February 20, 2009

Linda Bassi, Esq.
Stream and Lake Protection Division
Colorado Water Conservation Board
1313 Sherman, Suite 721
Denver, CO 80203

Re: Morrison Creek Instream Flow Recommendation

Dear Linda,

James Larson, Dequine Family L.L.C. and Flying Diamond Resources, (the "Parties") are writing to recommend that the CWCB appropriate a water right for instream flow purposes on Morrison Creek, under ISF Rule 5 and sections 37-92-102(3) and -302, C.R.S. (2008). Morrison Creek is located in the Yampa River basin in Routt County, Water District No. 58, Water Division No. 6, Colorado. In particular, the Parties recommend the CWCB appropriate water rights for instream flow purposes on Morrison Creek from immediately below the Dequine Ditch Alt Point #1, as described in the Judgment and Decree, Case No. 95CW35, Water Division No. 6, downstream to the confluence with the Yampa River (the "Recommended Reach"). A copy of that decree is attached to this letter as Appendix A. The Recommended Reach is approximately five miles, and is shown on the Green Ridge and Blacktail Mountain USGS Quadrangle Maps. A significant portion of the Recommended Reach is located on property owned by one or more of the Parties.

A. NATURAL ENVIRONMENT TO BE PRESERVED

Morrison Creek originates in the western Gore Mountains in the Routt National Forest. The creek flows northwest to its confluence with the Yampa River. The area surrounding Morrison Creek contains varied ecology and landscape, and supports diverse riparian habitats. Much of the habitat remains in its native state, undisturbed by agriculture and development. Morrison Creek supports myriad wildlife species and provides winter range area for elk. Golden eagle and sandhill crane nesting areas have been identified along Morrison Creek. In 1993, the Colorado Division of Wildlife classified the fishery as excellent. Recent studies, however, indicate that the quality of the natural environment and fishery habitat has degraded, despite decreed instream flow water rights upstream and downstream of the Recommended Reach.

The Recommended Reach would connect decreed instream flow water rights on Silver Creek and the Yampa River. The CWCB holds instream flow water rights on Silver Creek from its headwaters to its confluence with Morrison Creek. In Case No. 1326-77, the Water Court, Water Division No. 6 entered a decree for 1 c.f.s., for instream flow purposes from the headwaters of Silver Creek to its confluence with the South Fork of Silver Creek. In Case No. 1328-77, the Water Court, Water Division No. 6 entered a decree for 5 c.f.s., for instream flow purposes on Silver Creek from the confluence of the South Fork of Silver Creek to its confluence with Morrison Creek. The CWCB also holds an instream flow water right on the Yampa River, from the confluence of Morrison Creek downstream to the inlet of Lake Catamount. That right was decreed for 72.5 c.f.s.,

absolute, from April 1 through August 14; and 47.5 c.f.s. from August 15 through March 31, in Case No. 01CW106, Water Division No. 6.

B. DRAFT HABITAT ASSESSMENT

In the interest of protecting and improving the unique aquatic habitat of Morrison Creek, the Parties engaged a private consulting firm to analyze the existing conditions and to identify a course of action to maintain and improve those conditions.

Habitech, Inc. conducted a site visit and habitat assessment on August 23, 2008. On September 16, 2008, Habitech, Inc. sent to counsel for the Parties a DRAFT Summary of Morrison Creek Site Visit and Habitat Assessment (the "Draft Assessment"). A copy of the Draft Assessment is attached hereto as Appendix B. The Draft Assessment describes the methods that were used to analyze channel stability, habitat quality and recommends instream flow rates to protect and improve aquatic habitat in Morrison Creek below its confluence with Silver Creek, following the CWCB's protocol.

The Draft Assessment concludes that current conditions are well below optimum and that trout resting areas and cover, food production and reproductive capacity are likely impaired due to high volumes of sand and fine gravels transported in Morrison Creek. The Draft Assessment concludes that future water withdrawals from Morrison Creek would likely further degrade the quality of trout habitat.

C. AMOUNT OF RECOMMENDED APPROPRIATION

Habitech, Inc. developed instream flow recommendations based upon the criteria followed by the CWCB. Those criteria are summarized on page 2 of the Draft Assessment. Based upon the recommendations of Habitech, Inc. and the information provided above, the Parties recommend the CWCB appropriate instream-flow water rights in the Recommended Reach, in at least the following amounts: 18 c.f.s. during the summer months and 4 c.f.s. during the winter months. These flow recommendations may be adjusted based on more detailed field study, including a PHABSIM analysis. The Parties would support any higher stream flow recommendations developed by the Division of Wildlife or CWCB staff.

D. RESOURCE THREATS

There are several existing and potential threats to the existing natural environment within the Recommended Reach. The Upper Yampa Water Conservancy District (the "District") has decrees and pending water rights applications for several water projects that would divert water from Morrison Creek for storage in Stagecoach Reservoir, including a new reservoir on Morrison Creek. Admittedly, an appropriation by the CWCB would be junior to those projects. Ultimately, the District may not obtain decrees for some of those projects, or may choose to pursue other projects. Under those circumstances, a new appropriation by the CWCB would preserce the Recommended Reach in its existing condition. In addition, an appropriation by the CWCB would be senior to later appropriations and protect against additional changes in the stream regimen that would result from those new appropriations or changes in existing water rights.

One of the existing threats to the Recommended Reach is a proposed reservoir on Morrison Creek. In March, 1993, Hydrosphere Resource Consultants issued the Yampa River Basin, Alternative Feasibility Study, Final Report (the "Report"). Hydrosphere prepared the Report for the CWCB, the Colorado River Water Conservation District and the Bureau of Reclamation as part of the Statewide Water Supply Initiative ("SWSI"). Among other things, the Report evaluates potential reservoir sites in the Yampa River Basin, including but not limited to a reservoir on Morrison Creek. Excerpted portions of the Report are attached hereto as Appendix C.

The Report describes the existing natural environment that would be affected by a reservoir on Morrison Creek. The Report states that "[t]he existing fishery is classified as excellent by CDOW." Hydrosphere Report, at 4-14. The Report states that "wetlands occur along the entire reach of Morrison Creek [...]." *Id.* In addition, the Report describes diverse and abundant wildlife and ecology.

Ultimately, the Report recommends "that the Morrison Creek site be eliminated primarily on environmental grounds, although it is arguably the best reservoir site from a technical and economic perspective." *Id.* at 4-29.

The Upper Yampa Water Conservancy District is now proposing to build a reservoir on Morrison Creek (the "Reservoir") near the site studied and rejected in the Report. The District has pending two applications for water rights related to the Reservoir. Case No. 07CW61 involves claims for a change of existing water rights to allow them to be stored in the Morrison Creek Reservoir. Case No. 07CW72 includes claims for new conditional water rights to be stored in the Reservoir. The applications in both cases locate the dam for the Reservoir on Morrison Creek, just below its confluence with Silver Creek.

The Reservoir would significantly alter the natural stream flow regime of Morrison Creek by storing high flows during the spring runoff for later release during summer, fall and/or winter months when stream flows would normally be much lower. The Reservoir could alter the temperature, sediment load, and other characteristics of the existing environment, and introduce foreign aquatic species, such as Northern Pike, that prey on native trout populations. In addition, the District's water court applications include claims to pump water stored in the Reservoir into the Little Morrison Creek drainage for storage in Stagecoach Reservoir. It is likely that much of the water stored in the Reservoir would be transported to Stagecoach Reservoir for storage and never released to Morrison Creek.

Case Nos. 07CW61 and 07CW72 have been consolidated for trial, beginning on October 7, 2009. There are several issues for trial that could prevent the District from obtaining decrees in those cases. Significantly, the Reservoir would inundate a portion of Silver Creek that has a decreed instream flow right, Case No. W-1328-77, Water Division No. 6. The Reservoir might also inundate a portion of the Sarvis Creek Wilderness Area, which would require federal approval. There are other issues that could prevent the District from obtaining decrees in these cases. For example, in Case No. 03CW53, the Division 6 Water Court recently dismissed the District's application for new conditional water rights based on the District's failure to satisfy its burden of proof including, but not limited to, demonstrating a need for the claimed water rights.

In addition, the District's other decreed water rights could affect the Recommended Reach. For example, the Division 6 Water court recently entered a finding of reasonable diligence and decree continuing the District's conditional water rights for diversion of 50 c.f.s. from Morrison Creek in Case No. 04CW10. Under that decree, water would be diverted from Morrison Creek and released into Little Morrison Creek for storage in Stagecoach Reservoir.

To continue those conditional water rights, the District must file an application for finding of reasonable diligence by the end of February, 2015. However, the District may choose not to develop those conditional water rights in favor of another project, or file an application for a change of water rights to divert them at a different location on Morrison Creek. According to the recent testimony of Thomas Sharp, a member of the District's board of directors, the District is considering at least six different alternatives to divert water from Morrison Creek to increase the yield of Stagecoach Reservoir. A copy of a memorandum summarizing those alternatives is attached as Appendix D. By appropriating an instream flow water right for the Recommended Reach now, the CWCB could preserve and protect the existing natural environment against degradation from new appropriations for those alternatives or changes in points of diversion for decreed water rights.

A new appropriation could also protect the Recommended Reach against depletions from future exchanges of water rights on Morrison Creek or changes in points of diversion and/or places of storage for other existing water rights. For example, the district holds several decrees for conditional water rights for the Four Counties Ditch Nos. 1 and 3 and the Four Counties Ditch No. 3 First Enlargement. The District changed those water rights to allow them to be stored in Stagecoach Reservoir. The District may, in the future, seek to change those rights to allow them to be diverted by exchange on Morrison Creek, or stored in the Morrison Creek Reservoir. A new appropriation by the CWCB would be senior to a later appropriative right of exchange on Morrison Creek, and would protect against diminished stream flows resulting from future changes of existing water rights.

In summary, there are numerous threats to the natural environment within the Recommended Reach. Although some of those projects have decreed water rights or pending applications for water rights that would senior to a new appropriation by the CWCB, the District may not build those projects or obtain those decrees. In addition, by appropriating an instream flow right in the near future, the CWCB could protect the Recommended Reach from degradation that would result from future changes of the District's existing water rights and new appropriations.

D. RECOMMENDATION

Based upon the information provided above, and the preliminary conclusions of Habitech, Inc., the Parties recommend the CWCB appropriate instream-flow water rights on Morrison Creek, from its confluence with Silver Creek to its confluence with the Yampa River, in at least the following amounts: 18 c.f.s. during the summer months and 4 c.f.s. during the winter months. The Parties further recommend that the CWCB file an application for such water rights in the near future to obtain a senior priority against future appropriations and preserve the stream conditions existing at the time of the instream-flow appropriation against future changes in water rights.

Very truly yours,

FLYING DIAMOND RESOURCES

By: Scott Steinbrecher

DEQUINE FAMILY L.L.C.

By: Scott Steinbrecher

James A. Larson

For additional information, please contact:

Charles B. White
Scott Steinbrecher
Petros & White LLC
1999 Broadway, Suite 3200
Denver, CO 80202
(303) 825-1980
scott@petros-white.com

WATER COURT, WATER DIVISION NO. 6, STATE OF COLORADO

Case No. 95CW35

REFEREE'S RULING - SURFACE (CONDITIONAL IN PART, ABSOLUTE IN PART)

IN THE MATTER OF THE APPLICATION FOR WATER RIGHTS OF:

DEQUINE FAMILY LLC OF MORRISON CREEK RANCH

IN ROUTT COUNTY, STATE OF COLORADO

The above captioned Application was filed on February 24, 1995, amended on December 1, 1995 and was referred to the Water Referee in accordance with Sections 37-92-101, et seq., C.R.S. On May 1, 1995 the Division Engineer submitted a Summary of Consultation recommending approval of the Application with certain clarifications which are incorporated herein.

No Statement of Opposition to the Application has been filed and the time for filing such statement has expired.

The Water Referee has made such investigations as are necessary to determine whether or not the statements in the Application are true and has become fully advised with respect to the subject matter of the Application.

