F
591
.21
I46

BANCROFT
LIBRARY

THE LIBRARY
OF
THE UNIVERSITY
OF CALIFORNIA

MEMORIAL

TO THE

Congress of the United States

FROM THE

NATIONAL IRRIGATION CONGRESS

HELD AT

Salt Lake City, September 15, 16 and 17, 1891.

WITH

APPENDICES.

SALT LAKE CITY:
PRESS OF THE IRRIGATION AGE.
1892.

MEMORIAL

TO THE

Congress of the United States

FROM THE

NATIONAL IRRIGATION CONGRESS

HELD AT

Salt Lake City, September 15, 16 and 17, 1891.

WITH

APPENDICES.

SALT LAKE CITY:
PRESS OF THE IRRIGATION AGE.
1892.

F591
.21
I46

m/f
4/25/86

THE BANCROFT LIBRARY

MEMORIAL

TO THE

CONGRESS OF THE UNITED STATES

FROM THE

NATIONAL IRRIGATION CONGRESS

HELD AT

Salt Lake City, September 15,16 and 17, 1891.

To the Honorable, the Senate and House of Representatives in Congress Assembled—Your memorialists respresent that in pursuance of a call issued by the Hon. Arthur L. Thomas, Governor of Utah, for a convention "to consider matters pertaining to the reclamation of the arid public lands of the West," the Irrigation Congress met at Salt Lake City on September 15, 1891, and remained in session for three days. There were delegates in attendance from the States of California, Colorado, Idaho, Kansas, Montana, Nebraska, Nevada, Oregon, Texas and Wyoming, and the Territories of Utah and New Mexico, and the body was in a notable degree representative of that large section of the Union to which the rainfall is inadequate for the purposes of agriculture.

The sense of the Congress was embodied in the following resolutions:

Resolved, That this Congress is in favor of granting in trust, upon such conditions as shall serve the public interest, to the States and Territories needful of irrigation, all lands now a part of the public domain within such States and Territories, excepting mineral lands, for the purpose of developing irrigation, to render the lands now arid, fertile and capable of supporting a population.

Resolved, That it is the sense of this convention that the committee selected to prepare and present to Cnngress the memorial of

THE BANCROFT LIBRARY

this convention respecting public lands, should ask as a preliminary to the cession of all the land in the Territories, in accordance with the resolutions of the convention, a liberal grant to said Territories and to the States to be formed therefrom, of the public lands to be devoted to public school purposes.

WHEREAS, Large areas of arid lands and semi-arid lands, situated upon the great plains in the Dakotas, Western Nebraska, Kansas and Oklahoma, were settled upon in good faith by homeseekers, under the supposition that they were entering agricultural lands, and

WHEREAS, The settlers upon such lands have expended much time and labor upon the same, and paid into the United States Treasury therefor many millions of dollars, only to discover that irrigation, to a greater or less extent, is necessary in making homes for themselves thereon. Therefore, be it

Resolved, That the representatives of all of the States and Territories directly concerned in irrigation, do hereby pledge their unwavering support to the just demands of such settlers, that the General Government shall donate at least a portion of the funds received from the sale of such lands toward the procurement of the means necessary for their irrigation.

Resolved, That this Congress heartily endorse the irrigation work of the Agricultural Department of the National Government in the collection and dissemination of information, especially its admirable progress reports covering the whole field of irrigation development, and that it favors large appropriations for this work hereafter.

It is submitted that the considerations in support of the request expressed in the first of the above resolutions are of a very cogent character. It is undeniably true that the General Government has nearly reached the limit of its capacity to provide homes for settlers upon the public domain. The tracts now remaining are almost wholly such as can not be sold or otherwise disposed of under the liberal provisions of our land laws. Referring to the area embraced in the terms of the resolution, the condition is found to be that lands susceptible of irrigation at a practicable cost are occupied,

and that those which are still subject to entry can only be fitted for cultivation by systems of canals, reservoirs or artesian wells, involving expenditures quite beyond the resources of individual settlers.

The topography and other physical conditions that must be overcome in the work of utilizing water for the purposes of agriculture are not widely understood. The ultimate sources of the streams that provide the only available water supply are the snows that are deposited on the mountain tops and in the deep recesses of the canons. In the spring these snows melt rapidly and form raging torrents, that cut deep channels in their pathway. Thus when they enter the valley they are far below the levels of the lands which they are to reclaim. The condition renders it neceessary to fix the point of diversion far up the canon upon the rocky mountain sides, and to construct long canals and flumes to conduct the water at the required height to be delivered upon the successive benches that lie below.

The waste of water before the season of irrigation commences is another potent factor of expense. In the spring the flow of water is the largest, for obvious reasons, and then vast volumes run to waste. Later, the supply decreases, and is the least when most needed for the nourishment of growing crops. To prevent this the only efficient remedy is to impound the water in large storage reservoirs, which can only be costructed at an enormous cost.

