Staff Report

TO: Board of Directors

FROM: Chip Close, Water Operations Manager

DATE: November 9, 2021

SUBJECT: **Plan for Water Workshop #1- Mountain System Overview**

OPERATIONS

RECOMMENDATION:
Open a workshop and receive a presentation detailing NID's Mountain System operations and facilities.

BACKGROUND:
NID is embarking on the Plan for Water (PFW) process which includes a comprehensive review of available water supply and the long-term impacts on varying water demands. Once complete, it is anticipated the PFW will consist of a suite of possible supply and demand management strategies to address a range of future conditions to ensure reliable water supplies.

The success of the PFW will be largely dependent on stakeholder involvement. As such, NID has interest in providing relevant details and information regarding current system operations. A better understanding of NID today will help better inform future discussion as we navigate the PFW process.

This is the first of multiple PFW workshops, and will include details of NID's Mountain System operations and facilities. This is intended to be an open forum workshop, and public engagement is encouraged.

BUDGETARY IMPACT:
None at this time.

Attachments:

- PowerPoint – Mountain System Overview

NID PLAN FOR WATER WORKSHOP #1

MOUNTAIN DIVISION OVERVIEW

Plan For Water Workshop #1 Mountain Division Overview

- This Will Be An Open Forum Workshop
  - Feel free to ask questions as we go
  - Zoom attendees; raise hand on zoom app, or press *9 on your phone
    - We will call on you to unmute and join the conversation
- We plan on a short break at the one hour mark

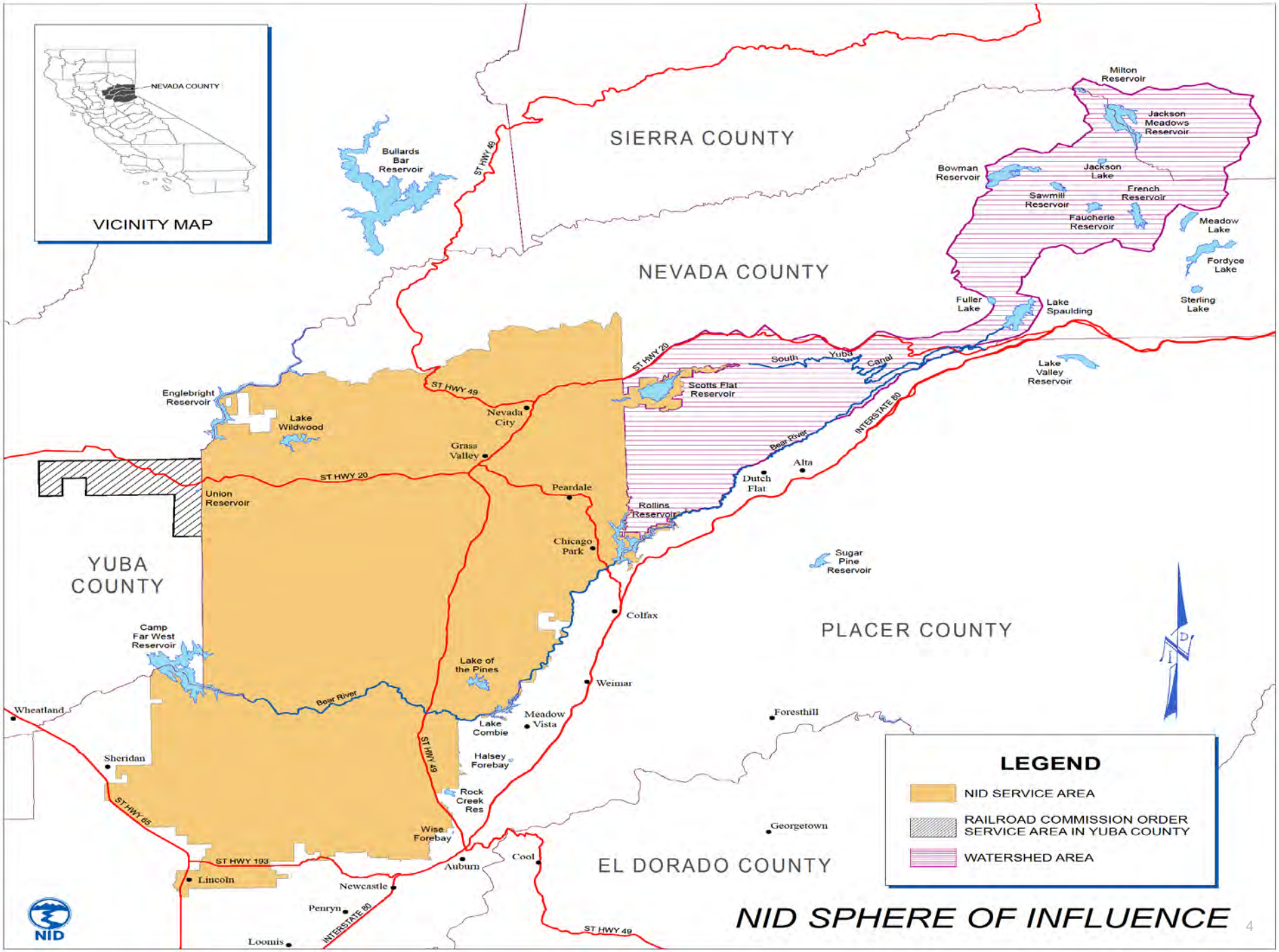
NID Lands Divided by Watershed Collection and Service Area

