



**2022
Idaho Barley Commission
Report**

Senate Agricultural Affairs Committee

Laura Wilder
Executive Director

February 1, 2022



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Idaho Barley Commission

- The Commission
- 2021 Idaho Barley Crop
- Economic Impact of Idaho Barley Industry
- Idaho Barley Commission Program Highlights



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Idaho Barley Commission

- Idaho self-governing agency established in 1988 through state statute. (*Title 22, Chapter 40*)
- Serves to enhance the profitability of the Idaho barley growers through **research, market development, promotion, information and education** programs.



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Idaho Barley Commission

- This is accomplished by two full-time staff members, as well as identifying and fully utilizing available resources and organizations to promote and further develop the Idaho barley industry.



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Idaho Barley Commission

- Funded by Idaho barley growers through \$0.03/cwt (per hundred weight) barley assessment outlined in state statute.



✓ per 100 pounds of barley

✓ This compares to \$0.0144 per bushel of barley

A great investment for growers!

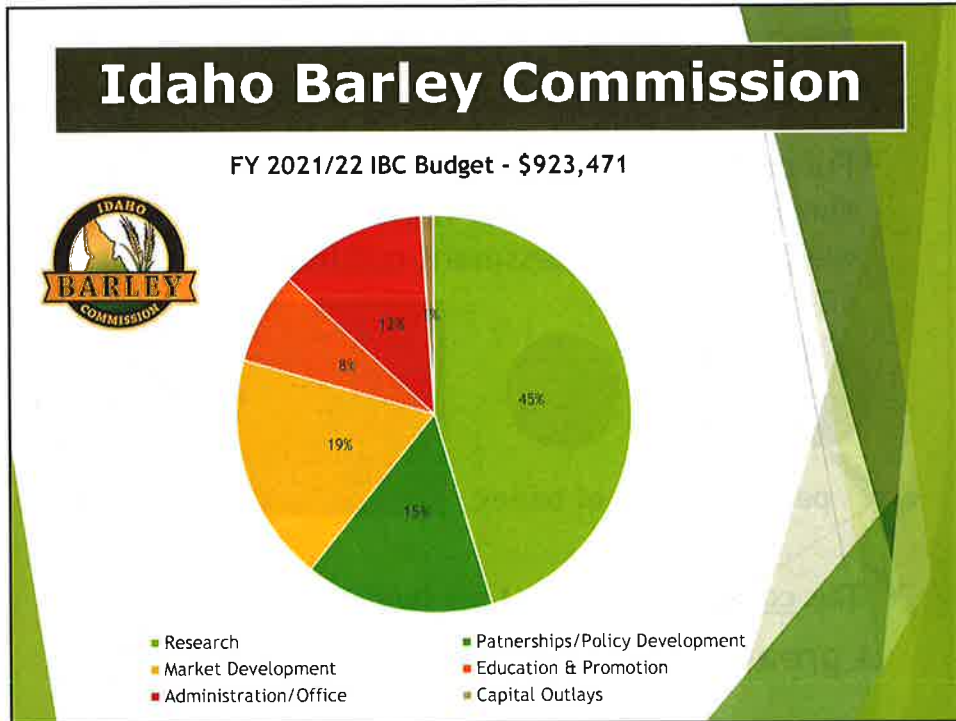
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Idaho Barley Commission

- Governed by 3 grower commissioners appointed by the Governor by IBC district for 3-year terms
- 1 industry rep selected by the grower commissioners
- District 1 **Wes Hubbard**, Bonners Ferry
- District 2: **Mike Wilkins**, Rupert
- District 3: **Allen Young**, Blackfoot
- Industry Rep: **Jason Boose**, MC, Burley




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Idaho Barley Commission

- Higher than usual carryover to end FY2021 due to Covid-19 program changes and some unspent funds
- Those funds rolled over to FY2022 budget with increased program funding, especially increased research funding



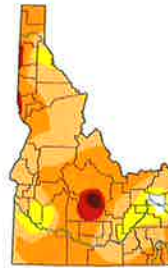
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2021 Idaho & US Barley Crop

The **GOOD**

The **BAD**

And the **UGLY**




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2021 Idaho Barley Crop

- Had not seen a year with so little spring precipitation in our lifetimes - spring rains did not materialize
 - The only spring that was drier going back to **1895** was **1924**.
 - Average spring precipitation across the state was **4.4"** or **46.5%** of normal rainfall.
- The entire state was categorized as being in drought most of the summer.
 - Unseasonably hot temperatures in June



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IDAHO BARLEY Leads the Nation

- **#1** Barley Producing State in U.S.
- **37%** of 2021 U.S. Barley Crop
- 490,000 Idaho acres harvested
- 43,610,000 bushels of barley produced

Source: USDA Small Grains Report
Sept. 30, 2021

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2021 Idaho & U.S. Barley Crop

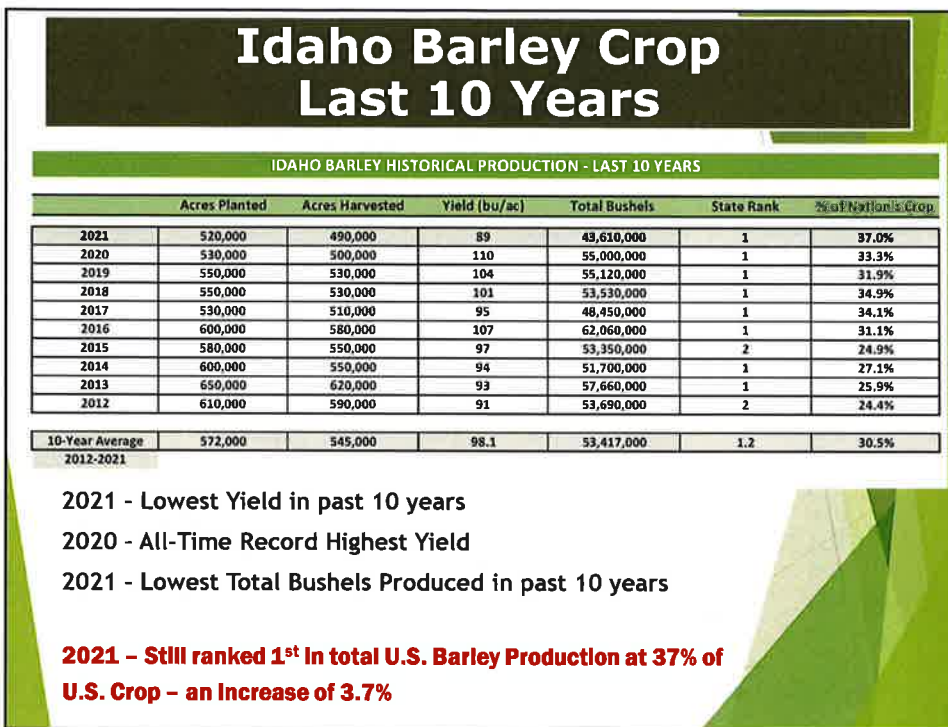
	2021	2020	% Change
Idaho Barley Acres Planted	520,000	530,000	- 2%
Idaho Acres Harvested	490,000	500,000	- 2%
Idaho Average Bushels/Acre	89	110	- 19%
Idaho Production in Bushels	43,610,000	55,000,000	- 21%
U.S. Acres Harvested	1,948,000	2,214,000	- 22%
U.S. Production in Bushels	117,673,000	170,813,000	- 31%
Idaho % of U.S. Total	37%	33.3%	+3.7%
Idaho Rank in U.S. Barley Production	1	1	

#1 - Idaho 43,610,000 bu = 37% of U.S. total
 #2 - Montana 23,750,000 bu = 20% (625,000 acres-38 bu/ac)
 #3 - North Dakota 21,930,000 bu = 18.6% (430,000 acres-51 bu/ac)

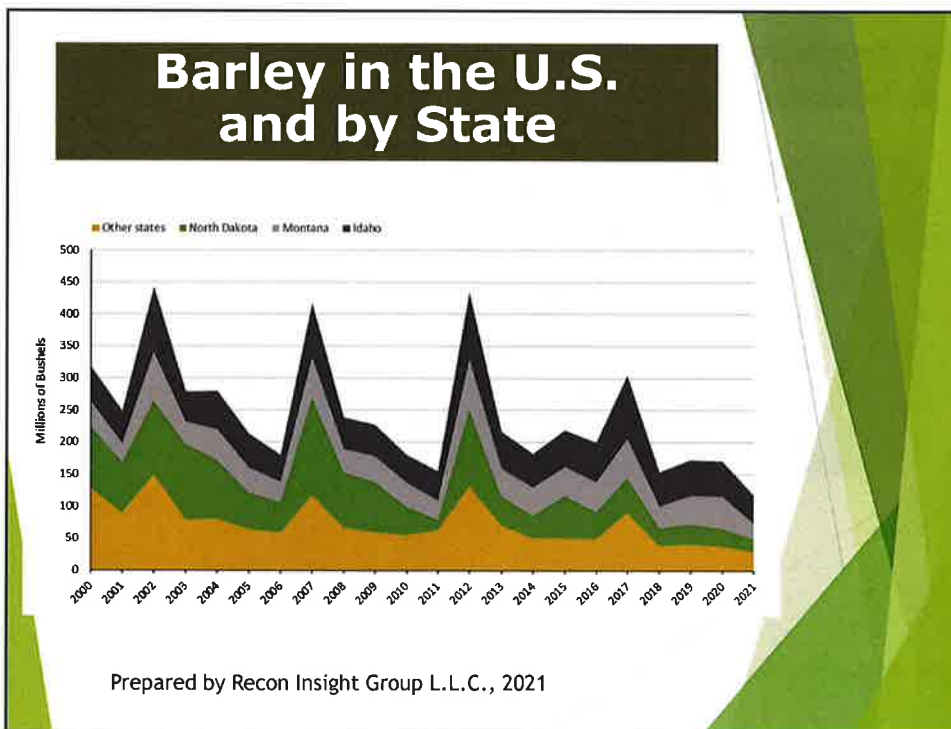
3 States = 76% of 2021 U.S. total production