IT IS HEREBY THE RULING OF THE WATER REFEREE:

GENERAL FINDINGS

1. The name and address of the Applicant is:

   Lou Dequine
   22100 RCR 16
   Oak Creek, CO 80467

2. The name of the structures are:

   Dequine Ditch, Dequine Ditch Alt Point #1, Dequine Ditch Alt Point #2, Dequine Spring.

3. The legal description for each point of diversion is:

   Dequine Ditch: SW 1/4 SW 1/4 of Section 11 Township 3 North, Range 84 West of the 6th P.M. at a point 500 feet East of the West Section line and 1200 feet North of the South Section line of said Section;

Dequine Ditch Alt Point #1: NW 1/4 SW 1/4 of Section 11 Township 3 North, Range 84 West of the 6th P.M. at a point 2600 feet South of the North Section line and on the West line of said Section;

Dequine Ditch Alt Point #2: NW 1/4 NW 1/4 of Section 14 Township 3 North, Range 84 West of the 6th P.M. at a point 1000 feet East of the West Section line and 600 feet South of the North Section line of said Section;

Dequine Spring: NE 1/4 SE 1/4 of Section 10 Township 3 North, Range 84 West of the 6th P.M. at a point 200 feet West of the East Section line and 1800 feet North of the South Section line of said Section.

4. The source of the water for each structure is:

Dequine Ditch: Morrison Creek of Yampa River;

Dequine Ditch Alt Point #1: Morrison Creek of Yampa River;

Dequine Ditch Alt Point #2: Morrison Creek of Yampa River;

Dequine Spring: Morrison Creek of Yampa River.

5. The date of the appropriation is:

Dequine Ditch: August 31, 1991;

Dequine Ditch Alt Point #1: August 31, 1991;

Dequine Ditch Alt Point #2: August 31, 1991;

Dequine Spring: June 1, 1968.

6. The appropriation was initiated by:

Dequine Ditch: pumped from creek into ditch;

Dequine Ditch Alt Point #1: pumped from creek into ditch;

Dequine Ditch Alt Point #2: pumped from creek into ditch;

Dequine Spring: livestock drinking water.

ABSOLUTE SURFACE WATER RIGHT

7. Water was applied to beneficial use in connection with following structure on the date indicated:

Dequine Ditch: August 31, 1991;

Dequine Ditch Alt Point #1: August 31, 1991;

Dequine Ditch Alt Point #2: August 31, 1991;

Dequine Spring: June 1, 1968.

8. The amount of water awarded absolutely is:

Dequine Ditch: 1.25 cfs, absolute;

Dequine Ditch Alt Point #1: 1.25 cfs, absolute;

Dequine Ditch Alt Point #2: 1.25 cfs, absolute;

Dequine Spring: 0.033 cfs, absolute.

9. The use of water under this absolute water right is:

Dequine Ditch: irrigation, livestock;

Dequine Ditch Alt Point #1: irrigation, livestock;

Dequine Ditch Alt Point #2: irrigation, livestock;

Dequine Spring: livestock.

10. The water right awarded herein is awarded absolutely and unconditionally, subject, however, to all earlier priority rights of others and to the integration and tabulation by the Division Engineer of such priorities and changes in accordance with the law.

CONDITIONAL SURFACE WATER RIGHTS

11. The amount of water awarded conditionally is:

Dequine Spring: no additional amount of water is awarded conditionally.

12. The use of water under this conditional water rights is:

Dequine Spring: domestic and irrigation of one acre.

13. The water rights awarded herein are conditional and are hereby continued in full force and effect until July, 2002. If Applicant desires to maintain such conditional decree, an application for a quadrennial finding of reasonable diligence shall be filed on or before the last day of July 2002 or a showing made on or before such date that the conditional water rights have become an absolute water right by reason of the completion of the appropriation.

14. The conditional water rights herein awarded are subject to all earlier priority rights of others and to the integration and tabulation by the Division Engineer of such priorities and changes in accordance with law.

It is accordingly ORDERED that this Ruling shall be filed with the Water Clerk subject to Judicial review.

It is further ORDERED that a copy of this Ruling shall be mailed to the owner of the land on which the diversion is located:

It is further ORDERED that a copy of this Ruling shall be filed with the appropriate Division Engineer and the State Engineer.

Dated June 12, 1996.

BY THE REFEREE

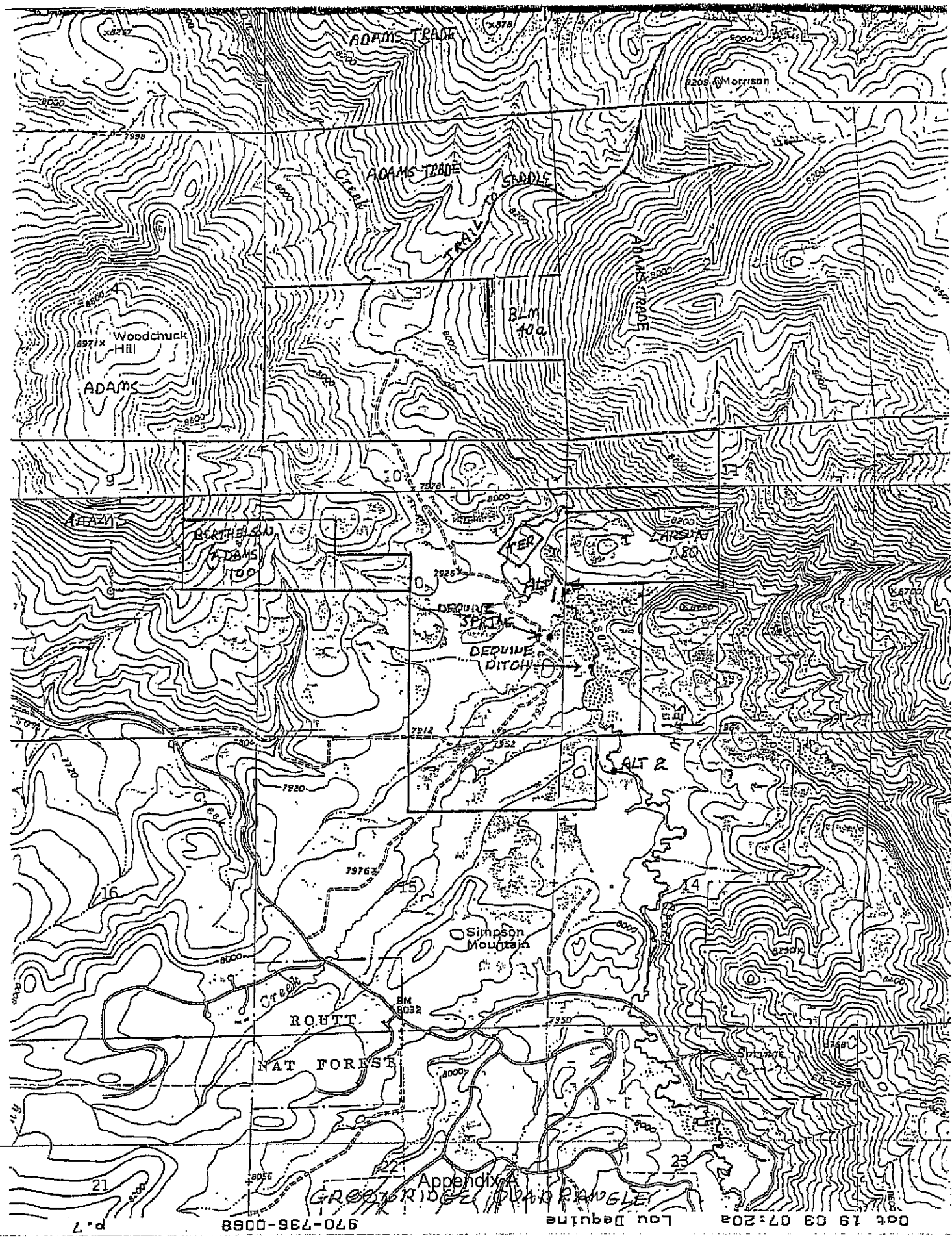
Daniel R. Birch
Water Referee
Water Division No. 6
State of Colorado

No protest was filed in this matter. The foregoing Ruling is confirmed and approved, and is made the Judgment and Decree of this Court.

Dated 7-16-96.

BY THE COURT

Richard P. Doucette
Water Judge
Water Division No. 6
State of Colorado


ADAMS TRAIL
Morrison
ADAMS TRAIL
Creek
TRAIL TO SADDLE
ADAMS TRAIL
BLM 40a
Woodchuck Hill
ADAMS
ADAMS
BERTHEAUD (ADAMS) 100
TER
ALT 1
DEQUINE SPRING
DEQUINE DITCH
LARSHAU 80
ALT 2
Creek
Simpson Mountain
Creek
ROUTT
NAT FOREST
BM 8032
Spring
GREGORY RIDGE QUADRANGLE
Appendix A
970-736-0068
Lou Daquine
Oct 19 03 07:20a
p.7

MORRISON CREEK WATER YEAR 1991

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	3	4.02	5	5	5	5	5	23.3	108	12.5	5.46	4.1
2	3.03	4.05	5	5	5	5	7.5	50.2	108	11.8	5.78	4.03
3	3.07	4.08	5	5	5	5	10	77.2	109	11	6.1	3.96
4	3.1	4.11	5	5	5	5	12.5	70.4	110	10.3	6.03	3.88
5	3.13	4.15	5	5	5	5	15	63.7	111	9.51	5.96	3.81
6	3.16	4.18	5	5	5	5	16.8	56.9	112	8.76	5.89	3.74
7	3.2	4.21	5	5	5	5	18.5	78.8	113	8.01	5.83	3.67
8	3.23	4.25	5	5	5	5	20.3	133	102	7.87	5.76	3.59
9	3.26	4.28	5	5	5	5	22.1	139	90.4	7.73	5.69	3.52
10	3.3	4.31	5	5	5	5	23.9	132	79.1	7.6	5.62	3.45
11	3.33	4.34	5	5	5	5	25.6	119	67.7	7.46	5.55	3.38
12	3.36	4.38	5	5	5	5	27.4	94.1	56.3	7.32	5.48	3.3
13	3.39	4.41	5	5	5	5	29.2	76	57.6	7.19	5.41	3.23
14	3.43	4.44	5	5	5	5	30.9	81.3	53.8	7.05	5.34	3.16
15	3.46	4.48	5	5	5	5	32.7	100	50	6.91	5.27	3.09
16	3.49	4.51	5	5	5	5	34.5	108	46.2	6.78	5.2	3.01
17	3.52	4.54	5	5	5	5	36.3	81.7	42.4	7.27	5.14	2.94
18	3.56	4.57	5	5	5	5	38	80.6	38.6	7.77	5.07	2.87
19	3.59	4.61	5	5	5	5	39.8	79.5	34.9	8.26	5	2.8
20	3.62	4.64	5	5	5	5	41.6	96.7	32	8.76	4.93	2.72
21	3.66	4.67	5	5	5	5	43.3	114	29.1	9.25	4.86	2.65
22	3.69	4.7	5	5	5	5	45.1	114	26.2	9.75	4.79	2.58
23	3.72	4.74	5	5	5	5	46.9	115	24.5	10.2	4.72	2.51
24	3.75	4.77	5	5	5	5	48.7	118	22.8	10.7	4.65	2.43
25	3.79	4.8	5	5	5	5	50.4	121	21.1	11.2	4.58	2.36
26	3.82	4.84	5	5	5	5	45.9	124	18.5	10.2	4.51	2.29
27	3.85	4.87	5	5	5	5	41.4	127	16	9.2	4.45	2.22
28	3.89	4.9	5	5	5	5	36.9	110	13.5	8.19	4.38	2.14
29	3.92	4.93	5	5		5	32.4	105	13.2	7.17	4.31	2.07
30	3.95	4.97	5	5		5	27.8	106	12.8	6.16	4.24	2
31	3.98		5	5		5		107		5.14	4.17	
TOTAL	108	135	155	155	140	155	906	3001	1721	267	160	91.5
MEAN	3.49	4.49	5	5	5	5	30.2	96.8	57.4	8.61	5.17	3.05
AF	215	267	307	307	278	307	1798	5952	3413	530	318	181

TOTAL = 6995 CFS-DAYS
MAX = 139 CFS
MIN = 2 CFS
MEAN FOR 365 DAYS = 19.2 CFS
VOLUME TOTAL = 13874 ACRE-FT.

