Tribal Agriculture in Arizona

An Economic Contribution Analysis

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Executive Summary

What is the issue?

Arizona's twenty-two federally recognized tribes have practiced agriculture for thousands of years, developing sophisticated systems based on ecological knowledge, water management, and crop diversity. These systems are key to tribal economies, cultural identity, and food sovereignty. However, despite its importance, the state-wide economic role of tribal agriculture has been scarcely studied.

This report provides a systematic profile of tribal agriculture using the best publicly available data and methods. We conduct a comprehensive benchmark of tribal agriculture's economic contribution in Arizona, the first to our knowledge. The main goal of this report is to serve as a foundation for future research, improved understanding, and more refined analyses over time. The report does not quantify other critical values of tribal agricultural production such as cultural values, nutritional and public health benefits, food sovereignty, and environmental values. Nonetheless, this study provides a needed baseline assessment of existing tribal agricultural activity in Arizona.

What did the study find?

Measuring Tribal Agriculture with Secondary Data

- The USDA Census of Agriculture, Reservation Census, and Navajo Nation Census together provide baseline data that can be used to develop economic estimates.
- Where official data fall short (for instance, when reservations span multiple states and it becomes difficult to isolate Arizona-specific activity), tools such as USDA's CropScape (a satellite-based cropland mapping tool) and grey literature sources such as institutional reports and Extension publications may help refine and validate estimates.
- The estimates produced here represent a starting point for future analysis and can inform efforts by tribes and their partners to improve the precision of future analyses.

Statewide Economic Contribution

- On-farm sales of tribal agriculture in Arizona totaled $434 million in 2022, directly contributing $168.8 million to Arizona's GDP.
- Crop production represented most of the activity ($410 million), with livestock contributing an additional $23.9 million.
- Tribal agriculture in Arizona directly supported roughly 2,300 jobs in the state and $106.6 million in labor income in 2022.

A Three-Quarter of Billion Dollar Output Contribution

In addition to these direct effects, Tribal agriculture also generates multiplier effects. Indirect multiplier effects measure the economic activity stimulated in industries supplying agriculture with inputs to production, such as fertilizer, water, or machinery. Induced multiplier effects measure economic activity that results when people employed in agriculture spend their incomes within the

local economy on rent, groceries, or doctors' visits, for example. Combined, these direct, indirect, and induced effects measure the total economic contribution of an industry to a regional economy.

Including multiplier effects, tribal agriculture supported:

- More than three-quarters of a billion ($753.3 million) in total output.
- $347.5 million in total value added.
- $198 million in total labor income.
- 3,820 jobs statewide.

Economic Spillovers into Non-Tribal Areas of Arizona

Tribal agriculture generates significant economic activity beyond reservation boundaries. In non-tribal areas of Arizona, tribal agricultural production generated:

- $296.7 million in sales (output)
- $159.8 million in value added (gross state product)
- $90.1 million in labor income
- 1,675 jobs

Roughly 85% of total multiplier effects from tribal agriculture in Arizona spill over into non-tribal areas of the state

Geographic concentration of spillover effects:

- Maricopa County: $203 million
- Yuma County: $31 million
- Pima County: $18 million

Home Consumption of Tribal Production

- Beyond market sales, tribal agriculture supports an estimated $28 million in food produced for home consumption (farm-gate value). If purchased at retail, this food would cost roughly $116 million.
- The Navajo Nation accounts for the majority of this value.
- This production does not enter formal market channels but directly supports food security in tribal communities.
- This estimate is conservative and likely understates the market value of tribal food production for home consumption. It also does not capture other values, such as cultural, ecological, and other values created through tribal agricultural production.

How was the study done?

The study uses multiple data sources and methods to build a comprehensive picture of tribal agriculture in Arizona. It begins by aggregating data on farm and producer characteristics from the 2022 Census of Agriculture and the 2022 American Indian Reservation Census, covering both state-level and county-level data. Building on that foundation, the report estimates agricultural sales and models the broader economic contributions of tribal agriculture using the IMPLAN model, specifically using multi-industry contribution analysis and multi-regional input-output analysis methods. It also examines tribal agricultural production for home consumption and explores the potential impacts of developing tribal agricultural value chains.

Introduction

Arizona is home to twenty-two federally recognized Native American tribes and nations, and many have practiced agriculture for thousands of years, from the Sonoran Desert to the Colorado Plateau (Arizona State Museum, 2026; Schwinning et al., 2008). Indigenous communities have developed specific agricultural systems adapted to regional climate conditions, based on ecological knowledge, water management practices, and local crop diversity. These systems are key parts of tribal economies, cultural identity, and ongoing efforts to strengthen tribal food sovereignty.

Despite the importance of tribal agriculture, its economic role has not been extensively studied. Existing research has focused on historical practices, ethnobotany, or environmental adaptation, with limited attention to measuring economic activity. The few economic analyses that exist are often constrained by data limitations or not directly comparable across regions or time. As a result, there is no comprehensive, consistent baseline for understanding the scale and structure of tribal agriculture within Arizona's broader economy.

This report provides a systematic profile of tribal agriculture using the best publicly available data and methods. As a first step, this study aggregates data on farm and producer characteristics from federal data sources such as the 2022 Census of Agriculture, the 2022 American Indian Reservation Census, and the Navajo Nation Census. Then, based on this data and complemented with economic modeling techniques, we estimate agricultural sales and evaluate the economic contribution of tribal agriculture at the state level. This report also explores the role of home production for home consumption and considers the potential for strengthening tribal agricultural value chains.

Agriculture at-large in the Southwest faces a series of challenges, including persistent water scarcity, the effects of climate change, and labor shortages. Meanwhile, tribal agriculture in the region faces added challenges such as barriers to market access, lack of resources, and lack of access to water in some cases. Nonetheless, tribal agriculture maintains a significant footprint in the state, physically and economically. There is growing recognition among policymakers, practitioners, and tribal communities that agriculture can play a central role in economic development, resilience, and food system sovereignty. Quantifying its economic contribution is a necessary step to inform policy and support tribal decision-making.

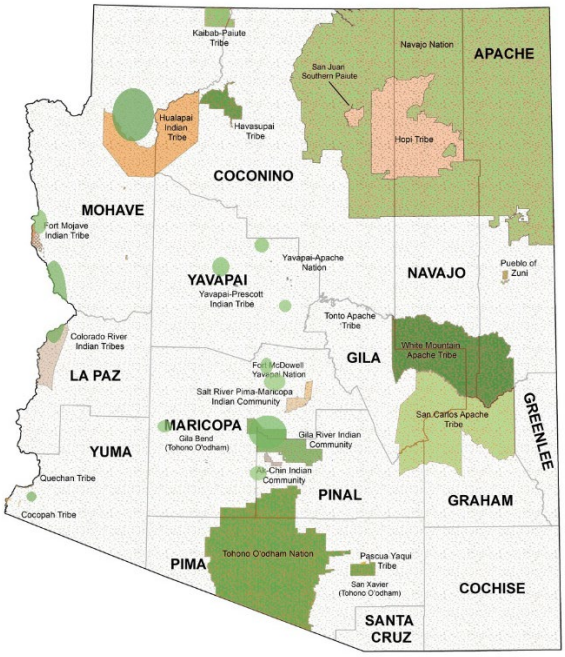
It is important to acknowledge that this study is one of the first to integrate multiple data sources and apply a consistent approach to this issue. Hence, there are some limitations regarding data availability and methodological constraints related to capturing the structure of tribal operations and cultural practices. Additionally, this study focuses exclusively on the economic dimensions of tribal agriculture and does not capture the full set of benefits that tribal food production provides. These include food sovereignty, as well as environmental stewardship, cultural preservation, intergenerational knowledge transmission, community health and nutrition outcomes, and the spiritual connections between indigenous peoples and their land. However, our analytical framework provides a first comprehensive benchmark of tribal agriculture's economic importance in Arizona. The main goal of this report is to provide benchmark data from multiple disparate sources in a single publication. We hope this will serve as a foundation for future research, improve data collection, support policy discussions, and lead to more refined analyses over time.

1. A Brief Overview of Tribal Agriculture in Arizona

Arizona is home to 22 federally recognized tribes (Figure 1-1), and their peoples have inhabited the region for thousands of years. Their reservations cover over a quarter of the state's land area, making Arizona one of the most significant centers of Native American presence in the United States.

The literature on Arizona tribal agriculture spans multiple disciplines, including archaeology, anthropology, ethnobotany, hydrology, geography, and agricultural economics. This report offers a brief overview of tribal agricultural history to contextualize our analysis and main findings.

Figure 1-1. Tribal Reservation Lands in Arizona by County



Source: Inter Tribal Council of Arizona

Historical Background

The story of tribal agriculture in Arizona began with the Hohokam, who inhabited the Sonoran Desert from approximately 300 BCE to 1450 CE. The Hohokam developed one of the most extensive prehistoric irrigation systems in North America, constructing canals fed by the Salt and Gila rivers. These systems required substantial social organization and cooperative labor to build and maintain (Whitley & Ledbetter, n.d). Hohokam agriculture supported dense population centers and complex exchange networks (Doelle and Wallace, 2019; Haury, 1976). Crops cultivated by the Hohokam peoples included corn (maize), beans, squash, cotton, and tobacco.

On the Colorado Plateau, the Hopi tribe developed a different agricultural tradition suited to a semi-arid, high-elevation environment with limited surface water, where they cultivated over twenty varieties of corn adapted to specific micro-environments (Bradfield, 1971; Rhoades, 2013). Hopi oral tradition and Indigenous knowledge frameworks demonstrate that Hopi farming has always

been dynamic, and their knowledge and practices are tied to religious observance, identity, and community governance (Kuwanwisiwma and Ferguson, 2004; Wall and Masayesva, 2004).

The Diné (Navajo) people, who arrived in the Southwest around the fifteenth and sixteenth centuries, adapted and developed their own agricultural systems across the vast Colorado Plateau. Franciscan missionary records and ethnographic works describe Navajo cultivation of corn, beans, squash, and melons, often together with sheep herding, introduced after Spanish contact (Bailey, 1964). Navajo farming plots were distributed across family use areas in ways that reflected kinship systems and ecological knowledge (Kelley, 1986). The Long Walk period (1864-1868), during which the U.S. Army forcibly relocated over eight thousand Navajo people to Bosque Redondo in New Mexico (Denetdale, 2007), caused massive disruption to Navajo agricultural systems, generating social and economic devastation during that period, and a subsequent struggle to rebuild food production after the Navajo peoples returned to their homeland (Roessel, 1973).

The Tohono O'odham developed Ak-chin farming, a specialized form of floodwater agriculture uniquely adapted to the Sonoran Desert. The Tohono O'odham Nation used over 450 plant species, grounded in a deep ecological knowledge of traditional planting and harvesting practices (Nabhan 1982, 1985). The Akimel O'odham (Pima) ethnobotany along the Gila River demonstrates the relationship between traditional crops and the cultural and ceremonial life of the community (Rea,1997).

The Spanish colonial period, the Mexican period, and subsequent American organization brought profound disruptions to Indigenous agricultural systems in Arizona. Spanish missions transformed tribal agriculture through the introduction of new crops (wheat, fruit trees, cattle, horses), new tools, and new labor obligations and systems (Spicer, 1962). While some of these novelties were integrated into existing agricultural systems, others displaced traditional practices or shifted the emphasis of tribal agriculture toward mission production.

American settlement in the mid-nineteenth century also brought disruptions, characterized by the loss of agricultural land to Euro-American settlers and the consequent collapse of subsistence farming economies (Carlson, 1981). Water diversion by upstream Euro-American settlers beginning in the 1870s had devastating consequences for the Akimel O'odham along the Gila River, transforming one of Arizona's most productive farming communities into an impoverished, food-insecure population (Hackenberg,1964).

Water Rights & Irrigation

Water rights represent one of the most debated aspects of tribal agriculture in Arizona. The doctrine of prior appropriation ("first in time, first in right"), which underlies water rights in most of the western United States, theoretically protects tribal water claims for agricultural use (Tarlock, 2000). However, in practical terms, there is evidence of privileges given to Euro-American settlers over Native nations despite clear evidence of prior use (Hundley, 1982).

The landmark *Winters v. United States* decision of 1908 established that federal reservation of land for Native peoples implicitly reserved sufficient water to make those reservations livable and productive (McCool, 1987; Tarlock, 2010). However, although Winters rights represent a powerful legal framework, the implementation of this doctrine in Arizona has been limited by the lack of

funding, political opposition, and diverse complexity (McCool, 2006; Shupe, 1982). The Central Arizona Project (CAP), completed in 1993, delivers Colorado River water to several Arizona tribes as part of negotiated water settlements, but access and infrastructure costs have limited agricultural benefits for many communities (Colby et al., 2005). On the other hand, the Gila River Indian Community Water Settlement, finalized in 2004, is one of the most significant tribal water settlements in US history (see Checchio and Colby (1993) for an early analysis of the negotiations). To this day, tribal water rights are still being settled in courts, and tribes continue to pursue resources to gain access to their water rights (Tso, 2025).

Climate Change & Tribal Agriculture

Climate change poses some challenges to tribal agriculture in Arizona, where average temperatures have already increased significantly, and precipitation patterns are becoming more variable (Berardi and Chester, 2017; Redsteer et al., 2013). Tribal communities are especially vulnerable to climate impacts due to limited financial resources for adaptation and dependence on climate-sensitive activities for livelihood (Cozzetto et al., 2013).

In this context, traditional ecological knowledge has emerged as a crucial resource for climate adaptation (Hosen et al., 2020; Vinyeta and Lynn, 2013). Including Indigenous knowledge and traditions into frameworks to address environmental crisis has been at the center of the debate and current research to tackle climate change (Arsenault et al, 2019; Wildcat, 2010).

Food Sovereignty

Across Arizona and the broader American Southwest, tribal communities have increasingly turned to agricultural revitalization in response to a variety of food system-related challenges. This movement operates at multiple scales, from individual family gardens to tribally operated commercial farms, and is rooted in the understanding that control over food systems is inseparable from tribal self-determination (Whyte, 2018; Coté, 2016). In the Southwest specifically, the disruption of traditional diets by colonization has made food sovereignty a central expression of broader tribal sovereignty (Guarino, 2015).

The Navajo Nation has been particularly active in this effort. The existence of persistent food deserts, commodity food dependence, and high rates of chronic disease have created an urgent need for change (Diné Policy Institute, 2014; Sundberg et al., 2020). Arizona's Apache County, at the heart of the Navajo Nation, is among the highest-risk areas for food insecurity in the country. In response, the Navajo Nation enacted the Healthy Diné Nation Act of 2014, using its tax authority to discourage unhealthy foods and incentivize healthy ones, which constitutes a concrete exercise of tribal sovereignty through food policy (Eddie et al., 2022). At the community level, initiatives like Coffee Pot Farms and Ndée Bikíyaa have worked to rebuild local food production capacity (Tribal Health, 2024), complemented by federally supported planning efforts in New Mexico (Brauer, 2021–2023).

Traditional agricultural knowledge has drawn growing attention not only for its cultural value but for its relevance to climate resilience (Nabhan et al., 2022). At the same time, there are still some questions about who controls the application of such knowledge and on what terms it is shared (Battiste & Henderson, 2000). Efforts such as the Indigenous Foods Knowledges Network seek to

address this through research partnerships that prioritize relational accountability and community priorities (Jäger et al., 2019). Federal frameworks for tribal co-management of lands such as Canyon de Chelly further reflect a growing institutional recognition of tribal authority over ancestral territories (Sams, 2022). The sustainability of these efforts over time depends on investments in capacity and knowledge transmission, through seed sovereignty networks, farm-to-school programs, food sovereignty newsletters, and scholarships for the next generation of Native agricultural leaders (First Nations Development Institute, 2023).

Economic Analysis of Tribal Agriculture

Although tribal agriculture has received increasing attention in recent years in different debates about economic development, climate change, and water rights, understanding the economic dimensions of tribal agriculture in the United States requires piecing together a fragmented body of studies and databases, since there is no single comprehensive study that captures the full picture.

Federal policy analyses, such as Monke's (2025) review of Farm Bill support for tribal communities, help contextualize how government programs have influenced the economic trajectory of tribal agriculture. Infrastructure gaps and limited market access have been identified as persistent obstacles, and strengthening local food production and distribution networks could unlock substantial economic opportunities for tribal communities (First Nations Development Institute, 2017; Hipp, 2020).

Some of the most rigorous quantitative work on tribal agricultural economies comes from Deol and Colby (2018), who analyzed data from 51 tribal nations across the western United States and found a consistent pattern: tribes that had formally quantified their water rights tended to generate significantly higher agricultural revenues than those that had not. This finding is particularly meaningful in the context of the arid Southwest, where water access is not just an agricultural input but a fundamental determinant of economic prosperity. Singletary et al. (2016) claimed that tribal producers face significant barriers to utilizing federal agricultural programs, especially those farming on individually held trust lands. Johnson et al. (2021) reinforced this finding and showed that even well-established Indigenous farming practices, such as Hopi dryland agriculture in Arizona, struggle to gain recognition within USDA conservation funding programs. Meanwhile, Drugova et al. (2022) found that drought had negative effects not only among tribal livestock and feed producers in Arizona tribal areas, but also across local economies, emphasizing the vulnerability of tribal agricultural economies to drought and other effects of climate change.

Despite being home to 22 federally recognized tribes and having the highest concentration of Native American agricultural producers of any state in the country, Arizona-specific economic research on tribal agriculture is scarce. Existing research tells us that tribal producers in Arizona are economically significant and vulnerable to climate and policy pressures, but currently, it does not tell us what tribal agricultural activity contributes economically to the state. Without a clear accounting of the economic value tribal agriculture generates, it remains difficult to make the case for investments, policy reforms, and infrastructure that tribal agriculture in Arizona needs to thrive.

The subsequent chapters are structured as follows. Chapter 2 presents a statewide overview of tribal agriculture in Arizona using data from the USDA Census of Agriculture (2022). Chapter 3

narrows the lens to the county level, allowing us to observe where tribal agricultural production is concentrated and how it varies across the state. Chapter 4 presents data from the Reservation Census to examine agricultural activity and economic conditions within individual tribal reservation boundaries. Chapter 5 focuses specifically on the Navajo Nation Census. Together, these chapters organize and synthesize the best publicly available data, identify what the data reveal, and clarify what remains uncertain. All this data directly informs the economic contribution analysis presented in Chapter 6 and the estimation of home consumption of tribal production reported in Chapter 7.

2. State Level Data from the 2022 Census of Agriculture

The USDA conducts a Census of Agriculture every 5 years, collecting data at the state and county levels. It is the most comprehensive data source on US agricultural production. The most recent Census was conducted in 2022 (with 2027 the next scheduled survey year). Certain data are collected by race of the producer, including American Indian and Alaska Native, Asian, Black or African American, Native Hawaiian and Other Pacific Islander, and White producers. For simplification, in this report, we refer to the American Indian and Alaska Native producer group as American Indian producers. Data were recorded and published for a maximum of four producers per farm operation. USDA defines a producer as:

> *"a person who is involved in making decisions for the farm operation. Decisions may include decisions about such things as planting, harvesting, livestock management, and marketing. The producer may be the owner, a member of the owner's household, a hired manager, a tenant, a renter, or a sharecropper" (USDA, 2022 Census of Agriculture, Appendix B).*

Data for American Indian producers are collected for the Census following two procedures. First, individual producers are contacted through the USDA's Census mail list. Second, USDA identified reservations that did not include all the individual producers on the Census mail list. Data for the entire reservation, including the data for the producers that would have met the definition of a farm, were collected on a single report form. Data for American Indian producers on reservations who did not report individually are obtained and reported by "knowledgeable reservation officials." Reservation reports included data for producers who identified as American Indians. They do not include data on reservation farms or ranches operated by non-Tribal producers. Census tables may treat reservation-level reports as single farms.

The following sections present Census data for Arizona's farms and ranches operated by American Indian producers as well as characteristics and agricultural practices of American Indian producers. Data are also reported for all Arizona operations and producers. American Indian responses are subtracted from these total values to create estimates for non-Tribal operations and producers. These operations and producers are labeled as "other farms" or "other producers."

Farm Characteristics

American Indians operate more than 10,000 farms in Arizona, accounting for 62% of total farms in the state (Table 2-1). American Indian operators also manage more than 20 million acres of land in farms, 81% of the Arizona total.

Table 2-1. Farms and Land in Farms

	All Arizona	American Indian	Other	% American Indian
Farms number	16,710	10,321	6,389	62%
Land in farms acres	25,525,087	20,802,166	4,722,921	81%

American Indian operations, while numerous, tend to be smaller-scale. Two-thirds (67%) of American Indian farms have only 1 to 9 acres, while only 6% have farms of 500 acres or more (Table

2-2). In contrast, only 35% of other producers have 1 to 9 acres, while 18% have 500 or more acres. American Indian farms represent a large share of the small, 1 to 9 acres category, accounting for 75% of these smaller-acreage operations. They account for a smaller share of the total number of larger operations.

Table 2-2. Farms by Farm Size

Farm size	Number of farms			Percent		
	All Arizona	American Indian	Other	American Indian in this size class	American Indian in each size class	Other in each size class
1 to 9 acres	9,161	6,901	2,260	75%	67%	35%
10 to 49 acres	3,559	1,939	1,620	54%	19%	25%
50 to 179 acres	1,537	675	862	44%	7%	13%
180 to 499 acres	705	177	528	25%	2%	8%
500 acres or more	1,748	629	1,119	36%	6%	18%

American Indians operate 93% of the tenant-operated farms in Arizona, while they account for 28% of part-owner and 21% of full-owner farms in the state (Table 2-3). While 84% of American Indian farms are tenant farms, these are very small-scale. Tenant farms account for only 4% of farm acreage on American Indian farms. In contrast, full owner farms are only 13% of American Indian farm operations, but account for 94% of American Indian farm acreage.