Source: USDA Small Grains Report, Sept. 30, 2021

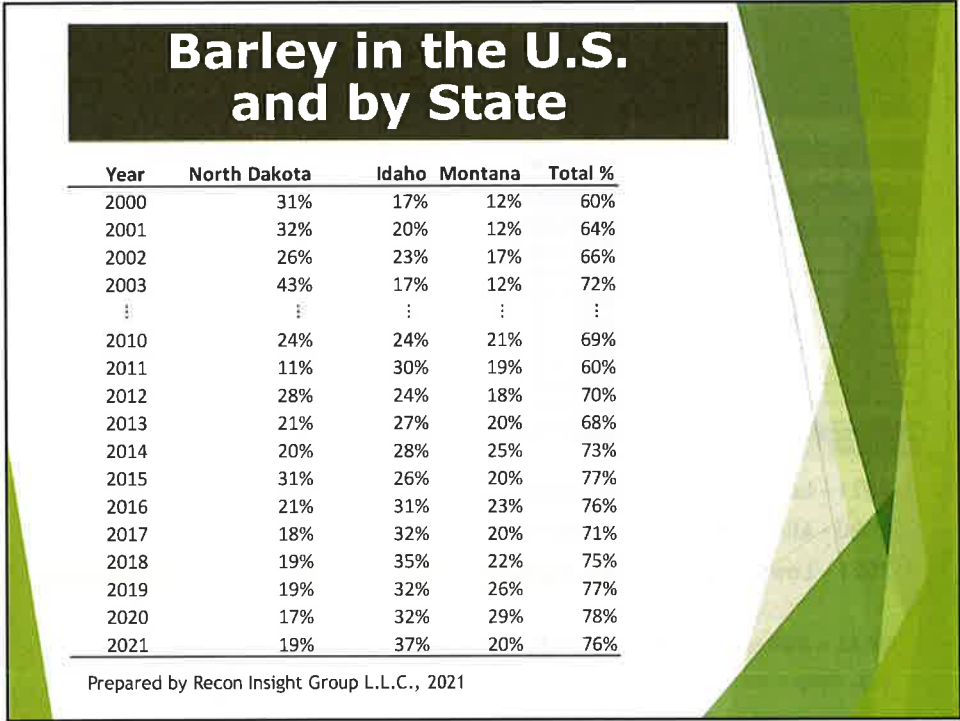
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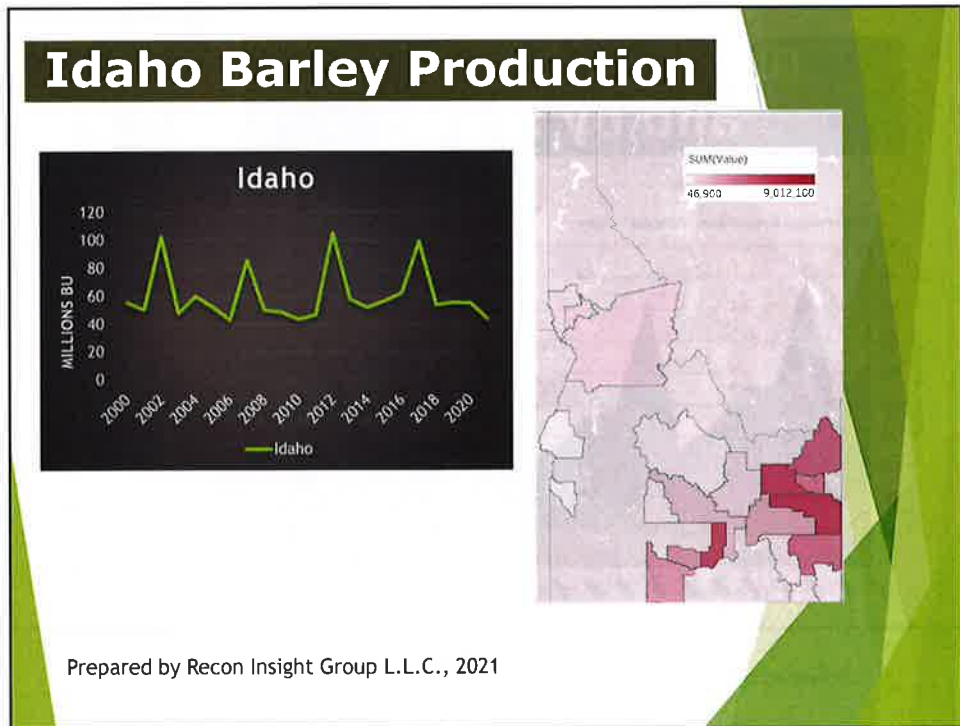
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What Makes Idaho Special?

Idaho's **altitude**, **high desert climate**, and **agronomic conditions** including **abundant irrigation water**, make it an ideal location to grow a **consistent, reliable** supply of **premium-quality BARLEY**, highly sought after by the malting industry, and for livestock feed, food barley and barley protein products.



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Economic Impact: 2021 Idaho Barley Contributions

2021 Total Barley Impacts

	Sales	GSP	Income	Jobs
Direct	\$209,328,000	\$99,651,567	\$38,877,670	473
Indirect	\$108,360,021	\$53,404,017	\$34,608,188	874
Induced	\$116,483,751	\$62,936,873	\$33,663,945	801
Total	\$434,171,772	\$215,992,457	\$107,149,803	2,148

Prepared by Recon Insight Group L.L.C., 2021

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Average vs 2021 Contributions

Assume:

1. Average coverage payments of \$15.95 million
2. Average production values of \$273.76 million

Average Annual Barley Contributions

	Sales	GSP	Income	Jobs
Direct	\$273,757,440	\$130,323,501	\$50,843,897	619
Indirect	\$141,712,346	\$69,841,335	\$45,260,305	1,142
Induced	\$136,011,891	\$73,479,998	\$39,343,042	936
Total	\$551,481,677	\$273,644,835	\$135,447,244	2,698

Prepared by Recon Insight Group L.L.C., 2021

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Average vs. 2021 Contributions

2021 market conditions resulted in:

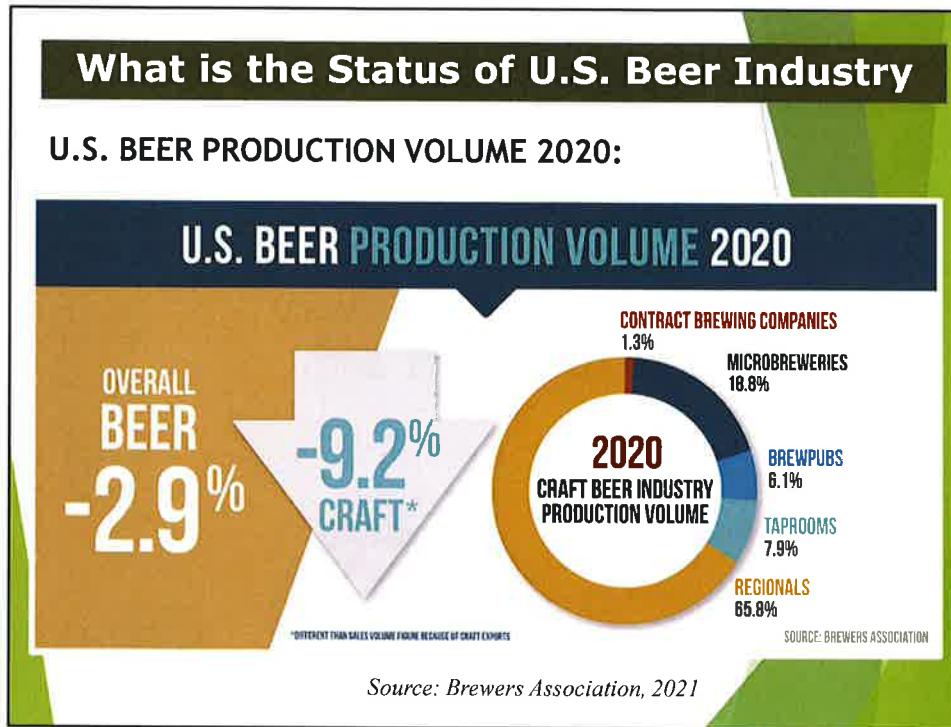
1. Direct financial injections to Idaho being **\$57.7 million less than average**
2. Total Employment contributions to be **549 jobs less than average**

Average Annual Barley Contributions

	Sales	GSP	Income	Jobs
Direct	(\$64,429,440)	(\$30,671,934)	(\$11,966,228)	(146)
Indirect	(\$33,352,325)	(\$16,437,318)	(\$10,652,116)	(269)
Induced	(\$19,528,140)	(\$10,543,125)	(\$5,679,097)	(135)
Total	(\$117,309,905)	(\$57,652,378)	(\$28,297,441)	(549)

Prepared by Recon Insight Group L.L.C., 2021

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IBC Program Highlights

FOCUS:

Investing grower dollars to advance Idaho barley in every way possible to support and help growers.



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Idaho Barley Commission Highlights

- 21 UI Research Projects funded to support Idaho barley growers - up from 13 in FY21



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Idaho Barley Commission Highlights

- 2 USDA-ARS scientists funded
 - Dr. Gongshe Hu, Aberdeen Barley Breeding Program
 - Dr. Chris Rogers, Kimberly ARS



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Maintaining Domestic & Foreign Marketing Initiatives

CONTINUED... Meeting People Where They Are during Pandemic

Online Meetings and Events



Social Media and Email Newsletters



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Export Market Development

- Idaho barley exports currently valued at \$59.2 Million - about 25% of Idaho production
 - Mexico is #1 Market
 - Canada #2 - big increase in 2020 and 2021
 - Japan #3
- Food barley exports to Japan and Korea stalled in 2020 and 2021
- New Export Protocol for China established in April 2020
 - China is largest beer consumer in the world
 - May 2020 China put 5-year 80% tariff on Australian barley



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Virtual Trade Visits

- Mexico Anheuser-Busch Team
- Constellation Brands Barley Procurement Team
- Heineken Mexico
- Chinese Malt Barley Webinar








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Virtual Trade Visits

Agronomic Performance of 11ARS183-9 and its checks from 2016-2018.

Line	Yield Ir. (Bu/A)	Yield Dry (Bu/A)	Test (Lbs./Bu)	Heading (Julian)	Height (inch)	Lodging (0-9)	DON (ppm)
Trial #	13	8	18	9	12	12	3
ACMetcalfe	129.4	62.4	51.7	182	35.2	4.2	8.7
CDC Copeland	132.8	65.0	52.1	173	34.6	4.5	7.2
Conrad	131.0	64.7	51.8	172	32.1	3.5	13.2
M69	129.0	63.3	60.6	175	27.8	1.3	12.4
Merit57	130.1	64.9	50.1	174	32.7	2.4	9.9
Voyager	138.4	66.6	51.4	182	33.0	1.8	8.3
11ARS183-9	138.8	69.0	51.2	172	34.7	1.3	7.6



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Featuring Idaho Growers Virtually












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China

- Large potential market, BUT, currently huge challenges with freight. Should improve in 12-15 months.
 - Costs and Container Availability
 - Delays at port due to not enough workers to unload and process shipments
 - Ag products currently low priority



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Food Barley Initiatives



- AHA “Bring on the Barley” Recipe Challenge
- AHA Go Red Luncheon

Reimagine your favorite recipe with barley!

