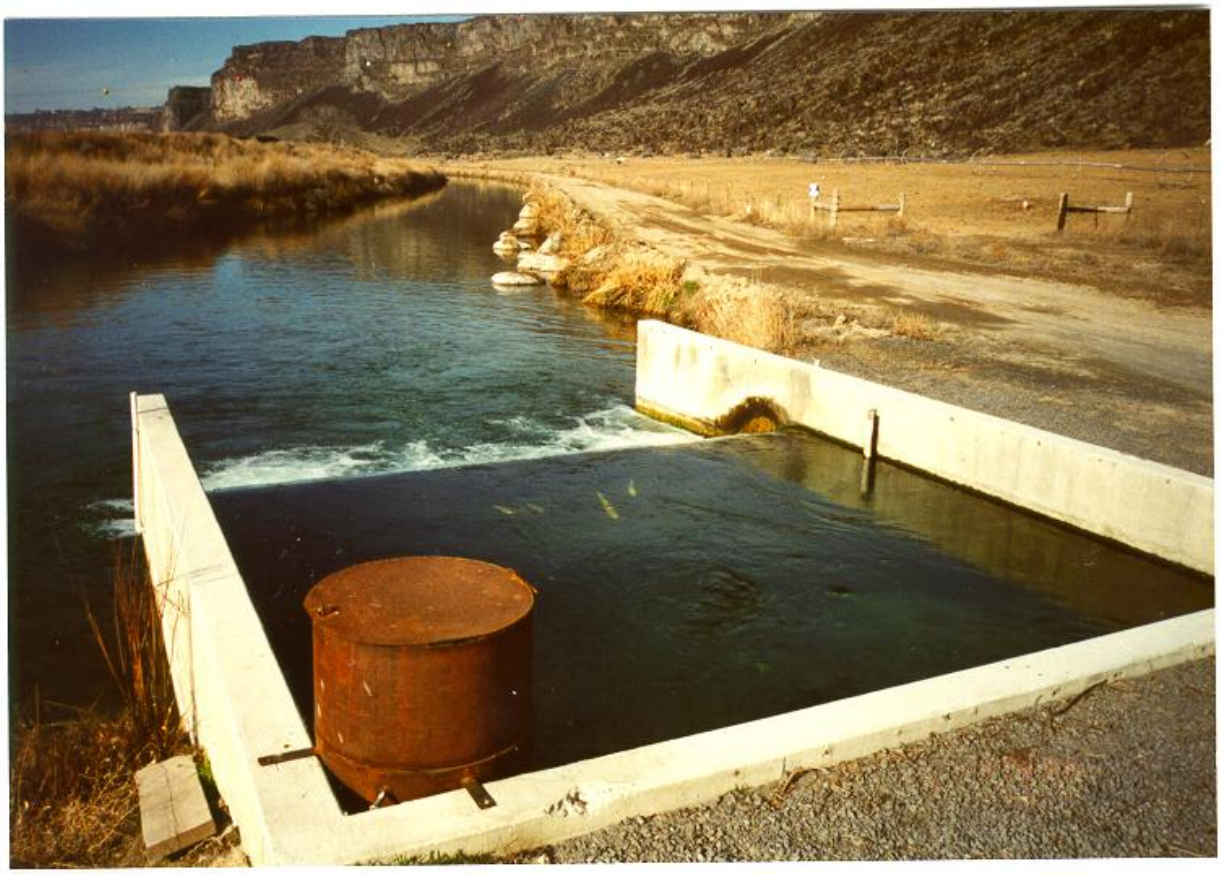
Watermaster Handbook

Statute update through May 2013



Idaho Department of Water Resources
322 Front Street, PO Box 83720
Boise, ID 83720-9800
208.287.4800
www.idwr.idaho.gov

Preface

Proper water distribution under Idaho water law and the appropriation system is the primary goal and responsibility of all Idaho watermasters. Daily water distribution, record keeping, measurement and general water district management can be a challenge. While the difficulty associated with these tasks depends upon the size and complexity of the individual water district, most of the principles and concepts involved are common to all districts. The purpose of this handbook therefore is to provide a quick reference when questions arise concerning water districts, and to provide all watermasters with the basic information needed to deliver water and manage a water district.

This handbook is divided into several sections involving different aspects of water delivery and water district management. Each section, while not all inclusive, is intended to stand alone and provide information when questions are raised concerning water districts and watermaster duties. Further information and assistance may be obtained by contacting any one of the Idaho Department of Water Resources offices listed on the following page.

Last updated 07/10/2013

Contact Information & Regional Locations

Email
For general comments and questions, email: IDWRinfo@idwr.idaho.gov
Email a specific employee by using their first name, adding a dot, followed by their last name.
Example: George Washington = george.washington@idwr.idaho.gov

How Are We Doing?
We welcome feedback! Please email us with your suggestions and concerns.

- IDWRinfo@idwr.idaho.gov

State Office
IDWR operates multiple offices around the state to serve you.
Our State Office is located on the corner of Broadway Avenue and Front Street in the Idaho Water Center building on the 6th floor, on the outskirts of downtown Boise and just a few blocks east of the Ada County Courthouse.

Parking is located underneath the building. 1st hour is free, $1.00 per hour after first hour and $10 maximum per day.

click to enlarge

1 State Office
The Idaho Water Center
322 East Front Street
PO Box 83720
Boise, Idaho 83720-0098
Phone: **(208) 287-4800**
Fax: **(208) 287-6700**

Regional Offices
We have divided the state into four regions to better serve the public. Each region has a full service regional office where you can receive assistance with water management and adjudication matters.

2 Western Regional Office
2735 Airport Way
Boise, ID 83705-5082
Phone: **(208) 334-2190**
Fax: **(208) 334-2348**

3 Northern Regional Office
7600 Mineral Drive, Suite 100
Coeur d'Alene, ID 83815-7763
Phone: **(208) 762-2800**
Fax: **(208) 762-2819**

4 Southern Regional Office
1341 Fillmore Street, Suite 200
Twin Falls, ID 83301-3380
Phone: **(208) 736-3033**
Fax: **(208) 736-3037**

5 Eastern Regional Office
900 North Skyline Drive, Suite A
Idaho Falls, ID 83402-1718
Phone: **(208) 525-7161**
Fax: **(208) 525-7177**

Table of Contents

Table of Figures & Tables

Appendices

SECTION 1. - IDAHO WATER DISTRICTS

Section 42-604 of the Idaho Code requires the director of the Idaho Department of Water Resources (IDWR) to create state water districts for public streams or water supplies for which priorities of appropriation have been adjudicated by the courts. The director also has authority to revise the boundaries of existing districts, combine two or more districts, and/or abolish districts if such action is necessary to properly administer water uses.

There are over 100 water districts in Idaho. More than 80 of these districts are currently active. Districts vary in both geographical size and number of water users. The state's largest district, District 01, covers most of the Upper Snake River basin above Milner Dam and includes numerous streams and tributaries with thousands of individual water users. The smaller districts may include only one tributary steam with no more than a half dozen users.

SECTION 2. - DEFINITIONS

Acre-Foot (AF) is a unit commonly used for measuring the volume of water; equal to the quantity of water required to cover one acre to a depth of one foot and equal to 43,560 cubic feet of 325,851 gallons.

Appropriation Doctrine is the system of water law adopted by most Western States. The basic principles of the appropriation doctrine are: (1) that a private right to use water can be acquired only by diverting the water and applying it to a beneficial use; (2) the first in time of beneficial use is the first in right and the right is maintained only by use.

Aquifer is a stratum or zone below the surface of the earth capable of producing water as from a well.

Beneficial Use is one or more of the recognized uses of water including but not limited to irrigation, domestic, municipal, commercial, recreation, hydropower, stockwatering and fish propagation uses for which permits to appropriate water can be issued. Industrial use includes manufacturing, mining and processing uses of water.

Consumptive Use is the amount of water transpired in the process of plant growth plus the water evaporated from the soil and foliage in the area occupied by the growing plant.

Cubic Feet per Second (CFS) is a unit used to express a rate of flow of water. One cfs is equal to 50 miners' inches or 448.8 gallons per minute.

CFS – Day or **24 – Hour Second Feet** is a flow rate expressed in terms of one day or 24 hours. Example, a continuous diversion of 2 cfs over 20 days would equal 40 24-hour second feet.

Commingle is any act by where water from one source is mixed or mingled with water from another source.

Department or **IDWR** means the Idaho Department of Water Resources.

Director means the Director of the Idaho Department of Water Resources.

Diversion is the structure through which water is removed from a water source. It also refers to the act of removing water for a specific purpose. A diversion structure, particularly on a natural channel, may also include a check structure in the channel.

Exchange is a broad term used to describe several different water diversion and distribution scenarios. It is often used to describe situations where water is diverted under one source with a valid water right and injected and commingled with water in another source, ditch or natural channel in exchange for diverting an equal amount of water at a different location from the same ditch or channel containing the commingled water. Example, a user diverts water from a river to a canal at point A and then by means of a well, injects ground water into the river at point B which is 5 miles downstream from Point A. Where water is injected at the upstream point and diverted downstream, stream flow losses, if any, should be evaluated. Exchange is also used to describe situations where two or more valid water rights are swapped. For example, user A with well A and ground water right #1 irrigates land one-half mile above where user B diverts right #2. The stream channel between A and B's land experiences losses and A's well is situated close enough to B's land that it can be used to irrigate B's land. Under exchange user A agrees to divert B's surface water right to A's land in exchange for allowing user B to irrigate his land with A's ground water well and right.

Expansion is the diversion and/or use of more water than originally allowed by a water right measured by either rate or volume. The application of water to a tract of land larger than the original tract is presumed to be an expansion.

Gaging Station is a site on a stream, canal, lake or reservoir where systematic observations of stage and discharge are made.

Ground Water is water that occupies all the voids within a geologic stratum and occurs in its natural condition below land surface. As defined by Idaho law, ground water is all water under the surface of the ground, whatever may be the geological structure in which it is standing or moving.

Head is the relative difference in the elevations of water surfaces.

Headgate or **Headworks** are structures which are constructed to control or regulate the flow of water in a ditch or canal.

Hydrograph is a plot of stage or discharge as a function of time.

Lateral Ditch is a ditch that supplies water to two or more users. Lateral ditches normally divert water from a main canal or ditch which has its heading from a river or natural stream channel.

License is the certificate issued by the director in accordance with Section 42-219, Idaho Code, confirming the extent of diversion and beneficial use of water that has been made in conformance with the permit conditions.

Measuring Device is a generally accepted structure or apparatus used to determine a rate of flow or volume of water. Examples are weirs, meters and flumes.

Miner's Inch (MI) is a variable unit used to express a rate of flow of water in the Western United States. In Idaho, a miner's inch is equal to 1/50 of a cubic foot per second (cfs), or 0.02 cfs. One miner's inch is the duty of water, or the standard allocated flow, for each acre of irrigated land.

Natural Flow is that portion of the total flow in a stream channel which does not include storage water released from a reservoir or water from other sources, such as groundwater pumped from a well and injected into a stream, or surface water transferred to the stream from another basin. Sources of natural flow may include tributary streams, springs, return flows from irrigated fields or ditches, and underground flow or groundwater which seeps into the stream channel.

Period of Use is the time period each year during which water under a given right may be beneficially used in compliance with terms of the water right.

Permit or **Water Right Permit** is the water right document issued by the Director authorizing the construction of diversion facilities and commencement of use of unappropriated public water of the state.

Place of Use (POU) is the location where water is used. The place of use under Idaho water rights is given by legal descriptions, or 40 acre quarter-quarter section or Government lot land descriptions.

Point of Diversion (POD) is the location at which water is physically diverted by manmade works from the source of water. Points of diversions are identified by legal descriptions in Idaho water rights.

Public Water, as defined by Idaho law, is all the waters of the state when flowing in their natural channels, including the waters of all-natural springs and lakes and ground water.

Priority or **Priority of Appropriation** or **Priority Date** is the date of appropriation established in the development of a water right.

Re-diversion as a general term is used to describe the location of any secondary point of diversion under a water right. Example, consider a storage reservoir on Creek A where storage water is released to Creek A and diverted downstream at Canal #1. The primary point of diversion for a water right with a storage reservoir on Creek A is the impounding dam across Creek A, while the point of re-diversion is Canal #1. Re-diversion, as used in an exchange, is the location where a quantity of water is diverted from source B after an equal quantity of water was diverted from source A and injected into source B.

Reservoir is a lake or pond in which water is collected and controlled for some beneficial use.

Stored Water is water that is diverted to and retained within a reservoir pursuant to a water right that describes storage as a beneficial use. Water may be diverted to and stored in a reservoir located either within the stream channel or off of the stream channel. If the water is then released for some beneficial use, it may be referred to as **Stored Flow**.

Source is the water body at the point of diversion. Examples are Salmon River, Squaw Creek, spring, ground water, etc.

Unappropriated Water is the public water of the state of Idaho in streams, rivers, lakes, springs or ground water in excess of that necessary to satisfy prior rights including minimum stream flows and rights established by law.

Water District (WD) is a district organized in accordance with the provisions of chapter 6, title 42, Idaho Code. The Director of the Idaho Department of Water Resources (IDWR) creates water districts in order to distribute water rights from natural water sources in accordance with water right priority dates. Water distribution in water districts is accomplished by watermasters who are elected annually by district water users. Watermasters are supervised by the Director of IDWR.

Watermaster is the person elected or appointed pursuant to Chapter 6, Title 42, Idaho Code, to distribute water in the order of priority to those water users entitled to its use.

Water User is a person, corporation, association, firm, governmental agency or other entity who is entitled to divert and beneficially use water.

SECTION 3. - WATERMASTER ELECTION, APPOINTMENT AND REMOVAL

Watermasters in Idaho are employed by the state but are elected and compensated directly by water users within water districts. Water districts are created by the Director of IDWR pursuant to Section 42-604, Idaho Code. A water district may be created only after the priorities of appropriation of the water rights have been adjudicated by a court of law.

The watermaster is elected at an annual meeting of the water users which is usually held on the first Monday in March of each year. The users also have the option of holding the meeting on any convenient day between the second Monday in January and the third Monday in March. To schedule the meeting on a day other than the first Monday in March, the water users must adopt a resolution at the annual meeting setting the revised day as the annual meeting date. (Section 42-605(2), Idaho Code).

At the beginning of each annual water meeting, the water users must first choose a meeting chairman and meeting secretary and should determine the manner and method of electing the watermaster. The meeting chairman or secretary from the preceding year should call the meeting to order and preside over the election of meeting officers. Prior to the election of a watermaster, the water users must agree on the compensation to be paid to the watermaster and any

watermaster assistants for that year or irrigation season. Fixing the watermaster compensation at an annual meeting is generally accomplished when considering the water district budget.

Votes cast in the election of a watermaster and in connection with other water district matters may be by majority vote of the water users present at the annual meeting unless one or more users request the alternative voting method identified in Section 42-605(4), Idaho Code may be used when considering one or more matters at the meeting. The alternative voting procedure is based upon assessments for delivery of stored and natural flow water. Under this alternative procedure, each user with a valid right or rights is entitled to a number of votes equal to the average annual dollar amount assessed for the user's right or rights for the previous five years, or lesser number of years the rights have been assessed. When voting by majority, a corporation or water delivery organization, such as an irrigation district or canal company etc., is considered one person and limited to one vote. Proxy votes are not allowed in a water district election in the absence of the water right owner, except that in the absence of the owner a right may be voted by another person present who has the use of the right for the ensuing season, such as a tenant, lessor or contract purchaser.

In the event a district does not hold a meeting or cannot agree on a watermaster, the Director of IDWR may appoint a watermaster and set a budget for the operation of the district if requested by one or more water users.

Before a watermaster can take office and actually control the delivery of water, the following requirements must be met:

a) He or she must take an oath of office before an officer authorized to administer oaths, usually a notary public, and then file the oath with the department (Section 42-605(10), Idaho Code).This statute was amended in 2011 to remove the requirement for filing an oath when a watermaster is reelected in consecutive years.

b) He or she must be "called on" by one or more water users stating the need for water delivery and control. . This step is not needed if the watermaster is authorized to serve year round by an adopted resolution.

The term of service for the watermaster begins with the need to deliver water as outlined above and continues until the necessity for delivery of water ceases or until the 1st day of November, whichever is earlier. The water users may, by resolution at any annual meeting, make the watermaster's job year-round or for a set term during each year (Section 42-608(4), Idaho Code). The Director of IDWR may extend the watermaster's term of service in any year upon receiving a petition for extension from one or more water right holders in the district (Section 42-608(3), Idaho Code).

The Director is responsible to provide direction for water distribution and watermaster supervision. He has made department staff available to provide technical assistance and advice to the watermaster in connection with water distribution.

Legal assistance is also available to the watermaster through the Attorney General's Office for matters that require the services of an attorney. This assistance is important, since the statutes require that in a water district in which an adjudicated water right is being sought, the

watermaster be named as a defendant in a supplemental adjudication action. As a defendant, the watermaster has the opportunity to provide input to the decision concerning the water right claimed.

Section 42-605(6) of the Idaho Code provides for the selection of a water district advisory committee by the water users at any annual meeting. The advisory committee consists of members of the water district who serve as advisors to the director or watermaster on matters pertaining to water distribution. The committee may be authorized to carry out policies set forth in resolutions adopted by users at an annual meeting or special meeting. An advisory committee may also provide some continuity in the operation of a district since the same watermaster is not always re-elected. In several water districts, the Idaho Water Resource Board has given the advisory committee authority to administer the rental of stored water. Since it is common for advisory committees to meet periodically throughout the season, and because these committees are considered governing bodies which can make recommendations to the Director, IDWR recommends that all advisory committee meetings comply with Idaho open meeting laws.

The watermaster may employ assistants to deliver water but such employment and any compensation must be approved by the water users at the annual meeting (Section 42-605(3), Idaho Code). In the case of emergency and upon approval of the director of IDWR, the watermaster may employ assistants in addition to those approved at the annual meeting. These assistants are entitled to the same salary or compensation as provided to assistants in the adopted budget. If a budget has not been adopted or no consideration was made for assistants, then the director of IDWR may set the compensation and require payment in the same manner as provided for the watermaster. Assistants must take the same oath of office as the watermaster (Section 42-609, Idaho Code).

The director of IDWR may remove watermasters who are not properly performing their duties (Section 42-605(9), Idaho Code). Before taking such action, the director must receive at least one written complaint from a valid water right holder within the district and must investigate the complaint(s) and hold a hearing with other users in the district. If a watermaster is removed, the director may appoint a new watermaster to fulfill the unexpired term.

The following page provides a checklist of items to be completed and/or considered at each annual water district meeting. After each meeting, the district secretary is required to forward a certified copy of the meeting minutes and all adopted resolutions to the Department. The watermaster or secretary must also file a certified copy of the adopted budget with the Department. Said copies of the minutes, resolutions and adopted budget are usually sent to the appropriate Department regional office. If the water district is a district in which the county assesses and collects water district assessments, a certified copy of the adopted budget must also be sent to the appropriate county or counties in which the district is located. In addition to filing copies of the minutes, resolutions and adopted budget to the Department, the watermaster's oath of office (unless the watermaster from the previous year is reelected) must also be filed with the Department before the director can officially appoint the watermaster. Upon appointment, the watermaster is covered under the state group surety bond for actions taken within the authorized scope of duties. A person who has been elected but has not yet been appointed as watermaster is not authorized to act as watermaster.

ANNUAL WATER DISTRICT MEETING CHECKLIST

- Call meeting to order
  Call to order made by meeting chairman or secretary from preceding year's meeting (if preceding year's secretary and chairman are not present, then call to order may be made by the watermaster or an IDWR representative).

- Selection of new meeting chairman and secretary *

- Reading of last year's minutes by secretary, and approval
- *Recommend reading or review of year's end financial statement.*

- Determine method of voting
- *Refer to section 42-605(4) of Idaho Code if voting by alternative method.*

- Fix compensation to be paid watermaster and assistants
- *Also fix compensation of water district treasurer and secretary if necessary.*

- Discussion and adoption of budget for ensuing year

- Adoption of resolutions
- *Adopt resolutions pertaining to collection of budget and other matters.*

- Election of watermaster

- Election of water district treasurer **
- *Elect treasurer if required (see explanation below).*

- Election of advisory committee for ensuing year

- Discussion of other items of business

- Set time and place for next year's meeting

- Adjournment of meeting by chairman

* It is the duty of the meeting secretary to record the minutes of the meeting; to prepare and file certified copies of meeting minutes, adopted budget and resolutions to the Department and appropriate auditor of the county or counties in which the district is located (to be done immediately or within a few days after the meeting); to receive a copy of the proposed budget for the ensuing irrigation season, to be filed by the watermaster at least thirty (30) days prior to the annual meeting, and to see that his proposed budget is properly presented at the annual meeting. The secretary may perform a number of other related duties as requested by the district.

** For districts in which the county treasurer no longer collects and disburses district fees, or for districts which have adopted resolutions which remove the county from collecting and disbursing fees, a district treasurer must be elected. The treasurer is responsible for collection and disbursement of fees related to delivery of water. The treasurer must also prepare a financial statement at the end of each year and file such statement with the Department. In districts which have annual budgets of $7,500 or less, the users may adopt a resolution which authorizes the watermaster to serve as the water district treasurer.

SECTION 3.1 INSERT MEMOS

SECTION 4. - WATERMASTER DUTIES

The primary function of the watermaster is to distribute water to those entitled to its use. This activity requires knowledge of the amount of water available in the source and the relative priorities of the water rights among users. The amount of water to be delivered is generally expressed in terms of a rate of flow (cubic feet per second or cfs) under Idaho law.

Watermasters are also often responsible for distribution of storage rights. When the owners of a reservoir seek to use a natural channel within the boundaries of a water district for the delivery of stored water, the watermaster is authorized to deliver the stored water to those entitled to its use. If a watermaster has not been appointed for the water district, the Director is authorized to appoint a special deputy to deliver the stored water. In most cases, the cost of delivering stored water is the same as for delivering natural flow rights (Section 42-801, Idaho Code).

Each watermaster should have a copy of the original court decree(s), and subsequent decrees if any, which contains all of the adjudicated or decreed rights within the water district. It is important that the watermaster become familiar with the decree or decrees within the district since they often contain special language or conditions relative to individual rights or groups of rights. The decree may provide general conditions about the period of use, water measurement requirements and distribution of water.

Prior to the distribution of any water, the watermaster must have a list of all water rights within the water district. This list should include all of the decreed rights plus any licensed rights or permits in the district, which may have been authorized by IDWR. The IDWR can provide each district or watermaster with a listing or copies of all post-decreed rights. The watermaster's delivery list should be arranged according to priority dates and should at least include a water right number (consistent with the Department's numbering system), type of water right, present name of water right holder, source of water, period of use, the rate of flow or diversion allowed under each right and the location of the point of diversion of each right. A list of water rights in the district containing this information can be provided by IDWR and updated as necessary. Claims and investigations made as part of the ongoing Snake River Basin Adjudication (SRBA) may often be helpful in updating watermaster lists. Eventually, the final court decree or decrees from the SRBA will supersede most of the existing water right decrees in Idaho.

SECTION 5. - WATER RIGHT TERMINOLOGY AND DISCUSSION

Water rights are generally categorized as decreed, statutory, or beneficial use (constitutional) rights.

A statutory right is perfected using the procedures described in the Idaho Code (statutes). The Idaho Code provides that a water right may be initiated by filing an application for permit to appropriate the public waters of the state. Upon approval of an application, the department issues a permit which authorizes the permit holder to construct diversion works and to apply the water to a beneficial use.

Upon completion of the diversion and application of the water to a beneficial use, the permit holder is required to file a proof of beneficial use form with the department. The department then examines the system to determine the extent of the beneficial use being made of the water. Examinations may also be conducted by certified water right examiners who have been appointed by the department. After the examination, the department issues a license of water right to the permit holder. The priority of the right established using this procedure is generally the date the application to appropriate the water was filed.

Uses of ground water initiated on or after March 23, 1963, must be represented by a permit or license to be valid. Uses of surface water initiated on or after May 20, 1971, must also be represented by a permit or license to be valid. These dates are commonly referred to as "mandatory permit" dates.

An exception to the mandatory permit filing date for a ground water source is for domestic use or stockwater use where the daily amount diverted does not exceed 13,000 gallons per day. Another exception is any ground water use where the diversion rate does not exceed 0.04 cfs or 2,500 gallons per day. An exception to the surface water mandatory filing date is for stock drinking directly from a natural stream.

A beneficial use right, as the name suggests, is a right which has been established merely by the diversion and beneficial use of water. Water right filings, if any, associated with these rights are in the form of a "Claim to a Water Right". The priority associated with these rights is the date the water was first applied to a beneficial use which ultimately must be confirmed in a court proceeding. Beneficial use rights may only be valid if the priority date precedes the "mandatory permit" dates described above.

The term "decreed right" means a right which has been determined in a court of law, usually through an adjudication of water rights or claims. The basis for a decreed right may originally have been a beneficial use right, permit or license.

The point of diversion, place of use, nature of use or period of use of an existing water right may be changed by filing an application for transfer with the department. Such applications can be approved by the department if the original right is not enlarged, if there is no injury to other water users, if the change is in the local public interest, and if the change is consistent with conservation of water resources in Idaho. Watermaster review and comments are required for any transfer involving a water right or use within a water district.

During times of scarcity, the watermaster can deliver water to rights represented by a permit, license or decree according to their respective priorities. Beneficial use rights or claims will be shut off during such regulation because the validity of such rights must first be determined by the courts regardless of the date of priority claimed for the beneficial use right.

SECTION 6. – HEADGATES, CONTROLLING WORKS AND MEASURING DEVICES

In order to insure accurate deliveries of water, the water users are required to install and maintain measuring devices in close proximity to their diversion works. They are also required to install a headgate or similar control device on their diversion works which may be set and locked by the watermaster. These installations are required in most decrees and are conditions of most water appropriation permits and licenses issued by the department in water districts. Sections 42-701 through 42-703, Idaho Code discuss the installation and maintenance of headgates and measuring devices for appropriation of public waters.

If measuring devices and headgates are not installed on the diversions, the Director of IDWR has authority to order the installation of the devices and headgates if needed by the watermaster to properly distribute water. The watermaster does not have authority to actually order the installation or repair of headgates and measuring devices. The watermaster should advise IDWR of the need for measuring devices and/or controlling works. Upon advising IDWR, the department can then work with the watermaster in issuing the appropriate order.

The water user has the responsibility for installing and maintaining measuring devices and headgates in satisfactory condition. The cost of installation and maintenance of these structures is also borne by the water user. The watermaster may refuse to deliver water if a headgate and/or measuring device is not installed or is not properly installed and maintained, provided that the user has been given some reasonable time in which to comply with any order of the department.

The setting of a headgate while the watermaster is in charge can only be properly changed by the watermaster or at the watermaster's direction. The watermaster may lock headgates or controlling works to insure that they remain shut or are properly set. The watermaster may post a notice at any headgate or diversion structure which notifies the user that the diversion has been regulated and that any person who changes or tampers with a headgate may be charged with a misdemeanor under Idaho law (Sections 18-4303 through 18-4305, and 42-802, Idaho Code). These notices may be obtained from IDWR.

When delivering or regulating water among various users, most watermasters will often need to determine stream discharge, or the amount of water available at a particular point on the stream. This can be done by either current metering the stream or by installing some type of measuring device. Costs of measuring discharge or installing measuring devices in the natural channel of any streams within the district are the responsibility of the district and will be apportioned among all of the users within the district.

In the case of a storage reservoir which impounds water on a natural channel, the person or organization using the reservoir is required by law to place and maintain a measuring device above the reservoir (Section 42-702, Idaho Code.) Although not required by law, the Department usually requires that some means of measurement be placed and maintained below the reservoir. This may include a measuring device or stream gaging station and would be applicable whether the storage water was released into either a natural channel or some man-made channel such as a canal ditch or pipeline. The purpose of these requirements is to account for reservoir inflows and outflows, and to quantify storage water apart from the natural flow of a channel.

SECTION 7. – FLOW MEASUREMENT

The watermaster's job of distributing streamflow requires knowledge of discharge diverted from the stream by each water user as well as the flow in the stream.

A. MEASURING DISCHARGE IN OPEN CHANNELS:

Discharge is expressed as:
Q=VA
where: Q = discharge (cubic-feet per second)
V = velocity (feet per second)
A = cross-sectional area (square-feet)

Discharge in an open channel may be determined either by measuring velocity and area directly or by using a pre-calibrated device, such as a weir or flume, installed in the channel. Direct velocity measurement in an open channel is accomplished using a current meter consisting of a set of rotating cups or a propeller driven by the current. Rotation of the meter produces a click for each revolution (or fifth revolution) in headphones worn by the operator, or a reading on a counter device. The rate of revolution in revolutions per second is then related to flow velocity at the position the meter is held in the current. Most meters can be equipped with devices that convert revolutions directly to velocity and display velocity in feet per second. By measuring velocity at a series of cross-sections of known area across the stream, the total flow can be determined. Forms for taking field note measurements are available from the department. Appendix B of this manual contains additional information about current metering, including an example field measurement form and a blank field measurement form.