02/05/95

100 AF 1 DAY Apx.

50 CFS = A/F

Appendix A

HabiTech, Inc.

Water Resource Consultants

P.O. Box 944
Laramie, WY 82073
(307) 742-4902 (Office)
(307) 742-4752 (Fax)

Lora B. Wesche, President
Thomas A. Wesche, PhD, Principal Scientist

E-mail: lwesche@aol.com

16 September 2008

TO: Charles B. White, Petros & White, LLC
FROM: Tom Wesche
SUBJECT: **DRAFT** Summary of Morrison Creek Site Visit and Habitat Assessment

Introduction:

As you requested, I made a site visit to Morrison Creek (MC) on the Flying Horse Ranch in Routt County, CO on 23 August 2008. My purpose was to 1) assess the condition of the MC channel and trout habitat, 2) collect data to develop a preliminary estimate of MC's instream flow needs following the Colorado Water Conservation Board's (CWCB) procedures, and 3) establish a study site for conducting a Physical Habitat Simulation (PHABSIM) investigation to further identify the instream flow needs of MC for maintaining fish habitat. This **draft** memorandum summarizes my findings to date.

Methods:

I walked and surveyed MC from the downstream boundary of the ranch up to the confluence with Silver Creek. Numerous photographs were taken at waypoints marked on a Garmin GPSmap60CSx. These will be sent to you on a CD in the near future. Channel condition and stability was evaluated using the Stream Reach Inventory and Channel Stability Evaluation (SRI/CSE) procedure developed by the USDA Forest Service (Pfankuch 1975). Aquatic habitat condition was evaluated using both the EPA Rapid Assessment and the Montana Department of Environmental Quality Habitat Assessment protocols. The field data forms for these assessment tools are appended.

Following my walk-through, I established a PHABSIM study site just below the confluence of Silver Creek, following the guidance of Bovee (1997). Four cross-channel transects were selected to represent riffle, run and pool habitats and measurements of water depth, velocity, substrate and cover were made across each at a series of up to 23 locations. These measurements will likely be repeated in the spring and summer of 2009 at two other stream flow levels and habitat-flow modeling will then be performed following the guidance of the U. S. Geological Survey (2001). One of these four transects (Transect 3) was placed across a shallow riffle for preliminary instream flow analysis following the CWCB's R2CROSS procedure, as described by Nehring (1979), Wesche and Rechard (1980), Annear and Conder (1983) and Roach (2008). Transect hydraulics were modeled using the USDA Forest Service WinXSPRO program (Hardy et al 2005). The results for Transect 3 (TR3) are appended. A staff gage was installed on river right about 40 ft downstream of the bridge at the Silver Creek confluence to monitor water stage during transect measurement and to allow development of a stage-discharge relation following future site visits.

Results:
During my walk-through, I observed a number of trout, most appearing to be less than 10 inches in length. Mr. Dequine indicated the predominant game fish was brook trout (*Salvelinus fontinalis*), with lesser numbers of cutthroat trout (*Oncorhynchus clarki*) and rainbow trout (*O. mykiss*). Stream flow was measured at 7.44 cfs (staff gage reading = 1.35 ft), with conditions being low and clear.

Channel stability based on the SRI/CSE was rated as "fair" with an overall score of 101 ("fair" range, 77 - 114). Most Upper Bank attributes scored in the "good" category, while 9 of 11 Lower Bank and Channel Bottom attributes fell into the "fair" category. Of particular concern is the accelerated bar formation and stream bed deposition observed due to the apparent transport of relatively large volumes of sand and finer gravels into the study reach from the upstream Morrison Creek watershed. Sediment movement into the study reach from the Silver Creek watershed appeared to be substantially less.

Habitat quality for most parameters in the EPA and Montana assessment procedures scored as either "marginal" or "sub-optimal". Of particular concern are the marginal ratings for "aquatic structure as cover", "channel flow status", "riffle development", "benthic substrate", "embeddedness", and "sediment deposition". These ratings suggest the likely impairment of trout resting areas, food-production, and reproductive capacity due to the accelerated bar formation and sediment deposition discussed above. Such conditions could be further degraded by future water withdrawals. Overall, habitat quality was 60.5% of optimum based on the EPA procedure and 55% of optimum based on the Montana protocol.

Instream flow recommendations following the CWCB protocol are based upon the hydraulic criteria established by Nehring (1979). These criteria include maintaining a wetted perimeter of at least 50% of the bankfull condition, an average cross-section depth of 0.39 ft for a channel the width of MC, and an average cross-section velocity of 1.0 ft/sec. Protecting salmonids during the summer season is accomplished by ensuring all three criteria are met while winter protection is accomplished by meeting two of the three criteria (Roach 2008). Based upon these criteria and our hydraulic modeling results for Transect 3, a summer instream flow of about 18 cfs and a winter flow of about 4 cfs would be appropriate for trout protection on MC below the Silver Creek confluence.

Conclusions and Recommendations:
My overall assessment of the Morrison Creek channel and the habitat provided is that current conditions are well below optimum, with likely impairment of trout resting areas and cover, food production and reproductive capacity. Such reduced habitat quality is due to the relatively high volumes of sand and finer gravels being transported into the study reach from the upper MC watershed. Future water withdrawals would likely degrade trout habitat quality even further. A watershed-based restoration effort by concerned landowners and agencies could prove beneficial in reducing sediment loading to the system and improving trout habitat quality.

The instream flow recommendations presented above will provide some level of trout habitat

protection, but should be considered as preliminary at this time, pending completion of the recommended PHABSIM analysis in 2009. Recommendations developed using the PHABSIM approach will be more ecologically-based as they take into consideration the specific physical habitat requirements of the trout species and life stages residing within MC. The weighted-usable area versus flow plots developed for each species and life stage will provide greater insight into the benefits of protecting different stream flow levels and allow the trade-offs of different future water development scenarios to be more thoroughly evaluated. Further, the extended spatial (multiple transects and habitat types) and temporal (3 flow levels field-measured) coverage afforded by PHABSIM will provide more comprehensive and defensible instream flow recommendations.

Finally, based upon the degraded habitat conditions observed resulting from the excessive accumulation of finer sediments, I recommend flushing flow recommendations also be developed for MC to assure protection of at least a portion of the annual high flow runoff. Such high magnitude, short term flow events can "flush" accumulated fine sediments from the stream bed and help to improve and/or maintain overall trout habitat quality. The analysis necessary to develop such recommendations would use the hydraulic data already being collected at the PHABSIM transects in conjunction with a bed load transport model such as described by Parker (1990). The programs needed for this modeling effort are already contained within the WinXSPRO software package and would require little additional time and expense.

Literature Cited:

Annear, T. C. and A. L. Conder. 1983. Evaluation of instream flow methods for use in Wyoming. Completion Report, Wyoming Game and Fish Department, Cheyenne, WY.

Bovee, K. D. 1997. Data collection procedures for the Physical Habitat Simulation System. U. S. Geological Survey, Biological Resources Division, Mid-Continent Ecological Service Center, Fort Collins, CO.

Hardy, T., P. Panja and D. Mathias. 2005. WinXSPRO, a cross-section analyzer, user's manual, Version 3.0. USDA Forest Service, Rocky Mountain Research Station, General Technical Report RMRS-GTR-147. Fort Collins, CO.

Nehring, B. 1979. Evaluation of instream flow methods and determination of water quantity needs in the state of Colorado. CO Division of Wildlife, Fort Collins, CO.

Parker, G. 1990. Surface-based bed load transport relation for gravel rivers. Journal of Hydraulic Research , IAHR 28:4.

Pfankuch, D. J. 1975. Stream reach inventory and channel stability evaluation, a watershed management procedure. USDA Forest Service, Northern Region, Missoula, MT.

Roach, W. J. 2008. Letter to L. Bassi and J. Baessler, Colorado Water Conservation Board, Denver, CO. Trout Unlimited, Colorado Water Project, Boulder, CO, February 13.

U. S. Geological Survey. 2001. Open File Report 01-340, Mid-Continent Ecological Science Center, Fort Collins, CO.

Wesche, T. A. And P. A. Rechard. 1980. A summary of instream flow methods for fisheries and related research needs. Eisenhower Consortium Bulletin 9, 122.

Stream Reach Inventory and Channel Stability Evaluation (SRI/CSE) ratings by attribute

	Attribute	Excellent		Good		Fair		Poor	
	Upper Banks								
1	Landform slope	Bank slope gradient <30%	2	Bank slope gradient 30-40%	(4)	Bank slope gradient 40 - 60%	6	Bank slope gradient 60%+	8
2	Mass wasting hazard	No evidence of past or any potential for future mass wasting into channel	3	Infrequent and/or very small. Mostly healed over. Low future potential	(6)	Moderate frequency and size, with some raw spots eroded by water during high flows.	9	Frequent or large, causing sediment nearly yearlong or imminent danger of same	12
3	Debris jam potential	Essentially absent from immediate channel area	2	Present but mostly small twigs and limbs.	4	Present, volume and size are both increasing.	(6)	Moderate to heavy amounts, predominantly larger sizes.	8
4	Vegetation bank protection	90% + plant density. Vigor and variety suggests a deep, dense, soil binding, root mass	3	70-90% density. Fewer plant species or lower vigor suggests a less dense or deep root mass.	(6)	50-70%density. Lower vigor and still fewer species form a somewhat shallow and discontinuous root mass.	9	<50% density plus fewer species and less vigor indicate poor, discontinuous, and shallow root mass.	12
	Lower Banks								
5	Channel capacity	Ample for present plus some increases. Peak flows contained. W/D ratio <7	1	Adequate. Overbank flows rare. W/D ratio 8 to 15.	2	Barely contains present peaks. Occasional overbank floods. W/D ratio 15-25.	(3)	Inadequate. Overbank flows common.W/D ratio >25	4
6	Bank rock content	65% with large, angular boulders 12"+ numerous	2	40 to 65%, mostly small boulder to cobbles 6-12"	4	20 to 40% with most in the 3-6" diameter class.	(6)	<20%rock fragments of gravel sizes, 1-3" or less.	8
7	Obstructions - Flow deflectors, sediment traps	Rocks and old logs firmly embedded. Flow pattern without cutting or deposition. Pools and riffles stable	2	Some present, causing erosive cross currents and minor pool filling. Obstructions and deflectors newer and less firm.	4	Moderately frequent, moderately unstable obstructions and deflectors move with high water causing bank cutting and filling of pools.	(6)	Frequent obstructions and deflectors cause bank erosion yearlong. Sediment traps full, channel migration occurring.	8
8	Cutting	Little or non evident. Infrequent raw banks less than 6" high generally	4	Some, intermittently at outcurves and constrictions. Raw banks may be up to 12".	(8)	Significant. Cuts 12 to 24" high. Root mat overhangs and sloughing evident.	12	Almost continuous cuts, some over 24" high. Failure of overhangs frequent.	16
9	Deposition	Little or no enlargement of channel or point bars	4	Some new increase in bar formation, mostly from coarse gravels.	8	Moderate deposition of new gravel and coarse sand on old and some new bars.	(12)	Extensive deposits of predominantly fine particles. Accelerated bar development.	16
	Channel Bottom								
10	Rock Angularity	Sharp edges and corners, plan surfaces roughened	1	Rounded corners and edges, surfaces smooth and flat.	(2)	Corners and edges well rounded in two dimensions.	3	Well rounded in all dimensions, surface smooth.	4
11	Brightness	Surface dull, darkened, or stained. Generally not "bright"	1	Mostly dull, but may have up to 35% bright surfaces.	2	Mixture, 50-50% dull and bright, range: 35 - 65%	(3)	Predominantly bright, 65%+ exposed or scoured surfaces.	4
12	Consolidation or particle packing	Assorted sizes tightly packed and/or overlapping	2	Moderately packed with some overlapping.	4	Mostly a loose assortment with no apparent overlap.	(6)	No packing evident. Loose assortment, easily moved.	8
13	Bottom size distribution and percent stable materials	No changes in sizes evident. Stable materials 80-100%	4	Distribution shift slight. Stable materials 50-80%.	8	Moderate change in sizes. Stable materials 20-50%.	(12)	Marked distribution change. Stable materials 0-20%.	16
14	Scouring and deposition	Less than 5% of the bottom affected by scouring and deposition	6	5-30% affected. Scour at constrictions and where grades steepen. Some deposition in pools.	12	30-50% affected. Deposits and scour at obstructions, constrictions, and bends. Some filling of pools.	(18)	More than 50% of the bottom in a state of flux or change nearly yearlong.	24
15	Clinging aquatic vegetation (moss and algae)	Abundant. Growth largely moss-like, dark green, perennial. In swift water too.	1	Common. Algal forms in low velocity & pool areas. Moss here too and swifter waters.	2	Present but spotty, mostly in backwater areas. Seasonal blooms make rocks slick.	(3)	Perennial types scarce or absent. Yellow-green, short term bloom may be present.	4
	Overall rating		40		76		75		90

Add each column, add column scores

<38 = Excellent, 39-76 = Good, 77-114 = Fair, 115+ = Poor.

