CHAPTER 8: NATURAL RESOURCES

Introduction

The vitality of Flathead County is inextricably connected to the abundance of its natural resources. From the aboriginal tribes to the early settlers, the beneficial use of natural resources has been to sustain lives and livelihoods. In the 21st century, industries such as timber harvest, milling, mining, farming and ranching in the county have shared a balance with real estate development, tourism and outdoor recreational activities. Flathead County in the past, as well as today, is dependent on the availability and utilization of natural resources.

The Montana state constitution states that all citizens are entitled to clean air and water, and this growth policy affirms that for Flathead County. Air and water are basic elements of the natural resources that are part of a complex environmental system. The water cycle encompasses all the aspects of water quality, flooding and drought. The carbon and oxygen cycles affect air quality. There are many other nutrient cycles that have an effect on the quality of the county's natural resources. Development and human interaction can alter these cycles and create imbalance. Location of development is a key consideration when addressing environmental concerns. This growth policy seeks ways to protect the environment by adequately mitigating development impacts where practicable and restricting development in areas of high sensitivity.

Flathead County has an abundance of natural resources. There are over 40 lakes and 3 major rivers surrounded by or adjacent to public lands. Flathead Lake extends from Flathead County into Lake County and encompasses nearly 200 square miles of surface area and 185 miles of shoreline. Flathead Lake is the largest natural freshwater lake between the Mississippi River and the Pacific Ocean and is a barometer of the ecological health for the entire Flathead watershed. The surrounding mountains are primarily forest lands managed by the federal and state government. Glacier National Park was established in 1910 and has become Flathead County's most popular tourist destination. The park is split between Flathead County and Glacier County and encompasses approximately 1,008,306 acres including over 200 lakes and streams and over 730 miles of hiking trails[1].

Private timberlands generate positive contributions to Flathead County's economy through timber production and maintenance of healthy forests, watershed protection, wildlife habitat, and other public value. Flathead County's valley floor is open as a result of extensive logging in the late 19th and early 20th century to accommodate agricultural uses, extractive industries and residential and commercial development. The two main tributaries that flow through the valley floor, the Flathead River and Swan River, create prime agricultural soils and critical riparian areas.

Flathead County has a long history of beneficial utilization of its natural resources. Agriculture and timber production have provided a solid economic base for residents and

[1] National Park Service, Glacier National Park

a record of stewardship that has effectively preserved the abundant natural resources that are enjoyed today. These resource industries are based on stable, ongoing production of essential products. Their role in the protection of natural resources is recognized, as is the importance of their continued presence.

The Flathead County Growth Policy public input meetings from 2005 to 2006 had an overwhelming response from participants about the preservation of natural resources. In particular, participants wanted goals and policies to protect water resources, open space scenic views, air quality and wildlife habitat (see Appendix B: Public Involvement Summary). The majority of comments expressed concern about the degradation of natural resources from commercial and residential development, agricultural uses and extractive industries. The goals and policies were developed from a public involvement process and are intended to promote and protect the public health, safety, and welfare of Flathead County.

Goal

G.35 Protect and preserve water resources within the Flathead watershed for the benefit of current residents and future generations.

Policies

P.35.1 Establish public/private partnerships to develop a Flathead basin watershed management plan using scientific data to determine critical areas and evaluate the impacts of future development on water quantity and quality.

P.35.2 Provide improved educational information to landowners on the importance of buffers and restoration techniques to reduce nutrient loading to water resources.

Goal

G.36 Protect water quality in lakes, rivers, aquifers and streams from existing and potential pollution sources.

Policies

P.36.1 Require development to demonstrate compliance with local, State, Tribal, and Federal water quality standards, where applicable.

P.36.2 Review and revise the Lakeshore Protection regulations to expand the lakeshore protection zone to reduce potential harm caused by fertilizers and pesticides entering lakes, streams and rivers.

P.36.3 Investigate the feasibility of a regional wastewater treatment system. Ensure that the regional wastewater treatment plan protects the Flathead watershed.

P.36.4 Require all public waste water treatment systems to meet applicable DEQ l discharge standards.

P.36.5 Identify and encourage land development practices that do not contribute to increases in Total Maximum Daily Loads.

P.36.6 Support non-point source pollution reduction within the Flathead basin watershed.

P.36.7 Identify critical aquifer recharge areas in Flathead County and land uses in these areas that protect water quantity and quality.

Goal

G.37 Prevent untreated storm water from entering into any surface water, stream, river, lake or shallow aquifer.

Policies

P.37.1 Encourage the development of stormwater collection, detention and retention systems.

P.37.2 Develop and provide educational information to individuals, organizations, and neighborhood associations regarding storm water management and the importance of proper storm water management practices.

P.37.3 Develop best management practices (BMPs) and setback requirements for development projects that impact water bodies. This may include vegetative buffer strips along stream sides and riverbanks, and the use of sedimentation barriers.

P.37.4 Encourage constructed wetlands as part of on-site drainage plans to restrict untreated storm water from entering lakes, rivers, and streams.

Goal

G.38 Preserve and protect floodplains to ensure the safety of residents from flood hazards and to prevent the degradation of water quality and critical wildlife habitat.

Policies

P.38.1 Adopt FEMA maps and existing floodplain studies as they become available.

P.38.2 Review and revise floodplain regulations. This could include appropriate setback requirements from floodplains.

P.38.3 Development in floodway or floodway fringe should not create a net increase in the floodplain area.

P.38.4 Consider density guidelines in the floodplain regulations.

P.38.5 Discourage development that displaces floodwaters within the 100-year floodplain.

Goal

G.39 Preserve and protect wetlands and riparian areas to prevent degradation of natural resources, including but not limited to, water quality and critical wildlife habitat.