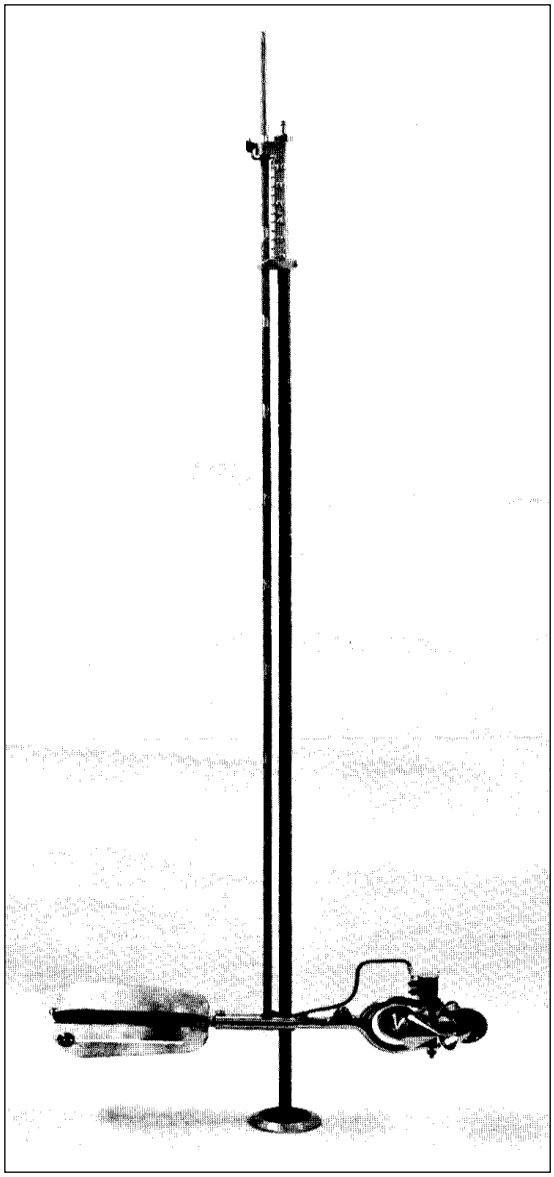


Figure 7.1: Price AA current meter with standing rod.

1. Gaging Stations

A series of discharge and corresponding stage or depth measurements at a measurement site can be plotted to produce a stage-discharge relationship or rating curve. The rating curve in turn can be used to determine discharge by simply knowing the stage. Stage can be obtained by observation of a fixed staff gage or it may be continuously recorded by any of several types of stage recorders. A rating curve generally becomes more accurate when more stage-discharge measurements are plotted. Since stage can be affected by sedimentation, algae or moss, it is important to conduct stage-discharge measurements at different times throughout the year. For example, since moss may be more prevalent later in the irrigation season, the same discharge in April and August may not correspond to the same gage height. This is called a gage shift. If there is suspicion that channel conditions alter the gage height, then a discharge measurement should be conducted and a shift applied to the rating curve.

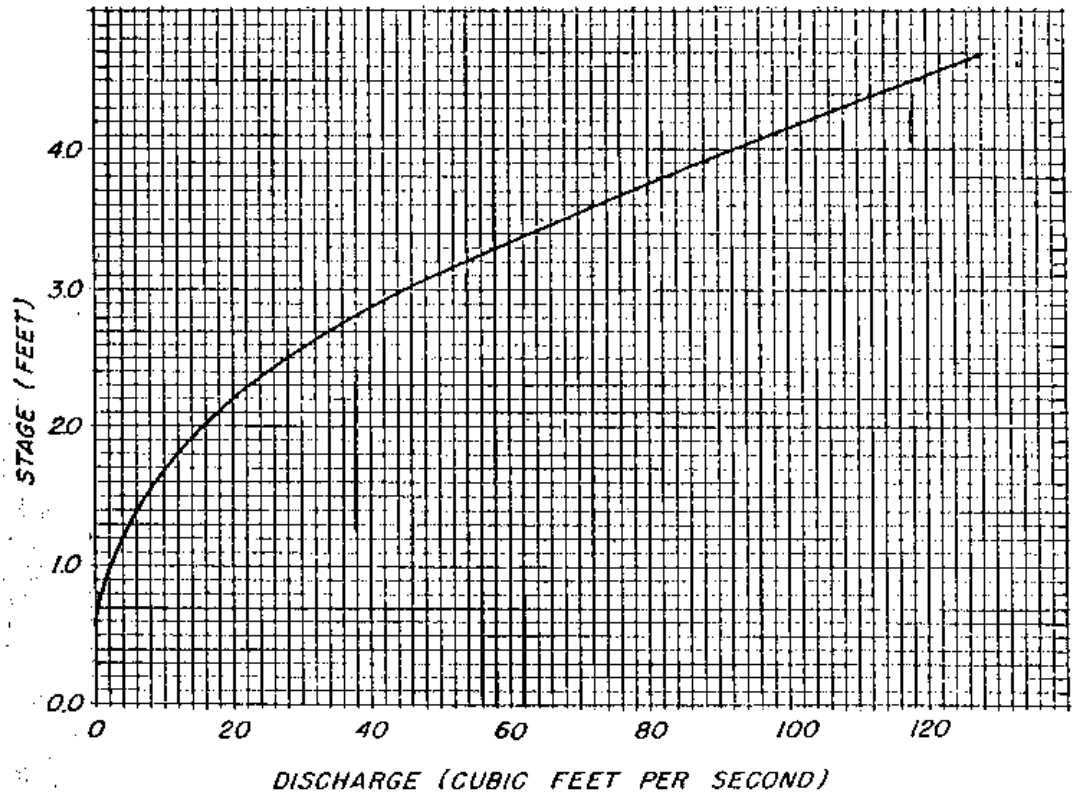


Figure 7.2: Typical stage discharge curve for unlined canal.

Many streams, rivers and large canals within Idaho have gaging stations which are maintained by the United States Geological Survey (USGS). These stations are generally equipped with staff gages and continuous stage recorders. A watermaster can observe the gage height or recorder and refer to USGS rating tables to determine discharge for that particular time of day. Regular stream discharge measurements are taken at these stations to maintain rating curves or tables and to determine gage shifts. Depending on their location, watermasters can often utilize existing USGS gaging stations for determining the available natural flow of the stream and proper distribution of water according to water right priority dates.

Many of the existing USGS stream gaging stations are funded under cooperative agreements between the USGS, IDWR and the local water district. Under these usual agreements, the USGS provides one-half of the funding while the remaining one-half is split between IDWR and the water district. Some stations are sponsored jointly by just the USGS and IDWR. Adding new stations under the cooperative program is dependent upon availability of matching funds from the USGS and IDWR.

2. Measuring Devices

Standard weirs, flumes and submerged orifices are pre-calibrated devices commonly used for measuring water in open channels. The installation of one of these devices provides a fixed relationship between the stage and flow, thus avoiding the need for current meter measurements. For rivers and creeks, it is generally not feasible to install these devices because of the wide range of flows encountered. Such devices are therefore more typically found in canals or ditches.

Weirs are generally the most economical devices to install and maintain. They consist of an opening in a bulkhead with a sharp-crested edge. The depth of water above the bottom of the edge, or the weir crest, is called the head. Measurement of the head can be related to discharge using appropriate tables. The stream of water which springs out from the weir crest is referred to as the nappe. Proper weir operation requires free flow over the weir blade and an air space around the nappe as shown in figure 7.3. If the water level downstream from the crest and below the nappe rises above the crest then the flow through the weir may be considered submerged. This may or may not affect the discharge rate to a measurable degree, but dependable measurements should not be expected in this range (Bureau of Reclamation, 1984, p. 9). Standard weirs most commonly used in Idaho include Cippoletti, rectangular and v-notch weirs (fig 7.4).

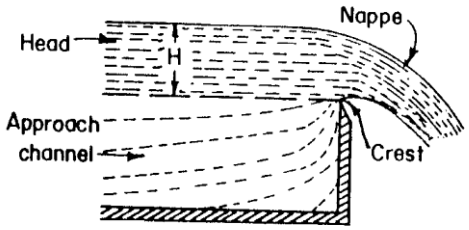


Figure 7.3: Profile of standard weir

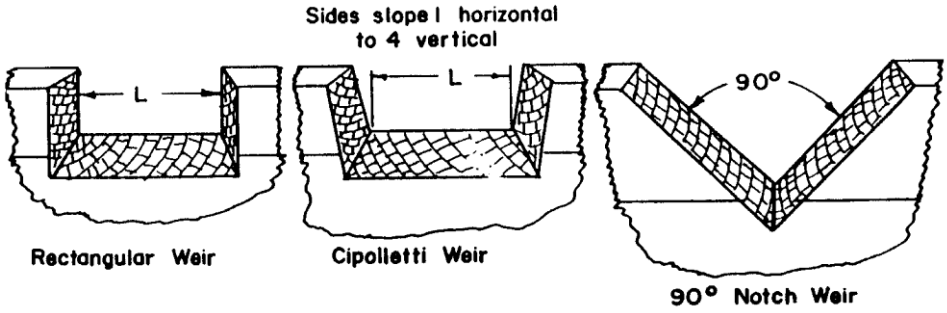


Figure 7.4: Illustration of three standard weirs

A flume is a device having a constricted section, or throat, between an upstream converging section and downstream diverging section. Discharge is determined by measuring the depth of water at a proper location in the flume and then referring to appropriate tables. Standard flumes commonly used in Idaho include Parshall and trapezoidal flumes. Flumes are used where the channel has relatively little slope and the water cannot be backed up significantly as it must be when a weir is installed.

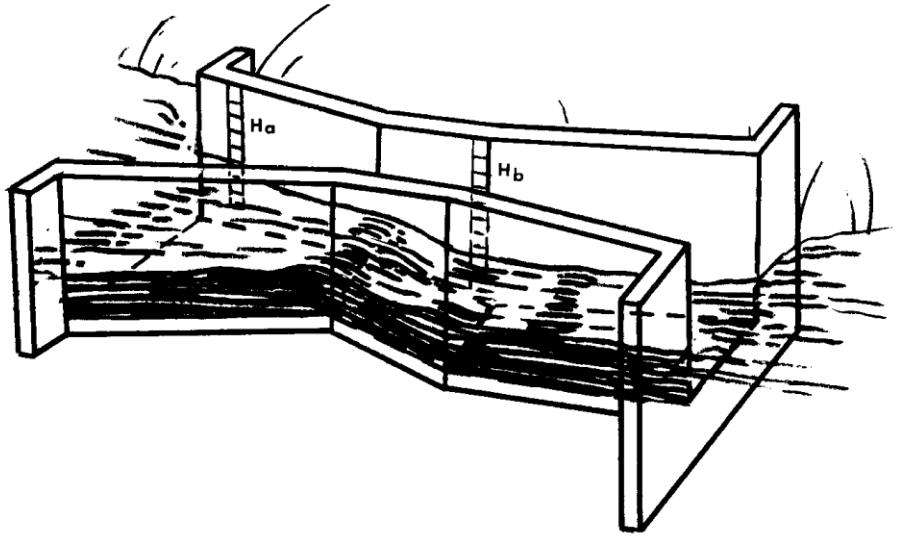


Figure 7.5: Parshall flume

A standard submerged orifice is any fixed dimension opening in a vertical bulkhead where both the upstream and downstream water surface is above the opening. The difference in head or depth of water between the upstream and downstream surfaces must be obtained to determine discharge. Like flumes, submerged orifices are better suited for flatter grade channels where weirs cannot be installed.

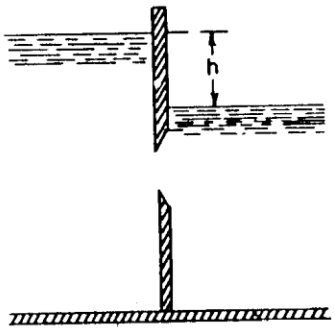


Figure 7.6: Profile of standard submerged orifice

Another measuring device which has been successfully used in Idaho and is gaining broader acceptance is the ramped broad crested weir (RBCW). This device is sometimes referred to as a ramped flume. The RBCW works well in larger canals and may be more economical than other measurement structures. Like standard weirs, the RBCW requires only a single upstream depth measurement for discharge determination. A particular advantage of the RBCW is that it passes floating debris and sediment well. A computer program has been developed for use in designing the RBCW to fit a given channel configuration. With the program, data entry of some basic channel measurements taken in the field generates as-built dimensions and a rating table. Further information about this device and program may be obtained from IDWR or the University of Idaho Kimberly Research and Extension Center.

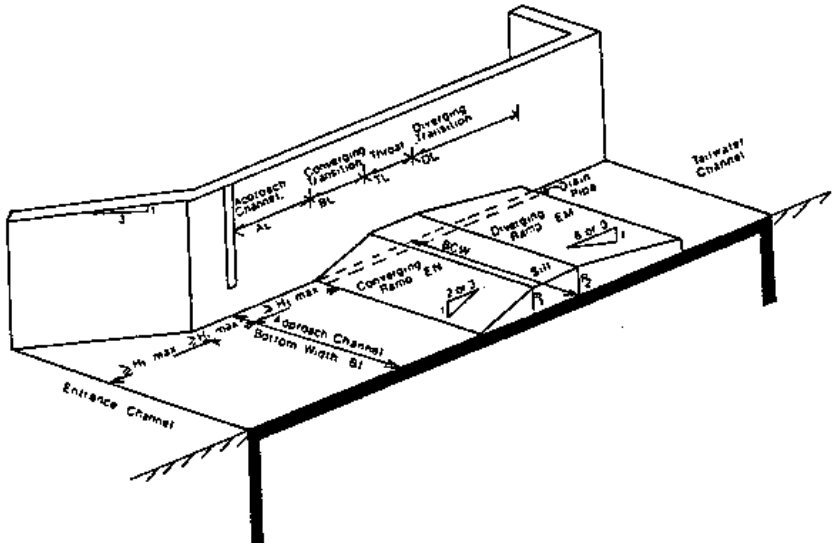


Figure 7.7: Schematic view of ramped broad crested weir.

Various size weirs, flumes and submerged orifices are available and each type and size has a separate rating, or relationship between head and flow. Standard designs and information about installation and use of different measuring devices, including rating tables, can be provided by the department. References cited in this handbook contain discharge tables and should be reviewed for further information.

B. MEASURING DISCHARGE IN CLOSED CONDUITS:

Many Idaho water users now use pressurized sprinkler irrigation systems. This conversion has created a need to measure discharge in pipes or closed irrigation systems. IDWR has adopted the use of electromagnetic and ultra-sonic flow metering as the minimum standard for measuring water in closed conduits.

1. Closed Conduit Measuring Devices

In-line flow sensor meters are the most commonly used devices for measuring flow in a pipe. These meters are usually installed in a horizontal pipe near the source or pump. It is similar to an open channel current meter whereby the water is measured by obtaining an average velocity moving through the section of pipe. Since the cross-sectional area of the pipe is constant, the dynamic variable of velocity is obtained using a sensor to detect changes in this variable. These changes have a proportional ratio that is used to determine discharge across a variety of flows. Many in-line sensor meters are equipped with two registers, one which displays instantaneous discharge, usually in gallons per minute or cubic feet per second, and one which displays volume in gallons or acre-feet. If the instantaneous register is difficult to read, rate of flow can be determined by recording the volume over a specific length of time, then dividing the volume by time. These meters usually have a liquid crystal display (LCD) similar to the display on a calculator and most have the ability to change measurement units based on the preference by the end user. There are a variety of in-line meter makes and models that have been approved by IDWR for use in closed conduit measurement (see link below for a list of approved meters) that include ultrasonic and electromagnetic technology. http://www.idwr.idaho.gov/WaterManagement/WaterMeasurement/PDFs/Approved_flow_meter_list.pdf . Flow meters on the approved list can be purchased through local dealers and some meters are stocked for sale through local irrigation/sprinkler dealers.

Ultra-Sonics

Ultrasonic metering technology has been used successfully for over five decades and is recognized as an economic approach to measurement of larger diameter piping. Ultrasonic meters utilize ultrasonic signal transducers (sensors) which measure flow that can be clamped either on the outside or inside (often referred to a wetted transducer) the pipe wall. The ultrasonic meters can be permanent or portable and can provide quick measurements without shutting down the flow in the pipe. Additionally these meters can be used on a wide range of pipe sizes from ½" to as large as 144" in diameter. These meters are also equipped with LCD monitors, which display both instantaneous flow and cumulative volume measurements based on end users preference of flow units. IDWR has used ultrasonic meters for over 20 years and conducted successful measurements using ultra-sonic on pipes up to 96" in diameter. IDWR recommends that the use of ultra-sonic flow

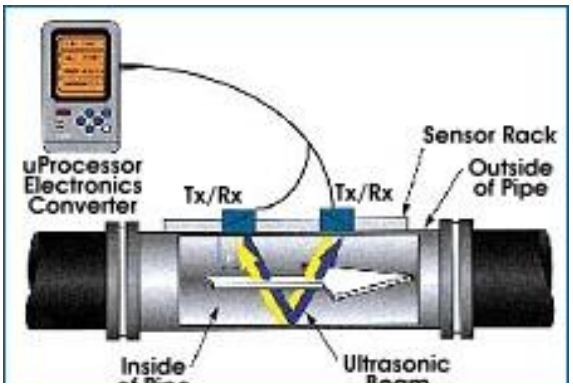


Fig 7.8 Transit Time Ultrasonic

metering technology be used on applications with pipe greater than 12" diameter for permanent installations.

The benefits of ultrasonic include the non-intrusive nature of the meter with highly repeatable and accurate (generally better than 5%) flow measurement with little to no maintenance. Ultrasonic flow metering technology does have some drawbacks that include piping conditions (pipe needs to be relatively clean and smooth on both outside and inside walls), does not measure water with entrained air (often looks milky) or solids, and requires longer straight runs of pipe to properly install for highest accuracy.

Electromagnetic (Mag meters)

Electromagnetic flow meters were first used in the early 1950s. Electromagnetic flow meters provide highly accurate measurements in a wide variety of applications. The meter is often associated with industrial and municipal fluid measurement including potable and wastewater applications. A mag meter is typically installed as part of the piping system and with an open flow tube design will not obstruct flow. The meter operates on the principle of a conductive fluid moving through a "magnetic" field. Sensors in the pipe pick up the change in the magnetic field due to the conductive fluid moving through it, this change is proportional to the water velocity. Each water particle that moves through the flow tube adds to better define the overall average velocity in the pipe. Due to the principle of induction and the sensors detecting each conductive fluid particle within this meter, mag meters can be installed in shorter section of pipe and still maintain high levels of accuracy. Additionally because mag meters can be installed in shorter sections of pipe this technology provides a cost effective approach to retrofitting flow meters into existing irrigation systems generally without additional plumbing modifications. These meters are two parts with the flow tube/sensors and a processing unit that displays rate of flow and volume on a LCD. Recently IDWR adopted the magnetic technology as the standard for installation on pipe sizes 12" in diameter and smaller.

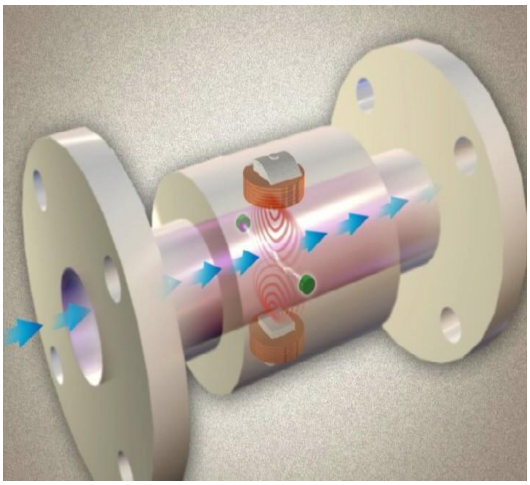


Fig 7.9 Mag meter cut away of the flow tube only

Benefits of a good mag meter include very high and reliable accuracy numbers (generally better than ±1%), mag meters do not have moving parts that wear and increase the probability of poor measurements, can be installed in a wide variety of applications and environments including shorter straight run piping requirements and will pass debris in surface water applications. Mag meters do have items that might limit the use which include; will not measure water with entrained air, will require a power source (mag meters are made in both AC and DC powered options), are diameter dependent, and will require the pipe to be cut for installation of the meter.

Manufacturers usually have specific recommendations regarding placement and installation. IDWR's approval of flow meter installation does include following these recommendations when installing meters. For example, ultrasonic flow meter sensor manufacturers require straight

and unobstructed pipe at least ten pipe diameters upstream and five pipe diameters downstream of the device.

Further information about the different types of closed conduit measuring devices may be obtained from one or more of the references listed in this handbook.

2. Alternative Methods for Measuring/Estimating Discharge in Closed Conduits

When a closed system is not fitted with a meter, total discharge may be estimated using one of several methods described below. These methods should only be used on an interim basis until an adequate measuring device can be installed.

The simplest method is to fill a one to five gallon bucket with a sprinkler nozzle and record the length of time the bucket fills, dividing the number of gallons by the time of fill will produce a flow rate for that sprinkler head. If this measurement cannot be made, nozzle discharge can be determined by knowing the size of the nozzle and measuring the nozzle pressure with a pressure gauge attached to a pitot tube. Note that many systems will often have nozzles of varying size. The size of a given nozzle can be determined by inserting the shank end of a drill bit into the nozzle opening. Tables are available showing discharge for particular nozzle sizes and pressures. Due to friction losses and elevation changes, sprinkler head pressures vary depending on location within the system. For this reason, it is necessary to obtain an average nozzle discharge or pressure measurement. This can be done by taking several measurements at different locations, or if the field is fairly level, by taking one measurement one-third the way down a lateral where the average operating pressure is usually found. The average rate multiplied by the total number of nozzles will provide a good estimate of total discharge.

A third method of estimating discharge is by using the horsepower equation. This method can be used where there is a motorized pump which lifts water from a stream or canal into a pressurized system as shown in figure 7.10. The equation can be used to estimate discharge at different points in the system.

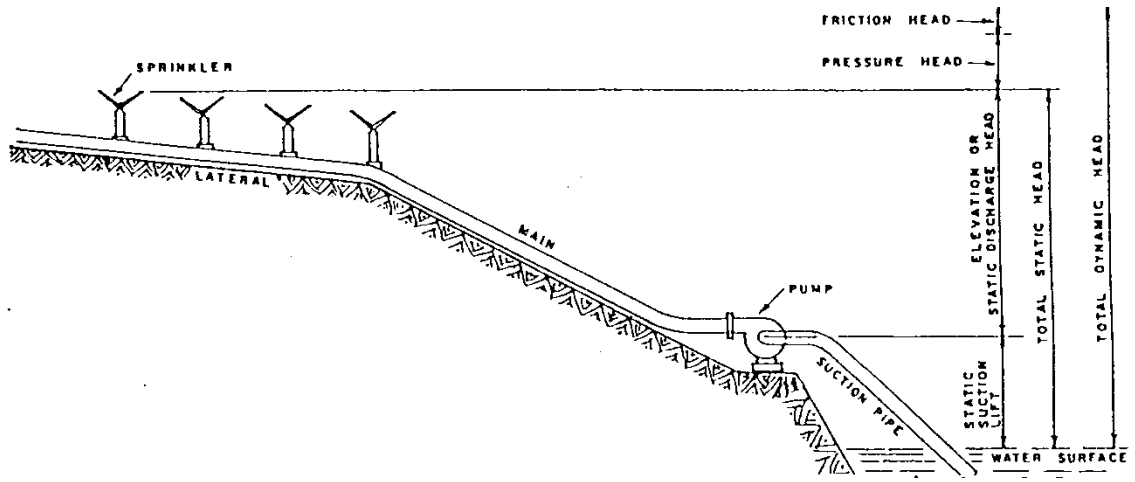


Figure 7.10: Illustration of system and total dynamic head for an irrigation system.

For discharge in cfs, the horse power equation is: $$Q = \frac{0.7 \; HP \; 8.81}{h + (2.31 * p)}$$

Where: Q = discharge in cfs
HP = motor horsepower (obtained from pump motor specification/nameplate)
h = vertical distance from water source to pump [static suction lift + vertical distance from pump to sprinkler (static discharge head)]
p = Pressure (pressure measured at sprinkler head, measured in pounds per square inch, or psi.
1 psi = 2.31 ft.)
and 0.7 (or 70%) is the assumed efficiency of the motor,
and 8.81 and 2.31 are conversion factors in the equation

Example: Motor horsepower = 25 HP
Static suction lift = 15 ft
Static discharge head at first nozzle = 25 ft
Pressure at nozzle = 35 psi

$$Q = \frac{0.7 \; (25) \; 8.81}{40 + (2.31 * 35)} = \frac{154.2}{120.9} = 1.28 \text{ cfs}$$

Note in this example, that friction losses on the inlet side of the pump and down to the first nozzle have been omitted. Obtaining such losses is more difficult and time consuming. In many field applications and for purpose of simplicity in this example, friction losses are ignored. This will result in the discharge being overestimated.

Another example of the horsepower equation is to consider only the operating pressure and discharge at the pump (see figure 7.10.) Pump pressures in many closed irrigation systems generally range between 40 and 80 psi. If a pressure gauge is installed in the pipeline just below the pump, pressure may be determined by reading the gauge. If a gauge is not installed or is inoperative, pressure near the pump can be estimated by measuring the pressure at the first

sprinkler nozzle and the vertical height or elevation between this nozzle and the pump. From the above example, pressure at the first nozzle is 35 psi while the elevation change between this nozzle and the pump is 25 ft. Since 1 psi = 2.31 ft., pressure at the pump should be about 10 psi greater than at the first nozzle. Note that discharge in the example below is about the same as discharge determined in the first example above.

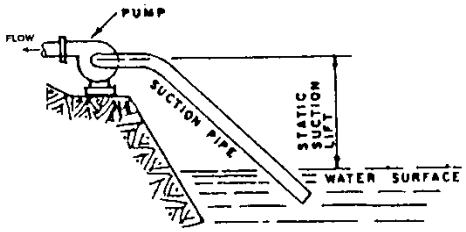


Figure 7.11: Pump and static suction lift in closed irrigation system.

Example: Motor horsepower = 25 HP
Static suction lift (h) = 15 ft
Pressure at pump (p) = 45 psi

$$Q = \frac{0.7\ (25)\ 8.81}{15 + (2.31 * 45)} = \frac{154.2}{119.0} = 1.30 \text{ cfs}$$

Nozzle Discharge in Gallons Per Minute

Nozzle Diameter in Inches*

p.s.i.	3/32	1/8	9/64	5/32	11/64	3/16	13/64
20	1.17	2.09	2.65	3.26	3.92	4.69	5.51
25	1.31	2.34	2.96	3.64	4.38	5.25	6.16
30	1.44	2.56	3.26	4.01	4.38	5.75	6.80
35	1.55	2.77	3.50	4.31	5.18	6.21	7.30
40	1.66	2.96	3.74	4.61	5.54	6.64	7.80
45	1.76	3.13	3.99	4.91	5.91	7.03	8.30
50	1.85	3.30	4.18	5.15	6.19	7.41	8.71
55	1.94	3.46	4.37	5.39	6.48	7.77	9.12
60	2.03	3.62	4.50	5.65	6.80	8.12	9.56
65	2.11	3.77	4.76	5.87	7.06	8.45	9.92
70	2.19	3.91	4.96	6.10	7.34	8.78	10.32
75	2.27	4.05	5.12	6.30	7.58	9.08	10.66
80	2.35	4.18	5.29	6.52	7.84	9.39	11.02
85	2.42	4.31	5.45	6.71	8.07	9.67	11.35
90	2.49	4.43	5.61	6.91	8.31	9.95	11.69

*Standard straight bore nozzle sizes

Table 7.11: Nozzle Discharge in Gallons per Minute

SECTION 8. – DISTRIBUTION OF WATER

A. GENERAL

As between appropriators, the older right is the better right and is to be supplied before later in time appropriators. Several Idaho court cases have stipulated that the watermaster may disregard the call of a senior downstream water user if, in the judgment of the watermaster, the water will not reach its point of diversion or an inadequate amount of said water will reach its point of diversion (i.e.; a futile call.) Some decrees in the state provide language or direction about this type of situation for specific tributaries or reaches of streams.

The season of use for irrigation purposes is commonly specified in the decree, permit or licensed water right. Whenever the season of use is not specified in a decree, permit or licensed water right, the watermaster should generally look to the recommended irrigation seasons used by the department in connection with permits, licenses and adjudication director's reports (see Map 8.1). If the season of use specified by a decree, permit or licensed water right is shorter than the recommended irrigation season, the season of use may be extended to the recommended irrigation season if such an extension does not injure other water rights.

B. NATURAL FLOW

The term natural flow may be considered as the actual flow of the stream which does not include storage water released from a reservoir or water from other sources, such as groundwater pumped from a well and injected into the stream. Natural flow may include tributary streams, springs, return flows and underground flow or groundwater which seeps into the stream channel. Except under a valid storage right, natural flow may not be stored for later use. A natural flow right must either be beneficially used as provided in the water right or shall not be diverted from the public source of water. An exception to this rule is when water is diverted to in-stream or off-stream storage facilities solely to facilitate the diversion or operation of the distribution system under a valid, in priority water right, provided the diversion does not result in a volume held in storage greater than what can be filled within 24 hours with the maximum authorized rate. Please contact IDWR for further guidance on the 24-hr fill allowance.

C. STORED WATER

Reservoirs are allowed to fill only once an irrigation season unless otherwise specified in the water right or determined by the Director.

