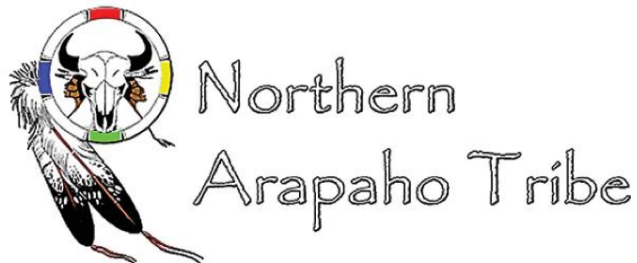


AGRICULTURAL RESOURCE MANAGEMENT PLAN
WIND RIVER INDIAN RESERVATION

June 2018



*The Wind River Indian Reservation
Agricultural Resource Management Plan
was approved by the
Wind River Reservation Inter-Tribal Council
on June 13th, 2018.*

ACKNOWLEDGMENTS

There are many people that have assisted in completing this plan through their thoughts, discussions and actions. From the beginning, the Eastern Shoshone and Northern Arapaho Tribal Councils' have supported the effort to complete the agricultural resource management plan (ARMP). Through their presence and contributions at the scores of meetings, the Water and Agricultural Producers Committees have been steadfast in helping develop the ARMP. The following groups have also assisted in a multitude of ways to complete the plan: Ft. Washakie Agency of the Bureau of Indian Affairs; the Wind River Indian Reservation Game and Fish; U.S.D.A. Natural Resources Conservation Service; the U.S.D.A. National Statistical Service; University of Wyoming Extension; and University of Wyoming EPSCoR. This plan could not have been conceived, constructed and completed without the assistance of the Wind River Indian Reservation Office of the Tribal Water Engineer. Finally, the citizens of the Wind River Indian Reservation participated by voicing their opinions and thoughts at community meetings, focus group meetings and discussions with the different committee members, the Tribal Councils and other groups to get their message across. This plan is the culmination of everyone's efforts to move the Wind River Indian Reservation forward through agricultural development that will benefit all.

TABLE OF CONTENTS

Acknowledgments	ii
Executive Summary	1
Agriculture Management.....	3
Water	3
Agricultural Economic Development	3
Land Leases.....	3
Land Ownership.....	3
Grazing/Rangeland Productivity	4
Cropland Productivity.....	4
Wildlife Management	4
Agricultural and Natural Resource Information.....	4
I. Introduction	5
A. Purpose.....	5
B. Scope	5
II. Methodology.....	8
III. Issues.....	11
IV. Vision Statement.....	12
V. Background.....	13
A. Physical Setting.....	13
B. Climate.....	13
1. Drought Mitigation Plan Synopsis	14
C. Current Land Tenure and Settlement Patterns.....	15
D. Current Agriculture.....	17
VI. Agricultural Goals, Objectives and Action Items	23
A. Agriculture Management.....	23
B. Water	27
C. Agricultural Economic Development	31
D. Land Leases.....	34
E. Land Ownership.....	36
F. Grazing/Rangeland Productivity	38
G. Cropland Productivity.....	40
H. Wildlife Management	43
I. Agricultural and Natural Resource Information.....	44

Appendix A: Structure of the Agricultural Resource Management Plan	48
Answers to the Critical Questions for the Plan.....	48
Appendix B: Listing of Issues Identified at Public Meetings	50
Appendix C: Topic Areas with Grouping of Issues	53
Management.....	53
Plans.....	53
Leases	54
Grazing.....	54
Water	54
Land	54
Ag Economy	55
Cropland.....	55
Wildlife.....	55
GIS/Digital Imagery	55
Appendix D: Basic Structure of Clearinghouse Spatial Databases.....	56
Wind River Indian Reservation Clearinghouse Structure.....	56

EXECUTIVE SUMMARY

The Agricultural Resource Management Plan (ARMP) was designed around the concept of a community plan, that is, to have community involvement in identifying topics and issues and the development of the goals, objectives and policies or action items, the foundation of the plan. The plan provides continuity - once the plan has been adopted, changes in tribal council or the configuration of tribal governance does not alter the issues and topics that the reservation community identified for agricultural development and progress. The WRIR Agricultural Resource Management Plan is designed to provide a comprehensive plan for agricultural development. The scope of the Agricultural Resource Management Plan follows the outline established by the American Indian Agricultural Resource Management Act of 1993 (P.L. 103-177, 25USC3701). The purpose of this Act is to provide a tribe with the means to create a long-term strategy for agricultural development on their reservation. The Act also states ... Indian agriculture resource management plans developed and approved under this section shall govern the management and administration of Indian agricultural resources and Indian agricultural lands by the Bureau and the Indian tribal government. With the completion and approval of the WRIR ARMP, two key components of tribal sovereignty can be accomplished. First, agricultural resource management will be in accordance with tribal laws, ordinances, and perceptions. Second, the ARMP provides an agricultural and natural resource development path on the reservation that has been developed by the community and represents the political will of the two Tribal Councils.

The development of the WRIR Agricultural Resource Management Plan began in January 2015. At the first meeting organized by the Wind River Tribal Water Engineer's Office and the Agricultural Resource Management Advisory (ARMA) committee it was imperative that all participants at the meeting agreed upon the basic philosophy and structure of the plan. The participants were a mixed group representing the WRIR Water Committee, the WRIR Agricultural Producers Committee, the WRIR Tribal Water Engineer's Office, the two Tribal Councils, the Bureau of Indian Affairs (BIA), the Natural Resources Conservation Service (NRCS), WRIR Div. of Game and Fish, the U.S. Fish and Wildlife Service (USFWS), U.S. Dept. of Agriculture (USDA) and University of Wyoming Extension. A simple questionnaire was given to each participant (over 25) and their responses recorded (Appendix A). Overall, four key elements came out of the questionnaire: 1) all of the participants wanted a community-based plan; 2) the community-based plan should include input by the citizens of the main communities (Arapahoe, Crowheart, Ethete and Ft. Washakie) throughout the planning process; 3) the plan had to be holistic, incorporating all aspects of the agricultural system on the Reservation; and 4) a variety of methods were used to solicit community input.

The ARMP followed the rational planning process (So et al., 1994) that focuses on community input. There are eight key components to the process:

- Development of a Vision Statement
- Identification of Goals
- Construction of Objectives
- Alternative Policy Options
- Examination of Policies
- Approval and Implementation of Policies
- Policy Monitoring
- Evaluation of Policies

Overall, more than 85 issues were discussed by the participants. During the next set of over 28 public meetings in Arapahoe, Crowheart, Ethete and Ft. Washakie the issues were organized into nine focused topics. The topics are:

- Agricultural Management
- Water
- Agriculture Economics
- Land Leasing
- Land Tenure
- Rangeland Productivity
- Cropland Productivity
- Wildlife Management
- Agricultural and Natural Resource Information Management

A vision statement is presented as the agreed upon ideal for the community and the direction that the community wants to incorporate into the plan. During a group public session, the following vision statement was agreed upon: **A viable, self-directed and sustainable agricultural economy that enhances the education, health, natural resources, traditions and culture of our native people.**

The 2012 Agriculture census indicates that the average farm size on the Wind River Reservation is over 4,500 acres, however, more than 62 percent of the farms operated by Native Americans are less than 500 acres. The majority of the reservation lands are considered range or grazing lands (67.9 percent), with a smaller percentage in crop production (10.8 percent). The croplands are generally found in the river lowlands along the Big and Little Wind Rivers. Overall, agriculture contributes approximately \$21 million to the reservation's economy, but has the potential to increase that to at least \$33 million with agricultural management and development.

A viable and central management structure is necessary to support an integrated and proactive agriculture resource management plan for the Reservation. Agriculture and Natural Resource management on the Reservation is currently distributed across an array of tribal, federal, state and local agencies. The *proposed* Office of Agriculture and Natural Resources (OANR) is designed to facilitate the development and implementation of the management plan and system that: 1) develops agriculture on the Reservation, 2) is economically viable and sustainable, 3) preserves natural resources, traditional ways and 4) encourages new farmers and ranchers.

The ARMP has nine major topics, 12 goals, 46 objectives and 88 policies that directly relate to agricultural development on the reservation. The following is a list of the major topics and their corresponding goals; the objectives and policies can be found in the ARMP planning document proper.

Agriculture Management

A viable and central management structure is necessary to support an integrated and proactive agriculture resource management plan for the Reservation.

Goal — An agricultural management system that develops agriculture on the Reservation that is economically viable and sustainable while preserving natural resources, traditional ways and encourages new farmers and ranchers.

Goal — The Agriculture Management Plan, and amendments to, of and approved by both tribes of the Reservation, shall be adhered to by the Secretary of the Interior pursuant to P.L. 103-177, 25USC3701.

Water

Water resources, and their management, are considered one of the most important agricultural and natural resource on the Reservation by the Eastern Shoshone and Northern Arapahoe Tribes.

Goal — Manage water availability for agricultural users that recognizes the Wind River Water Code and can adjust to long and short-term weather and climatic conditions.

Agricultural Economic Development

The economic develop goals and corresponding policies summarized below are designed to leverage the two Wind River Tribes' human and natural resources to create jobs and foster entrepreneurial development within the membership and their communities.

Goal — Integrate financial, business, education and natural resources to have a viable and sustainable agricultural economy.

Land Leases

The leasing system will be designed to facilitate economic sustainability and natural resource conservation for the benefit of Wind River Tribes' members.

Goal — Manage agricultural land leasing for the long-term benefit of tribal members, and the economic and social benefit of farmers and ranchers.

Goal — Manage agricultural land leasing that will benefit the lessees' investment, protect and enhance the natural resources, follow best beneficial land use principles, market fluctuations and provide for long-term sustainable agricultural production.

Land Ownership

There are three major types of land ownership on the Wind River Reservation; Trust, Allotted Trust and Fee Simple lands.

Goal — Land ownership regulations will correspond to traditional ways and adjust to contemporary conditions on sovereign lands.

Grazing/Rangeland Productivity

The Reservation has extensive rangeland resources (1,533,000 acres) that are significant to both the Eastern Shoshone and Northern Arapahoe tribes and vital for the long-term agricultural development on the Reservation.

Goal — Manage rangelands for a balance between natural ecosystems, improved pasture/grazing lands and profitable livestock development.

Goal — Maintain and improve reservation rangelands to be healthy, and have resilient soil and hydrologic functions and characteristics.

Cropland Productivity

Cropland plays a consistent role in the economics of the Wind River Reservation. As both a revenue source and to augment livestock production crops benefit a range of farmers and ranchers on the Reservation.

Goal — Cropland productivity will be socially and environmentally sustainable and economically viable.

Wildlife Management

Wildlife management on the Reservation is concerned with the interaction between wildlife, livestock and the changes to their habitat due to agricultural practices.

Goal — Protect and improve wildlife and fish habitats while maintaining and developing rangelands, croplands and riparian areas.

Agricultural and Natural Resource Information

Data, particularly geospatial data, is critical to sound and sustainable planning and decision-making processes concerning agricultural resource management on the Wind River Indian Reservation.

Goal — Spatial information (maps and mapping data) will be effectively and efficiently managed and used to assist in agricultural economic and natural resource management.

The ARMP is designed to provide the tools and actions needed so that the Wind River Indian Reservation can move forward in agricultural and natural resource development through the means the Eastern Shoshone and Northern Arapaho have decided for their future.

I. INTRODUCTION

A. Purpose

The Agricultural Resource Management Plan (ARMP) was designed around the concept of a community plan, that is, to have community involvement in identifying topics and issues and the development of the goals, objectives and policies or action items, the foundation of the plan. A community plan offers a range of advantages over a plan developed by an agency and then imposed on the community, which it is to service. The major advantages of a community-based plan are:

- The plan provides continuity - once the plan has been adopted, changes in tribal council or the configuration of tribal governance does not alter the issues and topics that the reservation community identified for agricultural development and progress.
- The plan provides a balance of issues to be addressed-the issues and topics of the ARMP were not prioritized because all issues have a direct bearing on moving forward in agricultural development of the Reservation.
- The plan provides a means by which tribal investment in administrative structure benefits all - without an administrative organization to assist agricultural development; investment in agriculture is reactionary and piecemeal. The ARMP provides a structure in which agricultural development is organized and logical.
- The plan provides guidance in the area of agricultural economic development - the ARMP focuses on agriculture, one of the few natural resources on the Wind River Indian Reservation (WRIR) that is controlled by the citizens.
- The plan allows the community to administer agricultural development in a way to protect valued resources-through community citizen input valued environmental, social and cultural resources are identified and can be protected through policy and action statements.
- The plan provides a justification for decisions - the WRIR ARMP plan is augmented by a web-based clearinghouse of environmental, social and economic information assembled into computerized databases accessible to all decision-makers, agency management and reservation citizens. This clearinghouse provides the basic information that can lead to informed decisions by both the citizenry and decision-makers. (<http://articles.extension.org/pages/26677/the-purpose-of-the-comprehensive-land-use-plan>)

B. Scope

The WRIR Agricultural Resource Management Plan is designed to provide a comprehensive plan for agricultural development. The ARMP focuses on creating an institutional organization to assist and manage agricultural activities on the WRIR. This includes not only agricultural production, but also processing, distribution, marketing and resource improvements. The benefits of the plan directly impact tribal trust lands, but with an integrative approach, broadens the impacts to allotted lands and even fee simple lands within the reservation boundary. Individuals, businesses, organizations and political entities work together to accomplish the goals and objectives of the plan.

The ARMP is designed to assist in guiding improvements to environmental management involving water, soils and vegetation resources on the WRIR along with administrative logistics in land leasing and

improvements and distribution of financial support. The balance among these aspects of agricultural management are key to preserving and rehabilitating the natural land resources and ensuring that management and administrative actions do not create barriers to agricultural development.

The scope of the Agricultural Resource Management Plan follows the outline established by the American Indian Agricultural Resource Management Act of 1993 (P.L. 103-177, 25USC3701). This act states the following:

According to 25 USCS § 3711(b) Indian agricultural resource management planning program means:

“(1) To meet the management objectives of this section, a 10-year Indian agriculture resource management and monitoring plan shall be developed and implemented as follows:

(A) Pursuant to a self-determination contract or self-governance compact, an Indian tribe may develop or implement an Indian agriculture resource plan. Subject to the provisions of subparagraph (C), the tribe shall have broad discretion in designing and carrying out the planning process.

(B) If a tribe chooses not to contract the development or implementation of the plan, the Secretary shall develop or implement, as appropriate, the plan in close consultation with the affected tribe.

(C) Whether developed directly by the tribe or by the Secretary, the plan shall--

(i) determine available agriculture resources;

(ii) identify specific tribal agricultural resource goals and objectives;

(iii) establish management objectives for the resources;

(iv) define critical values of the Indian tribe and its members and provide identified holistic management objectives;

(v) identify actions to be taken to reach established objectives;

(vi) be developed through public meetings;

(vii) use the public meeting records, existing survey documents, reports, and other research from Federal agencies, tribal community colleges, and land grant universities; and

(viii) be completed within three years of the initiation of activity to establish the plan.”

The purpose of this Act is to provide a tribe with the means to create a long-term strategy for agricultural development on their reservation. The Act also states that:

“(2) Indian agriculture resource management plans developed and approved under this section shall govern the management and administration of Indian agricultural resources and Indian agricultural lands by the Bureau and the Indian tribal government.”

SEC.102. INDIAN PARTICIPATION IN LAND MANAGEMENT ACTIVITIES.

TRIBAL RECOGNITION- The Secretary shall conduct all land management activities on Indian agricultural land in accordance with goals and objectives set forth in the approved agricultural resource management plan, in an integrated resource management plan and in accordance with all tribal laws and ordinances, except in specific instances where such compliance would be contrary to the trust responsibility of the United States.