Policies

P.39.1 Use scientific studies to identify locations of riparian areas and delineated wetlands.

P.39.2 Encourage educational programs on voluntary conservation strategies for private property owners.

P.39.3 Develop regulations that restrict development in jurisdictional wetlands and riparian areas.

P.39.4 Develop best management practices (BMP's) and setback requirements for development to mitigate adverse impacts to sensitive wetland and riparian areas.

Goal

G.40 Protect sensitive areas over shallow aquifers.

Policies

P.40.1 Use scientific studies to identify locations over shallow aquifers.

P.40.2 Promote development into areas with public facilities or appropriate depth to groundwater to preserve water quality and water supply.

P.40.3 Encourage rural residential densities at an average of one dwelling unit per five acres and/or community wastewater treatment systems on sites where the groundwater is less than eight feet unless scientific evidence shows that a greater or lesser density is appropriate.

P.40.4 Encourage rural low-intensity land uses in areas where the groundwater is less than eight feet unless scientific evidence shows that a higher or lower intensity of land use is appropriate.

P.40.5 Encourage through incentives the upgrading of failing and polluting septic systems.

P.40.6 Encourage educational programs for neighborhood associations and other organizations on septic system impacts to groundwater and surface water quality.

Goal

G.41 Promote the preservation of critical fish and wildlife habitat and preserve the area's unique outdoor amenities and quality of life.

Policy

P.41.1 Promote the distribution to home owners and home buyers of an educational brochure that explains Living with Wildlife information and the impacts landowners can expect. Promote the document by distributing it to home buyers and home owners in Flathead County.

P.41.2 Discourage unmitigated development in areas identified as critical wildlife habitat.

P.41.3 Maintain a greenbelt along streams and rivers to protect the quality of water, protect critical wildlife corridors, and maintain the natural aesthetics of waterways.

Goal

G.42 Recognize and work to manage Flathead County's rich heritage of hunting, fishing, timber, agricultural and mineral activities that provide economic benefits while utilizing and protecting our natural resources.

Policy

P.42.1 Promote an active and environmentally responsible timber industry utilizing sustainable practices on private and public lands.

P.42.2 Encourage agricultural practices and uses which protect natural resources and allow for productive use.

P.42.3 Recognize and respect the important history and heritage of hunting and fishing by encouraging development that creates new or preserves existing access to public lands and waters.

For further policies associated with G.42, see Goals 3, 4 and 12 in Chapter 2.

Goal

G.43 Protect the air quality in Flathead County.

Policy

P.43.1 Implement the existing Flathead County Air Pollution Plan, dated December 16, 1996, into development standards. Any new plans would be considered for inclusion through a public process.

P.43.2 Annually prioritize and perform road-surfacing and dust abatement projects to reduce airborne dust generated from gravel-surfaced roads.

P.43.3 Encourage industrial and other land uses that do not degrade the Glacier National Park Class I air shed.

PART 1: Water Resources (see Goals 35 through 40)

Flathead Watershed

The Flathead Basin includes approximately six million acres of land that drains water into Flathead Lake and the Flathead River. The water flows from headwaters in Glacier National Park, the Bob Marshall Wilderness and Canada into Flathead Lake. Water from the Flathead Basin sustains life in the Flathead Valley and is delineated in Map 8.1.

The Flathead Basin encompasses the Swan River and the North, Middle and South Forks of the Flathead River. These rivers provide about 90%[2] of the water flowing through the Flathead Valley. The North, Middle and South Forks of the Flathead River drain the

[2] Flathead Basin Stewardship Index, 2002

eastern portion of the Flathead Basin and merge at Columbia Falls to become the Upper Flathead River. The Whitefish River and Stillwater River drain the northwest part of the Flathead Basin and join the Upper Flathead River below Kalispell. The Upper Flathead River and Swan River are the two main tributaries that empty into the northeast corner of Flathead Lake. Water flow into and through the Flathead Lake is controlled partially by the Hungry Horse Dam on the South Fork of the Flathead River and the Kerr Dam near the lake's outlet.

Rivers and streams in the Flathead basin create floodplain areas, riparian corridors and wetlands critical to water quality, wildlife habitat, and fisheries habitat. Functional riparian corridors and wetlands are important for filtering nutrients, trapping sediments, reducing flooding, stabilizing soils and providing habitat. Riparian corridors extend along the banks of rivers, streams and drainage ways where ground water and surface water mix.

Groundwater is an important resource in the Flathead Basin. Most of the residential and agricultural developments rely on groundwater wells for drinking water. Shallow aquifers provide water to many of the wells. Well-defined shallow aquifers include; (1) the Delta region, between the north shore of Flathead Lake and the Flathead River, (2) the Evergreen aquifer between the Flathead and Whitefish Rivers, which is the most developed shallow aquifer, (3) the east side between the Flathead River and the foothills of the Swan Mountains, and (4) the Lost Creek fan west of the Stillwater River near the Salish Mountains. Most other places where shallow aquifers have been developed are along stream valleys.

Major threats to the water resources of the Flathead Basin include non point source pollution where sediments and nutrients, in particular nitrogen, or nitrates, and phosphorus, end up in streams and lakes via storm water runoff or groundwater contamination. Water quality in the Flathead Lake is an important indicator of the health of the entire Flathead Basin. Research by the University of Montana Flathead Lake Biological Station at Yellow Bay shows that water quality in Flathead Lake has been declining since 1977. Flathead Lake was listed as an impaired water body by the Montana Department of Environmental Quality in 1996 and 2000.

