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The purpose of the Big Hole Watershed Committee is to seek understanding of the river and agreement among individuals and groups with diverse viewpoints on water use and management in the Big Hole watershed.

2006 Drought Newsletter *May, 2006*

To All Members of the Big Hole Community:

Once again, as we enter the warm, dry season, our thoughts return to our common desire to safeguard instream flows in the Big Hole River and its tributaries. We all care about the condition of the river and the fishery it supports; ranchers, sportsmen, recreationist, and conservationists alike. We particularly appreciate the irrigators, fishermen, outfitters, and guides who make extraordinary voluntary contributions to our drought mitigation efforts year after year.

The Big Hole Watershed Committee adopted a drought management plan in 2000. We learn as we go and improve the plan every year. But undoubtedly, it is the on-going communication and good will that really makes the difference. We are getting better at maintaining streamflows in drought conditions, as last year's experience shows.

In 2005, our snowpack in February was the lowest in 111 years. Even though there was less water coming in to the headwaters last year compared to the year before, there was more water in the river at Wisdom. This improvement was not an accident. It was the direct result of landowners in the upper basin going the extra mile to delay the start of their irrigation..... and once they did start, by putting less water on the ground.

This year, there is lots of good news. We had nearnormal snowpack. This year's early and late spring runoff hit at a good time for grayling spawning and survival of the juveniles. We got close to bankfull flows, which the river needs to maintain healthy riparian vegetation and a healthy stream channel.

It is important that we do not become complacent, though. One year of normal snowpack does not break a drought. We must continue to build on our history of success and keep our momentum going.

We thank you all for your past efforts on this important initiative and we request your continued support.

Sincerely,

Kandy Smith

Randy Smith, Chairman

BIG HOLE BASIN SNOW PACK SUMMARY 2005 – 2006

by Dave Amman, DNRC

Big Hole Basin snow accumulation got off to a good start for the 2006 water year. Snow water was very near normal for the entire winter at the more southern SNOTEL sites (Darkhorse Lake, Mule Creek), and was above normal for the northern sites (Calvert Creek, Saddle Mountain). The Basin as a whole remained at abovenormal snow water levels until early May, as shown in the graph below.

In May, western Montana experienced much warmer than normal weather, which quickly melted the lower elevation snow and reduced the overall snow pack to below-normal levels. Generally, snowmelt has been about two weeks ahead of normal, and as of May 31 snow water sits at about 67 percent of normal. As the graph shows, this still leaves the Basin in better shape than last year at this time, when snow water was only 57 percent of normal. By comparison, 2004 snow water was at 78 percent of normal on May 31.

Total accumulated precipitation for the 2006 water year (starting October 1, 2005) is at 99% of normal for the Big Hole Basin. The latest flow volume forecasts from the NRCS show a "best estimate" at this time of 73 percent of normal flow at Wisdom and 84 percent of normal at Melrose for June through September.



Review of 2005 Upper Big Hole River Streamflows

by Mike Roberts, DNRC Hydrologist

Streamflows in the upper Big Hole River in 2005 were less than normal. River flows ranked 11th out of the18 years of record at the Wisdom gage and 5th out of 8 years at the Mudd Creek gage. Most of the period of record at the Wisdom and Mudd Creek river gages represents drought conditions.

Peak snowpack (May 1) for the Big Hole basin during

2005 was 52% of normal. Despite poor snowpack conditions, river flows, in particular spring flows at the Wisdom gage, were sustained at much higher levels than 2004. This was due in part to spring rains but also largely due to voluntary diversion reductions or delayed irrigation by landowners in the upper basin. The following table compares a two-week period in May of 2004 with the same period in May of 2005. The gaging station "Sag" represents mainstem inflows above all irrigation at Saginaw Bridge while "Wis" represents river flows at Wisdom below most of the upper basin irrigation diversions.

	Sag	Wis
	cfs	cfs
5/4/2004	69	16
5/4/2005	26	63
5/16/2004	50	7
5/16/2005	112	74
cfs = cubic feet per second		

Due to a delay in irrigation in 2005, flows at Wisdom relative to Saginaw Bridge were much higher than 2004. In fact, despite precipitation and snowpack being less than 2004, flows at Wisdom were 40% greater in 2005 (see hydrograph below).



