

ICE HARBOR



LOWER MONUMENTAL



LITTLE GOOSE



LOWER GRANITE

LOWER
SNAKE
RIVER
DAMS
MULTI-
PURPOSE



U.S. ARMY ENGINEER DISTRICT
WALLA WALLA, WASHINGTON
CORPS OF ENGINEERS

1961

LOWER GRANITE LOCK AND DAM *Statistics*

LOWER GRANITE LOCK AND DAM CARRIES CONGRESSIONAL APPROVAL BUT IS STILL IN THE PLANNING STAGE, WITH SITE EXPLORATION AND POOL LEVEL STUDIES THE PRINCIPAL WORK SCHEDULED FOR THE 1962 FISCAL YEAR.

TENTATIVELY, THE DAM SITE LOCATION IS RIVER MILE 107.5, WITH EXACT NORMAL POOL ELEVATION NOT AS YET DETERMINED. ESTIMATED TOTAL COST OF THE LOWER GRANITE PROJECT IS TARGETED FOR \$147,000,000.

IT IS REASONABLE TO ASSUME THAT IN DETAILED DESIGN LOWER GRANITE WILL FOLLOW CLOSELY SOME SPECIFICATIONS OF THE ICE HARBOR AND LOWER MONUMENTAL PROJECTS. UNDOUBTEDLY, THE STANDARDIZED DIMENSIONS OF DOWN-STREAM NAVIGATION LOCKS WILL BE CARRIED THROUGH AT LOWER GRANITE, WITH THE HEIGHT OF THE GATES DEPENDENT UPON THE ESTABLISHMENT OF THE NORMAL POOL LEVEL.

FISH LADDER FACILITIES SHOULD DUPLICATE DOWNSTREAM SPECIFICATIONS; NAMELY, ONE FISH LADDER ON EACH SHORE WITH A SLOPE RATIO OF 1 ON 10. POWERHOUSE DESIGN MAY VARY SOME, WITH LATE IMPROVEMENTS IN GENERATOR DESIGN ALLOWING FOR EVEN GREATER INDIVIDUAL GENERATOR KW OUTPUT THAN SPECIFIED AT THE THREE DOWNSTREAM DAMS.

WHILE 36 MILES OF RAILROADS WILL BE AFFECTED, LOWER GRANITE WILL DIFFER FROM THE DOWNSTREAM DAMS IN THAT A CONSIDERABLE AMOUNT OF LEVEE WORK WILL BE NECESSARY ON BOTH SHORES OF THE CLEARWATER AT LEWISTON AND THE SNAKE RIVER BETWEEN LEWISTON AND CLARKSTON.

About the Dams and the Snake River

THE MEANDERING SNAKE . . . RIVER OF MANY NAMES. FROM THE WYOMING TETONS THROUGH A TRIO OF SPRAWLING STATES, IT WINDS AND TWISTS LIKE A TRUE SERPENT TRACK IN THE TRAIL DUST.

TO THE INDIANS, IT TOOK ON THE NAME OF FANCIFUL LEGENDS. TO THE FUR TRADER, IT WAS IDENTIFIED BY THE PARTICULAR TRIBE THAT LIVED WITHIN A SHORE STRETCH. TO THE PIONEER SETTLER, THE CONFLUENCE OF EACH LESSER STREAM CARRIED A LOCAL IDENTITY.

WITH IDAHO'S GOLD DISCOVERY OF 1860, THE SNAKE BECAME THE WATER TRAILWAY TO THE UPSTREAM DIGGINGS. FORT WALLA WALLA ON THE COLUMBIA BELOW THE MOUTH OF THE SNAKE WAS THE "JUMPING-OFF" POINT . . . LEWISTON, IDAHO, 140 MILES UPSTREAM, THE BONANZA BOOM-TOWN GOAL. STERN-WHEELERS, FLATBOATS AND TINY RIVER CRAFTS ALIKE, LAY OFF THE MOUTH OF THE SNAKE IN EARLY SPRING, WAITING FOR THE UPSTREAM ICE-FLOW HAZARDS TO CLEAR. AN ADVENTURESOME FEW MANEUVERED THEIR CRAFTS INTO A TINY KIDNEY-SHAPED BAY ON THE SOUTH SHORE OF THE SNAKE TO SNEAK A FEW PRECIOUS MILES ADVANTAGE OVER THE WAITING HORDE DOWNSTREAM. THAT TINY HAVEN FROM THE RIVER'S TREACHEROUS ICE FLOW BECAME KNOWN AS ICE HARBOR.

