MISSOURI RIVER BASIN WATER RESERVATIONS

MONTANA FISH, WILDLIFE & PARKS
72155-41A

FISH, WILDLIFE & PARKS COMPLIANCE WITH CONDITION 2 OF THE BOARD OF NATURAL RESOURCES AND CONSERVATION'S ORDER GRANTING INSTREAM FLOW RESERVATIONS TO FWP

June 1994

Montana Department of Fish, Wildlife & Parks

June 7, 1995

To: File - Upper Missouri River basin water reservations

From: Liter Spence

Subj: FWP compliance with Condition 2 of the Board of Natural Resources and Conservation's order granting instream flow reservations to FWP.

Condition 2 of the Board's July 1, 1992 order (p. 184) granting water reservations to FWP required that "DFWP shall within two years of the date of the final order submit to the board a list of monitoring sites and a method of determining the extent of the instream flow along the reach proportional to the monitoring sites. Until approval of this monitoring report the DFWP may not object to any changes of use by other water users within a reach."

FWP presented the required monitoring report to the Board on February 10,1995. The Board, after discussion, approved both the monitoring plan and the method for proportioning the instream flow along other reaches of the stream, i.e., they approved the monitoring report as submitted.

The attached minutes of the Board's February 10, 1995 meeting contain a record of the discussion and approval of the monitoring plan (see p. 4). Therefore, FWP has met the requirements of Condition 2 of the order and FWP can now object to changes of use by other water users within reaches of streams where it has reservations.

bnrc.con

Liter Spence
DFWP

DEPARTMENT OF NATURAL RESOURCES AND CONSERVATION

MARC RACICOT, GOVERNOR

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STATE OF MONTANA

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See p. 4

MINUTES
BOARD OF NATURAL RESOURCES AND CONSERVATION MEETING
FEBRUARY 10, 1995
HELENA, MONTANA

Call to Order: The 163rd meeting of the Board of Natural Resources and Conservation was called to order at 10:00 a.m. on Friday, February 10, 1995 in the main conference room 111 of the Lee Metcalf Building, Helena, Montana by Chairman Jack E. Galt, BNRC Chairman.

Attendance: Board Members in attendance were: Jack E. Galt, John Bailey, Barton Cooper, John Brower, Gerald Feda, Mary Ann Sharon and Mary Hinebauch.

Robert R. Throssell, Retained Board Counsel, was in attendance for the Board meeting.

DNRC Staff Personnel: Mark A. Simonich, DNRC Director; Wayne A. Wetzel, Deputy Director; Fred Robinson, Legal Counsel; Gary Fritz, Administrator, Water Resources Division; Terri McLaughlin, Ron Guse, Tim Kuehn, Richard Moy, Larry Dolan, Michael Downey, Laurence Siroky, Karl Christians, Mike McLane, Water Resources Division; John Tubbs, Duane Claypool, Deeda Richard, Conservation & Resource Development Division; Norma J. Andriolo, Board Secretary.

Others: Liter Spence, Curtis Larson, Dept. Fish, Wildlife & Parks; John Bloomquist, Attorney, Helena/Dillon; Candace West, Assistant Attorney General, Helena; John Chaffin, US Department of Interior Attorney, Billings; Susan Reneau, Kay Woodworth, Marion B. Lavery, Hayes Creek Homeowners Association, Missoula.

Approval of Minutes: Mr. Bailey MOVED that the December 14, 15, 1994 Board meeting minutes be APPROVED as mailed. Mr. Feda seconded the motion and it PASSED. (A copy of the minutes is on file in the department.)

Little Beaver Conservation District Reserved Water Use - Detailed Development Plan LB-073-SC (Wayde & Lisa Mitchell)

Mr. Claypool, Conservation & Resource Development Division, discussed with the Board the Little Beaver Conservation District's request for Board approval for use of 24 acre-feet of water for waterspreading. The request was supported by a detailed development plan approved by the district. The source of water is Sandstone Creek in Fallon County and water will be diverted by a centrifugal pump.

Mr. Claypool explained to the Board that the department received one objection to the proposed project. The objector met with the district to discuss his objection to the proposed project. He then indicated that it would not adversely affect his water rights. The objector did not appeal the LBCD's decision to approve use of the reserved water for the proposed project.

The department recommended approval of the Detailed Development Plan based on the results of staff review and consideration of the 1978 Order Establishing Reservations.

Mr. Bailey MOVED that the Board APPROVE the Little Beaver Conservation District Reserved Water Use Detailed Development Plan LB-073-SC for Wayde & Lisa Mitchell. Mr. Cooper seconded the motion and it PASSED. (A copy of the plan is on file in the department.)

Little Beaver Conservation District Reserved Water Use - Detailed Development Plan LB-074-SC (Wayde & Lisa Mitchell)

Mr. Claypool, Conservation & Resource Development Division, discussed with the Board the Little Beaver Conservation District's request for Board approval for use of 5 acre-feet of water for waterspreading. The request was supported by a detailed development plan approved by the district. Water will be diverted by a diversion dike. This water will be supplemental to water use under permit LB-073-SC and both permits will be used to apply water to the same 12 acres.

Mr. Claypool explained to the Board that the project was completed by a previous landowner but no water rights were established. No objections to the project were received.

The department recommended approval of the Detailed Development Plan basd on the results of staff review and consideration of the 1978 Order Establishing Reservations.

Mr. Bailey MOVED that the Board APPROVE the Little Beaver Conservation District Reserved Water Use Detailed Development Plan LB-074-SC for Wayde & Lisa Mitchell. Mr. Cooper seconded the motion and it PASSED. (A copy of the plan is on file in the department.)

Yellowstone River Basin Water Reservation Annual Progress Reports

Ms. McLaughlin, Water Resources Division, presented the U.S. Bureau of Reclamation, the U.S. Bureau of Land Management and the Montana Department of State Lands Yellowstone River Basin Water Reservation Annual Progress reports to the Board. The Board may accept the reports or request additional information on the progress of any specific water reservation. The department recommended acceptance of the annual reports.

Mr. Bailey and the Board discussed the U.S. Bureau of Land Management's water reservation. The BLM is considering an option of using the water to maintain water levels in a proposed flatwater recreation reservoir known as the Cherry Creek Project. The project is being proposed because there has been no demand for the water. Mr. Bailey expressed concern with the BLM making a major change in the use of their water reservation from the originally granted full service irrigation. The BLM will file an Application for Change of Appropriation Water Right, if hydrologic investigations and reservoir construction is found to be feasible.

Ms. McLaughlin stated that last year the BLM was informed by DNRC that the Board would need a reasonable amount of time to assess the Cherry Creek project. Therefore, BLM should send in an Application for Change of Appropriation Water Right as soon as they know if the project is feasible.

The ten year review was discussed. The three reservants BLM, BOR, DSL will submit detailed reports on the objectives of their reservations by June, 1995. The statute provided for a ten-year review by the Board which will be conducted in 1995.

Mr. Feda MOVED that the Board ACCEPT the (1) U.S. Bureau of Reclamation, (2) U.S. Bureau of Land Management, and (3) Montana Department of State Lands, Yellowstone River Basin Water Reservations - 1994 Annual Progress Reports. Dr. Brower seconded the motion and it PASSED. Mr. Bailey voted nay. (A copy of the reports is on file in the department.)

Upper Missouri River Basin Water Reservations - Department of Fish, Wildlife & Parks Response to Board Condition

Mr. Spence, Department of Fish, Wildlife & Parks, responded to the Board's conditions as stated in its July 1, 1992 Order Establishing Water Reservations in the Missouri River Basin above Fort Peck Dam. He discussed condition 2 which requires the DFWP to submit: (1) a list of monitoring sites for each of the streams where reservations are granted, and (2) a method of determining the extent of the instream flow along the reach proportional to the monitoring sites.

Mr. Spence discussed with the Board the DFWP's primary instream flow method which was the Wetted Perimeter Inflection Point Method. He also discussed several other methods used when this method could not be used or was inappropriate.

The Board discussed their concerns with the other instream methods used by the DFWP. Mr. Spence replied that the DFWP needs some flexibility in the types of methods used depending on the situation. He presented optional ways of addressing this as part of the Board's condition.

Dr. Brower expressed concern for junior water right holders with the various instream flow methods used by the DFWP. He was especially concerned with switching from a wetter perimeter method to another one. Two different methods along the same reach of stream may result in a denial of water to a junior permittee. Mr. Spence responded that the protection of the water right will always be at the lower point on the stream because that is where the flow was granted by the Board Order.

The Board and the DFWP discussed hydropower use that could divert the entire flow of the stream for several miles but return all the water above the monitoring site.

The DFWP requested Board approval of its responses to the Board's condition in the Upper Missouri River Basin Water Reservations Order.

Mr. Cooper expressed concern with the amount of flexibility the DFWP has in using various instream flow methods because one of the methods may show the stream is dewatered too much.

Dr. Brower MOVED that the Board ACCEPT (1) Department of Fish, Wildlife and Parks response report to the Board Condition Number 2 in the Upper Missouri River Basin Water Reservations Order dated July 1, 1992 and, (2) Board ACCEPT all the instream flow options/methods which includes #1. Mr Feda seconded the motion and it PASSED. Mr. Cooper voted nay. (A copy of the report is on file in the department.)

Lower Missouri River Basin Water Reservations - Sheridan County Conservation District

Mr. Throssell, Board Counsel, stated that following the issuance of the Board's Lower Missouri River Basin Water Reservations Order, the City of Havre filed a Petition for Judicial Review in the Twelfth Judicial District, Hill County, Cause No. DV-95-020. Mr. Throssell has been in contact with the City of Havre Attorney to clarify their portion of the Board record.

Mr. Throssell discussed the issuance of a motion by the Department of Interior on behalf of the U.S. Fish and Wildlife service concerning the Board's Order as it was written for the Sheridan County CD. Mr. Chaffin, Office of the Field Solicitor, Billings, Montana filed a Motion for Clarification of Final Order for Sheridan County Conservation District. Mr. Bloomquist, Attorney, Sheridan County Conservation District, Helena filed with the Board a Sheridan County Conservation District's Response to United States' Motion for Clarification and Mr. Larsen, Attorney, Department of Fish, Wildlife and Parks filed with the Board Montana Department of Fish, Wildlife and Park's Response to Motion for Clarification of Final Order.

Mr. Chaffin, Attorney for the Department of Interior, appeared before the Board and moved the BNRC to clarify its Order of December 30,1994 concerning Sheridan County Conservation District to state that at any hearing required because the District has permitted 5,809 acre feet, the District bears the burden of proof in showing that further permits will not adversely affect other water users or resources.

Mr. Bloomquist, Attorney, Sheridan County CD appeared before the Board and agreed with Mr. Chaffin's clarification motion that the burden of proof is on the Sherian County CD. He wants to review any clarification language before it is inserted in the record.

Mr. Galt thinks that the Order already includes the correct language. Mr. Throssell agreed to draft language acceptable to the parties to amend the Board's December 30, 1994 Order in the Little and Lower Missouri River Basins.

Mr. Feda MOVED that the Board APPROVE for Mr. Throssell, Board's Hearing Examiner in the Lower Missouri River Basin Water Reservations (Sheridan County Conservation District) to work with counsel of record to draft clarification language that is agreeable to the parties and submit it to the Board for approval. Mr. Cooper seconded the motion and it PASSED. Mr. Bailey voted nay. (A copy of the final clarification will be on file in the department.) SEE INSERT 5A.

