

Lower Yellowstone Project

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Lower Yellowstone Project

Efforts made by Reclamation to provide irrigation water for arid regions of the West sometimes met resistance from settled dry-land farmers. Reclamation strove to justify the need for irrigation water in semi-arid regions. After dry farmers in these areas realized the potential value of irrigation, rapid settlement and success followed.

The Lower Yellowstone Project exemplifies Reclamation's determination for irrigation to succeed in a semi-arid territory. Reclamation overcame initial opposition by dry-land farmers to construct an irrigation system in the Lower Yellowstone Valley, through a program of education and aid. Farmers ultimately realized the value of irrigation and its importance to the development of the valley. The purposeful resolve of Reclamation employees led to the project realizing its full capabilities.

Project Location

The Lower Yellowstone Project is located in eastern Montana and western North Dakota. The project currently provides irrigation water to 52,133 acres of fertile land lying along the west bank of the Yellowstone River. Two divisions, dependant on state location, are incorporated into the project. Division One encompasses 34,755 acres of Dawson and Richland Counties in east central Montana. Division Two includes an additional 17,378 acres in McKenzie County in western North Dakota.¹

Water is diverted from the Yellowstone River by the Lower Yellowstone Diversion Dam 18 miles below Glendive, Montana. The Main Canal receives the diverted water for distribution to the lateral system. The Canal is 71.6 miles long running northeasterly along the west bank of the Yellowstone River to its confluence with the Missouri River. Two hundred and twenty-five miles of laterals distribute water to Project lands. Seepage water is collected and disposed of by 118 miles of drains. The ample water level of the Yellowstone River eliminates storage

1. U.S. Department of the Interior, Bureau of Reclamation. Lower Yellowstone Project: *Annual Project History 1954*, vol. 6, R.G. 115, Records of the Bureau of Reclamation, Project Histories, Lower Yellowstone, 1954, Box 72, p. 1.(located in the National Archives, Denver, Colorado), Hereafter cited as R.G. 115, followed by box number, volume, year, and page number.

requirements.²

Irrigation waters are distributed primarily through a gravity flow system, but two pumping plants on the Main Canal supply water for a small area not reached by the gravity system. The Thomas Point Pumping Plant serves 2,300 acres of benchland north of Savage, Montana. A drop of 28 feet in the Main Canal, 19 miles below the headworks, is used for generating hydraulic power to lift irrigation water 31 feet to otherwise unirrigable land.³

The Crane Pumping Plant is located 10 miles below the Thomas Point Pumping Plant. Two motor-driven units are used to pump 5 cubic feet per second of water from the Main Canal into Lateral BP-1.⁴

A deep sandy loom characterizes the soil of the valley. The valley receives an average of 14 inches annual precipitation.⁵ The semi-aridity of the valley led many early settlers to believe irrigation was a mistake. Reclamation undertook an concerted effort to convince the farmers otherwise.

Historic Setting

Cattlemen and ranchers moved onto the lands of the Lower Yellowstone Project beginning in 1883 upon completion of the Northern Pacific Railroad into the area. Then in 1900, an influx of settlers interested in dry-land farming lands adjacent to the river valley began.

The dry farmers practiced limited irrigation. Flood irrigation from storm waters on meadow lands combined with small ditches from local streams to carry water to trees and gardens. A series of reservoirs and dams on Four-Mile Creek were in the construction phase immediately before Reclamation assumed control. Severe weather damaged portions of the system and no repairs were attempted nor substantial irrigation ventures tried.⁶

Modest ditches provided irrigation water for small plots of land. Attempts to irrigate larger areas resulted in increased construction costs beyond the means of the individual farmers.

2. U.S. Department of the Interior, Water and Power Resources Service, *Project Data*, (Denver: United States Government Printing Office, 1981), pp. 591-2.

3. *Ibid*, p. 592.

4. *Ibid*.

5. *Ibid*, p. 593.

