BEAR RIVER COMMISSION

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MINUTES

BEAR RIVER COMMISSION
REGULAR MEETING
ONE-HUNDRED FIFTEENTH COMMISSION MEETING
November 17, 2009

The regular meeting of the Bear River Commission was called to order by Chairman Dee Hansen at 1:30 p.m. on Tuesday, November 17, 2009, at the Utah Department of Natural Resources building in Salt Lake City, Utah. This was the one-hundred and fifteenth meeting of the Commission. Hansen asked all Commissioners and those in the audience to introduce themselves. Erick Esterholdt was sitting in for Sam Lowham. An attendance roster is attached to these minutes as Appendix A.

With regard to the agenda, Pat Tyrrell suggested that an opportunity for public comment be added to the other issues under item XIV. With no objection to that addition, the agenda was approved. A copy of the approved agenda is attached to these minutes as Appendix B. The draft minutes of the April 16, 2009, meeting were approved without any changes.

Chairman Hansen moved to agenda item III, the report of the Secretary-Treasurer. Randy Staker noted that, for the fiscal year 2009, income of $11,888.34 was received from U.S. Fish & Wildlife and interest on savings for the year was $2,287.79. The total expenses for fiscal year 2009 were $124,216.87, leaving a cash balance of $108,593.60. This balance was carried over into the next fiscal year. So far in fiscal year 2010, there has been income from U.S. Fish & Wildlife in the amount of $3,141.68. Also shown as income is $6,000.00 from EPA/Stonefly. This is what the Commission paid for maintenance on Stonefly's website, which was reimbursed. The stream gage costs of $59,155.00 have been paid. Current expenses are $84,977.27, leaving a cash balance of $153,146.61. There was a motion to accept the Expenditure Report, which was seconded and approved. A copy of the Statement of Income and Expenditures for fiscal years 2009 and 2010 to date is attached hereto as Appendix C.

Under agenda item IV, Lyla Dettmer of Franklin Conservation District and JoAnn Taylor of Bear Lake Conservation District gave a power point presentation on water delivery improvements. JoAnn explained that there are 51 soil and water conservation districts in the State of Idaho, subdivisions of state government, which provide services to land users to help preserve natural resources. They are funded through county and state government, but they also pursue grants for additional funding. These two conservation districts (Franklin and Bear Lake) have come together with a third partner, Water District 11. Water District 11 was pursuing measuring devices for pumpers of Bear River water, and the two districts were focusing on conveyance networks for pipelines. The three entities together applied for the Bear River Innovative Water Conservation Measure Recovery Act of 2009. Of the 141 applicants applying for the grant, 13 projects were funded, with theirs being the only one in Idaho. Their grant includes 14 individual projects

in three counties. The project includes installing 30 water measuring devices, as well as real time automated water diversion reporting systems for 19 diversion points along the Bear River, converting 35.6 miles of open ditch to pipelines, and lining 450 feet of canal. The total cost of the project is $7.8 million, with a completion deadline of December 2010. A summary of this presentation is attached to these minutes as Appendix D.

Ms. Dettmer used the term "water banking" in her presentation, and Dee Hansen asked about the water banking aspect of this project. It was explained that, rather than transferring excess water, which would become permanent, they would decide on an annual basis whether or not to bank storage water. The water savings is created through efficiency. Hansen commented that it sounds like depletion. Hal Anderson responded that this was not through the state water supply, but was an agreement with individual owners of storage reservoirs, but not Bear Lake. Dennis Strong added that one of the savings shown was through loss of evaporation.

Connely Baldwin, as a continuation of the previous presentation, gave a power point presentation concerning real-time data collection and display, which is attached hereto as Appendix E. He mentioned that this was a cooperative effort between Water District 11, Last Chance Canal Company and PacifiCorp. He reported that Water District 11 had funded changes to the Bear River Basin website to display PacifiCorp Energy streamflow and reservoir gages, making that information available to the public and the irrigators. Telemetry was added to 3 laterals. With the Water for America Grant, they are funding meters and telemetry at a number of new sites. A map was included in the presentation which shows existing and new meters.

Jack Barnett suggested that the accounting model would have to be adjusted to these changes and that some water right transfers would be filed moving different water rights to points of diversion where water is being banked or redistributed. Dee Hansen suggested that there might need to be more discussion on this item.

As Walt Baker was not able to attend the meeting, Chairman Hansen turned the time to Jack Barnett for the Water Quality Committee report, agenda item V. He mentioned that the Water Quality Committee is functioning very well and that he felt it was a good decision by the Commission to create this committee. He indicated that Idaho, using the stream gaging system and monitoring water quality four times a year, has come to understand the phosphate loading in the Central Division better, as well as in the Lower Division. As a result, they will probably find that they are in compliance with water quality standards with respect to phosphate and will do a new TMDL for that reach.

The committee also talked about the EPA grant and the status of the final report. They hoped to have that report from Utah State University soon. The Water Quality Committee has come up with a process to review that final report and prepare a States Report back to EPA. Those two reports actually come through the Commission, so the Commission will receive recommendations to forward that report to EPA, which must be done by 90 days following September 30. The committee discussed what to do beyond the EPA grant and concluded that they would like to consider this at the next Water Quality Committee meeting in the spring. It would include things that the grant has brought forward which need follow-through, such as the use of the trading calculator and trading models. They also want to perpetuate the WIS, and the three state water quality agencies have agreed to contribute $5,000 per year for the next two years to Utah State University. With another $5,000 that USU has agreed to contribute, there would be a total of $20,000 to keep the WIS going for the next two years. Up until September 2009, it was funded by the EPA grant.

Jack mentioned that he had spent some time explaining to the committee the stream gaging system and the cost to the Commission to maintain that system, and there was discussion concerning the benefits of stream gaging to the water quality administrators. It was suggested that they may want to contribute some funds to the Commission. The committee's recommendation back to the Commission is that the Commission consider what they would like to ask the water quality departments to contribute to the stream gaging system. With some specific numbers in mind, the committee would consider it again at their next meeting in April. They realize that state budget woes are a concern here as well.

The Water Quality Committee also discussed the biennial report of the Commission and felt that it would be appropriate, if the Commission agreed, to include a small section on the activities of the Water Quality Committee in future biennial reports.

Chairman Hansen then moved on to item VI, the TAC report. Jack Barnett reported that the Commission had assigned the TAC to meet and discuss the issue of determining the depletion in each of the sections of the Compact-divided river. The TAC has met on a couple of occasions and concluded that there are really two sub-tasks. The first is to determine the change in amount of irrigated land that has occurred since 1976 or 1990, depending on where it was best to start. Those were the two landmark years used the last time the determination was made. The second was to determine what depletion numbers should be used to determine how much water is depleted by the irrigation. In addition, we need to look at the municipal and industrial depletions that are occurring. The TAC concluded that the three states are in a position, if the Commission so requests, to move ahead this winter to determine irrigated acreage using photography and return to the April Commission meeting with preliminary indications of the updated irrigated acreages. Then, if the Commission instructs the states to move ahead, they could field verify that irrigated acreage determination during the summer of 2010.

As to the second task, the TAC has met and communicated with Bob Hill from Utah State University and Rick Allen from the University of Idaho. Drs. Hill and Allen have discussed estimates of the amount of consumption that is occurring under their current best technology. Allen completed this research for Idaho last year which has been published. The Utah Divisions of Water Resources and Water Rights have contracted with USU to determine the consumptive uses throughout the State of Utah. Bob Hill's and Rick Allen's current estimates as to the depletion numbers best used in the Bear River drainage are not currently totally in sync. They have agreed to discuss this and see if they could concur on the numbers by April. The TAC would then bring that information to the Commission in the April meeting. If they cannot concur, then it may be necessary to determine what combination of experts to use to determine the best number for consumptive use. If the TAC can come up with a concurrence on this number, then that would also be available by next September. The TAC could then inform the Commission at the November meeting as to the number to multiply the acreage by to determine consumption. The Commission could then determine how to deal further with this issue.

Don Barnett then discussed history and procedure of depletions. He passed out a memo on this subject which is attached as Appendix F. He explained that the issue of depletions is associated with the 1980 amended Bear River Compact, which included allocations for depletions both above and below Bear Lake. Those depletions were assigned to specific states by reaches in the river. The Compact stated only that depletions would be calculated and administered "by a Commission-approved procedure." As indicated in the memo, the Commission worked on methods for estimating irrigation depletions and adopted 1990 depletion estimates prepared by the states. Updates were provided for every five to ten years, depending on location.

The time was then turned to Hal Anderson. He first indicated that he had been asked to report on an award that had been presented to the Idaho Department of Water Resources (IDWR) and the University of Idaho associated with the METRIC process. The METRIC process is a satellite-based, energy-balanced algorithm approach to estimating evapotranspiration. It doesn't necessarily have to be irrigated agricultural crops, but could be natural systems or any other area. He passed out a handout that included an article in the Washington Post, a Project History and information on how METRIC works. The handout is attached hereto as Appendix G. He indicated that information on the award is also available on the IDWR website. This was a very prestigious award entitled the "Innovations in American Government Award" given by the ASH Institute, which is affiliated with Harvard University. There were only six awards given out of hundreds of applications throughout the nation. Hal praised the IDWR for its culture of always encouraging the use of technology for improving opportunities to deal with water management in the state. This award is the fruition of many years of work developing applications associated with, in particular, satellite image based technology and how those technologies can be applied in the management of the state's water resources. With this system, they can very accurately (spatially) evaluate the amount of water that evapotranspires from individual fields over an entire season. It has been very useful in a number of applications.

