**Agricultural Water Use, Hay, and Utah’s Water Future**

Gabriel A. Lozada

Associate Professor

University of Utah Economics Department

lozada@economics.utah.edu

First version 10/14/2021; this version 11/27/2022

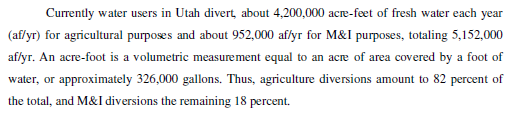
I begin with some observations about agricultural water use and hay cultivation in Utah, then suggest some implications for Utah water policy in the face of increasing aridity in the American West. I use screenshots of most of my references, instead of employing traditional academic citation styles, in order to demonstrate to skeptical or even antagonistic readers that I am faithfully representing those references. The topic is controversial—the trope in the American West is, “whiskey is for drinking, water is for fighting”—and my goal is to establish a common set of facts which all sides of the debate can agree upon, despite the striking lack of rich data about agricultural water use.

The focus of this report will be on water “diversions,” not water “use.” Water diverted is divided into water that is “used” (returning to nature as water vapor) on the one hand, and “return flows” (returning to nature as a liquid),on the other hand. Diversions are the easiest of these three to measure, because diverting water is what people do; return flows are very much more difficult to measure; and “use” is even harder to measure, so much so that it is typically obtained indirectly, as diversions minus return flows. Hence our focus on diversions.

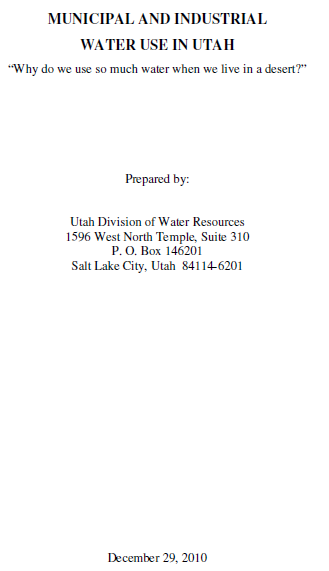
**1. Data on Utah’s Agricultural Water Diversions**

**Observation 1: The percentage (by volume) of Utah's water diversions which were diverted for agriculture was 82%, as of a 2010 report.**

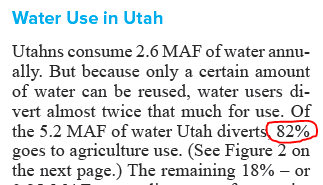
Source:



from page 3 of



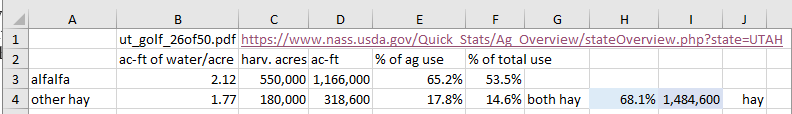
This report does not seem to be available on the State’s website any longer, so I have uploaded it to my website at <https://www.economics.utah.edu/lozada/Research/DNR_WaterUse_original.pdf>, and in 2019, the Utah Foundation used this same number in its report “High and Dry: Water Supply, Management and Funding in Utah” (available at <https://www.utahfoundation.org/reports/14309/>), as seen on page 3:



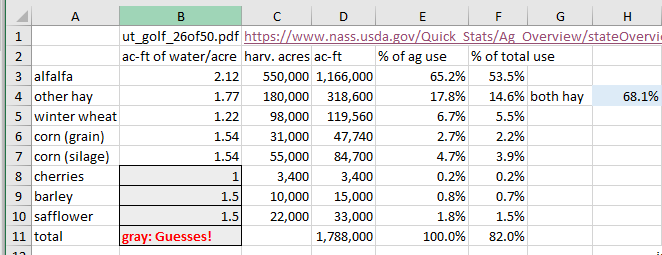
(On pages 27, 60, 75 of the State’s 2021 “Water Resources Plan,” available at <https://water.utah.gov/wp-content/uploads/2022/01/Water-Resources-Plan-Single-Page-Layout.pdf>, the percentage of Utah’s water which goes to agriculture is given as approximately 75%, but the source for that number is unpublished and unavailable.)

**Observation 2: The percentage of Utah's water diversions used for growing hay was about 68%, using 2020 production data, 2011 estimates for the amount of water needed to grow one acre of each type of crop, and 2010 estimates of the amount of water diverted to agriculture.**

I calculated this using a spreadsheet (cell H4) and the explanation is as follows.

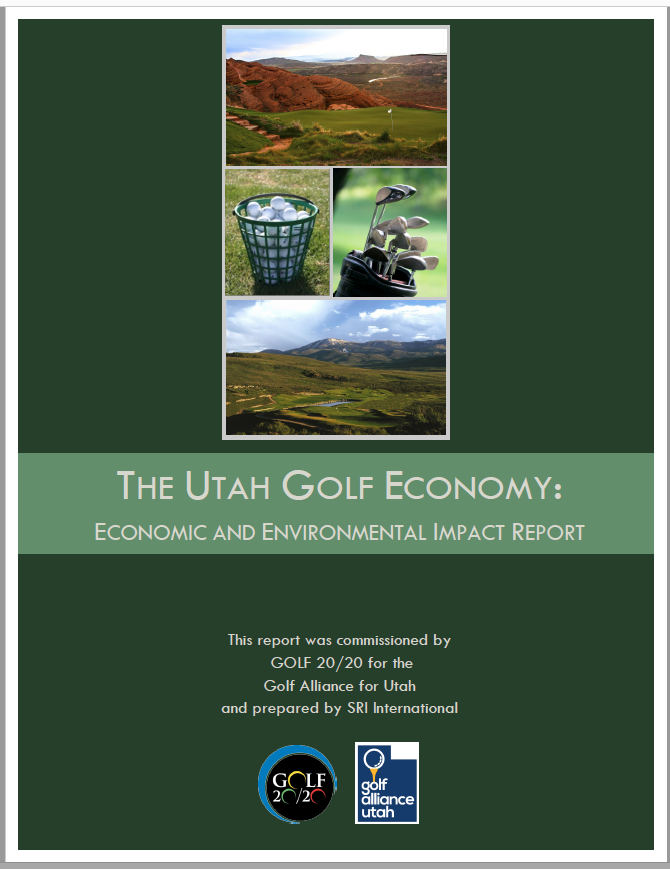


Source (1) below gives the figures in Column B, the acre-feet of irrigation water needed to grow alfalfa and other hay in Utah in 2011. This is “need”: it assumes no water is ever wasted. Source (2) below gives Column C, the number of acres of those crops planted in Utah in 2020. Multiplying Columns B and C (assuming that the biological and climate data of Column B is also relevant to 2020) gives the amount of water that would be needed in total to grow those crops in Utah, which is Column D. Doing that multiplication for all other crops as well gives

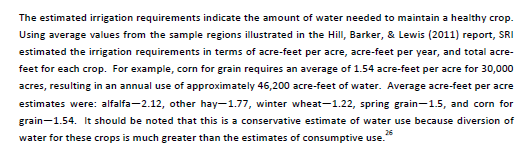


so cell D11 gives the total amount of water needed for all crops. (Cells B8 to B10 are guesses for water per acre for minor Utah crops: less for fruit trees, more for annual crops.) Column E divides Column D (water need per crop) by cell D11 (total water need for all crops), so Column E is the percent of agricultural water needed by each crop. Then since 82% of Utah’s water diversions are diverted for agriculture (Observation 1, assuming that this 2010 number still applies), multiplying Column E by 82% gives Column F, the percent of all water diverted for each crop. *This assumes that water “diversions” for a crop are proportional to the water “needs” of that crop*. That would be false if some crops were cultivated in a more water-wasteful way than others, but no data exists on that issue, so we maintain the assumption that water waste is uniform across crops. Hay is the sum of alfalfa hay and other hay, which gives approximately 68%.