Clean Waters

Preservation and improvement of water quality are perhaps the most critical elements when considering surface waters in Flathead County. The high water quality of Flathead County's lakes and rivers is consistently referred to as a prized and cherished characteristic of the Flathead Basin that leads to a high quality of living for residents and visitors.

The waters from the majority of rivers and streams in the Flathead Valley ultimately flow into Flathead Lake. The health of Flathead Lake is a good indicator of the health of the rivers, streams, lakes and surface waters that flow into the lake. Among the major contributing waters to Flathead Lake are Whitefish Lake, the Stillwater and Whitefish

Rivers, the North Fork, Middle Fork, South Fork and the main stem of the Flathead River and Swan River and Swan Lake.

The North and Middle Forks and South Fork of the Flathead River above the Hungry Horse Reservoir are designated as Wild and Scenic Rivers. Under the authority of the Wild and Scenic Rivers Act of 1968, a river or river section may be so designated by the U.S. Congress or the Secretary of the Interior. Rivers, or sections of rivers, so designated are preserved in their free flowing condition and are not dammed or otherwise improved. These portions of the Flathead River include the landscapes of Glacier National Park and the Bob Marshall and Great Bear Wilderness areas.

Designation as a wild and scenic river is not the same as designation as a national park and does not generally lock up a river like a Wilderness Area designation. The idea is not to halt development and use of a river; instead, the goal is to preserve the character of a river.

Every two years the Montana Department of Environmental Quality (DEQ) compiles a list of water bodies that fail to meet water quality standards. This document is known as the 303(d) list after the section of the Federal Clean Water Act that requires states to report impaired waters. The 303(d) list identifies the probable causes of impairment as well as the suspected sources of the pollutant. DEQ is required to develop Total Maximum Daily Loads (TMDL) for all water bodies on the 303(d) list. (See Appendix A)

There are two primary sources of water pollution. Point sources are discharges from an identifiable outfall such as pipes or ditches. Point source discharges are regulated by permits issued by the DEQ. Examples of point sources include municipal and public sewage treatment facilities, factories, some storm sewers and large livestock feedlots. Non-point sources are generally land extensive activities that do not require discharge permits. Non-point sources include agriculture and forestry activities, small construction projects, unregulated storm water discharges, individual septic systems and the many negative effects resulting from forest fires. Another potential source of non-point source pollution is leakage from municipal sewer lines.

Flathead Lake has been listed as a “water quality limited water body” or “impaired” by the Montana Department of Environmental Quality, and, therefore, a Total Maximum Daily Load (TMDL) is required. A TMDL is the total amount of a pollutant that a water body may receive from all sources without exceeding water quality standards. A TMDL can also be defined as a reduction in pollutant loading that results in meeting water quality standards. Swan Lake is also a high priority water body for TMDL development. Whitefish Lake and the Stillwater River are identified as moderate priority water bodies for TMDLs. Including the low priority water bodies on the list the Flathead basin has 35 water bodies that require development of watershed specific plans draining into Flathead Lake.

Table 8.1
Proposed Flathead Lake TMDL Targets

Primary production	80.0 g $C/m^2/yr$
Chlorophyll a	1.0 micrograms/liter
Soluble Reactive Phosphorous (SRP)	<0.5 micrograms/liter (BDL)
Total Phosphorous	5.0 micrograms/liter
Total Nitrogen	95 micrograms/liter
Ammonia (NH_3)	<1.0 micrograms/liter
Nitrate/ Nitrite ($NO_{2/3}$)nitrogen	30 micrograms/liter
No measurable blooms of Anabaena (or other pollution algae)	
No oxygen depletion in the hypolimnion	
Algal biomass measured as Chlorophyll a (on near-shore rocks) remains stable or exhibits a declining trend.	

Source: Flathead Basin Commission

Table 8.2
Flathead Basin Total Maximum Daily Load Priorities

High Priority	Flathead Lake, Swan Lake
Moderate Priority	Whitefish Lake, Stillwater River
Low Priority	Ashley Creek (3 segments), Big Creek, Coal Creek, S. Fk. Coal Creek, N. Fk. Coal Creek, Flathead River, S. Fork (below dam), Goat Creek, Granite Creek, Hungry Horse Reservoir, Jim Creek, Lion, Logan Creek, Lake Mary Ronan, Morrison Creek, Ole Creek, Piper Creek, Red Meadow Creek, Skyland Creek, Spring Creek, E. Spring Creek, Squeezer Creek, Stillwater River, Sullivan Creek, Swift Creek, E. Fk Swift Creek, W. Fk Swift Creek, Whale Creek, Whitefish River.

Source: Montana Dept. of Environmental Quality

The 303(d) List identifies probable causes of impairment such as, nutrients, siltation, suspended solids, flow alteration, organic enrichment or low dissolved oxygen, algal growth, PCBs, metals, mercury, and noxious aquatic plants. The main sources of pollution include runoff from development, old and poorly maintained septic systems, poor agricultural and timber harvest practices, and air pollution

As nutrients increase (nitrogen and phosphorus), the number of algae and other organisms increase. As these organisms die, bacteria break down their remains using

oxygen in the process. Oxygen depletion is a recognized sign of water quality degradation.

In 1998, the levels of dissolved oxygen in the Big Arm Bay of Flathead Lake were the lowest ever recorded and blooms of a pollution algae (Anabaena Flosaquae) were observed near shore. The result is the oxygen supply in the water becomes depleted. Similar oxygen sags, as they are called, have been identified in Swan Lake and Whitefish Lake. Nitrogen concentrations in the Stillwater and Flathead rivers were among the highest ever recorded.

Past efforts to reduce the amount of nutrients reaching Flathead Lake and its tributaries have been successful. Upgrading sewage treatment plants in the upper basin for phosphorus removal, connecting Evergreen to the Kalispell sewer system, and banning domestic use of phosphorus containing detergents have reduced the amount of nutrients reaching Flathead Lake from these sources.

