C. Draft Technical Report - Management Alternatives Analysis and Packaging

In the course of its deliberations, the Committee considered a range of management strategies designed to effectuate a change in the ESPA water budget. These strategies are described below along with the estimated hydrologic benefits, cost, timeframe, and environmental considerations. To better understand how a combination of strategies might affect the water budget over time, the Committee developed and modeled six alternative sets of measures.
Ultimately, the Committee adopted a set of strategies that can be implemented over a ten year timeframe and outlined a long-term vision of a 600 kaf change in the water budget over a 20-year period. The management strategies considered by the Committee are set forth below.

This section describes each management alternative considered during development of the CAMP. The alternatives include: A) Managed Recharge – Existing Facilities; B) Managed Recharge – Constructed Facilities; C) Groundwater to Surface Water Conversions; D) Demand Reduction Strategies; E) Additional Surface Water Storage; F) Experimental Weather Modification Project; G) Below Milner Exchange; H) Water Conservation Measures.

A. MANAGED RECHARGE – EXISTING FACILITIES

Description

Managed recharge refers to the intentional placement of water on designated recharge sites where the water either naturally infiltrates or is injected into the underground aquifer. The purpose of a managed recharge program is to temporarily store excess surface water in the aquifer so that water re-emerges as surface or spring water flow at a later date. The current managed recharge efforts in the ESPA uses existing facilities to divert water into existing canals when the IWRB recharge water rights are in priority. Managed recharge can also be accomplished using storage water leased through the Idaho Water Supply Bank Rental Pool.

Factors that must be considered in the implementation of the recharge program include the availability of natural flow for recharge, technical challenges including soil characterization and local geology, the cost of acquiring water from the rental pool, and wheeling it through canals, and canal capacity, to carry recharge water when available. In addition, measurement of water quantity diverted and water recharged must be conducted to document results.

Hydrologic Benefit

It is estimated that managed recharge using existing canal systems could yield at least 70,000 acre-feet in improved surface water and spring discharge as well as increasing ground water elevation levels. These improvements would be realized at various locations on the Snake River depending on the location of the recharge.

Implementation Steps, Timeframe & Costs

The funding requirement for this strategy is estimated at $640,000 per year. There may be additional operation and maintenance costs

Environmental Considerations

Incidental recharge programs that use existing canal structures are exempt from obtaining approval from the Department of Environmental Quality (DEQ) for a ground water management program plan. Fish and wildlife impacts will depend on the amount and timing of diversion from the Snake River and the amount and timing of increased natural flow and spring discharge.

Operational Issues

Reservoir operations by the Bureau of Reclamation may effect the availability of water for recharge in some years. Additionally, the Palisades Winter Water Savings Agreement, ESA and NEPA requirements for federal facilities, and the Snake River Water Rights/Nez Perce Agreement may place limits on the use of water.

B. MANAGED RECHARGE – CONSTRUCTED FACILITIES

Description

In November 2006, the IWRB approved $350,000 for feasibility studies and geological testing of several potential recharge sites on the ESPA as an interim measure. Information gathered to date indicates that additional technical studies and engineering design are needed to determine the feasibility of using injection wells. The three recharge sites currently under investigation are located on the Northside, Milner-Gooding, and Aberdeen Springfield canal systems, including the Board sponsored W-Canal pilot project. Studies of the W-Canal site indicate that some form of injection would be necessary.

Limiting factors include the availability of natural flow for recharge, technical challenges, the cost and availability of storage water, and the capacity of canal systems to deliver recharge water and water quality concerns. In addition, measurement of water diverted and water delivered must be conducted to quantify and document the actual amount of recharge taking place.

Hydrologic Benefit

It has been estimated that up to 400,000 acre-feet of water could be available for recharge on an average annual basis. This would require significant infrastructure, which currently does not exist, to capture 1,000,000 acre-feet of water in years with excess flood control releases. The ESPA ground water model would be used to quantify the hydrologic benefits of any proposed recharge project so that site-specific recharge projects can be evaluated and prioritized.

