Chapter 4: Existing Conditions / Trends

4.0 Existing Conditions and Trends

Introduction

Contained in the following nine subchapters is information on the social, economic and physical conditions of Yellowstone County and the City of Billings. This information provides the reader with an overview of the character of these jurisdictions and establishes the framework for understanding the issues raised during the public involvement process. Elected officials, staff, and the general public are encouraged to refer to these subchapters to support recommendations and decisions.

Montana statutes require a growth policy to describe the land uses, population, housing needs, economic conditions, local services, public facilities and natural resources (76-1-601(b), MCA). In addition, transportation, open space and recreation, and cultural and historic resources are also described. Each subchapter focuses on characteristics and trends that are relevant to growth and development.

A second purpose of this chapter is to create a context for understanding issues developed through public input. The issues listed in Chapter 3, Community Goals and Objectives are organized by the same elements discussed in the following subchapters. Keeping with the issue-driven theme of the Growth Policy, an attempt was made to cover information related to the issues. However, because some of the issues are based on perception rather than actual conditions, relevant background data may not be available or may support entirely different conclusions. The reader is encouraged to interpret the data and determine for themselves the relative importance of each issue.

4.1 Land Use

Introduction

Historically, Yellowstone County land use has been dominated by agriculture and related uses. Much of the early business in Billings developed to service the surrounding ranches and farms. Today, agriculture is still a dominant land use, but residential development and commercial uses have gained considerable ground. This trend is reflected in many of the parameters discussed in this chapter, including land use trends, acres annexed, and proportion of land uses. Over the last decade, development of land has been fairly slow, keeping pace with the population increase of 1 percent per year. However, even at this slow rate, growth pressures are being felt, particularly west and northeast of Billings. This chapter provides the baseline land use information that demonstrates a steady loss of agricultural land use and an increase in urban development.

Land Ownership

The area of Yellowstone County is approximately 1,693,751 acres. Of the total, 1,374,730 acres, or 82 percent, is under private ownership. Tribal land administered by the U.S. Bureau of Indian Affairs comprises 139,983 acres (8 percent) and is located primarily in the southeast part of the County. Other Federal agencies, including the U.S. Bureau of Land Management, the U. S. Bureau of Reclamation, and U.S. Fish & Wildlife Service administer 88,581 acres (5 percent) and state agencies administer 73,414 acres (4 percent). State land management agencies include the Department of Natural Resources, responsible mainly for State Trust Land, and the Montana Department of Fish Wildlife and Parks, which oversees State Parks and fishing accesses. Figure 1 provides a pie chart showing the percentage of land ownership in Yellowstone County. Map 4.1.1 shows the general distribution of land ownership. Land owned by the City of Billings, City of Laurel and Yellowstone County comprise less than 1 percent of Yellowstone County. The ownership of land coverend by water is also less than 1 percent where ownership is undetermined.

Current Land Use and Land Use Trends

In general terms, land use in Yellowstone County falls into five main categories: agricultural, residential, commercial, industrial and recreational. The majority of the County, over 1.3 million acres, is classified by the Montana Department of Revenue as agricultural. The primary residential and commercial centers are located in Billings, Laurel, and Lockwood and to a lesser extent, the communities of Custer, Shepherd, Huntley, Worden, Ballentine, Pompey's Pillar and Broadview. There is approximately 4,148 acres of commercially and industrially-classed property and 33,057 acres of res-

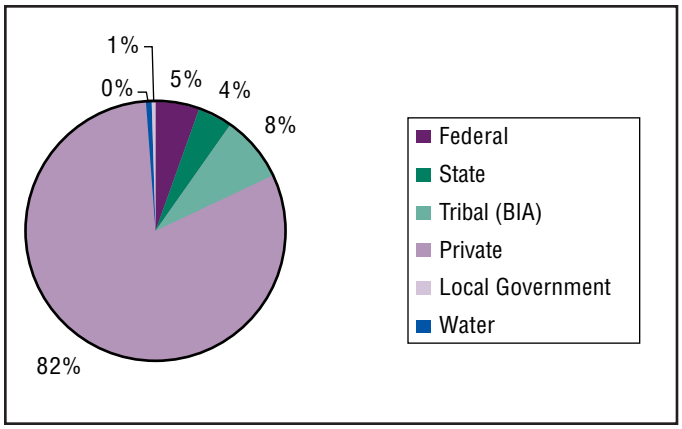
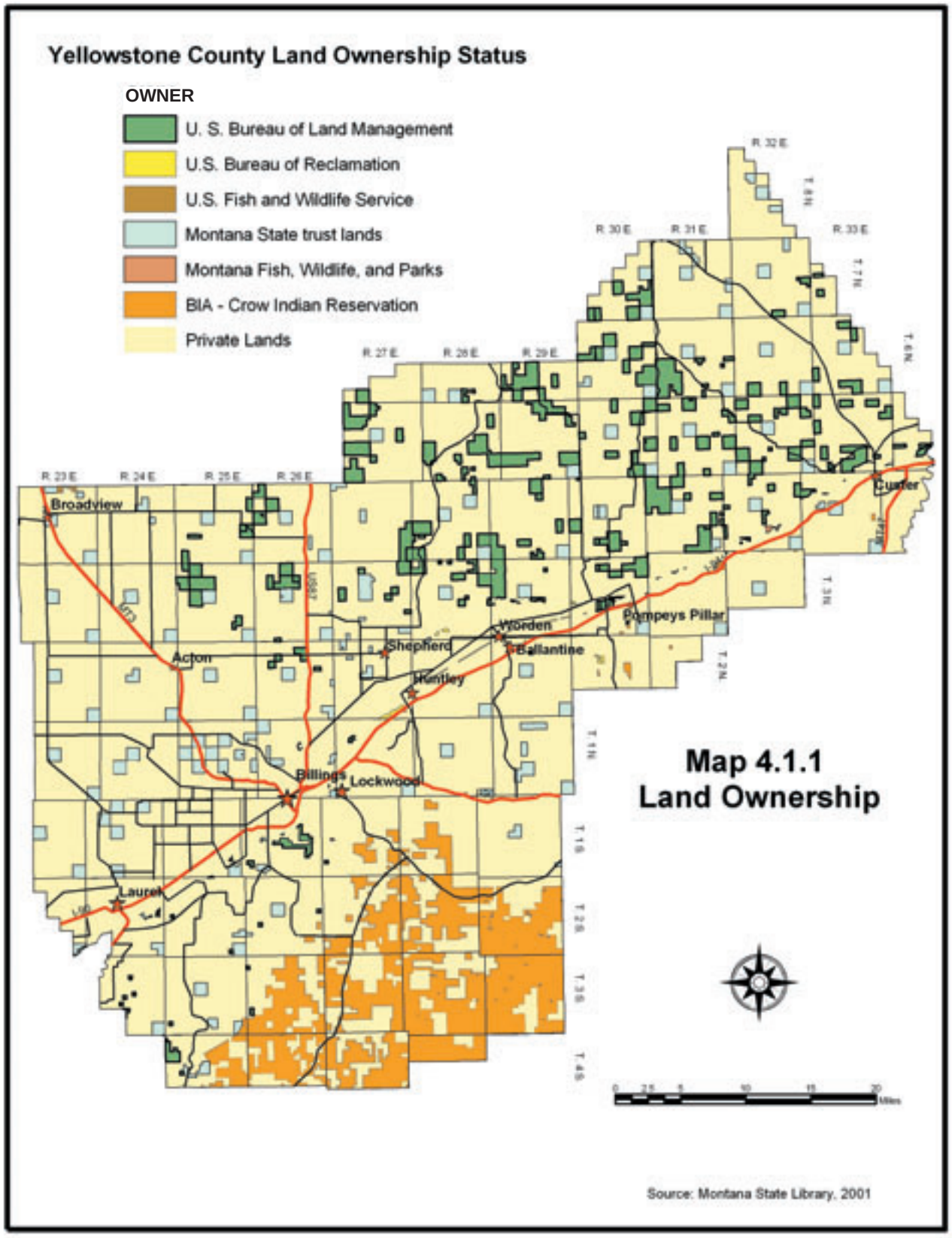


Figure 1. Percentage of land ownership in Yellowstone County. Source: Montana Department of Revenue.


Yellowstone County Land Ownership Status
OWNER
U. S. Bureau of Land Management
U.S. Bureau of Reclamation
U.S. Fish and Wildlife Service
Montana State trust lands
Montana Fish, Wildlife, and Parks
BIA - Crow Indian Reservation
Private Lands
R 32 E
R 30 E
R 31 E
R 33 E
R 27 E
R 28 E
R 29 E
R 23 E
R 24 E
R 25 E
R 26 E
T 4N
T 3N
T 2N
T 1N
T 1S
T 2S
T 3S
T 4S
Broadview
Custer
Pompeys Pillar
Worden
Ballantine
Shepherd
Acton
Huntley
Billings
Lockwood
Laurel
Map 4.1.1
Land Ownership
Source: Montana State Library, 2001

identially-classed property throughout the County. Industrial uses are mostly confined to Billings, Laurel and Lockwood. The remaining 350,000 acres includes land administered by the Bureau of Indian Affairs, or is not classified or is exempt[1].

City of Billings

The City of Billings contains 38.381 square miles and is the largest city in Montana. The size of Billings has more than doubled since 1970 when the gross area totaled 14.717 square miles. This figure increased by 6 square miles by 1980 to 20.347 square miles. By 1990, the City added another 10 square miles bringing the total City area to 31.726 square miles. The annexation rate dropped in the 1990's when less than 2 square miles was added. However, since 2000, more than five square miles has been annexed. The largest annexations occurred in 2002 when approximately 3,026 acres, or 4.7 square miles in the Briarwood, Cedar Park, Rehberg Ranch Estates and Yellowstone Country Club Estate subdivisions were annexed. Table 1 shows the annexation history of Billings from 1970 to 2002, including the miles of streets, alleys, highways and interstate annexed.

The City of Billings and Yellowstone County share Unified Zoning Regulations but the City and the County administer their zoning separately. Each jurisdiction has a Zoning Commission and a Board of Adjustment. The City Zoning Commission reviews special reviews and zone changes and forwards recommendations onto the City Council for their final action. The City Board of Adjustment is authorized to act on variances.

The annual number of zoning actions has stayed relatively stable in the past decade. The following table shows the number of actions from 1990 to 2001 for the City of Billings.

Subdivision Activity

The amount of subdivision activity the City experienced between 1988 and 2002 is consistent with the increase in population and building permits activity. During this period, the City processed 70 commercial subdivisions and 115 residential subdivisions. In total, 382 commercial lots were created and 2,341 residential lots were created. Most of the activity occurred between 1992 and 2002 when an average of 10 residential subdivision plats and 5 commercial subdivision plats were filed per year. Figure 2 plots the number of residential and commercial lots created between 1988 and 2002.

Residential Land Use

The City Zoning jurisdiction includes the entire City of Billings (38.381 square miles). There are 21 zoning districts in the City. When classed according to

TABLE 1: CITY OF BILLINGS ANNEXATION STATISTICS

YEAR	Gross Area	Net area	Total Miles of Streets	Total Miles of Alleys	Total Miles of Highway	Total Miles of Interstate
1970	14.717	13.084	250.681	97.304	0	0
1980	20.347	17.282	319.179	104.633	3.896	9.469
1990	31.726	27.129	437.710	120.666	7.221	9.469
2000	32.824	27.923	458.074	121.097	7.221	9.912
2002	38.381	33.00	480.775	121.323	8.128	9.912

Figure 2. Number of City lots or condominium units created annually, 1988 – 2002.

TABLE 2: CITY OF BILLINGS ZONING ACTIVITY 1990 TO 2001

Year	Variances	Special Reviews	Zone Changes
1990	25	23	17
1991	18	20	11
1992	22	18	11
1993	30	29	15
1994	11	25	20
1995	17	22	18
1996	15	20	10
1997	10	33	13
1998	11	32	19
1999	28	24	4
2000	23	34	8
2001	22	24	10

general use, residential land use comprises slightly less than 50 percent of the total zoning jurisdiction. In order of density, the residential zoning districts allowed in the City are listed in Table 3. Also shown is the percentage of City land occupied by the district.

Commercial and Industrial Land Use

Almost 28 percent of the land within the City is zoned for commercial and industrial. The commercial zoning districts include Neighborhood Commercial, Community Commercial, Highway Commercial, Central Business District, Entryway Light Commercial, Entryway General Commercial, Entryway Mixed Use, South 27th Street Corridor and Medical Corridor Permit Zoning Districts. Two zoning districts, Light Industrial and Heavy Industrial, allow industrial uses. The City also has several properties zoned Planned Development. Planned Development zoning allows for mixed use and provides for customized zoning regulations. The City currently has 20 PD zones, of these, seven are commercial, seven are residential, and six are mixed use.

Recreational Land Use

Public zoning accounts for 22 percent of the City of Billings and includes large tracts of land such as public parks, the Billings Logan Airport and street rights-of-way. In Billings, there are approximately 2,540 acres of public park land. Park land is acquired through subdivision dedication or through direct land acquisition. Park land ranges from undeveloped, natural parks to fully developed, multiple use parks and sports complexes.

Vacant Parcels

The 1990 Yellowstone Comprehensive Plan reported that there were 1,861.94 acres of vacant land in the City of Billings in 1989. This compares with an estimated 1,886 acres of vacant land in 2000 as classified by the Montana Department of Revenue. These data suggest that land annexed into the City in the past

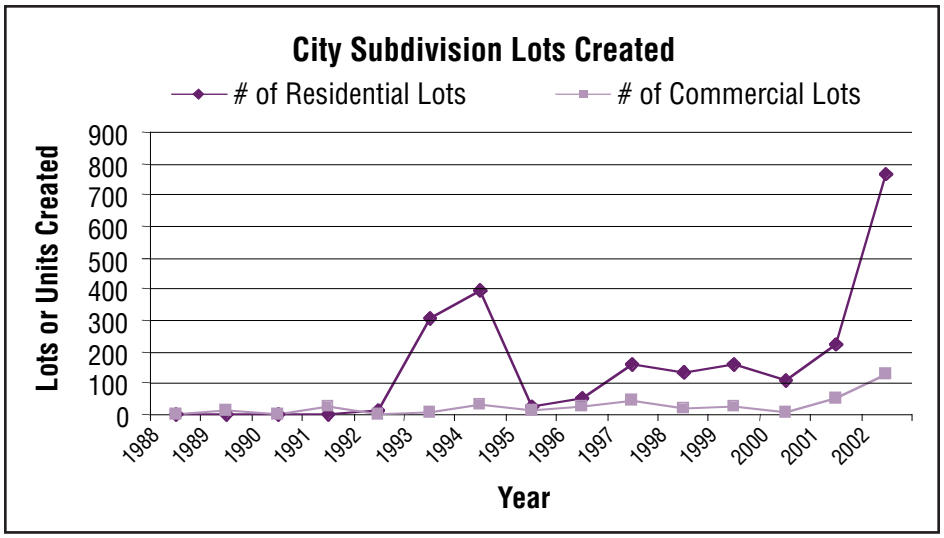


Figure 2. Number of City lots or condominium units created annually, 1988-2002.

TABLE 3: CITY OF BILLINGS RESIDENTIAL ZONING DISTRICTS		
DISTRICT	**% of City by Zoning District**	**DENSITY**
Residential 9,600	25.21%	1 d.u./9,600 s.f.
Residential 8,000	.11%	1 d.u /8,000 s.f., 2 d.u./10,000 s.f.
Residential 7,000	13.21%	1 d.u./7,000 s.f., 2 d.u./9,600 s.f.
Residential 6,000	6.2%	1 d.u./6,000 s.f., 2 d.u./8,000, 1,500 s.f. per additional unit up to 10 units.
Residential 5,000	.13%	1 d.u./5,000, 2 d.u./8,000 s.f.
Residential Multi-Family	1.6%	Square footage requirements increase for additional dwelling units. Minimum square footage is 6,000. 400 s.f. required for each additional unit over 8 units.
Residential Multi-Family Restricted	.85%	Square footage requirements increase for additional dwelling units. Minimum square footage is 6,000. 1,500 s.f. required for each additional unit over 8 units.
Residential Manufactured Home	1.84%	Allows 1 manufactured home per 6,000 s.f.

ten years is classified as something other than vacant. The data also indicate that vacant properties within the City have not been developed or the amount of vacant land would have decreased. The slight increase in vacant acreage may be attributed to either the annexation of vacant land or the reclassification of land that was previously classified as industrial, commercial, residential or agriculture.

Exempt Parcels

Properties exempt from state and local property taxes vary considerably in use and zoning. Tax exempt entities include government agencies, school districts, hospitals, and churches. In 2000, there were 1,156 properties classified as exempt by the Montana Department of Revenue, and they comprise 6.6 percent of the total City acreage.

Yellowstone County and Billings Urban Area

The County zoning jurisdiction encompasses 146 square miles and is divided into 23 zoning districts. The majority of land is zoned Agricultural-Open Space, a County zoning jurisdiction that permits 1 dwelling unit per 10 acres. Two other zoning designations that are exclusively County are Agricultural-Suburban (A-S) and Residential 15,000 (R-15,000). A-S zoning permits limited agricultural functions and allows 1 dwelling unit per 1 acre. R-15,000 provides for low density single-family residential with a minimum lot size of 15,000 square feet.

The zoning activity in the County zoning jurisdiction has fluctuated over the past 10 years, but in general makes up around 30 percent of the combined zoning activity in the City and County. Figure 3 displays the number of annual zoning actions that occurred in the County zoning jurisdiction between 1990 and 2001.

Subdivision Activity

Residential subdivision activity in the County increased significantly after 1992. Between 1988 and 1992 only 5 residential subdivisions plats were filed. Since 1992, a total of 218 plats were filed. The average for this period was 21 subdivisions per year. A total of 1,087 residential lots or condominium units were created between 1988 and 2002. Commercial subdivision activity was relatively low between 1988 and 2002, averaging less than 1 per year. The number of commercial lots created, however, increased considerably after 1998. The total number of commercial lots created after 1998 was 131; between 1988 and 1997 only 31 lots were created. Figure 4 plots the number of commercial and residential lots created between 1988 and 2002.

Residential Land Use
The majority of residential property is located along the Yellowstone River and concentrated in and around Billings and other communities. The largest residential areas located outside the City of Billings are Laurel, Lockwood, and Huntley. Within the County zoning jurisdiction, immediately surrounding the City of Billings and Lockwood, approximately 18 percent of the area is zoned residential.

Commercial and Industrial Land Use
The County commercial and industrial centers are located adjacent to the City of Billings, Lockwood and Laurel. Smaller commercial uses are concentrated in the other County townsites. Within the County zoning jurisdiction, including Lockwood and the area adjacent to the City, 1.1 square miles is zoned for commercial use and 2.5 square miles is zoned for industrial use.

Agricultural Land Use
The 1997 Census of Agriculture reported a 5 percent increase in the amount of land used for agricultural purposes between 1992 and 1997 in Yellowstone County. An estimated 1,526,007 acres or 90 percent of the total County land base is used for cropland and grazing. Most of the agricultural land, 1,144,617 acres, is used for livestock grazing while 381,390 acres are cultivated for crops. The amount of irrigated cropland increased from 73,261 acres in 1992 to 80,024 acres in 1997. This suggests that the loss of irrigated land to annexations and subdivisions was offset elsewhere in the County by an increase in irrigated land use. Within the County zoning jurisdiction, 69 percent or 100 square miles of land is zoned for agriculture.

Agricultural land is held in private, state and federal ownership. The Montana Department of Natural Resources manages 9,000 acres of land under agricultural production and 6,800 acres of grazing land. The Bureau of Land Management has approximately 76,900 acres allotted for grazing purposes.

Recreational and Conservation Land Use
Land accessible for recreational purposes is distributed throughout the County. The largest recreational areas are held by the U. S. Bureau of Land Management (BLM). The BLM administers almost 11,000 acres of recreational land. The Montana Fish, Wildlife and Parks Department maintains seven sportsman accesses along the Yellowstone River as well as Lake Elmo State Park and Pictograph Cave State Park. County parks make up a small fraction of the total recreation land in the County.

The Montana Natural Heritage Program (MNHP) maintains a database of general land ownership, including conservation easements. Conservation

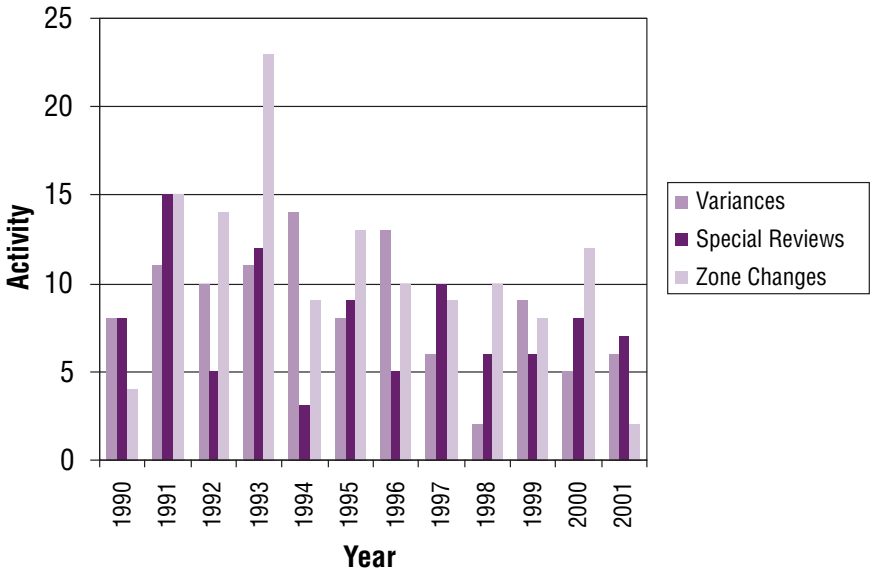


Figure 3. Zoning activity in Yellowstone County 1990 – 2001.

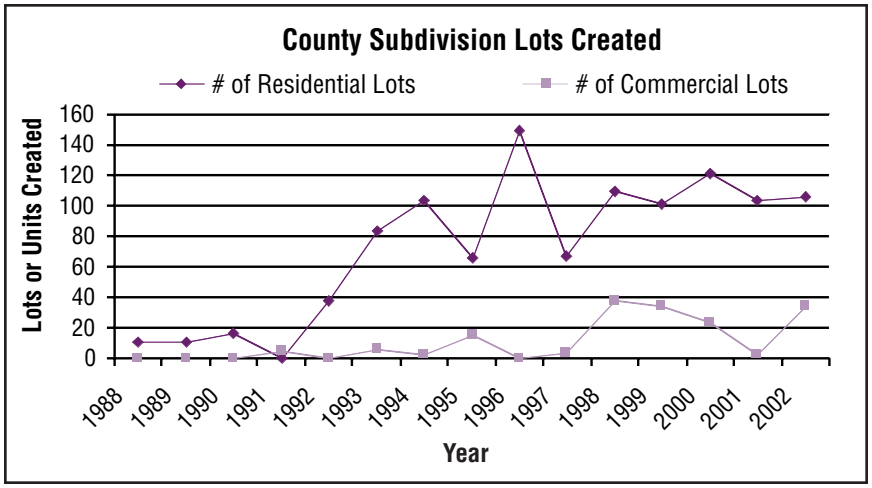


Figure 4. Number of County lots or condominium units created annually, 1988 – 2002.

easements remove development rights from property ensuring that important conservation values of the land are protected. The land remains in private ownership, but the easement is held by private, non-profit land trusts. In 2002, the MNHP reported there were 11 conservation easements, totaling 18,564 acres, in Yellowstone County. Ten easements are held by the Montana Land Reliance and total 18,306 acres. The largest of these which is 13,884 acres, is located between Billings and Roundup on the Musselshell County line. The Nature Conservancy holds a conservation easement located along the Yellowstone River just northeast of Billings. This easement is 258 acres.

The State also holds land in trust. State trust lands are administered by the Trust Land Management Division of the Montana Department of Natural Resources. The purpose of the Trust Land Management Division is to administer and manage the state trust timber, surface, and mineral resources for the benefit of the common schools and the other endowed institutions in Montana, under the direction of the State Board of Land Commissioners. In Yellowstone County there are approximately 73,193 acres administered by the Trust Land Management Division.

Vacant Parcels

There are 3,939 parcels in the County classified as vacant by the Montana Department of Revenue. The total acreage of vacant land is approximately 17,000 acres.

Exempt Parcels

All the land administered by federal agencies, state agencies and local governments is considered exempt from property tax. Non-profit organizations exempted from property tax by state and federal laws are also in this category. Exempt parcels comprise approximately 17% of the total County area.

Acton

Acton is a small, unincorporated community northwest of Billings along Montana Highway 3. The town is located adjacent to the Burlington Northern railroad tracks and provides community services for the outlying ranches and farms.

Ballantine

When the Huntley Project was developed, the Bureau of Reclamation platted several small towns. Ballantine was platted in 1907 and originally consisted of eleven blocks situated north of the Burlington Northern railroad tracks, between the Yellowstone River and Interstate 90. The town has grown slightly since it was originally platted, but the 2000 Census reports a population of 346 and a total of 130 households. Ballantine is unincorporated and unzoned.

Broadview

The incorporated Town of Broadview, situated approximately 25 miles northwest of Billings along Montana Highway 3, is zoned. The townsite measures roughly 130 acres and is divided into two zoning districts: residential and commercial. The commercial district comprises roughly 1/3 of the townsite and the remainder is zoned residential. The residential zone permits single-family and multi-family dwellings (not to exceed three stories), churches, parks, public utility stations, schools and individual mobile homes. The commercial zone is intended to accommodate service and retail facilities only. The City-County Planning Department administers the Broadview zoning regulations. A Board of Adjustment acts on variance requests, and the Town Council decides special use and zone change applications. Broadview has a population of 150 and 64 households according to Census 2000 data.

Custer

Custer is situated just off of Interstate 90 on the far east edge of the County. The town is unincorporated and unzoned. The original townsite consists of 28 blocks laid out in a grid pattern. The 2000 population of Custer was reported to be 145.

Huntley

Huntley is a small town in Huntley Project that was platted by the Bureau of Reclamation in 1907. The original townsite was situated next to the Yellowstone River on both sides of the Burlington Northern / Montana Rail Link railroad tracks. Montana Highway 312 cuts through the townsite which is unincorporated and unzoned. Huntley was one of the larger townsites in the Project and was originally platted with over 50 blocks. The 2000 population was reported to be 411.

Laurel

The town of Laurel lies outside the Yellowstone County Planning Board's jurisdiction and is not covered in this Growth Policy. It is, however, the second largest municipality in the County and consists of a population 6,255. The town lies on the west edge of the county along the Interstate 90 and railroad corridor. Laurel is zoned and incorporated. The zoning jurisdiction extends approximately one mile outside the city limits.

Lockwood

With a population of 4,306, Lockwood is the largest unincorporated urbanized area in Yellowstone County. Located east of Billings, it is situated along Interstate 90 just east of where it crosses the Yellowstone River. The area encompasses approximately 8.1 square miles. Lockwood lies within the Yellowstone County Zoning Jurisdiction. Most of Lockwood between the river and Interstate 90 is zoned Heavy Industrial and Controlled Industrial and comprises slightly more than half of the land area (52 percent). Approximately 3 percent of Lockwood is zoned for Commercial uses, and the remaining 45 percent of land is zoned for residential uses. While most of the land in the Lockwood area is zoned industrial, residents consider Lockwood a small rural town.[2]

Shepherd

Shepherd is small platted townsite originally consisting of a couple of blocks. Additions to the town increased the size to six blocks. The "town" straddles the Shepherd-Acton Road and is unincorporated and unzoned.

Worden

Worden is another Huntley Project townsite established around 1907. The original town of Worden consists of 57 blocks and has been added on to the south and north. The town is located along Montana Highway 312 and the railroad tracts. It is unzoned and unincorporated. Census 2000 reports a population of 506.

Special Zoning Districts

Yellowstone County contains six special zoning districts adopted under 76-2-101, MCA, which authorizes citizen-initiated zoning districts. The special zoning districts are administered by the Planning and Zoning Commission and regulations are enforced by the Planning Department. The Planning and Zoning Commission for these districts is composed of the County Commissioners, County Surveyor and Clerk and Recorder. The special zoning districts are shown on Map 4.1.2.

Echo Canyon Area, Special Zoning District 12
Adopted in 1970, Yellowstone County Planning and Zoning District No. 12 encompasses approximately 3.75 square miles and is located in Sections 15, 22, 23, and 24, Township 1 North, Range 24 East. The district regulations permit single family dwellings with accessory buildings, agricultural uses, home occupations and public parks. Restrictions are placed on building height, setbacks, as well as lot size, lot coverage, signage and parking areas.

Special Zoning District 14
Special Zoning District 14 contains approximately 31 square miles and stretches from the Yellowstone River south to the south township line of Township 2 South, Range 25 East. It is bordered on the west by the Laurel zoning jurisdiction and Special Zoning District 16 to the south. The district was adopted in 1977 and included agricultural, residential, and public zoning. The district was rezoned in 1991. The district now permits agricultural and related uses only and is zoned for 1 dwelling unit per 20 acres. District regulations also limit building setbacks.

Special Zoning District 15
In 1985, the County adopted Special Zoning District 15 , a small 60 acre area that includes the SE/SW Section 2 and E/NE/SW/ Section 2, Township 2 North, Range 27 East. The district is generally located .5 miles east of Shepherd along the Shepherd-Acton Road. Only single family dwelling on a minimum of 5 acres are permitted in this district and mobile home parks, feedlot operations, junkyards and commercial uses are not permitted. Home occupations are restricted.

Special Zoning District 16
Special Zoning District 16 occupies 23.25 square miles in Township 3 South, Range 25 East. The district is zoned exclusively for agricultural purposes and allows one single family dwelling per 40 acres. The district was adopted in 1986. The district extends from the south township line of Township 2 South, Range 25 East south to the south section line of Township 3 South, Range 25 East. It is bordered on the north by Special Zoning District 14. In addition to land use, the regulations also limit building setbacks.

Pleasant Hollow Trail Area, Special Zoning District 17
Special Zoning District 17 is located in Sections 13, 14, and 15, Township 3 North, Range 27 E and encompasses 960 acres. The District is divided into 3 zoning districts: Agricultural-Residential, Residential-10 and Residential-5. The Agricultural-Residential zone allows for 1 dwelling unit per 20 acres. Agricultural uses, childcare facilities, domestic greenhouses, home occupations, and private stables are also permitted. The remaining zoning districts permit the same uses but restrict the density to 1 dwelling unit per 10 acres for the Residential-10 zone, and 1 dwelling unit per 5 acres for the Residential-5 zone.

Special Zoning District 18
Special Zoning District 18 is situated south of the Yellowstone River between Spring Creek Road and Montana Highway 212 in Sections 22 and 23, Township 2 South, Range 24 East. The district is composed of five zoning districts: Agricultural, Suburban, Residential, Recreational and Commercial. Only two properties are zoned Commercial and are located adjacent to Thiel Road. The Commercial zone is intended for retail and service-oriented businesses. A single tract is zoned for recreational uses which allows single family homes and manufactured homes, as well as bed & breakfasts, campgrounds, motels, and restaurants. The Residential zone permits single family dwellings

at one dwelling unit per acre. The Suburban zone is zoned for one dwelling per two acres. Most of Special Zoning District 18 is zoned for agricultural uses that permit one dwelling unit per 5 acres as well as agricultural uses, child care facilities, manufactured homes, and home occupations.

Land Use Regulations and Policies

Subdivision Regulations

The City and the County have separately adopted subdivision regulations, but they function similarly. The City regulations apply to subdivisions proposed within the City limits. All other subdivisions outside of the Laurel Planning Jurisdiction and the Crow Indian Reservation are regulated by County regulations. Both the City and County regulations specify the subdivision procedure for major and minor subdivisions, stipulate required improvements, and provide development standards for commercial and residential subdivisions. The subdivision regulations closely follow what is required and authorized by state law with few exceptions. In general, they are not more stringent than state law.

Zoning Regulations

The zoning jurisdiction for the City and the County extends outside the city limits approximately 4.5 miles. The City administers zoning within the city limits and the County administers the remainder. The City and the County however, share the Unified Zoning Regulations. The City Zoning Commission advises the City Council on zone changes and special reviews. The City Board of Adjustment acts on city variances. A County Zoning Commission and Board of Adjustment administer these tasks for the County.

The Town of Broadview's zoning regulations are administered by the Zoning Commission, and final zoning decisions are made by the Town Council. Appeals are made to the Board of Adjustment, whose members are appointed by the mayor.

Floodplain Regulations

Both the City and County participate in the National Flood Insurance Program which requires jurisdictions to adopt floodplain development regulations. Yellowstone County's floodplain regulations are administered by the Disaster and Emergency Services Department. The County floodplain program began in 1975, and an average of 10 permits is issued per year. The Floodplain Regulations prohibit certain uses within designated floodplains and place conditions on other uses.

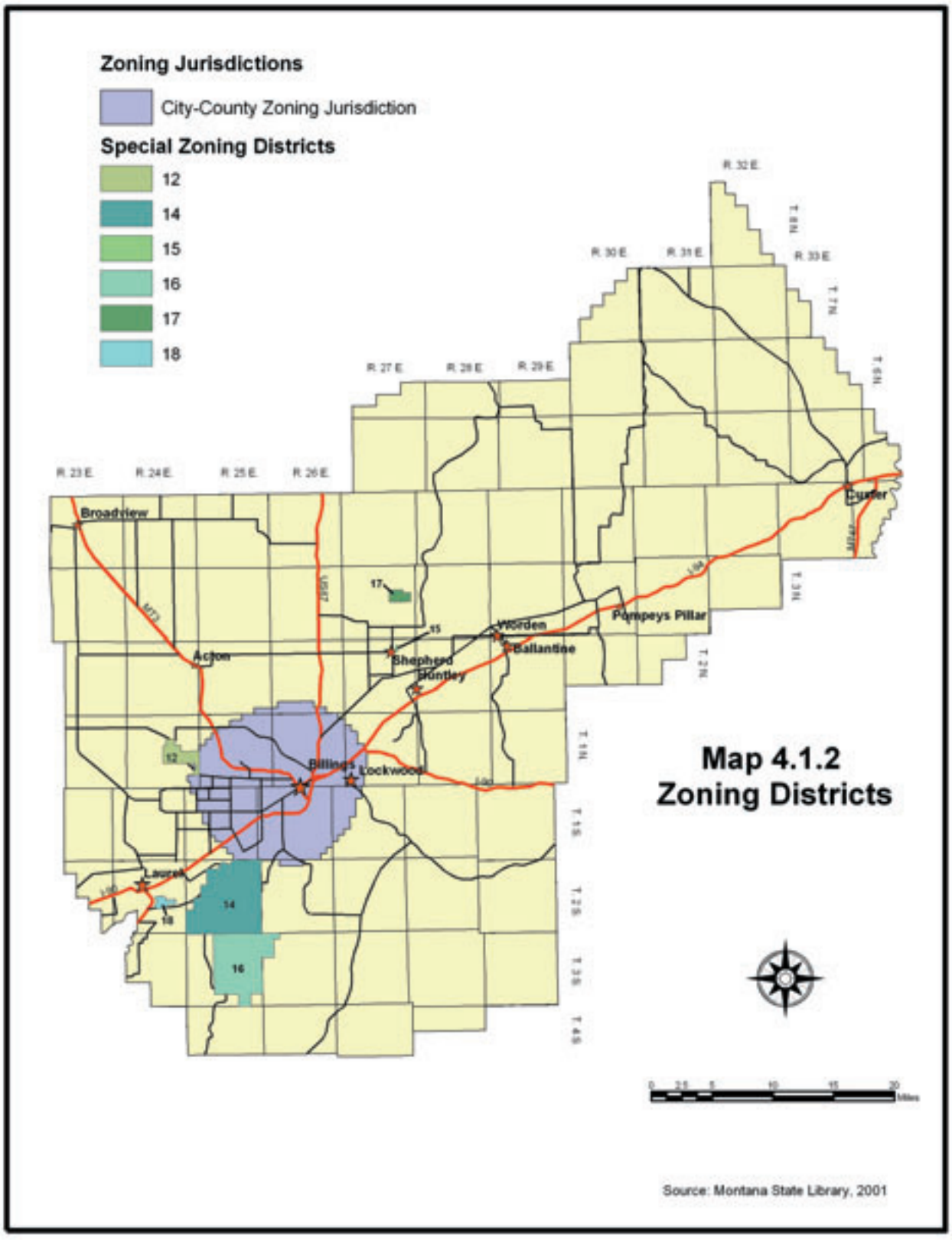
The City Building Division administers the City Floodplain Regulations that were adopted in 1999. Most commercial and residential development is generally prohibited in the floodway and flood fringe unless suitably floodproofed.

Annexation Policy

The City of Billings adopted an Annexation Policy in 2002 which establishes review criteria to help guide annexation decisions. The purpose of the policy is to promote orderly growth of the community at urban densities (greater than 4 units per acre) with urban services/facilities, and, control the type, quality and location of development in areas that are outside the City, but which are likely to develop at urban densities. Part of the policy is a map showing the "sphere of influence", an area in which annexations are encouraged. The area considers proximity of proposed annexation to existing city limits, availability of City services, current land use, and proximity to the Yellowstone River.

Land Use Projections

Based on population projections, Yellowstone County is expected to grow annually by 1 percent. This rate would suggest an additional 1,300 people or 535 new dwelling units annually. Over the past decade 7,395 dwelling units were constructed. If this rate is maintained and affordability is not an issue, residential development would keep pace with housing needs. Where the residential development would occur is controlled by several factors, including, but not limited to, zoning, availability of services and access, site conditions and market factors. Local governments can indirectly address market factors and substantially control the


Zoning Jurisdictions
City-County Zoning Jurisdiction
Special Zoning Districts
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T. 6 N.
T. 5 N.
T. 4 N.
T. 3 N.
T. 2 N.
T. 1 N.
T. 1 S.
T. 2 S.
T. 3 S.
T. 4 S.
Broadview
Custer
Acton
Worden
Ballantine
Pompeys Pillar
Shepherd
Huntley
Billings
Lockwood
Laurel
Map 4.1.2
Zoning Districts
Source: Montana State Library, 2001

availability of services, access, and creation of zoning districts. Billings' recent growth has been due in part to the extension of water and sewer service outside previous City limits. Not only has this added acreage to the City but it created a strong incentive for residents and businesses along the service extension routes to annex to the City. For that reason, it is highly probable that the highest density growth will occur along the recently extended sewer and water main routes.

Market factors may be indirectly affected by local governments by the cost of permitting and service fees. The City might influence the location of certain uses through zoning as well as through fee incentives. Public involvement has demonstrated a desire for more infill development as opposed to urban sprawl. To achieve infill, Billings may need to adopt incentives to lure developers to build on vacant city lots or rehabilitate dilapidated structures. This strategy would make infill development more competitive than land on the edge of or outside the city.

Land use strategies that would shape the pattern of development in Yellowstone County must begin with an understanding of what the community desires. This can be accomplished through the development of more detailed area or townsite plans and City and County policies. Based on the outcome of these plans, the ability to forecast the location and type of land use would be improved. The annexation policy will also influence development patterns. The policy encourages the annexation of large tracts of land adjacent to city limits that would be developed at urban densities, and generally discourages annexation of irrigated agricultural land and large lot development.

Land Use Preference Survey

The residents of Billings and Yellowstone County who attended the Billings Home Show, the Deaconess Medical Center Health Fair, or those who accessed the Growth Policy website were requested to complete a Land Use Preference Survey. The purpose of the survey was to determine which development pattern for residential, commercial, and recreational land uses, participants would prefer to see more of in Billings. The primary objective was to evaluate the current land use controls, principally subdivision and zoning regulations, and assess whether they encouraged or discouraged the preferred development pattern. A secondary objective was to determine how and where City resources should be focused. The survey consisted of three multiple choice questions: Which residential land use pattern would you like to see more of in Billings? Which commercial land use pattern would you like to see more of in Billings? And which recreational land use pattern would you like to see more of in Billings? Each question was accompanied by a graphic representing the development pattern, and a photograph exemplifying the land use. The representative graphic illustrated a generalized concept of the street network, lot size and layout for the development pattern choice. The graphic was also used to compile a graphical representation of how Billings might be transformed and grow based on the participants preferences. Each of the three questions offered a choice of three land use patterns. Where possible, examples for the patterns were selected from Billings.

Residential Land Use Patterns

Billings, like most western urban centers, was originally laid out in a rectilinear grid system. This pattern prevailed both in residential and commercial neighborhoods until the late 1960's and 1970's. During those decades, subdivision geometries changed and reflected a more suburban pattern of curvilinear streets, cul-de-sacs and large lots. This pattern became the convention and is the primary pattern repeated in contemporary subdivisions. A pattern to recently emerge in subdivision design, particularly in the more urban-rural interface, seeks to offer open space as an amenity. Most of the open spaces are golf greens and fairways laid out amidst a natural setting, and bordered by residential lots. In the style approximating the "Rural by Design"[3] concepts, lots and streets are designed in a way to maximize the benefits of open space through conservation of natural resources. Table 4 on the following page describes the three land use pattern choices for residential development.

TABLE 4: LAND USE PATTERN CHOICES

Traditional
Houses are arranged in rectilinear blocks and face the street. Sidewalks border shallow front yards. The backyards usually open onto alleys. Lot sizes are generally less than 8,000 square feet and each block may contain eight to twelve lots.

Conventional (curvilinear)
Blocks are not uniform and streets are often curvilinear. Houses may be at angle to street frontage. Front yards are deeper than in traditional neighborhoods and there may or may not be sidewalks. Lot sizes range between 8,000 and 12,000 square feet.

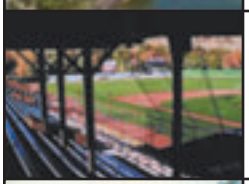
Conservation (cluster)
Houses are arranged in clusters separated by undeveloped or recreational greenspace. Streets are curvilinear and follow the contours of the land. Lot sizes are generally less than 8,000 square feet.

Neighborhood (nodes)
Commercial centers are located at major intersections within easy walking distance from residential neighborhoods. Stores are set back from front property lines and parking is in the front, side or rear of building. Buildings are typically one story and 15,000 to 50,000 square feet. Parking is landscaped.

Regional (concentrated)
Big retail and service centers requiring lots of space and concentrated near the interstate and highways. Stores are set back considerably from property lines, but may front internal streets. Buildings are very large, usually greater than 50,000 square feet. Buildings may share common walls or may be free standing. Parking lots, yards and internal street dividers are landscaped.

Traditional (centric)
Looks like small town downtowns. Located in areas central to mulitple neighborhoods. Storefronts are next to wide sidewalks and most parking is on-street. Buildings are multistory and ground floors are relatively small, usually less than 7,000 square feet.

Open Space and Agriculture (concentric)
Large swaths of land surrounding Billings are preserved for scenic, natural or agricultural values. Land set aside for open space or agriculture use controls the extent and location of future development.



Recreational Facilities (dispersed)
Facilities are dispersed throughout the City within easy access of all residential neighborhoods. Size of facilities range from 1 to 20 acres, depending on type. Facility types include ballparks, playgrounds, indoor gymnasiums and aquatic centers.

Bicycle and Pedestrian Corridors (linear)
Narrow, linear pathways may be along developed transportation corridors or in open space corridors. Corridors connect residents with work place and recreational destinations.

Commercial Land Use Patterns

When downtown Billings was developing in the late 19th Century, it conformed to a grid pattern established by the original plat. As the City grew, arterials stretched out from the original townsite and several developed as commercial strips. Strip development is the most prevalent commercial pattern in Billings. Modification to the strip pattern began in the 1960's with the advent of shopping malls that more or less created nodules in the commercial frontages. This pattern continued to refine and the nodules became larger and more robust. Shopping malls gave way to grand-scaled retail centers supporting grand-scaled retail cubes. The 1990's ushered in the age of the regional commercial centers and their benefactors; the big box retailers. Occurring simultaneously, and more in response to capitalizing on local consumers, neighborhood centers began emerging within or near residential areas. These commercial centers are similar to their shopping mall ancestors in scale, but do not purport to be regional attractions. Recently, the neighborhood commercial node has replaced the town center as the place to visit (McDonalds Restaurant), to be entertained (Blockbuster Video), and to grocery shop (Albertsons), all within a few minutes drive of the house. An even smaller-scaled commercial pattern is well known to dwellers of large urban areas such as Seattle and Denver. Many Montanans may recognize it, however, as a replica of the downtowns found in the smaller towns around the state. This traditional commercial pattern is truly a neighborhood center designed to serve and be part of the surrounding residential neighborhoods. Except for the downtown, Billings has few of these traditional retail centers, and what is left might be a nonconforming use isolated by the city planners and residents, who at one time, determined that mixing residential with commercial uses was not appropriate in neighborhoods. The pattern choices offered for the commercial land use question are described below. Strip development was not listed as a choice.

