U.S. ARMY CORPS OF ENGINEERS
WALLA WALLA DISTRICT

BUSINESS OPPORTUNITIES

2017 Industry Day

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18 October 2017

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TOPICS

Quick Revisit Hydropower:

The Corps History in Hydropower

Regional Look at Hydropower

Hydropower in the Future

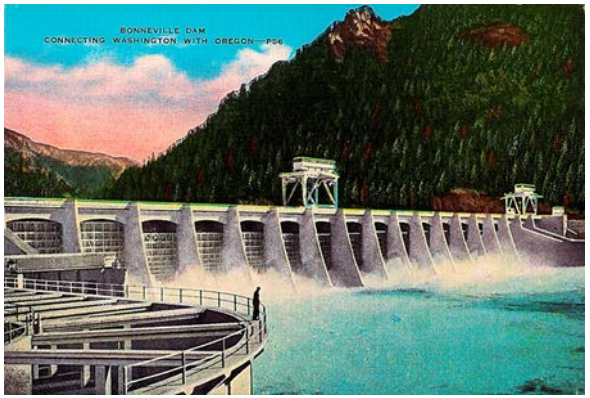
Potential Project Opportunities:

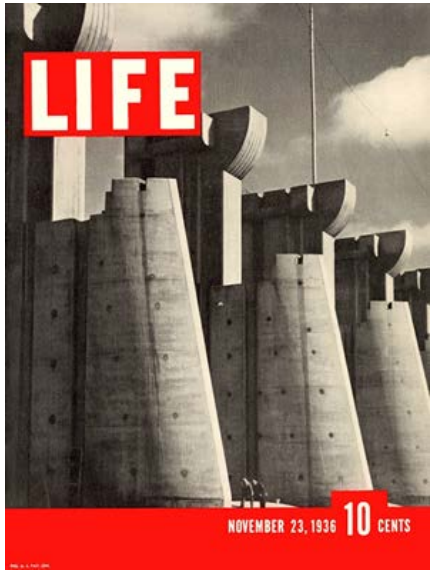
Hydropower Project Opportunities

Non-Hydropower Project Opportunities

1925 Rivers and Harbors Act
USACE authorized to explore cost and feasibility of identifying navigable rivers for power generation

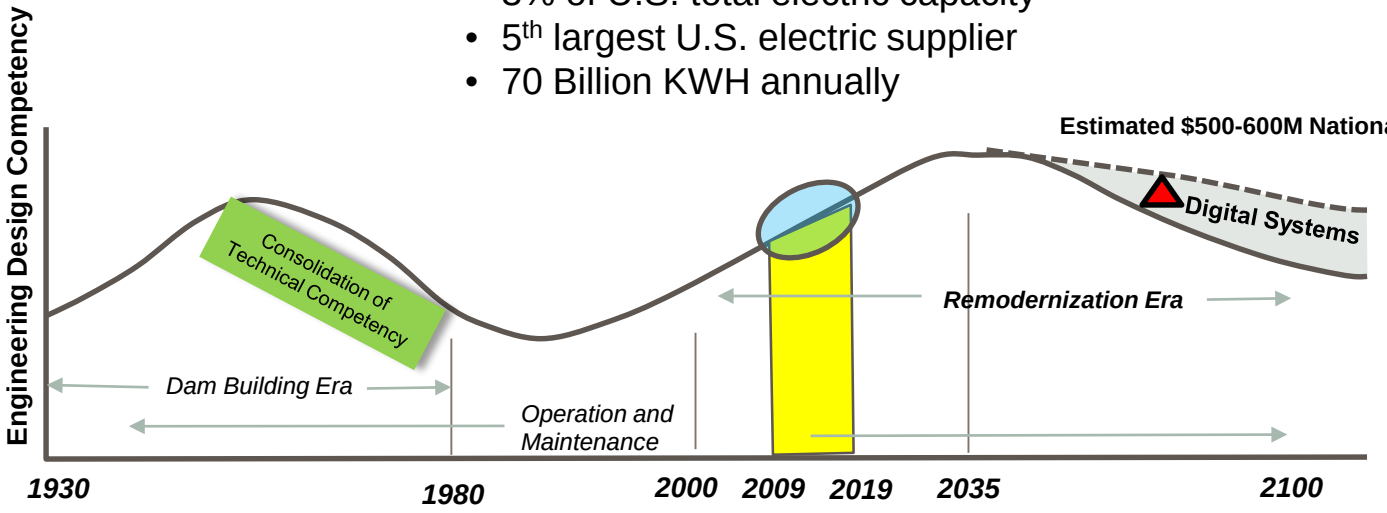
1934 Bonneville Dam, Columbia River
First USACE project to include hydropower, 40 miles east of Portland, OR