Implementation Steps, Timeframe & Costs

Cost estimates for constructing facilities for managed recharge are approximately $50 million dollars. Additionally, the annual operations and maintenance cost is 1% of capital costs, or $500,000 per year as well as annual wheeling costs. The majority of the capital cost would be used to construct recharge projects below American Falls. Estimated time frame for construction of the facilities to implement this strategy is 20 years.

Environmental Considerations

Maintaining water quality is an important consideration for managed recharge projects on the ESPA. It will be necessary to monitor recharge source water and the quality of ground water to verify that ground water impacts from a recharge basin do not degrade ground water quality. Fish and wildlife impacts will depend on the amount and timing of diversion from the Snake River and the amount and timing of increased natural flow and spring discharge.

Operational Issues

Canal system capacities, geologic conditions and specialized maintenance requirements due to project operation will need to be further evaluated.

C. GROUNDWATER TO SURFACE WATER CONVERSIONS

Conversions involve the replacement of groundwater with surface water.

Hard Conversions

<u>A&B Irrigation District</u>

Description

This project targets reduction of groundwater pumping in a key location by implementing the groundwater to surface water conversion of the A&B Irrigation District. Analysis indicates that a partial conversion of ground water areas may be the most feasible in terms of cost.

Hydrologic Benefit

If A&B Irrigation District was supplied surface water every year to offset ground water pumping, most benefits would be realized at springs feeding the Snake River and in tributary rivers within 20 years, assuming a 10-year implementation process. This alternative reduces pumping stress in a key location along the aquifer and provides long-term improvement to reach gains and aquifer levels that are evenly distributed above and below American Falls. It has been noted that conversion of the A&B Irrigation District would be the single-most important long-term beneficial action in the ESPA due to its location. However, a full system conversion is very expensive.

Implementation Steps, Timeframe & Costs

A&B Irrigation District conversion requires use of either storage water from the proposed Minidoka Dam enlargement or another new reservoir, or below-Milner water supplies acquired and exchanged for the Upper Snake flow augmentation requirement. An estimated $360 million capital cost and an annual operation and maintenance costwould be needed to implement a full system conversion; this estimate does not include the cost of developing a water supply by constructing additional storage capacity or implementing below-Milner water supply acquisitions. Further evaluation is needed to determine to what extent partial conversion is feasible. Implementation time frame is 10 years or more. This project would require modification of the existing water rights to provide for a surface water source. See MWH Engineering Draft Report on A&B Conversions.

Environmental Considerations

Fish and wildlife impacts will depend on the amount and timing of diversions from the Snake River and the amount and timing of increased natural flow and spring discharge.

Hazelton Butte

Description

This alternative involves providing capacity to supply surface water for up to approximately 9,000 acres of ground water irrigated land on Hazelton Butte when water is available.

Hydrologic Benefit

The hydrologic benefits depend on the available water supply. However, the project could result in up to 18,000 acre-feet of reduced withdrawals from the aquifer annually when there is adequate surface water. Reducing withdrawals from the aquifer is expected to improve reach gains below Milner, although increased flow could occur intermittently depending on surface supply.

Implementation Steps, Timeframe & Costs

Implementation of this alternative may require Below-Milner Exchange and/or increased storage at Minidoka Dam to provide a firm yield of surface water supply, as well as approximately $20 million in capital costs, with annual operations and maintenance costs. Conversion of Hazleton Butte would take approximately ten years to implement.

Environmental Considerations

Fish and wildlife impacts will depend on the amount and timing of diversions from the Snake River and the amount and timing of increased natural flow and spring discharge.

Soft Conversions

Description

Prior to the 1950's water users on the Eastern Snake River Plain relied on surface water for irrigation. More recently, ground water has been used to supplement or replace the surface water supply. There may be opportunities in these areas to provide additional surface water to replace groundwater use when available. This strategy would require the construction of facilities to deliver surface water. These conversion projects would not only reduce groundwater use, but would also increase incidental recharge from deep percolation of water into the aquifer from the land irrigated.

