

**EXPANDED NATURAL RESOURCES INTERIM COMMITTEE
MEETING - June 3, 2004
MINUTES
9:30 a.m. to 4:00 p.m. Boise City Hall, City Council Chambers,
3rd Floor, 150 N. Capitol Blvd., Boise, Idaho**

The meeting was called to order by **Cochairman Senator Noh** at 9:45 a.m. Committee members present were President Pro Tem Senator Robert Geddes, Senator Don Burtenshaw, Senator Stanley Williams, Senator Dean Cameron, Senator Joe Stegner, Senator Skip Brandt, Senator Clint Stennett, Cochairman Representative Dell Raybould, Representative Bert Stevenson, Representative Mike Moyle, Representative Scott Bedke, Representative George Eskridge, Representative Jack Barraclough, Representative Charles Cuddy. Senator Bert Marley, Representative JoAn Wood and Representative Wendy Jaquet were absent and excused. Adhoc members present were Senator Tom Gannon, Senator Gary Schroeder, Senator Shawn Keough, Senator Brad Little, Representative Darrell Bolz, Representative Tim Ridinger, Representative Wayne Meyer, Representative Larry Bradford, Representative Doug Jones, Representative Pete Nielsen, Representative George Sayler. Senator John Andreason, Senator Brent Hill, Senator Marti Calabretta, Representative Maxine Bell, Representative Lawrence Denney and Representative Eulalie Langford were absent and excused. Non-committee legislators in attendance included Speaker Bruce Newcomb, Representative Frances Field and Representative David Langhorst.

Others present were Larry Pennington and Ted Diehl, North Side Canal Co.; Bill Thompson, Minidoka Irrigation District; Lance Bates, City of Twin Falls; Martin Bauer and Patik Bandy, DEQ; Dick Rush, Idaho Association of Commerce and Industry; Lewis Rounds, Idaho Department of Water Resources District 120; Gary Johnson and Donna Cosgrove, University of Idaho; Ron Carlson; Chuck Coiner, Twin Falls Canal Co.; Steve Guerber, City of Eagle; Brenda Tominaga and Lynn Tominaga, Idaho Ground Water Association; Gregory Kasko, Idaho Trout Company; Randy MacMillan, Clear Springs Foods; Ray Houston, Legislative Services Budget and Policy; Carl Bianchi, Mike Nugent, Caralee Lambert, Maureen Ingram, Legislative Services Research and Legislation Office; Allyn Meuleman, USBR; Bert Bowler, Idaho Rivers United; Judy Bartlett, IFBF; Neil Colwell, Avista Corp.; Dale Ralston, Ralston Hydrologic Services; Bruce Wright, Basic American Foods; Director Karl Dreher, Dave Tuthill and Phil Rassier, Idaho Department of Water Resources; Don Dixon, Senator Crapo's Office; Judi Danielson, NWPC; Maria Minicucci, Boise City Parks and Recreation; Norm Semanko and Gayle Batt, Idaho Water Users Association; Dean Sangrey and Mary Lucacheck, Idaho Department of Parks and Recreation; James Yost, Governor's Office; Linda Lemmon, Thousand Springs Water Users Association, Inc.; Craig Evans and Todd VanOrden, Bingham Ground Water District; Chuck Brockway, Brockway Engineering; Charles Barnes, Congressman Simpson's Office; Kay Hardy,

Clear Lakes Trout Co. and Rich Rigby, Bureau of Reclamation.

Mr. Philip Mote, Climate Impacts Group, University of Washington (CIG) was introduced to discuss research relating to climate change. **Mr. Mote** explained that the CIG research team has been in existence for nine years. CIG presents its research to help with natural resource management decisions in the northwest. **Mr. Mote** presented the following points:

- ❗ Humans are changing global climate and these changes will become more evident.

Mr. Mote, stated that outside of the scientific community this is a controversial statement and he would, in his presentation, attempt to show the scientific evidence that supports it.

- ❗ Warming will reduce snowpack and exacerbate summer water shortages; some of these changes are already becoming apparent in Idaho.

Mr. Mote said that this assertion is not something that is going to happen in the future, it is already becoming apparent and may have something to do with the water situation in Idaho.

- ❗ Future warming introduces a climate-driven depletion of the Snake River Plain aquifer.

Mr. Mote noted that during the month of March, 2004, the snow amounts throughout the west dropped at near record or record rates. In some areas the drop from March 1 to April 1 was the greatest ever recorded. In the Rocky Mountains, the disappearance of snow in March was very rapid and had some fairly high consequences due to the fact that it comes on top of several years of drought. The rapid drop in snow was partly due to the dry spring that was experienced by much of the western United States. Most of Idaho was in an 80% of normal drought with most of that water coming in January. It was also warm in Idaho from January through April. The temperatures for that period were about 1.5 to 2.5 degrees warmer than normal. This was true of most of the United States. **Mr. Mote** continued that the outlook from the climate prediction center for the coming months is for the drought to persist.

Mr. Mote explained that Idaho's climate, as well as the west, is partly driving by Pacific Decadal Oscillation (PDO). This PDO is a feature of the North Pacific climate that influences North America. It has a warm phase and a cool phase. During the warm phase, there are certain consequences for climate in the west. In the last four years, the PDO has gone in both directions. Temperature anomalies over land are associated with the PDO in the winter. Alaska, British Columbia and the Northwest United States are warmed considerably by a warm phase PDO. During a warm phase PDO, precipitation in the Pacific Northwest is decreased. According to **Mr. Mote**, their concern is that the Pacific Northwest has remained dry over the last four years even though the PDO has been in a cool phase. CIG believes the conclusion from this is that the Pacific Ocean has some effect on Idaho's climate, but it is not consistent with typical PDO effects.