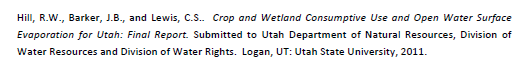
Source (1) is



which is located at <https://cdn.cybergolf.com/images/1287/UT-Golf-Full-Rpt_SRI-FINAL-(1).pdf> and which says on its page 21 that

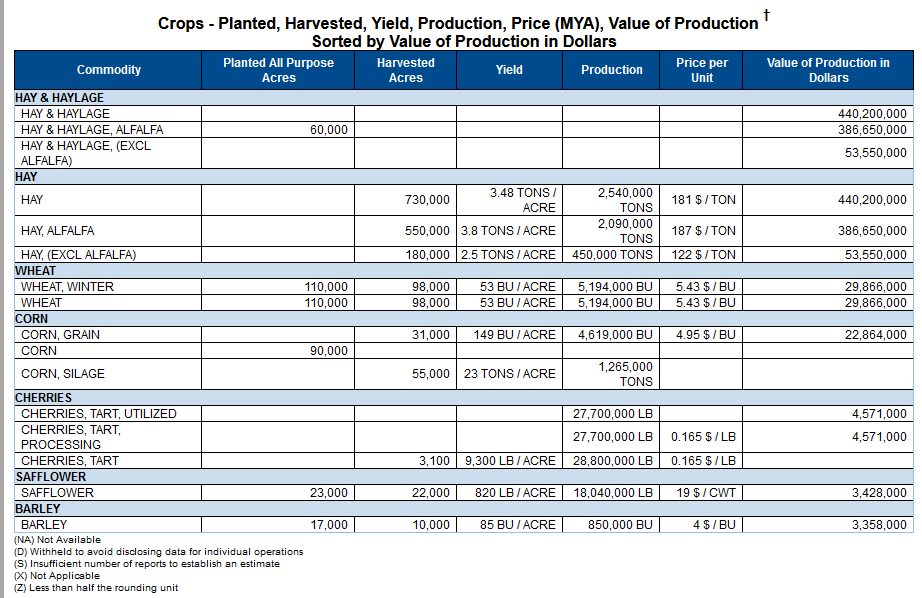


The 2011 work of Hill, Barker, and Lewis cited in this passage is

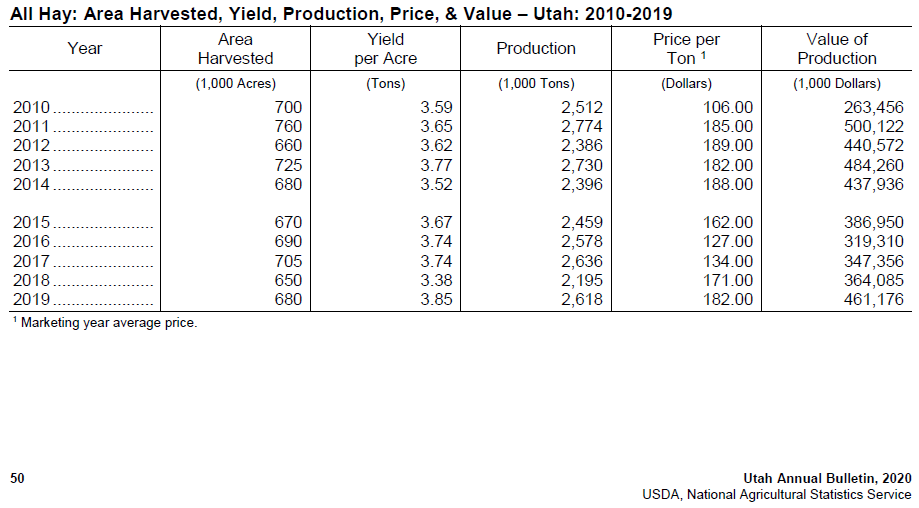


which is located at <http://waterrights.utah.gov/docImport/0545/05452313.pdf>.

Source (2) is the “2020 State Agricultural Overview” at <https://www.nass.usda.gov/Quick_Stats/Ag_Overview/stateOverview.php?state=UTAH>. The relevant portion of it is the “harvested acres” of:



The values for hay for earlier years are



which comes from <https://ag.utah.gov/wp-content/uploads/2020/10/Utah-2020-Final-Annual-Report-Statistical-Bulletin.pdf>, “Utah Agricultural Statistics and Utah Department of Agriculture and Food 2020 Annual Report.” Clearly the value of Utah hay production changes considerably from year to year, but harvested acres changes less.

Note that although Cell D11 of the spreadsheet on page 4 implies that the total amount water *needed* for agriculture in 2020 was 1,788,000 acre-feet, the first source cited in Observation 1 says that 4,200,000 acre-feet is *diverted* for agriculture, a difference of a factor of 2.35. The smaller figure is the theoretical minimum amount of water needed to grow crops using a perfectly lossless water transportation and irrigation system: remember the caveat in the source that “this is a conservative estimate of water use because diversion of water for crops is much greater than the estimates of consumptive use.” Evidently, in 2010 Utah diverted to agriculture 2.35 times more water than the theoretical minimum amount needed to produce Utah’s crops. Some losses and inefficiencies are unavoidable, but this implies that were million acre-feet of losses and inefficiencies, which is 57% of total agricultural diversions, and (from Observation 1) of all Utah water diversions.

The above spreadsheet’s Column D gives water *needs* per crop, not the amount of water actually *diverted* per crop. To obtain diversions per crop, start with the relative amounts from Column E of the spreadsheet, 65.2% and 17.8% of water diverted to agriculture going to alfalfa and to other hay, respectively; then obtain total diversions to agriculture from Observation 1’s first source (not from the spreadsheet’s D11 entry), which is 4,200,000 acre-feet (2010 data); and multiply to obtain diversions of 2,740,000 and 748,000 acre-feet for alfalfa and non-alfalfa hay, respectively, and 3,490,000 acre-feet for hay of both types combined.

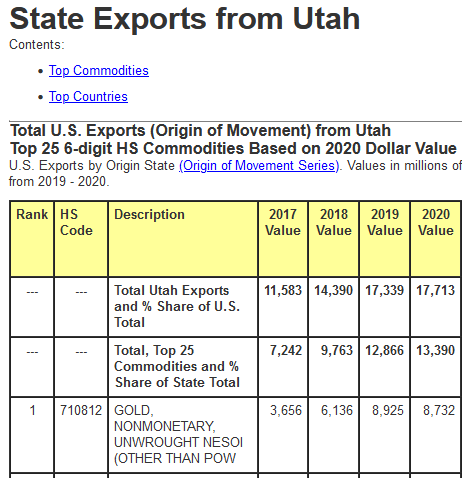
On a per-acre basis, Cell B3 of the spreadsheet on page 4 gives 2.12 acre-feet of water needed to grow one acre of alfalfa. Using the 2.35 ratio of diversions to needs, diversions for alfalfa would be acre-feet of water per acre of alfalfa. This matches remarkably well with an anecdote reported in the Salt Lake Tribune newspaper,[[1]](#footnote-1) which quotes “Sanpete County rancher Stan Jensen,” who devotes 100 of his farm’s 500 acres to alfalfa,” and who “estimates 5 feet of water are applied to every inch of land that grows the crop.” This confirms at least the broad outlines of our approach so far.