ROBERT R. THROSSELL
Special Assistant Attorney General
Hearings Examiner for the Little and
Lower Missouri River Reservations
1520 East Sixth Avenue
Helena, MT 59620-2301
(406) 442-0230

BEFORE THE MONTANA BOARD OF NATURAL

RESOURCES AND CONSERVATION

* * * * * * * * * * * * *

IN THE MATTER OF WATER RESERVATION APPLICATION NOS. L077646-40S, L077647-40Q, L077749-40S, L078651-40J, L084482-40S, L084483-40J, L084484-39G, L084485-39FJ, L084486-40J, L084487-41P, LO84488-40Q, L084489-40J, L084490-40J, L084491-40R, L084492-40P, L084493-40J, L084494-40G, L084495-40O, L084496-39E, L084497-40Q, L084498-39G, L084499-40S, L084500-40S, L084501-40S, L084502-40R, L084503-39G IN THE LITTLE AND LOWER MISSOURI RIVER BASIN	**STIPULATION RE AMENDMENT OF BOARD OF NATURAL RESOURCES AND CONSERVATION'S ORDER, SHERIDAN COUNTY CONSERVATION DISTRICT RESERVATION**

* * * * * * * * * * * * *

The Board of Natural Resources and Conservation (Board) received and heard argument on the U.S. Department of Interior, Fish and Wildlife Service's Motion to amend paragraph two of its Order granting a reservation to the Sheridan County Conservation District. As a result of discussions at the time the matter was heard by the Board and subsequent deliberations among the affected parties, agreement was reached on language acceptable to all interested parties to be substituted in the Order. The undersigned

hereby stipulate and agree that the Board may adopt the following language in place of paragraph two of its Order as it pertains to the reservation of the Sheridan County Conservation District:

2. When the total volume of water permitted by the Sheridan County Conservation District reaches 5,809 acre-feet, the Sheridan County CD will notify the Board and temporarily stop issuing authorization to use reserved water. At that time, notice will be given to all local water users and other interested parties, including but not limited to the U.S. Fish and Wildlife Service, Fort Peck Tribes, and Montana Department of Fish, Wildlife and Parks. Before Sheridan County CD is allowed to resume issuing authorization to use reserved water, ~~a A~~ hearing will be held before the Board to determine whether further groundwater development will adversely effect other water users or other resources. ~~During the hearing, parties will be permitted to submit evidence and findings to the Board.~~ Persons and entities other than those who appeared in this proceeding, may be permitted to participate in any hearing conducted by the Board upon a showing that their interests may be impacted by further development of the reserved water. The Board will conduct the hearing in accordance with its rules and the Montana Administrative Procedures Act. Sheridan County CD has the burden of showing that continued development of its reserved water will not adversely effect other water users or other resources. If the Board finds that development by the Sheridan County CD has not resulted in adverse effects to other water users or resources, it may authorize the Sheridan County CD to continue development of its reservation subject to any appropriate conditions. If adverse effects are found, the Board may modify or condition the remaining portion of the Sheridan County CD reservation as appropriate. (the underlined being new and the interlined language being deleted)

DATED this 14th day of March, 1995

John Caffin
attorney for
U.S. Dept. of Interior
Fish & Wildlife Ser.

John E. Bloomquist
attorney for
Sheridan County
Conservation District

Curt Larsen
attorney for
MT Dept. of Fish,
Wildlife & Parks

Mr. Throssell stated that although the Final Order has been printed, DNRC is on record that it will produce additional bound volumes which will include the clarification language for Sheridan County CD and maps.

Subordination of Water Reservations in the Upper and Lower Missouri River Basin

Mr. Throssell, Board Counsel, explained to the Board that subordination is a procedural mechanism which allows the Board to subordinate water reservations to junior permits issued since the reservation statute fixed the priority date of water reservations. Reservations in the Upper and Lower Missouri River Basins have a priority date of July 1, 1985. Reservations in the Little Missouri River Basin are fixed at July 1, 1989. Only those permits that were issued prior to the Order establishing reservations may be included in the subordination process.

The Board considered a variety of actions that would satisfy the statutory and regulatory requirements in the subordination issue.

Mr. Moy, Water Resources Division, discussed and distributed a Summary of Water Rights (Permits) Eligible for Advancement in Priority Date in the Lower, Little, and Upper Missouri River Basins for the Board's information.

Mr. Bailey MOVED that the Board WAIT until a permittee requests the process of subordination be initiated to take any action on the matter. Mr. Feda seconded the motion and it PASSED. (A copy of the report is on file in the department.)

Mr. Simonich commented that the Governor's proposal for reorganization provides for the department (DNRC) and the Board of Natural Resources and Conservation (BNRC) to be eliminated. The Department of Resource Management (DRM) would be created and any authority or responsibility that is currently invested in the Board would be invested directly to the DRM and ultimately it would be the Department Director who would make a decision on subordination of Water Reservations in the Upper and Lower Missouri River Basin.

Upper Clark Fork River Basin Management Plan Section - Presentation of Final Document

Mr. Simonich, DNRC Director, presented and discussed the Final Upper Clark Fork River Basin Water Management Plan and recommendations with the Board. The Board previously received a copy of the plan. Board approval of the plan is statutorily required if the Upper Clark Fork River Basin Water Management

Plan is to be adopted as part of the State Water Plan. The Upper Clark Fork River Basin Steering Committee was appointed by the DNRC Director in October, 1991 pursuant to SB 434. The goals of the plan are to provide for continued planning and management of the waters of the upper Clark Fork at the local level and to balance all of the basin's beneficial water uses. Public involvement and information was provided through meetings, a work plan and watershed committees. Written comments on the Plan were accepted until February 8, 1995. After a hearing notice was provided in all newspapers throughout the state during December, 1994 and January, 1995, a public hearing on the management plan as a State Water Plan section was conducted by the department on February 2, 1995 in Drummond, Montana.

The Final Upper Clark Fork River Basin Water Management Plan was submitted to Governor Racicot and the legislature in December, 1994. The recommendations in the report are embodied in Senate Bill 144 which was introduced by Senator Vivian Brooke in the Fifty-Fourth Legislative session.

Mr. Simonich commented that significant actions related to basin closure and water right leasing for instream flow will require legislative action.

Mrs. Sharon MOVED that the Board APPROVE the Final Upper Clark Fork River Basin Water Management Plan as part of the State Water Plan. Mrs. Hinebauch seconded the motion and it PASSED. (A copy of the plan is on file in the department.)

The Upper Clark Fork River Basin Steering Committee will review the Water Management Plan in five years and draft recommendations to the department.

South Side Canal Project Transfer

Mr. McDonald, Water Resources Division, informed the Board that the DNRC requests approval from the Board to present the quitclaim deed and agreement to transfer to the South Side Canal Project Association as the final proposal of transfer which is required by statute.

The department requested BNRC approval of the terms of the quitclaim deed and agreement to transfer, including a severance payment resulting in a net payment to the Association of $7,526.00.

Mr. Bailey MOVED that the BNRC APPROVE the terms of the quitclaim deed and agreement to transfer, including a severance payment resulting in a net payment to the South Side Canal Project Association of $7,526.00. Approval also included the

water right appraisal. Mrs. Hinebauch seconded the motion and it PASSED. (A copy of the documents is on file in the department.)

Livingston Ditch Transfer

Mr. McDonald, Water Resources Division, informed the Board that the DNRC requests approval from the Board to present the quitclaim deed and agreement to transfer to the Livingston Ditch Project Association as the final proposal of transfer which is required by statute.

The department requested BNRC approval of the terms of the quitclaim deed and agreement to transfer, including a severance payment resulting in a net payment to the Association of $16,006.71.

Mr. Bailey MOVED that the BNRC APPROVE the terms of the quitclaim deed and agreement to transfer, including a severance payment resulting in a net payment to the Livingston Ditch Association of $16,006.71. Approval also included the water right appraisal. Mrs. Hinebauch seconded the motion and it PASSED. (A copy of the documents is on file in the department.)

Hayes Creek Drainage Basin Groundwater Users' Petition for Controlled Groundwater Area

Mr. Guse, Water Resources Division, briefed the Board on a Hayes Creek drainage basin groundwater users (Hayes Creek Homeowners Association) Petition for a Controlled Groundwater Area the DNRC received on September 9, 1994. Montana statute provides that the Board may designate or modify controlled groundwater areas. The Hayes Creek Homeowners Association allege all of the statutory items in Section 85-2-506(2) (a) through (g) are very likely to occur or are in progress within the area located southwest of Missoula, Montana.

Ms. Susan Reneau, a representative of the petitioners (Hayes Creek Homeowners Association), appeared before the Board and described the purpose for the petition. The homeowners intend to have a temporary controlled groundwater area declared to determine if a continuing problem with water quality and quantity exists in the area. The petitioners feel that any commercial development in this sensitive water-supply area would negatively impact the water supply of the property owners who have already established water rights.

Mr. Feda MOVED that the Board (a) direct the DNRC to notice and schedule a public hearing on the Hayes Creek Homeowners Association's petition when possible in Missoula, Montana, and (b) the DNRC's Hearing Examiner conduct the hearing and draft a

proposed Order after the hearing for the Board's review and action at a future meeting. Mrs. Sharon seconded the motion and it PASSED. (A copy of the petition is on file in the department.)

Atlantic Richfield Company (ARCO) Petition for Controlled Groundwater Area

Mr. Throssell, Board Counsel, conducted a meeting with the parties to discuss the issues and expressed a good faith effort to try to resolve the issues. The discussions cleared up some of the objectors' concerns but the parties were unable to reach an agreement.

All the parties in the matter waived the requirement that the hearing be held in a location near the area of Anaconda (Butte). The Scheduling Order also required the parties to finalize their beiefing on ARCO's Motion to exclude the objections. Mr. Throssell will issue a ruling once the briefing schedule is completed.

Mr. Throssell recommended that the Board schedule a hearing on the ARCO Petition for a Controlled Groundwater Area in conjunction with its next scheduled meeting. About four hours will be set aside for the hearing.

Mr. Feda MOVED that the Board set aside one-half day for the ARCO Petition for a Controlled Groundwater Area on Thursday, May 25, 1995, the next scheduled Board meeting in Helena, Montana. Ms. Sharon seconded the motion and it PASSED.

Bitterroot River Floodplain Redesignation/Floodway Delineation Order

Mr. Throssell, Board Counsel, was the Board's Hearing Examiner in the matter of the alternation of the designated floodplain and the designation of floodway boundaries of the Bitterroot River in Ravalli County, Montana.

Mr. Throssell, Hearing Examiner, recommended that the Board of Natural Resources and Conservation grant the request to alter the base flood elevation and floodplain boundaries and designate floodway boundaries for the Bitterroot River in Ravalli County, Montana, being that portion of the Bitterroot River that is subject to the study prepared by the USDA Soil Conservation Service and consisting of the reach of the Bitterroot River, Ravalli County Montana from the confluence of the East and West Forks of the Bitterroot River to the boundary of Ravalli/Missoula Counties, Montana.

Mr. Bailey MOVED that the Board APPROVE the Hearings Examiner's Proposed Findings of Fact, Conclusions of Law, and Recommended Order and Memorandum in the matter of the alternation of the designated floodplain and the designation of floodway boundaries of the Bitterroot River in Ravalli County, Montana. Ms. Sharon seconded the motion and it PASSED. (A copy of the Order is on file in the department.)

The department agreed to prepare a Final Order to be signed by Chairman Galt.

Some possible agenda items for the May 25, 1995 Board meeting are:

(a) ARCO Petition for Controlled Groundwater Area Hearing

(b) Rock Creek Advisory Council Privatization Discussion

(c) Hayes Creek Drainage Basin Groundwater Users' Petition for Controlled Groundwater Area Decision

The meeting adjourned at noon on Friday, February 10, 1995. The next Board meeting is scheduled for Thursday, May 25, 1995 in the DNRC conference room in Helena, Montana commencing at 8:00 a.m.

