APPENDIX F.

Piceance Parcels Game Management Units (GMUs) -

Table 1 - GMU 22 Deer Hunters:

Year	Residency	Avg. # Hunters	Avg. Rec. Days	Avg. # Days in Field	Expenditures
2005	R	292	505	2	$17,520.00
2005	N	374	767	2	$224,400.00
2004	R	253	538	2	$15,180.00
2004	N	294	1107	4	$352,800.00
average	**R**	**273**	**522**	**2**	**$16,350.00**
average	**N**	**334**	**937**	**3**	**$288,600.00**

Table 2 - GMU 22 Elk Hunters:

Year	Residency	Avg. # Hunters	Avg. Rec. Days	Avg. # Days in Field	Expenditures
2005	R	1569	6637	5	$235,350.00
2005	N	1200	6232	5	$1,800,000.00
2004	R	1269	6024	5	$190,350.00
2004	N	1296	6615	5	$1,944,000.00
average	**R**	**1419**	**6331**	**5**	**$212,850.00**
average	**N**	**1248**	**6424**	**5**	**$1,872,000.00**

Shell Parcels Game Management Units (GMUs)-

Table 3 - GMU 23 Deer Hunters:

Year	Residency	Avg. # Hunters	Avg. Rec. Days	Avg. # Days in Field	Expenditures
2005	R	572	1964	3	$51,480.00
2005	N	511	2381	5	$766,500.00
2004	R	404	808	2	$24,240.00
2004	N	343	1489	4	$411,600.00
average	**R**	**488**	**1386**	**2.5**	**$37,860.00**
average	**N**	**427**	**1935**	**4.5**	**$589,050.00**

Table 4 - GMU 23 Elk Hunters:

Year	Residency	Avg. # Hunters	Avg. Rec. Days	Avg. # Days in Field	Expenditures
2005	R	2145	9484	4	
2005	N	2315	11,110	5	$3,472,500.00
2004	R	2115	10,156	5	$317,250.00
2004	N	2838	14,329	5	$4,257,000.00
average	**R**	**2130**	**9820**	**4.5**	**$287,325.00**
average	**N**	**2577**	**12,720**	**5**	**$3,864,750.00**

APPENDIX G - Letter of Concurrence, FWS Region 6 Archaeologist

August 22, 2006

Ms. Georgianna Contiguglia
State Historic Preservation Officer
Colorado Historical Society
1300 Broadway
Denver, Colorado 80203

Dear Ms. Contiguglia,

The U.S. Fish and Wildlife Service, as a part of their Federal Aid program to encourage state conservation efforts, has partnered with the Colorado Division of Wildlife to support a land exchange in the Piceance Basin of northwest Colorado. The exchange involves approximately 2,650 acres that is currently administered by the Colorado Department of Natural Resources – Division of Wildlife (DOW) but would be transferred to corporate ownership. Because Federal funding is involved in this transfer, Section 106 of the National Historic Preservation Act applies and a cultural resource inventory was conducted.

The survey was done in mid July 2006 by SWCA Environmental Consultants. The results of the survey are documented in the report *Class III Cultural Resource Inventory for the Piceance Property Exchange Parcels, Rio Blanco, Colorado* dated August 4, 2006, and the accompanying cultural resource forms. Based on a conversation with Greg Wolff earlier this month it is our understanding that the SHPO has received a copy of this documentation from the DOW.

A total of 21 sites and 19 isolated finds were recorded with 15 of the 21 sites being re-records of previously located sites. Of these resources, two sites are considered eligible or potentially eligible. Site 5RB509 is recommended as eligible due to the recovery of a probable Fremont projectile point, the remains of a possible wood structure and the presence of subsurface cultural remains. Site 5RB2098 is considered potentially eligible but limited access to the majority of the site prevented a conclusive determination.

We agree with the eligibility determinations as presented in the report and are asking for your concurrence. We realize that further work will be needed on those sites determined to be eligible or potentially eligible and we look forward to discussing possible treatment plans.

Thank you for your review and please do not hesitate to contact me if you have any questions or concerns.

