
TECHNICAL MEMORANDUM

SUBJECT: **Task 4. Snake/Salt River Basin Water Demand Projections**
Memo 2: Future Economic and Demographic Scenarios

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This memorandum describes economic and demographic projections for the Snake/Salt River Basin (Basin) under three alternative scenarios. The study team's economic and demographic projections for the Basin are addressed as follows:

- a description of the forecasting approach employed in this study, including a review of existing forecasts;
- alternative scenario projections for each of the key economic sectors within the Basin – agriculture and tourism;
- aggregate economic and demographic projections under each scenario corresponding to the individual sector projections.

Information summarized in this memorandum was gathered from publicly available secondary sources and from personal and telephone interviews conducted by BBC Research & Consulting (BBC) from May through August 2002. References are listed at the end of this memorandum.

This memorandum is one of three that comprise the water demand projections for the Basin. An overview of economic and demographic conditions in the Basin, and more specific description of current conditions in key economic and water use sectors, was provided in Memo 1. The third memorandum describes the future water demand projections, based upon the economic and demographic projections detailed in this memorandum.

Approach

There are numerous approaches to developing economic and demographic projections for a regional economy, ranging from simple statistical extrapolation to sophisticated econometric modeling. The projection approaches vary in terms of complexity, the amount of information they convey, and the amount of data they require. The following paragraphs provide a description of existing economic and demographic projections for the Snake/Salt River Basin area and the study team's assessment of the appropriateness of those projections for the purposes of this study. This section concludes with an overview of the forecasting approach adopted by the study team, and reviewed by the Wyoming Water Development Commission, and an overview of the three planning scenarios that drive the subsequent projections.

Review of Existing Projections

The study team reviewed a number of existing economic and demographic projections for potential suitability for use in this study. These projections come from various sources, including:

- the Federal government – Bureau of the Census;
- Wyoming state government – Department of Administration and Information (DAI) projections;
- local governments within the study area – various county and municipal planning projections; and
- the private sector – Applied Geographic Solutions (AGS), Woods & Poole, Regional Economic Models Incorporated (REMI) and Data Resources International (DRI-WEFA).

Necessary characteristics for purposes of projecting Snake/Salt River Basin water demands include: a time horizon similar to (or longer than) the 30- year planning horizon for this study, recognition of basin-specific economic and demographic characteristics and sufficiently detailed results to allow projection of specific types of water demand (such as agricultural use). The study team found that although each of the existing projections has merit for its intended uses, none was ideally suited in isolation to the purposes of this study.

Exhibit 1, below, provides a summary of the review of each existing economic and demographic projection.

Exhibit 1. Alternative Economic and Demographic Forecasting Techniques Potentially Applicable to the Snake/Salt River Basin

Source of Projection	Geographic Detail	Future Period	Variables Projected	Means of Application	Issues
Bureau of the Census	State of Wyoming	2025	Population	Trend applied to State, adjusted to reach national total	Not sufficiently Basin-specific
Wyoming State DAI	State of Wyoming; counties	2009	Population, Employment, Income	National model step down to state to counties	Forecast period not long enough
Teton County Water Supply Master Plan	Teton County	2020	Population and Households Only	Traffic Analysis Zones	Population and households only; Not full basin
Private AGS	County and block level	2012	Many demographic/ economic variables	Combination of local and national data	Forecast period not long enough
Woods & Poole	State of Wyoming; counties	2025	Many demographic/ economic variables	National model step down to economic areas to counties	Not sufficiently Basin-specific
REMI	State of Wyoming; counties	2035	Population, Employment, Income	Interaction of County/State economies with national economy	Not sufficiently Basin-specific
DRI - WEFA	State of Wyoming; counties	2027	Population, Employment, Income	Manufacturing trends, county built up to state totals	No agriculture information

Source: BBC Research & Consulting.

Economic Base Methodology

The economic and demographic projection approach adopted by the study team for this effort employs an established technique in regional economics known as “economic base analysis.” The economic base approach is a "bottom-up" method that has the advantages of focusing directly on specific activities that are likely to drive economic and demographic changes in the future and providing a substantial level of detail about those activities in the future, while at the same time being less data intensive than econometric modeling approaches. Essentially, this approach involves the following five steps:

1. Identify the existing and potential basic economic activities in the region through analysis of economic statistics and local interviews. Basic activities are defined as businesses or governmental organizations that bring money into the region from sales of goods or services to outside areas or through transfers of public funds.
2. Identify the current statistical relationships: a) between total employment in economic base activities and other employment in the economy (termed "local service employment"); and b) between total employment and population. The latter relationship reflects the proportion of the population that is of working age, the labor force participation rate amongst the working age population and the unemployment rate as well as in-commuting or out-commuting from the area.
3. Conduct industry studies for each of the basic economic sectors to identify trends in employment and production and factors affecting potential future growth of those sectors. These studies entail research and analysis of available industry data and local interviews. The likelihood of the emergence of new basic economic activities in the region is also assessed in this step.
4. Develop specific projections of future basic economic activity levels based upon the results of step 3 and clearly defined scenario assumptions.
5. Develop overall employment and population projections based upon the basic activity projections developed in step 4 and the statistical relationships developed in step 2. Potential changes in these statistical relationships in the future are also considered in this step.

Overview of Planning Scenarios

The study team developed three alternative planning scenarios for this study, employing the economic base forecasting approach just described. An overview of each of these scenarios is provided below. More specific details about the assumptions for the key sectors of agriculture and tourism and the potential interactions between these sectors in the economic base projection scenarios are provided following this overview.

High Scenario. In the simplest terms, the High Scenario incorporates the study team's views of the most growth in each of the key sectors that could potentially occur over the forecast horizon. It is remotely possible that one or more of the key sectors could grow even more than we have

assumed under this case or an unforeseen, new basic economic activity could become established and flourish in the region. It is also likely that due to the interrelationships between these sectors, the growth in aggregate employment and population that drives future water demand will be somewhat moderated. However, the study team felt that the underlying aggressive assumption that each of the key sectors will achieve its highest reasonably likely growth at the same time makes this scenario a useful upper bound for subsequent water planning purposes.

Low Scenario. The Low Scenario embodies the study team's views of the lowest simultaneous growth (or largest contraction) reasonably likely to occur in each of the key sectors over the planning horizon. While even lower economic activity levels in one or more sectors are not impossible, the inverse interrelationship between the agriculture and tourism sectors likely implies that the actual growth that occurs over the planning horizon may be somewhat higher than this projection. Again, the study team felt that the assumption of simultaneous low activity levels in each of the key sectors, though somewhat artificial, made this scenario a supportable lower bound for planning purposes. While the Low Scenario obviously will not impose pressure on regional water resources, this scenario is sometimes used for purposes of determining the financial risk involved with potential water resource enhancements.

Mid Scenario. The Mid Scenario represents the study team's views of the most realistic level of growth likely to occur in each of the key sectors over the planning horizon. As in the other two scenarios, the potential interaction between the agricultural and tourism sectors are acknowledged. Although the actual economic growth experienced in the Basin may vary somewhat from this projection because of this interaction, the assumed activity levels represent, in the study team's best judgment, the rate of growth most likely to be experienced in the Basin. As such, this scenario is perhaps the most useful for water planning purposes.

Economic Base Scenario Assumptions for Key Sectors – Agriculture

Local interviews and research into both historic agricultural practices and competing environmental and recreational interests provide insight into potential factors that may influence the future of agriculture in the Snake/Salt River Basin. The factor that will most likely have the largest potential impact on Basin agriculture is the continued demand for seasonal and second home development. Other potential factors that may significantly impact agriculture within the Basin include changes in public land grazing policies such as the listing of various cutthroat trout species or the expansion of grizzly bear recovery area on USFS land (Broyles, Grows). The following are summary observations about prospects for Snake/Salt River Basin agriculture in the future.

- **History and Potential Future Constraints.** The agricultural sector historically has been an important component of the economy in the Basin. However, its relative share of the local economy has declined dramatically in recent years due to the expansion that has occurred in the tourism and recreation industry within the Basin, especially in Teton County. Agricultural operators within the Basin are currently under increasing pressure to reduce livestock grazing due to increased land values from residential development, additional grazing restrictions on public lands and competing environmental and recreational pressures on public rangeland resources. While such pressures are likely to prevent the Basin's agricultural sector from

expanding significantly in the near future, the sector is also unlikely to disappear. The continued existence of agricultural enterprises within the Basin is important for maintaining the overall lifestyle so attractive to many tourists and second home buyers (Resor).

- **Local Insights.** Interviews with local agricultural representatives indicate that while little has changed in Basin agricultural practices over the past 30 years, the sector as a whole is shrinking steadily and it is hard to imagine a scenario resulting in significant future growth (Kennington, Brown, Resor, Maher). Local sources in both Teton and northern Lincoln County commented on the conversion of traditional ranches in the Basin to 35-acre ranchettes and second homes. While there is likely to always be some private agricultural land within the Basin, escalating land values make it very difficult to maintain viable agricultural operations (Resor, Kennington). Interviews with local agricultural experts indicate that although almost all irrigable land in Teton County is currently being irrigated (Resor), about 10 percent of such land in northern Lincoln County is currently vacant as retired land owners struggle to find managers for their ranching operations (Brown).