The level of reduction needed to protect Flathead Lake is commensurate with the levels achieved by the community waste water treatment plants through implementation of the 1986 Flathead Lake Phosphorous Strategy. Community waste water treatment plants have achieved the state mandated phosphorous limit of 1mg/L. All of the facilities in the basin meet or surpass this standard on an annual basis. The city of Kalispell routinely exceeds this standard, meeting levels closer to 0.2 mg/L for total phosphorous, and has voluntarily undertaken active nitrogen removal. The waste water treatment facilities have reduced pollution loading 70 to 90 percent.

Community facilities have also played a significant role in reducing non point loading. Reductions in non-point loading through the development of new public systems (Lakeside/Somers) and the expansion of areas served by public systems such as Evergreen, Big Mountain/ Whitefish Lake and Bigfork have played a major role in protecting water quality.

Storm Water Runoff

Polluted runoff, also known as non-point source pollution, is perhaps the greatest threat to water quality in the Flathead Basin. It is caused by rainfall or snowmelt moving over and through the ground. As it moves, runoff picks up and carries natural and human-caused pollutants, finally depositing them into rivers, lakes and groundwater.

Croplands, livestock feedlots, golf courses, lawns, gardens, roadways, parking lots, construction sites, landfills, city storm sewers, logging operations, residential septic systems and erosion from streams, river banks and lake shores are all sources of polluted runoff. Even airborne chemicals and particulates carried into our waters by rain or snow contribute to the problem.

The scattered locations of these pollutants and their often unpredictable dispersal make clean up efforts complex and often costly. This is because the waterways within a

watershed are interconnected. Streams flow into rivers, which flow into lakes. There can be a connection between these surfaces waters and groundwater. A pollutant introduced in one area upstream can pollute the water downstream.

Meeting TMDL targets and allocations for Flathead Lake will require reductions in nutrient loading in the Flathead River Headwaters and Whitefish and Swan Lakes as well as rivers and streams that flow into and out of these lakes.

Floodplains

Flooding causes more property damage in the United States than any other natural disaster. It is estimated that flooding causes 90 percent of all property losses from natural disasters in the United States. In terms of economic disruption, property damage and loss of life, floods are "nature's number one disaster."

The presence of floodplains in Flathead County (see Map 2.7) is an impediment to growth and development. The topography of the county, which includes extremely mountainous areas, large lakes, several deep river valleys and the low valley floor, form a very complex drainage system and wide variation in climate.

Foothills and valley bottom land make up approximately 20 percent of the county landscape. The relatively flat terrain of the valley floor manifests itself in the sinuous nature of the rivers that wind through the valley to Flathead Lake. Glacier outwash underlies most of the area in the Flathead River Valley and forms floodplains and terraces adjacent to Flathead River and its tributaries.

Precipitation averages are generally higher in Flathead County than in other areas of Montana. The most severe flooding in Flathead County usually occurs in the spring and early summer months as a result of snowmelt and/or rainfall runoff. On rare occasions ice jams cause some overbank flooding. In addition to flooding along streams, shallow flooding periodically occurs in other isolated, developed areas of the county due to other factors. The mountains sometimes receive several hundred inches of snow annually. Low flows in the basin occur naturally during the winter months, and floods normally occur in the spring during periods of rapid snowmelt. Runoff from snowmelt, occasionally combined with rainfall, provides high streamflows in the spring.

Historically, flooding has shaped much of the Flathead Valley floor. The Flathead Valley has experienced five (5) severe flood events. These occurred in 1894, 1926, 1948, 1964, 1975 and 1995. During the 1964 flood, families were evacuated from their homes, livestock drowned, and property damage was excessive. For a history of these floods, see Appendix A: Baseline Analysis.

The 100 year floodplain is the land subject to inundation by one percent (1%) or greater chance of flood in any given year. Construction is extremely limited in these areas and requires state, federal and local permits. The floodway fringe further limits the amount of construction within this boundary. The floodway is the channel of a stream and the

adjacent overbank areas that must be preserved in order to discharge a base flood without cumulatively increasing the water surfaces elevation more than one-half (1/2) foot.

The Federal Emergency Management Agency (FEMA) has not identified all of the floodplain in Flathead County, but most of the Flathead River corridor and the valley bottom have been mapped. Approximately 10 to 15% of the valley area of Flathead County is designated as 100-year floodplain. An additional 10 to15% of the valley bottom is designated as 500-year floodplain. Most of the floodplain is located along the Flathead River corridor between Columbia Falls and Flathead Lake. Areas of 100-year floodplain are present along the Stillwater and Whitefish Rivers.

100-year floodplains offer numerous benefits to the property and community by

- Providing flood storage and conveyance,
- Reducing flood velocities and potential for erosion,
- Absorbing large volumes of water and gradually releasing it to adjacent streams or water bodies during low flow periods,
- Recharging wells and aquifers by holding water long enough to allow it to percolate into underlying soils,
- Supporting vegetation that acts as a flood buffer and stabilizes the shoreline,
- Enhancing water quality by absorbing sediments, toxins and nutrients,
- Providing habitat for millions of birds, mammals, reptiles, fish and amphibians.

Construction is allowed in the floodway fringe by special permit and must meet established regulations. The Flathead City-County Health Department, which issues permits for all on site sewage disposal systems, does not allow a system in or within 100 feet of a designated 100-year floodplain because DEQ requires septic systems to be 100 feet from surface water.