Watershed Area

- Generally known as NID's Mountain Division
- Operated and Maintained by NID's Hydroelectric Division

Service Area

- Lands where NID provides water delivery for consumptive uses
- Operated and Maintained by NID's Water Division


NEVADA COUNTY
VICINITY MAP
SIERRA COUNTY
NEVADA COUNTY
YUBA COUNTY
PLACER COUNTY
EL DORADO COUNTY
Milton Reservoir
Jackson Meadows Reservoir
Bullards Bar Reservoir
Bowman Reservoir
Jackson Lake
Sawmill Reservoir
French Reservoir
Faucherie Reservoir
Meadow Lake
Fordyce Lake
Sterling Lake
Fuller Lake
Lake Spaulding
Lake Valley Reservoir
Scotts Flat Reservoir
South Yuba Canal
Englebright Reservoir
Lake Wildwood
Nevada City
Grass Valley
Union Reservoir
Peardale
Rollins Reservoir
Chicago Park
Bear River
Dutch Flat
Alta
Sugar Pine Reservoir
Colfax
Weimar
Camp Far West Reservoir
Lake of the Pines
Wheatland
Meadow Vista
Lake Combie
Foresthill
Sheridan
Halsey Forebay
Rock Creek Res
Wise Forebay
Georgetown
Auburn
Cool
Lincoln
Newcastle
Penryn
Loomis
ST HWY 49
ST HWY 20
ST HWY 65
ST HWY 193
INTERSTATE 80
LEGEND
NID SERVICE AREA
RAILROAD COMMISSION ORDER SERVICE AREA IN YUBA COUNTY
WATERSHED AREA
NID SPHERE OF INFLUENCE