Storage rights are generally filled according to priority. Where there are multiple reservoirs on one stream or river system, the senior storage rights should be satisfied ahead of junior storage rights, but it is often preferable to just allow the reservoirs to fill naturally and make adjustments later. Diversion of water to new storage during the storage period should not interfere with earlier priority natural flow rights.

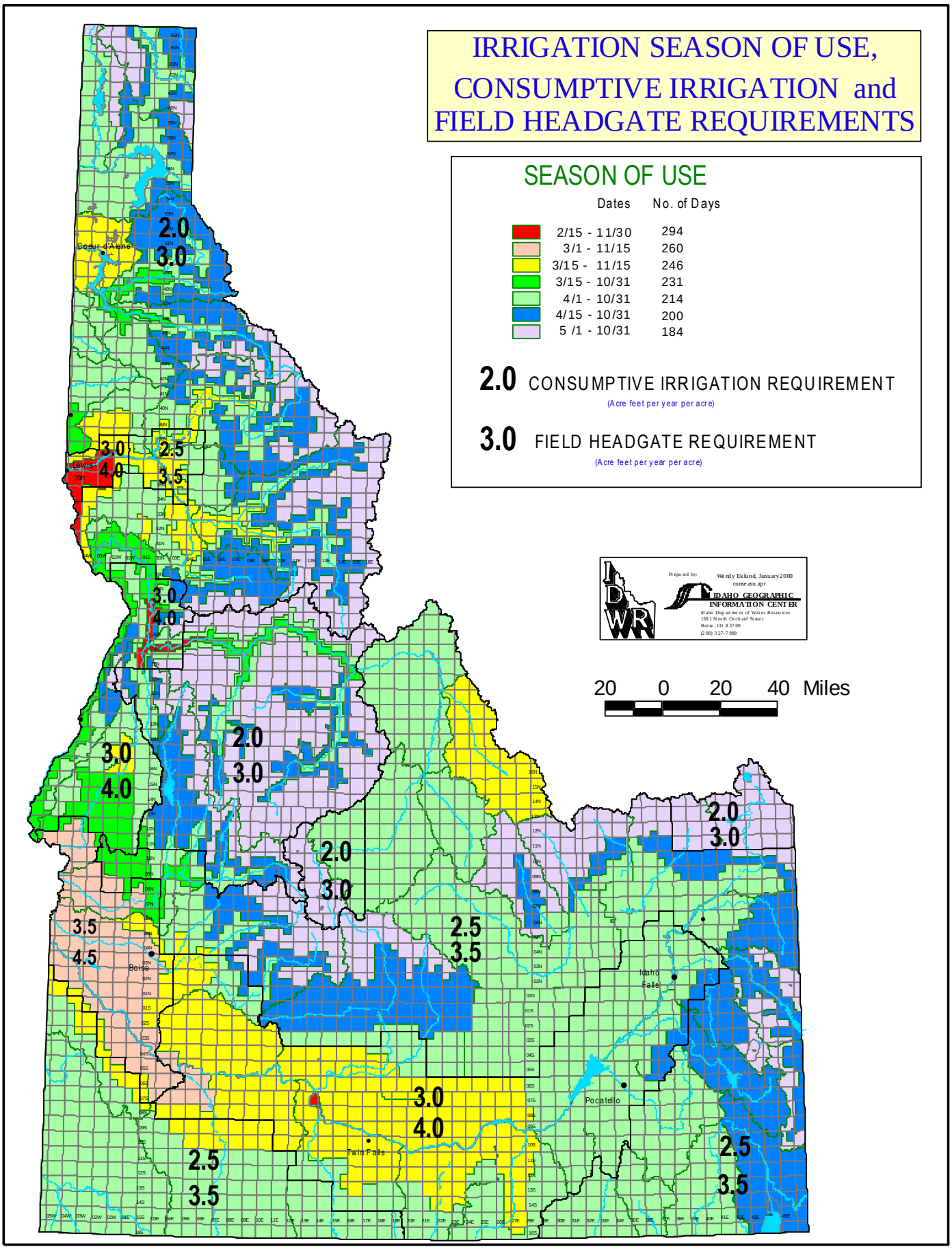
D. DETERMINATION OF NATURAL FLOW

To determine natural flow, the watermaster must measure the streamflow, and any diversions and reservoir storage changes. Data collection is essential to the proper delivery of water and may consume much of the time of the watermaster and assistants during the irrigation season.

After the natural flow has been determined, the watermaster must compute the allocation of flow to the respective users. In general, this is done by deducting the various amounts of the water rights calling for water (ranked from senior to junior) from the amount of the natural flow until the entire natural flow has been allotted. All diversions with a date of priority junior to the last water right for which water is available must be shut off or charged with the use of storage water if the user owns storage which is available. This procedure is also further discussed below.

After determination of the natural flow and the allocation of it to the users, the watermaster is authorized to adjust headgates to insure that the natural flow and stored water flows are delivered to those users entitled to its use. The above described procedure must be performed daily or as often as flows or diversion rates change.

Water districts in Idaho range in size from very small watersheds to major river basins. In some cases, the smaller districts may include a water producing area, such as a mountainous watershed, below which two or more canals divert the flow from the stream. If these diversions are near each other, such that they share essentially the same water supply, the district represents the simplest type of natural flow determination. Figure 8.1 illustrates a basin having one location for allocating the natural flow. In this case, the natural flow to be allocated is equal to the flow of the stream plus the sum of any diversions which may be located above the stream gage. Table 8.1 illustrates the method of computation of natural flow in this type of basin.



Map 8.1: Consumptive Irrigation Requirement, Field Headgate Requirement, and Season of Use.

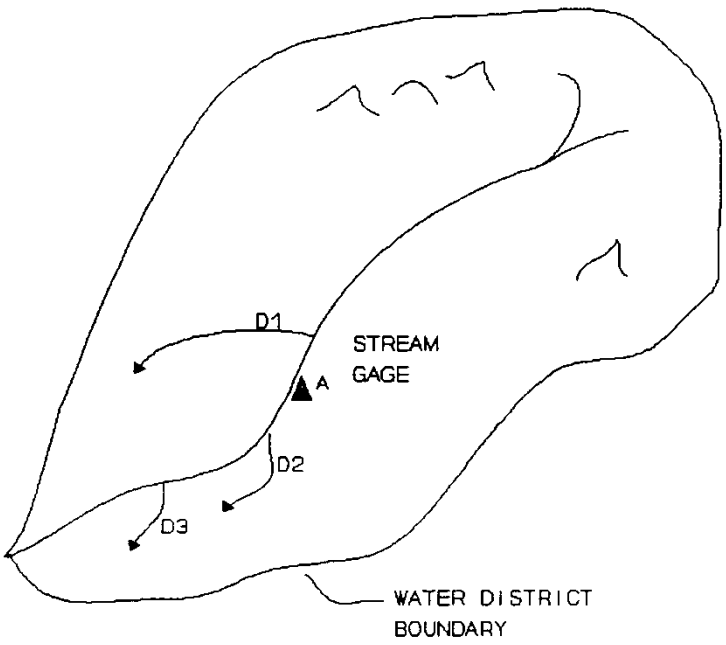


Figure 8.1: Water district having one location for natural flow allocation.

Date	D1 (cfs)	QA (cfs)	Natural flow at A (cfs)
May 13	10	12	22
May 14	12	11	23
May 15	18	10	28

Table 8.1: Computation of natural flow at one location,
[D1=diversion #1 and QA = discharge at Gage A]

The benefit of taking the approach shown in this simple example is that it establishes a record of natural flow or water supply available for all of the diversions. Comparing the natural flow with a list of ranked water rights will simplify distribution and priority cuts. While daily distribution in the above example might often be accomplished by trial and error or without stream gage A or determination of natural flow, the stream flow usually reaches a critical point which will require a stream measurement and computation of natural flow. If, in the above example, the stream became dry just below D2, and D3 is a senior right holder calling for water, then natural flow would represent the sum of D1 and D2. These latter junior right diversions then would have to be adjusted in order to satisfy D3's right. The temporary non-delivery of the senior right probably could be avoided if there were at least some periodic measurement and computation of natural flow.

A more complex basin might include diversions having differing water supplies. For example, diversions may be made from a stream above and below a significant tributary illustrated in Figure 8.2. Those which divert below the tributary have access to a larger supply of water than the upper diversions. It is therefore necessary to compute the natural flow at two locations. Table

8.2 illustrates the natural flow determinations for this situation. Natural gains are computed for the reach to gage A as in the simpler system illustrated by Figure 8.1 and Table 8.1. Then natural gains (or losses) from A to B are computed by summing the outflows (flow at B plus the diversions from A to B.) The total flow at B is the sum of the natural flow at A plus the natural gain A to B (or loss, expressed as a negative.)

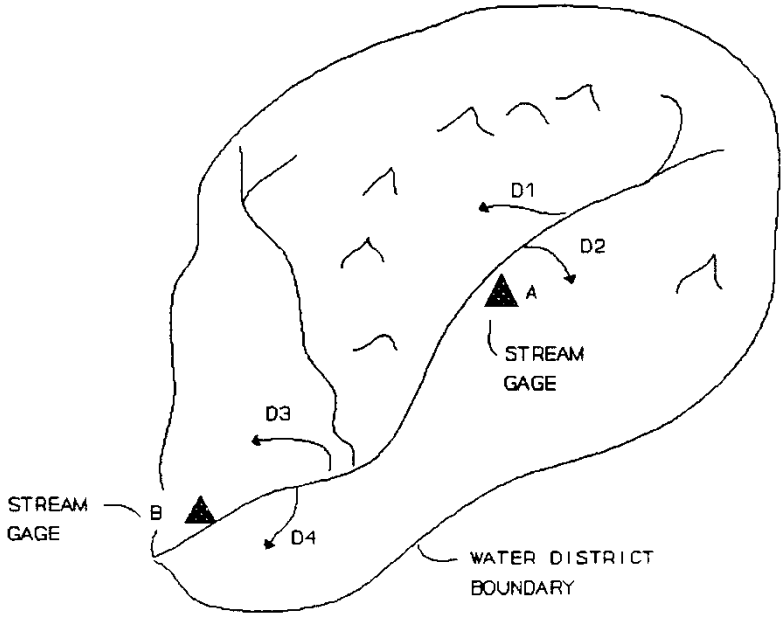


Figure 8.2: Water district having two locations for natural flow allocation.

1	2	3	4	5	6	7	8	9	10
Date	D1	D2	QA	Natural flow at A (2+3+4)	D3	D4	QB	Natural Gain A to B (6+7+8-4)	Natural Flow at B (5+9)
May 23	10	0	7	17	3	15	0	11	28
May 24	10	2	7	19	3	15	0	11	30
May 25	9	3	10	22	4	14	2	10	32

Table 8.2: Computation of natural flow at two locations.

Return flows may accrue to the stream from upstream diversions. In most cases, the return flow is considered part of the natural flow and is available to the downstream users. In the examples above, any return flows are automatically treated as natural flow because the computed gain does not distinguish between sources of water entering the channel.

For basins having reservoirs, the natural flow computations must take account of changes in storage. The usual way to accomplish this is to take the differences in reservoir contents on successive days and convert those differences to an average daily rate as follows:

$$\text{Storage change in cfs} = \frac{\text{contents on } 2^{nd} \text{ day} - \text{contents on } 1^{st} \text{ day}}{1.9835}$$

If this difference is positive (storage is increasing), it is added to the natural flow computed in the examples. If negative, it is subtracted. Gages or devices for measuring reservoir inflow and outflow should be read on a daily basis and compared with storage changes.

For large basins, the time required for flow to move through the system becomes important. The water supply available to a lower basin today may be affected by an upper basin diversion made on a previous day. Travel times, therefore, must be taken into account when determining natural flow or when allocating it. For example, if the travel time from A to B is one day, the computation lines could be offset one day between columns (5) and (6).

E. ALLOCATION OF NATURAL FLOW

When water supplies are inadequate to meet all needs in a basin, the watermaster must regulate diversions according to their respective rights.

In a water district having only one location for distribution of natural flow (see example in Figure 8.1), the allocation process is quite simple. After the natural flow has been determined (Table 8.1), and if it is insufficient to satisfy the diversion requests of all users to the extent of their rights, then the rights having the latest priority are cut or reduced. If stored water is being released from an upstream reservoir, diversions in excess of the natural flow entitlement are charged as stored water.

Table 8.3 illustrates the allocation computation for the example water district in Figure 8.2 when diversion requests exceed the available supply. Flows are those of May 23 from Table 8.2. In this situation, some of the natural flow in the upper reach must be passed downstream to supply a prior right in the lower reach. Water right priorities are to be supplied in the sequence shown in the "Priority Sequence" column of Table 8.3.

		Reach A			**Reach B**		
Canal	Priority Sequence	Water Right (cfs)	Actual Div. (cfs)	Remaining Natural Flow (cfs)	Water Right (cfs)	Actual Div. (cfs)	Remaining Natural Flow (cfs)
				17*			28*
D4	1				16	15	13
D1	2	10	10	7			3
D3	3				5	3	0**
D2	4	3	0				

* Flows for May 23 from Table 8.2

** Allocation ceases when the remaining natural flow in the lower reach is zero.

Table 8.3: Allocation of natural flow at two locations

Calculations in Table 8.3 begin with the natural flows which are entered from Table 8.2 at the tops of the remaining natural flow (RNF) columns. Diversions in the priority sequence are then subtracted from the preceding RNF and from the RNF of each downstream reach. Reach B RNF thus becomes 13 cfs (28 minus 15), then Reach A RNF becomes 7 (17 minus 10) and Reach B becomes 3 (13 minus 10.) When the RNF in Reach B becomes zero (after D3 has been subtracted), no additional allocation can take place.

By preparing Table 8.3, the watermaster knows that D2 should receive no water and that 7 cfs must be allowed to pass Gage A for downstream use. While this might have been determined by inspection or by a trial and error adjustment of diversion, the table provides a systematic method which will minimize errors and also establish a record of the decision process.

In this example, the diversions and flow at A and B in Table 8.2 conform with the allocation determined in Table 8.3. However, the natural flows are independent of diversions. The natural flows of 17 cfs at A and 28 cfs at B might have been determined from actual diversion rates occurring before allocation. Preparation of Table 8.3 would then tell the watermaster to reset the diversions within the requests as shown in Table 8.3.

The natural flow computation and allocation examples shown here represent basic water distribution scenarios. The principles and procedures shown above are applicable to more complex basins, including those basins having storage rights/reservoirs and water exchanges. Storage examples are omitted here because storage is usually very unique to each basin.

Both storage and natural flow can be allocated properly if all diversions including storage and natural flow diversions, storage inflow, outflow (or releases) and changes in storage contents are measured on a regular basis. In districts having multiple storage users with separate storage accounts, the water district should maintain a daily storage account balance for each storage user. Since some Idaho streams have reaches with significant losses, it may sometimes be appropriate to determine storage conveyance losses and assess such losses to the delivery of stored water. Losses may also need to be assessed to delivery of exchange water. Storage water, exchanges, and losing reaches are all very unique and site specific and should be addressed on a case by case basis. The Department can review and assist with distribution procedures involving storage and exchanges.

SECTION 9. – WATER DISTRICT FUNDS AND BUDGETS

A. ASSESSMENTS, COLLECTIONS AND DISBURSEMENTS

The water assessment collection procedure provides that after adopting a budget at an annual meeting and filing a certified copy of the budget with the Department and the County Auditor's office, the Auditor shall make a roll showing the amount to be collected from each user. The County Treasurer is then authorized to collect the assessments. Assessments may be collected with the regular county taxes, but are often collected separately. Water district assessments will have a due date set by the district or the County Treasurer. Assessments not paid by this date are subject to a penalty not to exceed ten percent (10%) of the amount owed and interest of one

percent (1%) per month, which both shall be fixed by resolution. Payment of bills incurred by the water district is done in the same manner as other bills paid by the County Treasurer (Section 42-613, Idaho Code.)

The water users at any annual meeting may adopt resolutions providing for alternative plans of collecting and paying district expenses. In addition to the above procedure where the county auditor and treasurer collects assessments and disburses funds, three other options are available: 1) the county may collect assessments, and the water district treasurer may hold and disburse funds; 2) the watermaster may collect assessments, and the county treasurer may hold and disburse funds; 3) the watermaster may collect the assessments, and the water district treasurer may hold and disburse district funds. All assessments collected by the watermaster must be turned over to the water district treasurer unless the district's annual budget is $7,500 or less and the district has adopted a resolution which authorizes the watermaster to serve as treasurer. If collected by the watermaster, assessments are also due by a date set by resolution. The penalty not to exceed ten percent (10%) of the amount owed and interest of one percent (1%) per month, which both shall be fixed by resolution. may also be applied to late payments where the district is collecting the assessments directly.

Under Section 42-619, Idaho Code, which was passed in 1989, Idaho counties may choose not to provide the service of paying water district expenses. Some Idaho counties have already embraced this statute and discontinued the responsibility of paying district expenses. In this case, the water district must elect a treasurer to do the accounting and fund disbursement. Section 42-619(11), Idaho Code provides that, in water districts with an annual budget of $7,500 or less, the users can adopt a resolution authorizing the watermaster to also serve as the water district treasurer. The watermaster must operate within the limitations of the budget set up at the annual meeting by the water users. The only expenses which may be incurred are those authorized within the scope of the adopted budget. Funds held by the district must be deposited in compliance with the Public Depository Law, Chapter 1, Title 57, Idaho Code.

Water users at any annual meeting may adopt a resolution which authorizes the watermaster to refuse or suspend delivery of water to users who have not paid their share of district expenses. Water delivery may be withheld until such expenses are paid. If the expenses are not paid after withholding delivery, or in the event that the district does not have a resolution which authorizes withholding deliveries, the water district may collect unpaid charges by court action (Section 42-618, Idaho Code.)

B. WATERMASTER PROPOSED BUDGET AND ADOPTED BUDGET

The budget for the ensuing year (Watermaster's Proposed Budget) is generally prepared by the present watermaster before the end of the term of service. Under Section 42-615, Idaho code, revised in 2011, the watermaster is required to prepare the proposed budget at least 14 days prior to the annual meeting and present the proposed budget to the users at the annual meeting (the law formerly required that the proposed budget be submitted to the Department 30 days prior to the annual meeting) The department encourages each watermaster to file a copy of the proposed budget with either the district secretary, treasurer or advisory committee. This allows other district officers to review the proposed budget prior to the annual meeting and assures that a copy

of the proposed budget will be available at the meeting in case the watermaster does not attend the meeting. The proposed budget includes the apportioned cost to each user based on the amount of water delivered to the user during the past irrigation season or seasons. Appendix C contains an example of a proposed budget.

At each annual water district meeting, the water users consider the proposed budget and may make changes. If a budget is approved or adopted with changes, then the secretary must compute a new cost factor and apply that to each user to determine the proper billing or assessment for each user. After preparing the adopted budget using the adopted budget form, a certified copy (i.e.; notarized copy) of the adopted budget and minutes of the meeting must be sent to the Department. A certified copy of the adopted budget must also go to the county if the county collects assessments. The adopted budget should also include all adopted resolutions pertaining to the time and manner of collecting the budget. There is space on the back of the form for these adopted resolutions. Other adopted resolutions may be added to this form or should be placed in the minutes of the meeting.

C. WATER DISTRICT FINANCIAL STATEMENTS & AUDITS

For those districts which handle their own money (i.e.; districts which make their own payments and/or collect their own assessments), Section 42-619 (9), Idaho Code requires the water district treasurer to prepare a statement of the financial affairs of the district at the end of each fiscal year and to file a copy of such statement with the Department. This copy may be submitted to the Department either with the annual watermaster's report or with the annual meeting minutes and adopted budget for the ensuing year. It is recommended that the financial statement which is prepared at the end of the year be read at the annual meeting which is held for the ensuing year. At a minimum, the financial statement should include a detailed listing of funds received and expenses made, as well as a general balance of funds and summary of all assets, debts and financial institution accounts.

Section 42-619 (9) formerly required that financial audits of water districts be completed periodically by an independent public accountant. This statute and the audit requirement was amended in 1993. Minimum audit requirements for all local government entities, including water districts, are now covered by Section 67-450B. Districts with annual expenditures less than $100,000 have no minimum audit requirements. Districts with annual expenditures between $100,000 and $250,000 may elect to have annual audits completed, or reviews made every two years as outlined under Section 67-450B. Districts with annual expenditures greater than $250,000 must have audits completed each fiscal year.

SECTION 10. – WATERMASTER DAILY RECORD KEEPING GUIDELINES

This section provides guidelines for using the watermaster daily log books. The daily log books provided by the Department are the official books for recording daily diversions, unless there has been an alternate method approved by the Department. Daily log books or approved substitute must be submitted to the Department each year with the watermaster's annual report.

- Use the official daily record book. Do not use substitutes unless approved by the Department.

- Use a separate daily record book for each stream you administer. Do not mix the users of several streams into one daily record.

- If you set the headgate or measure the water being delivered on a particular day record the flow in cubic feet per second in the proper grid space. If you do not measure a particular diversion on a given day, but believe that the water continues to be delivered without a change in the flow or headgate setting, place an "A" in the grid space for that day. The "A" represents that the previous flow and headgate setting is "assumed." An "A" must always be preceded by an actual numerical flow rate.

- If the water being delivered is not actually measured, enter an "E" in the fraction portion of the grid space for the particular day that the flow rate is estimated. An "E" should always follow an estimated numerical flow that is observed and set in the field.

- If water is not being delivered, enter a "0" (zero) in the proper grid space. If the water right is cut off because of unavailability of water, one zero may be entered in the grid space corresponding to the day the right could no longer be satisfied, and all subsequent days when water is not deliverable may be designated with a horizontal line through the grids that represent the days of non-delivery.

- If the water right is off merely because the user has not called for the water on one or more particular days (i.e.; user is haying a field or canal requires repair etc.), then a zero should also be entered in the appropriate grid space. In this case, it is recommended that comments be added noting that the right was not demanded or "called on" for these days.

- A blank grid space means that the watermaster has no knowledge of the amount of water being delivered on that day. A grid should never be left blank while the watermaster is delivering water.

- List the water right number (i.e.; water right number assigned by IDWR) in the daily record rather than just the owner's name and/or a number assigned by the district or by the decree. Future users of the records will likely look for a water right reference. If there are several rights for one name and diversion, then the watermaster should list all the rights and may record the actual measured or estimated diversion rate on one line (i.e.; such as the top line with the earliest priority right or a separate line showing the total diversion.)

- Record unusual or noteworthy happenings. For instance if a senior downstream right holder's water right is no longer available because the creek dries up, and junior upstream right holders are allowed to resume diversion of water upstream, this event should be recorded on the day it happens.

SECTION 11. – WATERMASTER ANNUAL REPORT

The watermaster is required to prepare and submit to the department an annual report (Watermaster's Report) of water delivery within the district. The report is to be submitted prior to the expiration of the watermaster's appointment for the current year. A copy of the report should also be filed with the secretary of the district. The report must include the following information:

- A list of the water rights in the district showing the identification of the water rights delivered, the name of the ditch and/or owner, and the amount of water delivered under each right.
- The share of the cost of district operation assessed to each user based on the amount of water delivered. Credits and debits attributable to each water user for successive water years shall also be shown.
- Records of stream flow the watermaster used or made in the process of distributing water supplies, including data relative to the release of stored water.

Additional information which should be included in the report includes the following:

- A description of any unusual activities, notes about measuring device installations, and a summary of disputes over water delivery.
- A description of the streams within the district, a map of the district showing the points of diversion and/or a water rights list summary showing priorities and points of diversions.

Records of stream flow required in the annual report include any of the basic data gathered and used by the watermaster in distributing the available water throughout the regulation season. These data include daily records of diversions, storage water releases and reservoir contents for the season compiled on forms from the watermaster's daily record books; daily flow records of streams or rivers at USGS gage sites or water district measuring sites; periodic or miscellaneous current meter measurements made by the watermaster or watermaster measurements made using some other method. Streamflow records and miscellaneous measurements may be presented as tables in the report. The sequence of these tables in the report should be in downstream order in the basin. Miscellaneous measurements should adequately describe the stream name and location with respect to other hydrologic features, i.e.; "Immediately downstream from the confluence with Pine Creek and 200 yards upstream from the Smith Canal."

In addition to the basic data, the report should include tables showing the computed natural flow at all points where allocations have been made. A schedule of dates during the season when water right priority cuts were made will allow later verification of the adequacy of the watermaster's regulation. If stored water deliveries have been made in the district, the report should include a tabulation of the daily and total seasonal amounts of such deliveries to each of the recipients. An example watermaster's report form and additional data is provided in Appendix C and Appendix D respectively.

SECTION 12. – ILLEGAL DIVERSION AND USE OF WATER AND ENFORCEMENT OF ACTION

Illegal use of water subject to administrative action by the Department or the watermaster includes, but is not limited to the following:

- Diversion of water without a right to do so.
- Use of water in a manner not provided for in the water right or not in conformance with the conditions of a water right.
- Irrigating land not included as the place of use of a water right.
- Wasting water as determined by the Department.
- Use of an unauthorized diversion.

When making a determination about an illegal or unauthorized use subject to administrative action, the watermaster should first contact and coordinate efforts with the Department.

A. WATERMASTER AUTHORITY

The watermaster is authorized to close the headgate of a party who is not entitled to the use of water or who is not using the water in compliance with the terms of the water right. This authority is applicable only during times of scarcity and after the watermaster has been appointed by the director of the department. Where it is clear that a party is diverting when not entitled to divert (i.e.; after right has been cut), or where a party is diverting water without a right, the watermaster should immediately close the headgate. Unauthorized uses associated with the place of use, point of diversion, and/or wasting of water are better handled by first consulting the Department or requesting that the Department issue a cease and desist order.

Unauthorized changing of a headgate is a misdemeanor. Under Section 18-4309, Idaho Code, the watermaster has the authority to arrest and file a complaint against anyone tampering with a headgate. This law specifies that the offender may be turned over to the county sheriff. Upon delivery of the offender, the watermaster must submit a written complaint against the offender and under oath before the proper justice of peace or probate judge of the county. Coordination with the Department is needed before taking any action to arrest. In cases where the watermaster has set a headgate and is concerned with potential tampering, the watermaster should post a notice on the headgate warning that the headgate has been regulated and that tampering with the headgate is a misdemeanor. Notices in the form of bright orange post cards are available from the Department.

If annual assessments are not paid, the watermaster can refuse delivery of water only if such a provision is adopted at the annual water users meeting. Districts may also seek civil action to collect delinquent payments. The watermaster does not have the authority to use force to make a water user comply. Legal means are available to obtain compliance.

In the case of a dispute between users from a "distributing lateral," the watermaster may appoint a lateral manager and fix his compensation, but only if:

a) the users from the distributing lateral do not appoint a lateral manager;

b) one or more users from the distributing lateral submits a written request for appointment of a manager and,
c) an irrigation district ***does not*** own the main canal from which the lateral takes its water. If the lateral is within an irrigation district, then the board of directors of the district may appoint a manager. (Section 42-909, Idaho Code)

Note: The authority of the lateral manager is set forth in Sections 42-907 and 42-910 Idaho Code. The watermaster has implied jurisdiction of the lateral manager, and can probably direct the lateral manager when questions arise. Before exercising any authority to appoint a lateral manager, it is advised that the watermaster first contact the Department.

B. DEPARTMENT AUTHORITY

Section 42-351, Idaho Code, provides that the Director may commence and pursue enforcement actions pursuant to Section 42-1701B, Idaho Code, or may seek injunctive relief in connection with unauthorized diversion or non-compliance with the terms of existing water rights. Violations of cease and desist orders may result in the assessment of a penalty of up to one hundred dollars ($150) per day that the illegal activity continues.

After serving a cease and desist order in compliance with Section 42-351, Idaho Code, the Department may instruct the watermaster to take control of a diversion and/or controlling works and reduce the amount of water diverted by the amount being wasted or unlawfully used.

The Director may remove a watermaster who is not properly performing his or her duties. Removal must be based on written complaint from at least one water user holding a valid water right and upon an investigation by the Department. The Department must also hold a hearing with the other users of the district prior to the removal of the watermaster and appointment of a successor. (Section 42-605, Idaho Code)

C. AUTHORITY REGARDING TRESPASS AND CONTROL OF BEAVERS

Both IDWR employees and watermasters have authority under Idaho law to make reasonable entry upon any lands in the state for the purpose of distributing water, adjusting headgates or controlling works, making investigations and surveys, or for other purposes necessary to carry out any of their duties imposed by law (Section 42-1701 (5), Idaho Code.) Construction of measuring devices by IDWR employees and watermasters are not authorized unless first having a written agreement with the landowner.

Section 36-1107, Idaho Code, provides some specific direction concerning the control and removal of fur bearing animals such as beavers and muskrats. The Idaho Department of Fish and Game (IDFG) employees have immunity from liability for damage claims which may arise from the removal or destruction of dams or houses of fur bearing animals. Watermasters appointed by IDWR and IDWR employees do not have this immunity protection and thus should not physically undertake removal of fur bearing animals, their dams or houses.
Section 36-1107 (a) essentially provides that the "owner or lessee" of property being damaged or destroyed, "may make complaint and report the facts to the director (IDFG) or his designee…." It is reasonable to interpret that the concern for the protection of property as described in Section 36-1107 (a) is broad enough to include water rights as a type of property eligible for protection

under the statute. Requests to remove fur bearing animals or their dams and houses which is interfering with the delivery of water rights should be made to IDFG in the form of a written complaint by the owner of a water right. IDFG then is charged by statute to investigate the complaint and take appropriate action. IDFG will usually issue permits upon request to remove wild animals in order to protect irrigation ditches, banks, canals, reservoirs or dams. Under Section 36-1107 (c), muskrats may be taken at any time without a permit when they are in or along irrigation ditches, reservoirs or dams by the owners or employees of the structures.