The best news associated with this is the awarding of $40,000 to do technology transfer. They will be presenting a series of hands-on workshops to provide training for other organizations on how to use this technology, and there has been a great deal of interest shown. Hal indicated that they were very excited about the capabilities of the METRIC process in quantifying water use in particular areas on a regular basis, and even being able to go back in time, as far as the early 90's, where data is available. As far as the Compact is concerned, this methodology could be used to calculate depletions as an alternative to the current method. The downside of this method would be the cost as it is not inexpensive. In answer to questions, Hal indicated that the cost of METRIC would be competitive with respect to other methods involving surveys, map work, etc. and that it is certainly cost effective as opposed to field verification and field measurements which can have their own significant errors. Pat Tyrrell wondered how METRIC corrected for cloud cover problems. Hal responded that this is a problem and they haven't come up with a "cloud eliminator" program yet! However, there are ways to simulate where there are holes in the data.

Chairman Hansen then suggested that the Commission give further guidance to the TAC on how to proceed on the items that were brought up. Pat Tyrrell stated that he thought the Commission should allow the TAC to proceed to investigate the depletions that are being calculated by the Hill and Allen techniques to see if they can corroborate their results. He wondered how it would affect the cap if a new method for estimating depletions was implemented since the cap was calculated with other methods.

Gary Spackman wondered about the process that was used to set the depletion allocations under the Amended Compact and if they were set based on actual measurements or scientific criteria or otherwise. He wondered if a parallel process should be used to document how these calculations were done in comparison to any new methods. Hansen indicated that those who were involved in past negotiations were no longer around and that it would be good to go back to old minutes to learn of the discussions that went into setting the caps. He knew there was a lot of give and take in the process and that there was some political input in addition to the technical input. He cautioned that changes of this type would involve changing the Compact, which would be a major issue.

In further direction to the TAC, Tyrrell felt it was important to be sensitive to the fact that if changes were made to the calculating procedure and even the cap, that it would be important to not allow it to wash out increased use. If the cap was raised and Idaho and Wyoming could use more water, it would adversely

affect water availability to Utah. The tools will not make more water, so it will be important to be sensitive to the results of changing calculation methods.

Jack felt that they had been given enough information and direction for the TAC to move ahead in the direction they had been going with the sensitivities that were given. Jack added that the TAC has continuing work assignments looking at other issues, including stream gaging, and will be meeting a couple of times before the next Commission meeting.

Chairman Hansen then turned to agenda item VII, the Operations Committee report. Blair Francis reported that 2009 had been a good year. The Upper and Central Divisions had no regulation. He referred to a handout from Connely Baldwin (Appendix H) which shows much of what happened in the Lower Division. Due to natural flow, Bear Lake has been able to recover 164,000 af, and the elevation is close to 5911, which will allow for storage in the Upper Division. There was some discussion on how big the new proposed water development projects need to be to require reporting to the Operations Committee, and they felt it should be at the discretion of the states. It was reported that the project by Twin Lakes was still progressing, which was a project of interest to many. There was a more lengthy discussion on water between divisions. There are some who are interested in selling their water shares. The committee talked about the issues involved, including depletion and the effect on those downstream. They felt they were not in a position to review the technical numbers involved and that it might be something for the TAC to consider.

Connely Baldwin was then called on to report on PacifiCorp, agenda item VIII. He referred to his handout, the Summary of Bear Lake and Bear River Operations for 2009 and Possible Irrigation Allocations for 2010 (which was mentioned by Mr. Francis and is attached hereto as Appendix H). He noted that 2009 was a good recovery year for Bear Lake and that the lake elevation is currently 5910.45, which is almost three feet higher than the previous year. Looking toward the coming year, it appears there will be a plentiful allocation for 2010. He mentioned that they will be drawing down Cutler Reservoir about four feet for repairs.

Chairman Hansen then turned to agenda item IX, Activities of the Bear River Water Users Association. Carly Burton felt that it was a great year in terms of water supply, not necessarily in storage, but from natural flow that held up so well through the season. He was very pleased with the lake recovery number of 164,000 af, which is equivalent to about 2.34 feet of elevation on Bear Lake. He suggested keeping our fingers crossed for three more years like the past one, which would get the lake back up to 5918. He reported that it was a calm year for new water applications and hearings. The two main ones continue to be the Black Bear Resort and the Cache County filing. The Board voted to withdraw its protest on the Black Bear application because of all the work they had done on mitigation and reduced future demands. The Cache County filing was made and protests and hearings were held. They are awaiting a decision by the State Engineer, which probably won't be until next year. A copy of his report is attached to these minutes as Appendix I.

The Commission took a short break and returned to address agenda item X, a report from the Records & Public Involvement Committee. Marc Gibbs reported that their committee discussed the EPA grant. It was very successful with great benefits in terms of water quality for all three states, and particularly for the State of Idaho. The committee talked about stream gages and the new diversion gages that have been added and felt that it has been most beneficial to get more of them automated in real time data. It's also good to have the Stonefly website containing all the information in one location. This has been so helpful in managing water usage. The Commission website was discussed briefly and it was suggested that that

site be updated with modern technology allowing quicker input and better access to a great deal of information.

Don Barnett then reported that a draft version of the 14th Biennial Report had been distributed to committee members and requested that they take time to look it over and provide any comments they might have. An electronic version will be sent to the TAC members for their review as well. That report will then be finalized. The 15th Biennial Report is in process as well, which commemorates 50 years of interstate comity.

Gibbs then mentioned that the committee had talked about publications of interest. There are 16 technical papers that have been written about the makeup and history of Bear Lake by the U.S. Geological Survey. Jack Barnett has suggested that they be rewritten in 5th grade language for the benefit of the general public. The Utah Geological Survey has begun work on this project and has produced a rough draft of that work. The committee recommended that the Commission allocate up to $2,000 of funding to help in this effort.

Gibbs mentioned that the new Commission logo is completed and is presently being used.

A motion was made for the Commission to allocate up to $2,000 for the technical rewrite of the history of Bear Lake from a geological perspective and that up to $1,000 be committed to improving the website. The motion was seconded and approved.

Dennis Strong gave a report on the Management Committee, agenda item XI. Dennis indicated that most of the items had been covered previously. He mentioned that Jack had talked previously about approaching the DEQ agencies regarding the funding of stream gages. The TAC is assigned to decide which gages to include and how much money would be requested. He wasn't sure if this needed to be presented as a motion or if direction just needed to be given, but he felt that this should be pursued as it would benefit all of the states. Marc Gibbs questioned what the time frame was for asking state DEQ's for funds. Jack responded that all state DEQ's were empathetic to the idea of being supportive, but did express concerns regarding budgets. He thought that the state DEQ's may not look to the state budgets for support, but rather may reach out for grants to help in this effort. A full gage would cost approximately $3,000 for each of the three states.

Dennis Strong wanted to clarify that the EPA grant was complete, so there would be no more funds coming from that source. He wondered if the Water Quality Committee should look to other sources for grants for the gages. Jack reported that the committee intends to meet in April and have Utah State University look at the grant and talk about where to go from here and if there were tasks left undone. He felt it would be helpful to write a letter in the interim for them to look at all potential sources of funding.

As to agenda item XII, Jack reported that everything in this category had been covered.

Chairman Hansen then turned to agenda item XIII and called on Gary Spackman for the state report from Idaho. As to the award to the Idaho Department of Water Resources that Hal Anderson spoke of, Gary said that he had had communication from some people who seemed to be suspicious of the new METRIC tool and how it was going to be used. He has reported to many of the good uses of this new process and that it has been a good enforcement tool for those who may be using water that they don't have a right to. Another example of a benefit from the METRIC process involved the Fort Hall Indian tribe for allocation of water in the Blackfoot River. A limitation had been placed on the upper water users as to their total volume of consumptive use with estimates of what that use would be. The METRIC tool was applied

with initial findings that consumptive use was much less than the original estimate, which resulted in a significant reduction in the amount of water that the irrigators would have to make up to the tribe.

He discussed the grant that has been received by the joint soil and water conservation districts, especially with regard to water banks. There is a state water supply bank administered by the Idaho Water Resource Board, with the Board being able to delegate the operation and exchange of storage water within a water district. He figured that the intent of this group was to have the Board delegate to them to manage that storage water so that it can be done easily without individual applications being filed. In regard to the depletion question, he felt it would be good to look at it and come up with a method to compute that.

Lastly, he mentioned that Idaho was really struggling with budgets, as were all the states. He reported a 22-25 percent reduction in the general fund over the last year for the Department of Water Resources, which means they cannot do all the things that are expected.

Dennis Strong then reported for the State of Utah. He mentioned that he had been talking for three years about a Bear River development project at Washakie Reservoir and that they finally have a cost estimate of $1 billion. It would be a 160,000 acre-foot, three-sided reservoir near the Idaho-Utah line at Plymouth. It is a very expensive project and the water will be for a municipal water supply. The associated pipeline would be a phased project costing about $150 million. It is estimated that the need for this pipeline from the Bear River to provide a supplemental water supply of about 50,000 af to the Wasatch Front would be needed around 2030 to 2035, with storage needed by around 2050. He felt that, through exchange, water could be made available from the Phase I project built in 2035 with the subsequent storage facility augmenting the ability to deliver the water in all of the areas.

