

THE IOWA SAWMILL INDUSTRY

The importance of the sawmill industry to the early settlement and subsequent development of Iowa is little known; most citizens of the United States, and even many in Iowa, regard this State as being entirely agricultural. They recognize the presence and importance of the many industries which convert raw agricultural materials into a variety of products, but relatively few persons realize that there were, and still are, forested areas in Iowa. It is even less well known that at one time this State was the center of a sawmill industry of considerable magnitude and that even at the present time the conversion of logs into lumber affords a livelihood for a considerable number of people in some sections of Iowa.

The colonization of Iowa began in 1833 with the opening of the Black Hawk Purchase. The first settlers found a territory relatively rich in forests. The area of forest land has been estimated at various amounts. Hugh P. Baker placed the timbered area of Iowa at one-fifth of the total land area.¹ Jacob T. Crane, Jr., and George W. Olcott wrote in 1933 that "two hundred years ago, about 5,000,000 acres, or about one-seventh of the state's area was wooded."² The most accurate estimate appears to be one offered in a memorandum found in the files of the Iowa Forest and Wasteland Survey³ which places the original

¹ Baker's *Native and Planted Timber in Iowa* (United States Forest Service Circular, No. 154, 1908), p. 8.

² Crane and Olcott's *Report on the Twenty-five Year Conservation Plan*, p. 72.

³ This typed memorandum, giving acres of timber by counties, based on the United States Land Office surveys, 1832-1859, is among the files of the Department of Forestry, Iowa State College.

forested area of the State at a figure of 6,680,926 acres, or 18.77 per cent of the land area. This estimate was determined by planimetry of a map of Iowa based on the original land survey. This last estimate was accepted by Charles M. Genaux and John G. Kuenzel as the most plausible of all those proposed.⁴ G. B. MacDonald says: "In northeastern Iowa some counties were 90 per cent forested, in southeastern Iowa from 70 to 75 per cent forested."⁵ The wealth of available timber and the needs of the early settlers for building materials led, naturally, to an early development of a pioneer sawmill industry.

George W. Hotchkiss wrote in 1898: "it is unfortunate that the immensity of value of the forestry industry of the country has never been adequately appreciated . . . it is the exception rather than the rule that the sawmills of the new settlements receive even a brief mention."⁶ Because the sawmill industry has been, and probably will continue to be, of importance to the economy of Iowa it appears logical that a brief accounting of the industry should be offered.⁷

Ralph C. Bryant has pointed out that the general trend of the lumber industry in all regions of the United States,

⁴ Genaux and Kuenzel's *Defects Which Reduce the Quality and Yield of Oak-Hickory Stands in Southeastern Iowa* in *Iowa Agricultural Experiment Station Bulletin*, No. 269 (1939), p. 410.

⁵ MacDonald's *The Beginning of a National and State Forestry Program in Iowa* in *Ames Forester*, Vol. XXV (1935), p. 15.

⁶ Hotchkiss's *History of the Lumber and Forest Industry of the Northwest*, p. 30.

⁷ This study was prepared in 1941 as a thesis for a master of arts degree at Iowa State College of Agriculture and Mechanic Arts. The materials used were found chiefly in the State College Library. County histories were consulted in the State Department of History and Archives at Des Moines. Some volumes were secured from the John Crerar Library in Chicago and from local public libraries. Useful information was also received from G. R. Ramsey, State extension forester for Iowa, from the Washington Office of the United States Forest Service, and from residents of Burlington, Davenport, and Dubuque.

except the northwest, has been to install small mills to supply local demands of the settlers.⁸ Later, when transportation facilities improved, the industry expanded to meet the needs of outside markets. During this phase of the industry, the producing units were large. When the virgin timber stands became depleted, the large mills decreased in number or disappeared and the small mills again became dominant because they could be operated on scattered stands of timber and in second growth timber more cheaply than could a large unit.

The Iowa sawmill industry has followed this general pattern. The first, or pioneer period, may be said to extend from 1829 to about 1860, the middle period of large producing units and peak lumber production from about 1860 to about 1910, and the third or small mill period from 1910 to the present time. The division of periods in this manner should not be construed to mean that all of the sawmills which operated during a certain period conformed to the pattern suggested. There were a few large units in existence during the pioneer period and numerous small mills in operation during the middle years. The dominant type of sawmill unit in each period has, however, run true, in general, to the suggested pattern.

THE PIONEER PERIOD OF THE SAWMILL INDUSTRY
1829-1860

On June 1, 1833, under the President's proclamation, a tract of land 50 miles wide west of the Mississippi River, known as the Black Hawk Purchase, was thrown open to settlement. This cession of land was supplemented by other treaties in 1836, 1837, 1842, and 1851, which opened more land to settlement.

⁸ Bryant's *Lumber, Its Manufacture and Distribution* (Second Edition, 1938), pp. xvii, xviii.

As a result of the opening of these lands there was a great influx of people from many sections of the United States. Into southeastern Iowa came colonists from the Carolinas, Virginia, Kentucky, Missouri, and States directly to the east. Settlers in more northerly portions of the new territory came from New England, New York, Pennsylvania, Ohio, Indiana, and Illinois. For the most part, the pioneers came from forested States and it was natural that they should first settle on land in Iowa which abounded in timber, chiefly along the rivers on the east.

"These river bottoms", commented one writer, "were covered with a virgin forest such as had never been seen by the white man." Black walnut trees which measured from four to six feet in diameter were growing on the bottom lands. Sycamore trees often grew to five feet in diameter. Other trees noted were oaks, hickory, hackberry, and butternut.⁹ Another writer, of an earlier date, pointed out that "along the streams there are thousands of acres covered with an excellent growth of oak, walnut, ash, linn, maple, hickory, elm, and cottonwood." The same writer records a noticeable lack of timber in the western part of Iowa, especially on the upland prairies between the stream bottoms.¹⁰

Some sections of the new territory possessed a heavy forest cover. A history of Buchanan County, published in 1881, made this statement: "Almost one-half of this township [Liberty] was, at the advent of the settlers, densely forested."¹¹ A description of a forested area in Bremer County gives the size of the tract as being 26 sections. Tree species mentioned as growing on this latter tract were

⁹ George F. Parker's *Iowa — Pioneer Foundations*, Vol. I, pp. 228-231.

¹⁰ Nathan H. Parker's *Iowa As It Is In 1855*, p. 35.

¹¹ *History of Buchanan County, Iowa* (edited by C. S. and Elizabeth Percival and published by Williams Bros., Cleveland, Ohio, 1881), p. 296.

hard maple, black walnut, butternut, white oak, elm, ash, basswood, poplar, dogwood, and ironwood.¹²

TABLE I
ROUGH LUMBER PRODUCTION IN IOWA¹³
THOUSAND FEET BOARD MEASURE

Year	White Pine	Total Soft- woods	Oak	Walnut	Total Hard- woods	Total Lumber
1859	161,000	161,000	9,500	3,500	22,000	183,000
1869	297,285	297,285	15,100	4,500	28,000	325,285
1879	372,000	374,000	22,000	5,100	38,578	412,578
1889	537,000	540,000	37,790	6,900	68,000	608,000
1899	288,581	290,741	33,994	4,313	61,670	352,411
1909	80,158	80,378	17,335	852	51,643	132,021
1919	285	362	4,096	5,074	18,131	18,493
1929			3,180	7,670	15,432	15,432
1939			3,262	294	5,164	5,164

Sawmills were a pioneer necessity. Very shortly after the new territory was opened for settlement, the need for building material became so great that "the sawmill often either preceded settlement or followed it so closely that the frame house soon became the standard." The farmer farmed the bottom portion of his land, which had been cleared of trees. Farm work occupied his time during the season of planting, cultivating, and harvesting. With the onset of cold weather, "he became again the woodman".¹⁴

The sawmills which were operated during the early days in Iowa were supplied with raw material, for the most part,

¹² Chas. E. Hall's *Pen Sketches of the Big Woods* in THE IOWA JOURNAL OF HISTORY AND POLITICS, Vol. XXIX, pp. 402-418.

¹³ Data for the years given in the table were received in a communication from R. W. Nelson, Acting Chief of the Division of Forest Economics, United States Forest Service, dated February 21, 1941. The data given were taken from United States Census reports, but were adjusted somewhat, so that totals and break-down of totals will not check accurately against published census data. In forestry "hardwood" is used to designate the wood of any broad-leaved deciduous tree.