With the completion and approval of the WRIR ARMP, two key components of tribal sovereignty can be accomplished. First, agricultural resource management will be in accordance with tribal laws, ordinances and perceptions. Second, the ARMP provides a unified direction for agricultural development on the reservation that has been developed by the community and represents the political will of the two Tribal Councils.

II. METHODOLOGY

The development of the WRIR Agricultural Resource Management Plan began in January 2015. At the first meeting organized by the Wind River Tribal Water Engineer's Office it was imperative that all participants at the meeting agreed upon the basic philosophy and structure of the plan. The participants were a mixed group representing the WRIR Water Committee, the WRIR Agricultural Producers Committee, the WRIR Tribal Water Engineer's Office, the two Tribal Councils, the Bureau of Indian Affairs (BIA), the Natural Resources Conservation Service (NRCS), WRIR Div. of Game and Fish, the U.S. Fish and Wildlife Service (USFWS), U.S. Dept. of Agriculture (USDA) and University of Wyoming Extension. A simple questionnaire was given to each participant (over 25) and their responses recorded (Appendix A). Overall, four key elements came out of the questionnaire: 1.) all of the participants wanted a community-based plan; 2.) the community-based plan should include input by the citizens of the main communities (Arapahoe, Crowheart, Ethete and Ft. Washakie) throughout the planning process; 3.) the plan had to be holistic, incorporating all aspects of the agricultural system on the Reservation; and 4.) a variety of methods had to be used to solicit community input.

The ARMP would follow the rational planning process (So et al., 1994) that focuses on community input (Figure II.1). This process identifies the following key components to the plan:

- Development of a Vision Statement
- Identification of Goals
- Construction of Objectives
- Alternative Policy Options
- Examination of Policies
- Approval and Implementation of Policies
- Policy Monitoring
- Evaluation of Policies

The first five components have been addressed in the WRIR ARMP. The completion of these components was facilitated by one or more members of the University of Wyoming Agricultural Planning team. Figure II.2 illustrates the timeline for plan completion and approval. The components of policy monitoring and evaluation will take an additional 2-5 years to be able to determine if the plan policies have been implemented and the tasks upon which they were developed completed.

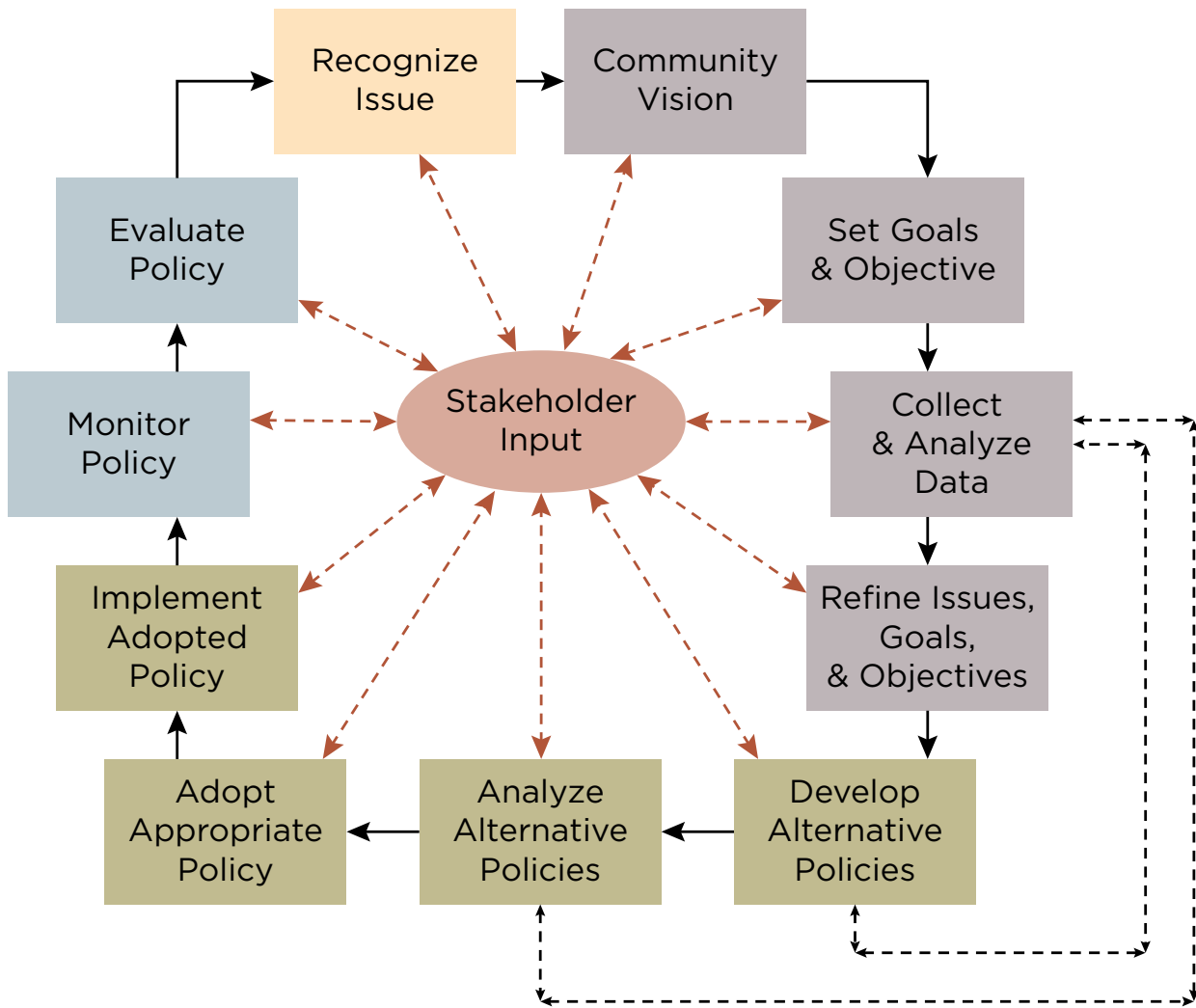


Figure II.1 Rational Planning Process.

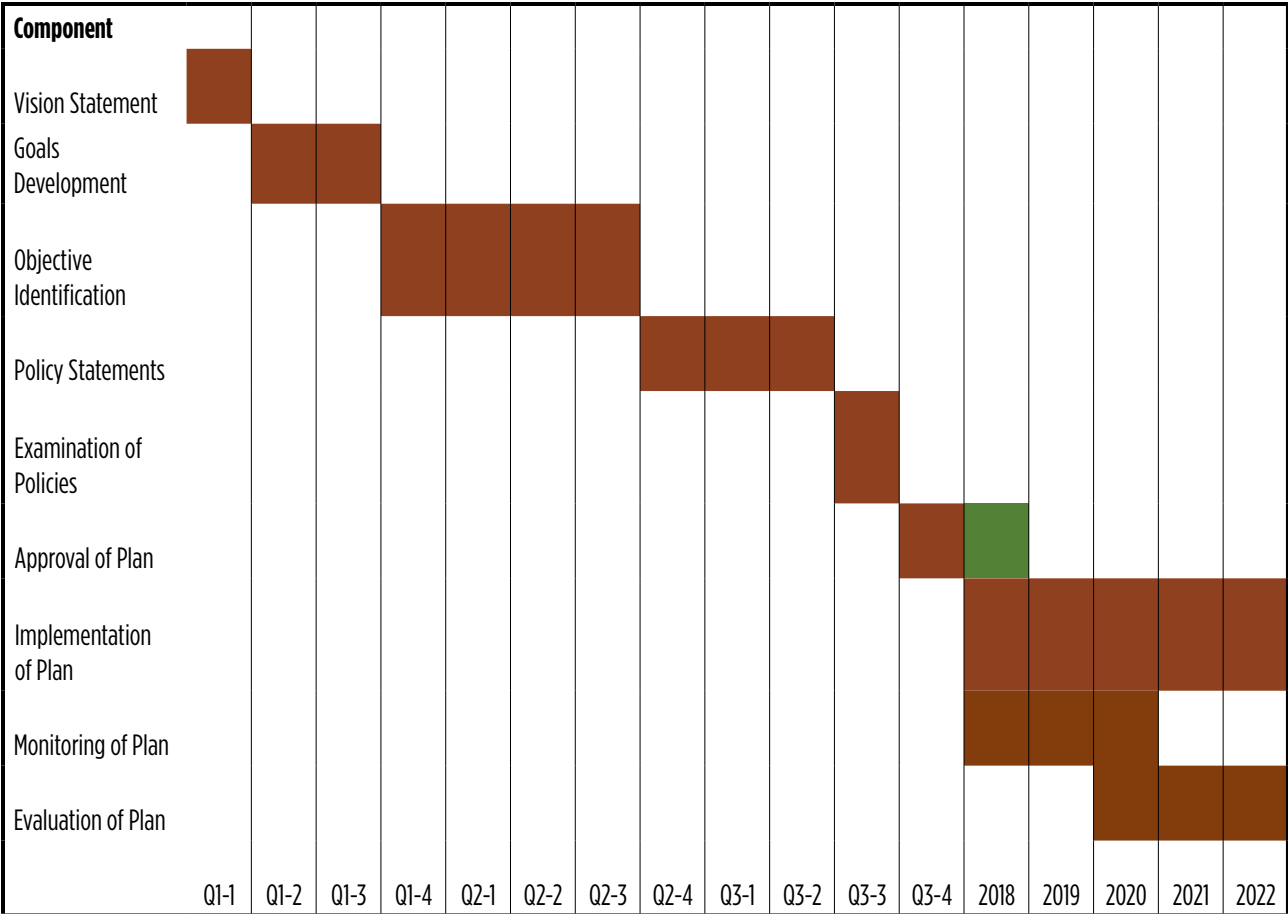


Figure II.2 Planning Process Timeline.

III. ISSUES

To ensure that the ARMP represented the needs of the Wind River Indian Reservation (WRIR), a series of four different types of public meetings were held during 2015-16 to hear from the reservation community. The first set of meetings brought together a combination of people; members of the Water Committee, the Agricultural Producers Committee, Council members, representatives from different federal agencies (particularly the Bureau of Indian Affairs (BIA), Natural Resource Conservation Service (NRCS), U.S. Dept. of Agriculture, University of Wyoming Extension and University of Wyoming EPSCoR. At the meetings individuals presented and discussed a range of agricultural issues, from the logistics of land leasing to protection of livestock from cattle thieves.

Overall, more than 85 issues were discussed by the participants (Appendix B). During the next set of public meetings held in Arapahoe, Crowheart, Ethete and Ft. Washakie the issues were organized into nine focused topics (Appendix C). The topics are:

- Agricultural Management
- Water
- Agriculture Economics
- Land Leasing
- Land Tenure
- Rangeland Productivity
- Cropland Productivity
- Wildlife Management
- Agricultural and Natural Resource Information Management

The ARMP is organized around these nine topics. The purpose of the ARMP is to provide a direction for agricultural development. To determine the direction for the plan, another set of public meetings were held using focus groups. The four focus groups were select citizens (8-12) that represented a cross section in each of the major communities (Arapahoe, Crowheart, Ethete and Ft. Washakie). The focus groups met to identify the key goals the ARMP should accomplish for each of the topics. The goals needed to be comprehensive enough to address the issues represented within each topic area.

IV. VISION STATEMENT

A vision statement is presented as the agreed upon ideal for the community. For the Wind River Indian Reservation a public meeting was held and the participants (24) were divided into three groups of eight. Each group was assigned the task of creating a vision of what they wanted from agricultural development on the Reservation. After completing their task, the members reconvened and compared and integrated their statements, remarkably they were all very similar in their concepts and components. The following is their combined vision:

A viable, self-directed and sustainable agricultural economy that enhances the education, health, natural resources, traditions and culture of our native people.

The vision statement is integrated into the Agricultural Resource Management Plan (ARMP) through the different goals, objectives and policies developed to address each of the major topics.

V. BACKGROUND

A. Physical Setting

The Wind River Indian Reservation was established on July 3, 1868 with the Treaty of Ft. Laramie (15STAT673) (Figure V.1). The treaty boundary delineates an area of 2.2m acres that is bounded by the Wind River Range on the west, the Owl Creek Mountains and the Owl Creek on the north and drifts into the Wind River Basin to the east and south. Gannett Peak (13,808ft) is Wyoming's highest peak and is in the Wind River Range near the western border of the reservation, while the lowest point (4282ft) is approximately the confluence of Owl Creek with the Big Horn River in the northeastern portion of the Reservation. The topography and geologic history of the area provides an environmental backdrop that limits the agricultural development of the Reservation. The main rivers dissecting the area, the Big and Little Wind Rivers, create narrow floodplains through the glacial outwash materials. These floodplains offer the rich soils in limited space to grow crops without the prolonged reliance on irrigation systems.

Overall, the land cover on the Reservation is dominated by sagebrush and grasslands. Figure V.2 illustrates the distribution of the major land cover types on the Reservation. Mixed Grass Prairie, Wyoming Big Sage and Desert Shrub cover more than 55 percent of the Reservation land area, while almost 11 percent is utilized for irrigated and dry land farming (Table V.1). The woodlands in the Wind River Mountains and the Owl Creek Range make up almost 19 percent of the Reservation, an area that has limited access and utilized for hunting, gathering and recreation. The riparian areas adjacent to the two major rivers do not account for a large portion of the Reservation (2.8 percent), but serve a major role in the ecological aspects of the Reservation.

The combination of topography, soils and climate are limiting factors to the agricultural development on the Reservation. However, through the efficient use of resources and technology, innovative use of the land, and knowledge-based decision-making, a more productive agricultural sector can develop on the Wind River Indian Reservation. Figure V.3 displays the prime agricultural lands throughout the Reservation and concentration along the major rivers. Overall, there are approximately 85,500 acres of prime agricultural lands as defined by the National Resource Conservation Service (NRCS) when irrigated, 3.8 percent of the Reservation. However, more than 235,000 acres are in crop production. The Big Horn Adjudication (September 2014) identified an additional 209,372 acre-feet of water for 53,760 acres of lands that are considered part of the futures irrigation area (Figure V.4). This land will be open to irrigation once the hydrologic system is in place. This is part of the Big Horn Settlement that has allocated over 554,000 acre-feet of water to the Reservation.

B. Climate

Irrigation is critical to agricultural development on the Reservation because of the climatic conditions in which it is situated. The Reservation is in the rain shadow of the Wind River Mountains and the Owl Creek Range, overall it has a relatively low precipitation rate, averaging approximately 9.5 inches, with a high of 12.7 inches in the Lander area and 7.5 inches on the eastern edge in Shoshoni (Table V.1). Average yearly temperature varies across the Reservation, with lower temperatures near the mountains (Dubois, 40.5 F) and warming in the lower lands (Thermopolis, 49.6 F) to the east. The average low temperatures impact the growing season, with the Wind River Basin having between 155-175 days above

32° F (www.wrds.uwyo.edu) or approximately four to five months above 50 F. Thus, the combination of low precipitation and short growing season limits the cropping selection.

Table V.1 Selected Weather Station Summaries, 1980-2010*.

Station	Average Annual		
	Temperature (F°)	Precipitation (in.)	Snow Fall (in.)
Boysen Dam	46.1	8.88	11.9
Burriss	42.7	8.46	33.3
Diversion Dam	43.7	9.09	20.9
Dubois	40.5	9.91	45.1
Lander	45.1	12.67	91.4
Pavillion	44.9	7.92	
Riverton	44.8	9.43	
Shoshoni	46.0	7.53	
Thermopolis	49.6	11.71	26.7

*Two additional weather stations were installed in 2013 at Ft Washakie and Arapaho; the data can be seen at: wrir_weather.wyisc.org.

