrologic characteristics such as flow quantity, timing, and duration to maintain active channel and floodplain features (e.g., riparian vegetation, undercut bank, bed structure, and sediment transport regimes). This action includes securing instream flow needs through water acquisition or regulation.	2.1.3	
Monitor detrimental impacts on BCT populations caused by road construction and maintenance, water diversions, livestock grazing, and mining activities on a regular basis.	2.2.2	
Establish trends based on long-term habitat monitoring to identify and rectify detrimental effects.	2.2.3	

Table F3.7-8 Management Objectives Related to Water Use Effects for Sensitive Species with Conservation Agreements (Continued)

Species / Objective	Objective #	Source of Information
Least chub		
Maintain, restore, and augment, where possible, the natural hydrologic characteristics and water quality.	A.4	Bailey et al. (2005)
Identify water needs in current and potential least chub habitats.	C.1	
Maintain natural hydrologic conditions.	C.3	
Develop site-specific mitigation for proposed water development and future habitat alteration, where needed.	G.1	
Identify impacts from existing and proposed watershed development that affect least chub habitat. Impacts will be assessed and mitigation will be determined on a case-by-case basis.	G.2	
Northern leopard frog		
Protect known and potential breeding sites.	Page 37	Smith and Keinath (2007)
Control introduced predaceous fish and bullfrogs.	Page 37	
Protect overwintering sites.	Page 39	
Control introduced infectious diseases.	Page 39	
Monitor and protect water quality.	Page 39	
Protect migratory and dispersal pathways.	Page 39	
Reduce road-related mortality.	Page 39	
Relict leopard frog		
Protect known or potential breeding sites.		Relict Leopard Frog Conservation Team (2005)
Protect overwintering sites.		
Monitor and protect water quality.		
Protect migratory and dispersal pathways.		
Control road-related mortality.		
Columbia spotted frog		
Eliminate or significantly reduce threats to species and its habitat.	1	Bailey et al. (2007)
Maintain existing self-sustaining populations and their habitat.	2	
Restore populations at selected localities within historic range.	3	
Increase size of selected populations.	4	
Maintain genetic diversity.	5	
Develop and implement an adaptive management framework by incorporating new information annually into conservation efforts.	6	
Implement and incorporate provisions of conservation strategy into signatory planning documents and budgets to ensure conservation goal and objectives are met.	7	

Table F3.7-9
Management Objectives Related to Water Use Effects for Sensitive Species with Recovery Plans

Table F3.7-9 Management Objectives Related to Water Use Effects for Sensitive Species with Recovery Plans

Species / Objective	Objective #	Source of Information
White River Spinedace		
Maintain and enhance aquatic and riparian habitats in the Pahranagat Valley.		White River Spinedace Recovery Plan USFWS 1994
Self-sustaining population in each of the three designated critical habitats for at least five consecutive years.	1	
Each critical habitat is secure from threats.	2	
Maintain native fish presence (Preston White River springfish, White River speckled dace, White River desert sucker) in Flag, Preston Big, and Lund springs.	3	
Pahrump Poolfish		
Establish a minimum of three sub-populations with each sub-population having at least 500 adults.	1	Recovery Plan for Pahrump Poolfish (USFWS 1980)
Habitat with no immediate and potential threats to affect species status.	2	

Table F3.7-10
Management Objectives in Wildlife Action Plans for Sensitive Species

Table F3.7-10 Management Objectives in Wildlife Action Plans for Sensitive Species

Objective / Habitat	Source of Information
Springs and Spring Brooks	
A measurable increase in the number of springs and springbrooks functioning naturally and supporting the natural ecological community expected for each spring by 2015.	Wildlife Action Plan Team 2006
No net loss of spring / springbrook-dependent Species of Conservation Priority.	
Wet Meadows	
Improve the hydrological and vegetation community condition of existing wet meadow habitats and restore hydrological and vegetation community condition to degraded wet meadows.	
Maintain healthy populations of Species of Conservation Priority at stable or increasing trend.	
Mojave Rivers and Streams	
Increase the linear extent of multi-storied riparian habitat on the floodplains of Mohave rivers and streams by 2015.	
Maintain healthy populations of terrestrial populations of terrestrial Species of Conservation Priority at stable or increasing trend.	
Increase total linear extent of fully functioning floodplain aquatic habitat on Mojave rivers and streams by 2015.	
Maintain healthy populations of aquatic Species of Conservation Priority at stable or increasing trend.	
Intermountain Rivers and Streams	
Increase total hectares of fully functioning lowland riparian and linear kilometers of montane riparian terrestrial habitat on intermountain rivers and streams by 2015.	
Maintain healthy populations of terrestrial populations of terrestrial Species of Conservation Priority at stable or increasing trend.	
Increase total linear kilometers of fully functioning riparian aquatic habitat on intermountain rivers and streams by 2015.	
Maintain healthy populations of aquatic Species of Conservation Priority at stable or increasing trend.	
Lowland Riparian	
Secure adequate in-stream flow in key lowland riparian habitats; implement water releases that more closely mimic natural hydrographs.	Utah Comprehensive Wildlife Conservation Strategy UDWR (Sutter et al. 2005)
Lentic Water Bodies (Standing Water Habitats)	
Secure adequate conservation pools in key lentic habitats.	
Lotic Water Bodies (Flowing Water Habitats)	
Secure in-stream flow in key lotic habitats.	
Improve degraded lotic habitats to compensate for lotic areas lost to development.	

Table F3.7-10 Management Objectives in Wildlife Action Plans for Sensitive Species (Continued)

Objective / Habitat	Source of Information
Wet Meadow	
Acquire conservation easements or fee-title to key wet meadow areas.	
Improve degraded wet meadow habitats to compensate for areas lost to development.	
Secure in-stream flow in streams functionally connected to key wet meadows.	
Acquire conservation easements of fee-title to key wet meadows or important upland areas that are adjacent to key wet meadows.	
Improve degraded upland habitats adjacent to key wet meadow habitats to compensate for uplands lost/degraded from development.	
Wetlands	
Acquire conservation easements of fee-title to key wetland areas.	
Improve degraded wetland habitats to compensate for wetlands lost/degraded from development.	
Acquire conservation easements or fee-title to important upland areas that are adjacent to key wetlands.	
Secure in-stream flow in streams functionally connected to key wetlands.	

Table F3.7-11
Spring/Ponds/Lakes and Aquatic Species Potentially Affected by Proposed Action Pumping

Table F3.7-11 Springs/Ponds/Lakes and Aquatic Species Potentially Affected by Proposed Action Pumping

Basin/Waterbody	Species	Effect (Model Period)			Percent Flow Change
		FB	75	200	
White River					
Butterfield Spring	Fish – White River sculpin	N	N[2]	N[2]	-1 to -18
	Invertebrates – springsnails (Butterfield pyrg, Hardy pyrg)				
Flag Springs	Fish – White River spinedace FE) (CH)[1], White River desert sucker, White River speckled dace	N	N[2]	N[2]	-1 to -17
	Invertebrates – springsnails (Flag pyrg)				
Spring (#184)					
Blind Spring	Amphibians – northern leopard frog	N	Y	Y	No data
Cleveland Ranch Springs	Amphibians – northern leopard frog	N	Y	Y	No data
Keegan Spring	Fish – relict dace	N[2]	Y	Y	-58 to -100
	Amphibians – northern leopard frog				
Minerva Spring Complex	Fish – Utah chub	N	Y	Y	No data
	Amphibians – northern leopard frog				
	Invertebrates – springsnails (Toquerville pyrg)				
North Millick Spring	Amphibians – northern leopard frog	N[2]	Y	Y	-31 to -75
O'Neal/ Frog Pond	Amphibians – northern leopard frog	N	Y	Y	No data
Osborne Spring	Invertebrates – springsnails (Toquerville pyrg)	N	Y	Y	No data
Shoshone Ponds[3]	Fish – Pahrump poolfish (FE)[1], relict dace	N	Y	Y	No data
	Amphibians – northern leopard frog				
South Millick Spring	Amphibians – northern leopard frog	N[2]	Y	Y	-55 to -99
Stonehouse Spring Complex	Fish – relict dace	N	N	Y	No data
	Invertebrates - springsnails (Toquerville pyrg)				
Swallow Spring	Fish – rainbow trout	N	Y	Y	No data
Unnamed spring #5	Amphibians – northern leopard frog	N	Y	Y	No data
	Invertebrates – springsnails (Toquerville pyrg)				
Unnamed spring near Cleve Creek	Invertebrates – springsnails (Toquerville pyrg)	N	Y	Y	No data
Willow Spring	Invertebrates – springsnails (Toquerville pyrg)	N	Y	Y	No data
Snake					
Big Springs	Fish – redside shiner, mottled sculpin, speckled dace, Utah chub	N	Y	Y	-2 to -100
	Invertebrates – springsnails (bifid duct pyrg, longitudinal gland pyrg)				

Table F3.7-11 Springs/Ponds/Lakes and Aquatic Species Potentially Affected by Proposed Action Pumping (Continued)

Basin/Waterbody	Species	Effect (Model Period)			Percent Flow Change
		FB	75	200	
Caine Spring	Invertebrates – springsnails (Toquerville pyrg)	N	Y	Y	No data
Clay Spring	Invertebrates – springsnails (longitudinal gland pyrg)	N	Y	Y	No data
Kious Spring	Invertebrates – springsnails	N	Y	Y	No data
Outhouse Spring	Invertebrates – springsnails, (Toquerville pyrg and glossy valvata)	N	Y	Y	No data
Pruess Lake	Fish – channel oatfish, Sacramento perch, largemouth bass, brown trout	N	Y	Y	No data
	Invertebrates – California floater				
Rowland Spring	Fish – brook trout	N	N	Y	No data
Silver Creek Reservoir	Fish – brown trout, rainbow trout	N	Y	Y	No data
Spring Creek Spring	Water source for Spring Creek Rearing Station	N	Y	Y	No data
Stateline Springs	Fish – Utah chub, Utah sucker, redside shiner, speckled dace, mottled sculpin	N	Y	Y	No data
	Invertebrates – springsnails (longitudinal gland pyrg)				
Unnamed spring north of Big Springs	Invertebrates – springsnails (longitudinal gland pyrg)	N	Y	Y	No data
Unnamed northeast of Big Springs	Invertebrates – springsnails	N	Y	Y	No data
Unnamed spring southwest of Caine Spring	Invertebrates – springsnails (Toquerville pyrg)	N	Y	Y	No data
Lake					
Wambolt Spring	Amphibians – northern leopard frog	N	N	Y	No data
	Invertebrates – springsnails (Lake Valley pyrg)				

[1] FE = Federally Endangered; CH = critical habitat.

[2] Although spring is not located within the 10-foot groundwater drawdown contour, model-predicted flow reductions indicate potential pumping effects.

[3] Shoshone Ponds' water is provided by manmade artesian wells.

Table F3.7-12
Perennial Streams and Aquatic Species Potentially Affected by Proposed Action Pumping

Table F3.7-12 Perennial Streams and Aquatic Species Potentially Affected by Proposed Action Pumping

Basin/Stream	Total Stream Miles	Species	Stream Miles Potentially Affected		
			FB	75	200
Lake	**2.1**		**0.0**	**0.0**	**1.0**
Geyser Creek	2.1	Brook trout[1], rainbow trout	0.0	0.0	1.0
Snake	**80.3**		**0.0**	**40.6**	**46.4**
Baker Creek	8.7	Brook trout[1], brown trout, rainbow trout, trout hybrids	0.0	1.5	1.8
Big Springs Creek	9	Mottled, sculpin, redside shiner, speckled dace, Utah chub, Utah sucker, springsnails	0.0	9.0	9.0
Big Wash	4.8	Bonneville cutthroat trout	0.0	4.8	4.8
Hendry's Creek	8.4	Bonneville cutthroat trout	0.0	0.2	0.4
Lake Creek	10.6	Mottled sculpin, redside shiner, speckled dace, Utah chub, Utah sucker	0.0	10.6	10.6
Lehman Creek	10.6	Brook trout[1], brown trout, rainbow trout, trout hybrids	0.0	4.0	4.6
Silver Creek	9.4	Brook trout, brown trout, rainbow trout, trout hybrids	0.0	2.6	5.6
Snake Creek	11.6	Bonneville cutthroat trout, brook trout, brown trout, rainbow trout, mottled sculpin, redside shiner, speckled dace	0.0	7.9	8.0
Spring Creek	0.8	Water Source for Spring Creek Rearing Station	0.0	<0.1	0.8
Strawberry Creek	6.4	Bonneville cutthroat trout, mottled sculpin, redside shiner, speckled dace	0.0	0.0	0.8
Spring (#184)	**81.4**		**6.1**	**19.0**	**24.1**
Bassett Creek	4.9	Rainbow trout	0.0	0.8	0.8
Bastian Creek	2.5	Brown trout, rainbow trout	1.2	1.8	2.3
Eightmile Creek	3.2	Brown trout, rainbow trout	0.0	0.6	0.6
Indian Creek	3.1	Rainbow trout	0.0	0.7	0.7
McCoy Creek	6.9	Rainbow trout, brown trout, trout hybrids	0.0	2.3	2.7
Meadow Creek	5.4	Brown trout	1.0	2.1	2.1
Muncy Creek	7.3	Brook trout[1], brown trout, rainbow trout, trout hybrids	0.0	0.3	0.3
Negro Creek	11.5	Brown trout	2.7	4.5	4.5
Odgers Creek	3.7	Rainbow trout	0.0	0.7	0.7
Piermont Creek	5.5	Brown trout	0.0	0.7	0.7
Pine Creek	0.8	Bonneville cutthroat trout	0.0	0.1	0.4
Ridge Creek	1.2	Bonneville cutthroat trout	0.0	0.6	1.1
Shingle Creek	3.7	Brown trout, rainbow trout, trout hybrids	1.2	1.2	2.1
Siegel Creek	6.7	Rainbow trout	0.0	2.0	2.0
South Taft Creek	3.3	Brook trout, rainbow trout	0.0	0.0	0.2
Spring Valley Creek	1.4	Relict dace	0.0	<0.1	1.4

Table F3.7-12 Perennial Streams and Aquatic Species Potentially Affected by Proposed Action Pumping (Continued)

Basin/Stream	Total Stream Miles	Species	Stream Miles Potentially Affected		
			FB	75	200
Taft Creek	3.4	Brook trout, rainbow trout	0.0	0.0	<0.1
Vipont Creek	3.3	Rainbow trout	0.0	0.2	0.2
Willard Creek	1.6	Trout hybrids	0.0	0.0	0.9
Williams Canyon Creek	2	Rainbow trout, trout hybrids	0.0	0.4	0.4
Pahranagat	**20.2**		**0.0**	**0.0**	**0.5**
Pahranagat Creek	20.2	Pahranagat speckled dace	0.0	0.0	0.5
Lower Meadow Valley Wash	**47.6**		**0.0**	**0.0**	**3.3**
Lower Meadow Valley Wash	47.6	Rainbow trout, Meadow Valley Wash desert sucker, Meadow Valley Wash speckled dace	0.0	0.0	3.3
Total Miles	**231.6**		**6.1**	**59.6**	**75.3**

[1] Brook trout present in stream, but occupied habitat is in head waters, which would not be affected by pumping.

Table F3.7-13A
Pumping Effects Analysis for Special Status Fish Species, Proposed Action and Alternative A

Table F3.7-13A Pumping Effects Analysis for Special Status Fish Species, Proposed Action and Alternative A

Species	Basin/Waterbody	Proposed Action			Percent Flow Change	Alternative A			Percent Flow Change
		FB	+75	+200		FB	+75	+200	
Federally Listed									
Big Spring spinedace	Panaca/Dry								
	Upper Meadow Valley Wash (CH)[1]	N	N	N	No data	N	N	N	No data
Hiko White River springfish (FE)[1]	Pahranagat								
	Hiko and Crystal springs (CH)[1]	N	N	N	0 to -2	N	N	N	0 to -1
White River springfish (FE)[1]	Pahranagat								
	Ash Spring (CH)[1]	N	N	N	0 to -2	N	N	N	0 to -1
Pahranagat roundtail chub (FE)[1]	Pahranagat								
	Upper Pahranagat Creek	N	N	N	No data	N	N	N	No data
Pahrump poolfish (FE)[1]	Spring								
	Shoshone Ponds	N	Y	Y	No data	N	Y	Y	No data
White River spinedace (FE)[1]	White River								
	Flag Springs	N	N[2]	N[2]	-1 to -17	N	N	N[2]	-1 to -8
	Indian Spring	N	N	N	No data	N	N	N	No data
	Preston Big Spring	N	N	N	0 to -1	N	N	N	0 to -1
	Lund Spring	N	N	N	0 to -1	N	N	N	0 to -1
	Sunnyside Creek	N	N	N	No data	N	N	N	No data
Moapa dace (FE)[1]	Muddy River Springs area								
	Muddy River	N	N[2]	N[2]	0 to -1	N	N	N	0
Other Fish Species									
Virgin River chub	Muddy River Springs, Lower Moapa								
	California Wash – Muddy River	N	N[2]	N[2]	-4 to -21	N	N	N	0
Moorman White River springfish	White River – Hot Creek Spring	N	N	N	0 to -3	N	N	N	0 to -2
	Moorman Springs	N	N	N	0 to -3	N	N	N	0 to -1
Pahranagat speckled dace	Pahranagat – Lower Pahranagat Creek	N	N	Y	No data	N	N	N	No data
	Crystal Spring, Cottonwood Springs	N	N	N	0 to -1	N	N	N	0 to -1
White River sculpin	White River – Butterfield Springs	N	N[2]	[2]	-1 to -18	N	N	N[2]	0 to -8

N

Table F3.7-13A Pumping Effects Analysis for Special Status Fish Species, Proposed Action and Alternative A (Continued)

Species	Basin/Waterbody	Proposed Action			Percent Flow Change	Alternative A			Percent Flow Change
		FB	+75	+200		FB	+75	+200	
Preston White River springfish	White River								
	Preston Big Spring	N	N	N	0 to -1	N	N	N	0 to -1
	Indian Spring	N	N	N	No data	N	N	N	No data
	Arnoldson Spring	N	N	N	0 to -1	N	N	N	0
	Nicolas Spring	N	N	N	0 to -1	N	N	N	0
White River desert sucker	White River								
	Arnoldson Spring	N	N	N	0 to -1	N	N	N	0
	Indian Spring	N	N	N	No data	N	N	N	0
Utah chub	Snake								
	Big Springs/Big Spring Creek	N	Y	Y	-2 to -100	N	Y	Y	-2 to -100
	Stateline Springs/Lake Creek	N	Y	Y	No data	N	Y	Y	No data
	Spring (#184)								
	Minerva Spring complex	N	Y	Y	No data	N	Y	Y	No data
Utah sucker	Snake								
	Big Springs/Big Spring Creek	N	Y	Y	-2 to -100	N	Y	Y	-2 to -100
	Stateline Spring/Lake Creek	N	Y	Y	No data	N	Y	Y	No data
Relict dace	Spring (#184)								
	Keegan Spring	N	Y	Y	-58 to -100	N	N	N	-12 to -36
	Shoshone Ponds	N	Y	Y	No data	N	Y	Y	No data
	Spring Valley Creek	N	Y	Y	No data	N	Y	Y	No data
	Stonehouse Spring Complex	N	N	Y	No data	N	N	N	No data
Least chub	Snake								
	Leland Harris	N	N	N	No data	N	N	N	No data
	Grandy Salt Marsh	N	N	N	No data	N	N	N	No data
	Bishop Springs Area	N	N	N	No data	N	N	N	No data
	Twin Springs	N	N	N	No data	N	N	N	No data
	Miller Spring	N	N	N	No data	N	N	N	No data
	Fish Springs								
	Ibis, Pintail Ponds	N	N	N	No data	N	N	N	No data

Table F3.7-13A Pumping Effects Analysis for Special Status Fish Species, Proposed Action and Alternative A (Continued)

Species	Basin/Waterbody	Proposed Action			Percent Flow Change	Alternative A			Percent Flow Change
		FB	+75	+200		FB	+75	+200	
Bonneville cutthroat trout	Steptoe, Spring (#184), Snake, Deep Creek								
	Steptoe Valley								
	Goshute Creek	N	N	N	No data	N	N	N	No data
	Snake Valley								
	Basin Creek	N	N	N	No data	N	N	N	No data
	Big Wash	N	Y	Y	No data	N	Y	Y	No data
	Birch Creek	N	N	N	No data	N	N	N	No data
	Cottonwood Creek	N	N	N	No data	N	N	N	No data
	Deadman Creek	N	N	N	No data	N	N	N	No data
	Deep Canyon Creek	N	N	N	No data	N	N	N	No data
	Granite Creek	N	N	N	No data	N	N	N	No data
	Hampton Creek	N	N	N	No data	N	N	N	No data
	Hendry's Creek	N	Y	Y	No data	N	N	N	No data
	Indian Farm Creek	N	N	N	No data	N	N	N	No data
	Mill Creek	N	N	N	No data	N	N	N	No data
	NF Birch Creek	N	N	N	No data	N	N	N	No data
	Red Cedar Creek	N	N	N	No data	N	N	N	No data
	SF Baker Creek	N	N	N	No data	N	N	N	No data
	Smith Creek	N	N	N	No data	N	N	N	No data
	Snake Creek	N	N	N	No data	N	N	N	No data
	Snake Creek (north, middle, and south forks)	N	N	N	No data	N	N	N	No data
	SF Big Wash	N	N	N	No data	N	N	N	No data
	Strawberry Creek	N	N	N	No data	N	N	N	No data
	Trout Creek	N	N	N	No data	N	N	N	No data
	Tom's Creek	N	N	N	No data	N	N	N	No data
	Upper Snake Creek	N	N	Y	No data	N	N	Y	No data
	Spring Valley (#184)								
	Pine Creek	N	Y	Y	No data	N	Y	N	No data
	Ridge Creek	N	N	N	No data	N	N	N	No data

Table F3.7-13A Pumping Effects Analysis for Special Status Fish Species, Proposed Action and Alternative A (Continued)

Species	Basin/Waterbody	Proposed Action			Percent Flow Change	Alternative A			Percent Flow Change
		FB	+75	+200		FB	+75	+200	
Bonneville cutthroat trout (Continued)	Deep Creek Valley								
	Dad's Fifteen Mile, Johnson, Sam's, Spring, and Steve creeks	N	N	N	No data	N	N	N	No data
Redside shiner, speckled dace, mottled sculpin, Utah sucker	Snake								
	Big Springs/Big Springs Creek	N	Y	Y	-2 to -100	N	Y	Y	-2 to -100
	Stateline Springs/Lake Creek	N	Y	Y	No data	N	Y	Y	No data

[1] FE = Federally endangered; CH = critical habitat.