The state report for Wyoming was delivered by Pat Tyrrell. He emphasized that they are also in a budget crunch, with recent numbers being $300-400 million below previous projections. Wyoming had already cut standard budget items by 10 percent and they are in a hiring freeze. Proposed budgets introduced this year were much more modest than previous budgets in terms of program dollars. There are two critical items that they were concerned about funding. The first is an "E-Permit System," which is a combination of data base, GIS capabilities relating to water rights and electronic permitting. A system like this not only needs to be built, but also maintained. The maintenance budget had been denied two years previous, and the State Engineer's Office is currently seeking $500,000 to keep the system updated, repaired and improved. He felt that they would be facing legislators who might be critical of this, as well as the stream gaging effort, so there are concerns there. The second thing they are asking for is a continuation of automating some stream gages. The stream gaging efforts on the Bear River have served as a "flag bearer" for the rest of Wyoming. They would like to continue the momentum that has been built in recent years, with the hope to equip another 100 sites, but these dollars are being scrutinized currently as being "nice to have," but not necessary.

Pat reported that the Governor had initiated an executive order the previous year that required agencies to no longer take any action resulting in the loss of habitat for greater sage grouse, hoping to stay in front of the "listing" pendulum on that particular species. Every agency affected by this had to take a look at their statutes and figure out how to comply with both sets of requirements. The State Engineer's office has spent a great deal of time looking at this situation and decided to impose additional conditions on water rights sought for "core sage grouse areas," not to reduce the number of permits issued or make it harder to get water, but to make the impact less disruptive on the bird. The concern is that if the sage grouse gets listed, future water development will be greatly restricted. The restrictions are not overly constraining, but do lighten the footprint on the ground. They will revisit this issue in a few years and remove the restrictions if the threat for the sage grouse is reduced and the executive order lifted.

Tyrrell reported on the lawsuit of Montana vs. Wyoming, which has been going on for three years in the U.S. Supreme Court. He indicated that the first briefings have been made and, looking at the Special Master's 1st Interim draft report, it appears that, on Wyoming's Motion to Dismiss, perhaps half of the case will remain and half will be dismissed. If so, the remaining half deals with interstate priorities on pre- vs. post-compact rights and on hydrologically connected groundwater. He felt the parts that would be dismissed included operations of reservoirs and use efficiencies.

Under agenda item XIV, Other Issues and Public Comment, Chairman Hansen turned time over to Dave Cottle. Dave reported on the growing concern involving the quagga mussel, an invasive species which could become a problem at Bear Lake. He mentioned that an adult mussel can produce a million eggs, which could then reproduce within nine months. They can get to densities of 100,000 per cubic meter. They are "filter" feeders, which means they suck in water and filter out the phytoplankton and zooplankton which is at the bottom of all food chains in bodies of water. Quagga mussels were discovered in Lake Mead in 2007 and are now downstream in every water body and the major canals in the San Diego and Phoenix water supplies. They foul everything they grow on and cause dead organisms and excretions that stink. They ruin boat motors and can sink docks. As far as the Bear River is concerned, these quagga mussels could really impact water delivery and ruin equipment. He reported that the States of Utah and Idaho are pursuing this problem with a three-fold effort: 1) education, 2) prevention and 3) preparation of a plan in case of infection in the Bear River.

In the education area, the states have had boat inspections. Bear Lake Watch has manned a booth at Raspberry Days to educate people, sent out articles in their newsletters and mailed out a brochure to over 3,000 property owners at Bear Lake. As far as prevention goes, Idaho sold a little sticker to fund a program to stop boats and inspect them. Utah's approach involved a "self certification" where boats were allowed to launch if they hadn't been to any "bad waters." Under the guidance of the Bear Lake Regional Commission, they are hoping to implement a more uniform level of protection for the coming year. To change Utah law to allow inspection of every boat is probably out of the question, so they hope to find money to increase the number of inspectors on the Utah side of the lake. Cottle indicated that each of the states has an aquatic invasive species plan. Under those plans, it is necessary to write a rapid response plan for each drainage should it become infected. That plan has begun for the Bear River drainage, and he encouraged everyone to participate. Should Bear Lake become infested, resulting in some fish being listed on the endangered species list, the irrigation system could be greatly impacted, with the possibility of eliminating storage both upstream and downstream. They could affect the canals and PacifiCorp's hydroplants. He stressed that this is a serious issue and encouraged all to become involved.

Chairman Hansen then announced that the next Commission meeting would be held on April 20, 2010. The meeting was adjourned at 3:50 p.m.

APPENDIX A

ATTENDANCE ROSTER

BEAR RIVER COMMISSION
REGULAR MEETING
Utah Department of Natural Resources Building
Salt Lake City, Utah
November 17, 2009

IDAHO COMMISSIONERS
Marc Gibbs
Gary Spackman
Rodney Wallentine

UTAH COMMISSIONERS
Dennis Strong
Charles Holmgren
Blair Francis
Norm Weston (Alternate)

WYOMING COMMISSIONERS
Patrick Tyrrell
Gordon Thornock
Erick Esterholdt (Alternate)
Jade Henderson (Alternate)
Sue Lowry (Alternate)

ENGINEER-MANAGER & STAFF
Jack Barnett
Don Barnett
Donna Keeler

FEDERAL CHAIR
Dee Hansen

OTHERS IN ATTENDANCE

IDAHO
Hal Anderson, Department of Water Resources
Liz Cresto, Department of Water Resources
Rock Holbrook, Water Commissioner

UTAH
Will Atkin, Division of Water Rights
Todd Adams, Division of Water Resources
Randy Staker, Division of Water Resources

WYOMING
Mike Johnson, State Engineer's Office
Don Shoemaker, Water Commissioner

OTHERS
Lyla Dettmer, Franklin Water Improvement District
JoAnn Taylor, Bear Lake Water Improvement District
Steve Noyes, Bureau of Reclamation, Provo, UT
Carly Burton, Bear River Water Users
Connely Baldwin, PacifiCorp Energy
Scott Clark, Barnett Intermountain Water Consulting
Claudia Conder, PacifiCorp
David Cottle, Bear Lake Watch
Dan Davidson, Bear River Canal Company
Voneene Jorgensen, Bear River Water Conservancy
Bob Fotheringham, Cache County
Cory Angeroth, U.S. Geological Survey

Bear River Commission Regular Meetings
November 16-17, 2009

Utah Department of Natural Resources Building
1594 West North Temple
Salt Lake City, Utah

COMMISSION AND ASSOCIATED MEETINGS

November 16

10:00 a.m.	Water Quality Committee Meeting – Room 314	

November 17

10:00 a.m.	Operations Committee Meeting – Room 314	Francis
11:00 a.m.	Records & Public Involvement Committee – Room 314	Gibbs
12:00 p.m.	Informal Meeting of Commission – Room 314	Barnett
12:15 p.m.	State Caucuses and Lunch	Tyrrell/Strong/Spackman
1:30 p.m.	Commission Meeting – Rooms 1040 & 1050	Hansen

AGENDA
REGULAR COMMISSION MEETING

November 17, 2009

Convene Meeting: 1:30 p.m., Chair Dee Hansen

I.	Call to order	Hansen
	A. Welcome of guests and overview of meeting	
	B. Approval of agenda	
II.	Approval of minutes of last Commission meeting (April 16, 2009)	Hansen
III.	Report of Secretary/Treasurer	Strong/Staker
IV.	Reclamation Grant	
	A. Water delivery improvements	Dettmer
	B. Real time measurements	Holbrook/Baldwin
V.	Water Quality Committee report	Baker
VI.	TAC report	
	A. Depletions procedures update	J. Barnett
	1. History and procedure	D. Barnett
	2. Accomplishments of the TAC	J. Barnett
	3. Landsat mapping techniques – Advancement in Science/Idaho award	Anderson
	4. Presentation of planned future worth	J. Barnett
	B. Other items	J. Barnett
VII.	Operations Committee report	Francis
VIII.	PacifiCorp report	Baldwin
IX.	Activities of the Bear River Water Users Association	Burton
	BREAK	
X.	Records & Public Involvement Committee report	Gibbs
	A. BearRiverBasin.org	D. Barnett/Baldwin
XI.	Management Committee report	Strong
XII.	Engineer-Manager report	J. Barnett
XIII.	State reports	
	A. Idaho	Spackman
	B. Utah	Strong
	C. Wyoming	Tyrrell
XIV.	Other issues/public comment	Hansen
XV.	Next Commission meeting (April 20, 2010)	Hansen

Anticipated adjournment: 3:45 p.m.