Mr. Mote continued by stating that CIG believes there is definitely more going on to affect climate. **Mr. Mote** went on to note that the subject of climate change has been studied for many decades and as far back as the 1890s some basic physical calculations were done concluding that a doubling of carbon monoxide would lead to a warmer climate.

According to **Mr. Mote**, in order for a theory to pass tests of credibility as to how the data was collected and the methods used for analysis, there are thousands of peer reviewed scientific papers that are the currency of the scientific world. The job of putting all of these papers together in a coherent body of knowledge on climate is undertaken by the Intergovernmental Panel on Climate Change (IPCC). The IPCC was constituted under the authority of the World Meteorological Organization and the United Nations Environment Program to provide a scientific statement about climate change to policy makers. The IPCC issued major reports in 1990, 1996 and 2001. The conclusions in the 2001 report include the following:

- An increasing body of observations gives a collective picture of a warming world and other changes in the climate system.
- There is new and stronger evidence that most of the warming observed over the last 50 years is attributable to human activities.

Mr. Mote went on to explain the greenhouse effect. He explained that greenhouse gases emit energy from the earth's atmosphere. This is what keeps earth warm. Roughly 2/3 of the energy that the surface of the earth receives is actually emitted by the atmosphere, not by the sun. According to **Mr. Mote**, this is important because humans have changed the composition of key greenhouse gases starting with carbon dioxide. It is clear from studies done that carbon dioxide amounts were stable up until the 1800s when the burning of coal, oil and natural gas began. This takes carbon dioxide out of the earth's crust and puts it in the atmosphere. This is a geological process happening on a scale of tens of years rather than tens of millions of years which is much faster than plants can absorb it. This shows an increase in carbon dioxide of 32% and is higher than it has ever been in the last 23 million years. Seventy percent of carbon dioxide emissions come from the burning of fossil fuels.

Mr. Mote continued that methane is the second greenhouse gas and it has increased by about 150%. This concentration has not been seen in at least 420,000 years. Slightly more than 50% of methane emissions originate from human activities. This includes rice paddies, cows, termites and so on. According to **Mr. Mote**, molecule for molecule, methane is more potent than carbon dioxide but it is not as abundant.

Mr. Mote stated that it is clear that there have been changes in the earth's atmosphere and the instrumental record of temperature for the last 140 years indicates there has also been an increase in the earth's average surface temperature. This warming has not proceeded smoothly with large increases before World War II and another pulse of warming about 30 to 35 years ago.

Mr. Mote explained that urbanization is often mentioned as a cause of this warming. Housing,

concrete and large buildings go up around weather stations that used to be over fields and these buildings and concrete retain heat. In a comparison of rural and urban stations, climatologists have been able to determine that about 10% of the one degree global average warming is related to urbanization. This figure was not included in the measurements discussed above.

Mr. Mote stated that another cause mentioned is that the weather stations are too far apart and cannot characterize the warming patterns. Warming patterns, **Mr. Mote** said, are very large so the distance between stations should not be a factor.

Mr. Mote continued that one of the most common arguments is that satellite patterns show no warming although CIG believes the research shows that the surface is definitely warming. According to **Mr. Mote**, a map of Idaho shows that urbanization is not playing a major role in climate warming. Challis and Arrowrock Dam show the largest warming trends in the state over the last eight years. The largest trends in Washington and Oregon also tend to be at small towns or ranger stations. Most glaciers in the west have thinned.

In further addressing satellite patterns, **Mr. Mote** explained the reason this is an issue is that in climate models, when computer programs used to simulate earth's climate are fed increasing greenhouse gases, they tend to show that the troposphere (0 to 5 miles above the surface) should warm faster than the surface. Over the period from 1979 to 2001 the satellites do not show this. Satellite measurements since 1960 do show warming up to 1979. The National Academy of Sciences issued a report trying to reconcile this difference. Their conclusion was that the satellite measurements in no way invalidate the conclusion that surface temperature has been rising. Ozone depletion has been considered as a factor in these differences. Even though this is still a big puzzle for the climate community, **Mr. Mote** said it should not be construed as proving that the surface is not warming.

Mr. Mote stated that the IPCC has observed that over the last 50 years some of this warming is a result of human activity. This observation is based on the fact that the rate of change is unusual. The warming seems to be faster than the average. Also, the places in the world that are warming the fastest, such as the arctic and high latitude continents, agrees with what is expected from a greenhouse effect. So, according to **Mr. Mote**, the pace of change and the place of change seem to support the idea that warming is human caused. A third reason for this observation involves the fact that solar radiation and volcanic forcing should have led, if anything, to a cooling in the last 30 years, not a warming. Charts showing this data are available on the Legislative Services website at <http://www2.state.id.us/legislat/2004%20Interim/04intcom.html#resource> and on the Idaho Department of Water Resources website at <http://www.idwr.state.id.us/Committee/default.htm>.

Mr. Mote noted that the starting point for what will happen in the future is what is going to happen to the greenhouse effect. The IPCC developed several scenarios of future socioeconomic development that would lead to different inputs of greenhouse gases into the atmosphere. Under the most modest growth scenario, the carbon dioxide level would double from pre-industrial levels in the next 100 years. **Mr. Mote** stated that absent a major international policy effort to

change greenhouse gas emissions, this will be true. These various models show a range of 3 degrees fahrenheit to 6 degrees fahrenheit raising of temperature by the end of this century. The more plausible temperature increase is about 2 to 3 degrees fahrenheit. This is due to the fact that the production of greenhouse gases has accelerated rapidly. According to **Mr. Mote**, there will likely be more change in the next 50 years than has been seen in the last 50 years.