Streamflows between mid-July and October were well below normal at the Wisdom gage. Unlike 2004, precipitation was below normal during the summer and flows did average less than 20 cfs at times (14 days total).

2005 Big Hole Fisheries Update

by Dick Oswald, MFW&P Fisheries Biologist

While improvements were noted in 2005 relative to the drought status of southwest Montana, base flows in the Big Hole remained well below average while warm thermal regimes continued.

While rainbow trout populations continued to decline in standing crop and numbers of 13 inch and larger fish, all Big Hole study sections exhibited a very strong

recruitment of Age I fish in the 2005 sample. These fish were survivors from the 2004 spawning season and were present in densities strong enough to elevate total rainbow trout population density across the board.



Brown trout populations continued to decline throughout the 2005 sample. Population declines include reductions in density, standing crop, and numbers of 13 inch or 18 inch and larger fish. Brown trout condition factor, which had been depressed as a result of drought conditions, rebounded strongly in 2005 as a result of reduced stock density and favorable water temperatures in the winter of 2004 – 2005. Brown trout population declines continued to be most prevalent downstream from Glen where severe summer temperatures have compounded low flow regimes since the summer of 2003.

Spring 2006 brown trout data have not been analyzed to this date but a favorable snowpack and strong April precipitation argue well for habitat conditions for the summer of 2006.

2005 Grayling Update

by Jim Magee, FWP Grayling Biologist



Population Monitoring

Fall 2005 surveys indicate the current Big Hole grayling population age composition is dominated by juvenile grayling with approximately 30% Young-of-the-Year (YOY) (<6inches), 26% age 1 (7-9 inches) and 29% age 2 (10-12 inches). A total of 99 grayling were captured during the sample.



Catch per unit effort (CPUE) was the sampling method employed and indicated reduced YOY abundance from 2003 and 2004. However, the strong YOY age-class from 2003 segment can be seen as age-2 grayling in the fall of 2005. Age-2 grayling were dispersed throughout the Big Hole and tributaries from the Jerry Creek section upstream to *CCAA Segment C, between Jackson and Wisdom. Age-3 and older grayling (>12 inches) remain at low abundance exemplified by lower CPUE in the midriver "Pools" compared to past years. Poor recruitment over the past few years has resulted not only in this low abundance, but also a population structure dominated by juvenile age classes. Successful reproduction of the 2003 cohort, which reaches maturity in 2006 will be a positive step to reversing current population trends.



In recent years, tributaries have provided habitat and conditions utilized by all age classes of grayling and have had the highest abundance of grayling in fall surveys compared to mainstem Big Hole reaches. Tributaries also provide favorable conditions to other species; Fishtrap, LaMarche and Deep Creek had among the highest catch rates of grayling as well as brook trout, rainbow trout, and burbot. The Schindler reach in the mainstem Big Hole had the highest CPUE of brook trout for mainstem reaches. Rainbow trout and brown trout are more abundant in downstream reaches and tributaries; Deep Creek and CCAA Segment E. *Under the Candidate Conservation Agreement with Assurances

(CCAA) for fluvial Arctic grayling , the upper Big Hole River is divided into five Management Segments. The segments are as follows: Segment A includes the area between Dark Horse Creek and Hamby Creek; Segment B includes the area between Hamby Creek and Little Lake Creek.; Segment C includes the area between Little Lake Creek and the Wisdom Bridge; Segment D includes the area between the Wisdom Bridge and the Mudd Creek Bridge; Segment R includes the area between the Mudd Creek Bridge and the Dickie Bridge.

Big Hole River Drought Management Plan

The Big Hole Watershed Committee Adopted May, 2000

Purpose

The purpose of the drought management plan is to mitigate the effects of low stream flows and lethal water temperatures for fisheries (particularly fluvial Arctic grayling) through a voluntary effort among agriculture, municipalities, business, conservation groups, anglers, and affected government agencies.

Overview

The Big Hole Watershed Committee has agreed on this dry year plan to help mitigate damage to the fishery during dry years as indicated by flows and temperature. This plan has been designed to take into full account the interests of all affected parties including ranching, municipalities, anglers, and conservation groups.