1. Drought Mitigation Plan Synopsis

Drought at Wind River Reservation is a part of natural climate variability, as the region experiences frequent and severe drought events, which have significant impacts on communities and natural systems on the reservation. Since the turn of the 21st century, WRIR has experienced three extremes to exceptional drought periods, and at least two “micro-drought” events that have caused water shortages in parts of the reservation. For example, during the extreme 2012-2013 drought, reduced spring runoff led to a management crisis and drastically reduced the summer irrigation season, which forced several local cattle producers to liquidate their herds and caused productive agricultural fields to die (Feemster, 2013). In comparison, the 2015 water year (October 1, 2014 – September 30, 2015) was characterized by wetter-than-normal conditions across the reservation (HPRCC, 2016) and remained drought-free throughout the year, according to the U.S. Drought Monitor (NDMC, 2017). Given these conditions, it would seem that water availability would not be an issue in 2015, yet the reservation still experienced water shortages in the Little Wind Basin due to a combination of climatic shifts and system characteristics that led to a micro-drought and water shortages (McNeeley et al., in review).

Climate projections suggest increased warming and evapotranspiration, and although there is no consensus on the directionality of precipitation, the timing and seasonality of precipitation events are expected to be altered. Therefore, there is an urgent need to build tribal capacity to prepare for, and respond to, drought and climate variability now and into the future. Rice et al. (2012) report that warming has already occurred in the region and is expected to continue and accelerate during the next century. Water resources are particularly vulnerable to this warming, and climate change is projected to reduce snowpack, increase evaporation, lengthen summer seasons and start spring runoff earlier. Although there is uncertainty associated with the climate projections, changes are expected to continue

to affect the amount, phase and timing of precipitation and availability of the reservation's water resources (Ojima et al., 2015). These changes bring with them new water-management challenges. Increasing water managers' understanding of the nexus of climate and water resources management on the reservation will provide essential information to plan for, and adapt to, current climate variability and potential future climatic changes.

To help address these issues, the Office of the Tribal Water Engineer has collaborated with several universities and local, state and federal agencies to investigate drought vulnerabilities on the reservation, develop quarterly climate monitoring summaries, and are in the initial phases of developing a drought mitigation plan to better prepare for and respond to future drought events (see tribalwaterengineers.org). When the drought mitigation plan is completed, it can serve as an appendix to this Agricultural Resource Management Plan.

C. Current Land Tenure and Settlement Patterns

As mentioned previously, the Wind River Indian Reservation boundary covers 2.25m acres; however, the tribal lands comprise only a portion of this extent. With land exchanges, allotments and fee simple acquisitions, the trust lands within the boundary are slightly more than 1.7m acres (75.3 percent). Figure V.1 illustrates the distribution of land ownership patterns across the Reservation. The area in the east-central portion of the Reservation represents the Midvale Irrigation project, lands that were allotted in the early 1900s through the Bureau of Reclamation. The intermittent patterns of lands in the northern portion and the block of land in the south-central portion of the Reservation are fee simple land holdings that were obtained in the later portion of the 19th Century after the Dawes Land Allotment Act of 1887 (24Stat388, ch119; 25USCA331).

The Reservation is surrounded by and incorporates a variety of towns and cities, but has four main communities located within its boundaries: Arapahoe, Crowheart, Ethete and Ft. Washakie. Overall, there are approximately 26,330 people (Census Bureau, 2011) within the 1868 boundary. Table V.2 lists the population of the towns and places within the Reservation and surrounding area. Distributed throughout the Reservation are ranches, homesteads and small clusters of homes (Figure V.2) with the majority of these people in the southeast and central portions of the Reservation within or near river floodplains.

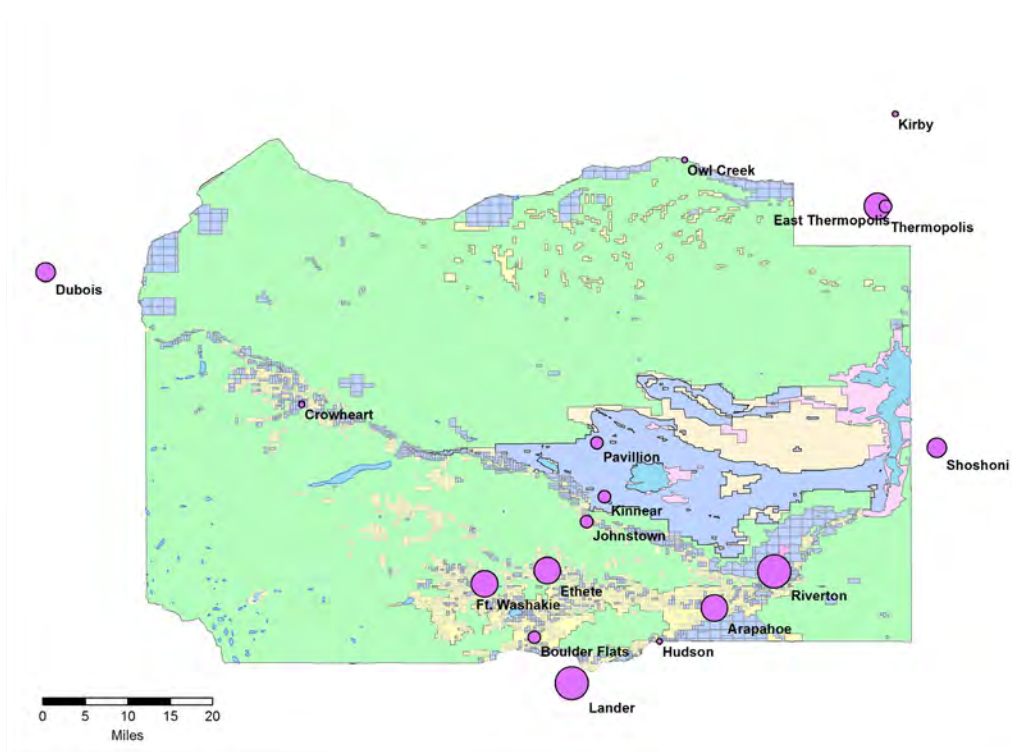


Figure V.1 Land Ownership and Towns within the Reservation.

Table V.2 Wind River Indian Reservation cities, towns and places (Census Bureau, 2011).

Settlement: Cities	Population	Settlement: Places	Population
Lander	7,457	Arapahoe	1,656
Riverton	10,615	Boulder Flats	408
Settlement: Towns	Population	Crowheart	141
Dubois	971	Ethete	1,553
East Thermopolis	254	Ft. Washakie	1,759
Hudson	73	Johnstown	242
Kirby	92	Owl Creek	5
Pavillion	231		
Shoshoni	649		
Thermopolis	2,949		

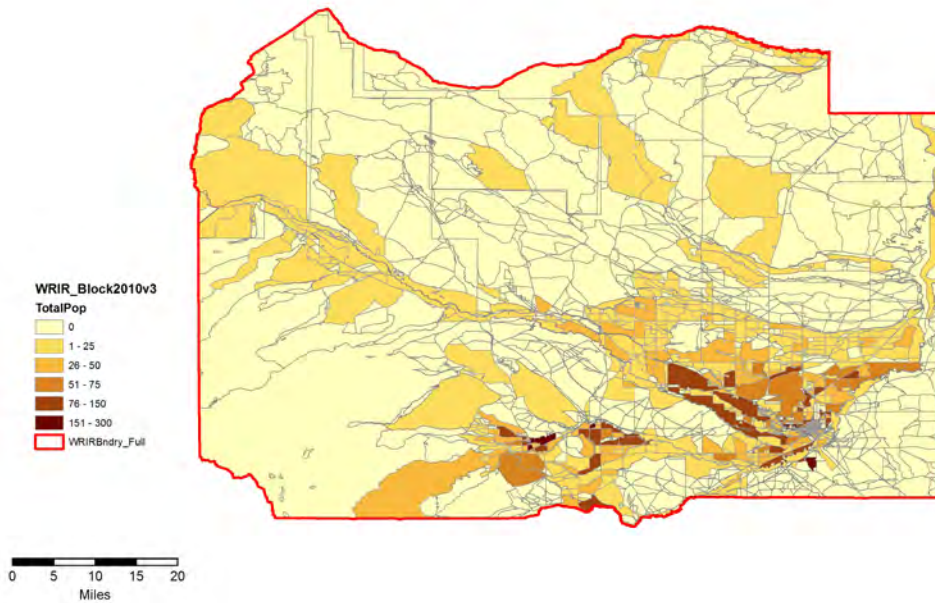


Figure V.2 Wind River Indian Reservation Population, 2010.

D. Current Agriculture

Agriculture on the Wind River Indian Reservation has been its focus since the formation of the reservation. In 2012, the U.S. Dept. of Agriculture in their normal Census of Agriculture segregated their data for Fremont and Hot Springs counties to separate tribal agriculture from county agriculture. The Census of Agriculture is obtained from a series of random surveys sent to agricultural producers across the U.S. The information from the survey is then processed and statistical tables completed for each county and, in this case, reservation. The key elements of the Agriculture Census for the Wind River Reservation are presented in Table V.3.

Table V.3. General farm characteristics on the Wind River Reservation (www.usda.gov).

		Total	Farms Operated by American Indians or Alaskan Natives	%
Farms	Number	293	79	27.0
Land in Farms	acres	594,364	359,015	60.4
Average Farm Size	acres	2,029	4,544	
Reservation Farms	acres	462,174	353,883	76.6

Farms by Size	Total	Farms Operated by American Indians or Alaskan Natives	American Indian Operated %
0.1 - 9 acres	11	-	-
10 - 49 acres	70	18	25.7
50 - 179 acres	60	16	26.7
180 - 499 acres	84	15	17.9
500 - 999 acres	34	15	44.1
1000 acres or more	34	15	44.1
Total Farms	293	79	

The 2012 Agriculture census indicates that the average farm size on the Wind River Reservation is over 4,500 acres, however, more than 62 percent of the farms operated by Native Americans are less than 500 acres. Farms are considered any activity that produces over \$1,000 in sold production, either crops or livestock. Figure V.3 illustrates the distribution of agricultural lands on the Wind River Reservation. The majority of the reservation lands are considered range or grazing lands (67.9 percent), with a smaller percentage in crop production (10.8 percent). The croplands are generally found in the river lowlands along the Big and Little Wind Rivers and account for less than 11 percent of the total reservation area (Table V.4).

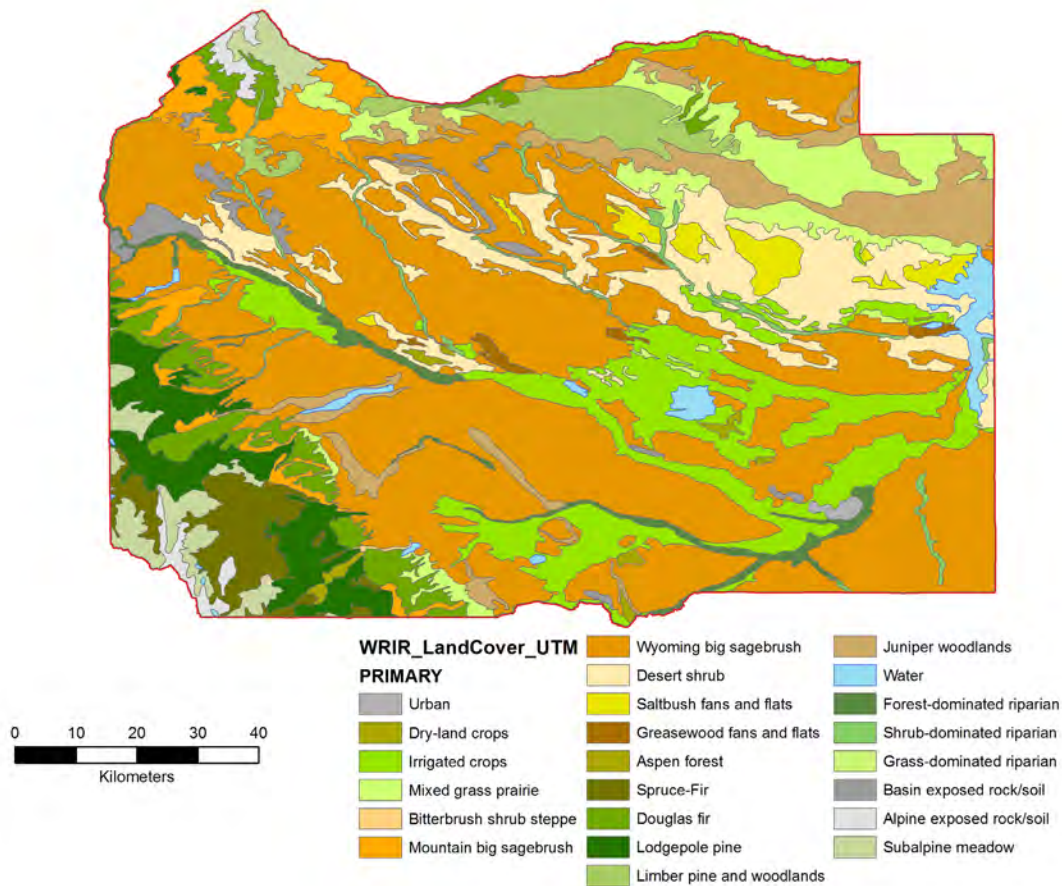


Figure V.3 General land cover and land use across the Wind River Reservation.

Table V.4. lists the different land use/land cover across the reservation. Wyoming big sagebrush dominates the reservation, occupying over 40 percent of the lands. Along the Big and Little Wind Rivers irrigated cropland is the next largest land use, over 237,000 acres in assorted crops, dominated by hay and other grains, together they account for more than 10 percent of the reservation. However, the majority of the irrigated cropland is on non-trust or allotted lands (Figure V.7.). As listed in Table V.4, almost twice the amount of irrigated agricultural land is found on the fee simple lands within the reservation boundary. Most all of that agricultural land is in the floodplain north of the Big Wind River.

Table V.4. Land use and land cover acreages across the Wind River Reservation, 2012.