It is not to be assumed that because the reclamation of the arid region involves the expenditure of large sums of money it is therefore impracticable. On the contrary, it can be fully justified as a business enterprise. Compare the yield in agricultural products of lands cultivated with the aid of irrigation with the yield of lands that are watered by the natural rainfall, and the difference will be found from 50 to 100 per cent in favor of the former. Land that is now wholly unproductive, upon being provided with facilities for irrigation immediately attains a value of from $10 to $50 an acre, the difference being due to location, accessibility to markets, and other manifest conditions. It may be questioned whether the country affords a more inviting field for the investment of capital than that which is here presented.

We feel warranted in assuming that the General Government will pursue no policy respecting the arid lands of the public domain that will not assist in their reclamation and the development of their possibilities in affording homes to settlers, increasing the food supply for the people and contributing to the general wealth. The question remains whether Congress will undertake the work by direct appropriations from the Treasury sufficient for the prompt construction of the required systems of irrigation. There has been some agitation of the subject for several years past, without further results than the appropriation of $350,000 and its expenditure in topographical surveys. It is not manifest that these have materially advanced the solution of the practical problems of irrigation. At all events, the rate of progress forbids the hope of any substantial results within a reasonable period. So far as we can infer the disposition of the General Government from its previous action, the answer to the above question must be in the negative.

NEITHER IS IT CERTAIN

that it would be practicable for Congress to pass a general law that would operate justly and sufficiently upon all parts of the arid belt. Not only do the physical conditions vary in the different sections, but the laws governing the appropriation and use of water are radically different in adjoining States. Wyoming differs in both from Montana and Idaho, and Colorado from Utah and New Mexico; and yet it is of primary importance that legislation designed to promote the reclamation of these lands should recognize and adjust itself to all of these differences.

The only alternative course seems to be that which is recommended in the resolutions of the Congress, viz.: "The granting in trust upon such conditions as shall serve the public interest, to the States and Territories, excepting mineral lands for the purpose of developing irrigation, to render the lands now arid fertile and capable of supporting a population." We feel assured that such action would be promptly followed by the inauguration and vigorous prosecution of enterprises for the reclamation of those lands, either by the States and Territories themselves, or through the

agency of municipalities erected for the purpose with power to borrow money upon the security of the works and the reclaimed lands.

A precedent for the policy proposed is not wanting. Congress ceded to the States in the Mississippi valley and other sections of the Union the swamp lands within their respective limits. The purpose of this action was to insure their reclamation, and it found its support in the knowledge that a considerable expense would be involved in fitting them for cultivation. Such is the condition of the arid lands, with this difference, that

is infinitely more difficult than that of draining the swamp lands, and also that the swamp lands in any one State were of comparatively little value and of so slight concern to the public that they were liable to maladministration; whereas in the case of the arid lands, as soon as they come under the control of the State they will at once become the most prominent question in State politics, and of so great and immediate importance to its citizens that their administration will be conducted under the surveillance of a deeply concerned people, who will permit of no chicanery. In principle, the cession of the swamp lands to the States affords a precedent for such action as we are seeking at the hands of your honorable body.

The importance of our pastoral interests makes it necessary that provision be made for the protection and utilization of the grazing land in connection with the contiguous irrigable areas. To the grazing lands as distinguished from the agricultural lands belong those vast areas of elevated table and bench lands and the high rolling divides which lie upon the summits and along the slopes of the watersheds; and they comprise three-fourths of the arid domain. They never can be made the self-supporting habitation of man, because they are too elevated and too vast in extent to be irrigated; but they furnish a valuable complement to the lands reclaimed, the first supplying the summer's, and the second the winter's food supply.

Adequate provision for securing possession or management of these lands, for the sole purpose to which they are adapted, has

NEVER BEEN ATTEMPTED

by Congress; and the question is of such magnitude and importance in connection with the subject of farming by irrigation in the region where grazing lands abound, that a great impetus will be given to irrigation if such States as may see fit to adopt that policy are placed in a position to encourage settlement by attaching to the land capable of being reclaimed a larger contiguous tract of grazing land. It will make more valuable the irrigable areas and supply the settler with an important source of income by adding the business of stock raising to that of the farmer.

No mention is made in the resolutions of the Congress of the preservation of the forests, but the subject is too intimately associated with that of irrigation to be divorced. The coniferous trees, such as constitute the timber growth on the mountains and elevated plateaus of the West, are exceedingly inflammable, and when fire is once communicated to them a vast destruction of value ensues. The loss from this cause measured by the stumpage value of the timber alone may be estimated, without extravagance, at $100,000,000 per year. The Federal Goverment has made some efforts to arrest this destruction, but wholly without success.

It is from the States, or local agencies created by the States, that protection must be sought. To the settlers the

PRESERVATION OF THE FORESTS

is a matter of grave importance. They are dependent upon them for fuel, fencing and building materials, but this is by no means the limit of their interest. The forests on the mountain tops are the chief conservators of the water that is to irrigate the valleys below. With their destruction the reclamation of the arid lands ceases to be a problem and becomes an impossibility. An efficient and just system of preserving the forests from destruction by fire and applying them, under proper restrictions, to the use of the set-

tlers, cannot be otherwise provided and administered than by the States.