Board of Natural Resources and Conservation Minutes Approved:

Mark A. Simonich

MARK A. SIMONICH, DIRECTOR
DEPARTMENT OF NATURAL RESOURCES
AND CONSERVATION

Jack E. Galt

JACK E. GALT, CHAIRMAN
BOARD OF NATURAL RESOURCES AND
CONSERVATION

DATE 5-25-95

Montana Department of Fish, Wildlife & Parks

1420 E 6th Ave
PO Box 200701
Helena MT 59620-0701
June 30, 1994

Jack Galt, Chairman
Board of Natural Resources and Conservation
1520 E. 6th Avenue
Helena, MT 59620

Dear Chairman Galt and Board Members:

In its July 1, 1992 Order Establishing Water Reservations in the Missouri River Basin Above Fort Peck Dam, the Board made several conditions to the DFWP reservations. One of those conditions requires that DFWP, within two years of the date of the final order, submit to the Board "... a list of monitoring sites and a method of determining the extent of the instream flow along the reach proportional to the monitoring sites." (Board Order, Paragraph IV.2, Pg. 184). This is DFWP's response to this condition.

DFWP requested DNRC to comment on the methods part of this response. Our request letter and their response letter are attached and we have discussed their responses in the Discussion section of the methods document.

Also included is a list of monitoring sites for each of the streams where reservations were granted. Some of the monitoring sites are on private land. DFWP collected data (with landowners permission) for our reservation requests at these sites because there was no public access available at the selected site. Therefore, these monitoring sites may or may not remain available, depending upon future access.

DFWP requests Board approval of our responses to the condition. We will be available to answer any questions you may have about the two documents.

Sincerely,

Larry G. Peterman

Larry Peterman
Administrator
Fisheries Division

Attachments
LT994.3

A METHOD OF DETERMINING THE EXTENT OF THE INSTREAM FLOW ALONG THE STREAM REACH PROPORTIONAL TO THE MONITORING SITES

Prepared for Board of Natural Resources and Conservation in Compliance with its Final Order Establishing Water Reservations above Fort Peck Dam, July 1, 1992

INTRODUCTION

In its July 1, 1992 order establishing water reservations in the Missouri River basin above Fort Peck Dam, the Board of Natural Resources and Conservation (Board) made several conditions to the DFWP reservations. One of those conditions requires that DFWP, within two years of the date of the final order, submit to the Board "... a list of monitoring sites and a method of determining the extent of the instream flow along the reach proportional to the monitoring sites." Until the monitoring report is approved, DFWP cannot object to any changes of use by other users within a stream reach. (Board Order, Paragraph IV.2., Pg. 184). This is DFWP's response to this condition.

BACKGROUND

DFWP applied to protect the fisheries values in reaches of streams and to monitor the instream flow at a single point at or near the lower end of a stream reach. DFWP's primary instream flow method was the Wetted Perimeter Inflection Point Method. This method was used in the lower reach of each stream to establish the requested instream flow for the reach at that point. The same flow may or may not be applicable to a reach above or below this point, i.e., a minimum flow giving the same protection may be more or less than the granted flow due to natural or man-made reasons.

To protect its rights, DFWP intends primarily to monitor the granted flow at or near the point where it was established (hereinafter called the monitoring site.) DFWP's Management Plan (Application, Vol. 1, Pg. 1-90) describes the philosophy and method of protecting the granted instream flow in each stream reach. Simply stated, DFWP can protect its rights from junior water users (if any) by using this method. By knowing who they are, DFWP can "call" for the junior water when flows fall below the granted reservations at the monitoring site. We do not need to know what the flow is above the monitoring site. Because senior users are not affected by the call to junior water users, streamflows within the reach are only improved in proportion to the amounts of the junior rights no longer diverted within the reach.

However, this method does not cover some situations. If some upstream use of water reduced the flow in a portion of the reach, even severely, but did not reduce the flow at the monitoring site, then there is no protection. For example, a hydropower use could divert the entire flow of a stream for miles but return all the water above the monitoring point. Or, the point of diversion for

a present use could be changed from lower in a reach, where the diversion was a relatively small fraction of the flow, to the upper portion of the reach where the amount diverted could be most of the flow. In either case, the point monitoring concept would provide no protection against these types of activities that could essentially dewater parts of the reach that were to be protected.

The condition in the final order was intended to correct this defect in the point monitoring approach. By having a method for proportioning the instream flow throughout the reach based on the amount granted at the monitoring site, all parts of a reach could be fully protected up to the same relative instream flow granted at the monitoring point. For example, if the instream flow granted by the Board at the downstream end of the reach (monitoring site) was the high inflection point flow determined by the wetted perimeter method, then the flow that could be protected midway through the reach could also be the high inflection point flow determined at that place on the stream or the flow could be calculated based on the decreasing watershed above the point to be protected. Thus, the midway flow might be 1/2 or 1/3 of the instream flow at the monitoring site. Whatever the amount, it would be the flow that provided the necessary level of habitat protection for that location.

In situations where the wetted perimeter method was not used to establish the instream flow in a stream reach, other acceptable methods to satisfy the Board's condition are available to determine the flow at points other than at the monitoring site.

The following describes methods that can be used to satisfy the Board's condition:

METHODS

Method 1 - Wetted Perimeter Inflection Point Field Method

Except for spring creeks, the required instream flow at other points along a stream can be determined in the same manner as the granted instream flow was determined at the monitoring site. The Wetted Perimeter Inflection Point Method can again be used by qualified personnel. A field crew can pick a suitable site that meets the criteria established for the method and apply the same procedures outlined in Nelson (1989). The result will be an instream flow recommendation for the stream at that site. The same method can be used at as many other sites as necessary.

This method could also be used on streams where DFWP was unable to use it during preparation of its reservation application due to time, budget, manpower, limited access or other constraints if those former problems can be overcome.

The advantage of this procedure is the better accuracy of the flow recommendation compared to those obtained using non-field methods.

The disadvantage is the amount of time, personnel and expense required to complete the field work and process the information through the wetted perimeter computer program.

Method 2 - Non-Field Method for Streams where a Wetted Perimeter Flow was Granted by the Board

The USGS conducted a water availability study that determined streamflow characteristics for all of the streams in DFWP's reservation application (Parrett et.al. 1989). Some streams were gauged and some were not. One of the parameters determined on each stream was the mean annual flow (MAF). The MAF is a parameter readily available on gauged streams and, on ungauged streams, can be estimated fairly accurately using various simulation techniques. The MAF is not necessarily an indicator of a stream's normal flow condition for all seasons, but it does provide a relative measure of the amount of water annually passed by a point in a stream channel.

Several methods were used by the USGS to determine the MAF. Some of those were office methods, some required field measurements of streamflows. In many cases, data from both methods were combined to get a "weighted-average estimate" which was more reliable than any single method. (Parrett, et. al. 1989).

The same USGS methods could be used at any other site on a reservation stream to determine the MAF. The required instream flow at this new site could then be calculated from the ratio of the granted wetted perimeter flow at the monitoring site to the calculated MAF at that same site. For example:

Sixteen Mile Creek

	Monitoring Site (near Toston)	New Site (near Maudlow)
MAF (cfs)	83[1]	53[2]
Wetted Perimeter Flow (cfs)	20	To be determined

Thus:

The wetted perimeter flow at the Toston monitoring site = 24% of the MAF at that site. Therefore, the wetted perimeter flow at the new (Maudlow) site is 0.24 x 53 = 12.7 cfs.

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[1]From USGS Water Availability Study (Parrett et. al. 1989) pg. 83, (Site No. 192) (DFWP Pre-filed Direct Testimony Exhibit No. 4).

[2]From Parrett et. al. (1989) pg. 83 (Site No. 191). If the MAF at this site was not already known, it could be determined by the USGS methods contained in Parrett et. al. (1989).

The advantage of Method 2 is that it could require less time, money and personnel if only office methods were used to determine the MAF at the new site. However, for better accuracy, several field (flow) measurements would be required and this would be more time consuming and expensive. Should it become necessary to acquire this information, we would contract with the USGS (or other qualified entity) to conduct these investigations.

The disadvantage of Method 2 is less accuracy in determining the required instream flow compared to using the wetted perimeter method. USGS non-field methods could over or under- estimate the MAF, which, in turn, would over or under-estimate the instream flow at the new site. The possible statistical variations for the various USGS methods are explained in Parrett et.al. (1989).

Method 3 - Non-field methods for spring creeks and streams where the Wetted Perimeter Inflection Point Method was not used.

A. Spring Creek Method

Spring creeks, with their relatively stable flow regimes, are not amenable to using the wetted perimeter method, which requires measurements of a wide range of flows.

Spring creeks in Montana are usually relatively short in length and originate in valley bottoms bordering mainstem rivers. The base flow, the lowest mean monthly flow for the year, was the granted instream flow. Consequently, due to the relatively stable flow regime and short stream length, it is unlikely a flow recommendation at a site other than the monitoring site would be necessary or warranted. If required, however, a stream gauging program would have to be established, or one of the USGS estimating techniques could be used to determine the base flow at the new site in the same manner as was done for the monitoring site on some spring creeks.

B. Fixed Percentage Method

DFWP used the Fixed Percentage Method on some streams where time, budget, manpower, limited access or other constraints prevented use of the wetted perimeter method. This method used the known wetted perimeter flow and the MAF on similar streams in the area to calculate the percentage that the wetted perimeter flow was of the MAF on each stream. These individual percentages from several streams in the area were then averaged to provide a single mean percentage. This percentage was then applied to the estimated MAF derived by the USGS at the monitoring site for a stream where wetted perimeter data were unavailable. This same procedure could be used for a new site by calculating the MAF at that site (via Parrett et. al, 1989) and applying the original subbasin percentage to the new MAF (See DFWP application, Vol. 1, pp. 1-18 for a more detailed explanation and examples.)

A summary of the methods and when they should be used is shown in Table 1.

Table 1. Summary of Methods

METHOD	USED FOR	NOT USED FOR
1	All streams except Spring Creeks	Spring Creeks
2	Streams where wetted perimeter flows were granted	Streams where wetted perimeter flows were not granted
3A	Spring Creeks	Other Streams
3B	Streams where wetted perimeter flow data are available on other streams in the basin	Streams where no wetted perimeter flow data are available on other streams in the basin

DISCUSSION

A draft of this response to the Board's condition was sent to DNRC for their review and comment (see attached November 19, 1993 letter). DNRC responded on March 15, 1994 (letter also attached). DNRC approved of the draft response but recommended that method #2 (non-field method) be used rather than method #1 (wetted perimeter inflection point method) because method #1 might result in an instream flow greater than the granted flow at the monitoring site and method #2 would be easier and more practical to implement and would be more defensible. We agree method #2 would be easier and more practical to implement but we do not agree it is more defensible than method #1. DNRC did agree that method #1 may be more accurate from a biological standpoint.

As a result of the DNRC review, DFWP expanded its analysis as follows:

DFWP believes flexibility should be retained in the methods used if the condition requires implementation. We would prefer not to be locked into a certain method. No matter which method is used, there may be some situations where the instream flow at a new site (either upstream or downstream from the monitoring site) will be higher than at the monitoring site because of natural hydrologic conditions or existing diversionary water uses. For example:

1. The new site is downstream from the monitoring site and has a larger drainage area. If method #2 is used, the MAF calculated using USGS non-field methods will be higher and the ratio of the MAF to the wetted perimeter flow will yield a higher flow at the new site. If method

#1 is used, the application of the wetted perimeter method will yield a higher instream flow because stream flows are greater.

2. The new site is upstream from the monitoring site and passes more flow than the monitoring site because, over time, downstream diversions have removed much of the flow and decreased the size of the channel. If the MAF is estimated using a USGS method requiring several flow measurements, the estimated MAF will be higher at the new site, resulting in a higher flow recommendation at the new site than at the downstream monitoring site. The wetted perimeter method will also result in a higher instream flow because the stream flows are greater at the upstream point.

This condition was the result of questions at the contested case hearing by opponents to DFWP's application. Their concern was that the same flow granted at the monitoring site would be required by DFWP at an upstream site where less stream flow was naturally available. The concern related to requiring too much water, not too little water. However, it is apparent from the above examples that a higher flow protection is the proper instream protection if stream conditions warrant it. In most cases, of course, the instream flows will be less at points upstream from the monitoring site.