- SWAP IT
- ADD TO IT
- REPLACE IT WITH SOMETHING NEW



American Heart Association.

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Food Barley Initiatives








- AHA “Bring on the Barley” Recipe Challenge
- AHA Go Red Luncheon Entrée

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Food Barley Initiatives



- 2022 Idaho Academy of Nutrition and Dietetics Annual Meeting Speaker Sponsor - April 2022
- Dr. Corrie Whisner



IDAHO ACADEMY OF
NUTRITION AND
DIETETICS



Topic Mash-Up Between:

- The Wide World of Grain-Based Dietary Fibers and Their Influence on Cardiometabolic Health
- Grains and Your Inner Ecosystem: Insights on How the Gut Microbiome Interacts with Grains for Improved Health

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Food Barley Marketing

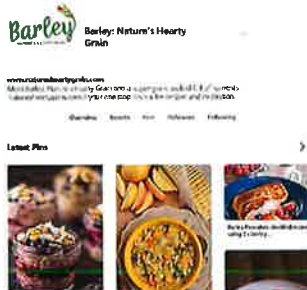
- Communications/Marketing

- EatBarley.com

- Videos

- Social Media / Print Media

- Outreach to Individual Influencers/Bloggers



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April – Idaho Craft Beer Month

- Collaboration and projects with Idaho Hops Commission and Idaho Brewers United to spotlight Idaho Craft Beer industry and agricultural side of craft beer production

- Radio Ads and Interviews; materials

- Pints Up Event



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IBC GROWER EDUCATION

► Idaho Grain Market Report

Published weekly by IBC - email distribution and posted on website

Working on online grower resources and website refresh

Idaho Grain Market Report, August 30, 2021 - NEW CROP PRICES
 Prepared weekly for the Idaho Barley Commission
 Prepared by: [Name] | Phone: [Number] | Email: [Address]

Grain	Grade	Price	Grade	Price	Grade	Price
Hard Red Winter	15.50	15.50	15.50	15.50	15.50	15.50
Soft Red Winter	15.00	15.00	15.00	15.00	15.00	15.00
White Winter	15.00	15.00	15.00	15.00	15.00	15.00
Yellow Winter	15.00	15.00	15.00	15.00	15.00	15.00
Hard Red Spring	15.00	15.00	15.00	15.00	15.00	15.00
Soft Red Spring	15.00	15.00	15.00	15.00	15.00	15.00
White Spring	15.00	15.00	15.00	15.00	15.00	15.00
Yellow Spring	15.00	15.00	15.00	15.00	15.00	15.00
Barley	15.00	15.00	15.00	15.00	15.00	15.00
Corn	15.00	15.00	15.00	15.00	15.00	15.00

Market Commentary: [Text describing market trends and prices]

Contact: [Name], [Phone], [Email]



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Barley Trends and Outlook



- Barley use for pet food, aquaculture, and protein concentrate
 - New Scoular Protein Concentrate facility in Jerome adding new barley acres to Idaho production
- New Mountain Malt malting facility under construction in Ucon, ID
- Some expansion of food and feed barley acres as export markets get back to normal
- Idaho has capacity to add additional contracted barley acres. Contracting programs for 2022 started earlier - early fall 2021. Prices are about 40% higher than 2021 and total 2022 acres will increase about 20% - however, farm input prices are also up significantly.
- There will not be enough malt barley supply in Idaho and the U.S. in 2021 and 2022.



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**NO BARLEY
NO BEER**



Questions?

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www.barley.idaho.gov

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2021 Idaho Barley: *Executive Summary*

Introduction

Idaho has become the single largest barley producing state in the nation, producing 37% of all U.S. barley in 2021. Most of that barley is sold locally within the state to large malting facilities. However, barley production nationally has been in decline for the last two decades. Idaho's barley production has remained stable, but with all the disruptions of 2021, i.e., droughts, supply chain disruptions, COVID-19 disruptions, etc. this year has seen the lowest barley production of the last decade. What follows are the key data and economic contributions of barley to the state of Idaho.

Average Annual Impacts

Because 2021 was a particularly difficult year, we need to see how barley impacts the state in a typical year. Later we will calculate the 2021 contributions barley added to Idaho's gross state product and we will be able to understand how damaging economic conditions were for growers by comparing the baseline contributions with those from 2021.

Table 1: Baseline Annual Barley Contributions to Idaho's Gross State Product and Employment

Direct Barley Contributions	\$130,323,501
Indirect (earned from business-to-business transactions) Barley Contributions	\$69,841,335
Induced (earned from spending for personal activity) Barley Contributions	\$73,479,998
Total Barley Contributions to Idaho Gross State Product	\$273,644,835
Direct Barley Employment	619
Indirect (earned from business-to-business transactions) Barley Employment	1,142
Induced (earned from spending for personal activity) Barley Employment	936
Total Barley Supported Employment in Idaho	2,698

Table 1 shows the baseline contributions of barley production and coverage payments to Idaho's gross state product. The direct contributions are derived from the production of barley, which is eventually exported, bringing new money into the state's economy. Growers spend that money on inputs for barley production. That spending generates the indirect contributions through business-to-business transactions. The induced contributions are a result of household-to-business transactions and includes the coverage payments farmers receive on their barley base acres.

All of that spending ripples through the economy and is converted to gross state product (GSP) and ultimately into full-time equivalent employment. Total barley contributions in a baseline year is \$273.6 million and supports nearly 2,700 FTE jobs.

Direct Production

In 2021 production levels were the lowest of the decade. Acres, yields, and prices were all at historic lows, resulting in the value of production being 46% lower than the 2013 peak production value and 27% below the baseline value of production. Table 2 shows the acres, yields, prices, and values of production. This production value is used as our direct contributions. Typically, we only claim exports as the direct contributions, however, we argue that in the case of barley, all or nearly all production is exported, though it usually goes through some value-added processing in-state before exiting the economy and bringing those new dollars into the state. For the 2021 FY barley generated \$209.3 million in direct sales, which translates into \$99.7 million in direct gross state product (see Table 3).

Table 2: Idaho Barley Acres, Yields, Sales, and Value from 2017-2021

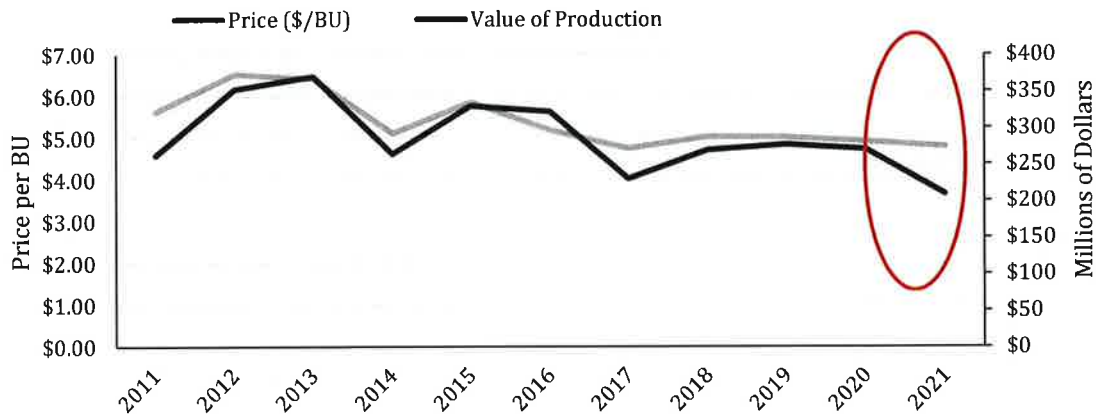
Year	Harvested Acres	Yield (BU/AC)	Production (BU)	Price (\$/BU)*	Value of Production*
2017	510,000	95	48,450,000	\$4.75	\$230,137,500
2018	530,000	101	53,530,000	\$5.03	\$269,255,900
2019	530,000	104	55,120,000	\$5.02	\$276,702,400
2020	500,000	110	55,000,000	\$4.92	\$270,600,000
2021	490,000	89	43,610,000	\$4.80	\$209,328,000

*2021 values are projections
Source: USDA NASS Quick Stats

Direct Coverage Payments (ARC-CO and PLC)

Coverage payments to Idaho growers in 2021 will not be paid until October of 2022 and are estimated to be lower than they might have otherwise been. Under the 2019 farm bill growers are allowed to switch base acres between agriculture risk coverage (ARC) and price loss coverage (PLC) plans. Most growers have historically been in PLC. But given the change in prices vs. the changes in value of output (see the circled area below), it looks as though 2021 conditions would have seen higher payments from the ARC program.

Figure 1: Price and Value of Idaho Barley Production



Source: USDA NASS

Based on a linear regression and given the mix of coverage on barley base acres, it is estimated that 2021 payments to Idaho growers will be slightly higher than \$31 million. Those dollars translate into payments to farm income and are only loosely tied to barley output. It is also important to note that the impacts from these dollars are all captured under the household-to-business contributions (i.e., induced contributions).

2021 Total Barley Contributions to Idaho

The total contributions of barley to the state of Idaho are those stemming from both the production and coverage payments. While the sales figures are useful in tracing the transactions in the economy, there is significant double counting that occurs in sales numbers, which must be accounted for. Removing the double counting leave us with the gross state product figures that are used for reporting total contributions, highlighted in Table 3 below. Total 2021 contributions from both production and coverage payments amount to \$216 million, and support roughly 2,150 FTE jobs. While this may not seem significant relative to the entire economy this is significant as it is only one commodity, and most farms will produce more than just one product. It is also the initial and essential reason why the malting facilities exist in the state. Malt facilities have much lower transport costs because they can locate near their primary input and, because they are in Idaho, they have access to high quality inputs. This is true for Idaho's dairy's as well since barley also acts as a feed grain in the dairy supply chain.

Table 3: Total 2021 Idaho Barley Contributions

	Sales	GSP	Income	Jobs
Direct	\$209,328,000	\$99,651,567	\$38,877,670	473
Indirect	\$108,360,021	\$53,404,017	\$34,608,188	874
Induced	\$116,483,751	\$62,936,873	\$33,663,945	801
Total	\$434,171,772	\$215,992,457	\$107,149,803	2,148

2021 Statewide Idaho Barley Damages

The difference between the 2021 contributions and the baseline contributions represents the losses to the Idaho economy from the market conditions and their negative influence on the barley growers and their supply chains. Table 4 shows the GSP and Employment contributions for both the baseline and 2021 years. The difference is reported in the final column of the table.

While the baseline contributions are close to a quarter of a billion dollars, the 2021 contributions were just \$216 million, \$57.7 million less than the baseline. This means full time equivalent employment in Idaho was almost 550 jobs less than it would have been had barley hit its traditional targets. These losses exist even with the increased 2021 coverage payments that were meant to offset the damages from the price and yield shocks of this past year.

