SAN MIGUEL WATERSHED REPORT CARD UPDATE 2006

WATER

Update on the Ames Power Plant Relicensing Effort

The Federal Energy Regulatory Commission (FERC) Relicensing effort for the Ames hydroelectric power plant is progressing on schedule. The power plant operators decided to use a new, optional FERC Relicensing process known as the Integrating Licensing Process (ILP), taking an estimated completion time of 5 to 6 years. At present the Ames Relicensing process is in year 2, and right on schedule. This process, unlike previous ones, requires involvement of interested parties at the beginning of the process rather than in a review capacity at the end of the process. At the core of the ILP is identification of power plant related issues. Subsequently, study plans are developed and implemented to better understand issues and identify potential corrective actions, which could become a condition of approval on the new power plant license to operate.

One of the study plans is looking at the issue of the power plant's influence on river ice processes, and the influence on the river's biota from diurnal flow fluctuations from power peaking operations. To address this issue, monitoring equipment is being installed in the San Miguel River, the South and Lake Forks, and Trout Lake. Water levels and temperature are being monitored, which provide valuable information to better understand the river icing and power peaking issues. As part of this particular study, experimental operations of the power plant and related facilities are needed during the winter season. Planned for this winter season is the installation of a series of water column mixers in Trout Lake, with the goal of cooling lake-bottom temperatures by 5-6 degrees Fahrenheit. Additionally, flow release modifications for power peaking from the power plant outlet will be designed to encourage the formation of a stable ice cover on the receiving South Fork and San Miguel Rivers.

The results of this and previous year's experimental operations will be analyzed over early to mid 2007, to plan for next years study plan needs. The relicensing schedule, which basically is cast in stone, is scheduled to conclude with a new operational license for the Ames Plant in mid 2010, which will incorporate significant findings from the implemented study plans. By Dennis Murphy 11/28/06

Water Quality in the San Miguel River

The Colorado Department of Public Health and Environment's Water Quality Control Division (CDPHE-WQCD) is the State agency and Water Quality Control Commission (WQCC) is the governor appointed Commission, which has the authority to implement the Colorado Water Quality Control Act. Regulation No 31 of the Act, the *Basic Standards and Methodologies for Surface Water***,** provides basic standards, an anti-degradation rule and implementation process, and a system for classifying state surface waters, assigns water quality standards based on the uses, grants temporary modifications and provides for periodic review of the classifications and standards. Regulation 31 is intended to implement the Colorado Water Control Act by maintaining and improving the quality of the State surface waters. The regulation is based on the best available knowledge to ensure the suitability of Colorado waters for beneficial uses including

public water supplies, domestic, agricultural, industrial and recreational uses and the protection and propagation of terrestrial and aquatic life.

The WQCD's classification system recognizes 5 major river basins in the State: the Rio Grande, San Juan River, Colorado River, Green River, Platte River and Republican River Basins. Regulation Number 35 provides the Classification and Numeric Standards for the Gunnison and Lower Dolores River Basins. The San Miguel River Basin is part of the Lower Dolores River Basin, which is part of the Colorado River Basin. The WQCD has delineated the San Miguel River into 15 water body segments, which vary from high mountain streams to ephemeral washes in the desert rim rock country. The combined stream length of the San Miguel River and its tributaries is 1,826.41 miles.

The water bodies are classified by use including aquatic life cold water, aquatic life warm water, recreation, water supply and agriculture. Water Quality Standards have been established to protect the various uses for each water body segment. Standards are set for:

a) physical and biological parameters including temp, dissolved oxygen, pH, and E. coli;
b) inorganic parameters including ammonia, chlorine, cyanide, fluoride, nitrate, nitrite, sulfide, boron, chloride, sulfate and asbestos;
c) 156 organic parameters;
d) metals including As, Cd, CrIII, CrVI, Cu, Fe, Pb, Mn, Hg, Ni, Se, Ag, Zn;
e) uranium and radionuclides; and,
f) salinity and suspended solids.

State water quality standards are the "yard stick" by which the State assesses the status of the water body or stream segment. The state compares recent information regarding the physical, chemical and biological condition of a stream segment with the associated water quality standards for that segment. Water quality of water bodies is reviewed by the WQCC every 3 years.

Issues of concern identified at the June 2006 Gunnison and Lower Dolores River Basin Hearing in Cortez are:

1) temperature issues below the CC diversion ditch, in the vicinity of the Tri-State Generation and Transmission Nucla Power Station, located upstream of the town of Naturita;
2) addition of uranium table value standards in the main stem of the San Miguel River from a point immediately below the confluence of Naturita Creek to its confluence it he Dolores River and on all tributaries, lakes, reservoirs and wetlands to the SMR from a point immediately below the confluence of Leopard Creek to the Dolores River due to uranium development; and,
3) high zinc concentrations in the head water tributaries of Marshall, Ingram Creeks and upper segments of the San Miguel River, below the Idarado Mine. Other headwater tributaries are being further evaluated for potentially exceeding metals standards.

An issue of concern in the basin is the temperature of the river below the CC irrigation diversion ditch in the vicinity of the Tri-State Generation and Transmission Nucla Power Station, located just upstream of the town of Naturita. At the June 2006

Hearing, the WQCC re-segmented the San Miguel river segment 4 (SMR immediately above the confluence with South Fork to a point immediately below the confluence of Naturita Cr.) into segments 4a and 4b with a new segment boundary at the CC Ditch. The decision was made based on dewatered conditions below the CC Ditch affecting the temperature of the SMR. The temperature standard of 20º C (68º F) is applied to segments 4a and 4b. A new temporary modification has been applied to segment 4b, below the mixing zone of Tri-State. The commission adopted a temporary modification for temperature in the lower portion of segment 4b of 26.3º C (80º F), as a maximum weekly average temperature from 6/1 to 9/39, to expire 12/3/2011. The WQCD agreed that Tri-State would maintain the existing daily maximum permit limit of 30º C (86º F) at the end-of-pipe.

There is an uncertainty associated with the underlying temperature standard in the lower portion of segment 4b. This portion of the stream is a transition between cold and warm water. A temporary modification has been adopted to provide time to address this uncertainty and recommend appropriate standards for the water bodies. During the effective period of the temporary modification, Tri-State, in coordination with WQCD and DOW will conduct studies designed to address whether Tri-State's discharge has an adverse impact on the aquatic community.

When streams do not meet the State's water quality standards they are determined to be "water quality limited". Of the 1,826 miles of streams in the San Miguel River basin, 12.7 miles (0.7%) are determined to be water quality limited. The remaining 99.3 % of the stream miles within the basin meet the standards set forth as protective of the various uses within those segments.