6. R.G. 115, Box 66, vol. 1, 1909, p. 9a.

Farmers formed small irrigation companies to combine resources, but costs exceeded available capital.⁷ Reclamation became aware of the valleys potential prosperity. Successful private irrigation in western Montana precipitated irrigation studies in eastern Montana. The Lower Yellowstone Project was declared feasible based upon favorable soil surveys and the presence of an abundant water supply in the Yellowstone River. Preliminary surveys by Reclamation began in 1903.

Project Authorization

Reclamation began surveying possible irrigation sites on the west bank of the Yellowstone River in 1903. The first survey, undertaken in July, concentrated on the irrigable area near Terry, Montana, 40 miles north of Glendive. The high elevation of proposed lands and the shallow fall of the river resulted in the U.S. Reclamation Service determining this proposal impracticable for a gravity flow system.⁸

A second survey investigated diversion into a canal two miles above Glendive to irrigate 70,000 acres. Examinations found construction costs excessive, and consideration of this site was also abandoned. However, data from these first two surveys revealed the possibility of a canal heading 18 miles below Glendive.⁹

In March of 1904, estimates for a low line canal were compiled from topographical sheets. Calculations indicated a \$25 to \$30 irrigation construction cost per acre. A Board of Consulting Engineers consisting of A. P. Davis, J. H. Quinton, B. M. Hall and C. H. Fitch visited the project site the following month. The board left instructions for Reclamation engineers to conduct investigations determining canal system location, land coverage estimates and cost projections. Ultimately a \$1,800,000 cost estimate was calculated for irrigating 64,144 acres of fertile land.¹⁰

Secretary of the Interior Ethan A. Hitchcock authorized construction on May 10, 1904.

7. P. L. Slagsvold and J. D. Mathews, *Some Economic and Soil Aspects of Irrigation in Montana*, (Bozeman, Montana: Montana State College, 1938), p. 3.

8. R.G. 115, Box 66, vol. 1, 1909, p. 10.

9. *Ibid*, p. 2.

10. *Ibid*, pp. 11-2.

Plans and specifications for the first 34 miles of canal were prepared in the Denver offices of Reclamation during the winter of 1904-1905. Initial plans included construction of a diversion dam, pumping plant, and a canal and lateral system.¹¹

Construction History

Reclamation encountered contractor problems during construction of the Yellowstone River Diversion Dam. Borings during 1905 showed the riverbed near Intake, Montana, to be hard, stiff clay extending 50 feet in depth. Reclamation engineers determined the best type of construction for the site to be the driving of several piling rows across the river, fill in between them with large stones, and then use timbers to cover the face of the dam. A belief persisted the potential danger of ice flow would slide over this structure without difficulty.¹²

With design completed, the contractor started preparatory construction in late fall of 1906. Quarrying and hauling of stone was completed in the summer of 1907. Flood waters caused delays in driving piles until the following spring. The contractor drove 473 round piles into the riverbed by May 19, 1908 when high water again forced the stoppage of work.¹³

High water subsided by August and work resumed. Attempts to drive additional wooden sheet piles proved futile. Each wooden sheet pile was made from three 2x12 inch boards. The texture of the riverbed changed unexpectedly to coarse gravel underlain with hard pan, making driving of piles impossible. Attempts to drive wooden piles with steam and drop hammers tested unsuccessful.¹⁴

Flooding damaged the driven wooden piles during high waters in the summer of 1908. An accumulation of trees and drift wood against the piles caused extensive erosion of the river bed. Many piles were uprooted and the remainder were left barely standing upright.¹⁵

At this point the contractor became frustrated and refused to execute the contract.

11. *Ibid*, pp. 3, 16.

12. *Ibid*, p. 13.

13. U.S. Department of the Interior, Bureau of Reclamation. Lower Yellowstone Project: *Lower Yellowstone Dam History*, R.G. 115, Records of the Bureau of Reclamation, Project Reports, Lower Yellowstone, 1910-55, Box 479, pp. 1-3.(located in the National Archives, Denver, Colorado). The Pacific Coast Company was awarded the contract for the construction of the Lower Yellowstone Diversion Dam on September 21, 1906.

14. *Ibid*, p. 4.

15. *Ibid*, p. 6.