Ready Today, while Setting the Conditions for Future Success

Today
- 376 generating units at 75 dams
- 25% of U.S. hydropower
- 3% of U.S. total electric capacity
- 5th largest U.S. electric supplier
- 70 Billion KWH annually



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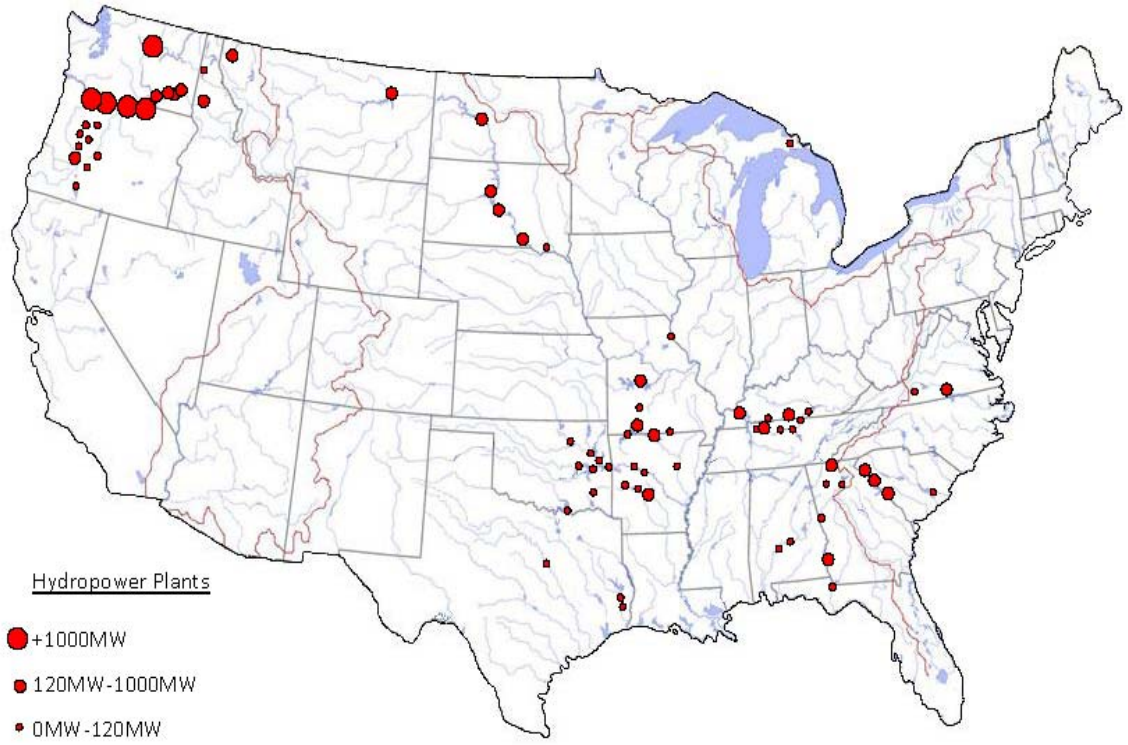
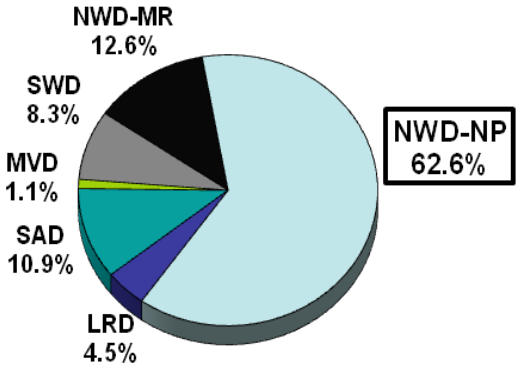
CORPS' HYDROPOWER CAPABILITY

- 75 major hydropower plants
- 376 generating units
- Generators ranging from <1 MW to 220 MW
- Total rated generating capacity of 21,060 MW