¹⁴ George F. Parker's *Iowa — Pioneer Foundations*, Vol. I, pp. 202, 228.

from the forests immediately adjacent to the location of the mill. The farmer felled timber and drew it to the sawmill. However, not all of the logs for the early mills came from native timber. Pioneer mills were constructed along the Mississippi River, many of which were supplied with pine logs from the Wisconsin pineries. The sawmills of Iowa, furnished with logs from within and outside the State, by 1850 were cutting sufficient lumber to rank Iowa in eleventh place among the States in the amount of lumber produced.¹⁵

The records indicate that the first sawmill to be erected on Iowa soil was built by a detachment of soldiers from Fort Crawford, which was located at Prairie du Chien, Wisconsin. They chose a site on the Yellow River about six miles from the Fort. Here they built a mill dam across the Yellow River, constructed a water wheel, erected a mill, and on October 9, 1829, began the production of rough lumber which was floated across the Mississippi River to the fort.¹⁶

In 1834, Benjamin W. Clark built a sawmill on Duck Creek in Scott County to supply the needs of the new settlers. The following year, a dam was thrown across the Skunk River at Augusta, in Des Moines County, and a sawmill erected. In 1837 a steam sawmill was built at Dubuque and the same year a steam mill was erected in Scott County and another in Muscatine County on Lime Creek.¹⁷ The number of mills, in towns along the Mississippi River, increased rapidly from this time on. Edgar R. Harlan,

¹⁵ Wm. Duane Wilson's *Description of Iowa and Its Resources* (1865), p. 85.

¹⁶ Bruce E. Mahan's *Old Fort Crawford and the Frontier*, p. 134; Ellison Orr's *Hunting an Old Dam Site*; Jacob A. Swisher's *Iowa — Land of Many Mills*, pp. 41, 42; letter from P. M. Hamer, The National Archives, to Ruth A. Gallaher, dated December 1, 1941.

¹⁷ Swisher's *Iowa — Land of Many Mills*, pp. 43, 66; Floyd B. Haworth's *The Economic Development of the Woodworking Industry in Iowa* (*Iowa Studies in Business*, No. XIII), p. 18.

writing about industry moving across the Mississippi River, comments, "the first important industries to mark them [the towns along the Mississippi] as manufacturing centers were mills that worked up the great log rafts floated down the Mississippi".¹⁸

The earliest date on record of a sawmill west of the Des Moines River is 1837. During that year Samuel Clayton placed a dam across Chequest Creek and erected a mill.¹⁹ An Indian agency was established by the Federal government where Agency City in Wapello County now stands and two mills used both as saw and grist mills were built in that vicinity in 1839. One mill was located on Sugar Creek and the other on Soap Creek.²⁰

When the settlers first came to Iowa their equipment with which to obtain building materials were axe, broad axe, frow, auger, and plane. With these few tools the timber was felled and shaped for use in the making of houses, furniture, and fences. Such work required long hours of laborious effort. Soon the settlers resorted to the production of planks by means of whipsawing. In preparation for whipsawing, a platform was erected on a hillside, a pit was dug beneath the platform, and a log rolled onto the platform. One man stood on the log, another in the pit, and the two, pulling a cross-cut saw, ripped planks off the log. This, too, was a slow, laborious process.²¹

The many streams in Iowa afforded power and, because

¹⁸ Edgar R. Harlan's *A Narrative History of the People of Iowa*, Vol. II, p. 78.

¹⁹ George C. Duffield's *Frontier Mills* in the *Annals of Iowa* (Third Series), Vol. VI, p. 428.

²⁰ Ruth A. Gallaher's *Indian Agents in Iowa* in THE IOWA JOURNAL OF HISTORY AND POLITICS, Vol. XIV, p. 379; Jacob Van der Zee's *The Opening of the Des Moines Valley to Settlement* in THE IOWA JOURNAL OF HISTORY AND POLITICS, Vol. XIV, p. 501.

²¹ Duffield's *Frontier Mills* in the *Annals of Iowa* (Third Series), Vol. VI, pp. 427, 428.

much of the timber was found along the water courses it was natural they should be harnessed to supply the power for the mills. Most of the early mills were built at locations where water power was available. There were a few steam mills in operation very early in the history of Iowa, such as the one erected in 1837 at Dubuque. But for many years, water-power sawmills continued to dominate the industry. The large mills which soon appeared along the Mississippi River were, in the main, steam-powered, as also were many of the smaller mills in western and northwestern Iowa, but the dominant type in other sections of the State was the water mill. One report on the early township surveys in western Iowa gave twenty-three sawmills and gristmills for the area along the Missouri River, "some of them very fine and worked by steam".²²

Because the abundance of water courses afforded power there was, at an early date, considerable competition for suitable sites for the erection of dams. Soon after Iowa became a Territory in 1838 the matter of mills and mill dams became a subject of legislative concern. General laws were passed to regulate mills and millers and special acts authorized the building of dams and mills. The first of these, adopted on January 12, 1839, authorized Benjamin Nye to build a dam across Pine River, now Pine Creek, in Muscatine County.²³

Many types of dams were built to impound the water in a stream. The simplest type was the brush dam. To make this, large logs hewed on two sides were laid end to end across the stream and spliced together. Brush was then piled against the logs with the butt ends upstream and weighted down with clay and rocks. Then another layer of

²² Jacob A. Swisher's *Township Surveys in the Iowa Country* in THE IOWA JOURNAL OF HISTORY AND POLITICS, Vol. XXXV, p. 19.

²³ Swisher's *Iowa — Land of Many Mills*, pp. 43, 44.

brush was laid on top of the clay and rock but with the butt ends extending a bit more upstream than the layer below. Successive layers of brush and clay and rock were added until the dam reached the height needed.

A more costly type of dam and a more enduring one was the crib dam. This was built by laying three or four strings of hewed timbers across the stream, the logs in each string being securely pinned together. Notches were cut in the top faces of the logs comprising the strings, and cross ties were laid in the notches and pinned to the logs beneath. These logs formed rectangular pens which were filled with clay and rock. On top of the cross ties more strings of logs were laid across the stream. Successive layers of strings and cross ties formed pens filled with clay and rock and raised the dam to the desired height. The dam was provided with a roof to protect the clay and rock filling from the elements. The Clayton mill had a crib dam.²⁴

The sawmills of an early date in Iowa used three forms of water wheels, the undershot wheel, the overshot wheel, and the flutter wheel.²⁵ Both the overshot and undershot wheels were very large in diameter. An early Dubuque County sawmill had a wooden overshot wheel which was 14½ feet in diameter and 15 feet wide.²⁶

The undershot wheel was generally used on small streams where the flow of water was small. It was driven by the force of the water against the under edge of the wheel. It turned very slowly and usually lacked power because of the absence of a strong stream flow. This necessitated the use

²⁴ Haworth's *The Economic Development of the Woodworking Industry in Iowa* (*Iowa Studies in Business*, No. XIII), pp. 15, 16; Duffield's *Frontier Mills in the Annals of Iowa* (Third Series), Vol. VI, pp. 428, 429; Swisher's *Iowa — Land of Many Mills*, pp. 47-49.

²⁵ Haworth's *The Economic Development of the Woodworking Industry in Iowa*, p. 16.

²⁶ Swisher's *Iowa — Land of Many Mills*, pp. 55-58.

of gears to obtain sufficient power and as gears were expensive and difficult to obtain in a pioneer community, the undershot wheel was not in great favor.

The overshot wheel was usually from 16 to 18 feet in diameter and was often used in mills located some distance from the dam. The water from the millpond was conducted to the wheel through a flume, which discharged the water against the top of the wheel into buckets, whereupon, gravity caused the wheel to turn.

The flutter or breast wheel was the type most commonly employed, because it was simple, used a small head of water, and required no gears. George C. Duffield described the flutter wheel constructed at Clayton's mill on Chequest Creek in Van Buren County as follows, "It was constructed upon a shaft that was about a foot in diameter, long enough to carry the wheel and give a bearing on each end. Holes were mortised through, say a foot from the bearings, not intersecting, and about three by six inches. Through the holes were driven tough scantling, which, being sawed off two or three feet from the shaft, formed the two ends of the wheel. It was completed by pinning to each pair of spokes a plank three by twelve or fourteen inches, and of the length of the wheel as designed (Clayton's flutter wheel was six feet). Boards were then pinned with their flat sides toward the shaft, in the angles of the spokes, and some 18 or 20 inches from the shaft. This gave something the appearance of a headless drum with vanes or flanges extending out of its eight corners. The shaft rested on bearings cut into logs left projecting from the underside of the race for that purpose. It was held down by cap bearings fitted over it, and pinned with long tough pins."²⁷

²⁷ Duffield's *Frontier Mills in the Annals of Iowa* (Third Series), Vol. VI, p. 430.

Later, after 1860, much use was made of the water turbine to generate the power necessary to drive mill machinery.