BEAR RIVER COMMISSION

STATEMENT OF INCOME AND EXPENDITURES

FOR THE PERIOD OF JULY 1, 2008 THRU JUNE 30, 2009

INCOME	CASH ON HAND	OTHER INCOME	FROM STATES	INCOME
Cash Balance 07-01-08	98,634.34			98,634.34
State of Idaho		-	40,000.00	40,000.00
State of Utah		-	40,000.00	40,000.00
State of Wyoming		-	40,000.00	40,000.00
US Fish & Wildlife		11,888.34		11,888.34
Interest on Savings		2,287.79		2,287.79
TOTAL INCOME TO 30-Jun-09	98,634.34	14,176.13	120,000.00	232,810.47

DEDUCT OPERATING EXPENSES

		APPROVED BUDGET	UNEXPENDED BALANCE	EXPENDITURES TO DATE
Stream Gaging/USGS Contract		52,300.00	-	52,300.00
	SUBTOTAL	52,300.00	-	52,300.00
EXPENDED THROUGH COMMISSION				
Personal Services	BIWC	59,450.00	(2,627.16)	62,077.16
Travel (Eng-Mgr)		1,200.00	540.66	659.34
Office Expenses		1,600.00	(242.50)	1,842.50
Printing Biennial Report		1,000.00	1,000.00	-
Treasurer Bond & Audit		1,400.00	1,300.00	100.00
Printing		1,600.00	362.13	1,237.87
Web Page/Data		6,000.00	-	6,000.00
Contingency		5,000.00	5,000.00	-
	SUBTOTAL	77,250.00	5,333.13	71,916.87
TOTAL EXPENSES		129,550.00	5,333.13	124,216.87
CASH BALANCE AS OF 06-30-09				108,593.60

APPENDIX C
PAGE TWO

BEAR RIVER COMMISSION

DETAILS OF EXPENDITURES

FOR PERIOD ENDING JUNE 30, 2009

679	USGS	52,300.00
680	BIWC	9,935.38
681	STONEFLY TECHNOLOGY	1,500.00
682	BIWC	5,189.56
683	BIWC	5,070.11
684	STONEFLY TECHNOLOGY	1,500.00
685	BIWC	4,960.83
686	BIWC	598.37
687	BIWC	10,702.25
688	STONEFLY TECHNOLOGY	1,500.00
689	BIWC	5,397.67
690	VOID	-
691	C N A SURETY	100.00
692	BIWC	4,975.55
693	BIWC	5,081.65
694	STONEFLY TECHNOLOGY	1,500.00
695	SCOTT SHARP (logo & letterhead design)	481.25
696	BIWC	5,241.59
697	BIWC	5,381.94
698	BIWC	173.60
699	see new year	-
700	see new year	-
701	BIWC	2627.12
	TOTAL EXPENSE	124,216.87

BANK RECONCILIATION

Cash in Bank per Statement 06-30-09	6,568.79
Plus: Intransit Deposits	
Less: Outstanding Checks	
Total Cash in Bank	6,568.79
Plus: Savings Account-Utah State Treasurer	102,024.81
TOTAL CASH IN SAVINGS AND IN CHECKING ACCOUNT	108,593.60

BEAR RIVER COMMISSION

STATEMENT OF INCOME AND EXPENDITURES

FOR THE PERIOD OF JULY 1, 2009 TO OCTOBER 31, 2009

INCOME	CASH ON HAND	OTHER INCOME	FROM STATES	INCOME
Cash Balance 07-01-09	108,593.60			108,593.60
State of Idaho		-	40,000.00	40,000.00
State of Utah		-	40,000.00	40,000.00
State of Wyoming		-	40,000.00	40,000.00
US Fish & Wildlife		3,141.68		3,141.68
Interest on Savings		388.60		388.60
EPA/STONEFLY		6,000.00		6,000.00
TOTAL INCOME TO 31-Oct-09	108,593.60	9,530.28	120,000.00	238,123.88

DEDUCT OPERATING EXPENSES

		APPROVED BUDGET	UNEXPENDED BALANCE	EXPENDITURES TO DATE
Stream Gaging/USGS Contract		59,155.00	-	59,155.00
	SUBTOTAL	59,155.00	-	59,155.00
EXPENDED THROUGH COMMISSION				
Personal Services	BIWC	57,000.00	38,000.00	19,000.00
Travel (Eng-Mgr)		1,200.00	1,045.79	154.21
Office Expenses		1,600.00	1,489.24	110.76
Printing Biennial Report		1,000.00	1,000.00	-
Treasurer Bond & Audit		1,400.00	1,400.00	-
Printing		1,600.00	1,472.70	127.30
Web Page/Data		6,000.00	-	6,000.00
Clerical		5,000.00	4,570.00	430.00
Contingency		3,000.00	3,000.00	-
	SUBTOTAL	77,800.00	51,977.73	25,822.27
TOTAL EXPENSES		136,955.00	51,977.73	84,977.27
CASH BALANCE AS OF 10-31-09				153,146.61

APPENDIX C
PAGE FOUR

BEAR RIVER COMMISSION

DETAILS OF EXPENDITURES

FOR PERIOD ENDING OCTOBER 31, 2009

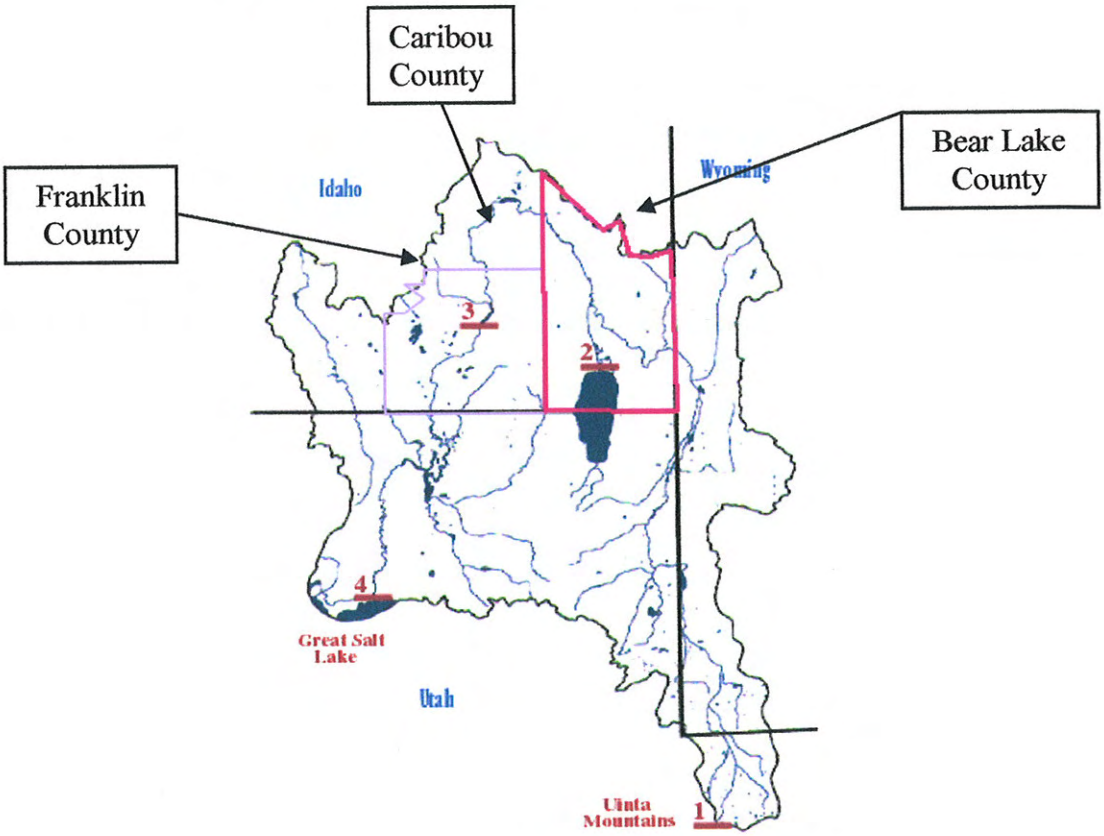
699	BIWC	4,750.00
700	STONEFLY	6,000.00
701	SEE FY 09	-
702	BIWC	4,935.36
703	USGS	59,155.00
704	BIWC	5,154.58
705	BIWC	4,982.33

TOTAL EXPENSE 84,977.27

BANK RECONCILIATION

Cash in Bank per Statement 10-31-09	5,733.20
Plus: Intransit Deposits	
Less: Outstanding Checks	
Total Cash in Bank	5,733.20
Plus: Savings Account-Utah State Treasurer	147,413.41
TOTAL CASH IN SAVINGS AND IN CHECKING ACCOUNT	153,146.61

Bear River: Innovative Water Conservation Measures, Recovery Act, 2009
Bear River Watershed, Idaho



Applicant
Water District 11 Bear River
Austin Moses, Treasurer
240 South Main Street
Soda Springs, ID 83276

Central Division Project Manager

Joann Taylor, District Manager
Bear Lake SWCD
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83263
(208) 847-0585 (208) 847-1517 Fax
0802…Fax
Joanne.Taylor@id.nacdnet.net

Lower Division Project Manager

Lyla Dettmer, District Manager
Franklin SWCD
98 East 800 North #5 Preston ID

(208) 852-0562 x 101 (208) 852-

FSWCD@earthlink.net

May 21, 2009

Executive Summary

Date: May 21, 2009

Applicant: Idaho Department of Water Resources, District 11

City: Preston County: Franklin, Bear Lake, & Caribou State: Idaho

Increasing demands from industry, recreational interests, rural to urban conversion, and agriculture are creating potential water crises and placing pressures on water, a very important and limited natural resource. The greater the demand, the greater the need for water users to use and share available water wisely. How can a user practice good management unless he knows the amount of water involved? How can the regulatory agencies complete their duties without knowing the amount of water diverted? Accurate measurement of water is the basis of good water management. But is management enough, do we need system improvements? Traditionally, irrigation system improvements have focused on the on-farm improvements. It is time to commit this same focus on the conveyance networks. A combination of both coupled with accurate measurement is necessary to achieve the highest efficiency.

Our project provides a two part approach to improving water efficiencies. Part 1 consists of installing 30 water measuring devices and real time automated water diversion reporting systems for 19 of the 53 diversion points along the Bear River Basin in Idaho to provide accurate and timely water diversion data and controls. In Part 2 we will convert 35.6 miles of open ditch to pipelines. In addition we will line 450 feet of canal with an innovative yet proven method involving the use of a polyurea lining. This is a fast acting polymer that can be applied over a variety of substrates.

