

I. Chapter 1 Iowa's Water Resources

From border to border and from top to bottom, Iowa has abundant and diversified water resources. Iowa is bordered on the east and west by two of the largest river basins in the world, the Mississippi River to the east and Missouri River to west. The diversity of the surface water is evidenced by the 307 miles of coldwater streams in northeastern Iowa to the nearly 41,000 acres of federal reservoirs in the central and southern portions of the state. Overall, permanent water surface area in Iowa includes 71,655 miles of rivers and streams, 161,366 acres of lakes, reservoirs and ponds and 125,155 acres of freshwater wetlands (see Table 1).

Surface water in Iowa is an important resource for both recreation and drainage. On the border rivers, it's also an important transportation source in moving agricultural commodities to market. Surface water in Iowa provides some limited generation of electricity.

Iowa has an estimated 900,000 anglers each year spending 9 million days annually on fishing. The economic impact of fishing activity is an estimated \$300 million with nearly 40 million fish caught annually. The IDNR operates three cold water and four warm water fish hatcheries.

All surface waters in Iowa are classified for protection of either "designated beneficial uses" or for "general uses." Surface waters designated for beneficial uses maintain flow throughout the year or contain sufficient pooled areas during intermittent flow periods to maintain a viable aquatic community.

A total of 12,185 miles of rivers and streams in Iowa have designated beneficial use designations. There are also 47,603 acres of lakes, 40,850 acres of flood control reservoirs and 27,273 acres of wetlands in the state that have designated beneficial uses (see Table 2.). Surface waters in Iowa can be designated for one or a combination of the following beneficial uses:

- Primary body contact (Class A)---any recreational or other water use such as swimming or skiing where there is direct human contact with the water involving considerable risk of ingestion of water or contact with sensitive body organs such as eyes, ears, and nose.
- Aquatic life (Class B)---uses of waters by wildlife, fish, aquatic and semi-aquatic life and uses for secondary contact where risk of ingesting appreciable amounts of water is either incidental or accidental such as fishing or boating.
- Drinking water (Class C)---surface waters that are protected as a raw water source of a potable water supply.

All surface waters in Iowa including those designated Class A, B and C are classified for the following general uses: livestock and wildlife watering, noncontact recreation, crop irrigation and industrial, agricultural, domestic and other incidental water withdraw uses.

Although more difficult to assess in terms of quantity, Iowa has three major aquifer types as sources of groundwater: Alluvial and buried channel aquifers; bedrock aquifers and glacial drift aquifers.

Alluvial aquifers are saturated sand and gravel deposits associated with streams and rivers throughout the state. The more productive alluvial aquifers are typically associated with larger streams. Alluvial aquifers often supply the largest quantity and best natural water quality in the areas where they exist, but are susceptible to contamination due to being shallow.

Buried channel aquifers are deeper sand and gravel deposits associated with ancient streams and are known to exist at numerous locations across the state. Where available, they tend to yield good quality and are less susceptible to contamination.

The upper most bedrock in roughly the northeastern half of the state provides a reliable source of good quality water for municipal and private uses. These aquifers consist of sandstone and fractured limestone and dolomite formations. In areas with thin overlying soils, especially karst areas where sinkholes exist in north central and far northeastern parts of the state, these aquifers are vulnerable to contamination such as surface-applied agricultural fertilizers and pesticides. Introduction of contaminants directly to bedrock aquifers is also possible via drainage wells. The Dakota sandstone aquifer located primarily in northwestern Iowa yields moderate to large amounts of water, but is high in dissolved minerals. The Jordan aquifer is one of the deeper bedrock aquifers and is available in all but the northwestern corner of the state. The depth of the Jordan aquifer provides good protection against man-made contaminants. The value of the Jordan is limited by high mineral concentrations in the western third of the state and by its more than 2,000 foot depth in the southwestern part of Iowa.

Glacial drift aquifers occur throughout most of the state and consist largely of silty clay materials with occasional pockets of sand and gravel. These aquifers tend to have low to moderate yields and are most frequently used for small, private water supplies when a better aquifer is not readily available. Natural water quality from glacial drift aquifers is generally good, but these formations are very susceptible to localized contamination because of their shallow depth.