	Baseline Barley Contributions to GSP	2021 Barley Contributions to GSP	Lost Barley Contributions from 2021 Market Conditions
Direct Barley Contributions	\$130,323,501	\$99,651,567	(\$30,671,934)
Indirect (earned from business-to-business transactions) Barley Contributions	\$69,841,335	\$53,404,017	(\$16,437,318)
Induced (earned from spending for personal activity) Barley Contributions	\$73,479,998	\$62,936,873	(\$10,543,125)
Total Barley Contributions to Idaho Gross State Product	\$273,644,835	\$215,992,457	(\$57,652,378)
Direct Barley Employment	619	473	-146
Indirect (earned from business-to-business transactions) Barley Employment	1,142	874	-269
Induced (earned from spending for personal activity) Barley Employment	936	801	-135
Total Barley Supported Employment in Idaho	2,698	2,148	-549

Conclusions

The economic contributions of barley growers in Idaho continue to be nearly a quarter of a billion dollars in agricultural economic output. 2021 however, was a down year due to drought and market factors that caused prices, yields, and value to be the lowest of the decade. The sector as a whole produced over \$99.7 million in direct economic contribution for the state (gross state product). Those added dollars then circulate in the economy, traveling through the barley and household supply chains, supporting nearly another \$53.4 million in indirect, business-to-business, value-added transactions. Employee income is also spent in the state's economy, generating activity in those industries that support household purchases such as food retailers, automotive maintenance, electricity, etc. Those household-to-business expenditures and their associated ripple effects generate approximately \$62.9 million in additional value-added. The entire 2021 barley sector in Idaho is responsible for just under \$216 million dollars in economic activity, supporting just under 2,150 full time equivalent jobs.

As substantial as barley is in supporting Idaho's GSP, it is roughly \$57.7 million dollars lower than the decade long average, suggesting that farmers and their vendors were devastated by the 2021 market and growing conditions. If the 5-6 years trend of barley production spikes continues, 2022 may see some recovery. Sustaining that recovery will be key for 2023 and beyond. Idaho's growth and comparative advantage in agricultural production is a sign that barley will maintain its presence and prevalence within the state, but building national and international demand for high quality barley will be essential to restoring the market to its full potential.



The
Story of Idaho Barley:
An Economic Analysis

Main Report
January 2022



The Story of Idaho Barley: An Economic Analysis

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This study was sponsored by the Idaho Barley Commission and prepared by Dr. Timothy Nadreau and Professor Steven Peterson. The results and opinions in the study are those of the authors alone and do not reflect on any associated institutions. The authors may be reached for questions or comments at recon.insight@gmail.com. The authors bear no liability in application or use of the study in any financial or policy decision making.

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Introduction and background

2021 has been a difficult growing season for barley. Drought conditions in the Pacific Northwest have hampered the primary U.S. growing region for the one of the world's most popular cereal grains. The Idaho Barley Commission began working with Recon Insight Group in May of 2021 in order to better understanding the role barley plays in the Idaho economy: where and how the barley supply chain works within Idaho, and what the potential risks are regarding the demand centers for Idaho barley. Additionally, we compare the Economic Contributions of Idaho Barley in 2021 with those of an average growing year in order to show barley's contributions to Idaho's economy in a typical year, and how drought and difficult market conditions in 2021 affected Idaho's barley growers.

The fact that very little raw barley exits the state might suggest that barley brings very little new money into the Idaho economy. This surface glance couldn't be further from the truth. Nearly all Idaho barley is exported out of the state, directly and indirectly through goods that utilize barley in their production processes. Barley malt, used in beer production, is the primary commodity that uses Idaho barley. Barley feed—food barley—sold to dairies also exits the state in the form of cheese and yogurt or is sent to a barley mill or other food manufacturer. Although barley is part of other industry supply chains in Idaho, ultimately it will exit the state. These exports are responsible for bringing new dollars into Idaho's economy; contribution analysis is based on those new dollars.

Although it is convenient and beneficial that many malting facilities are located in Idaho, and that dairies are so close to a primary feed stock, these are not the reasons Idaho is the primary barley producing state in the nation. Barley is grown in Idaho, not because of its consumers, but because of the natural advantageous growing conditions native to the region. If the malt manufacturers were to close and the dairies relocated, Idaho barley would still be grown and exported from the gem state. Potatoes and dairies tend to garner the majority of focus in our great state, but Idaho has been King of Barley since 2011.

Acknowledgments

We are grateful to the Idaho Barley Commission (IBC) staff and members that provided support, conversations, data, and a critical review of this analysis. Their efforts made this report possible. Particular thanks go to Laura Wilder, IBC Executive Director, who allowed us to meet with the board during the annual meeting, and for handling the logistics throughout the duration of the study. We are also grateful to the extension faculty of the University of Idaho, particularly Kate Painter and Ben Eborn for their work on the Barley Enterprise Budgets and the conversations we have had over the past several years. Lastly, to Christian Anderson, who collected much of the data and provided insight on the Price Loss Coverage (PLC) and Agricultural Risk Coverage (ARC-CO) programs. Any errors in the report are the responsibility of the authors and not of any other individuals or organizations.

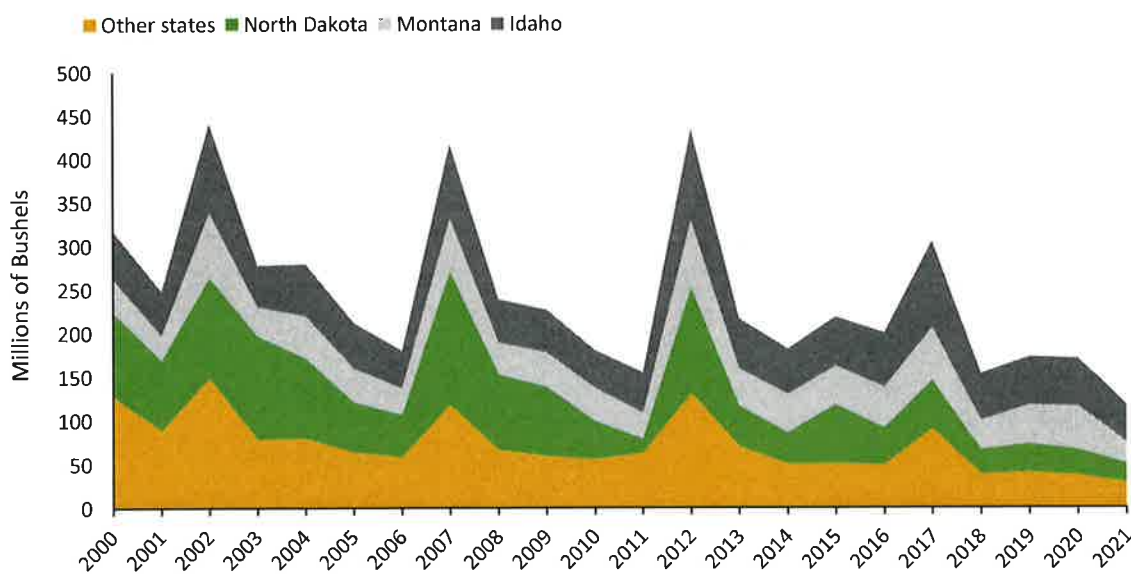
1. Industry Overview

National trends

Production of barley in the U.S. pales in comparison to most other grass grains: corn, wheat, rice, etc. all generate more crop value than barley. Nonetheless, in terms of quality and its use in the supply chain for food stocks, animal feed, and barley malt, barley plays an important role to the U.S.. The unfortunate reality is that barley production by volume has declined 63% since 2000. In 2000, the U.S. collectively produced 318 million bushels of barley. In 2021, that number was down to 117.7 million bushels. The one advantage to these hard times is that we are now able to see which regions of the U.S. truly have a comparative advantage in barley production.

Figure 1.1 shows the decline in barley production nationally along with the portion of production driven by the top three states in the U.S. (Idaho, Montana, and North Dakota). There are cyclical spikes in production, but one of the key take aways from Figure 1.1 is that these are not lasting positive shocks to output. Since 2011, North Dakota has not been able to recover its status as the primary barley producer in the United States. It did increase output during the 2012 and 2015 spikes, but Idaho and Montana have remained the stable and less volatile producers.

Figure 1.1: 2000-2021 Production Volume by Selected States and Nation (million bu)



Source: USDA NASS

Tables 1.1 and 1.2 shows the same data as Figure 1.1. In 2000 North Dakota produced 31% of the nation's barley, Idaho 17%, and Montana 12%. By 2021, the three states were collectively producing 76% of the nation's barley, with North Dakota now down to 19%, Idaho leading at 37%, and Montana at 20%. This shows mixed news for Idaho, in that it is not only now leading the nation in barley production, but it is winning at

a war of attrition. Montana has been a stable producer but lost considerable ground between 2020 and 2021, dropping from 49.8 million bushels to 23.8 million bushels. Idaho has remained the stable and growing constant for the industry.

Table 1.1: 2000-2021 Production Volume by Selected States and Nation (1,000 bu)

Year	North Dakota	Idaho	Montana	Other states	Total
2000	97,350	55,480	38,000	127,077	317,907
2001	79,750	50,250	29,520	89,017	248,537
2002	115,310	102,535	75,136	148,835	441,817
2003	118,800	47,520	34,000	78,098	278,418
2004	91,760	59,800	48,970	79,358	279,888
2005	57,240	52,200	39,200	63,464	212,104
2006	48,755	42,840	31,000	57,727	180,322
2007	153,285	85,365	61,350	117,351	417,351
2008	86,240	49,880	37,000	66,051	239,171
2009	79,100	48,450	40,320	58,916	226,786
2010	43,550	43,240	38,440	55,196	180,426
2011	16,450	46,500	29,760	62,253	154,963
2012	120,778	105,147	77,831	130,488	434,244
2013	46,080	57,660	43,160	69,955	216,855
2014	35,845	51,700	44,660	49,554	181,759
2015	67,200	56,260	44,720	50,153	218,333
2016	42,880	62,060	46,800	48,404	200,144
2017	55,259	98,902	60,999	89,962	305,122
2018	28,490	53,530	33,600	37,907	153,527
2019	32,040	55,120	44,840	40,499	172,499
2020	28,980	55,000	49,770	37,063	170,813
2021	21,930	43,610	23,750	28,383	117,673

Source: USDA NASS

The interesting observation here is that the cyclical effects occur every five years, or at least they have been for the past two decades. This suggests that production levels should spike again in 2022. The difficult question to answer is how to capitalize on these shocks in order to keep production levels high and increasing, rather than seeing the boom and immediate collapse the following year. Table 1.2 abstracts away from the production volumes and focuses solely on market share of national barley production. It makes clear that, with 76% of current production coming from Idaho, Montana, and North Dakota, those three states will be part of the solution for driving demand back up.

