

Big Hole River Drought Management Plan
The Big Hole Watershed Committee
Adopted 1997
(Amended 2000, 2002, 2004, 2005, 2007)

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 (BHC) 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 BHC agrees that if this plan is to be successful in a dry year, it will need broad-based 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 BHC's return flow study, increased information from new river gauges, and from the experiences gained by implementing this plan. The plan will be reviewed by the BHC every January for modifications.

Roles and Responsibilities

BHC 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 & Parks (FWP), 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 BHC 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, USGS Melrose, and USGS Glen 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. Rock Creek Road to Mouth of the North Fork

Flows *Monitored at the USGS Wisdom Gauge*

- 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.
- 60 cfs DNRC and FWP officials will meet with the BHWC 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 they voluntarily limit their angling activities to earlier, cooler hours of the day. 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, FWP will close the upper river to fishing, and will not conduct electrofishing surveys. (Subject to approval or change by the Fluvial Grayling Workgroup). 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.

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

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 gauge 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 gauge 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 gauge 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 gauge 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. Mouth of the North Fork to Dickie Bridge

Flows: *Monitored at USGS Mudd Creek Gauge*

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 BHWC 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.

Temperature: *Monitored at the Sportsman's Park Thermograph Site (July 15 – September 1):*

Step 1: 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 Gauge, 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.).

Step 2: When flows are 70 – 90 cfs at the USGS Mudd Creek Gauge 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.

Note: 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.

Step 3: When flows are 70 cfs or less at the USGS Mudd Creek Gauge 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.

Note: In years with clear-cut drought conditions under which triggers in both the Rock Creek to Mudd Creek Reach and the Mudd Creek to Dickey Bridge 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 Gauge 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. Dickie Bridge to Melrose Bridge

Flows: *Monitored at USGS Melrose Gauge*

260 cfs DNRC and FWP officials meet with BHWC 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 they voluntarily limit their angling activities to earlier, cooler hours of the day. The phone tree will inform local water users, anglers and outfitters of stream flow conditions. The media will be contacted and news articles released to inform public of low flow conditions.
- 140 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 previous Reach.

IV. Melrose Bridge to confluence with the Jefferson River

Flows: *Monitored at USGS Glen Gauge*

- 250 cfs DNRC and FWP officials meet with BHCW 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 they voluntarily limit their angling activities to earlier, cooler hours of the day. The phone tree will inform local water users, anglers and outfitters of stream flow conditions. The 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: *Monitored at the FWP Notch Bottom Thermograph Site (July 15 – September 1):*

- Step 1: When Temperatures exceed 70° F. for more than 8 hours per day for 3 consecutive days at the FWP Notch Bottom Thermograph and flows exceed 230 cfs at the USGS Glen Gauge, 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.).
- Step 2: When flows are 180 – 230 cfs at the USGS Glen Gauge 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 Melrose to the Mouth Reach to fishing. News releases will be issued and a phone/Email tree will again contact local outfitting businesses. The Melrose to the Mouth 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 200 cfs for 7 consecutive days.

Note: 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.

Step 3: When flows are 180 cfs or less at the USGS Glen Creek Gauge and temperatures exceed 70°F. for more than 8 hours per day for 3 consecutive days, FWP will close the Melrose to the Mouth 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 200 cfs for 7 consecutive days.

V. Notification and Monitoring Process

FWP, DNRC, and NRCS will keep the BHWC 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 BHWC meeting. Based on the year long monitoring of weather conditions that may influence flow, the BHWC 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 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 FWP 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.

FWP 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 of all recreation uses at critical times.

For Information Contact:

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Other Contacts:

Montana Department of Fish, Wildlife & Parks,

For information contact:

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>

VI. Chronological Listing of Amendments

Addendum 2002 – Definition

Flow trigger levels will be based on the Average Daily Flow 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 BHCW will issue weekly updates to irrigators during drought periods. Weekly updates will be provided in hard copy, electronic mailings and on the BHCW web site. In non-drought periods the BHCW will issue regular updates as needed.

The BHWC will work with FWP 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 FWP)

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)

Rationale:

1) The upper and lower wetted perimeter inflection points for the upper Big Hole River are 160 and 60 cfs respectively (FWP 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) FWP 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, FWP)

Rationale:

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)

Step 1: 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 Gauge, 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.).

Step 2: When flows are 70 – 90 cfs at the USGS Mudd Creek Gauge 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.

Step 3: When flows are 70 cfs or less at the USGS Mudd Creek Gauge 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, FWP)

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

Rationale:

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.

Addendum 2007 – Proposal to replace original language in the Drought Plan with the accepted Amendments

Rationale:

The current format of the Drought Plan is confusing. The initial read lists criteria that are no longer in affect and the Amendments in the back appear to contradict the Plan.

Recommendation:

The original language of the Plan should be replaced by the current appropriate Amendments. Maintain the list of Amendments in the back of the Plan to maintain the history and reasoning behind the changes.

Addendum 2007 (a) – Split the lower reach into two reaches and incorporate a thermal series into the new lower reach (R. Oswald, FWP)

Rationale:

The present reach from Dickie Bridge to the mouth is 71 miles in length and spans a very wide range in flows, species composition, and thermal regime. A single set of triggers often spans a flow range of 200 cfs or more and temperature ranges of 8 degrees or more. Moreover, trout species domination from approximately Melrose downstream favors brown trout which data show to be more severely affected by low flows than rainbow trout which increase in dominance upstream from Melrose.

Recommendation:

Split current reach from Melrose Bridge (Salmon Fly Fishing Access) (about 33 miles downstream and 38 miles upstream) into the Dckie Bridge to Melrose Bridge Reach and the Melrose Bridge to the Confluence with the Jefferson River Reach. In the Melrose Bridge to Mouth Reach, maintain original flow triggers generated below the WETP Minimum Flow. Return Dickey Bridge to Melrose Bridge Reach to original 1994 calculations of 260 -200 -140 cfs (see Addendum 2007(b)). Incorporate a series of Thermal Triggers similar to those in place for the upper reaches of the river to be measured at FWP Thermographs at Notch Bottom and at *Melrose Gauge*.

***Consider adding an additional component for PM closure under any flows below 260 cfs when temperatures at Notch Bottom or Pennington Bridge exceed 72 degrees for more than 8 hours per day for 3 consecutive days with lifting of closure when daily temperatures do not exceed 70 degrees for more than 8 hours per day for at least 3 consecutive days.

Addendum 2007 (b) – Return Dickey Bridge to Melrose Bridge Reach Flow Triggers to original 1994 calculations of 260 -200 -140 cfs (R. Oswald, FWP).

The original triggers were generated from FWP WETP Minimum Flow (and Instream Flow Reservation) of 260 cfs which represents a 40% depletion of wetted perimeter from the Upper Inflection Point Flow of 60 cfs. The original closure trigger was calculated to be 140 cfs, representing an additional 21% depletion in Wetted Perimeter from the minimum and closely approximating the August 95% Exceedence flow at the USGS Melrose Gauge. The second stage trigger represents the mid-point between the Upper and Lower Trigger Flows. Dropping the Stage 3 Closure Trigger from 150 to 140 cfs represents an additional loss in Wetted Perimeter of 5 feet and 4% of the total 21% depletion from the 260 cfs minimum. This would maintain a better biologically defensible base for the triggers and bring the Stage 3 (Closure) Trigger into compliance with current FWP statewide Drought Policy.

Recommendation:

Adjust the Dickey Bridge to Melrose Bridge Reach Triggers as recommended.