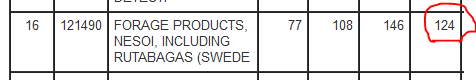
**Observation 3: The value of Utah’s 2020 hay production was $440 million.**

This comes from the table on page 6.

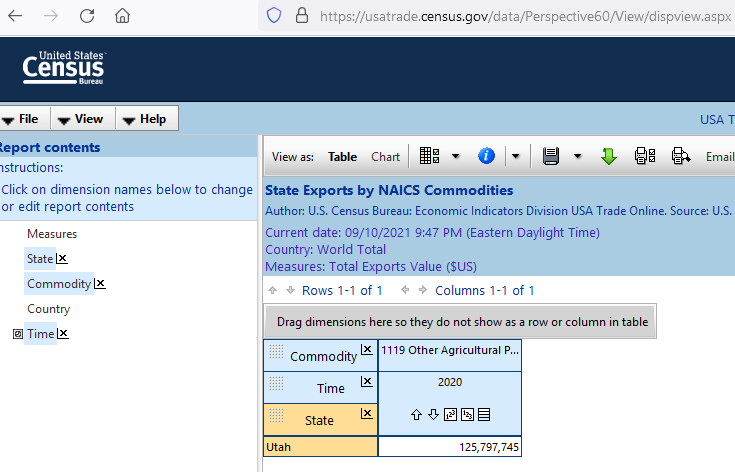
**Observation 4: The percentage (by value) of Utah's hay sold to foreign countries was about 29% in 2020.**

The web page <https://www.census.gov/foreign-trade/statistics/state/data/ut.html> says Utah’s 2020 exports of hay were worth about $124 million:

[…]



Partial confirmation of this number comes from



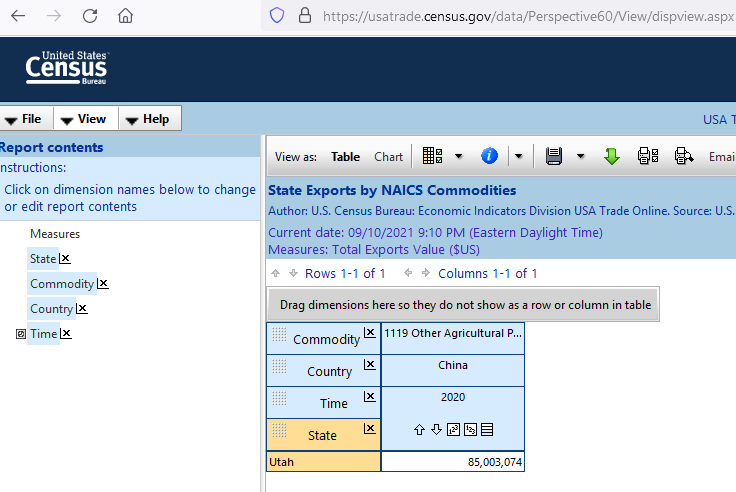
which says that Utah’s 2020 exports of all “other agricultural products” was $126 million.

Observation 3 says that the value of Utah’s 2020 hay production was $440 million. So 126/440 = 29%.

By the way, combining Observations 2 and 4, the percentage of Utah’s water diverted to grow hay that is exported to foreign countries is 29% of 68%, which is approximately 20%. From Observation 1, 100% – 82% = 18% of Utah’s water diversions go to the non-agricultural sector. Therefore, slightly more Utah water is diverted to grow hay that is exported to foreign countries, than is diverted for all of Utah’s cities.

**Observation 5: The percentage (by value) of Utah's hay that was sold to China was 19% in 2020. Using the previous answer, note that 19%/29% = 66% of Utah’s 2020 hay exports went to China.**

The source <https://usatrade.census.gov/data/Perspective60/View/dispview.aspx> gives $85 million for 2020 exports of “other agricultural products” to China:



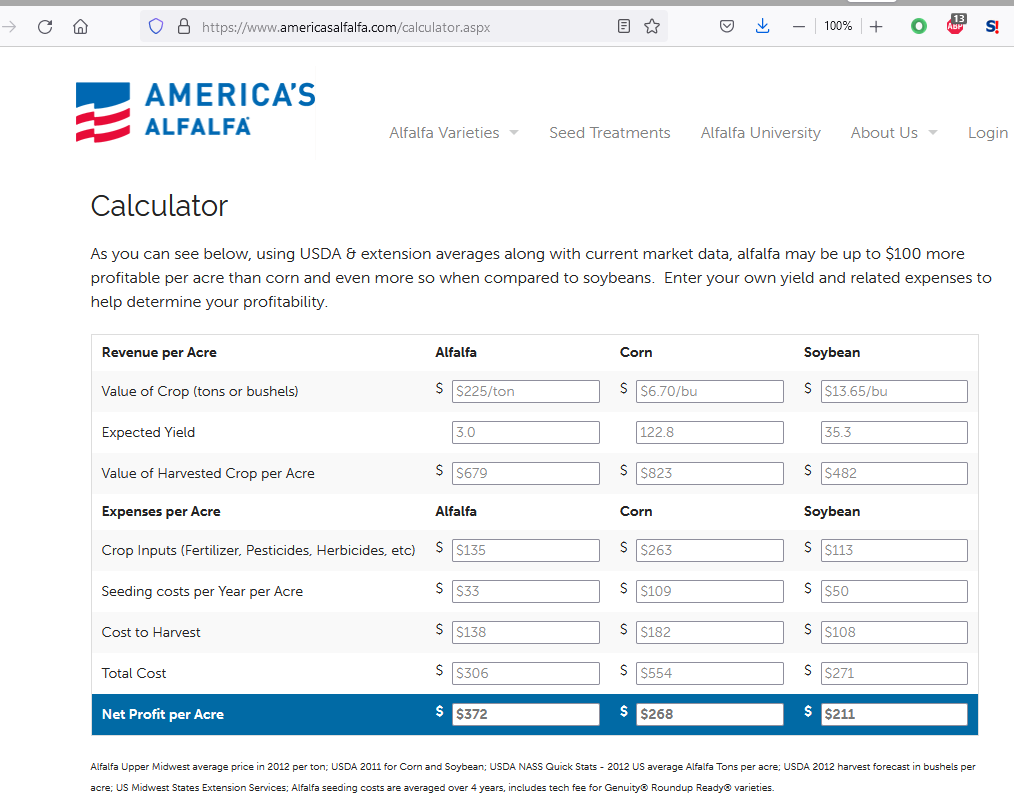
Observation 3 says that the value of Utah’s 2020 hay production was $440 million. So 85/440 = 19%.

**Observation 6: Hay generates approximately 0.2% of Utah’s GDP.**

From Observation 3, the revenue from Utah’s 2020 hay production was $440 million. Utah’s GDP in 2019 was about $193 billion (page 49 of <https://gardner.utah.edu/wp-content/uploads/ERG2021.pdf>). Dividing $440 million by $193 billion yields about 0.23% (less than one-fourth of one percent), but that *overstates* the contribution of hay to the state’s GDP, because GDP is the sum of value added in an economy, not the sum of revenues.