SECTION 13. – FORMS

The following are typical forms which the watermaster will need to properly perform the duties of his office. The forms are available from the department upon request.

- Watermaster's Proposed Budget
- Watermaster's Report
- Adopted Budget and Resolutions pertaining to the Collection thereof.
- Watermaster's and Treasurer's Oath of Office
- Watermaster Daily Record Books
- Current Meter Measurement note forms.

SECTION 14. – CONVERSION FACTORS

- The legal standard for the measurement of rate of flow in Idaho is cubic feet per second (cfs).
- The legal standard for the measurement of volume is acre foot (AF). One AF is the amount of water which will cover one acre of area to a depth of one foot.
- 1 AF is equal to 43,560 cubic feet.
- 1 miner's inch = 0.02 cfs or approx. 9 gallons per minute.
- 50 miner's inches = 1.0 cfs = 448.8 gallons per minute.
- A rate of 1 cfs flowing for 24 hours will produce a volume of 1.9835 acre feet (approx. 2.0 AF). This is termed "24-hour second feet" in the Watermaster's Report. Hence, the term "24-hour second feet" is approximately equivalent to 2 acre feet.
- 1 cubic foot of water contains 7.48 gallons.
- 1 AF of water contains 325,829 gallons.

REFERENCES

"Calibration of Maintenance of Vertical-Axis Type Current Meters". Smoot, G.F. and Novak, C. E. Techniques of Water Resource Investigations of the United States Geological Survey. Book 8, Chapter B2, Instrumentation, 1968.

"Design of Small Canal Structures". Aisenbrey, Jr., A. J., Hayes, R. B., Warren, H. J., Winsett, D. L., Young R. B., United States Department of the Interior, Bureau of Reclamation. 1978.

"Discharge Measurements at Gaging Stations". Buchanan, T. J. and Somers, W. P. Techniques of Water Resource Investigations of the United States Geological Survey. Book 3, Chapter A8: Applications of Hydraulics, 1969.

"Evaluation of Closed-Conduit Measuring Devices for Irrigation Diversions". Brockway, C. E. & Robison, C. Research Technical Completion Report. University of Idaho: Idaho Water Resources Research Institute. Moscow, Idaho. 1987.

"Flow Measurement Using Ramped Broad Crested Weirs". France, K. E. & Brockway, C. E. Research Technical Completion Report. University of Idaho: Idaho Water Resources Research Institute. Moscow, Idaho. 1987.

"Irrigation Basics and References". Ross, D. R. University of Maryland: Agricultural Engineering Department Cooperative Extension Service. Facts 138. September, 1982.

"Measurement of Irrigation Water". United States Department of Agriculture, Soil Conservation Service. SCS National Engineering Handbook, Chapter 9.

Water Measurement Manual. United States Department of Interior, Bureau of Reclamation. Second Edition, Revised Reprint. 1984.

"Water Measurement". Larsen, D. C. University of Idaho: College of Agriculture Cooperative Extension Service. Bulletin No. 552. February, 1976.

Appendix A

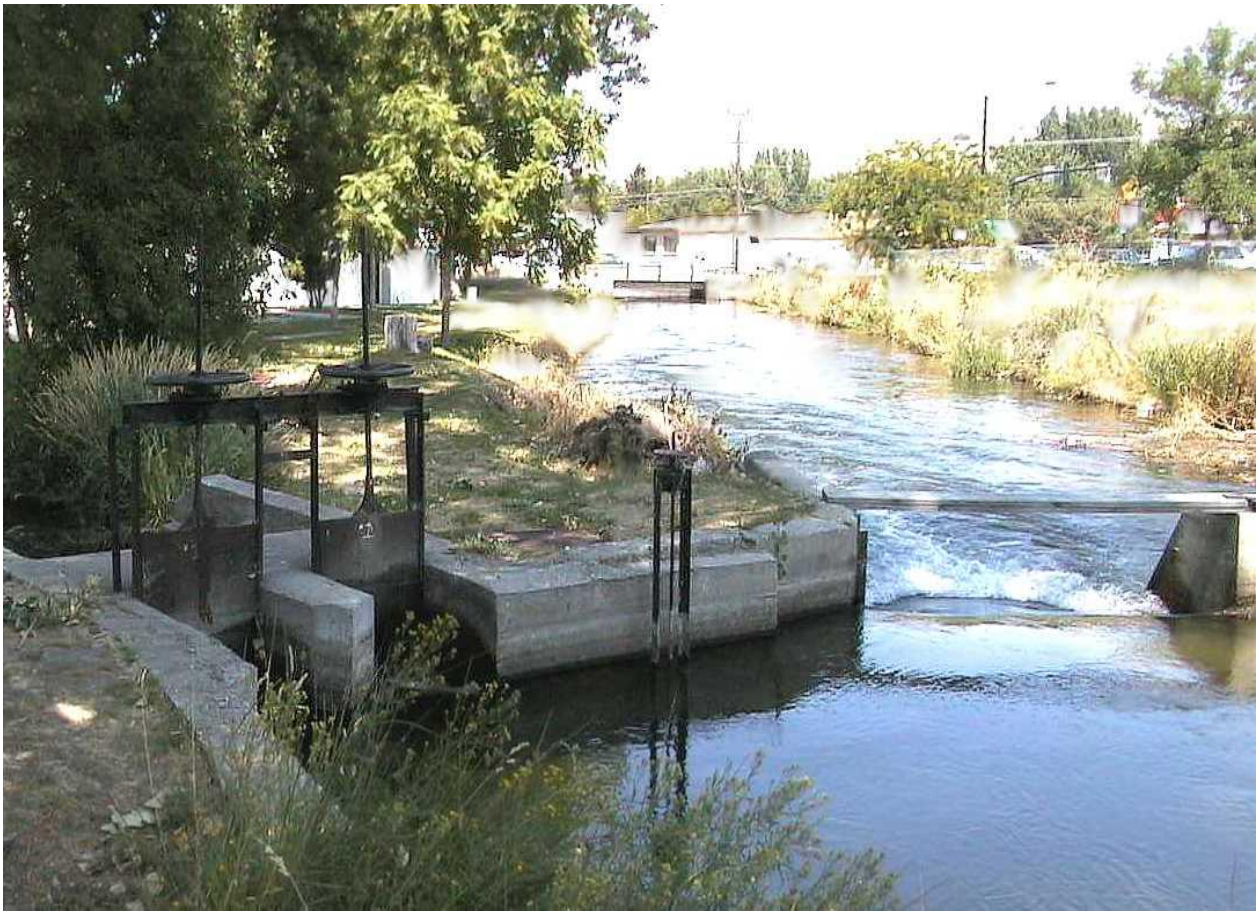
Water Distribution Statutes

A complete list of Idaho Statutes is available online at www.idwr.idaho.gov

Idaho Statutes

Pertaining to Canals and Laterals

Statute update through May 2013



Idaho Department of Water Resources
322 E Front Street, PO Box 83720
Boise, ID 83720-9800
208.287.4800
www.idwr.idaho.gov

Idaho Department of Water Resources

State Office
322 E Front St.
Boise, Idaho 83702
P: 208.287.4800
F: 208.287.6700

State Office Mailing Address
PO Box 83720
Boise, Idaho 83720-0098

Northern Region Office
7600 N Mineral Dr Ste. #100
Coeur d'Alene, Idaho 83815
P: 208.762.2800
F: 208.762.2819

Eastern Region Office
900 N Skyline Dr. Ste. A
Idaho Falls, Idaho 83402-1718
P: 208.525.7161
F: 208.525.7177

Southern Region Office
1341 Fillmore St. Ste. #200
Twin Falls, Idaho 83301-3380
P: 208.736.3033
F: 208.736.3037

Western Region Office
2735 Airport Way
Boise, Idaho 83705-5082
P: 208.334.2190
F: 208.334.2348

Preface

This pamphlet provides an index and copy of the various Idaho laws that pertain to water distribution on canals and laterals. It is intended as a reference guide so that water users and non-water users alike may have first-hand knowledge of certain water laws that apply to various aspects of canals and laterals. The pamphlet contains the most relevant and common laws pertaining to distribution of water on canals, ditches and laterals. Individuals are encouraged to consult these statutes when first addressing questions or issues related to ditches and laterals but recognize that these laws, and hence this pamphlet, may not answer or address all pertinent questions. Certain questions or assistance may be most appropriately addressed by local canal companies, irrigation districts and lateral organizations, etc. The Idaho Department of Water Resources (IDWR) may provide some assistance in addressing general questions related to Idaho water laws with respect to common water distribution matters. A guide to IDWR office locations and phone numbers is provided on the inside cover of this pamphlet.

In addition to those water distribution matters that routinely arise, many misunderstandings between neighbors involve disputes over the existence and scope of water related rights-of-way and easements. In many instances, disputes over these types of property interests can present difficult legal questions involving legal research and analysis requiring the parties to consult their attorneys.

Please note that this pamphlet is not a comprehensive reference of all the laws in Idaho related to irrigation, water use and water delivery. There are numerous laws that address water rights and irrigation. These laws are found in Titles 42 and 43 of the Idaho Code. These and several other laws found in different Titles of the Idaho Code may have some relevance to water delivery but are omitted from this publication since they are not germane to distribution of water on ditches and laterals. Sections 31-3805 and 31-3806 for example, address certain county zoning regulations applicable to water delivery systems in subdivisions.

A complete copy of the Idaho Code related to water rights and irrigation statutes may be viewed online via a link on the IDWR Internet homepage at www.idwr.idaho.gov , or through the State of Idaho homepage at www.accessidaho.org. A complete copy of the Idaho Code can also be obtained at most Idaho libraries.

Table of Contents

Title 42: Irrigation and Drainage – Water Rights and Reclamation

CHAPTER 1**. –** APPROPRIATION OF WATER — GENERAL PROVISIONS

42-109: Change in Course of Ditch — When Prohibited

Whenever any ditch or canal has been constructed for the purpose of conveying water and selling the same for irrigating purposes, it is unlawful for the owner or owners of said ditch or canal to change the line of said ditch or canal so as to prevent or interfere with the use of water from said ditch or canal, by anyone who, prior to the proposed change, had used water for irrigating purposes from said ditch or canal.

CHAPTER 9. – DISTRIBUTION OF WATER TO CONSUMERS

42-901: Appointment of Watermaster — Appointment by Court

It shall be the duty of those owning or controlling any ditch, canal or lateral to appoint a superintendent or watermaster, whose duty it shall be to measure the water from such ditch, canal or lateral through the outlet of those entitled thereto, according to his or her pro rata share: provided, that any vicinity or neighborhood, the inhabitants of which use the waters of any ditch, canal or lateral for the purpose of irrigation, or have or claim a common right to the waters of any ditch or lateral for such purposes, provided the waters so claimed or used have not been allotted to the individual users thereof, shall constitute a water district. Any one or more of said joint owners so using the water of any ditch, canal or lateral as aforesaid, when the appointment of a watermaster cannot be agreed upon, may petition the judge of the district court in whose district the ditch, canal or lateral may be located for the appointment of a watermaster for said ditch, canal or lateral, and shall set forth in said petition the facts of his or her ownership in said ditch, canal or lateral; the ownership and interest of all other joint owners; the location and length of said ditch, canal or lateral, and requesting said district court to appoint a watermaster to take charge of the same. Upon due notice being given to all of the water users under said ditch, canal or lateral, and after hearing before said court, it shall be the duty of the judge of said district court if he deem it necessary or equitable in order that the rights of all water users under said ditch, canal or lateral may be protected, to appoint a watermaster for the ditch, canal or lateral described in the petition. Said watermaster to receive such compensation as the court in his judgment may deem adequate, and shall be paid in the same manner as is provided for the payment of watermasters under chapter 5 of this title, and shall perform the same duties and have the same power and authority as other watermasters appointed or elected in accordance with the provisions of this code.

42-902: Injuring Ditch or Head gate — Triple Damages

Any person who, without the consent of the watermaster of the district, diverts any water from the ditch or channel where it was placed, or caused, or left to run by the watermaster or his deputies, or who shuts or opens any ditch, gate or dam with intent so to divert any water, and thereby deprive any person of the use of the same during any part of the time he is entitled to such use, or who, without the consent of the watermaster, cuts any ditch or the banks thereof, or breaks or destroys any gate or flume, is liable in a civil action to any person injured thereby in three times the actual damage sustained in consequence of any such wrongful act or acts.

42-903: Head gates and Measuring Devices — Water Companies to Furnish

Any person, association or corporation delivering or distributing water under any fixed annual charge or rental shall provide the necessary gates and measuring devices to render possible and practicable a measurement of the quantity of water being delivered to any consumer (or number of consumers using a common lateral or distributing ditch); and the price charged for the annual use of the water so distributed shall be in proportion to the quantity of water delivered from the works of such person, association or corporation. Such measuring devices shall be of such a character, and provided with such gauges or scales, that the quantity of water being delivered at any time can be ascertained by inspection; and shall be of such general plan as shall meet with the approval of the department of water resources, which shall inspect any such devices whenever possible to ascertain their character, and the department shall furnish such general information and instructions to any consumer, or the watermaster of any number of consumers of water, as may be necessary to enable him to ascertain the quantity of water flowing through any such measuring device.

42-904: Division of Land into Classes by Priority

When any ditch, canal or reservoir delivering or distributing water to several users has one or more rights or priorities by reason of enlargements made from time to time, the right of the land being irrigated by such works shall be divided into classes; rights of the first class belonging to those lands reclaimed between the dates of the first and second priorities or rights of such works; rights of the second class belonging to those lands reclaimed between the dates of the second and third priorities of such works; rights of any other class being determined in like manner; but all the rights belonging to the same class shall be equal and subject alike to the regulations of their respective class.

42-905: Point of Delivery

Any person, association or corporation which may contract to deliver a certain quantity of water to any party or parties, shall deliver the same to such party or parties, together with a reasonable and necessary allowance for loss by evaporation and seepage, at some convenient point on the main ditch, canal or reservoir of said person, association or corporation, or on any branch or lateral thereof belonging to the owner or owners of such ditch, canal or reservoir.

42-906: Amount and Lien of Rental or Maintenance

The amount to be paid by said party or parties for the delivery of said water, which amount may be fixed by contract, or may be as provided by law, is a first lien upon the land for the irrigation of which said water is furnished and delivered. But if the title to said tract of land is in the United States or the state of Idaho, then the said amount shall be a first lien upon any crop or crops which may be raised upon said tract of land, which said lien shall be recorded and collected as provided by law for other liens in this state. And any mortgage or other lien upon such tracts of land that may hereafter be given shall in all cases be subject to the lien for price of water as provided in this section.

42-907: Duties of Consumers — Appointment of Manager of Distributing Lateral

Where two (2) or more parties take water from said ditch, canal or reservoir at the same point, to be conveyed to their respective premises for any distance through the same lateral or

distributing ditch, such parties shall, on or before April first of each year, select some person to have charge during the succeeding season of the distribution of water from such lateral, whose duty it shall be to ascertain and see that the amount of water to which each of the parties interested is entitled is properly apportioned and distributed. It shall be his further duty to see that the said person, association or corporation, contracting to furnish such water shall deliver the amount as provided in section 42-905, [Idaho Code,] and in case of dispute between such person and the said person, association or corporation as to the quantity of water to be delivered, or the amount actually delivered, the matter shall be referred to the department of water resources. The parties entitled to said water shall keep their ditches and laterals in good condition for carrying and distributing the same. In case the parties entitled to the use of water as in this section stated shall neglect or refuse to perform the duties imposed upon them by this section, they shall have no cause for damage against the person, association or corporation furnishing said water for failure to properly furnish and distribute the same.

42-908: Manager of Distributing Lateral — Alternative Method of Selection

Wherever two [(2)] or more persons take water from any main ditch, canal or reservoir, at the same point, to be conveyed to their respective premises for any distance through the same lateral or distributing ditch, as provided in section 42-905, [Idaho Code,] the person to be selected by such parties on or before April first of each year, as provided in section 42-907 [Idaho Code,] may be selected and appointed by a written instrument designating such person, signed by the majority of such persons so using the said ditch for their said water, and filed with the watermaster or other managing agent or director of such main canal, ditch or reservoir.

42-909: Manager of Distributing Lateral — Appointment by District Watermaster — by Directors of Irrigation District — Payment of Compensation

If two (2) or more parties taking water from any main ditch, canal or reservoir at the same point to be conveyed to their respective premises for any distance, through the same lateral or distributing ditch, do not select a manager for said lateral, as provided in section 42-907, [Idaho Code,] or section 42-908, [Idaho Code,] the watermaster of the water district, shall on the written demand of any one or more of said parties, appoint a manager for said lateral, who shall have and exercise all the powers and perform all of the duties of a manager of the distributing lateral as provided in section 42-910[Idaho Code]:provided, that if an irrigation district is owner of the main ditch, canal or reservoir, the board of directors of such district shall, upon such demand, make such appointment.

The compensation of said manager shall be fixed by said watermaster, and shall be paid in the manner provided by section 42-910[, Idaho Code,] for the payment of expenses incurred by him. If not paid, it may be collected, with other damages in the action provided by said section: provided, that if an irrigation district is the owner of the main ditch, canal or reservoir, the board of directors of such district shall fix the compensation of said manager; and at the end of the irrigation season upon the request of such manager the secretary of such district shall prorate the amount of such compensation among the several parties taking water through such lateral, or distributing ditch upon the basis of the number of acres irrigated by each, and mail each a statement of the amount prorated to such party, requesting that remittance be made to such secretary for and on behalf of such manager. In the event such parties or either of them, not later than the date when irrigation district assessments are delinquent, remits to such secretary, he shall, upon receiving same, and without making any entry in his books of account, deliver it to

such manager. Should such parties or either of them fail or refuse at such time to remit to said secretary, then such manager may collect as hereinbefore provided.

42-910: Duties of Manager of Distributing Lateral — Assessment of Repair and Maintenance costs — Appeals

Such person shall be known as the manager of such distributing lateral for the season for which he is selected, and in addition to the powers granted to him by section 42-907[, Idaho Code,] he shall have power to require of each user of such lateral such user's proportion of the amount of labor, material or money reasonably necessary for the proper repair and maintenance of such lateral, and to require measuring weirs, head-gates and checks to be installed for distributing the water among the users, and each user of such lateral shall furnish his proportion of such labor, material or money upon three (3) days' notice so to do, and, in default of so doing, such manager may employ other labor in his place, or furnish the material or money necessary, and such user shall pay to the manager the reasonable value of such material or labor so furnished by the manager, upon demand, in case of default in payment by such user the said manager may sue and collect the same in any court of competent jurisdiction, and in addition to all costs, the court shall allow said manager his reasonable attorney's fees incurred in that behalf. In the event such water user or water users shall not furnish his or their respective share of such labor, material or money within three (3) days after notice so to do, as hereinabove provided, then said manager may, if he elects, notify the association or corporation delivering water into said distributing lateral of the failure, neglect or refusal of said water users or any of them to furnish his or their respective share of such labor, material or money for the proper repair and maintenance of such lateral or for the furnishing and installation of measuring weirs, head-gates and checks, and upon receipt of such notice said association or corporation may, if it chooses to do so, proceed to furnish all labor, material and money necessary for the proper repair and maintenance of such lateral and for the furnishing and installation of measuring weirs, head-gates and checks, or it may, if it chooses so to do, proceed to repair and maintain said laterals and furnish and install such measuring weirs, head-gates and checks as it shall deem necessary or proper for the distribution of water among the several water users. The cost of such repair and maintenance and the cost of furnishing and installing such measuring devices, head-gates, and checks shall be apportioned among the several water users on the basis of benefits derived there from by said water users, and the said association or corporation furnishing said funds or doing the aforesaid things or any of them shall within thirty [(30)] days after completion thereof give each of such water users written notice of the amount or amounts to be paid by him and demand payment thereof. Should the water users or any of them desire to contest the assessment and apportionment made by such association or corporation, appeal may be taken from such assessment and apportionment to the district court in the county where the principal office of said association or corporation is located within ten (10) days after receipt of said notice and demand for payment, in the same manner as in the case of appeals from the boards of county commissioners. In case of appeal any sum or sums determined by said district court to be due, or in the event no appeal is taken then any sum or sums determined by such association or corporation to be due from any water users, shall be paid by such water user within ninety (90) days and the said association or corporation may refuse to deliver any water to any such water user until the amount due shall have been paid in full.

42-911: Users of Water Defined

The term "users of water" from a community ditch shall be understood to include the owner of the land on which the water is used, or any tenant or other person in possession and control of said premises.

42-912: Company to Furnish Water on Demand

Any person, company or corporation owning or controlling any canal or irrigation works for the distribution of water under a sale or rental thereof, shall furnish water to any person or persons owning or controlling any land under such canal or irrigation works for the purpose of irrigating such land or for domestic purposes, upon a proper demand being made and reasonable security being given for the payment thereof: provided, that no person, company or corporation shall contract to deliver more water than such person, company or corporation has a title to, by reason of having complied with the laws in regard to the appropriation of the public waters of this state.

42-913: Application for Water

Any person or persons owning or controlling land which has or has not been irrigated from any such canal, shall on or before January first of any year, inform the owner or person in control of such canal whether or not he desires the water from said canal for the irrigation of land during the succeeding season, stating also the quantity of water needed. In distributing water from any such canal, ditch or conduit during any season, preference shall be given to those applications for water for land irrigated from said canal the preceding season, and a surplus of water, if any there be, shall be distributed to the lands in the numerical order of the applications for it. But no demand for the purchase of a so called perpetual water right, or any contract fixing the annual charges or the quantity of water to be used per acre, shall be imposed as a condition precedent to the delivery of water annually as provided in this chapter; but the consumer of water shall be the judge of the amount and the duty of the water required for the irrigation of his land; and the annual charges to be made and to be fixed under the further provisions of this title, shall hereafter be based upon the quantity of water delivered to consumers, and shall not in any case depend upon the number of acres irrigated by means of such amount of water delivered.

42-914: Sale or Rental Constitutes a Dedication — Domestic Purposes Construed — Liability for Violation

Whenever any waters have been or shall be appropriated or used for agricultural or domestic purposes under a sale, rental or distribution thereof, such sale, rental or distribution shall be deemed an exclusive dedication to such use upon the tract of land for which such appropriation or use has been secured, and, whenever such waters so dedicated shall have once been sold, rented or distributed to any person who has settled upon or improved land for agricultural purposes with the view of receiving the benefit of such water under such dedication, such person, his heirs, executors, administrators, successors or assigns, shall not thereafter be deprived of the annual use of the same when needed for agricultural or domestic purposes upon the tract of land for which such appropriation or use has been secured, or to irrigate the land so settled upon or improved, upon payment therefore, and compliance with such equitable terms and conditions as to the quantity used and times of use as may be prescribed by law. "Domestic purposes" shall not be construed to include any manner of land irrigation. Any person, association or corporation violating any of the provisions of this section, shall be liable for all

damage to any party or parties injured thereby, which damage shall be determined by the proper court.

42-915: Consumer's Title not Affected by Transfer of Ditch

When any payment is made under the terms of a contract, by means of which payment a perpetual right to the use of water necessary to irrigate a certain tract of land is secured, said water right shall forever remain a part of said tract of land, and the title to the use of said water can never be affected in any way by any subsequent transfer of the canal or ditch property or by any foreclosure or any bond, mortgage or other lien thereon; but the owner of said tract of land, his heirs or assigns, shall forever be entitled to the use of the water necessary to properly irrigate the same, by complying with such reasonable regulations as may be agreed upon, or as may from time to time be imposed by law. And said payment for said water right shall be a release of any bond or mortgage upon the canal property of the person or company from whom such right is purchased or their successors or assigns, to the amount of such water right thus purchased and paid for, and said person or company from whom such water right is purchased shall furnish to the party or parties purchasing such right a release, or a good and sufficient bond for a release, from said mortgage or bonded indebtedness to the amount of the water right thus purchased.

42-916: Liability for Waste of Water

No person entitled to the use of water from any such ditch or canal, must, under any circumstances, use more water than good husbandry requires for the crop or crops that he cultivates; and any person using an excess of water, is liable to the owner of such ditch or canal for the value of such excess; and in addition thereto, is liable for all damages sustained by any other person, who would have been entitled to the use of such excess water, as fixed by this section.

CHAPTER 11.– RIGHTS OF WAY

42-1101: Rights of Landowners to Water

All persons, companies and corporations owning or claiming any lands situated on the banks or in the vicinity of any stream, are entitled to the use of the waters of such stream for the purpose of irrigating the land so held or claimed.

42-1102: Owners of Land — Right to Right-of-Way

When any such owners or claimants to land have not sufficient length of frontage on a stream to afford the requisite fall for a ditch, canal or other conduit on their own premises for the proper irrigation thereof, or where the land proposed to be irrigated is back from the banks of such stream, and convenient facilities otherwise for the watering of said lands cannot be had, such owners or claimants are entitled to a right-of-way through the lands of others, for the purposes of irrigation. The right-of-way shall include, but is not limited to, the right to enter the land across which the right-of-way extends, for the purposes of cleaning, maintaining and repairing the ditch, canal or conduit, and to occupy such width of the land along the banks of the ditch, canal or conduit as is necessary to properly do the work of cleaning, maintaining and repairing the ditch, canal or conduit with personnel and with such equipment as is commonly used, or is reasonably adapted, to that work. The right-of-way also includes the right to deposit on the banks of the ditch or canal the debris and other matter necessarily required to be taken

from the ditch or canal to properly clean and maintain it, but no greater width of land along the banks of the canal or ditch than is absolutely necessary for such deposits shall be occupied by the removed debris or other matter. Provided, that in the making, constructing, keeping up and maintenance of such ditch, canal or conduit, through the lands of others, the person, company or corporation, proceeding under this section, and those succeeding to the interests of such person, company or corporation, must keep such ditch, canal or other conduit in good repair, and are liable to the owners or claimants of the lands crossed by such work or aqueduct for all damages occasioned by the overflow thereof, or resulting from any neglect or accident (unless the same be unavoidable) to such ditch or aqueduct.

The existence of a visible ditch, canal or conduit shall constitute notice to the owner, or any subsequent purchaser, of the underlying servient estate, that the owner of the ditch, canal or conduit has the right-of-way and incidental rights confirmed or granted by this section.

Rights-of-way provided by this section are essential for the operations of the ditches, canals and conduits. No person or entity shall cause or permit any encroachments onto the right-of-way, including public or private roads, utilities, fences, gates, pipelines, structures, or other construction or placement of objects, without the written permission of the owner of the right-of-way, in order to ensure that any such encroachments will not unreasonably or materially interfere with the use and enjoyment of the right-of-way. Encroachments of any kind placed in such right-of-way without express written permission of the owner of the right-of-way shall be removed at the expense of the person or entity causing or permitting such encroachment, upon the request of the owner of the right-of-way, in the event that any such encroachments unreasonably or materially interfere with the use and enjoyment of the right-of-way. Nothing in this section shall in any way affect the exercise of the right of eminent domain for the public purposes set forth in section 7-701, Idaho Code.

This section shall apply to ditches, canals or other conduits existing on the effective date of this act [March 12, 1996] as well as to ditches, canals or other conduits constructed after such effective date.

42-1103: Owners of Springs and Streams - Right to Right-of-Way

Where the owners of any spring, or the appropriators thereof, or of any stream, desire to conduct the waters thereof to any lands for the purposes of irrigation, or to any city or town for the use of the inhabitants thereof, or to any factory, or to any distant place, with the intent to apply the same to a beneficial use, and to accomplish such object it is necessary to cross with ditches, flumes or other conduit, the lands owned or occupied by others than the owners or appropriators of such spring or stream, the right of way over and across the lands of others for conducting said water may be acquired in the manner above provided.

42-1104: Right of Way Over State Lands

The right of way over and upon any and all lands owned or controlled by the state of Idaho is hereby granted to any and all persons for the purpose of constructing and maintaining any ditch, canal, conduit or other works for the diversion or carrying of water for any beneficial use: provided, that no property shall be taken under the provisions of this section until a just compensation shall be paid therefore, to be ascertained in the manner prescribed by law for the taking of private property for a public use.

42-1105: Right of Way for Riparian Proprietors

All persons, companies and corporations owning or having the possessory title or right to lands adjacent to any stream, have the right to place in the channel or upon the banks or margin of the same, rams or other machines for the purpose of raising the waters thereof to a level above the banks, requisite for the flow thereof to and upon such adjacent lands; and the right of way over and across the lands of others, for conducting said waters, may be acquired in the manner prescribed in the following section

42-1106: Right of Eminent Domain

In case of the refusal of the owners or claimants of any lands, through which any ditch, canal or conduit is proposed to be made or constructed, to allow passage thereof, the person or persons desiring the right of way may proceed as in the law of eminent domain.

42-1107: Right of Way for Drains

Whenever the owner or owners of any parcel or parcels of land desire to construct a drain for the purpose of carrying off surplus water, and they cannot agree among themselves or with the parties who own land below through which it is expedient to carry the drain in order to reach a natural waterway, then proceedings may be had in the same manner as in cases of eminent domain affecting irrigating works of diversion, and the right of way for such drains shall be regarded as equal to that of irrigation canals.