The Big Hole Watershed Committee agrees that if this plan is to be successful in a dry year, it will need broadbased support and understanding. Big Hole Committee members are committed to helping secure the support of their constituencies for the successful implementation of this plan.

This initial plan is intended as a starting point from which modifications can be made based on the lessons learned from research projects, such as the Big Hole Watershed Committee's return flow study, increased information from new river gages, and from the experiences gained by implementing this plan. The plan will be reviewed by the Big Hole Watershed Committee every January for modifications.

Roles and Responsibilities

Big Hole Watershed Committee roles:

- Educate interested and affected parties;
- Develop, adopt, and modify annually the dry year plan;
- Receive, monitor, and act on information regarding stream conditions and snow pack levels throughout the year;
- Notify interested and affected parties of implementation and secure support; and
- Evaluate the environmental, social, and economic impact of the plan.

Montana Fish, Wildlife and Parks (FW&P), Montana Department of Natural Resources and Conservation (DNRC), and the United State Natural Resource Conservation Service (NRCS) roles;

 Provide accurate and timely information regarding stream conditions and snow pack levels throughout the year;

- Provide technical assistance in reviewing the plan and monitoring its implementation; and
- Ensure coordination of effort among all affected government agencies.
- Contacts and informs media of dry year plan implementation and stream flow and temperature status.

Definition of Dry Year Conditions and Recommended Actions

The Big Hole Watershed Committee will monitor snow pack levels and forecasted low stream level information provided by the USGS and NRCS throughout the year to prepare for potential water conservation measures. Stream flow information gathered from the USGS Wisdom and USGS Melrose gauging stations will be used to initiate specific voluntary actions to conserve water and mitigate the effects of dry year conditions on fisheries from May 1 through October 31.

The following flow targets take into consideration preparation time necessary to implement this voluntary plan. The annual evaluation of the effectiveness of the dry year plan will provide information to more intensively analyze the minimum in stream flows necessary to sustain adequate habitat quality and buffer water temperatures.

I. Upper River - Rock Creek Road to Mouth of the North Fork

Flows – Monitored at the USGS Wisdom Gauge

60 cfs DNRC and FWP officials will meet with the Big Hole Watershed Committee to

present data; formulate options including voluntary reduction of irrigation, stock water diversions, municipal water use, angling, and encourage the use of stock watering wells; and prepare to take action. A phone tree is initiated to advise water users, outfitters, and anglers of low water conditions and encourage conservation measures.

- 40 cfs Notice to outfitters and anglers requesting fishing be voluntarily limited to morning hours. Well use will be encouraged for stock watering. A phone tree will advise water users and outfitters of low water conditions and encourage conservation measures. The media will be contacted and news articles released to inform publics of low flow conditions.
- 20 cfs FWP will close the upper river to fishing, and will limit electrofishing sampling to core sections near Wisdom. Voluntary reduction of irrigation and public municipal water use is initiated, and continued well use for stock watering encouraged. The

phone tree is again initiated to contact water users advising of extreme low water conditions and encourage conservation measures. The media is contacted and informed of fishing closures and encourages public conservation efforts. The river remains closed until flows exceed 40 cfs for seven consecutive days.

Temperature July 15-September 1:

Step 1 When temperatures exceed 70°F for over 8 hours per day for three consecutive days at the USGS Wisdom gage and flows are above 30 cfs, a phone tree is used to contact outfitting businesses and a news release is issued advising publics and anglers of potential stressful conditions to the fishery and encouraging anglers to seek other destinations (mountain lakes and streams, spring creeks).

Step 2 When flows are 25-30 cfs at the USGS Wisdom gage and temperatures exceed 70°F for more than 8 hours per day for three consecutive days, and evidence of thermally induced stress to the fishery occurs, FWP will close the upper river to fishing. News releases will be issued and a phone tree will again contact local outfitting businesses. The upper river will be closed until temperatures do not exceed 70°F for more than 8 hours per day for three consecutive days and flows are greater than 30 cfs for seven consecutive days.

Step 3 When flows are 25 cfs or less at the USGS Wisdom gage and temperatures exceed 70°F for more than 8 hours per day, for three consecutive days, FWP will close the upper river to fishing. News releases will be issued and a phone tree will again contact local outfitting businesses. The upper river will be closed until temperatures do not exceed 70°F for more than 8 hours per day for three consecutive days and flows are greater than 30 cfs for seven consecutive days.