Hydrologic Benefit

The hydrologic benefits resulting from soft conversion projects depend upon the available water supply. Generally speaking, these conversion projects would produce long-term improvements in reach gains above Milner. However results and could be intermittent depending on surface supply. Approximately 53,000 acres for potential conversion have been identified. See March 2008 Report "Soft Conversions" by IWWRI.

Implementation Steps, Timeframe & Costs

The application of this management alternative involves opportunistic delivery of surface water to lands near existing canals when river flows are adequate. It might involve delivery of surface water early and late in the season when surplus water and canal capacity are available. This option might be improved by the enlargement of Minidoka Dam or exchange of below-Milner water to realize an improved surface water supply. Implementation of this strategy would require $15 million in capital costs with an implementation time frame of 5 years. Annual operation and maintenance costs and some portion of the capital costs would be borne by the landowners.

Environmental Considerations

Fish and wildlife impacts will depend on the amount and timing of diversions from the Snake River and the amount and timing of increased natural flow and spring discharge.

D. DEMAND REDUCTION STRATEGIES

Description

Reduction in demand for water supplies can be accomplished through a number of strategies including the CREP, dry-year leasing, planting lower water use crops, acquisition and subordination agreements, and water conservation measures. Demand reduction strategies assist in achieving the Board objectives to 1) manage overall demand for water within the Eastern Snake Plain 2) reduce withdrawals from the aquifer, and 3) provide surface water for other measures, such as conversion or recharge.

Demand reduction efforts will be based upon the principle of willing buyer/willing seller and designed to benefit specific river and spring reaches as opportunities arise. This strategy is based on the principle of reducing the number and amount of irrigated lands, aquaculture operations, and industries that are permanently removed from production.

Hydrologic Benefit

It is estimated that implementation of a combination of demand-reduction measures could result in a 350 kaf change in the water budget. The state has already achieved approximately 40,000 acre-feet in demand reduction through the CREP program, and 18,000 acre-feet annually through the acquisition of the Pristine Springs facility.

Land and water purchases would have a permanent impact on the water budget through reduced depletions and also address site specific problems. Other options depend on a configuration of annual or partial year programs, which might be better applied across a larger geographical area. Meeting demand reduction targets is largely a function of price. Pricing and incentives can be used to target desired hydrologic effects.

Implementation Steps, Timeframe & Costs

Cost will vary depending upon location, water use, commodity prices, and other factors. Implementation time frame is 2-10 years. The Committee recommends continued evaluation of a "clearinghouse" mechanism that increases the efficiency of participation in demand reduction projects by connecting participants in CAMP implementation.

Environmental Considerations

Demand reduction strategies provide hydrologic benefits for spring and river systems by reducing withdrawals from the ESPA. This strategy has the advantage of benefitting the aquifer and springs in drought years, when water supplies for aquifer recharge tend to be more scarce. The strategy also tends to have environmental benefits because it does not impose new demands on reservoir storage or additional diversions of river flow. Environmental issues to be considered include ensuring that participating lands are not invaded by noxious weeds and assessing any impacts on local wetlands or spring features.

E. ADDITIONAL SURFACE WATER STORAGE

<u>New Storage – Minidoka Dam Enlargement</u>

Description

The Minidoka Dam, owned by the Bureau of Reclamation, is scheduled for major rehabilitation in 2011. Raising this structure by up to five feet could provide additional surface water storage along the Snake River system and increase the available water supply in the ESPA. A feasibility study of the cost to raise Minidoka Dam is currently underway.

Hydrologic Benefit

Raising the dam five feet would provide approximately 50,000 acre-feet in additional storage capacity at a critical point along the Snake River system. Additionally, the expanded reservoir may increase recharge due to seepage loss, which could benefit downstream water users. The Bureau of Reclamation will be evaluating this potential loss as part of the feasibility study. The increased storage capacity would provide a more reliable water supply for conversions, recharge, or other projects to benefit the ESPA water budget.