Value added is the sum of revenue going to profit and to labor. If we were to divide the profit (but not the labor income) due to hay by the state’s GDP, the figure obtained would *understate* the contribution of hay to the state’s GDP.

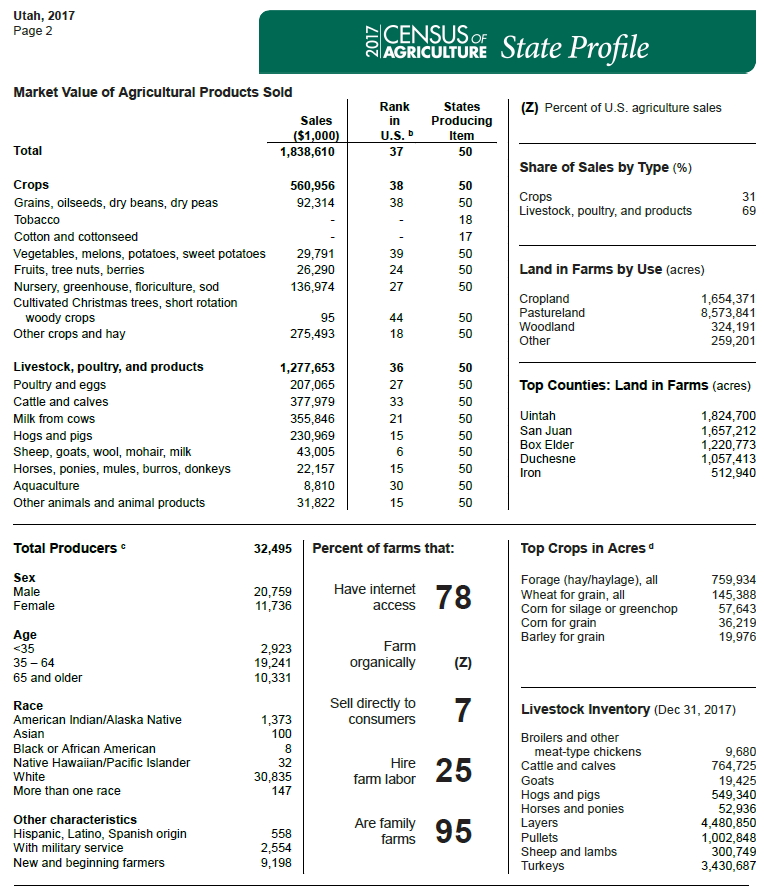
We estimate profit to be 55% of revenue. This is because nationwide, alfalfa average revenue and expenses are:



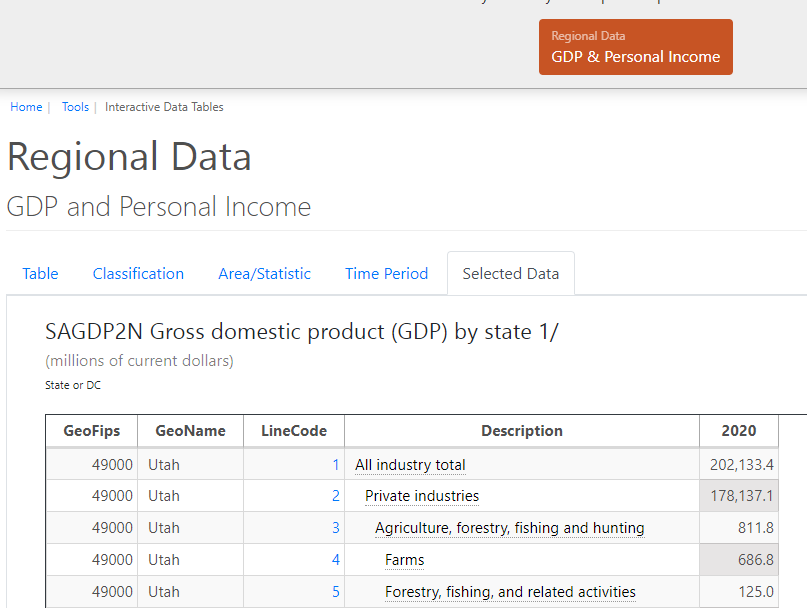
The ratio of expenses to revenue in this table is 306/679 = 45%, so profit would be the rest, which is 55%.

*Suppose this figure applies also to grass hay, and suppose it applies to Utah farmers in particular*. Then estimating that Utah farmers earned 55% profit on their $440 million in hay revenue, the result is that growing hay netted Utah farmers $242 million. As a fraction of the state’s GDP, this is 242 million/193 billion = 0.125%, about one-eighth of one percent.

As noted above, value added is profit plus labor income. If all hay was produced by sole proprietors (“family farms” with no hired farm hands), there would be no labor income, only profit, and 0.125% would be the proportion of state GDP generated by hay. However, if farmers paid some labor expenses, then the proportion of state GDP generated by hay will be greater than 0.125%. It will be less than 0.23% for reasons given in the first paragraph of this observation. Within the range of 0.125% to 0.23%, the proportion of state GDP generated by hay is very likely near the range’s low end, because as of 2017, 95% of Utah farms were “family farms,” and only 25% hired farm labor, according to the Utah State Profile of the USDA’s 2017 Census of Agriculture:[[2]](#footnote-2)

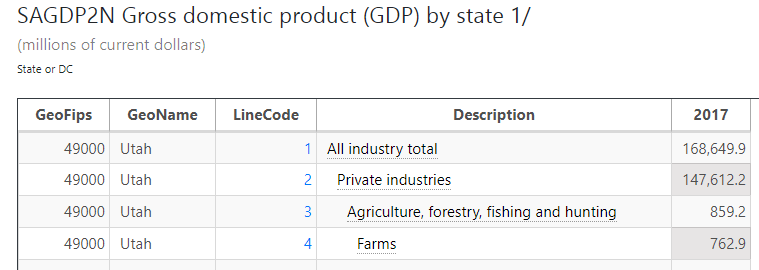


There is a second way to get an estimate of the share of hay in Utah’s GDP. In 2020, Utah’s entire agricultural sector generated $686.8 million in value added, and Utah’s entire GDP was $202,133 million, so its entire agricultural sector constituted 0.34% of its GDP. Source:



from the website of the US government’s Bureau of Economic Analysis.[[3]](#footnote-3) From the 2017 USDA Census of Agriculture, “other crops and hay” sales as a percent of total sales were 275,493/1,838,610 = 15%. *If one were to make the assumption that hay’s fraction of agricultural value added is the same as hay’s fraction of total sales*, 15%, then hay’s proportion of state GDP would be 15% of 0.34%, which is 0.05%.