The second of the above resolutions addresses itself to a subject that cannot fail to commend itself to your favorable consideration. It is inconceivable that Congress will make any disposition of the public domain without first securing to the Territories their endowment for the support of public schools. The arbitrary selection by law of the sections dedicated to this purpose operates as a great injustice to the Territories in the arid region. By far the greater number of the school sections are located on mountain tops or other places where they cannot be cultivated, and it follows that nothing can be realized from their sale. The liberal policies of the Government, dating from the passage of the great ordinance of 1787, in all that pertains to the education of our youth forbids the thought that any discrimination will be exercised against the newer portions of the Union, or that they shall be less than equal sharers in its bounty. The petition embodied in the resolution is simply an appeal for justice.

THE CONDITION OF SETTLERS

on lands within the semi-arid belt was felt to call urgently for relief at your hands. Thousands of people have settled within this area in reliance upon the assurance officially extended by the Government that they were "agricultural," which was naturally presumed to mean that they were capable of producing crops by the usual method of agriculture. They have found that the rainfall is highly uncertain in quantity and seasonableness, and that year after year the labors which they have bestowed upon their fields have been expended in vain. The consequences have been most deplorable. Without fault on their own part, acting only upon the impulse that has been the chief factor in expanding the domain of civilization, they now find themselves and their families confronted with actual destitution. The Government sold to them the lands that they occupy at no less prices and upon no other terms than such as obtained in more favored localities; and it has received into its treasury not less than $12,000,000 as the pur-

chase price. We submit that the circumstances eloquently support their prayer for relief, and that the Government may most properly dedicate a portion of the money which they have themselves contributed to the work of developing and applying the water supply in such a manner as to make these lands habitable and productive.

And your memorialists, as in duty bound, will ever pray, etc.

ALEX. C. BOTKIN, Chairman, Montana,
A. D. FOOTE, Secretary, Idaho,
C. C. WRIGHT, California,
FRANK BOND, Wyoming,
J. H. ABBOTT, Nebraska,
J. H. HAMILTON, Oregon,
C. W. IRISH, Nevada,
PLATT ROGERS, Colorado,
W. H. KING, Utah,
J. H. THOMAS, Washington,
D. H. WENGER, New Mexico,
Of the Committee on Memorial.

APPENDIX.

CALIFORNIA.

In California and other States laws have been enacted providing for the formation of irrigation districts which, in their quasi-municipal character, are empowered to construct works and supply water for irrigation to the lands constituting the district, and to this end are given authority to issue and sell bonds, and levy and collect assessments in payment thereof.

By this means the landowners are able to co-operate and to acquire a water supply which becomes a perpetual appurtenance to the land, at no greater expense than the actual cost of construction.

The system works well wherever the title to the lands is held in fee simple by the occupants, but there are large areas of arid lands in California and elsewhere where this system is being operated where a considerable portion of an area, which otherwise might thus be successfully operated, cannot be brought under this system, because assessments for raising the necessary revenues cannot be made a charge against the portion, the title to which is yet in the Government.

We respectfully suggest that if a statute were enacted by Congress providing that where Government lands, including such as may have been filed upon under the laws, are included within irrigation districts, formed under the laws of the State, a pro rata charge per acre, should become a lien on these lands, to be paid by the person who shall acquire title from the Government, that it would result in great benefit, and in the reclamation of vast areas which will not be reached by any other means for many years to come. In many localities in California, and doubtless in other

States having laws similar to the California district law, new communities, composed partly of homestead and pre-emption claims, are unable to successfully operate a system for the development of their lands, because lands, to which the title in fee simple has not been acquired by the occupant, cannot be subjected to the lien of the bonds which may be issued by the district.

Speaking particularly of the conditions existing in California, there would be great public benefit in a statute which would enable a district of this character to make a valid levy of assessments against lands so held, if not against lands upon which no filing has yet been made.

While the lien would be inoperative as against the Government, it would be possible to make such a provision as would render assessments so levied, a charge to be paid by the person who should eventually acquire the title.

If Congress should make the cession of public lands prayed for in the above memorial this feature of the subject would, of course, be dealt with by the various States and Territories interested. If not, relief in line with the above suggestions would be of material benefit in California and other States similarly situated.

IDAHO.

The total area of Idaho is 86,294 square miles, or 55,228,160 acres, classified as follows:

Class.	Acres.
Agricultural lands	16,000,000
Forest lands	10,000,000
Grazing lands	20,000,000
Broken, lava and mountainous lands	8,000,000
Lakes and rivers	1,228,160
Total	55,228,160

IRRIGATION AREAS AND RESERVOIR CAPACITIES.