Two Halves of NID

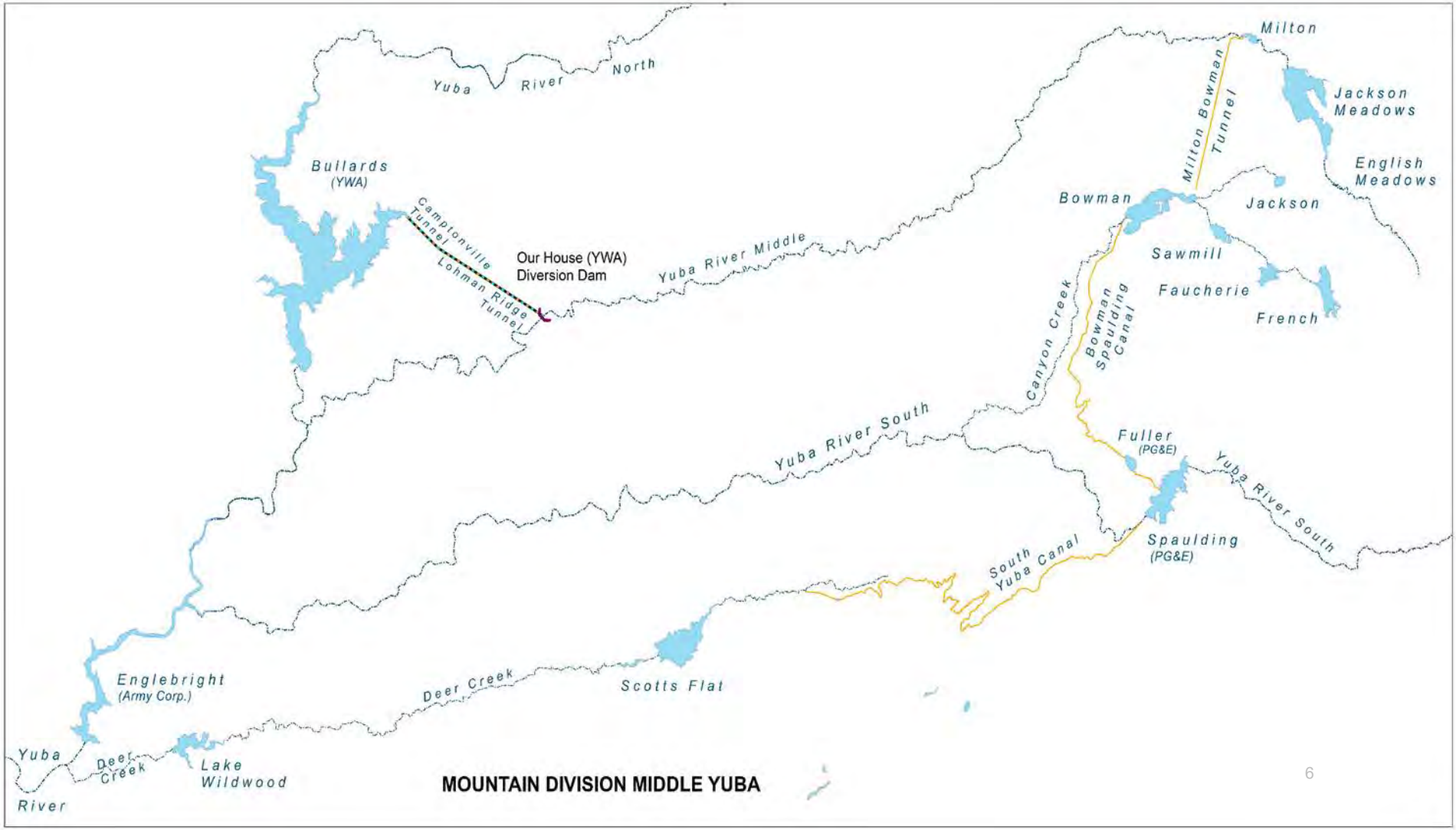
Watershed Lands

- 70k acres
- Lands Purchased With Water Rights
- Area of interest in NID SOI
- 9 Storage Res
- 270,089 Acre Feet Total Volume
- 24.4 Miles of Canal, Flume and Tunnel
- 7 Powerhouses
  - 82.2 Megawatts Max Cap.
- 19 Campgrounds and Dispersed Camping
- Roughly 300,000 Annual Visitors