THIRTY MILES UPSTREAM A TOWERING PILLAR OF ROCK THAT WARNED OF DANGEROUS RAPIDS AT A SHARP RIVER BEND BECAME LOWER MONUMENTAL. STILL FURTHER UPSTREAM WERE OTHER LANDMARKERS TO THE RIVER'S COURSE -- LITTLE GOOSE ISLAND AND LOWER GRANITE CANYON. SO THE RIVER CARRIED ITS LEGEND TO THE GENERATION OF TODAY AS MULTIPURPOSE DAMS NOW TAKE ON THE IDENTITY OF THEIR SHORE-LINE POINTS -- ALL MARKERS IN THE PARADE OF PROGRESS.

Navigation

ICE HARBOR LOCK AND DAM, AT THE HEADWATERS OF THE COLUMBIA RIVER'S McNARY DAM POOL, OR LAKE WALLULA AS IT IS OFFICIALLY TITLED, IS THE FIRST OF FOUR MULTIPURPOSE DAMS THAT WILL ULTIMATELY EXTEND SLACK-WATER NAVIGATION FROM THE CONFLUENCE OF THE SNAKE AND COLUMBIA RIVERS, 140 MILES UPSTREAM TO THE LEWISTON, IDAHO-CLARKSTON, WASHINGTON AREA.

THE RESERVOIR BEHIND ICE HARBOR LOCK AND DAM WILL, BY LATE 1961, HAVE CREATED A 31.9-MILE LONG POOL REACHING UPSTREAM TO THE LOWER MONUMENTAL DAM SITE AT RIVER MILE 41.6. LOWER MONUMENTAL LOCK AND DAM, IN TURN, WILL, WITH COMPLETION IN 1967, FORM A 28.7-MILE RESERVOIR WITH HEADWATERS AT THE SITE OF LITTLE GOOSE LOCK AND DAM AT RIVER MILE 70.3. THE FOURTH AND UPSTREAM-MOST DAM TOWARD THE LEWISTON-CLARKSTON OBJECTIVE IS LOWER GRANITE LOCK AND DAM SITE TENTATIVELY SET AT APPROXIMATELY RIVER MILE 107.5. ITS 36.5-MILE POOL WILL COMPLETE THE SLACK-WATER PATHWAY AND REACH TO BEYOND THE CONFLUENCE OF THE SNAKE AND CLEARWATER RIVERS AT LEWISTON, IDAHO.

WITH COMPLETION OF THESE FOUR DAMS, AND COMPLETION OF JOHN DAY LOCK AND DAM ON THE COLUMBIA RIVER, SLACK-WATER NAVIGATION WILL BE POSSIBLE FROM PACIFIC OCEAN TIDEWATER BELOW BONNEVILLE DAM 325 MILES UP THE COLUMBIA TO THE PASCO-KENNEWICK AREA AND 140 MILES UP THE SNAKE RIVER TO THE LEWISTON-CLARKSTON AREA. AVERAGE ANNUAL TONNAGE TO BE CARRIED ON THE LOWER SNAKE RIVER AFTER COMPLETION OF THE FOUR DAM PROJECT IS ESTIMATED IN EXCESS OF FOUR MILLION SHIPPING TONS.