Sincerely,

Meg Van Ness
Regional Historic Preservation Officer
U.S. Fish and Wildlife Service, Region 6
Denver

303-236-8103

APPENDIX H - **Piceance Exchange Soil Types** (USDA/USGS, 1982)

Soil Map Unit	Ryan Gulch	Stakes Springs	Duck Creek	Corral Gulch	Piceance Creek
6 – Barcus channery loamy sands, 2-8% slopes	X		X	X	X
36 – Glendive fine sandy loam	X	X	X	X	X
40 – Hagga Loam					X
41 – Havre loam, 0-4% slopes		X	X	X	X
73 – Rentsac channery loam, 5-50 % slopes	X	X	X	X	X
91 – Torriorthents-Rock outcrop complex, 15-90% slopes	X	X	X	X	

APPENDIX I – Detailed Expanded Water Resources Narrative

Water Resources

Water Rights and Surface Water Resources -

The Division owns nearly 60 water rights throughout the Piceance Creek SWA, and 28 of these comprise the water rights that are a part of the Piceance Parcels. Eleven of these rights remain appurtenant to the land they were decreed to, and 17 were severed in the late 1970s and early 1980s from the lands originally purchased (Appendix D-1). One of the Division's responsibilities has been to manage its portfolio of ditch rights, spring rights, and well rights for beneficial use for wildlife. The Division also owns and manages surface lands that have both permanent and ephemeral water resources that support wet meadow and riparian wetland habitats, including the parcels that are the subject of this exchange. The Division's land management objectives include enhancing riparian characteristics where perennial flow persists, maintaining meadow habitats, and promoting healthy upland range habitats in order to minimize erosion and sedimentation.

Piceance and Yellow Creeks are the only perennially flowing creeks within the SWA, although reaches of Yellow Creek (formed below the Stake Springs Draw / Corral Gulch confluence) are intermittently dry while the gage data at the mouth of Yellow Creek on the White River shows perennial flow since 1973. Other major drainages within the SWA are tributaries to Yellow Creek (Stake Springs Draw, Corral Gulch, Duck Creek) and Piceance Creek (Ryan Gulch, Dry Fork of Piceance Creek). The tributaries noted above and certain reaches of Yellow Creek all go dry on occasion, either during annual low flow, or spatially with distance from source water. Groundwater discharge accounts for nearly 80 percent of total annual surface flow (SEO, 1978), highlighting the importance of spring flows for the maintenance of perennial water within the Piceance and Yellow Creek watersheds. Often the emergence of groundwater within a drainage marks the upstream end of a short reach of perennial flow that dries in the downstream direction below the source. Yellow Creek Springs 3 and 4, Duck Creek Spring 1, an un-decreed spring near the Duck Creek Ditch, and Sulphur Gulch Well 9 (artesian), create small reaches of wetland habitat within these draws. In addition, Little Hills Spring 3, Square S Spring 12, Sayer Springs Ditch (sourced by a spring), and the Foote Pond Spring all add incremental surface flow to Piceance Creek near the mouth of the Dry Fork. These springs also support a large (> 3 acres) wetland / wet meadow complex in this area.

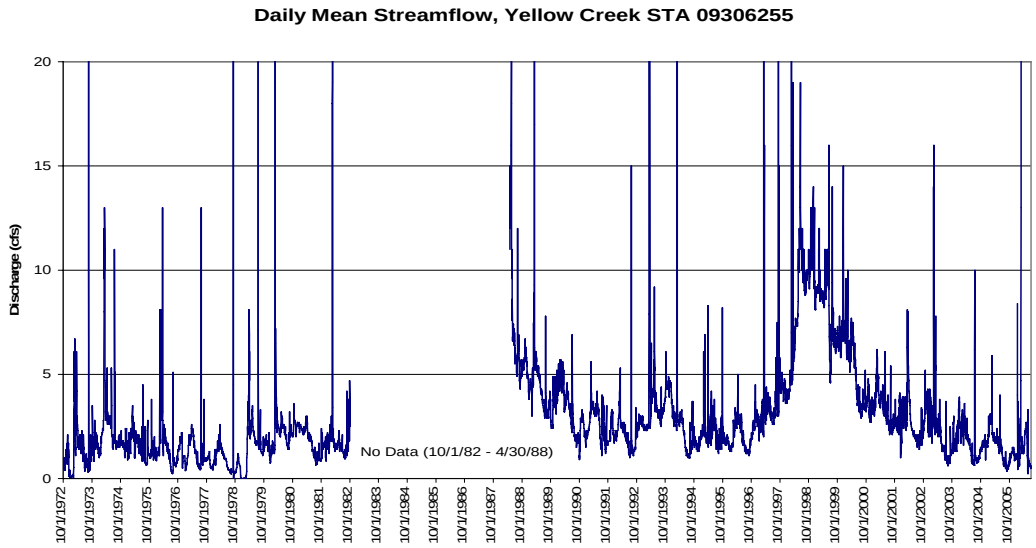
The historic link between source water and decreed water rights is evident from the proximity of ditch rights to spring sources, and in some cases, to direct linkage of the right to a spring source in the decree. Little Hills Spring 3 is cited in the decree as a source for the Burch No. 1 Ditch. Yellow Creek Springs 3 and 4 and other small seeps within Stake Springs Draw provide source water to the Smith and Sawyer Ditches, and the location of the Duck Creek Ditch corresponds closely with the un-decreed source. The Foote Pond Spring was developed into a pond and ditch used to support a small recreational fishery, pasture irrigation, and wetland habitat.