Drainage Systems.	Area now irrigated, acres.†	Area irrigated when canal systems now under construction are completed, acres.†	Area irrigable at a cost of less than $10 per acre, including storage, acres.†	Storage reservoir capacities, acre-feet.
Falls river	8,000	10,000	180,000	*500,000
North Fork Snake river	10,000	75,000	80,000	§200,000
Teton river	25,000	80,000	20,000	§50,000
Lost River country	9,000	9,000	325,000	§5,000
South Fork Snake river	8,000	8,000	35,000	*2,000,000
Main Snake river, north side	8,000	30,000	*1,250,000	.....
Main Snake river, south side	45,000	450,000	*450,000	‖200,000
Rock, Rat and Marsh creeks	16,000	16,000	65,000	§30,000
The Wood rivers	10,000	10,000	30,000	§250,000
Mountain Home	18,000	18,000	400,000	§20,000
Goose and Salmon creeks	25,000	25,000	450,000	§200,000
Bruneau river	12,000	22,000	250,000	§50,000
Boise river	30,000	375,000	‡375,000	‡250,000
Payette river	20,000	160,000	‡760,000	‡250,000
Weiser river	12,000	12,000	‡75,000	§100,000
Salmon river	10,000	10,000	600,000	§600,000
Bear river	21,500	21,500	61,500	§75,000
Totals	287,500	1,331,500	4,906,500	4,780,000

* Shown by U. S. irrigation surveys.
† Areas from U. S. land surveys.
‡ From private surveys.
§ Estimated.
‖ Estimated on Blackfoot and Portneuf rivers.

The State should own the forest lands and hold them, that it may preserve the forests thereon from destruction and the water supply from becoming intermittent and useless.

The State should own the grazing lands and hold them that they may be made valuable and that the revenues from them may be available to pay the expense of protecting the forests.

The State should own the irrigable lands, that it may obtain a revenue from their sale with which to so regulate and distribute the water supply for their irrigation as to produce the greatest benefit to the commonwealth and to the individual irrigator.

THE FORESTS.

Idaho has about ten million acres of forest lands. These are of great value for their natural products alone, and should be protected from devastation on that account. For the conservation and regulation of the water supply, however, they are of far greater value to the State.

No system of reservoirs, however costly, can so well regulate the flow of its great rivers and hold their waters back for irrigation late in the summer as the forests do now.

Under the care of the General Government the forests of this State are being destroyed with terrible rapidity, and there appears no hope of change in this policy.

This State, if it owned these forests, would establish a system of mounted patrols which would prevent the fires from destroying and the timber cutters from doing injury.

Such a system would cost about $75,000 per annum.

A portion of this sum would be repaid to the State by a tax on the timber cut, and the remainder from the rentals of the pasture lands.

THE GRAZING LANDS.

There are about twenty million acres of land in Idaho reported as grazing lands. These now are of no direct benefit to the General Government and cannot be sold, because, under the land laws, no one can acquire over 160 acres, and such a small area is of no value.

Under State ownership they would be leased on long terms in tracts not exceeding 5,000 acres each for two cents per acre per annum.

With the security of tenure thus given, stockmen would fence their holdings, develop water on them sufficient for stock and domestic use and make them extremely valuable as adjuncts to their irrigated hay lands, using the pastures for their summer and the hay lands for their winter feeding.

The revenue from the grazing lands thus rented would be sufficient for the administration and protection of both pastures and forests.

In irrigation, a very unstable, though valuable element is spread abroad over the land in open channels and must be divided equally amongst hundreds of individuals. The obtaining of this water at the proper time is often the sole condition between plenty and poverty to hundreds of families.

It is an absolute necessity that the water supply be controlled and regulated by the State to prevent terrible oppression and hardship.

Proper control and regulation is difficult and intricate, requiring men of ability and special training and a large expenditure of money. It is not reasonable to tax the other industries of the

commonwealth for the direct use and benefit of these irrigable lands, therefore the State should own these lands, that it may sell them at such a price as will pay for the extraordinary expense which their peculiar conditions require.

The State would establish a commission or board of waters, lands and forests, whose duties would be to protect the forests from fire, secure proper cutting of timber and collect the revenue therefrom; allot and rent the pastures and collect the rentals; control and regulate the water supply, that no waste, oppression or monopoly shall injure the people, and conduct the sale of the irrigable lands in such a manner as may advance the interests of the commonwealth. This board would thus control the greatest of all State affairs and would be held responsible for their proper administration.

Each citizen of the State would have an intimate personal interest in its proceedings and would watch it as if it were his own. The shape of his pocketbook would often be affected by their work. Is it probable that corruption could creep in where there were so many interested eyes upon the watch?

It would seem like questioning the ability of our people to govern themselves, to question their ability to administer the waters, lands and forests upon which their livlihood depends.

UTAH.

The people of Utah are heartily in favor of the proposition to cede the arid public lands to the States and Territories. They see in it an opportunity to vastly increase Utah's capabilities for the support of population and to make substantial provision for the support of an American public school system. The time has come when the need of a radical change in the manner of handling the arid public lands is keenly felt, as a necessity in the development of Utah.

In Utah the recent Federal census shows that in the purely agricultural counties, with some exceptions, the growth has been very slow. The truth is that Utah, rich as she is in all that can make a State great and prosperous, has been sending away thousands of her people to the more sparsely settled States and Territories. The hive has been swarming for many years. In the case of the great West, the western ocean has been reached and the

tide of immigration has been turned back in search of new fields, and these new fields have been found in the arable lands of the arid region which only wait for water to make them habitable for man. Passing to the question of the support of the public schools, it is hardly necessary to say that the Government has always taken a deep interest in the education of its people. Its course in this respect has illumined one of the brightest pages in our national history. It has given in support of the puublic schools an area of land greater than many empires in extent. The benign influence of this generous grant has been felt by every State admitted to the Union since the passage of the ordinance of 1787. Under the provisions of this great ordinance and of later laws, sections 16 and 36 of every section of land in the great tract of territory north and west of the Ohio was reserved for the schools of the States thereafter to be formed out of said territory. In what are known geographically as the Western States, the arbitrary selection of the lands by law did not effect their value, but as to the States and Territories of the arid region it has rendered them practically valueless, because of natural conditions which cannot be changed nor removed. A statement of the case of Utah will serve to bring this fact out more clearly.