Recreation

THE RESERVOIRS THAT WILL BE FORMED BEHIND THE FOUR DAMS BETWEEN THE MOUTH OF THE SNAKE AND LEWISTON, IDAHO, WILL IN ADDITION TO A 140-MILE STRETCH OF NAVIGABLE SLACK WATER, CREATE NUMEROUS RECREATIONAL SITES INVITING TO BOATING, SWIMMING, FISHING AND WATER SPORTS. McNARY'S SLACK-WATER POOL, OFFICIALLY TITLED LAKE WALLULA, EXTENDS 9.7 MILES UP THE SNAKE RIVER TO ICE HARBOR. BETWEEN THE MOUTH OF THE SNAKE AND ICE HARBOR IS HOOD PARK ON THE SOUTH SHORE, WHICH AFFORDS PUBLIC PICNICKING, SWIMMING, AND BOAT LAUNCHING FACILITIES.

WITH COMPLETION OF THE LOWER SNAKE'S FOUR DAM PROGRAM, PLEASURE BOATS WILL BE ABLE TO NEGOTIATE THE LOCKS AT EACH MULTI-PURPOSE PROJECT AND PROCEED UPSTREAM WITH ASSURANCE OF NUMEROUS BOAT HAVENS BEING AVAILABLE FOR PROTECTION AGAINST HAZARDOUS STORMS. BOAT LAUNCHING RAMPS, CAMPING SITES AND ACCOMMODATIONS FOR OVERNIGHT ANCHORAGE WILL ALSO BE ACCESSIBLE.

THE ACCESS ROADS NECESSARY TO THE CONSTRUCTION OF EACH DAM WILL FURNISH ACCESSIBILITY TO EACH OF THE RESERVOIR POOLS. ADDITIONAL ROADWAYS ARE PLANNED TO LEAD FROM THE MAIN HIGHWAYS TO THE VARIOUS RECREATIONAL SPOTS INCLUDED IN THE SHORE-LINE DESIGN FOR THE 140-MILE RIVER STRETCH.

WITHIN THE DECADE THE SLACK-WATER PATHWAY FROM THE PACIFIC OCEAN TO ABOVE LEWISTON SHOULD OFFER MANY INVITING TOURIST AND RECREATIONAL ATTRACTIONS ALONG THE 325-MILE CRUISE COURSE TO THE MOUTH OF THE SNAKE AND UP THE 140-MILE COURSE ON THE SNAKE TO LEWISTON, IDAHO, AND CLARKSTON, WASHINGTON.

Hydro-Electric Power

THE INITIAL HYDROELECTRIC POWER POTENTIALITIES OF THE COMPLETED FOUR LOWER SNAKE RIVER MULTIPURPOSE PROJECTS IS CURRENTLY ESTIMATED AT 1,485,000 KILOWATTS AND ULTIMATELY AT 2,970,000 KILOWATTS. PRESENT PLANS CALL FOR THE INITIAL INSTALLATION OF THREE GENERATING UNITS AT EACH DAM, WITH SKELETON UNITS INCORPORATED INTO THE POWERHOUSE STRUCTURE TO ULTIMATELY ACCOMMODATE THREE ADDITIONAL UNITS.

WHILE THE UNITS ALREADY INSTALLED AT ICE HARBOR DAM ARE DESIGNED FOR A NAME-PLATE RATING OF 90,000 KILOWATTS EACH, THE THREE UNITS FOR LOWER MONUMENTAL, THE SECOND UPSTREAM MULTIPURPOSE PROJECT, ARE BEING DESIGNED TO PRODUCE 135,000 KILOWATTS EACH. WITH A 15 PERCENT OVERLOAD INCORPORATED INTO THE DESIGN OF EACH UNIT, THIS WILL PROVIDE FOR AN INITIAL CAPACITY OF OVER 450,000 KILOWATTS AT LOWER MONUMENTAL.

THE INITIAL POWER INSTALLATION FOR LITTLE GOOSE IS ESTIMATED AT 405,000 KILOWATTS, WITH THREE UNITS CARRYING A NAME-PLATE RATING OF 135,000 KILOWATTS EACH BEING INCLUDED IN THE INITIAL POWERHOUSE DESIGN. ULTIMATE CAPACITY FOR LITTLE GOOSE IS ESTIMATED AT 810,000 KILOWATTS.