Complex geomorphological response to precipitation and runoff in many of the ephemeral (seasonally flow-limited), and intermittent (spatially flow-limited) drainages result in highly incised gullies and narrow within-draw riparian resources where surface water exists. Because some of these gullies are incised more than 20 feet below the surrounding valley bottom, the beneficial effects of surface water are often confined to the bed of an incised

channel. Discontinuous gully erosion in many drainages is evidence of significant sediment flux on an infrequent and spatially small extent. This creates a stepped-character to many draws in response to erosional / depositional sequences. Where spring sources occur in a depositional area, the channel is wider or closer to the valley bottom elevation, enlarging the extent of the wetland / riparian character within a drainage. Many of the ditch water rights that are the subject of this exchange were used on depositional fill materials that created irrigable lands across a valley bottom. Subsequent stormflow and channel incision into these sediments destabilized both the headgate structures and the lands they irrigated.

Yellow Creek and its tributaries are where most of the land and water rights of this exchange are located. Mean daily flows at the mouth of Yellow Creek near the White River were plotted over the period of record (Figure III-2). The data in this plot were truncated at a discharge of 20 cubic feet per second (cfs) to show two important facets of surface water flow in this region. First, that baseflow over time has been somewhat variable, as depicted by the general shape of the area beneath the daily values. For example, baseflow in the 1970s was relatively low (generally 1-3 cfs) while during the late 1980s and late 1990s, baseflow rose (generally 4-10 cfs). Baseflow since the latest dry cycle began in ~2000 indicate diminishing baseflow values.

Figure III-2: Mean Daily Streamflow , 10/1/1972 - 7/5/2006.