42-1108: Right to Cross Ditches

Any person, company or corporation, owners of any ditch, flume or other conduit, cannot lawfully deny to any other person, company or corporation the right to cross their right of way with another ditch, flume or conduit either upon a higher or lower level, where the same can be done in a convenient and safe manner: provided, that such second person, company or corporation shall be liable for all damages that may accrue from the construction of such ditch, flume or other conduit across the conduit of another.

CHAPTER 12. – MAINTENANCE AND REPAIR OF DITCHES

42-1201: Ditches to be Kept Full

Every person, company or corporation owning or controlling any ditch, canal or conduit for the purpose of irrigation shall, during the time from April first to the first day of November of each year, keep a flow of water therein sufficient to the requirements of such persons as are properly entitled to the use of water there from: provided, however, that when the public streams or other natural water sources from which the water is obtained is [are] too low and inadequate for that purpose, or when the board of directors or governing body of an organization or entity furnishing water deem it in the best interests of that organization or entity to adjust the dates of availability and provide for termination of irrigation water, then such ditch, canal or conduit shall be kept with as full a flow of water therein as may be practicable, subject, however, to the rights of priority from the streams or other natural sources as provided by law.

42-1202: Maintenance of Ditch

The owners or persons in control of any ditch, canal or conduit used for irrigating purposes shall maintain the same in good order and repair, ready to deliver water by the first of

April in each year, and shall construct the necessary outlets in the banks of the ditches, canals or conduits for a proper delivery of water to persons having rights to the use of the water.

42-1203: Maintenance of Embankments

The owner or owners of any irrigating ditch, canal or conduit shall carefully keep and maintain the embankments thereof in good repair, in order to prevent the water from wasting during the irrigation season, and shall not at any time permit a greater quantity of water to be turned into said ditch, canal or conduit than the banks thereof will easily contain or than can be used for beneficial or useful purposes; it being the meaning of this section to prevent the wasting and useless discharge and running away of water

42-1204: Prevention of Damage to Others

The owners or constructors of ditches, canals, works or other aqueducts, and their successors in interest, using and employing the same to convey the waters of any stream or spring, whether the said ditches, canals, works or aqueducts be upon the lands owned or claimed by them, or upon other lands, must carefully keep and maintain the same, and the embankments, flumes or other conduits, by which such waters are or may be conducted, in good repair and condition, so as not to damage or in any way injure the property or premises of others. The owners or constructors have the right to enter the land across which the right-of-way extends, for the purposes of cleaning, maintaining and repairing the ditch, canal or conduit, and to occupy such width of the land along the banks of the ditch, canal or conduit as is necessary to properly do the work of cleaning, maintaining and repairing the ditch, canal or conduit with personnel and with such equipment as is commonly used, or is reasonably adapted, to that work. The right-of-way also includes the right to deposit on the banks of the ditch or canal the debris and other matter necessarily required to be taken from the ditch or canal to properly clean and maintain it, but no greater width of land along the banks of the canal or ditch than is absolutely necessary for such deposits shall be occupied by the removed debris or other matter.

42-1205: Bridges over Ditches.

All owners of any ditch, canal or conduit, or any other means for conveying water, shall build substantial bridges not less than sixteen (16) feet wide, and with boards not less than two (2) inches in thickness (unless the same shall be on a county or state road, when such boards shall not be less than three (3) inches thick), at all places where any county or state road crosses the same, or any road kept open and used by any neighborhood of people for their benefit and convenience. In case of neglect or refusal of such owners to build such bridges as above required, after a notice of ten (10) days being given by the said board of county commissioners of the proper county, said board shall proceed to the construction of the same, and shall collect the cost thereof together with the costs of suit: provided, that after any bridge shall have been constructed across any ditch, canal or conduit on any county or state road in accordance with the provisions of this section, it shall thereafter be maintained at the public expense.

42-1206: Repair of Community Ditches

Where a ditch is common property, or there is a common right to the use of the water of a ditch without payment therefore, and any labor or materials are necessary for the repair or cleaning of the ditch, or any gate or flume thereon or thereunto belonging, the watermaster of the district may make a fair pro rata assessment of labor or materials against the inhabitants of the district claiming the use of such water, according to the benefits received by each; and if any person so assessed neglects or refuses, for the period of three (3) days after notice so to do from the watermaster or his deputy, to furnish his just proportion his pro rata in cash, to be recovered,

with costs, in an action by the watermaster of the necessary labor or materials, according to such assessment, he must pay in his own name.

42-1207: Change of Lateral Ditch or Buried Irrigation Conduit

Where any ditch, canal, lateral or drain or buried irrigation conduit has heretofore been, or may hereafter be, constructed across or beneath the lands of another, the person or persons owning or controlling said land shall have the right at their own expense to change said ditch, canal, lateral or drain or buried irrigation conduit to any other part of said land, but such change must be made in such a manner as not to impede the flow of the water therein, or to otherwise injure any person or persons using or interested in such ditch, canal, lateral or drain or buried irrigation conduit. Any increased operation and maintenance shall be the responsibility of the landowner who makes the change.

A landowner shall also have the right to bury the ditch, canal, lateral or drain of another in pipe on the landowner's property, provided that the pipe, installation and backfill reasonably meet standard specifications for such materials and construction, as set forth in the Idaho standards for public works construction or other standards recognized by the city or county in which the burying is to be done. The right and responsibility for operation and maintenance shall remain with the owner of the ditch, canal, lateral or drain, but the landowner shall be responsible for any increased operation and maintenance costs, including rehabilitation and replacement, unless otherwise agreed in writing with the owner.

The written permission of the owner of a ditch, canal, lateral, drain or buried irrigation conduit must first be obtained before it is changed or placed in buried pipe by the landowner.

While the owner of a ditch, canal, lateral, drain or buried irrigation conduit shall have no right to relocate it on the property of another without permission, a ditch, canal, lateral or drain owner shall have the right to place it in a buried conduit within the easement or right-of-way on the property of another in accordance with standard specifications for pipe, materials, installation and backfill, as set forth in the Idaho standards for public works construction or other standards recognized by the city or county in which the burying is to be done, and so long as the pipe and the construction is accomplished in a manner that the surface of the owner's property and the owner's use thereof is not disrupted and is restored to the condition of adjacent property as expeditiously as possible, but no longer than thirty (30) days after the completion of construction. A landowner shall have the right to direct that the conduit be relocated to a different route than the route of the ditch, canal, lateral or drain, provided that the landowner shall agree in writing to be responsible for any increased construction or future maintenance costs necessitated by said relocation. Maintenance of the buried conduit shall be the responsibility of the conduit owner.

42-1208: Rights-of-Way not Subject to Adverse Possession

Rights-of-way of irrigation districts, Carey act operating companies, nonprofit irrigation entities, and lateral ditch associations, are not subject to adverse- possession, and no person shall prevent free access of authorized personnel on rights-of-way or construct any obstruction on rights-of-way in an effort to adversely possess said right-of-way.

42-1209: Encroachments on Easements and Rights-of-Way

Easements or rights-of-way of irrigation districts, Carey act operating companies, nonprofit irrigation entities, lateral ditch associations, and drainage districts are essential for the operations of such irrigation and drainage entities. Accordingly, no person or entity shall cause or permit any encroachments onto the easements or rights-of-way, including any public or private roads, utilities, fences, gates, pipelines, structures or other construction or placement of objects, without the written permission of the irrigation district, Carey act operating company, nonprofit irrigation entity, lateral ditch association, or drainage district owning the easement or right-of-way, in order to ensure that any such encroachments will not unreasonably or materially interfere with the use and enjoyment of the easement or right-of-way. Encroachments of any kind placed in such right-of-way without express written permission of the owner of the right-of-way shall be removed at the expense of the person or entity causing or permitting such encroachment, upon the request of the owner of the right-of-way, in the event that any such encroachments unreasonably or materially interfere with the use and enjoyment of the right-of-way. Nothing in this section shall in any way affect the exercise of the right of eminent domain for the public purposes set forth in section 7-701, Idaho Code.

CHAPTER 13. – LATERAL DITCH WATER USERS' ASSOCIATIONS

42-1301: Organization — Officers — Rules

Where three (3) or more parties take water from same canal or reservoir at the same point to be conveyed to their respective premises for any distance through a lateral or distributing ditch or laterals or distributing ditches such parties shall constitute a water users' association known as "Water Users' Association of Lateral or Laterals." Such water users' association may meet and organize at any time after thirty (30) days after this chapter shall take effect, and shall meet annually thereafter between January first and the last Monday in March of each year, at the call of the secretary of such association, said secretary to give ten (10) days' notice by mail of such annual meeting; provided that if for any reason the secretary should fail to call a meeting, then the annual meeting of such association shall be held on the last Monday in March of each year. At such annual meetings each water user shall be entitled to one (1) vote in person, for each inch and a fractional vote for each fraction of an inch of water which such water user is entitled to receive from such laterals, and a corporation shall vote by one (1) of its officers designated by it. Such association shall organize by the election of a chairman, vice-chairman and a secretary-treasurer, which officers shall also constitute the board of directors of such association, and shall hold office for one (1) year and until their successors are elected. Such association at the annual meeting shall also elect a manager of said lateral or laterals to be known as "lateral manager" for the succeeding season and shall fix the compensation of said manager, and of all officers. Such association may adopt such rules and regulations for the management of said lateral or laterals or distributing ditch or ditches and the delivery of water therefrom as they deem best, and may, by majority vote, if it be deemed for the best interests of the association, combine one or more laterals and abandon laterals not in use, and do any and all things not in conflict with the provisions of this chapter or the laws of this state wherein the best interests of the association will be furthered.

42-1302: Lateral Manager — Election — Duties

Should any water user’s association at its annual meeting fail to elect a lateral manager or fix his compensation such lateral manager may be elected by the board of directors of such

association, who may also fix his compensation. The manager of any lateral shall, in addition to the duties prescribed by the association perform all duties fixed for such lateral manager under the provisions of sections 42-907 and 42-910, [Idaho Code,] except as modified by this chapter.

42-1303: Lateral Ditches — Repairs, Improvements, and Maintenance — Assessment of Costs

Immediately after the annual meeting of any such association the directors thereof and the lateral manager shall make an examination of the lateral or distributing ditch or ditches, and make an estimate as to the cost of the necessary repairs and improvements thereon, and the maintenance thereof for the succeeding season, including the compensation of officers and lateral manager and such total cost and charges shall be assessed pro rata to each water user from said lateral, in the following manner, if agricultural land in proportion to the water which the owner is entitled to receive from such lateral or ditch, and if lots within any city or village, then the assessment may be made upon the basis of each lot, the same to be uniform upon lots of the same size. The improvement, repair and maintenance of any such lateral or distributing ditch shall be under the direction of the directors of the association.

42-1304: Assessments — Notice — Penalties for Delinquency

On or before the fifteenth day of April in each year the secretary of the association shall notify each water user of the amount assessed against him for that year as herein authorized, and the same shall be due and payable on the first day of May of each year and if not so paid on or before the fifteenth day of June of such year, a penalty of ten per cent (10%) shall be added thereto, and the total amount due shall then draw interest at the rate of ten per cent (10%) per annum from said fifteenth day of June of such year until paid.

42-1305: Delinquent Users not Entitled to Water

No water user shall be entitled to demand or receive water from said lateral whenever any such assessment is due and unpaid, and the lateral manager shall not distribute any water to such water user while delinquent in such payment except upon order of the board of directors of the association who shall have authority to cause such water to be delivered: provided, the water user shall give such security for the payment of such assessment against him as shall be required by the board of directors

42-1306: Collection and Disbursement of Funds

The lateral manager shall collect all assessments so made and pay the same to the secretary [secretary]-treasurer taking his receipt therefore. The secretary-treasurer of this association shall keep the funds of the association in the name of the association and shall draw warrants or checks thereon to pay the costs and expenses of the management of said lateral as herein provided for upon the order of the board of directors, and shall perform such other duties as the association may prescribe.

42-1307: Action for Assessment — Attorneys' Fees

In case any assessment, as herein provided for is due and unpaid the association may sue to collect the same, in the name of its secretary-treasurer as such, in any court of competent jurisdiction, and in addition to the amount due including all penalties and interest, and all costs incurred in said action, may collect a reasonable attorney's fee in such action to be fixed by the court.

42-1308: Appointment of Lateral Manager by Director of Department of Water Resources

a) In the event that the water users or the board of directors of any lateral or ditch association do not meet and elect a lateral manager as provided chapter or a lateral manager is not selected as otherwise provided by law, then, the director of the department of water resources may appoint and fix the compensation of a lateral manager, upon the written petition of a water user alleging that water is not being apportioned and distributed properly among the users from the ditch or lateral and that the rights of the water user are being injured thereby.

b) If the water users also have failed to elect association officers, the lateral manager appointed by the director may exercise the duties of the association officers, including the making and collection of assessments, but not the borrowing of money, as is necessary to achieve the proper allocation and distribution of water from the ditch or lateral and without regard to the statutory dates for the performance of these duties.

c) The lateral manager appointed by the director shall hold office only for the period of time fixed by the order of appointment and in no event beyond the remainder of the year in which appointed.

d) If the lateral is located within a water district established pursuant to chapter 6, title 42, Idaho Code, the director shall advise the district watermaster of the receipt of the petition and invite the watermaster to make recommendations concerning the need for appointment of a lateral manager and the person to be appointed.

e) Upon receipt of a petition filed pursuant to subsection (1) of this section, the director shall make a reasonable effort to provide written notice of the petition to any irrigation district, Canal Company, or other water distribution entity that supplies water to the lateral, and to all persons having rights to the use of water from the lateral. Except in the case of serious threat of imminent injury to person or property, the director shall allow fourteen (14) days for written response to the petition.

f) Based upon a review of the petition, the responses thereto, the recommendations of the watermaster, if any, and any investigation by the department of water resources, the director shall issue an order with findings either appointing a lateral manager or declining to appoint a lateral manager. Any person aggrieved by the order of the director shall be entitled to request a hearing before the director pursuant to section 42-1701A, Idaho Code.

42-1309: Association Authorized to Borrow Money, Mortgage or Pledge Assets

Lateral ditch water users' associations are expressly authorized to borrow money from any private or governmental source, to be repaid over a period of years, and to levy assessments over such period of years for the purpose of repaying said loan, and they are also authorized and empowered to mortgage and/or pledge any of the assets of said associations as security for said loan; providing, however, that before any money can be borrowed or any mortgage or pledge can be made and entered into, all members of said association shall be notified of an election by two (2) weekly publications in a legally authorized newspaper, as defined in section 60-106, Idaho Code, within the county in which the association is located, said notice to provide that an election is being called to determine whether or not the association shall be authorized to borrow money and mortgage and/or pledge its assets, and shall also state the date, time and place of said election, which shall be held within ten [(10)] days after the date of the last publication of said notice. If a majority of the total outstanding shares shall vote at said election in favor of borrowing said money and mortgaging and/or pledging said assets, then said association, through its president and secretary, shall be authorized to borrow said money and mortgage and/or pledge its assets.

42-1310: Lateral Ditches — Repairs, Improvements and Maintenance by Irrigation Delivery Entities

In the event that a water users' association of lateral or laterals has not been constituted on a particular lateral or distributing ditch pursuant to this chapter, any individual water user taking water from a canal or reservoir to be conveyed to their respective premises for any distance through such lateral or distributing ditch may authorize the irrigation delivery entity providing water to the lateral or ditch to perform any necessary repairs, improvements, or maintenance to the lateral or ditch. The irrigation delivery entity may agree to perform such work only if it has duly adopted a bylaw authorizing such work to be done for its individual water users, or adopts a resolution authorizing the work. In performing such work, the irrigation delivery entity shall have the same rights and privileges to enter the land across which the right-of-way extends, for the purposes of cleaning, maintaining and repairing the lateral or ditch, and to perform such work, as does the individual water user authorizing the work. By performing such work, the irrigation delivery entity does not assume ownership of the lateral or ditch, or responsibility for or incur liability for any injury to person or property caused by an act or omission of the individual water user authorizing the work, or of any other person. When such work has been authorized, the irrigation entity shall assess the individual water user for the annual cost of any necessary repairs, improvements, or maintenance performed on the lateral or ditch, in addition to the assessments that are levied for the delivery of water to the individual water user, and the same provisions shall apply with regard to delinquent assessments as in the case of assessments levied for the delivery of water. Nothing in this section shall affect the authority of a water users' association of lateral or laterals from assessing its members for work authorized under this chapter.

Title 43 Irrigation Districts

CHAPTER 11. – EXCLUSION OF LANDS FROM DISTRICT

43-1101: Petition

Any person or persons owning land within any irrigation district and forming a part thereof may file with the board of directors of such irrigation district a petition in writing requesting the exclusion of the land or lands owned by them and described in the petition from the irrigation district. As many parties owning separate tracts or parcels of lands in any irrigation district or who are united in interest to which the same state of facts apply, may unite in the same petition. The petition shall be signed by all of the petitioners, but need not be acknowledged. A filing fee in the amount of five dollars ($5.00) for each parcel of land described in the petition shall accompany the filing of each petition, plus an exclusion fee in the amount of twenty-five dollars ($25.00) for each lot containing less than one (1) acre which is in a subdivision as defined in section 50-1301, Idaho Code, or an exclusion fee of fifty dollars ($50.00) for each acre or portion thereof in all other parcels of property, for which the district shall provide a suitable receipt evidencing payment. Any petition not accompanied by the required filing fee and exclusion fee shall be returned to the petitioner. All other costs of the exclusion proceeding shall be assessed as provided in section 43-1105, Idaho Code. A person or persons purchasing land

under a written contract shall be deemed to be the owners of that land for purposes of this section.

CHAPTER 15. – MISCELLANEOUS PROVISIONS OF DISTRICT LAW

43-1505: Irrigation Lateral Districts

For the purpose of constructing, operating, and managing water in distributing systems by means of laterals, sub laterals, ditches, flumes, and pipe lines, an irrigation lateral district may be organized and created within the territory already organized as an irrigation district, in the same manner and by the same process required by the provisions of this title, for the creation of an irrigation district from unorganized territory, and such interior irrigation lateral district, when organized shall through its board of directors, other officers and employees have all necessary powers for the purpose of its creation conferred by this title upon the original irrigation district, including the power to issue, negotiate and sell bonds payable and secured as is in this title provided; to build and construct new works and to levy assessments and taxes necessary for the purpose of conducting its affairs in the same manner and by the same process as are by this title provided in the case of irrigation districts; provided, however, it is distinctly understood that the negotiation and sale of coupons bonds and levying of assessments and taxes and incurring of debts and obligations by any such irrigation lateral district shall not in any way or manner affect any of the bonds, assessments, taxes, or obligations of the irrigation district of which it is a part and shall not in any way or manner limit the power of such original irrigation district to incur the indebtedness, levying of assessments and issue its bonds for any of the purposes for which such district is by this title entitled to levy or issue the same .

Title 18: Crimes and Punishments

CHAPTER 43. – IRRIGATION WORKS

18-4301: Interference with Ditches, Canals or Reservoirs

Every person who shall, without authority of the owner or managing agent, and with intent to defraud, take water from any canal, ditch, flume or reservoir, used for the purpose of holding or conveying water for manufacturing, agricultural, mining, or domestic uses, or who shall, without like authority, raise, lower, or otherwise disturb, any gate or other appurtenance thereof used for the control or measurement of water, or who shall empty or place, or cause to be emptied or placed, into any such canal, ditch, flume, or reservoir, any rubbish, filth, or obstruction to the free flow of water, is guilty of a misdemeanor.

18-4302: Wasting Water Used for Irrigation

Any person or persons, who shall willfully or wantonly waste any of the waters of any stream, the waters of which are used for irrigation, to the detriment of any claimant of such water for irrigation purposes, by diverting the same for an unnecessary use or purpose, or by allowing such water to waste by running into depressions or dry channels so that the same cannot be used

for irrigation, nor reach the original channel of the stream from which it has been diverted, are guilty of a misdemeanor.

18-4303: Obstruction of Overflow, Gauge or Waterway in Dam

Any person or persons who shall obstruct any overflow gauge or waterway, placed in any dam by order of any watermaster, so as to impede the flow of water over such dam as regulated by the water master, shall be guilty of a misdemeanor.

18-4304: Wrongful Diversion of Water

Any person who without the consent of the water master of the district, diverts any water from a ditch or channel where it has been placed, or caused or left to run by the water master or his deputies, or who shuts or opens any ditch, gate or dam, or in any way impedes or increases the flow of water in any stream or ditch diverting water from a stream, while the same is under the charge of a water master, or who cuts away any embankment of a stream, whereby the water of such stream is diverted, or breaks, injures, or removes any gate, flume or other device used for the equitable distribution of the water of any such stream by the water master, shall be guilty of a misdemeanor.

18-4305: Interference with Head gate — Cutting Banks of Stream

If any obstruction shall be willfully and maliciously placed on any overflow gauge in any stream of water which is used for irrigation and is under control of a water master, and such obstruction retards or impedes the free overflow of the water of such stream, thereby increasing the pressure against a head gate through which water is diverted by means of such dam, or if any head gate regulated by a water master shall be removed, broken, injured or interfered with so as to disturb the distribution of the water as regulated by the water master, or if any bank of the natural stream, the water of which is being used for irrigation and is being distributed by a water master, shall be cut away so as to increase the flow of water from such stream, thereby interfering with the distribution of the water as regulated by a water master, the person or persons so interrupting the flow of said water as aforesaid, shall be guilty of a misdemeanor.

18-4306: Injuries to Ditches, Canals, Laterals, Drains and Appurtenances

Any person or persons, who shall willfully cut, break, damage, or in any way interfere with any ditch, canal, lateral, drain, head gate, or any other works in or appurtenant thereto, the property of another person, irrigation district, drainage district, canal company, corporation, or association of persons, and whereby water is conducted to any place for beneficial use or purposes, and when said canal, head gate, ditch, lateral, drain, dam, or appurtenance is being used or is to be used for said conduct or drainage of water, shall be guilty of a misdemeanor.

18-4307: Injury to Measuring Devices

Any person or persons who shall cut, break, injure, destroy, enlarge, change, or alter any head gate, sluiceway, weir, water box, or other measuring device, the property of any irrigation district, corporation or association of persons, or in the possession of, or in the use of, said irrigation district, corporation, or association, or the property of another, shall be guilty of a misdemeanor.

Any person or persons who shall change, alter, destroy, disturb, enlarge, or interfere with any head gate, dam, weir, water box, or other measuring device, made, placed, used or regulated by

any duly appointed, elected, or authorized water master, deputy water master, ditch walker, ditch rider, engineer, or other authorized agent of any irrigation company, corporation or association or person, when said measuring device is being used or is to be used for the measurement of water, shall be guilty of a misdemeanor.

18-4308: Change of Lateral Ditch or Buried Irrigation Conduit

Where any lateral ditch has heretofore been, or may hereafter be, constructed across or beneath the lands of another, the person or persons owning or controlling the said land, shall have the right at his own expense to change said lateral ditch or buried irrigation conduit to any other part of said land, but such change must be made in such a manner as not to impede the flow of the water therein, or to otherwise injure any person or persons using or interested in such lateral ditch or buried irrigation conduit. Any increased operation and maintenance shall be the responsibility of the landowner who makes the change. A landowner shall also have the right to bury the ditch of another in pipe on the landowner's property, provided that the pipe, installation and backfill reasonably meet standard specifications for such materials and construction, as set forth in the Idaho standards for public works construction or other standards recognized by the city or county in which the burying is to be done. The right and responsibility for operation and maintenance shall remain with the ditch owner, but the landowner shall be responsible for any increased operation and maintenance costs, including rehabilitation and replacement, unless otherwise agreed in writing with the ditch owner.

In the event that the ditch, lateral, buried irrigation conduit, or canal is owned by an organized irrigation district, canal company, ditch association, or other irrigation entity, the written permission of the entity must first be obtained before a ditch, lateral, buried irrigation conduit, or canal is changed or placed in buried pipe by the landowner.

While a ditch owner shall have no right to relocate his ditch on the property of another without permission, a ditch owner shall have the right to place his ditch in a buried conduit within the easement or right-of-way on the property of another in accordance with standard specifications for pipe, materials, installation and backfill, as set forth in the Idaho standards for public works construction or other standards recognized by the city or county in which the burying is to be done, and so long as the pipe and the construction is accomplished in a manner that the surface of the owner's property and the owner's use thereof is not disrupted and is restored to the condition of adjacent property as expeditiously as possible, but not to exceed five (5) days after the start of construction. A landowner shall have the right to direct that the conduit be relocated to a different route than the route of the ditch, provided that the landowner shall agree in writing to be responsible for any increased construction or future maintenance costs necessitated by said relocation. Maintenance of the buried conduit shall be the responsibility of the ditch owner.

No more than five (5) days after the start of construction, a landowner or ditch owner who buries a ditch in pipe shall record the location and specifications of the buried irrigation conduit, including primary and secondary easements, in the county in which the burying is done, and shall provide the irrigation entity that supplies water to the ditch, with a copy of such location and specifications and the construction plans utilized. The irrigation entity shall keep and maintain such records and have them available for the public.

18-4309: Unauthorized Tampering With Measuring Devices

Every person who shall willfully waste water for irrigation, or who shall willfully open, close, change or disturb, or interfere with, any head gate or water box or valve or measuring or regulating device, without authority, shall be guilty of a misdemeanor. The water masters or their assistants, within their district, shall have the power to arrest any person or persons offending, and turn them over to the sheriff or the nearest peace officer of the county in which such offense is committed, and immediately upon delivering such person so arrested into the custody of either of such officers, it shall be the duty of the water master making such arrest to make complaint, in writing and under oath, before the proper justice of the peace, or the probate judge of such county, against the person so arrested

18-4310: Neglect to Deliver Water — Interference with Delivery

Any superintendent or any person having control or charge of the said ditch, canal or conduit, who shall willfully neglect or refuse to deliver water as provided in chapter 9, of title 42, or person or persons who shall prevent or interfere with the proper delivery of water to the person or persons having a right thereto, shall be guilty of a misdemeanor; and the owner or owners of such ditch, canal or conduit shall be liable in damages to the person or persons deprived of the use of water to which they were entitled as provided in said chapter 9.

Glossary

Note: Idaho Code references have been provided wherever possible. All other definitions are those commonly used by IDWR at the present time.

Acre-Foot (AF) is a unit commonly used for measuring the volume of water; equal to the quantity of water required to cover one acre to a depth of one foot and equal to 43-560 cubic feet of 325,851 gallons.

Appropriation Doctrine is the system of water law adopted by most Western States. The basic principles of the appropriation doctrine are: (1) that a private right to use water can be acquired only by diverting the water and applying it to a beneficial use; (2) the first in time of beneficial use is the first in right and the right is maintained only by use.

Aquifer is a stratum or zone below the surface of the earth capable of producing water as from a well.

Beneficial Use is one or more of the recognized uses of water including but not limited to irrigation, domestic, municipal, commercial, recreation, hydropower, stock watering and fish propagation uses for which permits to appropriate water can be issued. Industrial use includes manufacturing, mining and processing uses of water.

Consumptive Use is that portion of the annual volume of water diverted under a water right that is transpired by growing vegetation, evaporated from soils, converted to non-recoverable water vapor, incorporated into products, or otherwise does not return to the waters of the state. Consumptive use does not include any water that falls as precipitation directly on the place of use unless the precipitation is captured, controlled and used under an appurtenant water right. Idaho Code Section 42-202B

Cubic Feet per Second (CFS) is a unit used to express a rate of flow of water. One cfs is equal to 50 miners' inches or 448.8 gallons per minute.

Department or **IDWR** means the Idaho Department of Water Resources.

Director means the Director of the Idaho Department of Water Resources.

Diversion is the structure through which water is removed from a water source. It also refers to the act of removing water for a specific purpose. A diversion structure, particularly on a natural channel, may also include a check structure in the channel.

Ground Water is water that occupies all the voids within a geologic stratum and occurs in its natural condition below land surface. As defined by Idaho law, ground water is all water under the surface of the ground, whatever may be the geological structure in which it is standing or moving. Idaho Code Sections 42-501 – 42-230(a)

Ground Water District is a district organized in accordance with the provisions of chapter 52, title 42, Idaho Code. Such districts include holders of ground water irrigation rights and are formed or organized by such ground water users.

Groundwater Recharge is the introduction of surface or ground water to groundwater storage. It can consist of natural recharge, artificial recharge or incidental recharge.

Headgate or **Headworks** are structures which are constructed to control or regulate the flow of water in a ditch or canal.

Irrigation District is a district organized in accordance with the provisions of chapter 1, title 43, Idaho Code.

Irrigation Lateral District is a district organized in accordance with Section 43-1505, Idaho Code. A district created within an area already organized as an irrigation district for the purpose of constructing, operating and managing water in distributing systems by means of laterals, sub laterals, ditches, flumes and pipelines. District is organized in the same manner and by the same process required for irrigation districts under chapter 1, title 43, Idaho Code.

Lateral Ditch is a ditch that supplies water to two or more users. Lateral ditches normally divert water from a main canal or ditch which has its heading from a river or natural stream channel.