LOWER GRANITE'S HYDROELECTRIC POTENTIALITY, THOUGH STILL IN THE PLANNING STAGE, WILL, UNDOUBTEDLY, BE COMPARABLE TO THE KILOWATT OUTPUT OF LITTLE GOOSE. THE POWER GENERATED BY THESE FOUR LOWER SNAKE RIVER DAMS WILL ALL BE CHANNLED INTO THE NORTHWEST POWER POOL FOR REDISTRIBUTION THROUGHOUT THE NORTHWEST INDUSTRIAL AREA.

Other Benefits

THE LADDER OF FOUR DAMS THAT WILL MAKE UP THE IMPROVEMENTS PLANNED FOR THE LOWER SNAKE RIVER WILL FORM A SUCCESSION OF OVERLAPPING POOLS, WITH THE UPPERMOST RESERVOIR EXTENDING TO WELL ABOVE LEWISTON. NUMEROUS BENEFITS OTHER THAN THOSE USUALLY ATTRIBUTED TO MULTIPURPOSE DAMS, NAMELY, NAVIGATION RECREATION, IRRIGATION AND HYDROELECTRIC POWER WILL ACCRUE WITHIN THE SHORE LINE OF THESE FOUR PROJECTS. THE IRRIGATION BENEFITS WILL RESULT FROM A REDUCED PUMPING LIFT TO IRRIGABLE LAND BORDERING THE SNAKE RIVER. THE AVAILABILITY OF INCREASED POWER SUPPLY WILL ALSO MAKE IRRIGATION MORE FEASIBLE.

THE RESERVOIRS OF THE FOUR PROJECTS WILL COMPRISE A WATER AREA OF APPROXIMATELY 34,000 ACRES WITH A TOTAL SHORE LINE OF OVER 262 MILES.

THE PAST EXPERIENCE, AS CONFIRMED BY THE GROWTH OF INDUSTRY ALONG THE McNARY DAM RESERVOIR SINCE ITS COMPLETION, MAKES REASONABLE THE ASSUMPTION THAT A SIMILAR DEVELOPMENT WILL OCCUR AT THE MANY ACCESSIBLE SPOTS ALONG THE SNAKE RIVER. THE FOUR DAMS BETWEEN ITS MOUTH AND LEWISTON WILL CONSTITUTE A CHANGE IN WATER LEVEL FROM 340 MSL AT THE HEADWATERS OF THE McNARY POOL TO 735 AT LEWISTON.

AS PLANNED, THE OPERATIONS WILL BE SUCH AS TO MAINTAIN A RELATIVELY CONSTANT WATER LEVEL OF 735 IN THE LEWISTON-CLARKSTON AREA. THIS WILL BE ACCOMPLISHED BY VARYING THE WATER SURFACE ELEVATION AT LOWER GRANITE DAM ACCORDING TO RIVER FLOW. THIS WILL PERMIT CONSTRUCTION OF HARBOR FACILITIES FOR DEEP DRAFT EQUIPMENT IN THE LEWISTON-CLARKSTON AREA, AS WELL AS ADAPTABILITY TO INDUSTRIAL SHORE-LINE INSTALLATIONS.

Safety Rules

SWIMMING

DON'T SWIM ALONE. THERE IS SAFETY IN NUMBERS.
DON'T SWIM FROM BOATS. USE BEACHES AT PUBLIC SITES.

DON'T OVERESTIMATE YOUR SWIMMING CAPABILITIES.
BE SURE THE WATER IS DEEP ENOUGH BEFORE YOU DIVE.

BOATING

THE RIVER IS TREACHEROUS. BOATS ARE AN OCCUPANT'S RISK.

MOTORBOATS, WHEN APPROACHING SMALL BOATS OR DOCKS, SHALL REDUCE SPEED SUFFICIENTLY TO INSURE SAFETY OF LIVES AND PROPERTY.

ALL BOATS MUST CARRY AT LEAST ONE LIFE PRESERVER FOR EACH OCCUPANT.

