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WATER RESOURCES SURVEY OF IDAHO

Watershed Little Lost River
(Name)

County Butte, Custer, Lemhi Description

(a) Topography and Elevation

Valley floor at South end (mouth of valley) very flat sloping, probably not over 10' to the mile -- gets steeper progressively up valley. Valleys filled with gravelly alluvium washed from very steep mountain ranges rocky and barren at top. Elevation 5,200 to 12,000 feet.

(b) Precipitation and Climatic Conditions

Precipitation varies from about 9" at the lower end of the valley to probably not over 15" on the head of the watershed. The climate is rather severe with quite a variation in temperature, rather windy at the lower end of the valley and the average frost free growing season probably does not exceed 100 days.

(c) Land Use

Total area 676 square miles.

Area Cultivated	Irrigated	Present 9,000 Acres Previously 16,000
	Non-Irrigated	None successfully
Area Range	46 sq. miles	150 sq. miles in Forest Reserve. Remainder Public Domain and Private
Area Forest	150 sq. miles	Mostly sparsely covered with non-commercial
	70 sq. miles	High, barren, rocky waste in forest boundary

(d) Water Used at Present

Irrigation All available

Stock The entire area is grazed, and stock water is fairly well distributed in the forest areas except on the west side from

Wet Creek south. Large parts of the public domain have no stock water.

General statement regarding other uses as mining, navigation, power, etc.

No other water uses encountered in the area.

(e) Proposed Water Developments

Irrigation All for land now being irrigated

1. Repair Dry Creek Dam and possibly blanket-loosing areas
2. Develop ground water as outlined in Sterns & Crandell report
3. Improve and safeguard following bypass channels:
   Sawmill Creek (Little Lost Headwaters) & Dry Creek
4. Low dyke storages in Pass Creek and at head of Spring Creek

Stock -- Carrying capacity in forest. Feasible. Seems improbable on public domain.

Other -- None

(f) General information regarding floods - source of information. (Along lines of Preliminary Examination Report) -- No information gained.

(1) Location and nature of water developed for stock (See map)

Details of water developed on the forest were not all obtained. The ranger of this district stationed at Mackey said that considerable development had been made but that there were some areas where a shortage existed. Public domain lands are very short of water and on large areas stock are forced to trail from the foothills across the valley to the main creek. It is apparent that this area will support only a very small amount of grazing.

(2) Location and nature of water developments needed for stock (See map)

If it is determined that there is sufficient grazing to warrant it, surface ponds can be built and sealed with available material that will collect and hold water a sufficient length of time for spring grazing. A

few additional developments can be made inside the forest in cooperation with the Forest Service.

(3) Water used for irrigation - Location - type, i.e. stream flow, storage, pumping. (See map)

Land irrigated by stream flow 7,000 acres

Land irrigated by stored water from Dry Creek 2,000 acres

Blaine County Investment Company 4,000 acres in this district

Small storage dam on Pass Creek that furnished water to old land over washed out and needs repair.

(4) Proposed supplemental water. Location - type, i.e. storage, pumping, (see notes for full description and cost. See map.)

Pumping or infiltration ditch 5,700 acre feet 7,000 acres

This amount of supplemental water is needed on the lands with old water rights.

Pumping or infiltration ditch 4,000 acre feet
By pass improvements 3,600 " " } 4,000 acres
Small dyked reservoirs 1,200 " "

(5) New land possible to irrigate, location, source of water, etc. (Only make investigation when it is apparent that the development will assist in a soil conservation program. See map.)

None.

(6) Other water conservation and purpose. (See map)

The small reservoirs proposed would improve wildlife conditions in the areas where located.

(7) Condition of irrigation systems and measures for correction (See map)

Due to force of necessity systems have been partially improved. The lands in the lower valley lie very favorably to irrigation, and in most of the lands settled early almost no expense has been incurred in developing, dyking, or ditching systems. To fit in with water conserved all lands in the lower watershed where ground water is lost should be carefully prepared mostly by a dyking system to get maximum benefit from water.

(8) Other conditions of land sheet erosion misuse, possible correction. (See map)

Desert lands south and southeast have been winter-grazed extensively and in most of the area excessively to a point where wind erosion is serious. Spring grazing and drouth in low foothills have largely destroyed grasses. Considerable feed is obtained from forage in the form of "shadscale" or some types of sage. Normally this latter land is not subject to erosion but at times "waterspouts" or heavy rains cause run-off that causes very heavy washing of topsoil.

(9) Location of heavy silt flows and possible correction. (See map)

Low foothill areas from about T8 and 9N south past the valley are subject to silt flows. The valley is filled with gravel and the soils on these side slopes are quite shallow.

(10) Stream channel condition recommended treatment. (See map)

The only treatment recommended would be in connection with water conservation in sections where water is being lost during irrigation season due to unstability of the channel.