Neither method guarantees that the calculated flow at the new site will always be less than at the monitoring site. The Board, in its order, granted both a flow at a monitoring site and a process, under paragraph IV.2., for apportioning the granted flow throughout the entire stream reach. The only constraint should be on the method approved for determining the instream flows at points throughout the reach. The method approved should give the same relative level of instream flow protection that was provided by the flow at the monitoring site. Therefore, because the monitoring sites are near the lower end of each stream reach, the instream flows at other points within the reach will usually be less than the flow granted at the monitoring site. However, the flows could be greater if stream conditions require a higher flow to give the same level of instream flow protection.

SUMMARY

If the determination of an instream flow on a granted reservation stream at a site other than the monitoring site is required, several methods can be used. Except for spring creeks, the proposed methods are in some way associated with the Wetted Perimeter Inflection Point method, the primary method used by DFWP in its Missouri basin reservation requests. The appropriate method will depend on the type of stream involved, the desired level of accuracy and the amount of time that is available to commit to the determination.

REFERENCES

Board of Natural Resources and Conservation. 1992. Final order establishing water reservations above Fort Peck Dam. July 1, 1992. 398 pp.

Nelson, F. 1989. Guidelines for using the wetted perimeter (WETP) computer program of the Montana Department of Fish, Wildlife and Parks. Helena, MT. 28 pp. (DFWP Pre-filed Direct Testimony Exhibit No. 2).

Parrett, C., Johnson, D. and J. Hull. 1989. Estimates of monthly streamflow characteristics at selected sites in the upper Missouri basin, Montana, base period water years 1937-86. U.S. Geological Survey Water Resources Investigations Report 89-4082. Helena, MT. 103 pp. (DFWP Pre-filed Direct Testimony Exhibit No. 4).

REF: 994.4

LIST OF MONITORING SITES

Big Hole River Drainage

Stream	Legal Description	Site Description
American Cr.	NE,SE,SE, Sec 25, T3N,R12W	Access road crossing near mouth on Mt. Haggin WMA
Bear Cr.	NW,NW, Sec 3, T1N,R12W	Hwy 43 crossing at mouth
Big Hole River #1	SW,SW,NE, Sec 33, T2S,R15W	USGS gauge 06024450 at Wisdom
Big Hole River #2	SW,SE,NE, Sec 10, T1N,R12W	Inactive USGS gauge 06024580 near Wise River
Big Hole River #3	SW,NW,SE, Sec 29, T3S,R6W	Inactive USGS gauge 06026400 near Twin Bridges
Big Lake Cr.	South boundary, SE, Sec 19, T3S,R15W	County road crossings (two channels)
Birch Cr.	NE,NE, Sec 36, T4S,R9W	Hwy crossing near mouth
Bryant Cr.	NE, Sec 4, T1N,R12W	Adjacent to FS road near mouth
California Cr.	NW, Sec 1, T2N,R12W	Near mouth on Mt. Haggin WMA
Camp Cr.	SE,SW, Sec 26, T2S,R9W	Hwy crossing near mouth at Melrose
Canyon Cr.	NW,SW, Sec 32, T1S,R9W	Road crossing near mouth
Corral Cr.	SW, Sec 34, T3N,R12W	Near mouth on Mt. Haggin WMA
Deep Cr.	SW,NW,NE, Sec 32, T2N,R12W	Hwy 43 crossing at mouth
Delano Cr.	SE, Sec 20, T2N,R10W	Forest road crossing
Divide Cr.	SE,NW, Sec 17, T1S,R9W	Hwy 43 crossing at Divide
Fishtrap Cr.	NW,NW, Sec 4, T1N,R13W	Hwy 43 crossing near mouth
Francis Cr.	NE,NW, Sec 10, T3S,R15W	Road crossing near mouth
French Cr.	NW,NW,NW, Sec 21, T2N,R12W	Hwy 274 crossing at mouth
Governor Cr.	North boundary, NE,NW, Sec 35, T5S, R15W	Lake Road crossing near mouth

Jacobsen Cr.	East boundary, NE, Sec 33, T3S,R12W	Forest road crossing at mouth
Jerry Cr.	S½, Sec 36, T1N,R11W	Near mouth
Johnson Cr.	SE,SE, Sec 15, T1S,R17W	Forest road crossing near forest boundary
Joseph Cr.	E½,NE, Sec 16, T2S,R18W	Hwy 43 crossing near mouth
LaMarche Cr.	NW,SE, Sec 34, T2N,R13W	Hwy 43 crossing near mouth
Miner Cr.	SW, Sec 3, T6S,R16W	Inactive USGS gauge 06024000
Moose Cr.	SE,SE,SE, Sec 32, T1S,R9W	Road crossing near mouth
Mussigbrod Cr.	NW,SE,NW, Sec 9, T1S,R16W	Near uppermost diversion
NF Big Hole River	East boundary, NE,SW, Sec 33, T1S,R15W	Road crossing near mouth
Oregon Cr.	NE,NE, Sec 30, T3N,R11W	Hwy 274 crossing near mouth on Mt. Haggin WMA
Pattengail Cr.	NE,NE, Sec 10, T2S,R12W	Road crossing near mouth
Pintlar Cr.	North boundary, NW,NE, Sec 2, T1S,R15W	Road crossing
Rock Cr.	South boundary, SW,SW, Sec 19, T3S,R15W	County road crossing
Ruby Cr.	NE,SE, Sec 26, T2S,R17W	Road crossing near mouth
Sevenmile Cr.	SE,SE,NW, Sec 34, T3N,R12W	Near mouth on Mt. Haggin WMA
Seymour Cr.	NW, Sec 31, T2N,R12W	Hwy 43 crossing near mouth
Sixmile Cr.	SE,NE, Sec 25, T3N,R12W	Access road crossing near mouth on Mt. Haggin WMA
SF Big Hole River	North boundary, NE,NW, Sec 34, T5S,R15W	Lake Road crossing near Jackson
Steel Cr.	SE,NW, Sec 27, T2S,R15W	Hwy 43 crossing
Sullivan Cr.	SW, Sec 4, T2N,R12W	Adjacent to access road near mouth on the Mt. Haggin WMA
Swamp Cr.	East boundary, NE,SE, Sec 17, T2S,R15W	Road crossing

Tenmile Cr.	NW, Sec 34, T3N,R12W	Near mouth on Mt. Haggin WMA
Trail Cr.	NE,SW, Sec 22, T2S,R17W	Hwy 43 crossing near mouth
Trapper Cr.	NW,NE, Sec 33, T2S,R9W	Road crossing
Twelvemile Cr.	E½, Sec 4, T2N,R12W	Near mouth on Mt. Haggin WMA
Warm Springs Cr.	East boundary, NE,SE, Sec 26, T5S,R15W	Hwy 278 crossing at Jackson
Willow Cr.	NW,NE, Sec 26, T4S,R9W	Hwy crossing near mouth
Wise River	S½, Sec 34, T1N,R11W	Hwy 43 crossing at Wise River near mouth .
Wyman Cr.	NE, Sec 17, T3S,R12W	Near mouth opposite forest road

Gallatin River Drainage

Stream	Legal Description	Site Description
Baker Creek	South boundary, Sec 1, T1N,R3E	Hwy 346 crossing near mouth
Ben Hart Creek	NW, Sec 11, T1N,R4E	At mouth
Big Bear Creek	SW, Sec 23, T3S,R4E	Hwy 191 crossing
Bridger Creek	East boundary, Sec 31, T1S,R6E	County road crossing near mouth
Cache Creek	NW,NW, Sec 10, T9S,R3E	Forest road crossing near mouth
EF Hyalite Cr.	SE, Sec 23, T4S,R6E	DNRC gauge 41H 01000
East Gallatin R. #1	NE, Sec 26, T1S,R5E	Springhill Road crossing
East Gallatin R. #2	East boundary, Sec 13, T1N,R4E	Hwy 346 crossing immediately above mouth of Thompson Spring Cr
East Gallatin R. #3	SE, Sec 27, T2N,R3E	Upstream from Nixon Bridge near Manhattan
Gallatin R. #1	SW,NW, Sec 16, T7S,R4E	Road crossing on Porcupine WMA
Gallatin R. #2	South boundary, Sec 1, T1N,R3E	Hwy 346 crossing near Manhattan
Gallatin R. #3	NW,NE, Sec 35, T2N,R2E	USGS gauge 06052500 at Logan
Hell Roaring Cr.	SW,NE, Sec 33, T4S,R4E	Hwy 191 crossing near mouth
Hyalite (Middle) Cr. #1	SW, Sec 3, T3S,R5E	Above Middle Creek Ditch Intake
Hyalite (Middle) Cr. #2	South boundary, Sec 5, T1S,R5E	Road crossing above mouth
MF of the WF Gallatin R.	SW, Sec 35, T6S,R3E	Near mouth
Porcupine Cr.	NW, Sec 16, T7S,R4E	Road crossing near mouth on Porcupine WMA
Reese Cr.	West boundary, Sec 9, T1N,R5E	Road crossing above mouth
Rocky Cr.	NE, Sec 6, T2S,R6E	Road crossing near mouth
Sourdough (Bozeman) Cr.	NE, Sec 6, T2S,R6E	Road crossing at mouth
South Cottonwood Cr.	East boundary, Sec 12, T3S,R4E	Road crossing
SF Spanish Cr.	NW, Sec 14, T4S,R3E	Private road crossing near mouth

SF of the WF Gallatin R.	SE, Sec 31, T6S,R4E	Near mouth
Spanish Cr.	NE,NE, Sec 18, T4S,R4E	Hwy 191 crossing at mouth
Squaw Cr.	SW,SW, Sec 34, T4S,R4E	Road crossing near mouth
Taylor Fork	SE,SW, Sec 2, T9S,R4E	Hwy 191 crossing near mouth
Thompson Spring Cr.	South boundary, NE,SE, Sec 13, T1N,R4E	Private road crossing near mouth
WF Gallatin R.	NE,SE Sec 32, T6S,R4E	Hwy 191 crossing near mouth
WF Hyalite Cr.	NE,SW,NW, Sec 26, T4S,R6E	DNRC gauge 41H01500 near mouth at Window Rock FS station road crossing

Jefferson and Boulder River Drainages

Stream	Legal Description	Site Description
Boulder River #1	NW,NW, Sec 23, T6N,R5W	Road crossing immediately below the confluence of High Ore Creek
Boulder River #2	SW,SW, Sec 6, T2N,R2W	Road crossing
Boulder River #3	SE,NW, Sec 2, T1N,R3W	Hwy 2 crossing near mouth
Halfway Cr.	SW,SW, Sec 12, T3N,R6W	Trail crossing
Hells Canyon Cr.	NW,SE, Sec 34, T2S,R6W	Hells Canyon Road crossing at mouth
Jefferson River	SW,SW,NW, Sec 27, T2N,R1E	USGS gauge 06036650 near Three Forks
Little Boulder River	NW,SE, Sec 10, T5N,R4W	Hwy 69 crossing near mouth
North Willow Cr.	S½,NE, Sec 36, T1S,R2W	Hwy 287 crossing at Harrison
South Boulder River	NW,SW, Sec 25, T1N,R3W	Hwy 359 crossing
South Willow Cr.	SW,SW, Sec 31, T1S,R1W	County road crossing at Harrison
Whitetail Cr.	SW,NE, Sec 3, T1N,R4W	Hwy 2 crossing near mouth
Willow Cr.	Sec 30, T1N,R1E	County road crossing near mouth at Willow Creek
Willow Spring Cr.	NE, Sec 13, T1S,R5W	Farm road crossing near mouth