Current national floodplain management standards allow for floodwater to be diverted onto others, channel and overbank conveyance areas to be reduced, essential valley storage to be filled, or velocities changed with little or no regard to how these changes impact others in the floodplain and watershed. The net result is that through our actions we are intensifying damage potentials in the floodplains. This current course is not equitable to those whose property is impacted, and is a course that has shown not to be economically sustainable.

The Association of State Floodplain Managers and the Association of Montana Floodplain Managers support local accountability and active management of the floodplains through outreach and education. Both organizations support the "No Adverse Impact" policy that is meant to ameliorate negative impacts associated with floodplain development. This growth policy discourages activities in the floodplain that might displace floodwaters to neighboring properties.

FEMA is currently undergoing a comprehensive nationwide map modernization process. This process involves working with local communities and state officials, contracted

consultants, and the public. The result of this process is to produce digital maps and may include some detailed study on a limited number of waterways. Flathead County has been identified as a priority community that is in need of significant map modernization. This process began in 2004 and will likely continue through October 2007.

Riparian Areas and Wetlands

Riparian areas are contiguous to perennial, intermittent, and ephemeral rivers, streams or drainage ways. They have one or both of the following characteristics: distinctively different vegetative species than adjacent areas and/or species similar to adjacent areas but exhibiting more vigorous or robust growth forms[3].

Wetlands are areas inundated or saturated by surface or groundwater at a frequency and duration sufficient to support, and under normal circumstances do support, a prevalence of vegetation typically adapted for life in saturation soil conditions. Wetlands generally include swamps, marshes, bogs, and similar areas[4].

There are many types or classifications of wetlands. Wetland preservation is beneficial to many species of plants, birds, mammals and invertebrates. They serve as retention areas for overflowing rivers, lakes, and streams, thus reducing flood and erosion damage in other areas. Wetlands also filter pollutants through plant assimilation and slowing untreated surface runoff before entering the water body.

Only about 4 % of the state of Montana has been identified as riparian and/or wetland habitat. Yet more than 40% of the state's mammals, birds, amphibians, reptiles and fish depend on the preservation of riparian habitat. About 1/3 of species in greatest need of conservation require riparian habitats according to the Comprehensive Fish and Wildlife Conservation Strategy prepared by Montana Fish, Wildlife & Parks.

The quality of Montana's blue ribbon streams are uniquely dependent on the riparian habitat that is commonly found along rivers, streams and lakes. These areas usually have a variety of riparian forbs, shrubs and trees such as cottonwood, alder, serviceberry, chokecherry and willow to keep them intact. There is abundant wildlife and waterfowl as well as amphibious and unique plant life.

Riparian areas help slow stream erosion, remove nutrients from the water draining into the stream, improve fish habitat and help to maintain cool water temperatures that many fish species require. Riparian habitat may be degraded when water diversions and dams prevent flooding or when wetlands are drained or filled. Harvesting of trees, noxious weed invasions, livestock over-grazing and human uses can destroy stream riparian habitat. Maintaining proper and healthy vegetation may include harvesting, planting trees, trimming shrubs and the planting of shrubs.

[3] Adapted from USFWS, 1997
[4] Federal Register, 1982

The main stem of the Flathead River, Stillwater River, Whitefish River and Ashley Creek, and their associated backwater channels, spring creeks, wetlands and tributaries, provide important wildlife habitat. Areas that support intact natural stands of forest and shrubby vegetation are critical to retaining a variety of wildlife. These areas provide food as well as screening and thermal cover, and, although these habitats may be intermingled with residential development and agricultural use, they remain important to wildlife species that depend on them.

Groundwater and Depth to Water Table

Groundwater is water that fills pores and cracks in rocks and soil. Groundwater sustains lake levels, provides for base flows in streams, and is a major source of domestic water. Groundwater comes from precipitation and condensation that enters the soil and is susceptible to depletion in quantity and degradation of quality. Groundwater flows beneath the surface of the earth, generally moving down hill following the contours of the land. It moves toward a point of discharge, which is usually a lake, stream, spring or well.

The depth to groundwater varies with seasons and precipitation levels. Many areas experience seasonally high groundwater levels, usually in the spring, which limits land use. The areas are commonly near floodplains, alluvial deposits and swamps, which places limitations on septic tanks, basements and road building. In Flathead County, both public and private water supplies commonly depend on wells that utilize a variety of natural aquifers.

An aquifer is a water bearing layer of permeable rock, sand or gravel. The thickness and depth of an aquifer vary with its location. The quantity of water a rock can contain depends on its porosity, or the amount of open space and cracks between grains. Water movement in rock depends on the permeability or ability to transmit or allow water to flow. Aquifers are recharged or filled by precipitation and infiltration from streams. Recharge is greatest in late spring when snow melts and there is runoff from the mountains.

According to a 2004 report by the Montana Bureau of Mines and Geology[5], a large intermediate and deep aquifer sits below Flathead Valley, in the "Kalispell Sub-Area". This large aquifer is confined by bedrock to the north, west and east and by Flathead Lake to the south. Water at depths of 100-200 feet below the surface is considered to be from the intermediate aquifer, while wells drilled to over 200 feet below the surface are considered to be utilizing the deep aquifer. Well logs show that most residents living at the outer perimeter of the Flathead Valley derive water from the intermediate and deep aquifer.

[5] LaFave, John, Smith, Larry N. and Patton, Thomas W. Ground-Water Resources of the Flathead Lake Area: Flathead, Lake, Missoula, and Sanders Counties, Montana. Part A- Descriptive Overview and Water Quality Data. Montana Bureau of Mines and Geology. 2004.