A third way of estimating the share of hay in Utah’s GDP is to note that agriculture’s sales (revenues) were $1,838,610,000 from the 2017 Census of Agriculture. Agriculture’s contribution to Utah GDP (value added) in 2017 was $762,900,000:[[4]](#footnote-4)



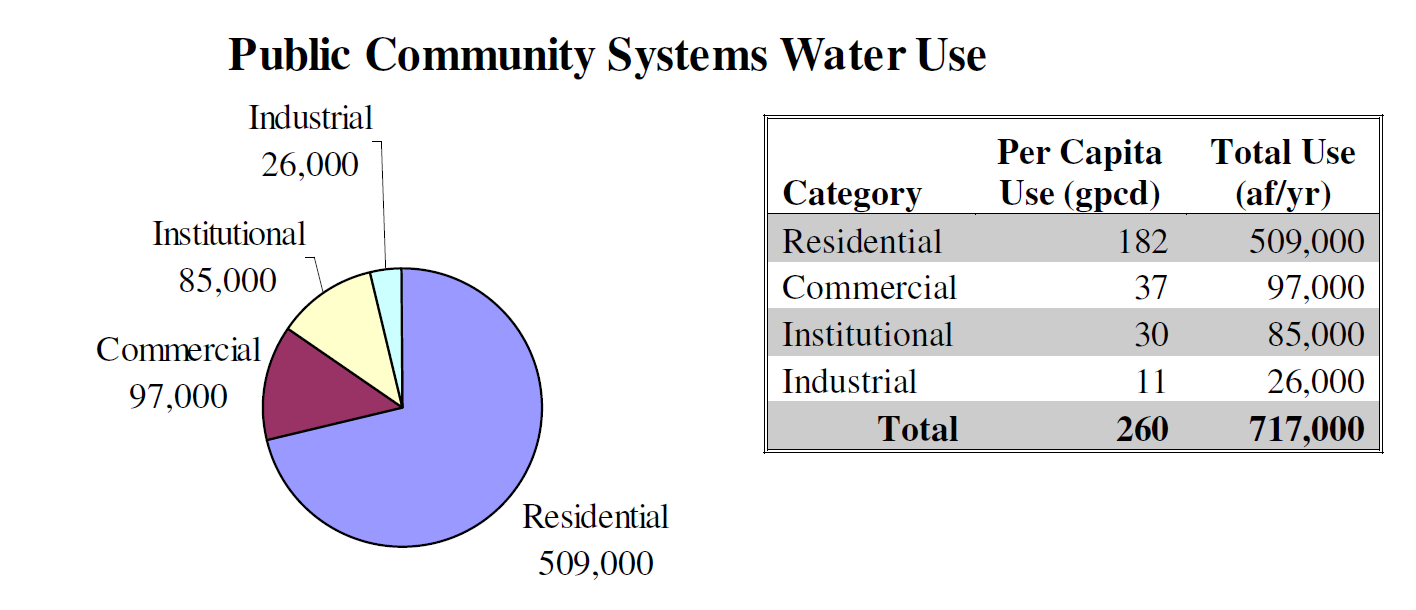
Therefore agriculture’s ratio of value added to revenue was 762,900/1,838,610 = 41.5%. *If we make the assumption that hay’s ratio of value added to revenue was the same as agriculture’s ratio of valued added to revenue*, 41.5%, then hay’s value added would be that percentage of Observation 3’s $440 million, which is $183 million. As a fraction of Utah’s 2017 GDP of $168,649.9 million, this would be 0.0011, or 0.11%.

The first method resulted in hay’s proportion of Utah’s GDP to be 0.125% – 0.23%, most likely near the lower end of that range. The second resulted in 0.05%. The third resulted in 0.11%. All these methods rely on making assumptions whose validity we cannot test—otherwise we would not have had to make the assumptions—but we know for sure that the figure cannot exceed 0.23%, because that is based on total revenue, and value added must be less than total revenue. For the rest of this paper, I will use 0.2% as hay’s proportion of Utah’s GDP, although the actual figure is likely less.

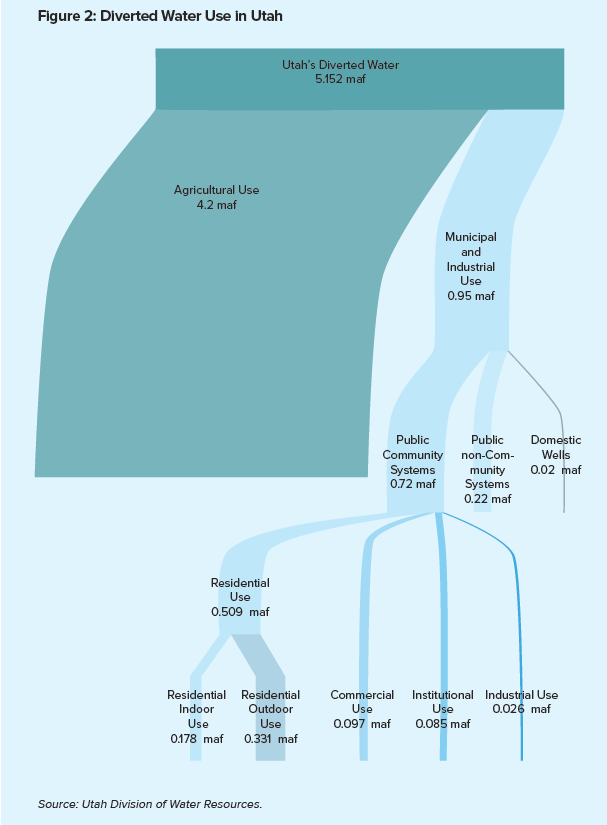
Using 68% of Utah’s water to generate 0.2% of its GDP raises concerns to which we will return.

**Observation 7: 4.5% of Utah’s water is diverted for indoor residential uses, 8.3% is diverted for outdoor residential uses, 2.4% is diverted for commercial uses, 2.1% is diverted for institutional uses, and 0.7% is diverted for industrial uses. (This observation is non-agricultural.)**

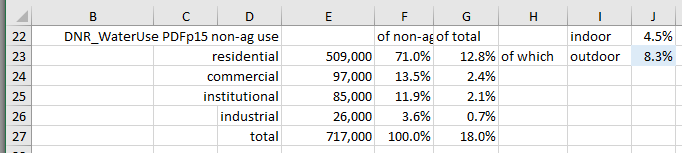
We use the two sources given in Observation 1. From page 7 of the 2010 report, we obtain the amount and types of non-agricultural water diversions:



This agrees with the numbers on page 4 of the 2019 Utah Foundation report, shown here:

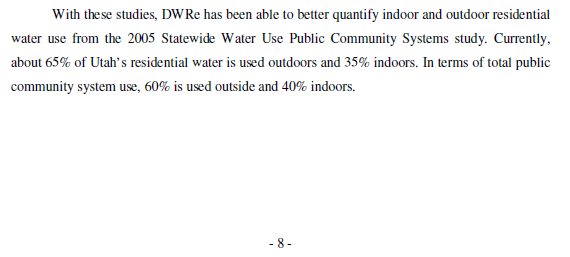


Those numbers form Column E of this spreadsheet:



Column F forms the percentages which each non-agricultural sector used of non-agricultural water. From Observation 1, non-agricultural water forms 18% of total diversions. Column G multiplies Column F by 18% to get the percent of total diversions represented by each of Column D’s sectors. This gives the conclusions for the commercial, institutional, and industrial sectors, and it gives 12.8% for the residential sector in total.

Next, in the 2010 report we see that about 65% of Utah’s residential water diversions are for outdoor use and 35% are for indoor use:



The 2019 Utah Foundation report’s chart implies diversions for indoor use as a percent of total residential diversions is 0.178/0.509 = 35% and diversions for outdoor use are 0.331/0.509 = 65%, so the two sources agree on how diversions for residential water are broken down. A 35%/65% division of the residential 12.8% gives a 4.5%/8.3% division, finishing the proof of Observation 7’s numbers.