Mr. Mote summarized that lowest model estimate for northwest temperature change in the 2020s is about .8 degrees fahrenheit. The average change is 2.5 degrees. For the 2040s the warming is more substantial at about 4 degrees. **Mr. Mote** said that these models are not as effective in predicting precipitation as they are in predicting warming. The models did not predict that the recent last four years of drought would happen. The models tended to say there would be more precipitation. Records show that droughts like the one the west is experiencing happen about every 200 years.

Representative Raybould asked how precipitation in the last 100 years varied according to temperature variations. **Mr. Mote** answered that most of the northwest, in the last 80 years, saw an increase in precipitation. This is, in **Mr. Mote's** opinion, because the 1930s were so dry and the 1990s were fairly wet. He stated that a graph of precipitation would bounce up and down and, in most places, there is not a strong upward trend. In response to another question from **Representative Raybould**, **Mr. Mote** responded that there is some connection between precipitation and the PDO that shows a tendency to shift to warm and dry or cool and wet but these are not strong correlations. **Representative Nielsen** asked why temperature change in one hemisphere would not affect the other hemisphere. **Mr. Mote** said the reason for the hemispheres not affecting each other has to do with the oceans. Oceans warm more slowly than land. So a strong greenhouse effect over those oceans does not make as much difference as it does over land. In addition to that, **Mr. Mote** stated that there are special places in the oceans where the water is sinking, causing any warmed water in those areas to be taken to great depths. These areas include the North Atlantic and the fringe of Antarctica. Both of these areas show very little warming.

In response to a question from an audience member, **Mr. Mote** stated that his presentation showing that global warming is happening is the consensus view of the scientific community as a whole. He said that he is trying to emphasize controversial areas but it is agreed by the scientific community that the world is warming and will continue warming because of the strengthened greenhouse effect.

Mr. Mote went on to address the theory that warming will lead to cooling due to ocean circulation. That theory suggests that ice melting from Greenland will enter the North Atlantic and shut down ocean circulation preventing heat transport to the northern climates. The problem with this theory, according the **Mr. Mote**, is that the amount of heat transported to the North Atlantic is not very great. Even if it is shut down, he stated that the greenhouse effect will win out.

In response to a question from **Senator Brandt**, **Mr. Mote** explained that when greenhouse

gases are put into the atmosphere, they stay for dozens to hundreds of years. When a volcano puts sulfur dioxide into the stratosphere, it only stays, at the longest, for three or four years. He added that the only way a volcano can effect climate for more than one month is by shooting a lot of sulfur dioxide into the stratosphere.

Representative Cuddy asked how migrating salmon will be effected if this warming trend continues. **Mr. Mote** said that would depend on whether streams flood or lower. In his opinion, in some areas salmon will be affected significantly. If streams are lower and temperatures are higher, he stated salmon will have more trouble finding cool water refuges. According to **Mr. Mote**, the conditions in the estuaries and the conditions the fish find as they make the transition from freshwater to the ocean will play a major role in how well the fish survive.

Representative Raybould asked for an explanation of why the sea surface temperature is decreasing when, at the same time, global warming is increasing. **Mr. Mote** explained that the reduction of sea surface temperature is due to the PDO.

Mr. Mote continued that warming reduces the amount of snow that is received and it causes the snowpack to melt sooner. According to **Mr. Mote**, studies show that the snowpack that will be lost is in the lower to moderate elevations which would include Idaho. He went on to explain that in Idaho, moving down the Snake River, the model shows flows increasing earlier in the spring due to the earlier snow melt. Regarding reservoir management, **Mr. Mote** stated that in a world where there is less snow to worry about, some account needs to be made for flood control in order to capture the earlier runoff and not be evacuating reservoirs to capture snow melt that will never come. He said that this is a very big issue that will have to be dealt with at some point.

In a chart depicting Idaho, **Mr. Mote** explained that over the last 50 years the losses have been particularly large in the Cascades and at some locations in the Rockies. Declines, according to **Mr. Mote**, are in the 10% to 30% range in Idaho. Another chart depicted spring snow melt happening earlier in the spring by about 10 to 40 days. As the west warms, **Mr. Mote** said, the winter flows rise and the summer flows drop. Charts are available at the websites for Legislative Services and Idaho Department of Water Resources, addresses of which are provided on page 4 of these minutes.

Mr. Mote stated that some work had recently been done regarding the Snake River Plain Aquifer and the effect of warming. This model simulates the flow of water into, through and out of the aquifer. The results show that in a warmer climate more pumping might make up for evaporative losses from groundwater irrigation. Lower flows in the rivers in the summer and more evaporation would lead to less recharge to the aquifer that would result in lower groundwater and lower output at Thousand Springs. According to **Mr. Mote**, these recharge/discharge patterns are sensitive to both climate and irrigation and decreases in irrigation would result in decreases in recharge and discharge.

Mr. Mote explained that the implications are that increased warming increases

evapotranspiration and reduces recharge. Both effects together tend to reduce the aquifer discharge to the Snake River at Thousand Springs. A warmer climate will require greater effort to maintain current levels of aquifer discharge. According to **Mr. Mote**, beyond the Snake River Plain Aquifer, downstream water users will additionally be affected by loss of snowpack.

Mr. Mote concluded by restating the three main points of his presentation. These are:

- Humans are changing global climate, and these changes will become more evident
- Warming will reduce snowpack and exacerbate summer water shortages; some of these changes are already becoming apparent in Idaho
- Future warming introduces a climate-driven depletion of the SRP aquifer

In response to a question from the audience, **Mr. Mote** explained that there is a distinction between relative humidity and specific humidity. The best understanding of how humidity will change with the warming climate is that relative humidity remains relatively constant while specific humidity goes up because warmer air holds more water. When that information was put into the model, it calculates an increase in evapotranspiration.