Ingram Creek, Marshall Creek, and the San Miguel River, from where it forms at the confluence of Ingram and Bridal Veil Creeks to the South Fork, located in the headwaters of the basin, are identified as being water quality limited for zinc as a result of historic mining operations. Additionally, Ingram Creek is on the Monitoring and Evaluation (M & E) List for cadmium and manganese. The main stem of the Howard fork is on the M & E list for total iron. Waterfall Creek is on the M & E list for Lead, although the most recent sampling indicated that all water quality standards are being met.

The Idarado Mine Remediation resulted from an agreement between the Idarado Mining Company and the State of Colorado's Natural Resource Trustees (CDPHE, AGO & DNR) to remediate damages to the State's natural resources, including water quality. Construction began in 1993 and was completed in 1999. Components of the remediation included tailings revegetation and hydrologic modifications (concrete ditches, infiltration systems, underground mine diversions, etc.) to minimize erosion and leaching of mine wastes into the San Miguel River and its tributaries.

Measures of success are two tiered: one being a vegetative cover performance objective or standard for the tailings piles, to minimize wind and water erosion, and the other a 50 % reduction in zinc concentration measured in San Miguel River below the confluence of Bear Creek (average of 52 weeks of sampling in any year between 2004 and 2008):

- Dissolved zinc $\leq$ .276 ppm; or,
- Total zinc $\leq$ .336 ppm

In 2005, Idarado has met the total zinc performance objective in the San Miguel River.

CONCLUSION

Water Quality in the San Miguel River and its tributaries meets State standards set forth to protect the various uses in 99.3% of the stream miles located within the Basin. There are two major issues of concern that are being addressed within the basin:

1) discerning appropriate temperature standards for a stream segment transitioning between cold and warm water classifications, as affected by diversions from the CC diversion ditch and discharges from Tri-state Generation and Transmission Nucla Power Station; and,
2) metal contamination in the headwater tributaries resulting from the Idarado historic mining operations.

The State and stakeholders are continuing to work together in order protect the various uses and users in the associated stream segments.
For further information, please contact:

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Trout Lake was chosen this year to be included in nationwide survey of the ecological health of the Nation's waters. This survey was the result of a lawsuit which claimed EPA had not met its obligation under the Clean Water Act to determine the "fishable, swim able" status of the Nation's waters. Trout Lake was chosen thru a problematic survey selection procedure developed by the EPA. The lake survey will include 30 lakes in Colorado. The intent of the survey is to determine the lakes ecologic integrity, trophic status, and recreational value.

The ecologic assessment will include an analysis of zooplankton, phytoplankton and diatoms in the bottom sediments and a survey of benthic macroinvertebrates near the shoreline. It will also include a survey of the habitat around the shoreline and a scan for invasive species along the lake margin and in the water.

The trophic status survey will include a temperature and oxygen profile, measurement of major ions and nutrients and a survey of chlorophyll to determine the amount of algae present. A measurement of water clarity will also be done. The water clarity and amount of algae provide indicators of enrichment or excess nutrients in the water.

The recreational value study will look for bacterial pathogens and toxins from bluegreen algae.

The sampling is to occur in 2007 and then at fiveyear intervals if funding allows. The protocols have not yet all been finalized. For more information go to http://www.epa.gov/owow/lakes/lakessuvey or contact Jim Saunders at the Colorado Department of Health and Environment at 303 692 3572. By Dennis Murphy 11/28/06

An Experience of a Life Time

Finally, after 28 years of waiting my wish came true. This may sound weird but as a hydrologist for the Bureau of Land Management for the last 28 plus years, I have had a fetish to experience a flash flood, rather than just visit and assess a flood's aftermath. On August 2, 2006 a few work peers and myself were monitoring our stabilization efforts on the Craig Draw Burn area. At our last monitoring site, which happened to be on the far end of the burned area from the access road, the sky opened up and produced one of the most intense precipitation events I have ever experienced. We managed to get back to our vehicle, which was 200-300 yards away, but in a totally saturated condition. Within minutes, while driving out across the burn, water began ponding, then flowing on the soil surface. I knew by the amount of area producing runoff, something interesting would be occurring downstream. On our way back to Norwood, via the Sanborn Park Road, traffic was stopped about half way between the Cascabel Ranch and the Norwood Bridge. Two drainages originating in the vicinity of the burned area had flooded and dumped a large sediment load on to the road (see pics) and into the San Miguel River. The river has been choked to about 1/3 of its pre-flood width from the debris flow. While the San Miguel County Road and Bridge Department had the road cleared and open by early evening, it will take some high, snowmelt generated flows in the San Miguel River to erode the flood debris and restore pre-flood channel dimensions. With a little luck, some of the larger debris will remain in place and create a little higher quality white water experience for future boaters.

Figure 1 Sanborn Park Road after Flood on August 2, 2006

Figure 2 Flood Debris on Sanborn Park Road, August 2, 2006

TSG Ski & Golf: Golf Course Irrigation and Improved Efficiencies.

For many of us, the golf course in Mountain Village is a familiar site, and with golf rounds in excess of 10,000 annually, the effort required to maintain the course is paramount. At the core of the turf's continued existence is the irrigation system, which uses a series of pumps and approximately 40 miles of pipe to sustain the 75 acres of maintained tees, greens and fairways. In an effort to reduce the amount of water the course requires on a daily basis, TSG has committed to a two-step process where, 1. turf area is reduced to the minimum acreage necessary, and 2. irrigation water is applied in the most efficient manner possible.

The original area platted for the golf course was in excess of 120 acres, however estimates of maintained turf at the complete opening in 1992 are placed at 105 acres. According to Kevin Cahalane, G.C. Superintendent, the area maintained today hovers around 75 acres. The 30 acres that were eliminated over the last 12 years were spread around the course, but largely out of the typical area of golf play. The abandoned blue-grass turf has slowly been replaced by more drought-tolerant grasses, including many native species, which have been established by overseeding the native areas.

Recent improvements to the original irrigation system have granted far increased controls over how the water is managed, including application rates and the length of time any particular "zone" is operating. By shifting the irrigation system to a centrally managed, computerized program, developed specifically for the golf industry, TSG is able to target specific areas on the course requiring unique water application rates. These enhancements and the continued refinement of the computer model have contributed to an estimated 25-40% efficiency improvement over the past 3 years. Of course, the rain lets us be more efficient too, as the golf course did call for any irrigation water between July 30th and August 26th, due to the 8.13" inches of rain recorded during the July through August period.