Duffield's description of the sawing mechanism of Clayton's mill describes the characteristic features of the early water-driven mills. The shore end of the flutter wheel shaft, previously described, was fitted with a crank iron. To the crank was pinned a pitman shaft about two by four inches and six to eight feet long. The upper end of the pitman shaft was attached to the bottom end of the sash saw blade which, when operating, had an up and down reciprocal motion. The saw blade was about eight inches wide with teeth two to three inches long pointing downward. The saw cut only on the downward stroke. The log to be cut rested on a series of wooden rollers and was pried forward against the saw teeth by use of a crow bar or other lever.²⁸

J. P. Walton, describing the Warfield mill on Mad Creek at Bloomington (Muscatine), stated that the mill had one saw six inches wide by seven feet long, with "teeth half as large as a man's hand". The saw blade was fastened in a square frame, which moved up and down in slides when actuated by the pitman shaft attached to the lower end of the saw frame. The movement of the saw frame in the slides was similar to the sliding of a window sash in the window frame.²⁹

Saw blades, with teeth on each edge, were introduced about 1850, the log being fed into the saw, first against one cutting edge, then the other. Gang saws, which later became standard equipment in most large mills, were made up of a large number of saw blades attached in a frame

²⁸ Duffield's *Frontier Mills* in the *Annals of Iowa* (Third Series), Vol. VI, pp. 430, 431.

²⁹ J. P. Walton's *Pioneer Papers*, p. 137.

which operated in the same manner as the single sash saw. The gang saw, having many blades, could cut several boards from a log simultaneously.³⁰

About 1856, the board of trustees of the Wittemberg Manual Labor College purchased eight acres of forest land, at a price of \$33.00 an acre, to supply lumber for the college buildings. One of their number, John Carey, was sent to the east to purchase a sawmill which could be moved from place to place to saw the timber into the needed lumber. All of the manufacturers whom he visited insisted that a portable mill would not be successful. Finally, however, Carey interested a machinery firm in Norwalk, Ohio, and the mill was built, shipped to Jasper County, and set up. The mill was a success and was used to produce the lumber needed for the college. Afterwards it was sold and was operating as late as 1880. This mill is reputed to have been the first portable sawmill ever built. The mill "created a revolution in the sawmill industry, east as well as west".³¹

The labor which was required to operate the sawmills of this period was recruited from the communities in which the mills were located. The mills were mostly small and required only a few men. Even at the close of the period, the average number of hands per mill remained quite small.

There were, however, some operations of moderate size. Franc B. Wilkie wrote in 1857, that Cannon and French of Davenport employed 80 men in a sawmill, and Renwick and Sons, of the same city, 30 men, at a wage of \$1.25 daily. At that time Davenport had five sawmills.³²

No record was found of the existence of any labor organ-

³⁰ Swisher's *Iowa — Land of Many Mills*, p. 73.

³¹ James B. Weaver's *Past and Present of Jasper County, Iowa*, Vol. I, p. 131.

³² Franc B. Wilkie's *Davenport Past and Present*, pp. 266, 267.

izations nor of any attempt to organize the workers in the early mills. The labor movement in the United States had not become formulated at that early date. Also, there were but few centers in Iowa where there were sufficient sawmill workers to present a united labor front.

As the pioneer period merged into the next period, about 1860, certain characteristics of the middle period became noticeable. The number of large sawmills in the towns along the Mississippi River was a dominant factor in the industrial life of the State. The Mississippi River was the scene of great activity, due to the traffic in logs on the river.

During the pioneer period the population of Iowa increased rapidly with a concomitant increase in the demand for lumber. Most of the lumber produced was used locally and transported by wagon. Later there were a few miles of railroad which afforded a more satisfactory means of distribution. In a period slightly longer than 20 years the sawmills had invaded almost every timbered section of Iowa. The native timber along the streams and on some upland areas was not sufficient to meet the needs of a growing population and to better meet the increased demand for lumber, many mills were established in the river towns where the supply of raw material from the forests of Wisconsin was easily available. By 1859 there were 540 sawmills operating in Iowa. These mills produced 183,000,000 board feet of lumber of which but 22,000,000 feet came from native forests. The balance of 161,000,000 feet consisted of white pine cut from logs rafted down the Mississippi River from the northern pineries. The economic picture of the sawmill industry in Iowa is shown in Table II. The size of the mills, as evidenced by the number of hands employed, was larger in the river counties than in the interior. These mills sawed the logs rafted down the Mississippi.

By 1860 the pioneer period merges into the middle period, an era characterized by large producing units and the peak of lumber production in Iowa.

PEAK LUMBER PRODUCTION
1860-1910

A study of statistics for the years 1860, 1870, and 1880, indicating the number of mills for those counties of the State which reported active sawmills and the average number of hands per mill, affords a clear picture of the centers of the sawmill industry for the early part of the middle period. Unfortunately, data of similar nature were not gathered for subsequent years. These data reveal that the average number of hands per mill was much greater in Clayton, Dubuque, Clinton, Scott, Muscatine, Des Moines, and Lee counties than in other counties of the State. The counties named are all bordered by the Mississippi River down which softwood logs were floated. Lansing, Dubuque, Bellevue, Lyons, Clinton, Le Claire, Davenport, Muscatine, Burlington, Fort Madison, and Keokuk turned out thousands of feet of lumber every year.³³

Table II illustrates the difference between the lumber industry in certain river counties, where the sawmills handled large numbers of logs from the north, and the remaining counties, where the sawmills simply made into lumber the logs cut in that locality. A few counties in the northwest, O'Brien for example, reported no lumbering at all. In others there was a limited supply and it took only a year or two to use up the local timber. In other counties the local lumber industry continued over several decades. Statistics on Fremont, Bremer, and Johnson counties are given to illustrate counties having a lumber industry covering

³³ Marie E. Meyer's *Rafting on the Mississippi* in *The Palimpsest*, Vol. VIII, p. 126.

only a short period of years. Appanoose, Clayton, and Decatur represent the counties with a comparatively steady local lumber industry. Clinton, Dubuque, Lee, Muscatine, and Scott counties represent the counties where the lumber mills grew into big business. It is to be noted that the number of mills bore little relation to the volume of business.

TABLE II
STATISTICS ON SAWMILL INDUSTRY IN IOWA³⁴

	<i>No. of Mills</i>	<i>No. of Employees</i>	<i>Capital</i>	<i>Wages</i>	<i>Value of Product</i>
<i>State</i>					
1860	540	1,680	\$1,606,210	\$458,544	\$2,124,502
1870	545	3,782	3,925,001	995,962	5,794,285
1880	328	2,989 ³⁵	4,946,390	825,244	6,185,628
<i>Appanoose</i>					
1860	20	47	34,750	9,516	41,405
1870	10	35	21,450	6,450	47,530
1880	7	18	7,250	2,450	31,750
<i>Bremer</i>					
1860	13	23	38,400	6,276	53,060
1870	10	37	25,200	3,175	43,300
1880	—	—	—	—	—
<i>Clayton</i>					
1860	4	6	9,800	1,344	6,300
1870	10	98	61,500	26,670	123,970
1880	14	148 ³⁶	198,500	41,490	284,701
<i>Clinton</i>					
1860	7	78	67,500	20,448	98,834
1870	8	813	1,420,000	324,416	1,598,322
1880	8	570	1,766,000	215,793	1,979,127

³⁴ *Eighth Census of the United States* (1860), *Manufactures*, pp. 146-160; *Ninth Census of the United States* (1870), *Industry and Wealth*, Vol. III, p. 517; *Tenth Census of the United States* (1880), *Manufactures*, p. 117. Data for all counties is to be found in these census reports.

³⁵ Of these 463 were listed as youths under 16 years of age.

³⁶ Of these 26 were listed as youths under 16 years of age.

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	<i>No. of Mills</i>	<i>No. of Employees</i>	<i>Capital</i>	<i>Wages</i>	<i>Value of Product</i>
<i>Decatur</i>					
1860	16	51	34,300	11,004	138,900
1870	10	32	20,500	6,750	61,571
1880	16	33	22,750	4,040	42,735
<i>Dubuque</i>					
1860	6	57	37,000	13,632	38,955
1870	6	164	163,000	68,000	306,700
1880	7	188	303,000	53,875	352,540
<i>Fremont</i>					
1860	12	49	29,175	11,352	41,307
1870	10	33	26,000	10,650	133,400
1880	—	—	—	—	—
<i>Johnson</i>					
1860	—	—	—	—	—
1870	4	18	14,400	2,850	17,500
1880	—	—	—	—	—
<i>Lee</i>					
1860	8	26	50,800	8,136	44,100
1870	10	220	216,300	70,088	384,067
1880	16	255	735,500	120,217	641,840
<i>Muscatine</i>					
1860	7	95	86,500	31,848	90,835
1870	3	103	302,000	95,100	381,650
1880	5	264 ³⁷	501,700	116,500	612,400
<i>Scott</i>					
1860	6	85	90,000	25,140	75,200
1870	7	341	518,000	110,000	597,200
1880	7	259	664,000	103,750	843,980

The growth of a large lumber producing industry in Iowa during this period was a part of the growth and westward development of the American lumber industry. In colonial days, lumbering began in Maine and over a period of years migrated westward through New York and Pennsylvania to Michigan. The industry flourished in lower

³⁷ Included 92 children or youths.