Land Use/Land Cover Type	Acres	Sq.Miles	Sq.Km	%
Human Settlement	3,694	5.8	15.0	0.16
Dry Land Crops	7,611	11.9	30.8	0.34
Irrigated Crops	237,728	371.4	962.1	10.54
Mixed Grass Prairie	127,403	199.1	515.6	5.65
Bitterbrush Shrub Steppe	865	1.4	3.5	0.04
Mountain Big Sagebrush	63,541	99.3	257.1	2.82
Wyoming Big Sagebrush	964,722	1,507.4	3,904.1	42.77
Desert Shrub	190,839	298.2	772.3	8.46
Saltbush Fans and Flats	34,963	54.6	141.5	1.55
Greasewood Fans and Flats	8,458	13.2	34.2	0.37
Aspen Forest	3,106	4.9	12.6	0.14
Spruce-Fir	58,616	91.6	237.2	2.60
Douglas Fir	78,738	123.0	318.6	3.49
Lodgepole Pine	93,230	145.7	377.3	4.13
Limber Pine and Woodland	59,842	93.5	242.2	2.65
Juniper Woodland	127,800	199.7	517.2	5.67
Open Water (Lakes, Reservoirs)	30,359	47.4	122.9	1.35
Forest-dominated Riparian	37,093	58.0	150.1	1.64
Shrub-dominated Riparian	24,972	39.0	101.1	1.11
Grass-dominated Riparian	865	1.4	3.5	0.04
Basin Exposed Rock/Soil	28,983	45.3	117.3	1.28
Alpine Exposed Rock/Soil	18,399	28.7	74.5	0.82
Subalpine Meadow	53,953	84.3	218.3	2.39
Total (acres)	2,255,781	3,524.7	9,128.8	100.00

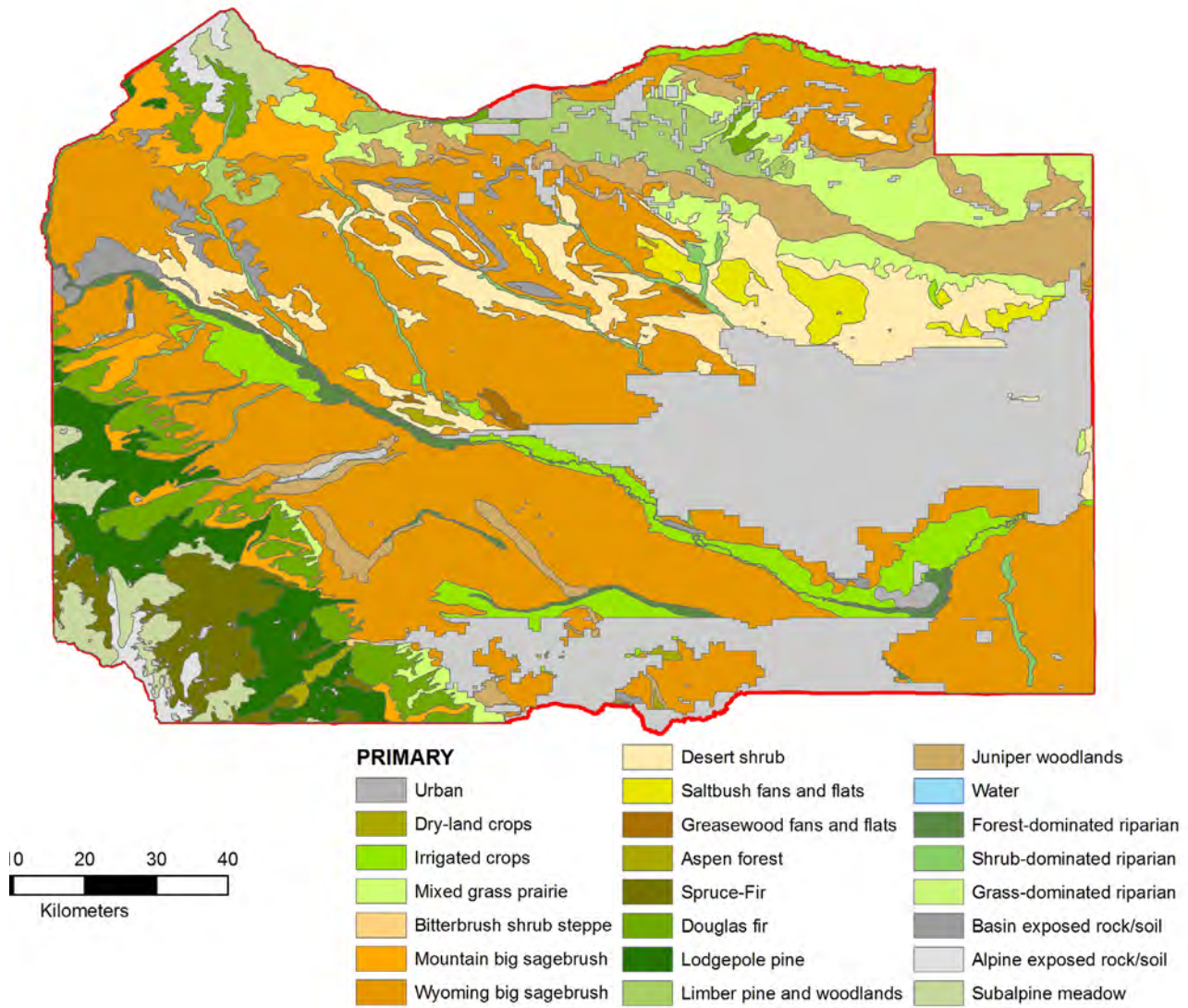


Figure V.4. Wind River Reservation Land Use, Tribal and Allotted Lands.

Table V.5. Wind River Land Use/Land Cover, Trust, Allotted and Fee Simple Lands (acres).

Land Use/Land Cover	Total	Trust & Allotted	Fee Simple
Human Settlement	3,694	3,682	12
Dry Land Crops	7,611	3,257	4,354
Irrigated Crops	237,728	85,266	152,462
Mixed Grass Prairie	127,403	117,914	9,489
Bitterbrush Shrub Steppe	865	677	188
Mountain Big Sagebrush	63,541	63,261	279
Wyoming Big Sagebrush	964,722	807,103	157,619
Desert Shrub	190,839	149,635	41,205
Saltbush Fans and Flats	34,963	31,862	3,101
Greasewood Fans and Flats	8,458	4,156	4,302
Aspen Forest	3,106	3,099	7
Spruce-Fir	58,616	56,903	1,712
Douglas Fir	78,738	75,926	2,812
Lodgepole Pine	93,230	92,294	937
Limber Pine and Woodland	59,842	50,246	9,595
Juniper Woodland	127,800	121,423	6,378
Open Water (Lakes, Reservoirs)	30,359	0	30,359
Forest-dominated Riparian	37,093	25,232	11,861
Shrub-dominated Riparian	24,972	18,303	6,669
Grass-dominated Riparian	865	1,947	1,082
Basin Exposed Rock/Soil	28,983	28,200	783
Alpine Exposed Rock/Soil	18,399	18,162	237
Subalpine Meadow	53,953	52,974	979
Total (acres)	2,255,781	1,811,522	444,258

VI. AGRICULTURAL GOALS, OBJECTIVES AND ACTION ITEMS

A. Agriculture Management

A viable and central management structure is necessary to support an integrated and proactive agriculture resource management plan for the Reservation. Agriculture and Natural Resource management on the Reservation is currently distributed across an array of tribal, federal, state and local agencies. This distributed management structure has resulted in difficulty with communication, data sharing and the development of integrated, coordinated approaches to agriculture and resource management.

The *proposed* Office of Agriculture and Natural Resources (OANR) (Figure VI.a1) is designed to facilitate the development and implementation of the management plan and system that: 1) develops agriculture on the Reservation, 2) is economically viable and sustainable, 3) preserves natural resources, traditional ways and 4) encourages new farmers and ranchers. The proposed OANR has both a governance and an administrative structure. It is proposed that an OANR board will be established that will be advisory to the Tribal Councils and have oversight of the administration of the OANR and development of policy. Administratively, the OANR will be structured to facilitate data and information sharing and coordinated agriculture and natural resource management (e.g., water, agriculture, land and natural resources). The OANR will house the administrative offices that oversee these divisions (Figure VI.a1). Two of the subdivisions, water and land, will have their own oversight boards. This proposed structure follows the current system that works well for management of water resources on the Reservation. Additional information on the Land Board is in Section d (Land Leases). In addition, it is proposed that the OANR include a Division of Agricultural Economic Development, to integrate financial, business, education and natural resources to have a viable and sustainable agricultural economy (see Section c).

The goals and corresponding policies summarized below are designed to facilitate and support the development and implementation of an Office of Agriculture and Natural Resources for the Wind River Tribes fully supportive of improving agricultural resource management on the Reservation.

Goal — An agricultural management system that develops agriculture on the Reservation that is economically viable and sustainable while preserving natural resources, traditional ways and encourages new farmers and ranchers.

Goal — The Agriculture Management Plan, and amendments to, of and approved by both tribes of the Reservation, shall be adhered to by the Secretary of the Interior pursuant to P.L. 103-177, 25USC3701.

- **Objective #1** — Create an agricultural management system that advises the Tribal Councils, but is independent and manages the whole agricultural system.

Policy #1: Create an OANR Board that is advisory to the Tribal Councils and shall be formed no later than three years after implementing this plan.

Policy #2: Create the OANR (Figure 1) that manages the whole agricultural system that includes production, processing, marketing and land management system shall be formed no later than four years after implementing this plan.

Policy #3: Tribal Councils will give authority to the OANR to manage and secure funding as a tribal organization.

- **Objective #2** — Identify the natural resources that has the highest priority for preservation.

Policy #1: [Get the list from the Ag Producers and NRCS]

- **Objective #3** — Identify how the traditional ways can be integrated into contemporary agricultural practices.

Policy #1: Develop incentives for traditional crops and medicines.

Policy #2: Create and refine the Indigenous stewardship model for WRIR [e.g. NRCS model].

Policy #3: Continue and expand family and community gardens, e.g., the growing resiliency program.

- **Objective #4** — Create incentives and financial structures to support current and new farmers and ranchers.

Policy #1: Develop an education program for agricultural production and financing.

Policy #2: Develop an education program to introduce and implement the FSA and EQUIP programs.

Policy #3: Streamline procedures to apply for and receive funds from the SBA (Small Business Administration), e.g., the Wind River Development Fund.

- **Objective #5** — Expand educational opportunities for current and future farmers and ranchers to improve their profitability through management, technology and best practices.

Policy #1: Reestablish agricultural in the K-12 curriculum.

Policy #2: Expand the 4-H program with schools.

Policy #3: Expand and support FFA (Future Farmers of America) in K-12.

Policy #4: Identify and establish educational programs for post-secondary education in agricultural production.

Policy #5: Develop scholarship programs for university study in agricultural and animal science.

- **Objective #6** — The completion of the Agricultural Resource Management Plan (ARMP) meets the criteria of Section 1.C. of the American Indian Agricultural Resource Management Act (P.L. 103-177, 25USC3701).

Policy #1: Approve and implement the Wind River Agricultural Resource Management Plan.

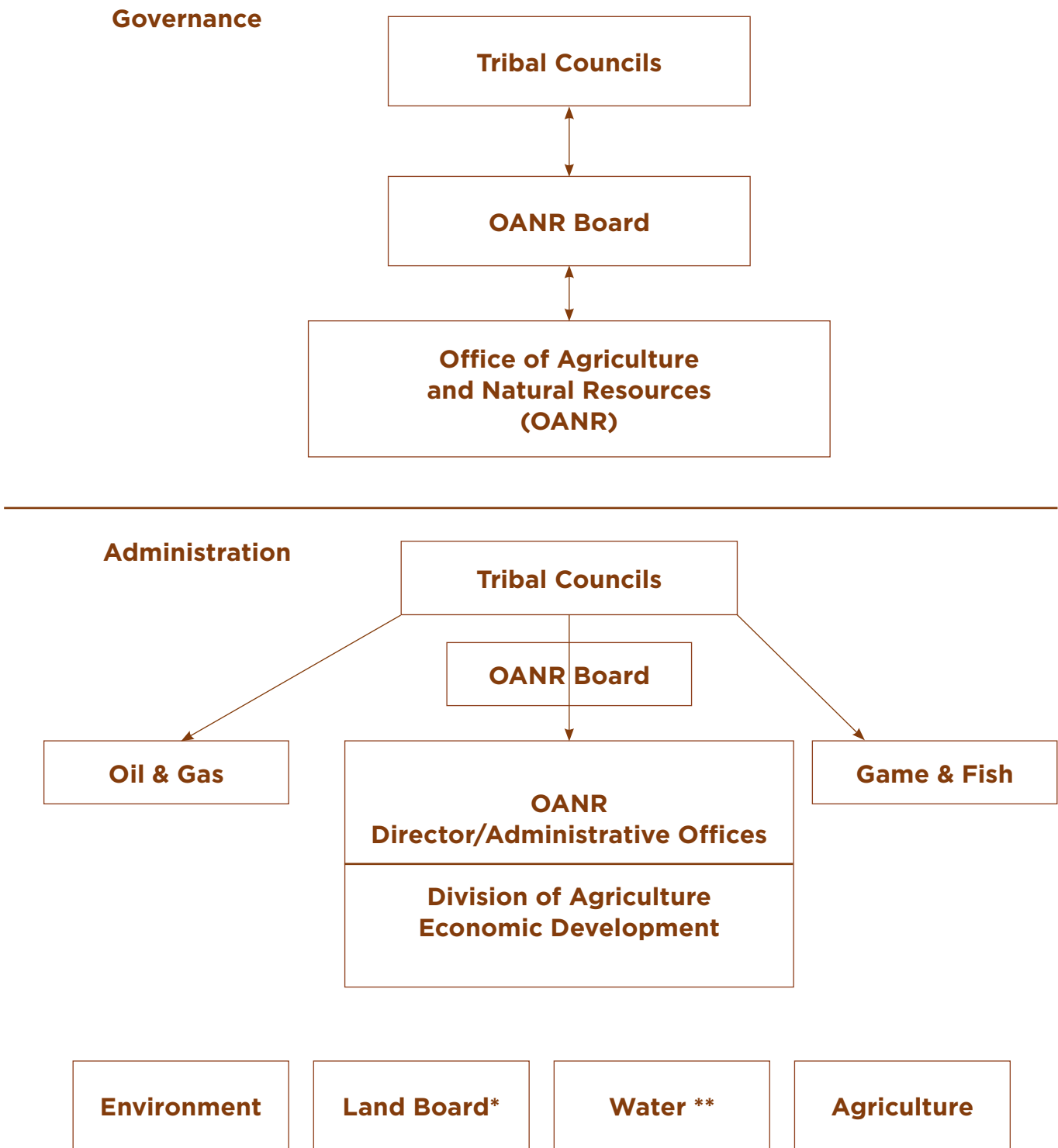


Figure VI.a1. Proposed Organizational Structure of the Wind River Office of Agriculture and Natural Resources.

**For additional information on the Land board see Section VI.d objectives 1-3. ** Water Board will work with OTWE.*

B. Water

Water resources, and their management, are considered one of the most important agricultural and natural resource on the Reservation by the Eastern Shoshone and Northern Arapahoe Tribes. Agriculture is the largest water use on the reservation, with surface water providing the majority of irrigation water. Other major water uses include: public water supply, domestic, industrial (e.g., energy development), recreation and fisheries. Ground water is the primary water source for domestic use on the Reservation. Fisheries and recreation are non-consumptive, but require minimum stream flows.

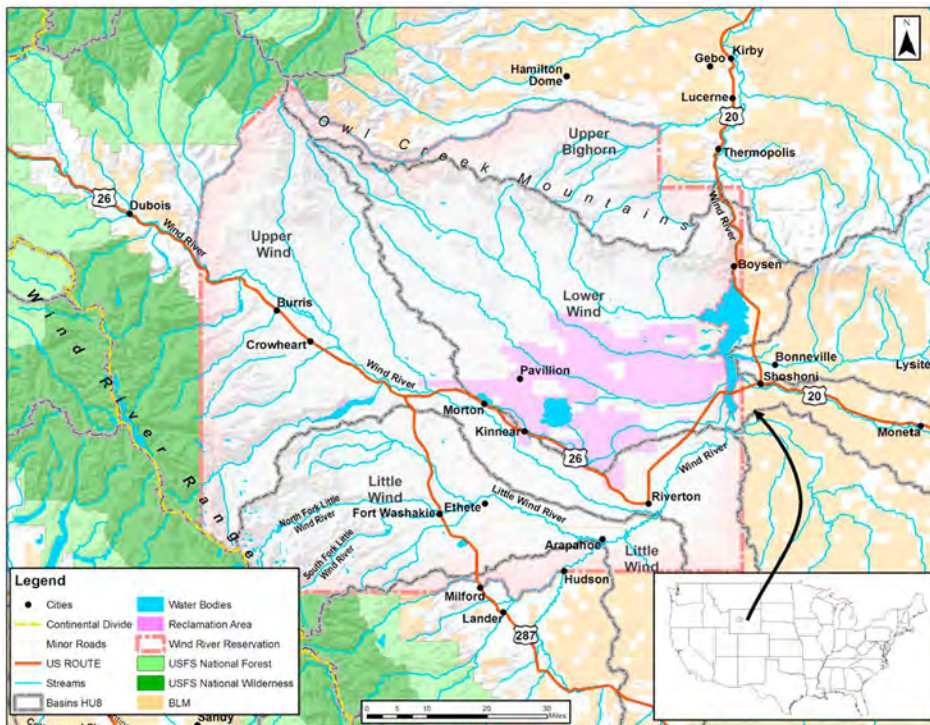


Figure VI.b1. Major streams and rivers (McNeeley, et al., *Climate Risk Management* 19 (2018) 61–82)

The Reservation, located in the center of the Upper Wind River Basin, has over 100 perennial streams (1100 miles) and numerous intermittent and ephemeral streams. The two main surface water streams on the south side of the Reservation are the main Wind River and the Little Wind Rivers, which are primarily snow-fed perennial systems with headwaters in the Absaroka and Wind River Ranges (Figure VI.2). The Wind River is the primary surface water system of the Reservation and the entire Wind River drainage basin. The northern part of the reservation is in the Owl Creek drainage, Owl Creek and South Fork Owl Creek, which is a tributary of the Bighorn River, the name given the Wind River after it passes through the Wind River Canyon.