Recreational Land Use Patterns

Recreational, including open space, land use patterns are mainly a function of use. The three recreational patterns offered to the survey participant are subtly distinguished by whether the use is active, passive or simply visual. Billings is surrounded by natural features that help describe this unique place. The City is fortunate to be situated on the Yellowstone River, which runs undammed throughout its course from Yellowstone National Park to the confluence with the Missouri River. The sandstone rimrocks almost encircle the City, standing sentinel to the downtown and many of its residential neighborhoods. Stretched out south of the river are cultivated farmlands bordered in the distance by impressive mountain ranges. Unobstructed high plains expand north of the City. Slowly these landscapes encircling the City are being altered. Some residents recognize the need to protect these landscapes for their intrinsic natural values or their agricultural value. While not purely preserved for recreational purposes, open space and agricultural land use afford a quality that is visually accessible. The visual and preservation values are often accompanied by the desire to physically experience the landscape. The recreational land use pattern that accommodates this preference is a network of linear corridors within the landscape that can be accessed on foot or bicycle. Pathways provide both access to the natural environment and connections across and around the City. The activity within these corridors is generally passive and unorganized. The recreational land use pattern that falls on the active extreme of the use spectrum are dispersed recreation facilities. Facilities are designed for active, organized sports and serves groups or organizations rather than individuals. As Billings grows, the demand for such facilities increases, not only for more, but grander, more upscale facilities. The choices in this land use pattern category were not meant to be exclusive of each other. Rather, the recreational question asked, as did the residential and commercial questions, "Which would you like to see more of in Billings?" The choices for recreational land use pattern are described below.

Survey Results

The survey was conducted electronically using a web browser which allowed it to be placed on a web-

site or on a personal computer. Participants were asked to take the survey and indicate their preference for residential, commercial and recreational land use patterns. Results from each survey response were recorded in a database. There were 241 responses. Results were tallied for each of the 9 patterns and for each of the 27 possible combinations of patterns.

In the Residential category, the traditional (grid) and conventional (curvilinear) patterns tied at 76 votes each. The conservation (cluster) pattern received 89 votes, a clear but not overwhelming preference. The Yellowstone County and City of Billings Subdivision Regulations or the Unified Zoning Code do not provide standards for conservation-style subdivision. The results of this category suggests that the codes should be amended to address this residential pattern. The codes were written primarily for the conventional and traditional patterns.

The survey results in the Commercial category established an obvious preference for the traditional (centric) pattern. The traditional pattern received 115 votes; the neighborhood (nodes) pattern received 80; and the regional (concentrated) pattern received 46. To encourage traditional commercial development, the Unified Zoning Code would need to be amended. While mixed use is permitted in all commercial and planned development districts, the existing standards could be modified to promote the desired intimacy and appropriate design. Furthermore, the locations of most commercial zones are not appropriate for traditional commercial centers in neighborhoods, but are more conducive to regional or neighborhood commercial centers. Residents should be involved in determining the best location for traditional land use patterns in their neighborhoods.

The votes for recreational patterns were more clustered but the bicycle and pedestrian corridor (linear) pattern was the winner with 93 votes compared with 76 for open space and agricultural (concentric) and 72 for recreation facilities (dispersed). This preference reflects the continued support for bikepaths that was initiated through the BikeNet Plan and the Heritage Trails Plan update. The other two patterns received enough votes to indicate that there is a desire for open space and agricultural protection and recreation facilities as well.

References

Arendt, Randall, 1994 “Rural by Design”, Planners Press, APA, Chicago, Illinois.

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Montana State Library, Natural Resource Information System, http://www.nris.state.mt.us/ .

Planning and Community Services Department, City of Billings, zoning activity database.

Public Works Department, City of Billings, city statistics database.

US Bureau of Land Management, Billings Office. Unpublished land use statistics.

1 Exempt properties refer to land owned by entities not subject to property tax such as school districts, local governments, state agencies and tax-exempt non-profit organizations.

2 Lockwood Visioning Process, Montana State University Local Government Center, February 28, 2002.

3 Randall Arendt, 1994, “Rural by Design”, Planners Press, American Planning Association, Chicago, Illinois.

4.2 Population

Introduction

The purpose of the Population Element of the Growth Policy is to provide information about the social and economic characteristics of Yellowstone County's population. This information includes population, age distribution, race characteristics, and educational attainment.

A common geographic designation used to report demographic data is census tract. There are currently 26 census tracts in Yellowstone County. This is an increase from 19 census tracts in 1980. Census Tract 1 was absorbed into Tract 4 while Tracts 7 and 18 were divided into four tracts each and Tracts 9 and 17 were divided into two tracts. Census tracts are defined by the Bureau of Census as "Small, relatively permanent statistical subdivisions of counties… for the purpose of collecting and presenting decennial census data. These neighborhoods contain between 1,000 and 8,000 people. The typical tract consists of approximately 1,700 housing units and 4,000 people. Tracts are designed to have homogenous population characteristics, economic status, and living conditions at the time they are established. Census tract boundaries normally follow visible features but may follow governmental unit boundaries and other non-visible features."

The information used in this section was found is several sources. Census data for the years 1970 through 1990 were found in various Bureau of the Census publications and on the Internet at **http://www.ceic.commerce.state.mt.us/demog/historic**. Information for 1990 was found on the Internet at **http://www.census.gov** and the data for 2000 were found at **http://www.factfinder.census.gov**. Additional information and charts were found in the following City/County Planning Department documents: 1990 Yellowstone County Comprehensive Plan, Population Characteristics Technical Appendix, The Data Book, December 1986, and Census Information for Yellowstone County, 1980 – 2000, August 2001.

Characteristics of County Population

Yellowstone County: Population Trends

Yellowstone County has enjoyed steady growth for the past several decades as indicated in Table 1. Growth within Billings has been gradual, especially in the last ten years. The most recent sizeable growth increase took place between 1950 and 1960. Population growth rate declined between 1970 and 1980. This slower growth rate reflects changes in the oil and gas industries and the agricultural industry. Because of the historic reliance on extractive resources, Billings and Yellowstone County have experienced repeated boom/bust economic cycles. This economic pattern is reflected in the population changes of the County.

Between 1970 and 1980, population increases occurred within the rural portion of the County and the Billings urban interface as shown in Table 2. Between 1980 and 1990 there was a marked decrease in the rural population. Some of the decrease may be accounted for with the large annexation of the Billings Heights area into the City of Billings as well as a slow economy. During the period between 1990 and 2000, the rural population, as a percent of the total population, increased by 4.4 percent. The area surrounding Billings saw a great deal of development between 1990 and 2000, which may account for some of the growth in the rural areas. Both Laurel and Billings had increases in their population in this time period.

The City of Billings lost population within its core neighborhoods (Census Tracts 1 though 6) between 1970 and 1990. This decline continued between 1990 and 2000 culminating with the combining of Census Tracts 1 and 2.

During the decade 1970 to 1980 Census Tracts 7 (Billings Heights) and 16 (southeastern Yellowstone County, more generally the South Hills to the Big Horn County line) had the most dramatic increase

TABLE 1: Population Of Yellowstone County And Incorporated Areas
Percent Change By Decade 1890 – 2000

Decade	Yellowstone County	Percent Change	City of Billings	Percent Change	City of Laurel	Percent Change	Town of Broadview	Percent Change
1890	2065	*****	836	*****	No Data	*****	No Data	*****
1900	6212	66.76	3221	285.29	No Data	*****	No Data	*****
1910	22,944	22.49	10,031	50.53	806	*****	No Data	*****
1920	29,600	29.01	15,100	8.48	2239	177.80	191	*****
1930	30,785	4.00	16,380	42.00	2558	14.25	260	36.13
1940	41,182	33.77	23,261	36.85	2754	7.66	140	**-120.00**
1950	55,875	35.68	31,834	66.02	3663	33.00	164	17.14
1960	79,016	41.41	52,851	65.12	4601	.25.60	160	**-2.44**
1970	87,367	10.57	61,581	16.52	4454	**-3.19**	123	**-23.13**
1980	108,035	23.65	66,798	8.47	5481	23.06	120	**-2.44**
1990	113,419	4.98	81,151	21.49	5686	3.74	133	10.83
2000	129,352	14.04	89,847	10.72	6255	10.00	150	12.78

TABLE 2: Rural and Urban Population Changes by Decade
1890 - 2000

Decade	Yellowstone County	Urban Population	Percent Change	Rural Population	Percent Change	Urban Population by Percentage	Rural Population by Percentage
1890	2065	836	*****	1229	*****	40.84	59.16
1900	6212	3221	74.05	2991	58.91	51.85	48.15
1910	22,944	10,837	70.28	12,107	80.25	47.23	52.77
1920	29,600	17,339	37.50	12,261	1.26	58.58	41.42
1930	30,785	18,938	8.44	11,847	**-3.5**	61.51	38.49
1940	41,182	26,015	27.20	15,167	21.89	63.17	36.83
1950	55,875	35,497	26.71	20,378	25.57	63.52	36.48
1960	79,016	57,452	38.21	21,564	55.00	72.71	27.29
1970	87,367	66,035	13.00	21,332	**-1.08**	75.58	24.42
1980	108,035	72,279	8.64	35,756	40.34	66.90	33.10
1990	113,419	86,837	16.76	26,582	**-34.51**	76.56	23.44
2000	129,352	96,102	9.64	33,250	20.05	74.30	27.70

in population. Billing Heights gained almost 10,000 people during this ten-year period. The Heights again had the greatest amount of growth in Yellowstone County between 1980 and 1990. At the time of the 1990 census, Census Tract 7 was divided into four separate census tracts. The total population at the time of the 1990 Census was 17,883, an increase of 117 percent. The growth rate for the Billings Heights area slowed between 1990 and 2000. The increase in population was 1,830, an increase of 9.2 percent.

Census Tract 16 in the southeastern portion of the County grew by 213.7 percent between 1970 and 1980, tripling the population in that area of the county. The rate of growth decreased sharply during the period of 1980 to 1990. The rate of growth was only 6.8 percent. The decline in growth from this census tract can be attributed to the economic decline in the 1980's. As the economy became more stable and began to grow in the 1990's this area of the county saw an increase in development. Between 1990 and 2000, Census Tract 16 had the third highest rate of growth in the county. The population grew from 4,422 in 1990 to 5,934 in 2000, an increase of 34.2 percent.

The tract that lost the most population in terms of actual numbers between 1970 and 1980 was Tract 4, located partially in the downtown core and extends west to Virginia Lane/5th Street West. The decrease was caused in part by the development of the Medical Corridor in the northeastern part of this tract. Many properties in the Medical Corridor were converted to medical related uses from traditional residential uses. Additionally, the portion of this tract that is located in the city center has seen a change in use from residential to commercial.

Census Tract 14 saw a 98 percent increase between 1970 and 1980 and a 43 percent increase between 1990 and 2000. Tract 14 is in the western portion of the county, excluding the City of Laurel and the Town of Broadview. This Tract is on the western edge of the City of Billings, where growth has been continually creeping westward into traditionally agricultural areas. This is an area of the County that has historically had a steady growth rate, regardless of the economy. Between 1980 and 1990, when there was slow economic growth in Yellowstone County, this Tract grew by 10 percent.

Both Census Tracts 17 and 18 had significant growth between 1970 and 1980. In 1990, Census Tract 17 was split into two census tracts and Tract 18 was split into four census tracts. Census Tract 17 is generally located in the southwest corner of the City of Billings. This Tract experienced substantial growth between 1980 and 1990 and moderate growth between 1990 and 2000.

Census Tract 18, generally located in the northwest corner of the City of Billings, including the Yellowstone County Club and Echo Canyon areas, experienced moderate growth between 1980 and 1990 and a more substantial growth rate between 1990 and 2000.

Census Tracts 1 (city center) and 4 experienced population losses from 1970 to 1990. Census Tract 1 was merged with Tract 4 for the 2000 Census, thereby showing an increase for Tract 4. Had these two tracts remained separate, the total growth for these tracts would have been 3.1 percent indicating that growth in this area is negligible.

Table 3 summarizes the change in County population by Census Tracts from 1970 to 2000. Census tracts for the City of Billings and Yellowstone County are shown in Map 4.2.1.

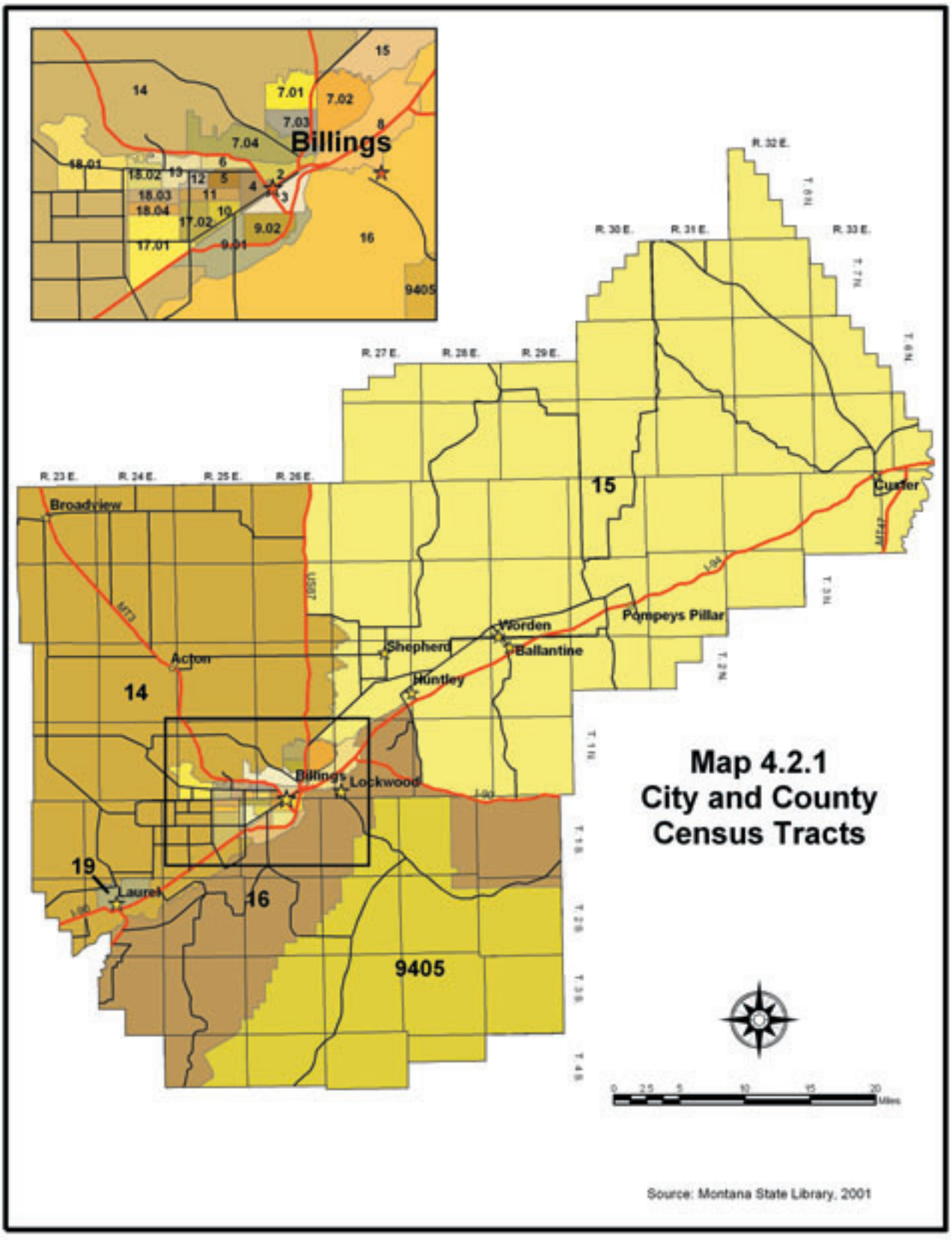
Current Population

Yellowstone County and the City of Billings are the most populated county and city in Montana. There are only two other incorporated jurisdictions in the County: Laurel and Broadview. Laurel is the second largest incorporated community in the County and Broadview is the smallest. In addition, there are numerous, unincorporated communities, five of which are classified as Census Designated Places by the Bureau of Census. Table 4 shows the population

TABLE 3: Yellowstone County Change in Population By Census Tract

1970 - 2000

Census Tract	1970	1980	Percent Change	1990	Percent Change	2000	Percent Change	Pop. Change
1	1503	1169	-22.2	788	-32.6			Tract eliminated
2	4472	3737	-16.4	3334	-10.7	3624	8.7	-848
3	4697	3894	-17.1	3300	-15.3	3592	8.9	-1105
4	7395	6189	-16.3	5237	-15.4	6214	18.7	-1181
5	5244	4464	-14.9	3971	-11.0	4119	3.72	-1125
6	4116	3696	-10.2	3055	-17.34	3136	2.7	-980
7	5496	15276	177.9		117.0			Tract split
7.01	****	****		2741		3422	24.9	681
7.02	****	****		4478		5097	13.8	619
7.03	****	****		7305		7562	3.5	257
7.04	****	****		3359		3632	8.1	273
8	2165	4152	91.8	4008	-3.5	4346	8.4	2181
9	6922	7898	14.1		-5.2			Tract split
9.01	****	****		3331		2682	-19.5	-649
9.02	****	****		4156		5069	22.0	913
10	5720	5002	-12.6	4667	-6.7	4772	2.2	-948
11	6311	5483	-13.1	5147	-6.1	5116	-0.6	-1195
12	2899	2533	-12.6	2574	1.6	2721	5.7	-178
13	5567	6182	11.0	6047	-2.2	6181	2.2	614
14	3179	6300	98.2	6981	10.8	9976	43.0	6797
15	3561	5646	58.6	6125	8.5	7834	2.8	4273
16	1320	4141	213.7	4422	6.8	5934	34.2	4614
17	5996	7182	19.7		51.3			Tract split
17.01	****	****		6379		8552	34.1	2173
17.02	****	****		4486		4345	-3.1	-141
18	6345	9634	51.8		10.9			Tract split
18.01	****	****		2669		3215	20.5	546
18.02	****	****		3097		4987	61.0	1890
18.03	****	****		2175		2178	.1	3
18.04	****	****		2736		2867	4.8	131
19	4459	5455	22.3	6851	25.6	7799	13.8	3340


Billings
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R. 31 E.
R. 33 E.
T 6 N
T 7 N
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R. 24 E.
R. 25 E.
R. 26 E.
T 5 N
T 4 N
T 1 N
T 1 S
T 2 S
T 3 S
T 4 S
15
Broadview
Custer
Pompeys Pillar
Worden
Ballantine
Shepherd
Huntley
Acton
14
Billings
Lockwood
19
Laurel
16
9405
Map 4.2.1
City and County
Census Tracts
0 2.5 5 10 15 20
Miles
Source: Montana State Library, 2001

counts based on the 2000 Census for the County, incorporated areas (Cities and Towns), and unincorporated areas (Census Designated Places).

Age Distribution

Yellowstone County has experienced a shift in age distribution during the last forty years. In 1960, the median age of persons within the county was 26.6 years. The 2000 Census shows that the median age has risen to 36.9 years. The City of Billings has seen a similar increase in the median age over the last forty years. This increase in median age is a reflection of an aging population nation-wide.

Some of the general trends that have occurred are as follows:

Under 5 years old
The population of this age group decreased significantly between 1960 and 1970. Between 1970 and 1990, the 5 and under age group was fairly stable in terms of numbers of person in this category, but showed moderate changes in the percentage of this group in respect to the total population. The 2000 Census indicates that this category is 6.62 percent of the overall population of Yellowstone County, which is a slight increase in this age group when compared to the 1990 Census numbers.

Billings experienced an increase in this population age group between 1970 and 1990 and had a small decrease between 1990 and 2000.

5 to 14 years old
In both Yellowstone County and Billings there was a moderate to significant decline in the number of children between 5 and 14, as illustrated by Tables 7 and 8, during the period between 1970 and 1980. Since 1980, both the City and the County have experienced continued growth in the number of children in this age range. This increase has resulted in a gain of population in this age group almost equal to the loss that occurred between 1970 and 1980.

15 to 24 years old
This group includes high school and college students as well as young adults entering the work force. The population of this group decreased significantly between 1980 and 1990 in both Yellowstone County and Billings. The 2000 Census shows that the population in this age group is similar to the higher 1970 Census numbers.

25 to 34 years old
While this age group represents one of the three largest age groups in Yellowstone County, it has declined since 1980. The decrease between 1980 and 1990 was slight, while the decrease between

TABLE 4: Population of Yellowstone County

2000 Census	
Yellowstone County	129,352
Billings (City)	89,947
Broadview (Town)	150
Custer (CDP)	145
Huntley (CDP)	411
Laurel (City)	6,255
Lockwood (CDP)	4,306
Shepherd (CDP)	193
Worden (CDP)	506

TABLE 5: Yellowstone County Age Distribution by Percentage of Population 1970 – 2000

	1970		1980		1990		2000	
Age	**Total Population**	**Percent of Total**	**Total Population**	**Percent of Total**	**Total Population**	**Percent of Total**	**Total Population**	**Percent of Total**
Under 5	7,068	8.09%	9,013	8.34%	8,388	7.40%	8,539	6.62%
5 to 9	8,964	10.26%	8,491	7.86%	8,776	7.74%	9,097	7.00%
10 to 14	10,143	11.61%	8,365	7.74%	8,952	7.89%	9,538	7.39%
15 to 19	9,080	10.39%	9,781	9.05%	7,896	6.96%	9,408	7.29%
20 to 24	7,068	8.09%	10,762	9.96%	6,551	5.78%	8,366	6.48%
25 to 34	10,482	12.00%	19,476	18.03%	19,252	16.97%	16,242	12.59%
35 to 44	10,243	11.72%	12,480	11.55%	18,190	16.04%	20,900	16.20%
45 to 54	9,930	11.37%	10,476	9.70%	11,788	10.39%	18,615	14.43%
55 to 64	7,325	8.38%	9,350	8.65%	9,627	8.49%	11,149	8.64%
65 to 74	4,114	4.71%	6,168	5.71%	8,182	7.21%	8,780	6.80%
75+	2,950	3.38%	3,673	3.40%	5,817	5.13%	8,463	6.56%
Total	**87,367**	**100 %**	**108,035**	**100%**	**113,419**	**100%**	**129,097**	**100%**
Median Age	**26.6***		**28.6**		**33.5**		**36.9**	

1990 and 2000 was 15.63 percent, a significant decrease. Even with the decreases, this age group is still 12.59 percent of Yellowstone County's population. In Billings, there was a very significant increase, 62.59 percent, between 1970 and 1980 and an increase of 19.45 percent between 1980 and 1990. There was, however, a decrease of 15.80 percent between 1990 and 2000, bringing the population of this group back to the 1980 numbers. Like the County, this age group represents 13 percent of the City's total population.

35 to 54 years old

The Census breaks these ages in two groups: 35 to 44 and 45 to 54. Combined, these two groups represent 30.63 percent of Yellowstone County's population and 29.12 percent of Billings' population, according to the 2000 Census. The 35 to 44 year old age group is the larger of the two. The growth rate has been approximately 16 percent for each of the last two decennial census periods for the 35 to 44 year old group while the rate for the 45 to 54 year old group has been between 10 percent and 14 percent. It is expected that the 45 to 54 year old population will continue to increase as our population ages.

55 and older

This age group has increased steadily over the years. Currently, this group comprises 22 percent of Yellowstone County's population and is expected to increase within the next ten years as the baby boomers continue to age and people live longer. Since the 1970 Census, when the group 75 and over was 2,950, there has been a steady and significant increase to the 2000 Census where this age group is now 6.56 percent of the population with a total of 8,463 people. The difference in numbers between the Under 5 age group and the 75 and older age group is only .06 percent with the Under 5 age group having 76 more people.

Tables 5 through 8 demonstrate the changes in our population that have occurred over the last thirty years in terms of age distribution. An aging population can

TABLE 6: Billings Age Distribution by Percentage Of Population 1970 - 2000

	1970		1980		1990		2000	
Age	**Total Population**	**Percent of Total**	**Total Population**	**Percent of Total**	**Total Population**	**Percent of Total**	**Total Population**	**Percent of Total**
Under 5	4,790	7.78%	4,907	7.35%	6,021	7.42%	5,882	6.55%
5 to 9	6,027	9.79%	4,673	7.00%	5,804	7.15%	5,985	6.66%
10 to 14	6,944	11.28%	4,635	6.94%	5,848	7.21%	6,063	6.75%
15 to 19	6,654	10.81%	6,032	9.03%	5,501	9.78%	6,290	7.00%
20 to 24	5,461	8.87%	7,377	11.04%	5,345	6.59%	6,483	7.22%
25 to 34	7,258	11.79%	11,801	17.67%	14,096	17.37%	11,869	13.21%
35 to 44	7,154	11.62%	7,071	10.59%	12,433	15.32%	13,882	15.45%
45 to 54	6,990	11.35%	6,664	9.98%	8,145	10.04%	12,284	13.67%
55 to 64	5,198	8.44%	6,401	9.58%	6,973	8.59%	7,770	8.65%
65 to 74	3,022	4.91%	4,424	6.62%	6,319	7.79%	6,464	7.19%
75+	2,083	3.38%	2,813	4.21%	4,666	5.75%	6,875	7.65%
Total	**61,581**	**100%**	**66,798**	**100%**	**81,151**	**71.55%**	**89,847**	**100%**
Median Age	**26.2**		**29.3**		**33.7**		**36.8**	

TABLE 7: Yellowstone County Change In Age Distribution by Percentage

	1970	1980	1970-1980	1990	1980-1990	2000	1990 - 2000
Age	**Total Population**	**Total Population**	**Percent Change**	**Total Population**	**Percent Change**	**Total Population**	**Percent Change**
Under 5	7,068	9,013	27.52%	8,388	**-6.93%**	8,539	1.80%
5 to 9	8,964	8,491	**-5.28%**	8,776	3.36%	9,097	3.66%
10 to 14	10,143	8,365	**-17.53%**	8,952	7.02%	9,538	6.55%
15 to 19	9,080	9,781	7.72%	7,896	**-19.27%**	9,408	19.15%
20 to 24	7,068	10,762	52.26%	6,551	**-39.13%**	8,366	27.71%
25 to 34	10,482	19,476	85.80%	19,252	**-1.15%**	16,242	**-15.63%**
35 to 44	10,243	12,480	21.84%	18,190	45.75%	20,900	14.90%
45 to 54	9,930	10,476	5.50%	11,788	12.52%	18,615	57.91%
55 to 64	7,325	9,350	27.65%	9,627	2.96%	11,149	15.81%
65 to 74	4,114	6,168	49.93%	8,182	32.65%	8,780	7.31%
75+	2,950	3,673	24.51%	5,817	58.37%	8,463	45.49%
Total	87,367	108,035		113,419		129,097	

TABLE 8: Billings Percent Change In Age Distribution

Age	1970 Total Population	1980 Total Population	1970 - 1980 Percent Change	1990 Total Population	1980 - 1990 Percent Change	2000 Total Population	1990 - 2000 Percent Change
Under 5	4,790	4,907	2.44%	6,021	22.70%	5,882	-2.31%
5 to 9	6,027	4,673	-22.47%	5,804	24.20%	5,985	3.12%
10 to 14	6,944	4,635	-33.25%	5,848	26.17%	6,063	3.68%
15 to 19	6,654	6,032	-9.35%	5,501	-8.80%	6,290	14.34%
20 to 24	5,461	7,377	35.09%	5,345	-27.55%	6,483	21.29%
25 to 34	7,258	11,801	62.59%	14,096	19.45%	11,869	-15.80%
35 to 44	7,154	7,071	-1.16%	12,433	75.83%	13,882	11.65%
45 to 54	6,990	6,664	-4.66%	8,145	22.22%	12,284	50.82%
55 to 64	5,198	6,401	23.14%	6,973	8.94%	7,770	11.43%
65 to 74	3,022	4,424	46.39%	6,319	42.83%	6,464	2.29%
75+	2,083	2,813	35.05%	4,666	65.87%	6,875	47.34%
Total	61,581	66,798		81,151		89,847	

present challenges in terms of the growing need to provide many types of services for senior citizens.

*The 1970 Census did not give a median age for the cities. This figure was extrapolated from information contained in the 1970 Census.

Race

The racial diversity of Yellowstone County has increased gradually over the last thirty years. In 1970, 98 percent of the County population was white and in 2000, the Census Bureau reported a decrease in the all-white population to 92.8 percent for the County. The 2000 Census also reported the percentage of the population considered white alone or in combination with one or more other races. This figure for the County was 94.5 percent.

The 2000 Census shows an increase in the Hispanic or Latino population. According to the 2000 Census, the total Hispanic population was 4,788 or 3.7 percent of the population for Yellowstone County and 3,758 or 4.2 percent for the City of Billings. This is an increase of 1,793 people or 57.24 percent since 1990 and 65.62 percent since 1980 in Yellowstone County. For the City of Billings, the increase in the Hispanic population was 1,389 people or 58.63 percent since the 1990 Census and 82.10 percent since 1980.

Education

The population in Yellowstone County and Billings is becoming more educated. Since 1960, the median years of education completed among persons 25 years old and older has increased. The percentage of the population in that age group that has completed a four-year college degree and/or graduate or a professional degree has continued to increase as well.

By 1990, the percentage of people in Yellowstone County who had completed high school was 83.66 percent and the percentage of people who had com

TABLE 9: YELLOWSTONE COUNTY AND BILLINGS RACIAL CHARACTERISTICS

	Yellowstone County								Billings							
	1970	Percent of Total	1980	Percent of Total	1990	Percent of Total	2000	Percent of Total	1970	Percent of Total	1980	Percent of Total	1990	Percent of Total	2000	Percent of Total
One Race							126,933	98.1							87,993	97.9
White	85,765	98.17	103,546	95.84	107,921	95.15	120,014	92.7	60,329	97.97	63,537	95.14	76,738	94.56	82,539	91.8
Black/ African American	227	0.26	289	0.27	511	0.45	580	0.4	212	.034	251	0.38	439	0.54	495	0.5
American Indian Alaska Native	1,063	1.22	2,268	2.10	3,235	2.85	3,950	3.0	832	1.35	1,560	2.34	2,569	3.16	3,088	3.4
Asian or Pacific Islander			372	.34	612	0.53	755	0.6			279	.42	479	0.59	533	0.5
Other Race	312	0.36	1,560	1.44	1,140	1.00	1,634	1.3	208	0.34	1,153	1.73	926	1.14	1,300	1.4
Two or More Races							2,419	1.9							1,854	2.1
Hispanic Origin (of any race)					3,158		4,788						2,481		3,758	4.2
Total Population	**87,367**		**108,035**		**113,419**		**129,352**		**61,581**		**66,780**		**81,151**		**89,847**	

TABLE 10: Yellowstone County and Billings Educational Attainment of 25 Years and Older 1970 - 2000

	Yellowstone County				Billings			
	1970	1980	1990	2000	1970	1980	1990	2000
Less than 9th Grade	10,270	8,338	5,169	3,325	6,108	5,076	3,774	2,332
9th to 12th Grade (No Diploma)	6,029	6,061	6,735	6,398	3,970	3,480	4,535	4,310
High School Graduate (Including GED)	15,335	22,727	23,519	26,153	10,380	13,731	15,820	17,304
Some College (No Degree)	6,234	12,228	17,744	21,465	6,234	8,252	13,177	15,082
A.A.			4,014	4,670			2,952	3,028
B.A.	5,098	12,228	11,591	16,053	5,032	8,579	9,144	11,982
Graduate or Professional Degree			4,084	6,169			3,230	4,796
Total Population 25 Years and Older	42,966	61,582	72,856	84,233	31,724	39,118	52,632	58,834
Percent High School Graduates	62.06	76.61	83.66	88.5	68.23	78.13	84.21	88.7
Percent Four or More Years of College/ Bachelor's degree or higher for 2000 data	11.66	19.86	21.51	26.4	15.86	21.93	23.51	28.5

pleted four or more years of college was 21.51 percent. These numbers for Billings were 84.21 percent for high school graduates and 23.51 percent for those with four or more years of college.

The 25 and older population of Billings and Yellowstone County are slightly more educated than both the overall numbers for the State of Montana and the nation as a whole. For instance, the percentage of Billings' 25 and older population that graduated from high school is 88.7 and the percentage in the entire County is 88.5. This compares with Montana's percentage of 87.2, and the national percentage of 80.4. The percentage of people 25 and older with a bachelor's degree or higher in Billings is 28.5 and in the County is 26.4. For Montana and the nation the percentage is 24.4.

Population Projections

The Census and Economic Information Center (CEIC) with the Montana Department of Commerce released population projections for counties up to the year 2025. The CEIC reports that Yellowstone County will maintain its rank of most populated county throughout this time period. Yellowstone County is expected to grow an average of 1 percent per year. At this rate, the County population will reach approximately 137,990 by 2005; 145,880 by 2010; and 162,410 by 2020. It would be consistent with historic development trends to assume that a higher percentage of growth will take place at or near the City limits than anywhere else in the county.

Population densities are decreasing from the residential core of Billings outward to the newly annexed territories. Older neighborhoods are more densely populated than neighborhoods developed in the last 30 years largely because of the lot size and street density. However, the newer neighborhoods tend to have more children per household than the older neighborhoods and a lower percent of single parent households.

Three age groups have seen dramatic increases in population over the past decade in Yellowstone County. The number of people aged 75 years and older has increased over 45 percent, reflecting the national trend of an aging population. The County has also experienced an increase in the population that constitutes a large part of the work force particularly the baby boom generation aged 45 to 54 years. This population increased almost 58 percent. The other increase in labor force population is the 20 to 24 years age bracket indicating an echo effect of the baby boomers. This population increased by half of their parents' generation, or 28 percent. The only decrease of an age group occurred in the population aged 25 to 34 years. This age group declined by 15 percent. These trends indicate, in addition to an aging population, a potential loss of an important work force component without significant immigration.

An aging population will have numerous ramifications for the level and type of public services needed. Service needs may include adjusting zoning regulations to allow for "mother-in-law" apartments for older family members, special transit facilities, possibly even larger traffic control signs and audible signals. At the same time, service providers will need to play a role in attracting a younger workforce to Yellowstone County and the City of Billings.

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4.3 Housing

Introduction

The need and availability of housing in Yellowstone County is relative to the space and income requirements of the residents. Household composition, or the characteristics of the residents, helps understand these requirements. Household information presented in this section, describes the number of people living in households, their income and the trends in household distributions. In order to determine if a housing deficit or surplus exists, an inventory of existing housing units is presented along with information on the number and type of units and whether they are rented or owner-occupied. Housing availability is also relative to the condition and vacancy of units. Information on the housing supply is described in terms of age and condition of dwellings. Comparative construction information for the past ten years is supplied to evaluate trends. The cost of housing is also a critical factor in determining the availability of housing. Both owner-occupied and rental housing costs are examined. Information on household composition, supply, and cost help define residential needs. Projecting future conditions can help determine whether the City of Billings and Yellowstone County will adequately address these needs. Conditions that will influence the number and type of dwelling units available for future residents are discussed at the end of this section.

Households

Census 2000 reported the total population for Yellowstone County as 129,352, an increase of approximately 16,000 from 1990. The number of households rose from 44,689 in 1990 to approximately 52,084 in 1999, and the average number of persons per household fell slightly to 2.43 in 2000 from 2.49 in 1990. This slight reduction in household size is a continuation of a downward trend that began in 1960 when household size peaked at an average of 3.3 persons.

Composition

In Yellowstone County, the difference between household compositions is greatest between the rural and urban areas. Billings tends to have fewer people per household on average (2.32) compared to the average number of persons per household outside of the urban area (2.43). Of the total County population, 97.7 percent live in households[1]. The percent of family households county-wide is 65.7 percent of 52,084 households; leaving 34.3 percent classified as non-family households. In contrast, family households comprise 61.7 percent of all households in Billings. The percent of non-family households in Billings is 38.3 percent. The percent of persons living in group quarters and institutions is roughly the same for both the County and City and is less than 3 percent of the population.

Income

While income has increased in the last 10 years, housing costs have risen even more. In Yellowstone County, the median household income for 2000 is estimated at approximately $35,360, which is a 36 percent increase over the 1990 median household income of $25,942. In Billings, the median household income rose 44 percent from $25,640 to $36,890 during this same period. In contrast, the median price for a home in Billings jumped 59 percent from $63,400 in 1990 to $107,750 in 2000.

Distribution

Yellowstone County maintains the status as the most populated county in Montana. Approximately 14 percent of the state's population of 902,195 lives in the County. More than 73 percent of the County population resides in the City of Billings; 5 percent live in Laurel; 5 percent live in the Shepherd-Huntley-Worden area; and 3 percent reside in Lockwood. The town of Broadview has a population of 150.

The Billings urban population grew at a rate of approximately 1.7 percent per year for the past ten

years. The fastest growing area was West Billings which grew at 4.7 percent per year since 1990.

Housing Supply

The number of housing units within the City of Billings increased from 33,181 in 1990 to 39,293 in 2000. According to the Bureau of Census, there were 22,798 single family units, 2,782 duplex units, 7,254 multi-family units and 2,707 manufactured homes in 1990. Four hundred twenty-three units were classified as "other". The number of single family units increased in 2000 to 26,032, duplex units decreased to 2,224 and multifamily units increased to 8,030. The number of manufactured homes increased slightly to 2,814 and there were 51 other housing units, such as recreational vehicles.

The Bureau of Census reported that the total number of housing units in the county rose from 44,689 in 1990 to 54,563 in 2000. Based on an average household composition of 2.5 people, there would be sufficient housing for approximately 136,000 people or 6,648 less than the current population. These figures understate the housing situation because the population is not evenly distributed among available housing and not all housing is in livable condition. Housing stock throughout the county, particularly in urban areas is old and some of it is vacant or in unlivable condition. About 5 percent of all housing stock is either vacant or in substandard condition[2].

Of the 54,563 dwelling units estimated in Yellowstone County, 64 percent of these are single-family detached structures. The next most common form of housing is manufactured housing. There are an estimated 6,675 manufactured homes in the County or 12.2 percent of the entire housing supply. Single family attached, duplexes, triplexes, four-plexes, and apartments comprise the remaining 12,933 housing units.

Age of Housing

The Montana Department of Commerce (MDOC) reported that 43 percent of all single family dwellings, mobile homes and condominiums located in Billings were constructed prior to 1960. By 1980, 77 percent of the existing units were constructed while 23 percent were constructed after 1980. In comparison, 249 single family dwellings, or less than 1 percent of the total, were constructed in 1999. The pie chart in Figure 1 illustrates the age of housing stock as a percentage of total constructed.

Housing Vacancy and Condition

Only 4.5 percent of the total 54,563 housing units in the County were reported vacant in 1999. In

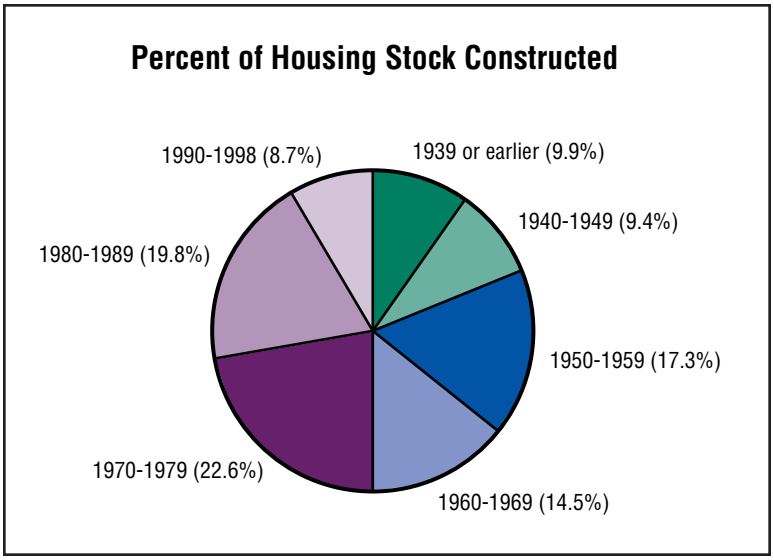

Figure 1. Percent of housing stock constructed during previous decades.

Billings, the neighborhoods with the highest vacancies are the Downtown area and the South Billings area. These are the oldest neighborhoods in Billings and both have lost population over the past decade. The newer neighborhoods in West and Northwest Billings and Billings Heights exhibit the lowest vacancy rates.

In the 1999 Montana Housing Condition Study, commissioned by MDOC, condominiums, single family dwellings and mobile homes located in Billings were ranked for quality and workmanship. The majority of condominiums and single family dwellings ranked average for these attributes while the majority of mobile homes were considered "low cost".

Substandard housing information from the 1990 Census reported 260 housing units in Billings without complete kitchen facilities and 118 with incomplete plumbing. Outside of Billings, 112 had incomplete kitchens and 104 had incomplete plumbing. The percentage of substandard houses reported in 1990 was about .1 percent of the total housing stock in the City and 1.7 percent in the County. These figures have decreased and are now closer to 1.2 percent in the City and 1.2 percent in the County.

Tenure

Home ownership has increased slightly in the last ten years. The percentage of units occupied by owners is 64 percent of total units in the City and 69 percent in the County. These percentages are approximately 5 percent higher in both the City and County than the total owner-occupied units reported in the 1990 Census for these jurisdictions. According to the 2000 Census, there are approximately 13,500 renter-occupied units in the City of Billings and 2,558 renter occupied units in the remainder of the county.

Housing Costs

Owner-Occupied Housing

Building costs have been steadily rising over the past ten years. The rate of increase was approximately 1.3 percent per year based on building permit valuation. In 1990, 140 building permits for single family residential structures were issued in the Billings building permit jurisdiction. The average cost of single family home construction reported on the permit was $108,992. In 2000, building permits swelled to 412 structures with an average construction cost of $125,686 reported. Sale prices have also risen slowly but steadily. In 2001, the average sales price of a 2,200 square foot, single-family dwelling with four bedrooms, two and one-half baths, a family room and a two-car garage in Billings was $129,125. This compares with an average sales price of $119,424 in 2000. Home prices vary considerably throughout Billings and Yellowstone County. Information provided by the Billings Multiple Listing Service indicates that property located just outside the Billings urban area is more expensive than property located in the city or smaller communities such as Laurel and Lockwood. Figure 2 shows the average sale price by area for the period between May 2000 and April 2001.

The average sale price of single family homes roughly correlates with the average loan amount for each area. Shown in Figure 3 are the average loan amounts for the areas in and around Billings in 1999.

Factors affecting development costs, excluding labor and materials, include land costs, on-site and off-site infrastructure costs and mortgage rates. Land costs vary throughout the county. Lot and acreage

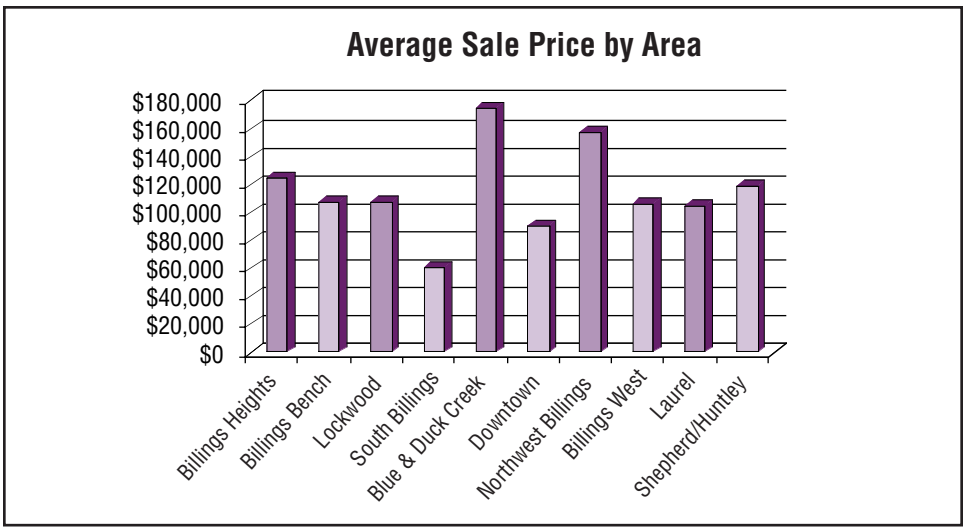

Figure 2. Average sale price by area, 2000
Source: Multiple Listing Service of the Billings Area Realtors.

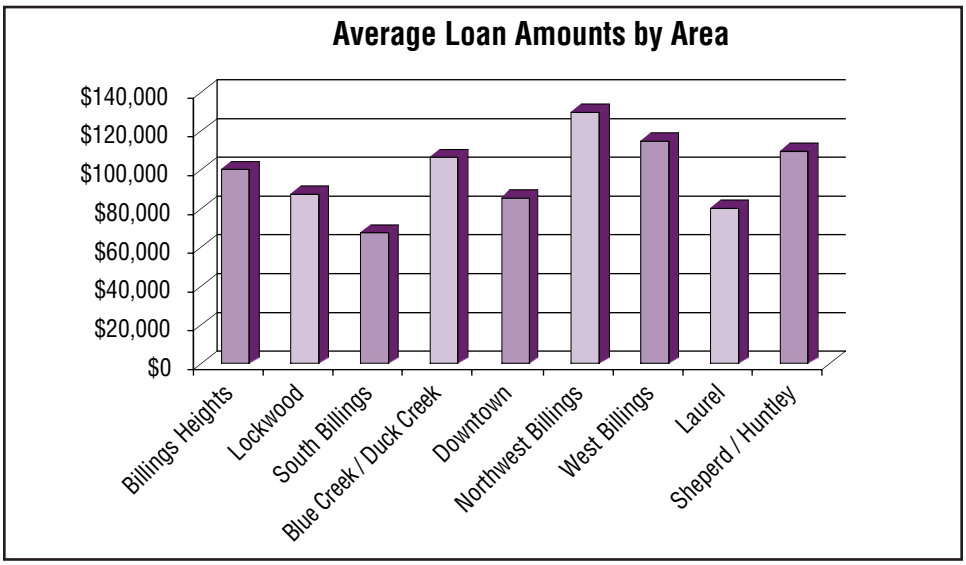

Figure 3. Average loan amounts by area, 1999.
Source: Federal Financial Institutions Examination Council, 1999 Home Mortgage Disclosure Act Data.