Corps Hydropower Capacity by Division



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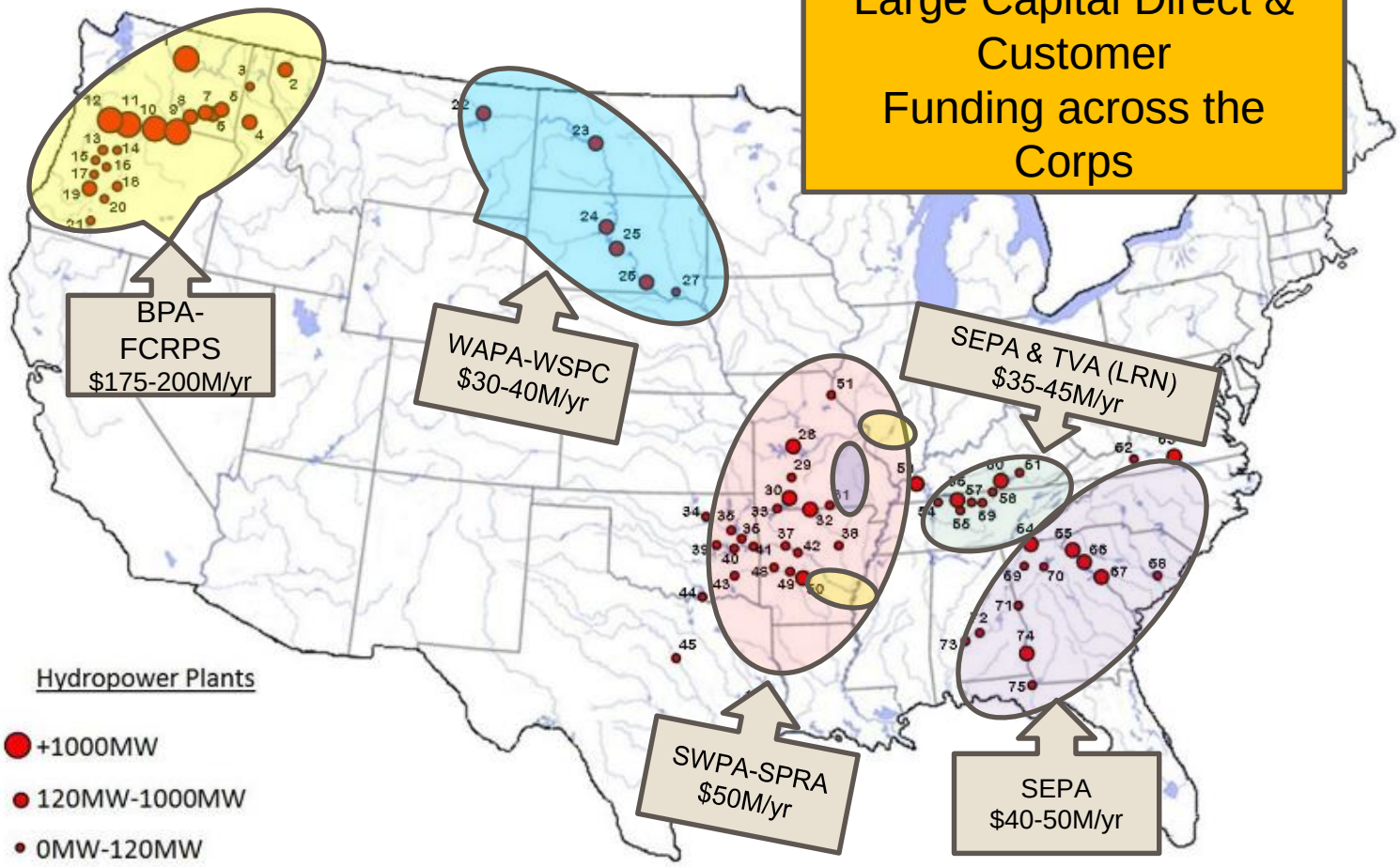
Large Capital Direct & Customer Funding across the Corps