Table F3.7-13B
Pumping Effects Analysis for Special Status Amphibian Species, Proposed Action and Alternative A

Table F3.7-13B Pumping Effects Analysis for Special Status Amphibian Species, Proposed Action and Alternative A

Species	Basin/Waterbody	Proposed Action			Percent Flow Change	Alternative A			Percent Flow Change
		FB	+75	+200		FB	+75	+200	
Northern leopard frog	Steptoe Valley								
	Lusetti Ranch Spring	N	N	N	No data	N	N	N	No data
	Spring (#184)								
	Blind Spring	N	Y	Y	No data	N	Y	Y	No data
	Cleveland Ranch Springs	N	Y	Y	No data	N	N	N	No data
	Keegan Spring	N[2]	Y	Y	-58 to -100	N[2]	N[2]	N[2]	-12 to -36
	Minerva Spring complex	N	Y	Y	No data	N	Y	Y	No data
	North Millick	N[2]	Y	Y	-31 TO -75	N	N[2]	N[2]	-4 to -11
	O'Neal Frog Pond	N	Y	Y	No data	N	N	Y	No data
	Shoshone Wells/Ponds[2]	N	Y	Y	No data	N	Y	Y	No data
	South Millick Spring	N[2]	Y	Y	-55 to -99	N[2]	N[2]	N[2]	-10 to -24
	West Spring complex	N	N	N	No data	N	N	N	No data
	Unnamed spring #5	N	Y	Y	No data	N	N	Y	No data
	Lake Valley								
	Geyser Spring	N	N	N	No data	N	N	N	No data
	Wambolt Spring	N	N	Y	No data	N	N	Y	No data
	Pahranagat Valley								
	L Spring	N	N	N	No data	N	N	N	No data
	Maynard Spring	N	N	N	No data	N	N	N	No data
	Fish Spring Flat								
	Crater, House, Lost, and South springs	N	N	N	No data	N	N	N	No data
	Snake Valley								
	Leland Harris	N	N	N	No data	N	N	N	No data
	Grandy Warm Spring	N	N	N	No data	N	N	N	No data
	Twin Spring	N	N	N	No data	N	N	N	No data
Columbia Spotted frog	Snake Valley								
	Beck Springs North	N	N	N	No data	N	N	N	No data
	Gandy Salt Marsh	N	N	N	No data	N	N	N	No data
	Leland Harris Spring	N	N	N	No data	N	N	N	No data
	Miller Spring	N	N	N	No data	N	N	N	No data
	Twin Spring	N	N	N	No data	N	N	N	No data
	Tule Valley								
	Coyote South Tule, Tule, and Willow springs	N	N	N	No data	N	N	N	No data
Relict leopard frog	Black Mountains Area								
	Blue Point Springs	N	N	N	0	N	N	N	0
	Gnatcatcher Spring	N	N	N	No data	N	N	N	No data
	Rogers Spring	N	N	N	0	N	N	N	0

[1] Although spring is not located within the 10-foot groundwater contour, model-predicted flow reductions indicate potential pumping effects.

[2] Shosone Ponds' water is provided by man made artesian wells.

Table F3.7-13C
Pumping Effects for Special Status Invertebrate Species, Proposed Action and Alternative A

Table F3.7-13C Pumping Effects for Special Status Invertebrate Species, Proposed Action and Alternative A

Species	Basin/Waterbody	Proposed Action			Percent Flow Change	Alternative A			Percent Flow Change
		FB	+75	+200		FB	+75	+200	
Petitioned Springsnails									
Bifid duct pyrg	Snake Valley								
	Big Springs	N	Y	Y	-2 to -100	N	Y	Y	-2 to -100
	Spring Valley (#184)								
	Rock Spring	N	N	N	No data	N	N	N	No data
	Turnley/Woodsman Spring	N	N	N	No data	N	N	N	No data
Butterfield pyrg	White Valley								
	Butterfield Spring	N	N[2]	N[2]	-1 to -18	N	N[2]	N[2]	0 to -8
Flag pyrg	Dry Lake Valley								
	Meloy Spring	N	N	N	No data	N	N	N	No data
	White River Valley								
	Flag Springs	N	N[2]	N[2]	-1 to -17	N	N[2]	N[2]	-1 to -8
Lake Valley pyrg	Lake Valley								
	Wambolt Spring	N	N	Y	No data	N	N	Y	No data
Longitudinal gland pyrg	Snake Valley								
	Big Springs	N	Y	Y	-2 to -100	N	Y	Y	-2 to -100
	Clay Spring	N	Y	Y	No data	N	Y	Y	No data
	Stateline Springs/Lake Creek	N	Y	Y	No data	N	Y	Y	No data
	Unnamed spring north of Big Springs	N	Y	Y	No data	N	Y	Y	No data
Southern Steptoe pyrg	Steptoe Valley								
	Lusetti Ranch Spring	N	N	N	No data	N	N	N	No data
White River Valley pyrg	White River Valley								
	Arnoldson Spring	N	N	N	0 to -1	N	N	N	0
	Flag Springs	N	N[2]	[2]	-1 to -17	N	N	N[2]	-1 to -8
	Nicolas Spring	N	N	N	0 to -1	N	N	N	0
	Preston Big Spring	N	N	N	0 to -1	N	N	N	0 to -1

Table F3.7-13C Pumping Effects for Special Status Invertebrate Species, Proposed Action and Alternative A (Continue)

Species	Basin/Waterbody	Proposed Action			Percent Flow Change	Alternative A			Percent Flow Change
		FB	+75	+200		FB	+75	+200	
Hardy pyrg	White River Valley								
	Butterfield Spring	N	N[2]	[2]	-1 to -18	N	N	N[2]	0 to -8
	Emigrant Spring	N	N	N	No data	N	N	N	No data
	Hardy Springs	N	N N	N	0 to -1	N	N	N	0 to -1
	Ruppos Boghole	N	N	N	No data	N	N	N	No data
	Silver Springs	N	N	N	No data	N	N	N	No data
	Cave Valley								
	Unnamed spring near Parker Station	N	N	N	No data	N	N	N	No data
Moapa pebblesnail, Moapa Valley pyrg	Muddy Spring Area								
	Moapa Spring, Apcar Spring, Cardy Lamb Spring	N	N	N	No data	N	N	N	No data
Grated tryonia	Muddy Springs Area								
	Oasis Spring, unnmamed spring west of Oasis Spring, Muddy Spring, Cardy Lamb Spring, Apcar Spring	N	N	N	No data	N	N	N	No data
	Pahranagat Valley								
	Ash Spring	N	N	N	0 to -2	N	N	N	0 to -1
	Crystal Spring	N	N	N	0 to -1	N	N	N	0 to -1
	White River Valley								
	Hot Creek Springs	N	N	N	0 to -3	N	N	N	0 to -2
	Moorman Spring	N	N	N	0 to -3	N	N	N	0 to -1
Hamlin Valley pryg	Hamlin Valley								
	Unnamed spring complex east of White Cabin Spring	N	N	N	No data	N	N	N	No data
Hubbs pyrg	Pahranagat Valley								
	Crystal Spring	N	N	N	0 to -1	N	N	N	0 to -1
	Hiko Spring	N	N	N	0 to -2	N	N	N	0 to -1

Table F3.7-13C Pumping Effects for Special Status Invertebrate Species, Proposed Action and Alternative A (Continue)

Species	Basin/Waterbody	Proposed Action			Percent Flow Change	Alternative A			Percent Flow Change
		FB	+75	+200		FB	+75	+200	
Pahranagat pebblesnail	Pahranagat Valley								
	Ash Spring	N	N	N	0 to -2	N	N	N	0 to -1
	White River Valley								
	Hot Creek Spring	N	N	N	0 to -3	N	N	N	0 to -2
	Moon River Spring	N	N	N	0 to -1	N	N	N	0 to -1
	Moorman Spring	N	N	N	0 to -3	N	N	N	0 to -1
Sub-globose Snake pyrg	Snake Valley								
	Gandy Warm Springs	N	N	N	No data	N	N	N	No data
	Gandy Warm Creek	N	N	N	No data	N	N	N	No data
	Warm Springs	N	N	N	No data	N	N	N	No data
Landyes pyrg	Steptoe Valley								
	Unnamed spring northwest of Steptoe Ranch	N	N	N	No data	N	N	N	No data
Neritiform Steptoe pyrg, Sub-globose Steptoe pyrg	Steptoe Valley								
	Two springs north of Steptoe Ranch	N	N	N	No data	N	N	N	No data
Flat-topped Steptoe pyrg	Steptoe Valley								
	Unnamed spring northwest of Clark Spring	N	N	N	No data	N	N	N	No data
Emigrant pyrg	White River Valley								
	Emigrant Spring	N	N	N	No data	N	N	N	No data
Blue Point pyrg	Black Mountains Area								
	Blue Point Spring	N	N	N	No data	N	N	N	No data
Camp Valley pyrg	Meadow Valley Wash								
	Unnamed spring in upper Camp Creek	N	N	N	No data	N	N	N	No data
Spring Mountains pyrg	Las Vegas Valley								
	Red Spring, Willow Spring	N	N	N	No data	N	N	N	No data
Corn Creek pyrg	Las Vegas Valley								
	Corn Creek Springs	N	N	N	No data	N	N	N	No data

Table F3.7-13C Pumping Effects for Special Status Invertebrate Species, Proposed Action and Alternative A (Continue)

Species	Basin/Waterbody	Proposed Action			Percent Flow Change	Alternative A			Percent Flow Change
		FB	+75	+200		FB	+75	+200	
Northern Steptoe pyrg	Steptoe Valley								
	Indian Creek	N	N	N	No data	N	N	N	No data
	10 Springs in Northern Steptoe Valley	N	N	N	No data	N	N	N	No data
Non-petitioned springsnails	Steptoe Valley								
	Lusetti Ranch Spring	N	N	N	No data	N	N	N	No data
	Snake Valley								
	Stateline Spring	N	Y	Y	No data	N	Y	Y	No data
	Caine Spring	N	Y	Y	No data	N	Y	Y	No data
	Kious Spring	N	Y	Y	No data	N	Y	Y	No data
	Unnamed spring southwest of Caine Spring	N	Y	Y	No data	N	Y	Y	No data
	Unnamed springs in Snake Creek	N	Y	Y	No data	N	Y	Y	No data
	Unnamed springs in Strawberry Creek	N	N	Y	No data	N	N	Y	No data
	Spring Valley (#184)								
	Minerva Springs #1, 2, 3	N	Y	Y	No data	N	Y	Y	No data
	Osborne Spring	N	Y	Y	No data	N	N	Y	No data
	Rock Spring	N	N	N	No data	N	N	N	No data
	Unnamed spring #5	N	Y	Y	No data	N	N	Y	No data
	Unnamed spring near Cleve Creek	N	Y	Y	No data	N	N	Y	No data
	Willow Spring	N	Y	Y	No data	N	N	Y	No data
	Panaca Valley								
	Bennett Springs	N	N	N	No data	N	N	N	No data
	Clover Valley								
	North Spring	N	N	N	No data	N	N	N	No data
	Lake Valley								
	Brown Springs	N	N	N	No data	N	N	N	No data
	Highland Spring	N	N	N	No data	N	N	N	No data
	White River								
	Indian Ranch Spring	N	N	N	No data	N	N	N	No data

Table F3.7-13C Pumping Effects for Special Status Invertebrate Species, Proposed Action and Alternative A (Continue)

Species	Basin/Waterbody	Proposed Action			Percent Flow Change	Alternative A			Percent Flow Change
		FB	+75	+200		FB	+75	+200	
California floater	Snake Valley								
	Pruess Lake	N	Y	Y	No data	N	Y	Y	No data
	Redden Spring	N	N	N	No data	N	N	N	No data
Pahranagat naucorid bug	Pahranagat Valley								
	Pahranagat Creek	N	N	N	No data	N	N	N	No data
Moapa Warm Springs beetle	Muddy River Area								
	Muddy River Springs area	N	N[2]	N[2]	0 to -1	N	N	N	0

[1] FE = federally endangered; FT = Federally threatened; CH = critical habitat.

[2] Although spring is not located within the 10-foot groundwater contour, model-predicted flow reductions indicate potential pumping effects.

Table F3.7-14
Springs/Ponds/Lakes and Aquatic Species Potentially Affected by Alternative A Pumping

Table F3.7-14 Springs/Ponds/Lakes and Aquatic Species Potentially Affected by Alternative A Pumping

Basin/Waterbody	Species	Effect (Model Period)			Percent Flow Change
		FB	75	200	
White River					
Butterfield Spring	Fish – White River sculpin	N	N	N[2]	0 to -8
	Invertebrates – springsnails (Butterfield pyrg, Hardy pyrg)				
Flag Springs	Fish – White River spinedace FE) (CH)[1], White River desert sucker, White River speckled dace	N	N	N[2]	-1 to -8
	Invertebrates – springsnails (Flag pyrg)				
Spring (#184)					
Blind Spring	Amphibians – northern leopard frog	N	Y	Y	No data
Keegan Spring	Fish – relict dace	N[2]	N[2]	N[2]	-12 to -36
	Amphibians – northern leopard frog				
Minerva Spring Complex	Fish – Utah chub	N	Y	Y	No data
	Amphibians – northern leopard frog				
	Invertebrates – springsnails (Toquerville pyrg)				
North Millick Spring	Amphibians – northern leopard frog	N	N[2]	N[2]	-4 to -11
O'Neal/ Frog Pond	Amphibians – northern leopard frog	N	N	Y	No data
Osborne Spring	Invertebrates – springsnails (Toquerville pyrg)	N	N	Y	No data
Shoshone Ponds[3]	Fish – Pahrump poolfish (FE)[1], relict dace	N	Y	Y	No data
	Amphibians – northern leopard frog				
South Millick Spring	Amphibians – northern leopard frog	N[2]	N[2]	N[2]	-10 to -24
Swallow Spring	Fish – Rainbow trout	Y	Y	Y	No data
Unnamed spring #5	Amphibians – northern leopard frog	N	N	Y	No data
	Invertebrates – springsnails (Toquerville pyrg)				
Unnamed spring near Cleve Creek	Invertebrates – springsnails (Toquerville pyrg)	N	N	Y	No data
Willow Spring	Invertebrates – springsnails (Toquerville pyrg)	N	N	Y	No data
Snake					
Big Springs	Fish – redside shiner, mottled sculpin, speckled dace, Utah chub	N	Y	Y	-2 to -100
	Invertebrates – springsnails (bifid duct pyrg, longitudinal gland pyrg)				
Caine Spring	Invertebrates – springsnails	N	Y	Y	No data
Clay Spring	Invertebrates – springsnails (longitudinal gland pyrg)	N	Y	Y	No data
Kious Spring	Invertebrates – springsnails	N	Y	Y	No data
Outhouse Spring	Invertebrates – springsnails (Toquerville pyrg and glossy valvata)	N	Y	Y	No data

Table F3.7-14 Springs/Ponds/Lakes and Aquatic Species Potentially Affected by Alternative A Pumping (Continued)

Basin/Waterbody	Species	Effect (Model Period)			Percent Flow Change
		FB	75	200	
Pruess Lake	Fish – channel catfish, largemouth bass, brown trout, Sacramento perch	N	Y	Y	No data
	Invertebrates – California floater				
Rowland Spring	Fish – rainbow trout	N	N	Y	No data
Silver Creek Reservoir	Fish- brown trout, rainbow trout	N	Y	Y	No data
Spring Creek Spring	Water Source for Spring Creek Rearing Station	N	Y	Y	No data
Stateline Springs	Fish – Utah chub, Utah sucker, redside shiner, speckled dace, mottled sculpin	N	Y	Y	No data
	Invertebrates – springsnails (longitudinal gland pyrg)				
Unnamed spring north of Big Springs	Invertebrates – springsnails (longitudinal gland pyrg)	N	Y	Y	No data
Unnamed northeast of Big Springs	Invertebrates – springsnails	N	Y	Y	No data
Unnamed spring southwest of Caine Spring	Invertebrates – springsnails (Toquerville pyrg)	N	Y	Y	No data
Lake					
Wambolt Spring	Amphibians – northern leopard frog	N	N	Y	No data
	Invertebrates – springsnails (Lake Valley pyrg)				

[1] FE = Federally Endangered; CH = critical habitat.

[2] Although spring is not located within the 10-foot groundwater drawdown contour, model-predicted flow reductions indicate potential pumping effects.

[3] Shoshone Ponds' water is provided by manmade artesian wells.

Table F3.7-15
Perennial Streams and Aquatic Species Potentially Affected by Alternative A Pumping

Table F3.7-15 Perennial Streams and Aquatic Species Potentially Affected by Alternative A Pumping

Basin/Stream	Total Stream Miles	Species	Stream Miles Potentially Affected		
			FB	75	200
Lake	**2.1**		**0.0**	**0.0**	**1.0**
Geyser Creek	2.1	Brook trout[1], rainbow trout	0.0	0.0	1.0
Snake	**65.5**		**0.0**	**39.5**	**38.9**
Baker Creek	8.7	Brook trout[1], brown trout, rainbow trout, trout hybrids	0.0	1.5	1.8
Big Springs Creek	9.0	Mottled, sculpin, redside shiner, speckled dace, Utah chub, Utah sucker, springsnails	0.0	9.0	9.0
Big Wash	4.8	Bonneville cutthroat trout	0.0	4.8	4.8
Lake Creek	10.6	Mottled sculpin, redside shiner, speckled dace, Utah chub, Utah sucker	0.0	10.6	4.6
Lehman Creek	10.6	Brook trout[1], brown trout, rainbow trout, trout hybrids	0.0	4.0	4.6
Silver Creek	9.4	Brook trout, brown trout, rainbow trout, trout hybrids	0.0	0.9	5.3
Snake Creek	11.6	Bonneville cutthroat trout, brook trout, brown trout, rainbow trout, mottled sculpin, redside shiner, speckled dace	0.0	7.9	8.0
Spring Creek	0.8	Water source for Spring Creek Rearing Station	0.0	0.8	0.8
Spring (#184)	**39.8**		**2.6**	**5.4**	**11.7**
Bastian Creek	2.5	Brown trout, rainbow trout	1.2	1.8	1.8
Indian Creek	3.1	Rainbow trout	0.0	0.0	0.2
Meadow Creek	5.4	Brown trout	0.0	1.0	2.0
Muncy Creek	7.3	Brook trout[1], brown trout, rainbow trout, trout hybrids	0.0	0.3	0.3
Piermont Creek	5.5	Brown trout	0.0	0.0	0.4
Pine Creek	0.8	Bonnevillee cutthroat trout	0.0	0.1	0.4
Ridge Creek	1.2	Bonneville cutthroat trout	0.0	0.6	1.1
Shingle Creek	3.7	Brown trout, rainbow trout, trout hybrids	1.4	1.2	2.1
Siegel Creek	6.7	Rainbow trout	0.0	0.0	2.1
Willard Creek	1.6	Trout hybrids	0.0	0.0	0.9
Williams Canyon Creek	2.0	Rainbow trout, trout hybrids	0.0	0.4	0.4
Total Miles	**107.4**		**2.6**	**44.9**	**51.6**

[1] Brook trout present in stream, but occupied habitat is in headwaters, which would not be affected by pumping.