Table 2-3. Land Tenure

Tenure	Number of farms			Percent		
	All Arizona	American Indian	Other	American Indian	American Indian by tenure	Other by tenure
Full owners (farms)	6,122	1,303	4,819	21%	13%	75%
Part owners (farms)	1,293	366	927	28%	4%	15%
Tenants (farms)	9,295	8,652	643	93%	84%	10%
Full owners (acres)	21,989,437	19,643,366	2,346,071	89%	94%	50%
Part owners (acres)	2,028,753	278,356	1,750,397	14%	1%	37%
Tenants (acres)	1,506,897	880,444	626,453	58%	4%	13%

American Indian farms account for 37% of Arizona farms with any crop sales and 60% of farms with any livestock (and related product) sales (Table 2-4). American Indian-operated farms account for 2% of total state agricultural sales, 3% of crop sales, and 1% of livestock sales. Census data allows one to develop a minimum estimate of farms with no sales. A farm may be recorded as operating by the USDA even if it has no sales. This could occur if crops or animals were grown or raised in the survey year but sold in a later year. It could also occur if agricultural commodities were produced for home consumption, shared, or otherwise not sold in formal markets. According to Census data, a minimum of 44% of American Indian farms had no sales in 2022. By comparison, a minimum of 19% of other farms had no sales in 2022.

Table 2-4. Market Value of Agricultural Products

	Units	All Arizona	American Indian	Other	% American Indian
Market value of agricultural products sold	farms	16,710	10,321	6,389	62%
	$1,000	$5,202,714	$117,365	$5,085,349	2%
Crops, including nursery & greenhouse crops	farms	3,465	1,270	2,195	37%
	$1,000	3,040,539	95,284	2,945,255	3%
Livestock, poultry, & their products	farms	7,525	4,520	3,005	60%
	$1,000	2,162,175	22,081	2,140,094	1%
Farms with no sales. minimum estimate	farms	5,720	4,531	1,189	
	percent	34%	44%	19%	

A large share of American Indian farms has relatively small sales (Table 2-5). Roughly 8,000 farms had sales of less than $1,000. Of these, 78% are American Indian farms. At the other end of the size distribution, only 6% of farms with $50,000 or more in sales are American Indian farms. While 61% of American Indian farms have sales of less than $1,000, only 2% have sales of $25,000 or more. Among other producers, 25% have sales of $50,000 or more, with 28% having sales of less than $1,000.

Table 2-5. Farms by Economic Class

Economic Class	Number of farms			Percent		
	All Arizona	American Indian	Other	American Indian in this class	American Indian in each class	Other in each class
Less than $1,000	8,070	6,282	1,788	78%	61%	28%
$1,000 to $2,499	2,005	1,360	645	68%	13%	10%
$2,500 to $4,999	1,605	1,041	564	65%	10%	9%
$5,000 to $9,999	1,557	848	709	54%	8%	11%
$10,000 to $24,999	1,217	540	677	44%	5%	11%
$25,000 to $49,999	588	152	436	26%	1%	7%
$50,000 or more	1,668	98	1,570	6%	1%	25%

The Census reports on farms receiving various USDA program payments in 2022. These include payments from the Conservation Reserve Program (CRP), the Wetlands Reserve Program (WRP), the Farmable Wetlands Program (FWP), and the Conservation Reserve Enhancement Program (CREP), loan deficiency payments, disaster aid payments, and other conservation programs. It also covers all other Federal farm programs under which payments were made directly to farm producers. These include payments specified in the 2018 Agricultural Act (Farm Bill), including Agriculture Risk Coverage (ARC) and Price Loss Coverage (PLC).

While American Indian farms account for 75% of Arizona farms receiving government payments, they receive only 16% of the total payments (Table 2-6). In contrast, other farms receive 84% of the dollar value of all payments. While 21% of American Indian farms receive payments, 11% of other farms receive payments. Total payments per farm average $788 for American Indian farms, but $6,938 for other farms. Among the subset of farms receiving payments, American Indian farms

receive $3,819 per farm receiving any payments. For other operated farms, average payments among farms receiving payments are $63,598 per farm.

Table 2-6. Government Payments

	Units	All Arizona	American Indian	Other	% American Indian
Government payments	farms	2,827	2,130	697	75%
	$1,000	52,462	8,134	44,328	16%
Payments per farm receiving payments	$	$18,557	$3,819	$63,598	--
Payments per all farms	$	$3,140	$788	$6,938	--
Percent of farms receiving payments	%	17%	21%	11%	--

The Census reports Arizona farms by North American Industrial Classification System (NAICS) codes. Developed jointly by the United States, Canada, and Mexico, the NAICS classifies economic activities and businesses, grouping establishments that use similar production processes. In the 2022 Census, all agricultural establishments (farms, ranches, nurseries, greenhouses, etc.) are classified using NAICS codes. Operations are classified according to the crop or livestock activity that accounts for more than half of their agricultural sales. If a farm receives more than half of its sales in crops, but no crop category accounts for more than half of its sales, it is classified under other crop farming. If a farm receives more than half of its sales from animal production, but no animal production category accounts for more than half of its sales, it is classified under other animal production.

Table 2-7. Farms by North American Industrial Classification System (NAICS) Codes

Classification (NAICS code #)	Number of farms			Percent		
	All Arizona	American Indian	Other	American Indian by this NAICS category	American Indian in each NAICS category	Other in each NAICS category
Oilseed & grain farming (1111)	278	153	125	55%	1%	2%
Vegetable & melon farming (1112)	886	627	259	71%	6%	4%
Fruit and tree nut farming (1113)	826	26	800	3%	0.3%	13%
Greenhouse, nursery, & floriculture production (1114)	230	0	230	0%	0%	4%
Cotton farming (11192)	106	7	99	7%	0.1%	2%
Hay & all other crop farming (11193, 11194, 11199)	1,349	547	802	41%	5%	13%
Beef cattle ranching & farming (112111)	4,561	2,993	1,568	66%	29%	25%
Cattle feedlots (112112)	20	1	19	5%	0.01%	0%
Dairy cattle & milk production (11212)	68	0	68	0%	0%	1%
Hog & pig farming (1122)	83	20	63	24%	0.2%	1%
Poultry & egg production (1123)	305	37	268	12%	0.4%	4%
Sheep & goat farming (1124)	4,918	4,665	253	95%	45%	4%
Other animal production & aquaculture (1125, 1129)	3,080	1,245	1,835	40%	12%	29%

In 2022, American Indian farms account for 95% of all sheep and goat farms, 71% of vegetable and melon farms, 66% of beef cattle ranches, and 55% of oilseed and grain farms in Arizona (Table 2-7). More than 86% of American Indian farms were focused on animal production. Among all American Indian farms in Arizona, 45% were sheep farms, 29% are e beef and cattle ranches, and 12% are other animal production operations (operations with a mix of animal production activities, with no one accounting for more than half of production).

American Indian producers have less Internet access than other producers. While only 55% of American Indian farms have Internet access, 85% of other farms do (Table 2-8). While 39% of other farms have broadband, only 10% of American Indian farms have broadband access. While 26% of other farms have satellite access, 8% of American Indian farms do.

Table 2-8. Internet Access on Farms

Farms reporting-	Number of farms with			Percentage of farms with		
	All Arizona	American Indian	Other	All Arizona	American Indian	Other
Internet access	11,116	5,685	5,431	67%	55%	85%
Dial-up	213	63	150	1%	1%	2%
Broadband (DSL, cable, fiber optic)	3,477	992	2,485	21%	10%	39%
Cellular data plan	7,947	4,548	3,399	48%	44%	53%
Satellite	2,564	876	1,688	15%	8%	26%
Don't know	542	273	269	3%	3%	4%
Other	132	39	93	1%	0%	1%
Arizona total farms	16,710	10,321	6,389	100%	100%	100%

For tax purposes, 91% of American Indian farms are family or individual operations, while 8% are listed in the “other”, including American Indian reservation category (Table 2-9). In some cases, an entire reservation is reported as a single farm. While only 0.3% of American Indian farms are organized as corporations, 13% of other farms are corporations. American Indian farms account for 68% of all family or individual farms in Arizona.

Table 2-9. Operations by Legal Status for Tax Purposes

	Number of farms			Percent		
	All Arizona	American Indian	Other	American Indian in this legal status	American Indian in each legal status	Other in each legal status
Family or individual	13,844	9,346	4,498	68%	91%	70%
Partnership	970	165	805	17%	2%	13%
Corporation	878	34	844	4%	0.3%	13%
Other *	1,018	776	242	76%	8%	4%

Notes: *estate or trust, prison farm, grazing association, American Indian reservation

Compared to other farms, American Indian-operated farms have somewhat more households sharing net farm income across farms. For American Indian farms, 25% of farms share income across two or more households. For other farms, such sharing occurs across only 18% of farms

(Table 2-10). American Indian farms account for 71%-80% of all Arizona farms sharing income between three or more households in Arizona.

Table 2-10. Farms by number of households sharing in net income of farm operation

	Number of farms			Percent		
Farms by number of households sharing in net income of operation	**All Arizona**	**American Indian**	**Other**	**American Indian in this sharing category**	**American Indian by each sharing category**	**Other by each sharing category**
1 household	12,967	7,758	5,209	60%	75%	82%
2 households	2,258	1,467	791	65%	14%	12%
3 households	732	519	213	71%	5%	3%
4 households	386	309	77	80%	3%	1%
5 or more households	367	268	99	73%	3%	2%

Producer Characteristics

American Indian males account for 53% of Arizona's male agricultural producers, while American Indian females account for 64% of Arizona's female agricultural producers (Table 2-11). Among all American Indian producers, the majority (52%) are female. Among other groups, females represent 42% of producers.

Table 2-11. Total Producers, Male Producers, and Female Producers

	Number of producers			Percent		
	All Arizona	**American Indian**	**Other**	**American Indian**	**American Indian of each gender**	**Other of each gender**
Total	29,100	16,913	12,187	58%	--	--
Male	15,164	8,063	7,101	53%	48%	58%
Female	13,936	8,850	5,086	64%	52%	42%

American Indians account for 66% of all Arizona producers reporting farming as their primary occupation (Table 2-12). They account for 47% of all Arizona producers reporting activities other than farming as their primary occupation. Two-thirds of American Indian producers reported farming as their primary occupation, while 47% of other producers reported farming as their primary occupation.

Table 2-12. Hired Farm Managers and Primary Occupation

	Number			Percent		
	All Arizona	**American Indian**	**Other**	**American Indian in this occupation**	**American Indian in each occupation**	**Other in each occupation**
Hired farm managers	1,186	130	1,056	11%		
Primary Occupation - Farming	16,936	11,255	5,681	66%	67%	47%
Primary Occupation - Other	12,164	5,658	6,506	47%	33%	53%

American Indian producers are more likely to live on their farms (83%) (Table 2-12) and focus solely on farm work compared to other producers (67%) (Table 2-13). They accounted for 63% of Arizona producers living on-farm and 65% of those doing only on-farm work (Table 2-13). Fewer American Indian producers reported off-farm work (49%) or intensive off-farm schedules of 200-plus days (26%), compared to 61% and 37% for other producers, respectively.

Table 2-13. Place of Residence and Days of Work Off Farm

		Number			Percent	
Place of residence	**All Arizona**	**American Indian**	**Other**	**American Indian in this residence**	**American Indian in each residence**	**Other in each residence**
On-farm operated	22,220	14,077	8,143	63%	83%	67%
Not on-farm operated	6,880	2,836	4,044	41%	17%	33%
Total	29,100	16,913	12,187			
Days of work off-farm	**All Arizona**	**American Indian**	**Other**	**% American Indian in this work category**	**% American Indian in each work category**	**% Other in each work category**
None	13,490	8,709	4,781	65%	51%	39%
Any	15,610	8,204	7,406	53%	49%	61%
1 to 49 days	2,099	843	1,256	40%	5%	10%
50 to 99 days	2,088	1,453	635	70%	9%	5%
100 to 199 days	2,581	1,589	992	62%	9%	8%
200 days or more	8,842	4,319	4,523	49%	26%	37%
Total	29,100	16,913	12,187			

Among American Indian producers, 82% have operated their current farm 10 or more years, while 83% have operated any farm for 11 or more years (Table 2-14). Among other producers, 63% operated their current farm for 10 or more years, while 67% operated any farm for 11 or more years.

Table 2-14. Farming Experience: Years on Present Farm and Years on Any Farm

	Number of producers			Percent		
	All Arizona	American Indian	Other	American Indian in this year category	American Indian in each year category	Other in each year category
Years on present farm						
2 years or less	1,331	556	775	42%	3%	6%
3 or 4 years	1,995	769	1,226	39%	5%	10%
5 to 9 years	4,180	1,642	2,538	39%	10%	21%
10 years or more	21,594	13,946	7,648	65%	82%	63%
Years operating any farm						
5 years or less	3,443	1,390	2,053	40%	8%	17%
6 to 10 years	3,442	1,500	1,942	44%	9%	16%
11 years or more	22,215	14,023	8,192	63%	83%	67%

Among American Indian producers, 44% are 65 years old or older (Table 2-15). Numbers are similar for other producers, where 41% are 65 or older. At the other end of the age distribution, 8% of American Indian producers are 34 or younger, while this age group accounts for 6% of other producers.

Table 2-15. Producers by Age Group

Age group	American Indian	Other
Under 25 years	3%	1%
25 to 34 years	5%	5%
35 to 44 years	8%	13%
45 to 54 years	14%	16%
55 to 64 years	27%	24%
65 to 74 years	25%	27%
75 years and over	19%	14%

The Census of Agriculture reports certain data on ethnicity, including whether producers are of Hispanic, Latino, or Spanish origin. One percent of American Indian producers report being of Hispanic, Latino, or Spanish origin. For other producers, this figure is 10% (Table 2-16).

Table 2-16. Producers of Hispanic Origin

	Number of producers			Percent		
	All Arizona	American Indian	Other	American Indian of this ethnicity	American Indian of each ethnicity	Other of each ethnicity
All producers	29,100	16,913	12,187	58%		
Producers of Hispanic, Latino, or Spanish origin	1,431	183	1,248	13%	1%	10%
Producers not of Hispanic, Latino, or Spanish origin	27,669	16,730	10,939	60%	99%	90%

A similar percentage of American Indian and other producers make day-to-day farm decisions, 87% and 86% respectively (Table 2-17). A higher percentage of American Indian producers (compared to other producers) are involved in land use and/or crop decisions and livestock and marketing decisions. A smaller share of American Indian producers make estate planning or succession planning decisions (46%), compared to other producers (53%).

Table 2-17. Producer Participation in On-Farm Decision Making

Decisions	All Arizona producers	American Indian	Other
Day-to-day decisions	86%	87%	86%
Land use and / or crop decisions	75%	82%	66%
Livestock decisions	75%	86%	60%
Marketing decisions	62%	63%	60%
Record keeping and / or financial management	67%	66%	69%
Estate planning or succession planning	49%	46%	53%

3. County-Level Data from the Census of Agriculture

The USDA Census of Agriculture Geographic Area Series report county-level data for Arizona (USDA, 2024), with some data broken down by race. This includes limited data on number of farms, number of producers, and land on farms. The USDA Quick Stats online database (USDA, 2026) also reports total crop sales and total livestock sales by race at the county level from the Census of Agriculture. As for the state-level data, one of the race categories is American Indian or Alaska Native. For brevity, we refer to this category in this report as American Indian. While the Geographic Area Series report data from respondents reporting their race as American Indian (alone), the Quick Stats data report data from respondents as American Indian alone or in combination with other races. This latter category is more inclusive, increasing the number of American Indian operated farms in Arizona by 1%.

As of 2022, there are 10,321 American Indian-operated farms in Arizona, managed by 16,913 American Indian producers (Table 3-1). Farms may be operated by more than one producer. USDA defines a producer as *"a person who is involved in making decisions for the farm operation"* (USDA, 2024). Nearly half of all American Indian farms and producers are in Apache County alone, while 96% of farms and producers are in just three counties (Apache, Navajo, and Coconino).

Table 3-1. American Indian farms and producers by Arizona county

Counties	Farms	Percent of farms	Cumulative percent of farms	Producers	Percent of producers	Cumulative percent of producers
Apache	5,065	49%	49%	8,256	49%	49%
Navajo	2,937	28%	78%	5,065	30%	79%
Coconino	1,869	18%	96%	2,943	17%	96%
Graham	105	1.0%	96.7%	235	1.4%	97.6%
Pinal	61	0.6%	97.2%	80	0.5%	98.0%
Mohave	52	0.5%	97.8%	59	0.3%	98.4%
Maricopa	49	0.5%	98.2%	57	0.3%	98.7%
La Paz	47	0.5%	98.7%	48	0.3%	99.0%
Cochise	37	0.4%	99.0%	44	0.3%	99.3%
Pima	35	0.3%	99.4%	48	0.3%	99.5%
Gila	26	0.3%	99.6%	35	0.2%	99.7%
Yavapai	23	0.2%	99.9%	25	0.1%	99.9%
Yuma	12	0.1%	99.97%	12	0.1%	99.96%
Santa Cruz	3	0.0%	100%	6	0.0%	100%
Greenlee	0	0.0%	100%	0	0.0%	100%
Total	**10,321**			**16,913**		

Coconino, Apache, and Navajo counties have the most land in American Indian operated farms in Arizona (Table 3-2). In the 2017 Census, these counties accounted for 73% of land in American Indian farms. For 2022, land acreage is not reported by USDA. Total land in farms exceeds 20 million acres in both census years. Between 2017 and 2022, land in American Indian farms grew by more than 600,000 acres.

Table 3-2. Land in American Indian farms by Arizona county

Land in Farms	2017		2022	
Counties	**Acres**	**% of total**	**Acres**	**% of total**
Coconino	5,712,161	28%	5,078,588	24%
Apache	5,128,249	25%	(D)	(D)
Navajo	3,977,710	20%	4,350,408	21%
Gila	971,497	5%	1,281,600	6%
Pinal	681,979	3%	1,039,594	5%
Graham	557,976	3%	1,085,969	5%
Mohave	476,983	2%	492,674	2%
La Paz	(D)	(D)	170,633	1%
Maricopa	110,853	1%	(D)	(D)
Cochise	15,432	0.08%	10,104	0.05%
Yavapai	9,446	0.05%	4,392	0.02%
Pima	(D)	(D)	(D)	(D)
Santa Cruz	(D)	(D)	499	0.002%
Yuma	36	0.0002%	30	0.0001%
Greenlee	0	0%	0	0%
AZ total	**20,139,899**	**88%**	**20,802,166**	**65%**

(D) Data withheld to avoid disclosing data for individual farms.

In the regular state and county reports, the USDA Census of Agriculture reports total crop and livestock sales by American Indian producers at the state level, but not the individual county level. USDA's Quick Stats online database does, however, report county-level sales data by race and ethnicity. Specifically, it reports county-level aggregate crop and livestock sales for American Indian producers alone or combined with other races. Census respondents may report that they are of multiple races. Thus, respondents may report they are American Indian alone, or they may report that they are American Indian but may also report they are another race as well. One can compare differences in reported sales.

The difference in the number of farms with sales between American Indian alone versus American Indian alone or in combination with other races is minor. In terms of farms with any agricultural sales, the difference is only 1% (Table 3-3). Farms with crop sales are larger by 4% for the latter group. There are greater differences in terms of the dollar value of sales. In 2017, including farms in combination with other races increased total sales by 27% and crop sales by 31%. In 2022, this increased values 12% overall and 13% for crop sales (Table 3-3). This occurs because farms reporting American Indian in combination with other races tend to have larger sales.

Table 3-3. Arizona crop, livestock, and total agricultural sales of American Indian alone farms and American Indian alone or in combination with other races, 2017 and 2022

	American Indian farms, 2017			American Indian farms, 2022		
	Alone	**Alone or in combination with other races**	**Percent difference**	**Alone**	**Alone or in combination with other races**	**Percent difference**
Market value of agricultural products sold						
Farms	11,612	11,729	1%	10,321	10,435	1%
Sales ($1,000)	108,790	137,694	27%	117,365	131,569	12%
Crops, including nursery and greenhouse crops						
Farms	1,722	1,743	1%	1,270	1,321	4%
Sales ($1,000)	91,128	119,146	31%	95,284	108,126	13%
Livestock, poultry, and their products						
Farms	5,268	5,320	1%	4,520	4,577	1%
Sales ($1,000)	17,662	18,547	5%	22,081	23,443	6%

USDA reporting of county-level American Indian livestock sales in Arizona was much more complete for the 2017 Census than for the 2022 Census. In 2017, 95% of livestock sales were reported for specific Arizona counties (Table 3-4). In 2022, only 37% of livestock sales were reported for specific counties. In 2017, Apache, Coconino, and Navajo accounted for 78% of American Indian livestock sales. In 2017, American Indian farm livestock sales accounted for 36% of total county sales in Apache County, 20% of total Coconino County sales, and 17% of total Gila County livestock sales. Overall, total American Indian (alone and combined with other races) livestock sales rose from $18.5 million in 2017 to $23.4 million in 2022.