TSG will continue to look for opportunities to make improvements to reduce waste and manage its water resources in the most efficient manner possible as a steward of lands in the San Miguel Watershed. These efforts may in turn contribute to the improved health of the San Miguel River and its greater watershed over the coming years.

has desensitized many of us to the reality of how much water is required to irrigate and sustain this recreational amenity. Chris Hazen

AQUATIC LIFE

WILDLIFE

Watershed Report Card Update
12/6/06

Craig Grother – USFS, Norwood

Rare and Declining Species

The Report Card includes four species; the Gunnison sage grouse, bald eagle, Canada lynx, and river otter. There is no pertinent new data or changes in the data available for the bald eagle or river otter. However, there are a few updates for the Gunnison sage grouse and Canada lynx

Gunnison sage grouse

As reported in the 2005 Report Card, the Gunnison sage grouse was considered a candidate species for listing under the Endangered Species Act, with a decision planned for possible listing as threatened or endangered in March of 2006. On April 12, 2006 the US Fish and Wildlife Service announced that the Gunnison sage grouse is "not warranted for listing" as threatened or endangered. This decision generated several appeals to list the bird as threatened but all of them were denied. Following the appeal process, a lawsuit was filed in US District Court for Washington DC challenging this decision.

Until this lawsuit is finalized the Gunnison sage grouse will continue to lack any protection under the Endangered Species Act. However, local County, State, and federal government agencies continue to provide protection for the bird and its habitat under their respective land use codes, laws, and regulations. The Gunnison sage grouse continues to be a species of concern in San Miguel County, and is listed as endangered by the Colorado Division of Wildlife, and listed as sensitive by the US Forest Service and Bureau of Land Management. Species and habitat protection and management efforts will continue to be emphasized within the San Miguel Watershed to meet the objectives of the Rangewide Conservation Plan.

Habitat Availability

There are no significant habitat losses (fires, etc) or degradation reported within the Watershed. However, several new conservation easements have been established on private lands within the watershed that will serve to protect existing habitat from future development.

Grade remains a C.

Percent Occupied Habitat

In 2006 the Colorado Division of Wildlife estimated that about 60% of the suitable habitat within the San Miguel watershed was utilized on a regular basis. Monitoring indicates that this estimate remains about the same. However, spring lek counts are

showing a lack of use on the triangle, desert, and Nelson Creek sites, and higher use on other lek sites, indicating a shift in distribution.

Grade remains a C-.

Threats

The Report Card lists oil and gas and residential development as the primary threats to Gunnison sage grouse within the watershed. The San Miguel Basin working group explored this issue further and has also identified livestock grazing, motorized recreation, predation, and west nile virus as additional threats to the local population. Some of these threats are possible to influence while others are beyond our management control.

Should consider raising the grade from D to a C- (my opinion).

Habitat Condition

Habitat conditions continue to improve over the drought years with another year of good precipitation. A wet summer and fall provided moisture favorable to native plant growth and reproduction, improving plant cover throughout the area. This moisture also provided water for Gunnison sage grouse and other species in areas that have been dry during the past drought years.

The Colorado Division of Wildlife, US Forest Service, and Bureau of Land Management have completed several habitat improvement projects for Gunnison sage grouse. CDOW completed brush-beating and seeding projects on the Dry Creek Basin State Wildlife Area. USFS and BLM implemented projects to remove pinyon and juniper trees that are encroaching upon sagebrush habitats to restore sagebrush-dominated habitat for sage grouse.

Grade remains a B.

Population

Population numbers based on established lek counts indicate a stable number of Gunnison sage grouse in the watershed. However, as noted before, activity at some lek sites has declined while activity has increased at others, indicating a shift in distribution. Basically, the overall trend seems to be higher numbers of birds in more confined habitats.

Grade remains a C.

Canada lynx

The lynx remains listed as threatened by the US Fish and Wildlife and is protected under the Endangered Species Act. In the State of Colorado, the Canada lynx is listed as endangered. In May of 2006 the US Fish and Wildlife Service and US Forest Service completed an Amendment to the Canada Lynx Conservation Agreement which designated lynx habitat as occupied or unoccupied on the National Forests in the northern and southern Rocky Mountains and Cascade Range. National Forest lands within the San Miguel Watershed are included in the Grand Mesa, Uncompahgre, and Gunnison National Forest and are designated as occupied habitat. The Recovery Plan further designates the Southern Rocky Mountains as a Provisional Core Area. These documents identify this area as an important component for recovery of this species.

Habitat Available

There have not been any substantial changes to the amount of habitat available or to the connectivity of available habitat within the watershed. However, there is growing concern over the scale and intensity of private land development on the south end of the Uncompahgre Plateau near Dallas Divide and the likely effects this will have on the ability of lynx to move between the Uncompahgre Plateau and the San Juan Mountain range at the Mount Sneffels Wilderness. Loss of this linkage zone could further isolate the Uncompahgre Plateau from suitable habitat on the San Juan's.

Grade remains a B.

Percent Occupied Habitat

The Report Card states that the available habitat is "not completely occupied". Canada lynx are a wide-ranging species that occur in low densities. Highly developed areas and intensive use within suitable habitat can reduce or eliminate occupancy. At the present time the percentage of suitable habitat that is impacted in this way is relatively minor. There are no developments present at this time that are precluding lynx from traveling between suitable habitat areas. Based on CDOW data, it appears as though lynx are occupying a large percent of the habitat available in and around this watershed.

Should consider raising the grade from D to a C (my opinion).

Threats

The Report Card lists habitat fragmentation due to development/subdivisions as the most significant threat to lynx. Other threats identified in the Lynx Conservation Assessment and Strategy include winter recreation activities, habitat degradation, and widely fluctuating snowshoe hare populations. The CDOW has also documented losses from highway fatalities and shootings, including two recent cases near Silverton.

Grade remains a C.

Habitat Condition

The primary suitable habitat types within the watershed include spruce-fir and mixed aspen/conifer forest at the higher elevations. This habitat extends on to lands adjacent to the north, south, and east of the San Miguel watershed. In general, forest habitat conditions are good with some of the larger blocks of habitat protected by the Mount Sneffels and Lizard Head Wilderness areas. Both managed and unmanaged forests are typically mature stands with varying degrees of fire, insect, and disease activity. Recent drought conditions have exacerbated these activities, but overall, habitat conditions are favorable for lynx and their primary prey species the snowshoe hare.

Grade remains a B.