Table F3.7-16
Springs/Ponds/Lakes and Aquatic Species Potentially Affected by Alternative B Pumping

Table F3.7-16 Springs/Ponds/Lakes and Aquatic Species Potentially Affected by Alternative B Pumping

Basin/Waterbody	Species	Effect (Model Period)			Percent Flow Change
		FB	75	200	
White River					
Butterfield Spring	Fish – White River sculpin	N[2]	N[2]	N[2]	-20 to -45
	Invertebrates – springsnails (Butterfield pyrg, Hardy pyrg)				
Flag Springs	Fish – White River spinedace FE) (CH)[1], White River desert sucker, White River speckled dace	N[2]	N[2]	N[2]	-19 to -37
	Invertebrates – springsnails (Flag pyrg)				
Hot Creek Spring	Fish – Moorman White River springfish	N	N	N[2]	-3 to -7
	Invertebrates – springsnails (Grated tryonia, Pahranagat pebblesnail)				
Moorman Spring	Fish – Moorman White River springfish	N	N	N[2]	-2 to -6
	Invertebrates – springsnails (Grated tryonia, Pahranagat pebblesnail)				
Spring (#184)					
Blind Spring	Amphibians – northern leopard frog	N	Y	Y	No data
Cleveland Ranch springs	Amphibians – northern leopard frog	N	Y	Y	No data
Minerva Spring Complex	Fish – Utah chub	Y	Y	Y	No data
	Amphibians – northern leopard frog				
	Invertebrates – springsnails (Toquerville pyrg)				
North Millick Spring	Amphibians – northern leopard frog	N	N[2]	N[2]	-2 to -42
Shoshone Ponds[3]	Fish – Pahrump poolfish (FE)[1], relict dace	N	Y	Y	No data
	Amphibians – northern leopard frog				
South Millick Spring	Amphibians – northern leopard frog	N[2]	N[2]	Y	-8 to -99
Swallow Spring	Fish – Rainbow trout	Y	Y	Y	No data
West Valley Spring Complex	Amphibians – northern leopard frog	N	N	Y	No data
	Invertebrates – springsnails (Toquerville pyrg)				
Unnamed spring #5	Amphibians – northern leopard frog	Y	Y	Y	No data
	Invertebrates – springsnails (Toquerville pyrg)				
Unnamed spring near Cleve Creek	Invertebrates – springsnails (Toquerville pyrg)	Y	Y	Y	No data
Snake					
Big Springs	Fish – redshide shiner, mottled sculpin, speckled dace, Utah chub	N[2]	Y	Y	-7 to -100
	Invertebrates – springsnails (bifid duct pyrg, longitudinal gland pyrg)				
Caine Spring	Invertebrates – springsnails (Toquerville pyrg)	N	Y	Y	No data
Clay Spring	Invertebrates – springsnails (longitudinal gland pyrg)	N	Y	Y	No data
Kious Spring	Invertebrates – springsnails	N	Y	Y	No data

Table F3.7-16 Springs/Ponds/Lakes and Aquatic Species Potentially Affected by Alternative B Pumping (Continued)

Basin/Waterbody	Species	Effect (Model Period)			Percent Flow Change
		FB	75	200	
Outhouse Spring	Invertebrates – springsnails (Toquerville pyrg and glossy valvata)	N	Y	Y	No data
Pruess Lake	Fish – channel catfish, Sacramento perch, largemouth bass, brown trout	N	Y	Y	No data
	Invertebrates – California floater				
Rowland Spring	Fish – brook trout	N	Y	Y	No data
Sacramento Pass Pond	Fish- rainbow trout	N	N	Y	No data
Silver Creek Reservoir	Fish – Brown trout, rainbow trout	N	Y	Y	No data
Spring Creek Spring	Water source for Spring Creek Rearing Station	N	Y	Y	No data
Stateline Springs	Fish – Utah chub, Utah sucker, redside shiner, speckled dace, mottled sculpin, Invertebrates – springsnails (longitudinal gland pyrg)	N	Y	Y	No data
Willow Patch Spring	Invertebrates – springsnails	N	N	Y	No data
Unnamed spring north of Big Springs	Invertebrates – springsnails (longitudinal gland pyrg)	N	Y	Y	No data
Unnamed spring northeast of Big Springs	Invertebrates – springsnails	N	Y	Y	No data
Unnamed spring southwest of Caine Spring	Invertebrates – springsnails (Toquerville pyrg)	N	Y	Y	No data
Unnamed Baker Creek Spring (Bake-AQUAINV-061)	Invertebrates-springsnails	N	Y	Y	No Data
Lake					
Wambolt Spring	Amphibians – northern leopard frog	N	Y	Y	No data
	Invertebrates – springsnails (Lake Valley pyrg)				
Steptoe					
Cave Lake	Fish – Brook trout, brown trout, rainbow trout	N	N	Y	No data

[1] FE = Federally Endangered; CH = critical habitat.

[2] Although spring is not located within the 10-foot groundwater drawdown contour, model-predicted flow reductions indicate potential pumping effects.

[3] Shoshone Ponds' water is provided by manmade artesian wells.

Table F3.7-17
Perennial Streams and Aquatic Species Potentially Affect by Alternative B Pumping

Table F3.7-17 Perennial Streams and Aquatic Species Potentially Affected by Alternative B Pumping

Basin/Stream	Total Stream Miles	Species	Stream Miles Potentially Affected		
			FB	75	200
Steptoe	**13.1**		**0.0**	**0.0**	**2.5**
Steptoe Creek	13.1	Brook trout[1], brown trout, rainbow trout	0.0	0.0	2.5
Lake	**2.1**		**0.0**	**1.0**	**1.0**
Geyser Creek	2.1	Brook trout[1], rainbow trout	0.0	1.0	1.0
Snake	**71.9**		**0.0**	**49.1**	**51.6**
Baker Creek	8.7	Brook trout[1], brown trout, rainbow trout, trout hybrids	0.0	3.5	3.9
Big Springs Creek	9.0	Mottled, sculpin, redside shiner, speckled dace, Utah chub, Utah sucker, springsnails	0.0	9.0	9.0
Big Wash	4.8	Bonneville cutthroat trout	0.0	4.8	4.8
Lake Creek	10.6	Mottled sculpin, redside shiner, speckled dace, Utah chub, Utah sucker	0.0	10.6	10.6
Lehman Creek	10.6	Brook trout[1], brown trout, rainbow trout, trout hybrids	0.0	6.1	6.4
Silver Creek	9.4	Brook trout, brown trout, cutthroat trout, rainbow trout, trout hybrids	0.0	4.9	6.2
Snake Creek	11.6	Bonneville cutthroat trout, brook trout, brown trout, rainbow trout, mottled sculpin, redside shiner, speckled dace	0.0	7.9	8.0
Spring Creek	0.8	Water source for Spring Creek Rearing Station	0.0	0.8	0.8
Strawberry Creek	6.4	Bonneville cutthroat trout, mottled sculpin, redside shiner, speckled dace	0.0	1.5	1.9
Spring (#184)	**36.4**		**3.1**	**8.9**	**12.8**
Bastian Creek	2.5	Brown trout, rainbow trout	1.2	2.3	2.3
Indian Creek	3.1	Rainbow trout	0.7	0.7	0.7
Negro Creek	11.5	Brown trout, rainbow trout	0.0	3.4	4.5
Pine Creek	0.8	Bonneville cutthroat trout	0.0	0.1	0.4
Ridge Creek	1.2	Bonneville cutthroat trout	0.0	0.6	1.1
Shingle Creek	3.7	Brown trout, rainbow trout, trout hybrids	1.2	1.2	2.1
South Taft Creek	3.3	Brook trout, rainbow trout	0.0	0.0	0.2
Taft Creek	3.4	Brook trout, rainbow trout	0.0	0.0	<0.1
Vipont Creek	3.3	Rainbow trout	0.0	0.2	0.2
Willard Creek	1.6	Trout hybrids	0.0	0.0	0.9
Williams Canyon Creek	2.0	Rainbow trout, trout hybrids	0.0	0.4	0.4
Phranagat	20.2		0.0	0.0	0.5
Pahranagat Creek	20.2	Pahranagat speckled dace	0.0	0.0	0.5

Table F3.7-17 Perennial Streams and Aquatic Species Potentially Affected by Alternative B Pumping (Continued)

Basin/Stream	Total Stream Miles	Species	Stream Miles Potentially Affected		
			FB	75	200
Lower Meadow Valley Wash	**47.6**		**0.0**	**0.0**	**3.3**
Lower Meadow Valley Wash	47.6	Rainbow trout, Meadow Valley Wash desert sucker, Meadow Valley Wash speckled dace	0.0	0.0	3.3
Total Miles	**191.3**		**3.1**	**59.0**	**71.7**

[1] Brook trout present in stream, but occupied habitat is in headwaters, which would not be affected by pumping.

Table F3.7-18
Springs/Ponds/Lakes and Aquatic Species Potentially Affected by Alternative C Pumping

Table F3.7-18 Springs/Ponds/Lakes and Aquatic Species Potentially Affected by Alternative C Pumping

Basin/Waterbody	Species	Effect (Model Period)			Percent Flow Change
		FB	75	200	
White River					
Butterfield Spring	Fish –White River sculpin	N	N	N	0 to -5
	Invertebrates – springsnails (Butterfield pyrg, Hardy pyrg)				
Flag Springs	Fish – White River spinedace FE) (CH)[1], White River desert sucker, White River speckled dace	N	N	N	-1 to -5
	Invertebrates – springsnails (Flag pyrg)				
Spring (#184)					
Blind Spring	Amphibians – northern leopard frog	N	N	Y	No data
Keegan Spring	Fish – relict dace	N[2]	N[2]	N[2]	-12 to -15
	Amphibians – northern leopard frog				
Minerva Spring Complex	Fish – Utah chub	N	Y	Y	No data
	Amphibians – northern leopard frog				
	Invertebrates – springsnails (Toquerville pyrg)				
Shoshone Ponds[3]	Fish – Pahrump poolfish (FE)[1], relict dace	N	Y	Y	No data
	Amphibians – northern leopard frog				
South Millick Spring	Amphibians – northern leopard frog	N[2]	N[2]	N[2]	-10 to -11
Swallow Spring	Fish – Rainbow trout	N	Y	Y	No data
Snake					
Big Springs	Fish – redshide shiner, mottled sculpin, speckled dace, Utah chub	N	N[2]	N[2]	-2 to -100
	Invertebrates – springsnails (bifid duct pyrg, longitudinal gland pyrg)				
Caine Spring	Invertebrates – springsnails (Toquerville pyrg)	N	Y	Y	No data
Clay Spring	Invertebrates – springsnails (longitudinal gland pyrg)	N	Y	Y	No data
Kious Spring	Invertebrates – springsnails	N	N	Y	No data
Outhouse Spring	Invertebrates – springsnails (Toquerville pyrg and glossy valvata)	N	N	Y	No data
Pruess Lake	Fish – channel catfish, Sacramento perch, largemouth bass, brown trout	N	Y	Y	No data
	Invertebrates – California floater				
Silver Creek Reservoir	Fish – Brown trout, rainbow trout	N	Y	Y	No data
Spring Creek Spring	Water source for Spring Creek Rearing Station	N	N	Y	No data

Table F3.7-18 Springs/Ponds/Lakes and Aquatic Species Potentially Affected by Alternative C Pumping (Continued)

Basin/Waterbody	Species	Effect (Model Period)			Percent Flow Change
		FB	75	200	
Stateline Springs	Fish – Utah chub, Utah sucker, redside shiner, speckled dace, mottled sculpin, Invertebrates – springsnails (longitudinal gland pyrg)	N	Y	Y	No data
Unnamed spring north of Big Springs	Invertebrates – springsnails (longitudinal gland pyrg)	N	N	Y	No data
Unnamed spring southwest of Caine Spring	Invertebrates – springsnails (Toquerville pyrg)	N	Y	Y	No data

[1] FE = Federally Endangered; CH = critical habitat.

[2] Although spring is not located within the 10-foot groundwater drawdown contour, model-predicted flow reductions indicate potential pumping effects.

[3] Shoshone Ponds' water is provided by manmade artesian wells.

Table F3.7-19
Perennial Streams and Aquatic Species Potentially Affected by Alternative C Pumping

Table F3.7-19 Perennial Streams and Aquatic Species Potentially Affected by Alternative C Pumping

Basin/Stream	Total Stream Miles	Species	Stream Miles Potentially Affected		
			FB	75	200
Snake	**65.5**		**0**	**25.4**	**39.8**
Baker Creek	8.7	Brook trout[1], brown trout, rainbow trout, trout hybrids	0.0	0.0	1.5
Big Springs Creek	9.0	Mottled, sculpin, redside shiner, speckled dace, Utah chub, Utah sucker, springsnails	0.0	5.5	6.6
Big Wash	4.8	Bonneville cutthroat trout	0.0	2.6	4.8
Lake Creek	10.6	Mottled sculpin, redside shiner, speckled dace, Utah chub, Utah sucker	0.0	10.6	10.6
Lehman Creek	10.6	Brook trout[1], brown trout, rainbow trout, trout hybrids	0.0	2.0	4.0
Silver Creek	9.4	Brook trout, brown trout, rainbow trout, trout hybrids	0.0	<0.1	3.5
Snake Creek	11.6	Bonneville cutthroat trout, brook trout, brown trout, rainbow trout, mottled sculpin, redside shiner, speckled dace	0.0	4.6	8.0
Spring Creek	0.8	Water source for Spring Creek Rearing Station	0.0	0.1	0.8
Spring (#184)	**10.2**		**1.2**	**3.5**	**3.5**
Bastian Creek	2.5	Brown trout, rainbow trout	1.2	1.2	1.2
Pine Creek	0.8	Bonneville cutthroat trout	0.0	0.1	0.1
Ridge Creek	1.2	Bonneville cutthroat trout	0.0	0.6	0.6
Shingle Creek	3.7	Brown trout, rainbow trout, trout hybrids	0.0	1.2	1.2
Williams Canyon Creek	2.0	Rainbow trout, trout hybrids	0.0	0.4	0.4
Total Miles	**75.7**		**1.2**	**28.9**	**43.3**

[1] Brook trout present in stream, but occupied habitat is in headwaters, which would not be affected by pumping.

Table F3.7-20
Springs/Ponds/Lakes and Aquatic Species Potentially Affected by Alternative D Pumping

Table F3.7-20 Springs/Ponds/Lakes and Aquatic Species Potentially Affected by Alternative D Pumping

Basin/Waterbody	Species	Effect (Model Period)			Percent Flow Change
		FB	75	200	
White River					
Butterfield Spring	Fish – White River sculpin	N	N	N[2]	0 to -9
	Invertebrates – springsnails (Butterfield pyrg, Hardy pyrg)				
Flag Springs	Fish – White River spinedace FE) (CH)[1], White River desert sucker, White River speckled dace	N	N	N[2]	0 to -9
	Invertebrates – springsnails (Flag pyrg)				
Spring (#184)					
Blind Spring	Amphibians – northern leopard frog	N	Y	Y	No data
Minerva Spring Complex	Fish – Utah chub	N	Y	Y	No data
	Amphibians – northern leopard frog				
	Invertebrates – springsnails (Toquerville pyrg)				
Shoshone Ponds[3]	Fish – Pahrump poolfish (FE)[1], relict dace	N	N	Y	No data
	Amphibians – northern leopard frog				
Swallow Spring	Fish – Rainbow trout	N	Y	Y	No data
Snake					
Big Springs	Fish – redshide shiner, mottled sculpin, speckled dace, Utah chub	N[2]	Y	Y	-19 to -100
	Invertebrates – springsnails (bifid duct pyrg, longitudinal gland pyrg)				
Outhouse Spring	Invertebrates – springsnails (Toquerville pyrg and glossy valvata)	N	N	Y	No data
Spring Creek Spring	Water source for Spring Creek Rearing Statiton	N	N	Y	No data
Unnamed spring north of Big Springs	Invertebrates – springsnails (longitudinal gland pyrg)	N	N	Y	No data
Unnamed spring northeast of Big Springs	Invertebrates – springsnails	N	N	Y	No data
Lake					
Brown Springs	Invertebrates – springsnails	N	N	Y	No data
Wambolt Spring	Amphibians – northern leopard frog	N	N	Y	No data
	Invertebrates – springsnails (Lake Valley pyrg)				

[1] FE = Federally Endangered; CH = critical habitat.

[2] Although spring is not located within the 10-foot groundwater drawdown contour, model-predicted flow reductions indicate potential pumping effects.

[3] Shoshone Ponds' water is provided by manmade artesian wells.

Table F3.7-21
Perennial Streams and Aquatic Species Potentially Affected by Alternative D Pumping

Table F3.7-21 Perennial Streams and Aquatic Species Potentially Affected by Alternative D Pumping

Basin/Stream	Total Stream Miles	Species	Stream Miles Potentially Affected		
			FB	75	200
Lake	**2.1**		**0.0**	**0.0**	**1.0**
Geyser Creek	2.1	Brook trout[1], rainbow trout	0.0	0.0	1.0
Snake	**36.8**		**0.0**	**0.7**	**20.1**
Big Springs Creek	9.0	Mottled sculpin, redside shiner, speckled dace, Utah chub, Utah sucker, springsnails	0.0	0.7	8.9
Big Wash	4.8	Bonneville cutthroat trout	0.0	0.0	4.8
Lake Creek[2]	10.6	Mottled sculpin, redside shiner, speckled dace, Utah chub, Utah sucker	0.0	—[2]	—[2]
Snake Creek	11.6	Bonneville cutthroat trout, brook trout, brown trout, rainbow trout, mottled sculpin, redside shiner, speckled dace	0.0	0.0	5.6
Spring Creek	0.8	Water source for Sprink Creek Rearing Station	0.0	0.0	0.8
Spring (#184)	**7.7**		**0.0**	**0.0**	**2.1**
Pine Creek	0.8	Bonneville cutthroat trout	0.0	0.0	0.1
Ridge Creek	1.2	Bonneville cutthroat trout	0.0	0.0	0.6
Shingle Creek	3.7	Brown trout, rainbow trout, trout hybrids	0.0	0.0	1.0
Williams Canyon Creek	2.0	Rainbow trout, trout hybrids	0.0	0.0	0.4
Spring (#201)	**11.0**		**0.0**	**2.0**	**5.7**
Camp Valley Creek	11.0	Brown trout, rainbow trout	0.0	2.0	5.7
Total Miles	**57.6**		**0.0**	**2.7**	**28.9**

[1] Brook trout present in stream, but occupied habitat is in headwaters, which would not be affected by pumping.

[2] Lake Creek flow would be reduced because portions of Big Springs Creek (one of the upstream water sources for Lake Creek) are located within the 10-foot drawdown contour.

Table F3.7-22
Springs/Ponds/Lakes and Aquatic Species Potentially Affected by Alternative E Pumping

Table F3.7-22 Springs/Ponds/Lakes and Aquatic Species Potentially Affected by Alternative E Pumping

Basin/Waterbody	Species	Effect (Model Period)			Percent Flow Change
		FB	75	200	
White River					
Butterfield Spring	Fish – White River sculpin	N	N	N[2]	0 to -8
	Invertebrates – springsnails (Butterfield pyrg, Hardy pyrg)				
Flag Springs	Fish – White River spinedace (FE) (CH)[1], White River desert sucker, White River speckled dace	N	N	N[2]	-1 to -8
	Invertebrates – springsnails (Flag pyrg)				
Spring (#184)					
Blind Spring	Amphibians – northern leopard frog	N	Y	Y	No data
Keegan Spring	Fish – relict dace	N[2]	N[2]	N[2]	-12 to -36
	Amphibians – northern leopard frog				
Minerva Spring Complex	Fish – Utah chub	N	Y	Y	No data
	Amphibians – northern leopard frog				
	Invertebrates – springsnails (Toquerville pyrg)				
North Millick Spring	Amphibians – northern leopard frog	N	N[2]	N[2]	-4 to -11
O'Neal/Frog Pond	Amphibians – northern leopard frog	N	N	Y	No data
Osborne Spring	Invertebrates – springsnails (Toquerville pyrg)	N	N	Y	No data
Shoshone Ponds[3]	Fish – Pahrump poolfish (FE)[1], relict dace	N	Y	Y	No data
	Amphibians – northern leopard frog				
South Millick Spring	Amphibians – northern leopard frog	N[2]	N[2]	N[2]	-10 to -24
Swallow Spring	Fish – Rainbow trout	N	Y	Y	No data
Unnamed spring #5	Amphibians – northern leopard frog	N	N	Y	No data
Unnamed spring near Cleve Creek	Amphibians – northern leopard frog	N	N	Y	No data
	Invertebrates – springsnails (Toquerville pyrg)				
Willow Creek	Invertebrates – springsnails (Toquerville pyrg)	N	N	Y	No data
Snake					
Big Springs	Fish – redside shiner, speckled dace, mottled sculpin, Utah chub	N	N[2]	N[2]	-2 to -78
	Invertebrates – springsnails (bifid duct pyrg, longitudinal gland pyrg)				

[1] FE = Federally Endangered; CH = critical habitat.

[2] Although spring is not located within the 10-foot groundwater drawdown contour, model-predicted flow reductions indicate potential pumping effects.

[3] Shoshone Ponds' water is provided by manmade artesian wells.