For crop sales, reporting at the county-level was more complete for the 2022 Census (Table 3-5). In 2017, just 32% of American Indian crop sales were reported at the county level. In 2022, the percentage rose to 86%. In 2017, American Indian farms accounted for 79% of total county crop sales in Coconino, 68% of Apache County's total crop sales, and 60% of Navajo County's total crop sales. In 2022, 83% of American Indian crop sales are in just two counties, La Paz and Pinal.

Table 3-4. Livestock and animal product sales (in dollars) by American Indian producers (alone or in combination with other races) by Arizona county, 2017 and 2022 Census of Agriculture data

	2017				2022			
County	**County Total**	**American Indian (alone or combined)**	**% of County Sales**	**% of AZ American Indian producer sales**	**County Total**	**American Indian (alone or combined)**	**% of County Sales**	**% of AZ American Indian producer sales**
Apache	$14,390,000	$5,180,000	36%	28%	$13,574,000	(D)	(D)	(D)
Cochise	$62,316,000	$675,000	1%	4%	$117,259,000	(D)	(D)	(D)
Coconino	$22,931,000	$4,603,000	20%	25%	$21,156,000	$5,596,000	26%	24%
Gila	$6,699,000	$1,169,000	17%	6%	$8,939,000	(D)	(D)	(D)
Graham	$7,323,000	$514,000	7%	3%	$7,030,000	(D)	(D)	(D)
Greenlee	$6,526,000	0	0%	0%	$1,871,000	0	0%	0%
La Paz	(D)	$26,000	(D)	0.1%	(D)	$85,000	(D)	0.4%
Maricopa	$733,448,000	$171,000	0.02%	1%	$815,425,000	$730,000	0.1%	3%
Mohave	$9,318,000	$686,000	7%	4%	$7,713,000	(D)	(D)	(D)
Navajo	$45,601,000	$4,656,000	10%	25%	$43,098,000	$4,390,000	10%	19%
Pima	$11,869,000	(D)	(D)	(D)	$10,843,000	(D)	(D)	(D)
Pinal	$554,274,000	(D)	(D)	(D)	$804,410,000	$541,000	0.1%	2%
Santa Cruz	$10,051,000	(D)	(D)	(D)	$4,846,000	(D)	(D)	(D)
Yavapai	$21,387,000	(D)	(D)	(D)	$22,120,000	(D)	(D)	(D)
Yuma	(D)	(D)	(D)	(D)	(D)	(D)	(D)	(D)
American Indian producer sales reported for counties				**$17,680,000**				**$11,342,000**
Arizona Total				**$18,547,000**				**$23,443,000**
American Indian producer sales not allocated to counties				**$867,000**				**$12,101,000**
American Indian producer sales allocated to counties				**95%**				**37%**

Table 3-5. Crop sales (in dollars) by American Indian producers (alone or in combination with other races) by Arizona county, 2017 and 2022 Census of Agriculture data

	2017				2022			
County	County Total	American Indian (alone or combined)	% of County Sales	% of AZ American Indian producer sales	County Total	American Indian (alone or combined)	% of County Sales	% of AZ American Indian producer sales
Apache	$3,613,000	$2,445,000	68%	2%	$3,411,000	(D)		
Cochise	$82,425,000	$350,000	0%	0.3%	$223,269,000	(D)		
Coconino	$977,000	$775,000	79%	1%	$1,437,000	$1,028,000	72%	1%
Gila	$561,000	$55,000	10%	0.05%	$412,000			
Graham	$54,751,000	(D)			$49,939,000	(D)		
Greenlee	$2,164,000		0%	0%	$1,239,000			
La Paz	(D)	$31,634,000		27%	(D)	$49,037,000		45%
Maricopa	$475,684,000	(D)			$742,596,000	$25,000	0.003%	0.02%
Mohave	$22,975,000	$485,000	2%	0.4%	$48,846,000	(D)		
Navajo	$4,316,000	$2,573,000	60%	2%	$4,898,000	$2,548,000	52%	2%
Pima	$63,600,000	(D)			$87,130,000	(D)		
Pinal	$307,665,000	(D)			$365,172,000	$40,810,000	11%	38%
Santa Cruz	$9,580,000				$6,486,000			
Yavapai	$14,344,000				$11,889,000			
Yuma	(D)				(D)			
American Indian producer sales reported for specific Arizona counties				**$38,317,000**				**$93,448,000**
Arizona Total				**$119,146,000**				**$108,126,000**
American Indian unallocated producer sales				**$80,829,000**				**$14,678,000**
American Indian producer sales allocated to counties				**32%**				**86%**

Source: USDA Quick Stats online database

4. Census of Agriculture: Indian Reservation Survey Data

To supplement data collected in the Census of Agriculture, USDA conducts an American Indian Reservation Survey (USDA, 2024). Both the main Census survey and the Reservation survey are collected in the same year, every five years. The most recent survey year was 2022. The 2022 Reservation Survey collects data for selected farms and producers for 72 selected American Indian reservations nationally. The Census defines a farm as a place where $1,000 or more of agricultural products were produced and sold, or normally would have been sold, during the Census year. USDA defines a producer as a person involved in making decisions for farm operation. A farm can have more than one producer, and the USDA collects data on up to four producers per farm.

Table 4-1. Arizona Indian Reservations, including reservations that span more than one state, 2022

Federally Recognized Tribes in Arizona	Reporting in USDA 2022 Indian Reservation Survey	States that include reservation lands
Ak-Chin Indian Community	Ak-Chin Indian Community	AZ
Cocopah Indian Tribe	Cocopah Indian Tribe	AZ
Colorado River Indian Tribes	Colorado River Indian Tribes	AZ, CA
Fort McDowell Yavapai Nation	Fort McDowell Yavapai Nation	AZ
Fort Mojave Indian Tribe	Fort Mojave Indian Tribe	AZ, CA, NV
Fort Yuma-Quechan Indian Tribe	Fort Yuma-Quechan Indian Tribe	AZ, CA
Gila River Indian Community	Gila River Indian Community	AZ
Havasupai Tribe		AZ
Hopi Tribe	Hopi Tribe	AZ
Hualapai Tribe	Hualapai Tribe	AZ
Kaibab Band of Paiute Indians	Kaibab Band of Paiute Indians	AZ
Navajo Nation	Navajo Nation	AZ, NM, UT
Pascua Yaqui Tribe		AZ
Pueblo of Zuni	Pueblo of Zuni	AZ, NM
Salt River Pima-Maricopa Indian Community	Salt River Pima-Maricopa Indian Community	AZ
San Carlos Apache Tribe	San Carlos Apache Tribe	AZ
San Juan Southern Paiute Tribe		AZ
Tohono O'odham Nation		AZ
Tonto Apache Tribe		AZ
White Mountain Apache Tribe		AZ
Yavapai-Apache Nation		AZ
Yavapai-Prescott Indian Tribe		AZ

The survey reports two types of data, from (a) all reservation farms and ranches on a reservation and (b) American Indian operated farms and ranches on that same reservation. To be counted as an American Indian operated farm, at least one producer must be an American Indian. That producer can be exclusively an American Indian or can be an American Indian in combination with one or more other races. Farms operated on reservations by non-American Indians would be included in reservation totals, but not in American Indian operated farms totals. This makes it possible to subtract data from American Indian operated farms from totals to obtain estimates of agricultural data from non-tribal producers on reservation lands. Data were not collected for all Indian Reservations in Arizona. While there are 22 Federally Recognized Native Nations with reservation

lands in Arizona, the Reservation Survey only reports data for 14 reservations (Table 4-1). Data for the Tohono O'odham Reservation were reported in the 2017 survey and earlier surveys, but not in the 2022 survey.

Farm-Level Data

A number of reservations that are in Arizona also have lands in other states. These include the Colorado River Indian Tribes (California), Fort Yuma-Quechan (California), Fort Mojave (California, Nevada), Navajo Nation (New Mexico, Utah), and the Pueblo of Zuni (New Mexico). The USDA Reservation survey does not report in which states particular reservation farms operate. The number of farms on the Navajo Nation accounts for nearly 96% of all farms for reporting reservations within Arizona, dwarfing numbers on other reservations (Table 4-2). A significant number of Navajo Nation farms operate in New Mexico or Utah, as well as Arizona, but the Reservation Survey does not report separate data by state of operation.

Table 4-2. Number of farms on Arizona Indian Reservations, including reservations that span more than one state, 2022

Farms	Number of farms	Percentage of total reporting reservation farms
Ak-Chin	3	0.02%
Cocopah	4	0.03%
Colorado River	71	0.5%
Fort McDowell	10	0.1%
Fort Mojave	2	0.01%
Fort Yuma-Quechan	10	0.1%
Gila River	58	0.4%
Hopi	131	0.9%
Hualapai	51	0.4%
Kaibab Paiute	3	0.02%
Navajo Nation	13,558	95.7%
Pueblo of Zuni	144	1.0%
Salt River Pima-Maricopa	4	0.03%
San Carlos Apache	119	0.8%
Total Reporting Reservations	**14,168**	**100.0%**

The Navajo Nation has more than 16 million acres of land in farms, primarily grazing lands (Table 4-3). It is followed by the San Carlos Apache and Hopi Reservations, with more than one million acres each of farmland. Most farms that operate on reservations do not have significant shares of acreage off-reservation. Exceptions are farms operating on the Cocopah Reservation, where reservation acres account for only 9% of their total acreage. This means that 91% of their operating acreages are off-reservation. Similarly, 22% of farms operating on the Fort Yuma-Quechan Reservation are on-reservation, with 78% off-reservation.

Table 4-3. Land in Farms and Reservation Acres on Farms, 2022

Reservation	Land in farms (acres)	Reservation acres on farm	Reservation acres as a % of farm acres
Ak-Chin	(D)	(D)	(D)
Cocopah	25,105	2,358	9%
Colorado River	205,785	191,106	93%
Fort McDowell	(D)	(D)	(D)
Fort Mojave	(D)	(D)	(D)
Fort Yuma-Quechan	31,941	6,954	22%
Gila River	349,560	(D)	(D)
Hopi	1,687,024	(D)	(D)
Hualapai	976,698	976,698	100%
Kaibab Paiute	(D)	(D)	(D)
Navajo Nation	16,275,267	16,062,580	99%
Pueblo of Zuni	435,855	404,907	93%
Salt River Pima-Maricopa	55,617	55,617	100%
San Carlos Apache	1,964,009	1,963,742	99.99%

(D) Withheld to avoid disclosing data for individual farms.

Of farms operating on reservations reporting to USDA, 59% operated less than 10 acres, while 79% operated less than 50 acres (Table 4-4). At the other end of the distribution, 8% operated 1,000 or more acres.

Table 4-4. Number of Farms by Acreage Size Categories

Reservations	1 to 9 acres	10 to 49 acres	50 to 179 acres	180 to 499 acres	500 to 999 acres	1,000 acres or more
Ak-Chin	0	0	0	0	1	2
Cocopah	0	0	0	0	0	4
Colorado River	0	15	14	13	13	16
Fort McDowell	6	2	0	0	0	2
Fort Mojave	0	0	0	0	0	2
Fort Yuma-Quechan	1	0	0	0	0	9
Gila River	5	8	25	6	10	4
Hopi	104	17	3	1	1	5
Hualapai	41	1	0	1	0	8
Kaibab Paiute	1	1	0	0	0	1
Navajo Nation	8,109	2,806	974	293	402	974
Pueblo of Zuni	54	9	9	7	0	65
Salt River Pima-Maricopa	0	0	0	0	0	4
San Carlos Apache	95	9	3	4	0	8
Total Reporting Reservations	**8,416**	**2,868**	**1,028**	**325**	**427**	**1104**
Percent of Reporting Reservations	**59%**	**20%**	**7%**	**2%**	**3%**	**8%**

Table 4-5 shows the distribution of farm sizes (by acreage) across reservations. Some reservations (Fort McDowell, Hopi, Hualapai, Navajo Nation, and San Carlos Apache) are comprised primarily of farms with fewer than 50 acres. In contrast, the Ak-Chin, Cocopah, Fort Mojave, Fort Yuma-Quechan, and Salt River Pima-Maricopa Reservations are comprised primarily of farms with 1,000 or more acres of farmland.

Table 4-5. The percentage of farms in each reservation in each acreage category (rows sum to 100%)

Reservation	1 to 9 acres	10 to 49 acres	50 to 179 acres	180 to 499 acres	500 to 999 acres	1,000 acres or more
Ak-Chin	0%	0%	0%	0%	33%	67%
Cocopah	0%	0%	0%	0%	0%	100%
Colorado River	0%	21%	20%	18%	18%	23%
Fort McDowell	60%	20%	0%	0%	0%	20%
Fort Mojave	0%	0%	0%	0%	0%	100%
Fort Yuma-Quechan	10%	0%	0%	0%	0%	90%
Gila River	9%	14%	43%	10%	17%	7%
Hopi	79%	13%	2%	1%	1%	4%
Hualapai	80%	2%	0%	2%	0%	16%
Kaibab Paiute	33%	33%	0%	0%	0%	33%
Navajo Nation	60%	21%	7%	2%	3%	7%
Pueblo of Zuni	38%	6%	6%	5%	0%	45%
Salt River Pima-Maricopa	0%	0%	0%	0%	0%	100%
San Carlos Apache	80%	8%	3%	3%	0%	7%

For many reservations, USDA does not disclose cropland data to avoid disclosing data for individual farms (Table 4-6). While the Navajo Reservation reports nearly 250,000 cropland acres, fewer than 30% of these were actually harvested. The San Carlos Apache Reservation also shows a large difference between potential cropland acres and actual harvested cropland. The Colorado River Indian Tribe and Gila River Indian Community also have differences between potential and actually harvested cropland, although the discrepancy is less pronounced. Irrigated acreage and harvested cropland are highly correlated and, in many cases, identical. This illustrates the importance of water for irrigation for crop production in arid Arizona.

Table 4-6. Total Cropland, Harvested Cropland, and Irrigated Acres.

Reservation	Total cropland acres	Harvested cropland acres	Irrigated acres
Ak-Chin	(D)	(D)	(D)
Cocopah	25,105	22,205	22,205
Colorado River	80,942	59,514	59,716
Fort McDowell	(D)	(D)	(D)
Fort Mojave	(D)	(D)	(D)
Fort Yuma-Quechan	31,928	31,191	30,860
Gila River	29,102	20,183	20,183
Hopi	553	368	368
Hualapai	(D)	(D)	(D)
Kaibab Paiute	(D)	(D)	(D)
Navajo Nation	249,985	69,387	71,728
Pueblo of Zuni	964	(D)	(D)
Salt River Pima-Maricopa	15,000	12,214	12,214
San Carlos Apache	1,516	246	243

(D) Withheld to avoid disclosing data for individual farms.

Table 4-7 reports on the distribution of farms and acreage by land tenure arrangement. For the Navajo Nation, while 85% of farm operators are tenants, tenants account for only 17% of acreage. In contrast, full owners are just 11% of farms, but 80% of acreage. This suggests that tenant-

operated farms are relatively small. There is a similar, although less pronounced, pattern on the Pueblo of Zuni Reservation, where full owners are only 5% of farms but account for slightly more than half of the acres.

Table 4-7. Number of Farms and Farm Acres by Tenure

Reservation	Full owners	Part owners	Tenants	Full owners	Part owners	Tenants
	% of farms			% of acres		
Ak-Chin	67%	33%	0%	(D)	(D)	(D)
Cocopah	0%	100%	0%	0%	100%	0%
Colorado River	20%	28%	52%	(D)	(D)	(D)
Fort McDowell	20%	10%	70%	(D)	(D)	(D)
Fort Mojave	100%	0%	0%	(D)	(D)	(D)
Fort Yuma-Quechan	10%	40%	50%	(D)	(D)	(D)
Gila River	5%	28%	67%	(D)	(D)	(D)
Hopi	19%	5%	76%	(D)	(D)	(D)
Hualapai	22%	0%	78%	99.96%	0.00%	0.04%
Kaibab Paiute	100%	0%	0%	(D)	(D)	(D)
Navajo Nation	11%	4%	85%	80%	3%	17%
Pueblo of Zuni	5%	8%	88%	52%	10%	37%
Salt River Pima-Maricopa	25%	25%	50%	(D)	(D)	(D)
San Carlos Apache	11%	0%	89%	100%	0%	0%
Total Reporting Reservations	**11%**	**4%**	**85%**	**83%**	**3%**	**15%**

(D) Withheld to avoid disclosing data for individual farms.

Table 4-8 reports crop, livestock, and total agricultural product sales. Again, USDA does not disclose many of these values. Two reservations along the Colorado River Mainstem (Colorado River Indian Tribe and Fort Yuma-Quechan Reservation) account for a large share of reported agricultural sales.

Table 4-8. Market Value of Agricultural Products Sold (in $)

Reservation	Total	Crops	Livestock & Animal Products
Ak-Chin	(D)	(D)	(D)
Cocopah	(D)	(D)	(D)
Colorado River[a]	$106,932,000	(D)	(D)
Fort McDowell	(D)	(D)	(D)
Fort Mojave	(D)	(D)	(D)
Fort Yuma-Quechan[a]	$354,471,000	(D)	(D)
Gila River	$35,031,000	$34,889,000	$142,000
Hopi	$2,329,000	$483,000	$1,846,000
Hualapai	$267,000	-	$267,000
Kaibab Paiute	$327,000	(D)	(D)
Navajo Nation[b]	$140,319,000	$121,275,000	$19,043,000
Salt River Pima-Maricopa	(D)	(D)	(D)
San Carlos Apache	$1,903,000	$223,000	$1,680,000
Total Reporting Reservations	**$641,579,000**	**$156,870,000**	**$22,978,000**

(D) Withheld to avoid disclosing data for individual farms.

a, Includes operations outside Arizona (in California).

b Includes operations outside of Arizona (in New Mexico and Utah).

Combined, these reservations account for 72% of the total reported crop sales of $641,579,000. As will be discussed, these reservations have a greater emphasis on high-value vegetable crops. The Navajo Nation also accounts for significant crop sales. For the Hopi, Hualapai, and San Carlos Apache Reservations, livestock sales are larger than crop sales.

Table 4-9 shows the raw number of farms in different sales classes, while Table 4-10 shows the percentage of farms in each reservation in each sales class.

Table 4-9. Number of Farms by Sales Class

	Less than $1,000	$1,000 to $2,499	$2,500 to $4,999	$5,000 to $9,999	$10,000 to $24,999	$25,000 to $49,999	$50,000 to $99,999	$100,000 or more
Ak-Chin	1	-	-	-	-	-	-	2
Cocopah	-	-	-	-	-	-	-	4
Colorado River	1	-	-	8	12	3	1	46
Fort McDowell	1	6	-	-	-	1	-	2
Fort Mojave	1	-	-	-	-	-	-	1
Fort Yuma-Quechan	-	-	-	-	-	-	1	9
Gila River	8	-	7	10	9	3	4	17
Hopi	56	6	23	18	12	15	-	1
Hualapai	37	3	2	4	1	2	2	-
Kaibab Paiute	-	-	-	-	-	2	-	1
Navajo Nation	8,898	1,839	1,180	920	571	115	21	14
Pueblo of Zuni	89	20	6	9	16	1	2	1
Salt River Pima-Maricopa	1	-	-	-	-	-	-	3
San Carlos Apache	90	14	4	1	-	3	2	5
Total	**9,183**	**1,888**	**1,222**	**970**	**621**	**145**	**33**	**106**

Table 4-10 illustrates that there are large differences in farm structure across different reservations. On Fort McDowell, Hualapai, Navajo, Pueblo of Zuni, and San Carlos Apache Reservations, 70% or more of farms have sales below $2,500. In contrast, farms with sales of $100,000 accounted for 100% of Cocopah, 90% of Fort Yuma-Quechan, 75% of Salt River Pima-Maricopa, and 67% of Ak-Chin farms.

Table 4-10. Percentage of Farms in Each Reservation in Each Sales Class (rows sum to 100%)

	Less than $1,000	$1,000 to $2,499	$2,500 to $4,999	$5,000 to $9,999	$10,000 to $24,999	$25,000 to $49,999	$50,000 to $99,999	$100,000 or more
Ak-Chin	33%	0%	0%	0%	0%	0%	0%	67%
Cocopah	0%	0%	0%	0%	0%	0%	0%	100%
Colorado River	1%	0%	0%	11%	17%	4%	1%	65%
Fort McDowell	10%	60%	0%	0%	0%	10%	0%	20%
Fort Mojave	50%	0%	0%	0%	0%	0%	0%	50%
Fort Yuma - Quechan	0%	0%	0%	0%	0%	0%	10%	90%
Gila River	14%	0%	12%	17%	16%	5%	7%	29%
Hopi	43%	5%	18%	14%	9%	11%	0%	1%
Hualapai	73%	6%	4%	8%	2%	4%	4%	0%

	Less than $1,000	$1,000 to $2,499	$2,500 to $4,999	$5,000 to $9,999	$10,000 to $24,999	$25,000 to $49,999	$50,000 to $99,999	$100,000 or more
Kaibab Paiute	0%	0%	0%	0%	0%	67%	0%	33%
Navajo Nation	66%	14%	9%	7%	4%	1%	0%	0%
Pueblo of Zuni	62%	14%	4%	6%	11%	1%	1%	1%
Salt River Pima-Maricopa	25%	0%	0%	0%	0%	0%	0%	75%
San Carlos Apache	76%	12%	3%	1%	0%	3%	2%	4%
Total	**65%**	**13%**	**9%**	**7%**	**4%**	**1%**	**0%**	**1%**

Table 4-11. Marketing Practices

	Food sold directly to consumers		Food sold directly to retail markets, institutions, and food hubs for local or regionally branded products	
Reservations	**% of farms**	**Sales ($ thousands)**	**% of farms**	**Sales ($ thousands)**
Ak-Chin	0%	0	33%	(D)
Cocopah	0%	0	0%	0
Colorado River	7%	15	0%	0
Fort McDowell	70%	61	10%	(D)
Fort Mojave	0%	0	0%	0
Fort Yuma-Quechan	0%	0	0%	0
Gila River	3%	(D)	0%	0
Hopi	0%	0	0%	0
Hualapai	2%	(D)	2%	(D)
Kaibab Paiute	0%	0	0%	0
Navajo Nation	2%	727	1%	(D)
Pueblo of Zuni	0%	0	0%	0
Salt River Pima-Maricopa	0%	0	25%	(D)
San Carlos Apache	3%	1	13%	20

(D) Withheld to avoid disclosing data for individual farms.