Table 1.2: 2000-2021 Percent of National Production by Volume for Selected States

Year	North Dakota	Idaho	Montana	Total %
2000	31%	17%	12%	60%
2001	32%	20%	12%	64%
2002	26%	23%	17%	66%
2003	43%	17%	12%	72%
2004	33%	21%	17%	72%
2005	27%	25%	18%	70%
2006	27%	24%	17%	68%
2007	37%	20%	15%	72%
2008	36%	21%	15%	72%
2009	35%	21%	18%	74%
2010	24%	24%	21%	69%
2011	11%	30%	19%	60%
2012	28%	24%	18%	70%
2013	21%	27%	20%	68%
2014	20%	28%	25%	73%
2015	31%	26%	20%	77%
2016	21%	31%	23%	76%
2017	18%	32%	20%	71%
2018	19%	35%	22%	75%
2019	19%	32%	26%	77%
2020	17%	32%	29%	78%
2021	19%	37%	20%	76%

Source: USDA NASS

NAFTA to USMCA and International Exports

Barley production is an asset to the U.S., not only because of its role domestically, but also because of the money it brings in from abroad when exported. Because barley is primarily exported from the U.S. to Mexico and Canada, our new trade agreement is extremely influential on this niche market. The disruptions caused by switching between the North American Free Trade Agreement (NAFTA) and the United States-Mexico-Canada Agreement (USMCA) have not fully settled, though exports are beginning to rise again. Table 1.3 shows the radical drop in U.S. barley exports from 2015 to 2016. Those exports remand low until 2020. Once full data for 2021 is available, we may see that exports have recovered to their 2015 levels.

Even though Idaho significantly contributes to total U.S. barley production, it contributes very little to national export totals. The second to last column of Table 1.3 shows the percent of national barley exports coming from Idaho, though 2019 and 2020 were exceptions to this historic trend. Malt is a value-added product, and, as such, is expected to command a higher export value. What is surprising, as you can see in the table, is that malt did not see the same fluctuation as barley at the national level, despite malt

exports dropping in recent years. Idaho's large contribution to national malt exports emphasizes the fact that the majority of Idaho barley is sold to malting facilities in country, particularly in Idaho. Idaho remains a major—and stable—contributor to U.S. malt exports.

Table 1.3: U.S. and Idaho Foreign Exports of Barley and Malt (2014-September 2021)

	US		Idaho			
	Barley	Malt	Barley	Malt	Barley	Malt
2014	\$86,608,212	\$236,273,646	\$87,652	\$54,294,350	0.1%	23.0%
2015	\$79,074,720	\$206,699,040	\$626,253	\$64,793,252	0.8%	31.3%
2016	\$23,942,229	\$202,898,032	\$813,562	\$63,705,122	3.4%	31.4%
2017	\$35,927,463	\$252,970,420	\$373,421	\$70,885,677	1.0%	28.0%
2018	\$26,944,741	\$237,085,827	\$81,934	\$65,751,104	0.3%	27.7%
2019	\$36,017,472	\$224,503,865	\$6,697,423	\$86,149,926	18.6%	38.4%
2020	\$47,227,939	\$196,817,934	\$10,220,283	\$64,505,737	21.6%	32.8%
2021 -Sep.	\$62,297,143	\$183,356,725	\$5,168,280	\$57,463,590	8.3%	31.3%

Source: USA Trade*Online and the World Integrated Trade Solution

Table 1.4 shows the destination of US and Idaho barley and malt exports. With the recent export expansion programs being funded by the USDA, we hope to see new markets develop abroad in the coming years. With the UK exiting the EU, we may find a ready importer of high-quality Idaho barley and barley malt. Currently Japan and China are our top barley importers outside of USMCA. Other markets have existed in the past, but maintaining those markets has proved difficult. See Appendix 2 for a full list of foreign barley importers.

Table 1.4: U.S. and Idaho Foreign Exports by Country of Destination (2021)

	US		Idaho	
	Barley	Malt	Barley	Malt
Antigua and Barbuda	\$0	\$14,476	\$0	\$0
Australia	\$0	\$221,095	\$0	\$0
Bahamas	\$0	\$0	\$0	\$0
Barbados	\$37,895	\$54,651	\$0	\$0
Bermuda	\$0	\$9,719	\$0	\$0
Canada	\$52,688,521	\$7,802,551	\$2,013,981	\$370,479
China	\$77,618	\$58,944	\$77,618	\$0
Colombia	\$16,009	\$106,445	\$0	\$0
Guatemala	\$0	\$168,227	\$0	\$0
Japan	\$4,495,836	\$1,282,509	\$94,139	\$0
Korea, South	\$727,660	\$95,130	\$0	\$0
Mexico	\$2,976,678	\$172,896,400	\$2,961,938	\$57,093,111
Panama	\$0	\$28,879	\$0	\$0
Taiwan	\$752,369	\$17,872	\$0	\$0
United Kingdom	\$169,004	\$69,120	\$20,604	\$0
Total Exports	\$62,297,143	\$183,356,725	\$5,168,280	\$57,463,590

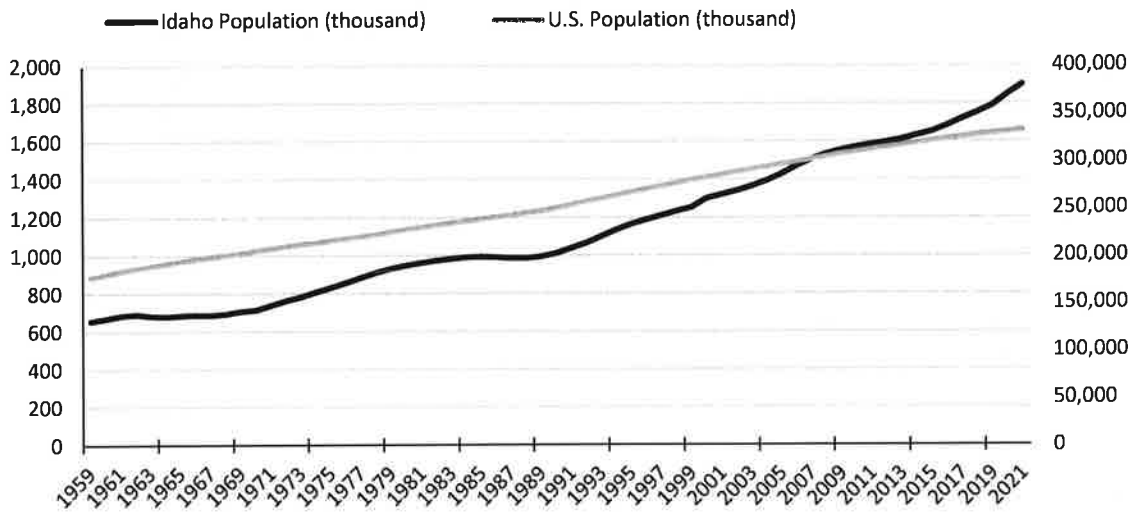
Source: USA Trade*Online and the World Integrated Trade Solution

State Trends

Employment and Population Trends

Idaho itself is in a period of unprecedented growth and has been since the 1990's. The growth in agriculture—and thus in barley—must be understood in the context of an overall high growth economy. Figure 1.2 shows the population of Idaho and the U.S. from 1959-2021. Note the steep increase in Idaho's population from 2015 to the present. Idaho's growth in population, relative to other states, is part of the reason Idaho agriculture generally, and barley in particular, remain strong forces in agricultural markets nationwide.

Figure 1.2: Idaho and US Population 1959-2021 (thousands)



Source: Federal Reserve Bank of Saint Louis <https://fred.stlouisfed.org>

Even though agriculture remains a small portion of Idaho's overall employment base (approximately 4% of total Idaho employment is in agriculture production),¹ it is a pillar in the economy. Idaho has roughly three times the concentration of agricultural employees than the average U.S. region. What is more, that concentration is growing, reemphasizing the fact that Idaho has a comparative advantage in agricultural output. A clear way to see this transformation is by analyzing what economists call Shift Share Analysis—a way to show the competitive effects a region has for a given industry by looking at actual growth relative to expected growth. The **industry mix effect** shows how employment in the Idaho economy is projected to change, given the overall direction of the industry nationwide. An industry in decline nationally is expected to see negative growth here in Idaho as well, while industries that are expanding nationally are expected to see positive growth. The **national growth effect** is the "rising tide lifts all boats" metric: if the national economy is projected to grow at 2%, then all industries are projected to grow to meet the increased national output by the same 2%. These two measures add up to the **expected industry change**. If the actual employment change is higher than the expected

¹ If food manufacturing and the associated multiplier effects are included, agriculture is responsible for closer to 20% of the state's economic activity (see Economic Contribution of Idaho Agribusiness 2018).

industry change, the region is said to have a competitive advantage in regard to that industry. Idaho's agricultural industry was expected to grow by 296 jobs between 2010 and 2020. It actually grew by 3,278, jobs, meaning Idaho agriculture has a competitive effect of 2,982 jobs (see Table 1.5).

Table 1.5: 2010–2020 Shift Share Analysis

INDUSTRY	Ind. Mix Effect	Nat'l Growth Effect	Expected Change	2010 - 2020 Change	Competitive Effect
Agriculture, Forestry, Fishing and Hunting	-2,317	2,612	296	3,278	2,982
Mining, Quarrying, and Oil and Gas Extraction	-612	201	-411	120	532
Utilities	-229	228	-1	254	255
Construction	6,134	3,532	9,665	23,578	13,913
Manufacturing	-2,096	4,663	2,567	14,789	12,222
Wholesale Trade	-1,649	2,200	551	5,193	4,642
Retail Trade	-5,685	6,687	1,001	12,658	11,656
Transportation and Warehousing	6,616	1,733	8,349	6,255	-2,094
Information	-798	858	60	-2,259	-2,319
Finance and Insurance	672	1,878	2,550	6,639	4,088
Real Estate and Rental and Leasing	352	801	1,153	3,728	2,576
Professional, Scientific, and Technical Services	5,902	3,142	9,044	11,826	2,781
Management of Companies and Enterprises	959	490	1,449	1,471	22
Administrative and Support and Waste Management and Remediation Services	2,411	3,508	5,920	11,908	5,988
Educational Services	658	1,017	1,676	7,170	5,494
Health Care and Social Assistance	8,451	6,870	15,322	23,086	7,765
Arts, Entertainment, and Recreation	-1,430	886	-544	3,437	3,981
Accommodation and Food Services	-4,305	4,253	-52	14,227	14,279
Other Services (except Public Administration)	-2,442	2,741	299	7,127	6,828
Government	-13,179	10,595	-2,584	5,799	8,383
Unclassified Industry	-15	7	-8	-85	-77
Total	-2,600	58,902	56,302	160,199	103,897

Source: Emsi 2021.4

Price and Yield Trends

We base our production impacts for Idaho barley on the past decade of United States Department of Agriculture National Agricultural Statistic Survey Data for Idaho (see Table 1.6). This data will also serve as a starting point for understanding the complexities of the ARC-CO and PLC payments. Acreage itself fluctuates but has remained fairly stable. 2011 and 2020 both saw 500,000 acres harvested. Yields have been steadily growing, but 2021 saw the lowest yields of the past decade at 89 bushels per acre. Total volume produced also remains stable, slightly increasing over time. However, in 2021 with both lower-than-average acres and much lower yields, production volumes were 18% below the 10-year average. Even with the scarcity, prices dropped to their lowest point in the decade

at \$4.80 per bushel. This caused the value of production in 2021—\$209.3 million—to be 27% below the 10-year average.