Recharge to the intermediate and deep aquifer comes from the mountain ranges surrounding the valley. Recharge occurs within and at the base of the Swan range front to the east, along the base of the Whitefish range to the north and along the Whitefish and Salish ranges to the northwest and west. Much of the recharge is often at the valley floor where the aquifer contacts are relatively close to the surface and the overlying impermeable deposits are thin or absent. The sources of recharge are mainly precipitation and snow melt run-off. Run-off from the Swan range front seems to contribute a significant amount through surface water to recharge the deep aquifer and to the overlaying shallow perched aquifers along the valley margins. Noisy Creek, Krause Creek, Brown Creek, Blaine Creek, Hemler Creek and others all go immediately under ground at, or shortly after, contact with the valley floor. Brown Creek alone has been shown to produce peak flow rates in excess of 20 cfs and produce an average volume of nearly 3000 acre-feet, none of which makes it much beyond Foothill road before it disappears into the gravels of the deep aquifer. Interformational leakage from the shallow perched aquifers may also recharge the deep aquifer at differing locations in the valley. Clearly, the quality and quantity of the deep aquifer owes a significant amount to the west side of the Swan range from the peaks to the valley floor and protection of the quality and quantity of water that comes off of this basin is one of the keys to the long term health of the deep aquifer.

The median yield reported from wells accessing the intermediate and deep aquifer is 25 gallons per minute. The Bureau of Mines and Geology report states that a downward trend in intermediate and deep aquifer irrigation well water levels was observed in the 1980s, but the trend appeared to level off in 1991. Overall water level declines over the past 10-20 years have been observed in most long-term records of all wells accessing intermediate and deep aquifers. The Bureau of Mines and Geology calls for continued monitoring of deep aquifer water levels to allow time for remedial steps by users if water levels should become dangerously low.

Residents living closer to the center of the valley commonly access a shallow alluvial aquifer, often referred to as the Evergreen Aquifer. The Evergreen Aquifer is located between the Flathead River to the east and Whitefish River to the west, and between Badrock Canyon to the north and the confluence of the Flathead and Whitefish rivers to the south. The depth to water table in this area is generally less than 50 feet and, for much of the area, less than five feet.

A significant amount of area with seasonally high ground water and/or frequent flooding can be found throughout the Flathead River corridor and the valley bottom, which is experiencing development pressure. Much of the development in the area south of Kalispell in the Lower Valley area is occurring where the depth to groundwater is less than 15 feet. Homes being constructed in this area are on individual water and septic systems. Since there is a direct connection between the aquifer and the Flathead River and Flathead Lake, activity that substantially or incrementally changes the natural integrity of the floodplains and their aquifers will have a direct and pervasive impact on surface water quality. The groundwater supply in this area feeds directly into the aquifer and Flathead Lake. High density development in the Lower Valley area has the potential

to degrade the water quality of Flathead River and Flathead Lake, as well as the groundwater that supplies and recharges domestic water wells in the area.

The Flathead Lake Biological Station, under the direction of Dr. Jack Stanford, has conducted groundbreaking research (see Appendix A: Baseline Analysis) detailing the environmental importance of the shallow alluvial aquifer of the Flathead River. They have documented water flows and detailed the effects of pollution. They have also identified areas where the depth to groundwater is five feet or less as critically sensitive.

Shallow aquifers are intrinsically susceptible to surface sources of contamination. The aquifer materials are highly permeable, allowing rapid movement of water (and any associated contamination) from the land surface to the aquifer. Furthermore, as the land surface in the valley becomes more developed, potential sources of point and non point source contamination will increase. Surface land uses not compatible with water quality policies in areas of shallow groundwater should be discouraged. High density individual wastewater disposal systems, high density housing, open pit gravel and mineral operations and other industrial uses are examples of surface land uses that can create health and safety issues in areas of shallow groundwater.

PART 2: Fish and Wildlife Resources (see Goals 36 through 38 and 41)

Fish and Wildlife Species

Mountain forests, meadows, streams, lakes, valley rivers, wetlands and riparian corridors are aquatic and terrestrial habitats for wildlife. These areas are nesting sites for 310 species of birds including the threatened bald eagle. Terrestrial habitats include the endangered grey wolf and the threatened grizzly bear and lynx. Twenty-seven species of fish inhabit the aquatic ecosystems, which also provide habitat for nine species of amphibians and nine species of reptiles.[6]

The biggest threat to fish and wildlife is habitat loss. The Montana Fish, Wildlife, and Parks (FWP) is the primary agency responsible for management of fish and wildlife populations. FWP jointly manage fish and wildlife habitats with the Salish and Kootenai Tribes within the Flathead Reservation. Throughout the year, FWP regulates fishing and hunting seasons for big game, upland game birds, webless migratory birds, waterfowl and furbearer. The white-tailed deer is the most popular big game animal pursued by hunters. The Montana Partners in Flight prepared the Montana Bird Conservation Plan to identify priority bird species and habitat most in need of conservation.

Fish Species

The rivers, streams, reservoirs and lakes of Flathead County support native fish communities that are threatened from declining water quality and the introduction of non-native fish species. Montana Fish, Wildlife, and Parks (FWP) fisheries biologists have conducted sinking and floating gill net surveys of Flathead Lake to assess shifts in

[6] Flathead Basin Stewardship Index – 2002

species composition in 1983 (pre-mysis) and 1999. Surveys have shown a decrease in native westslope cutthroat trout from 23% of the catch in 1983 to only 5% of the catch in 1999, while northern pike minnow increased from 12% of the catch in 1983 to 25% of the catch in 1999.

Wildlife Species

Of the total 3,361,230 acres that make up Flathead County, 82.5% of the land is managed by federal, state or tribal agencies (see Chapter 2: Land Uses). These public lands are home to a wide range of forest carnivores, big game species, osprey, eagles, upland game birds, migratory waterfowl, amphibians and reptiles.