Stream flow through the Wind and Little Wind River basins' is highly variable from year to year and primarily reliant on spring snow pack, with the highest flows usually in June and July. The long-term average flow into the reservation in June for the Wind River (at Crowheart) and Little Wind River (at Ft Washakie) are 3,780 cfs (228,201 acre-ft; 1946-89) and 511 cfs (30,850 acre-ft; 1922-40), respectively (USGS, 1996). Annually, a total of about 170,000 acre-ft of water is diverted from streams to irrigate an average of 30,000 acres (Figure VI.b2). Agricultural water use includes water for irrigation

of crops (most common) and water use for livestock production (e.g., beef, dairy, poultry and other). In reservation irrigation use, the Wind River serves the Upper Big Wind (Crowheart) Unit (UBWU), the Johnstown Unit (JTU) the Left Hand Unit (LHU), amounting to approximately 14,150 acres. The Little Wind River, by contrast, aided by a little additional water from the Popo Agie River, serves a total of 22,400 to 24,500 acres in the Little Wind Unit (LWU). (Figure VI.b.3).

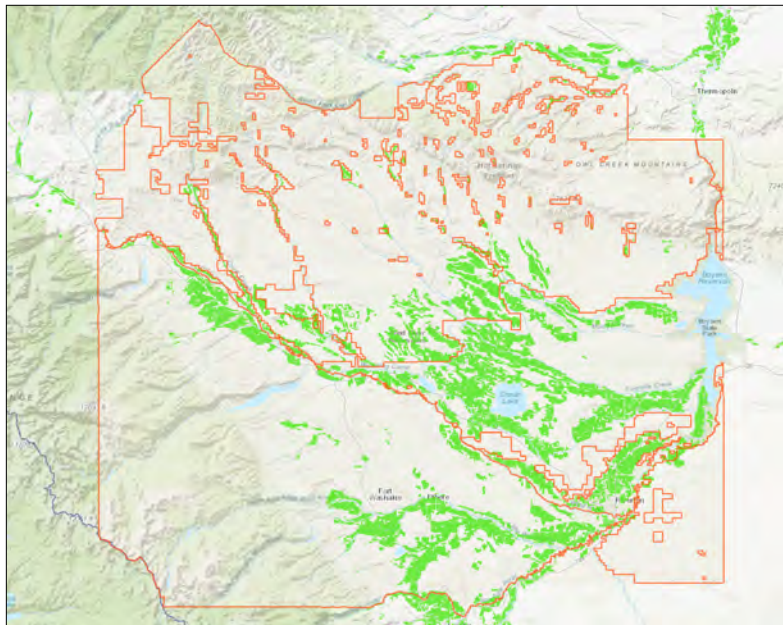


Figure VI.b2. Wind River Reservation Irrigated Lands.

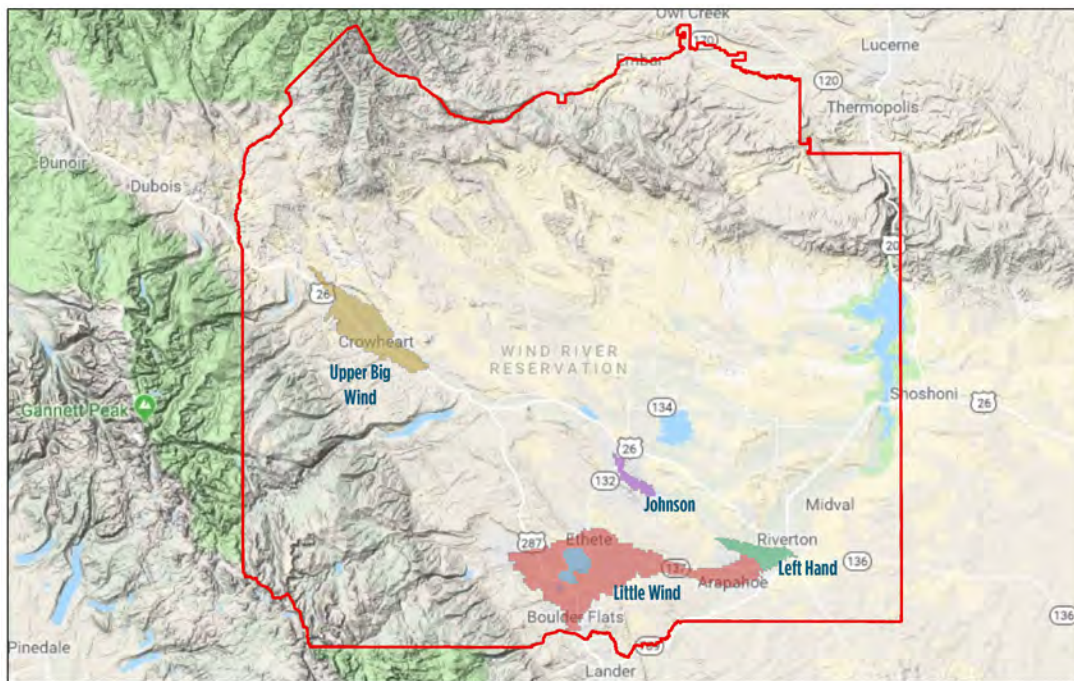


Figure VI.b3. Wind River Reservation Irrigation Districts.

Lakes and reservoirs are important resources for surface water storage and management on the Reservation. These include high elevation mountain lakes and lowland lakes and reservoirs. The 220 small (less than 15 acres) high mountain lakes (total surface area of 4,450 acres) are located in the Wind River Range (USGS, 1996). The major lowland lakes and reservoirs are Dinwoody Lakes, upper Dinwoody Lake, Ray Lake, Bull Lake and Washakie Reservoir (Figure VI.b4). (Bull Lake water levels, however, are managed by the federal Bureau of Reclamation to serve the non-reservation Midvale Irrigation District north of the Wind River, near Riverton). To meet additional identified water storage needs, the OTWE in collaboration with the Wyoming Water Development has just initiated phase II of a Water Storage project, looking at additional storage possibilities in the Little Wind drainage and off-channel on the Big Wind. Phase I assessment was completed in December 2016.

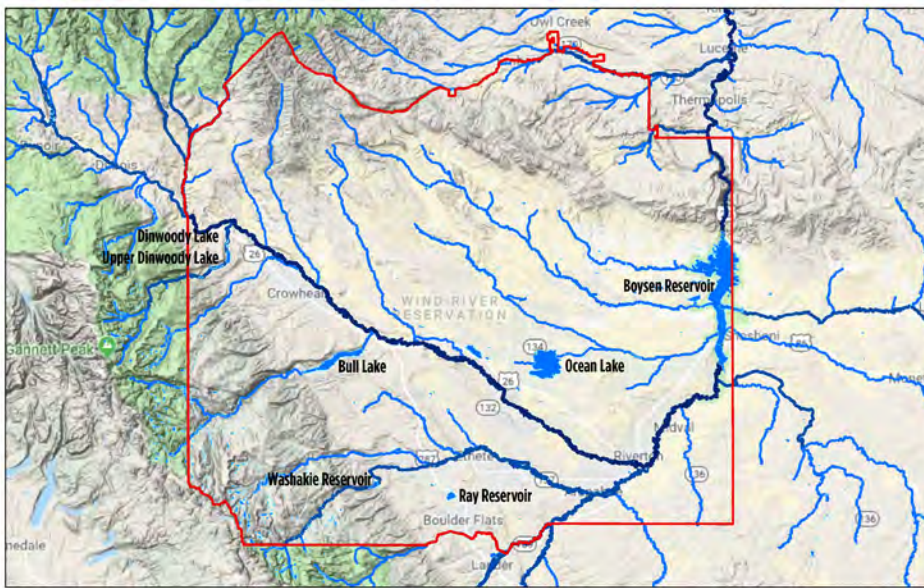


Figure VI.b4. Major lakes and reservoirs on the Wind River Reservation.

In 1989, the U.S. Supreme Court confirmed the Reservation’s rights to nearly 500,000 acre feet of water per year, with 209,000 acre feet of that amount allotted based on specific future irrigation projects. A question moving forward is use of this “futures” water, including development of efficient delivery of this water to irrigable land. Another issue is improvement of irrigation infrastructure in the major existing irrigation projects. Importantly, under the court decision the tribes’ reserved rights do not include groundwater; most ground water resources on the Reservation are still considered waters of the state.

The water resource management goal, objectives and corresponding policies summarized below are designed to leverage the Reservation’s water resources for advancing agriculture production and implementing the Wind River Water Code (1991), which recognizes 14 beneficial uses of water in addition to agriculture on the Reservation.

Goal — Manage water availability for agricultural users that recognizes the Wind River Water Code and can adjust to long and short-term weather and climatic conditions.

- **Objective #1** — Develop and maintain a water management system that can foster increases in agriculture production and recognizes the Wind River Water Code on the Reservation.

Policy #1: Recognize and implement the Wind River Water Code immediately upon completion and passage of Agricultural Resource Management Plan (ARMP).

Policy #2: An agriculture water management system/plan that follows the Wind River Water Code will be developed within two years after the completion and acceptance of ARMP.

Policy #3: The agriculture water management system/plan will be implemented within four years of completion and acceptance of ARMP.

Policy #4: The agriculture water management system/plan will address the access and delivery of water to adjudicated irrigable land.

- **Objective #2** — Increase water storage capacity within the Reservation to a) increase water availability for agriculture, fish and wildlife; b) increase resiliency (flexibility) in the water management system; and c) improve water distribution to meet current and future agricultural and natural resource needs.

Policy #1: Identify and select potential additional efficient water storage locations on the reservation within two years of implementation of ARMP.

Policy #2: After completion of the Level II Phase 3 study in collaboration with Wyoming Water Development Commission (WWDC), identification and funding of water storage expansion projects will be completed within five years of approval of ARMP.

Policy #3: a) An Improved Water Distribution Master Plan will be adopted. b) An Irrigation Rehabilitation Plan will be developed and implemented within one year of the Water Distribution Master Plan.

- **Objective #3** — Improve local water distribution systems to increase water use efficiency to maintain and/or increase agricultural production and decrease losses within the systems.

Policy #1: Implement the Water Distribution Master Plan and Irrigation Rehabilitation Plan (identified in Policy #3 – Objective #2).

- **Objective #4** — Develop local water resource management system and oversight capacity that recognizes water valuation and market potential considerations.

Policy #1: A model for the valuation of agriculture water for future marketing will be developed within three years of the completion of the ARMP, and ongoing market assessments will be continued.

- **Objective #5** — Efficiently and effectively use Wind River ground water resources to enhance agricultural production and maintain long-term sustainability.

Policy #1: Map and quantify ground water resources that could be available for agricultural use.

Policy #2: Determine the connectivity between surface water and ground water on the Reservation.

Policy #3: Evaluate the potential use of ground water resources for agricultural production, following the Wind River Water Code within five years of ARMP implementation.

Policy #4: Determine the potential for groundwater storage and recharge zones on the WRIR within seven years of ARMP implementation.

- **Objective #6** — Manage water resources to protect and or increase water quality for multiple beneficial uses.

Policy #1: Implement the Wind River Water Code.

C. Agricultural Economic Development

The economic development goals and corresponding policies summarized below are designed to leverage the two Wind River Tribes' human and natural resources to create jobs and foster entrepreneurial development within the membership and their communities. The goal of the Division of Agricultural Economic Development, within the Office of Agriculture and Natural Resources, is to integrate financial, business, education and natural resources to have a viable and sustainable agricultural economy. The tribes have three important components of capital that they need to leverage: land, natural capital and human capital. The Office of Agriculture and Natural Resources (OANR) Board that establishes the policies will facilitate the best use of these three sources of value for the tribe.

Agricultural operations that have long-term viability will increase the overall leasing system reliability. Division of Agriculture Economic Development will work with lessees to understand how to use market data for convention and specialty crops. The Department will also bring in outside financial representatives to reduce the likelihood of conflicts of interest and provide expertise on agricultural rental management.

As part of efforts to expand agriculture and make it sustainable, OANR and the Division of Agriculture Economic Development will provide educational opportunities on agricultural operations either internally or through outside partners (e.g. University of Wyoming Extension, Livestock Management Information Center, NRCS). This will include studies and data collection on crop and livestock marketing, market windows and food services information for specialty crops and livestock and production information assistance when possible. The objective is to diversify and strengthen the agricultural industry on the Reservation to include the possibility of marketing specialized crops as well as conventional crop and livestock products as well.

Tools that the division of Agricultural Economic Development staff will use are crop and livestock enterprise budgeting, machinery cost budgets, linear programming of the supply system on the Reservation, risk assessment techniques and others. It will also conduct market window analyses on specialized crops to assess the potential of tapping into new markets. Market window analysis compares price variations of fresh produce and herb prices with cost of production to identify ideal timing for harvest. Two division offices will be established to develop and facilitate agricultural economic development of the Reservation (Figure VI.c1).

Goal — Integrate financial, business, education and natural resources to have a viable and sustainable agricultural economy.

- **Objective #1** — Retain, expand, create and recruit economically sustainable agricultural enterprises, businesses and entrepreneurs on the Reservation.

Policy #1: Establish an Agriculture Economic Office within the OANR (Figure VI.1) to oversee and support agricultural marketing, finance and development on the Reservation within four years of acceptance of the ARMP.

Policy #2: The Agriculture Economic Office will be staffed by qualified professionals with experience and expertise in agriculture economic development, finance and marketing.

- **Objective #2** — Increase the availability of operating loans to support agricultural enterprises, businesses and entrepreneurs who provide evidence of economic profitability or potential profitability.

Policy #1: Identify and secure conventional (e.g., FBA, USDA) and alternative (e.g., develop a tribal credit union) funding sources to support agriculture enterprises, businesses and entrepreneurs on the Reservation.

- **Objective #3** — Increase the diversity of cropping enterprises and businesses located on the Reservation, spanning the entire industry, ranging from input/service providers to primary production, processing and marketing.

Policy #1: The Office of Agriculture Economic Development will a) explore and promote development and marketing of diverse cropping systems and enterprises; and b) investigate expanding production and processing potential.

- **Objective #4** — Increase the diversity of livestock enterprises and businesses located on the Reservation, spanning the entire industry, ranging from input/service providers to primary production, processing and marketing.

Policy #1: The Office of Agriculture Economic Development will a) explore and promote development and marketing of diverse livestock systems and enterprises; and b) investigate expanding production and processing potential.

- **Objective #5** — Expand the educational opportunities for improving the entrepreneurial aspects of the agricultural economy (also see section a. Agriculture Management, Objective 5 (policies 1-5)).

Policy #1: Expand and promote agriculture education in K-12.

Policy #2: Promote agriculture education training opportunities for educators in the classroom (e.g., Wyoming Ag in the Classroom or Wyoming Water in the Classroom).

Policy #3: Expand adult agriculture education on the reservation by partnering with agriculture educators such as University of Wyoming Extension.

Policy #4: Investigate the possibility of developing an “Agricultural Experimental Research Station” on the reservation in collaboration with UW Agriculture Experiment Station Office.