The wetted stream perimeter (flow below which standing crops of fish decrease (DNRC 1992) of the upper Big Hole River is 60 cfs. While this flow may be reasonable to maintain in ample moisture years and should be the goal for flow preservation efforts, in most years it is not a realistic quantity. Data from the USGS Wisdom gage from 1988-1999 recorded flows below 60 cfs in each of the twelve years. Population and flow data indicate 40 cfs is feasible to maintain while still sufficient to protect the Arctic Grayling population. A minimum survival flow of 20 cfs will provide flows necessary to maintain a wetted channel and ensure survival of the grayling population during brief, critical periods.

Temperatures above 70°F are generally considered stressful to salmonids. Warm water temperatures typically occur between July 15-September 1 in the Big Hole River. Although temperatures above 70°F can occur before and after this period, cooler night temperatures alleviate long periods of warm daytime temperatures. The upper incipient lethal temperature (e.g. that temperature that is survivable indefinitely for periods longer than one week by 50% of the population) for Arctic Grayling is 77°F (Loher et. al. 1997). Critical thermal maximum temperature is 85°F resulting in instantaneous death.

II. Middle River: Mouth of the North Fork to Dickie Bridge

<u>Flows:</u> Monitored at USGS Mudd Creek Gage <u>Temperatures:</u> Monitored at the Sportsman's Park Thermograph Site

- 100 cfs When flows decrease to 100 cfs or temperatures exceed 70°F for over 8 hours per day for three consecutive days. DNRC and FWP officials will meet with the Big Hole Watershed Committee to present data; formulate options including voluntary reduction of irrigation, stock water diversions, municipal water use, angling, and encourage the use of stock watering wells; and prepare to take action. A phone tree is initiated to advise water users, outfitters, and anglers of low water conditions and encourage conservation measures.
- 80 cfs When flows decrease to 80 cfs or temperatures exceed 70°F for over 8 hours per day for three consecutive days. Notice to outfitters and anglers requesting fishing be voluntarily limited to morning hours. Well use will be encouraged for stock watering. A phone tree will advise water users and outfitters of low water conditions and encourage conservation measures. The media will be contacted and news articles released to inform public of low flow conditions.

60 cfs When flows decrease to 60 cfs or temperatures exceed 70°F for over 8 hours per day for three consecutive days. FWP will close the river to fishing and not conduct electrofishing surveys. Voluntary reduction of irrigation and water use is initiated. A phone tree and media releases inform water users, outfitters, angler, and public of water the continued decline of in stream flows and encourages water conservation. The river remains closed until flows exceed 80 cfs for seven consecutive days and temperatures do not exceed 70°F for more than 8 hours per day for three consecutive days.

Note:

In years with clear-cut drought conditions under which triggers in both the upper and middle reach are met, or about to be met, these two reaches could be treated as one unit (Rock Creek Road to Dickie Bridge).

The Mudd Creek gage has limited data (1998-2003). Continued data on various flow scenarios will allow better analysis of wetted perimeter and in stream flow regimes. This plan should be fine tuned or modified as needed as additional data becomes available.

III. Lower River – Dickie Bridge to confluence with Jefferson

Monitored at USGS Melrose Gage

- 250 cfs DNRC and FWP officials meet with Big Hole Watershed Committee to present data; formulate options including the voluntary reduction of irrigation, municipal water use, and angling; and prepare to take action. A phone tree is initiated to advise irrigators and outfitters of stream flow conditions.
- 200 cfs Notice to outfitters and anglers requesting fishing be voluntarily limited to morning hours. The phone tree will inform local water users, anglers and outfitters of stream flow conditions. he media will be contacted and news articles released to inform public of low flow conditions.
- 150 cfs FWP will close the river to fishing and not conduct electrofishing surveys. Voluntary reduction of irrigation and water use is initiated. A phone tree and media releases inform water users, outfitters, anglers, and public of the continued decline of in stream flows and encourages water conservation. The river will remain closed until flows exceed 200 cfs for seven consecutive days.

Temperature triggers are the same as the middle reach.

