BENEFICIAL USE RECONNAISSANCE
MONITORING AND ASSESSMENT REPORT

Waterbody: Coantag Creek Watershed: Bear River

Hydrologic Unit Code: WYBR16010102 Segment: 045-1

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INTRODUCTION

Coantag Creek is classified by Chapter 1, Appendix A of the Water Quality Rules and Regulations as a Class 2AB, cold water stream (WDEQ/WQD, 2001b). Coantag Creek is approximately 9.33 miles in length and is located entirely on Bridger National Forest lands in southwest Wyoming. The creek flows south and west until joining Hobble Creek which also flows south and west until joining the Smiths Fork, a tributary of the Bear River. Designated uses for Coantag Creek include agriculture, protection and propagation of fish and wildlife, industry, human consumption, recreation, and scenic value (WDEQ/WQD, 2001c).

Coantag Creek was included in the WDEQ/WQD Monitoring Program because inconclusive data suggested partial use support for cold water fish, aquatic life use, agriculture and agriculture irrigation due to elevated salinity, total dissolved solids, chlorides and unknown causes(WDEQ/WQD, 1996). This report formalizes the results of an assessment of Coantag Creek conducted by WDEQ/WQD personnel on September 24, 1998.

METHODS

A pre-monitoring evaluation suggested that a single bioassessment station, located above the Forest Service road crossing, below the old oil exploration site and below the runoff-dominated tributaries would adequately provide an assessment of designated use support of this waterbody. This bioassessment station (ID Code= MRW-81) was established in the SE¼NW¼ Sec. 36, T.28N., R.117 1/2W., Lincoln County, Wyoming. Locational coordinates for the station are 42° 22' 16.18" north latitude and 110° 47' 19.49" west longitude. These coordinates were determined from a corrected global positioning system reading at the base of the sample riffle. The station was located approximately 10 feet upstream of the bridge road crossing at an elevation of approximately 7,200 feet. The station is found on the *Big Park* USGS 7½' Quadrangle and the *Fontenelle Reservoir* 1:100,000 BLM Surface Management Status map.

Water samples were collected, preserved, transported and analyzed in accordance with procedures outlined in WDEQ/WQD (2001a) and WDEQ/WQD (1998). Temperature, pH, dissolved oxygen,

turbidity, and conductivity were measured in the field. All other parameters were analyzed in the WDEQ/WQD laboratory in Cheyenne.

Physical (habitat quality) data were collected and analyzed according to WDEQ/WQD bioassessment protocols (King, 1993; WDEQ/WQD, 1998). Components included stream substrate composition and silt cover, a pool quality assessment, and a qualitative habitat assessment.

The qualitative habitat quality assessment for Coantag Creek covered a 550 foot segment upstream from the riffle used for macroinvertebrate sampling. The reach length is determined by multiplying the bankfull width by 20, or at a minimum, a 360 foot reach length is used. Thirteen parameters (5 primary parameters, 4 secondary parameters, and 4 tertiary parameters) were evaluated. Evaluation of these parameters allow for a total habitat score ranging from zero to 200 points. High total point scores equate to high quality habitat. Specifics of the individual habitat parameters are discussed in King (1993) and WDEQ/WQD (1998).

Pool quality (as related to fish habitat) was assessed at four consecutive pools, if present, upstream of the sampling riffle in accordance with WDEQ/WQD (1998). Assessed parameters include residual pool depth (maximum minus tailout depth), substrate size, overhead cover, subsurface cover, and bank cover. Each parameter is scored 0, 1 or 2; the maximum pool quality score is 10.

Riffle substrate composition and silt cover (embeddedness) were recorded at eight, one square foot sample points within the riffle where macroinvertebrates were collected. Water velocity was also recorded at each of these points.

Macroinvertebrate samples were taken from a riffle habitat. Eight Surber samples were collected from randomly selected locations within the targeted sampling riffle and a composite sample was obtained. Samples were collected and preserved according to WDEQ/WQD bioassessment protocols (King, 1993a). Macroinvertebrate samples were sent to WDEQ/WQD's contract laboratory (Aquatic Biology Associates, Corvallis, OR) where they were processed and subsampled according to WDEQ/WQD protocol and standard taxonomic effort (King, 1993).