Stream Name: Morrison Ck Observer: TAV Date: 8/23/08 Overall Score: 101

"Fair"

Notes: Flying Horse Ranch

Q lowa c loor

Appendix B

EPA

SITE HABITAT QUALITY EVALUATION FORM

Reach: Morrison Ck
Site: Flying Horse Ranch
Date: 8/25/08
Observer: TAW

Weather Conditions: Warm - Clear early - Lt breeze
River Flow Notes (Qualitatively describe volume, turbidity, recent precipitation, human-caused flow alterations):
Flow low + clear

Estimated channel width:_____
Approximate length of reach evaluated:_____

	Condition Category			
	Optimal	**Suboptimal**	**Marginal**	**Poor**
1. Aquatic Habitat Barriers and Diversion Sinks	No physical barriers prevent or inhibit movement of fish or other aquatic organisms through the stream reach; diversion structures are absent or prevent movement of aquatic organisms into ditches or other population sinks.	Minimal physical barriers exist but mostly do not inhibit movement of fish or other aquatic organisms through the stream reach; diversion structures partially prevent movement of aquatic organisms into ditches or other population sinks.	Some physical barriers exist that partially inhibit movement of fish or other aquatic organisms through the stream reach; diversion structures may allow movement of aquatic organisms into ditches or other population sinks.	Substantial physical barriers exist that mostly or entirely prevent movement of fish or other aquatic organisms through the stream reach; diversion structures encourage movement of aquatic organisms into ditches or other population sinks.
SCORE ___	20 19 (18) 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1

Shallow riffles may impede passage

	Condition Category			
	Optimal	**Suboptimal**	**Marginal**	**Poor**
2. Aquatic Structure as Cover	Greater than 70% of substrate provides fish cover; mix of snags, submerged logs, undercut banks, in-stream rocks larger than cobbles; structures stable (predicted to remain at least 5 years).	40-70% mix of stable habitat; adequate habitat for maintenance of populations; presence of additional substrate in the form of newfall, but not yet prepared for colonization (may rate at high end of scale).	20-40% mix of stable habitat; habitat availability less than desirable; substrate frequently disturbed, removed, or absent.	Less than 20% stable habitat; lack of habitat is obvious; substrate unstable or lacking.
SCORE ___	20 19 18 17 16	15 14 13 12 11	10 (9) 8 7 6	5 4 3 2 1

	Condition Category			
	Optimal	**Suboptimal**	**Marginal**	**Poor**
3. Velocity/ Depth Regimes	All 4 velocity/depth regimes present (slow-deep, slow-shallow, fast-deep, fast-shallow). (slow is <0.3 m/s, deep is >0.5 m).	Only 3 of the 4 regimes present (if fast-shallow is missing, score lower than if missing other regimes).	Only 2 of the 4 habitat regimes present (if fast-shallow or slow-shallow are missing, score low).	Dominated by 1 velocity/ depth regime (usually slow-deep).
SCORE ___	20 19 18 17 16	15 14 13 12 (11)	10 9 8 7 6	5 4 3 2 1

Deep - Fast absent
Shallow - Slow abundant

Appendix B

Reach: Morrison Ck EPA
Site: Flying Horse 2/4
Date: 8/23/08
Observer: TJW

	Condition Category			
	Optimal	**Suboptimal**	**Marginal**	**Poor**
4. Channel Flow Status	Water reaches base of both lower banks, and minimal amount of channel substrate is exposed.	Water fills >75% of the available channel; or <25% of channel substrate is exposed.	Water fills 25-75% of the available channel, and/or riffle substrates are mostly exposed.	Very little water in channel and mostly present as standing pools.
SCORE ___	20 19 18 17 16	15 14 13 12 11	10 9 (8) 7 6	5 4 3 2 1

	Condition Category			
	Optimal	**Suboptimal**	**Marginal**	**Poor**
5. Channel Alteration	Channelization absent or minimal; stream with normal pattern.	Some channelization present, usually in areas of bridge abutments; evidence of past channelization, i.e., dredging, (greater than past 20 yr) may be present, but recent channelization is not present.	Channelization may be extensive; embankments or shoring structures present on both banks; and 40 to 80% of stream reach channelized and disrupted.	Banks shored with gabion or cement; over 80% of the stream reach channelized and disrupted. Instream habitat greatly altered or removed entirely.
SCORE ___	20 19 18 17 (16)	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1

	Condition Category			
	Optimal	**Suboptimal**	**Marginal**	**Poor**
6. Frequency of Riffles	Occurrence of riffles relatively frequent; distance between riffles divided by width of the stream <7 (generally 5 to 7); variety of habitat is key.	Occurrence of riffles infrequent; distance between riffles divided by the width of the stream is 7 to 15.	Occasional riffles; bottom contours provide some habitat; distance between riffles divided by the width of the stream is 15 to 25.	Generally all flat water or shallow runs; poor habitat; distance between riffles divided by the width of the stream is >25.
SCORE ___	20 19 18 17 16	15 14 13 12 (11)	10 9 8 7 6	5 4 3 2 1

	Condition Category			
	Optimal	**Suboptimal**	**Marginal**	**Poor**
7. Channel Sinuosity NOTE—evaluate in office	Bends in the stream increase stream length 3 to 4 times longer than if it was straight.	Bends in the stream increase stream length 2 to 3 times longer than if it was straight.	Bends in the stream increase stream length 1 to 2 times longer than if it was straight.	Channel straight; waterway has been channelized for a long distance.
SCORE ___	20 19 18 17 16	15 14 13 12 11	10 9 (8) 7 6	5 4 3 2 1

Appendix B

EPA 3/4

Reach: Morrison Ck
Site: Flying Horse
Date: 8/23/05
Observer: TBV

	Condition Category			
	Optimal	**Suboptimal**	**Marginal**	**Poor**
8. Bank Stability (score each bank, left bank is on left facing downstream)	Banks stable; evidence of erosion or bank failure absent or minimal; little potential for future problems. <5% of bank affected.	Moderately stable; infrequent, small areas of erosion mostly healed over. 5-30% of bank in reach has areas of erosion.	Moderately unstable; 30-60% of bank in reach has areas of erosion; high erosion potential during floods.	Unstable; many eroded areas; "raw" areas frequent along straight sections and bends; obvious bank sloughing; 60-100% of bank has erosional scars.
SCORE ___ Left Bank	10 9	8 (7) 6	5 4 3	2 1
SCORE ___ Right Bank	10 9	8 (7) 6	5 4 3	2 1

	Condition Category			
	Optimal	**Suboptimal**	**Marginal**	**Poor**
9. Riparian Vegetation Cover and Disturbance (score each bank)	More than 75% of the streambank and riparian zone to 50 ft boundary covered by riparian vegetation including trees, shrubs, herbaceous vegetation, or wetland emergents; vegetative disruption by grazing or cutting minimal or absent; almost all plants allowed to grow naturally.	50-75% of the streambank and riparian zone to 50 ft boundary covered by riparian vegetation; disruption by grazing or cutting may be evident but not seriously affecting riparian vegetation structure.	25-50% of the streambank and riparian zone to 50 ft boundary covered by riparian vegetation; extensive areas of bare cobble or patches of bare soil; disruption by grazing or cutting may be evident and seriously affecting riparian vegetation structure.	Less than 25% of the streambank and riparian zone to 50 ft boundary covered by riparian vegetation; mostly bare cobble or bare soil; disruption by grazing or cutting may be present and severely affecting riparian vegetation structure.
SCORE ___ Left Bank	10 9	8 7 (6)	5 4 3	2 1 0
SCORE ___ Right Bank	10 9	8 7 (6)	5 4 3	2 1 0

Morrison Ck - Flying Horse Road EPA 7/4

8/23/05 TM	Condition Category			
	Optimal	Suboptimal	Marginal	Poor
10. Riparian Vegetation zone width (score each bank)	Width of riparian zone > 50 ft; human activities (development, crops, parks, roads) have not impacted zone.	Width of riparian zone 35 to 50 ft; human activities have impacted zone only minimally.	Width of riparian zone 15 to 35 ft; human activities have impacted zone a great deal.	Width of riparian zone, 15 ft; little or no vegetation due to human activities.
SCORE ___ Left Bank	10 9	8 (7) 6	5 4 3	2 1 0
SCORE ___ Right Bank	10 9	8 (7) 6	5 4 3	2 1 0

COMMENTS

Total Score = 121 121/200 = 60.5% of optimum

Appendix B

Montana Habitat Assessment Field Data Sheet — Riffle/Run Prevalence

Stream Morrison Ck — Site Flying Horse Ranch
Date 8/23/08 — Investigator TAV

Habitat Parameter	Category			
	Optimal	Sub-Optimal	Marginal	Poor
1A. Riffle Development SCORE ( )	Well-developed riffle; riffle as wide as stream and extends two times width of stream. 9-10	Riffle as wide as stream but length less than two times width. 6-8	Reduced riffle area that is not as wide as stream and its length less than two times width. (5) 3-5	Riffles virtually non-existant 0-
1B. Benthic Substrate SCORE ( )	Diverse Substrate dominated by cobble. 9-10	Substrate diverse, with abundant cobble but bedrock boulder, fine gravel, or sand prevalent. 6-8	Substrate dominated by bedrock, boulders, fine gravel, sand or silt; cobble present. (4) 3-5	Monotonous fine gravel, sand, silt or bedrock substrate. 0-
2. Embeddedness SCORE ( )	Gravel, cobble, or boulder particles are between 0-25% surrounded by fine sediment (particles less than 6.35mm [.25"]) 16-20	Gravel, cobble, or boulder particles are between 25-50% surrounded by fine sediment. 11-15	Gravel, cobble, or boulder particles are between 50-75% surrounded by fine sediment. (8) 6-10	Gravel, cobble, or boulder particles are over 75% surrounded by fine sediment. 0-
3. Channel Alteration (channelization, straightening, dredging, other alterations) SCORE ( )	Channel alterations absent or minimal; stream pattern apparently in natural state. (16) 16-20	Some channelization present, usually in areas of crossings, etc. evidence of past alterations (before past 20 yr) may be present, but more recent channel alteration is not present. 11-15	New embankments present on both banks; and 40 to 80% of the stream reach channelized and disrupted. 6-10	Banks shored with gabion or cement; over 80% of the stream reach channelized and disrupted. 0-
4. Sediment Deposition SCORE ( )	Little or no enlargement of bars and less than 5% of the bottom affected by sediment deposition. 16-20	Some new increase in bar formation, mostly from coarse gravel; 5-30% of the bottom affected; slight deposition in pools. 11-15	Moderate deposition of new gravel, coarse sand on old and new bars; 30-50% of the bottom affected; sediment deposits at obstructions, constrictions, and bends; moderate deposition in pools prevalent. (7) 6-10	Heavy deposits of fine material, increased bar development; more than 50% of the bottom changing frequently; pools almost absent due to substantial sediment deposition. 0-