- **Objective #6** — Integrate the diversity of cropping and livestock enterprises and businesses located on the Reservation, spanning the entire industry, ranging from input/service providers to primary production, processing and marketing.

Policy #1: Investigate the possibility of developing an “Agricultural Experimental Research Station” on the reservation in collaboration with UW Agriculture Experiment Station Office. (see Objective 5, policy #4, above)

Policy #2: The Office of Agriculture Economic Development will investigate and promote integrated cropping and livestock systems approaches and markets across the reservation.

- **Objective #7** — Develop a water leasing and marketing system that supports viable agricultural development.

Policy #1: A model for the valuation of agriculture water for future marketing will be developed within three years of the completion of the ARMP and ongoing market assessments will be continued. (See section b. Water, Objective 4, policy #1)

Policy #2: Develop a strategy to finance agriculture development through water markets following the Wind River Water Code.

Administration



OAED: Subdivisions



Figure VI.c1. Proposed administrative structure of Division of Agricultural Economic Development.

D. Land Leases

The leasing system will be designed to facilitate economic sustainability and natural resource conservation for the benefit of Wind River Tribes' members. The goal will be to encourage conservation and long-term viability by using longer lease terms and allow lessees to reap benefits of any investment in infrastructure and natural capital on their leased property. It is in the interest of both the lessees and the Tribes to foster long-term planning in the use of these lands. The length of these contracts will be based upon both the business plan of the lessee and the OANR Division of Agricultural Economic Development.

The core part of an agricultural development program for the Reservation is creation of agricultural leasing system. That system would allow tribal member producers access to the land and water resources to produce a long-term economically viable level that provides opportunities, education, capital development and asset creation and jobs. There are three components outlined in the objectives and policies below that foster broad agricultural and business development in tribal communities; viable long-term leasing operation that complements lessee business plans and capital investment, a revenue stream that allows the tribes to manage lessee land to increase the soil and water ecosystem services that agricultural production needs and funding market and production information and education to assist and expand lessee opportunities.

The goals of the leasing systems are to manage agricultural land leasing for the long-term benefit of tribal members, the economic and social benefit of farmers and ranchers, to manage agricultural land leasing that will benefit the lessees' investment, protect and enhance the natural resources, follow best beneficial land use principles, market fluctuations and provide for long-term sustainable agricultural production. Leasing approaches have been exhaustively studied by economists, lawyers and anthropologists over the

decades. Variations include more traditional fixed price per unit of land to share cropping to details on how one shares benefits of capital improvements by lessees and more. Leasing systems allow agricultural producers to expand their production levels while minimizing debt loads on the lessee side and bring in revenue streams (or second revenue streams) to the owner. In general leases involve sharing risk between owner and renter.

An ideal lease system is one that fosters efficient organization of resources on the farm but provides for an equitable distribution of product for all factors: funding employees equitably, covering land rental and fixed costs and providing a reasonable return per acre to the operator. The return to any resource owners (e.g. reservation land operations, labor payments, insurance, inputs, et al) must be equal to the productivity of those inputs to production (Heady 1947). While the operational objectives of the Board are larger than just lease management the objectives and relevant policies below are structured around increasing the economic viability of agricultural operations, which ultimately facilitates more secure revenues for the Wind River Tribes, both to the government and to the members.

Goal — Manage agricultural land leasing for the long-term benefit of tribal members, and the economic and social benefit of farmers and ranchers.

Goal — Manage agricultural land leasing that will benefit the lessees' investment, protect and enhance the natural resources, follow best beneficial land use principles, market fluctuations and provide for long-term sustainable agricultural production.

- **Objective #1** — Establish the use of longer-term land leases to facilitate sustainable agricultural production that also considers the needs of new ranchers and farmers.

Policy #1: Develop and ratify a WRIR Land Code within five years of acceptance of the Plan to assist in land leases, land improvements, land investments and future farmers and ranchers.

- **Objective #2** — Increase transparency in the valuation, allocation and administration of land leases.

Policy #1: Create a Land Board, as identified in the WRIR Land Code, to oversee the process of land leasing and investment, while making appropriate information available to the public.

- **Objective #3** — Develop a strategy to evaluate lessees' beneficial use of land for agricultural purposes.

Policy #1: The Land Board will examine and evaluate physical characteristics of the land to protect and improve its productivity.

- **Objective #4** — Support and create incentives for lessees' investment to improve the productivity and natural resources of the lands.

Policy #1: The division of Agriculture Economic Development will develop mechanisms to assist lessees with operational and investment strategies.

Policy #2: The division of Agriculture Economic Development will examine and evaluate land investments to ensure benefits for lessees and tribal members to determine lease terms and land valuations.

Policy #3: A portion of lease revenues will be reinvested in agriculture development, operations and services.

- **Objective #5** — Develop a formula such that lease prices shall reflect the investment and market fluctuations in production and processing of crops and livestock.

Policy #1: The division of Agriculture Economic Development will create and implement a lease pricing structure that integrates the fluctuation of market and investment values.

E. Land Ownership

There are three major types of land ownership on the Wind River Reservation; Trust, Allotted Trust and Fee Simple lands. Table VI. 1 illustrates the fact that the Reservation is fortunate in the fact that the majority of the area is in Trust land or Allotted Trust (79.1 percent). Even though there is approximately 21 percent of the Reservation in Fee Simple lands, the Trust land is not parceled into a checkerboard pattern of Trust, Allotted and Fee Simple lands similar to other western reservations. Figure VI.e1 illustrates the contiguity of trust lands across most of the reservation and the fee simple lands in the south-central and east-central portions of the reservation.

Table VI.1 Wind River Indian Reservation Land Ownership (source: BIA, 2017).

Land Status	Acres	Sq. Miles	Percent
Tribal Trust	1,684,724.3	2,632.4	74.6
Tribal Allotted	101,917.6	159.2	4.5
Fee Simple	471,720.4	737.1	20.9
Total	2,258,362.3	3,528.7	

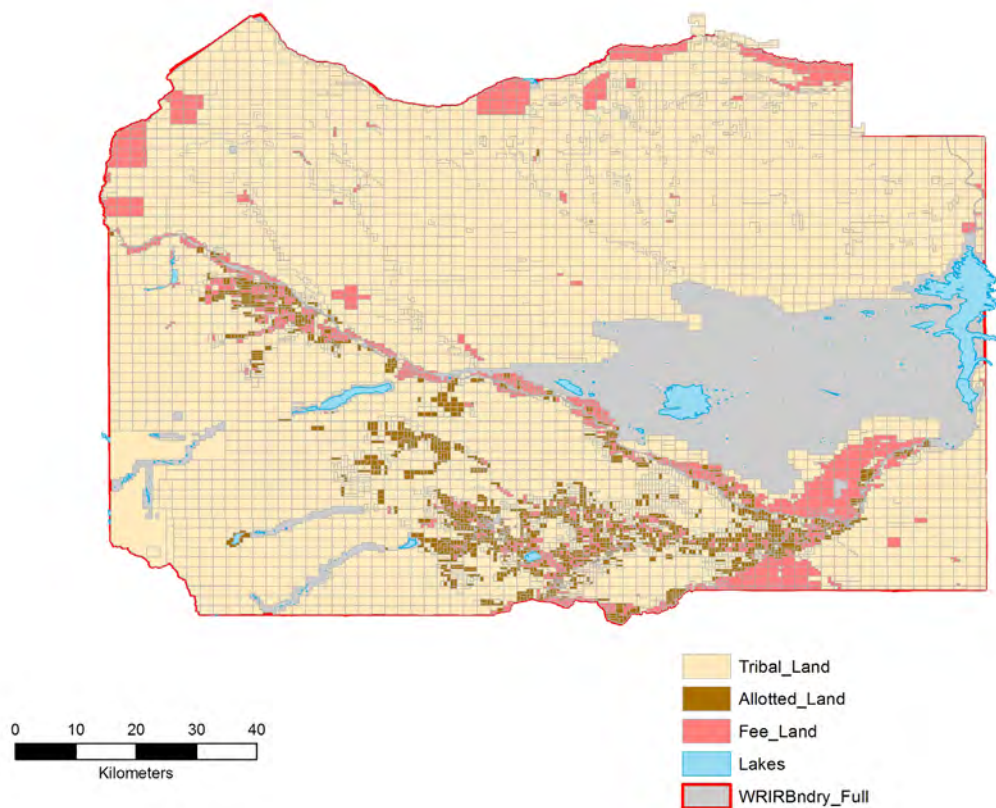


Figure VI.e1. Land Ownership on the Wind River Indian Reservation.

Goal — Land ownership regulations will correspond to traditional ways and adjust to contemporary conditions on sovereign lands.

- **Objective #1** — Identify the spatial distribution of the different land status and valid leases parcels on the Reservation.

Policy #1: Develop and maintain the spatial database of landownership & tenure for the Reservation.

- **Objective #2** — Create land regulations that protect and rehabilitate trust and allotted lands.

Policy #1: The WRIR Land Board and the division of Agriculture Economic Development will develop mechanisms to protect and improve land productivity (see section d. Land Leases objective #3, policy #1 and objective #4, policy #1).

Policy #2: Use the policy recommendations in the **Wind River Reservation Land Use Plan** to manage land uses on the trust and allotted lands.

- **Objective #3** — Create land regulations that blend traditional land allocations with contemporary land efficiency modes of land tenure.

Policy #1: The Land Code (see section d) will specify methods for land transfer and heirship for efficiency in land tenure to maximize benefits to tribal members.

F. Grazing/Rangeland Productivity

The Reservation has extensive rangeland resources (1,533,000 acres) that are of significant importance to both the Eastern Shoshone and Northern Arapahoe tribes and vital for the long-term agricultural development on the Reservation (Figure VI.f1). Overall, there are currently 134 lessees across the Reservation and approximately 26,370 allocations for cattle. The extensive agricultural resources are key for cattle and livestock production, wildlife habitat and a suite of ecosystem services that are important to the long-term natural resource base of the Reservation. Currently, the management and oversight of these resources is distributed across an array of tribal, federal, state and local agencies and depends on land-ownership, tenure and short- and long-term leasing structures. Critical is a coordinated and integrated approach to manage these resources. The proposed OANR (VI. a. Agriculture Management) is designed to facilitate and coordinate the long-term management of rangeland resources within a centralized coordinated management system.

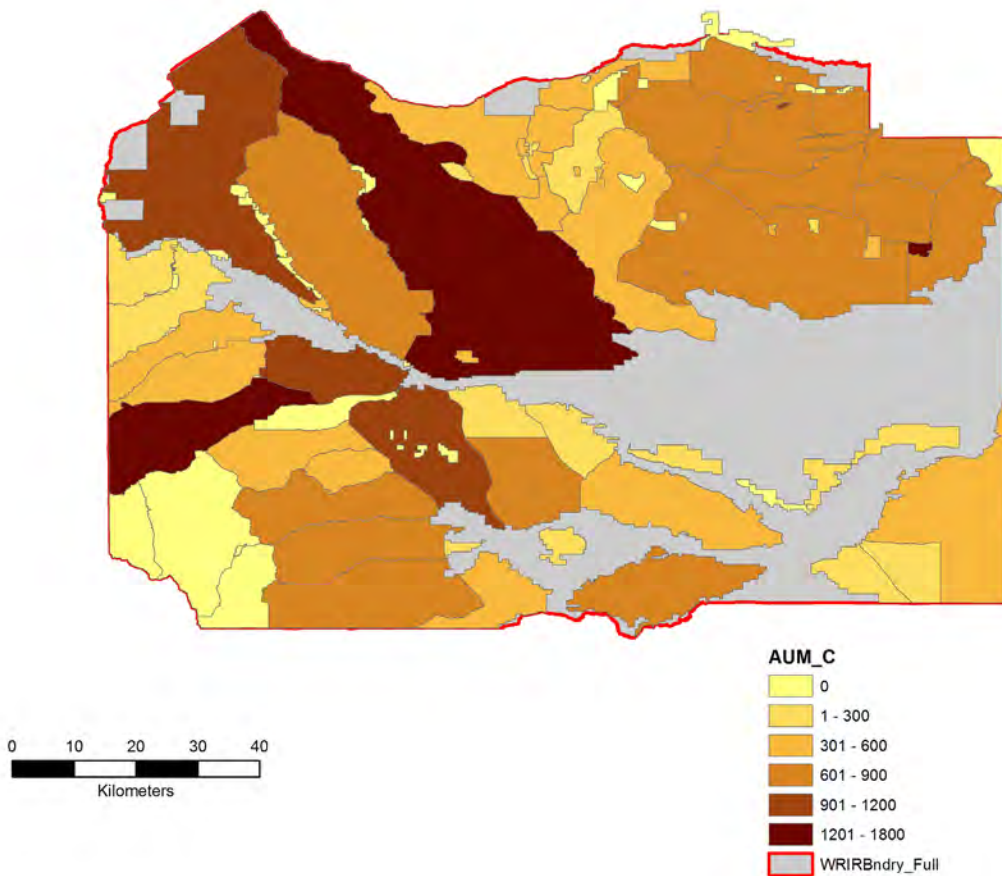


Figure VI.f1. Grazing and Rangeland across the Wind River Indian Reservation.

The goals and corresponding policies summarized below are designed to facilitate and support the development and implementation of agricultural management plan and system that supports integrated and proactive management of rangeland and grazing resources on the Reservation.

Goal — Manage rangelands for a balance between natural ecosystems, improved pasture/grazing lands and profitable livestock development.

Goal — Maintain and improve reservation rangelands to be healthy, and have resilient soil and hydrologic functions and characteristics.

- **Objective #1** — Achieve the optimal desired future condition of Reservation rangelands/pasture, with sustainable economic returns to livestock producers.

Policy #1: Develop and implement a rangeland/pasture monitoring system to assess condition, quality and identify rangeland/pasture condition change.

Policy #2: Create a system of grazing/rangeland association(s) within three years of agricultural resource management plan approval.

Policy #3: Establish an education program to be implemented through the grazing/rangeland associations for developing resources for long-term economic returns.

Policy #4: Examine the possibility of a tribal livestock marketing strategy.

- **Objective #2** – Establish grazing compliance procedures that will promote livestock management, recognize participation by lessees and leasers and benefit other natural resource programs.

Policy #1: Identify, review and update the current tribal resolutions for grazing unit standards as part of the Land Code (Section d: Land Tenure).

Policy #2: Examine strategies to finance compliance and livestock/enforcement officers.

Policy #3: Examine capital improvement fund for sustainable management.

- **Objective #3** – Increase recognition of wildlife and livestock production interactions in rangeland management approach.

Policy #1: Identify, review and update wildlife management plan in conjunction with U.S. Fish and Wildlife Service and Tribal Game and Fish, that benefits both wildlife and livestock production within five years of agricultural resource management plan approval.

Policy #2: Identification and enforcement of tribal wildlife protection and trespass resolutions as stated in the Land Code (Section d).

Policy #3: Develop a feral animal and invasive species management plan to protect and improve wildlife and domestic livestock production within five years of agricultural resource management plan approval.

G. Cropland Productivity

Cropland plays a consistent role in the economics of the Wind River Reservation. As both a revenue source and to augment livestock production crops benefit a range of farmers and ranchers on the Reservation. Overall, approximately \$7.2 million in revenues are generated by crops overall and Native American farm operators generated approximately \$796,000 or about 11 percent of the revenue (USDA, 2014). However, Reservation farmers are generally producing livestock feed in hay or alfalfa and are either selling it or using it for their own livestock production. Figure VI.g1 illustrates the distribution of cropland on the reservation. The majority of the crop land is along the major drainages and irrigation networks through the Reservation. The largest portion of the cropland (62.8 percent) is on the fee simple lands in the east-central part of the Reservation just to the northwest of Riverton. Overall, there are approximately 245,340 acres in crops of which about 88,520 acres are on trust or allotted lands, 37.2 percent.