Evaluation of the macroinvertebrate data was conducted through the use of the Wyoming Stream Integrity Index (WSII; Stribling et al, 2000). The WSII (Stribling et al., 2000) is a regionally-calibrated multi-metric biological criteria for assessing aquatic life use support in Wyoming streams. Because biological communities of Wyoming streams vary across natural gradients of environmental conditions, a two-tiered site classification scheme was used to group sites into relatively homogeneous units. The primary classification was the level III ecoregions of Omernik and Gallant (1987); the secondary classification was an aggregation of ecoregions into areas of relative biological similarity (bioregions). Core macroinvertebrate metrics with pronounced discrimination efficiency (degree of separation between metric value distributions of reference and degraded sites within each bioregion) were incorporated into the WSII. Scoring of individual metric values was based on comparison to the 5^{th} or 95^{th} percentile of bioregional reference stream data for each specific metric. Specific metric scoring formulae are presented in Stribling et al. (2000). The final index score is an

average of the individual metric scores.

Duplicate water quality and macroinvertebrate samples were collected and used to assess precision as specified in WDEQ/WQD (2001a). All water quality, habitat, and macroinvertebrate data were evaluated for completeness and compliance with the quality assurance project plan (WDEQ/WQD, 2001a). The data quality is described within the Coantag Creek Quality Assurance Quality Control Evaluation Summary which is available in the Coantag Creek assessment file in the Cheyenne office.

PHYSICAL SETTING

The station is located in the mountain land form area of the Middle Rockies West Ecoregion. The predominate geology in the immediate area of the sample station was determined to be Nugget sandstone (Love and Christiansen, 1985). The state-wide digital soils map of Wyoming (Munn and Arneson, 1998) lists the general soil taxonomy (order/suborder/great group/subgroup) at this station to be Typic Torrifluevents and Typic Hapludalfs, loamy-skeletal, mixed, and frigid. Typic Torrifluevent soils are dry (torr), flood plain (fluv) entisols (mineral soils without natural horizons) representing the central concept of the great group (typic). Typic Hapludalfs are minimal horizonation (hapl), moist (ud) alfisols (moist mineral soils having no mollic epipedon or oxicor spodic horizon) representing the central concept of the great group (typic).

There have been two known oil and gas exploration sites near this stream segment. One is located near the confluence of Coantag and Hobble Creek and one is located a couple miles northeast of the segment and just west of Slide Creek. There is a spring in upstream Coantag Creek located in S. 4, T.27N, R.117 ½ W. The *Metallic and Industrial Minerals Map of Wyoming* map (Harris et al., 1985) identifies the watershed to be within the Lake Alice Minerals District. This is a mineralized zone containing copper, zinc and silver.

Recreation and wildlife habitat was determined to be the primary land use at the station with logging considered to be the secondary land use. Irrigation diversions, irrigation returns, road crossings, and connected roads were identified upstream of the bioassessment station. No point source discharges are located in the watershed of Coantag Creek.

Discharge at the Coantag Creek bioassessment station was measured (mid-section method using a Global Flowprobe®) to be 50 cubic feet per second. The drainage area above the sample station was determined to be approximately 43 square miles. Coantag Creek was determined to be an order 3 stream at this location, using the Strahler method (Strahler, 1957).

Coantag Creek was estimated to be a C3 stream type and the sampling reach. This stream type is a slightly entrenched, meandering, riffle/pool, cobble dominated channel with a well developed

floodplain. This stream type has a gentle gradient of less than 2%, displays a high width/depth ratio, and is typically more sinuous with a higher meander width ratio than the C1 and C2 stream types. Streambanks are generally composed of unconsolidated, heterogeneous, non-cohesive, alluvial materials that are finer than the cobble-dominated bed material. The channel is therefore very susceptible to shifts in both lateral and vertical stability caused by channel disturbance and changes in flow and sediment regimes of the contributing watershed. Rates of lateral adjustment are influenced by the presence and condition of riparian vegetation (Rosgen, 1996).