Reclamation assumed control of the contract on September 15, 1908, and completed the dam through use of force account.¹⁶

The first task Reclamation forces faced was removing the remaining wooden piles and awaiting the next low water season. Most of the wooden piles were removed before high water delayed construction on the dam's framework until August of 1909. A few of the placed wooden piles were left in the dam's frame. Reclamation decided to abandon the ineffective wooden sheet piles in favor of 10x10 inch solid timbers made from Douglas Fir, successfully used on other dams. The timbers have strips of 3x4 inches spiked to serve for tongue and grove to provide greater rigidity and endurance. Driving by steam and drop hammers began August 13th. In a few cases the ground was too hard even for the timbers and steel sheet-pilings were driven instead.¹⁷

The Lower Yellowstone Diversion Dam was fully completed in March of 1910. The dam is a rockfilled timber-crib weir with a structural height of 12 feet and crest length of 700 feet. The dam is capable of diverting 1,100 cubic feet per second of water into the Main Canal.¹⁸

Main Canal and lateral system construction began in 1905. Reclamation let contracts for nine divisions of excavation and structure work. The contractors experienced labor difficulties and inclement weather leading to delays in target completion dates and inflated costs.

Severe winters in 1905 to 1907 coupled with expensive material and labor costs forced the failure of many contractors to properly execute their responsibilities. Contractors found it difficult to secure reliable laborers during construction, resulting in high wages for those hired.¹⁹ The remoteness of the area, the nearest railroad station being 40 miles away, increased material prices.²⁰ Completion of the canal to mile 62 was originally expected in 1908, but problems delayed completion until 1909. Delays and contractor difficulties increased construction costs to \$2,291,933.²¹

Steamshovels and dredges were used to excavate gravel, sandstone and blue shale.

16. *Ibid*, p. 7.

17. *Ibid*, p. 10.

18. *Project Data*, p. 593.

19. *Ibid*, pp. 32-3.

20. R.G. 115, Box 68, vol. 3, 1910, p. 30.

21. R.G. 115, Box 68, vol. 3, 1910, p. 30.

Trying to prevent problems, the canal was lined with stone and gravel in potential seepage sections. All structures; headworks, spillways, sluiceways, and conduits, are reinforced concrete. Thirteen creek crossings required concrete flumes and siphons. Originally, flumes and siphons were built from either wood or concrete, depending on the particulars of the crossing. At the diversion dam in the Yellowstone River, the headworks consist of 11 circular sluiceways 5 feet in diameter. The headworks stands 45 feet high and is built on a shale foundation.²²

Irrigation water was first available in 1909. 62 miles of canal and 74 miles of laterals capable of irrigating 40,535 acres and 424 farms were in place for operation.²³ The Main Canal was extended 4.7 miles to mile 66.7 in 1912. The contractor used dredge excavation machines to remove 6,000 cubic yards of earth. The extension services 2,100 acres of irrigable land.²⁴

Original plans included a pumping plant on the Main Canal for irrigating 2,300 acres of high land north of the town of Savage, Montana. Preliminary designs were prepared in 1908. A shortage of available funds in 1909 postponed construction of the plant indefinitely.²⁵ Further delays and the lack of proper funding shelved the building of the pump until 1922.

Once Reclamation completed initial construction, production of the farms on the project determined whether additional expansion of the project would occur. Disputes between Reclamation and the water-users delayed possible extensions of the project to reclaim additional lands. A period of growth and prosperity followed once agreements were reached between Reclamation and the irrigation districts.

Post-Construction History

After initial construction, activity on the Lower Yellowstone Project centered around expansion of the existing distribution system, building a pumping plant, and implementing a drainage system. The completion of the Thomas Point Pumping Plant in 1922 reclaimed an additional 2,300 acres. Extending the Main Canal five miles and constructing an additional 52

22. *Ibid*, p. 52.