Michigan as the products were needed to build Indiana and Illinois. The next natural move was to the pineries of Wisconsin but, because the Mississippi River offered a cheap method for transporting the bulky and heavy raw material, the manufacturing plants were built near to the points of great demand, namely, the growing prairie States. In this way, Wisconsin and Iowa joined to form a great area for the production of a product so vital to the upbuilding of the Middle West.

During the middle period, the many small mills located in the interior counties continued to produce lumber from hardwood timber of native origin, mostly for local consumption. A sawmill industry of some importance developed in the most westerly counties of the State. In 1877, 8,000,000 board feet of lumber were produced at Sioux City and in other towns along the Missouri River.³⁸ Most of this lumber was cut from the cottonwood timber which grew on the Missouri River flats.

During the period when lumber production was at its peak the increase in the mileage of railroads built in Iowa was pronounced. A number of the narrow gauge railroad lines were built during this period, one, at least, for the specific purpose of transporting lumber. This line was the Farmers Union Railroad, built in 1875 to carry lumber from a sawmill near the Iowa River west of Liscomb in Marshall County.³⁹

The bulk of the lumber produced during this period consisted of white pine and hemlock, neither of which was found in appreciable quantities in Iowa forests. Logs of these species were imported. The many species of "hard-

³⁸ Franklin B. Hough's *Report upon Forestry* (U. S. Government Printing Office, 1878), pp. 548, 549, 569.

³⁹ Haworth's *The Economic Development of the Woodworking Industry in Iowa*, p. 29; Ben Hur Wilson's *Iowa and the Narrow Gauge in The Palimpsest*, Vol. XIII, p. 143.

woods"⁴⁰ utilized included oak, both white and red, basswood, cottonwood, elm, ash, walnut, hickory, maple, sycamore, birch, and a few others of less importance. Most of these were supplied from native timberlands.

As indicated in the preceding paragraph, the "softwood" species were imported from the northern coniferous forests of Wisconsin. According to George W. Hotchkiss "the supply of log stock for these mills (in Iowa river towns) has of necessity been found in the forests of the Wisconsin, Black, Chippewa, and St. Croix rivers which stream (the Chippewa) was relied upon for a goodly portion of the log supply."⁴¹

The upper reaches of the Wisconsin River supplied many logs but only a few of these reached the Mississippi for sawing at Iowa mills; mills in Wisconsin reduced most of these logs to lumber. Some logs from the Black River were sent to Iowa mills but the greater portion of such logs were utilized by mills at La Crosse, Wisconsin. It was the Chippewa and tributary streams which supplied the greatest number of logs sent to Iowa sawmills. This stream and its tributaries penetrated the Wisconsin counties of Pepin, Dunn, Eau Claire, Chippewa, Sawyer, Ashland, Price, Taylor, and Barron.⁴²

Many citizens of Wisconsin and the sawmill operators of that State objected to the exportation of Wisconsin timber to sawmills in Iowa, Illinois, and Missouri. These parties hoped to retain the raw material for sawing in Wisconsin-owned mills. The matter was brought to the attention of the Wisconsin legislature but that body failed to legislate

⁴⁰ "Hardwoods", according to forestry usage, are broad-leaved deciduous trees.

⁴¹ George W. Hotchkiss's *History of the Lumber and Forest Industry of the Northwest*, p. 481.

⁴² Hotchkiss's *History of the Lumber and Forest Industry of the Northwest*, p. 482.

against the transportation of logs from the State. On the contrary, in 1866, the legislature granted authority for the construction of booms, piers, and wing dams to facilitate the driving and rafting of logs on Wisconsin rivers, provided such river improvements offered no impediment to the operation of boats on the streams. This legislation cleared the way for the movement of Wisconsin softwood timber out of the State.

These streams drained 10,000 square miles of territory about 85 per cent of which was covered with dense forests in which white pine was the chief tree of importance. Farther north the St. Croix River also supplied some logs for Iowa mills. It tapped the forested counties of Polk and St. Croix.⁴³

A special report of the United States Census Bureau⁴⁴ published in 1884 gives a detailed description of the forests of Wisconsin and indicates that the best quality of white pine timber was to be found in the southern portion of the Wisconsin pine area. This is the area drained by those streams which afforded water transportation for logs consigned to Iowa mills.

The felling and land transportation of logs in the northern forests were accomplished during the winter season as was customary in all American forests in the north. The logs were assembled along the streams while snow was on the ground. When the spring thaw occurred, the logs were rolled into the swirling flood waters and floated loosely down the Wisconsin rivers and collected "in convenient sloughs near the mouths of the Saint Croix, Chippewa, Black, Wisconsin, and other rivers". Each lumber company had a distinguishing mark for the identification of its

⁴³ Hotchkiss's *History of the Lumber and Forest Industry of the Northwest*, pp. 449, 474.

⁴⁴ *Report on the Forests of North America*, Part 3, *Economic Aspects*, by Charles S. Sargent (U. S. Census), pp. 554-558.

logs and one writer states that "there were over 2,000 log marks recorded by owners of logs floated on the St. Croix".⁴⁵

The locations where the logs were collected and sorted were known as booming works. Here, too, the logs were made into rafts for further transportation down the Mississippi. The logs from the St. Croix River were sorted in Lake St. Croix, those from the Chippewa and its tributaries at Beef (Boeuf) Slough, and later at West Newton, Minnesota, and those from the Black River at North La Crosse, Wisconsin. As stated previously, very few logs from the Wisconsin River ever reached the Mississippi.

The most famous of the booming works was that at the mouth of the Chippewa River at Beef Slough.⁴⁶ This slough was a branch mouth of the Chippewa in which the water was sluggish. It afforded a large area of water in which logs could be collected and sorted. In 1867, a number of sawmill operators formed the Beef Slough Boom and Improvement Company as an agency to handle the logs which were floated down the Chippewa. This organization was chartered to catch, sort, raft, and scale all logs driven down the Chippewa. The company was reorganized in 1873 as the Mississippi River Logging Company.⁴⁷

One of the chief organizers of this boom concern was Frederick Weyerhaeuser of Davenport, Iowa, founder of the great Weyerhaeuser Timber Company. Other Iowa sawmill companies which were original members of this boom company were the following:

C. Lamb and Sons.....Clinton

⁴⁵ John E. Briggs's *Iowa Old and New*, p. 361; W. H. C. Folsom's *History of Lumbering in the St. Croix Valley, with Biographic Sketches*, p. 317.

⁴⁶ Walter A. Blair's *A Raft Pilot's Log*, p. 47.

⁴⁷ Hotchkiss's *History of the Lumber and Forest Industry of the Northwest*, p. 635.

W. J. Young and Company.....	Clinton
Schricker and Mueller.....	Davenport
L. S. Davis	Davenport
Taber and Company.....	Keokuk
W. and J. Fleming.....	McGregor
B. Hershey	Muscatine
Hemenway, Wood and Company.....	Lansing

In 1889, the Beef Slough boom works was transferred across the Mississippi River to West Newton, Minnesota. During the peak of its operation, the Beef Slough works employed from 1200 to 1500 men. Most of these men were Scotch-Canadians who had been lumbermen in Canada on the Ottawa or Saint Maurice River. The logs were sorted and built into rafts so rapidly that 75 steamboats were kept busy on the Mississippi River towing the rafts to the saw-mills. Between 1867 and 1896, the Beef Slough and West Newton works handled over eight billion feet of logs.⁴⁸

Logging ended on the Wisconsin River about 1876, on the Black in 1897, on the Chippewa in 1905, and on the St. Croix in 1914. The total quantity of material floated down these rivers to boom works on the Mississippi follows:

St. Croix	— 12,444,281,720 feet
Chippewa	— 25,365,875,930 feet
Black	— 5,170,000,000 feet
Wisconsin	— 2,285,000,000 feet

The toll charge for handling material at the Beef Slough works was 75 cents per thousand feet log scale, two cents each for ties, and one cent each for fence posts. During 1874, this works handled 133,000,000 feet of logs. The price for towing the rafted logs from Beef Slough or West New-

⁴⁸ Hotchkiss's *History of the Lumber and Forest Industry of the Northwest*, p. 635; Blair's *A Raft Pilot's Log*, pp. 51, 53.