As requested we have summarized the following tasks:

Task A.. Water Banks and Water Markets
The unique inter-relationship present in the Bear River watershed is in essence simple cooperative water operating agreements. Multiple companies co-mingle their irrigation water in surface water and in company laterals. During the irrigation season water is released by the watermasters and managed with the goal of providing the best efficiency of the water for all the companies. If the system of one is efficient, the excess water is transferred to another irrigation district through these shared facilities. This has allowed the separate irrigation companies to share water and get the maximum potential from their stored water.

Currently the city of Preston is experiencing growth. This is placing pressure on the availability of culinary water. Preston city is poised to use their irrigation shares to create a secondary irrigation system. In addition due to recent changes in water policy in Idaho, any community wells must be mitigated with the purchase of surface water. This additional water could be purchased by developers to address this mitigation.

Based on legal advice concerning the distribution of water outside the authorized service area, a direct sale to Cub River Irrigation (CRI) allows for confusion and may damage the

future Preston Whitney Irrigation (PWI) water rights. The Idaho water bank has been created for this very situation. PWI plans to place 1,000 to 1,200 acre feet of their water in the water bank. A set agreed price per acre feet of $16.00 has been approved by the IDWR water board. 5% is withheld for administration and the remaining is placed on the market. Cub River Irrigation can purchase this water and easily transfer it to their shareholders via the pressurized Fairview Lateral phase 3. The benefit to the Cub River Irrigation is the reduction in pumping cost that is associated with using their stored water from the Bear Lake.

Due to the complexity of this intermingling, joint projects are inherent over-run with management problems and place the desires of one company against another. This is where the Franklin SWCD and Bear Lake SWCD expertise is vital to the partnership. The mediation role and unbiased approach of the Conservation District is important.

Task C..Canal Lining
Conveyance losses from the irrigation systems and the anticipated on-farm efficiency improvements will generate an annual water savings of 40-45% their normal water supplies. Currently these inabilities to deliver available water during critical periods has caused water shortages, yield losses, and has produced inefficient on-farm management due to the uncertainty of water distribution

Based on preliminary engineering information created from information obtained from the irrigators and the Natural Resources Conservation Service the proposed projects appears to have suitability for conversion to a gravity pipeline. The improved systems will remove leaks and seepage from 30.6 miles of ditch. In addition when the water is delivered to 10,686.6 acres of agricultural land it will reduce energy and maintenance costs, improve crop yields, and positively impact the environmental concerns of ground water quality and noxious weeds.

Task D.. Measuring Devices
The unavailability of timely data negatively impacts the planning and market forces and makes it hard to document illegal diversions. It has also encouraged excessive water use due to delays and inconsistencies in reporting. The proposed installation of a real-time monitoring system in the Bear River Basin will be integrated into the www.bearriverbasin.org website creating a publicly accessible comprehensive 3-state basin wide vision to optimize efficiency of the basin water supply. In addition to water measurement devices it will take advantage of radio telemetry technology to remotely monitor irrigation diversions. The data collected will be transmitted to data loggers which will transfer the data via cell phone modems to a central control computer.

The individual irrigation companies when converting to pipelines will improve the distribution of irrigation water by installing McCrometer propeller type measuring devices at each service connection. These meters will be used to confirm the amount of water released and the water use of each stockholder. Installation of meters as a water conservation measure has resulted in water savings of up to 42% at a location in California (Stockton East Water district, 2001).

Table 1-Summarized savings

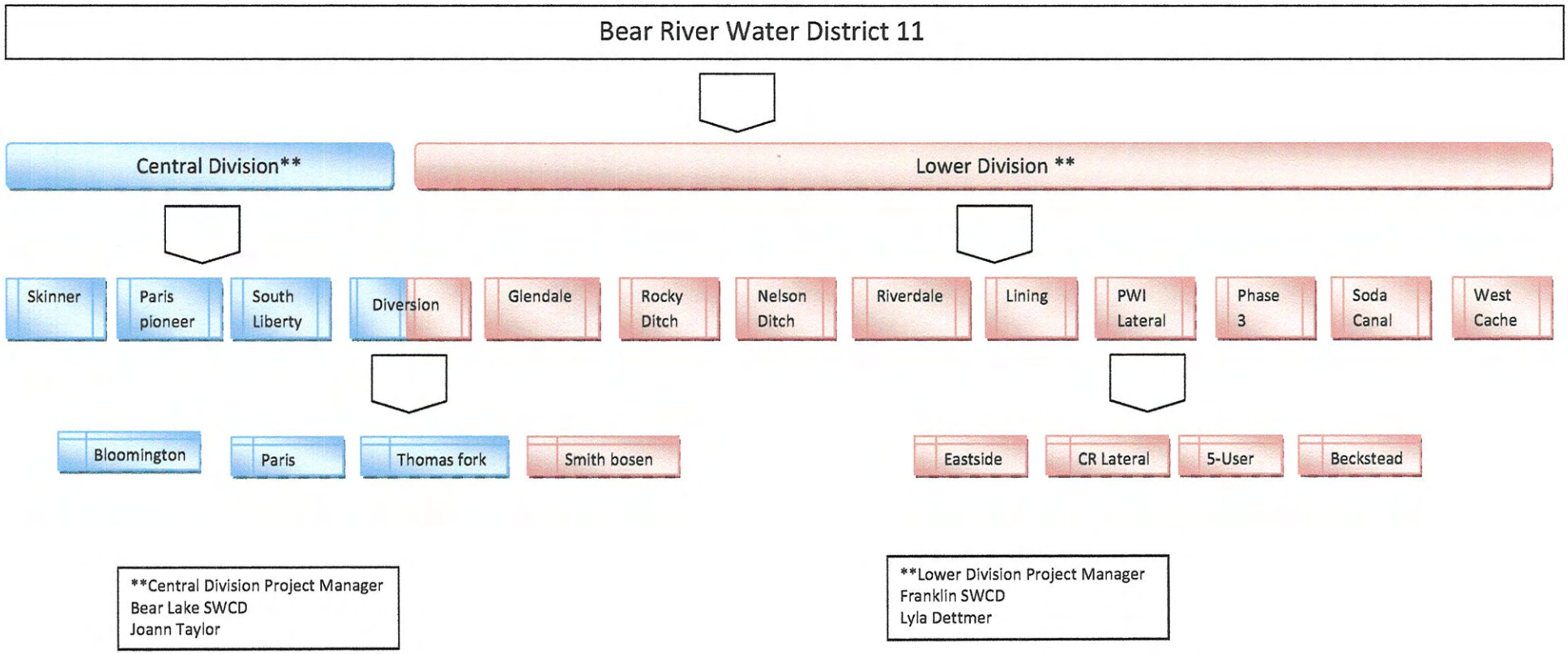
	Part 1-measuring devices	Part 2-canal lining	Total project
Current Average annual water supplied	181,000 AFA	146,804 AFA	327,805 AFA
Current Water Marketed	0.00 AFA	0.00 AFA	0 AFA
Estimated water saved	0.00 AFA	39,572 AFA	39,572 AFA
Estimated water better managed	48,000 AFA	146,804 AFA	194,804 AFA
Estimated water marketed	0.00 AFA	1,000 to 1,200 AFA	1,200 AFA

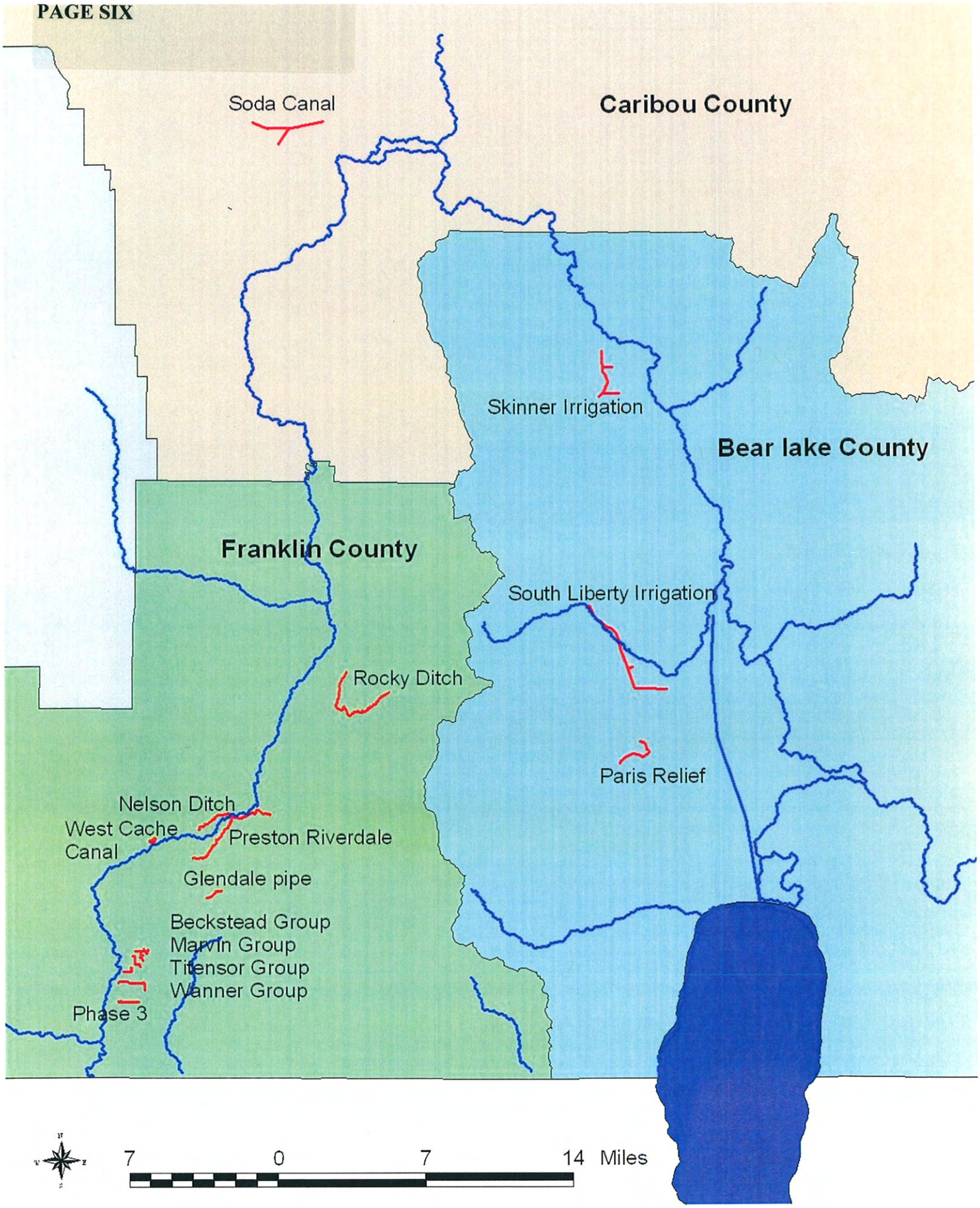
Water savings resulting from this proposed project will have three main purposes and uses depending on annual water conditions: 1) The water will be used to meet crop demands and satisfy water rights. 2) Using collaborative approach, excess water will be transferred to other irrigation users in the Bear River watershed through shared facilities. 3) Water saved by the Preston Whitney Irrigation will be transferred to other Franklin County users via the Idaho Water Bank.