23. R.G. 115, Box 66, vol. 1, 1909, p. 6.

24. R.G. 115, Box 68, vol. 3, 1912, p. 10.

25. U.S. Department of the Interior, Bureau of Reclamation. Lower Yellowstone Project: *Annual Operation and Maintenance Report, 1909-1917*, vol. 6, R.G. 115, Records of the Bureau of Reclamation, Lower Yellowstone, 1910, Box 698, p. 30.(located in the National Archives, Denver, Colorado), Hereafter cited as R.G. 115, followed by box number, volume, year, and page number.

miles of laterals in 1923 provided irrigation water for 17,000 acres of new land. Drainage canals placed in service between 1927 and 1931 prevent serious water-logging problems.

Routine rehabilitation and betterment accompanied these developments. The diversion dam required major repairs as a result of ice-jams and erosion in both 1911 and 1918. In 1911, several ice-jams suddenly broke free and pounded against the dam's apron at tremendous velocities. The ice cut approximately 500 feet of wooden sheet piles left from the original construction, causing considerable damage. Reclamation engineers discovered steel pilings resisted the force created by the ice. Stronger steel pilings replaced the damaged wooden type.²⁶

Erosion caused by heavy rains and excessive high flood waters necessitated supplementary repairs to the dam in 1918. Twenty-seven hundred cubic yards of heavy rocks were placed below the downstream apron to prevent further erosion.²⁷ Reclamation forces rehabilitated the dam in both instances.

Reclamation wished to expand the project as quickly as settlers readied themselves for water and construction funds were secured. Unfortunately, allocation of the necessary funds was not immediately forthcoming. Settlement on Project lands proceeded slower than expected and farmers on the Project lands did not always choose to use the irrigation system. Many farmers took a "wait and see" attitude hoping enough rain would fall in the valley during the growing season to make irrigation unnecessary. Delinquent construction and maintenance charges caused by a series of poor crop years between 1910-1916 meant no further money for expansion.

Reclamation repaired deteriorated wooden drops, turnouts, and flumes as soon as funds became available beginning in 1917. The average lifespan of wooden structures on the project was eight to ten years.²⁸ The lack of sufficient maintenance funds forced Reclamation to replace wooden turnouts with similar wooden structures. When adequate funds were secured, reinforced concrete displaced wooden drops and flumes.²⁹

The formation of two irrigation districts in early 1920 held the key to alleviating financial

26. George Wharton James, *Reclaiming the Arid West*, (New York: Dodd, Mead and Co., 1917), p. 197.

27. R.G. 115, Box 70, vol. 7, 1918, p. 7.

28. R.G. 115, Box 69, vol. 6, 1917, p. 35.

29. R.G. 115, Box 70, vol. 8, 1922, p. 18.

concerns. The Lower Yellowstone Irrigation District No. 1 contains Project lands in Montana. The Project lands in North Dakota are included in the Lower Yellowstone Irrigation District No. 2. On December 10, 1920, Reclamation entered into a contract with the first irrigation district providing for the expenditure of \$160,000 to build a pumping plant at Thomas Point and to extend the lateral system in Montana. Appropriations for North Dakota were included in a contract signed March 9, 1921. One hundred thousand dollars was allotted for extensions of the canal and lateral systems to lands not under the existing irrigation system.³⁰

Under the contract with Lower Yellowstone Irrigation District No. 1, extending the Main Canal five miles and constructing an additional 50 miles of laterals began in 1921. The contractor employed five foot fresnos to excavate 453,000 cubic yards of earth by the end of the year. A heavy frost caused a shutdown of work in December of 1921, the originally scheduled completion date. Reclamation granted an extension to July 1, 1922, at which time all excavation was complete.³¹

Also under the contract with Lower Yellowstone Irrigation District No. 1, Reclamation employees began construction of the Thomas Point Pumping Plant in March 1922. Frozen ground extending six feet required blasting to complete excavation. The housing, intake and outlet pipes are made from concrete. The Wellman, Seaver, Morgan Company supplied the pumps. Testing began on July 13th and the pumps were kept in service for the remainder of the irrigation season. Minor construction followed testing until the plant's final completion on August 11, 1922.³²

The plant and power generator are located at the head of Lateral KK on the Main Canal approximately 19 miles downstream from the headgates. Eighty cubic feet per second of energy is derived from the 28 foot drop from the Main Canal to Lateral KK. Two hydraulic turbine-driven centrifugal pumps lift 45 cubic feet per second of water 31 feet to Lateral LL for

30. R.G. 115, Box 70, vol. 8, 1922, p. 18.

31. R.G. 115, Box 70, vol. 8, 1921, pp. 4, 19. J. E. Hilton was awarded the contract for extending the Main Canal five miles.