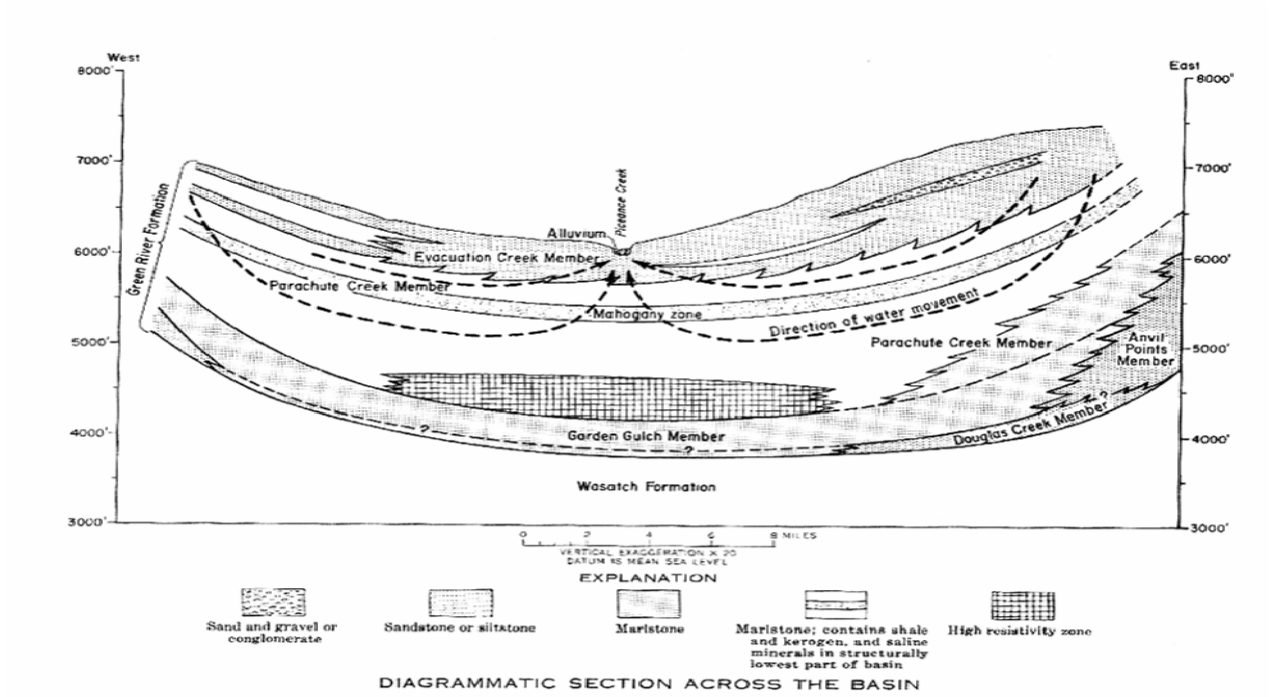


Another facet of streamflow that emerges from this data is the infrequent but relatively large discharges that periodically occur. There were 26 days with mean daily discharge greater than 20 cfs. Mean flow 9/7/1978 was 500 cfs, and instantaneous discharge of greater than 1000 cfs has been observed at the gage. The highest flows are short-duration spikes in streamflow caused by late summer thunderstorms, and 10- to 100-yr type storm events appear to be responsible for the discontinuous gullying observed in Yellow Creek and small tributaries in the region. Longer duration flows that occur due to rapid winter melt or rain on snow are primarily responsible for reworking the fine bed and bank materials deposited within the alluvial bottomlands.

Groundwater Resources -

Groundwater hydrology within the Piceance and Yellow Creek drainages was intensively studied in the 1970s and 1980s. These studies showed that groundwater resources can be generally stratified into three main source aquifers: alluvial, upper (Uinta Formation and the upper part of the Parachute Creek member of the Green River Formation), and lower (Green River Formation) (Figure III-3, USGS 1971). The alluvial aquifer represents the exchange area between surface water and shallow groundwater that does not penetrate the bedrock aquifers, although discharge from the bedrock aquifers into an alluvial setting is common. Variability within the Quaternary alluvial fill is high, as some sediments are derived from slower lake / meadow fill processes, while others reflect rapid sediment flux from surrounding hillslopes and ephemeral washes, resulting in generally coarser, unsorted valley fill materials.

Figure III-3. Diagrammatic cross section of the Piceance Creek basin, indicating gross geological controls on groundwater movement (USGS 1971).



The bedrock aquifers are generally distinct from one another due to the oil-shale bearing Mahogany Zone, a tight formation of very low permeability imbedded within the Parachute Creek Member. Water in the upper aquifer can be further stratified based on water quality differences between sources within the Uinta Formation and the Parachute Creek member of the Green River Formation. In general, source areas for the bedrock aquifers are the higher elevation areas to the south, east, and west, and groundwater flow is north toward lower the White River and lower elevation valley bottoms. Gas development occurs within the deeper Wasatch Unit, but requires well penetration through the source water aquifers for the Piceance and Yellow Creek watersheds.

Water Quality-

Water quality within the Piceance and Yellow Creek watersheds is highly variable due to the differences in the type of flow and its source. Surface runoff from hillslopes is typically

generated by intense storms, sometimes in the form of rain on melting snow in spring, and thus carries a heavy sediment load, which subsequently increases the salinity load. Baseflows are dominated by source water from the bedrock aquifers, thus water quality reflects the chemistry of the geologic parent material(s) that the water travels through. Surface water derived mainly from snowmelt contains less sediment and dissolved minerals, but may contain organic constituents derived from flow off agricultural land. In addition, return flows during the irrigation season on Piceance Creek increase the organic and nutrient components of flow.

The alluvial and upper aquifers are preferred water for all uses, with the Parachute Creek portion of the upper aquifer becoming higher in dissolved carbonates, potassium, sodium, chloride and sulfates. The lower Green River aquifer is very high in dissolved solids, sodium, potassium, chloride, fluoride, and dissolved carbonates, but lower in sulfates. Water quality samples from many wells and springs in the basin have been presented in the Colorado Water Resources Basic Data Release No. 35 (USGS, 1974), indicating highly variable water quality and generally deteriorating water quality with depth due to soluble minerals. Data from the Yellow and Piceance Creek gaging stations indicate very high TDS (indexed as micromohs specific conductivity at 25°C), ranging from near 2000 to 5000 micromohs. Dissolved solids increase toward the center of the basin, with much higher levels of sodium showing in surface water from Ryan Gulch downstream, especially below the Dry Fork, where Piceance Creek dissects the Parachute Creek Member and taps into groundwater with a much higher dissolved salt load.

By virtue of the differences in water chemistry between aquifers, the source water for specific springs or wells can be targeted based on water quality analyses. A brief water quality study of nine Division spring and well water resources was undertaken in spring of 2003, and five of these springs are included on the water rights exchange list. The resulting analyses suggest that the Little Hills Spring #3 and the Foote Pond Spring, both near the mouth of the Dry Fork of Piceance Creek, are sourced by the upper aquifer (Uinta/ Upper Green River) based on the lack of any lower aquifer constituents (e.g., fluoride, chloride) and relatively high concentrations of sulfate and calcium. The wells at Ryan Gulch (Well 6 and Sulphur Gulch Well 9) showed ambiguous sources, showing some characteristics of both aquifers, while Stake Springs Well 10 had sulfate concentration that reflected the upper aquifer.