While 70% of Fort McDowell reservation farms sold food directly to consumers, relatively few farms on other reservations were engaged in direct sales to consumers (Table 4-11). The Navajo Nation had a smaller share of farms participating in direct sales, but higher total sales. Reservations in the metro counties of Maricopa and Pinal Counties (Ak-Chin, Fort McDowell, Salt River Pima-Maricopa) had greater participation in sales directly to retail markets, institutions, or food hubs, sales of local or regionally branded products.

Table 4-12 shows total production expenses, along with expenses for selected itemized inputs. Production expenses exceeded $200 million on the Cocopah, Fort Yuma-Quechan, and Navajo Nation reservations. These input purchases directly increase sales, incomes, and employment in local input-supply companies. These sales, along with wage payments to farm labor, increase local incomes and spending power in local economies. These three reservations accounted for 85% of the total reported production expenditure.

Table 4-12. Farm Production Expenses (in $ thousands)

	Selected Itemized Inputs							
Reservation	**Total Expenses**	**Fertilizer**	**Chemicals**	**Livestock & poultry**	**Feed**	**Fuel**	**Hired farm labor**	**Interest**
	($ thousands)							
Ak-Chin	(D)	(D)	(D)	(D)	(D)	(D)	(D)	(D)
Cocopah	$208,673	$20,110	$16,088	-	-	$5,913	$46,965	$2,634
Colorado River	$80,810	$10,980	$7,432	$102	$506	$7,011	$9,354	$1,061
Fort McDowell	$4,245	(D)	(D)	(D)	(D)	$147	$478	-
Fort Mojave	(D)	(D)	(D)	(D)	(D)	(D)	(D)	(D)
Fort Yuma-Quechan	$231,355	$34,455	$27,475	(D)	(D)	$19,742	$47,061	$1,157
Gila River	$22,159	$2,888	$2,567	$12	$179	$1,845	$5,193	(D)
Hopi	$2,229	$7	$5	$269	$665	$458	$272	(D)
Hualapai	$1,013	-	-	-	$427	$179	$68	$51
Kaibab Paiute	$109	(D)	(D)	-	$32	$16	-	-
Navajo Nation	$217,885	$13,743	$10,688	$2,694	$55,751	$32,133	$31,779	$2,205
Salt River Pima-Maricopa	(D)	(D)	(D)	-	-	(D)	(D)	(D)
San Carlos Apache	$4,009	$11	-	$281	$805	$314	$444	$60
Total	**$772,487**	**$82,194**	**$64,255**	**$3,358**	**$58,365**	**$67,758**	**$141,614**	**$7,168**

(D) Withheld to avoid disclosing data for individual farms.

Table 4-13 shows the cost shares for selected inputs. The single largest item, however, was other or unreported expenses. For reservations where agricultural production emphasizes crop production, cost shares are relatively larger for fertilizers, agricultural chemicals, and labor. For reservations specializing more in livestock production, feed and fuel cost share are relatively larger.

Table 4-13. Selected Inputs as a Percentage of Farm Production Expenses (%)

Reservation	Fertilizer	Chemicals	Livestock & poultry	Feed	Fuel	Hired farm labor	Interest	Other / unreported
Ak-Chin	(D)	(D)	(D)	(D)	(D)	(D)	(D)	(D)
Cocopah	10%	8%	0%	0%	3%	23%	1%	56%
Colorado River	14%	9%	0%	1%	9%	12%	1%	55%
Fort McDowell	(D)	(D)	(D)	(D)	3%	11%	0%	85%
Fort Mojave	(D)	(D)	(D)	(D)	(D)	(D)	(D)	(D)
Fort Yuma-Quechan	15%	12%	(D)	(D)	9%	20%	1%	44%
Gila River	13%	12%	0%	1%	8%	23%	(D)	43%
Hopi	0%	0%	12%	30%	21%	12%	(D)	25%
Hualapai	0%	0%	0%	42%	18%	7%	5%	28%
Kaibab Paiute	(D)	(D)	0%	29%	15%	0%	0%	56%
Navajo Nation	6%	5%	1%	26%	15%	15%	1%	32%
Salt River Pima-Maricopa	(D)	(D)	(D)	(D)	(D)	(D)	(D)	(D)

Reservation	Fertilizer	Chemicals	Livestock & poultry	Feed	Fuel	Hired farm labor	Interest	Other / unreported
San Carlos Apache	0%	0%	7%	20%	8%	11%	1%	52%
Total	11%	8%	0%	8%	9%	18%	1%	45%

(D) Withheld to avoid disclosing data for individual farms.

The USDA Reservation Survey collected information on selected land use practices (Table 4-14). Tile drainage can be used to remove excess moisture from farm fields. Improved drainage can improve irrigation water management and improve crop yields. It is a long-term investment with upfront capital costs, with benefits of improved land productivity accruing after a few years (Leibold and Johanns, 2023). In Arizona, tile drainage may aid in salinity control (Watson, 1999, a,b), which can be particularly important along the Colorado River mainstem (Szmurlo and Gramig, 2024). Artificial drainage ditches can also provide a variety of ecosystem services (Herzon and Helenius, 2008; Kozelová, et al., 2020). Under conservation easements, landholders may receive payments from the government or conservation groups in exchange for a long-term agreement to keep land as farmland, wetlands, or for some other conservation purpose, precluding developing it. There is only a small level of conservation easement use on the Navajo Nation and Colorado River Indian Tribes Reservations.

Table 4-14. Adoption of Selected Land Use Practices

	Land drained by tile		Land artificially drained by ditches		Land under conservation easement	
Reservations	**% of farms**	**acres**	**% of farms**	**acres**	**% of farms**	**acres**
Ak-Chin	0%	0	0%	0	0%	0
Cocopah	50%	(D)	25%	(D)	0%	0
Colorado River	0%	0	11%	18,115	3%	(D)
Fort McDowell	0%	0	0%	0	0%	0
Fort Mojave	0%	0	0%	0	0%	0
Fort Yuma-Quechan	10%	(D)	0%	0	0%	0
Gila River	2%	(D)	43%	9,057	0%	0
Hopi	2%	(D)	0%	0	0%	0
Hualapai	0%	0	0%	0	0%	0
Kaibab Paiute	0%	0	0%	0	0%	0
Navajo Nation	1%	2,761	4%	25,527	1%	29,421
Pueblo of Zuni	0%	0	0%	0	0%	0
Salt River Pima-Maricopa	0%	0	25%	(D)	0%	0
San Carlos Apache	0%	0	0%	0	0%	0

(D) Withheld to avoid disclosing data for individual farms.

Table 4-15 reports on adoption of different tillage practices. Intensive or conventional tillage leaves less than 15% of the soil surface covered by crop residue. It may use implements such as moldboard, disk, or chisel plows. Conservation or reduced tillage conserves soil by reducing erosion and decreasing water pollution. Conservation tillage leaves 30% or more of the soil surface covered by crop residue after planting. Reduced tillage leaves 15-30% of the soil surface covered. No-till or minimum till is a practice used for weed control and helps reduce weed seed germination

by not disturbing the soil. Farms can use more than one tillage practice on their lands. So, it is possible for the percentage of farms that adopt the three tillage practices to exceed 100%, as it does for the Fort Mojave and Fort Yuma Quechan Reservations. Roughly half of the farms on the Hopi and Fort Mojave Reservations practice no-till. A significant share of farms on the Ak-Chin, Fort Mojave, Fort Yuma-Quechan, Gila River, and Salt River Pima-Maricopa Reservations practice conservation or reduced tillage.

Table 4-15. Adoption of Tillage Practices

	No-till		Conservation or reduced tillage, excluding no-till		Intensive or conventional tillage	
Reservations	**% of farms**	**acres**	**% of farms**	**acres**	**% of farms**	**acres**
Ak-Chin	0%	-	33%	(D)	33%	(D)
Cocopah	0%	-	0%	-	100%	24,793
Colorado River	0%	-	3%	(D)	24%	24,986
Fort McDowell	0%	-	0%	-		0.1
Fort Mojave	50%	(D)	50%	(D)	0.5	(D)
Fort Yuma-Quechan	0%	-	30%	2,855	80%	24,916
Gila River	2%	(D)	60%	7,869	7%	1,564
Hopi	45%	366	8%	30	10%	123
Hualapai	0%	-	0%	-	0%	-
Kaibab Paiute	0%	-	0%	-	0%	-
Navajo Nation	12%	10,516	2%	12,837	7%	34,916
Pueblo of Zuni	0%	-	1%	(D)	0%	-
Salt River Pima-Maricopa	0%	-	25%	(D)	75%	(D)
San Carlos Apache	0%	-	0%		0%	-

(D) Withheld to avoid disclosing data for individual farms.

Cover crops are planted primarily to manage soil fertility, soil quality, water, weeds, pests, diseases, or wildlife. While 20% of Fort Yuma-Quechan and 25% Cocopah Reservation farms plant cover crops, they are not used extensively elsewhere on Arizona tribal lands (Table 4-16). Adoption of precision agriculture practices was more extensive, the share of farms adopting ranging from 22% (Gila River), 23% (Colorado River), 25% (Cocopah), 30% (Fort Yuma-Quechan), 33% (Ak-Chin), and 50% (Salt River Pima-Maricopa). Adoption rates were 0-10% elsewhere. Precision agricultural practices rely on digital information technology to improve agricultural productivity. Examples include global positioning (GPS) guidance systems, GPS yield monitoring and soil mapping, variable rate input applications, drones for scouting fields or monitoring livestock, electronic tagging, precision feeding, and robotic milking.

Table 4-16. Adoption of Cover Crops and Precision Agriculture

	Cropland planted to a cover crop		Use of precision agriculture practices
Reservations	**% of farms**	**acres**	**% of farms**
Ak-Chin	0%	-	33%
Cocopah	25%	(D)	25%
Colorado River	1%	(D)	23%
Fort McDowell	0%	0	0%
Fort Mojave	0.5	(D)	0.5
Fort Yuma-Quechan	20%	(D)	30%
Gila River	0%	-	22%
Hopi	1%	(D)	2%
Hualapai	0%	-	0%
Kaibab Paiute	0%	-	0%
Navajo Nation	1%	6,006	3%
Pueblo of Zuni	0%	-	5%
Salt River Pima-Maricopa	0%	-	50%
San Carlos Apache	0%	-	10%

(D) Withheld to avoid disclosing data for individual farms.

Internet access is far from universal on American Indian farms (Table 4-17). Of 14 reporting reservations, only four reservations (Cocopah, Fort McDowell, Fort Yuma-Quechan, Kaibab Paiute) have 100% internet access across all farms, with three more (Colorado River, Gila River, Hualapai) at 90-98%. Internet access is particularly low on the Pueblo of Zuni (36%), Navajo Nation (53%), Fort Mohave (50%), and Ak-Chin (67%) reservations. There are six reservations where 25% or less of farms have broadband access, while another four have between 36-55% broadband access. Broadband access is critical for the adoption and use of precision agriculture practices (USDA, 2019).

Table 4-17. Internet Access of Reservation Farms (%)

		Percentage of Farms Using					
	Percentage of Farms with Internet access	**Dial-up**	**Broadband (DSL, cable, fiber optic)**	**Cellular data plan**	**Satellite**	**Don't know**	**Other**
Ak-Chin	67%	0%	67%	67%	0%	0%	0%
Cocopah	100%	0%	75%	75%	0%	0%	0%
Colorado River	90%	0%	55%	69%	32%	6%	0%
Fort McDowell	100%	10%	80%	80%	0%	0%	10%
Fort Mojave	50%	0%	50%	50%	0%	0%	0%
Fort Yuma-Quechan	100%	0%	50%	80%	20%	0%	10%
Gila River	98%	10%	17%	55%	21%	7%	21%
Hopi	74%	0%	36%	39%	2%	1%	0%
Hualapai	90%	0%	14%	65%	6%	24%	0%
Kaibab Paiute	100%	0%	67%	100%	0%	0%	0%
Navajo Nation	53%	1%	9%	43%	8%	2%	0%
Pueblo of Zuni	36%	0%	1%	32%	3%	2%	0%
Salt River Pima-Maricopa	75%	0%	25%	75%	0%	0%	0%
San Carlos Apache	78%	0%	12%	16%	37%	24%	3%

The main producers of vegetable crops within Arizona's tribal areas are reservations in the Yuma area (Table 4-18), along the Colorado River mainstem (Cocopah, Fort Yuma-Quechan). These are followed by the Navajo Nation. The Navajo Nation and Hopi Reservations are the only ones reporting squash acreage.

Table 4-18. Land in Vegetables and Orchards

	Land in vegetables		Squash		Land in orchards	
	farms	**acres**	**farms**	**acres**	**farms**	**acres**
Ak-Chin	1	(D)	0	0	1	(D)
Cocopah	4	19,314	0	0	4	(D)
Colorado River	4	383	0	0	0	0
Fort McDowell	0	0	0	0	1	(D)
Fort Mojave	1	(D)	0	0	1	(D)
Fort Yuma-Quechan	8	23,477	0	0	1	(D)
Gila River	0	0	0	0	1	(D)
Hopi	32	57	19	11	0	0
Hualapai	0	0	0	0	0	0
Kaibab Paiute	0	0	0	0	1	(D)
Navajo Nation	1,192	8,271	969	593	32	25
Pueblo of Zuni	0	0	0	0	0	0
Salt River Pima-Maricopa	1	(D)	0	0	0	0
San Carlos Apache	3	2	3	(Z)	3	1

(D) Withheld to avoid disclosing data for individual farms.

Table 4-19. Land in Melons

	Cantaloupes		Honeydew melons		Watermelons	
Reservations	**farms**	**acres**	**farms**	**acres**	**farms**	**acres**
Ak-Chin	0	0	0	0	0	0
Cocopah	1	(D)	0	0	0	0
Colorado River	0	0	0	0	0	0
Fort McDowell	0	0	0	0	0	0
Fort Mojave	0	0	0	0	0	0
Fort Yuma-Quechan	3	(D)	0	0	1	(D)
Gila River	0	0	0	0	0	0
Hopi	8	4	8	4	27	27
Hualapai	0	0	0	0	0	0
Kaibab Paiute	0	0	0	0	0	0
Navajo Nation	565	262	423	241	828	572
Pueblo of Zuni	0	0	0	0	0	0
Salt River Pima-Maricopa	1	(D)	0	0	1	(D)
San Carlos Apache	3	(Z)	0	0	3	(Z)

(D) Withheld to avoid disclosing data for individual farms. (Z) Less than half an acre reported.

The Navajo Nation is the only reservation that reports much acreage planted to melons (Table 4-19). However, the Cocopah and Fort Yuma-Quechan Reservations report farms producing melons, but acreage data are not disclosed. Both these reservations are in the major melon-producing Yuma area, so they could potentially have more significant acreage in melons.

The Navajo Nation and Hopi reservations are centers of traditional corn production (Table 4-20). Traditional corn is an open-pollinated (non-hybrid), non-genetically modified cultivar of Zea mays. Varieties have been indigenously developed and bred for attributes such as drought tolerance or food quality. According to the USDA Indian Reservation Survey, "Traditional corn grown on southwest reservations has been passed from generation to generation through seed saving by American Indian and Hispanic communities. Traditional corn is culturally significant (page A-3)." The Gila River Indian Community (GRIC) reports that two farms produce traditional corn, but acreage is not disclosed. The GRIC and Salt River Pima-Maricopa Reservation are the only reservations reporting much production of corn for silage or greenchop (used as animal feed).

Table 4-20. Corn production and acreage, including traditional corn

	Corn for grain			Corn for silage or greenchop			Traditional Corn		
Reservations	**farms**	**acres**	**bushels**	**farms**	**acres**	**tons**	**farms**	**acres**	**pounds**
Ak-Chin	-	-	-	1	(D)	(D)	-	-	-
Cocopah	-	-	-	-	-	-	-	-	-
Colorado River	1	(D)	(D)	1	(D)	(D)	-	-	-
Fort McDowell	-	-	-	-	-	-	-	-	-
Fort Mojave	-	-	-	-	-	-	-	-	-
Fort Yuma-Quechan	-	-	-	-	-	-	-	-	-
Gila River	-	-	-	5	2,250	24,750	2	(D)	(D)
Hopi	-	-	-	-	-	-	57	301	157,100
Hualapai	-	-	-	-	-	-	-	-	-
Kaibab Paiute	-	-	-	-	-	-	-	-	-
Navajo Nation	10	(D)	(D)	6	6	60	1,793	4,381	1,360,945
Pueblo of Zuni	-	-	-	-	-	-	-	-	-
Salt River Pima-Maricopa	-	-	-	3	2,497	74,086	-	-	-
San Carlos Apache	-	-	-	-	-	-	-	-	-

(D) Withheld to avoid disclosing data for individual farms.

Three reservations, combined, report producing around two million bushels of wheat (Table 4-21). These are reservations along the Colorado River mainstem (Cocopah, Colorado River, Fort Yuma-Quechan).

Table 4-22 breaks down wheat production by type. On the reporting reservations, this is primarily durum wheat production. The Colorado River mainstem is a national center of durum wheat production. Durum wheat is used largely in pasta production due to its high gluten content.

Table 4-21. Wheat and Small Grains Production

	Barley			Oats			Wheat, all		
Reservations	**farms**	**acres**	**bushels**	**farms**	**acres**	**bushels**	**farms**	**acres**	**bushels**
Ak-Chin	1	(D)	(D)	-	-	-	-	-	-
Cocopah	1	(D)	(D)	-	-	-	3	3,925	429,197
Colorado River	-	-	-	-	-	-	8	5,006	520,170
Fort McDowell	-	-	-	-	-	-	-	-	-
Fort Mojave	-	-	-	1	(D)	(D)	1	(D)	(D)
Fort Yuma-Quechan	1	(D)	(D)	-	-	-	7	11,002	1,103,975
Gila River	-	-	-	-	-	-	1	(D)	(D)
Hopi	-	-	-	-	-	-	-	-	-
Hualapai	-	-	-	-	-	-	-	-	-
Kaibab Paiute	-	-	-	-	-	-	-	-	-
Navajo Nation	-	-	-	7	22	1,035	20	(D)	(D)
Pueblo of Zuni	-	-	-	-	-	-	-	-	-
Salt River Pima-Maricopa	-	-	-	-	-	-	1	(D)	(D)
San Carlos Apache	-	-	-	-	-	-	-	-	-

(D) Withheld to avoid disclosing data for individual farms.

Table 4-22. Winter, Durum, and Spring Wheat Production

	Winter wheat			Durum wheat			Spring wheat		
Reservations	**farms**	**acres**	**bushels**	**farms**	**acres**	**bushels**	**farms**	**acres**	**bushels**
Ak-Chin	-	-	-	-	-	-	-	-	-
Cocopah	-	-	-	3	3,925	429,197	-	-	-
Colorado River	3	(D)	(D)	4	4,404	460,328	1	(D)	(D)
Fort McDowell	-	-	-	-	-	-	-	-	-
Fort Mojave	-	-	-	1	(D)	(D)	-	-	-
Fort Yuma-Quechan	-	-	-	7	11,002	1,103,975	-	-	-
Gila River	-	-	-	1	(D)	(D)	-	-	-
Hopi	-	-	-	-	-	-	-	-	-
Hualapai	-	-	-	-	-	-	-	-	-
Kaibab Paiute	-	-	-	-	-	-	-	-	-
Navajo Nation	2	(D)	(D)	9	45	924	9	24	780
Pueblo of Zuni	-	-	-	-	-	-	-	-	-
Salt River Pima-Maricopa	-	-	-	1	(D)	(D)	-	-	-
San Carlos Apache	-	-	-	-	-	-	-	-	-

(D) Withheld to avoid disclosing data for individual farms.

Reservation farms report producing over one-half million tons of forage and more than 30,000 bales of cotton (Table 4-23). A bale of cotton weighs 480 pounds, so this comes out to be more than 14.4 million pounds of cotton.

Table 4-23. Cotton, Bean, and Forage Production

	Cotton, all			Dry edible beans			Forage (all hay and haylage, grass silage, & greenchop)		
Reservations	**farms**	**acres**	**bales**	**farms**	**acres**	**cwt**	**farms**	**acres**	**tons / dry equivalent**
Ak-Chin	1	(D)	(D)	-	-	-	1	(D)	(D)
Cocopah	1	(D)	(D)	-	-	-	3	2,826	12,721
Colorado River	8	3,004	11,259	-	-	-	63	49,063	354,467
Fort McDowell	-	-	-	-	-	-	1	(D)	(D)
Fort Mojave	-	-	-	-	-	-	1	(D)	(D)
Fort Yuma-Quechan	3	1,972	5,481	1	(D)	(D)	8	8,620	51,972
Gila River	7	4,612	13,798	-	-	-	43	11,520	70,632
Hopi	-	-	-	6	6	60	-	-	-
Hualapai	-	-	-	-	-	-	-	-	-
Kaibab Paiute	-	-	-	-	-	-	1	(D)	(D)
Navajo Nation	-	-	-	26	(D)	(D)	661	25,748	49,845
Pueblo of Zuni	-	-	-	-	-	-	1	(D)	(D)
Salt River Pima-Maricopa	1	(D)	(D)	-	-	-	3	4,595	30,250
San Carlos Apache	-	-	-	-	-	-	4	240	810

(D) Withheld to avoid disclosing data for individual farms.