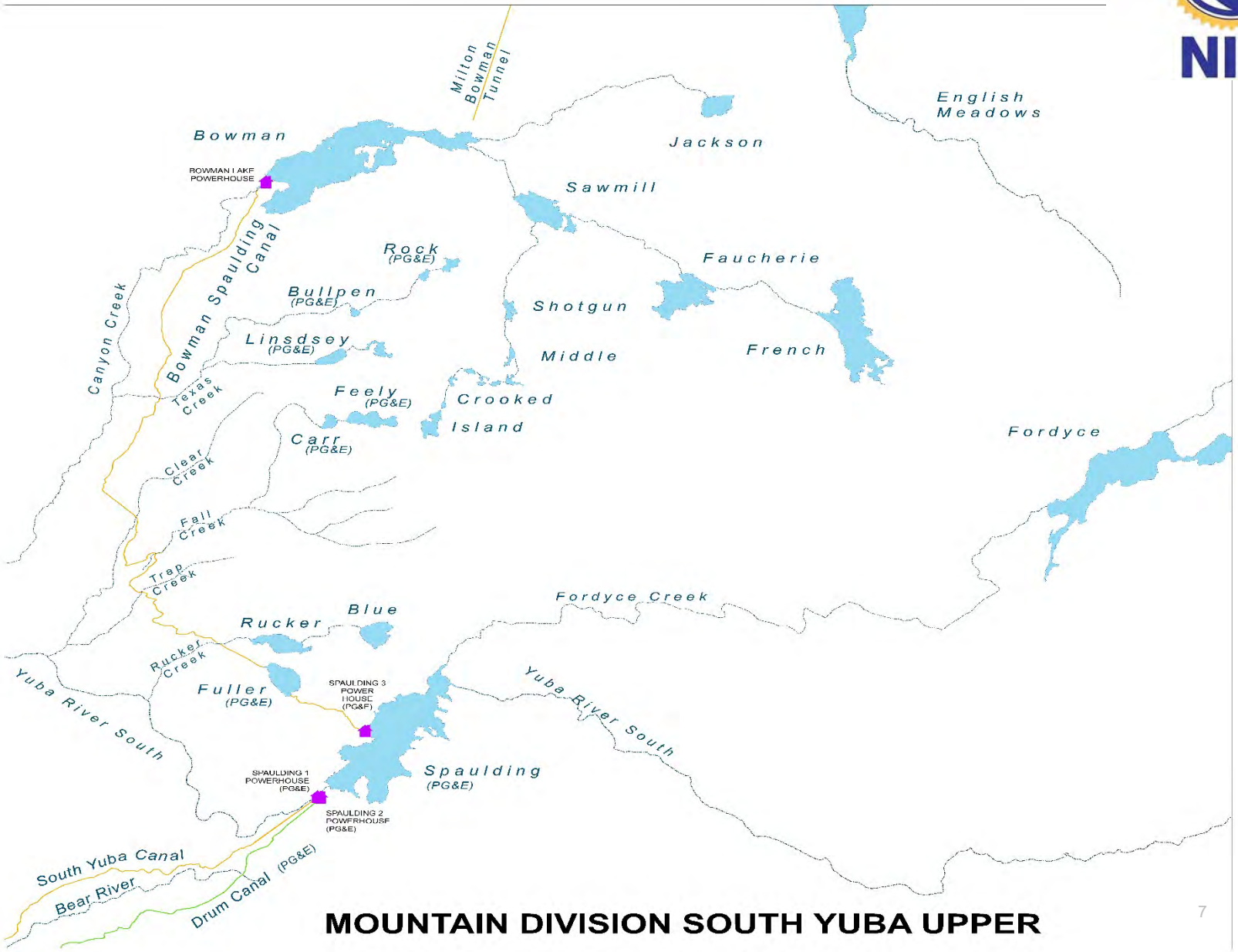
Service Area

- 287,000 Acres of Land
- Lands Included in Water Rights Service Area for Consumptive Use
- 500 Miles of Canal
- 6500 Raw Water Customers
- 6 Water Treatment Plants
- 400 Miles Treated Water Pipes
- 19,600 Treated Water Customers
- Utilize Roughly 150,000 Acre Feet a Year