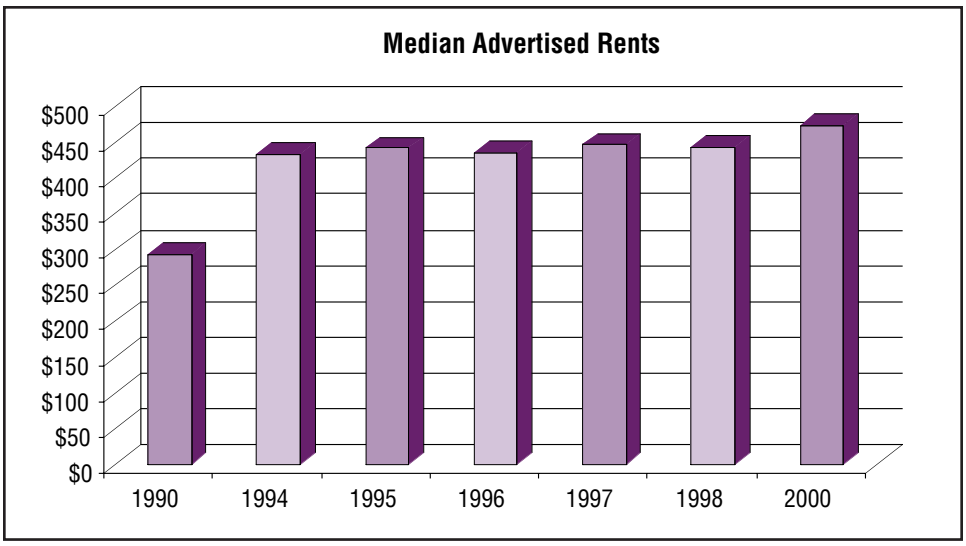

Figure 4. Median advertised rents for Billings area, 1990 - 2000.

sales in the August 26, 2001 edition of the Billings Gazette listed rural acreage between $1,500 to $4,000 per acre. Large lots located west of Billings were listed for up to $10,000 an acre. Platted lots served by municipal sewer and water cost between $50,000 and $100,000 per acre or $10,000 to $20,000 for a 9,000 square foot lot.

Subdividers are required to pay for the extension of water and sewer facilities for subdivisions located in or adjacent to the city limits. The cost of extending services is passed on to the purchaser and can add significantly to the cost of a lot. In addition to off-site improvements, on-site improvements such as curbs, gutters, sidewalks, streets and storm drainage facilities must be installed prior to recording the final plat. These costs are also passed on to the purchaser of the lot.

Rental Housing

Approximately 16,000 dwelling units in Yellowstone County are rentals. According to the Billings Housing Needs Analysis, rental costs have risen significantly and continue to rise. Figure 4 shows the median advertised rent for the Billings area. The 1990 and 2000 rents were obtained from the 1990 and 2000 Census. Years 1994 through 1998 were compiled by BBC Research and Consulting.

Housing Trends and Projections

Infill Potential

Sixty-nine percent of the population in Yellowstone County lived in Billings in 2000. This is slightly less than the 71.5 percent of the population that lived in the City in 1990. These figures suggest a slight growth in population outside the City limits. This trend is supported by the increase in subdivision activity in the County. The growth trend has been to develop on the edges of Billings or in the County and not within the City. This trend is not because of the lack of developable parcels in the City.

TABLE 1: Comparison of Billings' Household Income to Housing Supply

Household Income	Households	Affordable Owner-Occupied Units	Affordable Rental Units	Total Units	Difference
$0-$14,999	8,263	1,288	4,784	6,072	-2,191*
$15,000-$24.999	6,599	3,481	8,442	11,926	5,327
$25,000-$34,999	5,134	9,197	1,456	10,653	5,519
$35,000-$49,999	6,675	5,903	305	6,208	-467
$50,000-$74,999	7,065	3,007	63	3,070	-3,995
$75,000-$99,999	2,529	1,033		1,033	-1,496
$100,000-$149,999	1,324	278		278	-1,046
$150,000 and over	796	80		80	-716

* This figure, when adjusted for people who have paid off their homes and for households with rental payment assistance, is closer to 700.

Table 1. Comparison of Billings' household incomes and Billings' housing supply, 1998.

There are approximately 3,607 parcels classified by the Montana Department of Revenue as vacant residential land within the city limits. Of these, 3,529 parcels are two acres or less. The vacant parcels constitute 11 percent of all parcels in Billings.

Absorption Rate

For the years of 2000 and 2001, there were more single family home building permits issued than there were lots created in the Billings Metro (building permit jurisdiction). There were 403 building permits issued for single family home construction in 2000, and 476 permits were issued in 2001. An estimated 298 lots were created in the Metro Area in 2000 and 312 in 2001. This trend indicates that, in addition to new construction occurring on newly created lots, lots created in previous years are being developed. Many of the older lots have remained vacant for as many a decade or more until being developed only recently. This is particularly true for subdivisions in the Heights, including several filings of the Lake Hills Subdivision.

Housing Needs

According to the Billings Housing Needs Analysis, the need for low cost housing exceeds the supply. The study estimates a shortage of almost 2,200 low cost units that are affordable to households earning less than $15,000 per year. The estimates are based on the number of available units that would cost the homeowner no more than 30 percent of their income. There is also a shortage of housing for households earning more than $35,000 based on the same criteria. However, many people may choose to live in homes that are less expensive than they can afford and spend their money on other expenses.

The chart in Table 1, obtained from the Billings Housing Needs Study, shows a comparison of Billings' household incomes and the housing supply in 1999.

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1 "A household includes all of the people who occupy a housing unit. A housing unit is a house, an apartment, a mobile home, a group of rooms, or a single room occupied (or if vacant, intended for occupancy) as separate living quarters. Separate living quarters are those in which the occupants live separately from any other people in the building and that have direct access from the outside of the building or through a common hall." Bureau of Census.

2 Substandard means the dwelling unit lacks complete plumbing facilities.

4.4 Economic Conditions

Introduction

The economy has a central role in determining and maintaining the quality of life in our community. A strong economy provides economic opportunity to our citizens by creating jobs and business opportunities. Earnings from these activities are recycled in our community in the form of retail purchases, housing, business and personal investments, charitable giving, spending on recreation and in many other ways. In turn, earnings and the assets that they purchase help to create a tax base that pays for schools, public safety services, parks, roads and other community services, facilities and amenities. The Economic Conditions section of this Growth Policy contains an Introduction, a Community Profile, descriptions of the area's employment, income and cost of living, and finally, a discussion on the economic development organizations in the area and their economic development plans.

Economic development is the process of creating wealth by mobilizing human and capital resources to produce marketable goods or services. At different times in our history, economic development was principally the responsibility of the private sector or the federal government. Utilities, railroads, banks and sometimes, business organizations like chambers of commerce, had a stake in building the economy because their long-term profitability depended on expanding markets for their products or services. Later, the federal government became involved in economic development, usually concentrating resources in areas that were identified as being distressed. Starting in the 1970s, the federal government gradually withdrew its support for economic development and left the task to local and state efforts. These efforts over the past 25 years have been in the face of unprecedented changes in our economy:

- from a goods producing to a service producing economy
- from a local or national economy to a global one
- from businesses that concentrate on one product to multi-national conglomerates that produce many products and services
- from labor-intensive to capital or technology intensive

Measuring the health of an area's economy is a challenge. Yet, measuring it is essential because there is no other way to gauge the effectiveness over time of implementing plans such as this Growth Policy. Federal and state government agencies collect and distribute a huge volume of information and statistics that attempt to describe our economy. Most often the agencies focus on either business or personal characteristics.

While business information is important, it doesn't adequately describe how a local economy is performing, particularly in light of the transformations that are described above. When businesses are capital or technology intensive, they often purchase equipment elsewhere, employ fewer people in the host community and the traditionally reported job multipliers decrease. When businesses are part of large conglomerates whose ownership resides elsewhere, business/community involvement and charity decrease. Profit margins may be thinner and those profits don't necessarily remain in the community when marketing and other business decision are made in the face of global competition. Many service industry jobs pay less than the manufacturing or construction jobs that they replaced.

Personal wealth statistics better describe a local economy's performance and health. The resident wealth of an area determines its ability to support new or expanding businesses and to pay for government services and facilities. Personal wealth determines a community's ability to support and enjoy amenities such as museums and the arts or the natural environment. Personal wealth is described by using factors such as per capita income, the

number of jobs and types, area cost of living, and the hours and number of jobs worked. This Growth Policy will describe these factors, how they have changed over time and compare them to our state and nation. In that way we'll be able to judge the effectiveness of our past economic development efforts and form a baseline for periodic review of this plan and our future efforts to improve our economic condition.

Economic Profile

Yellowstone County is the most populous county in Montana with a 2000 population of 129,352. Billings is the County seat and is the State's largest city. It has one the nation's largest regional trade areas of over 125,000 square miles that serves almost 400,000 people. 1999 retail sales exceeded $1.5 billion.

Resource industries and agriculture dominate the local economy. There are three oil refineries in the county, with two of those in Billings and the third in nearby Laurel. A Western Sugar refinery is located in Billings. About 350 Montana farmers supply sugar beets to the refinery, which has a direct impact of $50 million per year on the county's economy.

Billings is the medical and educational center for the region. The two hospitals employ over 3,200 people and have almost 600 beds. Several clinics also operate in Billings. Montana State University – Billings has 4,000 students while its College of Technology has approximately 500. Rocky Mountain College, a private, four-year university, has 800 students and is the oldest college in Montana.

Employment

The number of people that are working in the community is an indicator of whether or not the local economy is growing. Particularly when historic employment figures are compared to population changes, it indicates if more of the local population is working and if workers are living elsewhere but working in the community. When categorized by industry type, it shows what industries have grown or declined over the study period. Predicted employment growth adds a different perspective and may help to predict personal wealth in the future. Finally, when job multiplier ratios are shown, it tells us which industry sectors are most valuable to the community in terms of secondary or spin-off employment. Assessing these factors and projecting their expected future trends should help guide policy makers and economic development experts to set goals for recruiting and retaining employers, help set infrastructure priorities and identify social, housing, education and training needs.

Table 1 shows the rate at which the civilian labor force has grown and how Yellowstone County's unemployment rate compares to the state and nation. It shows that the labor force has grown since 1980 and that the unemployment rate is lower than for either the State or nation. The employment growth rate equals 33 percent over the twenty-year period. The population grew by 20 percent over the same period. The rate of growth for the working age population nearly equals the general population growth rate. Therefore, we can conclude that the number of persons employed in Yellowstone County has increased at a greater rate than has the resident population. There are at least two explanations for this phenomenon. There may be a higher proportion of the eligible resident work force working in 2000 than in 1980, or there are more non-resident workers commuting to and being employed in Yellowstone County in 2000 versus 1980. The civilian labor force grew by about 11,000 workers from 1990 to 1999. Of those new workers, about 8,000 or 72 percent of them were women.

Several industry sectors grew rapidly during the 1990s. Table 2 shows the industry sectors that increased full and part-time employment by at least 10 percent from 1993 to 1998. During that time only the mining industry reduced total employment. The combined government employment grew by only 2.6 percent. Local government, at 13.9 percent, was the only level that grew while state, federal and military employment declined. Proprietors increased at a healthy rate over the 5-year period.

TABLE 1: YELLOWSTONE COUNTY ANNUAL AVERAGE CIVILIAN LABOR FORCE AND UNEMPLOYMENT RATES - 1980, 1990 AND 2000

	Yellowstone County Civilian Labor Force			Unemployment rate (%)		
Year	Total	Employed	Unemployed	Yellowstone County	Montana	U.S.A.
1980	55,549	52,870	2,679	4.8	6.1	7.1
1990	61,648	58,563	3,085	5.0	6.0	5.8
2000	72,921	70,158	2,763	3.8	5.2	4.2

Source: Montana Dept. of Labor and Industry, Research and Analysis Bureau, 1980-2002.

Note: "Civilian Labor Force" includes all persons 16 or older who are employed, are employed but are temporarily not at work plus persons that are seeking employment.

This category increased by 16.8 percent, perhaps reflecting the national trend of corporate downsizing and the creation of small, start-up businesses. The largest increase, 38.6 percent, was in the construction sector. The construction industry is recognized as having a significant impact on the area economy, which goes beyond the first year while construction is taking place. A recent study by MSU-Billings indicated that there is a ripple effect for every single family home built. This effect manifests itself in terms of sales, service and local government tax revenue. The study estimates that for every single family home constructed, the ongoing impacts include 1.2 additional jobs and $25,315 of local income.

The Montana Department of Labor and Industry produces job growth projections that are based on labor force data through 1998. The projections show that many of the jobs that are predicted to grow by the greatest numbers are in the service and retail trade sectors. This includes the top five (5) jobs and 9 out of the top 15 jobs that are predicted to grow by the greatest number between 1998 and 2008. Unfortunately, jobs in retail and some services are among the lowest wage jobs in a community. Fortunately for the state, the Montana job growth projections exceed those for the nation as a whole in the jobs that are predicted to increase the most.

Statewide, the estimated annual need for employees, both due to business growth and replacement workers, is 21,000 employees per year. Yellowstone County's "share" of those needed employees/available jobs can be projected. Since Yellowstone County had about 15.4 percent of the state's total employment in the year 2000, one could predict that Yellowstone County's share of new jobs will be the same percentage of statewide new jobs per year, or about 3,200 new jobs per year through 2008. Whether there will be enough workers to fill those jobs can be predicted by calculating the present day labor force as a percentage of population and assume that the proportion will remain the same in the future. Using the 2000 Census information and employment estimates from the Montana Department of Labor and Industry, 56 percent of the Yellowstone County population was in the county labor force during 2000.

If that percentage is applied to the population growth estimate for Yellowstone County of 145,880 people in 2010, the total labor force would be 81,692. That is an increase of 9,255 or 11 percent over 2000. Dividing that total by the ten years between estimate dates equals about 950 new workers per year that will enter the labor force. This comparison indicates that Yellowstone County is likely to have enough new employees to satisfy the predicted available jobs.

It is conventional wisdom that when a job is created in a community, the community gains benefits that exceed the primary job. Each job requires capital

TABLE 2: YELLOWSTONE COUNTY FULL-TIME AND PART-TIME EMPLOYMENT BY INDUSTRY, 1993-1999

	1993	1998	% change
Employment by Industry			
Private sector	75257	85322	13.4
Construction	4029	5584	38.6
Transportation and public utilities	4678	5303	13.4
Retail trade	15391	18287	18.8
Finance, insurance and real estate	5877	6544	11.3
Services	24664	28419	15.2
Government	9065	9298	2.6
Total full time and part time employment	**76538**	**86743**	**13.3**

TABLE 3: NUMBER OF JOBS CREATED BY THE CREATION OF ONE NEW JOB IN SELECTED INDUSTRIES

INDUSTRY	# JOBS CREATED
New Construction	3.27
Textiles	1.88
Primary Metals	2.24
Motor Vehicles and Equipment	2.35
Wholesale Trade	1.93
Retail Trade	1.46
Finance	2.19
Hotels and Amusements	1.89
Health Services	1.67
Eating and Drinking Places	1.41
Business Services	1.57

Source: U.S. Chamber of Commerce, What 100 New Jobs Mean to a Community, 1995.

investment by the employer and each job-holder spends some of his/her income within the community, thereby creating additional capital investment and additional jobs for other people. This effect of a primary job creating other jobs in the community is known as a job multiplier. Because jobs in different industries or business types require differing amounts of capital investment and have differing rates of pay, the job multiplier varies by industry. Some jobs may be more valuable than others to the community in respect to creating spin-off or secondary jobs for the community residents. The following table shows the spin-off effects of creating a new job in the community.

Montana Department of Labor's projections through 2008 indicate that the greatest job growth is likely to be in the industries that have the lowest job multipliers. For example, the job that is predicted to grow the most, retail salesperson, has a multiplier of 1.46, meaning that 1.46 secondary jobs will be created in the area by adding one retail salesperson job. In contrast, the job that is ranked 6th in job growth (carpenter) has a job multiplier of 3.27. This projection contrasts with the current employment statistics which indicate the construction industry has the highest employment.

Income

Per Capita Income

In Yellowstone County, the per capita income is no longer highest among Billings' residents as it was in 1989. In 1989, the annual per capita income for Billings' residents was $12,834 while the per capita income for the entire County was $12,416. This relationship changed in the 1990s and the per capita income for the entire County population exceeded that of Billings. The 2000 Census reports annual per capita income for Billings' residents now stands at $19,207 and for the entire County population is $19,303. This situation could change with the recent annexations of Blue Creek area and Yellowstone Country Club Subdivision. The per capita income levels in these two areas ($18,132 for Blue Creek and $47,342 for the Country Club) exceed per capita income for both the City and County and will increase the average for the City.

The average per capita income of Yellowstone County exceeds that of Montana's average, which in 2000 was $17,151. However, nationally the per capita income averages $21,690. Yellowstone County per capita income is approximately 89 percent of the national average.

There are several ways to report income: per capita, per household, per family, total personal income, etc. Per capita income is perhaps the most uniform parameter and therefore good for comparative analysis.

Montana and Yellowstone County have experienced a steady, but slow increase in their real dollar per capita income. By "real dollar", we mean dollar income that is adjusted for the effects of inflation over the reporting period. In Table 4, per capita income from 1970 to 1998 is converted to 1996 constant dollars. By making this adjustment it is possible to compare today's income to income that was reported in previous years, and account for the effects of inflation on the value of money. The analysis shows that Yellowstone County per capita income went from a high of 103.9 percent of the national average in 1980, to 89.8 percent of the national average in 1998. It also shows that Yellowstone County's per capita income is about 115 percent of the statewide average and that figure has remained fairly constant over the last 20 years.

Per capita income is calculated by dividing total personal income by the number of people in the subject population. Personal income includes earnings, investment income, including rents, and transfer payments to individuals (social security, veteran's disability, etc.). Table 4 shows that Yellowstone County's per capita income was below the national average in 1970, rose to above the national average over the following ten years and has been declining as a percent of the national average since 1980. Investment income tends to accumulate and grow for the wealthier and retired members of a commu-

nity. Many transfer payments, such as social security, are indexed to inflation and grow automatically over time. When calculating per capita income, children and others who don't earn or otherwise receive income are included in the calculation. Because of these factors and since most of Yellowstone County's personal income comes from earnings, earnings per job may be a better way to assess our economy's condition and how it has changed over the past decades.

Looking at employment earnings shows an even more dramatic decline in relative income or wealth than does per capita income. Table 5 shows that Yellowstone County's average earning per job has remained nearly unchanged for 30 years, when the earnings are adjusted for inflation. At the same time, the average Yellowstone County job earning has fallen dramatically when compared to the national average. Most of the remainder of Montana must be doing even worse, since Table 5 shows that

TABLE 4: YELLOWSTONE COUNTY PER CAPITA INCOME 1970-1998

Year	Per capita income in 1996 dollars	% of National average	% of Statewide average
1970	$ 13,720	95.1	107.4
1975	$ 16,219	101.3	107.6
1980	$ 19,018	103.9	115.7
1985	$ 19,563	95.0	117.4
1990	$ 20,388	89.6	113.0
1995	$ 21,928	91.2	114.5
1998	$ 23,799	89.8	115.1

Source: Gary W. Smith, Washington State University Cooperative Extension, Northwest Income Indicators Project and U.S. Dept. of Commerce, Bureau of Economic Analysis.

TABLE 5: AVERAGE EARNINGS PER JOB

Year	1996 Dollars	% of U.S. Average	% of Statewide Average
1970	$24,040	93.5	104.8
1975	$24,996	93.3	101.2
1980	$25,653	94.2	111.6
1985	$25,049	88.1	116.9
1990	$22,791	77.9	107.8
1995	$23,835	79.1	112.0
1999	$24,408	74.4	111.9

Source: Gary W. Smith, Washington State University Cooperative Extension, Northwest Income Indicators Project and U.S. Dept. of Commerce, Bureau of Economic Analysis.

Yellowstone County's average earnings per job increased when compared to statewide averages.

Median Household Income

Median household income, or the amount for which exactly half of the households are above and half are below, signifies the total purchasing power of a household. This figure is highest county-wide where the annual median household income is $36,727. This compares with the Billings' median household income of $35,147.

In 2000, Yellowstone County median household income was still well below the national median, which stood at $41,433. In comparison, however, it exceeds the state median which was reported at $33,024.

Poverty Status

The Bureau of Census calculates the poverty status using a set of income thresholds that vary by family size and composition. If an individual's total income is less than the threshold, than that individual is considered poor. For the U.S., the income threshold for individuals in 2000 was $8,794.00 per year. Yellowstone County was at 11.1 percent and the City of Billings rate was 12 percent. Those are the percentages of the target population that make less than the income threshold. These figures compare with the state poverty rate of 14.6 percent and the national rate of 16 percent. The City and County's poverty status has changed little from 1990 when both were at 12 percent.

Cost of Living

The number and type of jobs and per capita income don't give a complete picture of a local economy's strength or of personal wealth. The cost of basic, everyday needs like shelter, food and clothing play a significant role in determining how much discretionary income is available to a person. Discretionary income is necessary to support many of the businesses that provide personal service and products. These businesses are a significant part of most U.S. local economies. If those businesses aren't prosperous, there won't be spin-off or secondary employment and income. These effects limit the health and vitality of a local economy.

Cost of living analyses are conducted to show either periodic inflationary effects or as comparisons among different locations. ACCRA prepares annual cost of living indexes for a number of major U.S. cities, including Billings and some of our regional neighbors. ACCRA's cost of living index measures relative price levels for consumer goods and services for its participating members. The average cost for all entities equals 100, so each participant's index is read as a percentage of the average for all places. The index is a snapshot in time of what it costs to purchase normal consumer goods and services in each place, but it does not measure inflation. ACCRA surveys include the cost of groceries, housing, utilities, transportation, health care and some miscellaneous goods and services. Since there are so many variable in tax structures and rates, the ACCRA index does not include taxes.

Table 5 shows the ACCRA indexes for Billings, several Montana cities and some regional neighbors. It shows that while Billings isn't an expensive place to live in comparison to all others, it can't be considered to be a city where the cost of living is low. Billings' index of 98.8 indicates that, if the cost of all surveyed consumer goods and services are indexed to equal 100, those same goods and services would cost 98.8 percent of the average if purchased in Billings. It shows that the least expensive place to live among the reported cities is Great Falls (mostly due to low housing and health care costs), and the most expensive is Spokane.

Again, cost of living tells only a portion of the story about an area's economy. It may be useful to compare cost of living with income and employment earnings. Table 6 makes that comparison. The state's two largest cities, Billings and Great Falls, have lower cost of living and higher per capita income and earnings per job than the smaller cities in Montana. Conversely, Billings has a cost of living index nearly equal to the regional comparisons while per capita

Sources:

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Bureau of Economic Analysis, U.S. Dept. of Commerce, Local Area Personal Income, August 2001

Gary W. Smith, Washington State University Cooperative Extension, Northwest Income Indicators Project, Graphic Trend Analysis of Local Area Economic Indicators, 1969-1999.

TABLE 6: COST OF LIVING INDEX, PER CAPITA INCOME AND AVERAGE EARNINGS PER JOB FOR SELECTED CITIES

	Cost of Living Index	1999 Per Capita Income	1999 Avg. earnings per job (adjusted to 1996 $)
Billings	98.8	$25,253	$24,208
Bozeman	102.6	$24,017	$20,883
Great Falls	95.2	$24,463	$24,464
Kalispell	102.5	$22,265	$21,356
Missoula	102.0	$24,476	$23,674
Cheyenne	96.6	$27,361	no report
Bismarck	96.6	$24,460	no report
Boise	99.9	$27,408	$31,983
Spokane	102.7	$24,368	$27,855

income and earnings per job are generally lower than for those cities. Again, several of the Montana cities have less favorable comparisons, but reports from Bozeman and Missoula may be skewed by the large university student population and resulting lower per capita income and more part-time jobs.

The Billings and Yellowstone County economy can be summarized as follows:

- Employment grew by 1/3 between 1980 and 2000 and about 2/3 of those new workers were women.
- Employment growth in the mid to late 1990s was dominated by construction, retail sales and service jobs.
- Predicted Montana job growth through 2008 indicates that the most jobs will be produced in retail sales and services and the state growth rates for these jobs is predicted to be higher than for the U.S.
- The jobs that are predicted to grow most for the next few years have among the lowest job multipliers, thereby producing relatively low spin-off or secondary job opportunities.
- Supply of workers in Yellowstone County is predicted to equal or exceed the demand over the next several years.
- Per capita income has grown slowly over the past 30 years, but it has fallen when compared to the U.S., and has risen when compared to the state of Montana.
- When adjusted for inflation, average earnings per job have remained almost stagnant for the past 30 years and have fallen when compared to the U.S. average.
- The cost of living in Billings is slightly below the national average and is about the median among surveyed cities in Montana and the region.
- When the cost of living is compared to per capita income and earnings per job, Billings has a lower cost of living and higher income/earnings than most of the surveyed Montana cities. When compared to other surveyed cities in the region, Billings has about an equal cost of living and lower per capita income and job earnings.
- Yellowstone County and Billings aren't keeping pace with surrounding states and the nation in producing personal wealth, but appear to be doing better than the remainder of Montana.

Economic Development Organizations and Plans

There are a number of economic development organizations in Yellowstone County. Among them are:

- Big Sky Economic Development Authority
- Billings Area Chamber of Commerce
- Downtown Billings Association and Downtown Billings Partnership
- Beartooth Resource Conservation and Development District

There are also a number of shopping area or shopping center merchant's associations and organizations that work on economic development on the Crow Indian Reservation and in the City of Laurel. Since they have a narrow geographic focus and are primarily promotional or are outside of this plan's jurisdiction, they won't be described here.

Each of the organizations listed above has its own sphere of operation and work plan. The first three operate exclusively in Billings and Yellowstone County while the Beartooth RC&D operates in a five (5) county area that includes Yellowstone County.

Big Sky Economic Development Authority

The Big Sky EDA (BSEDA) was originally established as the Montana Tradeport Authority in 1989. It adopted its present name in 1999. BSEDA is an entity of Yellowstone County and receives a portion of its funding through a county-wide tax levy. A citizen Board of Directors, that represents businesses and public agencies, directs it. It contains a Small Business Development Center, a Government Contracting and Procurement division, a Community Development division and a Manufacturing Engineering Assistance program. The Board recently adopted a business plan that contains the following goals. Descriptions of the more significant work items are also shown.

GOAL: Attract to the County significant strong and growing high-tech value-added businesses.

WORK ITEM: The BSEDA will develop an effective Targeted Industry recruitment campaign that will result in successfully recruiting at least 3 high-tech firms and creating at least 100 jobs.

GOAL: Provide one-stop business development assistance to start-up, expanding, and incoming businesses through outreach to the existing business base in Yellowstone County

WORK ITEM: Continue and improve the BSEDA's business assistance programs and make them more visible and accessible in the community.

GOAL: Provide community development project and fund development assistance internally as well as to local governments, non-profit agencies, and for-profit businesses.

GOAL: Foster collaborative partnerships and coordination among various individual economic development efforts and create a community-wide economic development strategy for the Yellowstone County market region.

WORK ITEM: Partner with businesses and agencies such as the Chamber of Commerce, Montana Department of Commerce and the Beartooth RC&D to create the economic development strategy, business recruiting program, distribute economic data and help develop education/training programs that meet business needs for a high quality workforce.

GOAL: Ensure the continued development of BSEDA as the preeminent organization coordinating regional economic development efforts throughout Yellowstone County.

Billings Area Chamber of Commerce

The Billings Area Chamber of Commerce is a membership organization whose purpose is to serve its members by promoting a positive business and agricultural climate and actively pursuing cooperative economic development. There are approximately 1,100 members of the Chamber. The

organization's plan has five main work elements. Three of them are directly related to business development, retention and recruitment, while two of them are more internal. Each of the goals listed below has a number of work items that are designed to accomplish that goal.

The Business Development Council:

GOAL: Assist existing businesses to grow and prosper.

GOAL: Recognize firms that have displayed wise business practices and that have been a positive factor in our area's economy.

GOAL: Assist in the site selection process of companies considering a relocation or expansion into the Billing/Yellowstone County area.

The Convention and Visitors Council:

GOAL: Attract individual and family travelers, both domestic and international, to Billings with primary emphasis on the summer season and provide those services that enhance their visit.

GOAL: To actively recruit and increase convention, meeting and event bookings in the Billings area and to provide those services which enhance this effort. Emphasis will be placed on "shoulder season" bookings.

GOAL: To actively recruit and increase motorcoach and group tour business and to provide those services which enhance this effort.

GOAL: To provide assistance to scouts for films, movies and commercials.

The Public Affairs Council:

GOAL: Monitor local, state and federal entities to be informed on issues affecting business and act as an advocate on behalf of the membership.

GOAL: Educate and/or motivate members and the public regarding key business issues.

GOAL: Aggressively identify, recruit and develop candidates supportive of business and promote issues favorable to business.

Downtown Billings Association (DBA), Downtown Property Owners Committee and Downtown Billings Partnership (DBP)

These three organizations are the primary entities that promote Billings' downtown businesses and coordinate downtown redevelopment. The DBA has been in existence for over 50 years. It is a membership organization whose primary function is to promote downtown businesses and activities. The DBP is a non-profit corporation that was formed in 1998 to head the latest round of downtown revitalization. It is the clearinghouse for redevelopment grants and loans, beautification projects and efforts to increase downtown housing. The DBP coordinates the City of Billings' tax increment district spending whose funding is set to expire in 2008. The Downtown Billings Framework Plan was adopted by the Billings City Council and the Yellowstone County Board of County Commissioners in December, 1997. The Plan identifies five priorities:

1. Create the Downtown Billings Partnership to implement the Plan and its other priorities.
2. Pedestrianize the downtown core by changing parking and improving street systems and shuttle opportunities.
3. Develop a Kit of Parts that helps beautify the downtown and make it more livable.
4. Develop a system of downtown gathering spaces, such as parks, plazas and an open space network.
5. Bring housing back to the downtown so that there are people and activity during more than the 8-5 work day.

The Downtown Property Owners Committee is a committee of the DBA formed to oversee activities of the Downtown Business Improvement District (BID). The Property Owners Committee makes rec-

ommendations for assessment and use of funds for enhancing downtown public services and programs.

Beartooth Resource Conservation and Development District

The Beartooth RC&D started as a conservation district in 1971, was incorporated in 1990 and became an economic development district in 1995. A 22-member Board of Directors, that represents local government and conservation districts, governs it. The District covers a five county region consisting of Yellowstone, Big Horn, Stillwater, Carbon and Sweetgrass counties. Pursuing its economic development functions, the District has assisted primarily the smaller towns and counties in their region with obtaining grants and loans that support business development and employment, technical assistance and training. The District's economic development goals are listed below and each goal has a number of specific activities that are designed to implement the plan.

- Assist in the development of infrastructure to enhance the quality of life of people in the area and support future development.
- Strengthen and solidify the regional economy by supporting local industries to improve the quality of life and provide employment opportunities.
- Develop a regional forum for communication between communities and regional groups.
- Improve the standard of living by upgrading community services and their facilities.
- Assist local conservation groups in maintaining the Natural Resource Base.

The number and variety of groups involved in economic development for Yellowstone County raises the issue whether these groups could be more effective by working together in collaborative partnerships. This concern was addressed in the implementation chapter of this Growth Policy. Several of the groups share the same goals and have established similar work priorities. Through a collaborative partnership, each group could report on its achievements and assist the efforts of other groups. One of the key objectives among all groups is to assist existing businesses expand. The collective resources the economic development groups could bring to bear on this goal alone would exceed the individual efforts of each.

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4.5 Public Facilities and Services

Introduction

Public facilities are the physical assets that are used to supply services to the local population. They consist of buildings, wires, equipment, pipes or treatment facilities. Many of the services that are supplied through our public facilities are considered to be essential for modern life, particularly in urban areas. Identifying the present facilities and their service capabilities will impact growth and development in the community. For example, if utility services aren't available to support a parcel of land's development, the community must decide if it is willing to help pay for facility extensions, if the development will be totally responsible for extending services, or if the development won't occur because it can't be served. Each of these scenarios can dramatically affect the way the community may grow.

This section examines publicly owned facilities and privately owned facilities used to serve the general population. The publicly owned facilities are described first, with the investor owned utility companies, second.

Public Buildings

There are four governments that own or lease real estate in Billings: federal, state, city and county. Combined, they own or operate nearly 2,000,000 square feet of property. Seven significant public buildings or building complexes were constructed in the 1990s. Two of them were Federal office buildings, two were State buildings, plus one was substantially remodeled, one was a City building and two were County facilities.

United States

In Billings three buildings are identified as "federal" buildings. The oldest of those, and the only one owned by the U.S. Government, is the James Batten U. S. Courthouse, located at 316 N. 26th Street. It is a five story building with approximately 200,000 square feet of space and it presently houses about 325 employees.

The Wm. J. Jameson Building was constructed in 1994 at 2900 4th Avenue North, in Billings' downtown. The building houses a number of federal agencies including the Social Security Administration, Internal Revenue Service and Bureau of Indian Affairs. It is commonly referred to as the "new Federal Building," but in fact it is privately owned and leased to the U.S. government. It is a five story building with 124,000 square feet and presently houses over 500 federal employees.

In 1999 the Bureau of Land Management moved out of a leased downtown office building into a new building at 5001 Southgate Drive. The BLM building has 68,000 square feet of office space plus almost equal on-site storage space and houses about 250 employees. It is also a privately owned building that is leased to the BLM. Due to federal agency downsizing and consolidations, it is unlikely that any additional federal office buildings will be built in Billings in the foreseeable future. However, the terrorist attacks on New York City and Washington D.C. on September 11, 2001 may cause federal security forces to increase and cause other security demands that will require different office arrangements than are presently known.

State of Montana

The State of Montana purchased the former Rivendell Psychiatric Hospital at 701 S. 27th Street in 1993 and converted it into the Women's Correctional Center (State Prison). The facility was expanded in 2001 to house additional inmates and add facilities such as a chapel. In the 1990s the State agreed to long term leases of two other buildings on S. 27th. The Department of Justice occupies one of the buildings at 615 S. 27th Street and the Department of Corrections' Probation and Parole Division occupies a building at 2615 4th Avenue

South. While the State frequently consolidates or moves its offices, additional construction to house state employees within the next 5-10 years is unlikely.

Yellowstone County

Yellowstone County owns several significant buildings in Billings: the Courthouse, Youth Services Center, Detention Facility, Deering Clinic, Metrapark and Road Shop. The courthouse was built in 1954 and houses most of the County departments. It is located at 217 N. 27th Street. The County recently completed an almost 10 year remodeling project that improved space and equipment throughout the building, except for the 8th floor which contains the former county jail. The Metrapark facility is located at 308 6th Avenue North. After voters approved a $10 million general obligation bond issue in 1993, Metrapark constructed several new buildings and reorganized the exposition and fairgrounds. The Deering Clinic provides public health services to low income residents and some care to the general population. It is located at 127 S. 27th Street. The building is owned by the Big Sky Economic Development Authority, but is leased to the health service providers, many of which are County agencies or operations. The Youth Services Center, located at 410 S. 26th Street, houses youth offenders in a residential setting.

City of Billings

The City of Billings recently completed a condition and value study of most of its buildings. Not studied were the airport, utilities, swimming pools, MET bus barn and the stadium. This first phase study is designed to identify building conditions and forms the foundation for a Citywide Master Plan for all City facilities. Olsen Architecture found that "The vast majority of the facilities could be categorized as fair to good with regard to general condition and improvements required." The City owns about 1,000,000 square feet of space in these buildings and they are valued for insurance purposes at approximately $50 million.

The Billings Logan International Airport is located on the plateau above downtown Billings. It is a 2,300 acre facility that has 3 runways, 2 instrument landing systems, two fixed base operators and several executive hangars. The airport is owned by the City, which operates the airfield and nearly 300,000 square feet of building space. Six passenger airlines and over 10 cargo airlines operate from the airport. There are 33 airline flights per day, landing over 50 million pounds of cargo and enplaning over 350,000 people per year. About 150 aircraft, mostly for general aviation, are based at the airport. It is the state's largest airport, employing 48 full time people and hosting 650-700 total employees on the airport. The terminal building was initially constructed in 1958, remodeled and expanded in 1972 and again in1992 with a $19 million upgrade. The 1992 project also constructed a new Operations Center that houses the airfield maintenance and emergency services functions.

The City operates a public transit system called the MET. It operates from a facility located at 1705 Monad Road. The two MET buildings provide 5,000 sq. ft. of administrative area, 8,000 square feet of maintenance space and 27,300 square feet of bus and material storage space. The MET has an operating and recurring capital budget of $3.7 million in FY 2002. Almost half of the system's revenues come from local taxes, 28 percent from the Federal Transit Administration, and only 15 percent from rider fares. The system operates with 23 buses and also operates the 15-vehicle para-transit service for disabled riders.

The City of Billings completed a new parking structure and City Hall expansion in 1991. The Park 3 Garage has capacity for about 273 vehicles and the City Hall expansion houses the Finance and Administration Departments. Both are located at 210 North 27th Street next to the old City Hall. The City Parking Division operates four parking garages, Park 1 through 4, and several surface parking lots in addition to enforcing parking regulations and administering parking meter revenue. Park 1, located at 2912 Third Avenue North, was built in 1977 and contains 461 spaces. Park 2 followed in 1978 with 556 spaces and is located at 2651 1st Avenue North. In 1985, Park 4 garage was constructed at 515 North 31st Street and has

capacity for 772 vehicles. The five surface lots are located downtown and each has capacity for approximately 150 vehicles.

The City began its formal capital improvements planning in 2000. The City identifies and prioritized capital improvements projects and major equipment replacement needs through its Capital Improvement Plan process. This process is described in detail in Chapter 5.2.

Utilities

Water supply has been critical in determining how and where development has occurred in the arid West. It is not surprising therefore that the major development in Yellowstone County has been along the primary water source, the Yellowstone River. Development in other parts of the county has been constrained in part by the availability of water. The only other major source of water in the county is from groundwater. Along the Yellowstone Valley, groundwater is relatively plentiful and close to the surface. Outside of the valley, the ground water sources are much deeper, if ground water is available at all. The groundwater that is available may be unusable due to mineralization.

Within the State of Montana, allocation methods differ for surface water and ground water, but one principle holds true for both: "First in time, first in right." There are two basic types of surface water rights: 1) rights in existence prior to the Water Use Act of 1973, and 2) the water reservation system developed by the Act. The Act was designed to reserve water for future consumptive uses and to maintain a minimum flow level and quality of water. A claim to water under either system does not guarantee future supply in the amount of the claim because surface water rights are presently being adjudicated in Montana. Adjudication began in the 1970s and continues today. Additionally, on the Yellowstone River system, the reserved rights of Native American tribes, the federal government and the State of Wyoming have yet to be quantified. The confusion has left users unsure of the ultimate worth of their claims no matter when originally filed. One thing is relatively clear, the users with the most recent (junior) claims are far less likely to have water in a drought year than those with senior claims.

Ground water has not yet been quantified in the State of Montana nor are rights being adjudicated as they are for surface water. No permits are required for wells pumping less than 99 gallons per minute (gpm) but a Notice of Completion must be filed with the State. For wells pumping over 99 gpm, the user must demonstrate a ready supply and noninterference with existing wells before a permit will be issued.

Public Water Supplies

Across the State of Montana, only about four percent of the public water systems use surface water. However, these systems provide water to about seventy percent of all persons receiving water from public systems. Almost all of the public water systems described below derive their water from the Yellowstone River. The following text is not a complete survey of all public water sources in Yellowstone County. However, the majority of public water users within the County are served by the sources described below.

Municipalities

Billings

In 1915, the City of Billings purchased its waterworks from the Montana Water Company at a cost of $315,000. The original waterworks were built in 1886-1887. The source of supply is the Yellowstone River. Water is taken into the system with two intakes located at the water treatment plant, 2251 Belknap Avenue. The City has three water rights, dating as far back as 1885. The City has received water reservations through the State adjudication process that are sufficient to serve a population of at least 250,000 people. It is estimated that the City currently serves 92,000 people. The annexation of Briarwood and Cedar Park subdivisions in 2002 increased that amount by approximately 250 households or about 500 to 600 people.

TABLE 1: CITY OF BILLINGS TEN LARGEST WATER CUSTOMERS DURING 2000

Customer	Consumption - CCF
Billings Heights Water District*	950,691
Conoco Refinery	691,390
Casa Village Mobile Home Court*	191,829
St. Vincent Hospital	78,112
Montana State University - Billings	68,849
Radisson Northern Hotel	63,364
Golden Meadows Mobile Home Court*	59,727
Deaconess Hospital	59,403
PPL Montana	57,420
Billings Logan International Airport	51,306

(CCF = 100 cubic feet = 748 gallons)

The nominal capacity of the treatment plant is about 50 million gallons per day (MGD) although the filter capacity is rated at 83 MGD. Average daily production is slightly over 20 MGD. Treatment consists of coagulation, settling, filtration, disinfection, taste and odor control and corrosion protection.

There is a 600 feet elevation difference between the river valley floor, where the water plant is located, and the highest service area located in the Billings Heights. That necessitates five different service areas or pressure zones to provide suitable service to customers. The system has nine reservoirs capable of storing 23 million gallons, nine pumping stations and about 370 miles of distribution mains.

The Public Utilities Department (PUD) of the City of Billings supplies water primarily within City boundaries. The City currently has a policy that prohibits the provision of water services to any customer outside of the City's official water service area. The service area is defined by City code as the area within the City boundaries, any areas presently serviced outside the City, and any subsequently approved amendments to the service area. The code specifically states that any areas to be included in the service area must be annexed or an attempt at annexation made before any service area enlargement applications will be considered. The City presently serves about 700 customers outside the City limits and about 25,300 inside the City.

The City's water operation is classified as an enterprise fund. Enterprise Funds operate much like businesses in that they produce income from selling their products or services and are accounted for separately from other City funds. The City's water sales were almost $12 million in 2000, making it a sizeable business in the Billings community. In the same year, water operating expenses were about $5.5 million, recurring capital (mainly water line replacements) were $3 million, major capital improvements of about $700,000 and debt payments were about $1.75 million. The City's major water customers are shown in the table below. The PUD predicts that their capital expenditures will increase by $1 - $2 million per year over the next few years as it expands the water service area to the West Billings area and installs the trunk lines that are necessary for that expansion. It also plans an $18 million bond issue in 2002-2003 to finance the construction of new water filters and a new reservoir and pumping station on the rims above the Yellowstone Country Club. Other planned major capital improvements include a new water reservoir

in the Heights, purchasing land for a west end water treatment plant site and additional improvements on top of the rims to serve existing and predicted new development west of the airport. The PUD employs 103 people that manage and operate the water and wastewater systems.

Laurel

The City of Laurel provides domestic water service to the residents of Laurel and a few customers outside the City, including the Cenex refinery. Delivery to the refinery includes treated domestic water supply and untreated water for the cooling system. The original treatment plant was constructed in 1956 with a major retrofit completed in 1998. The plant treats a peak demand of 4 million gallons per day. Within the next year the City will conduct a facilities plan that will set capital priorities for the treatment plant and distribution system.

The treatment plant is located south of town on the Yellowstone River. The River has two main channels at this location and the Laurel plant and intake are on the north channel. During low flow periods, the City has had trouble with drawing adequate water from the channel. In August 2001, the City was permitted to construct a diversion dam on the south channel so that the water intake for the City would remain covered. This is a temporary solution and the City expects to spend up to $1 million constructing a new river water intake in mid-stream or to make permanent river diversions so that the present intake is more effective.

Broadview

The Town of Broadview produces its water from two wells. It is treated with chlorine for disinfection and stored in an elevated tank. The system serves approximately 60 residences and businesses.

Water Districts

South Hills

The South Hills Water and Sewer District served the Briarwood golf community with domestic water and sanitary sewer service. This area, located south of the Yellowstone River, was planned in 1979 which today has about 210 residential units plus an 18-hole golf course. The water system is fed by Yellowstone River water that is pumped into ponds with sand bottoms, then collected through perforated pipe, chlorinated and pumped to a 200,000 gallon storage tank. The District has been under State DEQ administrative order to improve its treatment. Rather than spending up to $1.5 million to make this change, the District annexed into the City of Billings in 2002 and will connect to the City's water system in 2003.