License is the certificate issued by the director in accordance with Section 42-219, Idaho Code, confirming the extent of diversion and beneficial use of water that has been made in conformance with the permit conditions.

Measuring Device is a generally accepted structure or apparatus used to determine a rate of flow or volume of water. Examples are weirs, meters and flumes.

Miner's Inch (MI) is a variable unit used to express a rate of flow of water in the Western United States. In Idaho, a miner's inch is equal to 1/50 of a cubic foot per second (cfs), or 0.02 cfs. One miner's inch is the duty of water, or the standard allocated flow, for each acre of irrigated land.

Period of Use is the time period each year during which water under a given right may be beneficially used in compliance with terms of the water right.

Permit or **Water Right Permit** is the water right document issued by the Director authorizing the construction of diversion facilities and commencement of use of public water of the state. Idaho Code Section 42-202

Place of Use (POU) is the location where water is used. The place of use under Idaho water rights is given by legal descriptions, or 40 acre quarter-quarter section or Government lot land descriptions.

Point of Diversion (POD) is the location at which water is physically diverted by manmade works from the source of water. Points of diversions are identified by legal descriptions in Idaho water rights.

Public Water, as defined by Idaho law, is all the waters of the state when flowing in their natural channels, including the waters of all-natural springs and lakes and ground water.

Priority or **Priority of Appropriation** or **Priority Date** is the date of appropriation established in the development of a water right.

Re-diversion, as a general term, is used to describe the location of any secondary point of diversion under a water right. Example, consider a storage reservoir on Creek A where storage water is released to Creek A and diverted downstream at Canal #1. The primary point of diversion for a water right with a storage reservoir on Creek A is the impounding dam across Creek A, while the point of re-diversion is Canal #1. Re-diversion, as used in an exchange, is the location where a quantity of water is diverted from source B after an equal quantity of water was diverted from source A and injected into source B.

Reservoir is a lake or pond in which water is collected and controlled for some beneficial use.

Stored Water is water that is diverted to and retained within a reservoir and then released for some beneficial use. Water may be diverted to and stored in a reservoir located either within the stream channel or off of the stream channel. IDWR considers a storage facility as one which will not fill within 24 hours using the maximum authorized flow rate.

Source is the water body at the point of diversion. Examples are Salmon River, Squaw Creek, spring, ground water, etc.

Unappropriated Water is the public water of the state of Idaho in streams, rivers, lakes, springs or ground water in excess of that necessary to satisfy prior rights including minimum stream flows and rights established by law.

Watermaster is the person elected or appointed pursuant to Chapter 6, Title 42, Idaho Code, to distribute water in the order of priority to those water users entitled to its use. In more general terms, a watermaster may also refer to a person who serves as the distribution manager of a canal, ditch or lateral.

Water District (WD) is a district organized in accordance with the provisions of chapter 6, title 42, Idaho Code. The Director of the Idaho Department of Water Resources (IDWR) creates water districts in order to distribute water rights from natural water sources in accordance with water right priority dates. Water distribution in water districts is accomplished by watermasters who are elected annually by district water users. Watermasters are supervised by the Director of IDWR.

Water and Sewer Districts are districts organized in accordance with the provisions of chapter 32, title 42, Idaho Code. Water districts supply water for domestic, commercial and/or municipal

purposes. Sewer districts provide for sewage disposal. A district may be created for a combination of water and sewer purposes. IDWR has no jurisdiction over this type of district.

Water Measurement District is a district organized in accordance with the provisions of chapter 7, title 42, Idaho Code. Water Measurement Districts are created by the Director of the Idaho Department of Water Resources (IDWR) in order to measure and report water that is diverted from natural water sources under state water rights. Water measurement and reporting in water measurement districts is accomplished by hydrographers who are elected annually by district water users. Hydrographers are supervised by the Director of IDWR.

Water User is a person, corporation, association, firm, governmental agency or other entity entitled to divert and beneficially use water.

Appendix B

Current Meter Measurement

CURRENT METER MEASUREMENT CONSIDERATIONS

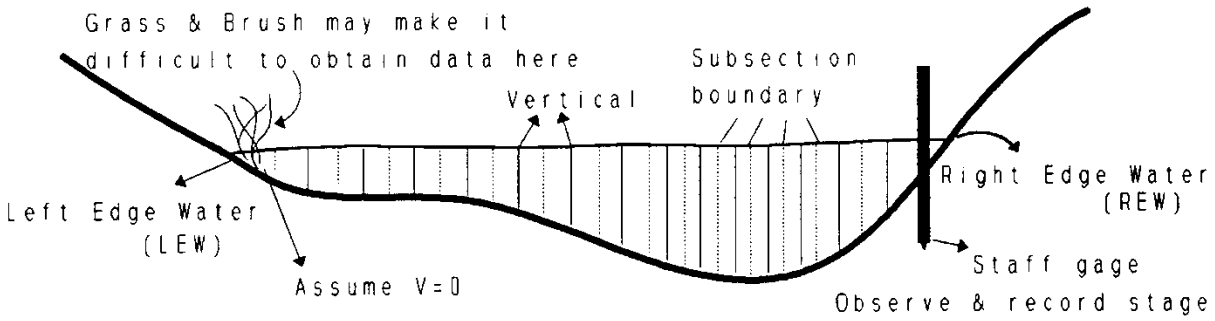


Figure B.1: Typical Stream Cross-Section[1]

Select a reach of steam having the following characteristics:

- A straight reach with laminar flow (i.e.; threads of velocity parallel to each other and channel walls.) Ideal flow is smooth with relatively slow velocity.
- Stable streambed free of large rocks, weeds, and protruding obstructions such as piers which would create turbulence.
- A flat streambed profile to eliminate vertical components of velocity.

It is usually not possible to satisfy all of these conditions. Select the best possible reach using these criteria and then select a cross-section.

After selecting a cross-section, determine the width of the stream using a measuring tape and fix the tape at right angles to the direction of flow. It is recommended to divide the distance between the Left Edge Water (LEW) and Right Edge Water (REW) into 20 subsections. Fewer sections may be used if there is a smooth cross-section and good velocity distribution. No more than ten percent (10%) of the total discharge should occur in any one subsection. Dividing the total width by the number of subsections will also determine the spacing of the verticals. Equal widths of partial sections across the entire cross-section are not recommended unless the discharge is well distributed. Make the width of the partial sections less as depths and velocities become greater.

[1] These measurement guidelines are selected in part from: T. J. Buchanan and W. P. Somers. Techniques of Water Resource Investigations of the United States Geological Survey. "Discharge Measurements at Gaging Stations," Book 3, Chapter A8. pp. 37-39. 1969.

The depth of water is measured at the vertical and the observation depth is decided. If the depth is less than 2.5 feet, the meter is set at .6 or 6/10 of the depth from the surface (or 0.4 from the bottom.) When depths are greater than 2.5 feet, the average of the measurements at .2 and .8 of the depth from the surface is the mean velocity. The scale on the standard top setting wading rod may be used to set the meter depth at the proper .8, .6, and .2 settings. For the .6 method, setting the scale at the exact depth of water places the meter at .6 of the depth from the surface. For the two-point method, setting the scale at two times the observation depth and one-half the observation depth places the meter at the proper .2 and .8 depths from the surface.

If using either a Price type AA or pygmy meter, count the number of revolutions with headphones or a counter for a period of 40 to 70 seconds. End the count on a convenient number given in the meter rating table column heading. When using the pygmy meter, one revolution equals one foot per second. The AA meter should be used where the average depth is greater than 1.5 feet. The pygmy meter is used for shallower depths, generally 1.5 feet or less.

Using a standard open discharge measurement field note form such as the one used in the attached example, record the depth, width and velocity of each sub-section.

To calculate the width of each subsection, calculate the distance between the previous measurement point and the following measurement point; divide this number by 2 and record the width. For example, the width for the first measurement subsection (distance from initial point = 1.0) in the attached example is calculated by subtracting 0.6 from 1.5 and dividing by 2 (1.5 – 0.6 = 0.9; 0.9/2 = 0.45). The width for the second

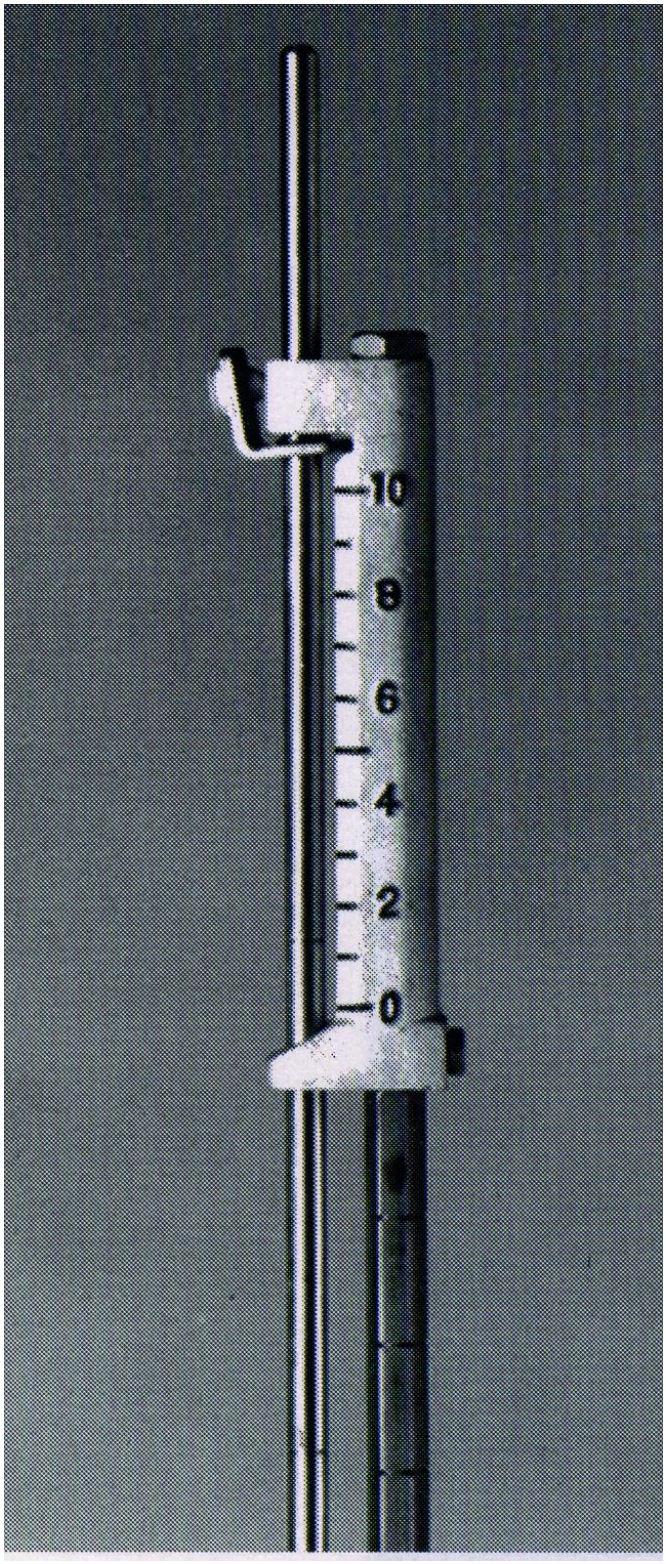


Fig. B.2: Setting scale on handle of top-setting wading rod. Setting and water depth is about 1.7 ft.

measurement subsection (distance from initial point = 1.5) is calculated by subtracting 1.0 from 2.0 and dividing by 2 (2.0 – 1.0 = 1.0/2 = 0.50). To calculate velocity using a pygmy meter, divide the revolutions by the number of seconds. Velocity in the first subsection measurement for example is 0.116 feet/second (5 revs/43 sec = 0.116). If using an AA meter, use the rating table that is provided with the meter. A sample rating table is provided in this appendix.

The discharge in each subsection is computed by multiplying the subsection area (width x depth) by the mean velocity. Total stream discharge is then equal to the sum of the discharges for all the subsection.

Keep the current meter clean. Moss and algae should not be allowed to wrap around the spindle or hub of propeller. A spin test should be made before and after each measurement to check for excessive friction in the bearings. For AA meter, the bucket wheel should spin freely between 1½ and 4 minutes. An acceptable spin test for a pygmy meter is 30 seconds to 1½ minutes.

The AA and pygmy meters are the most commonly used current meters. They are still the standard meters used by the USGS and are widely used among Idaho water districts. Other meters, which use propellers or electromagnetic sensors, are commercially available which can be used over a broad range of depths and velocities. Some of these meters are easier to operate and maintain then the standard AA and pygmy meters. Most alternative meters are equipped with a register device or digitizer which converts revolutions directly to velocity in feet per second. Direct velocity read-out registers are also available to fit existing AA and pygmy meters.

FLOAT METHOD AS ALTERNATIVE TO CURRENT METER MEASUREMENT

IDWR recommends that all open channel discharge measurements be made using either a current meter, an established gaging station with a rating curve or table, or an acceptable measuring device which is properly installed and maintained. In emergency situations such as where a current meter has broken and cannot be immediately repaired in the field, or when velocities are too low to provide reliable measurements with a current meter, one may use a surface water float to estimate stream velocity and discharge. The float method has limited accuracy but it is better than guessing. The float is placed on the surface of the water and allowed to travel a given distance downstream. The float distance and time can be converted to feet per second, which is then multiplied by the cross sectional area to obtain discharge. A float can be almost anything that floats, such as an orange peel, wooden disk or a partially weighted pop can or bottle.

To complete a float measurement, select two cross sections along a straight reach of the channel that are far enough apart so that the time the float takes to pass from one cross section to the other can be measured accurately. If velocity and channel conditions are favorable, a travel time of 20 seconds is recommended. The two selected channel cross sections should be divided into several subsections or more depending on the width of the channel and a float velocity measurement made for each subsection. The float should be allowed to reach a constant velocity before timing by stopwatch the interval it takes to travel between the two cross sections.
The float velocity recorded in each subsection is multiplied by a coefficient, usually 0.85, in order to convert surface velocity to the mean stream profile velocity. The discharge then in each

subsection is computed by multiplying the average area of the subsection by the mean velocity in the subsection. The total discharge of the stream is equal to the sum of the discharges for all the subsections.

Example Float Method Computation:

Determine discharge given a channel which is 3.3 ft. wide and has a mean depth of 2 ft., an orange peel is placed in the water and travels 12 feet in 20 seconds. (In this case, the channel is not subdivided for different float measurements since it is only about 3 ft. wide.)

Area of Channel = width x depth = 3.3 ft x 2 ft = 6.6 ft^2

Velocity of float = $\frac{12 \text{ ft.}}{20 \text{ seconds}}$ = 0.60 ft/sec

Multiply float velocity by coefficient:

0.60 ft/sec x 0.85 = 0.51 ft/sec

$Q = VA = 0.51 \text{ ft/sec} \times 6.6 \text{ ft}^2 = 3.37 \text{ ft}^3/\text{sec}$ or 3.37 cfs

Form 219-N
7/86

STATE OF IDAHO
DEPARTMENT OF WATER RESOURCES

Water Right No. (if applicable) _____

Open Channel Discharge Measurement Notes

A. GENERAL INFORMATION

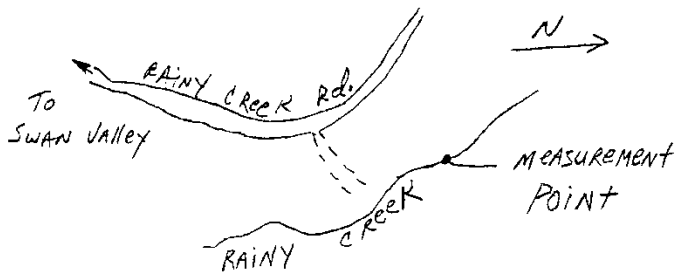
1. Name of stream or ditch: LOWER RAINEY CREEK
2. Location: NW NW SEC 33 T.1N R 44E
3. Person conducting measurement: MELVIN WEEKS
4. Date and time of measurement: 6/20/1990 9:45 A.M.
5. Accompanied by: _____
6. Measuring device size and ID no.: Pygmy 46261 = ID No.
7. Spin test before measurement OK? OK after measurement OK? OK
8. Purpose of measurement: MEASURE NATURAL FLOW IN STREAM ABOVE DIVERSIONS

B. MEASUREMENT DATA

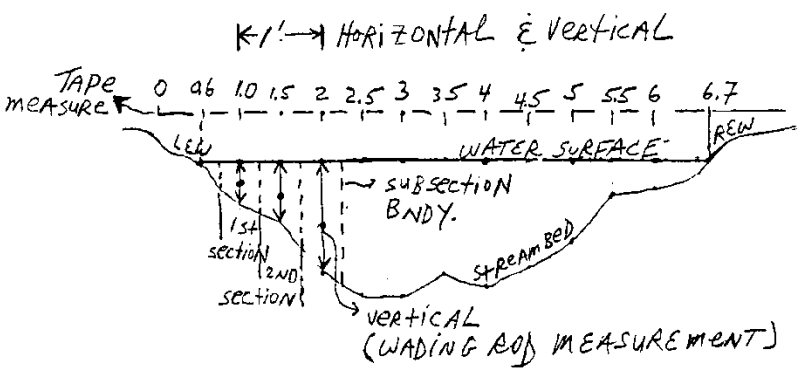
Angle coefficient	Dist. from initial point	Width	Depth	Observation depth	Revolutions	Time in seconds	VELOCITY: At point	VELOCITY: Mean in vertical	Adjusted for hor. angle or _____	Area	Discharge
	0.6	LEW									
	1.0	0.45	0.40	.6	5	43		.116		.180	.021
	1.5	0.50	0.65	.6	20	48		.417		.325	.136
	2.0	0.50	1.20	|	30	56		.536		.600	.322
	2.5	0.50	1.45	|	30	45		.667		.725	.484
	3.0	0.50	1.45	|	40	47		.851		.725	.617
	3.5	0.50	1.20	|	40	42		.952		.600	.571
	4.0	0.50	1.30	|	50	51		.980		.650	.637
	4.5	0.50	1.15	|	50	46		1.087		.575	.625
	5.0	0.50	0.80	|	30	42		.714		.400	.286
	5.5	0.50	0.35	|	10	52		.192		.175	.034
	6.0	0.50	0.30	↓	5	49		.102		.180	.018
	6.7	REW									
										5.14	3.75

C. DIAGRAMS

1. Measurement Location
Scale: _____ = _____



2. Cross-Section of Measurement
Scale _____ = _____



D. SUMMARY INFORMATION

1. Measurement rated X excellent ____ good ____ fair ____ poor
2. Remarks: MILD, SUNNY DAY. LAMINAR FLOW
3. Width: _____ Area: 5.14 Discharge in cubic feet per second: 3.75

6-20-90
DATE

SIGNATURE OF PERSON CONDUCTING MEASUREMENT

DEPARTMENT OF THE INTERIOR - GEOLOGICAL SURVEY

Water Resources Division

RATING TABLE FOR TYPE AA CURRENT METER

EQUATIONS: V = 2.140N + 0.015 (2.155) V = 2.150N + 0.005 . . . . STANDARD RATING NO. . . . X . . . .

Time in Seconds	VELOCITY IN FEET PER SECOND — Revolutions									Time in Seconds	Time in Seconds	VELOCITY IN FEET PER SECOND — Revolutions									Time in Seconds
	3	5	7	10	15	20	25	30	40			50	60	80	100	150	200	250	300	350	
40	.176	.282	.390	.550	.818	1.09	1.35	1.62	2.15	40	40	2.69	3.23	4.30	5.38	8.07	10.76	13.44	16.13	18.82	40
41	.172	.276	.380	.537	.798	1.06	1.32	1.58	2.10	41	41	2.63	3.15	4.20	5.25	7.87	10.49	13.11	15.74	18.36	41
42	.168	.270	.372	.525	.779	1.03	1.29	1.54	2.05	42	42	2.56	3.08	4.10	5.12	7.68	10.24	12.80	15.36	17.92	42
43	.164	.264	.363	.515	.762	1.01	1.26	1.51	2.01	43	43	2.50	3.00	4.00	5.00	7.50	10.00	12.50	15.00	17.50	43
44	.161	.258	.355	.501	.745	.988	1.23	1.47	1.96	44	44	2.45	2.94	3.91	4.89	7.33	9.78	12.22	14.66	17.11	44
45	.158	.253	.348	.491	.728	.966	1.20	1.44	1.92	45	45	2.39	2.87	3.83	4.78	7.17	9.56	11.95	14.34	16.73	45
46	.155	.248	.341	.480	.715	.945	1.18	1.41	1.88	46	46	2.34	2.81	3.74	4.68	7.02	9.35	11.69	14.03	16.36	46
47	.152	.243	.334	.470	.698	.926	1.15	1.38	1.84	47	47	2.29	2.75	3.66	4.58	6.87	9.15	11.44	13.73	16.02	47
48	.149	.238	.327	.461	.684	.907	1.13	1.35	1.80	48	48	2.24	2.69	3.59	4.48	6.72	8.96	11.20	13.44	15.68	48
49	.146	.233	.321	.452	.670	.888	1.11	1.33	1.76	49	49	2.20	2.64	3.51	4.39	6.59	8.78	10.97	13.17	15.36	49
50	.143	.229	.315	.443	.657	.871	1.09	1.30	1.73	50	50	2.15	2.58	3.44	4.30	6.46	8.60	10.76	12.90	15.06	50
51	.141	.225	.309	.435	.644	.854	1.06	1.27	1.69	51	51	2.11	2.53	3.38	4.22	6.33	8.44	10.54	12.65	14.76	51
52	.138	.221	.303	.427	.632	.838	1.04	1.25	1.66	52	52	2.07	2.49	3.31	4.14	6.21	8.27	10.34	12.41	14.48	52
53	.136	.217	.298	.419	.621	.823	1.02	1.23	1.63	53	53	2.03	2.44	3.25	4.06	6.09	8.12	10.15	12.17	14.20	53
54	.134	.213	.292	.411	.609	.808	1.01	1.20	1.60	54	54	2.00	2.39	3.19	3.99	5.98	7.97	9.96	11.95	13.94	54
55	.132	.210	.287	.404	.599	.793	.988	1.18	1.57	55	55	1.96	2.36	3.13	3.91	5.87	7.82	9.78	11.73	13.69	55
56	.130	.206	.282	.397	.588	.779	.970	1.16	1.54	56	56	1.93	2.31	3.08	3.84	5.76	7.68	9.60	11.52	13.44	56
57	.128	.203	.278	.390	.578	.766	.954	1.14	1.52	57	57	1.89	2.27	3.02	3.78	5.66	7.56	9.43	11.32	13.21	57
58	.126	.199	.273	.384	.568	.753	.937	1.12	1.49	58	58	1.86	2.23	2.97	3.71	5.56	7.42	9.27	11.13	12.98	58
59	.124	.196	.269	.378	.559	.740	.922	1.10	1.47	59	59	1.83	2.19	2.92	3.65	5.47	7.29	9.12	10.94	12.76	59
60	.122	.193	.266	.372	.550	.728	.907	1.09	1.44	60	60	1.80	2.15	2.87	3.59	5.38	7.17	8.96	10.76	12.55	60
61	.120	.190	.261	.366	.541	.717	.892	1.07	1.42	61	61	1.77	2.12	2.82	3.53	5.29	7.05	8.82	10.58	12.34	61
62	.119	.188	.257	.360	.533	.705	.878	1.05	1.40	62	62	1.74	2.09	2.78	3.47	5.21	6.94	8.67	10.41	12.14	62
63	.117	.186	.253	.356	.526	.694	.864	1.03	1.37	63	63	1.71	2.06	2.74	3.42	5.12	6.83	8.54	10.24	11.95	63
64	.115	.182	.249	.349	.517	.684	.851	1.02	1.35	64	64	1.69	2.02	2.69	3.36	5.04	6.72	8.40	10.08	11.76	64
65	.114	.180	.245	.344	.509	.673	.838	1.00	1.33	65	65	1.66	1.99	2.65	3.31	4.97	6.62	8.27	9.93	11.58	65
66	.112	.177	.242	.339	.501	.663	.826	.988	1.31	66	66	1.64	1.96	2.61	3.26	4.89	6.52	8.15	9.78	11.41	66
67	.111	.175	.239	.334	.494	.654	.814	.973	1.29	67	67	1.61	1.93	2.57	3.21	4.82	6.42	8.03	9.63	11.24	67
68	.109	.172	.235	.330	.487	.644	.802	.959	1.27	68	68	1.59	1.90	2.53	3.17	4.75	6.33	7.91	9.49	11.07	68
69	.108	.170	.232	.326	.480	.635	.790	.945	1.26	69	69	1.57	1.88	2.50	3.12	4.68	6.24	7.79	9.35	10.91	69
70	.107	.168	.229	.321	.474	.626	.779	.932	1.24	70	70	1.54	1.85	2.46	3.08	4.61	6.15	7.68	9.22	10.76	70
	3	5	7	10	15	20	25	30	40			50	60	80	100	150	200	250	300	350	

Sample current-meter rating table.

Appendix C

Examples

Watermaster Proposed Budget
Annual Report Form
Financial Statement

Examples: Watermaster's Proposed Budget, Annual Report Forms, and Water District Financial Statement

This section contains one example each of a watermaster's proposed budget and annual report using the forms prescribed by IDWR. Also included, is an example water district financial statement. The examples are fictitious but representative of a typical water district. They are not intended to cover all circumstances.

The forms used for the budget and watermaster report examples are the standard forms provided by the department. The watermaster report form only allows the entry of the information which is required by Section 42-606, Idaho Code, including the amount of water delivered to each user, the total expense of delivery, the apportionment of expenses among users and all debits and credits. The watermaster report form should be completed in order to prepare the budget and billing for the following year. The report is perhaps more of an accounting work sheet than it is a summary of water delivery and distribution. Examples of additional information which provide a better summary of water rights and water distribution which should be included with annual watermaster reports are given in Appendix D.

Districts may produce the budget and annual reports using different forms or some type of computer generated document as long as the information submitted is consistent with the information required on the department forms. Neither the Idaho Code nor the department requires that land descriptions be provided for individual rights on the proposed budget or annual watermaster's reports (this was a requirement under former law.) Those sections of the reports therefore were omitted from the attached examples.

Note also, on the proposed budget example that assessments are based on the amounts delivered for the past season or average amounts delivered for past seasons. A maximum of five seasons may be used for averaging past seasons.

There is no standard form for the water district financial statement. This statement which is required annually by Section 42-619, Idaho Code, should provide an annual summary of district revenues and expenses along with beginning and year end balances. The attached example is an acceptable statement.

Watermaster's Proposed Budget

FOR 19 99

Water District No. 71

Stream Idaho Creek

Name of Watermaster John Smith

Post Office Address PO Box 1, Anytown, Id 87654

Name of Secretary Bob Johnson

Post Office Address 123 Main, Anytown, Id 87654

SECTION 42-615, IDAHO CODE

PROPOSED BUDGET FOR SUCCEEDING YEAR. Each watermaster shall, at least thirty (30) days prior to the annual meeting of the water users of the water district, also prepare and file with the department of water resources a proposed budget for the succeeding year, together with a distribution of the amount of said budget to the respective water users, using the actual deliveries for the past irrigation season or seasons, as the basis for said distribution as hereinabove provided, which said proposed budget and distribution shall be submitted to the water users for consideration and approval at the next annual meeting.

In conformity with the above statute, I hereby submit a Proposed Budget for the season of 19 99.

John Smith
Watermaster

(This report must be made in duplicate, one copy to be forwarded to the appropriate regional office of the Idaho Department of Water Resources, and one copy to the Secretary of the last Annual Water User's Meeting of your District.)

	WATER RIGHT OWNER	IDWR WATER RIGHT IDENT No.	DIVERSION NAME / REMARKS
1	Anderson, L.	71-0102	
2	BB Ranches Inc.	71-0110	
3	BB Ranches Inc.	71-0112	
4	Edison, T.	71-0115	
5	Franklin, B.	71-0118	
6	Jefferson, A.	71-0121	
7	Harris Bros.	71-0525	
8	Harris Bros.	71-0210	
9	Lamb, J.	71-0220	
10	O'Brien, J.	71-0354	
11	Randolph, M.	71-0380	
12	Smith, S.	71-0386	
13	Tucker, K.	71-0440	
14	VW Ranches	71-0250	
15	VW Ranches	71-0690	
16			
17			
18			
19			
20			
21			
22			
23			
24			
25			
26			
27			
28			
29			
30			

	PAST SEASON DELIVERIES										Avg. Delivery for Past Seasons 6	Estimated Billing 7	Adjusted Billing 8
	1		2		3		4		5				
	19 94		19 95		19 96		19 97		1998				
1	380		375		450		458		420		417	585 80	
2	185		190		160		225		210		194	272 53	
3	170		175		162		200		180		177	248 65	
4	85		95		80		100		90		90	126 43	
5	270		290		255		315		280		282	396 15	
6	90		115		0		85		75		73	102 55	
7	155		200		110		125		140		146	205 10	
8	125		115		75		118		100		107	150 31	
9	300		360		260		340		325		317	445 32	
10	400		425		410		415		380		406	570 35	
11	245		260		310		336		300		290	407 39	
12	235		210		215		250		260		234	328 72	
13	410		360		385		415		400		394	553 49	
14	370		390		385		425		450		404	567 54	
15	345		300		350		180		390		313	439 70	
16											3844	5400 03	
17													
18													
19													
20													
21													
22													
23													
24													
25													
26													
27													
28													
29													
30													

WATERMASTER				ASSISTANT WATERMASTER, SECRETARY, STAFF, ETC.			OTHER	TOTAL
YEAR	DAYS	SALARY	TOTAL	DAYS	SALARY	TOTAL	EXPENSES	COSTS
19 94	90	$45/Day	4050 00				650 00	4700 00
19 95	90	$45/Day	4050 00				740 00	4790 00
19 96	80	$45/Day	3600 00				950 00	4550 00
19 97	90	$45/Day	4500 00				800 00	5300 00
19 98	90	$50/Day	4500 00				1000 00	5500 00
AVERAGE	88		4140 00				828 00	4968 00
WATERMASTER'S PROPOSED BUDGET								
NEXT YEAR	90	$50/Day	4500 00				900 00	5400 00

** $5400/3844 Avg. 24 Hr. Sec. Ft. = 1.4048 Cost Factor

Complete this proposed budget report form as follows:

1) Enter water right holder name, corresponding IDWR water right number or numbers, and corresponding diversion name and/or remarks on page 2;

2) If you wish to estimate next season's assessments based on the average delivery of past seasons, then enter the actual water deliveries to each user for the past two to five seasons on page 3. You have the option of using at least the past two seasons or up to five seasons for averaging. You also have the option of using last year's delivery or one year's delivery as a basis of determining assessments for the next season. Enter deliveries as total 24-hour second feet. Total 24-hour second feet is a flow rate expressed in terms of one day or 24 hours. For example, a continuous diversion of 2 cfs over 20 days would equal 40 24-hour second feet.