The concern here is that the ARC-CO coverage protects farmers' revenues, and is a hedge against both price and yield shocks. This is juxtaposed with the PLC program that only protects against price shocks. In the case of 2021, it appears that the ARC-CO program may have higher payouts than PLC. Historically, Idaho barley growers have opted into the PLC program and as a result Idaho may see lower payments than they were eligible for. We won't be able to verify this until actual hard data payments are made in October of 2022.

Table 1.6: Idaho 10-year Barley Data

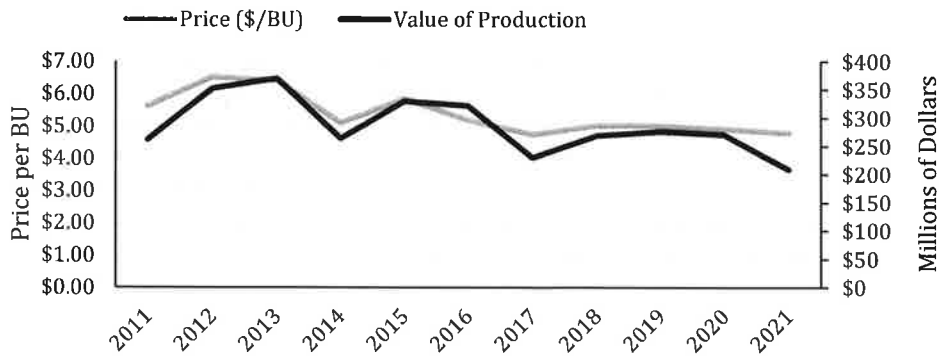
Year	Harvested Acres	Yield (BU/AC)	Production (BU)	Price (\$/BU)	Value of Production
2011	500,000	93	46,500,000	\$5.63	\$261,795,000
2012	600,000	90	54,000,000	\$6.53	\$352,620,000
2013	620,000	93	57,660,000	\$6.42	\$370,177,200
2014	550,000	94	51,700,000	\$5.11	\$264,187,000
2015	580,000	97	56,260,000	\$5.86	\$329,683,600
2016	580,000	107	62,060,000	\$5.19	\$322,091,400
2017	510,000	95	48,450,000	\$4.75	\$230,137,500
2018	530,000	101	53,530,000	\$5.03	\$269,255,900
2019	530,000	104	55,120,000	\$5.02	\$276,702,400
2020	500,000	110	55,000,000	\$4.92	\$270,600,000
2021	490,000	89	43,610,000	\$4.80	\$209,328,000

Source: USDA NASS

Combining the lowest acreage harvested in the past decade (490 thousand acres) with the lowest yields of the decade (89 bu/acre), has resulted in the lowest output of the decade (43.6 million bushels). This is a drop of 30% below the 2016 Idaho high of 62.1 million bushels. Our lowest production multiplied by the lowest price in a decade (\$4.80/bu) has resulted in 2021 generating the lowest value of production in a decade (\$209.3 million), roughly 43% lower than our peak production value from 2013.

Figure 1.3 shows the price on the primary vertical axis and the value of production on the secondary vertical axis. Time is on the horizontal axis. The key takeaway from the graph is the sharp divergence between the two lines between 2020 and 2021. This is what leads us to believe that the revenue coverage would provide greater coverage than the price protections of the PLC program for 2021. While price did fall below the USDA benchmark price and PLC covered acres will be receiving payments, the revenue fell much steeper than price alone, and the expectation is that the ARC-CO will provide optimal coverage under the 2021 conditions.

Figure 1.3: Barley Prices and revenues 2011-2021



Source: USDA NASS

Barley Subsidies (ARC-CO vs. PLC Crop Payments)

Table 1.7 shows the payout environment for barley base acres in Idaho since the coverage programs were enacted in 2014. The lower bound estimates reflect the payments Idaho farmers would have received had their base acres been placed into the less profitable program each year.² The majority of acres were placed into PLC. In the first three years, the ARC payouts would have greatly exceeded the PLC payouts. As such, farmers were receiving close to the lower bound and effectively lost out on \$6.1 million, \$4.1 million, and just under \$3.0 million in the first three years of the bill. However, the PLC payments kicked in from 2017 through 2020, and in those years farmers were extremely close to maximizing the coverage revenues. Even after discounting for present value metrics, the farmers did ultimately pick the optimal barley coverage plan. Under the 2019 farm bill, farmers were allowed to convert base acres between coverage programs. Now that farmers are able to switch their base acres between programs on an annual basis, this choice will need to be factored into their annual management choices.

Table 1.7: Annual Idaho Payouts from ARC-CO and PLC plans

Year	Lower Bound	Actual	Upper Bound
2014	\$0	\$150,741	\$6,142,325
2015	\$0	\$8,267	\$4,105,686
2016	\$0	\$24,580	\$2,942,958
2017	\$16,634,094	\$31,429,935	\$34,400,479
2018	\$3,327,779	\$22,878,764	\$24,284,447
2019	\$525,542	\$14,315,098	\$15,011,158
2020	\$393,556	\$11,124,800	\$11,831,879
2021	\$20,000,000		\$40,000,000

Source: USDA and Author's Calculations

² This assumes farmers could have switched coverage programs, which they weren't allowed to do until 2019 under the current farm bill.

As stated earlier, 2021 poses an interesting conundrum for growers. Under the 2014 farm bill, growers were not allowed to switch their base acres between program coverage, and PLC was the optimal program for the majority of the acres in Idaho. The same fact held true in 2019 and 2020 where actual payouts were nearly maximized. Based on the formulas for ARC-CO and PLC payments, we estimate that lower bound payments for 2021 will be approximately \$20 million and upper bound payments will be at or near \$40 million. Actual payments won't be made until October of 2022. Because the yield drop was so much more substantial than the price fall, it appears that the ARC-CO will be generating the upper bound returns in 2021, while the PLC will be generating substantial, but much lower returns. This will have large implications for the impacts associated with barley coverage payments.



2. Economic Model

Methodology (I-O)

The system of accounts known as Input-Output (I-O) represent an economist's version of double-entry bookkeeping for industries. Figure 2.1 below shows a simplified version of an I-O matrix with just a hand full of industries. Each cell, in this table of accounts is populated by dollar transactions.

Figure 2.1: Example System of Input-Output Accounts

		Producers as Consumers						Final Demand			
		Agric.	Min.	Const.	Manuf.	Services	Other	Households	Investment	Government	Net exports
Producers	Agric.										
	Min.										
	Const.										
	Manuf.										
	Services										
	Other										
Value Added	Labor							Gross Domestic Product			
	Returns to Capital										
	Taxes										

Reading down a column of this table shows what inputs an industry is buying in order to produce their output. The agriculture column, for example, may buy seed from themselves, fertilizer and farm equipment from the manufacturing sector, and legal and accounting services from the service sector. Payments to agricultural employees are captured in the "Labor" row. Payments must be made to owners of capital, and the industry pays taxes to the government. This is where the enterprise budget data enabled us to isolate the barley operations. Reading across a row tells us where an industry's income originates. Sticking with agriculture, they sell seed to others in the agricultural sector; barley is sold to malting facilities in the manufacturing sector. A portion of a households expenditures will go to buying agricultural goods, and even the government may purchase agricultural goods. Lastly, the agricultural industry will sell its output out-of-state, via the "Net exports" column.

Adding up all the labor, capital, and tax payments for all industries gives the sum of all value added and will equal the Gross Regional Product (GRP) of the region.³ Similarly summing all of the expenditures of households, government, investment, and net exports yields the GRP of the region. These two methods of calculating GRP are known as the Income and Expenditure approaches, respectively, and they represent a check for ensuring all accounts balance. It is through the I-O system that we are able to trace the dollars through the economy and calculate multiplier effects.

³ In our case the region is Idaho.

However, it is only through selling products outside of the region that an economy is able to attract new dollars. Economists distinguish between industries that are export-oriented and those that serve the local economy, recirculating the dollars once they are in the economy. We call export-oriented industries “basic” and resident serving industries “non-basic.” The barley sector, as with most agricultural and natural resource industries, is considered basic. Even though barley growers in Idaho sell most of their product to malting facilities in state, the majority of processed barley is exported out of Idaho. The basic industries that bring dollars into the economy support the non-basic industries, which could not exist locally without the income from exports. As such, the employment contributions of basic industries support an economy more than the employment directly within the industry.

Basic vs. Non-Basic Impacts: Which Industries Support the Economy?

A small agricultural town may seem to have a large medical industry in terms of employment, while the number of farm employment is fairly low, and often seasonal. However, the farms are exporting their product and bringing money into the economy. The doctor’s offices are predominantly serving the residents. In this story, it is the farmers that are supporting the economy and the doctors are retaining the money within the economy. However, it should be clear that the farms would continue to exist in the absence of the doctor’s offices, while the doctor’s offices would not be likely to stay in the absence of the farms. In this setting, the non-basic medical jobs rely on the basic agricultural jobs. The employment impacts, including many of the doctors and nurses, would be attributed to the non-basic agricultural industries.

This story gets more complex in the case of barley, potatoes, etc. where processing occurs near the primary commodity input. We structure these models to show the interdependency of the grower and processor and assume the grow operation is the dominate basic force. This is similar to coal mining or fishing operations where processing is forced to locate where the source of the commodity is located.

Model and Sector Modifications

One of the primary concerns when doing economic contribution studies is the potential for double counting. If we were to claim all the backward links from the malting facilities, and then also claim all the backward links of the growers, all of the barley contributions would be counted multiple times: once when the barley is sold to the malting facility, once when the malter sells to the brewer, and finally when the brewer sells to the retailer. This triple counting of the barley supply chain has to be prevented for an accurate analysis. However, we cannot claim only the direct exports of the growers either; doing so would miss the contributions to the state from the malter’s purchases and their decision to locate in Idaho near their primary input. In order to capture all contributions through the supply chain without double counting, we can sever the expenditure link between the industries in the sector (Steinback 2004).