32. R.G. 115, Box 70, vol. 8, 1922, pp. 30-5.

irrigation of 2,300 acres north of Savage.³³

The plant furnishes power for pumping and irrigation. Waste water from the turbine enters Lateral KK to irrigate 5,000 acres of bottom land lying beneath the lateral. A wasteway is used to handle surplus irrigation water passing through the turbines. A bypass from the Main Canal to Lateral KK provides water when the plant is not operating or an insufficient supply passes through the turbines.³⁴

Under the contract with Lower Yellowstone Irrigation District No. 2, Reclamation accepted proposals in December of 1921 for the construction of structures on the Main Canal and lateral extensions. The work consisted of excavation for structures, placing reinforced concrete and wooden structures, and erecting 600 linear feet of metal flume. Frozen ground and a scarcity of labor due to heavy harvesting demands led to delays in completion of the works until 1923.³⁵ Irrigation water for 14,857 acres of new land was ready for the 1923 irrigation season.

Drainage investigations for 700 acres of water-logged lands began in 1912. Reclamation investigations determined that seepage from the Main Canal and laterals caused the water-logging. Reclamation designed an underground drainage system.³⁶

Construction of open trench and tile drains commenced in 1912 and continued until 1915. Contractors built 4.5 miles of open trench and 1.1 miles tile drain.³⁷ Work was suspended in 1915 pending the adjustment of construction costs and plans for the water-users repaying these costs to the United States³⁸ When the irrigation districts formed, Reclamation pursued a contract to complete the drainage program.

By 1923, seepage affected 1800 acres which could not be cultivated. The seepage area was spread throughout the project leaving no large tracts water-logged. Reclamation became increasingly concerned with rising water tables under farmed lands.³⁹ Contracts signed with the

33. *Project Data*, p. 592.

34. R.G. 115, Box 70, vol. 8, 1922, p. 30; "Construction of the Thomas Point Pumping Plant," *The Reclamation Era*, December 1923, p. 324.

35. R.G. 115, Box 70, vol. 8, 1922, pp. 19-30.

36. R.G. 115, Box 69, vol. 6, 1912, p. 21.

37. R.G. 115, Box 70, vol. 7, 1919, p. 74.

38. R.G. 115, Box 70, vol. 7, 1918, p. 42.

39. R.G. 115, Box 70, vol. 8, 1923, p. 31.

irrigation districts in 1926 provided for further drainage canals. Five hundred and twenty-five thousand dollars was appropriated to accomplish this goal.⁴⁰

Reclamation sought bids for drainage work during the next four years. Draglines excavated earth. Thirty-six drains lying below mile 35.5 of the Main Canal were completed by 1931.⁴¹ Construction of drains continued through the 1950's, and in 1954 some 110 miles of sub-surface drains and 1.1 miles of tile drains operated.⁴² Currently, 118 miles of drains prevent water-logging of irrigable lands on the Project.⁴³

Continuous checking of the Main Canal at Crane Creek lead to the construction of the Crane Pumping Plant. Five cubic feet per second of water is lifted from the Main Canal into Lateral BP-1. Crane High Lateral BP-1 was converted into a pump lateral beginning in 1960. Installation of two Parma Water Lifter Pumps to provide better service to land owners served by the lateral were placed into operation on May 22, 1961. The plant is operated as demand requires during the irrigation season.⁴⁴

Settlement

Settlement on the Lower Yellowstone Project did not occur as rapidly as Reclamation hoped. Periodically during the project's early period, the valley received adequate rainfall dissuading many farmers from purchasing water-rights. Upon completion of the primary distribution systems in 1909, water for 424 farms comprising 40,535 acres was available for irrigation. Only 67 farms totalling 7,113 acres use the system.⁴⁵

Farmers were disenchanted with charges for water-rights and many refused to file applications until adjustments in their grievances were made. They felt the annual operation and maintenance charges were too steep in relation to the returns received. The value of cultivated crops barely covered water and operation and maintenance charges and profits were

40. R.G. 115, Box 71, vol. 9, 1926, pp. 5-6.

41. R.G. 115, Box 71, vol. 10, 1930, p. 31.

42. R.G. 115, Box 72, vol. 6, 1954, p. 4.

43. *Project Data*, p. 593.