Photographs taken at the sampling station include: upstream, downstream and panoramic. These photographs can be found in the Coantag Creek assessment file.

RESULTS AND DISCUSSION

Water Quality

Water quality parameters and results for the Coantag Creek station are found in Table 1. Duplicate water quality samples were taken and all parameters, except for total suspended solids, were within the required relative percent difference as described in the Quality Assurance Project Plan (WDEQ/WQD 2001a). Further information is provided in the QA/QC Evaluation Summary.

Table 1. Water Quality Parameters and Results, Coantag Creek (MRW-81), September 23,1998.

Parameter (units)	Results, Stn. 1
Time (hours)	11:10
Temperature (°C)	6.5
pH (Standard Units)	7.62
Conductivity (µS/cm)	339
Dissolved Oxygen (mg/l)	10.97
Turbidity (NTU)	.68
Total Suspended Solids (mg/L)[1]	3.0
Alkalinity (mg/l)	145
Chlorides (mg/l)	<5
Sulfate (mg/l)	64

Total Hardness (mg/l)	195
Total Phosphorus (mg/l	<0.1
Nitrate Nitrogen (mg/l)	< 0.1

[1] Did not meet DQO for precision between duplicates. Explanation in QA/QC Evaluation Summary.

All existing Wyoming water quality standards were attained. Parameters without State standards were within the range of expected values for a stream draining a small, forested watershed with local sandstone geology and minimal human-induced impacts.

Habitat Quality

The most common substrate component in the Coantag Creek sample riffle was cobble (41 %), followed by fine gravel (38 %) and coarse gravel (20 %). Fine substrate consisted totally of sand (1% of total). Cobble and coarser gravels provide stable habitat for invertebrate colonization. The prevalence of sand and silt in the riffle environment will be less stable than larger gravels and cobbles. Macroinvertebrate diversity and abundance tends to increase with substrate stability, with stability generally increases with the mean particle size (Giller, 1998). Clean substrate, such as found in the Coantag Creek sample riffle, generally reflects a diverse and balanced macroinvertebrate community, which is what was documented.

Weighted embeddedness scores (silt covering) can range from 20 (complete silt cover) to 100 (void of silt cover). The weighted embeddedness at the Coantag Creek sample riffle (100) represents a value where no silt cover was noted at any of the Surber sample locations. The high weighted embeddedness score (i.e. embeddedness is low), was probably a factor of water velocity (2.6 ft./sec) and a minimal suspended solids concentration.
The condition of upland, riparian, and instream habitat influences water quality and macroinvertebrate community structure. Habitat quality is strongly related to biological condition and may also limit biological potential (King, 1993a).

Coantag Creek had a total habitat score of 148 points. Low scores were recorded for wetted width to depth ratio, right bank stability and right bank-riparian vegetation width. The right-bank patterns were mainly influenced by the steep, wooded slope coming down towards the channel, minimizing potential for natural riparian vegetation development. The overall score of 148, out of a possible 200, represents a functional, stable environment and one which provides adequate to good habitat for fish.

Pool quality scores for the four pools examined on Coantag Creek were relatively high (8, 6, 6,

and 8 points, respectively). Factors which prevented optimal pool quality scoring included the absence of boulder substrate, a moderate residual depth and minimal overhead vegetative cover.

Macroinvertebrates and Biological Condition

The WSII score for Coantag Creek is at the upper end of the 'good' category for the streams in the Rockies Bioregion (Table 2 and Table 3). Results of the duplicate sample were very similar, resulting in index scores of (83 vs 84.4). Both scores result in a sample rating of "Good", indicating full support of aquatic life uses.

Table 2. Core metric values, scores, and site ratings for the Coantag Creek assessment station.