3) If using the averaging method, enter the average delivery for past seasons in column 6 of page 3. If you are not averaging, then enter each user's delivery from last year in column 5 and skip column 6.

4) In the work space provided at the top of this page, enter next years proposed watermaster salary, secretary and/or staff salaries, and expenses. You may use the past season costs and expenses, or average past seasons' costs and expenses as an aid in determining next years budget. A more detailed listing or itemization of expenses and salaries can be attached to this form.

5) Divide the total proposed budget amount for next year by the total past season delivery (total of column 5, page 3) or average past seasons deliveries (total of column 6, page 3) to obtain a unit cost factor.

6) Under column 7, page 3, multiply the unit cost factor by each user's past season or average past seasons deliveries to obtain the estimated billing for the next year.

7) Use column 8, page 3, to enter the adjusted billing amount if the district wishes to carry over debits and credits from the previous season. (Refer to the last watermaster report. If a user had a credit, subtract that credit from his or her estimated billing in column 7 of this report, and enter the difference or adjusted amount in column 8. If a user had a debit, then add that debit to his or her billing amount shown in column 7 and show as adjusted billing in column 8.

8) Sign the report and submit the original to the appropriate regional office of the Department of Water Resources. Retain one copy for the Water District.

Watermaster's Report – Page 3

	1	2		3		4		5		
	Total Delivery in 24-Hour Sec. Feet	Total Cost		Adopted Budget		Credits		Debits		Cost Per 24-Hr. Sec. Ft. $ 1.375
		$	cts.	$	cts.	$	cts.	$	cts.	
1	420	577	50	590	50	13	00			Total No. Days of Watermaster 90
2	210	288	75	245	00			43	75	90 days at $ 50.00 per day $ 4500.00
3	180	247	50	255	00	7	50			Total No. Days of Asst. Watermaster
4	90	123	75	120	00			3	75	days at $ per day $
5	280	385	00	345	50			39	50	Other expenses charged pro rata $ 1000.00
6	75	103	13	110	00	6	87			**TOTAL COST** $ 5500.00
7	140	192	50	182	00			10	50	Total No. 24-Hour Sec. Feet Delivered 4000.00
8	100	137	50	125	00			12	50	Cost per 24-Hour Sec. Feet Delivered $ 1.375
9	325	446	88	470	00	23	12			$5500/4000 24hr.sec.ft. =
10	380	522	50	525	00	2	50			$1.375/24hr.sec.ft.
11	300	412	50	405	00			7	50	
12	260	357	50	350	50			7	00	
13	400	550	00	525	00			25	00	
14	450	618	75	625	00	6	25			
15	390	536	25	530	00			6	25	
16	4000	5500	01	5403	50	59	24	155	75	TOTALS
17										Cost = Adopted Budget - Credits + Debits
18										
19										
20										
21										
22										
23										
24										
25										
26										
27										
28										
29										
30										

WATER DISTRICT NO. 71

STATEMENT OF REVENUES, EXPENSES
AND CHANGES IN FUND BALANCE

For the year ended December 31, 1999

Revenues:

Assessments	$5,404.00
Interest	75.00
Total Revenues	$5,479.00

Expenses:

Watermaster Salary	$4,500.00
Watermaster Taxes	195.00
Watermaster Insurance	165.00
Automotive	518.00
Telephone	52.00
Office & Miscellaneous	32.00
Equipment	38.00
Total Expenses	$5,500.00
Excess Revenues (Expenses)	($21.00)
Fund Balances, Beginning of the year	$560.00
Fund Balances, End of year	$539.00

Appendix D

Examples

Watermaster Annual Water Distribution Information

This section provides an example of how water distribution data and water right information can be compiled in a report format and used to supplement the standard annual report form and daily log books. Real data and water right information from an Idaho river has been used in compiling this example report. Some water rights and diversions within the water district however have been omitted in order to simplify the example.

Included in this example report is a written summary of water supply and distribution, and a map showing relative locations of diversions and measuring sites as well as diversion names and numbers, a water rights priority cut list, a spreadsheet showing daily diversions, natural flows and storage releases, plus miscellaneous measurements and stream gage data.

This example is intended to represent perhaps a smaller or average size district and provide suggestions of summarizing all data in one comprehensive report. Reports need not follow the same style or format shown in this example. The Department does recommend however that watermasters annually submit a water rights delivery list and some type of water right priority cut summary similar to the ones shown in the attached example. In addition to submitting daily log books, it is a good idea to summarize and submit daily diversions in some type of tabular format. All miscellaneous stream flow measurements, such as current meter measurements and all stream gage records, used in the process of distributing water are required by law to be submitted with an annual report.

Compilation of a report similar to the attached example provides better documentation of how water was actually delivered, and how much was delivered under each water right. In the event that litigation or just general questions should arise concerning delivery of specific rights, such documentation can support and defend a watermaster's actions. This type of concise and comprehensive reporting is also more informative than the standard annual report form and daily log books, and provides perhaps a better service to the district water users.

Tables and lists like those in the example can be easily generated using word processing and/or simple data base management software programs on a personal computer. Handwritten reports and tables are also acceptable but would be more laborious and less automated than using a personal computer.

Summary

The 1992 irrigation season was among the driest on record. The April 1 SCS estimated snow pack for the basin was only 30 percent of normal while projected annual runoff was about 43 percent of normal. Actual runoff for the water year ending on October 1, 1992 was 50 percent of normal. The Basin Reservoir filled approximately 40 percent of capacity prior to storage releases. Storage use was limited to only 46 days of use.

Natural flow rights on the river were cut very early in the season. Rights with priority dates of 1905 and later were not filled at any time of the season. Rights with priorities later than April 18, 1898 were cut prior to April 30. Additional rights with priorities past June 11, 1889 were cut on May 13. The June 11, 1889 right remained only partially filled for the rest of the season after May 13 and was completely cut for several days between June 5 and June 8. All rights with priorities earlier than June 11, 1889 were either filled or able to be satisfied during the season.

The total of all diversions for the season as determined from the attached diversion summary list and the watermasters billing was 15,360 24-hr. second-feet.

WATER DISTRICT

WATER RIGHTS DELIVERY LIST

PRIORITY NO.	DATE	DIVERSION NUMBER	DIVERSION NAME	AMOUNT	IDWR ADMIN. NO.	POINT OF DIVERISON	REACH	REMARKS
1	07/06/1868	D6	CUTLER DITCH	0.58 CFS	29-00247	09S 37E 21 SENE	RIVER BELOW TOPAZ	DECREED INIDAN RIGHT
1	07/06/1868	D6	CUTLER DITCH	1.40 CFS	29-00248	09S 37E 21 SENE	RIVER BELOW TOPAZ	DECREED INDIAN RIGHT
2	03/27/1889	D4	ARIMO DITCH	55.00 CFS	29-00051	09S 37E 22 SENW	RIVER BELOW TOPAZ	PD=PMV-ARIMO DITCH NR McCAMMON
3	05/01/1889	D2	CHRISTIANSEN DITCH	1.20 CFS	29-00044	09S 38E 09 NWNE	RIVER ABOVE TOPAZ	
4	06/11/1889	D5	McCAMMON DITCH	50.00 CFS	29-00057	09S 37E 21 SWNE	RIVER BELOW TOPAZ	
5	07/01/1889	D3	LAVA IRRIGATION	2.26 CFS	29-00047	09S 38E 10 NWSW	RIVER ABOVE TOPAZ	
6	04/18/1898	D1	DEMPSEY-TOPAZ DITCH	32.00 CFS	29-00036	08S 38E 28 NESW	RIVER ABOVE TOPAZ	
7	06/28/1901	D5	McCAMMON DITCH	18.95 CFS	29-00058	09S 37E 21 SWNE	RIVER BELOW TOPAZ	
8	02/11/1904	D3	LAVA IRRIGATION	20.50 CFS	29-00048	09S 38E 10 NWSW	RIVER ABOVE TOPAZ	
9	01/14/1907	D1	DEMPSEY-TOPAZ DITCH	7.50 CFS	29-00037	08S 38E 28 NESW	RIVER ABOVE TOPAZ	
9	01/14/1907	D1	DEMPSEY-TOPAZ DITCH	20.00 CFS	29-02053	08S 38E 28 NESW	RIVER ABOVE TOPAZ	
10	02/06/1907	D1	DEMPSEY-TOPAZ DITCH	13.63 CFS	29-02054	08S 38E 28 NESW	RIVER ABOVE TOPAZ	
11	12/18/1907	D4	DOWNEY DITCH	176.85 CFS	29-00052	09S 37E 22 SENW	RIVER BELOW TOPAZ	PD=PMV-ARIMO DITCH NR McCAMMON
12	05/01/1909	D6	CUTLER DITCH	0.80 CFS	29-00054	09S 37E 21 SENE	RIVER BELOW TOPAZ	PD=PMV-ARIMO DITCH NR McCAMMON
13	07/06/1912	D4	DOWNEY DITCH	16,410 AF	29-00589	09S 37E 22 SENW	RIVER BELOW TOPAZ	STORAGE RT FOR 16,410 AF

1992 WATER RIGHTS REGULATION & MISCELLANEOUS MEASUREMENTS

1992 Priority Cuts of Natural Flow Rights

Priority Date of Last Right Filled	Date Priority Cut Made in 1992	Remarks
2/11/1904	April 15	Right partially filled
6/28/1901	April 23	
4/18/1898	April 30	
6/11/1889	May 13	
5/01/1889	June 5	
6/11/1889	June 9	

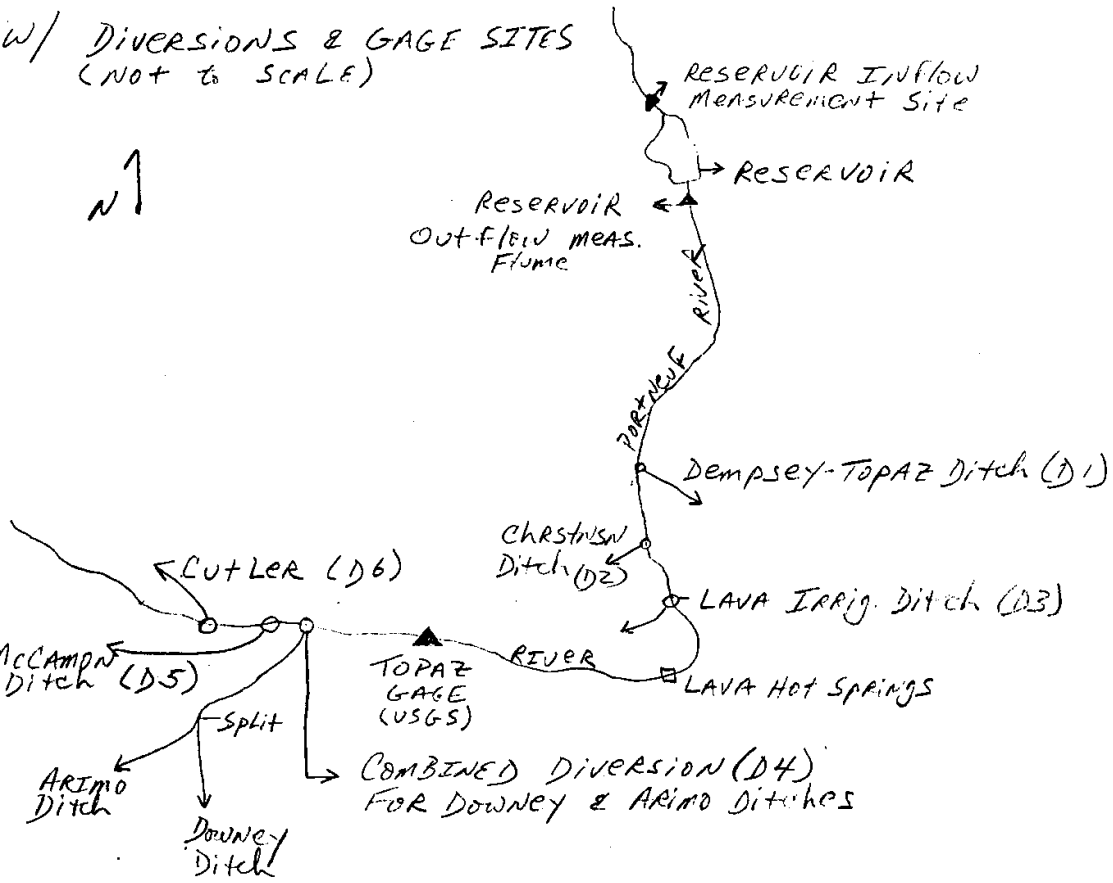
1992 SUMMARY OF MISCELLANEOUS MEASUREMENTS*

Date of Measurement	Location	Measured Flow Rate
May 6	Reservoir Inflow	4.13 cfs
May 21	Reservoir Inflow	2.68 cfs
June 23	Spring Discharge Below Reservoir	0.25 cfs
June 23	Reservoir Inflow	1.88 cfs

* attach discharge measurement notes

MAP OF RIVER

W/ DIVERSIONS & GAGE SITES
(NOT to SCALE)



See water rights delivery list for legal descriptions of all points of diversion.

Diversion CUTLER DITCH **Water Dist Div.**
13073161

Discharge, Cubic Feet per Second, Calendar Year 1992

Day	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
01					0.0	2.0	2.0	2.0				
02					0.0	1.0	2.0	2.0				
03					0.0	1.0	2.0	1.0				
04					0.0	1.0	0.0	1.0				
05					0.0	2.0	0.0	1.0				
06					0.0	2.0	0.0	1.0				
07					0.0	2.0	0.0	2.0				
08					0.0	2.0	0.0	2.0				
09					0.0	2.0	2.0	2.0				
10					0.0	2.0	2.0	2.0				
11					0.0	2.0	1.0	2.0				
12					1.0	2.0	1.0	2.0				
13					1.0	2.0	1.0	2.0				
14					1.0	1.0	0.0	2.0				
15				0.0	0.0	1.0	0.0	2.0				
16				0.0	0.0	1.0	1.0	2.0				
17				0.0	0.0	2.0	1.0	1.0				
18				0.0	0.0	0.0	2.0	1.0				
19				0.0	0.0	0.0	0.0	1.0				
20				0.0	0.0	0.0	0.0	1.0				
21				0.0	0.0	0.0	0.0	1.0				
22				0.0	1.0	0.0	0.0	2.0				
23				0.0	2.0	1.0	0.0	2.0				
24				0.0	2.0	2.0	2.0	2.0				
25				0.0	2.0	2.0	2.0	2.0				
26				0.0	2.0	2.0	2.0	2.0				
27				0.0	2.0	2.0	2.0	2.0				
28				0.0	1.0	2.0	2.0	2.0				
29				0.0	2.0	2.0	2.0	2.0				
30				0.0	1.0	2.0	2.0	2.0				
31					2.0		2.0	2.0				
Total				0.0	20.0	43.0	33.0	53.0				
Mean				0.0	0.6	1.4	1.1	1.7				
Min				0.0	0.0	0.0	0.0	1.0				
Max				0.0	2.0	2.0	2.0	2.0				
Ac-Ft				0.0	39.7	85.3	65.5	105.1				

Calendar Year 1992 Total Cfs: 149 **Total Ac-Ft: 296**

Diversion PORTNEUF IRRIGATING CO. (ARIMO) DITCH **Water Dist Div.** 13073130

Discharge, Cubic Feet Per Second, Calendar Year 1992

Day	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
01					55.0	52.0	52.0	54.0				
02					55.0	50.0	56.0	55.0				
03					54.0	54.0	55.0	54.0				
04					54.0	53.0	55.0	55.0				
05					54.0	52.0	55.0	55.0				
06					46.0	53.0	54.0	56.0				
07					46.0	52.0	53.0	55.0				
08					55.0	53.0	55.0	55.0				
09					55.0	51.0	55.0	55.0				
10					55.0	51.0	55.0	55.0				
11					54.0	52.0	54.0	55.0				
12					54.0	53.0	56.0	55.0				
13					56.0	53.0	55.0	55.0				
14					56.0	53.0	55.0	55.0				
15				0.0	55.0	57.0	54.0	55.0				
16				0.0	53.0	58.0	55.0	55.0				
17				0.0	52.0	57.0	53.0	56.0				
18				15.0	53.0	55.0	55.0	55.0				
19				3.0	56.0	55.0	54.0	55.0				
20				3.0	54.0	55.0	53.0	55.0				
21				3.0	53.0	55.0	57.0	55.0				
22				3.0	51.0	55.0	55.0	55.0				
23				7.0	52.0	55.0	56.0	55.0				
24				37.0	51.0	55.0	53.0	55.0				
25				38.0	49.0	54.0	55.0	55.0				
26				40.0	50.0	56.0	55.0	55.0				
27				37.0	53.0	57.0	55.0	55.0				
28				37.0	54.0	56.0	54.0	55.0				
29				38.0	50.0	57.0	55.0	55.0				
30				55.0	55.0	56.0	55.0	55.0				
31					53.0		55.0	55.0				
Total				316.0	1643.	1625.	1694.	1705.				
Mean				19.8	53.0	54.2	54.6	55.0				
Min				0.0	46.0	50.0	52.0	54.0				
Max				55.0	56.0	58.0	57.0	56.0				
Ac-Ft				626.8	3258.	3223.	3360.	3381.				

Calendar Year 1992 Total Cfs: 6983 **Total Ac-Ft: 13851**

Diversion CHRISTIANSEN DITCH **Water Dist Div.**
13072101

Discharge, Cubic Feet per Second, Calendar Year 1992

Day	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
01					0.0	1.0	1.0	0.0				
02					0.0	1.0	1.0	0.0				
03					0.0	1.0	1.0	0.0				
04					1.0	1.0	1.0	0.0				
05					1.0	1.0	0.0	0.0				
06					1.0	0.0	0.0	0.0				
07					1.0	0.0	0.0	0.0				
08					1.0	0.0	0.0	0.0				
09					1.0	0.0	0.0	0.0				
10					0.0	0.0	0.0	0.0				
11					0.0	0.0	0.0	0.0				
12					0.0	0.0	0.0	0.0				
13					0.0	0.0	1.0	0.0				
14					0.0	1.0	1.0	0.0				
15				2.0	0.0	1.0	1.0	0.0				
16				2.0	0.0	1.0	1.0	0.0				
17				2.0	1.0	1.0	1.0	0.0				
18				2.0	1.0	1.0	1.0	0.0				
19				2.0	1.0	1.0	1.0	0.0				
20				2.0	1.0	1.0	0.0	0.0				
21				2.0	1.0	0.0	0.0	0.0				
22				0.0	1.0	0.0	0.0	0.0				
23				0.0	1.0	0.0	0.0	0.0				
24				0.0	0.0	0.0	0.0	0.0				
25				0.0	0.0	0.0	0.0	0.0				
26				0.0	0.0	0.0	0.0	0.0				
27				0.0	0.0	1.0	0.0	0.0				
28				0.0	0.0	1.0	0.0	0.0				
29				0.0	0.0	1.0	0.0	0.0				
30				0.0	0.0	1.0	0.0	0.0				
31					1.0		0.0	0.0				
Total				14.0	14.0	16.0	11.0	0.0				
Mean				0.9	0.5	0.5	0.4	0.0				
Min				0.0	0.0	0.0	0.0	0.0				
Max				2.0	1.0	1.0	1.0	0.0				
Ac-Ft				27.8	27.8	31.7	21.8	0.0				

Calendar Year 1992 Total Cfs: 55 **Total Ac-Ft: 109**

Diversion MCCAMMON DITCH CO. CANAL **Water Dist Div.**
13073150

Discharge, Cubic Feet per Second, Calendar Year 1992

Day	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
01					51.0	5.0	27.0	16.0				
02					51.0	5.0	29.0	16.0				
03					49.0	3.0	29.0	16.0				
04					49.0	3.0	29.0	15.0				
05					48.0	0.0	29.0	15.0				
06					60.0	0.0	28.0	15.0				
07					59.0	0.0	28.0	14.0				
08					49.0	0.0	23.0	15.0				
09					50.0	2.0	22.0	15.0				
10					50.0	2.0	21.0	15.0				
11					49.0	1.0	21.0	15.0				
12					45.0	1.0	21.0	15.0				
13					27.0	2.0	21.0	15.0				
14					28.0	5.0	21.0	14.0				
15				28.0	30.0	3.0	21.0	14.0				
16				28.0	65.0	3.0	18.0	15.0				
17				31.0	35.0	15.0	16.0	17.0				
18				40.0	26.0	14.0	15.0	17.0				
19				32.0	23.0	13.0	15.0	17.0				
20				56.0	21.0	6.0	20.0	16.0				
21				66.0	20.0	4.0	18.0	16.0				
22				68.0	18.0	4.0	18.0	15.0				
23				69.0	16.0	5.0	16.0	15.0				
24				55.0	12.0	23.0	17.0	15.0				
25				56.0	13.0	25.0	16.0	16.0				
26				64.0	14.0	24.0	16.0	16.0				
27				54.0	13.0	23.0	17.0	17.0				
28				53.0	14.0	20.0	16.0	17.0				
29				55.0	11.0	21.0	15.0	17.0				
30				51.0	6.0	25.0	16.0	18.0				
31					4.0		16.0	18.0				
Total				806.0	1006.	257.0	635.0	487.0				
Mean				50.4	32.5	8.6	20.5	15.7				
Min				28.0	4.0	0.0	15.0	14.0				
Max				69.0	65.0	25.0	29.0	18.0				
Ac-Ft				1598.	1995.	509.8	1259.	966.0				

Calendar Year 1992 Total Cfs: 3191 **Total Ac-Ft: 6329**

UNITED STATES DEPARTMENT OF THE INTERIOR - GEOLOGICAL SURVEY - BOISE 01/04/93

STATION NUMBER 13073000 PORTNEUF RIVER AT TOPAZ ID STREAM SOURCE AGENCY USGS
LATITUDE 423730 LONGITUDE 1120520 DRAINAGE AREA 570 DATUM 4918.00 STATE 16 COUNTY 005

DISCHARGE, CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1991 TO SEPTEMBER 1992
DAILY MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	88	e103	122	120	119	145	128	112	152	93	75	77
2	87	107	125	119	120	147	127	113	144	93	75	77
3	86	110	126	118	119	e142	126	112	144	91	74	76
4	86	120	126	123	118	e143	126	110	143	91	74	77
5	87	124	126	123	118	e145	126	138	144	90	74	77
6	87	144	126	122	118	143	119	167	146	89	74	77
7	90	138	129	121	120	143	111	172	146	89	74	77
8	90	133	130	122	121	142	104	183	146	87	75	77
9	90	131	129	119	122	140	101	188	146	84	75	76
10	94	131	127	120	120	138	101	193	144	83	74	76
11	94	128	123	121	121	138	101	193	145	83	74	75
12	94	126	127	121	124	136	94	194	143	83	73	76
13	94	128	125	119	130	134	89	198	144	83	74	75
14	93	131	124	121	145	133	89	199	150	81	74	76
15	92	130	122	120	139	133	87	188	159	79	74	75
16	92	128	121	119	135	132	85	176	159	79	75	62
17	92	128	121	121	132	134	90	194	163	78	76	55
18	91	132	122	122	127	136	96	189	155	79	76	51
19	92	132	123	120	129	136	93	187	149	78	75	50
20	92	129	122	118	172	135	91	185	141	78	76	49
21	93	128	120	118	206	133	90	183	112	80	74	50
22	92	127	121	120	195	132	91	182	97	78	73	50
23	95	122	122	120	172	132	95	178	93	77	74	50
24	97	127	122	119	162	136	100	175	92	77	74	52
25	96	127	122	119	156	135	104	170	93	76	75	51
26	97	132	120	119	146	130	109	168	92	75	75	53
27	107	133	119	119	149	130	103	170	91	76	75	53
28	102	133	120	118	147	131	102	167	90	75	74	53
29	102	134	120	119	146	131	102	165	90	75	75	53
30	102	123	119	118	---	130	108	164	92	75	74	53
31	102	---	120	118	---	129	---	163	---	75	76	---
TOTAL	2896	3819	3821	3716	4028	4224	3088	5276	3905	2530	2310	1929
MEAN	93.4	127	123	120	139	136	103	170	130	81.6	74.5	64.3
MAX	107	144	130	123	206	147	128	199	163	93	76	77
MIN	86	103	119	118	118	129	85	110	90	75	73	49
AC-FT	5740	7570	7580	7370	7990	8380	6130	10460	7750	5020	4580	3830

CAL YR 1991 TOTAL 51353 MEAN 141 MAX 306 MIN 80 AC-FT 101900
WTR YR 1992 TOTAL 41542 MEAN 114 MAX 206 MIN 49 AC-FT 82400

e Estimated

Water District
Summary of Diversions & Distribution
1992
(All flows reported in cfs)

Page No. 1

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
DATE	Reservr Inflow	Resrvr Outflow	Storage (2-1)	Dempsey -Topaz Ditch	Chrstnsn Ditch	Lava Irrig. Ditch	Sum of Diversions Above Topaz (4+5+6)	Topaz	Natural Flow at Topaz (8-3+7)	Downey Ditch	Arimo Ditch	McCamon Ditch	Cutler Ditch	Sum of Diversions Below Topaz (10+11+12+13)	Topaz Gage Less Diversions Below Topaz (8-14)
04/15/92	4.50	4.50	0.00	22.00	2.00	13.00	37.00	87.00	124.00	0.00	0.00	28.00	0.00	28.00	59.00
04/16/92	4.50	4.50	0.00	22.00	2.00	13.00	37.00	85.00	122.00	0.00	0.00	28.00	0.00	28.00	57.00
04/17/92	4.50	4.50	0.00	22.00	2.00	13.00	37.00	90.00	127.00	0.00	0.00	31.00	0.00	31.00	59.00
04/18/92	4.50	4.50	0.00	26.00	2.00	15.00	43.00	96.00	139.00	0.00	15.00	40.00	0.00	55.00	41.00
04/19/92	4.50	4.50	0.00	26.00	2.00	15.00	43.00	93.00	136.00	0.00	3.00	32.00	0.00	35.00	58.00
04/20/92	4.50	4.50	0.00	26.00	2.00	14.00	42.00	91.00	133.00	0.00	3.00	56.00	0.00	59.00	32.00
04/21/92	4.50	4.50	0.00	26.00	2.00	18.00	46.00	90.00	136.00	0.00	3.00	66.00	0.00	69.00	21.00
04/22/92	4.50	4.50	0.00	26.00	0.00	18.00	44.00	91.00	135.00	0.00	3.00	68.00	0.00	71.00	20.00
04/23/92	4.50	4.50	0.00	26.00	0.00	18.00	44.00	95.00	139.00	0.00	7.00	69.00	0.00	76.00	19.00
04/24/92	4.50	4.50	0.00	26.00	0.00	2.00	28.00	100.00	128.00	0.00	37.00	55.00	0.00	92.00	8.00
04/25/92	4.50	4.50	0.00	23.00	0.00	2.00	25.00	104.00	129.00	0.00	38.00	56.00	0.00	94.00	10.00
04/26/92	4.50	4.50	0.00	23.00	0.00	3.00	26.00	109.00	135.00	0.00	40.00	64.00	0.00	104.00	5.00
04/27/92	4.50	4.50	0.00	23.00	0.00	3.00	26.00	103.00	129.00	0.00	37.00	54.00	0.00	91.00	12.00
04/28/92	4.50	4.50	0.00	23.00	0.00	3.00	26.00	102.00	128.00	0.00	37.00	53.00	0.00	90.00	12.00
04/29/92	4.50	4.50	0.00	23.00	0.00	3.00	26.00	102.00	128.00	0.00	38.00	55.00	0.00	93.00	9.00
04/30/92	4.50	4.50	0.00	12.00	0.00	3.00	15.00	108.00	123.00	0.00	55.00	51.00	0.00	101.00	7.00
05/01/92	4.50	4.50	0.00	12.00	0.00	3.00	15.00	112.00	127.00	0.00	55.00	51.00	0.00	106.00	6.00
05/02/92	4.50	4.50	0.00	12.00	0.00	3.00	15.00	113.00	128.00	0.00	55.00	51.00	0.00	106.00	7.00
05/03/92	4.50	4.50	0.00	12.00	0.00	3.00	15.00	112.00	127.00	0.00	54.00	49.00	0.00	103.00	9.00
05/04/92	4.50	86.00	81.50	12.00	1.00	3.00	16.00	110.00	44.50	0.00	54.00	49.00	0.00	103.00	7.00
05/05/92	4.50	92.00	87.50	12.00	1.00	3.00	16.00	138.00	66.50	0.00	54.00	48.00	0.00	102.00	36.00
05/06/92	4.13	90.00	85.87	12.00	1.00	3.00	16.00	167.00	97.13	70.00	46.00	60.00	0.00	176.00	-9.00
05/07/92	4.10	90.00	85.90	12.00	1.00	3.00	16.00	172.00	102.10	80.00	46.00	59.00	0.00	185.00	-13.00
05/08/92	4.00	112.00	108.00	12.00	1.00	3.00	16.00	183.00	91.00	86.00	55.00	49.00	0.00	190.00	-7.00
05/09/92	4.00	111.00	107.00	12.00	1.00	3.00	16.00	188.00	97.00	101.00	55.00	50.00	0.00	206.00	-18.00
05/10/92	3.70	110.00	106.30	4.00	0.00	3.00	7.00	193.00	93.70	108.00	55.00	50.00	0.00	213.00	-20.00
05/11/92	3.70	111.00	107.30	4.00	0.00	3.00	7.00	193.00	92.70	109.00	54.00	49.00	0.00	212.00	-19.00
05/12/92	3.50	112.00	108.50	4.00	0.00	3.00	7.00	194.00	92.50	101.00	54.00	45.00	1.00	201.00	-7.00
05/13/92	3.50	113.00	109.50	0.00	0.00	0.00	0.00	198.00	88.50	113.00	56.00	27.00	1.00	197.00	1.00
05/14/92	3.50	113.00	109.50	0.00	0.00	0.00	0.00	199.00	89.50	110.00	56.00	28.00	1.00	195.00	4.00
05/15/92	3.20	110.00	106.80	0.00	0.00	0.00	0.00	188.00	81.20	90.00	55.00	30.00	0.00	175.00	13.00
05/16/92	3.20	110.00	106.80	0.00	0.00	0.00	0.00	176.00	69.20	10.00	53.00	65.00	0.00	128.00	48.00
05/17/92	3.20	110.00	106.80	0.00	1.00	0.00	1.00	194.80	89.00	100.00	52.00	35.00	0.00	187.00	7.80
05/18/92	3.00	108.00	105.00	0.00	1.00	0.00	1.00	189.00	85.00	107.00	53.00	26.00	0.00	186.00	3.00