In this Territory the tillable lands are found in the valleys, and form but a small proportion of the whole. The majority of the school sections are found on the mountain tops and sides, and in places where they can not be cultivated. Where they are found in the valleys the title has mostly passed to settlers. The land office was not opened in Utah until March, 1889, and the lands in the valleys had been largely taken up by settlers before that time. The few reserved school sections remaining in the valleys are, with but two or three exceptions, of nominal value. Consequently, so far as Utah is concerned, and this is probably true in a greater or less degree of all the States and Territories in the arid region, the endowment which it was intended by the Government to be given to the public schools is lost. Such action, then, should be taken by the general Government as will place the States and Territories of the arid region on an equality with the other States and Territories that have been able to realize more fully from the bounty of the Government. In speaking of the cause of public schools, reference is made more especially to Utah. The situation of the States and Territories in the arid region differs materially with respect to the size of the streams, the extent of the land which can be irrigated under improved methods for saving and using the

water, and the provisions made or attainable for their school systems. Consequently the relative importance of the purposes for which the lands may be donated differ materially, and what may be a suitable donation for one State or Territory may require considerable modification in another in order to adapt it to the greatest needs and confer the greatest benefits upon the people. It is for this reason that the people of Utah favor the ceding of the lands.

It may also be remarked that the question of preserving the great grazing ranges, which now furnish nutricious food for hundreds of thousands of cattle and sheep, is one of transcendant importance. The people of all the country are interested in preserving this important source of food supply. Under the present conditions these lands are rapidly depreciating in value. If these lands could be sold in tracts of limited area, under carefully-guarded provisions of law, their value would be greatly increased and they would become, as they ought to be now, a source of revenue to the States and Territories in which they are situated.

There are several ways in which the water supply can be developed, if these problems be left with the States. In many places artesian wells may be developed, in other places storage reservoirs built, and in others the construction of large works will bring out upon the land water from the rivers, such as the Green and Grand in Utah, and the Snake in Idaho. The area of land of unsurpassed fertility that could by these means be rendered available would furnish comfortable and happy homes for a mighty population. There are few places more inviting than the well-cultivated valleys of the West, and the Government can render its people no greater service than to assist in a material way in reclaiming every acre possible. The policy of the Government has been not to regard the lands as a source of profit, but as lands held in trust for the common good. It has pursued the generous policy of aiding in the settlement of the lands, and has regarded the question of revenue to be derived from the sale as a minor consideration. We believe the message which the people of the arid region desire to send to the Congress of the United States is, give us the necessary aid and "we will open rivers in high places and fountains in the midst of the valleys," and make the West the "crowning land" of our country.

MONTHLY BULLETIN OF THE UTAH WEATHER SERVICE, IN CO-OPERATION WITH THE U. S. DEPARTMENT OF AGRICULTURE WEATHER BUREAU. DECEMBER, 1891.

General Conditions of Pressure and Temperature.—The atmospheric pressure was considerably above the average. Low-pressure areas affected the Territory on the 1st, 4th, 9th, 20th to 21st, 23d to 24th, and a noteworthy one on the 30th. In this storm the barometer fell below 29.5 inches. It was an off-shoot or "secondary" of the storm that on the 27th prostrated with its severity the telegraph wires in Washington, Oregon, Idaho and Montana. "Highs," or anticyclones, passed over Utah on the 3d, 5th to 8th, 10th to 19th, 22d, 25th to 26th, and one appeared on the 31st. The one on the 15th had a central pressure of 30.65 inches. The one on the 25th and 26th was central over Colorado on the 25th. It came from the British provinces and brought with it the lowest temperatures of the month and clearing weather, which, however, only lasted a day or two. The cold spell was general over Nevada, Utah and Colorado, as well as adjoining States.

Temperature.—Throughout the Territory the month seems to have been colder than the usual December; probably in most localities it was from 4 to 6 degrees colder. At Salt Lake City the records show it to have been 6 degrees lower than the normal December, and the coldest December since 1876.

The warmest day throughout the Territory was the 1st, without exception, and the coldest day was the 25th, for all localities except the extreme eastern part, where the lowest temperature occurred on the 26th. The coldest region was the plateau of the central part of Utah, comprising portions of Utah, Juab, San Pete, Sevier and Millard counties. The general mean temperature averaged from 17 stations was 26 degrees.