Madison River Drainage

Stream	Legal Description	Site Description
Antelope Cr.	NE,NE, Sec 36, T12S,R1E	Near mouth
Beaver Cr.	SE,NW, Sec 21, T11S,R3E	Hwy 287 crossing near mouth
Black Sand Spring Cr.	NE,NW, Sec 31, T13S,R5E	Near mouth
Blaine Spring Cr.	NW,NW, Sec 17, T7S,R1W	Varney Bridge Road crossing
Cabin Cr.	SW,SE, Sec 15, T11S,R3E	Hwy 287 crossing near mouth
Cherry Cr.	SE,NW, Sec 36, T2S,R1E	Hwy 84 crossing at mouth
Cougar Cr.	SW, Sec 22, T12S,R5E	Hwy 287 crossing
Duck Cr.	NW,NW, Sec 22, T12S,R5E	Hwy 287 crossing
Elk River	SE,NW, Sec 17, T12S,R1E	West Fork Road crossing near mouth
Grayling Cr.	SW,SW, Sec 8, T12S,R5E	Hwy 287 crossing near mouth
Hot Springs Cr.	SW,SW, Sec 10, T3S,R1E	Stream mouth at public access site
Indian Cr.	SE,SW, Sec 30, T8S,R1E	Hwy 287 crossing near mouth
Jack Cr.	NW,NW, Sec 26, T5S,R1W	Road crossing near mouth
Madison River #1	E½, Sec 10, T13S,R5E	Hwy 287 crossing near West Yellowstone
Madison River #2	NE,SE, Sec 10, T11S,R1E	USGS gauge 06038800 at county bridge 0.2 mi. upstream from WF Madison River
Madison River #3	South boundary, Sec 8, T7S,R1W	Inactive USGS gauge 06040000 at Varney Bridge
Madison River #4	SW,NE, Sec 20, T1N,R2E	Inactive USGS gauge 06042500 near Three Forks
Moore Cr.	N½, Sec 15, T5S,R1W	Near mouth
North Meadow Cr.	SE,NW, Sec 34, T4S,R1W	County road crossing near mouth
O'Dell Cr.	SW,SE, Sec 27, T5S,R1W	At mouth on Valley Garden FAS
Red Canyon Cr.	SE,NE, Sec 11, T12S,R4E	Hwy 287 crossing near mouth

Ruby Cr.	SE,SW, Sec 12, T9S,R1W	Road crossing near mouth
SF Madison River	NW,NW,NW, Sec 25, T13S,R4E	Hwy 20 crossing
Squaw Cr.	SE,SE, Sec 33, T10S,R1E	Hwy 287 crossing near mouth
Standard Cr.	S½, Sec 33, T10S,R1E	Near mouth
Trapper Cr.	NW,SE, Sec 35, T11S,R3E	Forest road crossing near mouth
Watkins Cr.	S½, Sec 7, T12S,R4E	Forest road crossing near mouth
WF Madison River	NE,SE, Sec 10, T11S,R1E	West Fork Road crossing near mouth

Red Rock - Beaverhead Drainage

Stream	Legal Description	Site Description
Bear Cr.	Sec 26, T10S,R15W	Near BLM boundary adjacent to forest road
Beaverhead River #1	SE,SW,SE, Sec 19, T8S,R9W	USGS gauge 06016000 at Barretts
Beaverhead River #2	SW,NW,SE, Sec 22, T5S,R7W	USGS gauge 06018500 near Twin Bridges
Big Sheep Cr.	SW,NW,SE, Sec 35, T13S,R10W	Inactive USGS gauge 06013500 below Muddy Creek
Black Canyon Cr.	NW, Sec 21, T11S,R14W	BLM land at Everson-Black Canyon Road crossing
Blacktail Deer Cr.	NE,SE,SW, Sec 14, T9S,R8W	Inactive USGS gauge 06017500
Bloody Dick Cr.	NW,NW, Sec 32, T9S,R13W	Land adjacent to county road near mouth
Browns Canyon Cr.	SW, Sec 15, T9S,R13W	Road crossing near mouth
Cabin Cr.	SW,SE, Sec 4, T15S,R10W	Road crossing at mouth
Corral Cr.	N½,SE, Sec 16, T14S,R1E	Adjacent to access road near mouth
Deadman Cr.	Sec 10, T15S,R10W	Near mouth opposite Big Sheep Road
EF Blacktail Deer Cr.	NE,SE,Sec 5, T11S,R6W	Road crossing near mouth
EF Clover Cr.	SE, Sec 7, T13S,R5W	Near mouth adjacent to access road
EF Dyce Cr.	SE,SE, Sec 26, T6S,R12W	Road crossing at mouth
Frying Pan Cr.	NW, Sec 24, T10S,R15W	Near mouth adjacent to forest road
Grasshopper Cr.	SW,NW, Sec 26, T8S,R10W	Inactive USGS gauge 06015500 near mouth
Hell Roaring Cr.	N½,SE, Sec 24, T14S,R1E	County road crossing
Horse Prairie Cr.	NE,NW, Sec 32, T9S,R13W	Inactive USGS gauge 06015000
Indian Cr.	SW,SE, Sec 18, T14S,R11W	Road crossing
Jones Cr.	NE,NW, Sec 28, T14S,R3W	Lakeview Road crossing

Long Cr.	North boundary, NW,NW, Sec 4, T14S,R4W	Road crossing
Medicine Lodge Cr.	NW,NW,NW, Sec 9, T10S,R11W	Road crossing near mouth
Narrows Cr.	SE,NW, Sec 29, T13S,R1E	Near mouth at Elk Lake Resort
Odell Cr.	NE,SE, Sec 14, T14S,R2W	Road crossing
Peet Cr.	NE, Sec 34, T14S,R4W	Near BLM boundary adjacent to access road
Poindexter Slough	SW, Sec 26, T7S,R9W	I-15 crossing near mouth
Rape Cr.	SE, Sec 4, T10S,R13W	Road crossing
Red Rock Cr.	SE,NW, Sec 17, T14S,R1E	Elk Lake Road crossing
Red Rock River #1	SE,SE,SW, Sec 6, T14S,R4W	Price Lane crossing upstream from Lima Reservoir
Red Rock River #2	SE, Sec 33, T10S,R10W	Inactive USGS gauge 06014500 at Red Rock
Reservoir Cr.	NE,SW, Sec 1, T8S,R12W	Road crossing near mouth
Shenon Cr.	NE,SE, Sec 25, T10S,R14W	Access road crossing near BLM boundary
Simpson Cr.	NE, Sec 35, T14S,R11W	BLM land near mouth adjacent to access road
Tom Cr.	NE, Sec 25, T14S,R1W	Road crossing
Trapper Cr.	E½, Sec 23, T10S,R15W	Near mouth adjacent to forest road
WF Blacktail Deer Cr.	NE,SE, Sec 5, T11S,R6W	Road crossing near mouth
WF Dyce Cr.	SW,SE, Sec 26, T6S,R12W	Near mouth adjacent to access road

Ruby River Drainage

Stream	Legal Description	Site Description
Coal Cr.	SE,NW, Sec 29, T11S,R3W	County road crossing near mouth
Cottonwood Cr.	SW,SE, Sec 9, T10S,R3W	County road crossing near mouth
EF Ruby River	NE,NW, Sec 5, T11S,R3W	County road crossing near mouth
MF Ruby River	SE,NW, Sec 5, T11S,R3W	County road crossing near mouth
Mill Cr.	NE,SW, Sec 32, T4S,R5W	County road crossing near mouth
NF Greenhorn Cr.	NE, Sec 26, T8S,R4W	Near mouth
Ruby River #1	SW,SW,SW, Sec 31, T7S,R4W	USGS gauge 06019500 above Ruby Reservoir
Ruby River #2	NE,NW, Sec 10, T4S,R6W	Seyler Lane Bridge crossing near mouth
Warm Springs Cr.	Sec 22, T9S,R3W	Public land above mouth
WF Ruby River	SE,NE, Sec 6, T11S,R3W	Road crossing near mouth
Wisconsin Cr.	NW,SW, Sec 18, T4S,R5W	County road crossing near mouth

Upper Missouri River and Tributaries

Avalanche Cr.	SW, Sec 21, T10N,R1E	Road crossing near mouth
Beaver Cr.	NW,SW, Sec 29, T9N,R1E	Road crossing near mouth
Beaver Cr.	NE, Sec 19, T12N,R2W	Adjacent to forest road at mouth
Canyon Cr.	NW,SE, Sec 31, T13N,R5W	Hwy 279 crossing
Confederate Gulch	SW,SW, Sec 32, T9N,R2E	Road crossing near mouth
Cottonwood Cr.	NE,NW, Sec 36, T14N,R3W	Access road crossing on Beartooth WMA
Crow Cr.	NW, Sec 25, T6N,R1W	Crow Creek Road crossing
Deep Cr.	SW,SW, Sec 8, T6N,R2E	DFWP gauging site at Montana Ditch crossing near mouth
Dry Cr.	NW,SW, Sec 26, T6N,R2E	Road crossing immediately upstream from Broadwater Missouri Canal crossing
Duck Cr.	West boundary, NW,SW, Sec 9, T8N,R2E	Road crossing near mouth
Little Prickly Pear Cr. #1	Sec 17, T13N,R4W	On Sieben Ranch near confluence of Clark Creek
Little Prickly Pear Cr. #2	NE,NW,NE, Sec 2, T14N,R4W	USGS gauge 06071300
Lyons Cr.	SW, Sec 28, T4N,R4W	Near Lyons Creek campground and adjacent to access road at mouth
McGuire Cr.	SW, Sec 35, T11N,R2W	Private road crossing
Missouri River #1	SE,NW, Sec 36, T5N,R2E	USGS gauge 06054500 at Toston
Missouri River #2	NE,SW,SE, Sec 5, T14N,R3W	USGS gauge 06066500 below Holter Dam
Missouri River #3	NE,NW,NW, Sec 5, T19N,R3E	USGS gauge 06078200 near Ulm
Prickly Pear Cr. #1	North boundary, NE,NE, Sec 36, T10N, R3W	Hwy 12 crossing at East Helena
Prickly Pear Cr. #2	North boundary, NW,NW, Sec 3, T10N,R3W	Sierra Road crossing near mouth

Sevenmile Cr.	East boundary, NE,SE, Sec 10, T10N,R4W	Head Lane crossing
Sheep Cr.	NW, Sec 1, T16N,R2W	Road crossing near mouth
Silver Creek	SE, Sec 29, T11N,R3W	East Frontage Road crossing
Sixteenmile Cr.	SE,NW, Sec 9, T4N,R3E	Road crossing near mouth
Spokane Cr.	SW,NE, Sec 13, T10N,R2W	County road crossing
Stickney Cr.	SW,SE, Sec 26, T16N,R3W	Frontage road crossing at mouth
Tenmile Cr.	South boundary, SW, Sec 33, T11N,R3W	Sierra Road crossing
Trout Cr.	SE, Sec 13, T11N,R2W	Adjacent to York Road at mouth
Virginia Cr.	S½, Sec 15, T13N,R6W	Adjacent to Stemple Creek Road near mouth
Wegner Cr.	NW,NW, Sec 11, T15N,R3W	Frontage Road crossing at mouth
Willow Cr.	NW,SE, Sec 12, T13N,R3W	Access road crossing near mouth on Beartooth WMA
Wolf Cr.	SW,SW, Sec 35, T15N,R4W	At I-15 crossing at mouth

Dearborn River Drainage

Stream	Legal Description	Site Description
Dearborn River	NW,NW,SE, Sec 27, T17N,R4W	USGS gauge 06073500 at Hwy 287 bridge at SM 19.0
Flat Cr.	SW, Sec 1, T17N,R4W	County road crossing at SM 10.9
MF Dearborn River	NW,SW,SW, Sec 20, T17N,R5W	County road crossing at SM 2.4
SF Dearborn River	NW,SW,NE, Sec 10, T16N,R5W	Hwy 434 crossing at SM 3.4

Smith River Drainage

Stream	Legal Description	Site Description
Big Birch Cr.	N½,SE, Sec 10, T9N,R5E	County road crossing
Eagle Cr.	NE,SE, Sec 1, T12N,R4E	County road crossing near mouth
Hound Cr.	NE,NE, Sec 19, T17N,R3E	County road crossing near mouth
Newlan Cr.	South boundary, SE,SW,SW, Sec 25, T10N,R5E	Hwy 360 crossing near mouth
NF Deep Cr.	Sec. 19, T15N,R5E	Above rock cascades adjacent to USFS pack trail
NF Smith River	West boundary, SW,SW, Sec 14, T9N,R6E	County road crossing
Rock Cr.	SW,SE, Sec 19, T13N,R4E	Near mouth adjacent to jeep trail
Sheep Cr.	NW,NW, Sec 18, T12N,R5E	County road crossing near mouth
Smith River #1	NE,SW,SW, Sec 13, T12N,R4E	USGS gauge 06076690 near Fort Logan
Smith River #2	SW,SW, Sec 29, T17N,R3E	Inactive USGS gauge 06077500 near Eden
Smith River #3	North boundary, NW,NW, Sec 23, T19N,R2E	Hwy 330 crossing near mouth
SF Smith River	SW,NE,SE, Sec 21, T9N,R6E	County road crossing near mouth
Tenderfoot Cr.	NW,SW,SE Sec 25, T14N,R3E	Near mouth

Sun River Drainage

Stream	Legal Description	Site Description
Elk Cr.	SE,SW,SW, Sec 2, T19N,R7W	State Highway 434 crossing
Ford Cr.	SE, Sec 31, T20N,R8W	Cobb Ranch
NF Willow Cr.	SE,NE,NE, Sec 6, T20N,R7W	Road crossing on Sun River Game Range Rd.
Sun River #1	NE,SW,NW, Sec 27, T21N,R6W	Highway 287 crossing
Sun River #2	NW,SE,SW, Sec 33, T21N,R2E	USGS gauge 06089000 near Vaughn
Willow Cr.	SW,SE,NE, Sec 5, T20N,R7W	Road crossing on Sun River Game Range Rd.