**Observation 8. The profit earned by Utah farmers from growing hay in 2020 was approximately $242 million.**

This was a byproduct of the calculations supporting Observation 6.

**2. Long-Run Policy Implications**

The perspectives below depend on the data introduced above. In particular, the source listed on page 1 is used, even though it was published in 2010, since I can locate no published updates, only citations to unpublished, unavailable data sources. Combining data from different years warrants caution; percentages by value will not equal percentages by weight if prices fluctuate or the mix of alfalfa versus non-alfalfa hay changes; and there are imperfections and uncertainties in water use numbers, meaning that general impressions, rather than exact numbers, should be gleaned from the comments below.

**Policy Scenario 1: Stop growing hay and stop urban outdoor watering. Indoor residential water use could increase 18-fold, and population could increase 18-fold as well, if industrial, commercial, institutional use remained unchanged; cost to reimburse farmers, $4.10 per capita per year.**

In contrast to the 68% of Utah’s water diverted to grow hay (Observation 2), from Observation 7, 4.5% of Utah’s water diversions are for indoor residential uses and 8.3% are for outdoor residential uses. If we were to stop growing hay and divert that water to indoor residential use, and stop all outdoor watering at home, that would multiply diversions for indoor residential uses by (4.5+8.3+68)/4.5 = 18.0 times. Utah’s current population is about 3.3 million people. If people stopped using any outdoor water at home, then by diverting water currently used to grow hay to indoor residential uses, we could supply water to a population 18.0 times larger than our current population, in other words, to 18.0 \* 3.3 = 59.3 million people, which is 56.0 million people (59.3–3.3 or 3.3\*(8.3+68)/4.5) more than Utah’s current population. This would hurt hay farmers and others living in rural Utah or living in cities but dependent on hay for their livelihoods, but compensating them might not be very expensive.

If we stopped growing hay and billed a hypothetical Utah population of 59 million people for that cost of reimbursing farmers for their lost hay income, each person would have to be billed, each year, using Observation 8: $242 million/59 million = $4.10. Even if you increase this to reimburse non-farmers hurt by the demise of hay growing, for example increasing it by a factor of 440/242 = 1.81 to cover the total revenue obtained from hay rather than the total profit (Observation 3), it is still a modest expense to get Utah’s population to 59 million people. (Caveat 1: You would need to pay to move the water from the farms to the cities also, and treat it. Caveat 2: With more people, industrial, institutional, and commercial water use would almost surely need to increase. So the actual population increase possible would be less than the factor of 18, and therefore the actual cost to reimburse just farmers would be more than $4.10 per capita.)

**Policy Scenario 2: Stop growing hay but continue urban outdoor watering. Indoor and outdoor residential diversions could increase 6-fold, and population could increase 6-fold as well, if industrial, commercial, institutional diversions remained unchanged; cost to reimburse farmers, $11.63 per capita per year.**

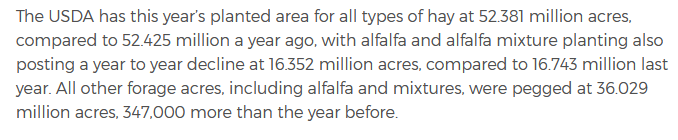
If people continued to divert water for outdoor water uses, and do so at the same rate they do now (no conservation), instead of 59 million people, eliminating hay would only support about 3.3 million \* (4.5+8.3+68)/(4.5+8.3) = 20.8 million people living in Utah, which is 17.5 million people (20.8–3.3 or 3.3\*68/(4.5+8.3)) more than Utah’s current population. The amount of water available for indoor and outdoor residential watering would increase by a factor of (4.5+8.3+68)/(4.5+8.3) = 6.3, instead of the factor of 18 which we obtained by eliminating residential outdoor watering. To compensate hay farmers for their losses, each Utahn of that population of 20.8 million people would have to be billed, using Observation 8, $242 million/20.8 million = $11.63 each year. (Billing would have to be more if we also paid support to non-farmers adversely affected. The caveats of the previous paragraph also apply, so for those reasons the 6.3 number is somewhat of an overestimate, and the $11.63 is an underestimate.)

**Observation 9: If Utah ceases all production of hay, the price of food is unlikely to be greatly affected.**

Utah devotes 730,000 acres to growing hay (from the table on page 6). The number of acres used to grow hay in the entire US is 52.381 million acres, from

<https://brownfieldagnews.com/news/hay-acres-down-in-2020/>

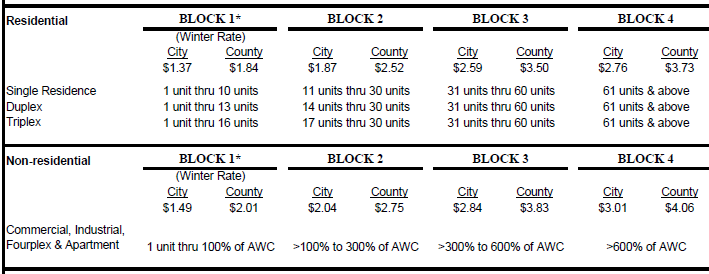
which states



Therefore, Utah’s hay-growing acreage represents 1.4% of the total number of acres devoted to growing hay in the US. I conclude that losing Utah’s hay is unlikely to raise the US price of food very much (particularly since about 29% of Utah’s hay is exported, as we saw in Observation 4). Furthermore, in the very many years that would pass before Utah completely ceased growing hay, other sources of hay might be developed.

**Observation 10: Water diverted for in growing hay generates $0.00021 profit per gallon. Many urban residents are willing to pay ten times more than that for water (although agricultural water would have to be transported and treated before urban residents could use it).**

Observe that Utah diverts about 5.1 million acre-feet of water per year according the 2010 source cited on page 1. Observation 2 was that 68% of this went to hay; that is 3.5 million acre-feet of water per year. (This exceeds the sum of cells D3 and D4 of Observation 2’s spreadsheet, which is 1,484,600, for reasons given in the last paragraph of Observation 2.) This water generated, in 2020, $242 million in profit from hay, as we estimated in Observation 8. In other words, $242 million/3.5 million acre-feet = $69 profit/acre-foot of water, which is $0.00021 profit/gallon ($69 profit/(acre-foot))\*325851 gallons/acre-foot). Farmers now pay nothing for “wet” water itself, and little for its transportation. If they had to pay $0.00021/gallon, growing hay would be unprofitable, and the increases in Utah’s population to 12.8 or 49.8 million people described above could occur. Salt Lake City Public Utilities currently charges for (culinary) water between $1.37 and $4.06 per 100 cubic feet (748 gallons), according to



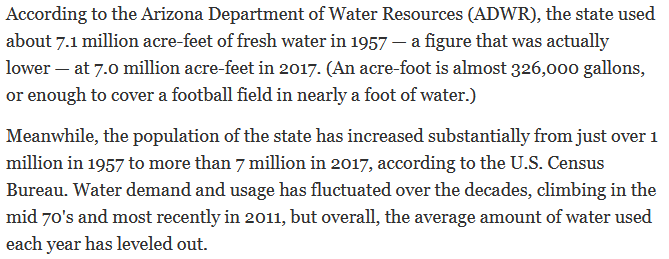
(from <http://www.slcdocs.com/utilities/PDF%20Files/UtilityRates/WaterrateswebCurrent.pdf>), which is $0.00183 to $0.00543 per gallon. Using the first figure, if farmers had to pay .00021/.00183 = 11% as much for “wet” water as city dwellers currently pay, the increases in Utah’s population described above could occur. Using the second figure, if farmers had to pay .00021/.00543 = 4% as much for “wet” water as city dwellers currently pay, the increases in Utah’s population described above could occur. Stated another way, additional gallons of (non-potable) water could be obtained from hay farmers (located at their farms) at costs between 4% and 11% of today’s retail price of water. (The section heading approximates this as one-tenth.)