Table 4-24 reports on selected crop yields for 2022 at the reservation level. Several reservations did not report yields. It also compares reservation yields with the Arizona state average from state-level Census of Agriculture data for 2022. Yields for individual crops vary significantly across reservations. For some reservations, yield are significantly lower than the state average. For others, yields are close to or exceed the state average. State average corn silage yields were 26.9 bushels per acre, while yields on the Salt River Pima-Maricopa Reservation were 30 bushels per acre. State average cotton yields were 2.9 bales per acre. They were 2.8 bales per acre on the Fort Yuma-Quechan Reservation and 3.0 and 3.7 bales per acre respectively on the Gila River and Colorado River reservations. Forage yields were near or above the state average for the Colorado River, Fort Yuma-Quechan, Gila River and Salt River Pima-Maricopa reservations.

Similarly, yields of all wheat on the Colorado River and Fort Yuma-Quechan reservations are comparable to state average yields. Durum wheat yields on the Cocopah and Colorado River Reservations are comparable to the state average. Table 4-24 and Table *4-25* highlight that, under the right production conditions, reservation crop productivity can be comparable to or exceed that of other Arizona farms.

Table 4-24. Crop Yields, Selected Crops

	Corn silage	Traditional corn	Cotton	Dry edible beans	Forage
Reservations	**bushels / acre**	**tons / acre**	**bales / acre**	**cwt / acre**	**tons (dry equivalent) / acre**
Cocopah	-	-		-	4.5
Colorado River	-	-	3.7	-	7.2
Fort Yuma-Quechan	-	-	2.8	-	6.0
Gila River	11	-	3.0	-	6.1
Hopi	-	522	-	10	
Navajo Nation	10	311	-	-	1.9
Salt River Pima-Maricopa	30	-	-	-	6.6
San Carlos Apache	-	-	-	-	3.4
Arizona State Average	26.9	-	2.9	24.6	6.2

Table 4-25. Crop Yields, Wheat and Oats

	Oats	Wheat, all	Durum wheat	Spring wheat
Reservations	**bushels / acre**			
Cocopah		47.0	109.3	-
Colorado River		103.9	104.5	
Fort Yuma-Quechan		100.3	100.3	-
Navajo Nation	47.0		20.5	33
Arizona State Average	(D)	103.2	106	88.4

(D) Withheld to avoid disclosing data for individual farms.

Table 4-26 shows that while milk production is not significant on Arizona reservations, beef production is. The bulk of beef cow inventory is on reservations in the northern and eastern parts of Arizona.

Table 4-26. Beef and Milk Cow Inventories

	Beef cows		Milk cows	
Reservations	**farms**	**number**	**farms**	**number**
Ak-Chin	-	-	-	-
Cocopah	-	-	-	-
Colorado River	8	726	-	-
Fort McDowell	-	-	-	-
Fort Mojave	-	-	-	-
Fort Yuma-Quechan	-	-	-	-
Gila River	13	297	-	-
Hopi	88	3,093	-	-
Hualapai	43	1,043	-	-
Kaibab Paiute	3	168	-	-
Navajo Nation	4,277	42,672	4	8
Pueblo of Zuni	56	2,456	-	-
Salt River Pima-Maricopa	-	-	-	-
San Carlos Apache	83	2,595	-	-

The Navajo Nation accounts for the bulk of cattle and calves' inventories and sales (Table 4-27). They are followed by the Hopi, San Carlos Apache, and Pueblo of Zuni reservations. Note that the number of farms with inventories significantly exceeds the number of farms with sales. This could occur if a significant share of cattle is raised for home consumption.

Table 4-27. All Cattle and Calves, Inventory and Sales

	Cattle and calves inventory		Cattle and calves sold	
Reservations	**farms**	**number**	**farms**	**number**
Ak-Chin	-	-	-	-
Cocopah	-	-	-	-
Colorado River	14	1,175	12	650
Fort McDowell	1	(D)	-	-
Fort Mojave	-	-	-	-
Fort Yuma-Quechan	-	-	-	-
Gila River	13	384	9	109
Hopi	88	4,061	58	2,142
Hualapai	48	1,422	14	249
Kaibab Paiute	3	253	3	119
Navajo Nation	5,066	66,187	2,121	15,307
Pueblo of Zuni	62	4,081	38	1,882
Salt River Pima-Maricopa	-	-	-	-
San Carlos Apache	109	5,596	42	1,911

(D) Withheld to avoid disclosing data for individual farms.

The Navajo Nation also accounts for the bulk of sheep and lambs' inventories and sales (Table 4-28). Again, the number of farms with inventories significantly exceeds sales. This could occur if substantial numbers are raised for home consumption.

Table 4-28. Sheep and Lambs Inventory and Sales

	Sheep and lambs inventory		Sheep and lambs sold	
Reservations	**farms**	**number**	**farms**	**number**
Ak-Chin	-	-	-	-
Cocopah	-	-	-	-
Colorado River	1	(D)	1	(D)
Fort McDowell	-	-	-	-
Fort Mojave	-	-	-	-
Fort Yuma-Quechan	-	-	-	-
Gila River	-	-	-	-
Hopi	19	369	4	21
Hualapai	-	-	-	-
Kaibab Paiute	-	-	-	-
Navajo Nation	8,910	170,363	2,057	20,815
Pueblo of Zuni	72	3,227	35	557
Salt River Pima-Maricopa	-	-	-	-
San Carlos Apache	1	(D)	-	-

(D) Withheld to avoid disclosing data for individual farms.

The Navajo Nation is the only reservation with significant inventories or sales of goats (Table 4-29).

Table 4-29. Goats Inventory and Sales

	Goats, inventory		Goats, sold	
Reservation	**farms**	**number**	**farms**	**number**
Ak-Chin	-	-	-	-
Cocopah	-	-	-	-
Colorado River	-	-	-	-
Fort McDowell	-	-	-	-
Fort Mojave	-	-	-	-
Fort Yuma-Quechan	-	-	-	-
Gila River	2	(D)	-	-
Hopi	-	-	-	-
Hualapai	-	-	-	-
Kaibab Paiute	-	-	-	-
Navajo Nation	4,017	45,931	572	4,373
Pueblo of Zuni	15	43	-	-
Salt River Pima-Maricopa	-	-	-	-
San Carlos Apache	-	-	-	-

(D) Withheld to avoid disclosing data for individual farms.

The Navajo Nation also has the largest inventory and sales of horses and ponies (Table 4-30).

Table 4-30. Horses and Ponies, Inventory and Sales

	Total horses and ponies inventory		Total horses and ponies sold	
Reservation	**farms**	**number**	**farms**	**number**
Ak-Chin	-	-	-	-
Cocopah	-	-	-	-
Colorado River	12	72	6	12
Fort McDowell	1	(D)	1	(D)
Fort Mojave	-	-	-	-
Fort Yuma-Quechan	-	-	-	-
Gila River	17	70	4	8
Hopi	57	261	7	19
Hualapai	8	30	-	-
Kaibab Paiute	3	(D)	1	(D)
Navajo Nation	7,060	35,615	614	1,937
Pueblo of Zuni	33	111	-	-
Salt River Pima-Maricopa	-	-	-	-
San Carlos Apache	19	958	9	24

(D) Withheld to avoid disclosing data for individual farms.

The Navajo Nation is the only reservation with appreciable inventories or sales of hogs and pigs (Table 4-31). The Navajo Nation also accounts for the bulk of layer inventories, with much smaller numbers on the Hopi and Pueblo of Zuni Reservations. Layers are chickens raised specifically for egg production.

Table 4-31. Hogs and Pigs and Poultry (Layers) Inventory and Sales

	Hogs & pigs inventory		Hogs & pigs sold		Layers inventory	
Reservation	**farms**	**number**	**farms**	**number**	**farms**	**number**
Ak-Chin	-	-	-	-	1	(D)
Cocopah	-	-	-	-	-	-
Colorado River	-	-	-	-	2	(D)
Fort McDowell	-	-	-	-	-	-
Fort Mojave	-	-	-	-	-	-
Fort Yuma-Quechan	-	-	-	-	-	-
Gila River	2	(D)	-	-	2	(D)
Hopi	-	-	-	-	12	256
Hualapai	-	-	-	-	-	-
Kaibab Paiute	-	-	-	-	-	-
Navajo Nation	448	1,115	61	163	1,521	11,938
Pueblo of Zuni	13	40	5	30	11	89
Salt River Pima-Maricopa	-	-	-	-	-	-
San Carlos Apache	-	-	-	-	3	30

(D) Withheld to avoid disclosing data for individual farms.

Producer-Level Data

The Reservation Survey, in addition to reporting farm-level data, reports data for agricultural producers. USDA defines producers as people involved in farm decision-making. Producers in this section of this chapter report include all producers operating reservation farms on reservations, whether or not they are American Indians.

Table 4-32. Total, Male, and Female Producers, and Persons Living in Producer Households

Reservations	Producers	% of Total Reporting Reservation Producers	Male Producers	Female Producers	% Female Producers
Ak-Chin	6	0.0%	5	1	17%
Cocopah	15	0.1%	10	5	33%
Colorado River	111	0.5%	83	28	25%
Fort McDowell	13	0.1%	12	1	8%
Fort Mojave	2	0.0%	2	-	0%
Fort Yuma-Quechan	24	0.1%	20	4	17%
Gila River	90	0.4%	61	29	32%
Hopi	211	0.9%	154	57	27%
Hualapai	57	0.2%	33	24	42%
Kaibab Paiute	8	0.0%	6	2	25%
Navajo Nation	22,442	95.6%	10,758	11,684	52%
Pueblo of Zuni	239	1.0%	172	67	28%
Salt River Pima-Maricopa	9	0.0%	7	2	22%
San Carlos Apache	256	1.1%	200	56	22%
Total	**23,483**	**100%**	**11,523**	**11,960**	**51%**

Across all reporting reservations, 51% of producers are female (Table 4-32). This is driven by the 52% of female producers on the Navajo Reservation. The percentage of female producers on other reservations

ranged from 0% (Fort Mojave) to 42% (Hualapai). For all other reservations, excluding the Navajo Nation, 27% of producers were female.

The percentage of producers reporting farming as their primary occupation averaged 67% across reservations (Table 4-33). This figure varies widely across reservations, from a low of 7% for the San Carlos Apache Reservation to a high of 83% for the Fort Yuma-Quechan Reservation. The percentage of producers who reside on the farm they operate averaged 81%, with this value driven by 83% from the Navajo Nation. Again, there was substantial variation. At the low end, no producers on the Ak-Chin or Salt River Pima-Maricopa Reservations reside on the farm they operate. Percentages are also low on the Cocopah (8%) and San Carlos Apache (5%) Reservations. In contrast, along with 83% for the Navajo Nation, the percentage of producers residing on their farms was 89% on the Hualapai Reservation and 67% on the Hopi Reservation.

Table 4-33. Producer Primary Occupation and Place of Residence

	Primary occupation			Place of residence		
Reservations	**Farming**	**Other occupation**	**Percent Farming**	**On farm operated**	**Not on farm operated**	**Percent on farm operated**
Ak-Chin	4	2	67%	-	6	0%
Cocopah	12	3	80%	4	11	8%
Colorado River	78	33	70%	58	53	52%
Fort McDowell	7	6	54%	2	11	15%
Fort Mojave	1	1	50%	1	1	50%
Fort Yuma-Quechan	20	4	83%	6	18	25%
Gila River	71	19	79%	13	77	14%
Hopi	87	124	41%	142	69	67%
Hualapai	23	34	40%	51	6	89%
Kaibab Paiute	2	6	25%	1	7	13%
Navajo Nation	15,305	7,137	68%	18,625	3,817	83%
Pueblo of Zuni	97	142	41%	27	212	11%
Salt River Pima-Maricopa	7	2	78%	-	9	0%
San Carlos Apache	17	239	7%	13	243	5%
Total	**15,731**	**7,752**	**67%**	**18,943**	**4,540**	**81%**

Reliance on off-farm work by American Indian producers varies widely across reservations, with the share working any days off-farm ranging from none for the Fort Mojave Reservation to 88% for the Kaibab Paiute and San Carlos Apache reservations (Table 4-34). Accounting for federal holidays and weekends, there are roughly a total of 250 workdays a year. Some reservations have a sizeable percentage of producers working 200 days or more off-farm. These represent many producers working full-time or nearly full-time off-farm jobs.

Table 4-34. Producer Days Worked Off Farm

Reservations	None	Any	1 to 49 days	50 to 99 days	100 to 199 days	200 days or more
Ak-Chin	33%	67%	0%	0%	17%	50%
Cocopah	67%	33%	20%	0%	0%	13%
Colorado River	53%	47%	8%	0%	5%	33%
Fort McDowell	46%	54%	0%	0%	0%	54%
Fort Mojave	100%	0%	0%	0%	0%	0%
Fort Yuma-Quechan	71%	29%	4%	0%	4%	21%
Gila River	64%	36%	0%	2%	7%	27%
Hopi	29%	71%	4%	23%	18%	26%
Hualapai	35%	65%	12%	4%	2%	47%
Kaibab Paiute	13%	88%	0%	0%	0%	88%
Navajo Nation	50%	50%	6%	9%	10%	26%
Pueblo of Zuni	19%	81%	8%	8%	16%	49%
Salt River Pima-Maricopa	67%	33%	11%	0%	11%	11%
San Carlos Apache	13%	88%	0%	1%	1%	85%

Producers' average years on their present farm ranged from 15.8 years to 35.7 years (Table 4-35). Across all reservations, 50% of more producers have 10 or more years of experience. The Colorado River Reservations had 26% of producers with 4 or fewer years of experience, while the Hualapai Reservation had 24% of producers with 4 or fewer years of experience.

Table 4-35. Years on Present Farm

Reservations	2 years or less	3 or 4 years	5 to 9 years	10 years or more	Average years on present farm
Ak-Chin	0%	0%	17%	83%	(D)
Cocopah	0%	0%	33%	67%	27.3
Colorado River	19%	7%	9%	65%	20.7
Fort McDowell	8%	0%	0%	92%	24.5
Fort Mojave	0%	0%	50%	50%	(D)
Fort Yuma-Quechan	0%	4%	0%	96%	27.1
Gila River	0%	0%	26%	74%	20.9
Hopi	0%	3%	8%	89%	35.7
Hualapai	4%	18%	18%	61%	18.1
Kaibab Paiute	0%	0%	38%	63%	15.8
Navajo Nation	3%	4%	11%	82%	29.4
Pueblo of Zuni	0%	3%	26%	71%	23.3
Salt River Pima-Maricopa	0%	0%	0%	100%	31.1
San Carlos Apache	5%	0%	3%	91%	32.3

(D) Withheld to avoid disclosing data for individual farms.

Average experience of producers on any farm (not just their present farm) ranged from 17.3 years on the Kaibab Paiute Reservation to 34.8 years on the Ak-Chin Reservations (Table 4-36). The percentage of producers with 5 or less years of experience on any farm is 25% for the Hualapai Reservation and 30% for the Colorado River Reservation.

Table 4-36. Years on Any Farm

Reservations	5 years or less	6 to 10 years	11 years or more	Average years on any farm
Ak-Chin	0%	0%	100%	34.8
Cocopah	0%	33%	67%	30.6
Colorado River	30%	2%	68%	22
Fort McDowell	0%	0%	100%	27.6
Fort Mojave	0%	50%	50%	(D)
Fort Yuma-Quechan	4%	0%	96%	33.8
Gila River	0%	26%	74%	21
Hopi	4%	6%	90%	36
Hualapai	25%	11%	65%	19.7
Kaibab Paiute	0%	38%	63%	17.3
Navajo Nation	8%	10%	82%	30.6
Pueblo of Zuni	13%	16%	71%	23.9
Salt River Pima-Maricopa	0%	0%	100%	34
San Carlos Apache	7%	2%	91%	32.5

(D) Withheld to avoid disclosing data for individual farms.

Across reporting reservations, average producer age ranges between 58 and 70 years old (Table 4-37). USDA defines young producers as those less than 35 years of age. Except for the Navajo Nation, the absolute number of young producers is quite small. The Pueblo of Zuni reports 26 young producers. For the other 12 reporting reservations, the number ranges between zero and ten per reservation. For these 12 reservations, there are 37 young producers in total, an average of 3 per reservation.

Table 4-37. Average Producer Age and Young Producers

Reservation	Average producer age	Young producers (less than 35 years old)
Ak-Chin	58.2	0
Cocopah	61.1	0
Colorado River	56.6	9
Fort McDowell	63.9	0
Fort Mojave	(D)	0
Fort Yuma-Quechan	60.3	0
Gila River	63.6	4
Hopi	60.7	9
Hualapai	53.9	5
Kaibab Paiute	69.8	0
Navajo Nation	60.8	1,841
Pueblo of Zuni	57.0	26
Salt River Pima-Maricopa	62.9	0
San Carlos Apache	62.7	10

(D) Withheld to avoid disclosing data for individual farms.

For each of the reporting reservations, more than half of the producers are more than 54 years old. A substantial proportion is more than 64 years old (Table 4-38). In contrast, very few producers are younger than 35. Except for the Hualapai Reservation, less than a quarter of producers are younger than 45.

Table 4-38. Age Distribution of Producers

Reservations	Under 25 years	25 to 34 years	35 to 44 years	45 to 54 years	55 to 64 years	65 to 74 years	75 years and over
Ak-Chin	0%	0%	0%	33%	50%	17%	0%
Cocopah	0%	0%	20%	20%	13%	33%	13%
Colorado River	5%	3%	14%	27%	21%	4%	26%
Fort McDowell	0%	0%	0%	15%	62%	15%	8%
Fort Mojave	0%	0%	0%	50%	50%	0%	0%
Fort Yuma-Quechan	0%	0%	4%	21%	21%	50%	4%
Gila River	0%	4%	2%	12%	19%	58%	4%
Hopi	1%	3%	10%	12%	30%	28%	15%
Hualapai	5%	4%	23%	18%	18%	26%	7%
Kaibab Paiute	0%	0%	0%	13%	25%	25%	38%
Navajo Nation	3%	5%	8%	13%	26%	26%	19%
Pueblo of Zuni	0%	11%	9%	17%	37%	18%	8%
Salt River Pima-Maricopa	0%	0%	0%	11%	56%	22%	11%
San Carlos Apache	2%	2%	4%	2%	53%	20%	18%

Table 4-39 reports on producer involvement with different types of decision-making. Producers can be involved in more than one type of decision, so the percentage for each reservation can add up to more than 100%. The bulk of producers are involved in day-to-day decision-making. This figure is lower for the Ak-Chin Reservation (50%) and the Salt River Pima-Maricopa Reservation 56%). A higher share of producers is involved in livestock decisions on reservations in the eastern half of Arizona, where livestock production dominates. Producer involvement in land use and/or crop decisions is relatively high across most reservations. The share of producers involved in marketing decisions ranges from 17% to 100%. For record keeping and/or financial management, the range is 40% to 100%. For estate planning or succession planning, the range is greatest, from 0% to 93%.

Table 4-39. Producer Involvement with On-Farm Decision Making

Reservations	Day-to-day decisions	Land use or crop decisions	Livestock decisions	Marketing decisions	Record keeping or financial management	Estate planning or succession planning
Ak-Chin	50%	50%	17%	17%	50%	33%
Cocopah	100%	73%	27%	27%	73%	73%
Colorado River	87%	80%	30%	59%	78%	58%
Fort McDowell	100%	85%	77%	100%	100%	31%
Fort Mojave	100%	100%	50%	50%	50%	0%
Fort Yuma-Quechan	96%	92%	13%	71%	63%	63%
Gila River	93%	89%	31%	76%	82%	64%
Hopi	87%	82%	70%	38%	40%	31%
Hualapai	98%	86%	98%	91%	93%	93%
Kaibab Paiute	75%	88%	38%	25%	25%	50%
Navajo Nation	87%	82%	84%	62%	65%	49%
Pueblo of Zuni	91%	69%	96%	63%	74%	59%
Salt River Pima-Maricopa	56%	67%	11%	33%	44%	44%
San Carlos Apache	95%	89%	94%	97%	86%	86%

Differences between American Indian & Non-Indian Operators on Reservation Farms

The reservations report data for the total number of operations and producers, as well as for producers who are American Indians. This makes it possible to compare characteristics of American Indian operated farms to farms operated by other groups on reservation farm and ranch lands. Generally, reservation farms in the western half of Arizona tend to be operated by non-American Indians (Table 4-40). The Cocopah, Fort McDowell, Fort Yuma-Quechan, and Salt River Pima-Maricopa reservations reported no on-reservation farms operated by American Indians. On the Ak-Chin Reservation, one of three farms was American Indian operated, but this farm had less than $1,000 in sales, while the other two non-American Indian farms reported $100,000 or more in sales. Similarly, the Fort Mohave Reservation reports one American Indian operated farm, which reported less than $1,000 in sales. Reservations with farms primarily operated by non-American Indians are in western and central Arizona and focus on crop production. In contrast, farms in the eastern half of Arizona are primarily American Indian operated. These reservations are concentrated on livestock production. All (or virtually all) farms were American Indian operated on the Hopi, Hualapai, Kaibab Paiute, Navajo, and Pueblo of Zuni reservations.