Both surface and groundwater are important sources of drinking water in Iowa (see Table 1). Approximately 25 percent of all Iowan's get their primary drinking supply from surface water with the other 75 percent relying on groundwater sources.

Table 1

Table 1. Summary of Iowa Water Resources.

Category	Category Described or Subdivided	Measure; Units	Iowa Population Served with Drinking Water
Area of Iowa	Total Area	56,275 sq. mi.	
	Land Area	55,965 sq. mi.	
	Water Area	310 sq. mi.	
Average Rainfall	Total Amount	32 in.	
Average Evapotranspiration	Total Amount	26 in.	
Average Direct Surface Runoff	Total Amount	3.5 in.	
Average Groundwater Recharge	Total Amount	2.5 in.	
Average Stream Discharge	Total Interior Stream Discharge	6 in. (18,000,000 ac ft/year)	
Rivers and Streams	Total Mileage	71,665 mi.	
	Intermittent Streams	42,957 mi.	
	Perennial Streams	26,630 mi.	
	Ditches	1,418 mi.	
	Border Rivers	660 mi.	
Lakes	Total Area	145 sq. mi.	2.9%
	No. of Significant Publicly Owned Lakes	115	
Flood Control Reservoirs(4)	Total Area	64 sq. mi.	1.2%
Wetlands	Total Area	79 sq. mi.	
Aquifer Storage	Total, All Aquifers	>100,000,000 ac ft.	74.7%
	Alluvial Aquifers	~25,000,000 ac ft.	22.9%
	Drift Aquifers & Pennsylvanian	~10,000,000 ac ft.	12.5%
	Dakota Aquifer	~3,000,000 ac ft.	6.1%
	Mississippian Aquifer	~25,000,000 ac ft.	3.8%
	Silurian-Devonian Aquifer	~55,000,000 ac ft.	15.4%
	Cambro-Ordovician Aquifer	~15,000,000 ac ft.	14.0%

Table 2

Table 2. Summary waterbodies and waterbody subsegments designated for beneficial uses in the Iowa Water Quality Standards (September 1996; IAC 1996).		
Waterbody Type and Use Designation	No. of waterbodies or waterbody subsegments	Total Size
RIVERS AND STREAMS		
	1,068	12,185.9 miles
Class A	93	2,276.4 miles
Class B	1,068	12,185.9 miles
Class B(WW)	259	5,069.4 miles
Class B(CW)	108	480.4 miles
Class B(LR)	701	6,636.0 miles
Class C	18	285.8 miles
High Quality (HQ)	50	342.0 miles
High Quality Resource (HQR)	109	1529.2 miles
LAKES		
	279	47,603 acres
Class A	163	44,903 acres
Class B	278	47,600 acres
Class B(LW)	271	44,866 acres
Class B(WW)	6	2,732 acres
Class B(CW)	1	2 acres
Class C	54	20,350 acres
High Quality (HQ)	7	10,249 acres
High Quality Resource (HQR)	5	8,571 acres
FLOOD CONTROL RESERVOIRS		
	4	40,850 acres
Class A	4	40,850 acres
Class B(WW)	4	40,850 acres
Class C	1	11,000 acres
High Quality Resource (HQR)	1	11,000 acres
WETLANDS		
	88	27,273 acres
Class A	10	6,296 acres
Class B(LW)	88	27,273 acres
Class C	1	308 acres
High Quality Resource (HQR)	5	2,033 acres
<p>Use designations: Class A = primary body contact (swimmable) recreation; Class B = aquatic life uses, Class B(WW) = significant resource aquatic life, Class B(CW) = coldwater aquatic life, Class B(LR) = limited resource aquatic life, Class B(LW) = aquatic life of lakes and wetlands, Class C = source of a potable water supply. River and stream waterbodies are divided into subsegments for purposes of Section 305(b) reporting. High Quality (HQ) and High Quality Resources (HQR) waters also designated for Class A, B, and/or C uses.</p>		