The Cedar Park Water District served about 80 households. Yellowstone River water is treated at a small treatment plant, stored in a 75,000 gallon elevated tank and gravity fed to the homes. Cedar Park also annexed in 2002 and will connect to the City water system in the spring of 2003.

Lockwood

Lockwood is an unincorporated area located on Billings' eastern border. The community has been served with domestic water by the Lockwood Water Users Association. In 2000, the Association dissolved and reformed as the Lockwood Water and Sewer District. It serves about 1,480 residential and business customers and peak daily consumption is 1.5 million gallons. The treatment plant, located on the north bank of the River near Exxon Refinery, is capable of treating up to 3 million gallons per day. The treatment plant has a conventional design of tri-media sand filters and chlorination. Water is stored and pressurized for the system in three storage tanks having a combined capacity of 1.8 million gallons.

Worden – Ballantine

The unincorporated area is served by a combined water and sewer district. Water is pumped from an above-ground spring and clearwells to approximately 280 households. The only treatment is chlorination. There is one 40,000 gallon elevated storage tank. The system has capacity to expand and the district is considering how to best serve land that is within the district but doesn't presently have service.

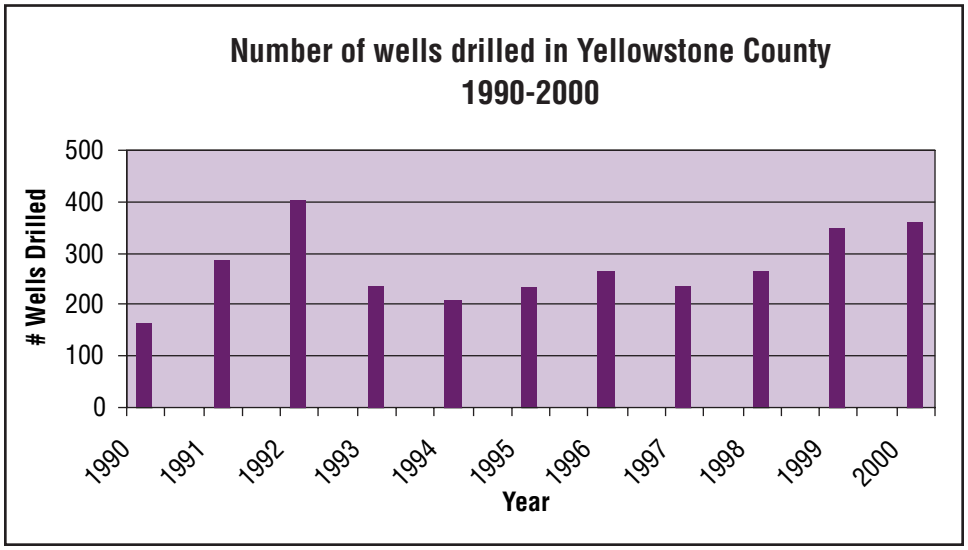
Groundwater – Individual Business and Residential Use

Groundwater wells are the primary source of domestic water for residents outside of Billings, Laurel and the water districts. Groundwater is readily available in the Yellowstone River Valley and is usually good quality. Outside of the valley, water is less available and the quality may be compromised by minerals or high concentrations of dissolved solids. Wells of 1,000 to 1,500 feet deep are common outside of the valley.

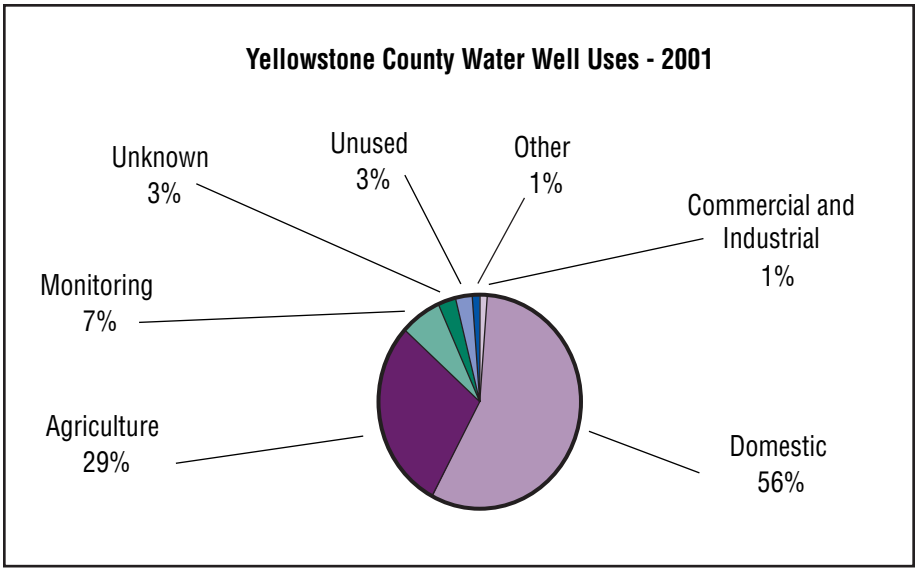
The Montana Bureau of Mines and Geology is conducting a groundwater characterization study in the middle and lower Yellowstone regions. The primary concern in the valley is Total Dissolved Solids (TDS). TDS in Yellowstone County tend to be salts that are leached from the clay topsoil and carried to underground aquifers. Areas with particularly severe problems include a pocket northwest of Laurel, Canyon Creek drainage above 72nd Street West and the Cove Creek/Hogan Slough drainage above 48th Street West. There has been some concern that the growing number of residences and septic tanks in the semi-rural area between Billings and Laurel might be contaminating the groundwater. The Bureau of Mines' preliminary study shows that there are almost indistinguishable differences in nitrates between land that is used for agriculture and where there are residential subdivisions. Water well yields appear adequate for residential uses in most valley areas except along the benches that rise from the valley floor. In those areas the gravel layer is thin and water may not be readily available.

Other possible aquifers outside of the valley are the Eagle Sandstone, Judith River and Fort Union formations. Eagle Sandstone is present in approximately 80 percent of Yellowstone County. Erosion has removed the Eagle Sandstone in the southern part of the County. The formation yields relatively low volumes of water, but is usually acceptable for domestic or stock uses. The areas that have unacceptably high TDS are a 2-3 mile wide band north of 5 Mile Creek, in the Heights and around Lockwood. Shallower alluvial layers in these areas may produce small amounts of acceptable quality water. North and south of these high TDS water problem areas may produce acceptable water but it is usually 1,000+ feet below the surface.

There are nearly 10,000 known wells in Yellowstone County. About 1/3 of those wells were added in the 1990s. Ten gallons of water per minute is considered the minimum yield for a single family house and most county wells yield less than 30 gallons per minute. About 55 percent of all wells are used for domestic purposes, with agricultural uses being the second greatest use. The following exhibits show this information in more detail and in graphic form.

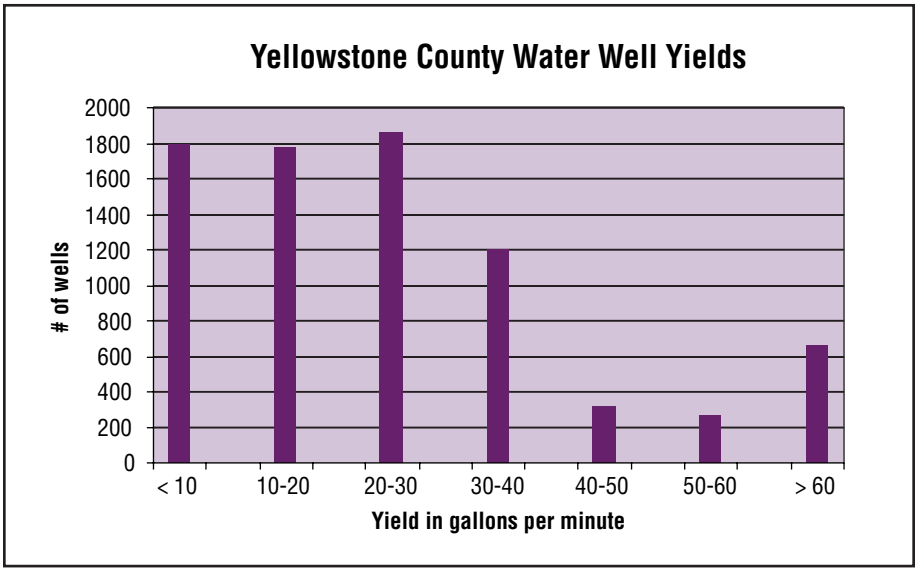


Note: Reported year 2000 data may be incomplete
Source: Luke Buckley, Groundwater Information Center, Montana Bureau of Mines and Geology, October, 2001.



Note: Well users may report more than one use for a single well – all uses are shown as reported by the well user.

Source: Luke Buckley, Groundwater Information Center, Montana Bureau of Mines and Geology, October, 2001.



Source: Luke Buckley, Groundwater Information Center, Montana Bureau of Mines and Geology, October, 2001.

Wastewater Treatment and Disposal

Regardless of the treatment and disposal method, wastewater is returned to the water system and is therefore recycled. Municipal treatment facilities typically discharge their effluent to surface water. Even those that don't directly discharge have some portion of their effluent seep into the ground or it evaporates and eventually returns as precipitation. Septic systems discharge their effluent to the ground where it returns to underground aquifers or evaporates to the air. Because a person's wastewater becomes the next person's drinking water, wastewater discharge is highly regulated.

Municipal discharges are regulated through many federal and state laws such as the federal and state Water Quality Acts, state and federal Environmental Protection Acts, the National Pollutant Discharge Elimination System, the state's Groundwater Pollution Control System and others.

The water quality and quantity are routinely monitored and must meet pre-established standards. Septic systems are regulated at both the state and local levels where the City/County Health Department becomes involved in permitting and inspecting system installation and operation.

Municipalities

Billings

The Billings Wastewater Treatment Plant (WWTP) is located on the Yellowstone River, about 1/3 mile downstream from the US 87 E Highway bridge. It was constructed in 1950 and had a treatment capacity of 15 million gallons per day. It was enlarged in the mid 1970s to treat an average of 26 million gallons per day (MGD), a maximum flow of 40 MGD and secondary treatment was added. The treatment process includes screening, grit removal, primary and secondary clarification, disinfection, activated sludge, anaerobic digestion and centrifuge sludge dewatering. The treated water is discharged to the Yellowstone River and the dewatered sludge is disposed of daily in the municipal landfill. Average daily flow is almost 15 million gallons, meaning that Billings' customers return to the wastewater system about 70 percent of the water that they use each day.

The collection system includes about 360 miles of sewer lines ranging from 8" to 60" diameter. Five sewer lift stations lift the wastewater from areas that are at low elevation to a higher elevation so that gravity flow can be achieved for most of the wastewater's transport to the WWTP. The system serves about 27,300 customers (connections) with only 31 being outside of the City. About 3,000 of those customers are commercial accounts, so the remainder is residential. The wastewater treatment plant has a capacity to serve approximately 50,000 customers at the average daily treatment of 14 gallons per day.

The utility received $7 million in operating revenues in Fiscal Year 2002. It had about $4.5 million in operating expenses, about $2 million in recurring capital expense (mainly sewer line replacements) and debt expense of $825,000. Projected major capital improvements over the next ten years include new sewer trunk lines to the Midland Road/ Holiday Inn area, King Avenue West from 32nd to Shiloh Road, the Yellowstone Country Club area, the Briarwood/Cedar Park area, a new headworks at the WWTP and a change to UV disinfection instead of the chlorine method that is used today. The utility's largest customers and their discharge volumes are shown below.

TABLE 2: CITY OF BILLINGS TEN LARGEST WASTEWATER CUSTOMERS DURING 2000

Customer	Discharge CCF
Casa Village Mobile Home Court	119,829
St. Vincent Hospital	70,131
Radisson Northern Hotel	62,925
Golden Meadows Mobile Home Court	59,727
Rocky Village Association	48,393
Deaconess Hospital	47,063
Montana State University - Billings	34,615
Sheraton Hotel	27,651
Conoco	26,520
Rimrock Mall	22,596

Laurel
Laurel built a new WWTP in 1985. It is located just east of the Montana Hwy. 210 Yellowstone River bridge and upstream from the Clark Fork confluence. The treatment plant is a Class 2 treatment facility, one that doesn't use activated sludge in its treatment process. The average daily treatment capacity is .8 million gallons per day (mgd) with a peak treatment capacity of 4.75 mgd. The City is preparing a wastewater facilities plan that reviews all of WWTP facilities and collection system, particularly inflow and infiltration issues. When the study is finished, the City will start its first Capital Improvement Program to prioritize improvements and will start a sewer line rehab/ replacement program. The system serves the City's commercial and residential customers, including the Cenex petroleum refinery and a small housing area outside of the City near the Montana Rail Link complex.

Ballantine
Ballantine has a sewer system that collects waste from approximately 60 customers and treats the waste in collection lagoons. There is no permitted discharge to a water course.

Sewer Districts

Worden – Ballantine
The sewer system is composed of a sewage collection system, two lift stations and a two-cell lagoon treatment system. There is an additional 13 acre lagoon that provides redundancy. It presently serves about 325 households and has capacity to serve about 450. The district doesn't have a discharge permit and has never discharged treated waste to the ground or surface water.

Lockwood
All of Lockwood uses septic tanks. The District negotiated an agreement with the City of Billings for a sanitary sewer connection, secured grants and loans and conducted a public bond financing election. The bond election in June 2001, received a majority of favorable votes, but Montana law requires a 60 percent super-majority to issue the bonds that the District was seeking. The District restudied the financing options and initiated a second public vote in 2003. This ballot measure also failed.

South Hills
Sewage is collected from the Briarwood subdivision through gravity mains and one lift station and is treated in two sewage lagoons. The water is discharged as part of the golf course irrigation. If or when the District connects its water system to the City of Billings, it may also connect its sewer system rather than continue operating the sewage lagoons and irrigation systems.

Custer
The town of Custer receives sewage treatment through a system created under a Rural Special Improvement District (RSID). The treatment is with a two-cell sewage lagoon that has 6.4 acres of surface area. It is permitted to discharge to the Yellowstone River, but doesn't because of the disinfection and monitoring requirements.

Yellowstone Club Estates
The Yellowstone Country Club and the housing area surrounding it created a sewage collection and treatment system through an RSID. Sewage is collected through a conventional gravity and force main system and is treated by an activated sludge treatment plant. The effluent is stored in two lagoons and is discharged for golf course irrigation. Yellowstone Club Estates was annexed into the City in 2002. Residents are continuing to negotiate whether they will hook up to the City system or maintain their own treatment system.

On-Site Underground Disposal Systems
County residents in areas not served by municipal or district systems usually rely on underground disposal systems. Most of these systems are composed of concrete septic tanks and drainfields. Biological activity in the tank provides primary treatment and the effluent is discharged to the drainfield where perforated pipe allows it to soak into the ground or be evaporated into the air. The Montana

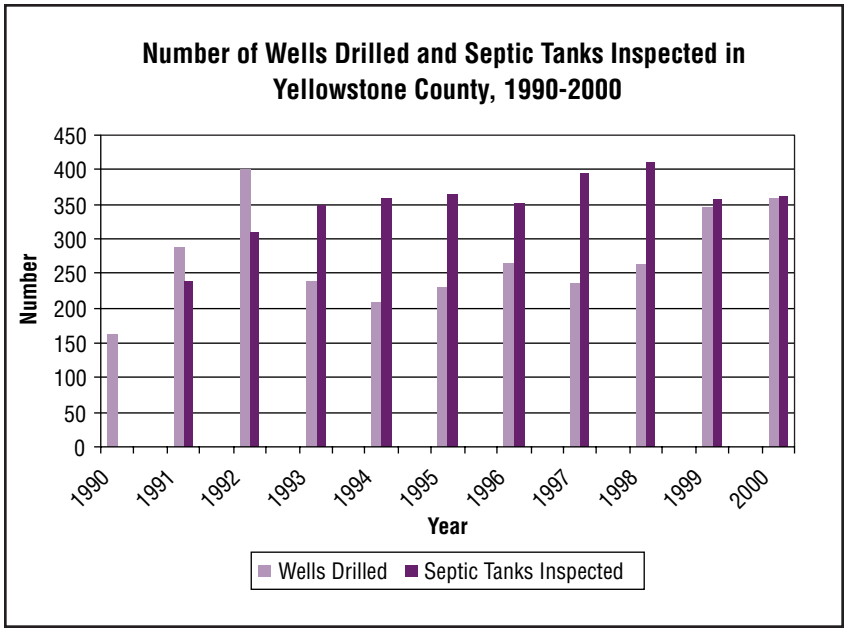
Department of Environmental Quality (DEQ) and the City / County Health Department permit and inspect septic systems. Minor subdivisions and individual systems are permitted and inspected by the Health Department while major subdivisions (more than 5 lots) are reviewed by DEQ. The reason for this level of review, permitting and inspection is because there are serious concerns about the impact that the underground systems may have on groundwater quality. As mentioned earlier, there doesn't appear to be a significant general impact from septic tanks, but localized impacts can occur as systems age or malfunction. The Billings Heights Water District and the Heights annexation and sanitary sewer service were responses to widespread groundwater contamination of wells by septic systems.

The 1990 Yellowstone County Comprehensive Plan reported that there were 7,830 septic tank inspections for new or repaired systems since 1975. That number doesn't indicate the total number of septic tanks in Yellowstone County because the Health Department doesn't keep records of systems installed prior to 1975. Since the 1990 plan was written, there have been almost 3,500 new systems installed or existing systems repaired. The number of inspections annually is shown below and is compared to new water wells that were completed in the same year.

Storm Drainage

Storm drains are installed to channel runoff from storms and snow-melt. As land use becomes more urbanized, the amount of runoff increases. Also increased are the resultant problems associated with insufficient storm drainage: danger to public safety from ponded streets, health hazards from stagnant water and mosquitoes, inconvenience of detours and storm debris, and deterioration of pavement and road bases from standing water and increased erosion. Infiltration of water to the ground decreases dramatically as development occurs and a greater percentage of the area is made impervious with asphalt and concrete streets, sidewalks and parking lots and the roofs of businesses and homes. The amount of runoff depends on a number of factors including the duration and intensity of the storm, time of year, absorption of surface areas, and the slope, shape and dimensions of the drainage area.

The design of storm sewers is based on an estimated volume of runoff. In order to estimate runoff, a determination must be made of the frequency-dura-



Source: Ted Kylander, Yellowstone City-County Health Department

Note: Septic Tank inspections include all inspections for initial installation and existing system repair or replacement.

tion-intensity relation of precipitation in the study area. Rainfall intensities are classified based upon the average frequency with which they occur. Intensities occurring on the average of once every two years are designated as two year storms. The design of the Billings City Storm Drain system is based on the "two year storm" as the baseline for residential development and the "five year storm" as the basis for commercial development. The data and calculation methods for storm drains in Billings and Yellowstone County are contained in the City's Stormwater Management Manual.

Stormwater Systems

Billings

The City of Billings provides storm drainage services within the City of Billings. The system is financed and operated as a utility enterprise fund. Financing comes from a storm sewer maintenance assessment on all property in the City. In FY 2002, the City plans to spend $3 million on maintenance, improvement projects and debt service. Not all areas of the City receive stormwater collection services, but most of the major trunk line systems east of Shiloh Road have been installed.

The City's first Stormwater Management Master Plan was prepared in 1962 and much of today's system follows that plan as well as updates that were prepared in the late 1980s and early 1990s. Stormwater Management Master Plans cover all areas of the City except west of the BBWA Canal in Billings Heights and a portion of southwest Billings. An engineering firm is under contract to prepare the SW Billings plan that will cover the area between the West Billings and Shiloh Road I-90 interchanges from King Avenue West to the Yellowstone River. The Heights Master Plan won't be completed until after the Federal Emergency Management Administration finishes remapping the flood elevations on Five Mile Creek and the County adopts the floodplain designation later in 2003.

Since 1990 the City built approximately 12 miles of primary stormwater trunk lines. A $12.5 million bond issue financed the construction. The improvements included a South Side trunk line, Holling Drain outfall, Hilltop outfall and piping the Bannister Drain corridor. The City has seven outfalls to surface waters: four to the Yellowstone River and one each to Alkali Creek, Five Mile Creek and Canyon Creek.

The City has several major stormwater projects underway or programmed for the next several years. In FY03, a major stormdrain trunk line will be constructed on Hawthorne Lane to serve the East Heights area. Two stormdrain master plans are under contract, one for Billings Southwest area and one for Briarwood. A stormdrain master plan for the West Heights neighborhood is programmed in the City CIP.

The irrigation ditches that enter the City from the west create the potential for widespread and disastrous flooding within the City. The record flood of 1937 was caused by an intense rainfall event west of the City and stormwater overflowing into the irrigation ditches. The ditches were apparently breached on the uphill and downhill sides resulting in a torrent of stormwater and irrigation water inundating parts of town. The City has since constructed overflow capability for the High Ditch and Big Ditch, but the Grey Eagle and Snow Ditch continue as potential contributors to flooding in the City.

Probably the biggest task facing the City is compliance with Phase 2 requirements of the EPA's stormwater program. The Phase 1 regulations required cities with populations above 100,000 to comply. Phase 2 applies to cities and urban areas over 50,000 population. Each surface water outfall must be covered by an NDPES permit that must be applied for by April, 2003 and received by October, 2003. In order to receive the permit the City must adopt a stormwater management system that has six tenets. The tenets aren't numerical discharge limits like in the wastewater management system. Instead, they are aimed at preventing stormwater pollution rather than at treating it once the water becomes polluted. The six tenets and their intentions are as follows:

- Public Education
  Learning about and teaching Best Management Practices (BMP) to the community

- Public Involvement
  Having the public involved in recommending stormwater management practices

- Illicit connections
  Eliminate illegal or potentially dangerous connections to the system. The EPA estimates that there may be more than 300 such connections that were made before 1972.

- Construction practices
  Introduce BMPs to the construction and development community

- Follow-up on BMPs
  Make sure that the facilities are maintained so that they continue preventing stormwater pollution

- City compliance
  City facilities are sometimes among the worst polluters, but were exempt under Phase 1. Phase 2 requires that cities clean up their facilities and prevent future pollution

Laurel

In the late 1970s, Laurel installed two trunk storm drains. Both accept drainage from the street system in the northern parts of the city. One runs south in 8th Avenue West to West Main Street and the other drains to the west and is in East 1st Street. Each discharges into the Laurel drain/ditch system that is an open drain for about 1 ? miles to an outfall at the Yellowstone River. Over the next five to ten years the City expects to expand the storm drainage system by constructing collector lines and connecting them to the trunk system. The City south of the railroad has no formal drainage system except for 1st Avenue where it intersects with Interstate 90.

Rural Systems for Storm Drainage

Subdivisions, planned unit developments and mobile home parks must comply with storm drainage standards established by the State and County's subdivision regulations. The County regulations specify two alternatives for drainage: on-site and off-site. On-site drainage control consists of a system designed to collect and retain storm water rather than to discharge it into other systems such as streets, adjacent land, or other stormwater disposal facilities. Allowances are made for discharge in the event of a storm with intensity equal to or greater than a maximum 25-year storm. Traffic control devices may be required where on-site storm drainage controls are placed adjacent to streets. Off-site drainage consists of the construction of curbs and gutters to channel storm drainage to storm drains, ditches or natural drainage channels.

County regulations require that easements be provided where a subdivision is traversed by a water course, drainage way, channel, or stream. A storm water easement and/or storm sewer drainage right-of-way must conform to the water course and provide further width as will be adequate for the purpose of controlling flows. Parallel streets or parkways may be required.

State regulations for subdivisions further specify that development should include steps to prevent erosion during and after subdivision construction. If storm water runoff from a subdivision will result in a degradation of state surface waters, treatment is required. Minimum treatment consists of the removal of settleable solids and floatable material. Plans for the treatment facility must also be approved.

With the exception of the subdivisions built in accordance with the subdivision regulation standards for storm drainage and the formal public systems described above, storm drainage in the remainder of the County consists of natural infiltration, irrigation drainage ditches, roadways, and barrow ditches along the roadsides.

Agricultural drainage ditches in Yellowstone County were developed in the first three decades of this century as a means to drain off excess water from the practice of flood irrigation and to draw

down the water table in areas where high water spots interfered with farming. These drainage ditches were not intended to convey stormwater runoff but by default, they do so in many developed areas outside of the City limits.

To date there has been no comprehensive study of the adequacy of storm drainage in areas outside of the City limits. The 1973 Areawide Facilities Plan for the Billings area did examine both the Billings Heights area, which has since been incorporated into the City, and Lockwood. An assessment of the drainage in Lockwood was made at that time. The drainage was characterized by numerous, generally parallel, drainage courses with relatively large tributary areas. It was proposed that the Lockwood area be zoned to protect the natural drainage courses and that two short storm drains be built along I-90 to discharge into natural ditches. The storm drains were not built and Lockwood currently has no formal system of storm drainage.

Solid Waste Collection and Disposal

National Trends

Federal solid waste regulations started with the Resource Conservation and Recovery Act of 1976. Present regulations are primarily contained in Parts 257 and 258 of Title 40 of the Code of Federal Regulations. Part 258 applies to Municipal Solid Waste (MSW) Landfills, which are the focus of this section of the Growth Policy. The regulations are commonly referred to as the Subpart D regulations, even though Subpart D is only one relatively small portion of the whole. These regulations were adopted on October 9, 1991. Montana's largest landfills were required to conform by October 1993 and smaller ones by April 1994. The regulations establish minimum criteria for location, operation, design, groundwater monitoring and corrective action, closure and post-closure care and financial assurance.

Municipal Solid Waste landfills can't be located or operated in wetlands, floodplains, fault areas, seismic impact zones or unstable areas. This restriction reversed the common practice of locating landfills in areas that had marginal development potential such as wetlands and steeply sloped lands. Among other operational limits, the Subtitle D regulations require operators to identify and prohibit hazardous waste, not burn mixed waste, cover each day's waste with earth, control methane gas releases and stormwater runoff and secure the site from unauthorized dumping. Again, this changed common practices of allowing almost unlimited access to landfills and burning much of the waste. Another section deals with how landfills must be closed and the long term care and monitoring that must be done. The final section requires financial guarantees that would allow a third party to close, monitor and correct landfill problems if the municipal owner fails to complete these tasks.

The portion of the regulation that perhaps had the greatest impact on landfills nationally addresses constructing new landfills or expanding existing ones. This is the true Subpart D regulation. It requires that landfills be designed so that they encase the waste, keep it dry and collect and treat any moisture that flows from, around or through the waste area. This is the "dry tomb" approach to solid waste management. All landfills have to have an impervious barrier between the waste and groundwater, although a groundwater monitoring system is still required. When a landfill area is closed, it must be capped with a moisture barrier that has the same or greater impermeability. The type of liner and leachate collection system depend on the geologic conditions at each landfill site. These design, construction and monitoring requirements significantly increase the difficulty of siting new landfills, increase landfill construction and operating costs and have reduced the number of active landfills while increasing the size of the remaining ones. In 1988, there were almost 8,000 active landfills in the US. By 1999, there were only 2,200. These landfills accepted over 57 percent of all MSW with the remainder going to incinerators (14 percent) or recovered/recycled (28 percent).

In 1989, the EPA established a waste management priority system that emphasized the following:

- Source reduction, or waste prevention, including reuse of products and on-site or backyard composting of yard trimmings

- Recycling, including off-site or community composting

- Disposal, including waste combustion, preferable with energy recovery, and landfills

In the Unites States, we generated 230 million tons of MSW in 1999, compared with 88 million tons in 1960, 121 million tons in 1970, 151 million tons in 1980 and 205 million tons in 1990. That equals 4.6 pounds of MSW per day per person in 1999 compared to 2.7 pounds in 1960. Fortunately, the amount of recovered and recycled materials in the waste stream increased dramatically over the past few decades. In 1960, only 6 percent of MSW was recovered or recycled, thereby reducing the amount of MSW that was disposed of in landfills or incinerators. By 1999 almost 28 percent of MSW was recovered or recycled. Most of the materials recovered or recycled were paper or paperboard, yard trimmings and metals. Non-ferrous metals had a particularly high recovery rate, largely due to recovering nearly 97 percent of the lead in lead-acid batteries.

Source reduction, meaning waste that never enters the waste disposal system, is the EPA's highest MSW priority and in 1999 had nearly as large an impact on MSW disposal as recovery and recycling. Over 50 million tons of waste was source reduced. Almost half of that waste was yard trimmings and food waste while containers and packaging were almost one-quarter of the total. Yard trimmings and food waste disposal declined over the past few years as more mulching mowers were used, landfills stopped accepting yard waste unless it could use it for composting / cover material and backyard composting became more popular.

State trends

In the early 1960s, there were over 500 cities and town in Montana. Each probably had its own landfill, or more than one. By 1975, the State had established a solid waste management program and had identified 227 known municipal landfills. The State downsized its solid waste program in the 1980s, but the threat of waste importation in the late 1980s, plus the impending adoption of the Subpart D regulations, increased awareness and legislative/ regulatory activity. The 1989 Legislature imposed a waste importation moratorium and ordered the Environmental Quality Council to conduct a study on the solid waste disposal system. In 1991, the Legislature approved landfill license fees to support the Montana regulatory program, part of which was to prepare an integrated waste management plan for the State. In December 1993, the EPA approved Montana's solid waste management program which allowed the State to administer the Subpart D regulations. Montana's integrated plan, approved in 1994, adopted the EPA's waste management priority system that emphasizes source reduction and recycling, including composting and finally landfilling or incineration.

The State classifies its approved landfills. Class I landfills may accept hazardous wastes. There are no licensed Class 1 landfills in the State. Class II landfills are ones that are licensed to accept MSW and non-hazardous industrial waste. Class III landfills may accept inert material such as concrete, rock, tires, dirt and untreated wood. In 1991, the last date for which data are available, disposal facilities reported receiving 743,631 tons of waste. 94 percent of the waste went to Class II landfills, 4 percent to Class III landfills and less than 2 percent was incinerated. This calculates to be 5.1 pounds of waste per person per day. Fifty-nine landfills were open and regulated by late 1993, with 20-25 of those expected to close by 1995, leaving 35-40 operating landfills in the State. Fourteen major landfills accepted over 70 percent of the State's MSW. As of 1993, Montana's major population centers, except the Flathead Valley, had licensed disposal facilities that had life expectancies of at least 20 years.

Local Trends

The Billings Sanitary Landfill is the only licensed Class II landfill in this region of Montana. It is

located south of the City in the bluffs that are south of the Yellowstone River. Access is from South Billings Boulevard and Jellison Road. The landfill is located on 707 acres owned by the City, but the original 80-acre landfill that opened in 1960 is still being filled. The land is sloped, having a base elevation of 3,200 feet on the north side and rising to 3,560 feet above mean sea level at the south end of the property. The property has limited water bearing geology, low permeability bentonite (clay) layers and horizontal stratigraphy that make it nearly ideal for waste disposal. It accepts MSW, yard, wood and inert (construction) waste, unregulated hazardous waste and non-hazardous industrial waste. It is the regional landfill and the City contracts to receive waste from Yellowstone, Carbon, Musselshell, Big Horn, Stillwater and Treasure Counties. The landfill accepts no out-of-state waste.

Recent improvements prevent residents from accessing the landfill's working face and provide areas for recycling certain products and a yard waste /composting area. Household hazardous wastes and unregulated hazardous wastes are accepted by the landfill. Unregulated hazardous wastes are those that are generated by businesses that are classified as conditionally exempt small quantity generators. These businesses generate less than 220 pounds per month of hazardous waste. These wastes are collected at the landfill or at the City's service center and held for proper disposal. Since 1995, the City had conducted an annual household hazardous waste roundup as a method to prevent some of the hazardous or potentially hazardous waste from entering the landfill. Since it began, the program has diverted over 150,000 pounds of hazardous waste. The City and a hazardous waste disposal contractor collect the waste and dispose of it by various approved methods. 68 percent of the waste collected in 2001 was paint and consolidated fuels, followed by pesticides at 15 percent of the total.

From 1968 to 1995, the landfill accepted approximately 3 million tons of waste. In 2002, the landfill will start closing about 35 acres of the original 80 acre landfill and start excavating soil from the area that will become the landfill's first lateral expansion since the Subpart D regulations were adopted. Within the 285 acres that may eventually be used for waste disposal, the site has space to receive at least 17 million tons more of waste, giving it a projected lifespan of 40 - 50 years.

Needs – Future Trends

The Billings Landfill, as well as many other landfills nationally, will face a number of issues over the next ten years. The Clean Air Act regulates most gas emissions and may be expanded to cover methane gas emissions from landfills. The Billings Landfill doesn't produce much methane or other landfill gases because of our semi-arid climate and operational methods. The City was able to obtain a variance from the Montana DEQ that allowed it to not install a gas extraction system. That may change as the landfill moves laterally, if the landfill starts producing more gas or if the Clean Air Act begins covering methane.

Flow control or waste importation will continue to be a national issue and one that will impact Montana and Billings. The Clean Air Act makes it difficult to obtain permits for incinerators. Densely populated states and those with high rainfall or groundwater that is easily contaminated are running out of landfill space and may pursue landfilling in other states. Some of Montana's private landfills accept out-of-state waste and there may be increasing pressure for others, such as the Billings landfill, to also accept this waste.

The Subtitle D regulations are being reviewed by the EPA. In particular, dry tomb landfills are being questioned. Landfills that permit some moisture penetration have greater success in reducing the volume of waste through biological activity. These bioreactive landfills may allow operators to increase the amount of waste that can be disposed of in active landfills and reduce the number of landfills that will be needed in the future.

Electronics have become a part of everyday life. When electronic equipment wears out or is replaced

by more technically advanced equipment, landfills often are the last resort for disposing of the used equipment. Heavy metals in the components, video monitor gases and the waste volume cause disposal problems. Determining the best disposal method and who is responsible for it (generators or users) will be challenges.

In Montana, two special issues face regulators and operators. Most of central and eastern Montana is semi-arid and operators in those areas are questioning the need for highly impermeable closure caps. Caps that let moisture evaporate out of the landfill may be superior to the standards that are now in place. Montana has obtained a reputation for being at the center of methamphetamine manufacturing, distribution and consumption. The chemicals that are used to manufacture the drug are highly volatile and toxic. How these chemicals can be safely handled and disposed of will continue to challenge the state.

Investor-Owned Utilities

Natural Gas

Montana-Dakota Utilities Company (MDU) is the only natural gas provider in Yellowstone County. MDU provides natural gas and electric services in eastern Montana and in four other states, but only gas in Yellowstone County. The utility company is a subsidiary of the Montana Dakota Resources Group, Inc. based in Bismark, North Dakota. MDU Resources has over 4,000 employees and had sales of $1.9 billion in 2000. It owns several natural resource development companies, including Knife River Corporation that recently purchased two local highway construction and aggregate companies.

MDU is an investor-owned utility that provides natural gas to over 205,000 customers in Montana, North Dakota, South Dakota and Wyoming. The Billings Division of the operation encompasses the largest number of natural gas customers served by the utility.

MDU purchases wholesale natural gas from its sister company, WBI Holdings, Inc. Gas is delivered from the Williston Basin in eastern Montana and western North Dakota through a 4,300 mile integrated pipeline system. MDU utilizes natural underground systems in the Williston Basin and other areas to store additional natural gas purchased from various suppliers. It is aggressively purchasing utility distribution companies in the region and WBI Holdings is purchasing other gas pipeline and electric transmission companies.

Electricity

Yellowstone Valley Electric Cooperative

The Yellowstone Valley Electric Cooperative (YVEC) was formed in 1937 under the Rural Electrification Act. The YVEC serves six counties, but 92 percent of its meters are in Yellowstone County. The YVEC primarily serves the unincorporated areas of the County.

The wholesale power contracting agent to the YVEC is the Central Montana Electric Power Cooperative. YVEC receives approximately 85 percent of its power from the Northwestern Energy and the balance comes from the Bureau of Reclamation's hydroelectric facility at Fort Smith, Montana.

Table 2 lists the percent usage of the major customers. The majority of YVEC customers are residential. Small commercial customers are convenience stores, banks and restaurants. Large commercial customers are feedlots, irrigators and agricultural product processing.

NorthWestern Energy

Northwestern Energy is a major, regional provider of electricity, natural gas and related services to approximately 598,000 customers in Montana, Nebraska and South Dakota. The foundation of NorthWestern's energy business dates back to 1923, with the start of the utility operations in a few communities in South Dakota and Nebraska. Their current energy-delivery system includes more than 26,000 miles of electrical lines and nearly 7,500 miles of gas pipelines.

TABLE 2:
YVEC CUSTOMER PROFILE PERCENTAGE BASED ON ACTUAL kWh REQUIREMENTS

Residential	80%
Irrigation	3%
Small Commercial	10%
Large Commercial	7%

The energy-delivery business expanded significantly in February 2002, with the acquisition of the former Montana Power Company's energy transmission and distribution business. The addition has allowed NorthWestern Energy and its more than 1,300 team members to take greater advantage of decades of experience and success in the energy business. In Yellowstone County, MPC provides service to the incorporated areas of Billings, Laurel, and Broadview. Some service is extended into the urban fringe of Laurel and Billings, but outside of that area is served by YVEC. Northwestern acquired the Montana Power Company customer base and has about 40,000 residential, 6,800 commercial and 700 other connections in its Billings area distribution system.

Telephone

The telephone industry is changing rapidly. The big, slow, but reliable local telephone company that for decades has handled all personal and business telephone needs is nearly extinct. With increased business and personal demand for data sharing and for access to the Internet, high speed transmission systems are in great demand. Wireless communication has blossomed and companies are attempting to offer all of the services that are now available with land-line service. Many businesses were started in the 1990s to market telephone services but the national economic downturn that began in 2000 caused many of the small companies to sell, merge or to fail. These changes are still occurring and additional ones are likely to continue for many years.

There are a number of companies that provide standard telephone services within Yellowstone County. Qwest Communications provides local dial tone and service to Billings, Laurel, Shepherd, and Pompey's Pillar and to the adjacent rural areas. Broadview, Molt and the surrounding rural areas are served by Triangle Telephone, which is headquartered in Havre, Montana. The Custer area and the rural area northeast of Shepherd are served by MidRivers Telephone Company headquartered in Circle, Montana. The Huntley-Worden area receives service from Project Telephone Company.

The Telecommunications Act of 1994 was designed to increase competition and improve service in the telephone industry. It has been marginally effective in Yellowstone County. Avista Communications, a subsidiary of the former Washington Water Power Corporation, provides competitive local dial tone and other services to the business community. There are about 24,000 business lines in Billings and Avista serves about 20 percent of that market. Cellular One also offers local dial tone for businesses, primarily in a wireless format. Several long distance or long haul companies operate in and through Billings including Sprint, MCI, Qwest, AT&T, TouchAmerica and Main. These companies use primarily fiber optic lines and equipment in their systems. Cutthroat Communication is attempting to build a nationwide point to point microwave wireless network and has a presence in Billings.

High speed wire or fiber communication may have an advantage over wireless because the transmission environment is more controlled and therefore is more reliable. However, the economic downturn early in this century has caused a decline in what was seemingly an unlimited escalating demand for telephone services. Optimism about increasing demand caused many companies, even some that don't specialize in communications, to install what now looks like excess fiber lines. Coupled with that is a rapid expansion of the fiber-end hardware capacity that allows higher transmission speed and volume, which in turn allows companies to lease or own fewer fiber strands. It may take several years for increasing demand to catch up to the present capacity.

Montana has good climate and topography for wireless communications and wireless companies abound in Billings. At least six companies offer local and long distance service in the Billings area and the number and names of the companies and their services change frequently. As digital service becomes the industry standard, a wider range of wireless services may become available including fully integrated voice and data transmissions, or unified messaging. Over the past few years there has been a boom in wireless communication tower construction. There are approximately 28 wireless communications towers in Billings and nearby Yellowstone County that were apparently constructed by or for wireless communication service companies. At least ten of those towers were approved for two or more antennae platforms, but few have more than one platform installed as of late 2001. This may indicate some amount of excess capacity that may take several years to absorb.

Television, Radio, and Other Media

Yellowstone County is served by the following:

- Television Stations
  - Local Stations
  - KHMT (local channel 4)
  - KTVQ-2 (local channel 2)
  - KULR (local channel 8)
  - KSVI (local channel 6)
- Cable Television
  - Bresnan
- Radio Stations
  - 9 FM stations
  - 5 AM stations
- Newspapers
  - Agri-News - weekly
  - Big Sky Business Journal - biweekly
  - Billings Gazette - daily
  - Billings Outpost - biweekly
  - Billings Times - weekly
  - Western Business
  - Western Livestock Reporter - weekly
  - Yellowstone County News - weekly
  - Laurel Outlook - weekly

School Districts and Facilities

Introduction

Yellowstone County has 15 separate school districts that contain 37 elementary schools, 13 middle schools and 10 high schools. Yellowstone County also has eight private schools available for elementary and secondary students. School District #2 is the largest school district in the county by student population and includes the City of Billings and accepts high school students from School Districts #52 (Independent School), #26 (Lockwood), #3 (Blue Creek), #17 (Morin), #8 (Elder Grove), #4 (Canyon Creek), and #23 (Elysian).

Statewide, the peak enrollment year for public schools was the 1995-1996 school year when 165,390 pupils were registered in the fall semester. The enrollment decline in Yellowstone County from the 1995-1996 school years to 2002 was a minor 1.5 percent as compared to the statewide enrollment decline of 6.4 percent over the same time period. Yellowstone County public schools enrolled 21,957 elementary and secondary school students in the fall of 2002. This number represents approximately 15 percent of all public school students in Montana.

The public school facilities in Yellowstone County provide a variety of community services in addition to education for our young citizens. Most schools provide meeting spaces for local civic and community groups, recreational play fields open for public use and in some communities the "center" of most civic activity. The 60 school facilities in Billings and Yellowstone County provide a civic and social anchor for many neighborhoods and communities.

Yellowstone County schools have experienced relatively stable enrollment over the past decade with minor fluctuations. However, educational standards and programs offered have been enhanced during the same time, requiring additional classroom or specialized space. School District #2 (Billings) is currently developing a long term strategy to accommodate an anticipated increase in high school enrollments during the next decade. In addition, rural elementary school districts surrounding Billings have either added space within the last five years or plan to add classroom space in the near future.

The average age of elementary school buildings in School District #2 (Billings) is approximately 40 years and deferred maintenance and upgrades to basic mechanical systems are making these facilities increasingly expensive to maintain. Regardless, many of these elementary schools act as a stabilizing influence in the surrounding residential communities. Much of the affordable housing stock in Billings is located in neighborhoods surrounding these older school buildings. School District #2 closed three elementary schools in 2001and one in 1982. Decisions to close school buildings, particularly neighborhood elementary schools, require a careful analysis of the desired outcome both for the school district and the surrounding neighborhood.

School Facilities and Enrollment

The following pages present information on each school district's facilities and student enrollments since 1990. Also included are any current year (2003) capital improvement projects and any expansion of facilities that may be planned for the next five years.