Table 4-40. American Indian operated and other-operated farms on Arizona Indian Reservations

	Total	American Indian Operated	Other Operated	Percent American Indian Operated
Ak-Chin	3	1	2	33%
Cocopah	4	0	4	0%
Colorado River	71	42	29	59%
Fort McDowell	10	0	10	0%
Fort Mojave	2	1	1	50%
Fort Yuma-Quechan	10	0	10	0%
Gila River	58	50	8	86%
Hopi	131	131	0	100%
Hualapai	51	51	0	100%
Kaibab Paiute	3	3	0	100%
Navajo Nation	13,558	13,498	60	99.6%
Pueblo of Zuni	144	142	2	99%
Salt River Pima-Maricopa	4	0	4	0%
San Carlos Apache	119	116	3	97%

Other operators tend to operate farms with more acreage than American Indian operators. While 60% of American Indian operators farm 1 to 9 acres, only 17% of other operators do so (Table 4-41). While 8% of American Indian operators farm 1,000 acres or more, 33% on other operators do so.

Table 4-41. Farm Size Distribution: Farms with American Indian Operators vs. Other Operators

	Total	American Indian Operator	Other Operator	American Indian Operator	Other Operator
All Farms	14,168	14,035	133		
1 to 9 acres	8,416	8,394	22	60%	17%
10 to 49 acres	2,868	2,849	19	20%	14%
50 to 179 acres	1,028	1,013	15	7%	11%
180 to 499 acres	325	316	9	2%	7%
500 to 999 acres	427	403	24	3%	18%
1,000 acres or more	1,104	1,060	44	8%	33%

One sees a similar pattern with farm sales: 65% of American Indian farms had sales of less than $1,000, compared to 21% for other farms (Table 4-42). At the other end of the distribution, 47% of other farms have sales of $100,000, while only 0.3% of American Indian farms do. Less than 2% of American Indian farms have sales of $25,000 or more, while 49% of other farms do.

Table 4-42. Farm Sales Distribution: Farms with American Indian Operators vs. Other Operators

	Number of farms		Percent of farms in each sales category	
	American Indian	**Other**	**American Indian**	**Other**
Total farms	14,035	133		
Less than $1,000	9,155	28	65%	21%
$1,000 to $2,499	1,862	26	13%	20%
$2,500 to $4,999	1,219	3	9%	2%
$5,000 to $9,999	962	8	7%	6%
$10,000 to $24,999	617	4	4%	3%
$25,000 to $49,999	144	1	1%	1%
$50,000 to $99,999	32	1	0.2%	1%
$100,000 or more	44	62	0.3%	47%

Percentages may not add to 100% due to rounding.

Table 4-43 reports agricultural sales on American Indian and other operated farms on Indian reservations in thousands of US dollars. For many of the reservations, only ranges of sales values are reported. For the Navajo Reservation, sales values are only reported for livestock sales. Agricultural sales from non-American Indian operators on reservation farms total at a minimum of $429.6 million. Of this, 83% came from sales on the Fort Yuma-Quechan Reservation and 15% came from the Colorado River Reservation. The vast majority of Fort Yuma-Quechan sales come from operations in California.

Table 4-43. Total, crop, and livestock sales on American Indian operated and other-operated reservation farms ($ thousands)

	Market value of all agricultural products sold ($ thousands)		Market value of crops sold ($ thousands)		Market value of livestock sold ($ thousands)	
	American Indian operated farms	Other farms	American Indian operated farms	Other farms	American Indian operated farms	Other farms
Ak Chin	<1	≥200	-	(D)	(D)	(D)
Cocopah	-	≥400	-	(D)	0	0
Colorado River [a]	43,001	63,931	42,916	(D)	85	(D)
Fort McDowell	-	>231	-	(D)	0	(D)
Fort Mojave	<1	≥100	(D)	(D)	0	0
Fort Yuma-Quechan [a]	-	354,471	-	(D)	0	(D)
Gila River	26,134	8,897	(D)	(D)	(D)	(D)
Hopi	2,329	-	483	-	1,846	0
Hualapai	267	-	-	-	267	0
Kaibab Paiute	327	-	(D)	(D)	(D)	(D)
Navajo Nation [b]	(D)	≥1,018	(D)	(D)	18,025	1,018
Pueblo of Zuni [c]	(D)	≥100	-	-	(D)	(D)
Salt River Pima-Maricopa	-	≥300	-	(D)	0	(D)
San Carlos Apache	1,898	5	220	3	1,678	2

a.Includes operations in California
b. Includes operations in New Mexico and Utah
c. Includes operations in New Mexico

Table 4-44 compares American Indian producers and non-American producers, both operating on reservation farms. It also tests whether differences are statistically significant. There are several differences between producers on reservation farms operated by American Indians compared to producers on reservation farms operated by others. On farms operated by American Indians, a higher proportion of producers are female, have farming as their primary occupation, reside at the farm they operated, and have no days worked off-farm. These differences are highly significant (based on Chi-square tests of independence).

Table 4-44. Differences in characteristics of producers on reservation farms operated by American Indians and reservation farms operated by others with Chi-square tests of differences between groups

Male vs. Female Producers	Male #	Female #	Male %	Female %	Null Hypothesis
American Indian	11284	11867	49%	51%	Reject
Other	239	93	72%	28%	p = 0.0000
Primary Occupation	**Farming #**	**Other**	**Farming**	**Other**	**Null Hypothesis**
American Indian	15542	7609	67%	33%	Reject
Other	189	143	57%	43%	p = 0.0000
Residence	**On farm operated**	**Not on farm operated**	**On farm operated**	**Not on farm operated**	**Null Hypothesis**
American Indian	18789	4362	81%	19%	Reject
Other	154	178	46%	54%	p = 0.0000
Days worked off farm	**None**	**Any**	**None**	**Any**	**Null Hypothesis**
American Indian	11313	11838	49%	51%	Reject
Other	138	194	42%	58%	p = 0.0082

Table 4-45 makes further comparisons between producers on American Indian versus other-operated farms. Producers on reservation farms operated by American Indians tend to work fewer days off farm, have more years of experience on their present farm, have more years of experience operating any farm, and have a higher share of older producers. All these differences are highly significant (based on Chi-squared tests of independence).

Table 4-45. Additional differences in characteristics of producers on reservation farms operated by American Indians and reservation farms operated by others with Chi-square tests of differences between groups

Days worked off farm	American Indian Operator	Other Operator	Years on present farm	American Indian Operator	Other Operator
Null Hypothesis	Rejected	p = 0.0000	Null Hypothesis	Rejected	p = 0.0000
Percentage of producers					
None	49%	42%	≤ 2 years	3%	8%
1 to 49 days	6%	11%	3 or 4 years	4%	4%
50 to 99 days	9%	6%	5 to 9 years	11%	25%
100 to 199 days	10%	8%	≥ 10 years	82%	63%
≥200 days	27%	33%			

Years operating any farm	American Indian Operator	Other Operator	Years of Age	American Indian Operator	Other Operator
Null Hypothesis	Rejected	p = 0.0000	Null Hypothesis	Rejected	p = 0.0000
Percentage of producers					
≤ 5 years	8%	17%	< 25 years	3%	2%
6 to 10 years	10%	9%	25 to 34 years	5%	3%
≥ 11 years	82%	73%	35 to 44 years	8%	13%
			45 to 54 years	13%	23%
			55 to 64 years	27%	26%
			65 to 74 years	26%	24%
			≥ 75 years	19%	9%

Producers on reservation farms operated by American Indians are more frequently involved in several on-farm decisions than producers on reservation farms operated by others (Table 4-46). These decisions include land use and/or crop decisions, livestock decisions, and marketing decisions. Chi-square tests were conducted to test the hypotheses of equality between farm operation type and decision-making between American Indian and non-American Indian operated farms. For these three decisions, the difference in frequencies of involvement is statistically significant at the 5% level. For two other decisions – day-to-day decisions and estate planning or succession planning – producers on farms operated by American Indians have a higher percentage of producers involved. These differences are statistically significant at the 10%, but not 5%. The share of producers involved in record keeping and/or financial management is the same across both farm types.

Table 4-46. Number (#) and percentage (%) of producers making on-farm decisions split between farms operated by American Indians and farms operated by others, with hypothesis tests concerning differences across farm types

	Number of producers making decisions		Percentage of producers making decisions		
Farm operator	**Day-to-day decisions No**	**Day-to-day decisions Yes**	**Day-to-day decisions No**	**Day-to-day decisions Yes**	**Null Hypothesis[a]**
American Indian	2988	20163	13%	87%	Fail to Reject
Other	54	278	16%	84%	p =0.0704[b]
	Land use and/or crop No	**Land use and/or crop Yes**	**Land use and/or crop No**	**Land use and/or crop Yes**	**Null Hypothesis**
American Indian	4169	18982	18%	82%	Reject
Other	81	251	24%	76%	p =0.0027
	Livestock No	**Livestock Yes**	**Livestock No**	**Livestock Yes**	**Null Hypothesis**
American Indian	3719	19432	16%	84%	Reject
Other	181	151	55%	45%	p =0.0000
	Marketing No	**Marketing Yes**	**Marketing No**	**Marketing Yes**	**Null Hypothesis**
American Indian	8633	14518	37%	63%	Reject
Other	157	175	47%	53%	p = 0.0002
	Record keeping and/or financial management No	**Record keeping and/or financial management Yes**	**Record keeping and/or financial management No**	**Record keeping and/or financial management Yes**	**Null Hypothesis**
American Indian	7989	15162	35%	65%	Fail to reject
Other	117	215	35%	65%	p = 0.7804
	Estate planning or succession planning No	**Estate planning or succession planning Yes**	**Estate planning or succession planning No**	**Estate planning or succession planning Yes**	**Null Hypothesis**
American Indian	11623	11528	50%	50%	Fail to reject
Other	183	149	55%	45%	p = 0.07531[b]

a. The null hypothesis is that decision-making is independent of whether the farm is operated by American Indians or others.

b. The null hypothesis can be rejected at the 10% level, but not at the 5% level of significance

5. Navajo Nation Census

As part of the 2022 Census of Agriculture, USDA collected data for a special tabulation of Navajo Nation agriculture, the *Navajo Nation Profile* (USDA 2025). This document reports data at the Chapter level, Agency level, and for the Nation as a whole. For administrative purposes, the Navajo Nation is divided into five profiles. These are the Chinle Agency, the Eastern Agency, the Fort Defiance Agency, the Shiprock Agency, and the Western Agency. Units with agencies are divided further into individual chapters. Agency and chapter boundaries do not necessarily fit with the boundaries of U.S. counties or states. The Navajo Nation spans the states of Arizona, New Mexico, and Utah. The Western Agency spans Arizona and Utah; the Chinle Agency is almost entirely in Arizona, the Eastern Agency is entirely in New Mexico, the Shiprock Agency spans Arizona, New Mexico, and Utah, and the Fort Defiance Agency spans Arizona and New Mexico. Individual chapters within Agencies may also span U.S. states.

The purpose of the present study is to assess the economic contribution of tribal agriculture to the Arizona economy. As such, it does not consider the economic contribution to neighboring states, even though a given reservation, such as the Navajo Nation, may contribute to the economies of multiple states. To confine analysis to the state of Arizona, we attempted to estimate which agricultural activities on the Navajo Nation were carried out entirely within the boundaries of Arizona. To do this, data from the Navajo Nation Profile were used in conjunction with remote sensing data from USDA's CropScape and from County-level data by race and ethnicity of producers.

The first step is to establish lower bound and upper bound estimates for agricultural activities on the Navajo Nation Reservation occurring within the state of Arizona using the Nation chapter-level data. Chapters can be divided into three types: (a) those entirely within the borders of Arizona, (b) those entirely outside the borders of Arizona, and (c) those that are partially in Arizona and partially in New Mexico and/or Utah. Activities (such as crop acres planted) in chapters entirely in Arizona form a lower bound estimate of activities within Arizona. The actual level of activities within Arizona will be greater than this lower bound.

In principle, an upper bound estimate of activities in Arizona could be the sum of activities of chapters entirely in Arizona and chapters partially in Arizona (and partially in other states). This upper bound assumes that all activities in chapters partially in Arizona are conducted entirely on the Arizona side of the border (this is what makes it the upper bound). Such an upper bound is only an upper bound of reported activities, however. This occurs for two reasons. First, for some chapters partially in Arizona, data are not reported for some activities to avoid disclosing information about individual operations. Second, USDA does not assign all activities in the Navajo Nation to specific chapters (or agencies). So, it is uncertain where within the Nation these occurred. Thus, our "upper bound" estimate of activities is really an "upper bound of reported activities."

Table 5-1 reports data for chapters completely inside, completely outside, and partially inside Arizona, along with quantities and values that were not assigned by USDA to any specific chapter or agency. USDA assigned 99.9% of Navajo Nation farms and ranches to specific chapters. Of these assigned chapters, 59% (7,934 of 13,543) were located in Arizona. Another 15% were in chapters that

span Arizona and other states. So, based on USDA estimates, 59% to 74% of Navajo Nation farms are within Arizona.

Table 5-1. Upper and lower bound estimates of Navajo Nation farms, sales, and expenses within the borders of Arizona, 2022

Chapters	Number of farms and ranches	Market value of products sold	Crop sales	Livestock sales	Farm production expenses
Completely outside AZ	3,580	7,300,000	2,048,000	5,293,000	25,596,000
Completely inside AZ	7,934	14,891,000	4,489,000	9,596,000	83,595,000
Partially in AZ	2,029	4,346,000	1,892,000	1,736,000	18,397,000
Total reported chapter values	13,543	26,537,000	8,429,000	16,625,000	127,588,000
Lower bound reported in AZ	7,934	14,891,000	4,489,000	9,596,000	83,595,000
Upper bound reported in AZ	9,963	19,237,000	6,381,000	11,332,000	101,992,000
Navajo Nation Total	13,558	140,319,000	121,275,000	19,043,000	217,885,000
Amount unassigned	15	113,782,000	112,846,000	2,418,000	90,297,000
Percent unassigned	0.1%	81%	93%	13%	41%

Turning to the value of sales, there is a much higher percentage, 81% of total sales, that are not assigned to any specific chapter. For chapters where data are disclosed, between $14.9 million and $19.2 million occurred within Arizona. Yet, $113.8 million was not assigned to any specific chapter. For crop sales, between $4.5 million and $6.4 million in sales are reported within Arizona, while $112.8 million is not assigned to any chapter by USDA. One reason for the large amounts not disclosed may be to avoid disclosing specific data about the operations of Navajo Agricultural Products Industry (NAPI), which is engaged in substantial crop production and food-related value-added activities. Data are not reported for some New Mexico chapters where NAPI operates. As of 2018, NAPI had 72,000 crop acres under production (Haskie, 2018). Older records report NAPI crop revenues of $37,180,472 for the fiscal year ending May 31, 2010, and $44,630,802 for the fiscal year ending May 31, 2011 (Moss-Adams, 2011). For context, this would be the equivalent of $48 million and $ 56.5 million in inflation-adjusted 2022 dollars, using the GDP price deflator. NAPI's direct crop-related production expenses were $37.5 million in FY 2010 and $40.3 million in FY 2011 (Moss-Adams, 2011). This would be the equivalent of about $48.4 million and $51 million in 2022 inflation-adjusted dollars.

Note that while unassigned total agricultural sales and crop sales are quite large, unassigned livestock sales are relatively smaller, accounting for only 13% of Navajo Nation livestock sales. Of sales reported for chapters, the lower bound estimate for livestock sales in Arizona was $9.6 million, with an upper bound estimate from reporting chapters is $11.3 million. NAPI does not have significant livestock operations. Thus, while NAPI operations in New Mexico likely account for a significant portion of crop sales and expense values that are not assigned to any particular chapter, but occur in New Mexico, we do not have enough information to estimate how much of the unassigned activities are carried out within Arizona. Thus, the Navajo Nation Profile data can give some indication of lower-bound estimates of sales and expenditures occurring within Arizona. This, by definition, is a minimum estimate. Based on the *Profil*e data alone, there remains a high degree of uncertainty about total sales and expenditure occurring within Arizona. Developing more precise

estimates above this lower bound requires the use of other data sources, such as remote sensing data from USDA's CropScape.

Table 5-2 reports lower and upper bound estimates for Navajo Nation livestock inventories within Arizona. For livestock inventories (compared to sales and expense data), a far higher percentage is assigned to specific chapters. The percentage of animals unassigned to chapters is relatively large for horses and ponies, 27%, but is only 2% for cattle and calves and beef cows, 1% for goats, and 0% for sheep. Lower bound estimates for livestock in Arizona are 35,086 for cattle and calves,21,220 for beef cows, 110,642 for sheep and lambs, 17,821 for horses and ponies, and 30,304 for goats. Table 5-2 reports two upper-bound estimates for livestock inventories. The first is the sum of livestock reported in chapters completely in Arizona and partially in Arizona. The second estimate adds all unassigned livestock numbers to this reported upper bound. This represents a conservatively large upper bound measuring the absolute maximum values Arizona livestock numbers can take. It implicitly assumes all unassigned livestock inventories are within Arizona. Compared to sales and expense data, the percentage difference in lower and upper bound estimates of livestock inventories in Arizona is much lower. Except for horses and ponies, chapter-level estimates of livestock numbers have relatively few missing, unassigned values.

Table 5-2. Upper and lower bound estimates of Navajo Nation livestock inventories within the borders of Arizona, 2022

	Cattle & calves	Beef cows	Sheep & lambs	Horses & ponies	Goats
Chapters	**Number of animals**				
Completely outside AZ	21,368	15,519	35,776	5,100	7,258
Completely inside AZ	35,086	21,220	110,642	17,821	30,304
Partially in AZ	8,343	5,094	23,945	,178	7,781
Total reported chapter values	64,797	41,833	170,363	26,099	45,343
Navajo Nation total	66,187	42,672	170,363	35,615	45,931
Amount unassigned	1,390	839	0	9,516	588
Percent unassigned	2%	2%	0%	27%	1%
Lower bound reported in AZ	35,086	21,220	110,642	17,821	30,304
Upper bound reported in AZ	43,429	26,314	134,587	20,999	38,085
Upper bound reported in AZ plus unassigned	44,819	27,153	134,587	30,515	38,673

Table 5-3 reports lower and upper bound estimates for Navajo Nation crop acres within Arizona. Except for traditional corn, the percentage of acres not assigned to specific chapters is quite high. This may be to avoid disclosing information about individual operations such as NAPI. Except for traditional corn, the gap between lower and upper bound estimates based on chapter-specific reporting is large. The gap between the lower bound estimates and the chapter-based upper bound plus unassigned values is even larger. Lower bound estimates of acres in Arizona are 1,496 for traditional corn, 115 for hay and haylage, 755 for vegetables, 112 for cantaloupes, 58 for honeydew melons, 251 for squash, and 174 for watermelon. Actual values could be considerably larger, though. Absolute acreage differences between the lower and absolute upper bounds are relatively

small for squash and melons (although the percentage differences are large). Absolute and percentage differences are both quite large for hay and haylage and for vegetables.

Table 5-3. Upper and lower bound estimates of Navajo Nation crop acres within the borders of Arizona, 2022

Chapters	Traditional corn	Hay & haylage	Vegetables	Cantaloupes	Honeydew melons	Squash	Watermelon
Completely outside AZ	2,341	3,428	395	92	114	178	131
Partially in AZ	412	801	237	-	14	82	47
Completely inside AZ	1,496	115	755	112	58	251	174
Total reported chapter values	4,249	4,344	1,387	204	186	511	352
Navajo Nation Total	4,381	25,748	8,271	262	241	593	572
Amount unassigned	132	21,404	6,884	58	55	82	220
Percent unassigned	3%	83%	83%	22%	23%	14%	38%
Lower bound reported in AZ	1,496	115	755	112	58	251	174
Upper bound reported in AZ	1,908	916	992	112	72	333	221
Upper bound reported in AZ plus unassigned	2,040	22,320	7,876	170	127	415	441

Summary & Implications

The Navajo Nation Profile data can be used to establish lower bound estimates of sales, production expenses, livestock inventories, and acreage of selected crops within the borders of Arizona. These lower bound estimates are based on reported chapter-specific data for those chapters lying entirely within the borders of Arizona. Except for livestock inventories, USDA does not assign a substantial number of values to specific chapters. This means the upper bound estimates of values can be substantially larger than the lower bound estimates. We see this for crop sales, production expenses, and acreage of hay and haylage and of vegetables.

While lower bound estimates provide information about the minimum amount of Navajo Nation agricultural activity occurring within Arizona, more accurate estimation will require other data sources than the Navajo Nation Profile. One possibility would be to use remote sensing data such as that available from USDA's CropScape. The lower and upper bound estimates developed here could then be used to cross-validate remote sensing data. For example, one would expect that remote sensing estimates of the acreage of specific crops to lie between the lower and upper bound estimates based on the Navajo Nation Profile.

Because of the high values not assigned to specific chapters, this means that reported chapter-level data cannot be treated as data observations for statistical analysis. Actual values of chapter-

level estimates of sales, production expenses, and acreage could be substantially larger than reported chapter-level values for some chapters. This means that most chapter-level data from the Navajo Nation Profiles cannot be treated as data points in statistical analysis. Chapter-level data on acreage decisions could potentially be created in CropScape with the Profile serving as a cross-check to validate estimates. Chapter-level data on livestock inventories suffer far less from non-reporting issues that can bias statistical analysis. In principle, one might use chapter-level numbers from the 2022 Profile and earlier profiles to examine factors that may affect herd sizes at the chapter level, such as drought indicators. Livestock inventory data are available for 2012, 2017, and 2022 (USDA, 2022).