Someone from the audience stated that the reduced snowpack in the spring and the shift of snow melt timing would seem to have potentially critical implications for winter and spring water management policy and practice. He asked **Mr. Mote** to comment on ideas for adjustments that will be required to winter and spring water management policy and practice. **Mr. Mote** commented that there are very place specific answers to that. He stated that there needs to be a more flexible way of recognizing weekly and monthly changes in snow pack and recognizing that peak snow accumulation will get steadily lower worldwide. According to **Mr. Mote**, there also needs to be more concern that reservoirs are full at the beginning of summer. This would require a way to capture the earlier snow melt and a way to manage for reduced summer flow.

Reports from the working groups were next on the agenda. The Mountain Home, Bear River, Treasure Valley, Northern Idaho and the Eastern Snake Plain Aquifer working groups each met since the last meeting of the entire committee.

The Bear River Working Group held a meeting on April 27, 2004 that was discussed at the last meeting of this committee. They are in the process of scheduling another meeting.

The Eastern Snake Plain Aquifer Working Group meeting was held on May 21, 2004 at the Burley Inn in Burley, Idaho. Cochairman Senator Noh chaired the meeting. The working group was briefed by Clive Strong, Division Chief, Natural Resources Division of the Attorney General's Office, as to the Upper Snake Component of the Nez Perce Term Sheet. The presentation included a detailed review of the two tiers of the component which include a provision for flows defined by the Swan Falls Agreement to be decreed by the Snake River Basin Adjudication Court to the Idaho Water Resources Board and a provisions for a flow augmentation program based upon renewal of Section 42-1763B, Idaho Code, for the term of the Agreement which may be extended for a period of up to thirty years.

Additional agenda items included Water District 120's mitigation plan framework as well as presentations and discussions relating to water management issues including an overview of water management options, a water management project and a discussion of aquifer management goals. There were also reports by ground water users, spring water users and a congressional report.

At the May 19, 2004, meeting of the Mountain Home Aquifer Working Group, the discussion focused primarily on domestic wells and supplemental water rights. The working group received an Idaho Department of Water Resources summary calculating that 819 wells were drilled in Basin 61 between 1988 and 2002. Most are assumed to be domestic wells. Almost twice as many wells (196) were drilled in 2001 and 2002 as in previous years. Local residents say this trend is due to growth and will probably continue. In trying to determine the impact of those wells, questions were raised about average consumptive use. Idaho Department of Water Resources does not meter or report diversion for domestic use nor do they distinguish between wells located in the ground water management area, critical ground water management area or other areas.

Supplemental water rights generated considerable discussion. The discussion encompassed everything from how the rights are defined to their application and what would be considered an enlargement.

The working group also received an overview of the Mountain Home Irrigation District and its systems. Idaho Department of Water Resources presented information about total irrigated acres in Basin 61 and how they are broken down between ground, surface and supplemental water.

The North Idaho Working Group meeting was held on May 28, 2004. Dr. Dale Ralston made a presentation about the hydrology of the Palouse aquifer and a discussion of ground water problems. Mr. Larry Kirkland, Palouse Basin Aquifer Committee (PBAC) made a presentation about the past and present activities of PBAC.

Helen Harrington, Idaho Department of Water Resources hydrogeologist, presented an overview of the status of the petition filed with Idaho Department of Water Resources for ground water management and critical ground water area declarations for the shallow and deep Palouse aquifers and other management actions.

The May 28, 2004 meeting of the Treasure Valley Aquifer Working Group focused on urban issues affecting water. Nancy Merrill, Mayor of Eagle, discussed water issues currently facing cities, including: surface water for development and its effect on recharge of the aquifer, cluster development and open spaces, pressurized irrigation, and future municipalities and their water rights.

Darren Coon presented information on behalf of the Nampa-Meridian Irrigation District. He explained that the District currently has contracts with the City of Nampa and the Ada County Highway District. He noted there is a concern about the loss of opportunity to allocate non-

allocated water in the reservoir and that the allocations in Lucky Peak should be made permanent.

Christian Petrich spoke on issues related to implications of urbanization on water use. He explained that urban use involves municipality water supply which is from the deep aquifer, but the recharge is to the shallow aquifer and noted that in dry years, there could be more demand on the municipal water source. With increased population, there is a move to more pressurized irrigation systems. The challenge is to seek ways to meet the needs within the context of the current delivery system.

Dr. Mary McGown, Idaho Department of Water Resources presented information on the Lower Boise River Basin Plan. She stated that currently the basin has 410,000 people but that number is estimated to be 1.2 million by 2050. The basin includes 5 irrigation districts. According to Ms. McGown, the way in which we meet the future demands of the water we have is through conservation, price of water, and by possibly changing the Bureau of Reclamation's authorization of water rights.