ton to points in Iowa was \$1.10 per thousand feet log scale.⁴⁹

After the logs were sorted according to ownership they were made into rafts. Each raft was made up of strings of logs about 17 feet wide, held together by poles laid on top of and across the logs. Each log was pinned to the cross poles by wooden pegs fitted into holes bored through the cross poles and into the logs beneath. Each raft was from five to ten strings wide and about 250 feet long.⁵⁰

Until the middle 1860's, all log rafts were floated with the current and kept in the main river channel and clear of sand bars, islands, bridges, and sloughs by a crew of husky men who manned sweeps (oars about 20 feet long) at both the stern and bow ends of the raft. There was a sweep at each end of each string of logs. Thus a raft ten strings wide was manned by a bow crew of ten and a stern crew of ten. All were under the direction of a raft pilot. Each raft was equipped with a tent in which the crew slept. At night, the raft was tied securely along the river bank. The average speed of a raft was about two and one-half miles an hour unless adverse winds retarded the progress.⁵¹

Food was plentiful and good. Occasionally, when a raft was delayed and provisions ran low, the crew resorted to land forays to replenish the larder. Walter A. Blair told the following story of one expedition of this kind: "An angry farmer, who missed a fat two year old heifer one morning after a raft passed down, overtook the raft by a long, hard row in a heavy skiff. The dressed carcass lay on the logs near the center of the raft, covered with a piece of white canvas. The crew was divided and crouched at the

⁴⁹ Blair's *A Raft Pilot's Log*, pp. 290, 291; Hough's *Report upon Forestry*, pp. 529, 530.

⁵⁰ Harry E. Downer's *History of Davenport and Scott County*, p. 435.

⁵¹ Blair's *A Raft Pilot's Log*, p. 27.

corners of the raft, while the old French pilot sat alone with his head down, when the farmer appeared and questioned him. . . . 'You see,' he replied, 'that white ting down there,—Smallpox, one of my best men, the cook. . . . I want you to help me take the cook ashore and bury him.' But the farmer was gone, nearly falling into the river in his excitement and hurry to get away."⁵²

When a raft reached its destination at Dubuque, Clinton, or other river town, the pilot shipped his rafting tools back to the booming works on a steamboat. The crew members were paid for their labors and then, they too took a boat headed upstream. The return trip was generally a long carousal. Each river steamer was equipped with a bar where the rafting crews could spend their earnings for liquor. Fighting often took place. On one occasion a race riot developed on the steamer *Dubuque* between negro steamboat hands and rafters, men "rough in dress and fluent in profanity, . . . who had floated huge rafts of logs down the river and were now returning . . . to the logging camps of the north."⁵³ Many of the ablest raft pilots later became steamboat pilots because of their intimate knowledge of the Mississippi River channel.

In 1864, Captain C. A. Bradley delivered the first raft towed down the river by steamer to the W. J. Young mill at Clinton.⁵⁴ This began a new era in the rafting business. The first boat built specifically for the towing of log rafts was the *Le Claire* built at Le Claire, Iowa, in 1866. This boat was 80 feet four inches long by 15 feet wide with a hull depth of three feet. The boiler was horizontal, 18 feet long by 40 inches in diameter with two 14 inch flues. The *Le*

⁵² Blair's *A Raft Pilot's Log*, pp. 38, 39.

⁵³ Ruth A. Gallaher's *A Race Riot on the Mississippi* in *The Palimpsest*, Vol. II, pp. 369, 370.

⁵⁴ Haworth's *The Economic Development of the Woodworking Industry in Iowa*, p. 24.

Claire was too small to tow rafts of logs satisfactorily and was sold for use where its size was not a disadvantage. Later, in 1869-1870, the *J. W. Van Sant* was built at Le Claire for towing service. This boat was 100 feet long, 20 feet wide, and had a hull depth of four feet. Soon after the *J. W. Van Sant* proved successful, many of the large lumber companies built and operated their own boats. Small companies, however, depended upon the regular steamboat companies or the free-lance boat captains for the towing of log rafts. Some of the most famous river boats engaged in the rafting business were:⁵⁵

<i>Name of Boat</i>	<i>Owner</i>	<i>Town</i>
Artemus Lamb	C. Lamb and Sons	Clinton
J. W. Mills	W. J. Young and Co.	Clinton
Douglas Boardman	W. J. Young and Co.	Clinton
W. J. Young, Jr.	W. J. Young and Co.	Clinton
Blue Lodge	Clinton Lumber Co.	Clinton
B. Hershey	Hershey Lumber Co.	Muscatine
Silver Wave	Musser Lumber Co.	Muscatine
F. C. A. Denkman	Weyerhaeuser and Denkman	Davenport

Within a few years, the old method of rafting became obsolete and was entirely replaced by steamboat rafting and the use of steamboats greatly increased the commerce in logs. For 30 years (1870-1900) the greatest volume of traffic on the upper Mississippi consisted of log rafts. During the 1890's when the peak of the rafting business was reached, there were 125 boats running to and from Clinton. In 1878, 498 log rafts and 159 lumber rafts passed through the drawbridge at Dubuque.⁵⁶

The advent of the raft steamer resulted in a new type of raft, the brailed raft. The introduction of this type of raft

⁵⁵ Blair's *A Raft Pilot's Log*, pp. 77-93, 195.

⁵⁶ Meyer's *Rafting on the Mississippi* in *The Palimpsest*, Vol. VIII, pp. 122, 123; P. B. Wolfe's *History of Clinton County, Iowa*, p. 115; Haworth's *The Economic Development of the Woodworking Industry in Iowa*, p. 26.

is credited to W. J. Young, who was a leading sawmill owner at Clinton. Chains, instead of cross poles and pegs, were used to hold the logs in place. This resulted in the saving of a considerable amount of lumber, as the holes bored in the logs to receive the pegs used to hold the old style raft together ruined parts of the logs for lumber. The brailed raft consisted of two pieces, or halves, each half made up of three brails placed side by side. A brail of logs was 45 feet wide by 600 feet long and a brailed raft was thus 270 feet wide by 600 feet long.⁵⁷

The first steamboats used for towing were sidewheelers which pulled the raft by means of a long towing cable. These side-wheel boats did not prove entirely satisfactory for towing and they were replaced by stern-wheel boats which were used to push the raft from behind instead of to pull it.⁵⁸ To assist in steering the raft, a smaller steamboat was placed crosswise of the raft at the front end. This boat, by moving forward or backward, was able to guide the raft effectively. The stern boat was free to use all of its power to propel the raft. The usual raft-boat speed was three and one-half miles an hour. During good stages of water the boats made round trips from Stillwater, Minnesota, to Fort Madison, Iowa, in ten or eleven days. If the river was low, 14 to 16 days were necessary.

The largest log raft of record was towed from Lynxville, Wisconsin, to Rock Island, Illinois, in 1896 by the steamer *F. C. A. Denkman*, using the *H. C. Brockman* as a bow boat. The raft was 275 feet wide and 1550 feet long and contained 2,250,000 feet of logs.⁵⁹ By 1904, the rafting of logs on the Mississippi had practically ceased. The last log raft went

⁵⁷ Blair's *A Raft Pilot's Log*, p. 51.

⁵⁸ Haworth's *The Economic Development of the Woodworking Industry in Iowa*, p. 25; Blair's *A Raft Pilot's Log*, p. 81.

⁵⁹ Blair's *A Raft Pilot's Log*, p. 204.

down the river in 1906, destined for Bellevue, Iowa.⁶⁰ The decrease and final stoppage of logs on the river resulted in the closing of the mills. The last mill in South Clinton closed in 1904 and in 1911, the last pine mill on the river, the Standard Lumber Company at Dubuque, closed.⁶¹

The changes in the size of mills during this period was associated with changes in machinery and types of plants. As early as 1860 two distinct types of sawmill plants were operating in Iowa. The small plant capable of sawing a few thousand board feet of lumber daily, and employing a crew of from two to six men, continued to exist in the counties of Iowa not bordered by the Mississippi River. In the eastern counties of the State, bordered by the Great River, the large sawmill was becoming dominant. The average number of hands per mill emphasizes the size of the sawmills in the river counties of Iowa.

The circular (rotary) saw was introduced about 1860 and it was not long before many of the large mills in the towns along the Mississippi were equipped with such saws. In the large mills, the muley (single sash) saws were replaced by the circular and gang types of sawing equipment. The types of saws in use in the large Iowa mills are shown in Table III.

As fast as newer types of machinery were developed, installations of such equipment were made in the larger mills. P. B. Wolfe writes of the C. Lamb and Sons mill in Clinton that, "many innovations in sawmilling were witnessed at the Lamb mill including an edger of an entirely new type and a trimmer, besides a friction log turner that, now driven by steam, is today known as a 'nigger'." Later,

⁶⁰ Fred A. Bill's *When "Rafters" Ruled the River* in the *Clinton Herald*, March 11, 1933.