In 2002, 46% of the irrigation water use was from Bear Lake. Heavy storage use continued until 2004 when the storage allocation was restrictive and resulted in sever irrigation reductions. The ability to accurately track the water supply and diversions will give water users the opportunity to cooperatively use the resources conservatively. The increased knowledge of the Bear River system and its operation will allow users to better manage their natural flow and their use of supplemental waste delivered from Bear Lake.

Estimated completion date: The majority of the work will be accomplished by October 2010 with the final reporting that details the quantifiable saving completed by October 2011.

Is the applicant in a reclamation District: (Yes) The only Reclamation project in the Idaho Bear River is the Preston, Riverdale, Mink Creek Irrigation Company Bench Project. The Preston Bench Project is a Bureau of Reclamation project authorized by the 80th Congress June 15, 1948 (62 Stat. 442). Improvements completed by the Preston, Riverdale, Mink Creek Irrigation Company have improved the efficiency of both their Eastside and North Laterals. They own 16% of the water distributed in the Fairview pipeline. Because of the unique co-mingling of irrigation water that occurs upstream of the Glendale/Foster Reservoirs the projected water savings will positively affect the water supply for the Preston, Riverdale, Mink Creek Irrigation Company. In addition the Glendale pipeline will have a direct impact to this company. This is a major component in their Water Conservation Plan to better manage their water as it is distributed by collaborating with the Preston Whitney Irrigation Company.


Bear River Water District 11
Central Division**
Lower Division **
Skinner
Paris pioneer
South Liberty
Diversion
Glendale
Rocky Ditch
Nelson Ditch
Riverdale
Lining
PWI Lateral
Phase 3
Soda Canal
West Cache
Bloomington
Paris
Thomas fork
Smith bosen
Eastside
CR Lateral
5-User
Beckstead
**Central Division Project Manager
Bear Lake SWCD
Joann Taylor
**Lower Division Project Manager
Franklin SWCD
Lyla Dettmer


Soda Canal
Caribou County
Skinner Irrigation
Bear lake County
Franklin County
South Liberty Irrigation
Rocky Ditch
Paris Relief
Nelson Ditch
West Cache
Canal
Preston Riverdale
Glendale pipe
Beckstead Group
Marvin Group
Titensor Group
Wanner Group
Phase 3
7
0
7
14 Miles

Bear River Commission Presentation
Water District #11 Bear River-Idaho

Bear River – Idaho Real-time Data Collection and Display

Co-operative effort between Water District #11, Last Chance Canal Company (LCCC) and PacifiCorp

Existing data telemetry – 3 major canals

Recent Accomplishments:

- Water District #11 funded changes to BearRiverBasin.org to display PacifiCorp Energy streamflow and reservoir gages
- LCCC added telemetry to 3 laterals

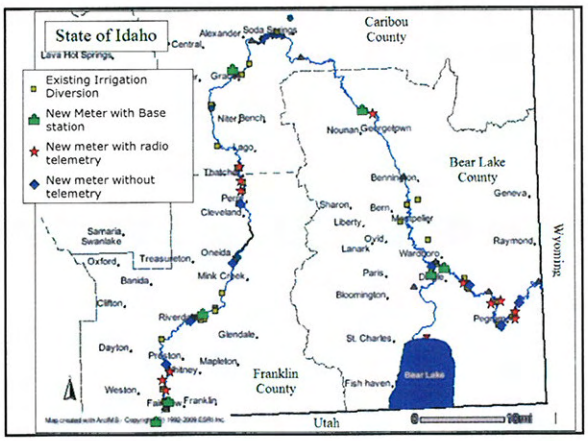
Bear River – Idaho Real-time Data Collection and Display

Expansion with Water for America Grant Funds

7 Base stations with meters – 2 in Central Division, 5 in Lower Division (6 new meters)

16 Telemetered sites, 13 sites with new mag meters or ADFM – 5 in Central Division, 11 in Lower Division

8 Metering Only, no telemetry – 4 in Central Division, 4 in Lower Division.



BEAR RIVER
COMMISSION

106 West 500 South
Suite 101
Bountiful, Utah 84010-6232
801-292-4662
801-524-6320 fax

MEMORANDUM BR09-67

TO: **Bear River Commission**

FROM: **Don A. Barnett**

SUBJECT: **Brief History of the Commission-Approved Procedures for Depletion Calculations**

DATE: **November 12, 2009**

1980 – Amended Bear River Compact water placed to beneficial use before January 1, 1976 and then provided for additional depletions as follows:

Above Stewart Dam:

Utah	13,000 af
Wyoming	13,000 af
Idaho	2,000 af

Lower Division:

Idaho	125,000 af (first right)
Utah	275,000 af (second right)
Idaho & Utah	75,000 af (each, equal priority)
Idaho	30% of remainder
Utah	70% of remainder

The Compact provides that the allowed depletions "shall be calculated and administered by a Commission-approved procedure."

1989 – the Commission adopted *interim* Commission-approved procedures. The Commission had also contracted with Utah State University to develop a method for estimating irrigation depletions (Research Report 125) and was working on 1976 base maps and 1990 updates.

1993 – the Commission adopted revised Commission-approved procedures and adopted the 1990 depletion estimates prepared by the states. The 1990 depletion estimates are as follows and have been included in each biennial report since their adoption.

Estimated Annual Depletions[1]

Changes from January 1, 1976, to January 1, 1990

ABOVE STEWART DAM

State	Allocation	Agricultural Depletions	M&I Depletions	Total Depletions	Remaining Allocation
Wyoming	13,000	1,996	781	2,777	10,223
Idaho	2,000	1,293	0	1,293	707
Utah	13,000	5,106	177	5,283	7,717

LOWER DIVISION

State	Allocation	Agricultural Depletions	M&I Depletions	Total Depletions	Remaining Allocation
Idaho	125,000[2]	7,348	-48	7,300	117,700
Utah	275,000[3]	2,936	1,178	4,114	270,886

[1]All values are in acre-feet. Data were obtained from the appendices of the April 22, 1992, Bear River Commission meeting minutes. Any reductions in pre-1976 depletions are reflected in the above numbers. With the exception of Woodruff Narrows Reservoir, reservoir evaporation was not calculated.

[2]First right under Compact grants additional rights.

[3]Second right under Compact grants additional rights.

The adopted procedures provide for updating of the depletion estimates as follows:

"Reporting Intervals"

"Every five years, or as determined by the Commission, a review of the changes in depletions since 1976 occurring in the Central Division portion in Idaho will be determined. Every ten years, or as determined by the Commission, a determination of the depletion changes occurring in the Upper Division, the Wyoming portion of the Central Division, and the Lower Division will be made."

Under the direction of the Commission the TAC has begun a review of the depletion estimates. The process includes reviewing the depletion estimate methodology, changes in irrigated acres and changes in M&I uses.

The Washington Post

Water Measured From the Sky

Satellites Track Land's Consumption

By Kari Lydersen
Washington Post Staff Writer
Monday, September 14, 2009

Water management is serious business in the American West, where precipitation is scarce, irrigated agriculture is a major industry, new housing subdivisions spread across arid landscapes and water rights are allocated in a complicated seniority system.

"If you can't measure it, you can't manage it," water officials are fond of saying.

But measurement -- trying to determine how much water is diverted from rivers and how much is pumped from hundreds of thousands of wells -- has been an inexact and expensive science.

Now a tool developed by the Idaho Department of Water Resources and the University of Idaho is changing the face of water management and conservation by efficiently offering specific measurements of the water consumed across a large region or single field.

Using surface temperature readings from government satellites, air temperature and a system of algorithms, the new method lets officials measure how much water is "consumed" on a certain piece of land through evapotranspiration. Evapotranspiration is a combination of the evaporation of water into the atmosphere and the water vapor released by plants through respiration -- basically, a measurement of the water that leaves the land for the atmosphere, not water that is diverted or pumped onto land but then returned quickly to the water table or river for other users.