MT DEQ (cont) 2/2

Morrison Ck at Flying Horse Ranch

8/23/08 TAW

Habitat Parameter	Category: Optimal	Sub-Optimal	Marginal	Poor
5. Channel Flow Status SCORE [ ]	Water fills baseflow channel; minimal amount of channel substrate exposed. 16-20	Water fills > 75% of the baseflow channel; < 25% channel substrate exposed. 11-15	Water fills 25-75% of the baseflow channel; riffle substrates mostly exposed. (8) 6-10	Very little water in channel, and mostly present as standing pools. 0-5
6. Bank Stability (Score each bank) *Note: determine left or right side while facing downstream.* SCORE [ ] (left) SCORE [ ] (right)	Banks stable; no evidence of erosion or bank failure; little apparent potential for future problems. 9-10	Moderately stable; infrequent, small areas of erosion mostly healed over. (7) (7) 6-8	Moderately unstable; moderate frequency and size of erosional areas; up to 60% of banks in reach have erosion; high erosion potential during high flow. 3-6	Unstable; many eroded areas; "raw" areas frequent along straight sections and bends; obvious bank sloughing; 60-100% of banks have erosion scars on side slopes. 0-2
7. Bank Vegetation Protection (note: reduce scores for annual crops and weeds which do not hold soil well, eg knapweed) SCORE [ ] (left) SCORE [ ] (right)	Over 90% of the streambank surfaces covered by stabilizing vegetation; vegetative disruption minimal or not evident; almost all plants allowed to grow naturally. 9-10	70-90% of the streambank surfaces covered by vegetation; disruption evident, but not affecting full plant growth potential to any great extent; more than one-half of potential plant height evident. (6) (6) 6-9	50-70% of the streambank surfaces covered in vegetation; disruption obvious; patches of bare soil or closely cropped vegetation common; less than one-half of potential plant height remaining. 3-5	Less than 50% of the streambank surfaces covered by vegetation; extensive disruption of vegetation; vegetation removed to 2 inches or less. 0-2
8. Vegetated Zone Width (score zone for each side of stream) SCORE [ ] (left) SCORE [ ] (right)	Width of vegetated zone > 100 feet. 9-10	Width of vegetated zone 30-100 feet. (7) (7) 6-8	Width of vegetated zone 10-30 feet. 3-5	Width of vegetated zone < 10 feet. 0-2

TOTAL SCORE [88]

88/160 = 55% of Optimum

STAGE (ft)	#SEC	AREA (sq ft)	PERIM (ft)	WIDTH (ft)	R (ft)	DHYD (ft)	SLOPE (ft/ft)	n	VAVG (ft/s)	Q (cfs)	SHEAR (psf)
0.3	T	1.79	16.83	16.77	0.11	0.11	0.003	0.026	0.69	1.23	0.02
0.4	T	3.68	20.62	20.55	0.18	0.18	0.003	0.026	0.98	3.61	0.03
0.5	T	5.8	21.9	21.81	0.26	0.27	0.003	0.026	1.28	7.46	0.05
0.6	T	7.99	22.17	21.99	0.36	0.36	0.003	0.026	1.59	12.68	0.07
0.7	T	10.31	27.36	27.09	0.38	0.38	0.003	0.026	1.64	16.93	0.07
0.8	T	13.19	30.46	30.11	0.43	0.44	0.003	0.026	1.81	23.92	0.08
0.9	T	16.26	31.36	30.94	0.52	0.53	0.003	0.026	2.06	33.44	0.1
1	T	19.37	31.79	31.3	0.61	0.62	0.003	0.025	2.3	44.62	0.11
1.1	T	22.52	32.21	31.66	0.7	0.71	0.003	0.025	2.54	57.17	0.13
1.2	T	25.7	32.64	32.02	0.79	0.8	0.003	0.025	2.76	71.06	0.15
1.3	T	28.92	33.07	32.38	0.87	0.89	0.003	0.025	2.98	86.26	0.16
1.4	T	32.18	33.47	32.71	0.96	0.98	0.003	0.025	3.2	102.82	0.18
1.5	T	35.46	33.79	32.95	1.05	1.08	0.003	0.025	3.41	120.84	0.2
1.6	T	38.77	34.1	33.19	1.14	1.17	0.003	0.025	3.62	140.15	0.21
1.7	T	42.1	34.42	33.43	1.22	1.26	0.003	0.024	3.82	160.76	0.23
1.8	T	45.45	34.74	33.67	1.31	1.35	0.003	0.024	4.02	182.65	0.24
1.9	T	48.84	35.15	34.02	1.39	1.44	0.003	0.024	4.21	205.52	0.26
2	T	52.26	35.6	34.42	1.47	1.52	0.003	0.024	4.39	229.52	0.27

YAMPA RIVER BASIN

Alternatives Feasibility Study

COLORADO RIVER WATER CONSERVATION DISTRICT

COLORADO WATER CONSERVATION BOARD
DEPARTMENT OF NATURAL RESOURCES

BUREAU OF RECLAMATION
U.S. DEPARTMENT OF THE INTERIOR

FINAL REPORT

March 1993

HYDROSPHERE
Resource Consultants
1002 Walnut Suite 200
Boulder, CO 80302

uncertainty about current CDOW and Service policy regarding the stocking of non-native species other than salmonids in the Yampa River basin.

The data collection at each site was limited to a visual evaluation of the existing stream habitat conditions, narrative description of the potential reservoir area, and stream channel stability rating. The existing stream habitat, reservoir characteristics and narrative description were recorded on "General Stream Habitat Survey" forms. The stream channel stability was rated using the Pfankuch (1978) method and recorded on the survey form. Water temperature and water quality were evaluated using the available USGS water quality records. Fishery information was obtained from the CDOW Database. Reservoir fishery potential was evaluated using the model of McConnell, et al. (1984).

Cultural Resources

The potential for impacts on cultural and historical resources was examined by reviewing readily available information from the Colorado Historical Society. A literature search was performed to ascertain which, if any, portions of the sites had been surveyed for archaeological and historical sites. The file search was completed in August of 1991. Ten sites were identified and twelve surveys were found. The relevant survey reports were reviewed and the identified sites' locations relative to the reservoirs determined. A brief discussion was held with officers of the State Historical Preservation office to determine the general likelihood of cultural resources in the vicinity of the reservoirs.

The file search reports list the types of sites and an assessment as to the sites' eligibility for the National Register. Assessments are either from the field, i.e. the surveyor, or official, from the State Historical Preservation Office. All sites and findings are classified as one of eleven different types. The only site types identified in this file search were "other historical site" type, "isolated find", "open camp" and "open lithic". Open camp refers to sites located in an open topographic situation and consisting of features or artifacts which indicate domestic activity, defined by the presence of one or more of the following: groundstone, ceramics, fire hearths, middens, and usually containing waste flakes and chipped tools. Open lithic refers to sites containing lithic (stone) material, usually waste flakes and chipped stone tools, located in an open topographic situation.

Summary of Field Evaluations

Morrison Creek Site

Engineering Aspects. Two possible dam sites were identified along the lower reach of Morrison Creek. Only the upper site was included in the field survey; however, it appeared that the lower site has very similar characteristics. The site is situated within a narrow canyon with steep rock abutments on either side of the creek. Although a dam was at one time considered at the canyon entrance upstream of the sites viewed in the field, it apparently never received serious consideration as no engineering documentation for such a project has been located. Virtually no other background information exists for the Morrison Creek site, and USGS 7.5' quadrangle sheets provide the best available mapping.

Morrison Creek through the canyon is a high gradient stream but appears to carry only a light sediment load. No evidence of mining activity in the area was seen. This site would be best suited for either a rockfill or roller-compacted concrete dam with an overtopping spillway; the dam crest would be approximately 450 feet long. Construction access and a staging area

would need to be constructed near the site, which lies in rugged terrain. No geological hazards were noted at this level of evaluation.

Hydrology. This site is desirable from a water delivery perspective since it lies upstream of most potential demand areas. Average annual inflow is estimated to be about 59,000 acre-feet. The maximum size reservoir that the site topography would allow would be about 31,000 acre-feet, and site characteristics would logically suggest development to this capacity.

Site Development Cost. A reservoir of 31,000 acre-feet (af) total volume at the Morrison Creek site would have development costs in the range of 14 to 21 million dollars. This figure represents a cost of approximately $900 per acre foot of reservoir active storage.

Recreation. The recreation potential of a Morrison Creek reservoir is limited by distance from Craig, by the relatively poor access to the site itself, and by competition from the nearby and more accessible Stagecoach Reservoir. Although a reservoir at Morrison Creek would be very scenic when full, with relatively small amounts of drawdown it would exhibit extensive mudflats in those portions of the basin that are most accessible and visible. The reservoir would have a surface area of roughly 400 acres at the high water line. Given the poor access and good substitutes available close by, about 100,000 visits might be expected annually under current conditions.

Terrestrial Ecology. The Morrison Creek site is located in an upper montane/subalpine valley that is characterized by a high degree of ecological and landscape diversity. In addition to the diverse riparian habitats including willow shrublands, wet grassy meadows and fens, there are spruce-fir forests (some of which are old growth in character), aspen woodlands, meadows and various types of shrublands. The native habitat types show only limited evidence of past disturbance from agricultural activities.

Wildlife populations in the valley and nearby vicinity are undoubtedly diverse in terms of both game and non-game species. Large year-round populations of mule deer and elk occur. WRIS mapping information identifies the area as being within elk "winter range" as well as within elk "severe winter range". Also, the site is within greater Sandhill crane and sharp-tailed grouse "overall range". Sandhill crane and golden eagle nesting areas have been identified within the area that would be inundated.

Wetlands occur along the entire reach of Morrison Creek with the greatest extent of development occurring in the upper reaches of the areas that would be inundated by a reservoir. These wetlands consist of wet meadows dominated by grasses and sedges and willow shrublands.

Aquatic Ecology. Stream habitat in the Morrison Creek Reservoir area is predominantly riffle-run habitat with some pools on the outside of meander bends. Stream substrate in the reservoir area is cobble and gravel. There is spawning habitat at the pool-riffle interfaces. Water clarity is good even at bankfull discharge. Bank stability is good throughout the site. There is extensive bank cover on the stream with little evidence of grazing. The existing fishery is classified as excellent by CDOW. There are no limiting factors listed for this site.

The lower half of the potential reservoir area is heavily forested with large coniferous forests with tree heights exceeding 80 feet. Large organic debris from the stands is in the channel and along the stream banks. Tree rootwads and downed trees provide instream cover in many sections of the stream.

The upper reservoir area is currently hay meadows and has the potential to be exposed during reservoir operations which would elevate turbidity levels in the reservoir. The reservoir elevation is approximately 7800 feet and therefore water temperatures should remain suitable for trout. The tailwater area is relatively steep gradient stream with large boulders, step pools and cascades. Stream habitat is more limited in this section of the stream than that found in the reservoir area.

Cultural Resources. No specific surveys of the area to be inundated were identified. However, a total of six archaeological sites were identified which would be impacted by the Morrison Creek reservoir. No official determination as to the sites' eligibility to the National Register has been made. Three of the sites are open lithic sites which have a "field needs data" status, which means that a determination has been made by the surveyor that more information is necessary before an unofficial (field) or official determination can be made. An additional open lithic site and two isolated finds have "field not eligible" status, meaning the surveyor thought the sites would not be eligible for listing on the National Register. Official determination would need to be made if the site were to be considered further.

Of the sites considered at this stage, Morrison Creek reservoir had the greatest potential impact on known archaeological resources.