Notification and Monitoring Process

Montana, Fish, Wildlife and Parks, Montana Department of Natural Resources and Conservation Service will keep the Big Hole Watershed Committee fully informed throughout the year regarding stream flows, water temperature, and snow pack data. This will allow for timely information to help in encouraging appropriate courses of action. Stream conditions, water temperature, and snow pack levels will be a standing agenda item at each Big Hole Watershed Committee meeting. Based on the year long monitoring of weather conditions that may influence flow, the Big Hole Watershed Committee will publish a notification of impending dry year conditions. Notifications will be sent to the press, ranchers, municipalities, outfitters, conservation and sportsmen groups, and posted on the "world wide web".

While most attention is on late summer conditions, it is crucial to certain species, including Fluvial Arctic Grayling that springs flows are closely monitored.

The Montana Fish, Wildlife and Parks will offer assistance to irrigators who are willing to cut back on water diversions. The BHWC will hold an open public meeting to present the information and conduct discussions with all parties concerning proposed actions.

Each caucus within the BHWC will communicate with their respective groups concerning implementation of the plan and secure support.

Public Education

The BHWC will develop and distribute educational material with agency assistance, describing the need for a drought management plan, its provisions, and anticipated benefits.

Information will be provided on the possible actions people can take to mitigate damage from dry years including but not limited to:

- Voluntary reduction of irrigation and diversion stock watering during critical times;
- Increase flood irrigation during spring runoff to augment return flows;
- Water conservation policies by municipalities and industries during sensitive times;
- Emergency water reduction policies by municipalities and industries during critical times;
- Reduced recreation uses during sensitive times; and
- Elimination o fall recreation uses at critical times.

Addendum 2002 – Definition

Flow trigger levels will be based on the <u>Average Daily</u> <u>Flow</u> measured in cubic feet per second (cfs). Therefore, flows will be reviewed the following day to determine trigger levels and fishing closures.

Addendum 2002 – Publicity

It is recognized that flow levels, forecasting and angling closures affect local businesses and residents. Whenever possible, maps and specific locations will be included in press releases and other communications (MT FW&P website).

Addendum 2004 – Publicity and Outreach

The BHWC will issue weekly updates to irrigators during drought periods. Weekly updates will be provided in hard copy, electronic mailings and on the BHWC web site. In non-drought periods the BHWC will issue regular updates as needed.

The BHWC will work with MFWP on press releases and other public outreach efforts. The BHWC will work with local newspapers and televisions to secure flow updates in these communication mediums.

The BHWC will issue an annual update in the form of a mailing (hard copy and electronic) which will include: a copy of the most recent Drought Management Plan, flow forecasting, updates on water conservation programs and assistance, and other related news items.

Addendum 2004 - May 15-June 30 Wisdom Reach Flow Levels (J. Magee MFWP)

Upper Reach:

160 cfs May 15 – June 30. When flows decrease below 160 cfs a phone tree will be used to contact water users advising of flow conditions and encouraging conservation measures.

20 cfs FWP will close the upper river to fishing, and will not conduct electrofishing surveys. (Subject to approval or change by the Fluvial Grayling Workgroup)

1) The upper and lower wetted perimeter inflection points for the upper Big Hole River are 160 and 60 cfs respectively (MFWP 1989). The upper inflection point is the flow required to maximize standing crop. While this flow may not be realistic in most years it should be the target goal for conservation measures. Maintaining this flow during grayling spawning and emergence in May and June will enhance survival and recruitment. Reduction of wetted perimeter is accelerated below the lower inflection point of 60 cfs. The flow goal for late summer and fall should be to maintain flows at 60 cfs or greater to avoid accelerated losses in standing crop. A minimum survival flow of 20 cfs will provide flows necessary to maintain a wetted channel, allow for migration into flow and temperature refugia and allow survival of some portion of the population during brief, critical periods.

2) Montana Fish Wildlife and Parks will not conduct electrofishing survey in the Wisdom West reach (Wisdom bridge downstream approximately 5 miles) if flows are less than 20 cfs and maximum daily temperatures are greater than 64°F.