Table F3.7-23
Perennial Streams and Aquatic Species Potentially Affected by Alternative E Pumping

Table F3.7-23 Perennial Streams and Aquatic Species Potentially Affected by Alternative E Pumping

Basin/Stream	Total Stream Miles	Species	Stream Miles Potentially Affected		
			FB	75	200
Lake	**2.1**		**0.0**	**0.0**	**1.0**
Geyser Creek	2.1	Brook trout[1], rainbow trout	0.0	0.0	1.0
Snake	**25.4**		**0.0**	**0.0**	**0.9**
Big Wash	4.8	Bonneville cutthroat trout	0.0	0.0	0.8
Big Springs Creek[2]	9.0	Mottled sculpin, redside shiner, speckled dace, Utah chub, Utah sucker, springsnails	—[2]	—[2]	—[2]
Snake Creek	11.6	Bonneville cutthroat trout, mottled sculpin, redside shiner, speckled dace	0.0	0.0	0.1
Spring (#184)	**39.4**		**1.2**	**5.4**	**10.9**
Bastian Creek	2.5	Brown trout, rainbow trout	1.2	1.8	1.8
Indian Creek	3.1	Rainbow trout	0.0	0.0	0.2
Meadow Creek	5.4	Brown trout	0.0	1.0	1.6
Muncy Creek	7.3	Brook trout[1], brown trout, rainbow trout, trout hybrids	0.0	0.3	0.3
Odgers Creek	3.7	Rainbow trout	0.0	0.0	0.1
Pine Creek	0.8	Bonneville cutthroat trout	0.0	0.1	0.4
Ridge Creek	1.2	Bonneville cutthroat trout	0.0	0.6	1.1
Shingle Creek	3.7	Brown trout, rainbow trout, trout hybrids	0.0	1.2	2.1
Siegel Creek	6.7	Rainbow trout	0.0	0.0	2.0
Spring Valley Creek	1.4	Relict dace	0.0	0.0	<0.1
Willard Creek	1.6	Trout hybrids	0.0	0.0	0.9
Williams Canyon Creek	2.0	Rainbow trout, trout hybrids	0.0	0.4	0.4
Total Miles	**66.9**		**1.2**	**5.4**	**12.8**

[1] Brook trout present in stream, but occupied habitat is in headwaters, which would not be affected by pumping.

[2] Big Springs Creek and Lake Creek flow would be reduced because portions of the upstream water sources (i.e., Big Springs) are located within the 10-foot drawdown contour.

Table F3.7-24
Springs/Ponds/Lakes and Aquatic Species Potentially Affected by No Action Pumping

Table F3.7-24 Springs/Ponds/Lakes and Aquatic Species Potentially Affected by No Action Pumping

Basin/Waterbody	Species	Effect (Model Period)			Percent Flow Change
		FB	75	200	
Panaca					
Bennett Springs	Invertebrates – springsnails	N	Y	Y	No data
Clover					
North Spring	Invertebrates – springsnails (Toquerville pyrg)	N	N	Y	No data
White River					
Arnoldson Spring	Fish – Preston White River springfish, White River speckled dace	N	Y	Y	-4 to -8
	Invertebrates – springsnails (White River Valley pyrg, Hardy pyrg)				
Indian Ranch Spring	Fish – White River spinedace (FE)[1], Preston White River springfish, White River speckled dace, White River desert sucker	N	Y	Y	No data
	Invertebrates – springsnails				
Nicholas Spring	Fish – Preston White River springfish	N	Y	Y	-5 to -9
	Invertebrates – springsnails (White River Valley pyrg)				
Preston Big Spring	Fish – White River spinedace, Preston White River springfish, White River speckled dace	N	N	N[2]	-2 to -7
	Invertebrates – springsnails (White River Valley pyrg)				
Lake					
Brown Springs	Invertebrates – springsnails	Y	Y	Y	No data
Wambolt Spring	Amphibians – northern leopard frog	N	N	Y	No data
	Invertebrates – springsnails (Lake Valley pyrg)				
Snake					
Big Springs	Fish – redside shiner, mottled sculpin, speckled dace, Utah chub	N[2]	N[2]	N[2]	-9 to -16
	Invertebrates – springsnails (bifid duct pyrg, longitudinal gland pyrg)				

[1] FE = Federally Endangered.

[2] Although spring is not located within the 10-foot groundwater drawdown contour, model-predicted flow reductions indicate potential pumping effects.

Table F3.7-25
Perennial Streams and Aquatic Species Potentially Affected by No Action Pumping

Table F3.7-25 Perennial Streams and Aquatic Species Potentially Affected by No Action Pumping

Basin/Stream	Total Stream Miles	Species	Stream Miles Potentially Affected		
			FB	75	200
Spring (#184)	**3.2**		**0.0**	**0.0**	**0.4**
Ridge Creek	1.2	Fish – Bonneville cutthroat trout	0.0	0.0	0.1
Williams Canyon Creek	2.0	Rainbow trout, trout hybrids	0.0	0.0	0.3
Clover	**13.8**		**0.0**	**0.0**	**13.8**
Clover Creek	13.8	Rainbow trout, Meadow Valley Wash desert sucker, Meadow Valley Wash speckled dace	0.0	0.0	13.8
Panaca	**5.8**		**1.5**	**1.5**	**2.1**
Meadow Valley Wash	5.8	Rainbow trout, Meadow Valley Wash desert sucker, Meadow Valley Wash speckled dace	1.5	1.5	2.1
Lower Meadow Valley Wash	**47.6**		**3.8**	**5.0**	**5.5**
Meadow Valley Wash	47.6	Rainbow trout, Meadow Valley Wash desert sucker, Meadow Valley Wash speckled dace	3.8	5.0	5.5
Spring (#201)	**11.0**		**0.0**	**0.0**	**4.7**
Camp Valley Creek	11.0	Brown trout, rainbow trout	0.0	0.0	4.7
Muddy River Springs Area	**15.9**		**0.0**	**0.0**	**0.0**
Muddy River near Moapa	15.9	Fish – Moapa dace (FE)[1], Virgin River chub, Moapa speckled dace	N	–[2]	–[2]
Total Miles	97.3		5.3	6.5	26.5

[1] FE = Federally Endangered.

[2] Although this river segment is not located within the 10-foot groundwater drawdown contour, model predicted percent flow reductions of 4 to 9 indicate potential pumping effects.

Table F3.7-26
Springs/Ponds/Lakes and Aquatic Species Potentially Affected by Cumulative Pumping (with Proposed Action)

Table F3.7-26 Springs/Ponds/Lakes and Aquatic Species Potentially Affected by Cumulative Pumping (with Proposed Action)

Basin/Waterbody	Species	Effect (Model Period)			Percent Flow Change
		FB	75	200	
Panaca					
Bennett Springs	Invertebrates – springsnails	Y	Y	Y	No data
Clover					
North Spring	Invertebrates – springsnails (Toquerville pyrg)	Y	Y	Y	No data
White River					
Arnoldson Spring	Fish – Preston White River springfish, White River speckled dace	N	Y	Y	-4 to -9
	Invertebrates – springsnails				
Butterfield Springs	Fish –White River sculpin	N	N[2]	N[2]	-2 to -20
	Invertebrates – springsnails (Butterfield pyrg, Hardy pyrg)				
Flag Springs Complex	Fish – White River spinedace (FE) (CH)[1], White River desert sucker, White River speckled dace	N	N[2]	N[2]	-2 to -19
	Invertebrates – springsnails (Flag pyrg)				
Indian Ranch Spring	Fish – White River spinedace (FE), Preston White River springfish, White River speckled dace, White River desert sucker	N	Y	Y	No data
	Invertebrates – springsnails				
Nicolas Spring	Fish – Preston White River springfish	N	Y	Y	-5 to -9
	Invertebrates – springsnails (White River Valley pyrg)				
Preston Big Spring	Fish – White River spinedace (FE) (CH)[1], White River speckled dace	N	N	N[2]	-2 to -8
	Invertebrates – springsnails (White River Valley pyrg)				
Steptoe					
Flat Spring	Invertebrates – springsnails	N	Y	Y	No data
Spring (#184)					
Blind Spring	Amphibians – northern leopard frog	N	Y	Y	No data
Cleveland Ranch Springs	Amphibians – northern leopard frog	N	Y	Y	No data
Keegan Spring	Fish – relict dace	N[2]	Y	Y	-64 to -100
	Amphibians – northern leopard frog				
McCoy Creek Ranch Wet Meadows	Amphibians – northern leopard frog	N	N	Y	No data

Table F3.7-26 Springs/Ponds/Lakes and Aquatic Species Potentially Affected by Cumulative Pumping (with Proposed Action)

Basin/Waterbody	Species	Effect (Model Period)			Percent Flow Change
		FB	75	200	
Minerva Spring Complex	Fish – Utah chub	Y	Y	Y	No data
	Amphibians – northern leopard frog				
	Invertebrates – springsnails (Toquerville pyrg)				
North Millick Spring	Amphibians – northern leopard frog	N[2]	Y	Y	-32 to -76
O'Neal/Frog Pond	Amphibians – northern leopard frog	Y	Y	Y	No data
Osborne Spring	Invertebrates – springsnails (Toquerville pyrg)	N	Y	Y	No data
Shoshone Ponds[3]	Fish – Pahrump poolfish (FE)[1], relict dace	Y	Y	Y	No data
	Amphibians – northern leopard frog				
South Millick Spring	Amphibians – northern leopard frog	N	Y	Y	-55 to -100
Stonehouse Spring Complex	Fish – relict dace	N	N	Y	No data
	Invertebrates – springsnails (Toquerville pyrg)				
Swallow Spring	Fish – Rainbow trout	Y	Y	Y	No data
Unnamed spring #5	Amphibians – northern leopard frog	N	Y	Y	No data
	Invertebrates – springsnails (Toquerville pyrg)				
Unnamed spring near Cleve Creek	Invertebrates – springsnails (Toquerville pyrg)	N	Y	Y	No data
Willow Spring	Invertebrates – springsnails (Toquerville pyrg)	N	Y	Y	No data
Snake					
Big Springs	Fish – redside shiner, speckled dace, mottled sculpin, Utah chub	N[2]	Y	Y	-10 to -100
	Invertebrates – springsnails (bifid duct pyrg, longitudinal gland pyrg)				
Caine Spring	Invertebrates – springsnails	N	Y	Y	No data
Clay Spring	Invertebrates – springsnails (longitudinal gland pyrg)	N	Y	Y	No data
Kious Spring	Invertebrates – springsnails	N	Y	Y	No data
Outhouse Spring	Invertebrates – springsnails (Toquerville pyrg and glossy valvata)	N	Y	Y	No data
Pruess Lake	Fish – channel catfish, Sacramento perch, largemouth bass, brown trout	N	Y	Y	No data
	Invertebrates – California floater				
Rowland Spring	Fish – rainbow trout	N	N	Y	No data
Silver Creek Reservoir	Fish – brown trout, rainbow trout	N	Y	Y	No data
Spring Creek Spring	Water source for Spring Creek Rearing Station	N	Y	Y	No data

Table F3.7-26 Springs/Ponds/Lakes and Aquatic Species Potentially Affected by Cumulative Pumping (with Proposed Action)

Basin/Waterbody	Species	Effect (Model Period)			Percent Flow Change
		FB	75	200	
Stateline Springs	Fish – Utah chub, Utah sucker, redside shiner, speckled dace, mottled sculpin	N	Y	Y	No data
	Invertebrates – springsnails (longitudinal gland pyrg)				
Unnamed spring north of Big Springs	Invertebrates – springsnails (longitudinal gland pyrg)	N	Y	Y	No data
Unnamed northeast of Big Springs	Invertebrates – springsnails	N	Y	Y	No data
Unnamed spring southwest of Caine Spring	Invertebrates – springsnails (Toquerville pyrg)	N	Y	Y	No data
Dry					
Echo Canyon Reservoir	Fish – largemouth bass, rainbow trout, white crappie	N	N	Y	No data
Pahranagat					
Maynard Spring	Amphibians – northern leopard frog	N	Y	Y	No data
Lake					
Brown Springs	Invertebrates – springsnails	Y	Y	Y	No data
Wambolt Spring	Amphibians – northern leopard frog	N	N	Y	No data
	Invertebrates – springsnails (Lake Valley pyrg)				
Muddy Springs Area					
Cardy Lamb Springs	Fish – Moapa White River springfish	N	N	Y	No data
	Invertebrates – springsnails (Moapa pebblesnail, grated tryonia)				
Lower Moapa Valley					
Bowman Reservoir	Fish – bluegill, largemouth bass	N	N	Y	No data

[1] FE = Federally Endangered; CH = critical habitat.

[2] Although spring is not located within the 10-foot groundwater drawdown contour, model-predicted flow reductions indicate potential pumping effects.

[3] Shoshone Ponds' water is provided by manmade artesian wells.

Table F3.7-27
Perennial Streams and Aquatic Species Potentially Affected by Cumulative Pumping (with Proposed Action)

Table F3.7-27 Perennial Streams and Aquatic Species Potentially Affected by Cumulative Pumping (with Proposed Action)

Basin/Stream	Total Stream Miles	Species	Stream Miles Potentially Affected		
			FB	75	200
Clover	**Basin Total 13.8**		**13.8**	**13.8**	**13.8**
Clover Creek	13.8	Brook trout[1], rainbow trout, Meadow Valley Wash desert sucker, Meadow Valley Wash speckled dace	13.8	13.8	13.8
Spring #201	**Basin Total 11.0**		**0.0**	**0.0**	**4.9**
Camp Valley Creek	11.0	Brown trout, rainbow trout	0.0	0.0	4.9
Panaca	**Basin Total 5.8**		**1.5**	**1.5**	**2.8**
Meadow Valley Wash (including Condor Canyon)	5.8	Big Spring spinedace (FT) (CH)[2], Meadow Valley Wash desert sucker, Meadow Valley Wash speckled dace, rainbow trout	1.5	1.5	2.8
Dry	**Basin Total 3.1**		**0.0**	**0.0**	**0.1**
Meadow Valley Wash	3.1	Meadow Valley Wash desert sucker, Meadow Valley Wash speckled dace	0.0	0.0	0.1
Lower Meadow Valley Wash	**Basin Total 47.6**		**3.8**	**10.3**	**25.6**
Meadow Valley Wash	47.6	Rainbow trout, Meadow Valley Wash desert sucker, Meadow Valley Wash speckled dace	3.8	10.3	25.6
Pahranagat	**Basin Total 20.2**		**0.5**	**0.5**	**0.5**
Pahranagat Creek	20.2	Pahranagat speckled dace	0.5	0.5	0.5
Muddy River Springs Area	**6.2**		**0.0**	**0.1**	**0.9**
Muddy River	6.2	Moapa dace (FE)[2], Moapa speckled dace, Virgin River chub	0.0	0.1	0.9
Lower Moapa Valley	**Basin Total 15.8**		**2.1**	**4.0**	**6.0**
Muddy River	15.8	Moapa speckled dace	2.1	4.0	6.0
Lake Valley	**Basin Total 2.1**		**0.0**	**0.0**	**1.0**
Geyser Creek	2.1	Brook trout[1], rainbow trout	0.0	0.0	1.0
Snake Valley	**Basin Total 79.5**		**0.0**	**41.6**	**46.0**
Baker Creek	8.7	Brook trout[1], brown trout, rainbow trout, trout hybrids	0.0	1.5	2.2
Big Springs Creek	9.0	Mottled sculpin, redside shiner, speckled dace, Utah chub, Utah sucker, springsnails	0.0	9.0	9.0
Big Wash	4.8	Bonneville cutthroat trout	0.0	4.8	4.8
Hendry's Creek	8.4	Bonneville cutthroat trout	0.0	0.2	0.4

Table F3.7-27 Perennial Streams and Aquatic Species Potentially Affected by Cumulative Pumping (with Proposed Action) (Continued)

Basin/Stream	Total Stream Miles	Species	Stream Miles Potentially Affected		
			FB	75	200
Lake Creek	10.6	Mottled sculpin, redside shiner, speckled dace, Utah chub, Utah sucker	0.0	10.6	10.6
Lehman Creek	10.6	Brook trout[1], brown trout, rainbow trout, trout hybrids	0.0	4.0	4.6
Silver Creek	9.4	Brook trout[1], brown trout, rainbow trout, trout hybrids	0.0	3.5	5.6
Snake Creek	11.6	Bonneville cutthroat trout, brook trout, brown trout, rainbow trout	0.0	8.0	8.0
Strawberry Creek	6.4	Bonneville cutthroat trout, mottled sculpin, redside shiner, speckled dace	0.0	0.0	0.8
Spring (#184)	**Basin Total 81.4**		**7.1**	**19.9**	**25.3**
Bassett Creek	4.9	Rainbow trout	0.0	0.8	0.8
Bastian Creek	2.5	Brown trout, rainbow trout	1.2	1.8	2.3
Eightmile Creek	3.2	Rainbow trout	0.0	0.6	0.6
Indian Creek	3.1	Rainbow trout	0.0	0.7	0.7
McCoy Creek	6.9	Brown trout, rainbow trout, trout hybrids	0.0	2.3	3.3
Meadow Creek	5.4	Brown trout	1.0	2.1	2.1
Muncy Creek	7.3	Brook trout[1], brown trout, rainbow trout, trout hybrids	0.3	0.3	0.9
Negro Creek	11.5	Brown trout, rainbow trout	2.7	4.5	4.5
Odgers Creek	3.7	Rainbow trout	0.0	0.7	0.7
Piermont Creek	5.5	Brown trout	0.0	0.7	0.7
Pine Creek	0.8	Bonneville cutthroat trout	0.1	0.1	0.4
Ridge Creek	1.2	Bonneville cutthroat trout	0.6	0.6	1.1
Shingle Creek	3.7	Brown trout, rainbow trout, trout hybrids	1.2	1.2	2.1
Siegel Creek	6.7	Rainbow trout	0.0	2.0	2.0
South Taft Creek	3.3	Brook trout[1], rainbow trout	0.0	0.0	0.2
Spring Valley Creek	1.4	Relict dace	0.0	0.9	1.4
Taft Creek	3.4	Brook trout[1], rainbow trout	0.0	0.0	<0.1
Vipont Creek	3.3	Rainbow trout	0.0	0.2	0.2
Willard Creek	1.6	Trout hybrids	0.0	0.0	0.9
Williams Canyon Creek	2.0	Rainbow trout, trout hybrids	<0.1	0.4	0.4
Total Miles	**286.5**		**28.8**	**91.7**	**126.9**

[1] Brook trout present in stream, but occupied habitat is in headwaters areas, which would not be affected by pumping.

[2] FT = federally listed species; FE=federally endangered species; and (CH) = critical habitat.

Table F3.7-28
Springs/Ponds/Lakes and Aquatic Species Potentially Affected by Cumulative Pumping (with Alternative A)

Table F3.7-28 Springs/Ponds/Lakes and Aquatic Species Potentially Affected by Cumulative Pumping (with Alternative A)

Basin/Waterbody	Species	Effect (Model Period)			Percent Flow Change
		FB	75	200	
Panaca					
Bennett Springs	Invertebrates - springsnails	Y	Y	Y	No data
Clover					
North Spring	Invertebrates – springsnails (Toquerville pyrg)	Y	Y	Y	No data
White River					
Arnoldson Spring	Fish – Preston White River springfish, White River speckled dace Invertebrates – springsnails (White River Valley pyrg)	N	Y	Y	-4 to -9
Butterfield Springs	Fish –White River sculpin Invertebrates – springsnails (Butterfield pyrg, Hardy pyrg)	N	N[2]	N[2]	-1 to -11
Flag Springs Complex	Fish – White River spinedace (FE) (CH)[1], White River desert sucker, White River speckled dace Invertebrates – springsnails (Flag pyrg)	N	N[2]	N[2]	-1 to -11
Indian Ranch Spring	Fish – White River spinedace (FE), Preston White River springfish, White River speckled dace, White River desert sucker Invertebrates – springsnails	N	Y	Y	No data
Nicolas Spring	Fish – Preston White River springfish Invertebrates – springsnails (White River Valley pyrg)	N	Y	Y	-5 to -9
Preston Big Spring	Fish – White River spinedace (FE) (CH)[1], White River speckled dace Invertebrates – springsnails (White River Valley pyrg)	N	N	N[2]	-2 to -8
Steptoe					
Flat Spring	Invertebrates – springsnails	N	Y	Y	No data
Spring (#184)					
Blind Spring	Amphibians – northern leopard frog	N	Y	Y	No data
Keegan Spring	Fish – relict dace Amphibians – northern leopard frog	N[2]	N[2]	N[2]	-19 to -52
Minerva Spring Complex	Fish – Utah chub Amphibians – northern leopard frog Invertebrates – springsnails (Toquerville pyrg)	Y	Y	Y	No data

Table F3.7-28 Springs/Ponds/Lakes and Aquatic Species Potentially Affected by Cumulative Pumping (with Alternative A) (Continued)

Basin/Waterbody	Species	Effect (Model Period)			Percent Flow Change
		FB	75	200	
North Millick Spring	Amphibians – northern leopard frog	N	N[2]	N[2]	-4 to -11
O'Neal/Frog Pond	Amphibians – northern leopard frog	N	N	Y	No data
Osborne Spring	Invertebrates – springsnails (Toquerville pyrg)	N	Y	Y	No data
Shoshone Ponds[3]	Fish – Pahrump poolfish (FE)[1], relict dace Amphibians – northern leopard frog	Y	Y	Y	No data
South Millick Spring	Amphibians – northern leopard frog	N[2]	N[2]	N[2]	-11 to -26
Stonehouse Spring Complex	Fish – relict dace Invertebrates – springsnails (Toquerville pyrg)	N	N	Y	No data
Swallow Spring	Fish – Rainbow trout	Y	Y	Y	No data
Unnamed spring #5	Amphibians – northern leopard frog Invertebrates – springsnails (Toquerville pyrg)	N	N	Y	No data
Unnamed spring near Cleve Creek	Invertebrates – springsnails (Toquerville pyrg)	N	N	Y	No data
Willow Spring	Invertebrates – springsnails (Toquerville pyrg)	N	Y	Y	No data
Snake					
Big Springs	Fish – redside shiner, mottled sculpin Invertebrates – springsnails (bifid duct pyrg, longitudinal gland pyrg)	N[2]	Y	Y	-10 to -100
Caine Spring	Invertebrates – springsnails (Toquerville pyrg)	N	Y	Y	No data
Clay Spring	Invertebrates – springsnails (longitudinal gland pyrg)	N	Y	Y	No data
Kious Spring	Invertebrates – springsnails	N	Y	Y	No data
Outhouse Spring	Invertebrates – springsnails (Toquerville pyrg and glossy valvata)	N	Y	Y	No data
Pruess Lake	Fish – channel catfish, Sacramento perch, largemouth bass, brown trout Invertebrates – California floater	N	Y	Y	No data
Rowland Spring	Fish – rainbow trout	N	N	Y	No data
Silver Creek Reservoir	Fish – brown trout, rainbow trout	N	Y	Y	No data
Spring Creek Spring	Water Sources for Spring Creek Rearing Station	N	Y	Y	No data

Table F3.7-28 Springs/Ponds/Lakes and Aquatic Species Potentially Affected by Cumulative Pumping (with Alternative A) (Continued)

Basin/Waterbody	Species	Effect (Model Period)			Percent Flow Change
		FB	75	200	
Stateline Springs	Fish – Utah chub, Utah sucker, redside shiner, speckled dace, mottled sculpin Invertebrates – springsnails (longitudinal gland pyrg)	N	Y	Y	No data
Unnamed spring north of Big Springs	Invertebrates – spsringsnails (longitudinal gland pyrg)	N	Y	Y	No data
Unnamed northeast of Big Springs	Invertebrates – springsnails	N	Y	Y	No data
Unnamed spring southwest of Caine Spring	Invertebrates – springsnails (Toquerville pyrg)	N	Y	Y	No data
Dry					
Echo Canyon Reservoir	Fish – largemouth bass, rainbow trout, white crappie	N	N	Y	No data
Pahranagat					
Maynard Spring	Amphibians – northern leopard frog	N	N	Y	No data
Lake					
Brown Springs	Invertebrates – springsnails	Y	Y	Y	No data
Wambolt Spring	Amphibians – northern leopard frog Invertebrates – spsringsnails (Lake Valley pyrg)	N	N	Y	No data
Muddy Springs Area					
Cardy Lamb Springs	Fish – Moapa White River springfish Invertebrates – springsnails (Moapa pebblesnail, grated tryonia)	N	N	Y	No data

[1] FE = Federally Endangered; CH = critical habitat.