As discussed in the first technical memorandum, while livestock in Teton County is almost exclusively cattle, there are a large number of sheep still being grazed in northern Lincoln County, especially on the land bordering the Greys river (Kennington). Public land grazing authorizations in the Basin may underestimate actual livestock numbers as large ranching operations exist, especially in Teton County, which utilize private grazing resources almost exclusively (Resor). As the numbers of traditional livestock (cattle and sheep) continue to decline, horses used for pleasure riding are becoming increasingly abundant, especially in Teton County. These horses are found both on individual ranchettes and as part of the burgeoning commercial riding sector that has developed in order to meet recreational demand (Resor, Maher).

The production of feed for local livestock is still the primary driving force behind irrigated agriculture within the Basin. Numbers of livestock and irrigated acres are not as closely correlated, however, as they are in other parts of the State. In normal years, northern Lincoln County produces more hay than can be consumed by local livestock. This surplus is either consumed by “tourist cattle” (cattle imported from Utah to graze during the summer months) or is exported outside the County, to Teton County or Idaho (Brown, Kennington). In contrast, Teton County imports hay with much of the supply coming from northern Lincoln County (Resor).

- **Residential Development Issues.** Much of the decline in the Basin’s agricultural sector may be traced to the high demand for residential development in the area. In Teton County, a large portion of the development is occurring in the form of 35-acre ranchettes in rural areas (United States Department of the Interior, February 2001). Second home development is also an increasing phenomenon within the county as approximately 30 percent of the county’s housing inventory is seasonal homes (Collins). Northern Lincoln County has also begun to experience spillover effects from the Teton County housing boom. As one Lincoln County agricultural representative noted, “the primary crop being planted around here these days is houses” (Kennington).

Escalating land values in Teton County have also created an affordable housing crunch for local workers. A recent study found the median values of homes sold to be just over \$300,000 in Teton County while the average annual wage for workers in the county was about \$27,000 in 2000 (Prior and Associates, 2001). Because of the lack of affordable housing, many Teton County residents are purchasing homes in eastern Idaho or northern Lincoln County and commuting to Jackson for work (Prior and Associates, 2001). In response to this problem, Teton County has recently undertaken an effort to update an affordable housing program that was originally developed in the mid-1990s (Teton County, May 2002).

- **Public Land Management Issues.** Another perceived factor affecting the future of agricultural operations in the Basin is the increased competition for public land grazing resources from recreational and environmental interests. Local agricultural representatives note that some agricultural operators are either letting their grazing permits expire or abandoning these permits altogether due to increased friction with other multiple use activities (Resor). Recreational use on Forest Service lands has increased dramatically over the past decade, and is not expected to diminish in the foreseeable future (Marsh). Likewise, a study evaluating the elimination of grazing on lands within and around Grand Teton National Park (GTNP) was recently submitted to Congress in 2002 (United States Department of the Interior, February 2001).

In addition, Forest Service representatives have raised several environmental issues during interviews that could potentially affect future stocking levels in the portions of the Bridger Teton (BTNF) and Caribou Targhee (CTNF) national forests within the Basin. Of primary concern is the potential listing of threatened or endangered species, including the Yellowstone, Bonneville and Colorado Cutthroat trout species. The listing of any or all of these species would affect all grazing allotments within the BTNF, and could restrict the length of the grazing season on public lands. Similar listings in western portions of the CTNF have produced reductions in stocking levels of between 25 and 30 percent (Broyles, Grows).

Another issue raised during interviews is the potential expansion of grizzly bear recovery area within the BTNF portion of the Basin. Currently, no expansion of the recovery area is planned and officials disagree on the impact that such an expansion would have on future stocking levels (Broyles, Grows). The issue of an expanding wolf population on BTNF lands has also been discussed (Broyles).

- **Scenario Approach.** BBC projected a high, low and mid scenario for livestock, irrigated acreage and dairy herds in the Snake/Salt River Basin based on historic trends and assumptions about 1) the rate of continued residential development in the basin and 2) future public land management policies and 3) the degree to which Lincoln County irrigated hay producers will export hay to meet demand in Teton County or elsewhere.

Since livestock are the most important cash crop of the Basin agricultural sector, BBC's analysis of agricultural sector water use is based on the Basin specific public land grazing authorizations and information from interviews with local ranchers presented in Exhibit 7 in Technical Memo 1. In order to standardize the analysis in terms of livestock forage levels, county level livestock inventories were converted to "Animal Units." Animal unit estimates

were calculated by dividing estimated cattle inventories by two, sheep inventories by five, and estimated horse inventories divided by 1.2. Using trend analysis on various historical data series stretching as far back as 1975, total animal units were then projected from the last year of historical data (2001) to the end of the planning horizon (2032).

The Snake/Salt river basin is somewhat different from other Wyoming Basins in that a variety of agencies have management responsibilities for public lands within the Basin. Accordingly, BBC used trends derived from agency specific historic stocking levels to project animal units within the Basin. A key assumption is that future changes in livestock inventories on lands managed by a particular agency will follow the same time-trend as historical inventories. Historical county level data from the Wyoming Agricultural Statistics Service (WASS) were also used to project livestock inventories in Lincoln County.

Interviews with key local agricultural personnel indicated only a loose correlation between stocking levels and irrigated hay acreage. In Teton County, for example, producers continue to import hay as an increasing amount of land is removed from production and converted to residential development. Lincoln County agricultural experts also note that, because of export markets and tourist cattle, irrigated acreage is not directly determined by local livestock levels (Kennington). Two key assumptions for BBC's analysis are: 1) irrigated land in Teton County is removed from production at roughly the same rate that residential development occurs; and 2) producers in Lincoln County are able to meet the resulting excess demand for hay in Teton County. The resulting trends are then applied to GIS-estimated, 2001 irrigated acreage levels for the Basin (Sunrise Engineering) to project changes in irrigated hay acreage over the planning horizon under each planning scenario.

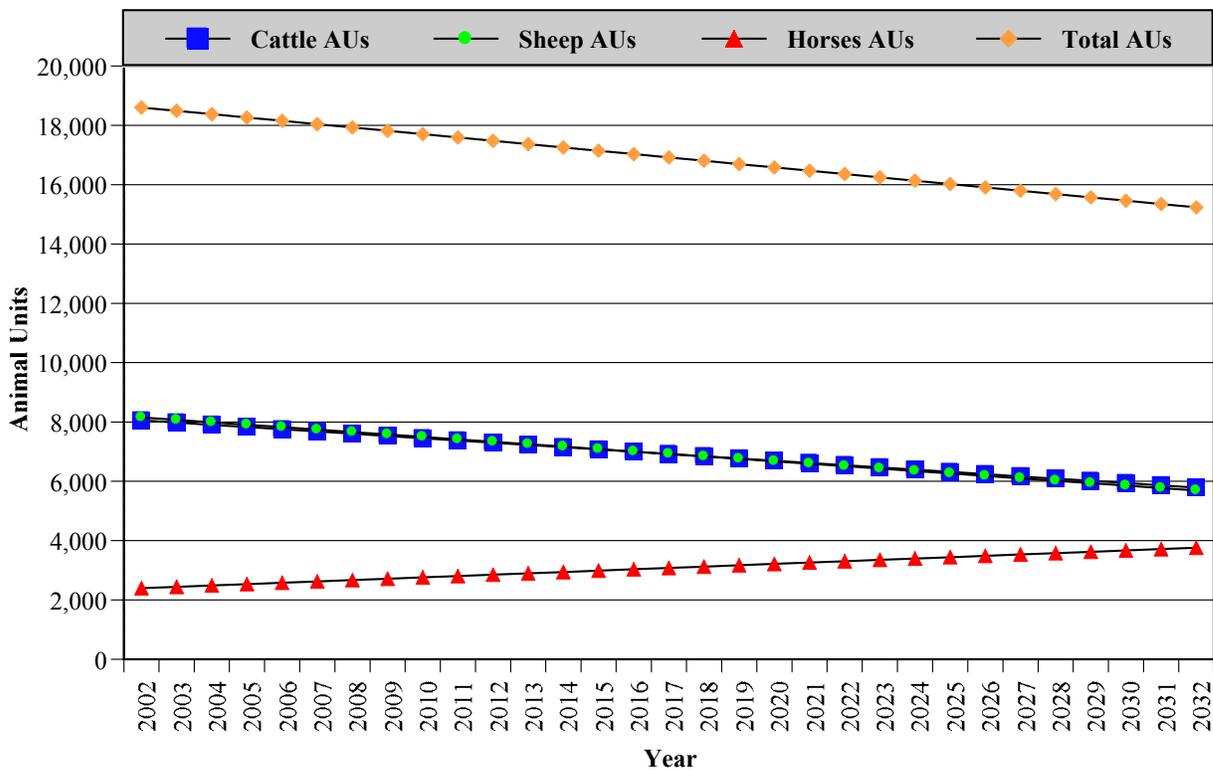
Data collected by the study team indicate that some small grains, primarily barley, are grown in both Teton and Lincoln Counties (Sunrise Engineering). In Teton County, grain acreage is minimal. For the sake of simplicity, this grain is assumed to be exported to Idaho for livestock feed, and the acreage is held constant throughout the projections period. A larger amount of acreage along the Salt River is planted to grains, with the resulting production split between feed for local livestock and dairy cattle (Kennington).