Another avenue for future research could be to construct a Four-Corners input-output model that included not only the Navajo Nation but also surrounding counties in Arizona, New Mexico, Colorado, and Utah. Such a Four-Corner model would not artificially separate Navajo economic activity and could more fully capture the contribution of Navajo Nation agriculture (or other economic activities) on the broader regional economy.

6. Economic Contribution of Tribal Agriculture

This portion of the analysis presents an estimate of the economic contributions of tribal agriculture in Arizona to the state economy. Drawing on data compiled in previous sections of the report and supplementing that information with other data sources, the analysis estimates tribal agricultural sales and expenses, and models the total economic activity supported in the state by that agricultural production through value chain linkages.

In this study, tribal agriculture is defined based on who operates the farm and where the farm is located, distinguishing between reservation and non-reservation areas, as well as between farms operated by American Indians and non-American Indians. Under this framework, tribal agriculture includes farms operated by American Indians both inside and outside reservation boundaries. In addition, farms operated by non-American Indians within reservation areas are also included to fully account for agricultural activity occurring on reservation lands (see Table 6-1).

Table 6-1. Definition of Tribal Agriculture for the Analysis

	Race/Ethnicity	
Areas	Farms Operated by American Indians	Farms Operated by Non-American Indians
Farms Inside American Indian Reservation Areas	x	x
Farms Outside American Indian Reservation Areas	x	

As the previous chapters demonstrate, data availability does not perfectly align with this conceptual definition. Information on farms operated by American Indians in Arizona is available from the Census of Agriculture by Race and Ethnicity, regardless of whether they are located within American Indian reservation areas or not (Chapters 2 and 3). For reservation areas, the Census of Agriculture of American Indian Reservations survey provides data on all farms located within reservation boundaries, including both American Indian and non-American Indian operators (Chapter 4). As a result, farms operated by American Indians within reservations appear in both data sources, creating an overlap that must be carefully addressed to avoid double accounting. In contrast, farms operated by non-American Indians within reservations are only observed in the Reservation Census, while farms operated by American Indians outside reservations are only observed in the Census of Agriculture. It is important to note that some tribes are not included in the Reservation Census (see Table 4-1).

Tribal Agricultural Sales

Crop Sales

Crop sales values for Arizona tribes were estimated based on available public data. The methodology prioritizes official data from the Census of Agriculture and Reservation Census when available and relies on spatial and economic estimation methods only when Census data are unavailable or not disclosed, or when tribal agricultural land extends beyond Arizona.

According to the Census of Agriculture, producers who identify their race and ethnicity as "American Indian or Alaska Native alone or in combination with other races" in Arizona reported $108,126,000 in crop sales in 2022. The Reservation Census reported $643,298,000 (only for the reporting tribes and disclosed data). Note that the Reservation Census reports sales for the reservation areas in total, even when the tribal land extends beyond Arizona borders, as is the case with the Navajo Nation, Colorado River Indian Tribes, and others.

On the other hand, the Census of Agriculture numbers by race and ethnicity do not include farms operated by non-American Indian producers within reservation areas. In many cases, American Indian tribes lease agricultural land to non-American Indian producers. Using data from the Reservation Census, we estimate that only 21% of total crop sales within reservation areas are generated by farms operated by American Indians.

As a result, limiting the measurement of tribal crop activity to sales reported by American Indian producers alone would significantly underestimate the true scale of agricultural production occurring on tribal lands. To more accurately capture tribal crop sales, we therefore go beyond total sales reported in the Census of Agriculture for American Indian producers (both within and outside reservation areas) and additionally include crop sales generated by non-American Indian producers operating within reservation boundaries in Arizona (see Figure 6-1). Appendix A offers more details about the estimation process.

Figure 6-1. Framework followed to estimate crop sales

Data Source: Census of Agriculture (Producers by Race and Ethnicity)

Data Source: Reservation Census

When the Census of Agriculture and the Reservation Census do not report data for a specific tribe, the estimates were constructed at the ZIP code level and then weighted by the share of tribal land area within each ZIP code. The share of tribal cropland within each ZIP code was estimated by extracting crop acreage from CropScape. The results were cross-checked against the Reservation Census-reported acreage, ensuring that sales were only attributed to crops for which acreage was reported in the Census (see Appendix A for more details).

Total crop sales were distributed between different agricultural sectors (grain farming, vegetable and melon farming, fruit farming, cotton farming, and all other crop farming) using Reservation Census-reported acreage combined with crop acreage estimated from CropScape.

Livestock & Other Animal Production Sales

According to the Census of Agriculture, producers who identify their race and ethnicity as "American Indian or Alaska Native alone or in combination with other races" reported $23,443,000 in sales of livestock, poultry, and related products in 2022. Using the Indian Reservation Survey, we were also able to identify an estimated $517,000 in livestock sales by non-American Indian producers operating within reservation areas, bringing the total tribal livestock and other animal production sales estimate to $23,961,000.

To distribute that total between different economic sectors (beef cattle ranching and other animal production), we estimate the market value of livestock sales across reservations using a harmonized methodology that combines livestock inventory and market prices (see Appendix B).

Sales Estimates

Estimates of tribal agriculture's crop sales, livestock and other animal production sales, and total agricultural sales in Arizona are presented in Table 6-2. *Estimated Agricultural Sales by Arizona Tribal Agriculture, 2022*. According to our estimates, the tribal agricultural sales totaled $434 million in 2022, where $410 million was generated by crop sales and $23 million by livestock and other animal production sales.

Table 6-2. Estimated Agricultural Sales by Arizona Tribal Agriculture, 2022

Tribe	Total Sales
Crop Sales	$410,079,000
Livestock Sales	$23,961,000
Total Agricultural Sales	$434,040,000

Statewide Economic Contribution

To estimate the total economic contribution of tribal agriculture to Arizona's economy, a statewide economic contribution analysis was conducted using IMPLAN's 2022 state-level Social Accounting Matrix (SAM), customized with USDA Census of Agriculture and Reservation Census data, following Montanía et al. (2025).

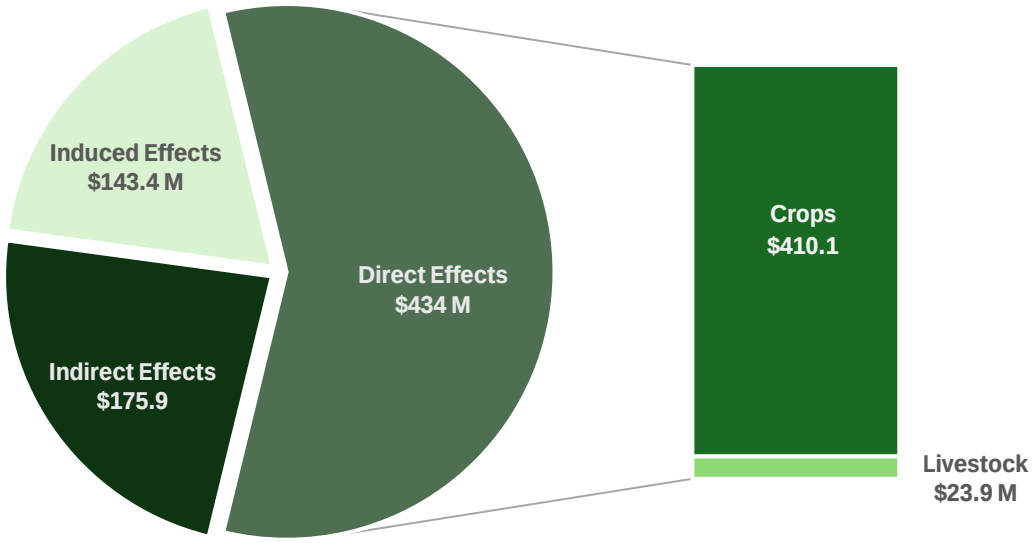
The economic contribution analysis was conducted using IMPLAN's multi-industry contribution analysis method, which simultaneously examines on-farm agricultural production and upstream input suppliers. To avoid double-counting of inter-industry transactions, where the output of one stage of the supply chain becomes an input to the next, the Local Use of Local Supply (LULS) coefficients were set to zero for all industries included in the analysis.

The statewide model estimates the total ripple effects of tribal agriculture across the Arizona economy as a whole, including employment, labor income, value added, and output effects

generated through supply chain linkages (indirect effects) and household spending (induced effects).

In 2022, the sales generated by tribal on-farm activities were roughly $434 million, directly contributing $168.8 million to Arizona's GDP. Crops and livestock production directly supported an estimated 2,310 jobs. Crop industries[1] contributed approximately $410 million to state output, and beef cattle and other animal production contributed an estimated $23.9 million (see Figure 6-2).

Figure 6-2. Economic Contribution of Tribal Agriculture to Arizona State Sales, 2022 (Sales, in Millions of 2022 USD)



Direct sales of crops and livestock only represent a part of tribal agriculture's total contribution to Arizona's economy. Agricultural sales support indirect and induced multiplier effects, generating additional rounds of business-to-business and household-to-business transactions in the local economy. These transactions support additional sales, value added, income, and jobs in other industries. Direct sales of $434 million in 2022 supported an additional $175.8 million in indirect effects and $143.4 million in induced effects, for a total sales contribution of $753.3 million (Table 6-3).

The contribution of tribal on-farm activities to Arizona's GDP was $347.5 million, including multiplier effects. An estimated 2,310 jobs were directly supported by agricultural industries, generating labor income of $106.6 million. Including direct, indirect, and induced multiplier effects, tribal agriculture in Arizona supported a total of 3,820 jobs in the state and $198.1 million in labor income in 2022.

[1] Crop industries include grain farming, vegetable and melon farming, fruit farming, cotton farming, and all other crop farming. See Appendix E for more information

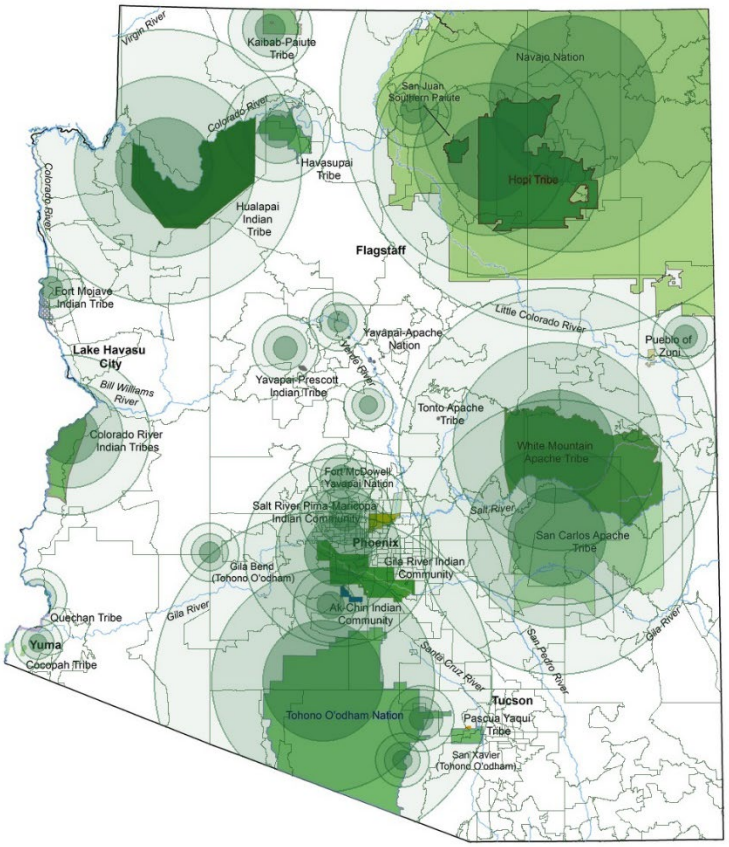
Table 6-3. Economic Contribution of Tribal Agriculture to the Arizona Economy, 2022

	Employment	Labor Income	Value Added	Output (Sales)
Direct Effects	2,310	$106,620,000	$168,873,000	$434,040,000
Crop Sales	2,180	$104,821,000	$164,550,000	$410,079,000
Livestock & Other Animals	130	$1,799,000	$4,323,000	$23,961,000
Indirect Effects	750	$47,171,000	$93,845,000	$175,893,000
Induced Effects	760	$44,380,000	$84,827,000	$143,433,000
Total Effects	3,820	$198,171,000	$347,545,000	$753,366,000

Multi-Regional Input-Output Analysis

To examine the extent to which tribal agriculture supports economic activity in non-tribal areas of the state, a Multi-Regional Input-Output (MRIO) analysis was conducted. An MRIO analysis estimates the economic linkages between two areas via supply chain relationships and enables us to estimate the effect that direct activity in one area has on the other.

Figure 6-3. Tribal agricultural activity zones and inter-regional economic spillover effects



Source: Authors' elaboration based on map provided by the Inter Tribal Council of Arizona

Figure 6-3 illustrates this framework. Tribal lands, shown in the map, represent the areas of direct agricultural activity, while the shaded circles extending beyond reflect the economic spillover effects captured by the MRIO model into non-tribal areas of Arizona. Two sub-regions were defined within the Arizona model: (1) tribal lands, delineated using ZIP codes corresponding to tribal reservation boundaries, and (2) non-tribal lands (the remainder of Arizona), comprised of all ZIP codes outside of tribal lands. For simplicity, we assume that 100% of tribal agricultural activity in Arizona occurs within Arizona tribal lands.

The area corresponding to tribal lands was customized using the same Census of Agriculture data as in the statewide analysis, maintaining consistent assumptions for output, employment, and spending patterns across models. As in the statewide analysis, local use of local supply (LULS) coefficients were set to zero for all agricultural industries in both regions to prevent double-counting of inter-industry transactions across the integrated supply chain.

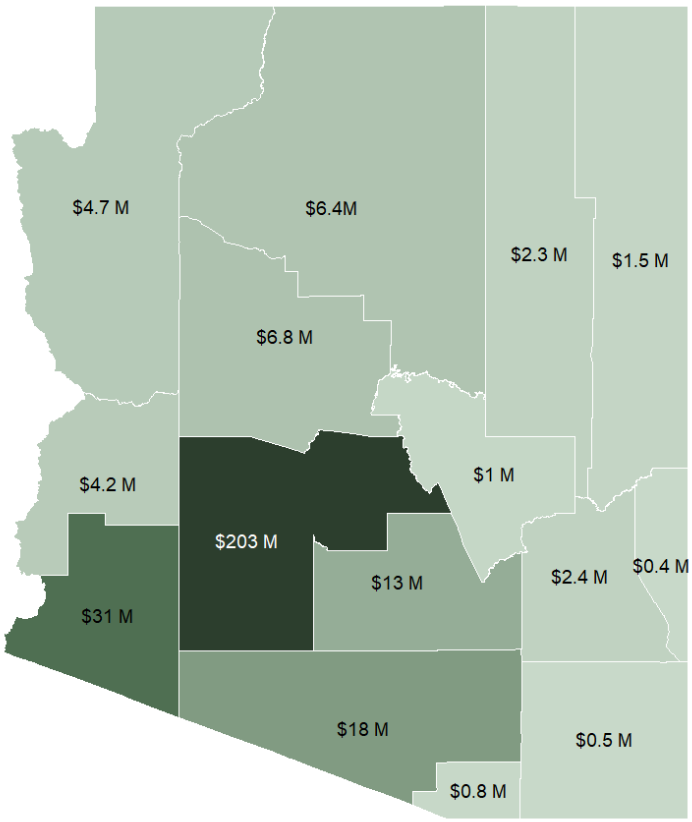
In 2022, the impact of Arizona tribal agriculture in non-tribal areas of the state was an estimated $296.7 million in output (sales). This represents roughly 84% of the total multiplier effects generated by tribal agriculture statewide (as measured by output within and outside tribal reservation boundaries). In addition, crop and livestock sales produced by Native American farms generated an estimated $159.8 in in value added (equivalent to GDP), $90 million in labor income, and 1,670 jobs outside of tribal areas of the state (Table 6-4).

Table 6-4. Economic Contribution of Tribal Agriculture on Tribal Land to Non-Tribal Areas of Arizona, 2022

	Employment	Labor Income	Value Added	Output
Direct Effects	0	$0	$0	$0
Indirect Effects	1,450	$77,402,000	$135,083,000	$255,604,000
Induced Effects	220	$12,767,000	$24,760,000	$41,139,000
Total Effects	1,670	$90,169,000	$159,843,000	$296,743,000

Figure 6-4 presents the output (sales) impact of tribal agriculture on non-tribal areas by county. Roughly 70% of this activity occurs in Maricopa County ($203 million), followed by Yuma County ($31 million) and Pima County ($18 million).

Figure 6-4. Sales Generated by Tribal Agriculture in Non-Tribal Areas of Arizona, 2022

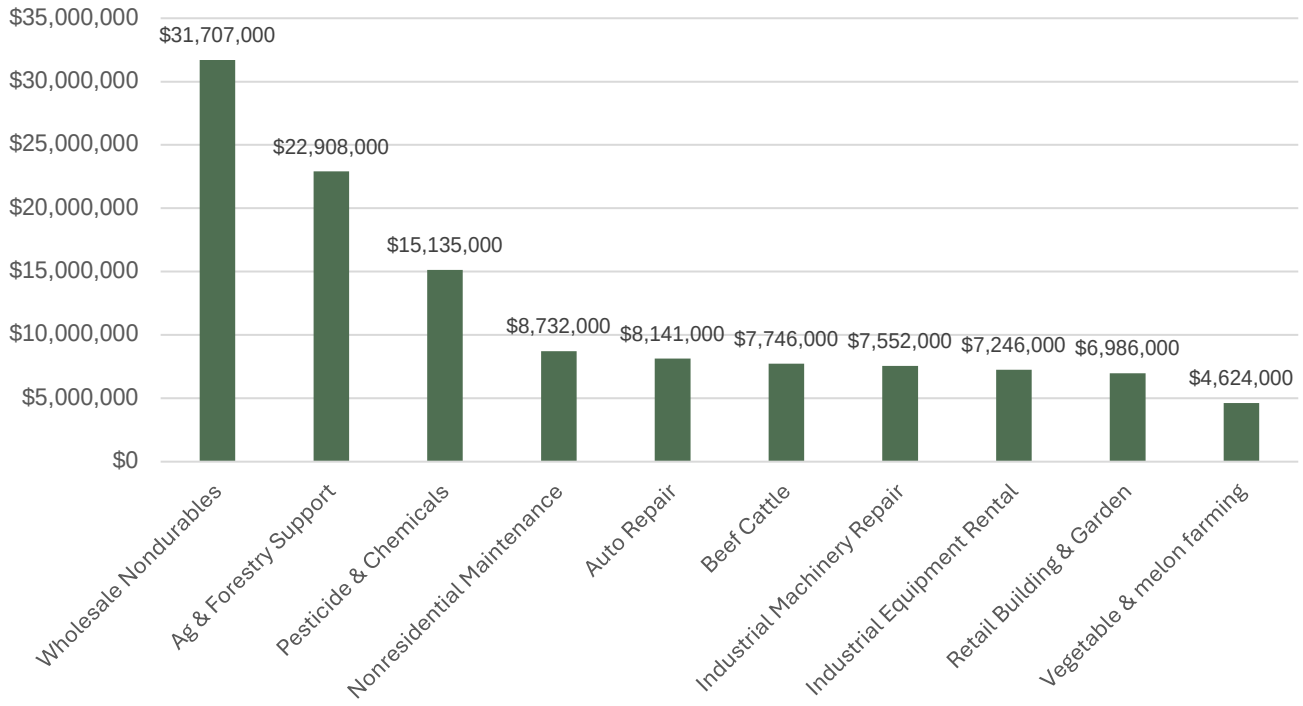


Inputs to tribal agricultural production in Arizona are sourced from different areas of the state. This includes wholesale nondurables, agricultural products, support services for agriculture and forestry (labor services), pesticides and chemicals, auto repair services, and industrial machinery repair and rental, among other industries (Figure 6-5)

The statewide contribution analysis and the MRIO impact analysis are not directly comparable in magnitude, as they use different methodological frameworks that treat household income and induced spending differently.

Several limitations should be considered when interpreting the MRIO results. First, IMPLAN's trade flow estimates are based on regional economic size and industry composition, which may not fully capture the unique purchasing and spending patterns of tribal agricultural operations. Second, the use of ZIP codes to delineate tribal lands is an approximation, as ZIP code boundaries do not perfectly align with tribal land boundaries. Third, agricultural workers in tribal lands may reside and spend their income in surrounding non-tribal communities, which could result in a slight overestimation of induced effects within tribal lands and an underestimation in the surrounding regions.