MIDDLE YUBA RIVER SYSTEM

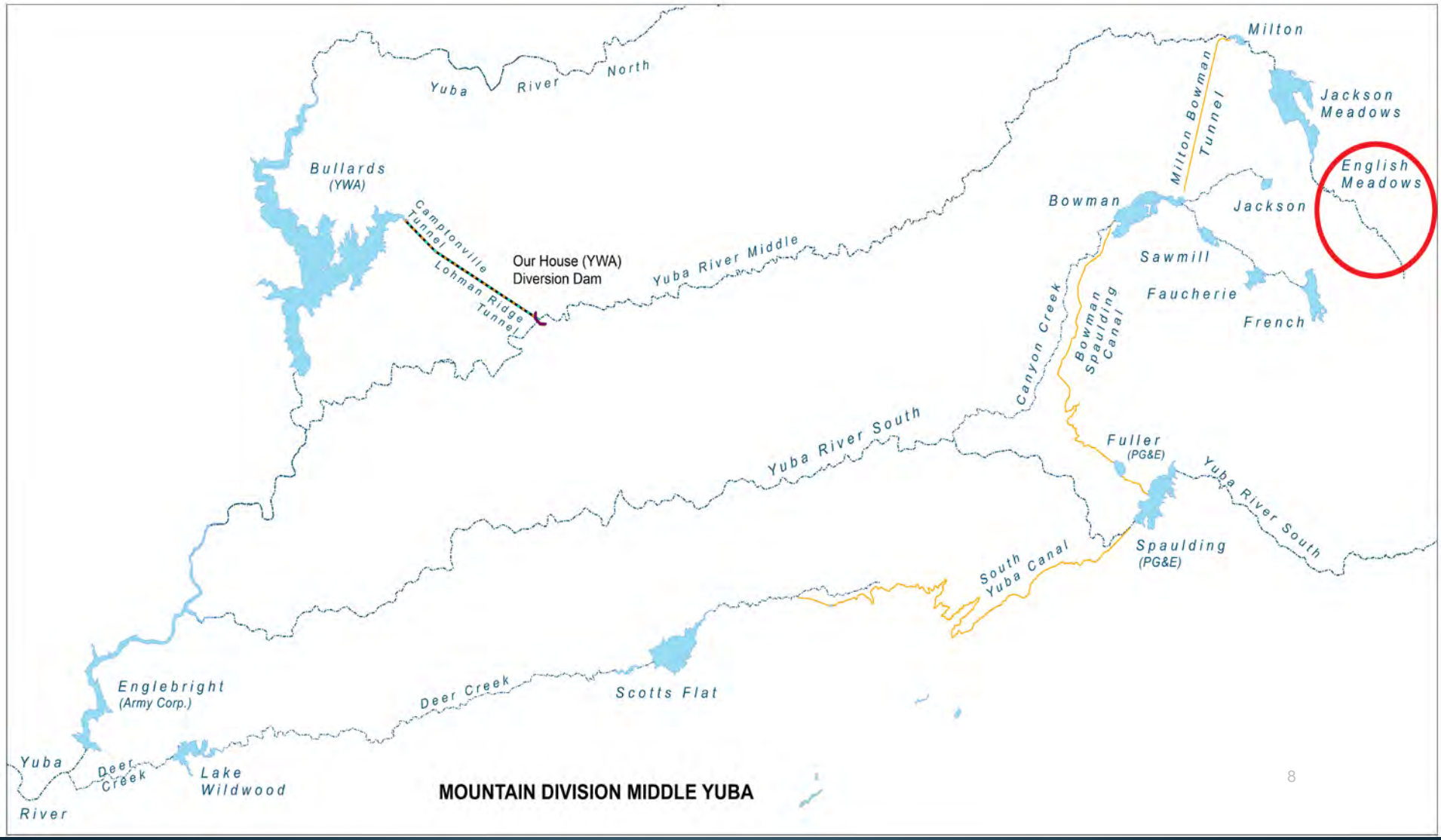


SOUTH YUBA RIVER SYSTEM



MOUNTAIN DIVISION SOUTH YUBA UPPER

MIDDLE YUBA RIVER SYSTEM



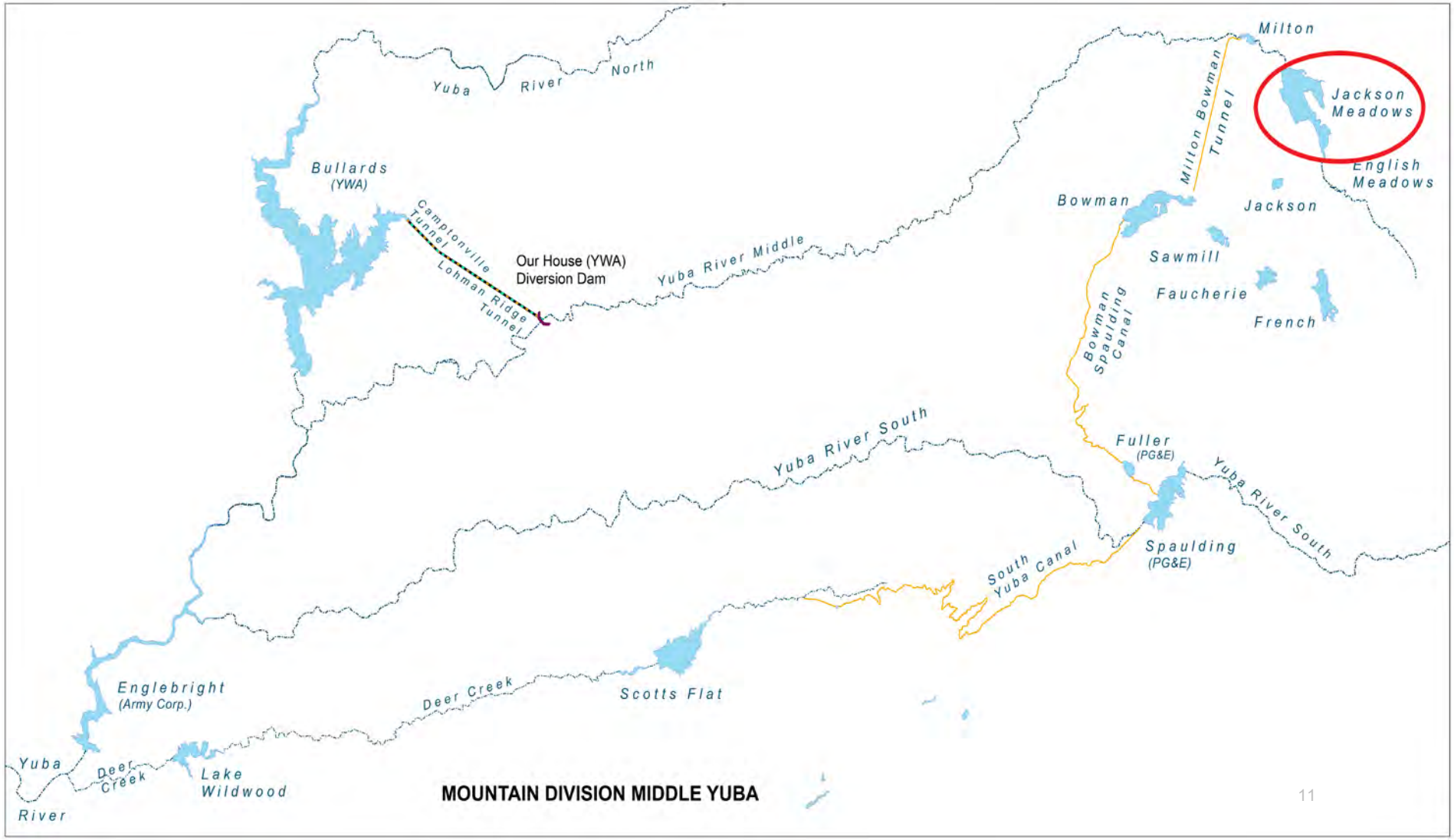
English Meadows

- Head Waters of Middle Yuba River
- Home to English Reservoir in 1857
  - Constructed to Support Hydraulic Mining
  - Dam was Ruptured in 1883

English Meadows

- NID Purchased the Land and the Water Rights During its Formation in the Early 1900's
  - NID Continues to Maintain and Improve the Meadow for Water Supply and Environmental Benefit

MIDDLE YUBA RIVER SYSTEM



Jackson Meadows Reservoir

Jackson Meadows Reservoir

- Instream Reservoir on Middle Yuba River
- Constructed in 1964-65
- Earth – Rockfill Dam
- Capacity = 69,205 Acre Feet
- Normal Max Elevation 6,036 ft
  - Minimum pool of 21,000 ac-ft during summer months and 3,000-10,000 af-ft fall-spring depending on water year type
- Water Rights – Storage rights for consumptive and non-consumptive uses
- Environmental Flow Requirements to Middle Yuba
  - Current Requirement = 5 CFS
  - Post FERC License Renewal = 11 – 120 CFS depending on month and water year type
- No Power Generation Onsite
- Includes Multiple Campgrounds, Day Use and Boating:
  - Silvertip, Aspen, East Meadows, Pass Creek, Pass Creek Overflow, Jackson Point Boat-in, Findley, Fir Top and Woodcamp
  - Supports Roughly 30,000 Visitors Annually