SCHOOL DISTRICT #2 – BILLINGS

Elementary Schools (Pre-K-6)
21 Facilities (3 closed in 2001)
2002 enrollment = 6,558

Middle Schools (7-8)
5 Facilities
2002 enrollment = 3,596

Total Elementary Enrollment
2002 = 10,154
1990 = 10,815

High Schools (9-12)
5 Facilities
2002 enrollment = 5,624
1990 enrollment = 4,575

School District #2 Enrollments 1990 through 2004 (projected)

YEAR	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003 (projected)	2004 (projected)
PK – 8	10,815	11,052	11,250	11,196	10,980	10,971	10,836	10,710	10,524	10,392	10,166	10,203	10,154	10,085	9,988
9-12	4,575	4,723	4,891	5,085	5,078	5,234	5,284	5,254	5,386	5,485	5,524	5,598	5,624	5,593	5,560
TOTAL	**15,390**	**15,775**	**16,141**	**16,281**	**16,058**	**16,205**	**16,120**	**15,964**	**15,910**	**15,877**	**15,690**	**15,801**	**15,778**	**15,678**	**15,548**

SCHOOL DISTRICT #2 FACILITIES

School Name	Address	Year Built	Acerage	Building Improvements
Alkali Creek Elementary	681 Alkali Creek	1979	9.0	1993 & 1994 (roof)
Arrowhead Elementary	2510 38th St West	1978	13.4	1994 & 1995 (roof)
Beartooth Elementary	1345 Elaine	1973	9.9	Closed in 2001; 1980 (addition)
Bench Elementary	505 Milton Road	1964	5.12	1994 (HC ramps); 2002 (roof); 1978 (addition)
Big Sky Elementary	3231 Granger Ave East	1986	3.45	None
Bitterroot Elementary	1801 Bench Blvd	1964	20.0	1996 (roof)
Boulder Elementary	2202 32nd St. West	1962	10.65	None
Broadwater Elementary	415 Broadwater	1910*	2.1	1995 (roof repair); 1916, 1920 & 1956 (additions)
Burlington Elementary	2135 Lewis	1956	4.26	1957 (addition)
Central Heights Elementary	120 Lexington	1962	4.4	1979 (addition)
Eagle Cliffs Elementary	1201 Kootenai	1986	11.18	None
Garfield Elementary	3212 1st Ave South	1902	3.0	Closed in 2001; 1921, 1935, 1949, 1955 (additions)
Highland Elementary	729 Parkhill	1947	1.32	1995 (fencing); 1956 (addition)
McKinley Elementary	820 N 31st St	1906	1.8	2002 (roof); 1918, 1958 (additions)
Meadowlark Elementary	221 29th St. West	1964	6.06	1993 (HC ramps)
Miles Ave Elementary	1601 Miles Ave	1955	5.01	1991 (roof)
Newman Elementary	605 S. Billings Blvd	1953	1.91	1957 (addition)
Orchard Elementary	120 Jackson	1918	4.4	1997 (fencing); 1999 (HVAC); 2000 (remodel); 1948, 1956, 1987 (additions)
Poly Dr. Elementary	2410 Poly Dr.	1952	5.0	2002 (roof); 1955, 1960 (additions)
Ponderosa Elementary	4188 King Ave East	1965	16.32	None
Rimrock Elementary	2802 13th St. West	1952	5.0	Closed in 2001; 1976, 1979 (additions)
Rose Park Elementary	1812 19th St. West	1958	6.25	1993 (roof)
Sandstone Elementary	1440 Nutter Blvd	1978	19.5	1995 (roof)
Washington Elementary	1044 Cook Ave	1899	3.03	1998 (HVAC); 1948, 1952, and 1962 (additions)
Castle Rock Middle School	1441 Governor's Blvd	1979	5.5	None
Lewis & Clark Middle School	1315 Lewis	1956	3.5	1996 & 2002 (roof); 2001, 2002 (remodel); 1962 (addition)
Riverside Middle School	3700 Madison	1963	12.55	1996-1998 (roof); 1995 (addition); 1979 (addition)
Will James Middle School	1200 30th St West	1967	21.0	1993 & 2001 (roof); 2000 (bleachers); 1974 (addition)
Senior High School	425 Grand Ave	1938	20.0	1997, 1998, 2000, 2001 (remodels); 1997 (roof); 1998 (HVAC); 1953, 1967, 1974 (additions)
Skyview High School	1775 High Sierra Blvd	1986	44.0	None
West High School	2201 St. Johns	1959	30.20	1995 &1998 (remodels); 1999 (roof and addition); 1962, 1966, 1975, 1976 (additions)
Alternative School	1320 Grand Ave	1952	Included with Lewis & Clark	1997 (roof); 1954 (addition)
Career Center	3723 Central Ave	1974	21.97	2000 (remodel)
Lincoln Center (Administration)	415 N. 30th St	1913	5.5	1921, 1935, 1951, 1964, 1968 (additions)

* Broadwater Elementary School was placed on the nationwide "12 Most Threatened School Sites" by the National Trust for Historic Preservation in 2001.

SCHOOL DISTRICT #2 CAPITAL IMPROVEMENT PLANS 2003	
SCHOOL NAME	**PROJECT DESCRIPTION**
Arrowhead Elementary	Roof top mechanical systems (HVAC)
Bench Elementary	Roof
Lewis & Clark Middle School	HVAC
Newman Elementary	Boiler replacement
Poly Ave Elementary	Roof & HVAC
Senior High School	Power upgrade and special systems
West High School	Power upgrade and special systems

School District #2 facilities encompass a total of 120 acres and 35 separate facilities. Four of these facilities are either vacant or being leased to other groups. School District #2 has not constructed a new school facility since 1986. The average facility size for elementary schools constructed prior to 1960 is 3.5 acres. Those constructed after 1960 average 10.7 acres.

The oldest continuously used school building in School District #2 is Washington Elementary at 1044 Cook Avenue (1899). Five other school buildings were constructed in the first 20 years of the following century (1900 – 1920) including the Lincoln Center, Orchard Elementary, McKinley Elementary, Garfield Elementary and Broadwater Elementary. Beartooth, Garfield and Rimrock Elementary Schools were closed in 2001 and Eastern Elementary was closed in 1982.

The improvements listed above are planned for School District #2 in 2003. For the next three years (through 2006), the district has budgeted to spend $2 million per year on elementary school improvements and $1 million per year on high school improvements.

SCHOOL DISTRICT #7 – LAUREL

Elementary Schools (Pre-K – 6)
3 Facilities
2002 Enrollment 746

Middle Schools (7-9)
1 Facility
2002 Enrollment 399

Total Elementary Enrollment
2002 = 1,145
1990 = 1,342

High Schools (9-12)
1 Facility
2002 = 587
1990 = 564

SCHOOL DISTRICT #7 ENROLLMENTS 1990–2002													
YEAR	**1990**	**1991**	**1992**	**1993**	**1994**	**1995**	**1996**	**1997**	**1998**	**1999**	**2000**	**2001**	**2002**
PK- 8	1,324	1,311	1,246	1,268	1,269	1,292	1,297	1,309	1,252	1,219	1,185	1,145	1,145
9 -12	564	570	594	631	640	620	642	656	623	630	586	587	587
TOTAL	**1,888**	**1,881**	**1,840**	**1,899**	**1,909**	**1,912**	**1,939**	**1,965**	**1,875**	**1,849**	**1,771**	**1,732**	**1,732**

SCHOOL DISTRICT #7 FACILITIES				
SCHOOL NAME	**ADDRESS**	**YEAR BUILT**	**ACREAGE**	**BUILDING IMPROVEMENTS**
Fred W. Graff Elementary	417 East 6th St. Laurel, MT	Data not available	Data not available	Data not available
West Elementary	502 8th Ave Laurel, MT	Data not available	Data not available	Data not available
South Elementary (Pre-K only)	606 SW 5th Laurel, MT	Data not available	Data not available	Data not available
Laurel Middle School	410 Colorado Laurel, MT	Data not available	Data not available	Data not available
Laurel High School	203 East 8th Laurel, MT	Data not available	Data not available	Data not available

SCHOOL DISTRICT #3 – BLUE CREEK

Elementary Schools (Pre-K – 6)
1 Facility

Total Elementary Enrollment
2002 Enrollment = 188
1990 Enrollment = 95

SCHOOL DISTRICT #3 ENROLLMENTS 1990 - 2002													
YEAR	**1990**	**1991**	**1992**	**1993**	**1994**	**1995**	**1996**	**1997**	**1998**	**1999**	**2000**	**2001**	**2002**
PK – 6	95	96	112	101	112	131	143	149	158	159	173	188	188
TOTAL	**95**	**96**	**112**	**101**	**112**	**131**	**143**	**149**	**158**	**159**	**173**	**188**	**188**

SCHOOL DISTRICT #3 FACILITIES				
SCHOOL NAME	**ADDRESS**	**YEAR BUILT**	**ACREAGE**	**BUILDING IMPROVEMENTS**
Blue Creek Elementary	3652 Blue Creek Rd Billings, MT	**Data not available**	**Data not available**	1996 (addition)

SCHOOL DISTRICT #4 – CANYON CREEK

Elementary Schools (Pre-K – 6)
1 Facility
2002 Enrollment = 209

Middle Schools (7-8)
1 Facility
2002 Enrollment = 59

Total Elementary Enrollment
2002 = 268
1990 = 195

SCHOOL DISTRICT #4 ENROLLMENTS 1990 – 2002

YEAR	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002
PK – 8	195	227	218	248	225	207	217	233	249	250	265	268	268
TOTAL	**195**	**227**	**218**	**248**	**225**	**207**	**217**	**233**	**249**	**250**	**265**	**268**	**268**

SCHOOL DISTRICT #4 FACILITIES

SCHOOL NAME	ADDRESS	YEAR BUILT	ACREAGE	BUILDING IMPROVEMENTS
Canyon Creek School	3139 Duck Creek Rd. Billings, MT	Data not available	Data not available	2002 (addition & remodel)

SCHOOL DISTRICT #8 – ELDER GROVE

Elementary Schools (Pre-K- 6)
1 Facility
2002 Enrollment = 257

Middle Schools (7 -8)
1 Facility
2002 Enrollment = 71

Total Elementary Enrollment
2002 = 328
1990 = 192

SCHOOL DISTRICT #8 ENROLLMENTS 1990 – 2002

YEAR	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002
PK-8	192	200	212	230	239	253	278	273	294	314	316	328	328
TOTAL	**192**	**200**	**212**	**230**	**239**	**253**	**278**	**273**	**294**	**314**	**316**	**328**	**328**

SCHOOL DISTRICT #8 FACILITIES

SCHOOL NAME	ADDRESS	YEAR BUILT	ACREAGE	BUILDING IMPROVEMENTS
Elder Grove Elementary	1532 S. 64th West Billings, MT	Data not available	Data not available	1998 (addition)

SCHOOL DISTRICT #15 – CUSTER SCHOOLS

Elementary Schools (pre-K – 6)
1 Facility
2002 Enrollment = 51

Middle Schools (7-8)
1 Facility
2002 Enrollment = 11

Total Elementary Enrollment
2002 = 62
1990 = 72

High Schools (9-12)
1 Facility
2002 Enrollment = 34
1990 Enrollment = 30

SCHOOL DISTRICT #15 ENROLLMENTS 1990 – 2002

YEAR	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002
PK -8	72	67	59	****	****	****	****	****	****	****	****	62	****
K - 12	30	30	26	84	89	84	83	92	88	92	104	34	96
TOTAL	**102**	**97**	**85**	**84**	**89**	**84**	**83**	**92**	**88**	**92**	**104**	**96**	**96**

**** Enrollment numbers combined after 1992

SCHOOL DISTRICT #15 FACILITIES

SCHOOL NAME	ADDRESS	YEAR BUILT	ACREAGE	BUILDING IMPROVEMENTS
Custer Public Schools	304 4th Ave Custer, MT	1923	Data not available	2000 (boiler), 1985 (addition) 1940-1978 (addition)

SCHOOL DISTRICT #17 – MORIN SCHOOLS

Elementary Schools (pre-K – 6)
1 Facility
2002 Enrollment = 41
1990 Enrollment = 27

SCHOOL DISTRICT #17 ENROLLMENTS 1990–2002

YEAR	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002
PK - 6	27	35	35	33	44	31	35	29	26	32	31	41	41
TOTAL	**27**	**35**	**35**	**33**	**44**	**31**	**35**	**29**	**26**	**32**	**31**	**41**	**41**

SCHOOL DISTRICT #17 FACILITIES

SCHOOL NAME	ADDRESS	YEAR BUILT	ACREAGE	BUILDING IMPROVEMENTS
Morin Elementary	8824 Pryor Rd Billings, MT	1956	3.44	Two building additions since original construction

SCHOOL DISTRICT #21J – BROADVIEW SCHOOLS

Elementary Schools (pre-K – 6)
1 Facility
2002 Enrollment = 78

Middle Schools (7-8)
1 Facility
2002 Enrollment = 18

Total Elementary Enrollment
2002 = 96
1990 = 75

High Schools (9-12)
1 Facility
2002 Enrollment = 42
1990 Enrollment = 40

SCHOOL DISTRICT #21J ENROLLMENTS 1990 – 2002

YEAR	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002
PK -8	75	70	66	70	64	89	106	106	115	116	116	96	96
9-12	40	40	36	38	37	38	52	57	53	55	52	42	42
TOTAL	**115**	**110**	**102**	**108**	**101**	**127**	**158**	**163**	**168**	**171**	**168**	**138**	**138**

SCHOOL DISTRICT #21J FACILITIES

SCHOOL NAME	ADDRESS	YEAR BUILT	ACREAGE	BUILDING IMPROVEMENTS
Broadview Schools	13935 1st St. Broadview, MT	Data not available	Data not available	Data not available

SCHOOL DISTRICT #23 – ELYSIAN SCHOOL

Elementary Schools (pre-K – 6)
1 Facility
2002 Enrollment = 106

Middle Schools (7-8)
1 Facility
2002 Enrollment = 27

Total Elementary Enrollment
2002 = 133
1990 = 89

SCHOOL DISTRICT #23 ENROLLMENTS 1990 – 2002

YEAR	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002
PK–8	89	93	136	141	138	147	147	144	139	131	120	133	133
TOTAL	**89**	**93**	**136**	**141**	**138**	**147**	**147**	**144**	**139**	**131**	**120**	**133**	**133**

SCHOOL DISTRICT #23 FACILITIES

SCHOOL NAME	ADDRESS	YEAR BUILT	ACREAGE	BUILDING IMPROVEMENTS
Elysian Elementary	6416 Elysian Rd. Billings, MT	Data not available	Data not available	Data not available

SCHOOL DISTRICT #24 – HUNTLEY PROJECT SCHOOLS

Elementary Schools (pre-K – 6)
1 Facility
2002 Enrollment = 373

Middle Schools (7-8)
1 Facility
2002 Enrollment = 137

Total Elementary Enrollment
2002 = 510
1990 = 494

High Schools
1 Facility
2002 Enrollment = 262

SCHOOL DISTRICT #24 ENROLLMENTS 1990 – 2002

YEAR	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002
PK - 8	494	485	501	520	540	****	****	****	****	****	****	510	510
9 - 12	180	177	204	226	241	786	794	755	742	761	782	262	262
TOTAL	**674**	**662**	**705**	**746**	**781**	**786**	**794**	**755**	**742**	**761**	**782**	**772**	**772**

**** enrollments combined after 1994

SCHOOL DISTRICT #24 – FACILITIES

SCHOOL NAME	ADDRESS	YEAR BUILT	ACREAGE	BUILDING IMPROVMENTS
Huntley Project School	1477 Ash St. Huntley, MT	Data not available	Data not available	Data not available

SCHOOL DISTRICT #26 – LOCKWOOD SCHOOLS

Elementary Schools (pre-K – 2)
1 Facility
2002 Enrollment = 418

Intermediate Schools (3-5)
1 Facility
2002 Enrollment = 399

Total Elementary Enrollment
2002 = 1,194
1990 = 1,157

Middle Schools (6-8)
1 Facility
2002 Enrollment = 377

SCHOOL DISTRICT #26 ENROLLMENTS 1990 – 2002

YEAR	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002
PK– 8	1,157	1,197	1,228	1,252	1,248	1,262	1,239	1,266	1,251	1,244	1,227	1,194	1,194
TOTAL	**1,157**	**1,197**	**1,228**	**1,252**	**1,248**	**1,262**	**1,239**	**1,266**	**1,251**	**1,244**	**1,227**	**1,194**	**1,194**

SCHOOL DISTRICT #26 FACILITIES

SCHOOL NAME	ADDRESS	YEAR BUILT	ACREAGE	BUILDING IMPROVEMENTS
Lockwood Elementary	1932 Highway 87E Billings, MT	Data not available	Data not available	1996 (HC ramps) 1998 & 1999 (additions) 1998 -2002 (remodels) 2002 (roof)

SCHOOL DISTRICT #37 – SHEPHERD PUBLIC SCHOOLS

Elementary Schools (pre-K – 6)
1 Facility
2002 Enrollment = 470

Middle Schools (7-8)
1 Facility
2002 Enrollment = 148

Total Elementary Enrollment
2002 = 618
1990 = 501

High Schools
1 Facility
2002 Enrollment = 274
1990 Enrollment = 208

SCHOOL DISTRICT #37 ENROLLMENTS 1990 – 2002

YEAR	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002
PK -8	501	511	545	550	572	540	539	544	558	575	584	618	618
9 – 12	208	216	245	262	285	296	299	318	295	274	276	274	274
TOTAL	**709**	**727**	**790**	**812**	**857**	**836**	**838**	**862**	**853**	**849**	**860**	**892**	**892**

SCHOOL DISTRICT #37 FACILITIES

SCHOOL NAME	ADDRESS	YEAR BUILT	ACREAGE	BUILDING IMPROVEMENTS
Shepherd Public School	7842 Shepherd Rd Shepherd, MT	Data not available	Data not available	Data not available

SCHOOL DISTRICT #41 – PIONEER SCHOOL

Elementary Schools (pre-K – 6)
1 Facility
2002 Enrollment = 58

Total Elementary Enrollment
2002 = 58
1990 = 67

SCHOOL DISTRICT #41 ENROLLMENTS 1990 – 2002

YEAR	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002
PK – 6	67	81	69	74	72	66	62	53	58	71	61	58	58
TOTAL	**67**	**81**	**69**	**74**	**72**	**66**	**62**	**53**	**58**	**71**	**61**	**58**	**58**

SCHOOL DISTRICT #41 FACILITIES

SCHOOL NAME	ADDRESS	YEAR BUILT	ACREAGE	BUILDING IMPROVEMENTS
Pioneer Elementary	1937 Dover Rd Billings	Data not available	Data not available	Data not available

SCHOOL DISTRICT #52 – INDEPENDENT SCHOOL

Elementary Schools (pre-K – 6)
1 Facility
2002 Enrollment = 237

Total Elementary Enrollment
2002 = 237
1990 = 165

SCHOOL DISTRICT #52 ENROLLMENTS 1990 – 2002

YEAR	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002
PK -6	165	168	175	184	192	203	223	226	226	231	238	237	237
TOTAL	**165**	**168**	**175**	**184**	**192**	**203**	**223**	**226**	**226**	**231**	**238**	**237**	**237**

SCHOOL DISTRICT #52 FACILITIES

SCHOOL NAME	ADDRESS	YEAR BUILT	ACREAGE	BUILDING IMPROVEMENTS
Independent Elementary	2907 Roundup Rd. Billings, MT	Data not available	Data not available	1996 (roof), 1998 (addition)

SCHOOL DISTRICT #58 – YELLOWSTONE ACADEMY

Elementary Schools (pre-K – 8)
1 Facility
2002 Enrollment = 63

Total Elementary Enrollment
2002 = 63
1990 = 85

SCHOOL DISTRICT #58 ENROLLMENTS 1990 – 2002

YEAR	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002
PK -8	85	39	41	41	43	41	50	46	57	63	61	63	63
TOTAL	**85**	**39**	**41**	**41**	**43**	**41**	**50**	**46**	**57**	**63**	**61**	**63**	**63**

SCHOOL DISTRICT #58 FACILITIES

SCHOOL NAME	ADDRESS	YEAR BUILT	ACREAGE	BUILDING IMPROVEMENTS
Yellowstone Academy	1732 S. 72nd St West Billings, MT	Data not available	Data not available	1999 and 2001 (additions)

YELLOWSTONE COUNTY PUBLIC SCHOOL ENROLLMENTS
1970, 1980 AND 1990 – 2002

YEAR	1970	1980	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002
PK - 8	14,802	14,359	15,371	15,632	15,893	15,908	15,738	15,773	15,712	15,628	15,447	15,337	15,115	15,144	15,095
9 - 12	7,039	6,381	5,597	5,756	5,996	6,326	6,370	6,518	6,531	6,592	6,647	6,757	6,700	6,797	6,823
TOTAL	**21,841**	**20,740**	**20,968**	**21,388**	**21,889**	**22,234**	**22,108**	**22,281**	**22,243**	**22,220**	**22,094**	**22,094**	**21,815**	**21,941**	**21,918**

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4.6 Natural Environment

Introduction

The physical environment of Yellowstone County has strongly influenced the economic, social, and physical development of the County. The following subchapters on climate, vegetation, wildlife, soil, geology, and hydrology describe the physical environment of Yellowstone County. The purpose of this section is to provide enough information on the physical conditions that future land use controls can take into account the unique constraints and opportunities presented by the natural environment.

Summary of Environmental Issues

Climate

Yellowstone County enjoys a relatively mild climate and experiences few significant weather events during an average year. Extremely low temperatures, less than 0 degrees Fahrenheit, may prevail in the winter for short periods of time. High wind events are possible in the spring and summer and may include rare tornadic activity. Heavy rainfall is rare, but localized thunderstorms can deposit significant rainfall in a small area resulting in flashfloods. Flooding is a problem on the Yellowstone River and tributaries particularly when warmer temperatures rapidly melt snow and ice during spring breakup.

Vegetation and Wildlife

The major vegetation type in the County is grassland which supports, in addition to domestic livestock, a healthy population of deer, antelope and several small mammal species. Critical to the survival of many native species are the riparian and prairie wetland habitats. In the semi-arid terrain, access to water, forage and cover these habitats provide increase their importance to wildlife. Weeds are a threat to all vegetation types, including cultivated crops. Yellowstone County has an aggressive weed management program that focuses on noxious weed containment and eradication. Most of the conflicts between humans and wildlife occur at the urban and wildland interface. This area is most susceptible to wildlife habitat destruction and noxious weed invasion.

Soil

The soil units in Yellowstone County are generally derived from nearby bedrock sources, or from transported alluvial sediments. Soils formed in place tend to contain high amounts of clay, silt and sand and low amounts of organic material. These soils are located on the higher terraces and hills north and south of the Yellowstone River valley. Many of these soils are suited only for rangeland but some support dryland cultivation. The transported soils found in the valley are more loam rich and highly suited to cultivation, especially when irrigated. The Yellowstone River valley in the vicinity of Billings and Huntley Project possesses some of the most productive soil in the State. These soils are designated as Prime Agricultural Soils by the Natural Resource Conservation Service.

Geology

Much of the geology of Yellowstone County is starkly visible when viewed from the sandstone rims north of downtown Billings. To the south, the view encompasses the broad Yellowstone River valley composed of several alluvial benches. Across the valley a wide terrace underlain by early Cretaceous and Jurassic sedimentary formations ramps gently upward towards the Pryor Mountains. These formations are composed predominantly of shale. Near Billings and north of the river valley, the eye is drawn to the prominent sandstone cliffs formed by the resistant Eagle Formation. The plains north of the Yellowstone River are broken by a series of northeast trending faults which expose interbedded shale and sandstone of the Judith River Formation. The geology of the County presents both obstacles and opportunities. Shallow bedrock and unstable slopes can pose difficulties for construction. However, near surface gravel and coal deposits have contributed to the area's economic development.

Hydrology

Clean water and reliable flows are critical for human consumption, agricultural production, wildlife and recreation uses. Yellowstone County is dependent on the main source of water, the Yellowstone River, for all these reasons. While there are numerous tributaries to the Yellowstone River, few carry water year round. Because of the scarcity of surface water, early settlers to the area constructed elaborate ditch systems to carry water from the Yellowstone River to the higher benches. Ditches continue to play an important role for groundwater recharge and agricultural production. Except in the alluvial deposits within the river valley, groundwater is scarce and usually found at depths too great to be economically developed. Within the valley, groundwater can be found at very shallow depths and susceptible to contamination from surface uses.

4.6.1 Climate

Introduction

Climate determines many of the economic and social activities that take place in Yellowstone County. Precipitation amounts and timing are critical for land management decision by farmers and ranchers and others directly affected by weather conditions. Temperature, snow loads and wind extremes determine housing styles and cost, and dictate the feasibility of urban activities. Climate also affects the cost of providing many public services. For the most part, climate is uncontrollable and the only available recourse is management of social and economic activities around it.

Yellowstone County's complex topography and lack of common slopes or drainage pattern result in a wide variety of local microclimates. In general, the Yellowstone River valley, where most urban settlement occurs, has the greatest range of highs and lows. The areas outside of the river valley tend to have lower temperatures. Precipitation rates vary along a west to east gradient, dropping significantly from Laurel to Custer. Winter Chinooks originating in the mountains move northeastward through the County, moderating winter temperatures. Cold fronts from the north tend to affect the eastern highlands more than they do the rest of the County. Cultivated lands usually experience little variance in the growing season, which averages 129 days, normally extending from mid-May through mid-September.

Billings, elevation 3,100 to 3,500 feet, is situated between the Great Plains and the Rocky Mountains. The climate takes on some of the characteristics of both regions. The climate is semi-arid. The favorable seasonable distribution of rainfall in the spring and fall months, along with irrigation, makes it possible to raise a variety of crops. The average annual rainfall is 15.09 inches, with an average of 57 inches of snow. Forty percent of the precipitation falls in the wet spring months of April, May and June. Winters are cold, but usually not severe. January's average maximum is 30 degrees and minimums average 12 degrees. Summers are warm with good sunshine and low humidifies, but the nights are generally cool. July's average maximum is 87 degrees and average minimum is 58 degrees.

General climatic trends can be examined in terms of precipitation, temperature and wind velocity. Two monitoring and recording stations are located in the County, one at the Billings Logan International Airport administered by the National Weather Service (NWS) and the other at the Huntley Experimental Station near Ballantine.

Temperature

Data about climatic averages was obtained from NWS. Extremes in temperature have ranged from 106° F in 1937 to -38° F in 1936. The average number of days per year with temperatures of 90° F or above is 28. The number of days with the temperatures 32° F and below is 48. The percentage of possible sunshine averages 62 percent; 48 percent in winter, 61 percent in spring, 72 percent in summer, and 59 percent in the fall.

Precipitation

Average annual precipitation is 15.09 inches, one-third occurs in May and June. Average snowfall is 57 inches. The maximum monthly rainfall recorded was in May 1981, while the maximum 24-hour rainfall was recorded at 3.19 inches in April 1978. Minimum monthly rainfall was a trace in November 1954. The maximum monthly snowfall was 42.3 inches in April 1955, while the maximum in 24 hours was 23.7 inches, also in April 1955.

Wind

Average wind speeds are greatest during the winter months when they range from 10.5 miles per hour to 12.5 miles per hour. The most blustery month is December when wind speeds average 12.5 miles per hour. Winds are slowest in July and August when speeds average 9.0 miles per hour. The average prevailing wind is from the southwest. In June 1968, the extreme wind speed of 79 mph was recorded. The City Building Division requires structures to comply with design standards for a wind load of 80 miles per hour, exposure C.

Snow

Snow depths are typically low in the winter months with greatest average depth of 3 inches occurring in January. Snow fall is greatest between the months of January and April. Snow loading can be a problem for construction. The roof snow load design criterion for Yellowstone County is 30 pounds per square foot.

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4.6.2 Vegetation and Wildlife

Introduction

The existence or absence of particular species of plants and animals helps define a region's geography and relative environmental health. Documenting existing conditions can help shape a regional plan to help conserve sensitive species, identify areas requiring noxious weed control, reduce conflicts in the urban and wildland interface and guide land use decisions in general. Certain plant and animal species are indigenous to this region of Montana while others have been introduced over the past century. This section defines and describes the existing conditions of both vegetation and wildlife found in Yellowstone County. Types and populations of species, their distribution throughout the region and the health and abundance of significant habitats are presented. The major categories in this section include Vegetation, Wildlife Habitat, Wildlife, and Areas of Conflict.

Vegetation Types

Located in the Northern Great Plains, Yellowstone County's vegetation is shaped by the semi-arid and arid conditions that predominate the region. Soil disturbance, drought conditions and catastrophic natural events such as wildfire and flooding also influence the types of vegetation that have adapted to this region. Low moisture conditions combined with high evaporation rates limit native plants to grasses, a few native wildflowers, shrubs and several tree species. In riparian zones along natural streams and irrigation canals and in isolated wetlands, there are pockets of hydrophilic plants.

Grasses are the dominant plant species best adapted to survive the climate in Yellowstone County. Most native grasses are perennial, cool-season, short grasses such as Western wheatgrass.

Coniferous and deciduous tree species are both native to the County, but only a few can survive the climate without human assistance. The native deciduous species, including cottonwoods, are found primarily in the riparian zones throughout the County. Conifers, such as Ponderosa pine are restricted to the 12-14-inch precipitation zone and further limited in much of the County to north faces and deeper coulees and draws that provide

TABLE 1: YELLOWSTONE COUNTY LAND USE AND VEGETATION TYPE

Acres	Vegetation/Land Use Type	Percent of County Land
44,000	Urban/built	2.6%
260,618	Cropland/pasture	15.4%
1,211,708	Rangeland	71.6%
77,847	Woodland	4.6%
98,155	Irrigated lands	5.8%
1,692,330		100.0%

adequate moisture and protection from drying winds. The Bull Mountains and the higher, cooler area in the northeastern portions of the County are more hospitable to coniferous tree growth than the remainder of the County.

Vegetation Classifications

For the purposes of the Growth Policy, vegetation can be divided into five broad functional classifications. These classes are 1) grasslands, 2) scrub and shrub lands, 3) woodlands, 4) riparian and prairie wetlands, 5) and human introduced species including cultivated species, noxious weeds, and urban landscape species. Grasslands and forests are important economically for livestock grazing and the timber industry. Scrub and shrub lands provide cover and nesting areas for upland birds. Riparian areas and other wetland types supply significant habitat for migratory and native species of waterfowl and fish. In addition, wetlands help preserve the integrity of the adjacent waterways by slowing and filtering runoff and by retaining floodwaters. Introduced landscaping plants provide shade, beauty and other aesthetic values in the urban landscape but may become invasive in the natural landscape. Cultivated crops are the mainstay of the County's agricultural economy. Invasive and noxious weeds in cultivated croplands are a major economic and ecological challenge.

The U.S. Department of Agriculture, Natural Resource and Conservation Service (NRCS) range site classifications and plant list are the most comprehensive and definitive for native vegetation. The NRCS classifies the rangeland vegetative types of Montana into five broad geographic zones. These are further divided into range site types, which include riparian, woodlands, and saline-tolerant range sites. Yellowstone County is included in two broad geographic zones: the Eastern and Western sedimentary plains. These range sites are for rangeland purposes and do not include urban areas and cultivated croplands. The percent of land in Yellowstone County covered by each of the vegetation types and land use is presented in Table 1. These data were compiled in 1972 and were obtained from the NRCS.

Grasslands

Prior to settlement by pioneers, grasslands in the County supported a complex and balanced mixture of grazing and burrowing animals and predators. The native plant communities and associated soils evolved under this natural grazing pressure. The County's grasslands have been classified in a number of different ways, but the generic name for this portion of the Northern Great Plains is the Mixed Grasslands. Generally dominant grasses are Idaho fescue, needle and thread and western wheatgrass.

Grasslands provide excellent habitat for grazing wildlife species including White-tailed deer, Mule deer and Pronghorn antelope. In addition, upland game and non-game bird species, such as Sage

grouse and Ring-necked pheasant prefer these grassland habitats. These intact grassland areas help support the recreation-based industries in Yellowstone County including guide services and tourism.

Scrub and Shrub lands

Range plants, primarily grasses, provide the forage necessary for raising cattle and other domestic livestock. This forage production is accomplished without the high inputs that are required for cultivated crops and pasture and provides an inexpensive source of feed for county livestock producers.

Woodlands

Total acreage in distinct woodlands is minimal when compared to the grasslands, but some commercial timberland does exist in the County. The common timber species is juniper, the next most abundant conifer in the County, has no commercial timber value but is an important habitat species for wildlife.

Woodlands not considered commercial timberlands do provide limited wood products for local consumption, such as firewood and fence posts. Forested lands provide wildlife habitat and add to the diversity of habitats in the County.

The deciduous woodlands in the riparian areas provide diversity in terms of wildlife habitat and aesthetics. Cottonwoods are particularly adapted to the natural flooding patterns in the Yellowstone River and its major tributaries.

Riparian and Prairie Wetlands

Riparian and wetland plant species form distinct and complex plant communities. These communities form along perennial streams and rivers, as well as some ephemeral streams, seeps and springs. Man-made canals and irrigation ditches can also promote the formation of riparian type areas but do not provide all of the wetland functions of naturally occurring riparian zones. Wetlands are composed of specific plant communities adapted to saturated soil conditions. Riparian wetlands exist where the natural flow of rivers and streams has been allowed to remain. The distribution and abundance of these areas in Yellowstone County are limited.

Plant species commonly associated with riparian areas are cottonwood, usually the dominant tree species, and willows, the dominant shrub. Numerous grasses and sedges are also found in these areas including broadleaf cattail and western wheatgrass. The Montana Natural Heritage Program recently completed an inventory of biological resources in the Upper Yellowstone River watershed from the headwaters in Yellowstone Park downstream to the northeastern boundary of Yellowstone County. Riparian vegetation has a number of critical roles including soil stabilization, transport and storage of nutrients and other chemicals in the water column and forage and habitat for numerous wildlife species. Isolated or prairie wetlands are important stopover points for migratory waterfowl.

The rarity of wetlands of all types in Yellowstone County and their critical role in maintaining and conserving water quality require close attention to land use practices in their proximity.

Cultivated Species, Weeds and Urban Landscape

A large number of plant species are cultivated as commodity crops or have been used in rangeland plantings. Included in this category are the numerous varieties of residential and commercial landscaping plants grown throughout the County. Crop and rangeland plants are discussed in detail in the Land Use section and landscape species are discussed in the "Urbanized Landscape" subsection below.

TABLE 2: MONTANA WEED SPECIES

Category 1 (currently established in MT)	Category 2 (recently introduced in MT)	Category 3 (not yet detected in MT)
Canada thistle	dyers woad	yellow starthistle
field bindweed	purple loosestrife	common crupina
whitetop	tansy ragwort	rush skeletonweed
leafy spurge	meadow hawkweed	
spotted knapweed	complex	
Russian knapweed	tall buttercup	
diffuse knapweed	tamarisk	
Dalmatian toadflax	rush skeletonweed	
St. Johnswort		
sulfur cinquefoil		
common tansy		
ox-eye daisy		
houndstongue		

Source: MSU Extension Service, 2002

Cultivated crop production has an impact on the environment. Native plant communities are eliminated in favor of introduced monoculture species. This monoculture technique is highly susceptible to diseases and pests and requires the application of fertilizers, pesticides, fungicides and herbicides. Wildlife species adapted to specific plant communities are dislocated to areas more suited to their habitat requirements.

A noxious weed is any plant designated by federal, state, or county government to be injurious to public health, agriculture, recreation, wildlife or any public or private property. Noxious refers to those weeds that have invasive characteristics. Noxious weed infestations throughout Montana led to the enactment of the County Noxious Weed Management Act of 1985 (7-22-2101 through 7-22-2153, MCA). Defined as weeds by this act are any exotic plant species established or that may be introduced in the state which may render land unfit for agriculture, forestry, livestock, or other beneficial uses. Species classified as noxious weeds throughout Montana are listed in Table 2. County weed control districts may add other species to this list if they are a problem in their districts.

Yellowstone County has several areas with populations of leafy spurge and Russian knapweed most of these are associated with the lands along the Yellowstone River and areas of Canyon Creek and Shepherd. There are numerous areas with field bindweed and Canada thistle including most urbanized areas of the County. Whitetop has been found to be a common weed in subdivisions under construction.

Transporters of noxious weeds include domestic livestock, vehicles, contaminated seed crops, poorly managed sand and gravel extraction and contaminated fill material. The Yellowstone County Weed Control District is implementing aggressive, integrated weed control measures within the transportation corridors of Yellowstone County. Yellowstone County Weed Control is facilitating weed control on various designated public lands. The U.S. Bureau of Land Management, Montana Fish, Wildlife and Parks Department, Montana Department of Transportation, and others are working together with Yellowstone County to initiate ecologically sound weed control practices on their properties. Soil disturbance associated with development and construction, road construction, or re-construction is also largely responsible for the spread of new noxious and undesirable week infestations.

Noxious weed control requires various mechanical, chemical or biological approaches to remove the invasive plants. Current county weed control efforts are hindered by a lack of adequate funding and the incorporated cities to develop comprehensive weed management plans for financial commitments that support the efforts of the County Weed Control Board.

Urban and suburban areas within the County depend upon landscaping for aesthetic values. Urban trees provide many practical benefits such as shade, increased humidity and dissipation of heat collected on hard surfaces such as asphalt and concrete. Residential and commercial landscaping is used to screen out visual detractions and act as a buffer against urban noise. Lawns and grass swales soften and break the monotony of the urban landscape and serve as filters for stormwater runoff. Lawns maintain a semi-permeable soil surface, allowing storm water to infiltrate the soil surface and recharge local groundwater supplies.

The Billings' area has the greatest concentration of urban landscaping in the County. Most of the landscape species are not native to this region but are tolerant of the regions weather. The City of Billings Parks, Recreation and Public Lands Department is responsible for the City's urban forestry program.

Wildlife

Wildlife is an integral part of the native Northern Plains prairie. A complex interaction exists between wildlife, native vegetation, and, indirectly, soils. Agricultural land uses, mineral extraction, and urban uses have radically altered this interaction. Many wildlife species are not compatible with agriculture, urban development, or any intensive land use. However, various management techniques can mitigate the intensity of this incompatibility, assisting in providing adequate habitat and opportunities for diversity among wildlife species, while at the same time allowing the use and development of affected lands.

For general management purposes, wildlife is often considered in terms of habitat requirements. That approach will be used in this plan since land use affects habitat. Food and cover, the prime requirements for wildlife survival, are directly related to habitat. Habitat must be considered in terms of time and space, providing a desirable mix of food and cover through all seasons.

Basic habitat types and generic locations will be used rather than site-specific information. No attempt will be made for this element to perform counts or any type of wildlife census since such data gathering requires extensive fieldwork. Although space limitation led to an emphasis on larger game animals, all wildlife (game, non-game, vertebrates and non-vertebrates) are important.

Animal Species of Concern

Portions of Yellowstone County lie within the Greater Yellowstone Ecosystem and may support animal species that migrate from the higher elevations to the Yellowstone River. Of particular concern, though no sightings have been reported, are the gray wolf and the North American lynx. Both species require large, unfragmented habitat

and would be considered rare in the County. More likely to occur within the County are species that populate grassland and shrublands such as the black-tailed prairie dog, the mountain plover, and the greater sage grouse. Two reptile species associated with drier habitats include the mild snake and western hognose snake. The riverine and associated riparian habitats are important to a variety of animal species. The sauger, a fish species, was recently added to the species of special concern list because of population declines. The bald eagle, which nests in the riparian forests, is listed as a threatened species. Other species of concern include the harlequin duck and the redheaded woodpecker. The river otter, also a species of concern, inhabits the Yellowstone River.

Grassland and Shrub Land Species

This habitat is the most common throughout the County, being found in all geographic regions. Most species can be found in grasslands and shrublands during some point in the year, although some use grasslands primarily for winter range. Antelope forage on various vegetative types, depending upon the availability and palatability, with sagebrush being their primary winter food. The Bull Mountain elk use grasslands on occasion, as do sage grouse and sharp-tailed grouse. Sage grouse use sage for their primary winter feed and cover. Sharp-tailed grouse have been observed using the upland grasslands for mating, nesting and brood raising. In the Bull Mountain region, turkeys use the grasslands during the summer months.

Woodland Species

While not an extensive habitat type, these areas are heavily used during certain seasons of the year by mule and white-tailed deer and elk, primarily for thermal or escape cover and resting areas. Sharp-tailed grouse use woodlands for cover and seasonal shifts in diet. Pheasants can be found in these areas, usually when they are adjacent to grain crops and weeds that are used as food sources. Ponderosa pine woodlands provide turkeys with escape cover, roosting sites and food.

Riparian/Wetland Species

Numerous species, both game and non-game, find this habitat critical for their continued survival. Waterfowl are the most dependent, as they require nesting, brooding, and feeding areas located in these habitat types. White-tailed deer depend heavily on the deciduous woodlands located in river bottomlands throughout the County, using the zones year round. Mule deer use the areas for winter range as it provides cover and food when other ranges are unusable. A large number of raptor species; owl, hawk, and Golden eagle) use these riparian and wetlands for nesting and brood raising.

Fisheries

With the exception of the Big Horn River, most of the rivers and streams in Yellowstone County support warm water fisheries. The Yellowstone River contains cold water species as it enters the County from the west, but the influence of warmer water from smaller tributaries raises the temperature to the point that most cold water fisheries decline in the eastern river segments. Game fish in the cold water environment include brown trout and rainbow trout while the warmer water support channel catfish and walleye.

There are few reservoirs and lakes in Yellowstone County that support game fish, but a few such as Lake Elmo and Broadview Pond, support largemouth bass and northern pike.

Areas of Conflict

Urban and Wildland Interface

Urban areas throughout the County provide a multitude of opportunities for various wildlife species. Houses and other buildings provide nesting sites for sparrows, starlings, pigeons and other bird species. Landscaping plants provide a wide variety of nesting and food sources not found in the "natural" environment. The urban environment is limiting because it lacks sufficient quantity and quality of vegetation. Birds appear to adapt easier to urban environments than most mammals, possibly because of their greater mobility.

While the urban landscape may prove sufficient for sustaining wildlife, often conflicts exist between urban dwellers and the species of wildlife involved. The coyote, various rodents and some birds provide ample evidence of this problem.

Agricultural lands include cultivated cropland, pastures and intensively managed rangelands. Most wildlife in the County utilizes these lands at some time during the year.

Windbreaks are another distinct habitat provided by the agricultural community, and numerous species of mammals and birds utilize these areas. These lands provide an island of high quality cover for security and feed in a sea of cultivated fields.

Irrigation canals and water diversions throughout the County provide abundant habitat for various aquatic and amphibian species. These canals also provide hiding and movement cover for other wildlife.

From a land use perspective, wildlife is affected primarily by the loss of habitat that occurs with development. Many times this conflict is direct, occurring with development of primary ranges. At other times the conflicts are not so clear, occurring with development of winter ranges, breeding and nesting sites and areas utilized only during a portion of the year. Secondary effects arise from changes in diet, pollutants, poisons, noise and other hazards that are associated with human settlement and use. A common and widespread problem is the effect dogs and other pets can have on wildlife. Dogs in particular are very disruptive to wildlife, especially on winter ranges.

The rural-urban interface is where much of the conflict between wildlife and development occurs. The conversion of croplands and rangelands into urban uses reduces available habitat for some species, although it may increase habitat for other species. Conversion of land to other uses or increased activity in natural areas for energy or other mineral developments increases the potential for people-wildlife conflicts.

Utility corridors for pipelines and power lines have much the same effect, but usually temporarily. Much of this conflict arises from the construction of roads through winter ranges and security habitat, allowing increased hunting pressures to occur. Road construction can hinder as well as aid in wildlife movement. For example, there may be increased poaching of game animals and increased road kills for all species of wildlife.

However, many conflict situations are highly variable and depend upon factors such as surrounding land uses, amount and severity of development, and type of animals involved. The key issue often is whether any other suitable habitat exists for displaced wildlife to move onto. There are no set answers, and each situation must be addressed on a site-by-site basis.

Wildlife pests are identified as those wildlife that cause damage or destruction of crops. Pests such as the Columbian and Richardson ground squirrel can cause a substantial amount of damage if their populations increase with large areas being impacted. Predators are those carnivores identified as preying on domestic livestock. Predators can and often do cause extensive damage to livestock. The young of any domestic animal are especially vulnerable to coyote, eagles or wolves. This aspect of wildlife and agriculture has been a constant source of controversy

for years. The basic problem is the predator-prey relationship, with domestic livestock being substituted for "natural" prey.

The grazing and browsing wildlife species common to the County do cause extensive damage to croplands and rangelands by over-utilizing plants, especially in winter and early spring. Often this occurs when wildlife winter ranges have been used for domestic livestock or development forces wildlife onto alternate range sites. Overuse causes the development of bare soil (increased erosion and compaction) and severely weakens or kills overused plants.

Increased land development usually results in increased road construction, which has proven to be a major source of sediment. This sediment alters the aquatic environment for both spawning and successful rearing of young fish. Stream obstructions such as culverts and dams alter spawning runs and migratory patterns.

A critical and potentially devastating problem for the aquatic environment is the possibility of toxic materials spills, such as oil, gas, and herbicides. Any of these materials can severely damage an aquatic environment. The loss or potential loss of streamside cover (riparian vegetation) can lead to the warming of a stream and increased sediment production from surrounding stream banks as well as the loss of hiding cover furnished by overhanging vegetation.

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4.6.3 Soil

Introduction

The most recent version of the "Soil Survey of Yellowstone County, Montana was published in 1972 by the U. S. Department of Agriculture Soil Conservation Service and U. S. Department of the Interior Bureau of Indian Affairs, in cooperation with Montana Agricultural Experiment Station. The general soil map included with the survey shows the soil associations for the County. Soil associations are landscapes that have a distinctive proportional pattern of soils, normally consisting of one or more major soils and at least one minor soil, and named for the major soil map units. This chapter provides a description of each soil association in the County and discussion on the suitability and limitations of individual soil units for specific applications. Some soil associations are inherently important because of special characteristics. These characteristics may increase or decrease the ability of the land to support a certain use. Soils of special importance discussed at the end of this chapter include prime agricultural soil, saline soil, and swelling clay soil.

Soils of Shale and Sandstone Uplands

The County soils found on the shale and sandstone uplands vary from shallow to moderately deep, are well drained, and located on undulating hills or steep slopes. Although most of these soils are located north of the Yellowstone River, some are also found in the southwestern and southeastern parts of the County. The eight soil associations on the shale and sandstone uplands and a description of each association and its major soils follow.

Bainville-Elso-McRae Association
These undulating to hilly soils are located on the plains north of the Yellowstone River in winding valleys and coulees separated by knolls and ridges. Streams flow intermittently, and drainage is into the Yellowstone. Vegetation includes grasses, shrubs, scattered pines and juniper trees, and a few cottonwood trees. The association encompasses 30 percent of the County, and the major soils are well drained. Between 45 and 60 percent of the association are Bainville soils, 20 to 35 percent Elso soils, 10 to 20 percent McRae soils, and the remainder are minor soils. Bainville soils are on slopes of 4 to 25 percent, and bedrock is at a depth of 20 to 40 inches. Elso soils have slopes of 20 to 35 percent, and the depth to bedrock is 10 to 20 inches. McRae soils are deep. As the soils are steep and shallow to bedrock and precipitation is low, the association is more suitable for grazing cattle than for crops. Drilled wells are the most reliable source of water.