Belt Creek Drainage

Stream	Legal Description	Site Description
Belt Cr. #1	NE, Sec 25, T18N,R6E	Hwy 89 crossing
Belt Cr. #2	NW,SE,SE, Sec 12, T21N,R5E	Salem Bridge near mouth
Big Otter Cr.	SE,SW,SW, Sec 6, T18N,R7E	Hwy 87 crossing at mouth
Dry Fork Belt Cr.	NE,NE,NE, Sec 4, T15N,R7E	Road crossing at mouth at Monarch
Logging Cr.	NE,SE, Sec 22, T16N,R6E	Near mouth
Pilgrim Cr.	SE, Sec 26, T16N,R6E	Near mouth adjacent to USFS trail #304
Tillinghast Cr.	NW, Sec 9, T15N,R7E	Downstream from confluence of Thunder Creek

Middle Missouri River and Tributaries

Stream	Legal Description	Site Description
Cow Cr.	SW,NW,NE, Sec 20, T27N,R19E	County bridge near T.U. Reservoir
Highwood Cr.	NW,NE,NW, Sec 14, T21N,R7E	Hwy 228 bridge at Highwood
Missouri River #4	NW,SE,SE, Sec 23, T24N,R8E	USGS gauge 06090800 at Fort Benton
Missouri River #5	SW,SW,SE, Sec 13, T26N,R11E	USGS gauge 06109500 at Virgelle
Missouri River #6	NW,NE, Sec 31, T22N,R24E	USGS gauge 06115200 near Landusky
Shonkin Cr.	SW,SE,SE, Sec 28, T22N,R9E	Road crossing at Town of Shonkin

Fort Peck Reservoir Tributaries

Stream	Legal Description	Site Description
Big Dry Cr.	NE,SW,NW, Sec 3, T18N,R42E	USGS gauge 06131000 near Van Norman
Little Dry Cr.	NE,NE,NE, Sec 9, T18N,R42E	Hwy 200 crossing at mouth

Judith River Drainage

Stream	Legal Description	Site Description
Beaver Cr.	SE,NE,NE, Sec 20, T15N,R17E	County road crossing
Big Spring Cr. #1	East boundary, NE,NE, Sec 28, T16N,R17E	Road crossing above confluence of Cottonwood Creek
Big Spring Cr. #2	SE,NW, Sec 18, T16N,R17E	Bridge at Spring Creek Colony
Cottonwood Cr.	NE,NE, Sec 28, T16N,R17E	Road crossing at mouth
East Fork Big Spring Cr.	SW,NE, Sec 31, T15N,R19E	Hwy 466 crossing at mouth
Judith River #1	NW,NE, Sec 27, T16N,R16E	County road crossing
Judith River #2	SW,NW,SE, Sec 30, T21N,R17E	Anderson Bridge
Lost Fork Judith R.	NE, Sec 6, T12N,R11E	Near mouth
Middle Fork Judith R.	SW,NE, Sec 35, T13N,R11E	Judith Ranger Station road crossing
South Fork Judith R.	SW,NW, Sec 12, T12N,R11E	Indian Hill Campground
Warm Spring Cr.	SE,SW, Sec 21, T18N,R16E	Road crossing
Yogo Cr.	SW,NE,SW, Sec 27, T13N,R11E	Forest road crossing

Musselshell River Drainage

Stream	Legal Description	Site Description
Alabaugh Cr.	NE,NE, Sec 35, T8N,R9E	County road crossing near mouth
American Fork Cr.	SE, Sec 6, T7N,R16E	Inactive USGS gauge 06122000 near Harlowton at SM 4.3
Big Elk Cr.	NW, Sec 35, T8N,R13E	Inactive USGS gauge 06120000 at SM 1.2
Careless Cr.	NW,NW,NW, Sec 16, T8N,R18E	County road crossing above confluence of Roberts Creek
Checkerboard Cr.	NE, Sec 2, T9N,R9E	Inactive USGS gauge 06117000 at Delpine at SM 0.3
Collar Gulch Cr.	East boundary, NE, Sec 2, T16N,R20E	Forest road crossing
Cottonwood Cr.	NW,SW,SW, Sec 19, T8N,R11E	Hwy 294 crossing
Flatwillow Cr.	SW,NW, Sec 20, T12N,R25E	Hwy 87 crossing
Musselshell River #1	NE, Sec 28, T8N,R15E	USGS gauge 06120500 at Harlowton
Musselshell River #2	SE,SW,NW, Sec 20, T9N,R29E	USGS gauge 06127500 at Musselshell
Musselshell River #3	NW,SW,NW, Sec 11, T14N,R30E	USGS gauge 06130500 at Mosby
NF Musselshell R. #1	SW,SE, Sec 22, T10N,R9E	Inactive USGS gauge 06115500 near Delpine
NF Musselshell R. #2	NW, Sec 1, T8N,R11E	Hwy 12 crossing near mouth
SF Musselshell R.	SW,NE, Sec 12, T8N,R11E	Inactive USGS gauge 06119500 at road crossing at SM 2.0
Spring Cr.	NE, Sec 15, T9N,R10E	Inactive DNRC gauge 40A02500 at SM 0.3
Swimming Woman Cr.	West boundary, NW,SW, Sec 3, T8N,R19E	County road crossing 8 linear miles upstream from mouth

Marias River Drainage

Stream	Legal Description	Site Description
Badger Cr.	NW,NW, Sec 10, T29N,R11W	Near Blackfeet Reservation boundary
Birch Cr.	Center of Sec 28, T29N,R8W	Inactive USGS gauge 06095000 near Dupuyer
Cut Bank	SW,SE,NE, Sec 11, T33N,R6W	USGS gauge 06099000 at Cut Bank
Dupuyer Cr.	NW,SE,NW, Sec 23, T28N,R8W	Private road crossing on Duncan Ranch
Marias River #1	NE,NW,SW, Sec 20, T31N,R2W	I-15 crossing
Marias River #2	SW,SW,SW, Sec 34, T30N,R5E	USGS gauge 06101500 near Chester
Marias River #3	SE,SW, Sec 4, T25N,R9E	Inactive USGS gauge 06102050 near Loma
North Badger Cr.	SW, Sec 30, T29N,R11W	At mouth
South Badger Cr.	SW, Sec 30, T29N,R11W	At mouth
SF Dupuyer Cr.	NE,SW,NW, Sec 19, T27N,R8W	Private bridge on Salansky Ranch
SF Two Medicine R.	SE, Sec 15, T30,R13W	Private bridge on Rising Wolf Resort Road

Teton River Drainage

Stream	Legal Description	Site Description
Deep Cr.	NE, Sec 20, T23N,R5W	Jerry Larson Ranch
McDonald Cr.	NE, Sec 33, T25N,R6W	Clay Crawford Ranch
NF Deep Cr.	NW, Sec 27, T23N,R8W	At mouth
SF Deep Cr.	NW, Sec 27, T23N,R8W	At mouth
Spring Cr.	SW,SE,NW, Sec 32, T24N,R4W	On Fellows Ranch at MPC gas pipeline crossing
Teton River	NE, Sec 35, T25N,R6W	Above Eureka Reservoir Diversion

Lakes and Swamps

Water	Legal Description	Site Description
Bean Lake	SE,SW,NE, Sec 24, T18N,R7W	South end of lake near outlet culvert
Antelope Butte Swamp	Swamp level SE,NW, Sec 28, T26N,R8W	South central edge of swamp
	Evaporation refill SE,SE, Sec 19, T26N,R8W	Weir on irrigation diversion from Muddy Cr. to swamp

517.58

Montana Department of Fish, Wildlife & Parks

1420 East Sixth Avenue
Helena, MT 59620
November 19, 1993

Gary Fritz, Administrator
Water Resources Division
Dept. of Natural Resources and Conservation
P.O. Box 202301
Helena, MT 59620-2301

Dear Gary:

As you know, the Board of Natural Resources and Conservation granted DFWP instream flow reservations in the upper Missouri basin in its July 1, 1992 order. One of the conditions in the order (p. 184) requires that DFWP, within two years of the date of the final order, submit to the Board "....a list of monitoring sites and a method of determining the extent of the instream flow along the reach proportional to the monitoring sites."

Enclosed is a draft response to the latter part of the condition. We would appreciate appropriate persons at DNRC reviewing the draft and providing us with any suggestions needed to properly comply with the condition. There may be other interpretations of the condition. For example, the condition may require us to present only one method to determine the instream flow. However, we have included several possible methods applicable to different types of streams and the required accuracy. We are also assuming the new flow does not necessarily have to be calculated from the granted flow, although it could be.

We anticipate your review will enable our response to the condition to have your support.

Thank you. Please contact Liter Spence if there are any questions.

Sincerely,

Larry G. Peterman

Larry G. Peterman
Administrator
Fisheries Division

REF: DL993.20
c: Bob Lane
Fred Nelson

DEPARTMENT OF NATURAL RESOURCES
AND CONSERVATION

MARC RACICOT, GOVERNOR

LEE METCALF BUILDING
1520 EAST SIXTH AVENUE

STATE OF MONTANA

DIRECTOR'S OFFICE (406) 444-6699
TELEFAX NUMBER (406) 444-6721

PO BOX 202301
HELENA, MONTANA 59620-2301

March 15, 1994

Larry G. Peterman, Administrator
Fisheries Division
Montana Department of Fish, Wildlife & Parks
1420 East Sixth Avenue
Helena, MT 59601

Dear Larry:

In your November 19th letter, you requested DNRC to review your agency's draft plan for determining the extent of an instream flow reservation along a stream reach. The plan is required to comply with a Board of Natural Resources and Conservation condition on DFWP's water reservations for streams in the Missouri River basin above Fort Peck Dam. We have reviewed your proposed methods and our comments follow.

For streams where DFWP used the wetted perimeter method, you identified two ways the extent of the reservation could be estimated at locations other than the monitoring site. Under method #1, the instream flow reservation at other points would be calculated by applying the wetted perimeter inflection point method. Method #2 would use a ratio concept: the mean annual flow at the new point, divided by that estimated for the monitoring site, times the granted instream flow. We prefer method #2.