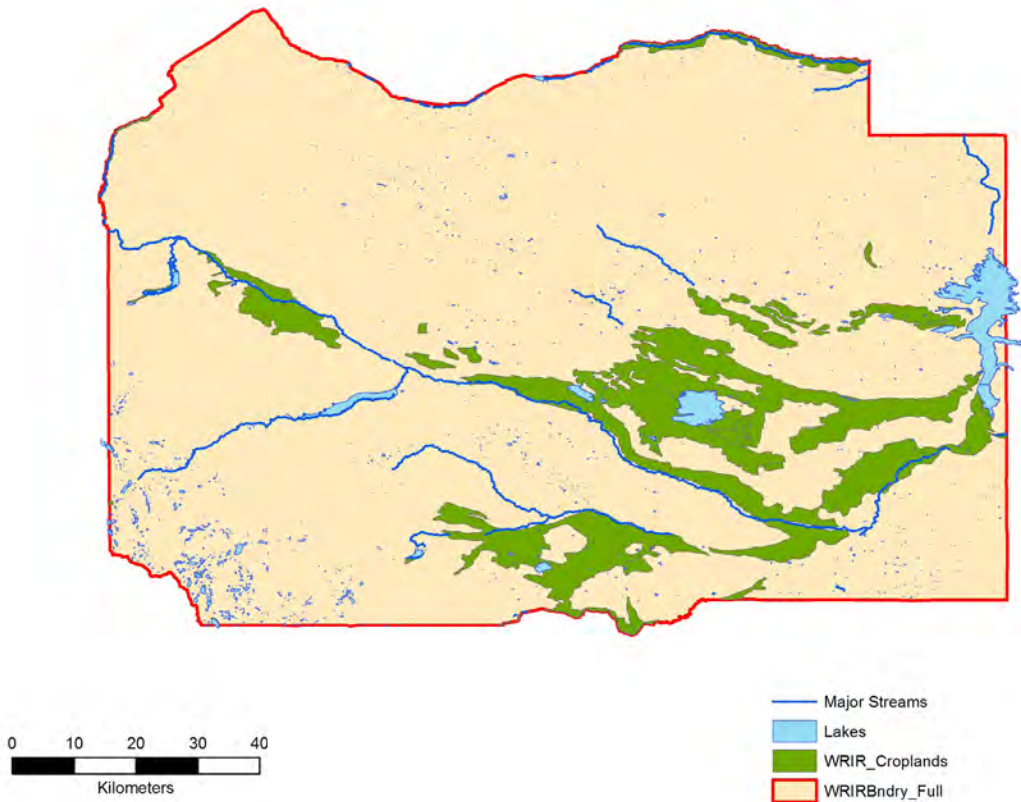


Figure VI.g1. Wind River Indian Reservation Croplands, 2012.

Goal — Cropland productivity will be socially and environmentally sustainable and economically viable.

- **Objective #1** — Increase the economic viability and environmental sustainability of existing cropping systems.

Policy #1: Develop full baseline inventory of agriculture and irrigation lands and resources on the Reservation (irrigable & dry land).

Policy #2: Develop an assessment of infrastructure needed to develop futures lands.

Policy #3: Assess potential to sustain and expand existing agricultural businesses on the Reservation: Establish an Agriculture Business Retention & Expansion program.

- **Objective #2** — Create incentives and increase the adoption of more diverse cropping systems that are economically viable and environmentally sustainable.

Policy #1: The division of Ag Economic Development will work with local growers and collaborate with USDA, NRCS, Rural Development and SBIR, University of Wyoming Agricultural Experiment Station & Extension to develop a crop “agriculture entrepreneurial” center.

Policy #2: The division of Agriculture Economic Development will a) explore and promote development and marketing of diverse cropping systems and enterprises; and b) investigate expanding production and processing potential. (See section c. Agricultural Economic Development, Objective 3, policy #1)

- **Objective #3** — Create incentives and encourage small scale and home-grown fruits and vegetables for nutritional and financial benefits.

Policy #1: Coordinate with and promote the Growing Resiliency nutrition education program focused on local fruit and vegetables, crops and meats.

Policy #2: Develop programs to investigate viability of Direct “Farm to Table” programs.

Policy #3: Investigate potential of food hubs to local institutional buyers (e.g., casinos, schools, correctional facilities, etc.)

Policy #4: Expand adult agriculture education on the reservation by partnering with agriculture educators such as University of Wyoming Extension. (See section c. Agricultural Economic Development, Objective 5, policy #3).

- **Objective #4** — Protect and enhance the quality of cropland soils.

Policy #1: Develop incentives for agricultural producers to monitor and assess cropping systems for long-term viability.

Policy #2: The Land Board and the division of Agriculture Economic Development will develop mechanisms to protect and improve land productivity (See section d. Land Leases, Objective 3, policy #1 and Objective 4, policy #1).

Policy #3: In collaboration with the Land Board, NRCS and University of Wyoming Extension, establish an educational program for improving and monitoring soil health.

- **Objective #5** — Protect and enhance the quality of water resources return flow in accordance with the Wind River Water Code as it leaves croplands.

Policy #1: Agricultural water quality standards will be maintained to meet designated beneficial uses as defined by the Wind River Water Code.

- **Objective #6** — Manage the impact of cropping activities on native plants and animals.

Policy #1: The Land Board (in collaboration with appropriate departments and agencies) will evaluate and develop a method to prioritize lands to protect traditional and native plants and animals that are of primary interest to the tribes.

H. Wildlife Management

Wildlife management on the Reservation is concerned with the interaction between wildlife, livestock and the changes to their habitat due to agricultural practices. Figure VI.h1 displays the diversity of wildlife habitats on the Reservation with over 200 species of mammals and birds alone that either have a permanent home on the Reservation or use the Reservation as part of their migratory pattern. The pattern of ecoregions corresponds to the riparian areas along the streams or rivers, the upland rangelands or the mountain areas that the variety of species use with the varying seasons of the year. In addition, the characteristics of wetlands, riparian areas and stream channels will also be habitats for a range of aquatic and semi-aquatic species to consider.

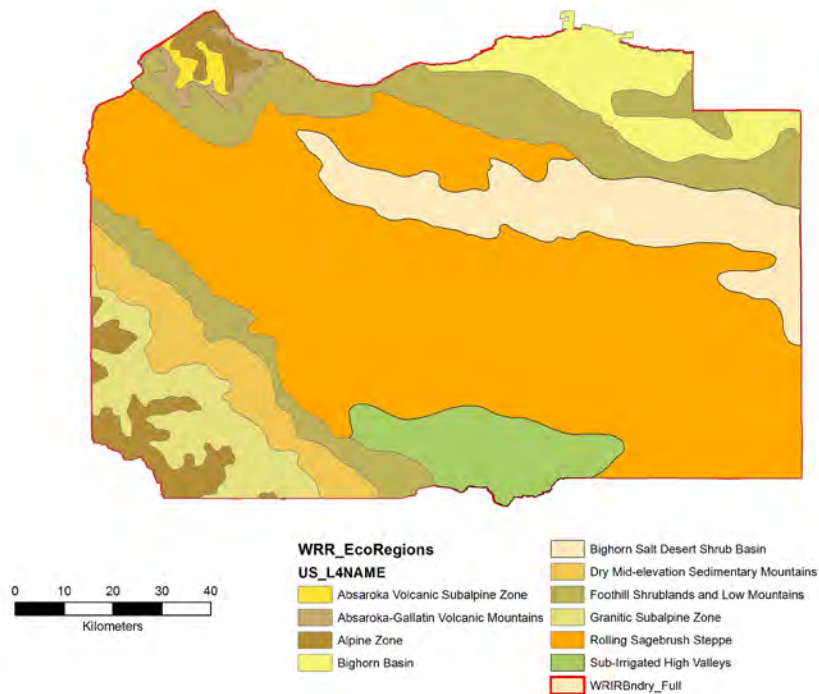


Figure VI.h1. Wind River Indian Reservation EcoRegions.

Goal — Protect and improve wildlife and fish habitats while maintaining and developing rangelands, croplands and riparian areas.

- **Objective #1** — Identify wildlife habitat areas and corridors.

Policy#1: Using available verifiable data within the next three years develop wildlife habitat areas and corridors for major species.

- **Objective #2** — Identify native and introduced fish habitat areas. Policy#1 – Using available verifiable data within the next three years develop wildlife habitat areas and corridors for major species.

Policy#1: Using available verifiable data within the next three years to develop native and game fish habitat areas and corridors for major species in accordance with the Water Code and in-streamflow.

Policy#2: Upon implementation of the plan, the Wind River Reservation will coordinate an annual meeting with collaborating federal and state agencies to manage aquatic species as defined by Objective #2, Policy#1.

- **Objective #3** — Identify wildlife priority areas.

Policy#1: Working with federal and state agencies, identify critical wildlife priority areas.

- **Objective #4** — Identify conflict areas between wildlife habitat and rangelands/pasture, croplands and wetlands.

Policy#1: Through the public process, identify a ranking system to determine conflict areas between wildlife habitat and rangelands pasture, croplands and wetlands for mitigation.

- **Objective #5** — Protect, enhance, manage and prioritize wetland habitats to benefit native fish and wildlife and desired game species.

Policy#1: Through the public process, identify a ranking system to determine conflict areas with wetlands, as identified in the Wind River Water Code*, and rangelands pasture and croplands for mitigation.

[*examine water code to determine its status]

- **Objective #6** — Protect, enhance, manage and prioritize upland habitats to benefit native wildlife and desired game species.

Policy#1: Develop a management plan and strategies integrating existing plans and strategies to control non-native species for the benefit of wildlife, livestock and agricultural production.

I. Agricultural and Natural Resource Information

Data, particularly geospatial data, is critical to sound and sustainable planning and decision-making processes concerning agricultural resource management on the Wind River Indian Reservation.

Geospatial data is often collected by multiple researchers, state and federal agencies, non-governmental organizations and others, and made available in several formats at various scales and levels of detail, spatial extents and accuracies using a wide range of tools and techniques (e.g. GPS, remote sensing, ground surveys, etc.). Assembling and sharing agricultural and natural resource data for the Wind River Indian Reservation through a centralized technological system has many benefits including minimizing data redundancy, enhancing data consistency and more effective and efficient data stewardship.

One cutting-edge solution in today's fast-changing digital world involves creating and maintaining a Web GIS-backed portal through which users located anywhere can interactively search for, browse and download both tabular and map-based datasets at any time. Data discovered via keyword (e.g. river, road, etc.) or thematic (e.g. water resources, transportation networks, etc.) searches can be loaded into powerful desktop GIS software like ArcGIS and Quantum GIS (QGIS) for advanced geographic visualization and spatial analysis to generate different kinds of information useful in, for example, understanding the states of affairs regarding natural resource qualities, quantities and changes over time, and addressing challenges involving resource allocation and use.

Design and development issues that the Wind River Indian Reservation and Tribal Water Engineer will need to consider to ensure successful deployment and stewardship of a Web GIS-supported data portal include but are not limited to the following: (1) metadata standards, (2) the specific kinds of data to include in the portal as well as data dissemination formats (e.g. shapefile, KML, web map service, etc.), (3) data sharing agreements with data creators/providers like BIA, BLM and SEO, (4) dealing with sensitive data and (5) technological and personnel resources for developing, hosting and maintaining a state-of-the-art data portal. From a system design and implementation perspective, the data portal will have three main tiers (i.e. frontend, middleware and backend) connected together in a three-tier client-server architecture (Figure VI.10). The backend consists of a networked geodatabase, map and web servers while the frontend represents the user interface via which different users can gain access to various Wind River Indian Reservation datasets. If an ESRI solution were to be implemented, the middleware would be made up of ArcGIS Desktop, ArcGIS Enterprise (including ArcGIS Server and ArcGIS Online) and ArcGIS Open Data.

The database and website use a hierarchical design with 14 major headings and 60 sub-heading topics (Appendix C) (Figure VI.11). The website allows the user to map the different topics and, if appropriate, overlay one topic map on another. The user has the ability to draw, measure and identify the map attributes and save the results as a file, share with another user or print the map.

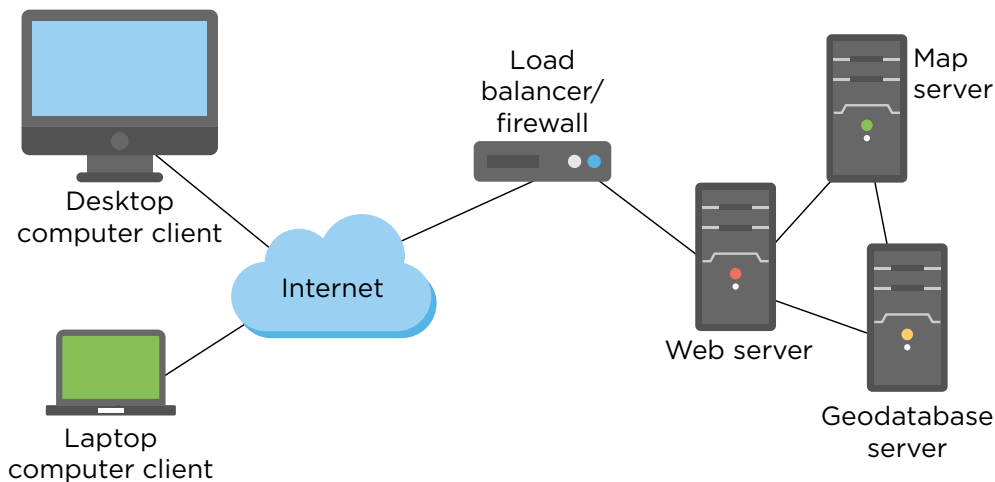


Figure VI.i1. Possible design architecture of the Web GIS-based data portal for the Wind River Indian Reservation.

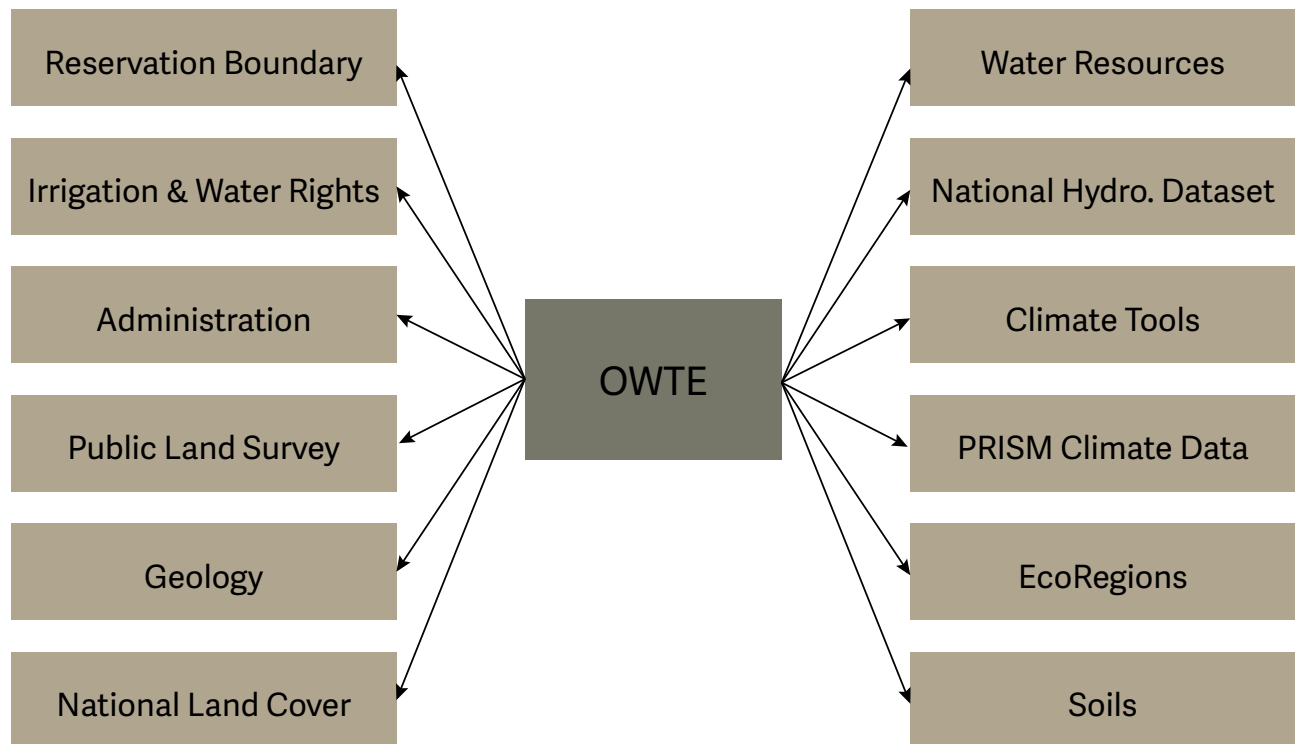


Figure VI.11. Basic structure of the spatial datasets for the Web GIS.