Core Metric	Rockies Bioregion Reference Condition (95th or 5th Percentile)	Coantag Creek Metric Value	Coantag Creek Metric Score
Ephemeroptera Taxa	12	10	83.3
Insect Taxa	45	30	66.7
Non-insect Taxa	1	3	80.0
% Ephemeroptera	69.8	68.74	98.5
% Oligochaeta	0	0.14	95.0
% 5 dominant	49.8	74.79	50.2
HBI (Hilsenhoff, 1987)	1.4	1	100
% Scrapers	56.1	50.87	90.7
Index Score (∑ /10)			83.0
Rating			good

* Metric where the trend increases with increasing stress (positive TwI). Higher values indicate a negative response. The 5th percentile of the Rockies bioregion reference stream data is utilized to calculate the score for positive TwI metrics.

Table 3: Criteria for narrative assessment and determination of aquatic life use support.

Aquatic life use support status	Narrative Assessment	Percentile of reference index values	WSII score
Full-support	Very Good	-	>85.1
Full-support	Good	≥25th	70.2 - 85.1
Partial-support	Fair	<25th	46.8 - 70.1
Non-support	Poor	-	23.4 - 46.7
Non-support	Very Poor	-	<23.4

Historical and Ancillary Information

The Wyoming Game and Fish Department information describes the aquatic environment of Coantag Creek within Township 28 N., Range 117 W., Section 31 as having mountain sucker, mountain white fish, mottled sculpin, bear river cutthroat and brown trout(Wyoming Game and Fish Database, November, 2000). The Wyoming Game and Fish Comprehensive Survey of the Bear River Drainage (Miller) indicate that Snake River Cutthroat have also been documented, but that the Bear River Cutthroat have dominated the fish population. Between 1951 and 1961 four plantings of cutthroat have been made.

SUMMARY AND CONCLUSIONS

Classification

Coantag Creek is correctly classified as a Class 2AB, Coldwater game fish stream. This conclusion is based on visual and quantified observations from September 24,1998 and from the Wyoming Game and Fish Stream and Lake database which identifies trout species present in the lower reaches of this segment.

Water Quality

Water quality data collected from the Coantag Creek on September 23,1998 do not identify any numeric water quality standards exceedences. An slightly elevated hardness reading of 195 mg/l, does indicate that the water in Coantag Creek is moderately hard. Water is considered to be hard

at hardness concentrations between 150-300 mg/l. This hardness may be influenced by the mineralogy in the Lake Alice minerals complex.

Physical and Habitat Quality

The physical assessment score for the Coantag Creek (148 points) was a good score for the Middle Rockies West ecoregion. The riffle substrate was stable and relatively silt free and the riparian zone had vigorous willow cover. Pool quality was slightly lower due to residual depths generally less than 1.5 feet and marginal overhead cover. The majority of the physical habitat observations indicate a stable, well supported system.

Macroinvertebrates and Biological Condition

The WSII indicates that the Coantag Creek macroinvertebrate community is well diversified and comprised of those taxa which favor less compromised conditions. All core metrics indicate a non-impacted and stable system, and corroborate the water quality and habitat data collected as part of this assessment. The overall metric index score of 83 indicates a “good” biological condition.

FINAL ASSESSMENT AND SIGNATURES

Review of the chemical, biological, and physical data collected on the Coantag Creek on September 24,1998 indicates that Coantag Creek is a Class 2AB (cold water) waterbody. Coantag Creek is minimally impacted by natural or human-induced activities and is supporting of coldwater game fish, aquatic life other than fish, and all other designated uses. The following weight of evidence was used to formulate this conclusion:

1. No water quality standard was exceeded
2. Trout populations have been supported
3. The benthic macroinvertebrate community indicates a moderate to good condition has been maintained by the system
4. Overall habitat condition is in fair to good condition.

None of the assessed parameters suggest impairment of the designated uses of Coantag Creek.

_____ _____
Sampler (signature and printed name) Date

_____ _____
Sampler (signature and printed name) Date

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Monitoring Program Supervisor (signature and printed name) Date

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