- **High Scenario.** The High Scenario for livestock production reflects what the study team feels are the most optimistic stocking assumptions for lands administered by each land management agency. In Teton County, stocking levels in and around GTNP are assumed to remain unchanged and current BTNF authorization trends (about a 3 percent annual rate of decline for cattle and a 2 percent annual rate of decline for sheep) are applied to all USFS lands. Private land stocking is projected to increase by a modest 25 percent over the 30-year projection period, reflecting the current trend of local operators moving away from public land grazing permits. Under the High Scenario, horses in Teton County are projected to grow at about 1.7 percent annually, a rate proportionate to half the rate of residential development in unincorporated parts of the county over the last decade (United States Department of the Interior, February 2001).

In Lincoln County, historical trends from the WASS are applied, reflecting the most optimistic observed rate of change (about a 1 percent annual rate of increase for cattle and a 1 percent annual rate of decline for sheep). Horses in northern Lincoln County are projected to grow at about 1.3 percent annually, a rate proportionate to half the rate of recent residential development in that portion of the county (Prior and Associates, 2001). Long-term BTNF authorization trends were also applied to authorized stocking levels in Sublette County.

Projected animal units under this scenario are depicted in Exhibit 2. By the end of the planning horizon, BBC projects roughly 5,800 cattle animal units, 5,700 sheep animal units and 3,800 horse animal units within the Snake/Salt river basin.

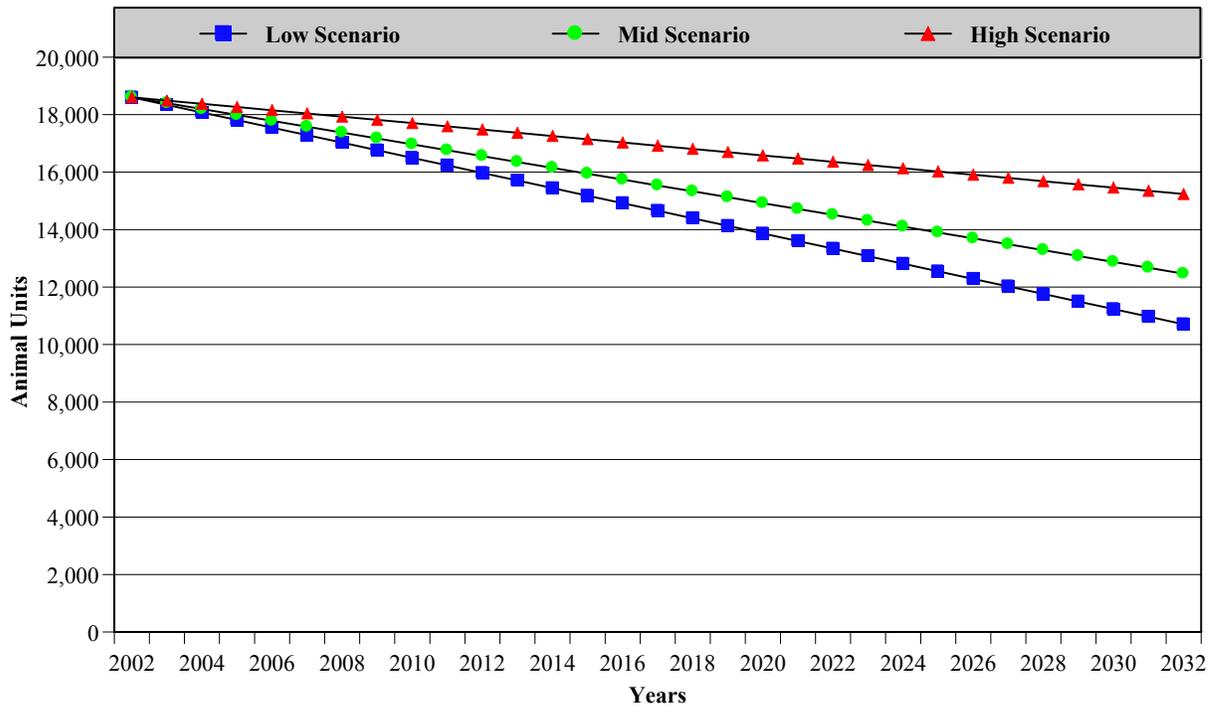
Exhibit 2. Projected Animal Units: Snake/Salt River Basin Counties, 2032 - High Scenario



Source: Current livestock authorization levels from interviews with Kemmerer and Pinedale offices, Bureau of Land Management, Bridger-Teton and Caribou-Targhee National Forest personnel and Department of the Interior, 2001. Basin level projections made by BBC based on historical trends and interviews with local agricultural operators (Resor, Maher).

Under this scenario, BBC projects a total of about 15,200 animal units will be grazed in the Basin at the end of the planning horizon. Basin-level projections for the High Scenario, the Low Scenario and the Mid Scenario (discussed later) are depicted in Exhibit 3.

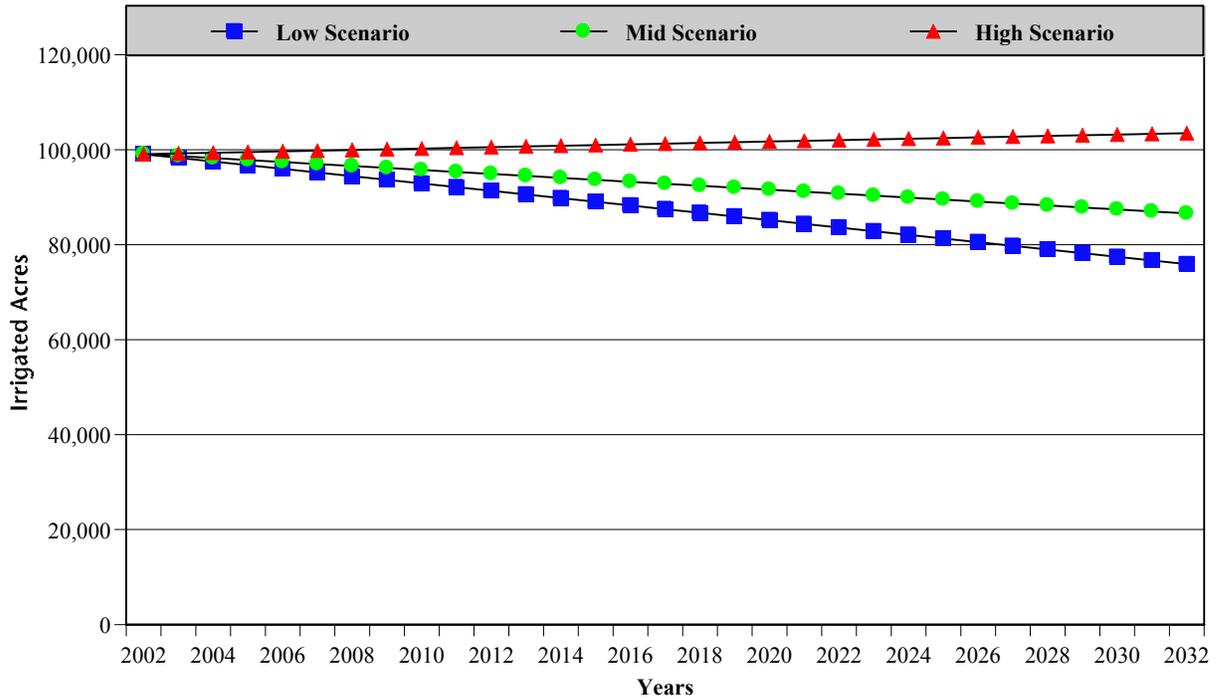
Exhibit 3. Projected Animal Units: Snake/Salt River Basin, 2032



Source: Current livestock authorization levels from interviews with Kemmerer and Pinedale offices, Bureau of Land Management, Bridger-Teton and Caribou-Targhee National Forest personnel and Department of the Interior, 2001. Basin level projections made by BBC based on historical trends and interviews with local agricultural operators (Resor, Maher).

Under the High Scenario, irrigated acreage will slightly increase from current levels for the duration of the thirty-year projection period (See Exhibit 4). Specifically under the High Scenario, BBC projects a total of about 103,000 irrigated acres within the Basin in the year 2032. This includes roughly 89,000 irrigated hay acres and 14,000 irrigated acres planted to small grains. Under this scenario, it is assumed that irrigated acres in Teton County will remain at current levels and that the estimated 10 percent of irrigable land currently vacant within the Lincoln County portion of the Basin will come back into hay production. Grain production along the Salt River is expected to change in proportion to a weighted average of projected livestock and dairy cattle in Lincoln County under this scenario.