Implementation Steps, Timeframe & Costs

Raising Minidoka Dam will require a significant initial funding commitment. It is anticipated that the enlargement of Minidoka Dam could cost upward of $250 million in capital costs. Raising the dam will delay scheduled rehabilitation construction (currently scheduled to start in 2011) by 2 to 3 years.

Environmental Considerations

Environmental impacts associated with the enlargement of Minidoka Dam include potential effects on fish habitat and water temperature, particularly in the Minidoka Wildlife Refuge. The environmental impacts of this measure will be evaluated during the feasibility study currently underway.

New Storage – Other Areas

Description

This alternative focuses on the construction of additional storage facilities. Projects currently under consideration are located on the Weiser River, (Galloway Project), the Boise River system (new or enlarged projects), and above American Falls in the Teton River Basin. The Board was funded by the Idaho Legislature to study these potential projects.

Hydrologic Benefit

New storage would provide a reliable water supply for conversion, recharge, and supplemental water for existing surface systems, recreation, salmon flow augmentation, and flood control. The specific benefits depend upon location; however, an estimate of overall potential hydrologic benefit is 100,000 to 300,000 acre-feet.

Implementation Steps, Timeframe & Costs

Rebuilding Teton Dam is estimated to cost in excess of $500 million. The Water Resource Board and the Bureau of Reclamation are in the process of formulating an assessment level study to evaluate options and estimate costs for replacing the Teton Reservoir at the original location or at alternate off stream locations. The Water Resource Board and the Corps of Engineers are developing a feasibility-level study to assess options and costs of constructing new or enlarged reservoirs in the Boise River Basin. Additional off-stream sites in the Upper Snake River Basin are also under review.

Environmental Considerations

Environmental impacts will need to be examined and identified impacts avoided, minimized or mitigated, if the project is undertaken.

F. EXPERIMENTAL WEATHER MODIFICATION PILOT PROJECT

Description

This strategy involves the implementation of an experimental pilot project to enhance precipitation through cloud seeding. The goal of the project is to determine if cool season cloud seeding results in increased snow-pack in the Upper Snake River Basin.

Hydrologic Benefit

The average annual anticipated hydrologic benefit is estimated to be in the range of 3% to 15%, depending on the drainage basin and the number of 'seedable' storm events. The objective is to increase natural flow for diversion or storage by increasing snowpack in the headwaters.

Implementation Steps, Timeframe & Costs

The anticipated annual cost of implementing a cloud seeding program utilizing a combination of ground based generators and aerial seeding is $1.7 million. The timeframe for implementation is one – two years. Idaho Power has volunteered to participate in an ongoing pilot project conducted by local governments. There may also be some potential for cooperation with some water users in Wyoming, but at this time no formal discussions have been held.

Environmental Considerations

Any weather modification program must include a detailed monitoring program. Procedures should be put into place to suspend weather modification activities during heavy precipitation periods when additional rain or snow may have adverse consequences on wintering game, public safety, flooding, or other factors.

G. BELOW-MILNER EXCHANGE

Description

The Upper Snake River Basin provides up to 200,000 acre-feet of water from reservoir storage most years for downstream flow augmentation. The actual amount is determined by a combination of reservoir carry-over from the prior year and the April 1 runoff forecast. If this obligation can be supplied from other sources, this water can be made available for other purposes. Between Bliss and Marsing, there are a number of so-called high-lift projects, where water is pumped from the Snake River several hundred feet up onto adjacent benches for irrigation use. Due to high pump lifts and associated power costs, project economics can be marginal and owners in the past have expressed interest in selling their land and or water rights. If purchased, Upper Snake River flow augmentation requirements could be met with "exchange water" making water available for other purposes above Milner Dam.

Hydrologic Benefit

Below-Milner water acquired and exchanged would be available to be rented by the Bureau of Reclamation every year. However, for years when there is no water available for rental in the Upper Snake River Basin, there would be no water available for projects above Milner. Exchanging salmon flow augmentation water would reduce releases past Milner. The exchanges would most frequently be realized in years when there is plenty of excess natural flow, however about half of the years from 1981 to 2006 had no excess natural flow. As much as around 205,000 acre-feet has been provided for flow augmentation from above Milner and the average approximate amount delivered is modeled to be 102,000 acre-feet.