The highest mean temperature was 35.9 degrees at St. George. The lowest mean reported was 21.2 degrees at Nephi. At St. George and Nephi also occurred the highest and lowest temperatures respectively, viz.: highest, 71 degrees on the 1st at St. George, and 19 degrees below zero on the 25th at Nephi; an extreme range of 90 degrees for the month. The greatest local monthly range was 69 degrees at Cisco, Grand county; the least monthly range was 41 degrees at Snowville, Box Elder county.

Precipitation.—The month was characterized by abundant snowfall. The average amount of rain and melted snow at the

different stations was 1.42 inches. The depth of snowfall ranged from 1 to 34 inches, and perhaps it was even greater in localities which did not report. Nephi reported 34 inches for the month, with 10 inches remaining unmelted at the end of the month; Ogden, 32 inches; Grouse Creek, 31 inches, with 13 remaining unmelted; Provo reported 29 inches; Levan, 22 inches, with 9 remaining unmelted; Salt Lake, 21, with 3 left unmelted; Losee, 15, with 8 unmelted; Snowville, 17, with 14 unmelted; other stations had less amounts.

State of Weather.—Over the greater part of the Territory the month was unusually cloudy and stormy; more than half of the days were regarded as cloudy. The sunshine was but 36 per cent. of the possible amount. Days with rain varied from 2 to 15 at the different stations.

The snowfall for December in the vicinity of Salt Lake was as much as had fallen in the entire previous season. Accumulating in the mountains as it is now doing, it will undoubtedly prove very beneficial, assuring an ample water supply for the ensuing growing season; and it is reasonnble to conjecture that unusually large crops will be raised in 1892, other conditions being favorable.

METEOROLOGICAL DATA—DECEMBER, 1891.

Stations.	Counties.	Temperature.						Precipitation. (Rain and snow.)					Obs'rv'rs
		Monthly mean.	Highest.	Date.	Lowest.	Date.	Monthly range.	Total monthly.	Days on which .01 more fell.	Total snowfall. Depth in inches.	Snow on ground on 15th—inches.	Snow on ground on 31st—inches.	
Beaver	Beaver	....	....	....	....	....	....	....	....	....	....	....	Graff
Castle Gate	Emery	....	....	....	....	....	....	....	....	....	....	....	Euler
Cisco	Grand	22.8	63	1st	−6	26th	69	1.90	11	14	0	4	Jeffers
Deseret	Millard	26.2	60	1st	−5	25th	65	0.21	4	1	0	0	Rogers
Green River	Emery	30.4	55	14th	−7	26th	62	0.15	2	1½	0	¼	Am'erman
Grouse Creek	Box Elder	....	....	....	....	....	....	2.90	11	31	3	13	Cooke
Lake Park	Davis	26.5	51	1st	−7	25th	58	1.49	8	.....	....	....	Blumel
Levan	Juab	21.5	44	1st	−6	25th	50	2.75	1	22½	2½	9	Brown
Logan	Cache	....	....	....	....	....	....	....	....	....	....	....	Walker
Losee	Garfield	22.3	60	1st	−7	25th	67	1.50	5	15	0	8	Caffull
Moab	Grand	27.8	65	1st	−1½	26th	63½	0.81	8	7½	0	2	Crouse
Mt. Carmel	Kane	26.4	57	1st	−6	25th	63	1.07	4	10.7	0	4	Monon
Nephi	Juab	21.2	43	1st	−19	25th	62	1.25	12	33½	2	10	May
Ogden	Weber	28.4	....	....	....	....	....	3.01	8	32	....	....	Crossman
Park City	Summit	....	....	....	....	....	....	....	....	....	....	....	Ferguson
Parowan	Iron	25.4	57	1st	−5	25th	62	1.13	12	15	2	6	Matheson
Provo	Utah	28.9	....	....	....	....	....	.....	5	29	....	....	Marlin
Richfield	Sevier	23.2	59	1st	−4	25th	63	0.75	5	12	2	1	Hales
Scofield	Emery	....	....	....	....	....	....	....	....	.....	....	....	.....
Soldiers' Summit	Utah	....	....	....	....	....	....	....	....	.....	....	....	.....
Snowville	Box Elder	24.5	45	1st	4	25th	41	2.08	9	17	4	14	Robbins
St. George	Washington	35.9	71	1st	8	25th	63	0.40	2	Trace	0	0	Pymm
Stockton	Tooele	23.6	....	....	....	....	....	0.50	2	3.2	....	....	Hughes
Salt Lake City	Salt Lake	28.6	51	1st	0	25th	51	2.19	15	21	0	3	Salisbury

Cisco.—Thunder storm on the 1st.

Grouse Creek.—Very heavy wind on the 30th; several persons lost their way in the blinding storm.

Losee.—Prevailing wind NW, moderate. From 23d to close of month colder than common; seven below zero 25th; 30th snowed hard all day. Ground not covered much of the time until the 30th.

Levan.—A heavy storm passed over at 8:30 p. m. on 1st, accompanied by thunder and lightning and high wind, moving from NW to SE.

Deseret.—Considerable thunder on 1st between 7 and 8 p. m. Wind heavy on 30th from SW. There has not been snow enough to lay on the ground more than three or four hours at a time.

Parowan.—Barometer very low on evening of 29th. Heavy south wind next day and an inch of snow at night. The month has been colder and more snow than common for December. Good for winter grain.