Water resource management agencies in Idaho and other states see this as the best way to measure water consumption, since it is a more exact definition of how much water is being removed from the system by a given individual or entity. The program, called METRIC for Mapping EvapoTranspiration with High Resolution and Internalized Calibration, was launched in 2000 with a NASA/Raytheon Synergy Project grant and is used by 11 states. (Though researchers do measure the evapotranspiration rates of residential developments, the method is mainly relevant

The Washington Post

Water Measured From the Sky

to the management of agriculture, fish farms and forest or wetland conservation.)

"There's not enough water for all uses, so you use METRIC to see exactly where water is being consumed," said Tony Morse, manager of geospatial technology at the Idaho Department of Water Resources. "How much for agriculture, how much on the Indian reservation, how much by native cottonwoods, how much by saltcedars."

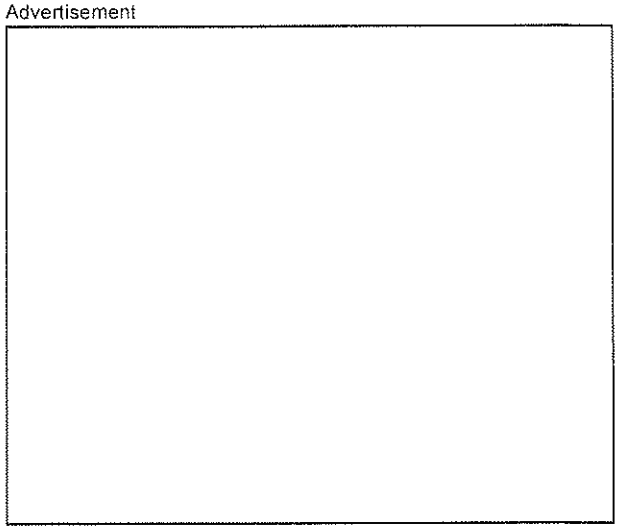
METRIC uses images from the two Landsat satellites, which orbit Earth every 16 days, meaning an image of a given field is available every eight days unless cloud cover interferes. Until this year users had to pay the U.S. Geological Survey $600 for each 185-by-180-kilometer "scene." Starting in 2009 the government satellite images, which are also used for Google Earth, are free to the public. METRIC developers have published their algorithms for anyone to use, though agencies must write their own computer codes.

The data have already been used to help settle a century-long fight between Colorado and Kansas over water in the Arkansas River and a dispute between Idaho irrigation districts. Previously, officials had to look at well-pumping records and electricity use to estimate each irrigation district's usage. Water managers say the data help to settle and avoid litigation.

"This tool would allow the state of Wyoming or Colorado to independently verify what's going on in California," said Tony Willardson, executive director of the Western States Water Council. "It probably wouldn't be safe for someone in a Colorado Department of Natural Resources truck to drive around in California to see how much water they're using."

In Oregon, METRIC data helped conserve water in Klamath Basin salmon habitats by helping scientists work with ranchers to withhold irrigation from certain cattle pastures. In California, the program eased fears that water transfers to Los Angeles and San Diego would increase the salinity of Imperial Valley farmland. In Texas, METRIC revealed that invasive saltcedar trees were using less water than expected, indicating an expensive eradication of the trees was likely not necessary.

Willardson said the system can allow irrigation districts or other entities to



The Washington Post

Water Measured From the Sky

conserve water and save the surplus for drier times. For example, if Southern California's Imperial Valley irrigation district can prove that it used less water than it has rights to, it can use more water from the Colorado River the following year. In the past, Imperial Valley farmers would have had little incentive not to use their full water rights.

The same principle applies to farmers who can "bank" their rights to consumer water and lease or sell those rights to other users. The data are also crucial to government programs that buy back water rights -- essentially paying farmers to let their land dry -- so the water can flow into streams where steelhead trout and salmon spawn.

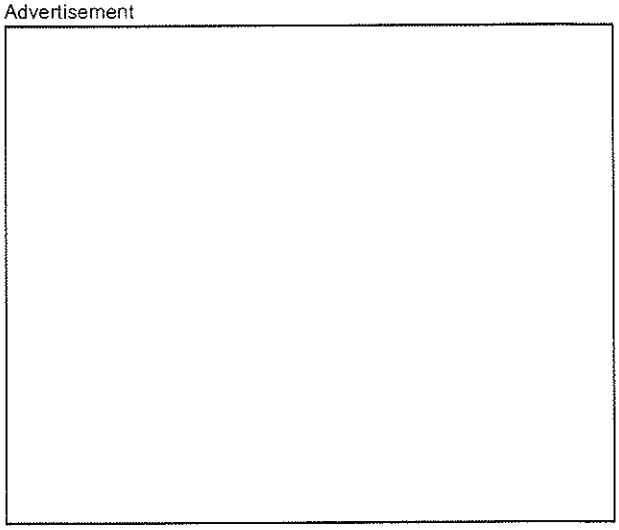
Recently the program's future has been in jeopardy because NASA was not planning to include the $100 million thermal infrared sensor needed to record surface temperature in the next Landsat satellite, scheduled to launch in 2012. The currently orbiting Landsat 5 and 7 were launched in 1984 and 1999 and were designed to last only three to five years.

After much pressure from Western politicians, it appears NASA will include the sensor in Landsat 8. A final decision is expected by the end of the year, according to Jim Irons, a project scientist for the Landsat Data Continuity Mission based at the Goddard Space Flight Center in Maryland.

"Due to their demonstration of the value of the data, we are doing our utmost to make sure we can include the instrument," Irons said.

The project is a finalist for the Harvard Kennedy School's Innovations in American Government Awards, to be announced Monday. James Levitt, director of the Program on Conservation Innovation at the Harvard Forest, Harvard University, said METRIC is among the most remarkable of hundreds of applications he has reviewed. He thinks it will help Western states adapt to climate change, as more extreme heat and less precipitation are expected.

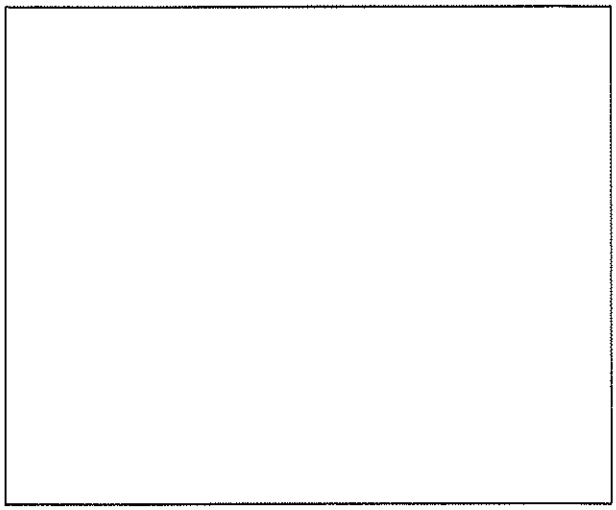
"The water conflicts that are brewing are intense," he said. "If you don't have water you can't farm. Climate change is actually happening now. This will allow government and farmers to adapt. Not every farmer in Idaho subscribes to global warming as a proven theory. But they want to know where



The Washington Post

Water Measured From the Sky

their water is."



- A-Z Index
- Water Management
  - Adjudication Bureau
  - Northern Idaho Adjudication
  - Water Rights
  - Administrative Basins
  - Orders
  - Water Districts
  - Water-Related Districts
  - Water Measurement
  - Wells & Drilling
  - Streams & Dams
  - Floodplain Management
- Rules, Statutes & Forms
  - Water Right Forms
  - Adjudication Forms
  - Wells & Drilling Forms
  - Dam Safety Forms
  - Stream Channel Alteration Forms
  - Water Measurement Forms
- Water Information
  - Ground Water Quality
  - EDMS
  - Ground Water Levels

- ← Geographic Information
- ← METRIC Evapotranspiration

Project History

Between January 2000 and February 2005, The Idaho Department Idaho's Department of Biological and Agricultural Engineering wo develop an efficient and accurate method of mapping evapotranspi

IDWR and UI worked, first, with the Surface Energy Balance Alg significantly modified into METRIC (**M**apping **E**vapo**T**ranspiratio **C**alibration). Both SEBAL and METRIC are energy balance mode compute a complete radiation and energy balance, sensible heat, ar image. For this application, IDWR and UI used Landsat ETM+

The goal of the project was to develop METRIC into an operationa Idaho water.

This project was one of eleven 'Infomart' projects across the Unitec program called the Earth Data Observing System Data and Informa Company administered these Infomarts as part of their Synergy Pr Synergy, this work was supported by funding from The Idaho Dep. University of Idaho's Departments of Biological and Agricultural E by the U.S. Bureau of Reclamation.

The Idaho Synergy project was structured in phases. Each phase w contained goals, tasks, and products, while building on the accomp

Phase I (1/12000 - 12/2000) of the project was completed at the en with Wim Bastiaanssen, who developed SEBAL, to modify SEBA limited in scope, designed to apply SEBAL in Idaho's Bear River E develop any necessary modifications. The results of Phase I were e

Phase II (1/2002 - 12/2001) was a much more ambitious project, pı through SEBAL on the Eastern Snake River Plain. The work inclu model suggested by Phase I, the comparison of SEBAL ET with E lysimeters at the Kimberly Research Station near Twin Falls, and t with estimated ground-water pumpage for water rights on the East completed Ph.D. studies working on Phase II.