Senator Noh announced that a Water Management Study Group and an Implementation Study Group would be added to the Eastern Snake Plain Aquifer Working Group. The Water Management Study Group will be called on to make some important recommendations to the full Eastern Snake Plain Aquifer Working Group that include determining how much progress can be made with recharge and how to get there as well as answering the difficult question of curtailment. **Representative Stevenson and Senator Williams** will be the cochairmen of the Water Management Study Group. **Representative Jaquet** will also participate. Other members invited to participate will include:

- ! From Water District #1
 - Albert Lockwood
 - Ron Carlson
 - Don Hale

- ! Ground Water
 - Tim Deeg
 - Lynn Carlquist
 - Dan Temple (A&B)

- ! Surface Water
 - Bill Jones
 - Randy McMillan
 - Chuck Coiner

- ! Local Governments
 - Bob Muffley

- ! Others
 - Idaho Power
 - Idaho Department of Water Resources
 - Bureau of Reclamation

Senator Noh continued that the Implementation Study Group will be chaired by **Representative**

Bedke and Senator Burtenshaw. Senator Stennett will also participate. This group will be asked to consider the statutory, regulatory and fiscal requirements to implement recommendations. The membership of this committee invited to participate will include:

- ! Upper Valley Dale Swensen
Stan Clark

- ! Ground Water Dean Stevenson
Craig Evans
Tom Geary

- ! Surface Water Vince Alberdi
Kay Hardy
Linda Lemmon

- ! Commercial Rex Mirchey (Jerome Cheese)

- ! Conservation Tom Stewart

- ! Idaho Water Resources Board Jerry Rigby

- ! Others Idaho Power
Idaho Department of Water Resources
Bureau of Reclamation

Mr. Charlie Barnes was introduced and stated that with USDA programs in the works that include a conservation reserve program and funding being made available to change groundwater irrigation systems to surface irrigation systems, there has been a meeting scheduled on June 28, 2004 for producers, legislators, agriculture industry and congressional aids. This will be an educational program at the USDA offices in Boise. It was also announced that Mr. John Johnson, Deputy Administrator for Farm Projects, USDA, will be in Idaho on August 16, 17 and 18. Congressman Simpson will be there as well.

Mr. Gary Johnson, Idaho Water Resources Research Institute, University of Idaho in Idaho Falls next addressed the committee about ground water modeling. He explained that the goal of the Idaho Water Resources Research Institute is to link up water research and education. The Idaho Water Resources Research Institute has been involved in water research in Idaho for several decades. One of the more recent projects the institute has been involved with is modeling and technical aspects of the Eastern Snake Plain Aquifer. **Mr. Johnson's** power point presentation is available at <http://www.idwr.state.id.us/Committee/default.htm> or at the Legislative Services website at <http://www2.state.id.us/legislat/2004%20Interim/04intcom.html#resource>. The presentation includes a ground water model analogy which is simpler in terms of understanding mathematical representation or the relationship between altitude and air temperature. The observation that temperature decreases when altitude increases can be used to help prepare a model. This

involves putting a line through those data points. This line can also be expressed as a mathematical equation. This idea of fitting a line through observations is part of the process of creating a model. If asked a question, a model can yield a prediction or estimate an effect.

Mr. Johnson continued that this same type of scenario can be applied to ground water. According to **Mr. Johnson**, the ground water flow model input/output comparison would look like the following:

Altitude/Temp Model

Model Input:
Altitude

Model Output:
Temperature

Ground Water Flow Model

Model Input:
Recharge and discharge at all locations for time frame of interest

Model Output:
**Aquifer water levels
Spring discharge and river gains and losses**

In terms of the ground water flow model, asking the model what the effect of climbing another 1,000 feet would be on temperature can be changed to asking the model what the effect on spring discharge of pumping 100 af at a given location would be. In response to a question from **Senator Noh, Mr. Johnson** stated that the calibration function is related to historical data that exists so the quality of the data is very important. The model can be calibrated to a certain period of time and then all of the data within that period that was relevant to what is being measured is used. Constants within the equations are identified such as physical properties of the aquifer.

Mr. Johnson explained that the results received from the ground water model are not 100% exact, they are estimates. It is believed that for many of the questions being asked, these results are the best estimates that the scientific community is able to generate.

Mr. Johnson continued to explain what the ground water model looks like and how it works. Inputs to the model include how much water is getting into the aquifer directly from precipitation, canals, surface water irrigation, streams, tributaries and pumping. Then the model gives its best estimate of what aquifer water levels will be at certain locations. The model also shows how much exchange there would be with surface water. The specific charts showing how the ground water model works are located at <http://www.idwr.state.id.us/Committee/default.htm> and at the Legislative Services website <http://www2.state.id.us/legislat/2004%20Interim/04intcom.html#resource>. Challenges in the process include estimating the recharge and discharge inputs to the system and estimating aquifer properties. The bottom line, according to **Mr. Johnson**, is that the model can provide the best estimates of changes in water level in a region and changes in spring discharge and river gains and losses for reaches along the Snake River. However, **Mr. Johnson** went on to note that the model will not automatically determine changes in recharge and discharge associated with

some change in land or water management. It will not provide “point specific” estimates of aquifer water level and spring discharge or provide exact solutions. The model cannot assess injury in a legal sense or assess economic impact of alternatives.

Representative Raybould asked how the data is collected for the model such as transmission losses in streams and rivers that recharge the aquifer and precipitation. **Mr. Johnson** answered that transmission losses will be addressed in a later presentation. As for precipitation, precipitation maps are used that cover a 23 year period. He added that it is difficult to interpret how much of that precipitation actually recharges the aquifer system.

Senator Stennett asked about the accuracy of the amount of water taken out by wells and how that number is determined. **Mr. Johnson** said that for ground water pumping the basis for determination of extraction is how much is consumptively used. In response to another question from **Senator Stennett**, **Mr. Johnson** said that the model does take into account the type of crops being grown on a county-wide basis.

Donna Cosgrove, Idaho Water Resources Research Institute continued with a presentation regarding the Snake River Plain Model upgrade. Her complete presentation is available at <http://www.idwr.state.id.us/Committee/default.htm> and at the Legislative Services website <http://www2.state.id.us/legislat/2004%20Interim/04intcom.html#resource>. She explained that the original model was built in the 1970s by the University of Idaho and Idaho Department of Water Resources and it used a home-grown modeling code. This model was calibrated using just 1980 conditions. 1980 was chosen due to USGS effort in 1980 to characterize regional aquifers. In 1997 the Idaho Department of Water Resources model was converted to MODFLOW, the USGS code that is the code of choice for ground water modeling, and was also expanded to include Henrys Fork at this time.