44. R.G. 115, Box 99, vol. 31, 1961, pp. 3-5.

45. R.G. 115, Box 66, vol. 1, 1909, p. 6.

unavailable.⁴⁶

Settlers believed it was a mistake to irrigate the valley, enough rain fell during four of the first eight project operating years to make irrigation impracticable.⁴⁷ Many farmers waited for rain and delayed applying for irrigation water until too late to benefit their crops. Settlement and the percentage of lands irrigated remained low as a result of these concerns. The formation of irrigation districts and subsequent contracts with Reclamation encouraged farmers to use Reclamation water and led to growth and economic stabilization.

Because farms on the project were not in a centralized area, the entire distribution system needed to be operated to irrigate the small percent of applied water-right lands. This situation resulted in a high cost per acre of lands irrigated. Operation and maintenance charges per acre rose due to this abnormality. If a system capable of irrigating 52,000 acres needed to be operated to serve for example, only 7,600 acres in 1911, the annual operation and maintenance charge to farmers would be high.⁴⁸

Reclamation and farmers were unable to resolve their differences over annual repayment charges and the project experienced a period of slow growth until the formation of irrigation districts in 1920. The principle reason behind the lackluster development was the unresolved repayment schedule. Prospective settlers stayed away until the exact costs of water could be determined.⁴⁹

Dry years between 1917 and 1919 affirmed the need for Reclamation's involvement in the valley. In those years, success on the two divisions was directly tied to the benefits of irrigation on Project lands. Because water was available for the entire first division, irrigation and settlement grew. The irrigation system did not reach lands in North Dakota and farmers experienced financial disaster. Water was to be provided by the proposed, and delayed, expansion of the Main Canal and lateral system.⁵⁰

46. R.G. 115, Box 69, vol. 6, 1913, p. 29.

47. R.G. 115, Box 69, vol. 6, 1916, p. 29.

48. R.G. 115, Box 69, vol. 6, 1911, p. 4.

49. R.G. 115, Box 70, vol. 7, 1918, p. 13.

50. R.G. 115, Box 70, vol. 7, 1919, p. 8.

Preliminary proceedings to form irrigation districts began in 1917. To encourage settlement and resolve the dispute with farmers, Reclamation offered the Water-Users' Association a five year period of operation without repayment of construction charges. Reclamations' offer included a stipulation for the formation of irrigation districts.⁵¹

The prospect and eventual formation of the districts in 1920 had a direct relationship on population and Project land values. There were 978 farmers on Project lands in 1917. With the advent of the districts, the population increased to 1,390 by 1921. Land values also experienced a dramatic surge. \$100 per acre was considered a fair price for improved lands in 1918. This figure rose to \$175 per acre by 1919.⁵² Settlement had begun to improve, but 45% of available lands remained unsettled in 1921.⁵³

Reclamation's efforts to resolve repayment charges culminated in a contract with the irrigation districts signed in 1926. The contract assigned a fixed construction charge repayment schedule and transferred the operation and maintenance of the project to the districts beginning in 1932.⁵⁴ The districts formed a Board of Control to operate the project. The resolution of repayment charges opened the avenues for further expansion. By 1949, 100% of lands on the project fell under the irrigation system Reclamation put into operation.⁵⁵

Uses of Project Water

Irrigation water on the Lower Yellowstone Project is used primarily for irrigation. The Thomas Point Pumping Plant supplies a small amount of water for municipal use in Savage, Montana. Currently, the principle crops grown on Project lands are sugar beets, alfalfa, small grains, pasture, silage and beans.⁵⁶ During the early period of the project, sugar beets and alfalfa were the staple crops that led the agriculture turnaround after poor years.