Population

The Colorado Division of Wildlife closely monitors the lynx population in the San Miguel Watershed. This year researchers have documented for the first time that a Colorado-born female lynx has produced kittens. The female cat, born in 2004, gave birth to two males in mid-June. This evidence is a significant milestone for the reintroduction program, which was initiated in 1999. However, the number of lynx kittens born and the number of kittens found in 2006 is down significantly from the previous three years. CDOW biologists believe that more kittens were likely born but could not be located because their mother's are not equipped with radio collars. The current estimate of lynx in Colorado is holding steady at around 200. Most of them live in the southern mountains, which include the San Miguel Watershed.

Researchers are not overly concerned with this decline. Biologists are not observing increased mortality, and veterinarians do not see indications of starvation. Also, most cats are staying within established territories, indicating a stable social structure. All of this leads them to believe that the population is nearing capacity and that further reintroduction efforts will be postponed to prevent disrupting the natural reproduction.

Should consider raising the grade from C to a B (my opinion).

Hi Leigh-- I don't know if you've taken a look at the migratory bird part
of the report card writeup from last year, but it seems to do a pretty good
job of explaining to a layman what the indicator value of these species is.
I have used it with minor changes for the paragraphs below

"Migratory birds which breed in the San Miguel Watershed can provide
valuable insight into habitat quality that other animal species cannot.
They are particularly sensitive to habitat quality, easy to observe, and

some species are closely allied with certain habitat types or vegetation
zones. Additionally, migratory birds can indicate problems with habitat fragmentation in the landscape. Perhaps most important is the availability
of long term data. There are four Breeding Bird Survey transects which have
been established and revisited by volunteers and birding organizations over
the past 10-30 years in this watershed. While problems with wintering habitats or migration routes that are out of the San Miguel Watershed can
also cause population declines, bird population data is important to consider as one of many contributing factors to watershed health. The bottom line is that when habitat fails to provide adequate food or nesting
resources, bird populations will decline. Breeding bird counts per transect
are shown for selected species which represent important habitat types in
the watershed.

Hi Leigh--- I put together the bird data for you for the report card...such as it is. I am including the original data file from the Breeding Bird Survey people, and my spreadsheet where I put together the averages. Here is the report card table for you as well--I included a couple more birds that we had last year as was our original intent. The low numbers recently may reflect the effects of drought and problems in the PJ and sagebrush zones, including substantial vegetation death.

Migratory Bird	Landscape / Vegetation Zone Utilized	Long term use from 1994-2000 (average # of individuals per transect)	Recent Use 2001-2005 (average # of individuals per transect)	Percent of long term average	GPA
Brewer's Sparrow	Desert Valley	45	16	36	D
Loggerhead Shrike	Desert Valley	4.6	3.25	71	C
Virginia's Warbler	Ponderosa / Shrublands	3	2.67	89	B
Pinyon Jay	Foothills/PJ Woodlands	13.1	6.3	48	D
Pine Grosbeak	Montane	3.33	2	60	C

TOTAL					1.8/ C-

----- Forwarded by Amanda Clements/MOFO/CO/BLM/DOI on 12/05/2006 10:09 AM -----

Keith_Pardieck@usgs.gov
11/30/2006 09:58 AM

To: amanda_clements@co.blm.gov
cc:

Subject: Database Query Results

Dear BBS Customer:

The attached file contains the total data from the North American Breeding Bird Survey (BBS) that you recently requested. Your request was: StateNumber = 17 Route in ('215','315','365','373') Year >= 1972 Year <= 2005 AOU in ('05620','05260','06220','05150','04920','06440','06830')

All data are provided either as comma delimited or fixed width files depending on which option you chose when requesting the data. If no data file(s) is attached, you can retrieve your data at the following ftp site:

ftp://ftpext.usgs.gov/pub/er/md/laurel/BBS/DataRequests/T2887400.csv

Although the North American Breeding Bird Survey (BBS) data have been processed successfully on a computer system at the U.S. Geological Survey, Patuxent Wildlife Research Center, no warranty expressed or implied is made regarding the accuracy or utility of the data on any other system or for general or scientific purposes, nor shall the act of distribution constitute any such warranty. This disclaimer applies both to individual use of the data and aggregate use of the data. It is strongly recommended that these data are directly acquired from a USGS Patuxent Wildlife Research Center source, and not indirectly through other sources which may have changed the data in some way. The U.S. Geological Survey shall not be

held liable for improper or incorrect use of the data retrieved from the North American Breeding Bird Survey data retrieval Internet site.

Moreover, the data contained within this file(s) does not necessarily meet the various methodological criteria of the BBS. Run type codes are used to distinguish between routes that meet BBS criteria and those that do not. Run type "1" is acceptable data; run type "0" is unacceptable data for BBS purposes. Both types of data are enclosed in the attached file(s). The run type codes for each route are available in the "weather data" file if you did not already request it. See the Run Type link in the Help section of the BBS data retrieval program for a more complete discussion of run type codes and their application.

Please remember that these data are the result of efforts by thousands of U.S. and Canadian BBS participants in the field, as well as, USGS and CWS researchers and managers. Publications based on these data should acknowledge all of these efforts. If a publication is based solely on the analysis of BBS data, we suggest that you involve the BBS office with the writing and/or review of the manuscript. We would also appreciate receiving a reprint or photocopy of any such article at the time of its publication.

Finally, I believe the information contained the data file(s) will be self-explanatory, but feel free to contact me if you have any questions.

Sincerely,

Keith Pardieck
USGS Patuxent Wildlife Research Center
Breeding Bird Survey
12100 Beech Forest Road
Laurel, MD 20708-4038
Keith_Pardieck@usgs.gov
(See attached file: T2887400.csv)(See attached file: sanmig2006birddataevaluation.csv)

VEGETATION

Watershed Report Card 2006 Update
San Miguel County Weed Control Program, By Sheila Grother

Noxious Weed Input-

Overall the San Miguel Watershed is in relatively good condition regarding noxious weeds- with a few notable exceptions and threats.

In 2003 the Colorado State Weed List was broken into three separate lists. The **A list** includes weeds that are not common or in some cases, not known to be present in the state but which represent a serious threat if allowed to become established. Plants

on the A list are mandatory for control whenever located. The San Miguel Watershed has the following known populations of A list species:

- Purple Loosestrife- known to be present in the Nucla area and recently discovered in the Redvale area (Maverick Draw drainage). This is an ornamental and has also been found twice in Telluride in ornamental plantings.
- Cypress spurge- known to be present in two locations in and near Telluride and in one location near Norwood- all ornamental.