Exhibit 4. Projected Acres Irrigated Hay: Snake/Salt River Basin, 2032



Source: Current irrigated acreage levels from Sunrise Engineering. Projections made by BBC based on historic trends and interviews with local agricultural representatives (Brown, Resor, Kennington)

The High Scenario for the Star Valley dairy industry assumes that the number of dairy cattle will remain at current levels over the course of the projection period. This optimistic outlook reflects the enactment of the national dairy market loss payment program (DMLP) as part of the 2002 farm bill, and the assumption that this income support program (or something similar) will be in place over the course of the projection period. According to dairy experts, this program is designed to encourage production and help smaller producers (those with 150 head or less), such those in Star Valley, survive (Wolf).

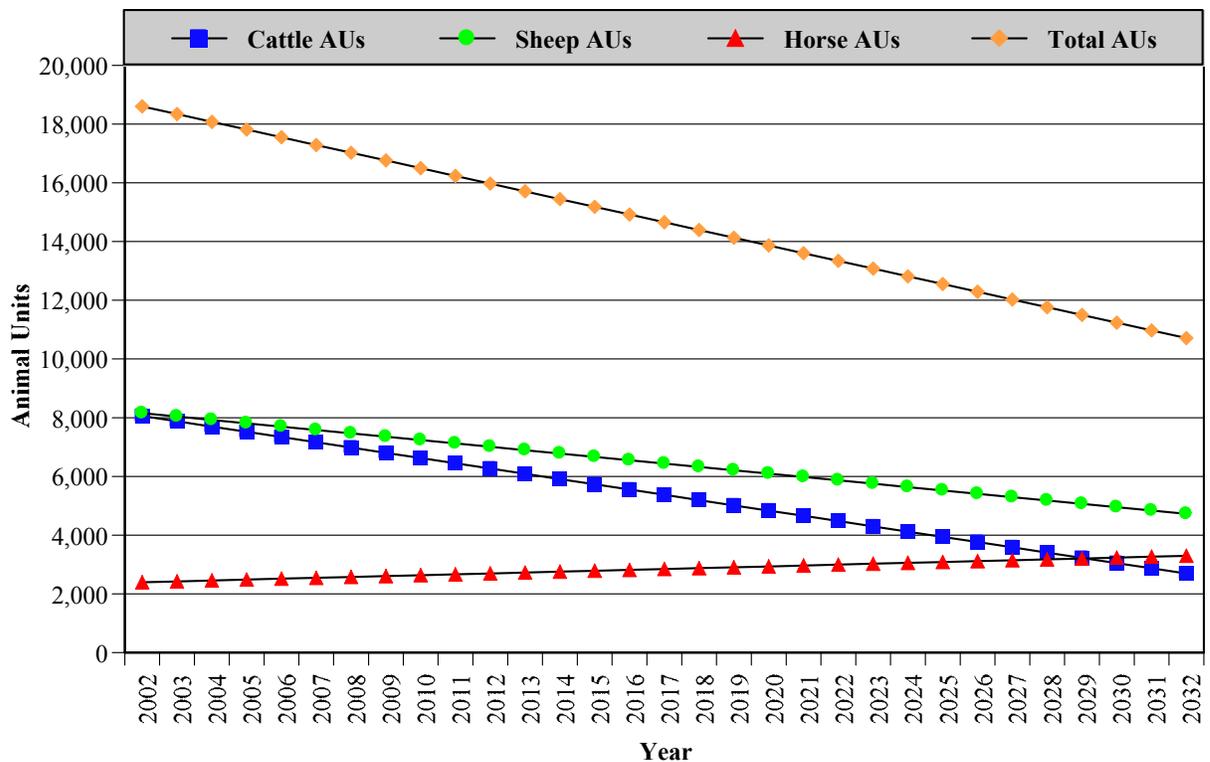
- Low Scenario.** The Low Scenario for livestock production reflects what the study team feels are the most pessimistic stocking assumptions for lands administered by each land management agency. In Teton County, grazing in and around GTNP is assumed to have been eliminated. Stocking levels on all USFS lands are assumed to be 30 percent less than the reductions that would occur assuming current BTNF stocking trends. These additional reductions on Forest Service lands reflect the assumption that the listing of one or more cutthroat trout species will occur over the course of the projection period. Private land stocking is projected to be reduced by 50 percent, reflecting continued development pressures in Teton County. Under the Low Scenario, horses in Teton County are projected to grow at about 1 percent annually, proportionate to a conservative estimate for residential development in unincorporated parts of the county.

Historical BTNF trends are applied in Lincoln County under this scenario, with the additional assumption that the rate of decline for cattle will double due to increased development pressures. Sheep are not similarly affected since they are typically grazed along the Greys

river, an area that is not expected to experience the same residential development pressures (Kennington, Brown). Horses in northern Lincoln County are projected to grow at about 1.3 percent annually, a rate proportionate to half the recent residential development in that portion of the county (Prior and Associates, 2001). Long-term BTNF trends were also applied to authorized animal units in Sublette County.

Projected animal units under this scenario are depicted in Exhibit 5. Under this scenario, BBC projects a total of about 10,700 animal units will be grazed in the Basin at the end of the planning horizon. Specifically, BBC projects roughly 2,700 cattle animal units, 4,700 sheep animal units and 3,300 horse animal units within the Snake/Salt river basin.

Exhibit 5. Projected Animal Units: Snake/Salt River Basin Counties, 2032 - Low Scenario



Source: Current livestock authorization levels from interviews with Kemmerer and Pinedale offices, Bureau of Land Management, Bridger-Teton and Caribou-Targhee National Forest personnel and Department of the Interior, 2001. Basin level projections made by BBC based on historical trends and interviews with local agricultural operators (Resor, Maher).

Under the Low Scenario, irrigated acreage will decrease by roughly 23 percent from current levels for the duration of the thirty-year projection period (See Exhibit 4). Specifically under the Low Scenario, BBC projects a total of about 76,000 irrigated acres within the Basin in the year 2032. This includes roughly 68,000 irrigated hay acres and 8,000 irrigated acres planted to small grains. Under this scenario, it is assumed that irrigated hay acres in Teton County will decline at .5 percent annually, a rate somewhat less than is projected for residential development in Teton County (Prior and Associates, 2001). This rate assumes that many of the newly developed ranchettes will continue to irrigate a portion of their land. Hay acreage

in Lincoln County is projected to decline at a similar rate, proportionate to projected local livestock declines. Grain production along the Salt River is expected to decline in proportion to a weighted average of projected livestock and dairy cattle in Lincoln County.

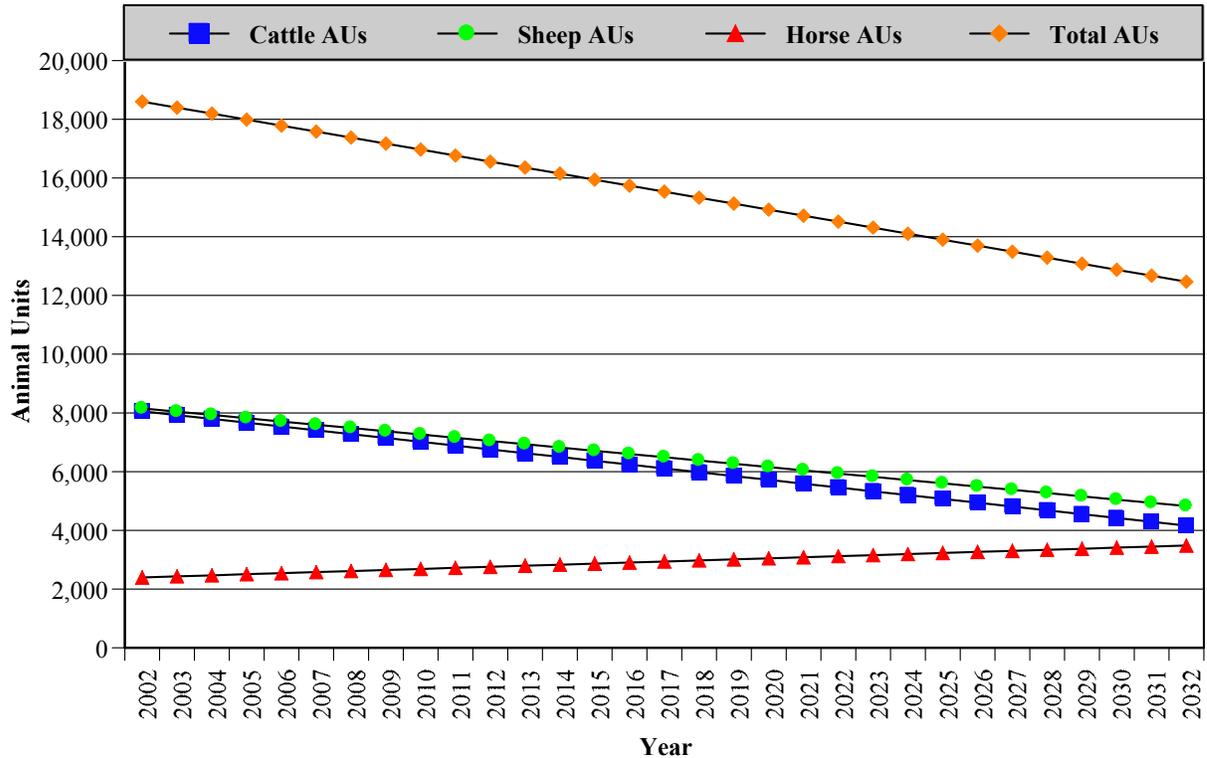
The Low Scenario assumes that the Star Valley dairy industry will be eliminated over the course of the projection period. This pessimistic outlook reflects the assumption that the USDA will move away from income support programs for small dairy operators over the course of the projection period. The economic reality is that without these types of programs, smaller dairy producers will have a difficult time competing. This scenario assumes that the Star Valley cheese factory will either relocate or obtain milk supplies from larger Idaho producers.