Water District
Summary of Diversions & Distribution
1992
(All flows reported in cfs)

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
DATE	Reservr Inflow	Resrvr Outflow	Storage (2-1)	Dempsey -Topaz Ditch	Chrstnsn Ditch	Lava Irrig. Ditch	Sum of Diversions Above Topaz (4+5+6)	Topaz	Natural Flow at Topaz (8-3+7)	Downey Ditch	Arimo Ditch	McCamon Ditch	Cutler Ditch	Sum of Diversions Below Topaz (10+11+12+13)	Topaz Gage Less Diversions Below Topaz (8-14)
05/19/92	3.00	108.00	105.00	0.00	1.00	0.00	1.00	187.00	83.00	102.00	56.00	23.00	0.00	181.00	6.00
05/20/92	3.00	106.00	103.00	0.00	1.00	0.00	1.00	185.00	83.00	103.00	54.00	21.00	0.00	178.00	7.00
05/21/92	2.70	106.00	103.30	0.00	1.00	0.00	1.00	183.00	80.70	103.00	53.00	20.00	0.00	176.00	7.00
05/22/92	2.70	105.00	102.30	0.00	1.00	0.00	1.00	182.00	80.70	104.00	51.00	18.00	1.00	174.00	8.00
05/23/92	2.70	104.00	101.30	0.00	1.00	0.00	1.00	178.00	77.70	101.00	52.00	16.00	2.00	171.00	7.00
05/24/92	2.50	105.00	102.50	0.00	0.00	0.00	0.00	175.00	72.50	101.00	51.00	12.00	2.00	166.00	9.00
05/25/92	2.50	105.00	102.50	0.00	0.00	0.00	0.00	170.00	67.50	100.00	49.00	13.00	2.00	164.00	6.00
05/26/92	2.20	105.00	102.80	0.00	0.00	0.00	0.00	168.00	65.20	94.00	50.00	14.00	2.00	160.00	8.00
05/27/92	2.20	106.00	103.80	0.00	0.00	0.00	0.00	170.00	66.20	100.00	53.00	13.00	2.00	168.00	2.00
05/28/92	2.00	105.00	103.00	0.00	0.00	0.00	0.00	167.00	64.00	95.00	54.00	14.00	1.00	164.00	3.00
05/29/92	2.00	105.00	103.00	0.00	0.00	0.00	0.00	165.00	62.00	96.00	50.00	11.00	2.00	159.00	6.00
05/30/92	2.00	106.00	104.00	0.00	0.00	0.00	0.00	164.00	60.00	99.00	55.00	6.00	1.00	161.00	3.00
05/31/92	2.00	105.00	103.00	0.00	1.00	0.00	1.00	163.00	61.00	99.00	53.00	4.00	2.00	158.00	5.00
06/01/92	2.00	90.00	88.00	0.00	1.00	0.00	1.00	152.00	65.00	101.00	52.00	5.00	2.00	160.00	-8.00
06/02/92	2.00	91.00	89.00	0.00	1.00	0.00	1.00	144.00	56.00	84.00	50.00	5.00	1.00	140.00	4.00
06/03/92	2.00	91.00	89.00	0.00	1.00	0.00	1.00	144.00	56.00	87.00	54.00	3.00	1.00	145.00	-1.00
06/04/92	2.00	91.00	89.00	0.00	1.00	0.00	1.00	143.00	55.00	87.00	53.00	3.00	1.00	144.00	-1.00
06/05/92	2.00	89.00	87.00	0.00	1.00	0.00	1.00	144.00	58.00	82.00	52.00	0.00	2.00	136.00	8.00
06/06/92	2.00	90.00	88.00	0.00	0.00	0.00	0.00	146.00	58.00	88.00	53.00	0.00	2.00	143.00	3.00
06/07/92	2.00	87.00	85.00	0.00	0.00	0.00	0.00	146.00	61.00	86.00	52.00	0.00	2.00	140.00	6.00
06/08/92	2.00	88.00	86.00	0.00	0.00	0.00	0.00	146.00	60.00	86.00	53.00	0.00	2.00	141.00	5.00
06/09/92	2.00	87.00	85.00	0.00	0.00	0.00	0.00	146.00	61.00	85.00	51.00	2.00	2.00	140.00	6.00
06/10/92	2.00	89.00	87.00	0.00	0.00	0.00	0.00	144.00	57.00	82.00	51.00	2.00	2.00	137.00	7.00
06/11/92	2.00	87.00	85.00	0.00	0.00	0.00	0.00	145.00	60.00	84.00	52.00	1.00	2.00	139.00	6.00
06/12/92	2.00	89.00	87.00	0.00	0.00	0.00	0.00	143.00	56.00	85.00	53.00	1.00	2.00	141.00	2.00
06/13/92	2.00	89.00	87.00	0.00	0.00	0.00	0.00	144.00	57.00	85.00	53.00	2.00	2.00	142.00	2.00
06/14/92	2.00	89.00	87.00	0.00	1.00	0.00	1.00	150.00	64.00	86.00	53.00	5.00	1.00	145.00	5.00
06/15/92	2.00	87.00	85.00	0.00	1.00	0.00	1.00	159.00	75.00	93.00	57.00	3.00	1.00	154.00	5.00
06/16/92	2.20	89.00	86.80	0.00	1.00	0.00	1.00	159.00	73.20	91.00	58.00	3.00	1.00	153.00	6.00
06/17/92	2.00	86.00	84.00	0.00	1.00	0.00	1.00	163.00	80.00	85.00	57.00	15.00	2.00	159.00	4.00
06/18/92	2.00	82.00	80.00	0.00	1.00	0.00	1.00	155.00	76.00	84.00	55.00	14.00	0.00	153.00	2.00
06/19/92	2.50	61.00	58.50	0.00	1.00	0.00	1.00	149.00	91.50	83.00	55.00	13.00	0.00	151.00	-2.00
06/20/92	2.00	10.00	8.00	0.00	1.00	0.00	1.00	141.00	134.00	81.00	55.00	6.00	0.00	142.00	-1.00
06/21/92	2.00	8.00	6.00	0.00	0.00	0.00	0.00	112.00	106.00	49.00	55.00	4.00	0.00	108.00	4.00

Water District
Summary of Diversions & Distribution
1992
(All flows reported in cfs)

Page No. 3

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
DATE	Reservr Inflow	Resrvr Outflow	Storage (2-1)	Dempsey -Topaz Ditch	Chrstnsn Ditch	Lava Irrig. Ditch	Sum of Diversions Above Topaz (4+5+6)	Topaz	Natural Flow at Topaz (8-3+7)	Downey Ditch	Arimo Ditch	McCamon Ditch	Cutler Ditch	Sum of Diversions Below Topaz (10+11+12+13)	Topaz Gage Less Diversions Below Topaz (8-14)
06/22/92	2.00	5.00	3.00	0.00	0.00	0.00	0.00	97.00	94.00	29.00	55.00	4.00	0.00	88.00	9.00
06/23/92	1.88	5.00	3.12	0.00	0.00	0.00	0.00	93.00	89.88	7.00	55.00	5.00	1.00	68.00	25.00
06/24/92	2.00	4.00	2.00	0.00	0.00	0.00	0.00	92.00	90.00	6.00	55.00	23.00	2.00	86.00	6.00
06/25/92	2.00	4.00	2.00	0.00	0.00	0.00	0.00	93.00	91.00	0.00	54.00	25.00	2.00	81.00	12.00
06/26/92	2.00	4.00	2.00	0.00	0.00	0.00	0.00	92.00	90.00	0.00	56.00	24.00	2.00	82.00	10.00
06/27/92	2.00	4.00	2.00	0.00	1.00	0.00	1.00	91.00	90.00	0.00	57.00	23.00	2.00	82.00	9.00
06/28/92	2.00	3.00	1.00	0.00	1.00	0.00	1.00	90.00	90.00	0.00	56.00	20.00	2.00	78.00	12.00
06/29/92	2.00	3.00	1.00	0.00	1.00	0.00	1.00	90.00	90.00	0.00	57.00	21.00	2.00	80.00	10.00
06/30/92	2.00	3.00	1.00	0.00	1.00	0.00	1.00	92.00	92.00	0.00	56.00	25.00	2.00	83.00	9.00
07/01/92	2.00	4.00	2.00	0.00	1.00	0.00	1.00	93.00	92.00	0.00	52.00	27.00	2.00	81.00	12.00
07/02/92	2.00	4.00	2.00	0.00	1.00	0.00	1.00	93.00	92.00	0.00	56.00	29.00	2.00	87.00	6.00
07/03/92	2.00	4.00	2.00	0.00	1.00	0.00	1.00	91.00	90.00	0.00	55.00	29.00	2.00	86.00	5.00
07/04/92	2.00	4.00	2.00	0.00	1.00	0.00	1.00	91.00	90.00	0.00	55.00	29.00	0.00	84.00	7.00
07/05/92	2.00	3.00	1.00	0.00	0.00	0.00	0.00	90.00	89.00	0.00	55.00	29.00	0.00	84.00	6.00
07/06/92	2.00	3.00	1.00	0.00	0.00	0.00	0.00	89.00	88.00	0.00	54.00	28.00	0.00	82.00	7.00
07/07/92	2.00	3.00	1.00	0.00	0.00	0.00	0.00	89.00	88.00	0.00	53.00	28.00	0.00	81.00	8.00
07/08/92	2.00	2.00	0.00	0.00	0.00	0.00	0.00	87.00	87.00	0.00	55.00	23.00	0.00	78.00	9.00
07/09/92	2.00	2.00	0.00	0.00	0.00	0.00	0.00	84.00	84.00	0.00	55.00	22.00	2.00	79.00	5.00
07/10/92	2.00	2.00	0.00	0.00	0.00	0.00	0.00	83.00	83.00	0.00	55.00	21.00	2.00	78.00	5.00
07/11/92	2.00	2.00	0.00	0.00	0.00	0.00	0.00	83.00	83.00	0.00	54.00	21.00	1.00	76.00	7.00
07/12/92	2.00	2.00	0.00	0.00	0.00	0.00	0.00	83.00	83.00	0.00	56.00	21.00	1.00	78.00	5.00
07/13/92	2.00	2.00	0.00	0.00	1.00	0.00	1.00	83.00	84.00	0.00	55.00	21.00	1.00	77.00	6.00
07/14/92	2.00	2.00	0.00	0.00	1.00	0.00	1.00	81.00	82.00	0.00	55.00	21.00	0.00	76.00	5.00
07/15/92	2.00	2.00	0.00	0.00	1.00	0.00	1.00	79.00	80.00	0.00	54.00	21.00	0.00	75.00	4.00
07/16/92	2.00	2.00	0.00	0.00	1.00	0.00	1.00	79.00	80.00	0.00	55.00	18.00	1.00	74.00	5.00
07/17/92	2.00	2.00	0.00	0.00	1.00	0.00	1.00	78.00	79.00	0.00	53.00	16.00	1.00	70.00	8.00
07/18/92	2.00	2.00	0.00	0.00	1.00	0.00	1.00	79.00	80.00	0.00	55.00	15.00	2.00	72.00	7.00
07/19/92	2.00	2.00	0.00	0.00	1.00	0.00	1.00	78.00	79.00	0.00	54.00	15.00	0.00	69.00	9.00
07/20/92	2.00	2.00	0.00	0.00	0.00	0.00	0.00	78.00	78.00	0.00	53.00	20.00	0.00	73.00	5.00
07/21/92	2.00	2.00	0.00	0.00	0.00	0.00	0.00	80.00	80.00	0.00	57.00	18.00	0.00	75.00	5.00
07/22/92	2.00	2.00	0.00	0.00	0.00	0.00	0.00	78.00	78.00	0.00	55.00	18.00	0.00	73.00	5.00
07/23/92	2.00	2.00	0.00	0.00	0.00	0.00	0.00	77.00	77.00	0.00	56.00	16.00	0.00	72.00	5.00
07/24/92	2.00	2.00	0.00	0.00	0.00	0.00	0.00	77.00	77.00	0.00	53.00	17.00	2.00	72.00	5.00
07/25/92	2.00	2.00	0.00	0.00	0.00	0.00	0.00	76.00	76.00	0.00	55.00	16.00	2.00	73.00	3.00

Water District
Summary of Diversions & Distribution
1992
(All flows reported in cfs)

Page No. 4

DATE	1 Reservr Inflow	2 Resrvr Outflow	3 Storage (2-1)	4 Dempsey -Topaz Ditch	5 Chrstnsn Ditch	6 Lava Irrig. Ditch	7 Sum of Diversions Above Topaz (4+5+6)	8 Topaz	9 Natural Flow at Topaz (8-3+7)	10 Downey Ditch	11 Arimo Ditch	12 McCamon Ditch	13 Cutler Ditch	14 Sum of Diversions Below Topaz (10+11+12+13)	15 Topaz Gage Less Diversions Below Topaz (8-14)
07/26/92	2.00	2.00	0.00	0.00	0.00	0.00	0.00	75.00	75.00	0.00	55.00	16.00	2.00	73.00	2.00
07/27/92	2.00	2.00	0.00	0.00	0.00	0.00	0.00	76.00	76.00	0.00	55.00	17.00	2.00	74.00	2.00
07/28/92	2.00	2.00	0.00	0.00	0.00	0.00	0.00	75.00	75.00	0.00	54.00	16.00	2.00	72.00	3.00
07/29/92	2.00	2.00	0.00	0.00	0.00	0.00	0.00	75.00	75.00	0.00	55.00	15.00	2.00	72.00	3.00
07/30/92	2.00	2.00	0.00	0.00	0.00	0.00	0.00	75.00	75.00	0.00	55.00	16.00	2.00	73.00	2.00
07/31/92	2.00	2.00	0.00	0.00	0.00	0.00	0.00	75.00	75.00	0.00	55.00	16.00	2.00	73.00	2.00
08/01/92	2.00	2.00	0.00	0.00	0.00	0.00	0.00	75.00	75.00	0.00	54.00	16.00	2.00	72.00	3.00
08/02/92	2.00	2.00	0.00	0.00	0.00	0.00	0.00	75.00	75.00	0.00	55.00	16.00	2.00	73.00	2.00
08/03/92	2.00	2.00	0.00	0.00	0.00	0.00	0.00	74.00	74.00	0.00	54.00	16.00	1.00	71.00	3.00
08/04/92	2.00	2.00	0.00	0.00	0.00	0.00	0.00	74.00	74.00	0.00	55.00	15.00	1.00	71.00	3.00
08/05/92	2.00	2.00	0.00	0.00	0.00	0.00	0.00	74.00	74.00	0.00	55.00	15.00	1.00	71.00	3.00
08/06/92	2.00	2.00	0.00	0.00	0.00	0.00	0.00	74.00	74.00	0.00	56.00	15.00	1.00	72.00	2.00
08/07/92	2.00	2.00	0.00	0.00	0.00	0.00	0.00	74.00	74.00	0.00	55.00	14.00	2.00	71.00	3.00
08/08/92	2.00	2.00	0.00	0.00	0.00	0.00	0.00	75.00	75.00	0.00	55.00	15.00	2.00	72.00	3.00
08/09/92	2.00	2.00	0.00	0.00	0.00	0.00	0.00	75.00	75.00	0.00	55.00	15.00	2.00	72.00	3.00
08/10/92	2.00	2.00	0.00	0.00	0.00	0.00	0.00	74.00	74.00	0.00	55.00	15.00	2.00	72.00	2.00
08/11/92	2.00	2.00	0.00	0.00	0.00	0.00	0.00	74.00	74.00	0.00	55.00	15.00	2.00	72.00	2.00
08/12/92	2.00	2.00	0.00	0.00	0.00	0.00	0.00	73.00	73.00	0.00	55.00	15.00	2.00	72.00	1.00
08/13/92	2.00	2.00	0.00	0.00	0.00	0.00	0.00	74.00	74.00	0.00	55.00	15.00	2.00	72.00	2.00
08/14/92	2.00	2.00	0.00	0.00	0.00	0.00	0.00	74.00	74.00	0.00	55.00	14.00	2.00	71.00	3.00
08/15/92	2.00	2.00	0.00	0.00	0.00	0.00	0.00	74.00	74.00	0.00	55.00	14.00	2.00	71.00	3.00
08/16/92	2.00	2.00	0.00	0.00	0.00	0.00	0.00	75.00	75.00	0.00	55.00	15.00	2.00	72.00	3.00
08/17/92	2.00	2.00	0.00	0.00	0.00	0.00	0.00	76.00	76.00	0.00	56.00	17.00	1.00	74.00	2.00
08/18/92	2.00	2.00	0.00	0.00	0.00	0.00	0.00	76.00	76.00	0.00	55.00	17.00	1.00	73.00	3.00
08/19/92	2.00	2.00	0.00	0.00	0.00	0.00	0.00	75.00	75.00	0.00	55.00	17.00	1.00	73.00	2.00
08/20/92	2.00	2.00	0.00	0.00	0.00	0.00	0.00	76.00	76.00	0.00	55.00	16.00	1.00	72.00	4.00
08/21/92	2.00	2.00	0.00	0.00	0.00	0.00	0.00	74.00	74.00	0.00	55.00	16.00	1.00	72.00	2.00
08/22/92	2.00	2.00	0.00	0.00	0.00	0.00	0.00	73.00	73.00	0.00	55.00	15.00	2.00	72.00	1.00
08/23/92	2.00	2.00	0.00	0.00	0.00	0.00	0.00	74.00	74.00	0.00	55.00	15.00	2.00	72.00	2.00
08/24/92	2.00	2.00	0.00	0.00	0.00	0.00	0.00	74.00	74.00	0.00	55.00	15.00	2.00	72.00	2.00
08/25/92	2.00	2.00	0.00	0.00	0.00	0.00	0.00	75.00	75.00	0.00	55.00	16.00	2.00	73.00	2.00
08/26/92	2.00	2.00	0.00	0.00	0.00	0.00	0.00	75.00	75.00	0.00	55.00	16.00	2.00	73.00	2.00
08/27/92	2.00	2.00	0.00	0.00	0.00	0.00	0.00	75.00	75.00	0.00	55.00	17.00	2.00	74.00	1.00
08/28/92	2.00	2.00	0.00	0.00	0.00	0.00	0.00	74.00	74.00	0.00	55.00	17.00	2.00	74.00	0.00

Water District
Summary of Diversions & Distribution
1992
(All flows reported in cfs)

Page No. 5

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
DATE	Reservr Inflow	Resrvr Outflow	Storage (2-1)	Dempsey -Topaz Ditch	Chrstnsn Ditch	Lava Irrig. Ditch	Sum of Diversions Above Topaz (4+5+6)	Topaz	Natural flow at Topaz (8-3+7)	Downey Ditch	Arimo Ditch	McCamon Ditch	Cutler Ditch	Sum of Diversions Below Topaz (10+11+12+13)	Topaz Gage Less Diversions Below Topaz (8-14)
08/29/92	2.00	2.00	0.00	0.00	0.00	0.00	0.00	75.00	75.00	0.00	55.00	17.00	2.00	74.00	1.00
08/30/92	2.00	2.00	0.00	0.00	0.00	0.00	0.00	74.00	74.00	0.00	55.00	18.00	2.00	75.00	-1.00
08/31/92	2.00	2.00	0.00	0.00	0.00	0.00	0.00	76.00	76.00	0.00	55.00	18.00	2.00	75.00	1.00
			4517.19	495.00	55.00	192.00	742.00			4298.00	6983.00	3191.00	149.00	14616.00	

Form 219-N
7/86

STATE OF IDAHO
DEPARTMENT OF WATER RESOURCES

Water Right No. (if applicable)

Open Channel Discharge Measurement Notes

A. GENERAL INFORMATION

1. Name of stream or ditch: Portneuf River
2. Location: Above Reservoir on Ft. Hall Reservation nr. Inkom, Bannock Co. 6S 38E 03 NESE
3. Person conducting measurement: T. Luke
4. Date and time of measurement: May 6, 1992
5. Accompanied by: Arlin Olsen, Dist. 29 Watermaster
6. Measuring device size and ID no.: Swoffer 2100
7. Spin test before measurement OK? OK after measurement OK? OK
8. Purpose of measurement: Determine natural flow above reservoir (i.e., Reservoir Inflow)

B. MEASUREMENT DATA

Angle coefficient	Dist. from initial point	Width	Depth	Observation depth	Revolutions	Time in seconds	VELOCITY: At point	VELOCITY: Mean in vertical	Adjusted for hor. angle or	Area	Discharge
LEW	0.5ft	1.0	0.11				0				
	1.5ft	0.75	0.23	.6			0.81			.17	0.14
	2.0	0.5	.32	"			1.09			.16	0.17
	2.5	0.5	.35	"			.87			.18	0.16
	3.0	"	.40				.72			0.20	0.14
	3.5	"	.49				.82			.25	0.21
	4.0	"	.50				.79			.25	0.20
	4.5	"	.50				1.20			.25	0.30
	5.0	"	.48				1.18			.24	0.28
	5.5	"	.56				1.27			.25	0.32
	6.0	"	.50				1.10			.25	0.28
	6.5	"	.47				1.33			.24	0.32
	7.0	"	.52				1.35			.26	0.35
	7.5	"	.58				1.00			.29	0.29
	8.0	"	.54				1.30			.27	0.49
	8.5	"	.55				.74			.28	0.21
	9.0	"	.50				.88			.25	0.22
	9.5	"	.40				.20			.25	0.05
REW	10.0	0.75	.35				0			.26	0
											4.13 cfs

D.16

Form 219-N
7/86

STATE OF IDAHO
DEPARTMENT OF WATER RESOURCES

Water Right No. (if applicable)

Open Channel Discharge Measurement Notes

A. GENERAL INFORMATION

1. Name of stream or ditch: Portneuf River
2. Location: Above Reservoir nr Inkom Cabin Ck on Ft. Hall Reservation 6S 38E 03 NESE
3. Person conducting measurement: Tim Luke
4. Date and time of measurement: 6/23/92 2:00 p.m.
5. Accompanied by: Alone
6. Measuring device size and ID no.: Swoffer 2100
7. Spin test before measurement OK? OK ✓ after measurement OK? OK
8. Purpose of measurement: Determine natural flow above reservoir (i.e., Reservoir Inflow)
   GH on staff gage = 0.20

B. MEASUREMENT DATA

Angle coefficient	Dist. from initial point	Width	Depth	Observation depth	Revolutions	Time in seconds	VELOCITY: At point	VELOCITY: Mean in vertical	Adjusted for hor. angle or	Area	Discharge
~~LEW~~	.75'	1.5	.23	.6			.51	.51		.345	0.18
	2.0'	1.0	.42	"			.40			.42	0.17
	3.0'	1.0	.50	"			.31			.50	0.16
	4.0	1.0	.50	"			.25			.50	0.13
	5.0	1.0	.50	"			.86			.50	.43
	6.0	1.0	.52	"			.39			.50	.20
	7.0	1.0	.56	"			.73			.56	.41
	8.0	1.0	.58	"			.32			.58	0.19
	8.75	0.5	.50	"			.09			.25	0.005
LEW	9.25										
										Q total =	1.88 cfs

YEAR 1997 **STATION NUMBER**

DIVERSION NAME Reservoir Inflow

Day	APR	MAY	JUNE	JULY	AUG	SEPT	OCT
1		4.50 cfs	2.00 cfs	A 2.00 cfs	A 2.00 cfs		
2		A 4.50 cfs	A 2.00 " "	2.00 cfs	2.00		
3		A 4.50 " "	A 2.00	A 2.00	A 2.00		
4		A 4.50 " "	2.00	A 2.00	A 2.00		
5		A 4.50 " "	A 2.00	A 2.00	A 2.00		
6		m 4.13 cfs	A 2.00	2.00	A 2.00		
7		4.10 " "	A 2.00	A 2.00	A 2.00		
8		4.00	A 2.00	A 2.00	A 2.00		
9		A 4.00	2.00	A 2.00	2.00		
10		3.70	A 2.00	A 2.00	A 2.00		
11		A 3.70	A 2.00	2.00	A 2.00		
12		3.50	2.00	A 2.00	A 2.00		
13		A 3.50	A 2.00	A 2.00	A 2.00		
14		A 3.50	A 2.00	A 2.00	A 2.00		
15	4.50 cfs	3.20	A 2.00	A 2.00	A 2.00		
16	A 4.50 cfs	A 3.20	2.20	A 2.00	A 2.00		
17	A 4.50 " "	A 3.20	A 2.00	2.00	2.00		
18	A 4.50 " "	e 3.00	A 2.00	A 2.00	A 2.00		
19	4.50 " "	A 3.00	e 2.00	A 2.00	A 2.00		
20	A 4.50	A3.00	A 2.00	A 2.00	A 2.00		
21	A 4.50	m 2.68	A 2.00	A 2.00	A 2.00		
22	A 4.50	A 2.70	A 2.00	A 2.00	A 2.00		
23	4.50	A 2.70	m 1.88	2.00	2.00		
24	A 4.50	2.50	A 2.00	A 2.00	A 2.00		
25	A 4.50	A 2.50	2.00	A 2.00	A 2.00		
26	A 4.50	2.20	A 2.00	A 2.00	A 2.00		
27	A 4.50	A 2.20	A 2.00	A 2.00	A 2.00		
28	4.50	2.00	2.00	A 2.00	2.00		
29	A 4.50	A2.00	A 2.00	2.00	A 2.00		
30	A 4.50	A2.00	2.00	A 2.00	A 2.00		
31		A2.00		A 2.00	A 2.00		

REMARKS: *Discharge Determined using staffgage & rating cruve.*

A = Assumed flow

m = measured flow w/current meter

e = estimated flow

May 18 & June 19 flows estimated due to mossing of gage

Term of service ended 8/31/97

Appendix E

Supplemental Information

for Voting in Water District Elections Under I.C. 42-605

Water Conversion Factors

1 cubic foot of water =	7.4805 gallons =	62.37 pounds
1 CFS =	448.83 gallons/minute =	26,930 gallons/hour
1 CFS =	646,315 gallons/day =	1.9835 AF/day
1 CFS =	59.502 AF/month (30 days) =	723.94 AF/year
1 Acre-Foot =	enough water to cover 1 acre of land one foot deep	
1 Acre-Foot =	43,560 cubic feet =	325,850 gallons
1 cubic meter per second =	35.31 CFS =	15,850 gallons/minute
1 million gallons =	3.0689 AF	
1 million gallons per day =	1,120.147 AF per year	
1Miner's Inch =	9 GPM =	0.02 CFS

CFS = Cubic Feet per Second
AF = Acre Feet
GPM = Gallons per Minute