[2] Although spring is not located within the 10-foot groundwater drawdown contour, model-predicted flow reductions indicate potential pumping effects.

[3] Shoshone Ponds' water is provided by manmade artesian wells.

Table F3.7-29
Perennial Streams and Aquatic Species Potentially Affected by Cumulative Pumping (with Alternative A)

Table F3.7-29 Perennial Streams and Aquatic Species Potentially Affected by Cumulative Pumping (with Alternative A)

Basin/Stream	Total Stream Miles	Species	Stream Miles Potentially Affected		
			FB	75	200
Clover	**Basin Total 13.8**		**13.8**	**13.8**	**13.8**
Clover Creek	13.8	Brook trout[1], rainbow trout, Meadow Valley Wash desert sucker, Meadow Valley Wash speckled dace	13.8	13.8	13.8
Spring (#201)	**Basin Total 11.0**		**0.0**	**0.0**	**4.9**
Camp Valley Creek	11.0	Brown trout, rainbow trout	0.0	0.0	4.9
Panaca	**Basin Total 5.8**		**1.5**	**1.5**	**2.4**
Meadow Vally Wash	5.8	Big Spring spinedace (FT) (CH)[2], Meadow Valley Wash desert sucker, Meadow Valley Wash speckled dace, rainbow trout	1.5	1.5	2.4
Dry	**Basin Total 3.1**		**0.0**	**0.0**	**0.1**
Meadow Valley Wash	3.1	Big Spring spinedace (FT) (CH)[2,] Meadow Valley Wash desert sucker, Meadow Valley Wash speckled dace	0.0	0.0	0.1
Lower Meadow Valley Wash	**Basin Total 47.6**		**3.8**	**8.8**	**22.2**
Meadow Valley Wash	47.6	Rainbow trout, Meadow Valley Wash desert sucker, Meadow Valley Wash speckled dace	3.8	8.8	22.2
Pahranagat	**Basin Total 20.2**		**0.5**	**0.5**	**0.5**
Pahranagat Creek	20.2	Pahranagat speckled dace	0.5	0.5	0.5
Muddy River Springs Area	**Basin Total 6.2**		**0.0**	**0.1**	**0.9**
Muddy River	6.2	Moapa dace (FE)[2], Moapa speckled dace, Virgin River chub	0.0	0.1	0.9
Lower Moapa Valley	**Basin Total 15.8**		**2.1**	**4.0**	**6.0**
Muddy River	15.8	Moapa speckled dace	2.1	4.0	6.0
Lake Valley	**Basin Total 2.1**		**0.0**	**0.0**	**1.0**
Geyser Creek	2.1	Brook trout[1], rainbow trout	0.0	0.0	1.0
Snake Valley	**Basin Total 79.5**		**0.0**	**40.4**	**45.4**
Baker Creek	8.7	Brook trout[1], brown trout, rainbow trout, trout hybrids	0.0	1.5	1.8
Big Springs Creek	9.0	Mottled sculpin, redside shiner, speckled dace, Utah chub, Utah sucker, springsnails	0.0	9.0	9.0
Big Wash	4.8	Bonneville cutthroat trout	0.0	4.8	4.8

Table F3.7-29 Perennial Streams and Aquatic Species Potentially Affected by Cumulative Pumping (with Alternative A) (Continued)

Basin/Stream	Total Stream Miles	Species	Stream Miles Potentially Affected		
			FB	75	200
Hendry's Creek	8.4	Bonneville cutthroat trout	0.0	0.0	0.2
Lake Creek	10.6	Mottled sculpin, redside shiner, speckled dace, Utah chub, Utah sucker	0.0	10.6	10.6
Lehman Creek	10.6	Brook trout[1], brown trout, rainbow trout, trout hybrids	0.0	4.0	4.6
Silver Creek	9.4	Brook trout, brown trout, rainbow trout, trout hybrids	0.0	2.5	5.6
Snake Creek	11.6	Bonneville cutthroat trout, brook trout, brown trout, rainbow trout, mottled sculpin, redside shiner, speckled dace	0.0	8.0	8.0
Strawberry Creek	6.4	Bonneville cutthroat trout, mottled sculpin, redside shiner, speckled dace	0.0	0.0	0.8
Spring (#184)	**Basin Total 41.2**		**4.2**	**8.1**	**12.8**
Bastian Creek	2.5	Brown trout, rainbow trout	1.2	1.8	1.8
Indian Creek	3.1	Rainbow trout	0.0	0.0	0.2
Meadow Creek	5.4	Brown trout	1.0	1.6	2.1
Muncy Creek	7.3	Brook trout[1], brown trout, rainbow trout, trout hybrids	0.0	0.3	0.3
Piermont Creek	5.5	Brown trout	0.0	0.1	0.1
Pine Creek	0.8	Bonneville cutthroat trout	0.1	0.1	0.4
Ridge Creek	1.2	Bonneville cutthroat trout	0.6	0.6	1.1
Shingle Creek	3.7	Brown trout, rainbow trout, trout hybrids	1.2	1.2	2.1
Siegel Creek	6.7	Rainbow trout	0.0	2.0	2.0
Spring Valley Creek	1.4	Relict dace	0.0	<0.1	1.4
Willard Creek	1.6	Trout hybrids	0.0	0.0	0.9
Williams Canyon Creek	2.0	Rainbow trout, trout hybrids	0.1	0.4	0.4
Total Miles	**226.1**		**25.4**	**76.7**	**109.5**

[1] Brook trout present in stream, but occupied habitat is in headwater areas, which would not be affected by pumping.

[2] FE = federally listed species; FT = federally threatened; and CH=critical habitat.

Table F3.7-30
Springs/Ponds/Lakes and Aquatic Species Potentially Affected by Cumulative Pumping
(with Alternative B)

Table F3.7-30 Springs/Ponds/Lakes and Aquatic Species Potentially Affected by Cumulative Pumping (with Alternative B)

Basin/Waterbody	Species	Effect (Model Period)			Percent Flow Change
		FB	75	200	
Panaca					
Bennett Springs	Invertebrates - springsnails	Y	Y	Y	No data
Clover					
North Spring	Invertebrates – springsnails (Toquerville pyrg)	Y	Y	Y	No data
White River					
Arnoldson Spring	Fish – Preston White River springfish, White River speckled dace Invertebrates – springsnails (White River Valley pyrg)	N	Y	Y	-5 to -10
Butterfield Springs	Fish –White River sculpin Invertebrates – springsnails (Butterfield pyrg, Hardy pyrg)	N[2]	N[2]	N[2]	-21 to -46
Flag Springs Complex	Fish – White River spinedace (FE) (CH)[1], White River desert sucker, White River speckled dace Invertebrates – springsnails (Flag pyrg)	N[2]	N[2]	N[2]	-19 to -39
Indian Ranch Spring	Fish – White River spinedace (FE), Preston White River springfish, White River speckled dace, White River desert sucker Invertebrates – springsnails	N	Y	Y	No data
Nicolas Spring	Fish – Preston White River springfish Invertebrates – springsnails (White River Valley pyrg)	N	Y	Y	-5 to -10
Preston Big Spring	Fish – White River spinedace (FE) (CH)[1], White River speckled dace Invertebrates – springsnails (White River Valley pyrg)	N	N[2]	N[2]	-3 to -9
Steptoe					
Flat Spring	Invertebrates – springsnails	N	Y	Y	No data

Table F3.7-30 Springs/Ponds/Lakes and Aquatic Species Potentially Affected by Cumulative Pumping (with Alternative B) (Continued)

Basin/Waterbody	Species	Effect (Model Period)			Percent Flow Change
		FB	75	200	
Spring (#184)					
Blind Spring	Amphibians – northern leopard frog	N	Y	Y	No data
Cleveland Ranch Springs	Amphibians – northern leopard frog	N	Y	Y	No data
Keegan Spring	Fish – relict dace Amphibians – northern leopard frog	N[2]	N[2]	N[2]	-7 to -15
Minerva Spring Complex	Fish – Utah chub Amphibians – northern leopard frog Invertebrates – springsnails (Toquerville pyrg)	Y	Y	Y	No data
North Millick Spring	Amphibians – northern leopard frog	N	N[2]	N[2]	-3 to -42
Shoshone Ponds[3]	Fish – Pahrump poolfish (FE)[1], relict dace Amphibians – northern leopard frog	Y	Y	Y	No data
South Millick Spring	Amphibians – northern leopard frog	N	N[2]	Y	-8 to -99
Swallow Spring	Fish – rainbow trout	Y	Y	Y	No data
Unnamed spring #5	Amphibians – northern leopard frog Invertebrates – springsnails (Toquerville pyrg)	Y	Y	Y	No data
Unnamed spring near Cleve Creek	Invertebrates – springsnails (Toquerville pyrg)	Y	Y	Y	No data
West Valley Spring Complex 1	Amphibians – northern leopard frog Invertebrates – springsnails (Toquerville pyrg)	N	N	Y	No data
Unnamed Baker Creek Spring (BAKE_QAUAINV_061)	Invertebrates-springsnails	N	Y	Y	No data
West Valley Spring Complex 5	Amphibians – northern leopard frog	N	N	Y	No data
Snake					
Big Springs	Fish – redside shiner, mottled sculpin Invertebrates – springsnails (bifid duct pyrg, longitudinal gland pyrg)	N[2]	Y	Y	-15 to -100

Table F3.7-30 Springs/Ponds/Lakes and Aquatic Species Potentially Affected by Cumulative Pumping (with Alternative B) (Continued)

Basin/Waterbody	Species	Effect (Model Period)			Percent Flow Change
		FB	75	200	
Caine Spring	Invertebrates – springsnails (Toquerville pyrg)	N	N	Y	No data
Clay Spring	Invertebrates – springsnails (longitudinal gland pyrg)	N	Y	Y	No data
Kious Spring	Invertebrates – springsnails	N	Y	Y	No data
Outhouse Spring	Invertebrates – springsnails (Toquerville pyrg and glossy valvata)	N	Y	Y	No data
Pruess Lake	Fish – channel catfish, Sacramento perch, largemouth bass, brown trout Invertebrates – California floater	N	Y	Y	No data
Rowland Spring	Fish – rainbow trout	N	Y	Y	No data
Sacramento Pass Pond	Fish – rainbow trout	N	N	Y	No data
Silver Creek Reservoir	Fish – brown trout, rainbow trout	N	Y	Y	No data
Spring Creek Spring	Water source for Spring Creek Rearing Station	N	Y	Y	No data
Stateline Springs	Fish – Utah chub, Utah sucker, redside shiner, speckled dace, mottled sculpin Invertebrates – springsnails (longitudinal gland pyrg)	N	Y	Y	No data
Willow Patch Spring	Invertebrates – springsnails	N	N	Y	No data
Unnamed spring north of Big Springs	Invertebrates – springsnails (longitudinal gland pyrg)	N	Y	Y	No data
Unnamed northeast of Big Springs	Invertebrates – springsnails	N	Y	Y	No data
Unnamed spring southwest of Caine Spring	Invertebrates – springsnails (Toquerville pyrg)	N	Y	Y	No data
Dry					
Echo Canyon Reservoir	Fish – largemouth bass, rainbow trout, white crappie	N	N	Y	No data
Pahranagat					
Maynard Spring	Amphibians – northern leopard frog	N	Y	Y	No data
Lake					
Brown Springs	Invertebrates – springsnails	Y	Y	Y	No data
Wambolt Spring	Amphibians – northern leopard frog Invertebrates – springsnails (Lake Valley pyrg)	N	Y	Y	No data

Table F3.7-30 Springs/Ponds/Lakes and Aquatic Species Potentially Affected by Cumulative Pumping (with Alternative B) (Continued)

Basin/Waterbody	Species	Effect (Model Period)			Percent Flow Change
		FB	75	200	
Muddy Springs Area					
Cardy Lamb Springs	Fish – Moapa White River springfish Invertebrates – springsnails (Moapa pebblesnail, grated tryonia)	N	N	Y	No data
Lower Moapa Valley					
Bowman Reservoir	Fish – bluegill, largemouth bass	N	N	Y	No data

[1] FE = Federally Endangered; CH = critical habitat.

[2] Although spring is not located within the 10-foot groundwater drawdown contour, model-predicted flow reductions indicate potential pumping effects.

[3] Shoshone Ponds' water is provided by manmade artesian wells.

Table F3.7-31
Perennial Streams and Aquatic Species Potentially Affected by Cumulative Pumping
(with Alternative B)

Table F3.7-31 Perennial Streams and Aquatic Species Potentially Affected by Cumulative Pumping (with Alternative B)

Basin/Stream	Total Stream Miles	Species	Stream Miles Potentially Affected		
			FB	75	200
Clover	**Basin Total 13.8**		**13.8**	**13.8**	**13.8**
Clover Creek	13.8	Brook trout[1], rainbow trout, Meadow Valley Wash desert sucker, Meadow Valley Wash speckled dace	13.8	13.8	13.8
Spring (#201)	**11.0**		**0.0**	**0.0**	**4.9**
Camp Valley Creek	11.0	Brown trout, rainbow trout	0.0	0.0	4.9
Panaca	**Basin Total 5.8**		**1.5**	**1.5**	**2.8**
Meadow Valley Wash	5.8	Big Spring spinedace (FT) (CH)[2], Meadow Valley Wash desert sucker, Meadow Valley Wash speckled dace, rainbow trout	1.5	1.5	2.8
Dry	**Basin Total 3.1**		**0.0**	**0.0**	**0.1**
Meadow Valley Wash	3.1	Big Spring spinedace (FT) (CH)[2], Meadow Valley Wash desert sucker, Meadow Valley Wash speckled dace	0.0	0.0	0.1
Lower Meadow Valley Wash	**Basin Total 47.6**		**3.8**	**10.3**	**25.6**
Meadow Valley Wash	47.6	Rainbow trout, Meadow Valley Wash desert sucker, Meadow Valley Wash speckled dace	3.8	10.3	25.6
Pahranagat	**Basin Total 20.2**		**0.5**	**0.5**	**0.5**
Pahranagat Creek	20.2	Pahranagat speckled dace	0.5	0.5	0.5
Muddy River Springs Area	**Basin Total 6.2**		**0.0**	**0.1**	**0.9**
Muddy River	6.2	Moapa dace (FE)[2], Moapa speckled dace, Virgin River chub	0.0	0.1	0.9
Lower Moapa Valley	**Basin Total 15.8**		**2.1**	**4.0**	**6.0**
Muddy River	15.8	Moapa speckled dace	2.1	4.0	6.0
Lake Valley	**Basin Total 2.1**		**0.0**	**1.0**	**1.0**
Geyser Creek	2.1	Brook trout[1], rainbow trout	0.0	1.0	1.0
Steptoe	**Basin Total 13.1**		**0.0**	**0.0**	**3.4**
Steptoe Creek	13.1	Brook trout[1], brown trout, rainbow trout	0.0	0.0	3.4
Snake Valley	**Basin Total 71.1**		**0.0**	**48.4**	**50.4**
Baker Creek	8.7	Brook trout[1], brown trout, rainbow trout, trout hybrids	0.0	3.5	3.5

Table F3.7-31 Perennial Streams and Aquatic Species Potentially Affected by Cumulative Pumping (with Alternative B) (Continued)

Basin/Stream	Total Stream Miles	Species	Stream Miles Potentially Affected		
			FB	75	200
Big Springs Creek	9.0	Mottled sculpin, redside shiner, speckled dace, Utah chub, Utah sucker, springsnails	0.0	9.0	9.0
Big Wash	4.8	Bonneville cutthroat trout	0.0	4.8	4.8
Lake Creek	10.6	Mottled sculpin, redside shiner, speckled dace, Utah chub, Utah sucker	0.0	10.6	10.6
Lehman Creek	10.6	Brook trout[2], brown trout, rainbow trout, trout hybrids	0.0	6.1	6.4
Silver Creek	9.4	Brook trout, brown trout, rainbow trout, trout hybrids, mottled sculpin	0.0	4.9	6.2
Snake Creek	11.6	Bonneville cutthroat trout, brook trout, brown trout, rainbow trout, redside shiner, speckled dace	0.0	8.0	8.0
Strawberry Creek	6.4	Bonneville cutthroat trout, mottled sculpin, redside shiner, speckled dace	0.0	1.5	1.9
Spring (#184)	**Basin Total 46.1**		**3.9**	**8.9**	**13.1**
Bastian Creek	2.5	Brown trout, rainbow trout	1.2	2.3	2.3
Indian Creek	3.1	Rainbow trout	0.7	0.7	0.7
Muncy Creek	7.3	Brook trout[1], brown trout, rainbow trout, trout hybrids	0.0	0.0	0.3
Negro Creek	11.5	Brown trout, rainbow trout	0	3.4	4.5
Pine Creek	0.8	Bonneville cuttthroat trout	0.1	0.1	0.4
Ridge Creek	1.2	Bonneville cutthroat trout	0.6	0.6	1.1
Shingle Creek	3.7	Brown trout, rainbow trout, trout hybrids	1.2	1.2	2.1
South Taft Creek	3.3	Brook trout, rainbow trout	0	0	0.2
Taft Creek	3.4	Brook trout, rainbow trout	0	0	<0.1
Vipont Creek	3.3	Rainbow trout	0	0.2	0.2
Willard Creek	4.0	Trout hybrids	0.0	0.0	0.9
Williams Canyon Creek	2.0	Rainbow trout, trout hybrids	0.1	0.4	0.4
Total Miles	**255.9**		**25.6**	**88.5**	**122.5**

[1] Brook trout present in stream, but occupied habitat is in upland reach, which would not be affected by pumping.

[2] FT = federally listed species; FE= federally endangered species; and (CH) = critical habitat.