- **Mid Scenario.** The Mid Scenario for livestock production reflects what the study team feels are the most realistic stocking assumptions for lands administered by each land management agency. In Teton County, stocking levels in and around GTNP are assumed to be reduced to about half of current levels, reflecting current development pressures. Current BTNF stocking trends (about a 3 percent annual rate of decline of cattle and a 2 percent annual rate of decline for sheep) are applied to all USFS lands in the county. Private land stocking is projected to remain at current levels over the 30-year projection period, reflecting the potential for implementing additional agricultural easements in order to combat continued development pressures. Under the mid scenario, horses in Teton County are projected to grow at about 1.3 percent annually, reflecting the notion that residential development in unincorporated parts of the county will slow due to increased land constraints, but not by as much as under the low scenario.

Historical BTNF trends are also applied in Lincoln County, reflecting the fact that the majority of grazing in this part of the Basin takes place on BTNF lands. Horses in northern Lincoln County are projected to grow at about 1.3 percent annually, a rate proportionate to recent residential development in that portion of the county (Prior and Associates, 2001). Long-term BTNF trends were also applied to authorized animal units in Sublette County.

Projected animal units under this scenario are depicted in Exhibit 6. Under this scenario, BBC projects a total of about 12,500 animal units will be grazed in the Basin at the end of the planning horizon. Specifically, BBC projects roughly 4,200 cattle animal units, 4,800 sheep animal units and 3,500 horse animal units within the Snake/Salt River Basin.

Exhibit 6. Projected Animal Units: Snake/Salt River Basin Counties, 2032 - Mid Scenario



Source: Current livestock authorization levels from interviews with Kemmerer and Pinedale offices, Bureau of Land Management, Bridger-Teton and Caribou-Targhee National Forest personnel and Department of the Interior, 2001. Basin level projections made by BBC based on historical trends and interviews with local agricultural operators (Resor, Maher).

Under the Mid Scenario irrigated hay acreage will decrease by about 13 percent from current levels over the duration of the thirty-year projection period (See Exhibit 4 above). Specifically under the Mid Scenario, BBC projects a total of nearly 87,000 irrigated acres within the Basin in the year 2032. This includes roughly 74,000 irrigated hay acres and 13,000 irrigated acres planted to small grains. Under this scenario, it is assumed that irrigated acres in Teton County will decrease by roughly .15 percent annually, reflecting a more conservative assumption for future residential development than under the low scenario. It is also assumed that many of the newly developed ranchettes will continue to irrigate a portion of their land. Hay production is expected to decline at about a .4 percent annual rate, reflecting the assumptions that 1) an estimated 10 percent of the irrigated land projected under the low scenario within the Lincoln County portion of the Basin will come back into production, and 2) Lincoln County hay producers will meet the excess hay demand created by Teton County irrigated acre reductions. Grain production along the Salt River is expected to decline in proportion to a weighted average of projected livestock and dairy cattle in Lincoln County.

The Mid Scenario for the Star Valley dairy industry assumes that the number of dairy cattle will continue to decline at historical rates (about 1 percent annually) over the course of the projection period. This outlook reflects the study team’s assessment that while the industry is

unlikely to be completely eliminated, local producers will continue to consolidate, and an increasing portion of the milk supplied to the Star Valley cheese factory will come from out of state (Brown).

- **Future Agricultural Employment.** Future agricultural employment is projected using the key assumption that agricultural employment will change in proportion to the projected change in irrigated acreage within the Basin. Under the High Scenario, the number of ranches and thus the number of farm proprietors and total farm jobs within the Basin would increase slightly. Under the Low Scenario, there would be a decline in total agricultural employment proportional to the projected 1 percent annual decline in irrigated acreage within the basin. Similarly, under the Mid Scenario, total agricultural employment would decrease by about 0.4 percent annually. Assuming the number of hired employees per ranch remains at its current level, the Basin could be expected to gain a total of about 20 farm jobs under the High Scenario, lose about 120 farm jobs under the Low Scenario, and lose roughly 60 farm jobs under the Mid Scenario by the year 2032.

Economic Base Scenario Assumptions for Key Sectors – Tourism

The tourism/recreational sector is the cornerstone of the economy within the Snake/Salt river basin, especially within Teton County. The two primary components of the sector are destination tourists and seasonal residents. Destination tourists are those who plan a trip specifically to visit Grand Teton National Park or some other attraction within the Basin. Seasonal residents are those who visit the area for an extended period of time because they have a second home in the area. Visitation within the Basin is highly seasonal, with the peak months generally being June through August for summer activities and January through March for winter activities. In order to gain insight into the recreational trends that affect the tourist industry within the Basin, BBC interviewed a variety of local commercial outfitters and recreational representatives from public land management agencies and representatives of local ski resorts and other resort attractions. The following are summary insights into the current recreational trends and the prospects for tourism and visitor related activities in the future, as well as a description of the underlying assumptions for the high, low and mid scenario projections.

- **Local Insights.** In contrast to other parts of Wyoming, the economy of the Snake/Salt river basin has experienced substantial rates of growth historically, due primarily to its robust tourist sector. This trend was particularly evident in the decade of the 1990's, when the national economy was strong, and many people had the disposable income necessary to support travel and associated recreational activity. The region has recently experienced significant increases, both in the number of visits from destination tourists and in the rate of local residential development; especially seasonal residences built in unincorporated areas of the Basin. In spite of the recent boom, interviews with local tourism experts indicate that a variety of factors, including adverse national economic conditions, perceptions regarding local weather conditions, gasoline prices and airline access could negatively impact the level of future tourism/visitor related activity in the Basin. When pressed, however, interviewees consistently responded that any scenario describing a sustained decrease in visitation to the area seemed unlikely.

Summer Peak Season. Areas within the Snake/Salt river basin that are available for recreational use include lands managed by the NPS, the USFS and the BLM. In general, recreation activity levels within GTNP are the most tightly controlled, especially water-based recreation. Two companies have outfitting contracts on Jackson Lake and some 14 companies have river contracts with the NPS (McMahill). All commercial guides operate under a strict quota system in terms of numbers of boats and launches (Myer). A large amount of private use also occurs on water bodies within the Park. Recreational activity on rivers within the BTNF (including the Snake River Canyon, the Greys River, the Hoback River and many small tributaries) is becoming more restricted, although in general, it is less heavily regulated than in GTNP (Turner). Over the last four years, the unregulated stretch of the Snake River between Wilson Bridge and South Park Bridge has become very popular among floaters. Although this stretch was not used much historically because of low scenic value, the fact that it has recently seen an expansion in use indicates that a significant, unmet recreational demand existed, signaling room for future growth.

Winter Peak Season. The primary winter attractions within the Basin are the three alpine ski areas of Jackson Hole, Snow King and Grand Targhee. Each area has recently diversified operations to include snow tube parks in the winter, and a host of summer activities such as scenic chairlift rides, alpine slides and mountain biking. Jackson Hole and Snow King have extensive snowmaking operations, and Grand Targhee is just installing its first snowmaking operation in 2002. Each of the three areas has significant expansions planned during the projections period, including both skiable terrain and snowmaking operations. Winter recreational activity, such as backcountry skiing and snowmobiling is also rapidly increasing on Forest Service lands, although accurate visitor counts are problematic. Snowmobiling within the boundaries of GTNP is currently under review as part of an EIS process.

Shoulder Seasons: In general, the shoulder visitation seasons within the Basin are the months of May, September and October. As both the summer and winter peak seasons experience increased congestion, these months have seen a rapid increase in visitation and recreational activity.