We realize that method #1 may lead to a more accurate determination of an instream flow from a biological standpoint, but are concerned about its practical implementation. As an example, it is quite possible that with method #1 a calculated instream flow upstream of the monitoring site could be greater than that granted by the Board. We believe it would be much less likely for this to happen if method #2 were used. We believe method #2 would be relatively easy to implement, and perhaps more defensible than method #1.

You mentioned on page 6 that you would contract with the USGS or other qualified entities to implement method #2. However, we believe all that is needed now is the plan. Contracts with USGS may best be initiated when a question regarding the instream flow at a particular point in a stream arose.

The methods your suggested for spring creeks and streams where instream flows were estimated using the fixed percentage method are appropriate.

As a final note, we believe the plan you submit to the Board should contain a table summarizing the various methods that would be used.

Please contact Larry Dolan at 444-6627 if you have any questions.

Sincerely,

Gary Fritz
Administrator
Water Resources Division

dw

LITER — LP

DEPARTMENT OF NATURAL RESOURCES AND CONSERVATION

MARC RACICOT, GOVERNOR

LEE METCALF BUILDING
1520 EAST SIXTH AVENUE

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Montana Department of Fish, Wildlife & Parks
1420 East Sixth Avenue
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good

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good
I think this mean that each stream reach would be listed.

Please contact Larry Dolan at 444-6627 if you have any questions.

Sincerely,

Gary Fritz
Administrator
Water Resources Division

dw

Bob Lane

Montana Department
of
Fish, Wildlife & Parks

1420 East Sixth Avenue
Helena, MT 59620
November 19, 1993

Gary Fritz, Administrator
Water Resources Division
Dept. of Natural Resources and Conservation
P.O. Box 202301
Helena, MT 59620-2301

Dear Gary:

As you know, the Board of Natural Resources and Conservation granted DFWP instream flow reservations in the upper Missouri basin in its July 1, 1992 order. One of the conditions in the order (p. 184) requires that DFWP, within two years of the date of the final order, submit to the Board "....a list of monitoring sites and a method of determining the extent of the instream flow along the reach proportional to the monitoring sites."

Enclosed is a draft response to the latter part of the condition. We would appreciate appropriate persons at DNRC reviewing the draft and providing us with any suggestions needed to properly comply with the condition. There may be other interpretations of the condition. For example, the condition may require us to present only one method to determine the instream flow. However, we have included several possible methods applicable to different types of streams and the required accuracy. We are also assuming the new flow does not necessarily have to be calculated from the granted flow, although it could be.

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Thank you. Please contact Liter Spence if there are any questions.

Sincerely,

Larry G. Peterman

Larry G. Peterman
Administrator
Fisheries Division

REF: DL993.20
c: Bob Lane
Fred Nelson

DRAFT 11-19-93

A METHOD OF DETERMINING THE EXTENT OF THE INSTREAM FLOW ALONG THE STREAM REACH PROPORTIONAL TO THE MONITORING SITES

Prepared for Board of Natural Resources and Conservation in Compliance with its Final Order Establishing Water Reservations above Fort Peck Dam, July 1, 1992

In its July 1, 1992 order establishing water reservations in the Missouri River basin above Fort Peck Dam, the Board of Natural Resources and Conservation (Board) made several conditions to the DFWP reservations. One of those conditions requires that DFWP, within two years of the date of the final order, (June 30, 1994) submit to the Board "... a list of monitoring sites and a method of determining the extent of the instream flow along the reach proportional to the monitoring sites." (Board Order, Pg. 184). This is DFWP's response to the latter part of this condition. A list of monitoring sites will be separately submitted.

The background behind this condition is as follows: DFWP applied to protect the fisheries values in reaches of streams and to monitor the instream flow at a single point at or near the lower end of a stream reach. DFWP's primary instream flow method was the Wetted Perimeter Inflection Point Method. This method was used in the lower reach of each stream to establish the requested instream flow at that point. The same flow may or may not apply to a reach above or below this point, i.e., it may be more or less than the flow due to natural or man-made reasons. To protect its rights, DFWP intends to monitor the granted flow at or near the point where it was established (hereinafter called the monitoring site.)

This should be written as what we had applied to the last which may be [illegible] by condition

DFWP's Management Plan (Application, Vol. 1, Pg. 1-90) describes the philosophy and method of protecting the granted instream flow in each stream reach. Simply stated, DFWP can only protect its rights from junior water users (if any). By knowing who they are, DFWP can "call" for the junior water when flows fall below the granted reservations at the monitoring site. We do not need to know what the flow is above the monitoring site. Since senior users are not affected by the call to junior water users, streamflows within the reach are only improved in proportion to the amounts of the junior rights no longer diverted within the reach.

However, this method does not cover some situations. If some upstream use of water impacted a portion of the reach, even severely, but did not impact the amount of flow at the monitoring point, then there is no protection. For example, a hydropower use could divert the entire flow of a stream for miles but return the water above the monitoring point. Or, the point of diversion for a present use could be changed from lower in a reach where the diversion was only a relatively small fraction of the flow to the upper portion of the reach where the amount diverted could be most of the flow. In either case, the point monitoring concept would provide no protection against these types of activities that could essentially dewater parts of the reach that were to be protected.

The condition in the final order was intended to correct this defect in the point monitoring approach. By having a method for

proportioning the instream flow throughout the reach based on the amount granted at the monitoring point, all parts of a reach could be fully protected up to the same relative instream flow granted at the monitoring point. For example, if the instream flow granted by the Board at the downstream end of the reach was the high inflection point of the wetted perimeter method, then the flow that could be protected midway through the reach could be the high inflection point at that place on the stream. Thus the midway flow might be 1/2 or 1/3 of the instream flow at the end to the reach. Whatever the amount, it would be the flow calculated to provide the proper level of protection for that location.

In situations where the wetted perimeter method was not used to establish the instream flow in a stream reach, other acceptable methods are available to determine the flow at points above the monitoring point.

The following describes some methods to satisfy the Board's condition:

Method 1 - Wetted Perimeter Field Method

Except for spring creeks, the required instream flow at other points along a stream can be determined in the same manner as the granted instream flow was determined at the monitoring site. The Wetted Perimeter Inflection Point Method can again be used by

qualified personnel. A field crew can pick a suitable site that meets the criteria established for the method and apply the same procedure outlined in Nelson (1989). The result will be an instream flow recommendation for the stream at that site. The same method can be used at as many other sites as are needed.

This method could also be used on streams where DFWP was unable to use it during preparation of its reservation application due to time, budget, manpower, limited access or other constraints if those former problems can be overcome.

The advantage of this procedure is the better accuracy of the flow recommendation compared to those obtained using non-field methods. The disadvantage is the amount of time, personnel and expense required to complete the field work and process the information through the wetted perimeter computer program.

Method 2 - Non-Field Method for Streams having a Wetted Perimeter Flow Recommendation Granted by the Board

The USGS conducted a water availability study for all of the streams in DFWP's reservation application (Parrett et.al. 1989). Both field and non-field methods, and combinations thereof, were used to determine streamflow characteristics on gaged and ungauged streams. One of the parameters determined on each stream was the mean annual flow (MAF). The MAF is a parameter readily available

on gauged streams and, on ungauged streams, can be estimated fairly accurately using various simulation techniques. The MAF is not necessarily an indicator of a stream's normal flow condition for all seasons, but it does provide a relative measure of the amount of water annually passed by a point on a stream channel.

There are several methods the USGS used to determine the MAF (Parrett, et. al. 1989). Some of those were office methods, some required field measurements of streamflows. In many cases, data from several methods were combined to get a "weighted-average estimate" which was more reliable than any single method.

The same USGS methods could be used at any other point on a reservation stream to determine the MAF. The required instream flow at the new site could then be calculated from the ratio of the granted wetted perimeter flow at the monitoring site to the calculated MAF at that same site. For example:

Sixteen Mile Creek

	Monitoring Site (near Toston)	New Site (near Maudlow)
MAF (cfs)	83[1]	53[2]
Wetted Perimeter Flow (cfs)	20	To be determined

Thus:

The wetted perimeter flow at the Toston monitoring site = 24% of

the MAF at that site. Therefore, the wetted perimeter flow at the new (Maudlow) site is 0.24 x 53 = 12.7 cfs.

---

[1]From USGS Water Availability Study (Parrett et. al. 1989) pg. 83, (Site No. 192)

[2]From Parrett et.al. (1989) p. 83 (site no. 191). If the MAF at this site was not already known, it could be determined by the USGS methods contained in Parrett et. al. (1989)

The advantage of Method 2 is that it could require less time, money and personnel if only office methods were used to determine the MAF at the new site. However, for better accuracy, several field (flow) measurements would be required and this would be more expensive. We would contract with the USGS (or other qualified entity) to conduct these investigations.

The disadvantage of Method 2 is less accuracy in determining the required instream flow compared to using the wetted perimeter method. Non-field methods could over or under- estimate the MAF, which in turn would over or under-estimate the instream flow at the new site. The possible statistical variations for the various USGS methods are explained in Parrett et.al. (1989).

Method 3 - <u>Non-field methods for spring creeks and streams where the Fixed Percentage Method was used.</u>

Spring Creeks

Spring Creeks, where the Wetted Perimeter Inflection Point Method could not be used to make an instream flow recommendation fall in this category. Spring creeks, with their relatively stable flow regimes, are not amenable to using the wetted perimeter method, which requires measurements of a wide range of flows.

Spring creeks in Montana are usually relatively short in length and originate in valley bottoms bordering mainstem rivers. The base flow, the lowest mean monthly flow for the year, was the granted instream flow. Consequently, due to the relatively stable flow regime and short stream length, it is unlikely a flow recommendation at a site other than the monitoring site would be necessary or warranted. If required, however, a stream gauging program would have to be established, or one of the USGS estimating techniques could be used to determine the base flow at the new site in the same manner as was done for the monitoring site on some spring creeks.

Fixed Percentage Method Streams

DFWP used the Fixed Percentage Method on some streams where time, budget, manpower, limited access or other constraints prevented use of the wetted perimeter method. This method used known wetted perimeter flows and tne MAF on several nearby streams to calculate

the percentage that the wetted perimeter flows were of their MAF. The individual percentages from several streams in the area were then averaged to provide a single mean percentage. This percentage was then applied to the MAF for streams in the subbasin where wetted perimeter data were unavailable. MAF data were derived by the USGS at the specified site (monitoring site). This same procedure could be used for a new site by calculating the MAF at that site (via Parrett et. al 1989) and applying the original subbasin percentage to the new MAF (See DFWP application, Vol. 1, p. 1-18 for a more detailed explanation and examples.)

In summary, should the Board require the determination of an instream flow on a granted reservation stream at a site other than the monitoring site where the reservation was granted, a number of methods can be used. Except for spring creeks, the proposed methods are in some way associated with the Wetted Perimeter Inflection Point method, the primary method used by DFWP in its Missouri basin reservation requests. The appropriate method will depend on the type of stream and the accuracy and degree of effort needed to acquire the data.

REFERENCES

Board of Natural Resources and Conservation. 1992. Final order establishing water reservations above Fort Peck Dam. July 1, 1992. 398 pp.

Nelson, F. 1989. Guidelines for using the wetted perimeter (WETP) computer program of the Montana Department of Fish, Wildlife and Parks. Helena, MT. 28 pp.

Parrett, C., Johnson, D. and J. Hull. 1989. Estimates of monthly streamflow characteristics at selected sites in the upper Missouri basin, Montana, base period water years 1937-86. U.S. Geological Survey Water Resources Investigations Report 89-4082. Helena, MT. 103 pp.

Bob Lane

Montana Department
of
Fish, Wildlife & Parks

MEMORANDUM

TO: Liter Spence

FROM: Bob Lane Bob Lane

DATE: October 1, 1993

RE: Compliance with Board's Missouri River Reservation Condition Requiring a Method to Proportion the Granted Instream Flow Throughout a Reach

This memo is to express my thoughts on the meaning of and the required department response to the second condition imposed by the Board of Natural Resources and Conservation on the instream flows granted to the department. In the board's final order granting instream reservations to the department, the board imposed the following condition on the granted reservations in paragraph 2, page 184:

> DFWP shall within two years of the date of the Final Order submit to the Board a list of monitoring sites and a method of determining the extent of the instream flow along the reach proportional to the monitoring sites. Until approval of this monitoring report the DFWP may not object to any changes of use by other users within a reach.