The upgrade came about because of increased need for conjunctive management and it was recognized that the model was the best tool to provide this. Due to the fact that the original model was only calibrated with one year’s worth of data (1980), there was concern about the accuracy and documentation of changes. Another concern was that the water budget was not balanced. Due to these concerns it was decided that an enhanced model was needed and, as a result, the Eastern Snake Hydrologic Modeling Committee was formed in 1998.

The new model includes a 22 year recharge/discharge data set with a smaller grid size. It contains better river representation, is calibrated using automated tools and matches to thousands of data points.

Ms. Cosgrove continued that the data sources included USGS Snake Plain reports, Idaho Department of Water Resources reports and Idaho Water Resources Research Institute reports. Other sources were USGS stream gauge and water level data, Idaho Department of Water Resources GIS data, watermaster records, National Weather Service and National Agriculture Statistics Service. She explained that GIS data has really changed that face of modeling.

In response to a question from **Representative Nielsen**, **Ms. Cosgrove** stated that the model does not deal with specific water rights, the approach is more regional.

Field data collected included three synoptic water level measurements conducted by the USGS. Idaho Power and USGS conducted acoustic doppler stream gauging and irrigation return flows were collected by Idaho Power. Field interviews with canal company managers were also conducted.

Model details include:

- ! Numerical model using USGS Modflow
- ! 104 rows, 209 columns, single layer
- ! Represent aquifer as confined system
 - ! Generally accepted as unconfined
 - ! Behaves more like confined system
- ! Five Snake River Reaches
- ! Six Spring Reaches (Thousand Springs Area)

Ms. Cosgrove's presentation included charts showing maps of the five Snake River reaches and the six spring reaches that were used.

According to **Ms. Cosgrove**, the model is calibrated to 22 years of data represented in six month increments. The calibrated model parameters include transmissivity, storativity, river and spring conductance and spring elevation. The model calibration used Parameter Estimation Software (PEST) and was initially calibrated as steady state and ultimately coupled steady state and transient. Charts showing this data are available in **Ms. Cosgrove's** power point presentation that is available at <http://www.idwr.state.id.us/Committee/default.htm> and at the Legislative Services website <http://www2.state.id.us/legislat/2004%20Interim/04intcom.html#resource>.

In summary, **Ms. Cosgrove** stated that the model enhancement was a very collaborative effort involving many organizations and technical personnel. The calibration was very successful but the model results are not perfect. It is the best tool available. She added that the model use should be regional and that it is not appropriate for highly local applications.

In response to a question from **Senator Williams**, **Ms. Cosgrove** said that transmissivity maps are consistent with barriers such as Mud Lake and the Great Rift. The model shows that there is transmissivity between the barriers and the aquifer, it just takes longer for the water to move.

Director Karl Dreher, Idaho Department of Water Resources, spoke to the committee regarding the new modeling tool that **Ms. Cosgrove** discussed. He stated that when the new modeling tool was designed, they wanted it to be a tool that was generally agreed to by all sides of the water conflicts that are being addressed. He added that the water budget he explained during the first meeting of this committee was derived from the 17 year steady state calibration. **Director Dreher** said that it was his intent to continue to capitalize on the collaborative efforts

that have been put together thus far. A draft memorandum is being prepared for scrutiny by the technical committee and a meeting will be held at the Idaho Department of Water Resources in one week to seek input from a broader range of views in order to reach agreement on a set of initial scenario runs for the model. In his opinion, one of the scenarios that will be proposed will ask what happens if nothing changes. From this point there are a number of “what if scenario runs.” These would include:

- Future scenarios - looking at the effects of the three specific recharge options that were proposed at the last Eastern Snake Plain Aquifer working group meeting
- Water rights administration scenarios/impact scenarios using different water right priority dates
- Legacy scenarios - how did we get here
- More complex recharge scenario - going beyond what feasible amount of recharge can be done to get an idea of the sensitivity of spring discharge and ground water levels to recharge activities
- What happens if the drought does not end

Director Dreher stated that the water rights administration scenarios or impact scenarios propose the same type of priority banding that was proposed in October, 2003. This would include the impacts of ground water depletions with priority dates of December 31, 1948 and earlier. The next band would be January 1, 1949 and later, January 1, 1961 and later, January 1, 1973 and later and January 1, 1985 and later. The results could be combined in different fashions to perhaps look at other contributions. The scenarios would provide information relating to the impact ground water development has had within those priority bands and what would happen if those ground water rights were curtailed beginning with the most junior and working back. He said that the model can provide us with information relating to changes in ground water levels and changes in reach gains. **Director Dreher** emphasized that a decrease in reach gains due to ground water depletion does not, in and of itself, constitute injury.

Director Dreher noted that the legacy scenarios are more speculative than the others because additional assumptions have to be made. There are, in **Director Dreher's** opinion, three basic legacy scenarios. One would be to try to go back to the 1950s when the enhanced spring discharge was at or near its maximum and take the water supply conditions and the irrigation practices that were in place at that time and carry them forward. They would try to determine what would have happened had there not been large scale conversions to sprinkler systems under surface water supplies. According to **Director Dreher**, this will help us understand how much of the enhanced spring discharge was the result of incidental recharge associated with earlier flood irrigation practices. **Director Dreher** said that the next legacy scenario would attempt to go back in time even further, to try to get an estimate of predevelopment conditions that existed in the late 1800/early 1900s. Another legacy scenario would look at the specific situation under the A and B irrigation district and what is causing the depletions there.