Table F3.7-32
Springs/Ponds/Lakes and Aquatic Species Potentially Affected by Cumulative Pumping (with Alternative C)

Table F3.7-32 Springs/Ponds/Lakes and Aquatic Species Potentially Affected by Cumulative Pumping (with Alternative C)

Basin/Waterbody	Species	Effect (Model Period)			Percent Flow Change
		FB	75	200	
Panaca					
Bennett Springs	Invertebrates - springsnails	Y	Y	Y	No data
Clover					
North Spring	Invertebrates – springsnails (Toquerville pyrg)	Y	Y	Y	No data
White River					
Arnoldson Spring	Fish – Preston White River springfish, White River speckled dace Invertebrates – springsnails (White River Valley pyrg)	N	Y	Y	-4 to -9
Butterfield Springs	Fish –White River sculpin Invertebrates – springsnails (Butterfield pyrg, Hardy pyrg)	N	N	N[2]	-1 to -8
Flag Spring Complex	Fish – White River spinedace (FE) (CH)[1], White River desert sucker, White River speckled dace Invertebrates – springsnails (Flag pyrg)	N	N	N[2]	-1 to -8
Indian Ranch Spring	Fish – White River spinedace (FE), Preston White River springfish, White River speckled dace, White River desert sucker	N	Y	Y	No data
Nicolas Spring	Fish – Preston White River springfish Invertebrates – springsnails (White River Valley pyrg)	N	Y	Y	-5 to -9
Preston Big Spring	Fish – White River spinedace (FE) (CH)[1], White River speckled dace Invertebrates – springsnails (White River Valley pyrg)	N	N	N[2]	-2 to -9
Steptoe					
Flat Spring	Invertebrates – springsnails	N	Y	Y	No data
Spring (#184)					
Blind Spring	Amphibians – northern leopard frog	N	N	Y	No data
Keegan Spring	Fish – relict dace Amphibians – northern leopard frog	N[2]	N[2]	N[2]	-19 to -27

Table F3.7-32 Springs/Ponds/Lakes and Aquatic Species Potentially Affected by Cumulative Pumping (with Alternative C) (Continued)

Basin/Waterbody	Species	Effect (Model Period)			Percent Flow Change
		FB	75	200	
Minerva Spring Complex	Fish – Utah chub Amphibians – northern leopard frog Invertebrates – springsnails (Toquerville pyrg)	Y	Y	Y	No data
North Millick Spring	Amphibians – northern leopard frog	N	N	N[2]	-4 to -6
Osborne Spring	Invertebrates – springsnails (Toquerville pyrg)	N	N	Y	No data
Shoshone Ponds[3]	Fish – Pahrump poolfish (FE)[1], relict dace Amphibians – northern leopard frog	Y	Y	Y	No data
South Millick Spring	Amphibians – northern leopard frog	N[2]	N[2]	N[2]	-11 to -13
Swallow Spring	Fish – Rainbow trout	Y	Y	Y	No data
Willow Spring	Invertebrates – springsnails (Toquerville pyrg)	N	N	Y	No data
Snake					
Big Springs	Fish – redside shiner, mottled sculpin Invertebrates – springsnails (bifid duct pyrg, longitudinal gland pyrg)	N[2]	N[2]	N[2]	-10 to -100
Caine Spring	Invertebrates – springsnails (Toquerville pyrg)	N	Y	Y	No data
Clay Spring	Invertebrates – springsnails (longitudinal gland pyrg)	N	Y	Y	No data
Kious Spring	Invertebrates – springsnails	N	Y	Y	No data
Outhouse Spring	Invertebrates – springsnails (Toquerville pyrg and glossy valvata)	N	Y	Y	No data
Pruess Lake	Fish – channel catfish, Sacramento perch, largemouth bass, brown trout Invertebrates – California floater	N	Y	Y	No data
Rowland Spring	Fish – rainbow trout	N	N	Y	No data
Silver Creek Reservoir	Fish – brown trout, rainbow trout	N	Y	Y	No data
Spring Creek Spring	Water source for Spring Creek Rearing Station	N	Y	Y	No data

Table F3.7-32 Springs/Ponds/Lakes and Aquatic Species Potentially Affected by Cumulative Pumping (with Alternative C) (Continued)

Basin/Waterbody	Species	Effect (Model Period)			Percent Flow Change
		FB	75	200	
Stateline Springs	Fish – Utah chub, Utah sucker, redside shiner, speckled dace, mottled sculpin Invertebrates – springsnails (longitudinal gland pyrg)	N	Y	Y	No data
Unnamed spring north of Big Springs	Invertebrates – springsnails (longitudinal gland pyrg)	N	Y	Y	No data
Unnamed northeast of Big Springs	Invertebrates – springsnails	N	Y	Y	No data
Unnamed spring southwest of Caine Spring	Invertebrates – springsnails (Toquerville pyrg)	N	Y	Y	No data
Dry					
Echo Canyon Reservoir	Fish – largemouth bass, rainbow trout, white crappie	N	N	Y	No data
Pahranagat					
Maynard Spring	Amphibians – northern leopard frog	N	N	Y	No data
Lake					
Brown Springs	Invertebrates – springsnails	Y	Y	Y	No data
Wambolt Spring	Amphibians – northern leopard frog Invertebrates – springsnails (Lake Valley pyrg)	N	N	Y	No data
Muddy Springs Area					
Cardy Lamb Springs	Fish – Moapa White River springfish Invertebrates – springsnails (Moapa pebblesnail, grated tryonia)	N	N	Y	No data

[1] FE = Federally Endangered; CH = critical habitat.

[2] Although spring is not located within the 10-foot groundwater drawdown contour, model-predicted flow reductions indicate potential pumping effects.

[3] Shoshone Ponds' water is provided by manmade artesian wells.

Table F3.7-33
Perennial Streams and Aquatic Species Potentially Affected by Cumulative Pumping (with Alternative C)

Table F3.7-33 Perennial Streams and Aquatic Species Potentially Affected by Cumulative Pumping (with Alternative C)

Basin/Stream	Total Stream Miles	Species	Stream Miles Potentially Affected		
			FB	75	200
Clover	**Basin Total 13.8**		**13.8**	**13.8**	**13.8**
Clover Creek	13.8	Brook trout[1], rainbow trout, Meadow Valley Wash desert sucker, Meadow Valley Wash speckled dace	13.8	13.8	13.8
Spring (#201)	**Basin Total 11.0**		**0.0**	**0.0**	**4.9**
Camp Valley Creek	11.0	Brown trout, rainbow trout	0.0	0.0	4.9
Panaca	**Basin Total 5.8**		**1.5**	**1.5**	**2.4**
Meadow Valley Wash	5.8	Big Spring spinedace (FT) (CH)[2], Meadow Valley Wash desert sucker, meadow valley wash speckeled dace, rainbow trout	1.5	1.5	2.4
Dry	**Basin Total 3.1**		**0.0**	**0.0**	**0.1**
Meadow Valley Wash	3.1	Big Spring spinedace (FT) (CH)[2], Meadow Valley Wash desert sucker, Meadow Valley Wash speckled dace	0.0	0.0	0.1
Lower Meadow Valley Wash	**Basin Total 47.6**		**3.8**	**8.8**	**22.2**
Meadow Valley Wash	47.6	Rainbow trout, Meadow Valley Wash desert sucker, Meadow Valley Wash speckled dace	3.8	8.8	22.2
Pahranagat	**Basin Total 20.2**		**0.5**	**0.5**	**0.5**
Pahranagat Creek	20.2	Pahranagat sprckled dace	0.5	0.5	0.5
Muddy River Springs Area	**Basin Total 6.2**		**0.0**	**0.1**	**0.9**
Muddy River	6.2	Moapa dace (FE)[2], Moapa speckled dace, Virgin River chub	0.0	0.1	0.9
Lower Moapa Valley	**Basin Total 15.8**		**2.1**	**4.0**	**6.0**
Muddy River	15.8	Moapa speckled dace	2.1	4.0	6.0
Lake Valley	**2.1**		**0.0**	**0.0**	**1.0**
Geyser Creek	2.1	Brook trout[1], rainbow trout	0.0	0.0	1.0
Snake Valley	**Basin Total 64.9**		**0.0**	**34.6**	**41.0**
Baker Creek	8.7	Brook trout[1], brown trout, rainbow trout, trout hybrids	0.0	1.5	1.8
Big Springs Creek	9.0	Mottled sculpin, redside shiner, speckled dace, Utah chub, Utah sucker, springsnails	0.0	6.0	6.6

Table F3.7-33 Perennial Streams and Aquatic Species Potentially Affected by Cumulative Pumping (with Alternative C) (Continued)

Basin/Stream	Total Stream Miles	Species	Stream Miles Potentially Affected		
			FB	75	200
Big Wash	4.8	Bonneville cutthroat trout	0.0	4.6	4.8
Lake Creek	10.6	Mottled sculpin, redside shiner, speckled dace, Utah chub, Utah sucker	0.0	10.6	10.6
Lehman Creek	10.8	Brook trout[1], brown trout, rainbow trout, trout hybrids	0.0	4.0	4.6
Silver Creek	9.4	Brook trout, brown trout, rainbow trout, trout hybrids, mottled sculpin	0.0	<0.1	4.6
Snake Creek	11.6	Bonneville cutthroat trout, brook trout, brown trout, rainbow trout, redside shiner, speckled dace	0.0	7.9	8.0
Spring (#184)	**Basin Total 15.0**		**4.2**	**4.8**	**9.5**
Bastian Creek	2.5	Brown trout, rainbow trout	1.2	1.2	1.8
Meadow Creek	5.4	Brown trout	1.0	1.0	2.1
Muncy Creek	7.3	Brook trout[1], brown trout, rainbow trout, trout hybrids	0.0	0.3	0.3
Piermont Creek	5.5	Brown trout	0.0	0.0	0.1
Pine Creek	0.8	Bonneville cutthroat trout	0.1	0.1	0.1
Ridge Creek	1.2	Bonneville cutthroat trout	0.6	0.6	0.6
Shingle Creek	3.7	Brown trout, rainbow trout, trout hybrids	1.2	1.2	1.2
Siegel Creek	6.7	Rainbow trout	0.0	0.0	2.0
Spring Valley Creek	1.4	Relict dace	0.0	0.0	0.9
Williams Canyon Creek	2.0	Rainbow trout, trout hybrids	0.1	0.4	0.4
Total Miles	**185.3**		**25.4**	**67.6**	**101.8**

[1] Brook trout present in stream, but occupied habitat is in upland reach, which would not be affected by pumping.

[2] FE = federally endangered species; FT= federally threatened species; and CH= critical habitat.

Table F3.7-34
Springs/Ponds/Lakes and Aquatic Species Potentially Affected by Cumulative Pumping (with Alternative D)

Table F3.7-34 Springs/Ponds/Lakes and Aquatic Species Potentially Affected by Cumulative Pumping (with Alternative D)

Basin/Waterbody	Species	Effect (Model Period)			Percent Flow Change
		FB	75	200	
Panaca					
Bennett Springs	Invertebrates - springsnails	Y	Y	Y	No data
Clover					
North Spring	Invertebrates – springsnails (Toquerville pyrg)	Y	Y	Y	No data
White River					
Arnoldson Spring	Fish – Preston White River springfish, White River speckled dace Invertebrates – springsnails (White River Valley pyrg)	N	Y	Y	-4 to -9
Butterfield Springs	Fish –White River sculpin Invertebrates – springsnails (Butterfield pyrg, Hardy pyrg)	N	N	N[2]	-1 to -12
Flag Spring Complex	Fish – White River spinedace (FE) (CH)[1], White River desert sucker, White River speckled dace Invertebrates – springsnails (Flag pyrg)	N	N	N[2]	-1 to -11
Indian Ranch Spring	Fish – White River spinedace (FE), Preston White River springfish, White River speckled dace, White River desert sucker	N	Y	Y	No data
Nicolas Spring	Fish – Preston White River springfish Invertebrates – springsnails (White River Valley pyrg)	N	Y	Y	-5 to -9
Preston Big Spring	Fish – White River spinedace (FE) (CH)[1], White River speckled dace Invertebrates – springsnails (White River Valley pyrg)	N	N	N[2]	-2 to -7
Steptoe					
Flat Spring	Invertebrates – springsnails	N	Y	Y	No data
Spring (#184)					
Blind Spring	Amphibians – northern leopard frog	N	Y	Y	No data
Keegan Spring	Fish – relict dace Amphibians – northern leopard frog	N[2]	N[2]	N[2]	-6 to -10
Minerva Spring Complex	Fish – Utah chub Amphibians – northern leopard frog Invertebrates – springsnails (Toquerville pyrg)	N	Y	Y	No data

Table F3.7-34 Springs/Ponds/Lakes and Aquatic Species Potentially Affected by Cumulative Pumping (with Alternative D) (Continued)

Basin/Waterbody	Species	Effect (Model Period)			Percent Flow Change
		FB	75	200	
Shoshone Ponds[3]	Fish – Pahrump poolfish (FE)[1], relict dace Amphibians – northern leopard frog	N	Y	Y	No data
Swallow Spring	Fish – rainbow trout	N	Y	Y	No data
Snake					
Big Springs	Fish – redside shiner, mottled sculpin, speckled dace, Utah chub Invertebrates – springsnails (bifid duct pyrg, longitudinal gland pyrg)	N[2]	Y	Y	-26 to -100
Kious Spring	Invertebrates – springsnails	N	N	Y	No data
Outhouse Spring	Invertebrates – springsnails (Toquerville pyrg and glossy valvata)	N	N	Y	No data
Pruess Lake	Fish – channel catfish, Sacramento perch, largemouth bass, brown trout Invertebrates – California floater	N	N[4]	N[4]	No data
Spring Creek Spring	Water source for the Spring Creek Rearing Station	N	N	Y	No data
Stateline Springs	Fish – Utah chub, Utah sucker, redside shiner, speckled dace, mottled sculpin Invertebrates – springsnails (longitudinal gland pyrg)	N	N	N	No data
Unnamed spring north of Big Springs	Invertebrates – springsnails (longitudinal gland pyrg)	N	N	Y	No data
Unnamed northeast of Big Springs	Invertebrates – springsnails	N	N	Y	No data
Dry					
Echo Canyon Reservoir	Fish – largemouth bass, rainbow trout, white crappie	N	N	Y	No data
Pahranagat					
Maynard Spring	Amphibians – northern leopard frog	N	N	Y	No data
Lake					
Brown Springs	Invertebrates – springsnails	Y	Y	Y	No data
Wambolt Spring	Amphibians – northern leopard frog Invertebrates – springsnails (Lake Valley pyrg)	N	Y	Y	No data

Table F3.7-34 Springs/Ponds/Lakes and Aquatic Species Potentially Affected by Cumulative Pumping (with Alternative D) (Continued)

Basin/Waterbody	Species	Effect (Model Period)			Percent Flow Change
		FB	75	200	
Muddy Springs Area					
Cardy Lamb Springs	Fish – Moapa White River springfish Invertebrates – springsnails (Moapa pebblesnail, grated tryonia)	N	N	Y	No data

[1] FE = Federally Endangered; CH = critical habitat.

[2] Although spring is not located within the 10-foot groundwater drawdown contour, model-predicted flow reductions indicate potential pumping effects.

[3] Shoshone Ponds' water is provided by manmade artesian wells.

[4] Lake Creek flow and Pruess Lake input would be reduced because portions of Big Springs Creek (upstream water source for Lake Creek) are located in the 10-foot drawdown contour.

Table 3.7-35
Perennial Streams and Aquatic Species Potentially Affected by Cumulative Pumping
(with Alternative D)

Table F3.7-35 Perennial Streams and Aquatic Species Potentially Affected by Cumulative Pumping (with Alternative D)

Basin/Stream	Total Stream Miles	Species	Stream Miles Potentially Affected		
			FB	75	200
Clover	**Basin Total 13.8**		**13.8**	**13.8**	**13.8**
Clover Creek	13.8	Brook trout[1], rainbow trout, Meadow Valley Wash desert sucker, Meadow Valley Wash speckled dace	13.8	13.8	13.8
Spring (#201)	**Basin Total 11.0**		**0.0**	**3.6**	**5.7**
Camp Valley Creek	11.0	Brown trout, rainbow trout	0.0	3.6	5.7
Panaca	**Basin Total 5.8**		**0.8**	**1.5**	**2.4**
Meadow Vally Wash	5.8	Big Spring spinedace (FT) (CH)[2], Meadow Valley Wash desert suker, Meadow Valley Wash speckled dace, rainbow trout	0.8	1.5	2.4
Dry	**Basin Total 3.1**		**0.0**	**0.0**	**0.1**
Meadow Valley Wash	3.1	Big Spring spinedace (FT) (CH)[2],Meadow Valley Wash desert sucker, Meadow Valley Wash speckled dace	0.0	0.0	0.1
Lower Meadow Valley Wash	**Basin Total 47.6**		**3.8**	**6.1**	**22.2**
Meadow Valley Wash	47.6	Rainbow trout, Meadow Valley Wash desert sucker, Meadow Valley Wash speckled dace	3.8	6.1	22.2
Pahranagat	**Basin Total 20.2**		**0.5**	**0.5**	**0.5**
Pahranagat Creek	20.2	Pahranagat speckled dace	0.5	0.5	0.5
Muddy River Springs Area	**Basin Total 6.2**		**0.0**	**0.1**	**0.9**
Muddy River	6.2	Moapa dace (FE)[2], Moapa speckled dace, Virgin River chub	0.0	0.1	0.9
Lower Moapa Valley	**Basin Total 15.8**		**1.6**	**4.0**	**6.0**
Muddy River	15.8	Moapa speckled dace	1.6	4.0	6.0
Lake Valley	**Basin Total 2.1**		**0.0**	**0.0**	**1.0**
Geyser Creek	2.1	Brook trout[1], rainbow trout	0.0	0.0	1.0
Snake Valley	**Basin Total 46.6**		**0.0**	**1.6**	**19.3**
Big Springs Creek	9.0	Mottled sculpin, redside shiner, speckled dace, Utah chub, Utah sucker, springsnails	0.0	1.6	8.9
Big Wash	4.8	Bonneville cutthroat trout	0.0	0.0	4.8
Lake Creek	10.6	Mottled sculpin, redside shiner, speckled dace, Utah chub, Utah sucker	___[3]	___[3]	___[3]

Table F3.7-35 Perennial Streams and Aquatic Species Potentially Affected by Cumulative Pumping (with Alternative D) (Continued)

Basin/Stream	Total Stream Miles	Species	Stream Miles Potentially Affected		
			FB	75	200
Lehman Creek	10.6	Brook trout[1], brown trout, rainbow trout, trout hybrids	0.0	0.0	<0.1
Snake Creek	11.6	Bonneville cutthroat trout, brook trout, brown trout, rainbow trout, redside shiner, speckled dace	0.0	0.0	5.6
Spring (#184)	**Basin Total 14.9**		**0.0**	**2.3**	**2.6**
Muncy Creek	7.2	Brook trout[1], brown trout, rainbow trout, trout hybrids	0.0	0.0	0.3
Pine Creek	0.8	Bonneville cutthroat trout	0.0	0.1	0.1
Ridge Creek	1.2	Bonneville cutthroat trout	0.0	0.6	0.6
Shingle Creek	3.7	Brown trout, rainbow trout, trout hybrids	0.0	1.2	1.2
Williams Canyon Creek	2.0	Rainbow trout, trout hybrids	0.0	0.4	0.4
Total Miles	**187.1**		**20.5**	**33.5**	**74.5**

[1] Brook trout present in stream, but occupied habitat is in headwater areas, which would not be affected by pumping.

[2] FE = federally endangered species; FT= Federally threatened species; and CH= critical habitat.

[3] Lake Creek flow would be reduced because portions of Big Springs Creek Cone of the upstream source for Lake Creek are located within the 10-foot drawdown contour.

Table 3.7-36
Springs/Ponds/Lakes and Aquatic Species Potentially Affected by Cumulative Pumping (with Alternative E)

Table F3.7-36 Springs/Ponds/Lakes and Aquatic Species Potentially Affected by Cumulative Pumping (with Alternative E)

Basin/Waterbody	Species	Effect (Model Period)			Percent Flow Change
		FB	75	200	
Panaca					
Bennett Springs	Invertebrates – springsnails	Y	Y	Y	No data
Clover					
North Spring	Invertebrates – springsnails (Toquerville pyrg)	Y	Y	Y	No data
White River					
Arnoldson Spring	Fish – Preston White River springfish, White River speckled dace Invertebrates – springsnails (White river Valley pyrg)	N	Y	Y	-4 to -9
Butterfield Springs	Fish –White River sculpin Invertebrates – springsnails (Butterfield pyrg, Hardy pyrg)	N	N	N[2]	-1 to -11
Flag Springs Complex	Fish – White River spinedace (FE) (CH)[1], White River desert sucker, White River speckled dace Invertebrates – springsnails (Flag pyrg)	N	N	N[2]	-1 to -11
Indian Ranch Spring	Fish – White River spinedace (FE), Preston White River springfish, White River speckled dace, White River desert sucker	N	Y	Y	No data
Nicolas Spring	Fish – Preston White River springfish Invertebrates – springsnails (White River Valley pyrg)	N	Y	Y	-5 to -9
Preston Big Spring	Fish – White River spinedace (FE) (CH)[1], White River speckled dace Invertebrates – springsnails (White River Valley pyrg)	N	N	N[2]	-2 to -8
Steptoe					
Flat Spring	Invertebrates – springsnails	N	Y	Y	No data
Spring (#184)					
Blind Spring	Amphibians – northern leopard frog	N	Y	Y	No data
Keegan Spring	Fish – relict dace Amphibians – northern leopard frog	N[2]	N[2]	N[2]	-19 to -52
Minerva Spring Complex	Fish – Utah chub Amphibians – northern leopard frog Invertebrates – springsnails (Toquerville pyrg)	Y	Y	Y	No data
North Millick Spring	Amphibians – northern leopard frog	N	N[2]	N[2]	-4 to -11
O'Neal/Frog Pond	Amphibians – northern leopard frog	N	Y	Y	No data
Osborne Spring	Invertebrates – springsnails (Toquerville pyrg)	N	Y	Y	No data
Shoshone Ponds[3]	Fish – Pahrump poolfish (FE)[1], relict dace Amphibians – northern leopard frog	Y	Y	Y	No data

Table F3.7-36 Springs/Ponds/Lakes and Aquatic Species Potentially Affected by Cumulative Pumping (with Alternative E) (Continued)

Basin/Waterbody	Species	Effect (Model Period)			Percent Flow Change
		FB	75	200	
South Millick Spring	Amphibians – northern leopard frog	N[2]	N[2]	N[2]	-11 to -25
Stonehouse Spring Complex	Fish – relict dace Invertebrates – springsnails (Toquerville pyrg)	N	N	Y	No data
Swallow Spring	Fish – rainbow trout	Y	Y	Y	No data
Willow Spring	Invertebrates – springsnails (Toquerville pyrg)	N	Y	Y	No data
Unnamed spring #5	Amphibians – northern leopard frog Invertebrates – springsnails (Toquerville pyrg)	N	N	Y	No data
Unnamed spring near Cleve Creek	Invertebrates – springsnails (Toquerville pyrg)	N	N	Y	No data
Snake					
Big Springs	Fish – redside shiner, mottled sculpin, speckled dace, Utah chub Invertebrates – springsnails (bifid duct pyrg, longitudinal gland pyrg)	N[2]	N[2]	N[2]	-10 to -82
Outhouse Spring	Invertebrates – springsnails (Toquerville pyrg and glossy valvata)	N	N	Y	No data
Spring Creek Spring	Water source for Spring Creek Rearing Sation	N	N	Y	No data
Dry					
Echo Canyon Reservoir	Fish – largemouth bass, rainbow trout, white crappie	N	N	Y	No data
Pahranagat					
Maynard Spring	Amphibians – northern leopard frog	N	N	Y	No data
Lake					
Brown Springs	Invertebrates – springsnails	Y	Y	Y	No data
Wambolt Spring	Amphibians – northern leopard frog Invertebrates – springsnails (Lake Valley pyrg)	N	N	Y	No data
Muddy Springs Area					
Cardy Lamb Springs	Fish – Moapa White River springfish Invertebrates – springsnails (Moapa pebblesnail, grated tryonia)	N	N	Y	No data

[1] FE = Federally Endangered; CH = critical habitat.