Walton Creek Site

Engineering Aspects. USGS 7.5' quadrangle sheets provide the best available mapping for the Walton Creek site since virtually no other background information exists. The dam axis at the Walton Creek site would be located at the narrowest section of the drainage basin approximately 4 miles above the confluence with the Yampa River. The site would require a dam approximately 1,250 feet long and 300 feet high.

Both abutments are of moderate slope consisting largely of metamorphic and igneous rock with some silty clay. Material available for dam construction in the immediate vicinity consists of rock and clay. The most probable dam construction method would be earthfill or rockfill. This site would require an overtopping type of spillway or possibly a spillway constructed along the right abutment. Side slopes within the reservoir area are moderate to very steep. No geologic hazards were noted at this level of evaluation.

Hydrology. This site is favorable in terms of water delivery, being upstream of most potential demand areas. Average annual inflow is estimated to be about 64,000 acre-feet. The maximum size reservoir that the site topography would allow would be about 25,000 acre-feet, and site characteristics would logically suggest development of this capacity. The sediment load in Walton Creek appears to be light.

Site Development Costs. A reservoir of 25,000 af total volume at the Walton Creek site would have development costs in the range of 120 to 150 million dollars, due primarily to the large dam size required. This figure represents a cost of approximately $6,400 per acre foot of reservoir active storage.

Recreation. Access to the Walton Creek site is better than that for Morrison Creek, the site itself being only a few miles off of U.S. Highway 40. Still, the site is quite remote from Craig. The reservoir would have fairly steep side slopes and a rather uniform "bathtub" shape with few opportunities for boat ramps and campgrounds. The reservoir would provide only about 200 acres of surface area when full. About 50,000 annual visits might be expected under 1991 conditions.

was added partly at the suggestion of TSG at its August 16, 1991 meeting. This suggestion was followed up when it appeared that the evaluation would lead to the elimination of all but one upper basin long-term storage site. The evaluation data for the Stagecoach Enlargement alternative was derived from the Final EIS for the Stagecoach Project.

Site Selection Recommendations

Based on the foregoing evaluations, the multi-disciplinary evaluation team developed a set of preliminary recommendations regarding the sites that should be carried forward into formulation of alternatives. The sites recommended for further consideration are listed in Table 4-6 and shown in Figure 4-3.

Table 4-6

Sites Recommended for Further Consideration

1. Stagecoach Reservoir Enlargement
2. Elk Creek Off-channel Storage
3. Elkhead Reservoir Enlargement
4. Williams Fork near Hamilton
5. East Fork Williams Fork above Willow Creek

Morrison Creek

It was recommended that the Morrison Creek site be eliminated primarily on environmental grounds, although it is arguably the best reservoir site from a technical and economic perspective. A reservoir at the Morrison Creek site would inundate a well-developed and diverse forest ecosystem, much of which is old growth in nature. The upper reaches of the reservoir would inundate relatively large areas of subalpine wetland; with cyclical operation, these wetland areas would become broad mud flats. In addition, Morrison Creek is the only stream visited which is currently rated as an excellent fishery by CDOW. The reservoir would also inundate the greatest number of known archaeological sites.

Walton Creek

It was recommended that the Walton Creek site be eliminated primarily on the basis of development cost. While the site has good inflow and few environmental constraints, the shape of the valley is such that a relatively large dam embankment is unavoidable. Other sites studied offer substantially lower cost per unit of storage.

Pilot Knob

It was recommended that the Pilot Knob site be eliminated from further consideration based on both technical and environmental grounds. From a technical perspective, the site is inferior to the enlargement of Elkhead Reservoir with which it would compete for a water supply. The site is also relatively inconvenient to get to, which limits its recreational value. From an environmental perspective, development of any long-term water storage capacity would encroach upon large wetland areas which are known Sandhill crane habitat.

Morrison Creek Diversion Status Summary

1. Diversion at Silver Creek/Morrison Creek Confluence
   - This site has excellent access.
   - For 2003, the peak flow below the confluence was 826 cfs (6/1/03). Flow averaged approximately 300 cfs from April 28th through June 12th.
   - We have considerable concern about the amount of sediment transported in Morrison Creek from Muddy Creek. This sediment will end up in Stagecoach.
   - A mile long pipeline is required from the diversion structure below the confluence to the upper Little Morrison Creek drainage. 500 feet of the pipeline would be buried at approximately 50 feet deep. 55
   - Two options considered:
     - Open trenching: cost estimated at $2,200,470
     - Boring: cost estimated at $4,572,350
   - The highest average monthly stream flow for Little Morrison Creek occurs in April and measures approximately 7 cfs. Normal flow in Little Morrison Creek would quadruple with the diverted water. There is significant concern about the probable deterioration of the existing natural Little Morrison Creek channel due to the diverted water.
   - An alternative would be to continue the pipe down county road 16 to Stagecoach thereby preserving the Little Morrison Creek channel. Miro recommends this alternative.

2. Diversion up Silver Creek
   - The proposed diversion site is located on National Forest property and borders the Sarvice Creek Wilderness Area.
   - Access to the site would be very difficult requiring a bridge and steep road constructed over a mountain.
   - The Silver Creek water runs extremely clear and thus does not have the potential sedimentation problem of Morrison Creek.
   - This option would require a 2000 foot bore through the mountain.
   - As a result of the higher diversion elevation, the pipeline (with the exception of the bore) would be at standard depth.
   - This concept has the same potential negative impact on the Little Morrison Creek drainage as the concept above.
   - No cost estimate was developed for this concept.

3. Diversion at Morrison Creek Bridge Crossing on County Road 16
   - This diversion point is above the confluence of Silver Creek and Morrison Creek. Therefore, this option does not get the benefit of the Silver Creek water.
   - This site has excellent access.
   - We have considerable concern about the amount of sediment transported in Morrison Creek from Muddy Creek. This sediment will end up in Stagecoach.

- A several mile long pipeline is required from the diversion structure to the upper Little Morrison Creek drainage. 500 feet of the pipeline would be buried at over 70 feet deep.
- This concept has the same potential negative impact on the Little Morrison Creek drainage as the concepts above.
- No cost estimate was developed for this concept.

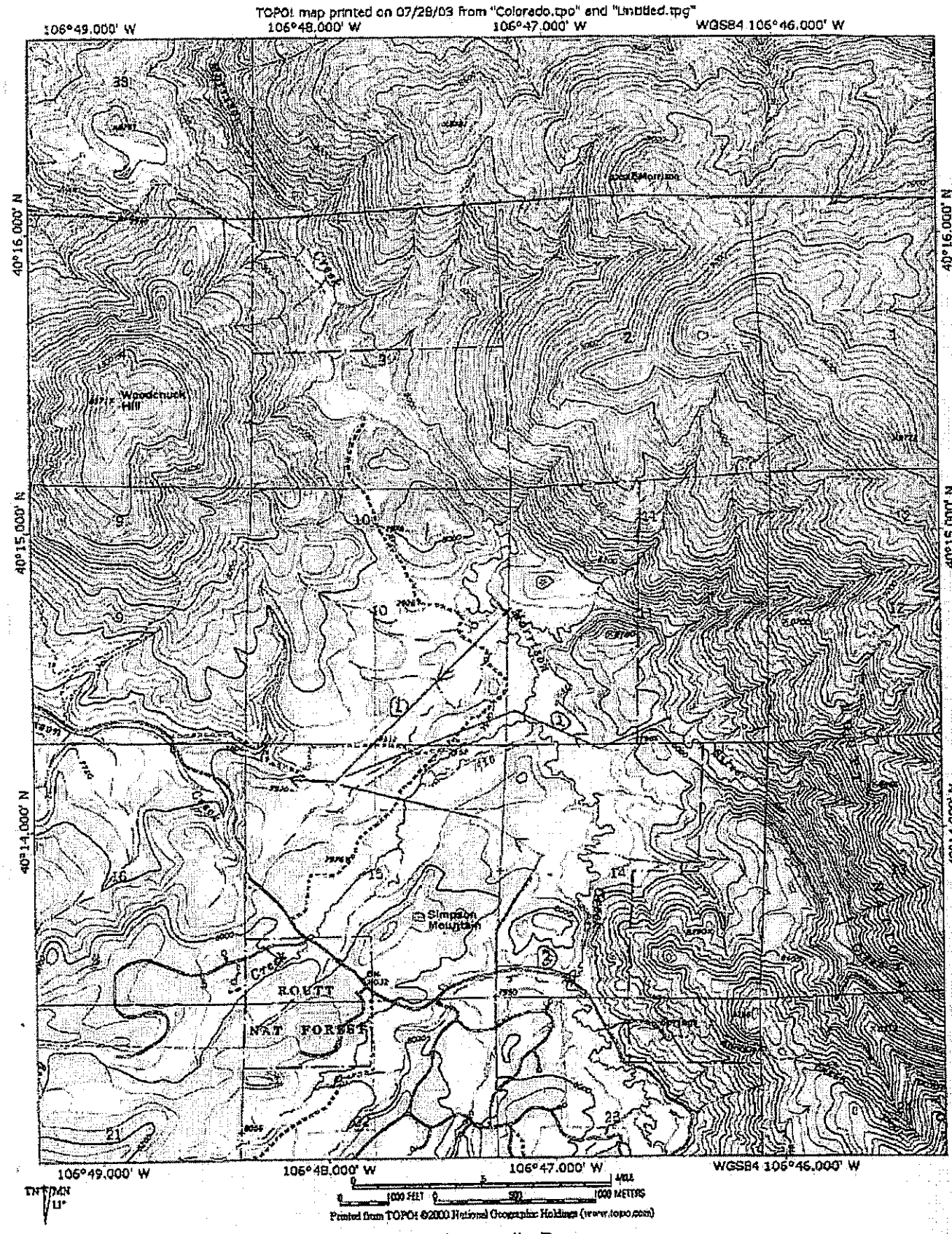
4. Morrison Creek Canyon Diversion
   - A diversion structure would be placed in Morrison Creek Canyon. A pipeline would transport the water around the hill to Stagecoach. This option may combine both an open trench pipeline as well as a bored pipeline.
   - Access to the diversion would be difficult.
   - As this diversion point is below the confluence of Silver Creek and Morrison Creek, this option would also have the potential sedimentation problem.
   - There would be a significant cut in the hillside for the road and pipeline. Commissioner Monger stated that the county would not likely approve this design due to the environmental impacts.
   - The project has been estimated to cost approximately $1,000,000.

5. Irrigation Ditch
   - This diversion point is above the confluence of Silver Creek and Morrison Creek. Therefore, this option does not get the benefit of the Silver Creek water.
   - This diversion site would have excellent access.
   - We have considerable concern about the amount of sediment transported in Morrison Creek from Muddy Creek. This sediment will end up in Stagecoach.
   - A several mile long irrigation is required from the diversion structure to the upper Little Morrison Creek drainage. This potential ditch would impact multiple property owners.
   - Likely very high maintenance costs.
   - This concept has the same potential negative impact on the Little Morrison Creek drainage as the concepts above.
   - No cost estimate was developed for this concept.