Table 2.1: Average Idaho Barley Enterprise Budget

	Quant/Acre	Unit	Price or Cost/ Unit	Value or Cost/ Acre
Gross Returns - Malting Barley	130	bu	\$4.50	\$585.00
Operating Costs				
<i>Seed:</i>				
Malting Barley Seed - Spring	110	lb	\$0.25	\$27.50
<i>Fertilizer:</i>				
Dry Nitrogen - Pre-plant	90	lb	\$0.40	\$36.00
Dry P205	45	lb	\$0.38	\$17.10
K2O	10	lb	\$0.31	\$3.10
<i>Pesticides/Chemicals:</i>				
Axial XL	16.4	fl oz	\$0.85	\$13.94
Affinity Tank Mix 50SG	0.6	oz	\$7.00	\$4.20
Starane Ultra	0.3	pint	\$22.25	\$6.68
TwineLine	7	fl oz	\$1.65	\$11.55
<i>Custom:</i>				
Fert: 0-400 lbs	1	acre	\$7.35	\$7.35
Air Spray - 5 gal. rate	1	acre	\$9.00	\$9.00
Haul: barley	125	bu	\$0.35	\$43.75
<i>Irrigation:</i>				
Water Assessment - A1	1	acre	\$19.00	\$19.00
Repairs - CP	20	ac-in	\$0.55	\$11.00
Power - Center Pivot	18	ac-in	\$1.93	\$34.74
<i>Other:</i>				
Crop Insurance	1	acre	\$28.00	\$28.00
<i>Labor:</i>				
Equipment Operator Labor	1.66	hrs	\$22.50	\$18.00
Irrigation Labor - CP	0.8	hrs	22.5	\$7.65
General Farm Labor	0.34	hrs	\$17.55	\$5.97
<i>Machinery:</i>				
Gas	2.88	gal	\$3.15	\$9.07
Diesel	5.32	gal	2.9	\$15.43
Road Diesel	0.16	gal	\$3.40	\$3.76
Lube				\$15.07
Repair				
<i>Interest on Operating Capital @ 7.00%:</i>				\$10.04
Total Operating Costs/Acre				\$357.89
Gross Margins				\$227.11
Cash Overhead Costs				
<i>General Overhead</i>				\$10.00
<i>Land Rent</i>				\$250.00
<i>Management Fees</i>				\$37.00
<i>Property Taxes</i>				\$0.00
<i>Property Insurance</i>				\$1.56
<i>Investment Repairs</i>				\$0.00
Total Cash Overhead/Acre				\$298.56
Total Costs				\$656.45
Net Returns				-\$71.45

Source: UI Idaho Extension Publications

This gives slightly more weight to the barley growers. Had we maintained the producer-processor transactional links and only shocked barley exports, malt processors would appear much larger, and the barley growers, much smaller. Severing the transactional link is, in our opinion, a more equitable approach for allocating contributions amongst the firms within the overall sector.

The other important component in avoiding double counting is to report value added—also known as gross state product—rather than sales. Though the model is built on producer prices and sales transactions, summing up sales receipts will overstate the actual productivity of a region. If a dairy produces milk, milk is sold to a processor, the processor sells cheese to a commercial pizzeria, and the pizzeria sells pizzas to a retailer; thus, the value of the milk is being incorporated and captured in each round of transactions. To prevent this double, triple, and quadruple counting, we report contributions on a value-added basis.

Sales vs. Value-added

A way to explain why sales overstates impacts is to imagine individuals spending money in a regional economy. Suppose an individual spends \$40,000 on a new truck. Another individual spends the same amount on an appendectomy at the regional hospital. From a sales perspective, the impacts are the same, \$40,000. However, from a value-added perspective the purchase of the truck provides less to the regional economy. Perhaps \$30,000 of the truck purchase had to immediately go to the manufacturer back in Detroit or Japan. Conversely, the appendectomy at the hospital probably saw most of the spending stay local as income to the doctors, nurses and hospital staff. Perhaps only \$10,000 leaves the region for importing of capital assets like the hospital bed, scalpels, etc. From a value-added perspective, the hospital is more valuable than the auto dealership even though they are equivalent from a sales perspective.

Determining Direct Effects

Coverage Payments

The actual coverage payments from 2021 will not be paid out until October of 2022. However, in order to determine the contributions of barley for the 2021 growing season, we need to account for those dollars. We estimate that the 2021 payments will be approximately \$31.4 million. This assumption is based on a simple linear regression of market conditions and actual payments from previous years.

Production Value

The production value-generating contributions in 2021 are the gross barley sales of \$209.3 million (see Table 1.6). This direct effect will ripple through the economy as growers spend that money in accordance with their enterprise budgets (see Table 2.1). Those vendors will likewise spend the money on inputs and staff wages, etc. (i.e., the multiplier effects). Total effects from these initial sales are discussed in detail in Section 3. Again, the rationale for including total sales, rather than only exports, is that Idaho has a

comparative advantage in barley production, and the primary consumers of barley have located in Idaho to mitigate their costs. Only measuring the contributions from barley exports would understate true contributions.



3. Results

2021 Contributions

Coverage Contributions

Coverage contributions are a direct income injection to the farmers. The money is not technically tied to the production of barley, but to barley base acres. For example, a farmer may have barley base acres that are being fallowed or have been converted to forage crops. Those acres would still be eligible for—and receive—coverage payments. Because coverage dollars are going to the farmers as income, and not for barley production, the money is spent according to the family budgets, rather than the crop budgets.

We are able to isolate household spending patterns for households within various income groups. The expected \$31.4 million in 2021 coverage payments are allocated to each industry according to the farm household's spending profile. Some of the money is spent on retail goods, electricity, transportation expenses, school supplies for the children, etc. Roughly \$11.5 million is spent on imported goods and services, meaning those dollars do not generate multiplier effects in the economy, but rather leak out of the economy. Because all of the effects stem from household spending, there are no direct business effects or indirect business-to-business transactions. As such the impacts from the coverage contributions are all captured in the induced row of Table 3.1.

Of the \$31.4 million in barley payments received by Idaho farmers, \$11.5 million exited the state, and generating no multiplier impacts. Just under \$20 million remained in the state, and generated induced multipliers of an additional \$6.8 million. Converting this to gross state product results in a total of \$14.5 million in GSP, and \$7.7 million in income. All of this supports 183 full time equivalent jobs in Idaho.

Table 3.1: 2021 Barley Coverage Contributions

	Sales	GSP	Income	Jobs
Direct	\$0	\$0	\$0	0
Indirect	\$0	\$0	\$0	0
Induced	\$26,742,523	\$14,462,328	\$7,670,563	183
Total	\$26,742,523	\$14,462,328	\$7,670,563	183

Source: IMPLAN and Author's Calculations

Production Contributions

As shown in Table 1.6, total value of Idaho barley production in 2021 was \$209.3 million, which represents the direct sales effect. Those dollars were then spent by the farms according to their barley enterprise budgets (Table 2.1), generating business-to-business indirect effects of \$108.4 million. The labor and profit payments to the farms and their employees were spent by those households, generating consumer-to-business transactions and another \$89.7 million in induced effects. Total sales resulted in \$407.4 million. Those dollars need to be converted to GSP to determine the actual 2021 production contributions to the economy. Total gross state product from 2021 barley production amounted to

\$201.5 million. This is also associated with \$99.5 million in income and nearly 2000 FTE employees, (see Table 3.2).

Table 3.2: 2021 Barley Production Contributions

	Sales	GSP	Income	Jobs
Direct	\$209,328,000	\$99,651,567	\$38,877,670	473
Indirect	\$108,360,021	\$53,404,017	\$34,608,188	874
Induced	\$89,741,229	\$48,474,545	\$25,993,382	618
Total	\$407,429,249	\$201,530,129	\$99,479,240	1,965

Source: IMPLAN and Author's Calculations

Total 2021 Contributions

Total 2021 barley contributions are the sum of the coverage payments and production contributions. Barley in 2021 was responsible for \$216 million in GSP. A fundamental reason we refer to these dollars as contributions, not raw impacts, is because, in the absence of barley, farmers would have utilized their land in the production of other goods. As such, we cannot say the economy would have been \$216 million smaller in the absence of barley production. For example, barley production may have been offset by wheat production, restoring some of the lost barley output. For more on the difference between contributions and impacts, see Watson et. al. 2007. What we can say is that barley supported roughly 2,150 full time Idaho jobs in 2021, not including the forward links in their supply chain, like malting jobs.

Table 3.3: 2021 Barley Contributions

	Sales	GSP	Income	Jobs
Direct	\$209,328,000	\$99,651,567	\$38,877,670	473
Indirect	\$108,360,021	\$53,404,017	\$34,608,188	874
Induced	\$116,483,751	\$62,936,873	\$33,663,945	801
Total	\$434,171,772	\$215,992,457	\$107,149,803	2,148

Source: IMPLAN and Author's Calculations

2021 vs. Average Annual Contributions

In this section of the report, we want to analyze the average annual contributions barley has made over this past decade, providing us with a benchmark for comparing the 2021 contributions. Market conditions, ongoing supply chain disruptions from the corona virus, and a severe drought combined to make 2021 a difficult year for barley growers. Comparing the actual contributions with the decade average will provide a sense of how deep the 2021 conditions cut into the barley growers' overall contributions to Idaho's economic health.

Table 3.4 shows the combined contributions from the average annual coverage payments and production sales. It shows that the average annual barley contributions amount to \$273.6 million in gross state product, \$130.3 million in direct contributions, \$69.8 million in indirect effects, and \$73.5 million in induced effects. Total contributions translate into \$135.4 million in income and nearly 2,700 FTE jobs.

Table 3.4: Average Barley Contributions (2001-2021)

	Sales	GSP	Income	Jobs
Direct	\$273,757,440	\$130,323,501	\$50,843,897	619
Indirect	\$141,712,346	\$69,841,335	\$45,260,305	1,142
Induced	\$136,011,891	\$73,479,998	\$39,343,042	936
Total	\$551,481,677	\$273,644,835	\$135,447,244	2,698

Source: IMPLAN and Author's Calculations

Table 3.5 shows the difference between Tables 3.3—actual 2021 contributions, and Table 3.4—average annual contributions. This difference is what we can safely attribute to the market and drought conditions of 2021. Those conditions effectively cost the state of Idaho \$57.7 million in gross state product—of which \$28.3 million would have been household income—and nearly \$12 million in lost farm income (i.e., the direct income effects). A total of 549 full time equivalent jobs were lost because of the negative 2021 barley conditions, income growers will not recover.