NWD:
1- Chief Joseph (WA)
2- Libby (MT)
3- Albeni Falls (ID)
4- Dworshak (ID)
5- Lower Granite (WA)
6- Little Goose (WA)
7- Lower Monumental (WA)
8- Ice Harbor (WA)
9- McNary (OR/WA)
10- John Day (OR/WA)
11- The Dalles (OR/WA)
12- Bonneville (OR/WA)
13- Big Cliff (OR)
14- Detroit (OR)
15- Foster (OR)
16- Green Peter (OR)
17- Dexter (OR)
18- Cougar (OR)
19- Lookout Point (OR)
20- Hills Creek (OR)
21- Lost Creek (OR)
22- Fort Peck (MT)
23- Garrison (ND)
24- Oahe (SD)
25- Big Bend (SD)
26- Fort Randall (SD)
27- Gavins Point (SD)
28- Harry S. Truman (MO)
29- Stockton (MO)
SWD:
30- Table Rock (MO)
31- Norfork (AR)
32- Bull Shoals (AR)
33- Beaver (AR)
34- Keystone (OK)
35- Fort Gibson (OK)
36- Tenkiller Ferry (OK)
37- Ozark (AR)
38- Greers Ferry (AR)
39- Eufala (OK)
40- Webbers Falls (OK)
41- Robert S. Kerr (OK)
42- Dardanelle (AR)
43- Broken Bow (OK)
44- Denison (TX)
45- Whitney (TX)
46- Sam Rayburn (TX)
47- R.D. Willis/Town Bluff (TX)
MVD:
48- Narrows (AR)
49- Blakely Mountain (AR)
50- DeGray (AR)
51- Clarence Cannon (MO)
LRD:
52- Saint Mary's Falls (MI)
53- Barkley (KY)
54- Cheatham (TN)
55- J. Percy Priest (TN)
56- Old Hickory (TN)
57- Cordell Hull (TN)
58- Dale Hollow (TN)
59- Center Hill (TN)
60- Wolf Creek (KY)
61- Laurel (KY)
SAD:
62- Philpott (VA)
63- John H. Kerr (VA)
64- Carters (GA)
65- Hartwell (SC/GA)
66- Richard B. Russell (SC/GA)
67- J. Strom Thurmond (SC/GA)
68- St. Stephens (SC)
69- Allatoona (GA)
70- Buford (GA)
71- West Point (AL/GA)
72- Jones Bluff (AL)
73- Millers Ferry (AL)
74- Walter F. George (AL/GA)
75- Jim Woodruff (FL)

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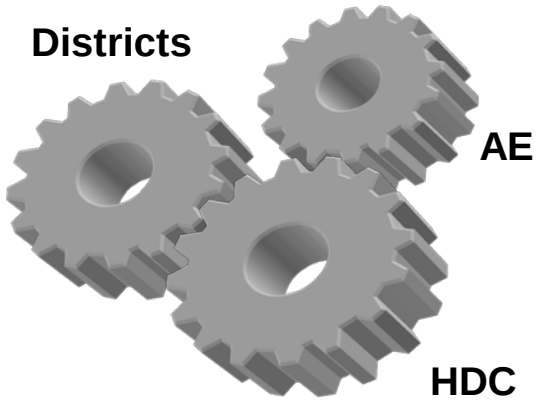
POSITIONING TO MEET THE DEMAND
LOOKING OUTWARD



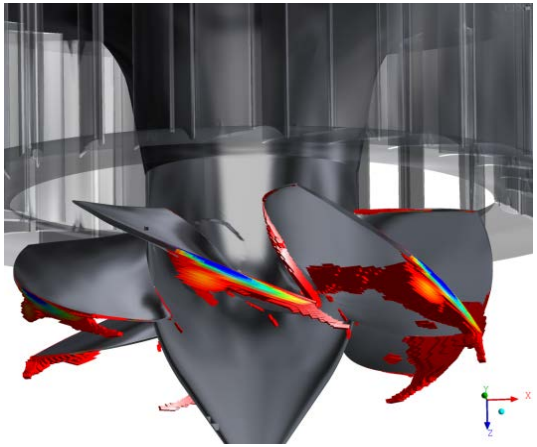
- USACE is taking a Three Pronged Design Approach
  - Hydropower professionals at the Hydroelectric Design Center MCX
  - District Engineering design support teams
  - Utilizing AE Capability in hydropower

  AE Contract Capacity in-place in Portland, Walla Walla, and Omaha Districts

- 15 Major Rehabs to start in the next 10yrs
  - 8 Major Rehabs currently on-going, $3B effort