Cushman-Bainville Association
This soil association is located on rolling and undulating uplands. The association is mostly in the northwestern part of the County, and small areas are scattered about the northern half. Bedrock is silty and loamy shale and sandstone; drainages are shallow. Vegetation is mostly grasses, forbs, and shrubs. Seven percent of the County is in this association. Cushman soils represent 45 percent of the association. Bainville is 40 percent, and minor soils comprise the rest. The major soils are well drained. Cushman soils are gently to moderately sloping. Bainville soils are sloping. Depth to the underlying shale and sandstone varies from 20 to 40 inches in the major soils. Most of the association soils have been or are used for dryland farming. No streams flow in the association, so wells and surface reservoirs supply stock water.

Worland-Bainville-Travessilla Association
Found in the northeast quarter of the County, this association consists of soils on sandstone and loamy shale in hilly upland terrain. Streams flow only when there is rapid snow melt or after hard summer rains. Grasses, sagebrush, and sumac are the main vegetation. There are also scattered pine and juniper trees and a few cottonwood trees. The association encompasses 5 percent of the County: 40 percent is

Worland, 30 percent Bainville, and 15 percent Travessilla soil units. The balance of the association is in minor soil units. All soils except the Worland are well drained. Worland soils are somewhat excessively drained and are on ridges and knolls with outcrops of soft sandstone; bedrock is 20 to 40 inches. Bainville soils are on broad ridges and knolls without sandstone outcrops, and bedrock is at a depth of 20 to 40 inches. Travessilla soils are on ridges and knolls where hard sandstone outcrops and on the tops of sandstone ledges. Hard sandstone is at a depth of 10 to 20 inches. Nearly all of the association is used only for grazing cattle because of the low annual precipitation, steep slopes, and shallow soils. Wells and surface reservoirs supply stock water.

Bainville-Travessilla-Rock Land Association

This soil association includes moderately steep to steep soils on uplands northeast of Shepherd and on the south slopes of the Bull Mountains. The landscape's most prominent features are vertical ledges of sandstone 20 to 50 feet thick. Drainages are tributaries of the Yellowstone River, including the headwaters of several creeks. Vegetation consists of grasses, sagebrush, rabbit brush, skunk bush, sumac, red cedar, and ponderosa pine. Eight percent of the County is contained in this soil group. Forty percent are Bainville soils, 25 percent Travessilla, 20 percent Rock land, and the rest minor soils. Bainville soils are moderately steep, well drained, and underlain by platy shale and sandstone at a depth of around 30 inches. Travessilla soils are excessively drained and lie immediately above sandstone ledges and outcrops; hard sandstone is at a depth of 10 to 20 inches. Rock land consists of sandstone ledges and escarpments and exposed shale. The association's steep slopes, low annual precipitation, and shallow soils lead to its primary use, cattle grazing. Pumped wells are the most reliable source of livestock water.

Wormser-Lavina-Razor Association

The undulating to rolling soils on plateaus and uplands in the western part of the County are part of this association. Its drainages are mostly shallow and carry water only when rapid snowmelt occurs or when rains are heavy. Vegetation is primarily grasses, sagebrush, yucca, and a few cedar and ponderosa pine trees. Three percent of the County soils are in this association. Wormser soils include 55 percent of the association, Lavina is 15 percent, Razor is 15 percent, and the rest are minor soils. All major soils are well drained. Wormser soils have a depth to shale and sandstone bedrock of 24 to 36 inches. The Lavina soils are directly underlain by shale and sandstone at a depth of 8 to 20 inches. Razor soils have a depth to soft and semi hard shale of 20 to 40 inches. Wormser and Razor soils can be used for small grains dryfarmed in a crop-fallow system, and Lavina soils are used for range. Wells are generally drilled in the deepest valleys, as springs do not occur. Some of the wide valleys found in this association around Billings are used for homesites.

Pierre-Lismas-Kyle Association

These rolling to moderately steep soils occur on eroded uplands underlain by clay shale. Approximately one-third lies between Shepherd and Acton, while the rest is scattered in the southern part of the County and along the south side of the Yellowstone River. The intermittent drainages are tributaries of the Yellowstone and Bighorn Rivers, and vegetation is mostly grasses, sagebrush, shrubs, and a few cedars. The soil group encompasses 11 percent of the County, with 35 percent of the association in Pierre soils, 35 percent in Lismas, 20 percent in Kyle, and the remainder in minor soils. Pierre soils are on smooth, broad ridges and hills and parts of the landscape not deeply cut by drainages; depth to shale bedrock is 20 to 40 inches. Lismas soils are on narrow, steep ridges and the sides of deep drainages. The depth to shale bedrock is 10 to 20 inches. Kyle soils are in troughs between low ridges and on the sides and bottoms of valleys. It has very gravelly loam, sand, or clay shale lying below a depth of 40 inches. The association is used most for grazing cattle. A reliable source of stock water is runoff water stored in reservoirs. Some Pierre and Kyle soils can be used for wheat and barley dryfarming, although crop growth depends on the amount of precipitation received during the growing season. A lot of water is avail-

able along the southern boundary of the association when snow melts or rains are heavy.

Midway-Heldt Association
Located mostly in the southeastern part of Yellowstone County, the sloping to moderately steep soils are found on alluvial fans and terraces and on uplands underlain by clay shale. They are drained by the headwaters of East Fork and Telegraph Creeks. Vegetation consists of grasses, broom snakeweed, and sagebrush. Two percent of the County is in the association. Midway soils represent 45 percent of the association, and Heldt soils comprise an additional 30 percent. Minor soils make up the balance, with 15 percent of the minor soils classified as Work soils. The soils are well drained. Midway soils are found on the tops and steep sides of ridges and hills and have a depth to partly weathered shale of less than 20 inches. Heldt soils, on fans, terraces, and valley slopes, have a depth to bedrock of over 48 inches. Most of the association is in the Crow Indian Reservation and is used for grazing cattle. Suitable sites and sufficient runoff water are available for stock water ponds. Heldt soils and Work soils, one of the association's minor soils, are suitable for dryland crops in a summer fallow system.

Maginnis-Absarokee Association
The association has undulating to steep soils occurring on a deeply dissected plateau, underlain by hard shale and sandstone. Three-fourths of the association is in southwestern Yellowstone County, and the remainder is in the southeastern part of the County. Streams flow only when there is snowmelt or heavy rains. The main drainages are Duck, Blue, and Spring Creeks. Vegetation consists of grasses, sagebrush, cottonwoods, wild roses, and some junipers. Seven percent of the County is part of the Maginnis-Absarokee association. Maginnis soils, equaling 40 percent of the association, are stony and steep, and bedrock is at a depth of 4 to 15 inches. Absarokee soils, 25 percent of the association, are on smooth plateaus between deep drainages. Depth to hard sandstone is 20 to 40 inches. Maginnis soil is used only for cattle grazing. The Absarokee and Amherst (minor soil) soils not in the Crow Indian Reservation are used for small grains dryland farming. Absarokee soils have few suitable sites for stock water ponds, but springs and seeps in the main valleys supply adequate water for livestock on Maginnis soils.

Soils of River Terraces, Low Alluvial Fans, and Flood Plains

Soils of river terraces and low alluvial fans are primarily deep, well drained or moderately well drained, and nearly level to gently sloping. Soils on flood plains are subject to overflow and have a water table that fluctuates near the surface. The soils of this entire group are found along major streams and on low river terraces throughout Yellowstone County, and the broadest area is between Billings and Laurel. Most of the area is either irrigated or used for communities. There are three soil associations in the County that are on river terraces, low alluvial fans, or flood plains.

McRae-Lohmiller-Keiser Association
These gently sloping to sloping soils are on terraces and fans built up by the large intermittent streams that flow into the Yellowstone River Valley. They are located between Billings and Laurel, and northeast of Shepherd and Huntley. Vegetation is mostly grasses, sagebrush, and rabbit brush. The association occupies seven percent of the County. McRae soils are 40 percent of the association, Lohmiller 25 percent, Keiser 20 percent, and the balance is minor soils. Major soils are well drained. McRae soils are on fans close to uplands bordering river valleys and depth to shale bedrock is 48 to 72 inches. Lohmiller soils are on low terraces and along intermittent stream channels draining the terraces. Depth to bedrock is more than 60 inches. Keiser soils are on high terraces underlain by gravel. Most of the soils are irrigated and the major soils are easily managed with good crop growth. Small grains are dryfarmed on the outer fringe of the river valleys. Cattle can graze crop residues and hay crops in winter. Some of the land west of Billings is used for housing.

Vananda-McKenzie-Arvada Association
The level to gently sloping soils of this association are on dry lake basins, terraces, and fans in the northwest corner of the County and on terraces northeast of Huntley. Distinct drainages are found at the outer edges of lake basins and on fans, and they carry water only when snowmelt or heavy rain occurs. The lake basins are undrained. Vegetation is western wheatgrass, sagebrush, and greasewood. Three percent of the County is in this association. Vananda soils comprise 50 percent of the association, McKenzie soils total 20 percent, Arvada has 20 percent, and the remainder is in minor soils. Vananda soils are well drained, level to gently sloping, and have a depth to bedrock of more than 60 inches. McKenzie soils are moderately well drained and occur in areas where water ponds, and greasewood and sagebrush do not grow. Depth to bedrock is over 60 inches. Arvada soils are moderately well drained and nearly level. Depth to bedrock is more than 40 inches. The major soils are clayey in the surface layer and subsoil and are very slowly permeable. They also contain sodium and other salts. Thus, they are better suited for range than farming.

Haverson Association
The association has level to gently sloping soils on flood plains and terraces of the Big Horn, Yellowstone, and Clarks Fork of the Yellowstone Rivers, and Pryor Creek. Sandy and gravelly soils occur along river channels and on islands, seeped and wet soils are found in oxbows and meanders. Vegetation is primarily cottonwoods, wild roses, buckbrush, and grasses. The water table is within 60 inches of the surface on flood plains, and soils are flooded during spring snowmelt. Willows, cattails, and sedges also grow along water-filled oxbows. Five percent of the County is in the association: 65 percent is Haverson soils. Haverson soils are well drained and occur on terraces, and depth to loose sand and gravel is more than 60 inches. Soils on flood plains and islands are used mostly for cattle grazing. Terrace soils and soils found in the smaller stream valleys are irrigated or dry farmed. Dry farmed small grains and hay and pasture plants grow moderately well, while irrigated sugar beets, dry beans, corn for silage, alfalfa, and small grains grow well.

Soils of High Terraces and Benches

These soils are moderately deep to deep, and clayey and loamy. They are well drained and vary from nearly level to steep. As their name suggests, the soils are found mostly on high terraces along rivers and on benches south of the Yellowstone River and are used for grazing, dryland farming, and irrigated crops. Three soil associations are on high terraces and benches in the County.

Bew-Allentine Association
The level to sloping soils of this association are on terraces south of Shepherd and west of Huntley. The intermittent drainages are tributaries of the Yellowstone River. Vegetation consists of grasses, sagebrush, and greasewood. This association occupies one percent of the County. Bew soils comprise 60 percent of the association, and Allentine is 20 percent. Minor soils make up the balance of the association. Major soils are well drained. Bew and Allentine soils have a depth to bedrock of over 60 inches. Nearly all of the association is in irrigated small grains, corn for silage, and hay and pasture.

Wanetta-Keiser Association
The association has level to steep soils on gravel capped sandstone and shale uplands along the Yellowstone and Bighorn Rivers, and east of Pryor Creek. Vegetation includes grasses, sagebrush, yucca, skunkbush, sumac, and Ponderosa pine and juniper. Seven percent of the County is found in this association: 35 percent Wanetta soils, 30 percent Keiser soils, and the rest hilly, gravelly land and minor soils. Major soils are well drained. Wanetta soils are on smooth terraces between deep drainages, and depth to gravel is 20 to 40 inches. Keiser soils are also on smooth terraces between deep drainages. Depth to bedrock is more than 60 inches. Wanetta and Keiser soils are used for dryland farming, irrigated crops, and range. Hilly, gravelly land found in this association is used only for range and as a source of gravel and sand. The lowest terraces along the

Yellowstone are irrigated. Pumped wells are the most reliable source of water.

Danvers Association

Gently undulating to rolling soils are found in this association, located on high terraces near the headwaters of Arrow and Spring Creeks south of Ballantine and along Pryor Creek. Drainages are tributaries of the Yellowstone River and Pryor and Fly Creeks. Vegetation is mainly grasses and sagebrush, plus some shrubs. The association occupies four percent of the County. It is 50 percent Danvers soils, 20 percent Shaak, 10 percent Oburn, and 20 percent Hilly gravelly land. Danvers soils are well drained and are found on crests of low mounds, convex slopes, and along deep drainages. Depth to underlying sand and gravel is 48 to 72 inches. The association is used for range and for wheat and barley dry farming in a crop fallow system. Crop growth is good on all major soils. Cattle graze on crop residues. Seeps and springs provide water for livestock.

Soil Suitability and Limitations

The major soils of Yellowstone County were evaluated by the Natural Resources and Conservation Service according to their suitability as a source of topsoil, sand, gravel, and road fill; their effect on land leveling, irrigation, and building sites; and their limitations for sewage disposal fields and sewage lagoons. As a source of topsoil, sand, gravel, and road fill, the soils are rated good, fair, poor, or unsuitable. Soil features affecting land leveling include slope and depth to bedrock. Soils suitable for irrigation are both well drained and contain enough fine material for good available water capacity. Building sites need soils that have a low shrink-swell potential, are stable, not flooded or ponded, and that do not have a seasonal high water table. The suitability of soils for sewage disposal fields is dependent upon permeability, slopes, seasonal high water table, and susceptibility to flooding. In the case of sewage lagoons, the soil acts as a dam and the floor for the impounded water area, so the soils need to be impervious to seepage, have little slope, and have little or no organic matter. In addition, the sealing potential of the soil material, depth to bedrock and high water table, stability, permeability, shrink-swell potential, and compactibility are important soil features to assess for sewage lagoons. Twenty-six major soils were reviewed for their suitability and limitations. The following generalizations can be made based upon the findings[1]:

Suitability of Soil for Topsoil, Sand, Gravel, and Road Fill

The suitability of each soil for use as topsoil was highly variable, with the best being Haverson and McRae, followed by Cushman, Heldt, Keiser, Lohmiller, and Wanetta soils. Few were suitable for sand or gravel use; Haverson and Wanetta are the most highly rated. Road fill potential was generally poor or fair to poor for a variety of reasons (see Table 1 for explanations), with only the Wanetta soils considered good. The Wanetta soils, found in the Wanetta-Keiser association and generally south of the Yellowstone River between Pryor Creek and Sand Creek, are the most suitable for topsoil, sand, gravel, and road fill.

Soil Features Affecting Land Leveling, Irrigation, and Building Sites

Haverson soils are generally favorable for land leveling, irrigation, and building sites and are found adjacent to the Yellowstone and Bighorn Rivers as well as several creeks. Bew, Heldt, Lohmiller, and McRae soils are mostly favorable for land leveling. Slow permeability affects the ability of several soils to accommodate irrigation: Allentine, Arvada, Bew, Kyle, and Vanada. Erosion risk is also a feature of Arvada and some Keiser soils. Over half of the soils have low bearing capacity for building sites and moderate to high shrink-swell potential.

Limitations for Sewage Disposal Fields, Detention Ponds and Sewage Lagoons

Most of the major soils in Yellowstone County have severe limitations for sewage disposal fields, due primarily to slow to moderately slow permeability and slow percolation rates. Steep slopes and depth to sandstone, shale, and siltstone are additional limita-

tions. Some of the Haverson and Lohmiller soil series, and areas of Wanetta and McRae soils have the least limitations for sewage disposal fields. Again, Haverson soils are found adjacent to the major rivers and several creeks in the County. Lohmiller and McRae soils are found north of the Yellowstone River between Billings and Laurel. McRae is also contained in the Bainville-Elso-McRae association north of the Yellowstone River. Wanetta soils are mainly south of the Yellowstone, in a region bordered by Pryor and Sand Creeks. The same soil characteristics that create a problem for sewage disposal fields create drainage problems for stormwater detention ponds. Clay-rich soils, particularly those that contain swelling clays, inhibit water infiltration. Unless adequately engineered, ponds located on these soils may develop standing water, a potential breeding ground for mosquitoes. Limitations for sewage lagoons are primarily due to slopes. In a few cases, the depth to bedrock is less than 40 inches. When slope is not a factor, then Allentine, Arvada, Bew, and Keiser soils are the most suitable soils for sewage lagoons. These units are generally located around the Huntley, Shepherd, Ballantine, and Worden areas, and between Billings and Laurel.

Soil of Special Importance

Certain soil units have unique characteristics that lend themselves to special uses or conservation methods. The identification of these soil units is important when considering development options.

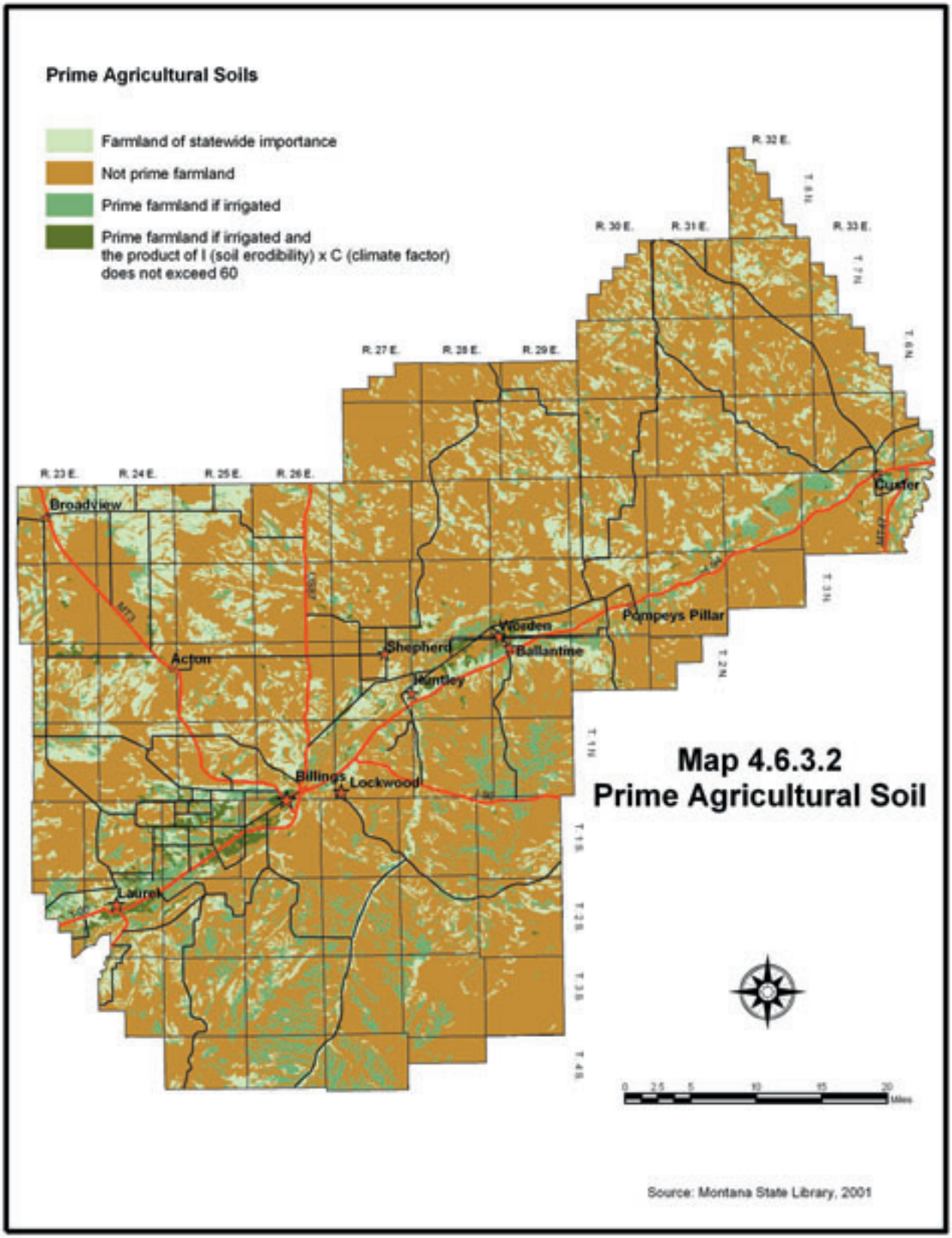
Prime Agricultural Soils

Yellowstone County contains a high percentage of soils that are classified as Prime Farmland (if irrigated) and Farmland of Statewide Importance. The Natural Resource Conservation Service assigns these classes to land that have favorable soils and a suitable environment to support commercial crops. The designation of Prime Farmland always includes the qualifier "if irrigated". This land has the best combination of physical and chemical characteristics for producing feed, food, forage, fiber, and oilseed crops, and is also available for these uses. Prime Farmland must have an adequate and dependable water source from precipitation or irrigation water. Because precipitation levels are too low in the County to support cultivation of some crops, the water must be obtained through irrigation. Other factors that are considered include temperature, growing season, acceptable acidity or alkalinity, acceptable salt and sodium content and few or no rocks. Farmland of Statewide Importance includes land that supports production of crops important to Montana, sugar beets for example. Many soil types that are considered Prime Farmland at 0 to 4% slopes are also Farmland of Statewide Importance at 4 to 7% slopes. Farmland of Statewide Importance is also less reliant on a dependable water source and much of it is dryland farmed.

Both classes of Farmland are found in soil associations of river terraces and floodplains in the Yellowstone Valley or higher terraces and benchs. Soils supporting Prime Farmland and Farmland of Statewide Importance include the McRae-Lohmiller-Keiser, Haverson, Bew-Allentine, Wanetta-Keiser and Danvers soil associations. Map 4.6.3.2 shows the distribution of Farmland of Statewide Importance and Prime Farmland ("if irrigated", and "if irrigated and the product of soil erodibility multiplied by the climate factor does not exceed 60").

Saline Soils

There are approximately 82,000 acres of saline and alkali soils in Yellowstone County. Saline soil contains soluble salts that inhibit seed germination and plant growth. Saline soils may be reclaimed by removing salts through leaching with water. Alkali soil contains exchangeable cations of sodium that can expand clay particles and reduce permeability. Alkali soils are not easily reclaimed. Typically it requires large volumes of soil amendments to adjust the alkalinity. Soil salinity is caused by salty water rising from high water tables or seeping from irrigation canals, and overirrigation. Soil alkalinity originates from a sodium-rich parent material. Both saline and alkaline soils occur mainly in stream valleys and have slopes of less than 8 percent.


Prime Agricultural Soils
Farmland of statewide importance
Not prime farmland
Prime farmland if irrigated
Prime farmland if irrigated and the product of I (soil erodibility) x C (climate factor) does not exceed 60
R. 32 E.
R. 30 E.
R. 31 E.
R. 33 E.
R. 27 E.
R. 28 E.
R. 29 E.
R. 23 E.
R. 24 E.
R. 25 E.
R. 26 E.
Broadview
Custer
Pompeys Pillar
Wooden
Shepherd
Ballantine
Acton
Huntley
Billings
Lockwood
Laurel
Map 4.6.3.2
Prime Agricultural Soil
Source: Montana State Library, 2001

Soil salinity and alkalinity reduce agricultural productivity. Special planting and irrigation methods are required to minimize salt accumulation and maintain relatively high soil moisture in cropland. Rangeland productivity is greatly reduced because these soils do not support forage plants.

In Yellowstone County, the soil associations that are characterized by moderately high to high salinity include the Vanada-McKenzie-Arvada and the Bew-Allentine. Individual soil units characterized by high salinity are Allentine, Arvada, Bone, Laurel, McKenzie, Sage and Vananda.

Swelling Clay Soil

The shrink-swell potential of a soil indicates the volume change to be expected when moisture is added. The volume change is determined primarily by the amount and type of clay in the soil. Swelling soil can contribute to road and foundation failure and increased surface runoff. As soil swells with added moisture, pressure is increased on roadways and building foundations causing buckling, rotation or cracking. The presence of swelling clays can significantly add to maintenance costs unless the structure is appropriately engineered and constructed. Swelling clay can also inhibit water infiltration causing severe surface runoff. Surfaces down gradient from slopes containing swelling clays can experience more frequent and severe flooding events than areas down slope from more permeable soil.

Swelling clay is a product of weathering of the parent material particularly shale bedrock. One form of swelling clay is bentonite, which is an alteration product of volcanic ash. Where bentonite or shale is present, the overlying soil tends to have a greater shrink-swell potential. High swelling clays also collect in areas of deposition down slope from shale bedrock. Soil with high shrink-swell potential is found throughout the County. Soil associations with moderately high to high shrink-swell potential include; Pierre-Lismas-Kyle, Vananda-McKenzie-Arvada, Midway-Heldt, Bew-Allentine and Danvers association.

References

USDA, Soil Conservation Service, 1972, Soil Survey of Yellowstone County.

1 Detailed information on engineering limitations can be found in Tables 4 and 5, 1972 Soil Survey of Yellowstone County.

4.6.4 Geology

Introduction

The geology of an area influences the suitability of land for development. Several geologic factors affect the ability of land to support certain uses; among these are depth and configuration of bedrock and mineral composition. This section addresses these factors and identifies areas where the geology presents certain constraints to development such as areas of shallow bedrock, unstable geology, and groundwater recharge. Also provided is an overview of the physiography or "lay of the land" to give the reader a general sense of the terrain. To appreciate how the landforms were developed, the geologic history is presented followed by an explanation of the resulting rock formations and structural elements. Finally, the geologic resources that contribute or have potential to contribute to the economic base of the County are described.

Physiography

Yellowstone County lies within the unglaciated Missouri Plateau section of the Great Plains Province. Elevation in the County ranges from 2,680 feet above sea level on the Yellowstone River near Custer to 4,971 feet at Stratford Hill in the southwest corner of the County. While the elevation differences in the County are not great, the local terrain can be quite varied ranging from broad, level plains to abrupt, vertical cliffs. Yellowstone County is divided into four distinct topographic regions; the Yellowstone River Valley, the Plains, the Lake Basin, and the Bull Mountains.

The Yellowstone River forms the dominant physiographic feature in Yellowstone County. As the river winds its way from the southwest portion of the County near Laurel to the northeast corner near Custer, it is flanked by a broad alluvial valley. Over the course of its existence, the river meandered through the valley eroding sandstone and shale formations and depositing sand and gravel. Where the river carved down through the sandstone, steep cliffs resulted. These cliffs, or rims, are as high as 300 feet in places and are prominent landforms surrounding Billings and the west part of the Yellowstone Valley. Pompey's Pillar, a prominent bluff located in the eastern part of the County, is an erosional sandstone remnant made famous by Capt. William Clark of the Corps of Discovery during his return trip from the Pacific Ocean in 1806.

The Plains Region constitutes the largest portion of the County north and south of the Yellowstone River. The topography of the plains varies with the thickness of the underlying shale and the presence of sandstone beds. Thicker shale beds translate into more gently rolling terrain cut by steep-sided coulees. Rimrocks, rough ridges and frequent outcrops occur where eroded shale layers expose the interbedded sandstone formations.

Eroded terraces that gradually increase in elevation to the south characterize the plains south of the Yellowstone River. Elevations range from 3,392 feet at the Billings landfill to 4,971 feet at Stratford Hill. The terraces are bisected by three major drainages; Pryor Creek, Blue Creek and Duck Creek. Each flows northward and drains into the Yellowstone River. The bedrock underlying the terraces southwest of Blue Creek are primarily composed of shale with thin sandstone beds of the Cretaceous Colorado Group. Northeast of Blue Creek the rock formations belong to the Cretaceous Montana Group composed of sandstone and shale units.

Portions of the northern Plains are gently rolling with fewer steep-sided drainages where thick, flat-lying sandstone beds of the Eagle Sandstone occur near the surface. This topography is exhibited just north of Billings in the upper Alkali Creek drainage. Areas underlain by the shale formations of the Montana Group, primarily northeast of Billings, are easily eroded and tend to be more dissected with numerous small coulees and draws. The significant drainages north of the Yellowstone include Canyon, Alkali, Crooked, Razor, Pompey's Pillar, Railroad, Hibbard, and Buffalo Creeks.

Vegetation tends to be sparse grassland where the surface is underlain by shale and Ponderosa pine and juniper shrub forest in the eroded draws and coulees and areas underlain by sandstone.

In the northwest part of the County, unusual physiographic features occur where undrained or poorly drained depressions form temporary lakes of varying sizes. The depressions are filled with fine-grained Tertiary sediments. The Lake Basins region includes the area of Comanche Flats located south of Broadview. At 15,000 acres, it is the largest lake basin in the County.

The Bull Mountains, along the north boundary of the County generally create the drainage divide between the Musselshell and the Yellowstone Rivers. The Bull Mountains are rugged hills with a maximum local relief less than 2,000 feet. Intermittent stream flow carries large volumes of water during heavy rain events that scour highly erodible shale bedrock. The vegetation in the Bull Mountains is primarily open to heavily forested Ponderosa pine with an understory of grass and forbes.

Geologic History

Between 135 and 75 million years ago, an inland sea, stretching from the Gulf of Mexico to the Arctic Ocean covered much of the central United States and what is now Yellowstone County. The sea level fluctuated numerous times during this period. When the region was completely covered by the sea, dark, marine silt and mud were deposited. When the shoreline receded, the marine sediments were covered with cleaner sandstone. At the transition between the land and marine environment, swamp

and beach channel sediments were deposited. The first advance of the sea occurred during the late Cretaceous period, approximately 90 million years ago. During this time, mostly marine sediments belonging to the Colorado Group were deposited. The consolidated sediments occur over the south half of Yellowstone County. Sedimentary rocks of the Montana Group, which comprise the central potion of the County, were deposited during a time of cyclic advances and retreats of the inland sea. The sediments reflect the fluctuations between marine and terrestrial environments. Interbedded coal beds in the Eagle and Judith River sandstone formations are evidence of swamps repeatedly formed near the shoreline. The final retreat of the sea was accompanied by the deposition of the Lance Formation in late Cretaceous and the Fort Union Formation in the Early Tertiary period. The massive amount of sand that comprises the Fort Union was derived from the ancestral Rocky Mountains to the west. The Fort Union Formation also contains numerous swamp deposits that later fossilized into mineable coal beds.

During the Tertiary period, the crustal rocks of south central Montana were being gently warped by more intense earth moving events to the west and southwest. The warping created folds in the sediments, trapping oil and gas deposits and shaping the topography of the plains. Sediments filled the basins created by the folded and faulted Cretaceous and early Tertiary formations.

The present land surface has been shaped over the past 70 million years by continued erosional and depositional cycles. Alluvial sediments, deposited by the Yellowstone River began during the Quaternary Period, approximately 1.8 million years ago and continue today. The Lake Basin area also filled with shallow deposits of Quaternary alluvium.

Geologic Formations and Structure

Most of the bedrock throughout the County is layered Cretaceous sandstone and shale. The oldest formation, deposited in the early Cretaceous period, is the Kootenai Formation which outcrops in the southern part of the County. Above that lies the Colorado Group, the base of which is formed by the Thermopolis Shale and Fall River Sandstone Formations. The Group is further subdivided into the Mowry Shale, Belle Fourche Shale, Greenhorn Formation, Carlile Shale and the Niobrara Shale. Rocks of the Colorado Group are primarily confined to the south half of Yellowstone River, west of Blue Creek. The Montana Group, of Upper Cretaceous age, is subdivided into the Telegraph Creek, Eagle Sandstone, Claggett Shale, Judith River, Bearpaw Shale and Lance Formations. These rock units occur in the east and central portion of the County. The exception to the Cretaceous age bedrock occurs in the Bull Mountains, in the north part of the County where the Tertiary Fort Union Formation comprises the Bull Mountains.

Beginning in the Late Tertiary and continuing through the Quaternary, gravel deposits accumulated on terraces, stream channels and alluvial fans. Ancient channels of the Yellowstone River deposited sand and gravel 400 to 500 feet above the present altitude of the river. The U.S. Geological Survey has mapped four alluvial terraces occurring in Yellowstone County. Most of the gravel pits in the County are located in the third alluvial terrace. The most recent alluvial deposits occur in and along the present Yellowstone River channel and in the Lake Basin region. A stratigraphic column and description of the bedrock and surface geology is provided in Table 1. The surface geology of Yellowstone County is presented in Map 4.6.4.1.

The bedrock formations dip gently to the north off of the Pryor Mountain uplift at the southern edge of the County. Crossing the County from Acton in the west through Huntley in the central portion is the Lake Basin fault zone. Over 100 individual fault segments, between two to six miles in length, strike northeast and are spaced one half to five miles apart. The land surface along this fault zone is broken by resistant sandstone ledges exposed by the earth movement.

TABLE 1: STRATIGRAPHIC COLUMN FOR UNITS WITHIN YELLOWSTONE COUNTY

ERA	PERIOD		FORMATION	Range of Avg. thickness	DESCRIPTION
CENOZOIC	QUATERNARY		Alluvial Terrace Deposits	130' -' 210'	Unconsolidated material range from fine to coarse-grained sand and gravel.
	TERTIARY		Fort Union Sandstone	Up to 2,500'	Sandstone and shale with mineable coal beds
MESOZOIC	CRETACEOUS	Montana Group	Lance Formation	350'	Cliff-forming, thick-bedded sandstone.
			Bearpaw Shale	200 – 300'	Dark-gray shale
			Judith River Fm.	250'-350'	Interbedded fine-grained sandstone, shale and some bentonite
			Claggett Shale	100' – 400'	Shale, some bentonite and sandstone
			Eagle Sandstone	100'-350'	Cliff-forming sandstone
			Telegraph Creek Fm.	150'	Sandy shale, sandstone
		Cobrado Group	Niobrara Shale	700'	Dark shale, some calcareous sandstone and thin bentonite beds.
			Carlile Shale	250' – 300'	Dark shale with thin sandstone beds.
			Greenhorn and Belle Fourche Shale	400' – 475'	Dark shale with thin bed of salt and pepper sandstone
			Mowry Shale	250'	Shale with thin sandstone beds and mineable bentonite
			Thermopolis Shale and Fall River Sandstone	600' – 650'	Shale, and interbedded shale and sandstone. Some bentonite
			Kootenai Formation	200' – 250'	Dark mudstones with interbedded sandstone.

Areas of Geologic Concern

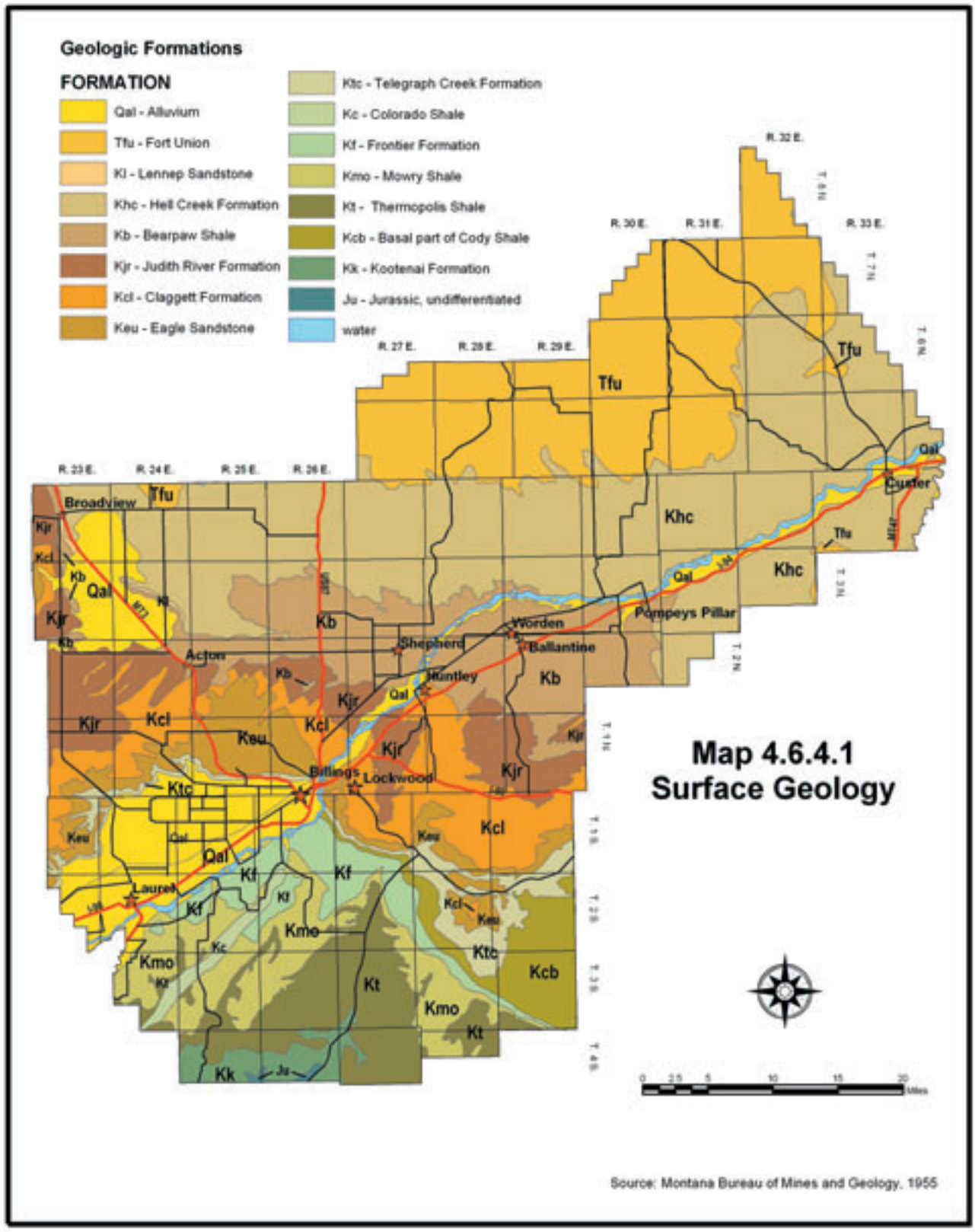
Geology has an immediate and locally relevant role in the development of the County. Discussed below are areas of concerns that can significantly affect the cost of development and public health. These factors may be considered obstacles to development, but they help define locations of suitable development sites to ensure safe and healthy communities.

Areas of Shallow Bedrock

The depth to bedrock affects development by limiting or enabling excavation of foundations, emplacement of septic drainfields, and construction of roads. While many of the barriers of shallow bedrock can be overcome, the cost of engineering acceptable structures may be prohibitive. Billings and Yellowstone County residents are familiar with the presence of thickly bedded sandstone (Eagle Sandstone) at or near the surface. Much of the County north of the Yellowstone River is underlain by shallow bedrock consisting of sandstone and shale. Throughout the County, shallow bedrock is primarily confined to the Plains and Bull Mountain physiographic regions. Soil cover is thinnest along ridgetops and steep slopes.

Areas of Unstable Geology

The greatest potential hazards associated with unstable geologic conditions are rock falls and mass


Geologic Formations
FORMATION
Qal - Alluvium
Tfu - Fort Union
Kl - Lennep Sandstone
Khc - Hell Creek Formation
Kb - Bearpaw Shale
Kjr - Judith River Formation
Kcl - Claggett Formation
Keu - Eagle Sandstone
Ktc - Telegraph Creek Formation
Kc - Colorado Shale
Kf - Frontier Formation
Kmo - Mowry Shale
Kt - Thermopolis Shale
Kcb - Basal part of Cody Shale
Kk - Kootenai Formation
Ju - Jurassic, undifferentiated
water
Map 4.6.4.1
Surface Geology
Broadview
Billings
Lockwood
Shepherd
Worden
Ballantine
Huntley
Pompeys Pillar
Custer
Laurel
Acton
Source: Montana Bureau of Mines and Geology, 1955

failure. These potential hazards correlate with steep slopes composed of sandstone and shale bedrock. A particularly hazardous condition is created where sandstone beds overlie shale horizons on steep slopes. Natural weathering processes weaken and erode shale layers more rapidly than sandstone layers. As the shale beds weaken, gravitational forces exceed cohesional forces in the rock, resulting in slope failure.

Evidence of past landslides is an important indicator of a high probability of future hazards. Unpublished documentation of landslides in Yellowstone County identified 200 sites of slope failure. This study did not identify small events of a few cubic yards, like rock falls along the rims (Eagle Sandstone) in Billings, although they are known to occur.

Areas of Groundwater Recharge

An area of groundwater recharge is where water from precipitation or surface runoff is transmitted downward to the water table. Water will continue to migrate downward under the force of gravity, until it reaches the water table or encounters an impermeable or confining layer. When groundwater concentrates in rock or unconsolidated deposits that yield water in a usable quantity to a well or spring it is classified as an aquifer. In Yellowstone County, few rock formations yield enough water of acceptable quality for domestic use. The greatest volume of good quality water is produced from the unconsolidated alluvial deposits in the Yellowstone Valley that overlie Cretaceous bedrock.

Because the alluvium is exposed at the surface, the entire Yellowstone Valley becomes an area of potential groundwater recharge. In addition to rainfall, surface water from irrigation ditches, flood irrigation of cropland, and the Yellowstone River and its tributaries are important sources of groundwater. A recent study by the Montana Bureau of Mines and Geology provides evidence that the aquifer west of Billings is recharged to a significant extent, by irrigation ditches and canals. The report suggests that without irrigation water, the West Billing-East Laurel area could experience a drastic drop of the water table. Irrigation facilities in this area are the most important sources for groundwater recharge and the natural creeks and streams act as groundwater drains.[1]

The quality of groundwater obtained from the unconfined aquifer is largely influenced by the quality of surface water sources. Contamination of these sources from agricultural operations, septic drainfields, urban runoff, and underground storage tanks pose a serious threat to the domestic water supply in Yellowstone County. Billings, Laurel, Huntley, Worden, Ballantine, Pompey's Pillar and Custer are all communities that obtain domestic water from the alluvial aquifer either through individual or municipal wells or directly from the Yellowstone River.

Seismic Activity

According to the Seismic Zone map in the Uniform Building Code, Yellowstone County is in a Zone One (minor risk). Earthquakes originating in Yellowstone National Park, the nearest locale of frequent and intense seismic activity, have been felt in Yellowstone County.

Geologic Resources

The extractive industries contribute significantly to the economic base in Yellowstone County, either directly or indirectly. There are several economic deposits of sand, gravel, oil, gas and coal located in the County, and many other deposits of oil, gas, coal and strategic minerals occur within the region.

Sand and gravel

The alluvial deposits located in the Yellowstone River valley and the Lake Basin regions contain mineable deposits of sand and gravel. The primary source of economic gravel is the Quaternary alluvial deposits that parallel the Yellowstone River on the north side. Sand and gravel are essential materials for construction and sand and gravel operations are significant economic contributors to the County.

As of 2001, there were approximately 50 operating gravel pits located in Yellowstone County. These

pits are mostly located within the northeast trending river valley, often close to existing and expanding residential development. Transportation costs and availability of material dictate the location of sand and gravel operations. The owners and number of sand and gravel operations in Yellowstone County are listed in Table 2. The locations of sand and gravel operations are shown on Map 4.6.4.2.

Open pit mining often entails removal of material to a depth just above the water table and may affect the flow of local groundwater. Increased noise, dust and traffic are also unavoidable consequences of mining that may adversely affect adjoining properties. State law limits local government's ability to regulate sand and gravel operations, however, local governments may take measures to minimize impacts on residential property through Special Review provisions, when a proposed operation is located in a zoning jurisdiction.

Decorative stone

Building stone is quarried in a few locations in the County. The primary products are sandstone and river rock used for building. Gravel is also locally mined, sorted and washed for landscaping.

Oil and gas

Historically, there have been five producing oil fields located in the County. Today, only 3 fields are producing. The number of producing wells and the amount of oil and gas production has dwindled over the past ten years. In 1990, there were 35 producing wells pumping over 66,000 barrels of oil and 749 cubic feet of gas. In 2000, only 19 wells were producing 21,000 barrels of oil. No natural gas was produced in 2000.

The five oil fields located in the County include Weed Creek, Wolf Springs and South Wolf Springs, Crooked Creek, and the Mosser Dome. Weed Creek, Wolf Springs and South Wolf Springs, located in the northeast part of the County, have been the longest producing fields. Wolf Springs and South Wolf Springs were discovered in 1955 and Weed was discovered in 1966. The producing horizon in all three fields is the Amsden Formation (Pennsylvanian) at a depth of approximately 6,200 feet. These fields are primarily oil producers and are continuing to produce today. In 2000, six wells produced 20,237 barrels of oil.