The question is: How does the department comply with this condition? I believe that it is important to first discussed the reason for this condition. This will help us decide how to comply.

The department applied to protect the fisheries values in reaches of streams and rivers and to monitor the instream flow at a single downstream point. This method had a defect. If some use of water impacted a portion of the reach, even severely, but did not impact the amount of flow at the monitoring point, then there was no protection. For example, a hydropower use could divert the entire flow of a stream for miles but return the water above the monitoring point. Or, the point of diversion for a present use could be changed from lower in a reach where the diversion was only a relatively small fraction of the flow to the upper portion of the reach where the amount diverted could be most of the flow. In either case, the point monitoring concept would provide no protection against these types of activities that could essentially dewater parts of the reach that were to be protected.

The condition added to the final order was intended to correct this defect in the point monitoring approach. By having a method for proportioning the instream flow throughout the reach based on the amount granted at the monitoring point, all parts of a reach could be fully protected up to the same relative instream flow as granted at the monitoring point. For example, if the instream flow granted by the board at the downstream end of the reach was the high inflection point of the wetted perimeter method, then the flow that could be protected midway through the reach would be the high inflection point at that place on the stream. Thus the midway flow might be 1/2 or 1/3 of the instream flow at the end to the reach. However, it would be the flow calculated to provide the same level of protection.

The condition only requires that the department develop and submit a method for proportioning the instream flow throughout the reach. No particular method is required. The method or methods that the department submits should provide a means of calculating or developing an instream flow amount that provides the same level of protection that the flow granted at the monitoring site does. The method would only be used when the department is objecting to something like a new permit for a hydropower diversion that dewater a portion of a protected reach. The method would set an instream flow that is our reservation right under the board's final order and which the department would be entitled to protect.

The methods that you have proposed in your draft all seem reasonable to me. I had assumed originally that the department could take the instream flow granted at the downstream monitoring point and proportion that flow throughout the reach based on the watershed characteristics of the stream. For example, if the mean annual flow at the midpoint in the reach is 50% of the mean annual flow at the point on the stream where the wetted perimeter measurements were made, the instream flow at the midpoint would be 50% of the flow at the monitoring site. I am assuming for the purposes of this discussion that the monitoring site and the point where the wetted perimeter measurements were made are the same point or effectively the same point. I believe that this is generally true with some exceptions related to the particular circumstances of a few reaches. We should discuss some of the details of your draft proposal of methods. I am not sure what all is possible, how suitable a method might be, whether all potential methods have been identified, etc. I assume we will want to get Fred Nelson's input also.

You also asked whether the department should ask DNRC or the broad what the condition means. I think the intent of the condition is fairly clear. However, the specific means of implementing the

condition may take some thought. The department is in the best position to propose what we think are the best methods and to advocate their approval when we submit them to the board. I do think it would be a good idea to keep the DNRC's staff informed about the ideas the department is developing, to get their input and, hopefully, to get their technical concurrence with the methods the department will be submitting to the board.

cc: Larry Peterson
Fred Nelson
Curt Larsen

Read - See Liter

MEMOGRAM

To: Bob Lane

From: Liter Spence

Subject: Missouri reservations-DFWP compliance with Board Order

On page 184 of the Board Order, there is a condition that requires DFWP within two years of the date of the final order, to submit to the board "--- a list of monitoring sites and a method of determining the extent of the flow along the reach proportional to the monitoring sites".

We are having some difficulty deciding what the latter part of the condition means. I drafted a response based on my interpretation of the condition. (Copy attached) Fred Nelson has a completely different interpretation than mine. Also, Chuck Parrett, USGS, has an opinion based on his questioning at the hearing. There may be other interpretations.

I'd like to discuss with you how to proceed in satisfying this condition. Should we make our own interpretation and/or ask the Board or DNRC what they think it means? We have until June 30, 1994.

A METHOD OF DETERMINING THE EXTENT OF THE INSTREAM FLOW ALONG THE STREAM REACH PROPORTIONAL TO THE MONITORING SITES

Prepared for Board of Natural Resources and Conservation in Compliance with its Final Order Establishing Water Reservations above Fort Peck Dam, July 1, 1992

In its July 1, 1992 order establishing water reservations in the Missouri River basin above Fort Peck Dam, the Board of Natural Resources and Conservation (Board) made several conditions to the DFWP reservations. One of those conditions requires that DFWP, within two years of the date of the final order, submit to the Board "... a list of monitoring sites and a method of determining the extent of the instream flow along the reach proportional to the monitoring sites." (Board Order, Pg. 184). This is DFWP's response to the latter part of this condition. A list of monitoring sites will be separately submitted.

DFWP's primary instream flow method was the Wetted Perimeter Inflection Point Method. This method was used in the lower reach of each stream to establish the requested instream flow at that point. The same flow may or may not apply to a reach above or below the measured site; it may be more or less than the flow at the measured site due to natural or man-made causes. To protect its rights, DFWP intends to monitor the granted flow at or near the measured site, hereinafter referred to as the monitoring site.

A flow must be measured at a point. There was considerable discussion at the contested case hearing about how the flow at the

monitoring site relates to the flow above or below the monitoring site. DFWP's Management Plan (Application, Vol. 1, Pg. 1-90) describes the philosophy and method of protecting the granted instream flow on each stream. Very simply stated, DFWP can only protect its rights from junior water users (if any). By knowing who they are, DFWP can "call" for the junior water when flows fall below the granted reservations at the monitoring site. We do not need to know what the flow is above or below the monitoring site. Since senior users are not affected by the call to junior water users, streamflows within the reach are only protected in proportion to the amounts of the junior rights no longer diverted within the reach. However, due to the confusion on this point, the hearing examiner proposed, and the Board accepted, the condition discussed here. The following describes some methods to satisfy this condition:

? I don't understand

Method 1 - Wetted Perimeter Field Method

Except for spring creeks, the required instream flow at other points along a stream can be determined in the same manner as the granted instream flow was determined at the monitoring site. The Wetted Perimeter Inflection Point Method can again be used by qualified personnel. A field crew can pick a suitable site that meets the criteria established for the method and apply the same procedure outlined in Nelson (1989). The result will be an instream flow recommendation for the stream at that site. The same

maybe

method can be used at as many other sites as are needed.

This method could also be used on streams where DFWP was unable to use it during preparation of its reservation application due to time, budget, manpower, limited access or other constraints if those previous problems can be overcome.

The advantage of this procedure is the better accuracy of the flow recommendation compared to those obtained using non-field methods. The disadvantage is the amount of time, personnel and expense required to complete the field work and process the information through the wetted perimeter computer program.

Method 2 - Non-Field Method for Streams having a Wetted Perimeter Flow Recommendation Granted by the Board

The USGS conducted a water availability study for all of the streams in DFWP's reservation application (Parrett et.al. 1989). Both field and non-field methods, and combinations thereof, were used to determine streamflow characteristics on gaged and ungauged streams. One of the parameters determined on each stream was the mean annual flow (MAF). The MAF is a parameter readily available on gauged streams and, on ungauged streams, can be estimated fairly accurately using various simulation techniques. The MAF is not necessarily an indicator of a stream's normal flow condition for all seasons, but it does provide a relative measure of the amount

of water annually passed by a point on a stream channel.

There are several methods the USGS used to determine the MAF (Parrett, et. al. 1989). Some of those were office methods, some required field measurements of streamflows. In many cases, data from several methods were combined to get a "weighted-average estimate" which was more reliable than any single method.

The same USGS methods could be used at any other point on a reservation stream to determine the MAF. The required instream flow at the new site could then be calculated from the ratio of the granted wetted perimeter flow at the monitoring site to the calculated MAF at that same site. For example:

Sixteen Mile Creek

	Monitoring Site (near Toston)	New Site (near Maudlow)
MAF (cfs)	83[1]	53[2]
Wetted Perimeter Flow (cfs)	20	To be determined

Thus:

The wetted perimeter flow at the Toston monitoring site = 24% of the MAF at that site. Therefore, the wetted perimeter flow at the new (Maudlow) site is 0.24 x 53 = 12.7 cfs.

This is [illegible] what I thought the condition meant.

[1]From USGS Water Availability Study (Parrett et. al. 1989) pg. 83,

(Site No. 192)

[2]From Parrett et.al. (1989) p. 83 (site no. 191). If the MAF at this site was not already known, it could be determined by the USGS Methods contained in Parrett et. al. (1989)

The advantage of Method 2 is that it could require less time, money and personnel if only office methods were used to determine the MAF at the new site. However, for better accuracy, several field (flow) measurements would be required and this would be more expensive. We would contract with the USGS (or other qualified entity) to conduct these investigations.

we only need a "method" we can use another only when needed.

The disadvantage of Method 2 is less accuracy in determining the required instream flow compared to using the wetted perimeter method. Non-field methods could over or under- estimate the MAF, which in turn would over or under-estimate the instream flow at the new site. The possible statistical variations for the various USGS methods are explained in Parrett et.al. (1989).

also we primarily need this method for Oregon

Method 3 - Non-field methods for ~~Spring~~ Creeks and streams where the fixed percentage method was used.

Spring Creeks

Spring Creeks, where the Wetted Perimeter Inflection Point Method could not be used to make an instream flow recommendation fall in

this category. Spring creeks, with their relatively stable flow regimes, are not amenable to using the wetted perimeter method, which requires measurements of a wide range of flows.

Spring creeks in Montana are usually relatively short in length and originate in valley bottoms bordering mainstem rivers. The base flow, the lowest mean monthly flow for the year, was the granted instream flow. Consequently, due to the relatively stable flow regime and short stream length, it is unlikely a flow recommendation at a site other than the monitoring site would be necessary or warranted. If required, however, a stream gauging program would have to be established, or one of the USGS estimating techniques could be used to determine the base flow at the new site in the same manner as was done for the monitoring site or some spring creeks.

Fixed Percentage Method Streams

DFWP used the Fixed Percentage Method on some streams where time, budget, manpower, limited access or other constraints prevented use of the wetted perimeter method. This method used known wetted perimeter flows and the MAF on several nearby streams to calculate the percentage that the wetted perimeter flows were of their MAF. The individual percentages from several streams in the area were then averaged to provide a single mean percentage. This percentage was then applied to the MAF for streams in the subbasin where

wetted perimeter data were unavailable. MAF data were derived by the USGS at a specified site (monitoring site). This same procedure could be used for a new site by calculating the MAF at that site (via Parrett et. al 1989) and applying the original subbasin percentage to the new MAF (See DFWP application, Vol. 1, p. 1-18 for a more detailed explanation and examples.)

In summary, should the Board require the determination of an instream flow on a granted reservation stream at a site other than the monitoring site where the reservation was granted, a number of methods can be used. Except for spring creeks, the proposed methods are in some way associated with the Wetted Perimeter Inflection Point method, the primary method used by DFWP in Missouri reservation request. The appropriate method will depend on the type of stream and the accuracy and degree of effort needed to acquire the data. Most of these methods were already used by DFWP in developing its reservation application.

REFERENCES

Board of Natural Resources and Conservation. 1992. Final order establishing water reservations above Fort Peck Dam. July 1, 1992. 398 pp.

Nelson, F. 1989. Guidelines for using the wetted perimeter (WETP) computer program of the Montana Department of Fish,

Wildlife and Parks. Helena, MT. 28 pp.

Parrett, C., Johnson, D. and J. Hull. 1989. Estimates of monthly streamflow characteristics at selected sites in the upper Missouri basin, Montana, base period water years 1937-86. U.S. Geological Survey Water Resources Investigations Report 89-4082. Helena, MT. 103 pp.

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