Farmers were fairly prosperous during the 1905 to 1909 construction phase, when they

51. *Ibid*, pp. 80-1.

52. R.G. 115, Box 70, vol. 7, 1919, p. 16.

53. R.G. 115, Box 70, vol. 7, 1919, p. 118; and vol. 8, 1921, pp. 111-2.

54. R.G. 115, Box 71, vol. 9, 1926, pp. 5-6.

55. R.G. 115, Box 71, vol. 1, 1949, p. 8.

56. *Project Data*, p. 593.

grew wheat and grains and sold them to contractors for a quick profit.⁵⁷ Early settlers did not prepare their soil and farms for the long run, the consequences being poor crop prices and depleted soil after the contractors completed work. Fields became infested with wild oats, and in some instances, the only crop raised was this weed.⁵⁸ Reclamation managers strived to persuade farmers to practice permanent farming techniques. They promoted alfalfa and sugar beet cultivation to replenish the soil and increase profits.

Between 1910 and 1916 Reclamation supported increased alfalfa farming. Many fields were infested with wild oats and alfalfa was considered the only crop capable of destroying this weed.⁵⁹ Poor crop rotation resulted in depletion of soil productivity. Reclamation believed increased alfalfa acreage would bring about a system of permanent farming, subdue the weed problem, and add plant food to the soil.⁶⁰

Reclamation's efforts proved successful. Productivity grew in proportion to enlarged alfalfa acreage. In 1913 wheat comprised 42% of all crops grown, compared to 12% alfalfa. During the next four years, alfalfa acreage increased to 36% while wheat declined to 21%. Alfalfa was then and remained the largest cultivated crop on the project.⁶¹ Crop values rose from \$129,325 total gross value in 1910 to \$729,877 in 1918.⁶²

Reclamation turned its attention to promoting production of a cash crop once permanent farming practices were installed in water-user's methods. The answer lay in sugar beets, successfully grown in other Reclamation projects of the region. Beets were first grown on Project lands in 1917 when the Great Western Sugar Company cultivated a minimal 307 acres. By 1920 beets had become the most successful cash crop per acre. An \$130 per acre return provided the impetus for expanded cultivation.⁶³

Sugar beets became the second largest crop grown on the project in 1923. The Holly Sugar Corporation announced the construction of a sugar factory in Sidney, Montana to be ready

57. R.G. 115, Box 71, vol. 9, 1924, p. 34.

58. R.G. 115, Box 69, vol. 6, 1915, p. 4.

59. R.G. 115, Box 69, vol. 6, 1915, p. 4.

60. R.G. 115, Box 69, vol. 6, 1916, p. 4.

61. R.G. 115, Box 69, vol. 6, 1916, p. 13; and 1917, p. 18.

62. R.G. 115, Box 69, vol. 6, 1910, p. 1; and Box 70, vol. 7, 1918, p. 95.

63. R.G. 115, Box 70, vol. 7, 1920, p. 59.

for the 1925 crop. The erection of the plant saved the farmers \$75,000 to \$100,000 in annual freight charges. Expanded sugar beet production directly resulted in a financial rebound and increased settlement of Project lands.⁶⁴ Total gross crop value on the project increased to \$985,862 in 1930, and \$643,349 of that came from 7,402 acres of sugar beets.⁶⁵ A solid cash crop relieved farmers from whims of the market.

Conclusion

Reclamation's work on the Lower Yellowstone Project did not conclude upon the completion of the irrigation system. Project prosperity was not guaranteed nor immediate. Reclamation countered the resistance of settled dry farmers by implementing programs to teach new settlers the value of permanent farming methods and irrigation. The success achieved by farmers due to alfalfa and sugar beet cultivation is directly attributed to Reclamation's desire to not only build projects, but to see farmers realize financial security.

64. R.G. 115, Box 71, vol. 9, 1924, p. 19; "Improvements on Lower Yellowstone," *The Reclamation Era*, October 1925, p. 157.

65. R.G. 115, Box 71, vol. 10, 1930, p. 6.

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