IF YOUR BOAT UPSETS, STICK TO IT AND USE IT AS A LIFE PRESERVER.

DON'T STAND UP IN A BOAT TO START THE MOTOR OR MAKE A REPAIR.

DON'T PASS A BOAT IN DISTRESS -- GIVE HELP. IF YOU NEED HELP, ASK FOR IT.

BOATS MUST NOT PASS CLOSER TO A DAM THAN INDICATED BY WARNING SIGNS.

OBEY BAD WEATHER WARNINGS. HEAD FOR THE SHORE BEFORE A STORM BREAKS.

SKIING

LEARN TO SWIM PROFICIENTLY BEFORE ATTEMPTING TO WATER SKI. ALL SKIERS SHOULD WEAR LIFE JACKETS.

DON'T SKI IN SHALLOW WATER AND AVOID EXCESSIVE SPEEDS.

SKI PROGRESSIVELY--NEVER TRY STUNTS FOR WHICH YOU DON'T HAVE THE BASIC SKILL.

AVOID SKIING NEAR OBJECTS SUCH AS BOATS AND DOCKS.

BE CONSIDERATE OF RIGHTS OF SWIMMERS, BOATER AND FISHERMEN.

ICE HARBOR

LOCK AND DAM

Statistics....

GENERAL

STREAM	RIVER MILE 9.7,	SNAKE RIVER
DRAINAGE AREA, SQUARE MILES		109,000
NORMAL POOL ELEVATION, MSL		440
LENGTH NORMAL POOL, MILES		31.9
NORMAL POOL AREA, ACRES		9,200
LENGTH OF DAM OVER-ALL, FEET		2,790
COST OF DAM COMPLETE		\$121,000,000
SCHEDULED COMPLETION DATE		1961

SPILLWAY SECTION

LENGTH SPILLWAY, FEET	600
NUMBER SPILLWAY BAYS	10
SIZE OF GATES, FEET	50 BY 53
SPILLWAY CAPACITY, CFS	850,000

POWERHOUSE

POWERHOUSE LENGTH, FEET	661
NUMBER POWER UNITS INITIALLY	3
NUMBER POWER UNITS ULTIMATELY	6
TURBINES, TYPE	KAPLAN
REVOLUTIONS PER MINUTE	90
HORSEPOWER PER UNIT	143,000
GENERATOR CAPACITY PER UNIT, KW	90,000
TOTAL INSTALLED CAPACITY, KW	540,000

NAVIGATION LOCK

NAVIGATION LOCK TYPE	SINGLE LIFT
MAXIMUM LIFT, FEET	103
LOCK CLEAR LENGTH, FEET	675
LOCK WIDTH, FEET	86
HEIGHT DOWNSTREAM GATE, FEET	91
FILLING TIME, MINUTES	12

FISH LADDER

NUMBER FISH LADDERS	2
SLOPE RATIO SOUTH SHORE	1 ON 16
SLOPE RATIO NORTH SHORE	1 ON 10

MISCELLANEOUS

MILES RAILROADS AFFECTED	53
ACRES LAND ACQUIRED	5,784
COST OF LAND ACQUIRED	\$1,245,000

LOWER MONUMENTAL

LOCK AND DAM

Statistics

GENERAL

STREAM	RIVER MILE 41.6,	SNAKE RIVER
DRAINAGE AREA, SQUARE MILES		108,500
NORMAL POOL ELEVATION, MSL		540
LENGTH NORMAL POOL, MILES		28.7
NORMAL POOL AREA, ACRES		6,590
LENGTH OF DAM OVER-ALL, FEET		3,800
COST OF DAM COMPLETE		\$150,000,000
SCHEDULED COMPLETION DATE		1967