In response to a question from **Representative Raybould**, **Director Dreher** said that the time frame for running these scenarios is as soon as possible. They plan to set targets next week and

as results are received for individual scenarios, the Idaho Department of Water Resources plans to disseminate those. Entities will need to realize that the individual scenario information does not present the complete picture.

Senator Geddes asked whether adequate efforts are being made in looking at the other aquifers in the state besides the Eastern Snake Plain Aquifer. **Director Dreher** stated that there is not enough being done in other areas of the state. He said that it is unfortunate that due to budget reductions the Idaho Department of Water Resources is stretched so thin, these other studies cannot be done. Staff or resources are simply not available. He said that, in his opinion, the other aquifers need to be addressed.

In North Idaho and the Bear River area, where the state has the opportunity to be proactive, the basic hydrologic information will not even be available. He commented that the price tag for a hydrogeologic characterization of the aquifer system in the Treasure Valley was \$6 million. The effort that has been described today was \$3 million and the effort that has been outlined for the Rathdrum Prairie aquifer is about \$3.5 million. This money is largely to acquire data that has not been collected in the past. **Senator Noh** commented that he remembers at least the last three directors of the Idaho Department of Water Resources have pleaded with JFAC to keep measuring devices and gauges on rivers for future management needs.

Representative Bedke asked whether the cost will be about the same for each of these basins as they become adjudicated and mitigation plans are imposed. **Director Dreher** stated that he is not sure of the cost. He said that one uncertainty that exists in the current model is tributary underflow which is the amount of water coming into the aquifer from the Little Lost Basin, the Big Lost Basin and so on. This type of characterization has not been done for those basins and tributary underflow is a significant contributor to the water supply in the Eastern Snake Plain Aquifer. **Representative Bedke** stated that conflicts similar to that in Water District 130 are going to exist in each of these other basins. He asked whether, in order to be prepared for that, would a model need to be available to support that. **Director Dreher** said that was correct and he agreed that other areas exist that have just as much conflict as Water District 130. One example involves the Rathdrum Prairie Aquifer that discharges in the State of Washington. Under the federal Clean Water Act, Idaho is required to meet Washington's water quality standards since the aquifer is also located in Idaho. Similarly, the Bear River Basin involves Wyoming and Utah as well as Idaho.

Mr. Dale Ralston, Professor Emeritus of Hydrogeology, University of Idaho, addressed the committee next and discussed hydrologic conditions in the Palouse Aquifer. He stated that in some ways Idaho is going to be at the mercy of what happens and what is going on in the State of Washington. This area has a long history of water level decline that indicated that if ground water pumpage could be stabilized and held constant, the computer model said that ground water levels would ultimately stabilize. **Mr. Ralston** said that a local organization called the Palouse Basin Aquifer Committee, that consisted primarily of the city of Moscow and Pullman, the University of Idaho and Washington State University, agreed to voluntarily reduce pumpage. Collectively these four entities stabilized ground water pumpage in the early 1990s. There is a

petition in front of the Idaho Department of Water Resources to declare the area a critical ground water area and there is a lot of local concern about the future. This is probably the single best example of local ground water management that may exist in the western United States. **Mr. Ralston's** complete power point presentation is available at <http://www.idwr.state.id.us/Committee/default.htm> and at the Legislative Services website <http://www2.state.id.us/legislat/2004%20Interim/04intcom.html#resource>.

In the interest of time, **Mr. Ralston** moved on to discuss an overview of the Spokane Valley — Rathdrum Prairie Aquifer. He explained that glacial flood sediments formed the aquifer about 15,000 years ago. Floods eroded away basalt and older fine grained sediment. Larger material (boulders, cobbles and coarse gravel) were deposited along the center of the valley with finer sediments deposited in side eddy valleys. Most wells penetrate only a few tens of feet into the aquifer and have high yields with little drawdown.

Mr. Ralston noted that the aquifer crosses the state line with ground water flow from Idaho into Washington. Aquifer discharge is to the Spokane River and Little Spokane River in Washington plus consumptive pumpage from wells. None of the water discharges other than to the rivers. In this way, it starts to look like the Snake Plain. The depth of water in all of the Idaho portion of the aquifer is greater than 100 feet and ground water does not discharge to surface water within Idaho. He explained that geophysical surveys provide our primary knowledge of the thickness of the aquifer. There has been no need to drill very deep into the aquifer because all of the water needed can be obtained by drilling only ten feet into it. Information suggests it could be 800 to 900 feet thick.

Mr. Ralston stated that recharge to the Spokane Valley — Rathdrum Prairie Aquifer occurs from precipitation on the aquifer, inflow from the tributary valleys and leakage from Coeur d'Alene Lake and portions of the Spokane River. Precipitation can be used as a measure of variation in recharge. Taking an average precipitation for the periods of record along with taking cumulative departures from annual precipitation show the highest period was in the mid 1990s. This is used to show how recharge occurs and how the aquifer actually functions. Ground water levels provide a measure of recharge and pumping impacts. Charts showing long-term water level records for observation wells are available at <http://www.idwr.state.id.us/Committee/default.htm> and at the Legislative Services website <http://www2.state.id.us/legislat/2004%20Interim/04intcom.html#resource>.

The conclusions from well hydrographs, according to **Mr. Ralston**, show that ground water levels in 2003 are about the same as a number of times in the past (1943, 1948, 1954, 1975 and 1985). The dominant control on ground water levels is variation in annual precipitation. **Mr. Ralston** continued that well development has impacted ground water levels but no long-term water level decline is evident.