- **Scenario Approach.** BBC projected a high, low and a mid scenario for tourist activity in the Snake/Salt River Basin. Aggregate projections under each scenario represent the sum of projections for destination tourists and seasonal homeowners. Season specific annual growth rates were estimated for each scenario using trend analysis on a variety of historical visitation/recreational data. Season- specific annual growth rates for seasonal residents represent the average of scenario specific household growth rates and the corresponding growth rate estimated for destination tourists.
- **High Scenario.** The High Scenario represents the study team's most optimistic assessment of potential future trends for both destination tourists and seasonal residents within the Snake/Salt river basin. Destination tourism during the summer months was projected to grow at an annual rate of 2.3 percent, approximately half the rate of growth in visitation that has been experienced on BTNF lands within the Snake River Drainage over the past fifteen years (Marsh). This was a period a rapid growth in visitation, and the study team felt that such a high rate of growth was not sustainable throughout the projection period. Destination tourism

during the winter months was projected to grow at an annual rate of 3 percent, proportionate to the increase in skier days projected if all planned expansion occurs at each of the three alpine ski resorts within the Basin (Blann, Sullivan, Williamson). Destination tourism during the shoulder months was projected to grow at an annual rate of roughly 2.8 percent, equivalent to half the rate of growth in visitation to GTNP during these months over the past 25 years (GTNP Visitor Use Statistics, 2002). Growth rates for seasonal residents under this scenario are the average of the study team’s optimistic assessment of overall household growth within the Basin (about 2 percent) and the corresponding seasonal destination tourism rates described above. Estimated Visitor Days, Visitor Expenditures and Supporting Jobs under the High Scenario are presented for destination tourists, seasonal residents and in total in Exhibit 7 below.

Exhibit 7. Number of Visitor Days, Visitor Expenditures and Jobs Supported by Tourism in the Snake/Salt River Basin, 2032 – High Scenario

	Number Visitor Days (Thousands)	Total Visitor Expenditures (Millions)	Total Supporting Jobs
Seasonal Residents	3,991	\$460	12,223
Summer	2,385	\$266	7,066
Winter	410	\$49	1,301
Other	1,196	\$145	3,856
Destination Tourist	10,890	\$1,082	28,769
Summer	6,296	\$576	15,310
Winter	1,196	\$129	3,415
Other	3,399	\$378	10,044
Grand Total Tourist	14,882	\$1,541	40,992
Summer	8,681	\$841	22,376
Winter	1,606	\$177	4,716
Other	4,595	\$523	13,900

Source: Current levels based on Morey and Associates, 1999, 2000; Runyan and Associates, 2001; and Prior and Associates, 2001. Projections made by BBC based on historical recreational and housing trends in the Basin.

Exhibit 7 shows that under this scenario, the number of visitor days for destination tourists and seasonal residents would increase to roughly 15 million by 2032. Total annual visitor expenditures would increase to \$1.5 billion and the total number of tourist sector jobs would rise to nearly 41,000 full time equivalents over the same time horizon. Estimated tourist related employment in the Basin would be more than two times current employment levels, reflecting an average annual growth rate of 2.4 percent.

- Low Scenario.** The Low Scenario represents the study team’s most pessimistic assessment of potential future trends for both destination tourists and seasonal residents within the Snake/Salt river basin. Destination tourism during the summer months under this scenario was projected to remain at current levels, reflecting a long-term economic downturn in the national economy. While such a long-term projection may seem unlikely, it is useful in representing a lower bound and is consistent with interview responses regarding certain pessimistic long-term projections. Destination tourism during the winter months under this scenario was also projected to remain at current levels, reflecting the assumption that the expansion planned at each of the three alpine ski resorts within the Basin will not be approved. Destination tourism during the shoulder months under this scenario was projected to decline at an annual rate of less than 1 percent, reflecting the rate of decline in GTNP shoulder season commercial activities during these months over the past decade (GTNP Concessionaire Statistics, 2002). Growth rates for seasonal residents under this scenario are the average of the study team’s pessimistic assessment of overall household growth within the Basin (about 1 percent) and the corresponding seasonal destination tourism rates described above. Estimated Visitor Days, Visitor Expenditures and Supporting Jobs under the High Scenario are presented for destination tourists, seasonal residents and in total in Exhibit 8 below.

Exhibit 8. Number of Visitor Days, Visitor Expenditures and Jobs Supported by Tourism in the Snake/Salt River Basin, 2032 – Low Scenario

	Number of Visitor Days (Thousands)	Total Visitor Expenditures (Millions)	Total Supporting Jobs
Seasonal Residents	2,366	\$272	7,235
Summer	1,460	\$163	4,326
Winter	227	\$27	720
Other	679	\$82	2,189
Destination Tourist	5,133	\$506	13,460
Summer	3,169	\$290	7,706
Winter	493	\$53	1,407
Other	1,471	\$164	4,348
Grand Total Tourist	7,499	\$778	20,695
Summer	4,629	\$452	12,031
Winter	720	\$80	2,127
Other	2,150	\$246	6,537

Source: Current levels based on Morey and Associates, 1999, 2000; Runyan and Associates, 2001; and Prior and Associates, 2001. Projections made by BBC based on historical recreational and housing trends in the Basin.

As depicted in Exhibit 8, under this scenario, the total number of visitor days for destination tourists and seasonal residents in the Basin would increase to roughly 7.5 million by 2032. Total annual visitor expenditures would increase to \$778 million and the total number of tourist related jobs in the Basin would rise to roughly 20,700 full time equivalents over the same time horizon. Estimated tourist related employment in the Basin would rise by only 5 percent, reflecting an average annual growth rate of less than 1 percent.

- Mid Scenario.** The Mid Scenario represents the study team’s most realistic assessment of potential future trends for both destination tourists and seasonal residents within the Snake/Salt river basin. Destination tourism during the summer months under this scenario was projected to grow at an annual rate of about 1 percent, approximately the long term rate of growth in visitation to GTNP over the past quarter century (GTNP Visitor Use Statistics, 2002). Destination tourism during the winter months under this scenario was projected to grow at an annual rate of about 1.5 percent, reflecting the assumption that only a portion of the expansion planned at the three alpine ski resorts within the Basin will be approved. Destination tourism during the shoulder months under this scenario was projected to grow at an annual rate of 1.4 percent, or about half the rate of growth projected under the High Scenario. Growth rates for seasonal residents under this scenario are the average of the projected 1.6 percent annual rate for household growth within the Basin (Prior and Associates, 2001) and the corresponding seasonal destination tourism rates described above. Estimated Visitor Days, Visitor Expenditures and Supporting Jobs under the Mid Scenario are presented for destination tourists, seasonal residents and in total in Exhibit 9 below.

Exhibit 9. Number of Visitor Days, Visitor Expenditures and Jobs Supported by Tourism in the Snake/Salt River Basin, 2032 – Mid Scenario

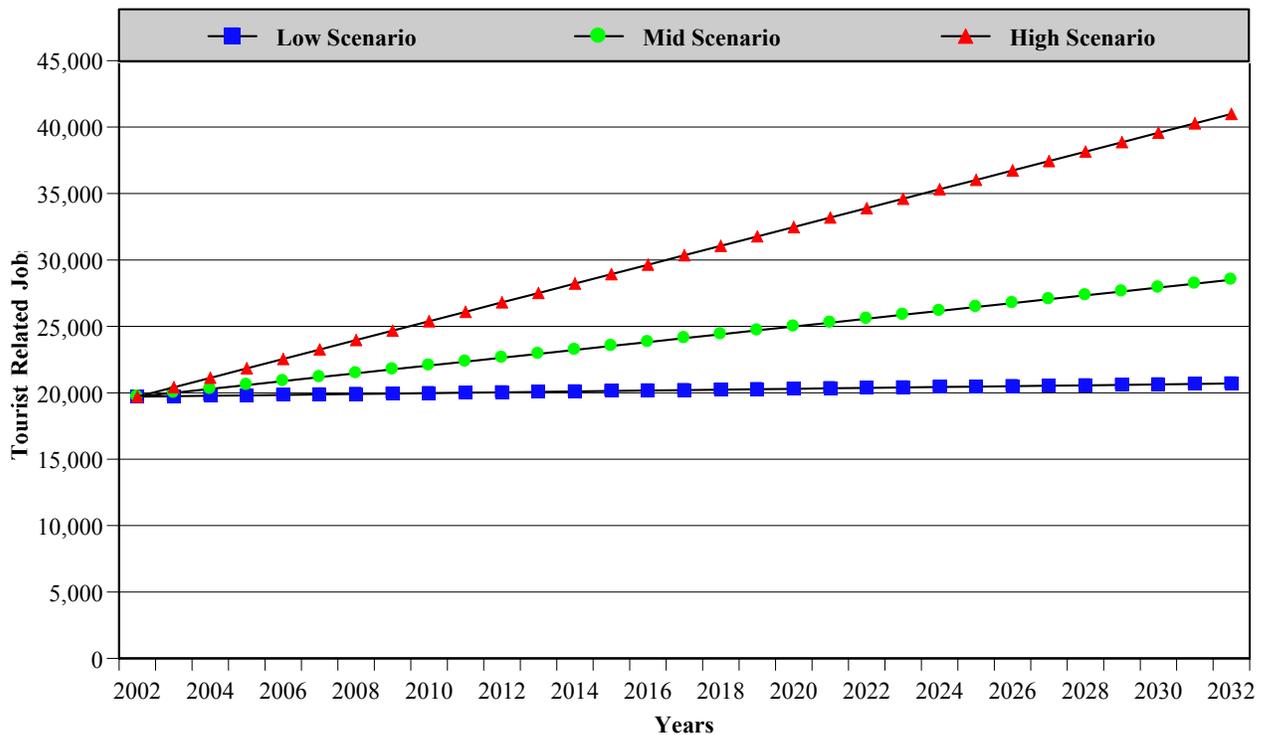
	Number Visitor Days (Thousands)	Total Visitor Expenditures (Millions)	Total Supporting Jobs
Seasonal Residents	3,083	\$355	9,441
Summer	1,850	\$206	5,479
Winter	312	\$37	990
Other	922	\$112	2,972
Destination Tourist	7,224	\$717	19,069
Summer	4,208	\$385	10,233
Winter	770	\$83	2,199
Other	2,246	\$250	6,638
Grand Total Tourist	10,307	\$1,072	28,510
Summer	6,058	\$591	15,712
Winter	1,082	\$120	3,189
Other	3,168	\$361	9,610

Source: Current levels based on Morey and Associates, 1999, 2000; Runyan and Associates, 2001; and Prior and Associates, 2001. Projections made by BBC based on historical recreational and housing trends in the Basin.