HYDRO TRENDS

- Unit and Plant optimization
- New Technologies/Digital Equipment
- Cyber Protection, GDACS/SCADA, Instrumentation for the Corps & Others
- Renewable Energy Integration and Environmental Sustainability
- Investing in Modernization/Rehabilitation of our Infrastructure

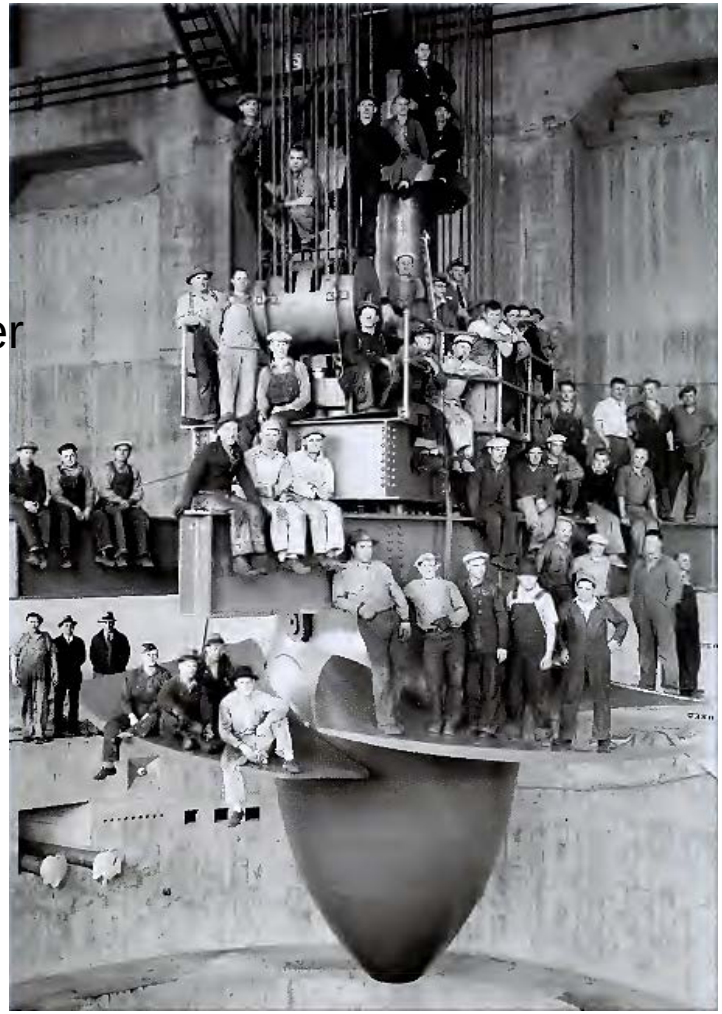


THE INFRASTRUCTURE CHALLENGE

- Capital stock built in first two-thirds of the 20th century
- 50 years - average age of Corps dams
- 80 years - Average age of non-federal hydropower turbines

Infrastructure investments:

- U.S. investing 2.5% GDP – Need = 3.1%



THE HYDROPOWER ENVIRONMENT IN THE NEXT 30-50 YEARS

- High Certainty of increasing Large Capital Investment to modernize Corps' hydropower fleet ($300M/yr now -> going to $500M/yr by 2025

- High value energy resource; Base, Peak, Voltage Support, Frequency Response/Regulation, major integrator of other renewables

- 10 Major Rehabs on-going (Gen rewind +/or Turbine runner) 15 new Rehabs to start in next 10 years.

- Increased Emergency Response, Aging Fleet, Forced Outages Trouble shooting, Emergency Repairs, Forensics

- SCADA & ICS Emerging Requirements, Compliance and Reliability burden, cyber security assurance, navigation and flood BLs

WALLA WALLA POTENTIAL HYDROPOWER PROJECT OPPORTUNITIES FY18-20

- Dworshak - Excitation System Replacement, FY18
- Dworshak - Intake Gantry Crane Replacement, FY20
- Dworshak - Powerhouse Annunciation Upgrade, FY20
- Dworshak - Tailrace Gantry Crane Rehab, FY20
- Ice Harbor - Generator Air Coolers Supply, FY18
- Ice Harbor - Station Service Breaker Replacement, FY18
- Ice Harbor - Station Service Transformer Replacement, FY18
- Ice Harbor - Transformer Deluge Fire Protection System Replacement, FY18
- Ice Harbor - Intake Gantry Crane Controls Upgrade, FY19
- Little Goose - Isophase Bus Refurbishment, FY18
- Little Goose - Station Service Breakers Replacement, FY18
- Little Goose - DC System and Low Voltage Switchgear Replacement, FY19