**Policy Scenario 3: Another free-market solution.**

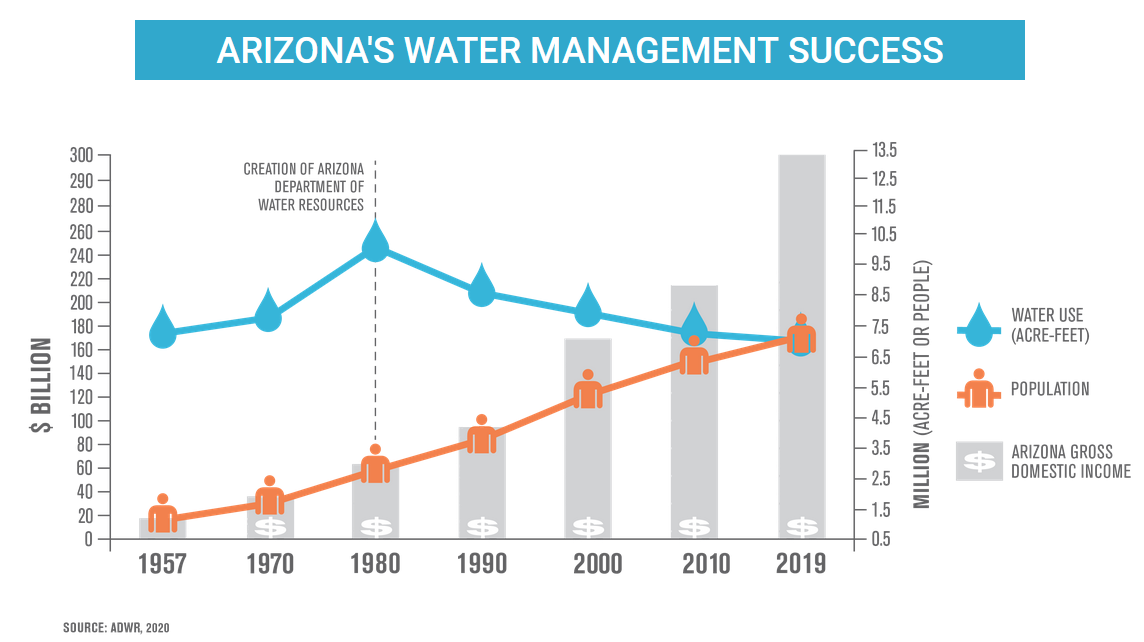
Another free-market solution to water shortages would entail the government buying all water rights in existence and from then on selling every gallon of water diverted in the state, at a price sufficiently high to equate supply and demand (including demand by government, and perhaps non-governmental organizations, for environmental uses). This is a “free market” solution even though the seller is the government because it uses the price system to allocate water, just like the price system allocates other commodities in this country including foodstuffs. As time goes on if the demand for water in urban areas rises—which may never happen, see Observation 11—the government would make more money by transporting water from where its value is low, namely agriculture, to areas where its value is high, namely urban areas. (In Colorado, hedge funds are now buying water rights in order to set themselves up to profit from future such arbitrage opportunities.) Besides ensuring that the government’s taking over of water rights is accompanied by adequate compensation, some of the revenue earned by the government should be directed to rural non-farmers and other people hurt by the new policy.

**Observation 11: Utah’s population may be able to grow while its water diversions fall.**

Even if Utah’s population expands rapidly, with urban water conservation and farmland being converted to urban uses, Utah’s urban areas may never need more water. The experience of Arizona is remarkable: it uses less water now than it did in 1957, despite its population growing *by a factor of seven*:



(source: <https://www.azcentral.com/story/news/local/arizona-environment/2019/02/12/arizona-water-usage-state-uses-less-now-than-1957/2806899002/> Feb. 12, 2019). From a website run by the Arizona Department of Water Resources, here is this history depicted graphically:



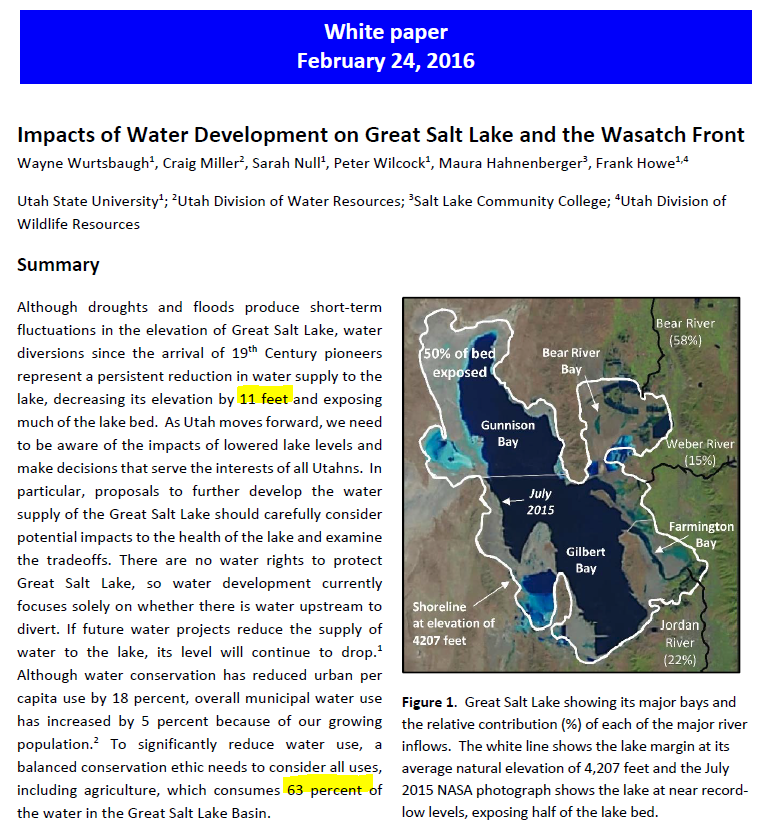
(source: <https://www.arizonawaterfacts.com/water-your-facts>). These changes happened without needing any of the explicit agriculture-to-urban water transfer policies sketched earlier in this paper.

**Policy Scenario 4: Immediate partial replenishment of the Great Salt Lake, the Colorado River, and other water sources. Cost somewhat more than $80 per capita per year to return to nature more than three times the amount of water currently diverted for all of Utah’s cities and towns.**

If Utah’s current population had to free up 68% of Utah’s water immediately, one way would be to stop the growing of hay (Observation 2). This would cost farmers $242 million/year (Observation 8). To reimburse farmers would cost each of Utah’s current 3.3 million people: ($242 million/year)/(3.3 million people) = $80.67/year. Reimbursing other people hurt by the demise of hay growing would increase this figure. There are no additional costs, because there is no need to transport the water; all the policy entails is *refraining* from artificial water transport. In fact, there would be cost savings from that reduction in artificial water transport, and those cost savings could partially offset the agricultural reimbursement costs.