[2] Although spring is not located within the 10-foot groundwater drawdown contour, model-predicted flow reductions indicate potential pumping effects.

[3] Shoshone Ponds' water is provided by manmade artesian wells.

Table 3.7-37
Perennial Streams and Aquatic Species Potentially Affected by Cumulative Pumping (with Alternative E)

Table F3.7-37 Perennial Streams and Aquatic Species Potentially Affected by Cumulative Pumping (with Alternative E)

Basin/Stream	Total Stream Miles	Species	Stream Miles Potentially Affected		
			FB	75	200
Clover	**Basin Total 13.8**		**13.8**	**13.8**	**13.8**
Clover Creek	13.8	Brook trout[1], rainbow trout, Meadow Valley Wash desert sucker, Meadow Valley Wash speckled dace	13.8	13.8	13.8
Spring (#201)	**Basin Total 11.0**		**0.0**	**0.0**	**4.9**
Camp Valley Creek	11.0	Brown trout, rainbow trout, Meadow Valley Wash desert sucker, Meadow Valley Wash speckled dace	0.0	0.0	4.9
Panaca	**Basin Total 5.8**		**1.5**	**1.5**	**2.4**
Meadow Valley Wash	5.8	Big Spring spinedace (FT)(CH)[2], Meadow Valley Wash desert sucker, Meadow Valley Wash speckled dace, rainbow trout	1.5	1.5	2.4
Dry	**Basin Total 3.1**		**0.0**	**0.0**	**0.1**
Meadow Valley Wash	3.1	Big Spring spinedace (FT)(CH)[2],Meadow Valley Wash desert sucker, Meadow Valley Wash speckled dace	0.0	0.0	0.1
Lower Meadow Valley Wash	**Basin Total 47.6**		**3.8**	**8.8**	**22.2**
Meadow Valley Wash	47.6	Rainbow trout, Meadow Valley Wash desert sucker, Meadow Valley Wash speckled dace	3.8	8.8	22.2
Pahranagat	**Basin Total 20.2**		**0.5**	**0.5**	**0.5**
Pahranagat Creek	20.2	Pahranagat speckled dace	0.5	0.5	0.5
Muddy River Springs Area	**Basin Total 6.2**		**0.0**	**0.1**	**0.9**
Muddy River	6.2	Moapa dace (FE)[2], Moapa speckled dace, Virgin River chub	0.0	0.1	0.9
Lower Moapa Valley	**Basin Total 15.8**		**2.1**	**4.0**	**6.0**
Muddy River	15.8	Moapa speckled dace	2.1	4.0	6.0
Lake Valley	**Basin Total 2.1**		**0.0**	**0.0**	**0.0**

Table F3.7-37 Perennial Streams and Aquatic Species Potentially Affected by Cumulative Pumping (with Alternative E) (Continued)

Basin/Stream	Total Stream Miles	Species	Stream Miles Potentially Affected		
			FB	75	200
Geyser Creek	2.1	Brook trout[2], rainbow trout	0.0	0.0	1.0
Snake Valley	**Basin Total 25.4**		**0.0**	**0.0**	**10.4**
Big Springs	**9.0**	Mottled Sculpin, redside shiner, speckled dace, Utah chub, Utah sucker, springsnails	___[3]	___[3]	___[3]
Big Wash	4.8	Bonneville cutthroat trout	0.0	0.0	4.8
Snake Creek	11.6	Bonneville cutthroat trout, brook trout, brown trout, rainbow trout, redside shiner, speckled dace	0.0	0.0	5.6
Spring (#184)	**Basin Total 41.2**		**4.2**	**8.1**	**13.4**
Bastian Creek	2.5	Brown trout, rainbow trout	1.2	1.8	1.8
Indian Creek	3.1	Rainbow trout	0.0	0.0	0.2
Meadow Creek	5.4	Brown trout	1.0	1.6	2.1
Muncy Creek	7.3	Brook trout[1], brown trout, rainbow trout, trout hybrids	0.0	0.3	0.3
Piermont Creek	5.5	Brown trout	0.0	0.1	0.7
Pine Creek	0.8	Bonneville cutthroat trout	0.1	0.1	0.4
Ridge Creek	1.2	Bonneville cutthroat trout	0.6	0.6	1.1
Siegel Creek	6.7	Rainbow trout	0.0	2.0	2.0
Shingle Creek	3.7	Brown trout, rainbow trout, trout hybrids	1.2	1.2	2.1
Spring Valley Creek	1.4	Relict dace	0.0	<0.1	1.4
Willard Creek	1.6	Trout hybrids	0.0	0.0	0.9
Williams Canyon Creek	2.0	Rainbow trout, trout hybrids	0.1	0.4	0.4
Total Miles	**192.2**		**25.9**	**36.8**	**74.6**

[1] Brook trout present in stream, but occupied habitat is in headwater areas, which would not be affected by pumping.

[2] FE = federally endangered species; FT=federally threatened species; and CH= critical habitat.

[3] Big Springs Creek and Lake Creek flow would be reduced because portionsof the upstream water sources (i.e. Big Springs) are located within the 10-foot drawdown corridor.

Table 3.7-38
Springs/Ponds/Lakes and Aquatic Species Potentially Affected by Cumulative Pumping (with No Action)

Table F3.7-38 Springs/Ponds/Lakes and Aquatic Species Potentially Affected by Cumulative Pumping (with No Action)

Basin/Waterbody	Species	Effect (Model Period)			Percent Flow Change
		FB	75	200	
Panaca					
Bennett Springs	Invertebrates – springsnails	Y	Y	Y	No data
Clover					
North Spring	Invertebrates – springsnails (Toquerville pyrg)	Y	Y	Y	No data
White River					
Arnoldson Spring	Fish – Preston White River springfish, White River speckled dace Invertebrates – springsnails (White River Valley pyrg, Hardy pyrg)	N	Y	Y	-4 to -8
Indian Ranch Spring	Fish – White River spinedace (FE)[1], Preston White River springfish, White River speckled dace, White River desert sucker Invertebrates – springsnails	N	Y	Y	No data
Nicholas Spring	Fish – Preston White River springfish Invertebrates – springsnails (White River Valley pyrg)	N	Y	Y	-5 to -9
Preston Big Spring	Fish – White River spinedace (FE)[1], Preston White River springfish, White River speckled dace Invertebrates – springsnails (White River Valley pyrg)	N	N	N[2]	-2 to -7
Dry					
Echo Canyon Reservoir	Fish – largemouth bass, rainbow trout, white crappie	N	N	Y	No data
Pahranagat					
Maynard Spring	Amphibians – northern leopard frog	N	N	Y	No data
Lake					
Brown Springs	Invertebrates – springsnails	Y	Y	Y	No data
Wambolt Spring	Amphibians – northern leopard frog Invertebrates – springsnails (Lake Valley pyrg)	N	N	Y	No data
Steptoe					
Flat Spring	Invertebrates – springsnails	N	Y	Y	No data
Snake					
Big Springs	Fish – redside shiner, mottled sculpin, speckled dace, Utah chub Invertebrates – springsnails (bifid duct pyrg, longitudinal gland pyrg)	N[2]	N[2]	N[2]	-9 to -16

Table F3.7-38 Springs/Ponds/Lakes and Aquatic Species Potentially Affected by Cumulative Pumping (with No Action) (Continued)

Basin/Waterbody	Species	Effect (Model Period)			Percent Flow Change
		FB	75	200	
Spring Valley					
Keegan Spring	Fish – relict dace Amphibians – northern leopard frog	N[2]	N[2]	N[2]	-7 to -10
Muddy Springs Area					
Cardy Lamb Spring	Fish – Moapa White River springfish Invertebrates – springsnails (Moapa pebblesnail, grated tryonia)	N	N	Y	No data

[1] FE = Federally Endangered.

[2] Although spring is not located within the 10-foot groundwater drawdown contour, model-predicted flow reductions indicate potential pumping effects.

Table 3.7-39
Perennial Streams and Aquatic Species Potentially Affected by Cumulative Pumping (with No Action)

Table F3.7-39 Perennial Streams and Aquatic Species Potentially Affected by Cumulative Pumping (with No Action)

Basin/Stream	Total Stream Miles	Species	Stream Miles Potentially Affected		
			FB	75	200
Spring (#184)	**Basin Total 10.5**		**0.0**	**0.0**	**0.7**
Muncy Creek	7.3	Brook trout[1], brown trout, rainbow trout, trout hybrids	0.0	0.0	0.3
Ridge Creek	1.2	Bonneville cutthroat trout	0.0	0.0	0.1
Williams Canyon Creek	2.0	Rainbow trout, trout hybrids	0.0	0.0	0.3
Clover	**Basin Total 13.8**		**13.8**	**13.8**	**13.8**
Clover Creek	13.8	Rainbow trout, Meadow Valley Wash desert sucker, Meadow Valley Wash speckled dace	13.8	13.8	13.8
Spring (#201)	**Basin Total 11.0**		**0.0**	**0.0**	**4.7**
Camp Valley Creek	11.0	Brown trout, rainbow trout	0.0	0.0	4.7
Panaca	**Basin Total 5.8**		**1.5**	**1.5**	**2.4**
Meadow Valley Wash	5.8	Big Spring spinedace (FT)(CH)[2], Meadow Valley Wash desert sucker, Meadow Valley Wash speckled dace, rainbow trout	1.5	1.5	2.4
Dry	**Basin Total 3.1**		**0.0**	**0.0**	**0.1**
Meadow Valley Wash	3.1	Big Spring spinedace (FT) (CH)[2],Meadow Valley Wash desert sucker, Meadow Valley Wash speckled dace	0.0	0.0	0.1
Lower Meadow Valley Wash	**Basin Total 47.6**		**3.8**	**6.1**	**22.2**
Meadow Valley Wash	47.6	Rainbow trout, Meadow Valley Wash desert sucker, Meadow Valley Wash speckled dace	3.8	6.1	22.2
Pahranagat	**Basin Total 20.2**		**0.5**	**0.5**	**0.5**
Pahranagat creek	20.2	Pahranagat speckled dace	0.5	0.5	0.5

Table F3.7-39 Perennial Streams and Aquatic Species Potentially Affected by Cumulative Pumping (with No Action) (Continued)

Basin/Stream	Total Stream Miles	Species	Stream Miles Potentially Affected		
			FB	75	200
Muddy River Springs Area	**Basin Total 6.2**		**0.0**	**0.1**	**0.9**
Muddy River near Moapa	6.2	Moapa dace (FE)[1], Virgin River chub, Moapa speckled dace	0.0	0.1	0.9
Lower Moapa Valley	**Basin Total 15.8**		**2.1**	**4.0**	**6.0**
Muddy River	15.8	Moapa speckled dace	2.1	4.0	6.0
Total Miles	**134.0**		**21.7**	**26.0**	**51.3**

[1] Brook trout present in stream, but occupied habitat is in headwaters areas which would not be affected by pumping

[2] FE = federally endangered species; FT=federally threatened species, and CH= critical habitat

Table 3.7-40
Summary of Cumulative Effects with the Proposed Action on Aquatic Biological Resources

Table F3.7-40 Summary of Cumulative Effects with the Proposed Action on Aquatic Biological Resources

Percent Flow Reductions (Habitat Effects)	Cumulative with No Action			Proposed Action			Cumulative with Proposed Action		
	FB	FB+75 Yrs.	FB+200 Yrs.	FB	FB+75 Yrs.	FB+200 Yrs.	FB	FB+75 Yrs.	FB+200 Yrs.
White River Valley									
Arnoldson Spring	4	6	8	0	0	1	4	7	9
Butterfield Spring	0	1	3	1	7	18	2	8	20
Flag Springs	0	1	3	1	7	17	2	9	19
Hot Creek Spring	0	1	1	0	1	3	0	2	4
Moorman Spring	0	1	1	0	1	3	1	2	4
Nicolas Spring	5	7	9	0	0	1	5	7	9
Preston Big Spring	2	5	7	0	0	1	2	5	8
Spring Valley									
Keegan Spring	7	9	10	58	100	100	64	100	100
North Millick Spring	0	1	1	31	62	75	32	63	76
South Millick Spring	1	1	1	55	94	99	55	94	100
Snake Valley									
Big Springs	9	13	16	2	100	100	10	100	100
Pahranagat Valley									
Ash Spring	2	2	2	0	1	2	2	3	4
Crystal Spring	1	2	2	0	0	1	1	2	3
Hiko Spring	2	3	3	0	0	2	2	3	5
Muddy River Springs Area									
Muddy River near Moapa	37	54	61	0	0	1	37	54	62
Impact Parameters									
White River Valley									
Number of Streams with Aquatic Biological Resources	0	0	0	0	0	0	0	0	0
Miles of Game Fish Streams	0	0	0	0	0	0	0	0	0
Number of Springs with Game Fish or Special Status Species	0	3	4	0	2	2	0	5	6

Table F3.7-40 Summary of Cumulative Effects with the Proposed Action on Aquatic Biological Resources (Continued)

Percent Flow Reductions (Habitat Effects)	Cumulative with No Action			Proposed Action			Cumulative with Proposed Action		
	FB	FB+75 Yrs.	FB+200 Yrs.	FB	FB+75 Yrs.	FB+200 Yrs.	FB	FB+75 Yrs.	FB+200 Yrs.
Spring Valley (#184)									
Number of Streams with Aquatic Biological Resources	0	0	2	4	17	20	8	17	20
Miles of Game Fish Streams	0	0	1	6	19	24	7	20	25
Number of Springs with Game Fish or Special Status Species	0	0	0	3	13	14	6	13	15
Snake Valley									
Number of Streams with Aquatic Biological Resources	0	0	0	0	8	8	0	8	9
Miles of Game Fish Streams	0	0	0	0	41	46	0	42	46
Number of Springs with Game Fish or Special Status Species	1	1	1	0	12	13	1	12	13
Lake Valley									
Number of Streams with Aquatic Biological Resources	0	0	0	0	0	1	0	0	1
Miles of Game Fish Streams	0	0	0	0	0	1	0	0	1
Number of Springs with Game Fish or Special Status Species	1	1	2	0	0	1	1	1	2
Pahranagat Valley									
Number of Streams with Aquatic Biological Resources	1	1	1	0	0	1	0	0	0
Miles of Game Fish Streams	<1	<1	<1	0	0	<1	<1	<1	<1
Number of Springs with Game Fish or Special Status Species	0	0	0	0	0	0	0	0	0
Lower Meadow Valley Wash									
Number of Streams with Aquatic Biological Resources	1	1	1	0	0	1	1	1	1
Miles of Game Fish Streams	4	6	22	0	0	3	4	10	26
Number of Springs with Game Fish or Special Status Species	0	0	0	0	0	0	0	0	0

Table 3.7-41
Summary of Cumulative Effects with Alternative A on Aquatic Biological Resources

Table F3.7-41 Summary of Cumulative Effects with Alternative A on Aquatic Biological Resources

Percent Flow Reductions (Habitat Effects)	Cumulative with No Action			Alternative A			Cumulative with Alternative A		
	FB	FB+75 Yrs.	FB+200 Yrs.	FB	FB+75 Yrs.	FB+200 Yrs.	FB	FB+75 Yrs.	FB+200 Yrs.
White River Valley									
Arnoldson Spring	4	6	8	0	0	0	4	7	9
Butterfield Spring	0	1	3	1	3	8	1	5	11
Flag Springs	0	1	3	1	3	8	1	5	11
Hot Creek Spring	0	1	1	0	1	2	0	1	3
Moorman Spring	0	1	1	0	0	1	0	1	3
Nicolas Spring	5	7	9	0	0	0	5	7	9
Preston Big Spring	2	5	7	0	0	1	2	5	8
Spring Valley									
Keegan Spring	7	9	10	12	28	36	19	39	52
North Millick Spring	0	1	1	4	9	11	4	10	11
South Millick Spring	1	1	1	10	21	24	11	21	26
Snake Valley									
Big Springs	9	13	16	2	100	100	10	100	100
Pahranagat Valley									
Ash Spring	2	2	2	0	0	1	2	2	3
Crystal Spring	1	2	2	0	0	1	1	2	2
Hiko Spring	2	3	3	0	0	1	2	3	4
Muddy River Springs Area									
Muddy River near Moapa	37	54	61	0	0	1	37	54	61
Impact Parameters									
White River Valley									
Number of Streams with Aquatic Biological Resources	0	0	0	0	0	0	0	0	0
Miles of Game Fish Streams	0	0	0	0	0	0	0	0	0
Number of Springs with Game Fish or Special Status Species	0	3	4	0	0	2	0	6	6

Table F3.7-41 Summary of Cumulative Effects with Alternative A on Aquatic Biological Resources (Continued)

Percent Flow Reductions (Habitat Effects)	Cumulative with No Action			Alternative A			Cumulative with Alternative A		
	FB	FB+75 Yrs.	FB+200 Yrs.	FB	FB+75 Yrs.	FB+200 Yrs.	FB	FB+75 Yrs.	FB+200 Yrs.
Spring Valley									
Number of Streams with Aquatic Biological Resources	0	0	2	2	7	11	6	10	12
Miles of Game Fish Streams	0	0	1	3	5	12	4	8	13
Number of Springs with Game Fish or Special Status Species	0	0	0	3	6	8	3	11	14
Snake Valley									
Number of Streams with Aquatic Biological Resources	0	0	0	0	7	7	0	7	8
Miles of Game Fish Streams	0	0	0	0	39	39	0	40	45
Number of Springs with Game Fish or Special Status Species	1	1	1	0	6	7	1	12	13
Lake Valley									
Number of Streams with Aquatic Biological Resources	0	0	0	0	0	1	0	0	1
Miles of Game Fish Streams	0	0	0	0	0	1	0	0	1
Number of Springs with Game Fish or Special Status Species	1	1	2	0	0	1	1	1	3
Pahranagat Valley									
Number of Streams with Aquatic Biological Resources	1	1	1	0	0	0	1	1	1
Miles of Game Fish Streams	<1	<1	<1	0	0	0	<1	<1	<1
Number of Springs with Game Fish or Special Status Species	0	0	0	0	0	0	0	1	1
Lower Meadow Valley Wash									
Number of Streams with Aquatic Biological Resources	1	1	1	0	0	0	1	1	1
Miles of Game Fish Streams	4	6	22	0	0	0	4	9	22
Number of Springs with Game Fish or Special Status Species	0	0	0	0	0	0	0	0	0

Table 3.7-42
Summary of Cumulative Effects with Alternative B on Aquatic Biological Resources

Table F3.7-42 Summary of Cumulative Effects with Alternative B on Aquatic Biological Resources