TABLE 2: SAND AND GRAVEL OPERATORS IN YELLOWSTONE COUNTY

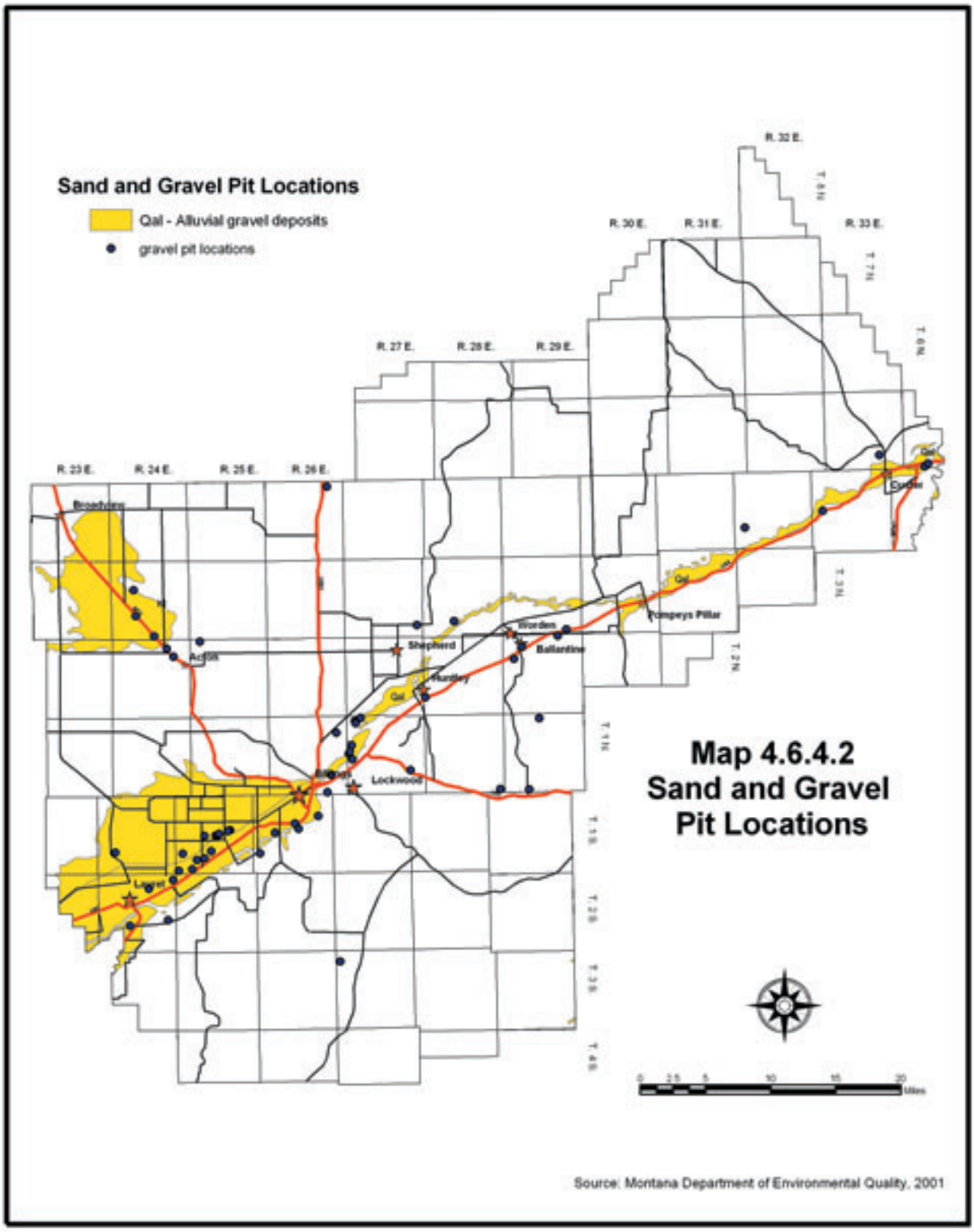
Company	Number of Operations
Empire Sand & Gravel Company	19
Yellowstone County Road Department	13
JTL Group, Inc.	7
Jim's Excavating Service	2
Northern Line Layers, Inc.	2
Blain Gerhart	1
Century Companies, Inc.	1
Concrete Materials of Montana	1
Emerald Hills Development	1
Exxon Billings Refinery	1
Huntley Projects Irrigation District	1
JP Inc.	1
Krug Sand and Gravel	1
Montana State University	1
Myers Lee	1
Ostermiller HL Construction, Inc.	1
Quality Concrete Company	1

The Crooked Creek field was discovered in 1985 but produced only 27,395 barrels of oil before production stopped in 1993. Crooked Creek is located in the northwest part of the County, near the Musselshell County line.

Mosser Dome oil field has had an inconsistent history of production beginning in 1936. The average number of barrels produced daily has ranged between 0 and 40. Wells in the Mosser Dome draw from the Greybull Formation, a late Cretaceous sandstone. Production in 2000 was very slight with 13 wells producing only 732 barrels of oil. The Mosser Dome is located south of Laurel near the Carbon County line.

Coal and coal bed methane

The Bull Mountain field, on the Musselshell and


Sand and Gravel Pit Locations
Qal - Alluvial gravel deposits
gravel pit locations
R. 32 E.
R. 30 E.
R. 31 E.
R. 33 E.
T. 6 N.
T. 7 N.
R. 27 E.
R. 28 E.
R. 29 E.
R. 23 E.
R. 24 E.
R. 25 E.
R. 26 E.
Broadview
Shepherd
Worden
Ballantine
Acton
Huntley
Lockwood
Laurel
Pompeys Pillar
Qal
T. 1 N.
T. 1 S.
T. 2 S.
T. 3 S.
T. 4 S.
Map 4.6.4.2
Sand and Gravel
Pit Locations
Source: Montana Department of Environmental Quality, 2001

Yellowstone County lines, is the only mineable coal field in the County. The 26 mapped coal seams are confined to the Tongue River member of the Fort Union formation. Most of these beds are thin and non-economic. Two of the beds have potential for underground and possibly surface mining methods. The area of strippable coal is estimated to be 5,640 acres. Coal reserves have been reported to be 42.6 million tons. The underground mineable reserves contain 25.5 million tons of coal. The coal seams have been mined intermittently since 1906, originally mined to fuel the steam locomotive engines. The first mine, the Klein Mine, employed 550 workers in 1927 and closed in 1956. Another mine, the PM Mine operated from 1954 to 1992. Both of these mines are located in Musselshell County, just north of the Yellowstone County line.

In 1993, there was renewed interest to mine the coal near the old PM Mine by Meridian Minerals, a subsidiary of Burlington Northern. The mine was permitted, but the permit was transferred to Mountain, Inc. of Knoxville. Mountain, Inc. operated the Bull Mountain Coal Mine No. 1 for 2.5 years before the permit was revoked for permit violations and unpaid fees. Plans to reopen the mine emerged in August 2001 when it was reported that BMP of New York bought the mine. BMP has indicated that they plan to employ 256 workers to mine the 400 tons of reserves. The mine would ship coal via rail spur to the main line at Broadview and south to Billings.

Coal bed methane is considered an unconventional hydrocarbon fuel source but is currently experiencing a production boom in the Powder River Basin coal fields. The Montana Board of Oil and Gas Conservation has permitted 263 wells and authorized up to 200 exploration wells. None of the permitted or exploratory wells are located in Yellowstone County. At present, there is a moratorium on the production of coal bed methane in Montana because of pending lawsuits. A byproduct of coal bed methane extraction is large amounts of water. The lawsuits primarily focus on the means of disposal of that water, the effect on groundwater resources and the ownership of associated water rights. In Yellowstone County, the coal beds in the Bull Mountains and those at depth throughout the County may yet be candidates for coal bed methane extraction.

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4.6.5 Hydrology

Introduction

As in most areas of the west, surface and groundwater has played a critical role in the history and development of Yellowstone County. The contemporary role water plays is equally important for the growth and sustainability of the community. Economic sustainability and community development depend on sufficient quantities of good quality water. Municipalities, agriculture and industry rely on surface water sources for continued productivity while individuals depend on groundwater sources for domestic use. The County's premier water source, the feature from which the County derives its name, is the Yellowstone River. Because of its importance, the Yellowstone River is described in

detail in this section. The few perennial tributaries are noted, as are the intermittent drainages if they bear water rights. Water right ownership is important because it controls the allocation and use of a precious commodity. The possession of water rights helps ensure legal availability of water. The development of a complex network of irrigation ditches ensures that water is physically available to many parts of the County. Besides irrigation, water rights and water reservations are also held for municipal, domestic, livestock, wildlife, and habitat preservation purposes. The availability of groundwater for much of the County is influenced by natural stream flows and irrigation facilities. Both are responsible for recharging shallow aquifers in the Yellowstone Valley. Other groundwater sources lie at greater depths in sediments deposited between 165 and 75 million years ago. As the County continues to grow, the pressure on all water sources will increase along with the need to protect them.

Surface Water

The entire Yellowstone County is situated in the Yellowstone River watershed. All drainages flow into the Yellowstone River, which in turn, flows into the Missouri River 340 miles to the east. The Yellowstone River originates in Yellowstone National Park, and upon reaching Billings it has drained approximately 11,795 square miles. Based on 75 years of flow data from the USGS gaging station at Billings, the mean daily flow of the Yellowstone River is 4,147 cubic feet per second (cfs). The lowest daily flow recorded was 1,550 cfs recorded in 1934 and the highest peak daily flow was 12,240 cfs recorded in 1997. Streamflow volumes peak during the month of June, largely because of snowmelt at higher elevations combined with increased rainfall. The lowest streamflow volumes are recorded during December and January.

Between Laurel and Billings, the Yellowstone River is classified B-2 by the state which indicates the waters are suitably for drinking, culinary and food processing purposes only after conventional treatment. This stretch of the river is also suitable for bathing, swimming and recreation, as well as growth and propagation of salmonid fishes. Below Billings, the river is classified B-3. Salmonid populations are not supported in this stretch of the river mainly because of an increase in temperature and sediment load. The water quality of the Yellowstone River in the vicinity of Billings is generally good. Suspended sediments increase downstream from the confluence of Clark's Fork of the Yellowstone because of natural sediments and irrigation practices. The amount of suspended sediments also fluctuates with flow conditions and tends to increase substantially during spring runoff. Total dissolved-solids are also moderately low. Dissolved-solids concentrations often relate to type and amount of discharge into the river but also are a response to soil and rock type, precipitation and vegetation coverage. Concentrations of dissolved-solids generally are inversely related to streamflow, consequently, dissolved-solids concentrations also fluctuate with seasonal flow.

At the USGS streamflow gaging station in Billings, the suspended sediment concentration measured between 9 and 500 milligrams per liter (mg/l). Total dissolved-solids concentration measured between 100 to 500 mg/l. In contrast the suspended sediment load measured at the mouth of Yellowstone Lake in Yellowstone National Park is between 5 and 145 mg/l and the total dissolved-solids is less than 100 mg/l.

The Yellowstone River is free flowing from its headwaters in Yellowstone Park to the confluence with the Missouri River. Natural streamflows prevail resulting in spring floods and summer droughts. Major floods of record on the Yellowstone River occurred in 1918, 1943, 1944, 1967, 1974, 1975 and 1997. The record flood occurred in 1997. The 1918 flood was considered a 100-year event with a discharge of 78,100 cubic feet per second. The 1997 flood exceeded that event with a peak discharge of 82,000 cubic feet per second.

The only tributaries of the Yellowstone River to carry water year round are the Clarks Fork of the Yellowstone, Bighorn River and Pryor Creek. The Clarks Fork defines a small segment of the west County boundary while the Bighorn forms a small segment of the east County boundary. Other County drainages that flow intermittently but with some regularity include Alkali Creek, Blue Creek, and Canyon Creek. These streams and the remaining streams in the County that can be classified as intermittent or ephemeral are listed in Table 1. Stream lengths are provided for all 44 streams, and drainage areas are provided for those streams with known flooding potential.

Flooding

Approximately 14,573,600 acres of land lie within the 100-year flood plain in Yellowstone County. This figure has decreased over the past 50 years as flood protection measures, such as levees, streambank stabilization, and diversion structures, increased. The effects of these actions, especially bank stabilization, have been to channel floodwaters away from the adjacent floodplain and route them downstream. As this happens, the volume of water and flow velocities increase resulting in greater damage to downstream banks and channels that are not protected.

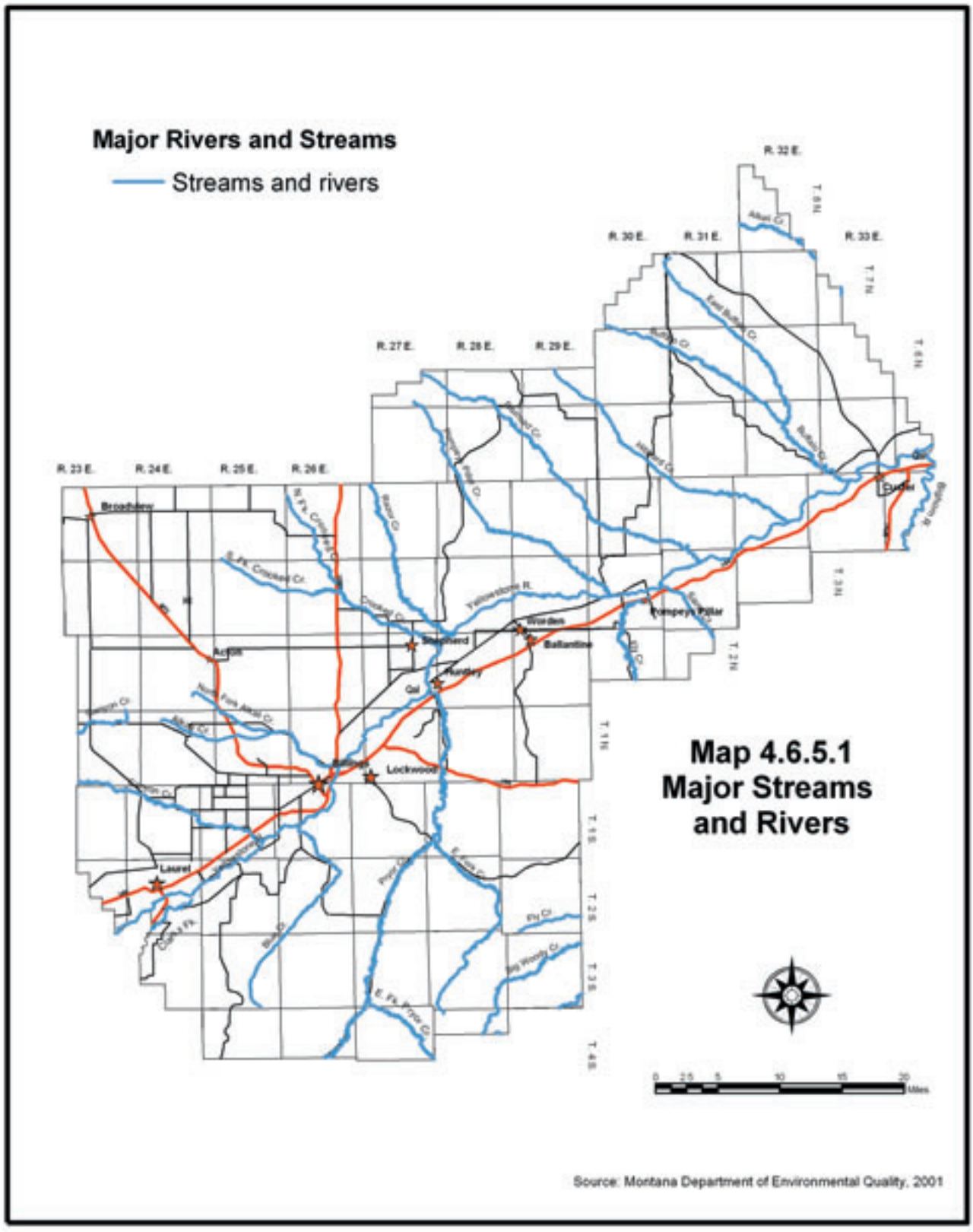
Only a few tributaries of the Yellowstone River experience significant flooding, primarily as a result of intense rain events and rapid snowmelt. In some areas, notably the mouths of Blue Creek and Duck Creek, flooding has occurred as a result of ice jams. Major floods causing significant property damage were recorded in 1923 and 1937 on Alkali Creek, Canyon Creek and Cove Creek. On June 11 and 12, 1937, Billings suffered a devastating and costly flood resulting from an intense rain and hailstorm over drainages west and northwest of Billings. Substantial overland flows, with volumes in the range of 5,000 to 13,000 cubic feet per second, developed along Canyon Creek, Cove Creek, and Alkali Creek. Railway bridges became partially clogged with flood debris west of town and floodwaters swept eastward along the railroad tracks into the City. This disaster resulted in loss of life and damage to over 2,600 dwellings and 600 businesses. Historic records show that eleven significant flooding events have occurred in these drainages.
In the 1937 Billings flood and flood events in Laurel, irrigation ditches have played an important role. In these floods, runoff resulting from heavy rains and/or rapid snowmelt, was intercepted by irrigation ditches overwhelming the ditch's' capacity while destroying the upslope and downslope banks. This situation becomes particularly severe where natural drainages have been rerouted to drain into irrigation facilities.

Both the City of Billings and Yellowstone County participate in the National Flood Insurance Program. The Department of Disaster and Emergency Services administers the County floodplain regulations and the City Building Division administers the regulations for the City. The drainages that have a designated 100-year floodplain, as mapped by the Federal Emergency Management Agency, include the Yellowstone River, Clarks Fork of the Yellowstone River, Alkali Creek, Blue Creek, Canyon Creek, Dry Creek, Duck Creek and Unnamed Creek. Proposed developments within the 100-year floodplain of these drainages require a floodplain development permit. Consultants for the County recently completed a floodplain management study for Cove Creek, Little Cove Creek and Hogan's Slough west of Billings. These drainages have had eleven recorded flood events, two of which were catastrophic. The

TABLE 1: LIST OF STREAMS AND RIVERS IN YELLOWSTONE COUNTY

Stream Name	Tributary of	Total Length (miles)
Alkali Creek	Yellowstone R.	88.2
Alkali Creek downstream of Highway 3		
Allen Creek	Yellowstone R.	7.7
Antelope Creek	Buffalo Creek	25.6
Arrow Creek	Yellowstone R.	20.9
Big Woody Creek	Woody Creek	36.2
Bighorn River	Yellowstone R.	98.5
Bitter Creek	Yellowstone R.	6.9
Blue Creek	Yellowstone R.	23.5
Buffalo Creek	Yellowstone R.	36
Canyon Creek	Yellowstone R.	27.8
Canyon Creek, 1,275' above confluence with Yellowstone River		
Cottonwood Creek	Clarks Fork	43.1
Cove Creek Cove Creek at the Molt Road	Canyon Creek	19.2
Cow Gulch Creek	Railroad Creek	32.9
Crooked Creek	Yellowstone R.	17.6
Crooked Creek, N. Fk.	Crooked Creek	12.1
Crooked Creek, S. Fk.	Crooked Creek	10.8
Deadman Creek	Buffalo Creek	9.8
Duck Creek	Yellowstone R.	12.5
Dry Creek	Yellowstone R.	-
E. Buffalo Creek	Buffalo Creek	26
East Fk Pryor Creek	Pryor Creek	31
Fivemile Creek	Yellowstone R.	19.6
Fly Creek	Yellowstone R.	65.5
Hay Creek	Pryor Creek	12.2
Hibbard Creek	Yellowstone R.	31.5
Horse Creek	Alkali Creek	23
Indian Creek	Pryor Creek	12.2
Indian Creek	Alkali Creek	10.1
Little Woody Creek	Woody Creek	23.0
Lostboy Creek	Fly Creek	17.7
Mill Creek	Yellowstone R.	25.5
Monument Creek	Pryor Creek	6.8
Pompey's Pillar Creek	Yellowstone R.	35.4
Pryor Creek	Yellowstone R.	103.0
Railroad Creek	Yellowstone R.	37.7
Razor Creek	Yellowstone R.	40.4
Razor Creek, W. Fk.	Razor Creek	17.3
Sand Creek	Yellowstone R.	16.7
Spring Creek	Fly Creek	11.8
Spring Creek	Clarks Fork	11.6
Telegraph Creek	Fly Creek	10.3
Twelvemile Creek	Yellowstone R.	17.9
Weed Creek	Alkali Creek	17.2
Yellowstone River	Missouri River	632.8
Clarks Fork of the Yellowstone	Yellowstone R.	77.5

Source: Montana Rivers Information System, Montana Fish, Wildlife & Parks


Major Rivers and Streams
Streams and rivers
Map 4.6.5.1
Major Streams
and Rivers
Source: Montana Department of Environmental Quality, 2001

study evaluated the existing flood storage capacity and projected retention area requirements to contain a 100-year flood event. This study, and floodplain management studies for Unnamed Creek, Dry Creek and Five Mile Creek, are currently being reviewed by the Montana Department of Natural Resources and Conservation and the Federal Land Management Agency.

Water Rights and Water Reservations

The amount of water an individual can remove from Montana waterways is based on their documented water rights. Montana water law is structured after the doctrine of prior appropriations. This doctrine is typically paraphrased as "first in time, first in right". The state adjudicates water rights according to seniority, intent of use, benefits of use, point of diversion, access priority and quantity. Individuals, businesses and agencies hold approximately 15,300 water rights to waterways in Yellowstone County. Water rights apply to specific amounts of water, based on flow rates, that can be withdrawn from a waterway. However, the state also recognizes the need to retain instream flow for existing and future consumptive uses and water quality. To ensure adequate stream flow, government entities were allowed to reserve specific water quantities. The Montana Department of Fish, Wildlife and Parks hold water reservations for in-stream flow, the City of Billings for municipal use, and conservation districts for irrigation use. In Yellowstone County above Billings, municipal reservations have first priority, instream flow reservations have second priority, irrigation reservations have third priority and multipurpose storage reservations were given last priority. Below Billings, the highest priority is reserved for irrigation.

Irrigation Facilities

Irrigation in the Yellowstone Valley and upper terraces played a critical role in the settlement history of Yellowstone County. The vast network of irrigation canals and ditches throughout the valley is testament to the perseverance of government and early settlers alike to make the County an agricultural center. Yellowstone County possesses several extraordinary irrigation facilities constructed to deliver water to areas far removed from the original intake. For instance, the intake for the Billings Bench Water Association Canal is located south of Laurel and continues more than 20 miles through the City of Billings, under the Rimrocks and Alkali Creek, through Billings Heights before discharging into Fivemile Creek. A complex system of ditches, canals and drains was constructed between 1905 and 1915 by the U. S. Reclamation Service, later renamed the Bureau of Reclamation between Huntley and Pompey's Pillar. The network was developed to irrigate land opened for homesteading. The 35,000 acres in the Huntley Project were divided into 40-acre homestead tracts in 1907 and land sold for $4 an acre. Originally the Huntley Project claimed 750 second feet from the Yellowstone River and 100 second feet from Pryor Creek.

In Billings, a network of seven ditches traverse the City. These ditches carry irrigation water for agriculture, private lawns and gardens, and City parks. Many of the facilities are open waterways but several miles of culverts and pipes also carry water. The longest irrigation facility in the City is the Billings Bench Water Association Canal (BBWA) which is nearly 7.5 miles long. Hi-Line Ditch is 4.5 miles long and flows between Poly Drive and Rimrock Road until it turns toward Wisconsin Avenue at Selvig Lane and through Pioneer Park. Grey Eagle Ditch runs along the Southside for just over a mile. Big Ditch flows across northwest Billings for a mile before discharging into a storm sewer at Nina Clare Road. In West Billings, near Rimrock Road, Cove Ditch connects into the storm sewer system west of Shiloh Road. Suburban Ditch, in the southeast part of Billings, stretches for 2,600 feet. A second network composed of two and a half miles of open ditches and three mile of covered pipe, carry excess water away. The main drains include the Arnold Drain located in between Shiloh and 24th Street north of Broadwater, Kratz Drain, City-County Drain and Yegen Drain, all located in the southside. Two miles of Hogan Slough, which is mostly located west of the City flow through the City.

There are 22 irrigation facilities in the County with organized ditch companies administering the water rights. These companies are listed in the Table 2.

TABLE 2: DITCH AND CANAL ORGANIZATIONS
Big Ditch Company (incl. Snow Ditch)
Big Four Ditch Company
Billings Bench Water Association
Burnstead Water Users Association
Canyon Creek Ditch Company
City High Ditch Water Users Association
Clarks Fork Ditch Company
Coulson Water Users Association
Cove Irrigation Company
Danford Ditch District
Davis Ditch
Grey Eagle Ditch
Huntley Project Irrigation District
Italian Ditch Company
Lockwood Irrigation District
Old Mill Ditch Company
Rock Creek Water Users Association
Suburban Ditch Company
Sunnyside Water Users Association
Victory Irrigation District
Waco-Custer Ditch Company
Whitehorse Canal Company

Lakes, Reservoirs and Wetlands

There are very few bodies of standing water in Yellowstone County. The largest of these bodies is Rattlesnake Reservoir located north of Billings between Montana Highways 87 and 312. Rattlesnake Reservoir is a manmade lake created for irrigation purposes. Lake Elmo, located in Billings Heights, is also a manmade lake, fed by the BBWA Canal. Lake Elmo is a State Park and allows daytime use including picnicking, swimming, fishing and boating. The only natural standing bodies of water occur in the Lake Basin region of the County. These lakes are created by shallow water tables exposed in confined depressions. The water levels in these depressions vary considerably with the level of the water table. When dry, the lakebeds are flat, grass covered areas. As moisture increases, wetland vegetation growth is present. Broadview Ponds, Twin Lakes and Comanche Lake are examples of these ephemeral lakes.

Yellowstone County has no wetlands identified by the U.S. Environmental Protection Agency (EPA), few natural wetlands, but numerous manmade areas that possess wetland values. The Montana Natural Heritage Program mapped two significant natural wetlands for the Montana Department of Environmental Quality. They are both located in Billings along the Yellowstone River in Riverfront Park and Two Moon Park. These wetlands are similar in that they occur within the riparian zone and consist of mature cottonwood stands with a mid-story of exotic Russian olive and an understory of grasses, and shrubs. The condition of both of these wetlands is poor because of weed infestations. While both areas contain stands of mature cottonwoods, the mature are being replaced by Russian olive and not actively regenerating. This study also identifies a need for weed management plans for both parks.

Natural wetlands are also located in the large shallow lake basins in the northwest corner of the County. Isolated depressions fill with water during years of above average precipitation and dry up during drier periods. When dry, they leave expansive, unvegetated, alkaline mud flats. Wet conditions produce emergent vegetation in some ponds, while others are too alkaline to support wetland vegetation.

Abandoned and reclaimed gravel pits provide favorable conditions for wetland development. Most of the gravel pits are located within the upper alluvial terraces of the Yellowstone Valley. The highest concentration of these pits is located on the west end of Billings where over 300 acres of naturalized wetlands have been identified. The reclamation plans for many active gravel pits in this area include post-mining wetland construction.

The gravel pit ponds are mainly fed by groundwater originating from leaking irrigation ditches and flood irrigation. The pit water levels fluctuate seasonally in response to irrigation practices. Over time there has been enough water available to support the growth of wetland vegetation. The wetlands provide habitat for deer, small mammals, pheasants, nesting waterfowl and a variety of other birds including Sandhill cranes and bald eagles.

Groundwater

The quantity and, to some degree, the quality of groundwater in Yellowstone County are determined by the physical and geochemical properties of the subsurface rocks comprising the aquifer. Accessible quantities of groundwater within 3,000 feet of the surface are found in Quaternary unconsolidated sediments and Cretaceous sandstone and shale formations. Deeper aquifers are present in the Pennsylvanian Tensleep sandstone and Mississippian Madison limestone but because of their depth are not used for domestic or agricultural purposes.

Most of the groundwater for domestic and agricultural uses is drawn from the Quaternary alluvial gravels in the Yellowstone Valley and major tributaries. The majority of wells in the valley reach depths less than 124 feet. Depth to groundwater increases and yields decrease towards the edges of the valley. Seasonal fluctuations have been measured as high as 8 feet annually. Yields from the alluvial aquifer generally are greater than 10 gallons per minute which is sufficient for domestic and agricultural purposes. The quality of groundwater from the alluvial aquifer is moderately high but elevated levels of salt are reported. The salts are leached from overlying clays by irrigation water. Along with high sodium and potassium levels, elevated nitrate levels are also recorded during periods of high runoff.

Cretaceous sandstone units, underlying most of the County, produce suitable quantities of groundwater for livestock and domestic use. The most favorable groundwater-yielding units include the Fort Union Formation, Lance Sandstone, and Eagle Sandstone. Shale units of Cretaceous age also yield some poor quality groundwater but are generally unreliable sources. Shale contains minerals such as sulfur, salts and calcium that contribute to hard, unpleasant tasting and smelling water.

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4.7 Transportation

Introduction

The transportation system hierarchy in Yellowstone County begins with the Federal Highway System, which includes Interstates 90 and 94. U.S. Routes present in the County include U.S. Highway 87, 212 and 310. Numerous State highways and secondaries traverse the County in addition to County roads and City streets. Maintaining the condition and efficiency of all these roadways is the responsibility of the Montana Department of Transportation, the County Public Works Department and the City Public Works Department. Much of the planning for these routes is accomplished through the Billings Metropolitan Planning Organization (MPO) under the jurisdiction of the County Planning Board.

This chapter addresses existing conditions of roadways and transportation planning within the Billings Urban Area and throughout the County. The greatest transportation planning effort is focused on the Billings Urban Area where most of the traffic is concentrated. Much of the information in this chapter was obtained from the 2000 Transportation Plan which covers the urban area only. This plan is the most recent in a series of Transportation Plans dating back to 1961. Information was updated where possible. The most significant update is probably the redesignation of Billings from "nonattainment" to "attainment" which happened in February 2002. This action is discussed further under the Air Quality section of this chapter.

Billings Urban Area

Regional Network

For Transportation purposes, the Billings Urban Area includes the area within the City of Billings as well as a planning area extending approximately 4.5 miles outside the City limits and into Yellowstone County. The area encompasses approximately 146 square miles. Billings is the largest city in the state and the largest transportation hub in the central and eastern portions of the state. Key roadway linkages between Billings and other urban areas in Montana include I-90, I-94, and MT 3/US 87. Located at a key crossroads of regional transportation facilities, the City's physical location in the Yellowstone River valley also presents some physical constraints to surface transportation.

There are few roadways that cross the Yellowstone River or climb up the rimrocks to provide north-south connections. North 27th Street and Zimmerman Trail are two of only three direct connections between I-90 and MT 3. Zimmerman Trail traverses residential areas and presents significant topographic constraints. The 27th Street corridor routes traffic through the heart of downtown Billings. A third connection for north-south travel between I-90 and MT 3 is provided via US 87 (Main Street and Airport Road).

Local Road Network

All the roadways in the Billings Urban Area are classified by type or Functional Classification. Four levels of roadways are classified; Principal Arterial, Minor Arterial, Collector and local. The Functional Classification takes into account the type and distance of travel served by the roadway as well as the land access function.

Principal Arterial streets provide a high level of mobility favoring mobility functions over land access functions. Higher speeds, long distance continuity, and higher levels of service combine to efficiently serve longer distance trips. Access management is critical to preserve through-put capacity and roadway safety. Arterial streets provide connection to both higher class roadways (freeways) and lower class Collectors. There are approximately 32 existing roadways classified as Principal Arterials in the Billings Urban Area and six proposed. The proposed Principal Arterials are not yet constructed, but due to increased volume on connecting road-

ways, are recommended. The proposed Principal Arterials include the North Bypass, the Inner Belt Loop, the extension of 32nd Street West to Zimmerman Trail, Gabel Road and a north-south connection between Hardin Road (US 87) and Becraft Lane in Lockwood.

Minor Arterial streets are similar to Principal Arterial streets but are distinguished by lower capacity and operating speeds. Minor Arterials typically have shorter continuity than Principal Arterial streets and may serve land access to a greater degree. Forty-four existing streets or segments of existing streets are classed as Minor Arterial. Numerous Minor Arterials are proposed, especially on the Billings West End where future mid-section roads will be classed as Minor Arterials.

Collector streets collect traffic from local streets and carry it to Arterial streets. They provide the link between the local land access system and the Arterial street network. Collectors should provide access to, but not through residential neighborhoods. Collectors are generally shorter in distance and have slower speeds than Arterial streets. Approximately twenty existing streets are classified as Collectors in the Billings Urban area. The recommended Collectors are located on the west edge of Billings Heights, connecting Annadale Road with Alkali Creek and in the South Hills, connecting Blue Creek Road with Hillcrest Road.

The remaining City streets and County roads within the Billings Urban Area are considered local streets. Local streets provide the primary access to the land and individual properties. Local streets are constructed as land is subdivided and developed. In most cases, these roadways are open to the public. In some subdivisions, the street has been platted as a private road which restricts access to the general public.

Travel Demand Trends and Needs Assessment

The Billings Urban Area 2000 Transportation Plan analyzed the current and future travel demand using the QRS-II Travel Demand Model. This model takes into account trip generation, trip distribution, mode split and trip assignment. The modeling identified unfavorable travel conditions resulting from the projected near-term growth (1996-2000), mid-term growth (1996 – 2010) and long-term growth (1996 – 2020). For purposes of analysis, the model divided Billings and the outlying areas into general neighborhoods: Central Billings, West Central, South Central, Outlying North, Heights West, Heights East, Billings Northwest, West End, Shiloh West, Shiloh Northwest, Lockwood, External West, External East, and External Northwest.

In the near-term growth scenario, significant increases in daily trips can be expected in the Outlying North neighborhood, Heights West, Billings Northwest and West End neighborhoods. Increased trip generation is anticipated in the mid-term growth horizon for the Heights West, Billings Northwest and West End neighborhoods. The Outlying North, Shiloh West and Shiloh Northwest neighborhoods will experience the greatest increase in trip-making in proportion to the existing trip generation levels. Long-term growth will result in the greatest proportional increase in trips in the Outlying North, Shiloh Northwest, and Shiloh West neighborhoods. In terms of raw trip-making, Heights West, Billings Northwest, and the West End will see the greatest increases.

Capacity deficiencies of the Billings Urban Area roadway system for the long-term will develop as a result of too few lanes on heavily traveled roadways or too many approaches and intersections on roads with high traffic volumes. Roadways that are expected to remain or become compromised include Main Street, Montana Avenue, Grand Avenue, North 27th Street, 24th Street West, and Shiloh Road. Increased capacity on east-west Arterial streets including King Avenue, Central Avenue, Grand Avenue and Rimrock Road will also be needed to carry traffic to the West end and Shiloh Road corridor.

The model evaluated several alternatives to address the projected system deficiencies in addition to issues identified at the regional, community and neighborhood levels. The key public issues

addressed in the evaluation of alternatives were:

1. Improved north-south arterial continuity in the west area
2. Improved capacity into and out of the Heights to downtown area
3. Improved mobility from the Heights to the west side of town
4. Improved truck/commercial vehicle access to and through town
5. Reduction of physical barrier impacts to transportation (rims, river, railroad tracks, etc).

The preferred system incorporates the best elements of all alternatives as well as addressing the key public issues. The preferred model consists of eight elements:

1. North bypass facility from the I-90/I-94 Interchange to MT 3, with a connection from MT 3 to Molt Road
2. Wicks Lane extension to MT 3 at Zimmerman Trail
3 32nd Street West improvements to extend/improve 32nd Street West from Broadwater Avenue to Rimrock Road as a Principal Arterial
4. Aronson Avenue connection to Alkali Creek Road
5. Bench Boulevard extension/improvements to extend Bench Boulevard south to intersect with Main Street at 4th and 6th Avenues with one-way connections
6. Extension/re-alignment of South Billings Boulevard to connect to Moore Lane, including the Monad Road extension to 8th Street West
7. Widening of Old Hardin Road to three lanes of a "super collector" facility
8. Gabel Road, Hesper Road and Zoo Drive reconfigurations to coordinate with current planning near the Shiloh Interchange and TransTech business park

These facility improvements, along with other transportation project recommendations, are listed in the 2000 Billings Urban Area Transportation Plan. Components of several of these recommendations are being implemented. Transportation projects that are currently programmed in the 2002–2006 Transportation Improvements Plan (TIP) are listed below.

1. Airport Road reconstruction
2. Shiloh Road environmental studies
3. Montana Avenue Overpass rehabilitation
4. Grand Avenue reconstruction
5. 32nd Street West construction
6. 6th Avenue to Bench Boulevard connection
7. Interstate 90 interchange study
8. Swords Park bike path

High Accident Locations

Accident records for city streets and state highways are maintained by the Montana Department of Transportation. These data were used in the development of the 2000 Transportation Plan to identify locations of high accident rates. High accident locations coincide with locations with the most traffic and the most congestion. The Transportation Plan assessed 35 locations and ranked them according to accident severity. Different accident types were weighted. Fatal accidents received 5 times the incident occurrence. Injury accidents received twice the incident occurrence and accidents that caused property damage only received a single incident occurrence. This weighting system resulted in a strong indictor of problem locations. Of the 35 locations assessed, those with the highest weighted accident index are:

1. 24th Street West and St. John's Avenue – Accident Index = 237
2. Main Street and 1st Avenue North – Accident Index = 227

3. Main Street and Airport Road – Accident Index = 219
4. Grand Avenue and 17th Street West – Accident Index = 194
5. King Avenue West and 20th Street West – Accident Index = 185

According to the Plan, recommended improvements targeted to reduce traffic volume or increase system capacity should result in accident rate reductions. The Plan recommends routine monitoring to identify indicators of correctable problems or conditions.

Airport Facilities

Billings Logan International Airport is a growing regional air traffic hub with a market area encompassing central and eastern Montana and northern Wyoming. The airport is served by seven passenger airlines: Northwest, Delta/Skywest, Big Sky, United/Air Wisconsin, and Horizon, with 35 scheduled flights per day. Passenger emplanements have risen from 290,000 in 1989 to 354,722 emplanements in 2001. In addition to passenger service, the airport is served by two Fixed Base General Aviation Operators: Corporate Air, Inc. and Edwards Jet Center. In 2001, there were 66,000 general aviation operations. Mail and airborne freight are also handled out of Billings Logan.

The facility was last expanded in 1992 and has grown from a small 192 square foot facility with a single dirt runway, to a 300,000 square foot facility with three runways and associated taxiways. The first 1,820-foot unpaved runway was constructed in 1929 and has since been replaced with a full depth asphalt, 10,500-foot runway that can accommodate any aircraft flying today. The entire complex now encompasses 2,300 acres of city property.

The City Airport Department is a self supporting enterprise fund. The costs of operations are recaptured through use and tenant rates and charges. The Department has not received general fund support since 1975. The Department and the businesses located at the airport provide approximately 700 jobs and generate an estimated $190 million annually. Recent changes in security regulations require increased security staff. The initial security force of 42 employees is federally employed.

Freight Movement

The Billings Urban Area relies on two major rail companies and numerous trucking firms to move freight in, out, and through the region. The geographic location and the existing infrastructure generally restrict freight movement from east to west. Rail lines in particular are oriented toward transcontinental east-west flows, while freeway routes provide some, though less convenient, north-south flow.

The two railroad operators in Billings are Burlington Northern Sante Fe and Montana Rail Link. Both move large volumes of coal and freight through the area and serve the downtown Billings intermodal facility. A total of 53 million tons of coal and freight was moved by rail through Billings in 1996. Freight originating in the region includes coal and coal products, petroleum, farm products, lumber and wood products, and stone, clay, glass and concrete products. Ninety percent of these commodities were shipped out of state. Existing rail facilities for Montana Rail Link and Burlington Northern Sante Fe are adequate and have sufficient capacity to accommodate current and anticipated freight movement demand.

The main railroad tracks bisect downtown Billings creating disruption of traffic flow between the downtown and southside neighborhoods. The need for one or more grade separations between downtown streets and the railroad tracks has been a serious concern for Southside residents for more than four decades. Excessive delays, long queue lengths and public safety are the primary issues. Funding is being sought by the "Over, Under and Around the Railroad Tracks" committee to develop alternatives for grade separated crossings. The goal of this committee is to "secure funding to study the feasibility of a grade separation of the railroad tracks or a combination of over, under or around the railroad tracks to improve vehicle traffic and public safety through downtown Billings".

In Montana, more than 75 percent of commodities are moved by truck. Interstate 90 carries more than

1,000 commercial vehicles per day and is the busiest truck route in the State. Interstate 94, MT 3 and US 87 are also important truck routes in and around the Billings Urban Area. There are no designated truck routes through the urban area, but preferred routes include 27th Street South, Shiloh Road, Laurel Road and Moore Lane, Main Street, Old Hardin and Hardin Roads and King Avenue.

The lack of a north-south connection with interstate routes is a national, as well as local, concern. The "Camino Real" is a conceptual north-south trade route connecting Canada, the U.S. and Mexico via I-25, I-90, I-15, MT 3 and US 87. It is in the vicinity of Billings and Yellowstone County that the concept of a 4-lane trade route is not realized. US 87 and MT 3, both of which are two lanes provide the most direct route between I-90 at Billings and I-15 at Great Falls. Moving traffic between I-90 to MT 3 and US 87 is part of the objective of a North Bypass Feasibility Study currently funded by Federal Highway Administration (FHWA).

Alternate Travel Modes

Three alternate travel modes are available in the Billings Urban Area; Pedestrian, Bicycle and Transit. The Pedestrian mode is supported by a network of sidewalks throughout the City of Billings, and to a lesser extent, into some areas of Yellowstone County. Bicycle paths also provide for pedestrian access as well as bicyclist and other non-motorized, wheeled vehicles. The Bicycle mode is also supported by an increasingly longer network of built trails and designated bicycle routes in the City and County. The City-operated Metropolitan Transit System (MET) provides service on 18 fixed routes, Monday through Friday, and seven fixed routes on Saturday.

Sidewalks

The sidewalk network in Billings is fragmented. Most sidewalks are constructed at the time of subdivision or programmed through SIDs in older neighborhoods. The City Subdivision Regulations and City Public Works standards require sidewalks to be constructed along both sides of all streets, unless waived by the City Council. In most cases, sidewalks are not required to be constructed at the time of subdivision, but may be postponed until the lot is developed. This policy results in disconnected segments of sidewalks that may or may not be completed for many years after the subdivision is platted. Sidewalks along Arterial and Collector streets are required to be 7-foot wide boulevard type.

A 1992 School Sidewalk Study prioritized sidewalk construction along school routes. The Study established priorities based on the route and scope of work needed. In 1999, the Billings City Council took action to address the existing sidewalk funding policies. The Council did not change the development/building permit policy. For new or replacement sidewalks, Community Transportation Enhancement Program (CTEP) funds will be used to construct sidewalks along arterial and collector street and priority school walking routes. Sidewalk projects are selected in accordance with the CTEP public involvement requirements. Other walking routes, not on Collector or Arterial streets, will be constructed if requested through a neighborhood petition.

Bicycle Trail and Routes

Yellowstone County and the City of Billings adopted the BikeNet Plan in 1995. An update, now called Heritage Trails, will be completed in 2003. BikeNet is a comprehensive bicycle plan for the Billings Urban Area. This plan identified important improvements in the pedestrian and bicycle facilities to facilitate and promote use of these two travel modes and enhance the quality of life of Billings' residents. The BikeNet Plan envisions a future system and recommends actions for policy, programs and physical facilities. The policy change recommendations and accomplishments include the following:

1. Increase the involvement of bicycle interest on government boards and transportation planning steering committees. Bicyclists are currently represented on the Traffic Board and there is increased involvement in the Technical Advisory Committee.
2. Adopt bicycle-friendly review procedures and design standards. The City of Billings and Yellowstone County Subdivisions now require

compliance with the BikeNet plan for all subdivisions.

3. Program funding of improvements to the system. System improvements have been primarily funded through Community Transportation Enhancement Program (CTEP). The construction of a bikeway in Swords Park is planned using funds from the Montana Air Congestion Initiative, and the Alkali Creek Bike Path will be funded through the federal Transportation Community System Preservation (TCSP).
4. Hire an Alternative Modes Coordinator. A part-time Alternative Modes Coordinator was hired in 1999. The position is responsible for identifying, programming and facilitating improvements to the bicycle and pedestrian network.
5. Incorporate a bicycle "check-off" on all private site development and subdivision review, as well as public infrastructure projects. The Alternative Modes Coordinator is now part of the review team for all subdivisions and site plans.
6. Integrate bicycle standards into street design and maintenance standards.
7. Encourage intergovernmental and interdepartmental cooperation to plan and implement BikeNet through multiple use projects, particularly greenways. City and County Departments now coordinate in the development and programming of BikeNet projects and some drainage planning projects are considering recommendations. Significant changes will need to be made to storm drainage policy to effectively implement a system of multiple use greenways.
8. Revise street design standards for new streets and to retrofit existing streets. No new standards have been adopted, but bicycle standards are given consideration in project planning.
9. Improve bicycle parking. There has been limited success in implementing this recommendation.
10. Develop a series of multiple use corridors. The West Billings Plan, adopted in 2001, emphasized the need for multiple use corridors and provided an action plan to achieve this goal. Implementation of this plan will ensure that the West End is developed in accordance with this concept.
11. Strengthen the bicycle components of the 1990 Comprehensive Plan and updates. The public involvement component of the 2002 Growth Policy includes reviewing the recreation and open space needs of Yellowstone County and the City of Billings.