⁶¹ *Marshalltown Times-Republican*, November 25, 1904, reprinted in the *Annals of Iowa* (Third Series), Vol. VII, pp. 225, 226; information from R. H. Collier, January 23, 1941.

TABLE III
SEASONAL CAPACITY AND SAWMILL EQUIPMENT OF
MILLS IN IOWA RIVER TOWNS IN 1877⁶²

Town	Number of Mills	Saws			Gang Edgers	Seasonal Capacity in Board Feet
		Gang	Circular	Muley		
Lansing	2	—	3	—	2	12,500,000
McGregor	1	1	1	—	1	15,000,000
Guttenberg	1	—	1	—	—	2,000,000
Dubuque	5	1	8	1	5	30,500,000
Bellevue	1	—	2	—	1	5,000,000
Sabula	1	—	1	—	1	3,500,000
Lyons	3	3	5	—	5	41,000,000
Clinton	4	13	8	2	13	113,000,000
Camanche	1	—	1	1	1	6,000,000
Davenport	5	4	7	1	5	54,000,000
Muscatine	3	2	5	—	4	41,000,000
Burlington	2	—	3	—	3	15,000,000
Fort Madison	2	—	4	—	2	20,000,000
Montrose	1	—	2	—	1	8,000,000
Keokuk	1	—	2	—	1	10,000,000
Total	33	24	53	5	45	376,680,000

about 1884, when the band saw was developed, Chauncey Lamb, of Clinton, was the first man to install one for the manufacture of white pine lumber.⁶³

The capacity of the mills, in general, increased until about 1890 although no record of output by cities is available for years later than 1877. The seven sawmills located in Clinton and Lyons (North Clinton), in 1877, had a total yearly capacity of 154,000,000 board feet of lumber. The records indicate that Clinton, during this period, was the largest center of lumber production in the world.⁶⁴

⁶² The data for this table are from Hough's *Report upon Forestry*, p. 568. The band saw had not been introduced in 1877.

⁶³ Wolfe's *History of Clinton County, Iowa*, p. 685; Hotchkiss's *History of the Lumber and Forest Industry of the Northwest*, p. 594.

⁶⁴ Wolfe's *History of Clinton County, Iowa*, p. 687.

The early sawmill industry, as indicated previously, relied almost solely upon water power and many of the smaller mills operating during the middle period continued to use water power, but as early as 1858 only two out of 12 sawmills in Scott County were water driven. In 1870, of the 545 sawmills in Iowa 401 were steam powered.⁶⁵

As improvement was made in the manufacture of steam boilers and engines, they were adopted for use in the larger mills. In 1866, W. J. Young and Company, of Clinton, built the "largest mill in the world".⁶⁶ It was driven by a 1,000 horse power steam engine. Between 1899 and 1914 the steam engine capacity employed in the lumber industry increased at the expense of water power,⁶⁷ a trend which earlier had been apparent in the Iowa branch of the industry.

The workers in the sawmill plants of the middle period were, according to one writer, mostly Germans who had just come to the United States. Another writer stated that the workers were largely German, Irish, and Swedish. These informants indicate that the mills operated from 10 to 12 hours a day for six days each week during the active season. The season began when the first log raft reached the mills in the spring and ended when the last logs of the season's "run" were cut.⁶⁸ The labor of the sawmill workers, as well as that of the woodsmen and rafting crews, was arduous. "But from their perilous labors came the fruit-

⁶⁵ Thomas P. Christensen's *An Industrial History of Scott County, Iowa*, in the *Annals of Iowa* (Third Series), Vol. XXII, p. 118; *Ninth Census of the United States* (1870), *Industry and Wealth*, p. 517.

⁶⁶ Hotchkiss's *History of the Lumber and Forest Industry of the Northwest*, p. 588.

⁶⁷ Victor S. Clark's *History of Manufactures in the United States 1860-1914*, pp. 773-780.

⁶⁸ Communication from Geo. W. Cable of Davenport about the early sawmill industry at Davenport, January 22, 1941; communication about the early sawmill industry at Burlington from F. A. Millard, January 22, 1941.

age of a larger time when fine houses began to dot the prairies of Iowa".⁶⁹

According to F. A. Millard the usual wage for "men who carried boards" was \$1.25 per day. Men who had aptitude for handling machinery received \$10.00 to \$20.00 weekly and sawyers, \$5.00 a day. George W. Cable reported that wages ranged from 21 cents an hour for common labor to 35 cents an hour for skilled labor. An early publication⁷⁰ gives \$1.45 as the laborer's daily wage in Iowa industry about 1875. No record has been found of any labor troubles in the Iowa sawmill industry at this time nor of the existence of any organized labor groups composed of workers in the mills.

A complete list of the owners and operators of the important sawmills in Iowa from 1860 to 1900 would be formidable, as ownership of some plants changed several times. T. P. Christensen in writing about Scott County mills tells of one mill which was built in the 1850's by Renwick and Sons. Later it was reorganized as Renwick, Shaw, and Crossett and in the 1890's sold to Weyerhaeuser and Denkman.⁷¹

Some of the most important and largest mill companies which operated in Iowa river towns from 1860 to 1900 were as follows: Lansing Lumber Company, Lansing; W. and J. Fleming, McGregor; Zimmerman and Ines, Guttenberg; Knapp, Stout and Company, Standard Lumber Company, and M. H. Moore, Dubuque; Dorchester and Huey, Bellevue; Gardiner, Batcheler, and Wells Mills 1 and 2, Lyons Lumber Company, and David Joyce, Lyons (now North Clinton); Clinton Lumber Company, W. J. Young and

⁶⁹ Thomas Teakle's *The Romance of Iowa History* in THE IOWA JOURNAL OF HISTORY AND POLITICS, Vol. XIV, pp. 165, 166.

⁷⁰ *Iowa State Gazetteer, Business Directory, and Farmer's List.*

⁷¹ Christensen's *An Industrial History of Scott County, Iowa, the Middle Period*, in the *Annals of Iowa* (Third Series), Vol. XXII, p. 290.

Company (The Upper Mill and The Big Mill), C. Lamb and Sons (The Stone Mill, The Brick Mill, Riverside Mill, and Lower Riverside Mill), Clinton; W. R. Anthony, Camanche; J. W. Strobeen (formerly Van Sant and Zebley), Le Claire; Lindsay and Phelps, Cable Lumber Company, Mueller Lumber Company, and Weyerhaeuser and Denkmann, Davenport; Musser Lumber Company, Hershey Lumber Company, and Muscatine Lumber Company, Muscatine; Berry and Company, Burlington Lumber Company, Cascade Lumber Company, and Island Lumber Company, Burlington; S. and J. C. Atlee, Fort Madison; Taber Lumber Company, Keokuk.⁷²

Most of the early sawmill operators in Iowa came from the east, chiefly from New England, New York, and Pennsylvania and had been reared in lumbering communities, or had been operators at eastern points before moving to Iowa.⁷³

After the pineries of Wisconsin had been depleted and could no longer supply a sufficient quantity of logs to Iowa mills, the plants, one by one, ceased to operate. A number of the sawmill operators, foreseeing the end of the sawmill era in Iowa, invested in timberland in other parts of the United States. Frederick Weyerhaeuser, of Davenport, went to Minnesota, thence to the Pacific Northwest to establish the great Weyerhaeuser Timber Company. Gardiner, of Lyons, went to the pineries of Mississippi to become a partner in Gardiner, Eastman, and Company of Laurel, Mississippi. David Joyce, of Lyons, was interested in timberlands in Texas and Wisconsin. The Musser interests, of

⁷² Information concerning Davenport was derived from a personal communication from Geo. W. Cable, January 22, 1941. Information concerning Burlington was secured from F. A. Millard, January 22, 1941. Data for the remaining cities was secured from Blair's *A Raft Pilot's Log*, pp. 255-264.

⁷³ Hotchkiss's *History of the Lumber and Forest Industry of the Northwest*, p. 588.

Muscatine, moved, in part, to the long leaf pine country of southwestern Louisiana, and Artemus Lamb, of the C. Lamb and Sons concern in Clinton, although remaining in Clinton, became part owner of the Shevlin and Weyerhaeuser timber holdings in California and Washington.⁷⁴

In addition to the production of white pine lumber, the sawmills of Iowa also manufactured large quantities of shingles and lath. Other products⁷⁵ for the year ending May 31, 1880, were as follows:

Laths	79,924,000 pieces
Shingles	128,100,000 pieces
Staves (barrel)	5,335,000 pieces
Headings (barrel)	650,000 pieces

During the years in which the sawmill industry flourished in Iowa, dry kilns for artificial seasoning of lumber had not been introduced and all of the lumber produced was air seasoned. Some of the sawmills used no standard rules by which to grade the lumber produced, although these mills attempted to avoid the shipment of lumber which contained knotholes, shakes, or wane. Other mills adopted the grading rules of the Northwestern Lumbermen's Association and graded the output of lumber in conformity to these standard rules.⁷⁶

The lumber, which was produced in the large mills of Iowa, was consumed chiefly in Illinois, Iowa, and States to the west of Iowa. Although no consumption data are available for this period, it appears certain that the middle western States afforded the largest domestic market for lumber because the building of the Middle West was con-

⁷⁴ Hotchkiss's *History of the Lumber and Forest Industry of the Northwest*, p. 599.