Table 3.5: 2021 Lost Contributions from Market Conditions and Drought

	Sales	GSP	Income	Jobs
Direct	(\$64,429,440)	(\$30,671,934)	(\$11,966,228)	(146)
Indirect	(\$33,352,325)	(\$16,437,318)	(\$10,652,116)	(269)
Induced	(\$19,528,140)	(\$10,543,125)	(\$5,679,097)	(135)
Total	(\$117,309,905)	(\$57,652,378)	(\$28,297,441)	(549)

Source: IMPLAN and Author's Calculations

4. Conclusions

The economic contributions of barley growers in Idaho continue to be nearly a quarter of a billion dollars in agricultural economic output. 2021 however, was a down year due to drought and market factors that caused prices, yields, production, and value to be the lowest of the decade. The sector as a whole produced over \$99.7 million in direct value-added economic contribution for the state (gross state product). Those added dollars then circulate in the economy, traveling backwards through the barley and household supply chains, supporting nearly another \$53.4 million in indirect, business-to-business, value-added transactions. Employee income is also spent in the state's economy, generating activity in those industries that support household purchases such as food retailers, automotive maintenance, electricity, etc. Those household-to-business expenditures and their associated ripple effects generate approximately \$62.9 million in additional value-added. The entire 2021 barley sector in Idaho is responsible for just under \$216 million dollars in economic activity, supporting just under 2,150 full time equivalent jobs.

As substantial as barley is in supporting Idaho's GSP, it is roughly \$57.7 million dollars lower than the decade long average, suggesting that farmers and their vendors were devastated by the 2021 market and growing conditions. If the 5-6 years trend of barley production spikes continues, 2022 may see some recovery. Sustaining that recovery will be key for 2023 and beyond. Idaho's growth and comparative advantage in agricultural production is a sign that barley will maintain its presence and prevalence within the state, but building national and international demand for high quality barley will be essential to restoring the market to its full potential.

Appendix 1: References

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Appendix 2: International Trade Data

Table A2.1: Idaho Barley Exports by Country of Destination and Year

	2017	2018	2019	2020	2021 (Jan-Sep)
Canada	39,370	33,530			2,013,981
China					77,618
Japan	131,038		538,822	756,299	94,139
Mexico	203,013	48,404	6,158,601	9,463,984	2,961,938
United Kingdom					20,604
World Total	373,421	81,934	6,697,423	10,220,283	5,168,280

Source: USA Trade*Online and the World Integrated Trade Solution

Table A2.2: U.S. Barley Exports by Country of Destination and Year

	2017	2018	2019	2020	2021 (Jan-Sep)
Australia	10,250	112,073			
Barbados	54,227	7,540	32,100	47,664	37,895
Brazil	13,558		9,028	8,621	40,632
Canada	18,367,676	7,882,593	7,187,916	23,570,904	52,688,521
Cayman Islands			3,257		
Chile					74,381
China				27,025	77,618
Colombia		8,200	23,096		16,009
Costa Rica	84,305				73,450
Croatia				2,641	
Ecuador					29,448
El Salvador	3,839				
French Polynesia		11,802	4,984		
Germany	15,087			3,501	11,687
Honduras			3,914	2,790	
India	11,145				38,880
Indonesia				5,414	
Ireland		13,620			
Jamaica			23,155		
Japan	14,655,164	15,284,302	18,847,491	11,857,417	4,495,836
Korea, South	733,733	1,499,334	1,607,344	1,015,440	727,660
Mexico	351,346	116,179	6,345,758	9,480,018	2,976,678
Netherlands	56,405	44,592			49,416
New Zealand	2,630				
Palau			5,800		
Peru					37,659
Philippines	95,740				
Qatar	3,261				
South Africa	17,655				
Suriname		7,600			
Sweden	49,600			2,857	
Taiwan	1,134,606	1,664,658	1,677,771	1,069,547	752,369
Trinidad and Tobago	5,312			4,500	
United Kingdom	119,100	197,500	245,858	129,600	169,004
Uruguay	142,824				
Vietnam		94,748			
World Total	35,927,463	26,944,741	36,017,472	47,227,939	62,297,143

Source: USA Trade*Online and the World Integrated Trade Solution



Idaho Barley Commission Annual Report

July 1, 2020—June 30, 2021 Fiscal Year

Your Grower Dollars at Work

The Idaho Barley Commission serves to enhance the profitability of Idaho barley growers through research, market development, promotion, information and education programs which are funded through the \$0.03 per hundredweight grower assessment. This is equivalent to \$0.0144 per bushel—a great investment for growers!



Wes Hubbard,
2020-2021
IBC Chairman

The commission is governed by a board of 4 commissioners—3 growers and 1 industry representative. There are two full time staff members and the commission works with additional partners and contractors as needed to develop and carryout IBC programs.

Challenging times spawn opportunities, creativity, resilience and growth!

Every sector of the Idaho barley industry was impacted by COVID-19 over the 2020-2021 fiscal year.

During this challenging time, the commission worked hard to meet people where they were—mostly online, and not only continue programs and developing relationships to benefit growers and advance the industry, but find new pathways to ensure the best return on investment for grower dollars.

2020-2021 IBC total revenue was three percent above projections at \$733,586, however total expenses were seventeen percent below budget at \$658,295. Reduced expenses were mostly related to COVID-19 impacts and meetings and events that were held virtually rather than in person. With a higher than normal carryover due to this situation, the commission was able to invest more in research and market development for the 2021-2022 fiscal year.

IBC commissioners and staff welcome grower comments and input throughout the year. Please reach out if you have questions or ideas on ways the commission can better serve grower interests.

In 2020, Idaho ranked 1st among states, growing 33 percent of the nation's barley crop—producing 55 million bushels of barley on 500,000 harvested acres at a record average yield of 110 bushels per acre.

The 2020 Idaho barley crop value was estimated at **\$276 million** with the average price per bushel at \$5.02 according to USDA NASS data.

Research Highlights

15 University of Idaho Projects and Initiatives Funded:

- Barley Extension Nurseries
- Small Grains Research Report
- Evaluation of Elite Barley Lines in Northern Idaho
- Support Scientist Funding for North Idaho Cereal Extension
- Wireworm Survey and Control
- Fungal and Oomycete Soil-Borne Disease in Idaho Cereals, and Disease Management Tools
- Evaluating Freeze Tolerance of Winter Barley Genotypes with Diverse Genetic Backgrounds
- Investigating Nitrogen Translocation and Grain Protein Accumulation in Spring Barley Genotypes of High and Low Grain Protein
- Screening for Resistance to Cereal Cyst Nematode in Current Barley Varieties
- Evaluating Impact of Invasive Cereal Aphid
- Biochemical Characterization of High Beta Glucan Barley Mutant
- Pathology Diagnostic Support
- Contrasting Barley Varieties' Yield and Protein Responses to Nitrogen and Sulfur Fertilizer Rates and Application Timing
- UI Barley Agronomy Endowment
- UI Idaho Center for Plant and Soil Health in Parma

2 ARS Programs Supported:

- Aberdeen Barley Breeding Program
- Assessing Residue Source and Management Practices for Improving Fertilizer Recommendations in Cereal-based Cropping Systems



Idaho Barley Commission Annual Report—Page 2

July 1, 2020—June 30, 2021 Fiscal Year

Market Development Highlights

Foreign Market Development:

- Partnered with U.S. Grains Council on export market development
- Five virtual trade team meetings featuring Idaho growers
- Participated in China Craft Beer Expo



Food Barley Market Development:

- Initiatives with American Heart Association:
 - Bring on the Barley Recipe Challenge
 - Back-to-School with Barley Webinar
 - Virtual Go Red For Women
 - Virtual Heart Walk



Food Barley Communications and Social Media:

- Monthly Food Barley Email Newsletter
- EatBarley.com website, and barley consumer focused pages on Facebook, Pinterest, Instagram and YouTube
- Barley recipe development and educational materials



Information / Education

- Published weekly Idaho Grain Market Report, distributed via email.
- Supported virtual UI Extension Field Days and Cercal Schools
- IBC website development to provide grower and industry information and resources



Industry Partnerships / Grower Services

- Partnered with Idaho Grain Producers Association and National Barley Growers Association to ensure the concerns and priorities of Idaho barley growers are considered and represented on state and national levels



Follow the Idaho Barley Commission at:

Websites

www.idahobarleycommission.org
www.eatbarley.com

Social Media

Facebook—Idaho Barley Commission, and, Barley: Nature's Hearty Grain
Pinterest—EatBarley **Instagram**—EatBarley
YouTube—Barley: Nature's Hearty Grain
Twitter—@idahobarleycom

Financials: July 1, 2020—June 30, 2021

REVENUE:

Barley Assessment Revenue	\$ 731,630
Interest and Other Revenue	\$ 2,793
Miscellaneous Income	\$ 16,563
Carryover/Reserve Funds Used	\$ 0
Total Revenue	\$ 750,986

EXPENSES:

Research	\$ 237,155
Market Development	\$ 140,910
Industry Partnerships/Grower Services	\$ 117,623
Information / Education	\$ 45,926
Office and Administrative Costs	\$ 116,441
Capital Outlay	\$ 233
Total Expenses	\$ 658,328
Carryover/Reserve Funds	\$ 684,206



2020-21 IBC Commissioners, from left to right: Allen Young, Blackfoot, District III Commissioner and Vice Chairman; Wes Hubbard, Bonners Ferry, District I Commissioner and Chairman; Mike Wilkins, Rupert, District II Commissioner; and Jason Boose, Industry Representative.

IBC Staff:

Laura Wilder, Executive Director
 Wren Hernandez, Office Manager



2021 Idaho Barley Crop Stats

IDAHO BARLEY LEADS U.S. PRODUCTION

37%

Idaho's share
of the 2021
U.S. Barley
Crop

43,610,000 bushels
harvested in 2021 on **490,000 acres** at an **average yield of 89 bushels per acre**, compared to record yields of 110 bushels per acre and 55,000,000 bushels harvested in 2020.



Lowest average yield in 10 years during the extreme drought conditions of 2021 across the entire state and region but Idaho kept and increased the #1 spot.

2021 Idaho & U.S. Barley Crop

	2021	2020	% Change
Idaho Barley Acres Planted	520,000	530,000	-2%
Idaho Acres Harvested	490,000	500,000	-2%
Idaho Average Bushels/Acre	89	110	-19%
Idaho Total Bushels	43,610,000	55,000,000	-21%
U.S. Acres Harvested	1,948,000	2,214,000	-22%
U.S. Total Bushels	117,673,000	170,813,000	-31%
Idaho % of U.S. Total	37%	33.3%	+3.7%
Idaho Rank in Total U.S. Barley Production	1	1	No Change

5-Year Average Total Idaho Production: 51,142,000 Bu
5-Year Average Idaho Yield/Acre: 99.8 Bu/Acre