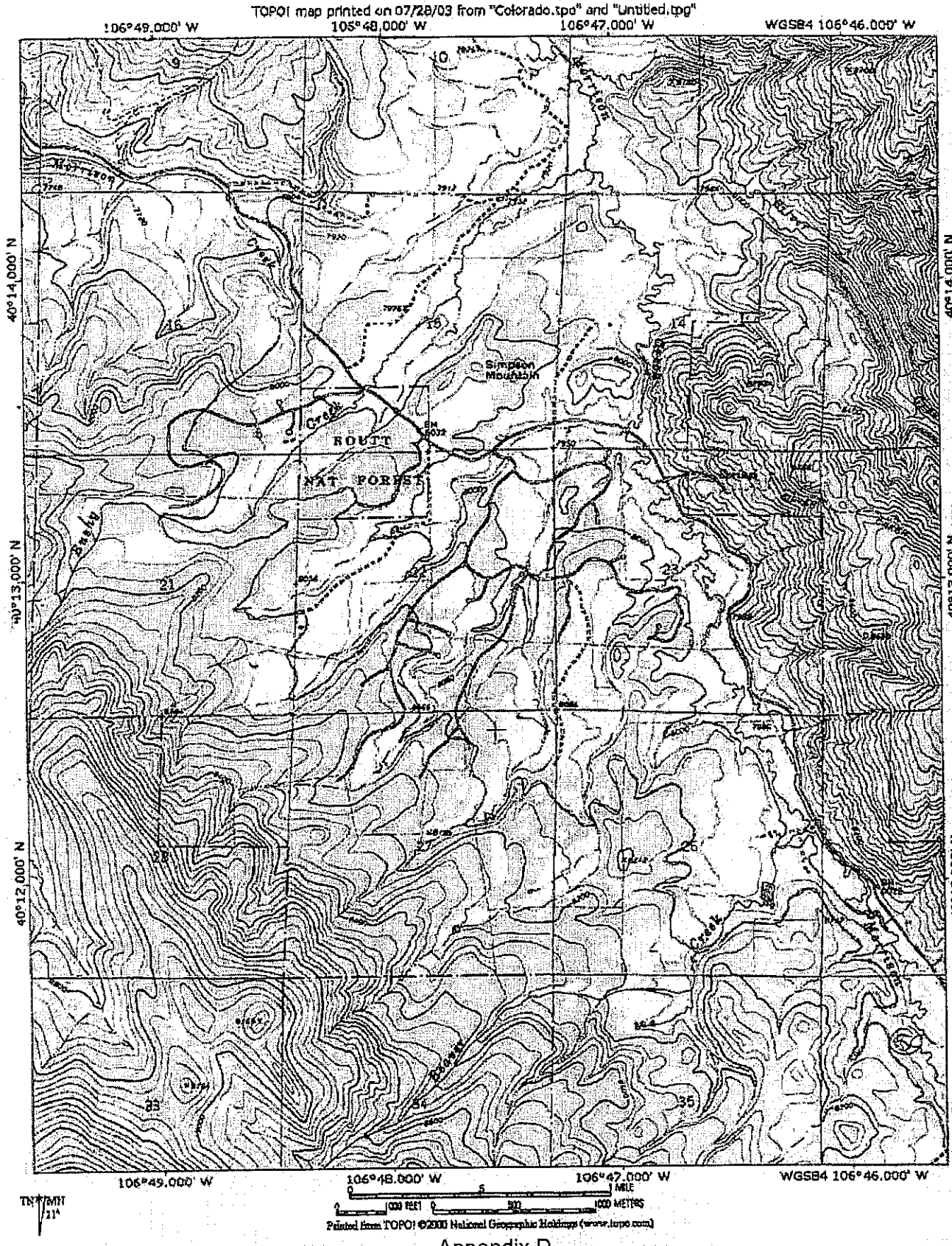
6. Pump Back from Confluence of Morrison Creek and the Yampa River
   - This diversion point is below the confluence of Morrison Creek and the Yampa River.
   - Access may be an issue as the diversion point is on private property (Bill Gay)
   - Pipeline would follow the existing road up to Stagecoach.
   - Pumps would pump excess water from Morrison Creek up to Stagecoach.
   - The ongoing operating cost would be the difference in what we get for producing electricity and what we pay for electricity as well as the additional electricity losses to overcome the frictional line losses.
   - Least environmentally damaging project overall.
   - No cost estimate has been established for this concept.

7. Morrison Creek Canyon Tunnel
   - Access to the diversion would be difficult.
   - As this diversion point is below the confluence of Silver Creek and Morrison Creek, this option would also have the potential sedimentation problem.
   - An approximately 1.25 mile tunnel would be bored through the mountain. After the tunnel, the diversion water would run down an open channel. Likely the open channel would need to be improved to handle the diversion water.
   - No cost estimate has been established for this concept.

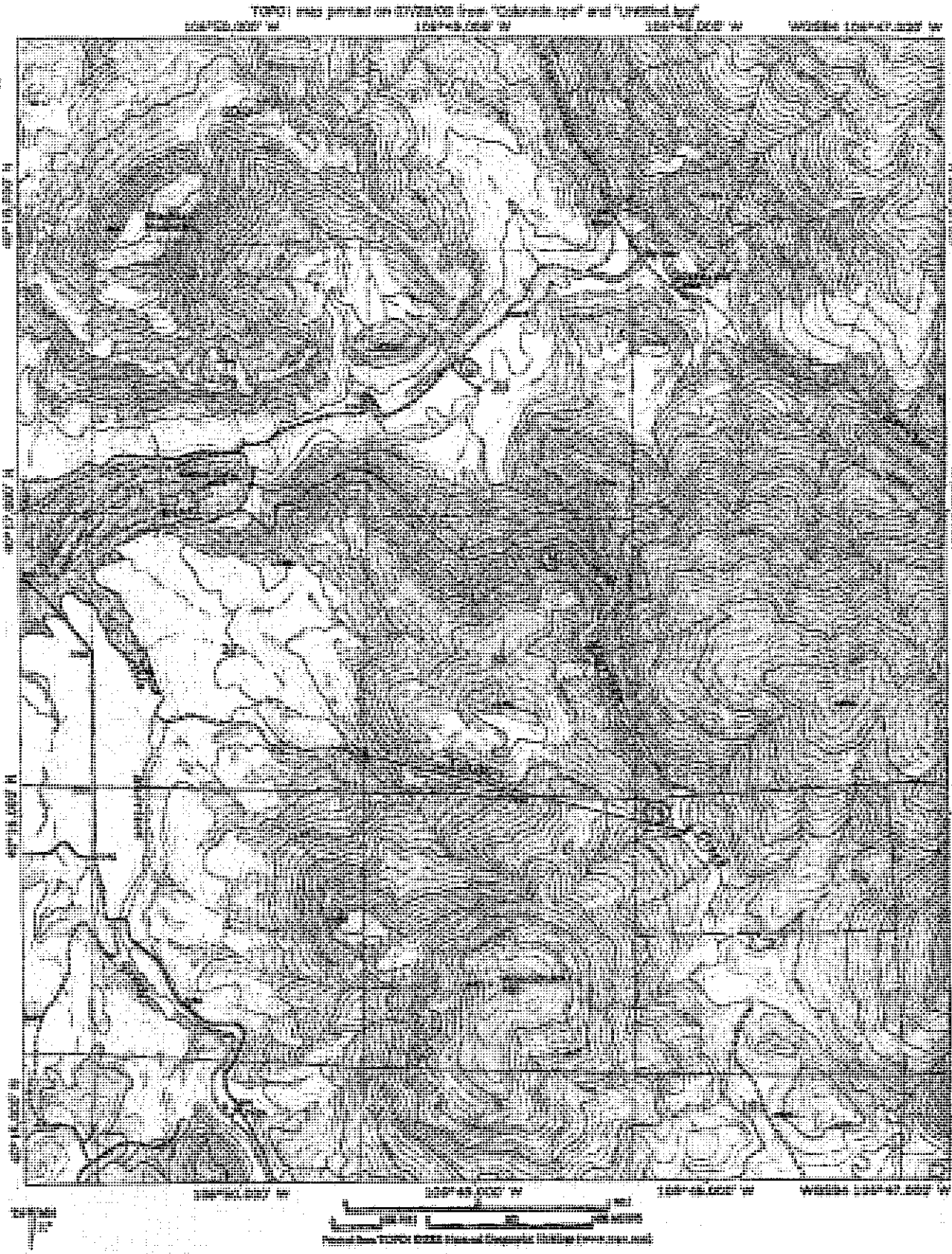
Robert Stoddard
Monday 28 July 03


TOPO! map printed on 07/28/03 from "Colorado.tpo" and "Untitled.tpg"
106°49.000' W
106°48.000' W
106°47.000' W
WGS84 106°46.000' W
40°16.000' N
40°15.000' N
40°14.000' N
Woodchuck Hill
Simpson Mountain
ROUTT
NAT FOREST
1000 FEET
1000 METERS
Printed from TOPO! ©2000 National Geographic Holdings (www.topo.com)

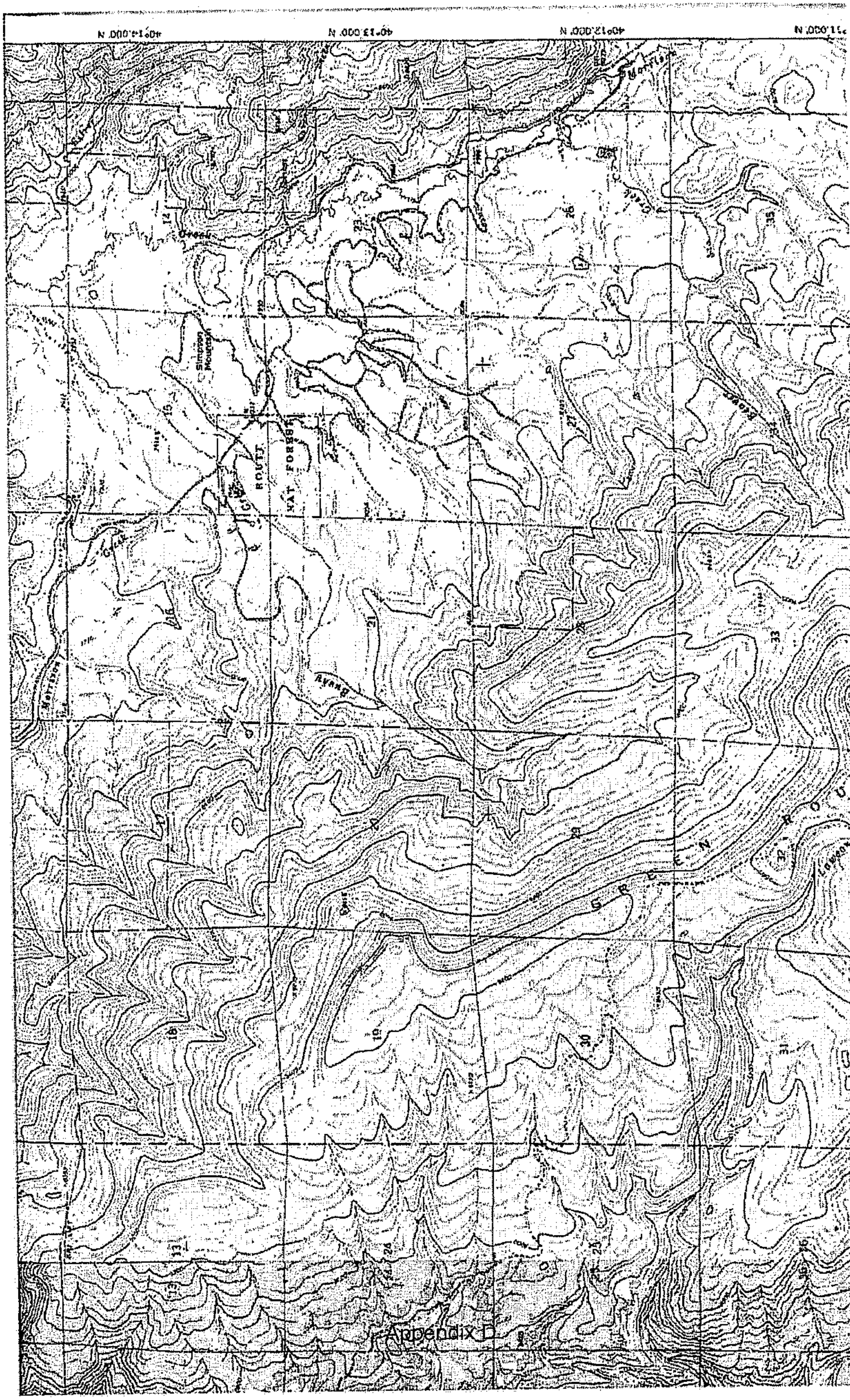
Appendix D


TOPO! map printed on 07/28/03 from "Colorado.tpo" and "Untitled.tpg"
106°49.000' W
106°48.000' W
106°47.000' W
WGS84 106°46.000' W
40°14.000' N
40°13.000' N
40°12.000' N
Simpson Mountain
ROUTT
NAT FOREST
Printed from TOPO! ©2000 National Geographic Holdings (www.topo.com)