Phase III (1/2002 - 12/2002) was designed to further refine the SEI

- hydro.online
- Water Supply
- Ground Water Management
- Geothermal Resources
- Technical Publications
- Special Hydrologic Projects

- Search Tools
  - Water Right & Adjudication
  - New Water Right Listing
  - Water Supply Bank Lease
  - Well Construction Search
  - hydro.online
  - River Flows
  - Interactive Mapping
  - Idaho GIS Data
  - Irrigation Rights Finder
- Geographic Information
  - Water Rights Accounting
  - Landsat Thermal Band
  - General Information
  - Idaho Watersheds
  - National Hydrography Dataset
  - Publications
  - METRIC ET

States, and to demonstrate that it could be used operationally as a t
with the Phase III modifications that METRIC fully diverged from
"SEBAL" in order to protect Wim Bastiaanssen's intellectual prope

Phase IV (1/2003 - 12/2003) was designed to begin the transition t

Phase V (1/2004 - 2/2005) was designed to finish the transition of

Since 2005 Rick Allen has continued to refine METRIC and apply
other states). IDWR has expanded its operational use of METRIC

Applications of the METRIC Evapotranspiration Model at the Idaho Department of Water Resources

Anthony Morse and William J. Kramber
Idaho Department of Water Resources
Boise, Idaho

Richard G. Allen
University of Idaho
Kimberly, Idaho

HOW METRIC WORKS

General Principle

METRIC (Mapping Evapotranspiration at high Resolution and with Internalized Calibration) is an image-processing tool for calculating evapotranspiration (ET) as a residual of the energy balance at the earth's surface using the equation ET = R_n-G-H where ET is evapotranspiration, Rn is net radiation, G is sensible heat flux conducted into the ground, and H is sensible heat flux convected into the air as illustrated by Fig. 1. The fundamental principle underlying METRIC is that evaporating liquids absorb heat

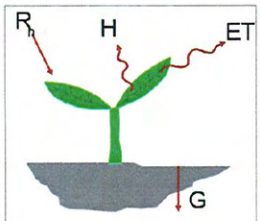


Figure 1.

METRIC is a variant of SEBAL, an energy balance model developed in the Netherlands and applied worldwide by Bastiaanssen (1995, 1998 a,b, 2000, 2004). METRIC has been extended to provide tighter integration with ground-based reference ET and has been applied with Landsat images in southern Idaho to predict 24-hour, monthly, and seasonal ET for a variety of applications as described in panels 2 and 3.

Internal Calibration

Internal calibration of the sensible heat computation within METRIC eliminates the need for atmospheric correction of temperature or albedo. The internal calibration also reduces impacts of any biases in estimation of aerodynamic stability correction or surface roughness. The calibration is done by manually picking a hot and a cold pixel to define the range of ET (Fig. 2).

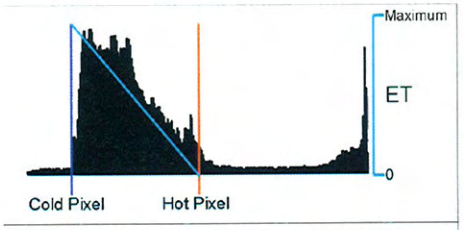


Figure 2. Thermal histogram and the hot and cold pixels for an image.

24-Hour ET

METRIC computes 24-hour ET from the essentially instantaneous ET calculated at the time of the satellite image using reference ET fraction (ETrF). ETrF is the ratio of ET to ETr, which is alfalfa reference ET. ETr is essentially the same as the well-known crop coefficient, Kc. The assumption of constant ETrF during a day captures impacts of advection and changing wind and humidity conditions during the day, as illustrated by Figure 3.

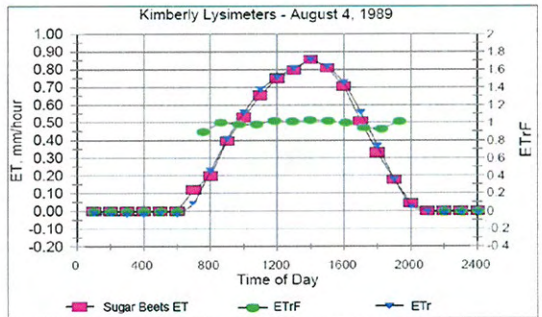


Figure 3. The diurnal relationship between ET and ETrF for sugar beets.

Interpolation to Monthly and Seasonal ET

The 24-hour ET can be interpolated to a cumulative ET for monthly or seasonal periods, or for any arbitrary period within a season. For any given period, the ETrF is computed by Formula 1, where *m* and *n* are the starting and ending dates, respectively, which are usually halfway between two Landsat overpass dates. For the same period, the cumulative ET is computed using Formula 2.

$$ET_r F_{period} = \frac{\sum_{i=m}^{n} ET_r F_i \times ET_{r24i}}{\sum_{i=m}^{n} ET_{r24i}}$$

Formula 1. Computation for reference ET fraction for any given period.

$$ET_{period} = \sum_{i=m}^{n} ET_r F_i \times ET_{r24i}$$

Formula 2. Computation for ET for a given period.

Accuracy

Energy-balance ET models have proven to be robust tools for computing and mapping ET. Bastiaanssen, *et al.* (2007) summarize the results of 19 studies that include verification of results from METRIC and/or SEBAL. The 19 studies have an average of 4.5% disagreement with other, ground-based methods of measuring ET.

References

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APPENDIX G
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SUMMARY OF BEAR LAKE/BEAR RIVER OPERATION FOR 2009 AND POSSIBLE IRRIGATION ALLOCATIONS FOR 2010

Water Year 2009 Bear Lake Operation

Low elevation (fall of 2008)	5907.68'	November 2, 2008
High elevation	5912.34'	July 12, 2009
Bear Lake Irrigation Allocation	209,000 Ac. Ft. (91% of full 230,000 Ac. Ft.)	
Apr. 1 runoff forecast	125,000 Ac. Ft. (53%) – April through July	
Rainbow Inlet Canal (April-July)	195,000 Ac. Ft. (83%)	
Outlet Canal-period of release	July 2 to October 6 (additional releases to refill irrigation storage release from Soda Point reservoir Oct 30 – Nov 6; Nov 13 – Nov 19)	
Outlet Canal total release^	91,200 Ac. Ft.	
Outlet Canal storage release*	44,900 Ac. Ft.	
Allocation for Lake Recovery	164,000 Ac. Ft.	

** As computed by PacifiCorp (note that the difference between the total release and the storage release is natural flow per Dietrich Decree for Mud Lake and Bear Lake Tributaries plus Rainbow Canal inflows)*

"System Loss" volume^	7,200 Ac. Ft.

^ Due to uncontrolled flow from (welcome) rain events. Whenever water flows below Cutler during the irrigation season any storage water in the system at Cutler is the first water out. Natural flow goes to irrigators.

Current Status
Fall minimum elevation occurred on November 14, 2009: 5910.44'

Bear Lake elevation as of November 16, 2009: 5910.45' (37% of total reservoir capacity)

Rainbow Inlet canal 220 cfs and releasing 240 cfs through the Bear Lake Outlet Canal to refill irrigation storage released from Soda Point reservoir. Pumps are off.

Range of Possible Irrigation Allocation for 2010
We are in the 'fat' part of the allocation curve and the range of possible irrigation allocations is very small.

- If Bear Lake rises only 1.5' to about 5912 in the spring, the irrigation allocation would be 214,000 Ac. Ft. (93%).
- If Bear Lake rises 6' like it did in 2005, then the allocation would be 230,000 (full allocation).

BEAR RIVER WATER USERS ASSOCIATION
REPORT TO THE BEAR RIVER COMMISSION
NOVEMBER 17, 2009

2009 Operation

This year will go down as one of those years where we set the standard of what a great irrigation season ought to be. The biggest factor in this year's water supply was the cool, wet June, which provided abundant precipitation, prolonged snowmelt runoff and reduced irrigation demands. The best news is the fact that total Bear Lake storage release for irrigation was only 45,000 acre feet or 22% of the 209,000 acre foot allocation and about 40% of the historical average storage release for irrigation. The other important fact is that 164,000 acre feet or the equivalent of 2.34 feet is preserved for lake recovery. The June condition certainly was the biggest factor in reduced storage use but a greater awareness of conservation practices by the irrigation groups certainly helped in minimizing storage use. The total lake rise of 4.66 feet from last fall to this past summer is a good increase since the average lake increase is about 3 to 3.5 feet. This was one of those unusual years when evaporation was substantially greater than the releases and even with the good conditions of 2009, the reality is that it will still take many years of above average runoff for the lake to fully recover.

New Water Applications

2009 was a relatively quiet year with respect to new water applications. The two most controversial were the Black Bear Resort project at Bear Lake and the Cache County filing. The Association voted to withdraw its protest on the Black Bear Resort application because the applicant had made substantial efforts to improve its mitigation plan and reduce projected water demands of the project. The mitigation plan which proposed drying up formerly irrigated farmland above Bear Lake to mitigate for project groundwater withdrawals was a reasonable plan top prevent injury to downstream irrigation rights. The Cache County filing was protested by several parties, has gone through the hearing process and we are awaiting a final decision by the State Engineer. I am advised that the decision will not be made any time soon so it is likely that the decision will not be made until next year.

Utah Water Summit Conference

On another matter, the Utah Water Summit Conference will be held on December 1 at the Davis Convention Center. The theme this year is "Mitigating Risk in a Growing Urban Environment". This theme was chosen as a result of the mud slide that occurred in Cache County resulting in three deaths. The only reason I am bringing this up today is because this disaster occurred within the Bear River Basin. Everyone from the Governor on down is trying to come to grips with the issue of canal maintenance and safety. I have brought registration forms if anyone is interested in attending this event.