SPILLWAY SECTION

LENGTH SPILLWAY, FEET	512
NUMBER SPILLWAY BAYS	8
SIZE OF GATES, FEET	50 BY 59
SPILLWAY CAPACITY, CFS	850,000

POWERHOUSE

POWERHOUSE LENGTH, FEET	695
NUMBER POWER UNITS INITIALLY	3
NUMBER POWER UNITS ULTIMATELY	6
TURBINES, TYPE	KAPLAN, 6-BLADE
REVOLUTIONS PER MINUTE	90
HORSEPOWER PER UNIT	212,400
GENERATOR CAPACITY PER UNIT, KW	135,000
TOTAL INSTALLED CAPACITY, KW	810,000

NAVIGATION LOCK

MAXIMUM LIFT, FEET	103
LOCK CLEAR LENGTH, FEET	675
LOCK CLEAR WIDTH, FEET	86
FILLING TIME, MINUTES	15

FISH LADDER

NUMBER FISH LADDERS	2
SLOPE RATIO SOUTH SHORE (TENTATIVE)	1 ON 10
SLOPE RATIO NORTH SHORE (TENTATIVE)	1 ON 10

MISCELLANEOUS

MILES RAILROADS AFFECTED	63.1
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LITTLE GOOSE

LOCK AND DAM

Statistics

GENERAL

STREAM	RIVER MILE 70.3,	SNAKE RIVER
DRAINAGE AREA, SQUARE MILES		103,900
NORMAL POOL ELEVATION, MSL		638
LENGTH NORMAL POOL, MILES		37.2
NORMAL POOL AREA, ACRES		9,860
LENGTH OF DAM OVER-ALL, FEET		2,660
COST OF DAM COMPLETE		\$144,000,000
SCHEDULED COMPLETION DATE		1969

SPILLWAY SECTION

LENGTH SPILLWAY, FEET (TENTATIVE)	508
NUMBER SPILLWAY BAYS (TENTATIVE)	8
SIZE OF GATES, FEET (TENTATIVE)	50 BY 59
SPILLWAY CAPACITY, CFS (TENTATIVE)	850,000

POWERHOUSE

POWERHOUSE LENGTH, FEET (TENTATIVE)	695
NUMBER POWER UNITS INITIALLY (TENTATIVE)	3
NUMBER POWER UNITS ULTIMATELY (TENTATIVE)	6
TURBINES, TYPE (TENTATIVE) KAPLAN,	6-BLADE
HORSEPOWER PER UNIT (TENTATIVE)	212,400
GENERATOR CAPACITY PER UNIT, KW	135,000
	(TENTATIVE)
TOTAL INSTALLED CAPACITY, KW	810,000
	(TENTATIVE)

NAVIGATION LOCK

NAVIGATION LOCK TYPE	SINGLE LIFT
MAXIMUM LIFT, FEET	101
LOCK LENGTH, FEET	675
LOCK WIDTH, FEET	86
HEIGHT DOWNSTREAM GATE	85
FILLING TIME, MINUTES	15