Important wildlife species include grizzly and black bear, mountain lion, white-tailed deer, three species of mountain grouse, and furbearers such as marten and wolverine. Big game species include black bears, mountain goats and lions, moose, elk, white-tail and mule deer. Elk and deer inhabit forested areas, while moose occupy wetland and riparian areas. Highly important bear habitats occur along foothills of major valleys, particularly east Flathead Valley, Stillwater, Swan, Middle Fork, and North Fork Valleys.

The U.S. Fish and Wildlife Service maintains a list of all species classified as endangered, threatened or candidate in Flathead County. Endangered species are in danger of extinction throughout all or a significant portion of their range. Threatened species are likely to become endangered within the near future. Candidate species are those for which there is sufficient information on biological vulnerability and threats to support a proposal to list as endangered or threatened. The loss of a species to extinction can have irrevocable impacts on the ability of remaining species to survive.

Table 8.3
Endangered, Threatened, and Candidate Species

Designation	Species Name
Endangered	gray wolf, whooping crane
Threatened	grizzly bear, bald eagle, Canada lynx, bull trout, water howellia, Spalding's Catchfly
Candidate	None

Source: U.S. Fish and Wildlife Service Endangered Species List, May 1, 2006

Glacier National Park and the Flathead National Forest include Federal Wilderness, Research Natural Areas, and Wild and Scenic Rivers. These critical habitat areas provide large, relatively undisturbed blocks of open space important for wildlife migration corridors. A variety of designated protection areas exists in Flathead County. Table 8.4 shows approximately 15,000 acres that have been permanently set aside for the health of fish and wildlife species.

Table 8.4
Special Designated Wildlife Areas in Flathead County

Name	Acres	Year Initiated	Management Agency
Flathead Waterfowl Protection Area	2,370	1971	FWS
Batavia Waterfowl Protection Area	510	1975	FWS
Smith Lake Waterfowl Protection Area	975	1973	FWS
Blasdel Waterfowl Protection Area	535	1987	FWS
McGregor Meadows Waterfowl Protection Area	799	1999	FWS
Lost Trail National Wildlife Refuge	7,885	1999	FWS
Ray Kuhns Wildlife Management Area	1,530	1953-1986	FWP
Flathead River Wildlife Habitat Protection Area	220	1986-1999	FWP
Owen Sowerwine Natural Area	480	1970s	DNRC
Total	**15,304**		

Source: U.S. Fish and Wildlife Service

PART 3: Land Resources (see Goals 36 through 42 and see also Chapter 2: Land Uses)

Forestry

Proactive forest management creates healthy forest ecosystems through practices that include planting, thinning and harvesting of forest vegetation. Proper management of forests protects the cultural integrity of Flathead County and promotes the health and safety of residents by reducing the risk of wildfires and contributing to the local economy.

The USDA Forest Service is responsible for management of National Forests (including wilderness areas), and Flathead County contains portions of four National Forests and two Wilderness Areas. Flathead National Forest (including portions of the Great Bear and Bob Marshall Wilderness Areas) has approximately 1,875,545[7] acres within Flathead County. Various species of trees found in the mid elevation areas of these forests are Douglas fir, western larch, Lodgepole pine, western white pine, grand fir, western red cedar, western hemlock and Engelmann spruce. Various species of trees found in the higher elevation areas of these forests are subalpine fir, whitebark pine and subalpine larch.

The three largest private timber landowners, F.H. Stoltze Land and Lumber, Plum Creek and Montana Forest Products together account for approximately 9.2% (310,000 acres) of

[7] Montana Natural Resource Information System

the total land area in Flathead County. Land owned by the three largest corporations represents approximately 52.7% of the private land in Flathead County (see Map 2.2).

Many growth issues are associated with forest lands such as the declining timber industry and the conversion of private forest lands into high-end real estate projects. An important issue to identify is the wildland-urban interface. The wildland-urban interface (WUI) is commonly described as the zone where structures and other human development meet and intermingle with undeveloped wildland or forests.[8] This WUI zone can be comprised of private and public lands and poses tremendous risks to life, property, and infrastructure in associated communities. These risks to health and safety in the WUI can include inescapable wildfires and natural disasters or human contact with species such as bears, mountain lions and wolves if not adequately mitigated. Forest management practices that reduce the health and safety risks are essential to areas where public and private forest land border developed properties. Risk reduction strategies can consist of commercial thinning projects and homeowner education.

The State of Montana manages approximately 129,670 acres of forested trust lands in Flathead County. The lands are managed by the Montana Department of Natural Resources Conservation Trust Lands Management System. Although trust lands are commonly thought of as forestry and/or recreation lands, these lands are managed to generate revenue and uses can be as varied as any other public or private lands in Flathead County.

Agriculture

Agriculture represents a portion of the historic culture in the Flathead Valley, and as the economy changes in Flathead County, agriculture remains critically important toward maintaining economic diversity. In 2002, approximately 40% of the private land (234,861 acres) in Flathead County was being farmed.[9] There were approximately 1,075 individual farms, with the majority of these farms (78%) under 179 acres.

Some of the major crops produced by farmers include wheat, barley, flax, alfalfa, grain hays, silage and livestock pasture. Specialty crops such as seed potatoes, mint, lawn sod, canola, mustard, raspberries, strawberries, grapes and vegetable crops are important products.[10]

A primary concern of residents is the conversion of farmlands into residential developments. The conversion of these lands affects the rural community character, water quality, water supply and wildlife habitat.