The **B list** includes most of the plants that are problematic in the watershed. Many of these plants are not common in the San Miguel Watershed and should therefore be treated as A list species locally. These include:

- Spotted knapweed- present on the Uncompahgre Plateau, mostly on USFS property and in small populations throughout much of the east end of San Miguel County. The largest known population is on Hwy 62 and is less than ½ acre.
- Diffuse knapweed- with several small populations located over the past few years and presumably eradicated. No currently active populations are known.
- Leafy spurge- with a large population in Ouray Co. leafy spurge is a serious threat to the area above 8000 feet at the east end of the drainage. Two spots have been located and treated in San Miguel County but it is likely that others are present but not yet located.
- Scentless chamomile, another ornamental, is becoming more common in and near Telluride- although an annual it produces plentiful seed and has become a serious problem in similar locations, in the state.
- Dalmatian toadflax and black henbane are still very rare in the watershed but have been found and treated at various locations.
- Tamarisk- is common lower in the watershed but is unknown, at this time, above Norwood Bridge. Several isolated locations have been discovered at up to 10,000 feet and treated with good success. The lower watershed contains large populations of tamarisk.

Other **B list** species present and common in the watershed include:

- Oxeye daisy- originally used in ornamental plantings but escaped into the wild oxeye represents a serious threat to all riparian areas.
- Russian knapweed- common in lower watershed but beginning to be present as high as 10,000 feet in small, isolated populations mostly associated with disturbance.
- Canada thistle- is present throughout the watershed but is most common at higher elevations and in riparian and wetland areas. This is most likely the most common weed in all of Colorado.
- Musk thistle is common from Riparian through Montane but most problematic in disturbed areas such as fires.
- Bull thistle is becoming more common and is well suited to virtually all vegetation types.
- Yellow toadflax has been found at the east end of the watershed at elevations to 12,000 feet. It is uncommon below 8000 feet at this time.
- Russian olive often grows along with tamarisk in riparian areas and is a serious threat in the lower watershed. It is often found in ornamental plantings in the Norwood area.

- Houndstongue is very common on the Uncompahgre Plateau and is now being found along deer and elk migration routes up to about 11,000 feet.

Scores- Please note that this is based on current conditions. Some areas are observed more thoroughly and frequently than others. Disturbances have a serious impact on potential new populations and if these areas are not being monitored frequently it would be possible for a new invader to become established without early recognition.

Riparian

Upper Watershed	B -
Middle Watershed	B -
Lower Watershed	C -

Desert Valleys

Upper Watershed	NA
Middle Watershed	NA
Lower Watershed	C

Foothills

Upper Watershed	NA
Middle Watershed	B-
Lower Watershed	C

Ponderosa/Shrub

Upper Watershed	B+
Middle Watershed	B
Lower Watershed	B

Montane

Upper Watershed	B+
Middle Watershed	B
Lower Watershed	NA

Alpine

Upper Watershed	A
Middle Watershed	NA
Lower Watershed	NA

The Uncompahgre Field Office of the BLM has been monitoring the

effectiveness of rehabilitation efforts on the 2002 Burn Canyon Fire. To date, rehabilitation measures have been effective in achieving perennial plant canopy cover and basal cover values similar or greater to levels found in unburned areas. The control area which was not rehabilitated did not achieve these levels three years post burn.

The seeding has also proven to be effective at reducing the level weeds in the burn. Preliminary results suggest that seeding is essential in reestablishing sagebrush in burned areas. Dean Stindt

SOILS

December 11, 2007

Soil Health – It's A Matter of Organic Matter

In the "2005 Report Card: An Ecological Assessment of the San Miguel Watershed," three factors were looked at to determine the overall health of soils in the San Miguel Watershed. The three factors considered were 1) Erosion, 2) Surface Cover, and 3) Biological Crusts. While collectively these are good indicators of the stability of soils, they don't speak directly to the main ingredient of healthy soils, and that is **organic matter**.

This begs the questions: What is soil? What constitutes healthy soil? And how can one create or maintain a healthy soil?

Soil is a mixture of mineral particles and organic matter of varying size and composition.

The mineral (inorganic) fraction of the soil makes up about 50% of the soil's volume. It includes small rock particles of varying sizes (sand, silt, and clay); and chemical elements or molecules like iron, zinc, calcium carbonate, sulfates, etc. A combination of near equal parts of sand, silt, and clay particles (a soil's texture), with a balanced suite of chemical elements constitutes the ideal soil medium. Pure sand does not make productive soil for plant and animal life - it's too droughty. Likewise, a soil with high concentrations of salts will not support much plant growth or other biological activity because of the chemical effects of salt.

The mineral fraction of the soil results from the weathering and movement of rock in the locality where the soil forms, although soil can be transported hundreds of miles by wind and water, and deposited. Numerous physical, chemical, and biological processes working over millions of years turn rock into soil. Deeper soils form in the low areas of the landscape, while thinner soils form on the hillsides and hilltops. Furthermore, different geologic materials and climatic conditions combine to create unique soils. A landscape with sandstone as the prominent geologic feature will tend to develop sandy textured soils.

A key player in the formation of soil is water, without which many of these soil forming processes would not occur.

The organic fraction of the soil can be quit variable and can range from 1 to 20% of the soil's volume. **Organic matter** in soil is the dead remains of plant and animal life, in various stages of decomposition. Organic matter is the essential feedstock for living organisms in the soil. The biologic cycling of organic matter and nutrients within soil sustains the web of life that exists on land, and moreover, it contributes to the creation of new soil.

Most biological activity within soils occurs in the top one foot of the soil profile. This surface layer of soil is called top-soil, and it is the primary nutrient and water reservoir for plants and other living organisms within the soil. Layers of soil beneath the top-soil are called subsoil, and typically are less nutrient rich because they lack organic matter. The essentials for life: air, water, and sunlight do not penetrate the subsoil sufficiently to make it biologically productive. Naturally, soils high in organic matter support a much more diverse complex of living organisms than soils low in organic matter.

The organic matter in soil not only provides nutrients to plants and other soil organisms, but it also enhances the soil's ability to accept and retain water. Organic matter and clay particles in the soil can actually "hold onto" water. In addition, mineral soil high in organic matter will tend to have what we call good **structure**. Structure refers to the extent which soil particles bind to each other and form aggregates. Aggregation of soil particles creates porosity in soil which allows for air and water infiltration and storage. Biological activity in the soil, along with plant growth, fed by the decay of organic matter, creates the "glues" that facilitate particle aggregation, and hence good soil structure. A soil with good structure will have lots of pore space (50% by volume) for water storage, and this gives the soil more biologic potential. Compacted soils, on the other hand, have poor water and air infiltration and are not able to store sufficient amounts of water to support good biological activity and plant growth.