WALLA WALLA POTENTIAL HYDROPOWER PROJECT OPPORTUNITIES FY18-20

- Lower Granite - DC System and Low Voltage Switchgear Replacement, FY18
- Lower Granite - Isophase Bus Refurbishment, FY18
- Lower Granite - Station Service Breakers Replacement, FY18
- Lower Monumental - Isophase Bus Refurbishment, FY18
- Lower Monumental - Station Service Breakers Replacement, FY18
- Lower Monumental - DC System and Low Voltage Switchgear Replacement, FY19
- McNary, Ice Harbor, Lower Monumental, Little Goose, and Lower Granite, 12 Main Unit Spare Bearings, FY18+
- McNary - Turbine Runners and Generator Winding Replacement, FY17
- McNary - Governor Replacement, FY19
- McNary - Exciter Replacement, FY19
- McNary - Powerhouse Controls, Exciters and Governors Replacement, FY19
- McNary - Intake Gantry Crane Replacement, FY20
- McNary - Isolated Phase Bus Upgrade, FY20
- McNary - Tailrace Gantry Crane Replacement, FY20
- McNary - Station Service Turbine/Generator Units Upgrade, FY20+

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POTENTIAL NON-HYDROPOWER PROJECT OPPORTUNITIES FY18-19

Facility/Location	Project Name	Fiscal Year
Clarkston	Equipment Shed/Shelter	18
Clarkston	Modular Office Building	19
Dworshak	Diversion Tunnel Lighting	18
Dworshak	Weld Shop Bridge Crane	19
Dworshak	Fish Hatchery Mech Building 1 Boiler/Heat Exchanger Replacement	19
Ice Harbor	Lamprey Adult Ladder Entrance Modification	18
Ice Harbor	Weir Gate Hoists Replacement	19
Jackson Hole Levees	Veggie-Rap	18
Jackson Hole Levees	John Dodge Levee Barbs	18
Jackson Hole Levees	Morgan Levee Turnarounds	18
Little Goose	Waterstop Repair	18
Little Goose	Adult Passage Ladder Improvements	18
Little Goose	Juvenile Fish Facility Standby Generator	19
Lower Granite	Monolith Crack Repair	18
Lower Granite	Fishway Entrance Plugs and Bulkhead	18
Lower Granite	Prototype Spillway PIT Tag Monitoring System	18
Lower Granite	Miter Gate Pintle Bearing Grease Line Repairs	19
Lower Monumental	Fish Pump Penstock Emergency Closure	18
Lower Monumental	CCTV Security Visual Equipment Upgrade	19

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POTENTIAL NON-HYDROPOWER PROJECT OPPORTUNITIES FY18-19

Facility/Location	Project Name	Fiscal Year
Lucky Peak	Fire Suppression Water Line	18
Lucky Peak	Outlet Structure Slide Gate Hydraulic Cylinder Repairs	18
Lucky Peak	Dam Safety Vegetation Removal	18
Lucky Peak	Emergency Hoist Replacement	19
Mcnary	Navigation Lock Tainter Valves Replacement	18
Mcnary	Above Ground Fuel Storage Tank Replacement	18
Mcnary	Avian Predation Measures	18
Mcnary	Lamprey Adult Ladder Entrance Permanence	19
Mcnary	Navigation Lock Derrick Crane Replacement	19
Mcnary	Washington & Oregon Weir 4 Concrete Closures	19
Mcnary	Navlock Dow nstream Gate Fabrication/Replacement	19
Mill Creek	Return Canal Expansion Joint Repair	18
Mill Creek	Diversion Dam/ Spillw ay Sediment Removal	18
Mill Creek	Return Channel Bank Armor Rehabilitation	18
Mill Creek	Intake Canal Baffles Replacement	18
Mill Creek	Replace Yellow haw k/Garrison Creek Needle Gates	18
Mill Creek	Diversion Dam and Debris Barrier Maintenance	19

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