Exhibit 9 demonstrates that, under the Mid Scenario, the total number of visitor days for destination tourists and seasonal residents in the Basin would increase to roughly 10.3 million by 2032. Total annual visitor expenditures would increase to \$1.1 billion and the total number of tourist related jobs in the Basin would rise to roughly 28,500 full time equivalents over the projection period. Estimated tourist related employment in the Basin would rise by 47 percent, reflecting an average annual growth rate of 1.2 percent.

- Future Tourist Related Employment.** As depicted in Exhibit 10 below, under both the high and mid scenarios, the total number of tourist sector jobs within the Basin are projected to grow substantially. Tourist sector jobs are projected to remain roughly at current levels under the Low Scenario.

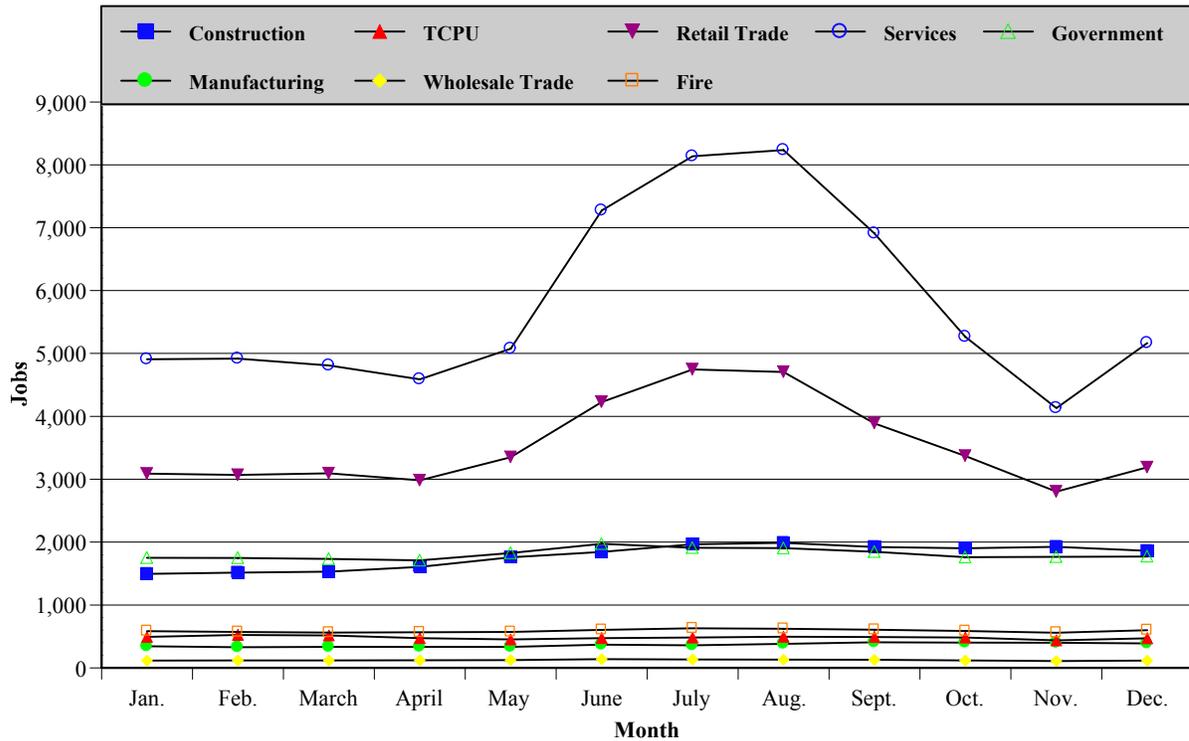
Exhibit 10. Projected Direct Tourism/Recreation Related Jobs for the Snake/Salt River Basin, 2032



Source: Current levels based on Morey and Associates, 1999, 2000; Runyan and Associates, 2001; and Prior and Associates, 2001. Projections made by BBC based on historical recreational and housing trends in the Basin.

The overall employment projections for the tourism sector described above were distributed across major industrial sectors using monthly Teton County employment data from the Wyoming Department Employment. The seasonal distribution of employment, by sector, is depicted in Exhibit 11.

Exhibit 11. Seasonal Distribution of Jobs by Sector, Teton County



Source: Wyoming Department of Employment

Tourist related jobs were identified as incremental jobs that exist during the peak and shoulder tourism seasons from May through October. Approximately 60 percent of these incremental jobs are within the services sector, 30 percent within the retail trade sector and the remaining 10 percent are distributed between the construction, real estate and government sectors.

Overall Economic and Demographic Projections

The preceding evaluations and assumptions were incorporated into a model of Snake/Salt River Basin employment and population in order to develop aggregate estimates of total residents and total jobs in 2032 under each of the three planning scenarios. As previously noted, an inverse relationship exists within the Basin between the two key water use sectors (agriculture and tourism) that is well documented (Prior and Associates, 2001; Department of the Interior, 2001). Specifically, growth in the number of visitors implies increased demand for visitor lodging and seasonal residences, which in turn drives up land values and reduces the economic viability of conventional agricultural operations. This implies decreases both in the number of irrigated agricultural acres and commercial livestock production occurring simultaneously with increases in the number of pleasure horses. In fact, such substitution has already been observed in Teton County (Resor). This inverse relationship implies the unconventional result that future levels of economic development within the Basin may be inversely proportional to future water use levels.

To simplify the analysis, the study team chose to develop projection scenarios using the more conventional (though somewhat artificial in this case) assumption that economic development for the basic sectors within the Basin is positively correlated. The primary result of this assumption is that the High and Low Scenarios represent more extreme estimates of growth (or contraction) than may actually occur. While “true” High and Low scenarios are likely to be closer to the Mid Scenario, the more extreme projections presented here are useful in that they are simpler in concept while providing clear upper and lower bounds for future water use planning purposes. Given this important caveat, the following text describes the development of overall economic and demographic projections for the Snake/Salt River Basin in 2032 under the High, Low and Mid Scenarios.

Projected Total Employment in 2032

To fully characterize the economic impact of the growth in employment under each scenario, projected employment changes for the agricultural and tourism sectors were run through an IMPLAN model for the Basin. This allowed the study team to estimate the total number of secondary jobs associated with the projected growth in these sectors within the Basin. Results from this analysis indicate that an additional 9,750 secondary jobs would be generated under the High Scenario, 430 secondary jobs under the Low Scenario and 4,020 secondary jobs under the Mid Scenario.

Projected growth in direct and secondary employment for each scenario appears below in Exhibit 12. Under the assumptions regarding changes in key economic activities described above, the study team projects that Snake/Salt River Basin employment under the High Scenario will more than double, from about 28,200 jobs at present to roughly 76,900 jobs by 2032. This increase would be completely driven by growth in tourism related employment in the Basin, as the number of agricultural jobs would remain essentially constant. Under the Low Scenario, Basin wide employment is projected to remain near current levels, increasing by only about 1,800 jobs over the 30-year projections period. Under the Mid Scenario, aggregate employment is projected to increase by roughly 19,600 jobs over the course of the projection period.

Currently, the multiplier, or ratio of total employment to direct basic employment is estimated to be approximately 1.4, indicating that each basic job supports approximately 0.4 additional jobs in local services. Higher multipliers imply relatively larger levels of supporting, indirect basic/local service employment that are characteristic of more thriving, vibrant economies. Accordingly, the study team used increasingly higher multipliers for the Mid and High Scenarios, while leaving the multiplier at the current level under the Low Scenario. Since the actual growth in total employment and corresponding population levels will be subject to the buildout capacity of the area (something that is difficult to project 30 years into the future), the study team employed conservative increases for the multipliers under these scenarios.