⁷⁵ *Report on the Forests of North America*, Part 3, *Economic Aspects*, by Charles S. Sargent (U. S. Census), p. 487.

⁷⁶ Information from Geo. W. Cable and F. A. Millard.

temporary with the peak of lumber production in Iowa. The Iowa sawmills were close to the available markets which minimized the problem of distribution for the products of the industry.

RETURN OF THE SMALL SAWMILL — 1910 TO THE PRESENT

After the close of the middle period, the importance of the sawmill industry in Iowa declined greatly as shown by the amount of lumber manufactured.⁷⁷ An unofficial count of Iowa sawmills was made in 1934 by the Department of Forestry of the Iowa State College. This survey accounted for 428 mills of all kinds and sizes in the State. A government publication reported but five sawmills for Iowa in 1928 and another government report two years later gave Iowa eleven sawmills.⁷⁸ A similar census for 1934 would probably have shown like figures. The discrepancy between the government report figures and those of the unofficial Iowa survey representing the number of mills may be explained by the fact that the United States Census Bureau does not count a sawmill unless the yearly production of lumber is in excess of 50,000 board feet.⁷⁹ Since the majority of Iowa sawmills at the present time are very small plants with a very limited yearly output, the Census Bureau fails to include many small mills in reports of the industry.

Practically no data are available relative to the present location of sawmills in Iowa, nor are data available which offer any information as to the number of mills in the

⁷⁷ See Table I.

⁷⁸ Paul W. Stewart's *Market Data Handbook of the United States* (U. S. Bureau of Foreign and Domestic Commerce, Domestic Commerce Series, No. 30), pp. 292-303; Charles B. Eliot's *Manufacturing Market Statistics* (U. S. Bureau of Foreign and Domestic Commerce, Domestic Commerce Series, No. 67), p. 461.

⁷⁹ Albert H. Pierson's *Lumber Production 1869-1934* (U. S. Forestry Service), footnote p. 71.

various counties of the State. Foresters who are acquainted with Iowa report that there are, at present, several small sawmills in almost every county. The industry is dispersed widely over the State with no important centers.

Table I indicates that for the past twenty-nine years hardwood species have comprised most of the raw material used by the sawmills of Iowa. The species chiefly utilized, on the basis of volume in board feet, have been oak, walnut, cottonwood, and elm. The production of walnut lumber affords some interesting contrasts. In 1913, Iowa sawmills produced 290,000 board feet of walnut lumber and in 1914 4,974,000 feet. The large increase probably was due to the demand for walnut gunstock material by the European nations which were engaged in World War I. The amount of walnut lumber produced dropped off by 1920, but increased to 7,399,000 board feet in 1924. This second rise in the volume of production seems to have been coincidental with the revival of the demand for walnut furniture. The production of walnut lumber continued to be large until the depression years. Since 1930, the volume of walnut lumber produced in Iowa has been low.

The principal species utilized in recent years are the same as those which supplied logs for the pioneer mills. This is true, despite the misuse which the forests of the State have undergone.

Most of the sawmills in Iowa for the past 30 years have been capable of producing rough lumber only. The equipment of the small mill has consisted of a circular saw and a log carriage, on which the log rests, which carries the log against the saw. Only a few mills have been equipped with edgers to remove the "waney" edges from the boards and to rip them into the desired widths. Machinery to refine the product beyond the rough sawed condition has been lacking almost entirely.

Such mills have a limited capacity ranging from one or two thousand board feet daily to a maximum output of about 10,000 feet. One of the larger plants operated in Boone until a few years ago, when it was destroyed by fire. The Amana colony, at Amana, has operated a mill of the larger size for many years.

In general, the sawmills now in operation in Iowa are either portable or semi-portable and may be moved from one location to another within a few hours or a few days time.

Prior to 1925, power was derived chiefly from portable steam tractors or from stationary steam boilers and engines. Since 1925, the power for driving the small mills of Iowa has usually been supplied by several forms of internal combustion engines. Some operators utilize old automobile engines as a source of power to drive both the saw and the carriage. Others use a tractor equipped with a pulley over which a drive belt operates. Small mills, generally, are underpowered and Iowa mills of the present appear to be no exception to the general condition.

The supply of labor necessary for the operation of the small mills in Iowa has been available, for years, in the communities in which the mills have been located. Most of the mills have been operated only intermittently and hence, have not offered regular employment. Because of this condition, and because there are so few sawmill workers in any one community, there has been little opportunity for any labor organization to exist.

Most of the sawmills which have been operated in Iowa for the past 20 years have been owned locally. Oftentimes, the owner has been a farmer who has operated the sawmill during slack periods, when farm work did not require his attention. In some cases, however, operators run their sawmills throughout the year. The Webster Lumber Com-

pany, with headquarters in Saint Paul, Minnesota, owns and operates a number of small units. These plants are located at places where sufficient timber may be purchased to make the operation profitable. The same concern also contracts to buy the output of numerous small privately owned mills and markets the products along with the material sawed by its own mills. This company reports that they had but one mill in operation in Iowa during 1940, employing ten men and producing 20,749 pieces of railroad ties and 107,873 board feet of lumber for the season. The daily capacity of this mill was averaged at 300 crossties and 1,500 board feet of lumber. This mill is located near Burlington.⁸⁰

Two products — crossties for railroad use and lumber — have comprised the greater part of the material produced by Iowa mills in recent years. The data shown in Table I include both crossties and lumber, the volume of ties produced having been converted into board feet for ease of recording.

RELATIVE POSITION OF THE SAWMILL INDUSTRY OF IOWA

From 1859 to 1889 the lumber production of Iowa and the United States increased at almost equal rates. Iowa's percentage of the total for the United States ranged from 2.25 to 2.77 for the period of three decades. From 1889 to 1909, the lumber production of Iowa decreased at about the same rate as the increase from 1859 to 1889.

During this same period of years, the total production of the United States continued to increase and the percentage of Iowa production to the national total decreased successively from 2.25 to 1.00, to 0.30. Since 1909 the production of Iowa has continued to decline until, in 1939, it amounted

⁸⁰ The Webster Lumber Company.— Private communication to the author, March 13, 1941.

to but 0.002 per cent of the total production of the United States. The rank of Iowa among the States in lumber production has decreased from 9th in 1879 to 44th in 1934 and 43rd in 1939.⁸¹

Until 1919 (Table IV), the rank of the lumber industry of Iowa among other industries in the State, based on the value of product, was high. For the half century, from 1859 to 1909, the value of product of the sawmill industry ranked no lower than fifth among all industries and, as late as 1919, it ranked 9th. Thereafter, the value of lumber products, resulting from decreased volume of production, declined to such an extent that for both 1929 and 1939 the industry was grouped with minor industries and lost its identity.

On the other hand the value of the products of the sawmill industry of the United States even for the past twenty years has given the industry a relatively high rank among all industries. From 1859 to 1909, the lumber industry in the United States ranked second, third, or fourth among industries in value of production. By 1919 it had dropped to ninth place and in 1929 it was eleventh in rank. In 1939 the sawmill industry ranked thirteenth in the national field. On the basis of value of product, the rank of the industry in Iowa and the United States kept apace from 1859 to 1919. In the latter year, the industry ranked 9th both in Iowa and the nation.

Before 1909, the only industries in Iowa which were of greater importance than the lumber industry, based on the value of product, as given in the reports of the Census, were agricultural manufactories. It seems incredible that

⁸¹ These data are from a communication from R. W. Nelson, Acting Chief, Division of Forest Economics, U. S. Forest Service, February 21, 1941; Albert H. Pierson's *Lumber Production 1869-1934*; *Biennial Census of Manufactures*, 1939, U. S. Census Bureau; *Preliminary Report, Industry*, No. 520 (U. S. Census Bureau, December 12, 1940). For additional statistics see also Haworth's *The Economic Development of the Woodworking Industry in Iowa*, pp. 79-118.

a prairie State should have had a sawmill industry almost as important as farm product manufactories. The reason, as indicated previously, lay in the northern pineries and not solely in the timberlands of Iowa.