Moab.—Thunder storm 1st, 7 p. m. First snow on 4th, ½ inch.

Nephi.—First half of month hard on crops.

GEO. N. SALISBURY, Director.

SALT LAKE CITY, January 22, 1892.

WASHINGTON.

UNITED STATES LAND OFFICE,
NORTH YAKIMA, WASHINGTON, August 28, 1891.

HON. J. H. THOMAS, North Yakima, Washington:

Dear Sir—Referring to your letter of August 29, 1891, requesting an estimate of the number of acres of desert land in our district, we have the honor to report by a rough estimate that there are 4,515,840. This includes the desert lands of the Yakima Indian reservation.

Trusting that your visit to Salt Lake will be both pleasant and profitable to yourself, as well as the State of Washington,

I remain, yours truly,

W. H. HARE,
Receiver.

UNITED STATES LAND OFFICE, WATERVILLE, WASH.

HON. J. H. THOMAS, North Yakima, Washington:

Dear Sir—Your letter of the 29th ult., asking for an estimate as to the number of acres of desert land in this land district has been received. I find it difficult to make anything like a correct estimate. Taking that portion of the land district that has been surveyed and the settlement of which can be ascertained, I find that there are a number of townships that are unsettled, and the Assessor of this county states that the land is desert in character. There are some sixteen of such townships, or an approximate of 368,000 acres. I believe this is as nearly as can be told.

Yours very respectfully,

J. C. LAWRENCE,
Register.

UNITED STATES LAND OFFICE,
SPOKANE FALLS, WASH., August 31, 1891.

HON. J. H. THOMAS, North Yakima, Washington:

Sir—Referring to yours of August 29, '91, I have to say that none of the lands in this land district have been returned by the surveyors as being desert land. There is no doubt that a million acres of this district would be the better if it could be irrigated, but as to the desert land I must report "None."

Yours respectfully,

A. W. STRONG,
Register.

UNITED STATES LAND OFFICE,
VANCOUVER, WASH., August 31, 1891.

Respectfully returned to writer—I do not believe that there is any land in this district properly classed as desert land. In Klickitat County there is much land requiring irrigation when it is intended to farm same, but I am informed that all this land makes excellent pasturage, and when fenced in small tracts is very valuable for grazing. Desert land entries have been made at this office.

I invite your attention to the Dunbar's indorsement, however.

J. M. GEOGHEGAN,
Register.

GOLDENDALE, WASH., September 2, 1891.

There are no desert lands in that portion of Klickitat County

lying within the Vancouver Land Office District. The statements of Hon. John D. Geoghegan in his letter above are correct.

Respectfully,
W. R. DUNBAR.

NORTH YAKIMA, WASH., August 29, 1891.

HON. REGISTER AND RECORDER, Walla Walla, Washington:

Gentlemen—Having been appointed by the Governor a delegate from this State to attend the National Irrigation Convention to be held at Salt Lake City on the 15th, 16th and 17th of September, I shall be under many obligations if you will furnish me at once an estimate of all desert lands in your district. I will need the information in the convention.

I am, very respectfully,
J. H. THOMAS.

We estimate the desert land in this district at from 50,000 to 60,000 acres.

Very respectfully,
ED. C. ROSS,
Register.

WYOMING.

The total area of the State of Wyoming, excluding Yellowstone National Park, is 60,752,000 acres, divided as follows:

CLASS.	ACRES.
Forest lands	10,000,000
Grazing lands	34,752,000
Desert lands	10,000,000
Irrigable lands, under D	3,000,000
Irrigable lands, reclaimable	3,000,000

FOREST LANDS.

In general the forest lands include the mountain areas upon which timber grows, regardless of its commercial value. In Wyoming large tracts of country upon which the timber grows but sparsely, are classed as forest lands, the timber upon these tracts being principally confined to the slopes of the narrow valleys and the gorges and canons cut by the stream. This scattering timber

has small commercial value, because it is found in bodies too small to warrant the expenditure of money necessary to convert it into lumber. It can only be used to advantage by the ranchman and the miner, whose requirements are not great and whose necessities are easily supplied. But the lands where such timber abounds, being upon the slopes of the mountain ranges, furnish catchment areas for the heavy snows of winter. It is here that the water for irrigation must be conserved.

Not to exceed twenty per cent or two million acres of the total area of forest land in the State are valuable for commercial purposes.

GRAZING LANDS.

To the grazing lands belong those tracts which furnish natural pasturage for flocks and herds. Without them the great cattle industry, which is now and will continue to be one of the most important sources of wealth in Wyoming, could not exist. These lands comprise nearly two-thirds of the total area of the State, are too vast in extent, too broken in surface, too elevated and far removed from the water supply, to be reclaimed. Their value must always remain small, but can be maintained and augmented by legislation which will give security of tenure to their use and prevent the destruction of the native grasses.

DESERT LANDS.

The desert lands of Wyoming are two-fold in character. Those devoid of vegetation and those which, although they may support a fair growth of native grasses, are too far from streams or water courses to be utilized as pasture lands. These lands have no intrinsic value and often on account of their existence in large tracts and the consequent separation of the irrigable areas materially depreciate the value of the agricultural lands. They comprise about one-sixth of the total area of the State.