Soils

[8] Flathead County Community Wildfire Fuels Reduction / Mitigation Plan

[9] USDA 2002 Census of Agriculture

[10] Flathead County Natural Resource Use Policy

Soils in the relatively flat portion of Flathead County north of Flathead Lake consist of two broad types. One is rocky and poorly drained and is underlain by unsorted glacial till. This is commonly used for timber production. The second type of soil is deep, well structured and well drained. It is underlain by deposits that have been reworked or sorted by running water and is the most productive in Flathead County.

The concept of hydric soils includes soils developed under sufficiently wet conditions to support the growth and regeneration of hydrophytic vegetation. Soils that are sufficiently wet because of artificial measures are included in the concept of hydric soils. Soils in which the hydrology has been artificially modified are hydric if the soil, in an unaltered state, was hydric. Some series designated as hydric have phases that are not hydric depending on water table, flooding and ponding characteristics.

Hydric soil lists have a number of agricultural and nonagricultural applications including land use planning, conservation planning and assessment of potential wildlife habitat. A combination of the hydric soil, hydrophytic vegetation and hydrology criteria defines wetlands as described in the National Food Security Act Manual (Soil Conservation Service, 1994) and the Corps of Engineers Wetlands Delineation Manual (Environmental Laboratory, 1987).

Surveys were completed in the upper Flathead valley for most of the valley bottom by the Natural Resource Conservation Service, soil survey. The majority of hydric soils are found along the Flathead River in the Lower Valley area, along Ashley Creek and Smith Lake, and southeast of Whitefish. Much of the remaining soil types in the valley bottom have hydric inclusions and characteristics, especially prevalent along the Flathead River corridor. A complete list of hydric soils and soils with hydric inclusions in the Upper Flathead Valley with descriptions of soil characteristics is available at the Montana Natural Resource Conservation Service (NRCS).

Geology and Minerals

The topography of Flathead County was formed during the ice ages when the enormous glacier that filled the Rocky Mountain Trench of British Columbia thinned as it spread southward through the Flathead Valley and into the Mission Valley. The Mission Range split the glacier sending one branch of ice down the Swan Valley and another to the southern end of Flathead Lake. When the glacier melted, it left a deep fill of sediment in the floor of the Flathead Valley.

The valley bottom is generally level to moderately sloping. Most steep slopes occur in the public and private timberlands surrounding the valley bottom, as well as in Glacier National Park. Approximately 75 % of Flathead County has slopes over 25% most of which is in the mountainous National Forest and National Park lands surrounding the valley.

At the beginning of the 1900's coal and oil exploration with mining and drilling occurred in the North Fork. Currently open cut mining is primarily limited to sand, gravel and

rock. Various types of gravel are in demand for road construction. Rock is used for concrete and asphalt road construction, as well as fill and road surfaces.

Under the Metal Mine Reclamation Act (MMRA), "mining" is defined as the extraction of ores or minerals in commercial quantities for sale, beneficiation, refining, or other processing.

All open cut sand and gravel operations must comply with applicable zoning regulations if the proposed mine site is in an area zoned as residential. An air quality permit from the DEQ is required for the operation of any mineral crushing or other processing plants. The Employment Relations Division of the Montana Department of Labor and Industry enforces mine safety regulations. The division's Safety Bureau works with the mine operator and mining contractors who must report the name of the mine, the location of the mine, the name of the company and contractors operating the mine, the type of mining activity, the date mining activity will begin and other information.[11]

Currently, there are over 240 permitted gravel pits . 142 gravel pits are currently active.[12] Historically county governments have placed conditions on gravel pit operations, limiting hours of operation or requiring measures be taken to curb dust and noise pollution for pits near housing developments.

PART 4: Air Quality (see Goal 43)

Under the Clean Air Act, the Environmental Protection Agency establishes air quality standards to protect public health, including the health of “sensitive” populations such as people with asthma, children, and older adults. EPA also sets limits to protect public welfare. This includes protecting ecosystems, including plants and animals, from harm, as well as protecting against decreased visibility and damage to crops, vegetation and buildings.

Air quality problems in Montana are usually related to urban areas and mountainous topography or river valleys that are sensitive to temperature inversions. Particulate matter and carbon monoxide are the criteria pollutants that have the greatest adverse impact on Montana's air quality. Particulate matter generally comes from vehicles traveling on unpaved roads, sand and gravel from winter traction material, and residential wood burning. Increasing traffic levels on unpaved roads is a growing problem, which is headed towards a critical stage. This growth policy contains policies recommending county-wide dust abatement programs. Carbon monoxide comes primarily from motor vehicles and residential wood burning. Although industrial sources account for only a small part of carbon monoxide and particulate matter emissions in most communities, industries are the main sources of sulfur dioxide and lead pollution in Montana. Forest fires are also a very serious threat to air quality.

[11] Montana DEQ
[12] Flathead County Geographic Information System

The Flathead County Air Pollution Control Program requires the use of all available practicable methods to reduce, prevent and control air pollution in Flathead County. The Flathead County Air Pollution Control Plan regulates open burning, solid fuel burning, prohibited materials for wood or coal residential stoves, and the Kalispell, Columbia, and Whitefish Air Pollution Control Districts.

Congress states that one of the purposes of the Clean Air Act is "to preserve, protect and enhance the air quality in national parks, national wilderness areas, national monuments, national seashores and other areas of special national or regional natural, recreation, scenic or historic value".

In Glacier National Park, an extensive air quality monitoring network exists for pollution and visibility conditions. As a Class I airshed Glacier National Park is provided the greatest air quality protection under the Clean Air Act. This includes visibility and fluoride monitoring and a national atmospheric deposition network. Glacier's monitoring instruments are located mostly on the west side of the park. Seasonal vegetation collection associated with fluoride monitoring also occurs at various sites on the west side.