Figure 6-5. Top 10 Industries Supported Outside Tribal Areas by Arizona Tribal Agricultural Production, 2022



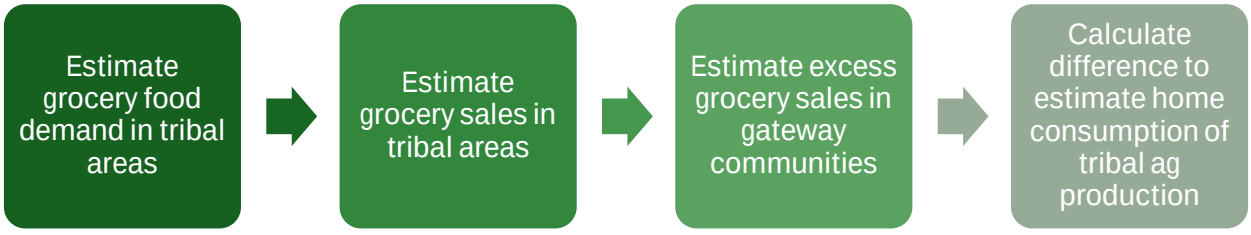
7. Home Production for Home Consumption

In previous sections of this report, a number of observations regarding Arizona tribal agriculture arise. First, there are a significant number of livestock operations with inventory of animals but no sales. Second, production expenses are often larger than sales generated by individual agricultural operations. Such observations might lead to the conclusion that these operations are losing money. While operating expenses may exceed revenues for many operations, this does not necessarily mean that the people operating these farms do not derive benefit from agricultural production. Particularly in remote areas of Arizona's tribal lands, access to food retail is often limited, and what food is available for purchase is expensive due to transportation costs. In these food-limited environments, agricultural production can, and does, fill a gap in food access. The purpose of this section is to estimate the value of tribal agricultural production in Arizona that is not marketed and sold but rather is destined for home consumption.

Few studies have endeavored to estimate the value of home consumption of unmarketed agricultural production. A common strategy used for estimating the value of subsistence agriculture, a related concept, is to rely on household surveys and estimate value using market prices (e.g., Davidova et al., 2009; Bevilacqua et al., 2019). In an early review of strategies for estimating the value of subsistence agriculture, Chibnik (1978) cites the use of retail value as the most commonly applied approach.

In the absence of household survey data, we develop rough estimates of food demand and supply to estimate the value of agricultural production used for home consumption in Arizona tribal areas (see Figure 7-1). Any difference between the two is assumed to be made up through home consumption of agricultural production. To develop these estimates, we rely on average food spending patterns, population estimates, and data on food and retail tax collections at the reservation and community levels.

Figure 7-1. Overview of the strategy followed to estimate the value of agricultural production used for home consumption



presents a range-based estimate of the value of home consumption obtained through this approach. At the retail level, the difference in total grocery consumption is estimated to be between $24 million and $116 million, while the equivalent value at the farm gate ranges from $6 million to $28 million. On a per capita basis, this corresponds to approximately $230-$1,120 in grocery retail value and $56-$272 in farm gate value per person. The difference in estimates relates to assumptions about per-capita spending on food away from home. The low estimate assumes that people on tribal lands only spend the state average on food at home, not any food away from home, and that the difference is not made up by spending more on food at home. The high estimate assumes that the difference is made up by more spending on food at home.

Table 7-1 presents a range-based estimate of the value of home consumption obtained through this approach. At the retail level, the difference in total grocery consumption is estimated to be between $24 million and $116 million, while the equivalent value at the farm gate ranges from $6 million to $28 million. On a per capita basis, this corresponds to approximately $230-$1,120 in grocery retail value and $56-$272 in farm gate value per person. The difference in estimates relates to assumptions about per-capita spending on food away from home. The low estimate assumes that people on tribal lands only spend the state average on food at home, not any food away from home, and that the difference is not made up by spending more on food at home. The high estimate assumes that the difference is made up by more spending on food at home.

Table 7-1. Estimated Value of Home Consumption (2022)

Measure	Low Estimate	High Estimate
Grocery Retail Value	$24 million	$116 million
Farm Gate Value	$6 million	$28 million
Grocery Retail per Person	$230	$1,120
Farm Gate per Person	$56	$272

To validate these estimates, we calculate a proxy for home consumption using Reservation Census data. This database reports production expenses for some tribes (see Table 4-12). Using this information, we estimate total production expenses for both crop and livestock/other animal production activities within Arizona borders.

For tribes that report both sales and production expenses for farms operated by American Indians, we calculate the difference between total sales and total expenses. We interpret this difference as a proxy for home consumption, under the assumption that part of the value generated by tribally operated farms may not enter formal market channels.

In contrast, for tribes that do not report farms operated by American Indians, we assume no home consumption. In these cases, agricultural production is assumed to be carried out by non-American Indian operators on leased tribal lands, and therefore, all agricultural production is treated as fully market-oriented. Note that we use the Reservations survey and do not include the Census of Agriculture by race and ethnicity to calculate the difference, as we focus on farms within tribal reservations.

Table 7-2 reports an estimated $28.8 million in tribal agricultural production that is not sold in the market and can be interpreted as home consumption. The majority of this amount is attributable to the Navajo Nation. This result is consistent with the high estimate of the farm gate value estimated in Table 7-1.

The expenditure-based proxy focuses on farm-level accounting data, while the demand-supply approach is based on household consumption behavior. The consistency between the results obtained in both methods reinforces the validity of the value estimated. Therefore, we establish that the estimated value for home consumption of tribal agricultural production was at $28 million in 2022, as measured by farm-gate value. If this food were to be purchased at retail, it would have an estimated cost of $116 million.

Table 7-2: Proxy for Home Consumption (Difference between Sales and Expenses of American Indian operated Farms) (2022)

	Estimates
Crops	$8.7 million
Livestock & Other Animal Products	$20.1 million
Total	$28.8 million

8. Discussion

Tribal agriculture in Arizona is diverse and persists despite the historical displacement of peoples, and limited access to physical and financial resources. Recognizing the many benefits of preserving and growing tribal agricultural tradition, practitioners in numerous disciplines are pursuing tribal agriculture as a solution to problems. This includes application of traditional ecological knowledge to address environmental issues, promotion of native crops and foods to address nutrition and public health challenges, and building-out agricultural value chains to support economic development in tribal areas.

One such example of pursuing agriculture for economic development is the Navajo Agricultural Products Industry (NAPI) located within the New Mexico portions of the Navajo Nation:

> *"In 1962, PL 87-483 "authorized the Secretary of the Interior to construct, operate, and maintain the Navajo Indian Irrigation Project as participating projects of the Colorado River Storage Project and for other purposes. […] On April 16, 1970, the Navajo Agricultural Products Industry (NAPI) was developed by the Navajo Nation Council as an enterprise to operate Navajo Indian Irrigation Project (NIIP). The Navajo Nation Council not only created this enterprise to assist NIIP, but to create economic opportunities for the Navajo people and to build a foundation of commitment, pride, and dedication to their nation." (NAPI, 2026)*

Today, NAPI is involved in the production of forage and traditional foods, including organic products. Outside of the Navajo Nation, another example of developing tribal agricultural value chains exists in Oklahoma, where the Quapaw Nation has developed a series of enterprises meeting different food system needs. This includes the Quapaw Cattle Company, which produces cattle, buffalo, and feed; the Quapaw Food Services Authority, a federally inspected slaughter and meat processing plant supporting farmers and ranchers of the Quapaw Nation; and the Quapaw Farmers Market & Food Hub, which offers a market channel for farmers to sell their products (Quapaw Nation, 2026).

As demonstrated in the MRIO analysis, much of the economic value supported through tribal agriculture accrues to non-tribal areas of the state. Furthermore, as seen in the home consumption analysis, lack of food retail access is a persistent challenge for many tribes. This presents opportunities for tribal communities to pursue economic development by attracting or building enterprises that fulfill upstream supply functions or downstream value-added activities linked to agricultural production. Beyond the benefits of economic development, many other values, whether monetary in nature (e.g., reduced public health costs) or non-monetary (e.g., cultural values), may be achieved through tribal agriculture.

To that point, it's important to emphasize that this report is focused on quantifying the monetary value of tribal agricultural production in Arizona and the resulting circulation of money in the state economy attributable to this activity. This includes marketed agricultural production as well as an estimate of the market value of unmarketed production destined for home consumption. The report does not quantify other critical values of tribal agricultural production such as cultural values, nutritional and public health benefits, food sovereignty, and environmental values. Nonetheless, this study provides a needed baseline assessment of existing tribal agricultural activity in Arizona. This information may be used to inform strategies to promote tribal agriculture and its benefits. It

may also be used by tribal communities to encourage agricultural producers to share their stories and information, as appropriate, in official data collection efforts.

The research presented in this report revealed a number of important points about publicly available data on tribal agricultural production. First, there are significant gaps in data coverage over time and space, often making it difficult to work with the data. There are also discrepancies between data sources, for example, between county-level, state-level, reservation-level, and sub-reservation-level data. These may be due to reporting, sample sizes, or non-disclosure requirements. Addressing the data discrepancies requires careful attention and consulting experts with local knowledge. It also lends support to the need for increased participation in official data development, such as the agricultural census or other collection efforts. Finally, tribal areas typically do not coincide with other geographical units such as counties or zip codes. In fact, as is the case for tribes in Arizona, they often span multiple states or counties. For purposes of modeling regional economic effects of tribal agriculture, this calls for developing regional models that capture functional regional economies as single areas. Examples include tribal areas with land in multiple states, such as the Fort Yuma Quechan Reservation (Arizona, California) or the Navajo Nation (Arizona, New Mexico, Utah).

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Appendix A: Crop Sales Estimates

The estimation strategy for crop sales is based on combining two components: (i) sales by American Indian producers and (ii) sales occurring within tribal areas generated by non-American Indian producers. While the first component is directly obtained from the Census of Agriculture by Race and Ethnicity (reported as totals for Arizona), the second must be estimated using data from the Reservation Census. This source reports crop sales for tribes under two categories: 1) *all farms* and 2) *farms operated by American Indian producers*, which allows for a straightforward calculation of sales generated by farms operated by non-American Indian producers.

However, not all values are disclosed, and not all tribes are reported. A second challenge is that some tribes, like the Navajo Nation and the Fort Yuma -Quechan, extend beyond Arizona territories, and most of their crop production occurs outside Arizona. Consequently, we developed some methods to estimate the sales allocated to Arizona, to fully estimate total crop sales by tribe within reservation areas.

The total crop sales estimated within the reservation area in Arizona were $384 million, including farms operated by both American Indians and non-American Indian producers. Once we obtained estimates of crop sales generated within Arizona for each tribe, we again relied on the Reservation Census to identify which tribes report sales made by farms operated by American Indian producers. This information enables us to identify which tribes also have sales generated by farms operated by non-American Indian producers. We find that Ak-Chin, Cocopah, Fort McDowell, Fort Mojave, Fort Yuma-Quechan, and Salt River Maricopa report that 100% of their crop activity is carried out by farms operated by non-American Indian producers. In contrast, the Colorado River Indian Tribes, Gila River, San Carlos, and Fort Apache report both American Indian-operated and non-American Indian-operated farm activity, with sales values available for each case. The remaining tribes report crop production exclusively from farms operated by American Indian producers within reservation areas.

With this information, we were able to estimate the non-tribal farms' crop sales at $302 million. This value was used to get the final estimate of $401 million for crop sales according to our definition (see Table A1). The distribution of this total across tribes was done using the share of each tribe's sales on the total, following the Reservation Census data.

Table A1. Estimated Total Values for Each Category included in our definition of Tribal Crop Sales

	Value	Source
Reported Sales by All American Indian Producers (AZ only)	$108 million	Census of Agriculture
Estimated Sales in Reservation Areas (AZ only)	$384 million	Author's estimates with Reservation Census Data
Estimated Sales of Tribal Farms in Reservation Areas (AZ only)	$82 million	Author's estimates with Reservation Census Data
Estimated Sales of Non-Tribal farms in Reservation Areas (AZ only)	$302 million	Author's estimates with Reservation Census Data
Total Crop Sales	**$401 million**	**Author's estimates with Reservation Census Data**

Information was not available for some tribes, so we use CropScape acreage and IMPLAN values by ZIP codes to calculate sales. These estimates begin by identifying ZIP Code Tabulation Areas (ZCTAs) that intersect tribal lands (see Figure A1). Total crop acreage and crop-specific acreage were calculated both inside and outside Tribal lands. These data were used to compute tribal acreage shares, defined as the ratio of cropland located within tribal boundaries to total cropland within each ZIP code.

For each crop category, acreage shares were applied to ZIP-level IMPLAN output after matching observed crops in CropScape to the corresponding IMPLAN industry codes (see Table A2). ZIP-level IMPLAN crop output was then scaled by these acreage shares. Additional consistency checks were performed using the ZIP Code Census of Agriculture data, including the number of crop farms and reported sales categories (ranges). Estimated values were constrained to remain consistent with these observed sales ranges.

Figure A1: Tribal Areas and ZIP Code Areas Considered

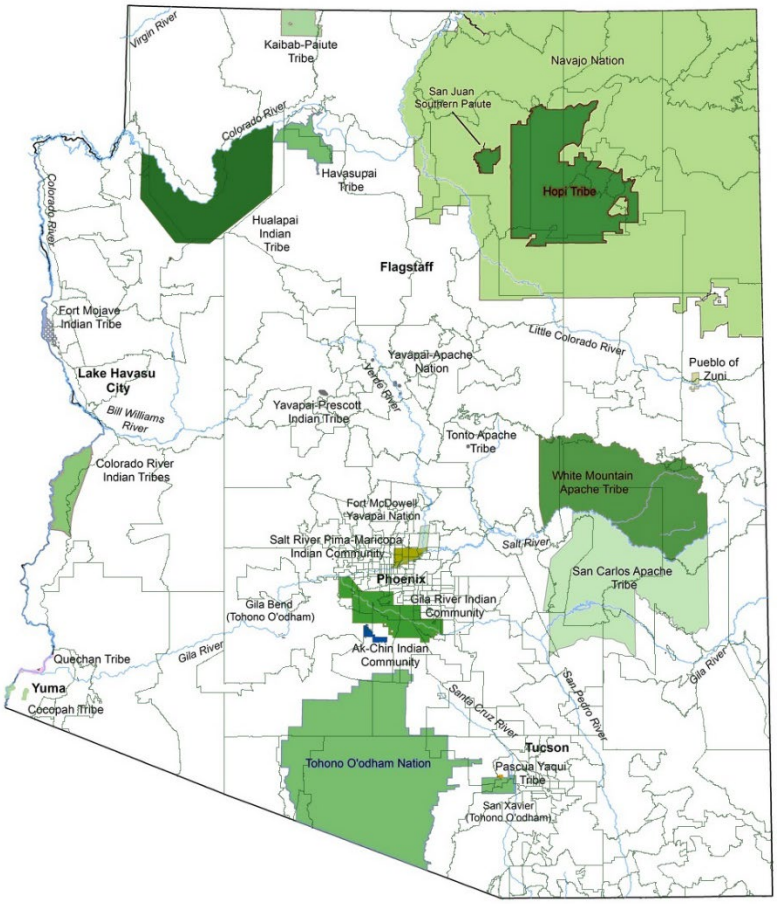

Table A2: Correspondence between CropScape and IMPLAN categories

CropScape Category	IMPLAN Category
Corn	Grain farming
Cotton	Cotton farming
Rice	Grain farming
Sorghum	Grain farming
Soybeans	Oilseed farming
Sunflower	Oilseed farming
Peanuts	Grain farming
Tobacco	Tobacco farming
Sweet Corn	Grain farming
Pop or Orn Corn	Grain farming
Mint	Greenhouse, nursery, and floriculture production
Barley	Grain farming
Durum Wheat	Grain farming
Spring Wheat	Grain farming
Winter Wheat	Grain farming
Other Small Grains	Grain farming
Dbl Crop WinWht/Soybeans	Grain farming
Rye	Grain farming
Oats	Grain farming
Millet	Grain farming
Speltz	Grain farming
Canola	Oilseed farming
Flaxseed	Oilseed farming
Safflower	Oilseed farming
Rape Seed	Oilseed farming
Mustard	Oilseed farming
Alfalfa	All other crop farming
Other Hay/Non Alfalfa	All other crop farming
Camelina	Oilseed farming
Buckwheat	Grain farming
Sugarbeets	Sugarcane and sugar beet farming
Dry Beans	Grain farming
Potatoes	Vegetable and melon farming
Other Crops	All other crop farming
Sugarcane	Sugarcane and sugar beet farming
Sweet Potatoes	Vegetable and melon farming
Misc Vegs & Fruits	Vegetable and melon farming
Watermelons	Vegetable and melon farming
Onions	Vegetable and melon farming
Cucumbers	Vegetable and melon farming
Chick Peas	Grain farming

CropScape Category	IMPLAN Category
Lentils	Grain farming
Peas	Grain farming
Tomatoes	Vegetable and melon farming
Caneberries	Fruit farming
Hops	All other crop farming
Herbs	Greenhouse, nursery, and floriculture production
Cherries	Fruit farming
Peaches	Fruit farming
Apples	Fruit farming
Grapes	Fruit farming
Christmas Trees	Greenhouse, nursery, and floriculture production
Other Tree Crops	All other crop farming
Citrus	Fruit farming
Pecans	Tree nut farming
Almonds	Tree nut farming
Walnuts	Tree nut farming
Pears	Fruit farming
Pistachios	Tree nut farming
Triticale	Grain farming
Carrots	Vegetable and melon farming
Asparagus	Vegetable and melon farming
Garlic	Vegetable and melon farming
Cantaloupes	Vegetable and melon farming
Prunes	Fruit farming
Olives	Fruit farming
Oranges	Fruit farming
Honeydew Melons	Vegetable and melon farming
Broccoli	Vegetable and melon farming
Avocados	Fruit farming
Peppers	Vegetable and melon farming
Pomegranates	Fruit farming
Nectarines	Fruit farming
Greens	Vegetable and melon farming
Plums	Fruit farming
Strawberries	Fruit farming
Squash	Vegetable and melon farming
Apricots	Fruit farming
Vetch	All other crop farming
Dbl Crop WinWht/Corn	Grain farming
Dbl Crop Oats/Corn	Grain farming
Lettuce	Vegetable and melon farming
Dbl Crop Triticale/Corn	Grain farming

CropScape Category	IMPLAN Category
Pumpkins	Vegetable and melon farming
Dbl Crop Lettuce/Durum Wht	Vegetable and melon farming
Dbl Crop Lettuce/Cantaloupe	Vegetable and melon farming
Dbl Crop Lettuce/Cotton	Vegetable and melon farming
Dbl Crop Lettuce/Barley	Vegetable and melon farming
Dbl Crop Durum Wht/Sorghum	Grain farming
Dbl Crop Barley/Sorghum	Grain farming
Dbl Crop WinWht/Sorghum	Grain farming
Dbl Crop Barley/Corn	Grain farming
Dbl Crop WinWht/Cotton	Grain farming
Dbl Crop Soybeans/Cotton	Cotton farming
Dbl Crop Soybeans/Oats	Grain farming
Dbl Crop Corn/Soybeans	Grain farming
Blueberries	Fruit farming
Cabbage	Vegetable and melon farming
Cauliflower	Vegetable and melon farming
Celery	Vegetable and melon farming
Radishes	Vegetable and melon farming
Turnips	Vegetable and melon farming
Eggplants	Vegetable and melon farming
Gourds	Vegetable and melon farming
Cranberries	Fruit farming
Dbl Crop Barley/Soybeans	Grain farming

Appendix B: Livestock Sales Estimates

Livestock inventories are obtained from the Reservation Census, which reports animal counts by reservation and species. Market prices for cattle, sheep, and goats are taken from the USDA Agricultural Marketing Service (AMS) Livestock Dashboard, using auction prices from New Mexico and Texas. These markets are selected because they represent the most relevant reference markets for livestock sales in the region. Feeder livestock prices from 2022 are used to ensure consistency with inventory data.

Prices for horses are obtained from the 2026 Arizona Fact Book prepared by the Jockey Club, using reported prices for yearling horses in 2022. For all species, average prices are applied to animals of representative market weight.

Livestock sales values are estimated using the following procedure for all reservations:

1. Livestock inventories are compiled by reservation and species (cattle, sheep, goats, and horses).
2. Species-specific average market prices are assigned using the relevant data.
3. Estimated quantities sold are multiplied by average prices to obtain total sales values by species and reservation.

For reservations where direct sales data are limited, sales quantities are inferred using available aggregate information and consistent assumptions across species.

For Navajo Nation, where more detailed information is available, the number of animals sold is estimated as a percentage of total inventory for cattle, sheep, goats, and horses, with sales shares calibrated using the Navajo Nation Census Chapter Reports. These reservation-level livestock sales are then allocated to the Western, Chinle, and Fort Defiance Agencies based on their respective livestock inventories and further distributed to chapters to estimate livestock sales occurring within Arizona. The resulting estimates are consistent with livestock sales reported in the Navajo Nation Census Chapter Reports, providing a validation check for both the sales calibration and the spatial allocation procedure.

Appendix C: Sales by IMPLAN Economic Sector

The total crop sales we estimated were then allocated across sectors according to the economic sector classification used by IMPLAN to calculate economic contributions. This allocation was based on information from the Reservation Census on the primary crops produced in each area. Crop shares were derived from our own acreage estimates for each tribe and crop type, calculated using CropScape data. The results are displayed in Table C1.

For livestock and other animal production, we used inventory values from the Reservation Census to distribute totals across the corresponding IMPLAN sectors. These inventories were paired with price data from USDA AMS to ensure that the allocation across sectors reflected relative production values.

Table C1: Production Patterns following Reservation Census and IMPLAN categories

IMPLAN Category	Sales Estimates
Crops	$410,079,000
Grain farming	$26,835,000
Vegetable & melon	$184,305,000
Fruit farming	$838,000
Cotton farming	$32,620,000
All other crop farming	$165,481,000
Livestock & Other Animal Production	$23,961,000
Beef & Cattle Ranching	$20,022,000
All other animal Production	$3,939,000