(11) Ground water condition as it affects plant growth correction measures. (See map)

Very little of the agricultural land is affected by ground water level. The high water-level area in sections 17, 20, 21 T7N, R28E is mostly in rough cut-up land covered with "greasewood." The same is true at the head of Spring Creek. The high water table near the middle of T9N R27E and in Sections 12 and 13, T10N, R26E occurs only early in the season and does not materially interfere with hay growth. The wet area in Pass Creek is used for pasture.

(12) Location and necessity of gully structures.

None necessary unless they are used in stabilising Wet Creek for water conservation purposes.

(13) Information on floods gained in the field. (See Preliminary Examinations Report 1)

There are no floods. Maximum discharge of 450 sf. caused by cloudburst in August, 1936, caused some overflowing and a little crop damage, but the hazard is so slight that this needs very little consideration.

(14) Location ownership and evaluation of land to be flooded by flood control structures. (See map.)

None.

(15) Location, purpose and feasibility of contour furrows or terraces.

None considered feasible.

(16) Location and effectiveness of water spreader dams. (See map)

Scarcity of water and lack of good vegetative cover makes general range waterspreading seem impractical. Present systems where early water is spread on agricultural land could be improved by better and more permanent controls. If some experimentation or study would prove it feasible, there is an area where I believe winter waterspreading would form sheet ice and

add to the spring water supply. To be of use the ice sheet would have to form to sufficient depth to prevent melting early in season.

(17) Make observations in regard to irrigated land that should be abandoned.

A large portion of Cury Act project at Bernice has been abandoned. It is probable that no water can be developed for this abandoned land and it should be permanently retired to grazing. Available water will have to be determined by progressive development. If water can be conserved in the quantities outlined, I believe it will be possible to have a stable stock-raising program on approximately 11,000 acres.

Written report showing water utilization in relation to erosion and land use. Cost and economics of development. Economic and social condition in watershed.

WATER UTILIZATION

The original land settled and irrigated in the lower end of the valley has been used as the basis of a prosperous stock-raising industry. The several thousand head of cattle that were owned there were grazed in the spring on the low hills and plain area, in the summer on the higher land; that is, non-national forest,and in the winter out on the plain or desert area which was at that time fairly productive of grass and other forage. By this arrangement there was very little feeding of the stock and the relatively small area supported more stock than similar areas at very much lower elevations. Hay was only used in the fall before moisture fell on the plains or in very severe winter weather when snow got of great enough depth to hamper grazing.

Due to this overcrowding of the range due to less precipitation in the area and due to the fact that low lying plain lands at the mouth of the valley were deprived of nearly flooding from Big Lost River perennial grasses have been almost entirely eliminated from the lower areas. The vegetation there that affords some forage resists neither wind nor water erosion.

WATER DEVELOPMENT

Due to the fact that stock were grazed principally on open land both summer and winter and also that hay was principally timothy or the wild variety, no effort had been made to conserve or store water by the old settlers.

Based on the meager records available and the very evident possibilities of water-saving works the Blaine County Investment Company started a development previous to 1920 that was designed to supply water to over 8,000 acres of land near the mouth of the valley and east of the old settled area. This development was partly carried out by the construction of two reservoirs and a bypass pipe and ditch arrangement. The Little Lost Reservoir six miles above Howe was intended to have a capacity of 10,000 acre feet, but was only built to store about 5,000 acre feet. It was found that even this storage was rapidly lost by percolation into the underlying alluvium, and the storage had to be abandoned.

On Dry Creek an 85-foot dam was built to store 2,400 acre feet of water. This design was made for a 100-foot dam storing around 5,000 acre feet. This storage basin is not tight and storage to about 65 feet amounting to about 1,200 acre feet is available for late use. With the present arrangement not more than about 60 percent or 700 acre feet of

this is effective storage due to the losses in the channel below. The bypass pipe and channel that originally saved this stored water and also a large part of the Dry Creek stream flow for the district has been abandoned and the new bypass ditch arrangement delivers not to exceed 50 percent of the entire spring and summer flow of Dry Creek.

LANDS IRRIGATED

There are approximately 7,000 acres of land in the old settled areas that are irrigated from the main stream -- 5,200 acres of this are around Howe and the remainder scattered up the valley to near the mouth of Sawmill Creek. There are scattered areas on south Sawmill and Pass Creeks that use stream flow supply to give them some irrigation. The Pass Creek ranch diverts water from the head of Goldberg Creek in the Pahsimeroi watershed and has some storage to irrigate their hay-producing ranch on the summit.

There are now 4,000 acres of land in the Bernice district, but a reconnaissance of the area indicated that there were being irrigated about 2,000 acres during the early 1938 irrigation season.