Let's put it all together: a soil with good texture, sufficient depth, and high amounts of organic matter has the ability to provide the needed nutrients and water storage for good biologic activity and plant growth. A fertile soil, with good soil structure, and adequate amounts of water, will support vigorous plant growth. The roots of these growing plants, the leaf litter they produce for ground cover, and the good soil structure created by its living organisms increases the soil's stability and resistance to the erosive forces of wind and water, thus protecting the soil's productive future.

The accumulation of organic matter in soil is in essence **carbon storage**. When organic matter decays (oxides), the carbon is released to the atmosphere. In an era of increased levels of carbon dioxide in the atmosphere and its potential influence on global climate change, it is important to manage soils so that high levels of organic matter are maintained within the soil, and that plant growth is maximized, because plants sequester

carbon. Naturally, a certain amount of decomposition of organic matter is necessary to provide nutrients to the next generation of living organisms. In the presence of oxygen and water, and with the appropriate temperatures, decomposition of organic matter just happens. If one increases the amount of oxygen entering the soil, say through tillage, then one increases the rate of organic matter decomposition. If one continually harvests the above ground plant growth and exports this carbon from the site, the organic matter pool is not replenished and eventually diminishes, unless an organic matter source such as manure is imported to offset the losses.

High desert soils, common in much of the San Miguel Watershed, tend to be inherently low in organic matter due to extreme climatic conditions that inhibit plant growth and biological activity. The conditions responsible are: low precipitation, and hot and cold extremes of temperature. The shrub-like vegetation that dominates desert landscapes produces little residue, so the annual input of organic residues to the soil is small, while decomposition of organic matter continues, although at a slower rate than in more moist climates with similar temperatures. Therefore, little organic matter accumulates in or on hot desert soils.

On the other hand, the mountainous areas of the San Miguel Watershed receive more precipitation than do our desert environments, due to the higher elevations. Despite a short growing season, plant production is generally high in the mountains below a certain elevation – timberline. Increased plant growth increases the amount of organic residues returned to the soil. And with relatively cool summer temperatures the decomposition process is slower in the mountains than it is in the desert. In this case organic matter tends to accumulate.

So what can we do to protect as well as increase the organic matter content of our soils?

1) Encourage maximum plant growth through plantings, proper watering, and nutrient additions. Try to keep the soil covered with growing plants and their dead remains.

2) Maximize the return of plant residues or other organic materials to the soil. Limit the harvest and export of carbon from the system, unless it is replaced.

3) Limit the frequency and intensity of soil tillage operations. Remember, organic matter "burns" in the presence of oxygen.

4) Reduce soil losses from wind and water erosion. Again, keeping the soil covered with growing plants and their residues is the best protection. Other soil erosion prevention measures may be necessary depending on the circumstances.

To summarize:

The capacity of a soil to support plant growth and act as a buffer is a measure of its quality. Soil texture, structure, water-holding capacity, porosity, organic matter content, and depth are some of the properties that determine soil health. All soils have limits imposed by geologic and climatic factors. A soil with sufficient capacity to support one ecosystem – rangeland for example – may not be capable of supporting another, such as a corn field.

Measures of soil health include how effectively soils:

- accept, hold, and release nutrients
- accept, hold, and release water
- promote and sustain root growth
- maintain suitable biotic habitat
- respond to management and resist degradation

And **organic matter** matters greatly in respect to all of these!

Jim Boyd, NRCS Resource Conservationist

CLIMATE

THE TELLURIDE UNPLUGGED INITIATIVE – Have you unplugged?

Last October, Telluride's Ecology Commission launched a new community-wide initiative called, Telluride Unplugged. Having committed Telluride to meeting the goals of the Kyoto Protocol by signing onto the U.S. Mayors Climate Protection Agreement and recognizing that the spirit of these agreements intended to include everyone—not just Town Government, Town Council asked the Commission to spearhead a public awareness campaign to educate, motivate, and engage citizens in a united effort to decrease carbon emissions for the region.

The Telluride Unplugged Initiative is designed to be an annual information "fest" that brings the Community into contact with the latest scientific thinking on Climate Change and the most up-to-date, ready-to-implement technologies that can help us decrease our emissions of Greenhouse Gases. It's intent is to prompt residents, business owners, Town staff and all Councils, Commissions, and Advisory Committees to investigate how Climate Change may impact our local environment, discuss how the community might mitigate predicted impacts, and prepare for the changes to come.

This year's campaign provided 6 weeks of practical information on how each of us can easily reduce our carbon footprint—that is, the

Telluride UNPLUGGED 2006

Week 1 – Introducing Telluride Unplugged
Week 2 – Energy Efficient Lighting
Week 3 – Food: The Choices We Make
Week 4 – Purchasing, Packaging, Reusing, & Recycling
Week 5 – Phantom Loads – Those Ghoulish Electronics
Week 6 – Transportation

amount of carbon dioxide emissions we generate through consumption patterns, transportation habits, and home and business heating, lighting, and electronics. The opening event of the initiative was a free screening of the documentary "An Inconvenient Truth" at the Palm Theater at the Telluride Middle/High School for all local students and then a second evening screening for adults. These screenings were conducted in partnership with the R1 School District.

The local impacts of global climate change can be understood in a regional context. The Western United States has warmed at twice the rate of the East over the past half century. Climate change in the Western U.S. will result in more heat, less snow pack, earlier snowmelt, and more runoff. Scarcity of water makes our region's ecosystems and wildlife especially vulnerable to changes in temperature, which may result in rapid loss of species. Insect infestations are likely to become more common as temperatures rise, as witnessed by recent tent caterpillar and bark beetle problems. More heat and less water may also result in more wildfires
Such changes will pose serious threats to Telluride's existing environment, economy, and quality of life. As a premier destination ski resort, our region stands to lose almost all of its snow pack by 2100. As a remote hiker's paradise, high country wildflowers, snow-capped vistas, and many high country animal species are likely to be displaced or completely lost.