After looking at recharge and historic ground water levels, he believes ground water discharge needs to be examined. **Mr. Ralston** noted that in Idaho ground water discharge is consumptive pumpage from wells that is not well documented and ground water flows across the state line.

Mr. Ralston stated that, in terms of the Spokane Valley - Rathdrum Prairie Aquifer, it is not possible for a well to impact a surface water system within the State of Idaho. Ground water does not discharge to any surface water system. This means that every lake in Northern Idaho is perched above the Spokane Valley — Rathdrum Prairie Aquifer. **Mr. Ralston** said that ground water discharge in Washington is also consumptive pumpage from wells that is better documented than in Idaho. Ground water discharges to the Spokane River and Little Spokane River and USGS streamflow stations are in place. Essentially no ground water exits the basin west of Spokane.

According to **Mr. Ralston**, ground water withdrawal in the Spokane Valley - Rathdrum Prairie Aquifer cannot impact surface water in Idaho because the Spokane River and all of the lakes are perched. On the other hand, ground water withdrawal in Idaho and Washington can and does impact the flow of the Spokane River and Little Spokane River in Washington. In his opinion, the problem is close to being identified. The basic controversy that exists is that the minimum flow of the Spokane River during the summer reaches critical levels and causes many problems. According to **Mr. Ralston**, this is the dominant issue that will drive this two state analysis. The question is what controls the minimum low flow of the Spokane River. **Mr. Ralston** explained that the Spokane River issues from Coeur d'Alene Lake and the discharge during the summer is controlled by a dam at Post Falls. This dam cannot control the high flow of the river. Another control is the discharge from the aquifer into the river which is controlled by the aquifer water level. Water levels in the aquifer are dependent on recharge and consumptive pumpage. Consumptive pumpage in Washington and Idaho with the greatest impact is from wells close to the gaining reaches of the river.

Mr. Ralston noted that river flow problems in Washington include the fact that low flows do not meet target levels set by the fish and game agency, problems with recreation on the river and with water temperature and quality.

Mr. Ralston said that regarding water quality, the aquifer itself is vulnerable to contamination from surface sources because of the lack of any significant fine grained layers in the subsurface. Long-term efforts led by the Panhandle Health Department and Idaho Department of Environmental Quality have been successful in protecting ground water quality in Idaho.

According to **Mr. Ralston**, the aquifer within Idaho has not been significantly impacted by development. Water quality is excellent in most locations but continued protection is needed. There are no surface water - ground water issues in Idaho but there are major issues in Washington. The demand for water in Idaho (Kootenai County) is growing and there is the potential for water quality degradation. **Mr. Ralston** stated that the primary issue is interstate water management. Consumptive ground water use in both states can impact flow in the Spokane River and Little Spokane River in Washington and meeting those target flows is going to be a challenge.

Mr. Ralston noted that there are things that need to be done within Idaho in terms of data collection that show the hydraulic characteristics of the aquifer, the recharge amounts and

controls as well as the consumptive ground water use. Transmissivity is very important but difficult to get because most of the wells only penetrate a few tens of feet into the aquifer. In order to do modeling, this information must be gathered. The knowledge of the hydraulic characteristics of the aquifer need to be expanded to include the hydraulic conductivity of the aquifer, the depth of the aquifer and the hydraulic conductivity of the “seal” along the bottom of the Spokane River and the lakes surrounding the aquifer. The recharge needs to be better estimated. **Mr. Ralston** stated that an analysis of water levels can serve as an independent check on recharge estimates. His power point presentation contained a chart showing an estimate of how much water flowed across the state line since 1960. According to **Mr. Ralston**, the graph illustrates the need to obtain better data on both aquifer recharge and water use. The graph is available at <http://www.idwr.state.id.us/Committee/default.htm> and at the Legislative Services website <http://www2.state.id.us/legislat/2004%20Interim/04intcom.html#resource>.

Mr. Ralston noted that there are some ongoing studies within the State of Washington that provide the basis for an improved estimate of the consumptive use of ground water. A companion study within Idaho is needed. Our present knowledge of consumptive use of ground water is very limited. A series of steady state and transient ground water models of the entire aquifer are needed. A data base needs to be developed so that models can be constructed to accurately represent the aquifer, ground water flow and the linkage to surface water systems. He added that alternatives ways to meet target minimum streamflow levels in the Spokane River need to be developed. This, in **Mr. Ralston’s** opinion is the hot button issue and he noted that perhaps there are other ways to solve it other than curtailing all ground water development. One possibility is to change the operation of the Post Falls Dam that influences summer lake levels. Curtail operation of wells near gaining reaches of the river during critical periods and exploring recharge enhancement alternatives from the Spokane River are other possibilities to consider. Alternative interstate management approaches should be evaluated. According to **Mr. Ralston**, historical interstate approaches range from adjudication, compacts, congressional apportionment and informal basin management groups. **Mr. Ralston** concluded that both Idaho and Washington follow the appropriation doctrine but there are significant differences.

Senator Barraclough asked whether there have been any proposals to drill wells through the aquifer and do pumping tests, and if so, what the cost would be. **Mr. Ralston** said there is a proposal for a combination study with the State of Washington, the State of Idaho and the USGS that has received an initial appropriation of \$500,000 and drilling wells is included. However, funding for the first phase has not been identified.

Representative Raybould asked whether there are any water quality problems in the Spokane River before it leaves the State of Idaho. **Mr. Ralston** said that, as he understands the problem, there are no major water quality issues in the Spokane River within Idaho. The dominant issues of concern deal with low-flow, temperature and so on once the river gets to Washington.

The meeting was adjourned at 3:50 p.m.