Goal — Spatial information (maps and mapping data) will be effectively and efficiently managed and used to assist in agricultural economic and natural resource management.

- **Objective #1** — Create and maintain a comprehensive and reliable spatial database of agricultural and natural resources data.

Policy#1: The Office of Agricultural and Natural Resources (OANR) will negotiate and collaborate with federal, state, local agencies and other reliable resources to obtain up-to-date spatial datasets for agricultural and natural resource management.

- **Objective #2** — Disseminate agricultural and natural resources data and metadata in digital form from a single source.

Policy#1: All agricultural and natural resource data will be publicly accessible through the University of Wyoming Wind River Reservation Clearinghouse except that data which is culturally or economically sensitive as identified by the agricultural and natural resource board in consultation with appropriate tribal agencies, e.g., THPO, Tribal Historic Preservation Office.

Policy#2: Agricultural and natural resource data will be accessible through digital and analog methods.

Policy#3: Sensitive agricultural and natural resource data will be accessible through permission and restrictions established by the Agricultural and Natural Resource Board.

- **Objective #3** — Integrate and analyze agricultural and natural resources information to support agricultural, economic and natural resource decision-making activities.

Policy#1: The OANR will create and obtain appropriate analytical tools to support agricultural, economic and natural resource decision-making activities.

- **Objective #4** — Create and maintain a comprehensive and reliable database of agricultural and natural resources data that maintains quality control and interoperability.

Policy#1: In collaboration, the University of Wyoming (WY-EPSCoR Office, WyCEHG), the OANR will annually examine and evaluate appropriate dataset updates and modifications.

APPENDIX A: STRUCTURE OF THE AGRICULTURAL RESOURCE MANAGEMENT PLAN

Answers to the Critical Questions for the Plan.

1. **Who is the audience for the Plan?**

Ag Committee appointed by Tribal Councils
Three resolutions, resolutions with financing
Each Tribal Council appointed two people to the IWG
Quarterly meetings with the tribal councils by UW, keep them informed

2. **What type of Plan to develop?**

Holistic with land use policy
Focus on Ag, but don't forget other aspects
Community-based
 Crow Heart
 Arapaho
 Ethete
 Fort Washakie

3. **Which planning process to follow?**

Community-based with input from stakeholders throughout the process

4. **What will be the structure of the planning process?**

Facilitator-Led with UW being the facilitator working with the IWG

5. **Define the planning area:**

Treaty boundary of Ft. Bridger Treaty-1868.

6. **Define sub-planning areas:**

Combination of water basins, water districts, irrigation districts to form land use districts

7. Stakeholder Input:

- Stakeholders
 - IWG and public
 - Two at-large members from each tribal council
 - USFWS
 - WYDG&F
 - Oil & Gas
 - Community members
- Types of input
 - Web-based questionnaire
 - Newspaper questionnaire
 - Public meetings
 - Need good PR
- Timing of input
 - Throughout the process, most in the beginning phases

APPENDIX B: LISTING OF ISSUES IDENTIFIED AT PUBLIC MEETINGS

Plan stipulation for grazing
Use buyout [Covell case?] for purchasing undivided interests
Help out local ranchers
Purchase range lands to put into production
Get water to rangelands
Rangeland management
Get horses off lands
Deal with wildlife
Financial analysis of irrigation and fisheries
Get funding for more water to rangelands
Fix the irrigation system
Management group to work with land leasing improvements
Get locals to approve the system
Have appraisals of the land production
Need infrastructure on the rangelands
Water on range units difficult to manage without water
Fencing difficult, need 1000 miles of fencing to replace
Need long-term and short-term goals, mainly infrastructure
Zoning issues, look at preserving productive lands
Rangelands need water
Ranges and leasing, need enforcement, need regulations
Need enforcement by Feds, State and Reservation
Three to four agencies regulating the ranchers, need consistency and lead agency
Need chain of command for range
No one takes responsibility for rustling, branding inspection, lease violations
Need to look at the chain and a financial diagram
State Brand, but no jurisdiction
 State does not take responsibility
BIA inconsistent in implementing regulations
Lease terms create problems, leases too short for investment, longer leasing for financing
Off-Reservation, ranching inherited or financed
On-Reservation, need assistance in financing
Plan goes through tribal councils
Access to GIS data
Need GIS
Need aerial imagery for analysis of agriculture
Land Management issues
NRCS inventories completed, how can we better manage the lands
Range units overgrazed, need better inventory and who is managing those resources
Tribes have committees and what are they trying to accomplish
Inventory of lands, irrigated and non-irrigated

Infrastructure is important, what/where is water
Whose responsibility to monitor
The plan will provide the strategies
What are our objectives
It says Ag resource management, but everything needs to be considered
Different agencies will contribute
Land status, what is it
Data access limited
Many agencies, but a consolidated effort with the plan
Everyone needs data
Need GIS data
Planning purposes-need to reduce conflict between other elements
e.g., housing and agriculture
Producers need to have some input in the plan
Data needs to be readily available
Look at other plans and studies and inventory and implement where appropriate
Look at existing data and studies
Incorporate the Land Use Plan
Inventory what we have in terms of studies and reports and incorporate into the data and the plan
Need to work with GIS and appraisers
Need imagery over time to see development and Ag lands
Who is using the water and what is the production
WRIR Environmental Agency digitized documents, regulations and resolutions, need access to them
Jurisdictional issues, who do you call for trust or fee lands
Personnel issues, too few people to monitor and deal with issues
Producer issues
Produce hay, but need to improve
Fencing issues, cattle move from one unit to another, violator gets free grazing
Solid plan that can be used on the ground
Good usable plan
No one knows the rules, no consistency
You get things done by who you know
Some illegal subleasing going on
Enforcement difficult
Cattle stealing, but no one takes responsibility to enforce
State issue with how they tabulate the numbers, cattle, farming, etc.
Ag Resource Management Plan, how is it enforced
How to protect areas: riparian and wetlands
Is there a plan for wild game
USFWS has been a good partner, e.g., prairie chickens
Need Agriculture Department, can give direction
Effect both Tribal and Non-Tribal
BIA can fix fences on trust lands
Need plan to provide other opportunities in Ag business, marketing etc.

Need predator control

Need natural resource office, with multiple divisions

Wild horses a problem with their impacts on range lands, put strain on resources for range and wildlife

2,400-3,000 horses counted by BIA

Wild horse conflicts with prairie chickens, conflicts with other wildlife

APPENDIX C: TOPIC AREAS WITH GROUPING OF ISSUES

Management

- Rangeland management
- Get locals to approve the system
- BIA needs direction
- CFRs are too broad, need specifics
- Need enforcement by Feds, State and Reservation
- Three to four agencies regulating the ranchers, need consistency and lead agency
- Need chain of command for range
- No one takes responsibility for rustling, branding inspection, lease violations
- Need to look at the chain and a financial diagram
- State Brand, but no jurisdiction
 - State does not take responsibility
- BIA inconsistent in implementing regulations
- Land Management issues
- NRCS inventories completed, how can we better manage the lands
- Tribes have committees and what are they trying to accomplish
- Different agencies will contribute
- WRIR Environmental Agency digitized documents, regulations and resolutions, need access to them
- Jurisdictional issues, who do you call for trust or fee lands
- Personnel issues, too few people to monitor and deal with issues
- No one knows the rules, no consistency
- You get things done by who you know
- Cattle stealing, but no one takes responsibility to enforce
- State issue with how they tabulate the numbers, cattle, farming, etc.
- Need Agriculture Department, can give direction
 - Effect both Tribal and Non-Tribal
- Need predator control
- Need natural resource office, with multiple divisions

Plans

- Need long-term and short-term goals, mainly infrastructure
- Plan goes through tribal councils
- The plan will provide the strategies
- What are our objectives
- It says Ag resource management, but everything needs to be considered
- Many agencies, but a consolidated effort with the plan
- Planning purposes-need to reduce conflict between other elements
 - e.g., housing and agriculture
- Look at other plans and studies and inventory and implement where appropriate
- Incorporate the Land Use Plan
- Solid plan that can be used on the ground
- Good usable plan
- Ag Resource Management Plan, how is it enforced

Leases

Management group to work with land leasing improvements
Ranges and leasing, need enforcement, need regulations
Lease terms create problems, leases too short for investment, longer leasing for financing
Some illegal subleasing going on
Enforcement difficult

Grazing

Plan stipulation for grazing
Need infrastructure on the rangelands
Fencing difficult, need 1000 miles of fencing to replace
Range units overgrazed, need better inventory and who is managing those resources
Fencing issues, cattle move from one unit to another, violator gets free grazing
BIA can fix fences on trust lands

Water

Get water to rangelands
Fix the irrigation system
Grazing on range units difficult to manage without water
Rangelands need water
Infrastructure is important, what/where is water
Whose responsibility to monitor
Who is using the water and what is the production
How to protect areas: riparian and wetlands

Land

Use buyout [Covell case?] for purchasing undivided interests
Have appraisals of the land production [Barry Smith, Appraiser]
Inventory of lands, irrigated and non-irrigated
Land status, what is it

Ag Economy

- Help out local ranchers
- Financial analysis of irrigation and fisheries
- Get funding for more water to range lands
- Zoning issues, look at preserving productive lands
- Off-Reservation, ranching inherited or financed
- On-Reservation, need assistance in financing
- Producers need to have some input in the plan
- Need plan to provide other opportunities in Ag business, marketing etc.

Cropland

- Purchase rangelands to put into production
- Producer issues
- Produce hay, but need to improve

Wildlife

- Is there a plan for wild game?
- USFWS has been a good partner, e.g., prairie chickens
- Get horses off lands
- Deal with wildlife
- Wild horses a problem with their impacts on rangelands, put strain on resources for range and wildlife
- 2,400-3,000 horses counted by BIA
- Preston working on a grant, \$250K, for wild horse removal.
 - 7 percent of BLM budget for wild horse programs
- Wild horse conflicts with prairie chickens, conflicts with other wildlife

GIS/Digital Imagery

- Access to GIS data
- Need GIS
- Need aerial imagery for analysis of agriculture
- Data access limited
- Everyone needs data
- Need GIS data
- Data needs to be readily available
- Look at existing data and studies
- Inventory what we have in terms of studies and reports and incorporate into the data and the plan
- Need to work with GIS and appraisers
- Need imagery over time to see development and Ag lands

APPENDIX D: BASIC STRUCTURE OF CLEARINGHOUSE SPATIAL DATABASES

Wind River Indian Reservation Clearinghouse Structure

Initial Menu

- Layers
- Legend
- Bookmarks
- Identify
- Find
- Draw
- Measurement
- Print
- Share This Map

Layers

- Reservation Boundary
- Irrigation & Water Rights
 - Irrigation Lines
 - Walton Awards
 - Consent Decree
 - Remand Walton
 - Reserved Rights
 - Irrigation Units
- Administrative
 - City & Town Boundaries
 - State Parks
 - Wind River Reservation
 - National Parks and Monuments
 - National Recreation Areas
 - National Wildlife Refuges
 - National Forests
 - Wilderness Areas
 - Wilderness Study Areas
 - Areas of Critical Environmental Concern
 - County Boundaries
 - Township, Range, Section and Quarter Sections
 - Surface Land Management (General Ownership)
 - Federal Mineral Estate
 - Bedrock Geology
 - Elevation
- Public Land Survey System
 - Township, Range, Section, Quarter Sections
- Geology
 - Alluvial Aquifers

- Deep Shale
- Principal Aquifers
- Surficial Geology
- Bedrock Geology
- STATSGO (NRCS) Soils
- Elevation
- USGS 24K Quads Topographic Maps
- Landcover
- Water Resources
 - WyState Water Engineer's Office (SEO) Wells
 - SEO Wells by Depth
 - SEO Wells by Actual Yield
 - SEO Wells by MWBZ Top
 - Public Water System Survey
 - Points of Diversion
 - WRDS Groundwater Quality
 - WRDS Surface Water Quality
 - Water Quality Stations (USGS)
 - Water Gaging Stations (USGS)
 - Dams (USGS)
 - National Wild & Scenic Rivers
 - Impaired Streams (WyDEQ)
 - WSGS Reservoirs
 - Irrigated Lands
 - Impaired Lakes (WyDEQ)
 - Wetlands
 - Depth to Initial Groundwater
- National Hydrography Dataset
 - Streams/Rivers
 - Ice Mass
 - Lakes/Ponds
 - Playas
 - Reservoirs
 - Swamp/Marsh
 - HUC6-Basins, Hydrologic Unit Code
 - HUC8-SubBasins
 - HUC10-Watersheds
 - HUC12-SubWatersheds
- Climate Tools
 - WACNet Stations-Wyoming Agriculture Climate Network Stations
 - NWS COOP Stations-National Weather Service CoOp Stations
 - SNOTEL (Snowpack) Stations
 - CoCoRaHS Precipitation Stations-Community Collaboration Rain, Hail, Snow Network
 - PRISM Climate Data (Annual)

- PRISM 30yr Maximum Temperature
- PRISM 30yr Minimum Temperature
- PRISM 30yr Mean Temperature
- PRISM 30yr Precipitation
- Precipitation (Monthly)
 - Jan.-Dec., Annual
- Maximum Temperature (Monthly)
 - Jan.-Dec., Annual
- Minimum Temperature (Monthly)
 - Jan.-Dec., Annual
- Mean Temperature (Monthly)
 - Jan.-Dec., Annual
- NLCD-National Land Cover Dataset
- Ecoregions
 - State Lines
 - Level III Ecoregions
 - Level IV Ecoregions
 - Level IV Ecoregions Status
- SSURGO-Soil Survey Geographical Database
 - Soil Survey Geographic
 - State Soil Survey
 - Global Soil Regions
- Current NDVI (Satellite Imagery)-Normalized Difference Vegetation Index
- BIA Range Units.



College of Agriculture
and Natural Resources
Extension

MP-138 • June 2018

UW Extension Editor: Katie Shockley. UW Extension Graphic Designer: Tanya Engel.

Issued in furtherance of extension work, acts of May 8 and June 30, 1914, in cooperation with the U.S. Department of Agriculture. University of Wyoming Extension, University of Wyoming, Laramie, Wyoming 82071.

Persons seeking admission, employment, or access to programs of the University of Wyoming shall be considered without regard to race, color, religion, sex, national origin, disability, age, political belief, veteran status, sexual orientation, and marital or familial status. Persons with disabilities who require alternative means for communication or program information (Braille, large print, audiotape, etc.) should contact their local UW Extension office. To file a complaint, write to the UW Employment Practices/Affirmative Action Office, University of Wyoming, Department 3434, 1000 E. University Avenue, Laramie, WY 82071.