WATER SUPPLY

In presenting the information on water supply, there is so much variation between favorable and unfavorable years that it is hard to state just what the supply is. Considerable of the land is above the gaging station, and the record of what these places used is not available. In a complete examination of water supply and losses it will be found that Mr. N. W. Hansen* has a fairly accurate record of both deliveries and

* Mr. N. W. Hansen has been watermaster of the Little Lost River for about five years.

losses during the last few years. No winter records are available, but water flowing then represents surface loss and is not now available for use.

There have only been two years in the last twelve in which there wasn't sufficient stream flow to properly irrigate the old settled lands until July 1. On August 1 there was a shortage ten of the twelve years. On the project lands there has never been sufficient water; six years out of twelve there was sufficient water to irrigate about 500 acres on August 1. Based on available records, observation and information gained from land owners and the watermaster, the following amounts would give sufficient water in nine out of ten years: For old water rights to give all season irrigation -- 5700 acre feet; for 4000 acres of Blaine County Investment Company lands -- 8800 acre feet. On the years when this would not give ample water, it would at least supply sufficient moisture to insure such crops as alfalfa hay, seed and grain. The pasture forage that would be short due to lack of water could be replenished with annual grains.

WATER DEMAND

There are no figures available that show just what the demand of this land is but from the nature of the soil, the way it lies and the growing season, three acre feet should be ample for delivery to the land between May 1 and September 15. In showing water supply and shortage none of the water used in April and only about half of that delivered in May is considered to be useful irrigation. Excessive irrigation is at present carried on in these months because of the danger of non-availability later in the season. The soil is a loam or clay loam, retains water well, and is very deep, particularly in the lower end of the valley.

LAND USE

In recent years the number of stock grown in the area has been greatly reduced and it is doubtful whether there is sufficient spring or summer feed to maintain more stock than there is at present. Probably less damage would be done the plain country to the southeast if it were grazed in the winter rather than any other time. The additional production then due to more irrigation should be devoted first to supplemental feed to relieve spring grazing, to summer pastures, and to fall grazing. On the smaller units some type of land use aside from stock raising should be followed.

The growing season seems to be fairly good and some cash crops such as peas, potatoes, and beets might be raised along with possibly dairying to utilize the irrigated land. There would be no successful dry farming.

GEOLOGY AND DESCRIPTION

The watershed is about fifty miles long and has an average width of 17 miles; it consists of high mountain ranges on each side with an alluvium-filled valley between. The geology is described by Harold T. Sternes, Geologist for the U.S.G.S. in a report he made as a result of a ground water survey made in the winter of 1929-30. Due to the fact that the underground valley alluvium is mostly open gravel most surface streams have a big loss of water where they flow into the valley from adjoining canyons. Partially impervious underground layers of fine material bring limited quantities of water to the surface in four different areas.

PROPOSED DEVELOPMENTS

The loss to the ground water in these flowing streams is probably in excess of 30,000 acre feet a year more than appears again as reflow.

Due to the nature of the watershed there is no doubt considerable ground water that never reaches flowing streams.

Mr. Sterns has estimated that 25 to 50 second feet can be recovered at the lower high water table area. Fifty second feet recovered from June 10 to September 15 would be 9,700 acre feet and it would seem reasonable to expect this much recovery. Amount of recovery as outlined by Mr. Sternes can only be determined by test. To make up irrigation needs on the old settled land, it is assumed 5,700 acre feet of this supply would be needed. The remaining 4,000 acre feet would be available on the project land. To make up the total shortage of 8,800 acre feet, I believe 3,600 acre feet could be readily saved during the irrigation season by improved bypasses that would save 24 s.f. flow for the two and one-half months when it is needed. The remaining shortage of 1,200 acre feet can be made up in one of three ways -- (1) Tamping bed and sides of old reservoir above Howe to form an impervious sheet that would hold this amount of water; (2) building low dams 8 or 10 feet high across the valley on two impervious sections; or (3) artificial building of a large ice cap with water diverted from Sawmill Creek. If the full fifty s.f. can be recovered from ground water; if it proves practical to make a greater saving in bypasses; and if all three proposed methods of storage prove economically feasible, additional land could be irrigated on the Blaine County Investment Company lands. An immediate job of repair on the Dry Creek dam should be carried out to maintain the water supply they have had in the past.

PLANS AND COST

This report will give only a brief outline of plans and a very rough estimate of costs.

DRY CREEK DAM REPAIR

Rock and Gravel fill with concrete face and cut-off.

The broken up conduit has been dug out and the resulting tunnel through loose rock and gravel shored up with timber. It appears that to make the repair the entire area above the break will have to be removed. A 3-foot steel conduit could be placed to extend inside the present remaining conduit and upstream above the face sufficiently to put in a temporary bulkhead. The water could then be diverted through the pipe. The pipe should be enclosed with a foot of reinforced concrete back fill made and concrete face and cut-off rebuilt. The valve should be removed from the lower end of the conduit and placed at the upper end with a trash-rock entrance. The guides could be placed in the face of the dam and stem control placed up the face.