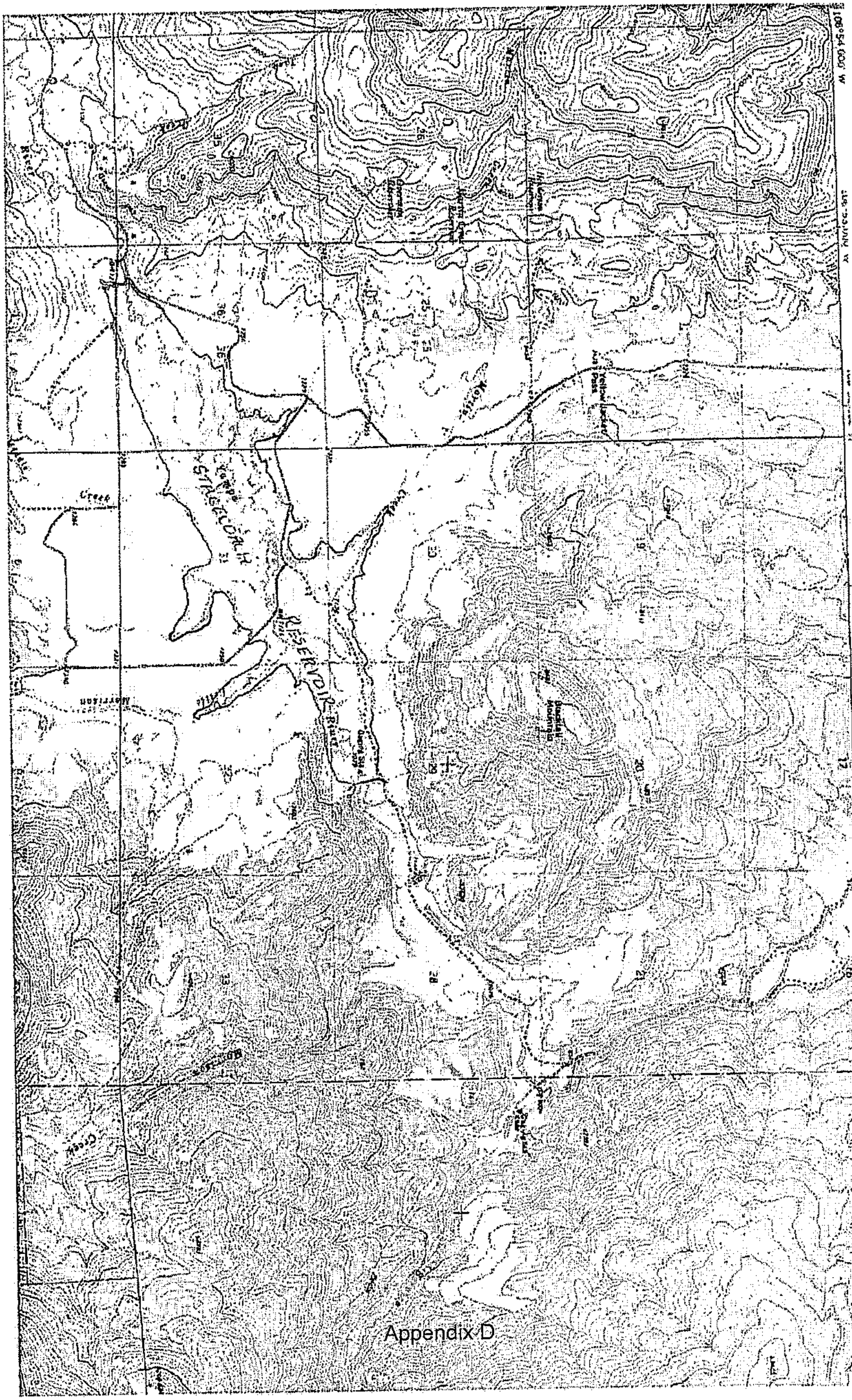
Appendix D



Appendix D



Appendix D



Appendix D

Upper Yampa Water Conservancy District

July 31, 2009

Linda Bassi, Esq.
Stream and Lake Protection Section
Colorado Water Conservation Board
1313 Sherman Street, Suite 721
Denver, CO 80203

Re: Morrison Creek Instream Flow Recommendation

Dear Linda:

The Upper Yampa Water Conservancy District is pursuing several potential projects with the primary objective of providing drought protection to the Upper Yampa Basin. Several of these projects center on Morrison Creek. We have previously discussed these projects with the CWCB, including staff of the Stream and Lake Protection Section. Indeed the District requested and participated in the original field visit with your staff to assess flow needs of Morrison Creek. This was done to aid in project planning and was prior to the current requests for an ISF on Morrison Creek. Additionally, as part of the District's Stipulations in water court filings, we have committed (and fully expected) to work with the staff of the CWCB on mitigation of the Silver Creek ISF should the Morrison Creek Reservoir project come to fruition. Remember, funds from the CWCB's 1177 funds have partially financed the feasibility study for the Morrison Creek Reservoir option.

Since several projects are currently under study we suggest that an ISF on Morrison Creek is premature. As you are aware any water development project on Morrison Creek will involve consultation with many agencies in order to craft appropriate mitigation. For the reservoir under study that would include at a minimum the CWCB, the Water Quality Control Division, the Colorado Division of Wildlife, the U.S Fish and Wildlife Service, Routt County, the U.S. Army Corps of Engineers, the U.S. Environmental Protection Agency, The U. S. Forest Service and the Federal Energy Regulatory Commission. Input form these agencies and the public will be necessary to meet both environmental and water supply needs of the Upper Yampa Basin. An ISF on Morrison Creek at this time, prior to this input, is not warranted. We respectfully request that the Morrison Creek ISF proposal be withdrawn until the appropriate project to supply drought protection to the basin is decided upon and appropriate coordinated environmental mitigation decisions can be completed with all parties.

Sincerely,

Kevin McBride, P.E.
District Manager

Mailing Address
P.O. Box 880339

Location
Fish Creek Filtration Plant

Telephone
(970) 879-2424

SHARP, STEINKE, SHERMAN & ENGLE LLC
Attorneys and Counselors at Law
401 Lincoln Avenue
P.O. Box 774608
Steamboat Springs, Colorado 80477
Telephone: (970) 879-7600 FAX: (970) 879-8162
sharp@steamboatlawfirm.com

MARK E. STEINKE
MELINDA H. SHERMAN
GARY S. ENGLE
KARINA SERKIN SPITZLEY

THOMAS R. SHARP
Of Counsel

August 1, 2009

VIA EMAIL
Mr. Jeff Baessler
Stream and Lake Protection Section
Colorado Water Conservation Board
Denver, CO

Re: Proposed Instream Flow for Morrison Creek, Water Division 6

Dear Jeff:

I have been a director for over 30 years of the Upper Yampa Water Conservancy District. I have been general counsel for over 35 years to the Morrison Creek Metropolitan Water and Sanitation District. I am currently the chairman of the Yampa-White River Basin Round Table. I have been involved for more than 30 years in water policy and water development in the Upper Yampa River Basin. I am currently Routt County's representative on the Colorado River Water Conservation District Board of Directors.

I was previously a member for 3 years of the Colorado Water Conservation Board, ending about 2 and ½ years ago. During that period, the BLM proposed a new instream flow appropriation on Morrison Creek. I strongly objected to the new appropriation at that time, and informed the Stream and Lake Protection Section and my fellow board members on the CWCB that the water users, Upper Yampa District, and Morrison Creek Metro District needed to defer any action on Morrison Creek for a new instream flow appropriation for a period of 5 years while we settle out how and where Morrison Creek water can be used and developed to (i) firm up the yield of Stagecoach Reservoir, and (ii) provide supplemental long-term M&I water to the upper basin, including particularly the 11,000-acre Stagecoach area which is an urban growth center in Routt County's master plan and which already has about 700 residents. Indeed, the south end of the Stagecoach area, including more than 1,000 platted lots, lies in the upper reaches of Morrison Creek.

The Board and BLM agreed to defer action on a Morrison Creek instream flow.

Now, only 2 and ½ years later, due to requests other than from BLM, the subject of appropriating instream flows on Morrison Creek has again reached nearly formal stages.

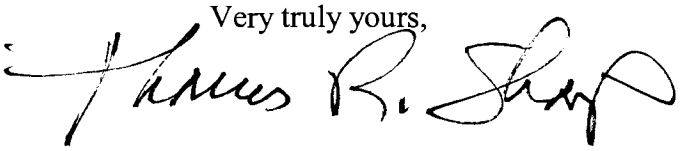
Neither the Upper Yampa District nor the Morrison Creek Metro District have resolved and completed the necessary focus on the location, method, and amounts of Morrison Creek water necessary for M&I development and to firm up Stagecoach Reservoir. The Metro District is still in the middle of its first major water supply master plan by HRS Water Engineers. Unless the proposals to make a new appropriation of instream flow on Morrison Creek are deliberately deferred and delayed for another couple of years at most, at least the Metro District may have to prematurely file for various water rights on upper Morrison Creek before it is even finally determined that such a filing is necessary for the final solution for water supply to the portion of the District on upper Morrison Creek.

I strongly and urgently request that the proposal for an instream flow on Morrison Creek be deferred and delayed for 2 more years, so that the total delay does not exceed the 5 years agreed to by the BLM when I was on the CWCB board.

During that time, the efforts of both the Upper Yampa District and the Metro District may become focused and finalized, so that the future instream flow appropriation will not encumber or impede such efforts.

Thank you for your consideration. Please consider this as my testimony at the August 4 meeting at the Routt County courthouse, which I cannot attend as I will be in the Leadville area.

Very truly yours,



Thomas R. Sharp

:trs
cc: Geoff Blakeslee (via email)
Kevin McBride (via email)
Steve Colby (via email)

MORRISON CREEK METROPOLITAN WATER & SANITATION DISTRICT
24490 Uncompahgre Road, Oak Creek, Colorado 80467
Telephone (970) 736-8250 / Fax (970) 736-0177
Email: info@mcwater.org

August 3, 2009

VIA EMAIL
Mr. Jeff Baessler
Stream and Lake Protection Section
Colorado Water Conservation Board
Denver, CO

Re: Proposed Instream Flow Recommendation on Morrison Creek in Water Division 6

Dear Mr. Baessler,

The Morrison Creek Metropolitan Water and Sanitation District (MCMWSD) is the entity which is responsible for providing water and sanitation services to the Stagecoach subdivisions south of Steamboat Springs. The MCMWSD currently serves approximately 400 service connections and has water distribution lines in place which serve another approximately 300 as yet undeveloped lots. In addition there are another approximately 1800 platted lots which currently do not have water distribution lines but which could be serviced in the future. Most of these platted lots lie in the south area of the District which is tributary to Morrison Creek. There is also substantial unplatted land in the District boundaries which is identified for future development in land use plans.

The MCMWSD currently relies on groundwater pumped from the Browns Park aquifer for all of its supply. A water supply master plan has recently been prepared by HRS Water Consultants Inc. for the District. This plan has determined that wells drilled into the Browns Park aquifer could supply the Districts needs until close to full buildout. Many of these wells will need to be located in the southern area of the District which is in the Morrison Creek drainage. HRS Water Consultants are currently studying how these wells may affect the surface streamflows.

We are concerned how a premature instream flow designation on Morrison Creek will affect our ability to provide for our service area. We would particularly ask that the designation be delayed until the MCMWSD has completed all masterplanning and investigative studies and has firmed up its future supply. We are also aware of efforts by the Upper Yampa Water Conservancy District to complete projects on Morrison Creek which could provide clear advantage to the MCMWSD for direct supply and/or augmentation purposes.

Thank you for consideration of our concerns and do not hesitate to contact me should you have any questions.

Sincerely,

Steve Colby

District Manager

cc: Board of Directors, MCMWSD
Geoff Blakeslee
Kevin McBride
Doug Monger, Routt County Commissioner