Addendum 2004 - Thermal Series for the Middle Reach (R. Oswald, MFWP)

Rational: Last summer, we encountered extremely high water temperatures at the Sportsman's Park Thermograph (FWP) in the Middle Reach. These temperatures often

exceeded our Upper Reach Drought Plan standard of 70° F for more than 8 hours per day for 3 consecutive days. When we consulted the Drought Plan, we found a somewhat contradictory set of standards at the 3 triggers. That is, each flow trigger (100, 80, and 60 cfs) contained the same default thermal statement, i.e., "or temperatures exceed 70° F for over 8 hours per day for 3 consecutive days." This left us with a situation in which the river would have closed to angling at any time we encountered the temperature standard at 100 cfs or less. Moreover, the only standard for reopening the river following closure was linked to seven consecutive days of flows greater than 80 cfs. Thus thermal closure at flows less than 80 cfs would have required the same reopening criteria as flows below 60 cfs. The alternative of changing "or" to "and" in the thermal series also didn't work because that would have rendered any temperature considerations redundant as the drought response actions would have defaulted to the flow triggers. In order to cope with the problem, we (FWP) merely monitored key segments of the reach for biological indicators of thermal stress.

In order to eliminate this problem in the future, I have drafted the following proposed Thermal set of Triggers for the Middle Reach. The set of Triggers parallels the series currently applied to the Upper Reach.

Temperature (July 15 – September 1)

<u>Step 1:</u> When Temperatures exceed 70° F. for more than 8 hours per day for 3 consecutive days at the FWP Sportsman's Park Thermograph and flows exceed 90 cfs at the USGS Mudd Creek Gage, a phone/Email tree is used to contact outfitting businesses and a news release is issued advising publics and anglers of potential stressful conditions to the fishery and encouraging anglers to seek other destinations (reservoirs, mountain lakes and streams, spring creeks, etc.).

<u>Step 2:</u> When flows are 70 - 90 cfs at the USGS Mudd Creek Gage and temperatures exceed 70° F. for more than 8 hours per day for 3 consecutive days and evidence of thermally induced stress to the fishery occurs*, FWP will close the Middle Reach to fishing. News releases will be issued and a phone/email tree will again contact local outfitting businesses. The Middle Reach will remain closed to fishing until temperatures do not exceed 70° F. for more than 8 hours per day for 3 consecutive days and flows are greater than 80 cfs for 7 consecutive days.

* Thermally induced stress as observed by trained, experienced observers may include any of the following: Observed mortality in significant numbers of Age I and older mountain whitefish and other salmonid species in lieu of other logical sources of mortality; Outbreaks of stress related piscid diseases such as Bacterial Furunculosis; Extraordinary concentrations of fish in thalweg or riffle tailout habitats; Hyperactivity to include gasping, rolling, jumping, etc., of large, concentrated numbers of fish; and Frenzied feeding activity at inappropriate times and under inappropriate conditions. <u>Step 3:</u> When flows are 70 cfs or less at the USGS Mudd Creek Gage and temperatures exceed 70° F. for more than 8 hours per day for 3 consecutive days, FWP will close the Middle Reach to fishing. News releases will be issued and a phone/email tree will again contact outfitting businesses. The Middle Reach will remain closed until temperatures do not exceed 70° F. for more than 8 hours per day for 3 consecutive days and flows are greater than 80 cfs for 7 consecutive days.

Addendum 2005 – Voluntary Angling Limits (R.Oswald, MFWP)

Modify the Second Trigger language to request anglers "voluntarily limit their angling activities to earlier, cooler hours of the day".

Rational: It does not necessarily make sense to limit angling to morning hours when some days, differing climatic conditions and flow regimes result in high water temperatures well before noon while other days exhibit cool water temperatures well into the early afternoon. This approach sends the message to consider the temperature and time of day as diminishing flows compound stress on the system.

For Information Contact:

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Other Contacts:

Montana Department of Fish, Wildlife & Parks, Dillon office – 406-683-9310

U.S. Fish and Wildlife Service Dillon Office – 406-683-3893 Montana Drought Monitoring 406-444-5354

Internet Resources

Drought Report http://www.nris.state.mt.us/drought

USGS Real Time Flow Data http://waterdata.usgs.gov/mt/nwis/current?type=flow

NRCS Snowpack Monitoring http://www.wcc.nrcs.usda.gov/snow/ Montana Fish, Wildlife & Parks Closure Policy http://www.fwp.state.mt.us/drought/closurepolicy.asp http://www.fwp.state.mt.us/drought/default.asp

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