IRRIGABLE LANDS.

The limits of the appropriation from the smaller streams of the State is about reached and the future extension of irrigated areas must come from the utilization of waters of our important streams. Hereafter ditches must be built by aggregations of capital rather than by the efforts of the individual. This means a marked increase of cost of irrigation per acre and a complete change in the methods employed in the construction of irrigating works. Six hundred natural water ways have their waters diverted in irrigation and four great rivers rise within the State and

cross her borders—the Big Horn on the north, the Platte on the east, the Green on the south and the Snake on the west—with a maximum discharge of 25,200, 10,130, 11,495 and 30,000 cubic feet per second, respectively. By far the greater portion of the unreclaimed lands will be irrigated by the waters of these rivers, and the question of building storage reservoirs to conserve the waters carried away during the spring floods is of secondary importance so long as their perennial supply runs to waste.

IRRIGATION DEVELOPMENT UP TO JAN. 1, 1891.

Compiled from surveys of the State Engineer, and from description of land under ditch in the State Engineer's office:

Total number of ditches	3,080
Total length—miles	5,464
Total capacity in cubic feet per section	25,639
Total acreage under ditch	2,172,781
Estimated cost of ditches per acre	$ *3 62
Estimated cost of reclaimed land per acre	*18 30

*Estimated cost of ditches and reclaimed lands based on figures in Census Bulletin, "Irrigation in Wyoming," dated August 27, 1891.

Tabular summary of the applications for permits to appropriate water filed in the State Engineer's office since Jan. 1, 1891:

Total number	210
Total length, miles	970
Total capacity, cubic feet per S	12,410
Total acreage	856,700
Estimated cost of ditch, per acre	$ 5.00
Estimated cost of reclaimed land, per acre	24.25

The detailed statistics of five of these ditches are interesting, as they show the character of the work which must prevail in the future:

No.	Name of Canal.	Stream.	Length of Canal.	Est. Cost.	Acres to be Irrigated.
155	Central Wyoming Canal	N. Platte	150 miles	$2,000,000	275,000
106	Northern Wyoming Canal	Tongue	54 Miles	200,000	70,000
13	Douglas & Platte River Canal	N. Platte	45 Miles	200,000	58,880
55	Anglo-American Ditch	Grey Bull.	44 Miles	128,000	172,280
115	The Elkhorn Ditch	Tongue	24 Miles	100,000	30 000

The data of these ditches is based on actual surveys and estimates. It represents possibilities, but their construction will hardly be possible under existing land laws. The money, therefor, cannot be secured.

The acreage covered by these canals would, if reclaimed, make

Wyoming self-supporting from an agricultural standpoint. At present the State imports annually over half a million dollars worth of farm products. The statistics for 1889 being as follows:

	Pounds.
Wheat	577,650
Oats	6,845,370
Flour	6,616,050
Bran, meal and chops	2,609,630
Corn	2,850,040
Hay	9,166,000
Fruit and vegetables	5,483,600
Packing house products	912,970
Butter, eggs, poultry, etc	471,540
Total	35,533,800

Note. See State Engineer's Report, 1889, page 66.

The increase in productive capacity of reclaimed land over natural pasturage of the arid region is shown by the following table:

*Spring wheat, bushels	20
Oats, bushels	50
Spring rye, bushels	20
Spring barley, bushels	25
†Alfalfa, tons	3
Timothy, ton	1
‡Potatoes, bushels	200
**Sugar beets, tons	15
Cabbage, tons	15
Onions, bushels	400
Field peas, bushels	50
††Ruta bagas, tons	20

*Per acre in all cases. †In two crops yearly. ‡Very best quality. **Analyze 15 per cent sugar. ††Best table quality.

VALUE OF FARM PRODUCTS—CHEYENNE, JAN. 16, 1891.

Wheat, per 100 pounds	$ 1.90
Flour, per 100 pounds	2.40
Oats, per 100 pounds	1.25
Corn, per 100 pounds	1.00
Chop, per 100 pounds	1.10
Meal, per 100 pounds	2.00
Bran, per 100 pounds	1.15
Beans, per 100 pounds	6.00
Hay, per ton	13.00
Potatoes, per 100 pounds	.75
Butter, per pound	.30
Cheese, per pound	.20
Eggs, per doz	.30
Apples, per barrel	3.50

At these prices an acre of irrigated land would have an annual productive value of

If sown to wheat	$22.80
If sown to oats	25.00
If in potatoes	75.00
If in timothy hay	13.00

Its value, if unirrigated, is for pasturage purposes only. It requires forty acres to support an animal. At the present price of cattle this would be worth about five dollars or twelve and a half cents per acre. The productive capacity of irrigated and unirrigated lands are therefore as one to one hundred if the irrigated product is hay, and one to six hundred if the irrigated product is potatoes.

GAYLAMOUNT
PAMPHLET BINDER
~
Manufactured by
GAYLORD BROS. Inc.
Syracuse, N.Y.
Stockton, Calif.