Exhibit 12. Current and Projected Employment Breakdown in Snake/Salt River Basin

	Current 2002	Low Scenario 2032	Mid Scenario 2032	High Scenario 2032
Basic Sector Employment				
Agriculture	490	370	490	660
Mining	0	0	0	10
Construction	1,360	1,440	2,060	3,060
Manufacturing	120	130	230	380
TCU	0	20	200	480
Trade	5,760	6,150	9,310	14,350
FIRE	170	220	590	1,200
Services	11,600	12,410	18,880	29,220
Government	700	760	1,200	1,910
Total Basic Employment	20,200	21,500	32,960	51,270
Total Non Basic Employment	8,000	8,500	14,840	25,630
Total Basin Employment	28,200	30,000	47,800	76,900
Multiplier Ratio (Total/Basic Employment)	1.4	1.4	1.45	1.50

Source: BBC estimate.

Projected Total Population in 2030

For the high, low, and mid scenarios, projections of total Snake/Salt River Basin population were derived from the preceding employment projections. Deriving the population estimates from the projected employment totals for the Basin required five steps:

1. *Net In-commuters were accounted for.* This step is necessary because a significant number of workers in Teton County must commute from other locations due to the high cost of living. The study team assumed that the number of people commuting to Teton County to work from Lincoln County and Teton County Idaho would increase over the projection period.
2. *Total jobs were relied upon to estimate of the number of employed persons.* This step is necessary because the employment estimates used in this study follow the conventions used by the U.S. Department of Commerce, Bureau of Economic Analysis (BEA). BEA job counts include part-time jobs and self-employment, consequently there are numerous instances of multiple job holding by individuals.
3. *Based upon the number of employed persons and projected unemployment rates, an estimate of the total labor force was derived.* The unemployment rate will gradually move closer to the current national average of 4.9 percent over time.

4. *Based upon projected labor force participation rates, an estimate of the total population over the age of 16 was projected.* In projecting future labor force participation rates, the study team made the assumption that participation rates in the Teton County portion of the basin would decline somewhat towards the current state average of 87 percent over the projection period.
5. *The population of ages 16 and older was utilized to project future population of all ages.* The study team assumed that the current Snake/Salt River population proportion age 16 and older would move slightly towards the national average of 77 percent by the end of the projection period.

The results of these calculations are shown in Exhibit 13 below. Under the High Scenario, the Basin’s population is projected to more than double, reaching just over 75,000 residents. Under the Low Scenario, population within the Basin is projected to experience very little growth over the next 30 years, reaching just over 29,000 residents. Under the Mid Scenario, population within the Basin would experience substantial growth over the next 30 years, gaining more than 20,000 additional people to reach a total of almost 47,000 residents.

**Exhibit 13. Employment and Population Projections for Snake/Salt Rive Basin
(Numbers Reflect Only Portions of Counties Within Basin)**

	2002		2032 Low		2032 Mid		2032 High	
	Teton County	Lincoln County	Teton County	Lincoln County	Teton County	Lincoln County	Teton County	Lincoln County
Estimated/Projected Jobs (Total)	24,000	4,200	25,532	4,468	40,681	7,119	65,447	11,453
Net Incommuters*	3,654	(462)	4,021	(670)	6,407	(1,068)	10,308	(1,718)
Estimated/Projected Jobs (County Resident)	20,346	4,662	21,511	5,138	34,274	8,187	55,139	13,171
Estimated/Projected Employed Persons County Total**	14,560	3,620	15,400	4,000	24,530	6,370	39,470	10,240
Unemployment Rate	2.2%	5.4%	4%	5%	4%	5%	4%	5%
Labor Force	14,890	3,830	16,040	4,210	25,550	6,710	41,110	10,780
Labor Force Participation Rate	92%	79%	90%	80%	90%	80%	90%	80%
Population Age 16 or Older	16,180	4,850	17,820	5,260	28,390	8,390	45,680	13,480
Proportion of Population 16 or Older***	82%	73%	80%	75%	80%	75%	80%	75%
Total Population	19,730	6,640	22,280	7,010	35,490	11,190	57,100	17,970

* Net incommuting assumes 17 percent of Teton County employees come from Teton County Idaho and 2 percent of Teton County residents and 4 percent of Lincoln County residents work in Idaho (Prior and Associates, 2001).

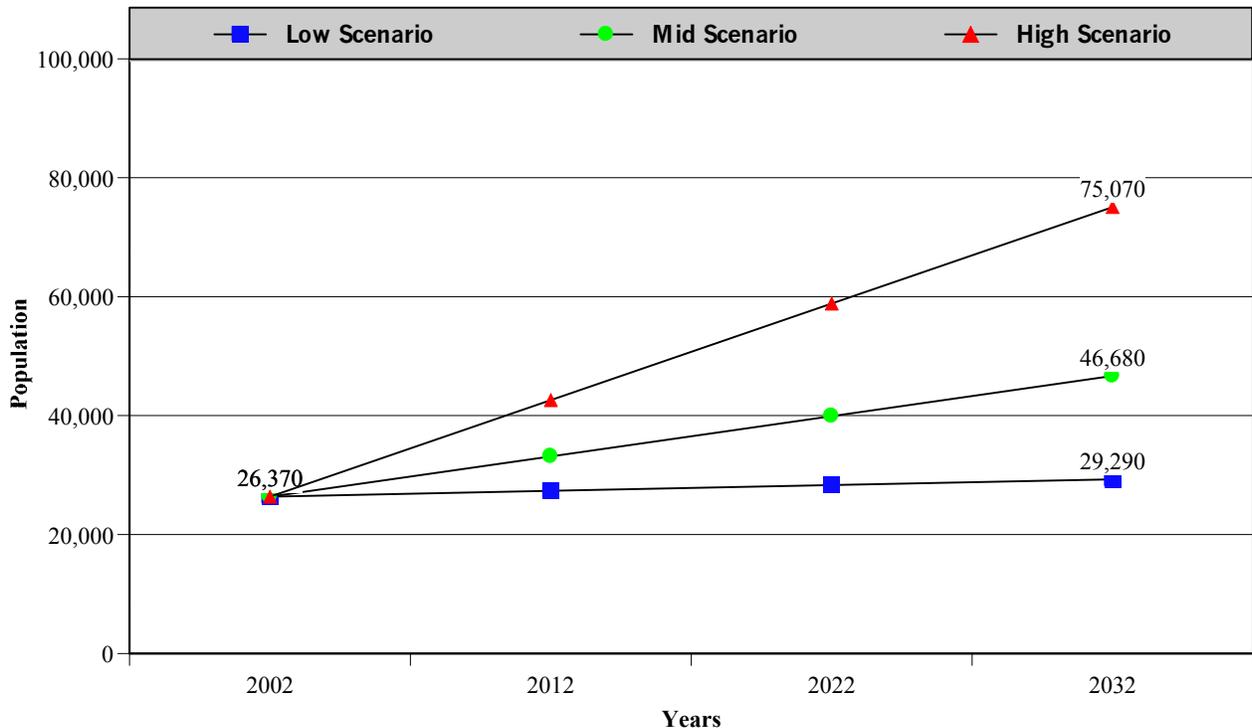
** Number of employed persons is less than number of jobs due to multiple jobholding by individuals. Multiple job factors calculated by dividing State 1998 employment totals by BEA 1998 employment totals.

*** Proportion derived from Census 2000 data

Source: BBC estimate.

Exhibit 14, below, provides a graphic depiction of the three alternative population projections for the Snake/Salt River Basin.

Exhibit 14. Alternative Population Projections for Snake/Salt River Basin



Source: BBC estimate.

Summary

The study team projected three future scenarios for economic and demographic growth in the Snake/Salt River Basin, through the year 2032. All three scenarios employed an economic base modeling approach, in which prospects for the key sectors that either bring money into the region and/or are the source of substantial water use were analyzed in detail. Based upon these analyses, high, low, and middle case alternative forecasts were developed for each key sector. The growth in total employment, and the corresponding population base, was then estimated based upon the key sector projections. Due to the well documented inverse relationship for future development between the agriculture and tourism sectors, the high and low projections presented in the memo are likely more extreme but represent useful bounds for future water planners. It is the study team’s judgment that the Mid Scenario is the most realistic and is the most likely scenario to occur.

The three scenarios presented in the memo portray markedly different potential futures for the region. Under the High Scenario, both the number of irrigated acres and commercial livestock within the Basin would increase modestly. In contrast, tourism related activity, expenditure and supporting employment would more than double. Under the Low Scenario, both livestock numbers and irrigated acreage would decline sharply due to continued pressure for residential development and changes in public land management policies. The tourism/visitation sector,

under this scenario, would remain essentially at current levels. The Mid Scenario projects livestock animal units within the Basin to decline by roughly 33 percent, and the number of irrigated acres to decline by roughly 13 percent. Tourism activity, expenditures and employment under this scenario are expected to increase by nearly 40 percent.

Projected Snake/Salt River Basin population in 2032 under the High Scenario would reach just over 75,000 residents, compared with almost 47,000 residents under the Mid Scenario and just over 29,000 residents under the Low Scenario, which is similar to year 2002 Basin population.

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