Because a bicycle program did not exist prior to BikeNet, the plan recommends strengthening bicycling in the community by providing bike route maps, information systems, lock and ride promotions, monitoring accidents and other coordinated efforts. A BikeNet map, showing on-street and off-street routes was first published in 1995. The BikeNet Plan is currently being updated to address new standards and policy changes and will be available in 2003.

Since the adoption of the 1995 BikeNet, the City and County have constructed or plan to construct several additions to the off-street network. The remaining two miles of a seven mile, 10-foot wide concrete bike path was completed in 2002. The original Kiwanis Trail, extending from Mary Street to Yellowstone Road was completed in 1997. In 1999 an additional two miles were added extending the trail from Yellowstone Road to Coulson Park. The last 2.6 mile segment was completed in 2002 and extends from Coulson Park to Mystic Park along the Yellowstone River. A new on-street bike route segment which would connect the river bike path with downtown was recently striped along South 25th. The final connection is still in the planning phase. The completed project would provide access from the river trail to downtown. Private funding is being sought to complete the connection with a pedestrian/bicycle bridge spanning the railroad tracks at 25th Street.

The other bicycle path that is being constructed in 2002 is the Descro Park trail, a .5 mile, 10 foot wide trail running the length of Descro Park. The trail connects with the trail in Lampman Park and Stewart Park. Improvements also include a safe crossing at Central and Broadwater Avenues. A portion of Alkali Creek Bike Path and the Swords Park Bike Path are currently programmed to be constructed in 2003. The Alkali Creek path is proposed

to extend from Main Street to Senators Boulevard with funding available for only a section of that connection that will follow along or near Alkali Creek. The Swords Park Path is in the preliminary engineering phase and will provide a connection between Boothill Cemetery and 27th Street North through Swords Park.

Priority projects recommended in the BikeNet Plan include:

- A 6th West Avenue Underpass. Construction of an off-street path connecting 8th Avenue West and 6th Avenue West along the railroad tracks. The path would link the South Side neighborhood via Calhoun Street with the Central-Terry neighborhood.
- Extension of the Yellowstone River path to Riverfront Park. Continued trails and paths along the Yellowstone River. The section remaining would begin at Mystic Park and go to Riverfront Park, and possibly beyond as recommended by The Yellowstone River Master Plan (Wirth & Associates, 1994).
- North 27th Street bicycle improvements. An on-street, uphill climbing lane for bicycles and an off-street pedestrian trail south and west of North 27th Street.
- Zimmerman Trail. Road widening and drainage improvements to construct uphill climbing lane on Zimmerman Trail.
- Division Street crossing. A westbound contraflow bicycle lane along north side of Clark Avenue for easier access to and from downtown.
- More information regarding funding and design of bicycle and pedestrian projects is provided in the 1994 BikeNet Plan and updates.

Public Transportation

MET Transit Service provides scheduled bus service within the City of Billings. MET operates a fleet of 21, 35-foot RTS buses and two 30-foot low floor Eldorado buses. There are 18 fixed routes offered Monday through Friday and seven fixed routes on Saturday. The primary transfer areas are located downtown and Stewart Park.

Transportation System Management Plan (TSM)

Projects that would improve operation of the street and highway network and reduce travel delays, referred to as Transportation System Management strategies, were identified in the 2000 Transportation Plan. These strategies are low-cost opportunities to better manage and operate the existing transportation infrastructure in the near-term. The plan lists TSM projects not yet implemented from the 1990 Transportation Plan and those developed as part of the 2000 Transportation Plan. The Plan identified $10.2 million of improvements over the next 10 years. The projects include signalization of intersection, reconstruction of intersection, some street widening, turn lane improvements, sidewalk installation and implementation of the City Signal Priority Program. A variety of funding sources could be used to implement the TSMs, including federal and state programs, local fuel tax funds and private developers. A complete list of the TSM Plan Project Elements, along with costs and potential funding sources, is provided in the Billings Urban Area 2000 Transportation Plan.

Street Design Standards

The City Subdivision Regulations specify standards for street design based on functional classification. Based on these standards, the typical street section designs requirements are shown in Table 1. Subdivisions within the City are required to install

TABLE 1: DESIGN STANDARDS BY FUNCTIONAL CLASS

Functional Class	Right of Way	Lane Width	Park Width	Median Width	Back to Back Cub Width
Principal Arterial:					
6 –lane + median	120’	12’		16’	92’
Minor Arterial:					
2-lane + parking	100’	14’	10’	-	52’
4-lane no parking	100’	12’	-	-	52’
4-lane + median	100’	12’	-	16’	68’
Collector:					
2-lane + parking	80’	14’	10’	-	49’
4-lane no parking	80	12’	-	-	49’
Local Access					
Commercial	70’	12’	10’		49’
Residential	60’	10’	8’		37’

curb, gutter and sidewalks on all streets. Variances from these standards are often requested by developers suggesting that changes to the standards should be considered when updating the subdivision regulations.

Rural Transportation

County Roads and Bridges

Yellowstone County maintains approximately 1,500 miles of public and County roads. Public roads are distinguished from County roads in that they have been expressly dedicated for public use, but were not formally petitioned and approved as in the case of County roads. The County Public Works Department maintains the County road network. County Road projects scheduled for FY02 - FY03 include:

- Shepherd/Acton Road Reconstruction – gravel
- Vandaveer Road Reconstruction – gravel
- Fritz Road Reconstruction – pave
- Musselshell Trail Reconstruction – gravel

There are approximately 240 bridges in Yellowstone County and thousands of culverts. These include all bridges in the City as well as the County.

Roads in Yellowstone County may also be privately owned. These roads are generally designated as private at the time of subdivision platting. For roads to be considered private, they must restrict access to the general public. In some cases, this is accomplished by gating or signage indicating private use only.

The Bureau of Land Reclamation (BLR) is also the owner of an estimated 54 miles of public road in the Huntley Project area. These roads were originally platted in 1907 and ownership was retained by the BLR. The County and the BLR are negotiating transferring the ownership of the Huntley Project roads at this time. The primary issue to resolve is whether or not funding will be available to bring these roads up to County standards.

Funding for Maintenance

Funding for maintenance of County and public roads comes from the County Road and Bridge tax levies, gas tax funds, and from Rural Special

Improvement Districts (RSIDs). The voters approved a road mill levy increase of 4.03 mills for FY01 bringing the total mills to 23.16 from 15.97 in FY00. This mill levy increased slightly in FY02 to 24.36. City residents do not pay this mill levy but do contribute to the County Bridge Fund. The Bridge Fund mill levy was 2.80 in FY01 and 2.91 in FY02. Most rural subdivisions that are serviced by internal public roads also pay an annual assessment for road maintenance through the RSID mechanism. There were approximately 63 RSIDs active in the County in 2001. Other sources of revenue for the Road and Bridge Department are Federal and State grants and cost sharing. The Road and Bridge Division actively promotes cost-share projects with property owners. Cost-share projects are limited to roads where the Division has had an historical maintenance responsibility.

Air Quality

Based on air quality measurement collected in 1977, the City of Billings was categorized as nonattainment "Not Classified" for carbon monoxide (CO) by the U. S. Environmental Protection Agency (EPA). This meant that Billings exceeded the National Ambient Air Quality Standards mandated by the National Clean Air Act. Because of this designation, Billings was required to prepare an implementation plan to bring the area into compliance with the national air quality standards. As part of the 2000 Transportation Plan, a regional emissions analysis was performed to demonstrate the proposed plan would not adversely affect air quality.

Beginning with a baseline year of 1996, future estimates of transportation-related emissions were determined for the horizon years of 2000, 2010, 2020. The results of this analysis indicated that emissions would decrease because, by implementing the Transportation Plan, traffic congestion would decrease and future cars and trucks would be less polluting.

This analysis became the basis for redesignating the Billings "not classified" carbon monoxide nonattainment area to attainment for the carbon monoxide National Ambient Air Quality Standard (NAAQS). The EPA approved the redesignation of Billings from nonattainment for CO to attainment and approved the maintenance plan that is designed to keep the area in attainment for CO for the next 10 years.

Yellowstone County regularly monitors air pollutants at nine monitoring stations around Billings and Laurel in order to comply with regulations imposed by several authorities, including the Yellowstone County Air Pollution Control, the Montana Department of Environmental Quality, and the US Environmental Protection Agency. The regulations require monitoring sulfur dioxide, carbon monoxide, nitrogen oxides, ozone, and particulate levels from major sources and also from the cumulative effect of all sources in the region.

References

City of Billings, Yellowstone County, Billings Urban Area 2000 Transportation Plan.

City of Billings, Yellowstone County, 1994, BikeNet Bicycle Plan for the Billings Urban Transportation Planning Area.

Billings Logan International Airport, homepage, 2002, www.flybillings.com.

4.8 Open Space and Recreation

Introduction

Parks and recreational facilities, as well as natural areas, are an integral part of the quality of life in the community. They provide opportunities for citizens and visitors to enjoy their surroundings and enjoy their environment through recreational and aesthetic pursuits. Open space and recreational areas are the amenities that shape a community and make it a desirable place to live and work.

Several entities within Yellowstone County administer and maintain parkland and recreational sites including; the Federal government, the State, the County, the City of Billings and other incorporated cities in the County.

Federal Recreation Areas

The U. S. Bureau of Land Management (BLM) administers several recreational sites in Yellowstone County for public use.

Pompeys Pillar
Pompeys Pillar itself has been declared a National Monument and the area around the site is designated as a National Historic Landmark. It is located along the Yellowstone River at the site where Captain Clark stopped along his journey to etch his name in the sandstone pillar. There is an information museum on the site and the area that includes 566 acres is available for hiking, fishing and wildlife viewing. The approximate visitation for fiscal year October 2000-September 2001 was 45,000 visitors.

Sundance Lodge Recreational Area
This area is located south of the Yellowstone River along River Road between Billings and Laurel. The primary use of this area is for hiking, horseback riding, fishing, and wildlife viewing. It contains 380 acres and the approximate visitation for fiscal year October 2000-September 2001 was 2,000 visitors.

Shepherd, Ah-Nei
This area is located approximately 9 miles northeast of Shepherd on the CA Road. The primary use of this area is for environmental education, off-highway vehicles, snow play, hunting, and bicycling and contains 3,602 acres. The approximate visitation for fiscal year October 2000-September 2001 was 3,250 visitors.

17-Mile
This area is located approximately 14 miles north of Billings on Montana Highway 87 and west on Crooked Creek Road. 17-Mile is used for target practice, hiking, hunting (upland bird). The area contains 2,080 acres. The approximate visitation for fiscal year October 2000-September 2001 was 3,000 visitors.

Acton
The Acton area is located 25 miles northwest of Billings on Montana Highway 3 and then 6 miles east on Oswald Road. The primary use of this area is for hiking, horseback riding, hunting and snow play. The area contains 3,800 acres. The visitation for fiscal year October 2000-September 2001 was approximately 2,500 visitors.

Four Dances Natural Area
This 764 acre natural area is located south of Billings and south of the Yellowstone River off Interstate 90, Lockwood exit. The primary use is for hiking. BLM estimates visitation for fiscal year October 2000-September 2001 was 2,750 visitors.

South Hills Off-Road Vehicle (OHV) Area
There are 1,270 acres located southeast off South Billings Boulevard adjacent to the Old Blue Creek Road set aside for OHV-motorcycle riding. The approximate visitation for fiscal year October 2000-September 2001 was 4,600 visitors.

Steamboat Rock
Steamboat Rock is located approximately 25 miles northeast of Shepherd. This is an open area for any recreational use. There are no visitation records kept.

The National Park Service along with the Friends of Canyon Creek manages the Canyon Creek Skirmish Site, a unit of the Nez Perce Historical Park Battlefield. This half acre site is located 16 miles north of Laurel on Buffalo Trail.

State Parks and Recreation Areas

The Montana Department of Fish, Wildlife, and Parks manages a number of outdoor recreation sites in Yellowstone County.

Lake Elmo
This 122 acre urban day-use park is located at 2300 Lake Elmo Drive and attracts visitors to swim, sailboat, windsurf, and fish. A display in the Fish, Wildlife & Parks headquarters located on site provides weekday interpretation of the park. During the summer, a concessionaire offers food, beverages and non-motorized watercraft rental. The visitor count for 2000 was 98,723.

Pictograph Cave
This site is located six miles south of Billings off Interstate 90 Lockwood exit. The Pictograph, Middle and Ghost Cave complex was home to generations of prehistoric hunters. Over 30,000 artifacts have been identified from the park. A short paved trail allows you to view the rock paintings, known as pictographs that are still visible in Pictograph Cave, the largest of the three. Interpretive signs tell the story of Montana's first professional archaeological studies and excavations. This site is listed as a National Historic Landmark and is administered by Montana Fish, Wildlife and Parks. The visitor count for 2000 was 36,164.

Sportsman Accesses
These access areas provide public recreation access to land-based and water-based sites for fishing, hunting, floating, and other recreational activities. Management of these facilities includes the protection of the on-site resources and adjacent private lands. Minimum facilities and developments are allowed consistent, with recreation use and resource protection.

The Yellowstone River flows through the length of Yellowstone County and provides many water recreational opportunities for the area. The following are the public access points along the Yellowstone River.

- Buffalo Mirage (7 miles E. of Laurel on I-90 at Park City exit, then 6 miles SE on county road) located at river mile 387.0
- Duck Creek (south of Billings, off 56th St.), located at river mile 374.6
- South Hills (south of Billings, off South Billings Blvd.) located at river mile 365.6
- East Bridge (Lockwood Bridge access off I-90) located at river mile 360.7
- Gritty Stone (by Worden) located at river mile 337.3
- Voyagers Rest (by Ballantine) located at river mile 334.9
- Captain Clark (8 miles W. of Custer on the Frontage Road) located at river mile 310.6

Navigable Waterways

Yellowstone River
The Yellowstone River provides a continuous, navigable waterway through Yellowstone County. It is the longest free flowing river in the lower 48 states. The river adds to the aesthetic beauty of the region and provides water for farming and municipal water supplies, as well as providing many recreational opportunities for the community including fishing, boating and other water-based activities. The river may be navigated by small non-motorized crafts such as kayaks, canoes, rafts and drift boats. Jet

boats are the most common motorized craft on the river due to the variable water depths.

Bighorn
The fishing on the Big Horn River is legendary. The Bighorn River flows north out of the Bighorn Canyon Reservoir at Fort Smith. The "blue ribbon" fisheries lie predominantly in Big Horn County although the last 12 miles of the Big Horn River forms the east boundary of Yellowstone County before it enters the Yellowstone River. The river can be navigated with power jet boats up from the confluence, but most anglers prefer the non-motorized canoes and drift boats.

Yellowstone County Parkland

The County Park Board adopted the Yellowstone County Park Plan in 1984. The plan inventoried existing parks throughout Yellowstone County. Each park was classified according to size, service area and degree of development. Descriptions of the County parkland classes are listed below.

Parkland Classifications:
Neighborhood Park/Playground (NPP)
Day use parks of limited size providing close to home opportunities for a variety of unstructured active and passive recreation activities. Parks will serve all ages with an emphasis on ages 5 – 18.

Neighborhood Mini-Park (NMP)
Small day use parks retained to accommodate various activities desired and developed by neighborhood or special interest groups. These parks are most viable in urban areas or in the context of small lot, multiple family or mobile home residential developments.

Neighborhood Open Space (NOS)
Open space to preserve or enhance the environmental quality of the neighborhood. Parks may preserve natural features, act as buffers and provide limited recreational opportunities.

Community Natural Areas/Open Space (CNA)
Parks preserve areas of high natural resource value or special natural or environmental features. They provide opportunities for passive recreation and study of the natural environment or conserve features of community significance (i.e., rims, river).

Community Playfields (CPF)
A Community Playfield is a large outdoor recreation area developed primarily to serve the active recreational needs of the junior and senior high school ages and adults of the community. Playfields provide specialized facilities for daytime and evening programmed activities.

Community Park-Multiple Use (CMU)
Multiple Use Community parks are designed to provide a wide variety of recreational opportunities. Parks provide for day and evening use by all segments of the population. Ideally, these parks incorporate elements of community natural areas and playfields as well as less structured activities within an ornamental landscape setting. The larger size community park allows for a variety of non-conflicting uses.

Major Park (MJR)
Major Parks are considered large resource based park, designed to provide large number of people with a wide variety of recreational day and evening uses. Major Parks provide for both intensive uses and passive pursuits within a natural setting or landscape setting. Facilities are provided to serve all segments of the population.

Regional Park (R)
Regional Parks serve multi-governmental units and are usually administered by a regional body. These parks provide a wide range of day and overnight uses. Regional Parks are usually natural resource based and are developed to serve the entire population. Often large portions of the land area remain undeveloped for the purpose of preserving significant areas of the natural landscape or to provide extensive open space or greenbelt areas.

Single/Special Use Facility (SU)
Special Use Facilities provide unique recreational opportunities to a variety of age groups. Central feature may be a golf course, zoo, historic site, festival, amphitheatre or ski areas. Special Use Facilities often serve the entire region or state and may attract population from a larger base.

Recreation Corridor (RC)
Recreation Corridors are linear parks establish extensive and continuous strips of land and water dedicated to recreational travel including hiking, biking, horseback riding, cross country skiing and canoeing. Recreation Corridors serve the entire community population.

Excess Lands (EX)
The Excess Land classification qualifies lands with limited or no recreational potential for disposition or sale. Revenues generated will be used to maintain and develop existing County parks or to acquire additional, needed parklands.

Table 1 lists the parks in Yellowstone County along with their classification and acreage.

Leased County parkland is currently in the inventory of parklands, but is not being used for recreational purposes. Rather, they are leased for farming, ranching or special use. These parcels include:

- Arrow Island I (east of Shepherd)
- Arrow Island II (east of Shepherd)
- Cove Creek Park (Echo Canyon)
- Falcon Heights (for mobile home) (Blue Creek)
- River Vista (east of Shepherd)
- Sharptail (King and Shiloh)
- Valley (Blue Creek)
- West Park (west of Laurel)
- Winchester (Shepherd)
- Zimmerman (for cell tower)

Special use facilities and land, such as Oscar's Dreamland and MetraPark, are included in the City of Billings Parkland Inventory.

TABLE 1: CLASSIFICATION AND ACREAGE OF COUNTY PARKLANDS

NAME	CLASS	ACREAGE
Northwest Park Area		
Byron Nelson	NPP	4.0
Cynthia	NOS	2.0
Indian Cliffs	CNA (R)	24.2
Yellowstone Meadows	NMP	1.6
Zimmerman Acreage Tr.	NMP	1.0
Zimmerman Park	MJR (R)	UK
West Park Area		
Canal	NOS (R)	3.4
Clydesdale	NPP	6.3
Grand Acres	NMP	0.3
Lampman	NPP	9.5
Un-named C/S 2189-2175 (Wells Garden Estates)	NPP	3.0
South Park Area		
Agricenter	CNA	2.2
Byrnes Stephens	NOS	0.5
Carla Island	MJR (R)	25.0

TABLE 1 continued: CLASSIFICATION AND ACREAGE OF COUNTY PARKLANDS		
NAME	**CLASS**	**ACREAGE**
Kimble Park	CNA	0.7
Peterson	NMP	1.0
Riverside Estates	CNA (R)	6.8
Lockwood and Billings East Area		
Bel Aire	NMP	1.3
Brookdale	NPP	1.8
Charles Russell	NOS	3.8
Coulson	MJR	60.0
Dry Creek	NPP	1.9
Emerald Hills		
Harris	NPP	2.5
Hillner	NPP	7.1
Lockwood	CPF	10.0
Lockwood Jr. High	CMU	16.3
McKenzie	NOS	10.0
Pinehill	NOS	8.9
Sannon	NPP	2.6
Sled	NOS	8.7
Shawnee	NMP	1.4
Billings Heights Area		
Alkali Creek	NMP	0.7
Holfeld	NOS	.3
Madsen	NMP	1.4
Oxbow	NOS	10.3
Quarterhorse	NPP	4.7
Sacrifice Cliff Park	CNA	Unknown
Sun Valley	NPP	8.9
Two Moons	MJR (R)	150.6
Laurel Area		
Century	NPP	5.6
Echo	CNA	15.5
Eggebrecht	NPP	4.5
Homewood	NPP	7.7
O'Donnell (C/S 1233)	NPP	3.8
Pike	NPP	5.3
Plenty Coup	NPP	13.3
Shepherd Area		
Arrow Island 1st Filing	CNA	15.3
Arrow Island 2nd Filing	CMU	24.2
Hidden Lake Sub. Park (6 sites)	NMP&NPP	16.0
Mustang unnamed	NPP	5.4

TABLE 1 continued: CLASSIFICATION AND ACREAGE OF COUNTY PARKLANDS		
NAME	**CLASS**	**ACREAGE**
Prairie	NPP	7.0
River Vista	NPP	13.6
Shepherd Lions	CPF	0.5
Unnamed Whitney Sub	NOS	8.5
Winchester	NPP	3.2
Huntley, Ballantine, and Worden Area		
Homesteader		
Huntley		
Pryor Creek Subdivision	NOS	1.8
Riverside		
Custer Area		
Custer J.C. Park	NPP	4.5

City of Billings Parkland

This information is derived from the Parks2020 Billings Parks, Recreation, and Open Space Master Plan that was adopted January 27, 1997 prepared for the City Park Board. The Park Board consists of nine members and is advisory only. The City Parks, Recreation, and Public Lands Department (PRPL) is staff to the board. In addition to an inventory of all 2,592 acres of City parkland, Parks2020 identified areas in need of future parks and capital improvement needs of existing park. Many of the capital improvements were completed in 2000 and 2001 after City residents approved a General Obligation bond for recreational facility improvements in 1999. The following is a description of park classes found in the Billings urban area.

Recreation Parks

The most easily identified parks in the system are the recreation parks which are centers of activity and host to many community and neighborhood events. Recreation parks include Multiple Use Parks, Sports Complexes, and School Sites.

Larger Multiple Use Parks

These parks are frequently referred to as Community Parks, are provided to meet open space and recreation needs, and to preserve large areas of open space in developed areas. Parks development includes open lawn area, youth sports fields, picnic grounds with shelters, playgrounds, court sport, and large open area for special uses or events. These parks are appropriate sites for special use facilities and frequently include aquatic facilities, activity center, and complexes of sports fields or sports courts.

Neighborhood Parks

A series of smaller less intensively developed multiple use Neighborhood Parks provide basic recreation opportunities within a mile from home. Typical improvements include open lawn areas, landscaping, and sport courts and backstops for informal play.

Subdivision Parks

Subdivision Parks are small parks (less than two acres) developed to provide a playground for small children and open space within a ? mile radius of home.

Sports Complexes

Sports Complexes are large Community Parks developed to consolidate heavily programmed complexes of athletic fields on a few larger sites. The need for softball, baseball, soccer, and field sports

has emerged as the interest in organized sports has grown and complexes for hosting tournaments and special events are desired. Ideally, sports complexes should be located throughout the community on sites where use, noise, and lightning in the evening will not interfere with adjacent land uses.

School Sites/Parks
School Sites/Parks are mapped and included in the discussion of Multiple Use Recreational Parks. Site development of these lands make significant contributions to the overall park and recreation system, particularly in meeting neighborhood and play lot needs.

Conservation and Multiple Use Park Lands
Conservation lands include lands managed principally for their natural or visual resource value including Natural Areas and Urban Green Space.

Natural Areas
Natural Areas are lands set aside primarily for conservation of natural features and sensitive habitat. Most natural parks are located along the Yellowstone River, creeks and drainages, and the sandstone rims. Recreational pursuits are passive, including walking, nature study, interpretive activities, photography, and wildlife watching.

Urban Greenspace
Urban Greenspace includes landscaped parks, whose primary purpose is to provide visual relief to the built environment. Lands may include buffer strips between land uses, landscape development along transportation corridors, or landscaping at community gateways and subdivision entrances.

Special Use Parks
Special Use Parks include diverse lands serving unique and mostly singular functions. The Par 3 Golf course, Cobb Field Stadium, Mountview Cemetery, and Yellowstone Kelly's Grave are existing examples. Suggestions for additions to the system include an outdoor amphitheater, dog parks, ice skating rinks, sledding hills, skateboard parks, water parks, and equestrian parks. Ideally, special uses are included in larger parks or located along greenways.

Multifunctional Parks
Multifunctional parks incorporate many functions, balancing scenic, cultural, and natural resource conservation with developed recreational opportunities. These parks offer diverse resource-based recreational pursuits, including boating, river sports, hiking, climbing, fishing, and wildlife watching. Riverfront and Swords Parks are good examples of existing Multifunctional parks.

Undeveloped Park Lands
Undeveloped lands are those not formally managed, but are currently administered by the City or County Parks Boards. Undeveloped park lands, which will remain in the system, are shown on the Master Plan Map as Recreation, Conservation or Special Use Parks.

Greenways
Greenways are corridors of land managed to provide a variety of functions, which may include recreation, conservation, transportation, infrastructure, or community shaping. Greenways are linear corridors, comprised of private and public lands. Greenways do not necessarily include public access or recreational opportunities although ideally they would incorporate both. They would also provide connecting pathways used by cyclists, walkers, runners, skaters, and strollers. Greenways include vegetation, natural or ornamental, as an essential component to add bio-diversity and scenic value. Greenways are also inclusive of the BikeNet trail system that now has only about seven

miles of paved trail developed in the Billings community. The Yellowstone River Greenway Master Plan is another important plan that maps out greenway corridors exclusively along the Yellowstone River. As new subdivisions come in for review the conservation corridors delineated in the BikeNet and Yellowstone River Greenway plans are requested for preservation for future trail development.

Open Space
Open space is defined as: "all land and water in an urban area, not covered by buildings, which has value for park and recreation purposes, conservation of land and other natural resources, or historic or scenic purposes." Park lands contribute to, but do not fully comprise, the community open space system. Similar to greenways, these lands may or may not be administered by PRPL.

Urban Forest
The Urban Forest includes trees planted on public and private lands in developed areas. Developing and maintaining the urban forest is a community responsibility. The urban forest should be developed and enhanced in the entire urbanized area. Street tree planting and maintenance should occur as a result of incentive programs and regulations.

Scenic Resources
Scenic Resources include views and landscape features which have been identified as important to the community's sense of place. These are generally noted on The Parks2020 Master Plan. A comprehensive open space study as part of a growth management plan would further refine the priorities and map important view corridors.

The community currently has no method, policy, or responsible party for managing open space, the greenways, or scenic resources. No comprehensive inventory of important natural, scenic, or biological resources is available for Yellowstone County.

Special Use Facilities and Lands
Special Use facilities include cultural facilities, conservation, recreation, or open land resources, which contribute to or enhance the community's parks, open spaces, or recreational opportunities but are not managed by the City or County Parks Departments.

Cultural and Recreation Facilities
Cultural and Recreation Facilities include the YMCA and YWCA, athletic clubs, Zoo Montana, Billings Community Center, Oscar's Dreamland, and the Boy's and Girl's Club. Some, but not all, of these resources are mapped.

Conservation Lands
Conservation Lands include flood plains, scenic resources, wetlands, and unique natural areas such as the rims, the Yellowstone River and its tributaries. Some, but not all, of these resources are mapped. A comprehensive inventory of natural resource lands is needed.

Other Open Space

Open Lands include state and federal lands, undeveloped lands, and public utility lands. Open Lands shown on the master plan illustrate the current conditions, based on zoning and ownership, rather than established community priorities for open space.

There are several agencies and groups, such as the Nature Conservancy, the Montana Land Reliance and Mid-Yellowstone Land Trust, that operate within Yellowstone County and are concerned with conservation easements and preserving open spaces for the future of the community. These groups may be involved with land that is protected but does not provide any recreational opportunities for public use.

References

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4.9 Cultural and Historic Resources

Introduction

Yellowstone County has been inhabited over the last 12,000 years and the remains of human activity can be found virtually everywhere. Approximately 450 of the more than 23,000 archaeological and historical sites identified in Montana are located in Yellowstone County. The majority of these sites are located in or near the Yellowstone River valley.

Yellowstone County and the area that is now Billings were also prominent throughout the recorded history in Montana.

A Brief History of Billings and Yellowstone County

Since the time when prehistoric man first inhabited the Yellowstone Valley some 12,000 years ago, the land and the people who lived here have experienced many changes. Great mammals, which have now disappeared, once roamed the area and were an important source of food for small groups of hunters and gatherers. Today farming, ranching, energy development, and providing goods and services to the region are the activities of most residents.

The earliest inhabitants lived off the land, taking their tools, clothing, shelter, and food from what nature provided for them. Their weapons, spears and atlatls, killed the mammoth, bison, and camel which were their food. Fiber from yucca plants was twisted into rope, and hide was the raw material for clothing and shelters. When large game was in short supply due to harsh winters or drought, the natives survived on berries, seeds, and small animals.

About 11,000 years ago the extinction of large prehistoric animals occurred in the Yellowstone Region. Between 6,500 and 4,000 years ago, the Yellowstone Valley experienced an extended period of warmer, drier weather that left the plains a virtual desert, which was less hospitable to mammals and humans. During this period, humans moved from the prairie to the mountains where vegetation was more varied and small animals would support the human population. As the climate moderated, they moved out of the mountains and returned to the plains. The modern bison evolved and was hunted by native populations who had developed more sophisticated weapons such as the bow and arrow, which were introduced about 2,000 to 1,500 years ago. Great migrations of humans took place during this time period.

Evidence of this journey is recorded in pictographs, petroglyphs, pottery, and vessels left behind by tribes, such as the Shoshone. The Crow, who had been sedentary farmers, moved to the Yellowstone Valley and became hunters and traders. Other tribes living in the Yellowstone area included the Assiniboine, Sioux, Cheyenne, Flathead, Blackfeet, Arapaho, and Gros Ventres. By the mid 1600s, the horse, which was gained in trade or stolen from enemies, had been introduced in Montana, and began to change the native way of life. On horseback, a person could travel farther and faster in pursuit of buffalo, the mainstay of his existence. Warriors were more able to defend the land against enemies, whether white men or other warring tribes. During the early 1800s, Captain William Clark, along with several members of the expedition, fur trappers, traders and missionaries traveled through the Yellowstone Valley. In 1853, Col. Isaac Stevens, along with Captain John Mullan of the US Army, was assigned the task of preparing a preliminary survey of the Yellowstone Valley for the future railroad. The US Army established posts along the Yellowstone to maintain a semblance of peace and protect the use of the river for transportation.

By the mid-1800s, the area's population had increased considerably and the Army began driving the Sioux onto the reservations in South Dakota. The Crow Reservation was established in 1851 and stretched across what is now south central Montana, south of the Yellowstone River. The reservation was

reduced to its current size in 1868. By 1876, skirmishes with the Sioux had reached serious proportions; Fort Pease was held under siege for nine months in 1875; Baker's Battle took place near Huntley in 1872; and the fight with the Sioux climaxed at the Battle of Little Big Horn on June 25, 1876. Following a brutal campaign, the Army succeeded in driving the Sioux and the Cheyenne on to the reservations or across the boarder into Canada. In an epic attempt to retreat to Canada, the Nez Perce were also pursued and skirmished on Canyon Creek, five miles north of Laurel. The Canyon Creek Battle was fought in 1877. By the 1880s, the Indian Wars ceased and the buffalo had been exterminated. Meanwhile, a small town was developing along the Yellowstone River, known by the name of Coulson.

By 1883, Coulson was a thriving burg containing a telegraph office, store, saloon, hotel, and sawmill. It was near this site where the steamboat Josephine, commanded by Captain Grant Marsh, landed in June 1875. On his way up the Yellowstone River, Capt. Marsh engraved the name of his vessel in Pompeys Pillar, along side the inscription made by Captain William Clark in 1806. The Northern Pacific Railroad, unfortunately, bypassed Coulson, preferring the higher bench land. Seizing the opportunity, the Minnesota and Montana Land and Improvement Company purchased 800 acres 2 miles north of Coulson and platted the townsite of Billings in 1882. As if by magic, Billings, named after the past president of the Northern Pacific Railroad, sprang from open prairie to flourishing town overnight. Within four weeks of platting, the land company sold 5,000 lots in the original townsite. Billings incorporated in 1885. Montana became the 41st state in the Union in 1889.

Yellowstone County's early development was less than magical. The County was formed in 1883, but its boundary went through several relocations before settling on its final configuration. Originally carved from a large section of Custer County, the boundaries of Yellowstone County were rearranged by the formation of Sweet Grass, Musselshell, Carbon, Bighorn and Stillwater Counties. The County, however, did benefit from the number of large, productive farms and ranches and established a strong agricultural-based economy. Only through hard work and the introduction of new farming methods and drought resistant crops and livestock could agriculture flourish in the semi-arid conditions. Probably most important to cultivating the Yellowstone Valley was the construction of an extensive irrigation system. The Billings Bench Water Association was instrumental in bringing irrigation water to the high benches north of Alkali Creek. It was the Bureau of Reclamation that brought irrigation to the Huntley Project area in 1907, making it feasible for people to own small, productive parcels of land.

Agriculture, while still an important industry in Yellowstone County, has taken its place among more important economic sectors. The County has benefited from coal development in Musselshell, Carbon and Rosebud County, from palladium-platinum mining in Stillwater County and oil and gas development throughout the Powder River Basin. Billings and Yellowstone County continue to be the regional economic hub, although the main economic sectors today are commercial retail and wholesale, and private and government services.

Cultural Sites

The history of Yellowstone County is documented by the scattered remnants of prehistoric and historic cultures. From artifacts and evidence of earlier inhabitants, Yellowstone County can document a long period of human occupation. Key cultural and historic sites in the County are listed below.

Prehistoric Sites

Rock Art Sites

Yellowstone County contains numerous rock art sites, dating as early as 750 A.D., which provide important information on the symbols of Native American religious life as well as on the historical patterns of use on the land. An example of a Rock Art Site is Pictograph Caves State Park. The

Montana Fish, Wildlife, and Parks Department describes the site as follows:

"Located just 6 miles south of Billings, the Pictograph, Middle and Ghost cave complex was home to generations of prehistoric hunters. Over 30,000 artifacts have been identified from the park. A short paved trail allows you to view the rock paintings, known as pictographs that are still visible in Pictograph Cave, the largest of the three. Interpretive signs tell the story of Montana's first professional archaeological studies and excavations. This site is listed as a National Historic Landmark".

Prehistoric Structures
The most common form of prehistoric structure found in the County is the tipi ring, consisting of a circle of rocks used to hold down a hide lodge in windy conditions. Far less common is the wooden lodge. Both provide important information about Native American family and community patterns and activities.

Native American Religious Sites
Small rock cairns, vision quest structures, and eagle trapping pits are found on high points. All have religious value to Native American groups.

Battlement Sites
A few rifle pit or battlement sites, dating after 1750 A.D., are also known to exist in Yellowstone County.

Rockshelters
Shallow caves and rock overhangs like those at the "Indian Caves" were used by prehistoric peoples in Yellowstone County.

Burial Sites
Most early historic and prehistoric human burials are located outside of registered cemeteries. Modern Native Americans feel a strong spiritual connection to ancient Indian burials.

Camp Sites
Some early human occupation sites are identified by the presence of "lithic scatter", i.e., scatters of discarded tools and flakes of various rock types which result from the manufacture or resharpening of stone tools. These sites can provide information on the age and use of an area, as well as on the human movement, activities, and trade that took place at the location.

Bison Kill Sites
Occasionally, Native Americans killed large numbers of big game at one event, either in a bison jump or a bison trap. Kill sites provide significant information on the date and season of the kill, and the pattern of use of the animals from butchering marks present.

Historic Sites

Homestead Sites and Schools
Homesteads, barns, sheds, and school houses, in their varying architectural styles, reflect the changing patterns of historic utilization of the land.

Remaining Historic Sites
The range of types of historic structures in Yellowstone County is varied. All sites may not possess the characteristics required to qualify for the National Register of Historic Places, however, they may still be regarded as having historic or cultural value by the community.

To date, the primary method by which information is gathered on historic resources in the County has been through federally mandated surveys, which occurs usually in areas of development. Underdeveloped areas of the County have received substantially less scientific investigation.

Recognized Historic Sites in Yellowstone County

A number of the prehistoric and historic sites in Yellowstone County have been formally recognized for their local, regional, and national significance. Of these tributes, placement on the National Park Service's National Register of Historic Places is perhaps the most important since selected sites must meet established criteria and receive a thorough evaluation of their historical value.

There are 14 properties listed in the National Register Yellowstone County. Some sites may also be identified as meeting the minimum criteria used to determine eligibility for the National Register. Four structures, two neighborhood districts and numerous prehistoric and historic sites have been listed with the National Park Service as eligible for the National Register. Sites listed on the National Register and those eligible for listing are shown in Table 1.

The majority of historic sites in Yellowstone County have not received National Register designation. The reason for this is that much of the survey work and research required for placement on the National Register has not been completed for potential sites. More than 20 other sites in Yellowstone County have been recognized locally for their historic value.

Billings Townsite Historic District

In 1977, the Billings City Council passed an ordinance creating the Billings Townsite Historic District and establishing the Historic Design Review Board. The purpose of the District is to restore and preserve a significant element of Billings' history, as well as providing for "a mix of the old and

TABLE 1: YELLOWSTONE COUNTY PROPERTIES LISTED IN THE NATIONAL REGISTER

Name	Location	Listing Date	Reference Number
Antelope Stage Station	E. of Broadview, Broadview	01/19/1983	24YL257
Billings Chamber of Commerce Building	303 N. 27th St., Billings	01/20/1972	24YL259
Billings Historic District	Roughly bounded by N. 23rd and N. 25th Sts., 1st and Montana Aves., Billings	03/13/1979	24YL752
Billings West Side School –also called Broadwater School	415 Broadwater Ave, Billings	03/20/2002	24YL196
Boothill Cemetery	6th Ave. and Main St., Billings	04/17/1979	24YL755
Electric Building	113-115 Broadway, Billings	03/01/2002	24YL1539
Fire House No. 2	201 S. 30th St., Billings	02/29/1980	24YL261
Hoskins Basin Archeological District	Address Restricted	11/20/1974	24YL1031
Masonic Temple	2806 Third Ave. N, Billings	04/17/1986	24YL260
Moss, Preston B., House – also called the Moss Mansion.	914 Division, Billings,	04/30/1982	24YL263
North, Austin, House	622 N. 29th St., Billings	11/23/1977	24YL258
O'Donnell, I. D., House	105 Clark Ave, Billings	11/23/1977	24YL265

TABLE 1 continued:
YELLOWSTONE COUNTY PROPERTIES LISTED IN THE NATIONAL REGISTER

Name	Location	Listing Date	Reference Number
Parmly Billings Memorial Library – also called the Western Heritage Center	2822 Montana Ave., Billings	10/26/1972	24YL756
Pictograph Cave*	7 mi. SE of Billings in Indian Caves Park, Billings	10/15/1966	24YL1
Pompeys Pillar*	W. of Pompey, Pompeys Pillar	10/15/1966	24YL176
Prescott Commons	Rimrock Rd., Billings,	04/30/1982	24YL264
US Post Office and Courthouse-Billings	2602 First Ave. N., Billings	03/14/1986	24YL754
Yegen, Christian, House	208 S. 35th St., Billings	10/01/1979	24YL262
Yegen, Peter, House	209 S. 35th St., Billings	04/16/1980	24YL266

* designated as National Historic Landmarks by the National Park Service.

the new"[1]. The District began as a four block area along Montana Avenue between North 26th Street and North 22nd Street. The district now encompasses eight blocks between North 30th Street and North 22nd. In recent years, the Historic District has gone through a major transformation with the restoration of the Billings Depot and the construction of new sidewalks, planters and pedestrian crosswalks. Several new businesses have located on Montana Avenue and many have expanded. The property owners of the Historic District levied a special improvement assessment on themselves to pay for the public infrastructure improvements and leveraged these funds with Downtown Tax Increment District financing and federal grants.

The District also imposed special sign standards that are administered by the City-County Planning Department and reviewed by the Montana Avenue sign review committee.

Cultural Amenities

The Billings Cultural Partners, an organization formed to preserve and promote Billings' cultural resources, developed the Billings Cultural Plan in 2002. The plan outlines strategies to continue and expand cooperation among the individual arts, cultural and historic organization, improve access to the arts and culture, increase educational opportunities, strengthen the existing cultural institutions and enhance Downtown. The partners represent the major cultural, arts and historic institutions in Billings. Descriptions of these institutions taken from the Billings Cultural Partners website[2] and are listed below:

Alberta Bair Theatre: "The Alberta Bair Theater brings the excitement of every discipline in the performing arts to the Northern Rockies. With a 1,450 seating capacity, it attracts national and interna-

tional renowned and culturally diverse entertainment. The Theater also provides a home for local cultural and civic groups. The ABT usually has walk in tickets available. It's as easy and often as inexpensive as going to the movies! 2801 3rd Avenue North.

Billings Depot: "This historic building was the center for railroad travel which opened the West for settlement. The Billings Depot compliments the spirit of revitalization within the Historic District. The Passenger Station Event Center accommodates conferences, receptions, public open house events, children's theater and a variety of entertainment and community events. The "Horse of Course" benefit was hosted by the Depot with the funds dedicated to continued restoration". 2310 Montana Avenue.

Billings Studio Theatre: "The largest community theatre within 500 miles, the Billings Studio Theatre showcases local talent, staging, sets, equipment, and costumes. Pre-teens, teens, and adults participate in a dozen theater productions year-round. Volunteers from northern Wyoming and eastern Montana fill all acting and production roles at the theatre, which celebrated its fiftieth anniversary in 2000." 1500 Rimrock Road.

Billings Symphony Society: "Maestro Uri Barnea and the musicians of the Billings Symphony Orchestra and Chorale invite you to join them for live symphonic music with internationally recognized guest artists. While most of their performances are at the Alberta Bair Theater, the Symphony performs in schools, offers workshops for students and celebrates Billings each year at Symphony in Pioneer Park."

Channel 7 – Public Access TV: "Channel 7 is a true friend to the community with its commitment to air community events and contribute to cultural awareness. Visit Channel 7's website to get information about programs and scheduling for the week."

Moss Mansion: "Step into history with a one-hour guided tour of the Moss Mansion Historic House Museum. The tour captures early turn-of-the-century life as the Preston Boyd Moss family lived it. Visitors see original draperies, fixtures, furniture, Persian carpets and artifacts displayed in the 1903 red sandstone structure." 914 Division Street.

MetraPark: "MetraPark, a public facility located in Billings, Montana, is an enterprise of Yellowstone County, Montana. MetraPark consists of a substantial acreage along the Yellowstone River. The site is located in the Billings city limits, is within sight of the interstate highway, one mile from downtown, and one and one half miles from Logan International Airport."

"The facility offers a 10,000 seat arena, 6,500 seat grandstand, two major heated and air conditioned exhibit buildings, a half mile track used for both horse racing and motor sports, and an assortment of horse barns and smaller buildings. Landscaped parks and paved, lighted parking comprise the rest of the site." 308 6th Avenue North.

Parmly Billings Library: "The City's library is located at 510 N. Broadway. It offers education and a cultural history of Billings. The Parmly Billings Library is a community library that is a non-profit organization with activities for children and adults alike." 510 N. Broadway.

Peter Yegen Junior Yellowstone County Museum: "The Peter Yegen Jr. Yellowstone County Museum is located on the Rims by Logan International Airport. It contains over 5,000 objects from the Yellowstone Valley, including a large collection of

Native American artifacts and a Lewis and Clark Fur Trading Post exhibit. There is a gift shop and changing contemporary exhibits. The museum is open throughout the entire year and free to the public." 1950 Terminal Circle.

Rimrock Opera Company: "The Rimrock Opera Company enhances cultural life in Billings and the surrounding areas with their excellent productions. It is their goal to make opera available to everyone through community outreach and educational programs."

Venture Theatre: "With its stage in a defunct automotive repair garage, Venture Theatre is true community theatre. Venture performs multiple productions of six plays, children's theatre and teaches grade school and high school classes." 1410 Central Avenue.

Western Heritage Center: "The Western Heritage Center features interactive exhibits exploring "Our Place in the West." It is located in the historic Parmly Billings Library. The Center is open year round and is free of charge. The Center also offers historic site interpretation through its "Museum Without Walls" program." 2822 Montana Avenue.

Yellowstone Art Museum: "Contemporary and historic work from nationally and internationally acclaimed artists are featured in changing exhibitions at the largest and most comprehensive art museum in Montana. A first-class Montana collection showcases Russell Chatham, Deborah Butterfield and more. View the largest public collection of cowboy artist and writer Will James." Visit the YAM at 401 North 27th Street.

Yellowstone Public Radio: "Montana's public broadcasting station at 91.7 in Billings Montana. It is a culturally rich station with public arts and community events broadcast daily."

ZooMontana: "A walk on the Wild Side? Visit Zoo Montana, where you'll see a diversity of wild animals from Montana and many other countries. The zoo features northern temperate climate species, and is a wonderful new home for Siberian Tigers, North American River Otters, Sika Deer, Eastern Grey Wolf, Great Horned Owls and Lesser Spot-Nosed Guenon." 2100 South Shiloh Road.

1 Allen McMath Hawkins Architects, 1978, Billings Townsite Historic District Development Program.

2 http://www.downtownbillings.com/PARTNERSHIP/bcpartners/cultural.htm