FISH LADDER

NUMBER FISH LADDERS	2
SLOPE RATIO SOUTH SHORE (TENTATIVE)	1 ON 10
SLOPE RATIO NORTH SHORE (TENTATIVE)	1 ON 10

MISCELLANEOUS

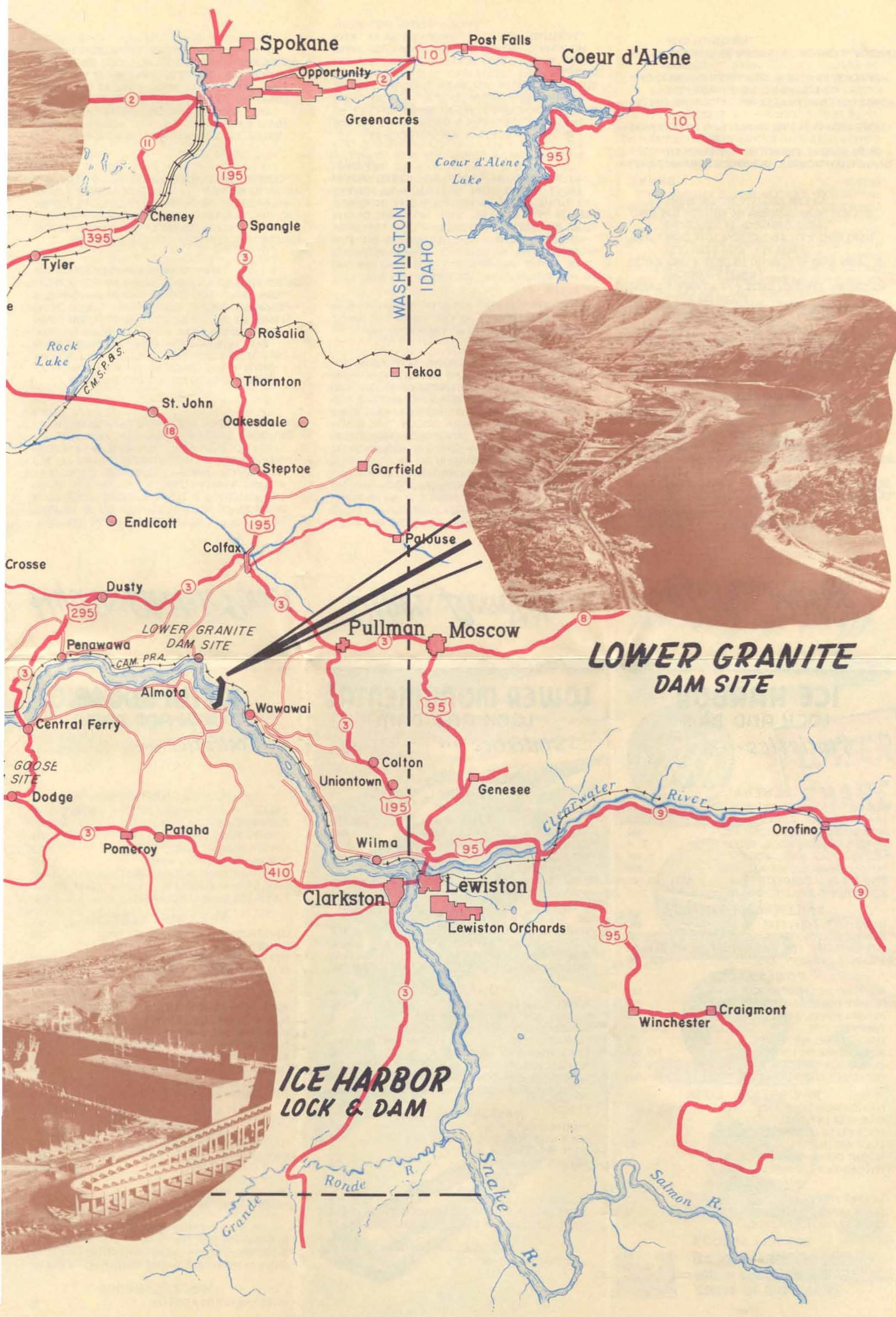
MILES RAILROADS AFFECTED	40
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LITTLE GOOSE DAM SITE



LOWER MONUMENTAL LOCK & DAM





Spokane

Coeur d'Alene

WASHINGTON
IDAHO

**LOWER GRANITE
DAM SITE**

**ICE HARBOR
LOCK & DAM**

Grande R.

Ronde R.

Snake R.

Salmon R.

Coeur d'Alene Lake

Rock Lake

Clearwater River

Cheney

Crosse

GOOSE SITE

LOWER GRANITE DAM SITE

Almota

Clarkston

Lewiston

Lewiston Orchards

Winchester

Craigmont

Greenacres

Spangle

Rosalia

Thornton

Oakesdale

Steptoe

Endicott

Colfax

Dusty

Penawawa

Central Ferry

Dodge

Pataha

Pomeroy

Uniontown

Wilma

Clarkston

Lewiston

Genesee

Orofino

St. John

Garfield

Palouse

Pullman

Moscow

Post Falls

Opportunity

Tyler

Rock Lake

C.M.S.P.&S.

Crosse

Dodge

Pataha

Pomeroy

Central Ferry

Dodge

Pataha

Pomeroy

Central Ferry

Dodge

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