Implementation Steps, Timeframe & Costs

It would take an estimated five years to complete water rights purchases. The purchase of rights by the State would be permanent and benefits could start as soon as the rights were in priority. The up-front costs would be approximately $185 million, assuming the need to acquire 205,000 acre-feet at $750 per acre-foot.

Environmental Considerations

Possible environmental impacts could be water quality-based impacts dependant upon the flow scenario. Water quality immediately below Milner Dam may be impacted but as aquifer levels increase and spring flows improve there may be improvements in the middle reaches of the river during fall and winter. Depending on location and season of use, fflow exchange could have negative impacts by reducing Snake River flows over a defined reach (i.e., buying out down-river water rights and using the water in the Upper Snake River Basin for recharge or to meet other use demands). Furthermore, it could further flatten the hydrograph in the Snake River. This could negatively impact downstream Snake River fisheries and fishing opportunities due to flow shaping associated with the water exchange.

Legislative Requirements

An exchange with the BOR for salmon flow augmentation water above Milner Dam will require review and approval under the provisions of the Endangered Species Act (ESA) (NOAA Fisheries and possibly the US Fish and Wildlife Service) and NEPA.

H. WATER CONSERVATION MEASURES

Conservation measures can be very beneficial if they are implemented in a way that includes the overall effects on the river and the aquifer. For example, lining canals may reduce river diversions and improve supply at the farm headgate, but there would be reduced incidental recharge to the aquifer. Implementing check structures, automated gates and other measures including conservation projects on tributaries to the ESPA may provide a water source for CAMP recommendations. All conservation efforts are site specific and need to be examined on a case-by-case basis to ensure desired effect.

PACKAGING OF ALTERNATIVES

The Advisory Committee developed a series of packages to evaluate and compare, using the identified management alternatives. The packages were created and modified based on size and management alternative composition, and included a small, medium and large packages with two different emphases: demand reduction and recharge. The CAMP recommendations (based on hydrologic, economic and environmental analysis) include conversions, recharge, and demand reduction strategies to accomplish the desired water budget change.

Small Package

The small package of management alternatives was designed to produce an average supply of 300,000 acre-feet per year through a combination of soft conversions, aquifer recharge (with some construction), and demand reduction elements. It was anticipated that this alternative would take a total of ten years to reach full implementation and would cost $131 million in capital cost in addition to annual wheeling, operations, maintenance, and administration.

Medium Package

The medium package was designed to produce an average water budget change of 600,000 acre-feet, through soft conversions, aquifer recharge, and demand reduction. The increase in supply comes from an additional 50,000 acre-feet per year in salmon flow exchange and increased reliance on natural flow (average of 200,000 acre-feet). It would cost about $325 million for the recharge emphasis and over $600 million for the demand reduction emphasis, in addition to annual wheeling, operations, maintenance and administration. It is anticipated that the medium package would take approximately 20 years to fully implement.

Large Package

The large package broadened the scope and expands the number of management alternatives to yield a 900,000 acre-feet per year water budget change. Both soft and hard conversions would be used, as well as increases in recharge and demand reduction. Soft conversions would rely on new storage above American Falls with a 100,000 acre-foot average annual yield. Hard conversions (A&B) would add 120,000 acre-feet with the enlargement of Minidoka Dam and the implementation of Salmon flow exchange. Finally, aquifer recharge and demand reduction actions provide an additional 440,000 acre-feet per year. This package would entail capital costs of between $1.51 billion and $1.7 billion, in addition to substantial annual wheeling, operations, maintenance, and administration costs.

Each of the packages of alternatives was modeled to determine the hydrologic impacts associated with implementation. The Committee decided to eliminate the large package of improvements based on financial considerations. In return, the Committee focused technical efforts on the medium package including the spatial differences of targeting demand reduction strategies.