The amount of water freed up would be 3.7 times the total amount of water currently diverted for all of Utah’s cities (3.7 = 68/18 where 18 is the sum of Observation 7’s numbers: 4.5% indoor residential, 8.3% outdoor residential, 2.4% commercial, 2.1% institutional, and 0.7% industrial).

If a policy’s goal was merely to help the Great Salt Lake, rather than all water sources in the state, then costs would be correspondingly less. According to a 2016 report available at <https://digitalcommons.usu.edu/cgi/viewcontent.cgi?article=1891&context=wats_facpub>, water diversions have decreased the lake’s elevation by 11 feet, and 63% of those diversions are to agriculture:



Not all of these agricultural diversions are for hay, but the state government has not yet gathered detailed agricultural water use data or estimates on a small-scale level, so it is not yet possible to be more precise about how much the Great Salt Lake’s elevation would rise when any particular amount of agricultural profit is foregone.

**General comments on future water policy.**

In light of the experience of Arizona, Utah’s population may be able to grow even while its water diversions fall as its climate becomes more arid. But whether that happens or not, some sector of Utah is going to have to divert less water as the climate changes, especially if the Great Salt Lake needs to be partially refilled, and in order to manage that transition, what Utah needs more than anything else right now is a reorientation of its attention. Roughly 82% of Utah’s water goes to agriculture, so agriculture is where roughly 82% of its attention needs to be, not the 6 pages out of 136 which treat agriculture in the State’s 2021 “Water Resources Plan” cited in Observation 1. And when attention is focused on agriculture, the next step to achieving the right perspective is to keep in mind is that agriculture generates less than one-half of one percent of Utah’s GDP. Sixty-eight percent of Utah’s water goes to hay, which generates less than one-fifth of one percent of Utah’s GDP.

The point of this framing is not to demonize hay farming, but rather to show that every Utahn could be made better off (in terms of income) by refraining from building the Lake Powell Pipeline, the Bear River Development, or a pipeline from the Pacific Ocean, and instead planning a transition in which agriculture diverts less water. If urban areas need more water, farmers should be able to sell their water to urban areas without losing their water rights; or urban water districts should be allowed to buy farms from willing sellers, for their water rights; or the government should buy up all water rights at fair prices and use the price system to allocate water. If urban areas do not need more water, the State could directly pay farmers for not using water. Such policies, properly designed, would be a “win” for farmers, and simultaneously impose only modest costs on urban dwellers—costs on the order of tiny percentages of the state’s GDP. Alternatively, the cost of decreasing water diversions could be shared with farmers as well, for example by paying them compensation, in return for permanently reducing their water diversions, only for 50 years instead of in perpetuity, either on the grounds of “shared sacrifice” or in recognition of their previous prosperity’s roots in subsidized water, or both. Non-farming rural residents, and urban residents whose livelihood is connected to agriculture, would get hurt, and government should help them. Over the coming decades, much farming life could gradually disappear from Utah, but if no one’s incomes are hurt by that (except to a minor extent—growing aridity cannot be cost-free), it is just a sign that due to climate change, the state’s economy is evolving even further from its 19th century, agrarian-based model. The free market destroys industries regularly. Our goal should be to manage that process so it doesn’t also destroy any *people*. The alternative, clinging to old ways of life because of nostalgia, will cost of billions of dollars. And even then, at some point in the future, the logic of decreasing agricultural water use will become irresistible.

(I have ignored the adverse effect of canceling the water development projects on the engineering consultants, contractors, and construction workers who would build the projects and on the Division of Water Resources employees who would plan the projects and supervise construction. I have also ignored the environmental benefits of canceling the projects.)

The basic cause of inefficient use of water in Utah’s agriculture is that “wet” water itself (ignoring in-farm delivery costs) has a zero marginal cost to farmers, although supplying this water is costly and it is in short supply. It is certainly true that Utah grossly under-prices municipal and industrial water as well, using property taxes to subsidize most of those water rates. For example, the difference between the “City” and “County” rates for Salt Lake City (see the rate schedule in Observation 10 above) are that the “County” rates reflect no property tax subsidy but the “City” rates do reflect this subsidy. The urban property tax subsidy enables profligate, sometimes even frivolous urban water use. Since all water in Utah is priced below its supply cost due to government policy, water demand both in agriculture and in urban areas is higher than it would be in the absence of that policy. Shortages loom for exactly the same obvious reason that government setting of prices below the market-clearing level caused endemic shortages in the USSR. There exist people who would argue that this type of market interference was desirable in the 19th century, since it encouraged Euro-American migration to the arid West and helped ensure the territory would not be lost in wars to Native Americans or to Canada or Mexico. However, it caused significant destruction of the natural environment, and lost its main rationale more than a century ago. Government interference in free-market price setting can sometimes be justified, but should only be engaged in after careful consideration of its disadvantages. In Utah, government interference in water pricing has been part of the state’s economy for so long that it is largely not even recognized, let alone analyzed or critiqued. It is high time to make the system of water allocation in the state more economically efficient—in urban areas, absolutely yes, but especially where the bulk of the water is used, in agriculture.

1. Brian Maffly and Mark Eddington, “One Crop uses More than Half of Utah’s Water. Here’s Why,” Salt Lake Tribune, Nov. 24, 2022. [↑](#footnote-ref-1)
2. <https://www.nass.usda.gov/Publications/AgCensus/2017/Online_Resources/County_Profiles/Utah/cp99049.pdf> [↑](#footnote-ref-2)
3. <https://apps.bea.gov/itable/?ReqID=70&step=1#eyJhcHBpZCI6NzAsInN0ZXBzIjpbMSwyNCwyOSwyNSwzMSwyNiwyNywzMF0sImRhdGEiOltbIlRhYmxlSWQiLCI1MDUiXSxbIkNsYXNzaWZpY2F0aW9uIiwiTkFJQ1MiXSxbIk1ham9yX0FyZWEiLCIwIl0sWyJTdGF0ZSIsWyIwIl1dLFsiQXJlYSIsWyI0OTAwMCJdXSxbIlN0YXRpc3RpYyIsWyItMSJdXSxbIlVuaXRfb2ZfbWVhc3VyZSIsIkxldmVscyJdLFsiWWVhciIsWyIyMDIwIl1dLFsiWWVhckJlZ2luIiwiLTEiXSxbIlllYXJfRW5kIiwiLTEiXV19> [↑](#footnote-ref-3)
4. One can choose the year from the menu at <https://apps.bea.gov/itable/?ReqID=70&step=1#eyJhcHBpZCI6NzAsInN0ZXBzIjpbMSwyNCwyOSwyNSwzMSwyNiwyN10sImRhdGEiOltbIlRhYmxlSWQiLCI1MDUiXSxbIkNsYXNzaWZpY2F0aW9uIiwiTkFJQ1MiXSxbIk1ham9yX0FyZWEiLCIwIl0sWyJTdGF0ZSIsWyIwIl1dLFsiQXJlYSIsWyI0OTAwMCJdXSxbIlN0YXRpc3RpYyIsWyItMSJdXSxbIlVuaXRfb2ZfbWVhc3VyZSIsIkxldmVscyJdXX0=> . [↑](#footnote-ref-4)