TABLE IV
LEADING INDUSTRIES OF IOWA FOR SEVEN CENSUS YEARS⁸²

<i>Year</i>	<i>Rank</i>	<i>Manufacture</i>	<i>Value of Product</i>
1859	1	Flour and meal	\$ 6,799,000
	2	Lumber, sawed	2,124,000
	3	Provisions, pork, etc.	756,000
	4	Boots and shoes	364,000
		All Iowa industries	13,971,000
1869	1	Flour and grist products	15,635,000
	2	Lumber, sawed	5,794,000
	3	Carpentering and building	2,981,000
	4	Carriages and wagons	1,952,000
		All Iowa industries	46,534,000
1879	1	Flour and grist mill products	19,089,000
	2	Meat packing	11,285,000
	3	Lumber, sawed	6,185,000
	4	Carpentering	2,280,000
		All Iowa industries	71,045,000
1889	1	Meat packing	19,615,000
	2	Flour and grist mill products	11,833,000
	3	Lumber, sawed	11,829,000
		All Iowa industries	125,049,000
1899	1	Meat packing	25,296,000
	2	Dairy products	15,846,000
	3	Flour and grist mill products	13,823,000
	4	Lumber and timber products	8,677,000
		All Iowa industries	164,617,000
1909	1	Meat packing	59,045,000
	2	Dairy products	25,850,000
	3	Foundry and machine shop products	14,064,000
	4	Flour and grist mill products	12,871,000
	5	Lumber and timber products	12,657,000
	All Iowa industries	259,238,000	

⁸² Data given are from the various Census reports for 1860 to 1940.

<i>Year</i>	<i>Rank</i>	<i>Manufacture</i>	<i>Value of Product</i>
1919	1	Meat packing	226,865,000
	2	Dairy products	57,800,000
	3	Other food preparations	54,994,000
	4	Foundry and machine shop products	48,994,000
	5	Cars and general shop construction and repairs	33,099,000
	6	Printing and publishing	26,806,000
	7	Flour and grist mill products	21,325,000
	8	Bakery products	20,244,000
	9	Lumber and timber products	17,893,000
		All Iowa industries	745,473,000

LUMBER PRODUCTION AND CONSUMPTION IN IOWA

Until 1922, accurate data for the consumption of lumber in Iowa were not available. Since that date, the United States Forest Service has gathered such data. Table V lists both the production and consumption of lumber for the even-numbered years from 1922 to 1938. Three conclusions may be drawn from these data:

(1) Iowa consumes a large volume of lumber yearly. In normal years the amount used approximates 500,000,000 board feet.

(2) The production of lumber in Iowa falls far short of the amount consumed.

(3) The board foot deficit each year is very great.

In 1926 (Table V), Iowa consumed 586,799,000 board feet of lumber for all purposes of which but 14,002,000 feet came from Iowa mills. During that year, a survey of the wood-using industries of the State revealed that these industries normally required 191,000,000 board feet yearly. The difference between the total amount consumed and the amount used by the industries was 395,799,000 feet. This difference represented material used for general construction and other purposes. The construction industry relies

largely upon softwood lumber which the sawmills of Iowa are unable to supply. The wood-using industries of the State, however, use large quantities of hardwood lumber which may be taken from local sawmills. If, in 1926, when the wood-using industries consumed 191,000,000 board feet of lumber, they had used the entire output of Iowa sawmills, there would have been a deficiency of 176,998,000 board feet. This deficit necessarily would have had to be brought into Iowa from other sections of the nation.

TABLE V

LUMBER PRODUCTION AND CONSUMPTION IN IOWA⁸³

Year	<i>Production</i>	<i>Consumption</i>	<i>Deficit</i>
	<i>Thousand Feet Board Measure</i>	<i>Thousand Feet Board Measure</i>	<i>Thousand Feet Board Measure</i>
1922	6,131	751,271	745,140
1924	12,149	649,128	636,979
1926	14,002	586,799	572,797
1928	13,908	584,105	570,197
1930	13,267	495,331	482,064
1932	2,015	180,167	178,152
1934	2,938	221,674	218,736
1936	4,303	478,975	474,672
1938	4,733	430,661	425,928

SUMMARY

The decline in the production of lumber in Iowa has been pronounced during the past 25 years. There are several causes for this condition.

First, there is less forest area. At the time of the original land survey of Iowa, 6,680,926 acres were classified as forest land. In 1935, the United States Census Bureau

⁸³ The data for all these years except 1938 were compiled by R. V. Reynolds and Albert H. Pierson and were printed in *Forest Products Statistics of Central and Prairie States*, Statistical Bulletin No. 73, U. S. Department of Agriculture, January, 1941. The figures for 1938 came from *Lumber Distribution and Consumption* by the same authors, Miscellaneous Publication No. 413, U. S. Department of Agriculture.

placed the total woodland area of Iowa at 2,312,244 acres, of which 2,060,105 acres were woodland pasture. Only 252,139 acres were classed as forest land not pastured.⁸⁴ This decrease in land area devoted to forests means less sawtimber, and in turn, fewer sawmills have been required to convert the available timber into lumber.

Second, the quality of timber to be found on the forested lands of Iowa at the present time is poor.⁸⁵ In 1939 Genaux and Kuenzel explained that the agencies "which reduce the quantity and quality of Iowa's timber stands are fire, grazing, improper cutting practices, insects, and climatic phenomena."⁸⁶ Continuous cutting of the best trees in the stands and these unfavorable agencies have resulted in depleted stands. There are fewer merchantable trees per acre than was the case when Iowa was colonized. As a result fewer sawmills have been needed.

Third, the wood-using industries of the State have been reluctant, in many instances, to purchase hardwood lumber sawed in Iowa. In 1926 C. L. Harrison asserted: "Iowa produced lumber will not regain its lost prestige until improved methods of sawing, grading, and seasoning have placed it on the same quality level as lumber imported from other sections of the United States." He also concluded that the Iowa market would absorb all of the local material available, "if the price is right and the product properly manufactured."⁸⁷ A survey conducted in 1937 by G. R.

⁸⁴ United States Census Bureau, *Farm Census Preliminary Report*, October 28, 1935.

⁸⁵ "Farm Forestry Plan for Iowa", an unpublished report by the Iowa Farm Forestry Committee, dated November 7, 1939. A copy of this report is on file in the office of the State Extension Forester.

⁸⁶ Genaux and Kuenzel's *Defects Which Reduce the Quality and Yield of Oak-Hickory Stands in Southeastern Iowa* in *Iowa Agricultural Experiment Station Bulletin*, No. 269.

⁸⁷ C. L. Harrison's *Markets for Iowa Grown Timber* (unpublished Master's thesis, in the Library of Iowa State College, Ames).

Ramsey, State extension forester,⁸⁸ indicated that the wood-using industries would take Iowa lumber if it were properly manufactured. The need for better seasoning practices was mentioned by J. A. Loetscher⁸⁹ of Dubuque.

Steps to restore the forest cover on denuded and eroded land have been and are being taken. The Iowa State Planning Board recommended, in 1933, that certain forest and submarginal lands should be designated as forest lands.⁹⁰ At the same time G. B. MacDonald⁹¹ suggested the need for State and national forest lands in Iowa. Some progress has been made toward carrying out these suggestions. The United States Soil Conservation Service is promoting a program of wood-lot development for Iowa farms. These steps, if continued, should assure a greater land area in forests and, in time, greater volumes of raw material for the sawmill industry.

The quality of the growing stock on forest lands of the State should improve if the Soil Conservation Service and the State Conservation Commission are successful in their program to prevent forest fires and improve cutting practices. Better quality will result naturally in a great quantity of raw material for the sawmill industry.

To date, little has been done to improve the quality of the lumber manufactured by Iowa mills⁹² or to insure better seasoning methods for the lumber. As pointed out previously, the equipment of the mills is scant and of poor

⁸⁸ Data on file in the office of the State Extension Forester.

⁸⁹ Private communication from J. A. Loetscher to G. R. Ramsey, July 24, 1936.

⁹⁰ *Second Report of the Iowa State Planning Board, Part I, Land.*

⁹¹ G. B. MacDonald's *The Beginning of a National and State Forestry Program in Iowa* in the *Ames Forester*, Vol. XXV, pp. 15-20.

⁹² C. D. Jackson is said to have developed a new and improved portable sawmill.—Private communication to G. R. Ramsey, State Extension Forester, March 10, 1941.

quality. Small sawmills are manned, generally, by workers who lack a knowledge of lumber manufacturing and of proper seasoning methods. All agencies interested in the proper utilization of forest products might cooperate to provide for a better sawmill product.

The foregoing discussion indicates that the major problem of the sawmill industry in Iowa is not one of markets. Rather, it is a problem of providing suitable lumber for an already existing market.

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