COST ESTIMATE

Excavation	5,000 cu. yds.	$3,000. based on maintaining ½-1 slopes
Pipe 86' 3' pipe		300.
Reinforced concrete @ $30. cu. yd.		1,350.
Steel for trash-rock and valve installation		200.
Back fill	5,000 cu. yds.	3,000.
Rubble concrete face	480 cu. yds.	5,000.
Total Repair		$12,850.

An alternate arrangement would be to drive sheet piling on each side of the broken area, shore it up and make the repair. This might cut the repair job to $8,000. Local residents expected to make the repair by putting in the conduit and concreting it up without removing any more fill. After the pouring of the conduit, the space around it would be filled with gravel. Only about 200 cu. yds. of material would have to be replaced and 1,000 square feet of surface repair under this arrangement might be effected for $4,000. If the material in place is found sufficiently settled in a thorough engineering investigation this latter method might prove feasible.

Test wells as outlined by Mr. Sternes.

Cost of infiltration ditch 6,000 feet long; 5 to 25 feet deep; 10 feet wide on bottom. This ditch would have to be excavated to excessive width where it is carrying the water through porous material and backfilled on the sides and bottom with clay or compacted topsoil.

142,000 cu. yds. at 15¢	$21,300.
Control works	4,000.
Cross cut on wells	6,000.
Overexcavation and backfill from lower control works to impervious material 10,000 cu. yds. at 30¢	3,000.
Total	$34,300.
Test wells and operation	5,000.

BYPASS DITCHES

Wide shallow ditches would be made to bypass lost waters.

Section for 20 S.F.

Roll entire area exposed to water with 250# sheepfoot tamper 10 trips or more; add topsoil or heavy rock where necessary. All waters in excess of designed capacity should be dumped down old channel. This will have to be done by means of permanent concrete control works with an overflow weir to safeguard the channel.

DRY CREEK CHANNEL BYPASS

Lower end of canyon to head of ditch -- 45 miles

Carry 20 s.f.	Head Control	$800.
Ditch	24,000 cu. yds. at 10¢	2,400.
Rolling		500.
Flume		200.
Repair old section		500.
		$4,400.

SAWMILL CREEK

Carry 40 s.f.	Head Control	$1,000.
Repair 3½ miles canal		3,000.
		$4,000.

PASS CREEK

Repair Head Control	$200.

WET CREEK

Channel stabilization on 5 miles $1,000.

STORAGE RESERVOIRS

Shallow storage reservoirs on land where water table is at surface - valley slope ½%, 100 cu. yds. of fill per acre foot of water plus controls. This fill material could be placed with dozer and drag for about 30¢ a cubic yard properly placed -- embankment for 1,200 a.f. $36,000.

Control works 4,000.

$40,000.

It would seem possible to blanket the bottom of the old reservoir and compact it sufficiently to hold water for considerably less than this. However, there would be high channel losses and since this stored water would probably be used in the late summer there would be high evaporation losses.

The proposed iceberging should be investigated and its possibilities determined.

There is a small storage prospect reported on one of the tributaries of Wet Creek that the writer was unable to go to.

There are ten stock water developments in the area that should be made for better grazing management - $500.00 each.

These estimates do not include administrative, supervision or planning costs.

ECONOMIC CONDITION

The operators on old settled land probably do as well or better than the average in the state that are in the stock raising industry. The Beraice

settlers have largely had to move out and all this land will eventually have to be abandoned unless they receive help. There is no reason why a moderately prosperous community cannot be sustained on the 4,000-acre tract remaining in the district.

For water right and distribution purposes all lands should be included in the valley development program. There are sufficient records to establish old rights in case of lost water from springs during development. Original rights could be supplied and developed, water furnished as supplemental water, the land paying for developed water in proportion to the anticipated supply.

Assuming a total cost of $145,000, the cost would only be $10 an acre foot and would average about $8.00 an acre on old settled land varying with their water right, and would be $22.00 an acre on the project land with them assuming the risk of an occasional water shortage once in ten years. If the ground water is available as outlined by Mr. Sterns this is an excellent project. If pumping is resorted to or if more storage or bypass watersaving works are resorted to it will still be feasible to a large extent. Electric power is available from Idaho Power Company distribution lines six miles below the area of development. Roads are good to Howe but the valley roads are very poor. I believe the land owners in the area would gladly cooperate in a water conservation program.

There were numerous possibilities of stream flow conservation aside from those outlined. Observations were made as to methods and processes of work that cannot all be elaborated here. Work could be

started on the dam repair and possibly some of the bypass work before the whole plan is completed and all details worked out.

Respectfully submitted,

Robert W. Leep
Ass't. Agricultural Engineer