Percent Flow Reductions (Habitat Effects)	Cumulative with No Action			Alternative B			Cumulative with Alternative B		
	FB	FB+75 Yrs.	FB+200 Yrs.	FB	FB+75 Yrs.	FB+200 Yrs.	FB	FB+75 Yrs.	FB+200 Yrs.
White River Valley									
Arnoldson Spring	4	6	8	0	1	2	5	7	10
Butterfield Spring	0	1	3	20	34	45	21	35	46
Flag Springs	0	1	3	19	29	37	19	30	39
Hot Creek Spring	0	1	1	3	5	7	3	5	8
Moorman Spring	0	1	1	2	4	6	3	5	7
Nicolas Spring	5	7	9	0	1	1	5	8	10
Preston Big Spring	2	5	7	0	1	2	3	6	9
Spring Valley									
Keegan Spring	7	9	10	0	3	5	7	11	15
North Millick Spring	0	1	1	2	18	42	3	19	42
South Millick Spring	1	1	1	8	47	99	8	47	99
Snake Valley									
Big Springs	9	13	16	7	100	100	15	100	100
Pahranagat Valley									
Ash Spring	2	2	2	0	1	2	2	3	4
Crystal Spring	1	2	2	0	0	1	1	2	3
Hiko Spring	2	3	3	0	1	2	2	3	5
Muddy River Springs Area									
Muddy River near Moapa	37	54	61	0	0	1	37	54	62
Impact Parameters									
White River Valley									
Number of Streams with Aquatic Biological Resources	0	0	0	0	0	0	0	0	0
Miles of Game Fish Streams	0	0	0	0	0	0	0	0	0
Number of Springs with Game Fish or Special Status Species	0	3	4	2	2	4	2	6	6

Table F3.7-42 Summary of Cumulative Effects with Alternative B on Aquatic Biological Resources (Continued)

Percent Flow Reductions (Habitat Effects)	Cumulative with No Action			Alternative B			Cumulative with Alternative B		
	FB	FB+75 Yrs.	FB+200 Yrs.	FB	FB+75 Yrs.	FB+200 Yrs.	FB	FB+75 Yrs.	FB+200 Yrs.
Spring Valley									
Number of Streams with Aquatic Biological Resources	0	0	2	3	8	11	6	8	12
Miles of Game Fish Streams	0	0	1	3	9	13	4	9	13
Number of Springs with Game Fish or Special Status Species	0	0	0	4	8	9	5	9	11
Snake Valley									
Number of Streams with Aquatic Biological Resources	0	0	0	0	8	8	0	8	8
Miles of Game Fish Streams	0	0	0	0	48	52	0	48	52
Number of Springs with Game Fish or Special Status Species	1	1	1	1	7	8	1	7	8
Lake Valley									
Number of Streams with Aquatic Biological Resources	0	0	0	0	1	1	0	1	1
Miles of Game Fish Streams	0	0	0	0	1	1	0	1	1
Number of Springs with Game Fish or Special Status Species	1	1	2	0	1	1	1	2	2
Pahranagat Valley									
Number of Streams with Aquatic Biological Resources	1	1	1	0	0	0	1	1	1
Miles of Game Fish Streams	<1	<1	<1	0	0	0	<1	<1	<1
Number of Springs with Game Fish or Special Status Species	0	0	0	0	0	0	0	1	1
Lower Meadow Valley Wash									
Number of Streams with Aquatic Biological Resources	1	1	1	0	0	1	1	1	1
Miles of Game Fish Streams	4	6	22	0	0	3	4	10	26
Number of Springs with Game Fish or Special Status Species	0	0	0	0	0	0	0	0	0

Table F3.7-42 Summary of Cumulative Effects with Alternative B on Aquatic Biological Resources (Continued)

Percent Flow Reductions (Habitat Effects)	Cumulative with No Action			Alternative B			Cumulative with Alternative B		
	FB	FB+75 Yrs.	FB+200 Yrs.	FB	FB+75 Yrs.	FB+200 Yrs.	FB	FB+75 Yrs.	FB+200 Yrs.
Steptoe Valley									
Number of Streams with Aquatic Biological Resources	0	0	0	0	0	1	0	0	1
Miles of Game Fish Streams	0	0	0	0	0	3	0	0	3
Number of Springs with Game Fish or Special Status Species	0	0	0	0	0	0	0	1	1

Table 3.7-43
Summary of Cumulative Effects with Alternative C on Aquatic Biological Resources

Table F3.7-43 Summary of Cumulative Effects with Alternative C on Aquatic Biological Resources

Percent Flow Reductions (Habitat Effects)	Cumulative with No Action			Alternative C			Cumulative with Alternative C		
	FB	FB+75 Yrs.	FB+200 Yrs.	FB	FB+75 Yrs.	FB+200 Yrs.	FB	FB+75 Yrs.	FB+200 Yrs.
White River Valley									
Arnoldson Spring	4	6	8	0	0	0	4	7	9
Butterfield Spring	0	1	3	0	2	5	1	4	8
Flag Springs	0	1	3	1	2	5	1	4	8
Hot Creek Spring	0	1	1	0	0	0	0	1	2
Moorman Spring	0	1	1	0	0	1	0	1	2
Nicolas Spring	5	7	9	0	0	0	5	7	9
Preston Big Spring	2	5	7	0	0	1	2	5	7
Spring Valley									
Keegan Spring	7	9	10	12	14	15	19	24	27
North Millick Spring	0	1	1	4	5	5	4	5	6
South Millick Spring	1	1	1	10	12	11	11	13	12
Snake Valley									
Big Springs	9	13	16	2	87	100	10	89	100
Pahranagat Valley									
Ash Spring	2	2	2	0	0	1	2	2	3
Crystal Spring	1	2	2	0	0	0	1	2	2
Hiko Spring	2	3	3	0	0	1	2	3	4
Muddy River Springs Area									
Muddy River near Moapa	37	54	61	0	0	0	37	57	65
Impact Parameters									
White River Valley									
Number of Streams with Aquatic Biological Resources	0	0	0	0	0	0	0	0	0
Miles of Game Fish Streams	0	0	0	0	0	0	0	0	0
Number of Springs with Game Fish or Special Status Species	0	3	4	0	0	0	0	3	6

Table F3.7-43 Summary of Cumulative Effects with Alternative C on Aquatic Biological Resources (Continued)

Percent Flow Reductions (Habitat Effects)	Cumulative with No Action			Alternative C			Cumulative with Alternative C		
	FB	FB+75 Yrs.	FB+200 Yrs.	FB	FB+75 Yrs.	FB+200 Yrs.	FB	FB+75 Yrs.	FB+200 Yrs.
Spring Valley									
Number of Streams with Aquatic Biological Resources	0	0	2	1	5	5	6	7	9
Miles of Game Fish Streams	0	0	1	1	4	4	4	5	10
Number of Springs with Game Fish or Special Status Species	0	0	0	2	5	6	5	5	7
Snake Valley									
Number of Streams with Aquatic Biological Resources	0	0	0	0	6	7	0	7	7
Miles of Game Fish Streams	0	0	0	0	25	40	0	35	41
Number of Springs with Game Fish or Special Status Species	1	1	1	0	5	6	1	7	8
Lake Valley									
Number of Streams with Aquatic Biological Resources	0	0	0	0	0	0	0	0	1
Miles of Game Fish Streams	0	0	0	0	0	0	0	0	1
Number of Springs with Game Fish or Special Status Species	1	1	2	0	0	0	1	1	2
Pahranagat Valley									
Number of Streams with Aquatic Biological Resources	1	1	1	0	0	0	1	1	1
Miles of Game Fish Streams	<1	<1	<1	0	0	0	<1	<1	<1
Number of Springs with Game Fish or Special Status Species	0	0	0	0	0	1	0	0	1
Lower Meadow Valley Wash									
Number of Streams with Aquatic Biological Resources	1	1	1	0	0	0	1	1	1
Miles of Game Fish Streams	4	6	22	0	0	0	4	9	22
Number of Springs with Game Fish or Special Status Species	0	0	0	0	0	0	0	0	0

Table 3.7-44
Summary of Cumulative Effects with Alternative D on Aquatic Biological Resources

Table F3.7-44 Summary of Cumulative Effects with Alternative D on Aquatic Biological Resources

Percent Flow Reductions (Habitat Effects)	Cumulative with No Action			Alternative D			Cumulative with Alternative D		
	FB	FB+75 Yrs.	FB+200 Yrs.	FB	FB+75 Yrs.	FB+200 Yrs.	FB	FB+75 Yrs.	FB+200 Yrs.
White River Valley									
Arnoldson Spring	4	6	8	0	0	0	4	6	9
Butterfield Spring	0	1	3	0	3	9	1	5	12
Flag Springs	0	1	3	0	3	9	1	5	11
Hot Creek Spring	0	1	1	0	0	2	0	1	3
Moorman Spring	0	1	1	0	0	1	0	1	3
Nicolas Spring	5	7	9	0	0	0	5	7	9
Preston Big Spring	2	5	7	0	0	0	2	5	7
Spring Valley									
Keegan Spring	7	9	10	0	0	0	6	8	10
North Millick Spring	0	1	1	0	0	0	0	0	1
South Millick Spring	1	1	1	0	0	0	1	1	1
Snake Valley									
Big Springs	9	13	16	19	100	100	26	100	100
Pahranagat Valley									
Ash Spring	2	2	2	0	0	1	2	2	3
Crystal Spring	1	2	2	0	0	0	1	2	2
Hiko Spring	2	3	3	0	0	1	1	3	4
Muddy River Springs Area									
Muddy River near Moapa	37	54	61	0	0	0	36	53	61
Impact Parameters									
White River Valley									
Number of Streams with Aquatic Biological Resources	0	0	0	0	0	0	0	0	0
Miles of Game Fish Streams	0	0	0	0	0	0	0	0	0
Number of Springs with Game Fish or Special Status Species	0	3	4	0	0	2	0	3	6

Table F3.7-44 Summary of Cumulative Effects with Alternative D on Aquatic Biological Resources (Continued)

Percent Flow Reductions (Habitat Effects)	Cumulative with No Action			Alternative D			Cumulative with Alternative D		
	FB	FB+75 Yrs.	FB+200 Yrs.	FB	FB+75 Yrs.	FB+200 Yrs.	FB	FB+75 Yrs.	FB+200 Yrs.
Spring Valley									
Number of Streams with Aquatic Biological Resources	0	0	2	0	0	4	0	4	5
Miles of Game Fish Streams	0	0	1	0	0	2	0	2	3
Number of Springs with Game Fish or Special Status Species	0	0	0	0	3	4	1	4	5
Snake Valley									
Number of Streams with Aquatic Biological Resources	0	0	0	0	2	4	0	2	5
Miles of Game Fish Streams	0	0	0	0	1	20	0	2	20
Number of Springs with Game Fish or Special Status Species	1	1	1	1	1	3	1	4	8
Lake Valley									
Number of Streams with Aquatic Biological Resources	0	0	0	0	0	1	0	0	1
Miles of Game Fish Streams	0	0	0	0	0	1	0	0	1
Number of Springs with Game Fish or Special Status Species	0	0	2	0	0	2	1	2	2
Pahranagat Valley									
Number of Streams with Aquatic Biological Resources	1	1	1	0	0	0	1	1	1
Miles of Game Fish Streams	<1	<1	<1	0	0	1	0	0	1
Number of Springs with Game Fish or Special Status Species	0	1	1	0	0	1	0	1	1
Lower Meadow Valley Wash									
Number of Streams with Aquatic Biological Resources	1	1	1	0	0	0	1	1	1
Miles of Game Fish Streams	4	6	22	0	0	0	4	6	22
Number of Springs with Game Fish or Special Status Species	0	0	0	0	0	0	0	0	0

Table 3.7-45
Summary of Cumulative Effects with Alternative E on Aquatic Biological Resources

Table F3.7-45 Summary of Cumulative Effects with Alternative E on Aquatic Biological Resources

Percent Flow Reductions (Habitat Effects)	Cumulative with No Action			Alternative E			Cumulative with Alternative E		
	FB	FB+75 Yrs.	FB+200 Yrs.	FB	FB+75 Yrs.	FB+200 Yrs.	FB	FB+75 Yrs.	FB+200 Yrs.
White River Valley									
Arnoldson Spring	4	6	8	0	0	0	4	7	9
Butterfield Spring	0	1	3	0	3	8	1	5	11
Flag Springs	0	1	3	1	3	8	1	5	11
Hot Creek Spring	0	1	1	0	1	2	0	1	3
Moorman Spring	0	1	1	0	0	1	0	1	3
Nicolas Spring	5	7	9	0	0	0	5	7	9
Preston Big Spring	2	5	7	0	0	1	2	5	8
Spring Valley									
Keegan Spring	7	9	10	12	28	36	19	39	52
North Millick Spring	0	1	1	4	9	11	4	10	11
South Millick Spring	1	1	1	10	21	24	11	21	25
Snake Valley									
Big Springs	9	13	2	26	78	100	10	36	82
Pahranagat Valley									
Ash Spring	2	2	2	0	0	1	2	2	3
Crystal Spring	1	2	2	0	0	1	1	2	2
Hiko Spring	2	3	3	0	0	1	2	3	4
Muddy River Springs Area									
Muddy River near Moapa	37	54	61	0	0	0	37	54	61
Impact Parameters									
White River Valley									
Number of Streams with Aquatic Biological Resources	0	0	0	0	0	0	0	0	0
Miles of Game Fish Streams	0	0	0	0	0	0	0	0	0
Number of Springs with Game Fish or Special Status Species	0	3	4	0	0	2	0	3	6

Table F3.7-45 Summary of Cumulative Effects with Alternative E on Aquatic Biological Resources (Continued)

Percent Flow Reductions (Habitat Effects)	Cumulative with No Action			Alternative E			Cumulative with Alternative E		
	FB	FB+75 Yrs.	FB+200 Yrs.	FB	FB+75 Yrs.	FB+200 Yrs.	FB	FB+75 Yrs.	FB+200 Yrs.
Spring Valley									
Number of Streams with Aquatic Biological Resources	0	0	2	1	7	7	6	10	12
Miles of Game Fish Streams	0	0	1	1	5	11	4	8	13
Number of Springs with Game Fish or Special Status Species	0	0	0	2	7	10	5	8	10
Snake Valley									
Number of Streams with Aquatic Biological Resources	0	0	0	0	0	2	0	0	2
Miles of Game Fish Streams	0	0	0	0	0	1	0	0	10
Number of Springs with Game Fish or Special Status Species	1	1	1	0	1	1	1	1	1
Lake Valley									
Number of Streams with Aquatic Biological Resources	0	0	0	0	0	1	0	0	1
Miles of Game Fish Streams	0	0	0	0	0	1	0	0	1
Number of Springs with Game Fish or Special Status Species	1	1	2	0	0	0	1	1	2
Pahranagat Valley									
Number of Streams with Aquatic Biological Resources	1	1	1	0	0	0	0	0	0
Miles of Game Fish Streams	<1	<1	<1	0	0	0	0	0	0
Number of Springs with Game Fish or Special Status Species	0	0	0	0	0	0	0	0	1
Lower Meadow Valley Wash									
Number of Streams with Aquatic Biological Resources	1	1	1	0	0	0	1	1	1
Miles of Game Fish Streams	4	6	22	0	0	0	4	9	22
Number of Springs with Game Fish or Special Status Species	0	0	0	0	0	0	0	0	0

Appendix F3.7
Aquatic Resources

Bailey, C. L., K. W. Wilson, and M. E. Andersen. 2007. Conservation Agreement and Strategy for Least Chub (*Iotichthys phlegethontis*) in the State of Utah. Utah Department of Natural Resources, Division of Wildlife Resources – Native Aquatic Species. Publication No. 05-24. 37 pp.

_____. 2005. Conservation Agreement and Strategy for Columbia Spotted Frog (*Rana lutieventris*) in the State of Utah. Utah Department of Natural Resources, Division of Wildlife Resources – Native Aquatic Species, Publication Number 06-01.

Baker, G. 2008. Great Basin National Park. Personal Communication with R. Daggett, AECOM. Comments on Springsnail Occurrence in Snake Creek Watershed. April 28, 2008.

BIO-WEST. 2009. Ecological Evaluation of Selected Springs within Spring Valley and Southern Snake Valley, Nevada and Utah. 2008 Report. PR 1195-1. Submitted to Southern Nevada Water Authority, Las Vegas, Nevada. 55 pp + Appendices. June 2009.

_____. 2007. Ecological Evaluation of Selected Aquatic Ecosystems in the Biological Resources Study Area for the Southern Nevada Water Authority's Proposed Clark, Lincoln, and White Pine Counties Groundwater Development Project. Final Report Volumes 1 and 2. March 2007.

Edwards, E. A., D. A. Krieger, G. Gebhart, O. E. Maughan. 1982. Habitat Suitability Index Models: White Crappie. U.S. Department of the Interior, Fish and Wildlife Service. Biological Report 82(10.7). February 1982.

ENSR/AECOM. 2008. Natural Resources Baseline Summary Report: Clark, Lincoln, and White Pine Counties Groundwater Development EIS. Prepared for the BLM, Nevada and Utah Offices.

Hershler, R. 1998. A Systematic Review of the Hydrobiid Snails (Gastropoda: Rissooidea) of the Great Basin, Western United States. Part I. Genus *Pyrgulopsis*. The Veliger 41(1):1-132.

Lentsch, L. D., C. A. Toline, J. Kershner, J. M. Hudson, and J. Mizzi. 2000. Range-wide Conservation Agreement and Strategy for Bonneville Cutthroat Trout (*Oncorhynchus clarki utah*). Utah Division of Wildlife Resources, Publication No. 00-19. Salt Lake City, Utah. December 2000.

NatureServe. 2007. NatureServe Explorer: An Online Encyclopedia of Life [web application]. Version 6.2. NatureServe, Arlington, Virginia. Internet website: http://www.natureserve.org/explorer. Accessed November 30, 2007.

NDOW 2006a -- NDOW Shapefile for Northern Leopard Frog.

_____. 2006b. Conservation Agreement and Conservation Strategy for Bonneville Cutthroat Trout (*Oncorhynchus clarki utah*) in the State of Nevada. November 2006.

Polhemus, D. A. and J. T. Polhemus. 2002. Basins and Ranges: The Biogeography of Aquatic True Bugs (Insecta: Heteroptera)(in the Great Basin). In: R. Hershler, D. Madsen, and D. R. Currey, Editors. Great Basin Aquatic Systems History, Smithsonian Contributions to the Earth Sciences No. 33. 405 p.

Raleigh, R. F. 1982. Habitat Suitability Index Models: Brook Trout. U.S. Department of the Interior, Fish and Wildlife Service. FWS/OBS-82/10.24. 42 pp.

Raleigh R. F., L. D. Zuckerman, and P. C. Nelson. 1986. Habitat Suitability Index Models and Instream Flow Suitability Curves: Brown Trout. U.S. Department of the Interior, Fish and Wildlife Service. Biological Report 82(10.124). September 1986 (Revised).

_____. 1984. Habitat Suitability Information: Rainbow Trout. U.S. Fish and Wildlife Service. FWS/OBS-82/10.60. 64 pp.

Relict Leopard Frog Conservation Team. 2005. Conservation Agreement and Rangewide Conservation Assessment and Strategy for the Relict Leopard Frog (*Rana onca*). Final, July 2005.

Sada, D. W. 2007. Rare Aquatic Macroinvertebrates Occupying Springs, Lakes, and Streams in the Great Basin. Unpublished Spreadsheet.

Sigler, W. F. and R. R. Miller. 1963. Fishes of Utah. 203 pp.

Sigler, W. F. and J. W. Sigler 1987. Fishes of the Great Basin. University of Nevada Press.

Smith, B. E. and D. A. Keinath. 2007. Northern Leopard Frog (*Rana pipiens*): A Technical Conservation Assessment (on-line). USDA Forest Service, Rocky Mountain Region. Internet website: http://www.fs.fed.us/ r2/projects/ sep/assessments/ northernleopardfrog.pdf. Accessed January 16, 2007.

Southern Nevada Water Authority (SNWA). 2009. Clark, Lincoln, and White Pine Counties Groundwater Development Project: 2008 Wildlife Surveys. Final Report. August 2009.

Stebbins, R. C. 1954. Amphibians and Reptiles of Western North America. McGraw-Hill, New York. 536pp.

Stuber, R. J., G. Gebhart, and O. E. Maughan. 1982. Habitat Suitability Index Models: Largemouth Bass. U.S. Fish and Wildlife Service. FWS/OBS-82/10.16. 33 pp.

University of California-Davis. 2010. Cooperative Extension. Sacramento Perch, *Archoplites interruptus*. Internet website: http://calfish.ucdavis.edu/calfish/SacramentoPerch.htm.

U.S. Fish and Wildlife Service (USFWS). 1998. Recovery Plan for the Aquatic and Riparian Species of Pahranagat Valley. Portland, Oregon. 82 pp.

_____. 1995. Lahontan Cutthroat Trout, *Oncorhynchus clarki henshawi*, Recovery Plan. Portland, Oregon. 147 pp.

_____. 1994. White River Spinedace, *Lepidomeda albivallis*, Recovery Plan. Portland, Oregon. 45 pp.

_____. 1980. Pahrump Killifish Recovery Plan, Dated March 17, 1980. Prepared by the U.S. Fish and Wildlife Service in Cooperation with the Recovery Team Composed of the Following Individuals: J. E. Deacon, University of Nevada, Las Vegas; O. Casey, Bureau of Land Management; H. Gunther, Water and Power Resources Service; J. Radtke, National Park Service; D. Soltz, California State University; and D. Lockard, Nevada Department of Wildlife.

Sutter, J. V., M. E. Anderson, K. D. Bunnell, M. C. Canning, A. G. Clark, D. E. Dolsen, and F. P. Howe. 2005. Utah Comprehensive Wildlife Conservation Strategy (CWCS). Publication Number 05-19. Utah Division of Wildlife Resources, Salt Lake City, Utah.

Wildlife Action Plan Team. 2006. Nevada Wildlife Acton Plan. Nevada Department of Wildlife, Reno.