For more information on the Telluride Unplugged initiative go to www.telluride-co.gov and look under "About Telluride". By Karen Guglielmone, Town of Telluride

CLIMATE SUMMARY

Happy New Year!! October starts the 2007 Water Year. OK, Quiz time: what is and why do we have a water year?? In the US a water year is the 12 month period from October 1 through the following September 30, and is named for the year in which it ends. So, the end of the 2007 Water Year is September 30, 2007 (very similar to the government fiscal year, just much more interesting!!). The dates for the "water year" were selected (I think by the United States Geological Survey) as kind of a best fit for the hydrologic cycle in our portion of the northern hemisphere (i.e. how water accumulates and is used over time on the earth's surface). The water supply for next year's growing season and the soil moisture going into next years growing season best fits the accumulated moisture during the water year, now you know!

Speaking of water years, 2006 was interesting to say the least. Most of the period from January through June was moisture limited. Then, all hell broke loose with precipitation averaging about 160% over the July-September period, what a come back. For the water year, the UFO averaged 101% of normal precipitation. Interestingly, we are not seeing much response from the cool season grasses to the late season moisture, I guess too much of a hang over from the early dry spell!

For September, the UFO was cool, averaging 4.8 degrees below normal. For the water year, however, UFO was 1.28 degrees above normal.

According to snow survey reports (snotel10.06), the Gunnison and San Miguel/Dolores/Animas Basin's are starting off the 2007 year with a snow water equivalent of 185% and 134%, respectively, very nice! Not to scare you, but the forecast maps (NDJ.temp.gif and NDJ.prcip.gif) prepared by the National Oceanic and Atmospheric Administration (NOAA), are showing warmer than normal temperatures and uncertain precipitation over the period from November through January. However, due to a weak, recently formed el nino, my forecast is for continued above normal precipitation

but still warmer than normal.

Dennis M. Murphy, Hydrologist
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High-Elevation Lake Monitoring

Draft Preliminary Report
Dr. Koren Nydick
November 14, 2006

Introduction

In mid-August 2006, Mountain Studies Institute (MSI) initiated a high-elevation lake survey to understand variability in ionic chemistry, nutrient concentrations, and ecology. This initial survey included 12 lakes in the western San Juan Mountains. The main application is focused on air pollution impacts, but fish stocking effects and invasive species are also of concern.

This work complements USFS and USGS long-term monitoring of several lakes for outlet water chemistry by providing additional information on organic nutrients and biological components. MSI's hopes to use this information to develop biological metrics to track possible effects of increased atmospheric nitrogen deposition, which is caused by vehicle, power plant and agricultural emissions. Also, this year's monitoring will set the stage for sampling of lakes for mercury in 2007 as part of MSI's EPA funded Air Quality Project. Lastly, MSI will identify one or two lakes to monitor more intensely in the future as a long-term program.

San Miguel County and the GMUG National Forest contributed financially to this survey.

Mountain Studies Institute
SAN JUAN MOUNTAINS, COLORADO

Methods

Each of 12 lakes was visited once during August 22 to September 13, 2006. Depth profiles of temperature, dissolved oxygen (DO), and specific conductivity were measured at the deepest location identified by depth sonar. The profiles were used to determine depth of the epilimnion, metalimnion and hypolimnion if vertical stratification existed. Samples were taken from within each layer (always 1.0 m for the eplimnion). Water samples were collected from discrete depths with a Kemmer bottle. Alkalinity was measured on an unfiltered sample within 24 hours of collection. Part of the water sample was filtered with a pre-ashed GF/F filter and frozen for analysis of major ions and dissolved organic phosphorus (DOP). An aliquot was acidified to ~pH2 in a vial with septum for analysis of dissolved organic carbon and nitrogen (DOC and DON). Seston (with zooplankton filtered out) were collected on pre-ashed GF/F filters and dried for analysis of carbon, nitrogen and phosphorus. An additional filter was frozen, extracted in ethanol, and then analyzed for chlorophyll *a* via fluorometry within one month of collection. Lastly, zooplankton were collected with an 80 micron net towed from near the bottom to the surface of the lake. Tows were collected and compisted from 3 locations except for very small lakes. Zooplankton will be analyzed for C, N, and P and taxa will be identified and counted.

Existing data: Depth, temperature, specific conductivity, DO, alkalinity, and chlorophyll a.

Data pending analyses: Major ions, DOC, DON, DOP, Seston CNP, Zooplankton CNP, and zooplankton taxa. TN and TP will be determined by adding the various fractions together.

Preliminary Results:

Lake Name	Lake-Layer-Rep	Date	Watershed Geology	pH	Sp Cond (uS/cm)	Alk (ueq/L)	Chl a (ug/L)	Max Depth (m)	Sample Depth (m)	Temp (deg C)	Stratified?	Zooplankton?	Notes
Andrews Lake	AL-E	8/23/2006	Limestone		117	1155	3.9	5.3	1	14.6	no	yes	
Andrews Lake	AL-M	8/23/2006	Limestone		118	1155	3.0	5.3	3	14.6	no	yes	
Andrews Lake	AL-H	8/23/2006	Limestone		117	1155	2.8	5.3	4.5	14.6	no	yes	
Molas Lake	MO-E	8/23/2006	Limestone		150		2.5	9.1	1	16.1	yes	yes	
Molas Lake	MO-M	8/23/2006	Limestone		181		15.1	9.1	5	15.4	yes	yes	
Molas Lake	MO-H	8/23/2006	Limestone		300		49.3	9.1	8	8.5	yes	yes	
Little Molas Lake	LM-E	8/22/2006	Limestone		107	1017	2.1	5.2	1	16.3	weak	yes	Macrophytes: Potomogeton and others, fringed by wetland sedges
Little Molas Lake	LM-M	8/22/2006	Limestone		108	1031	1.3	5.2	3	15.3	weak	yes	Macrophytes: Potomogeton and others, fringed by wetland sedges
Little Molas Lake	LM-H	8/22/2006	Limestone		108	1027	3.6	5.2	4.5	14.9	weak	yes	Macrophytes: Potomogeton and others, fringed by wetland sedges
Clear Lake	CL-E	8/25/2006	Volcanic		135	390	3.8	35.4	1	11.5	yes	yes	
Clear Lake	CL-M	8/25/2006	Volcanic		142	416	8.0	35.4	10	5.8	yes	yes	
Clear Lake	CL-H	8/25/2006	Volcanic		151	416	5.3	35.4	20	4.1	yes	yes	
Blue Lake	BL-E	8/31/2006	Volcanic		68	136	0.9	29.6	1	10.3	yes	yes	Mine Tailing on far (East) shore. No outlet? Inlet from pipes. Did not see fish
Blue Lake	BL-M	8/31/2006	Volcanic		72	138	1.6	29.6	13	6.6	yes	yes	Mine Tailing on far (East) shore. No outlet? Inlet from pipes. Did not see fish
Blue Lake	BL-H	8/31/2006	Volcanic		105	150	2.0	29.6	27	3.4	yes	yes	Mine Tailing on far (East) shore. No outlet? Inlet from pipes. Did not see fish
Ophir	OL-E	8/30/2006	Volcanic		351	26	0.4	4.6	1	10.2	weak	no	No visible Zooplankton. 1 sample taken for taxa. Bottom seems hard. No fish.
Ophir	OL-E-R	8/30/2006	Volcanic		351	22	0.4	4.6	1	10.2	weak	no	No visible Zooplankton. 1 sample taken for taxa. Bottom seems hard. No fish.
Ophir	OL-H	8/30/2006	Volcanic		358	26	0.4	4.6	3.5	9	weak	no	No visible Zooplankton. 1 sample taken for taxa. Bottom seems hard. No fish.
Ophir	OL-H-R	8/30/2006	Volcanic		358	26	0.4	4.6	3.5	9	weak	no	No visible Zooplankton. 1 sample taken for taxa. Bottom seems hard. No fish.
Kite Lake	KL-E	9/5/06/200	Volcanic?		107	12	0.5	6.1	1	11.4	no	no	3 Pulls revealed no zooplankton. Dead Lake? Tailings pile into lake. Orange sediment at bottom.
Kite Lake	KL-H	9/5/06/200	Volcanic?		109	10	0.4	6.1	5	10.9	no	no	3 Pulls revealed no zooplankton. Dead Lake? Tailings pile into lake. Orange sediment at bottom.
Verde Lake	VR-E	8/24/2006	Crystalline/volcanic		83	759	2.0	8.5	1	12.8	yes	yes	The Larger (lower) of the two lakes was sampled. Fish (small trout) were jumping.
Verde Lake	VR-M	8/24/2006	Crystalline/volcanic		84	755	2.1	8.5	4	12.7	yes	yes	The Larger (lower) of the two lakes was sampled. Fish (small trout) were jumping.
Verde Lake	VR-H	8/24/2006	Crystalline/volcanic		87	755	9.8	8.5	7.5	11.6	yes	yes	The Larger (lower) of the two lakes was sampled. Fish (small trout) were jumping.
Highland Mary Lak	HM-E	8/24/2006	Crystalline/volcanic		72	679	1.2	41.5	1	13.1	yes	yes	Largest MHL sampled
Highland Mary Lak	HM-M	8/24/2006	Crystalline/volcanic		68	635	2.8	41.5	11	6.5	yes	yes	Largest MHL sampled
Highland Mary Lak	HM-H	8/24/2006	Crystalline/volcanic		68	627	4.0	41.5	20	4.8	yes	yes	Largest MHL sampled
Eldorado Lake	EL-E	9/5/06/200	Crystalline		27	46	2.5	11.6	1	11.7	no	yes	No Fish
Eldorado Lake	EL-M	9/5/06/200	Crystalline		28	46	1.9	11.6	5	11.5	no	yes	No Fish
Eldorado Lake	EL-H	9/5/06/200	Crystalline		28	42	2.5	11.6	9	11.4	no	yes	No Fish
White Dome	WD-E	9/13/2006	Crystalline		12	16	3.5	7.6	1	9.7	no	yes	Caddisflies, small trout, visible large red cocopods visible floating near surface, dead elk.
White Dome	WD-E-R	9/13/2006	Crystalline		12	20	3.6	7.6	1	9.7	no	yes	Caddisflies, small trout, visible large red cocopods visible floating near surface, dead elk.
White Dome	WD-H	9/13/2006	Crystalline		12	18	5.0	7.6	5	9.4	no	yes	Caddisflies, small trout, visible large red cocopods visible floating near surface, dead elk.
White Dome	WD-H-R	9/13/2006	Crystalline		12	16	4.8	7.6	5	9.4	no	yes	Caddisflies, small trout, visible large red cocopods visible floating near surface, dead elk.
Crater Lake	CR-E	8/28/2006	Crystalline		32	304	1.9	13.4	1	12.8	yes	yes	
Crater Lake	CR-M	8/28/2006	Crystalline		41	376	4.1	13.4	7.5	8.2	yes	yes	
Crater Lake	CR-H	8/28/2006	Crystalline		45	412	9.1	13.4	10	6.1	yes	yes	
West Snowdon	WS-E	8/28/2006	Crystalline		14	62	0.9	6.7	1	3.8	no	yes	
West Snowdon	WS-E-R	8/28/2006	Crystalline		14	64	0.9	6.7	1	3.8	no	yes	
MEAN					**112**	**387**	**4**	**14**	**5**	**10**			
Standard Deviation					**101**	**404**	**8**	**12**	**6**	**4**			

Full analysis and interpretation pending.

San Miguel County and GMUG Special Interest Lakes

Ophir Lake is a pond located in a volcanic watershed just to the north of Ophir Pass above the town of Ophir. It is approximately 4.5 m (15ft) deep and appears to be formed from a beaver dam. The water was very clear; the bottom of the lake was visible and the substrate seemed hard. Dead trees were located in the lake. Alkalinity was 1.3 mg/L as CaCO3 (~25 microeq/L), which is extremely low. Specific conductance was moderately high (351-362 microS/cm). Data for major ions and nutrients are not yet available. The lake appeared to harbor little life, although heterotrophic bacteria were not sampled. Phytoplankton chlorophyll *a* was 0.4 microg/L, which is extremely low. No zooplankton were observed in ten tows of a net through the water column. Fish and benthic macroinvertebrates were not observed during our work, although we did not attempt to quantitatively sample them. Ophir Lake appears to be a relatively newly formed beaver pond that is probably affected by acid rock drainage coming from the watershed. It is not a good candidate for long-term monitoring to detect impacts of air quality.

Blue Lake is located above Bridal Vail Falls near Telluride in a volcanic watershed. Old mining workings still exist on the shore, including a pipe which feeds the lake water from an adjacent watershed and mine tailings. The lake is deep (at least 29.6m) and strongly stratified. Specific conductance and chlorophyll *a* is about average for this group of lakes. Alkalinity is somewhat low. Zooplankton were observed. Data for major ions and nutrients are not yet available. Although this lake might have served as a good long-term monitoring lake for air quality effects, mining impacts make this lake undesirable for this purpose.

Future Plans

Pending analyses and interpretation of data will occur during winter 2006-07. Lakes for future monitoring will be identified in spring 2007. The Blue Lakes near Mount Sneffels will be considered for monitoring in lieu of the above special interest lakes.