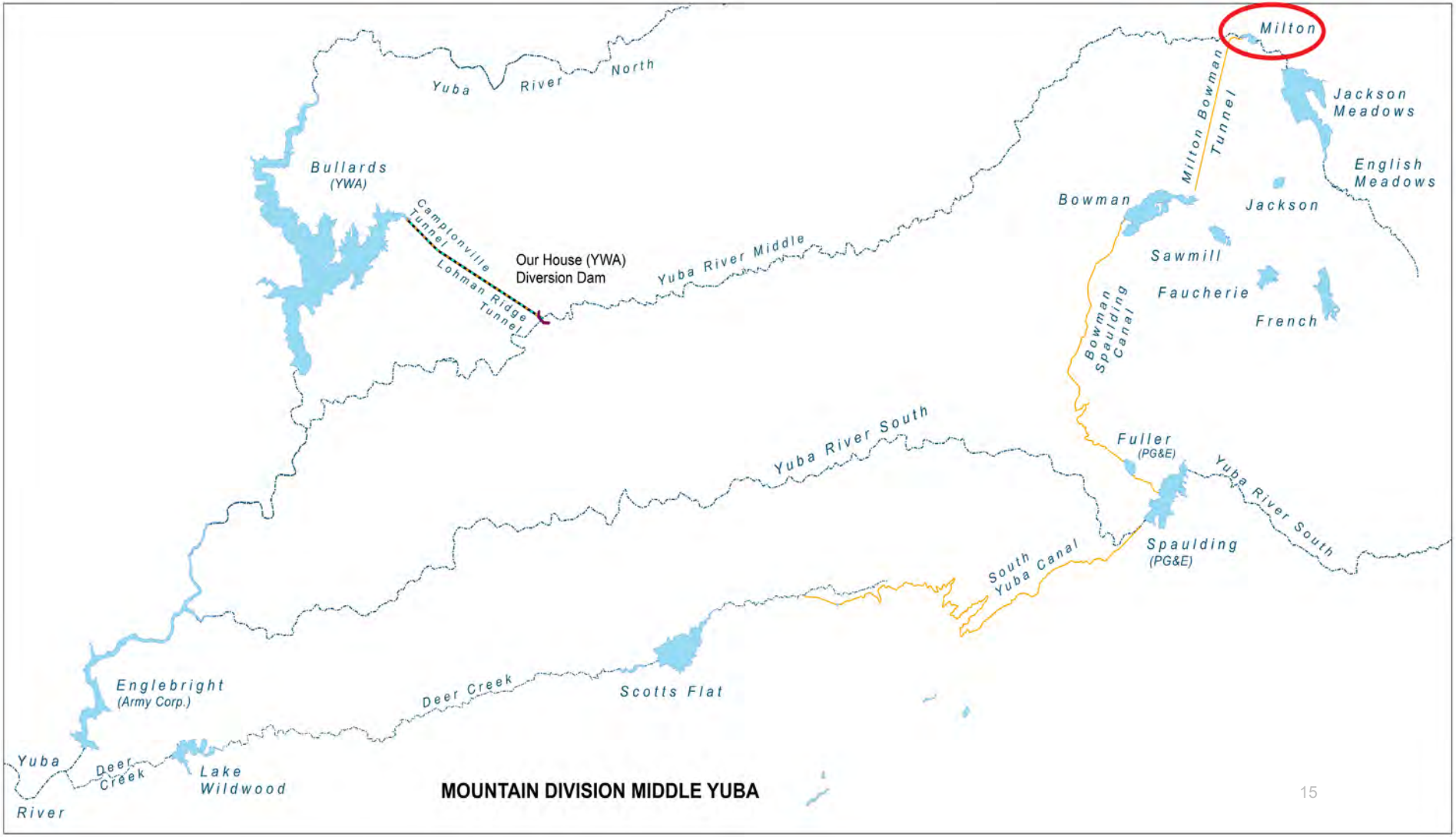
JACKSON MEADOWS DAM

Height: 195 feet

Crest Elevation: 6,044.5 ft.

Spillway Type: Radial Gates

MIDDLE YUBA RIVER SYSTEM



Milton Diversion

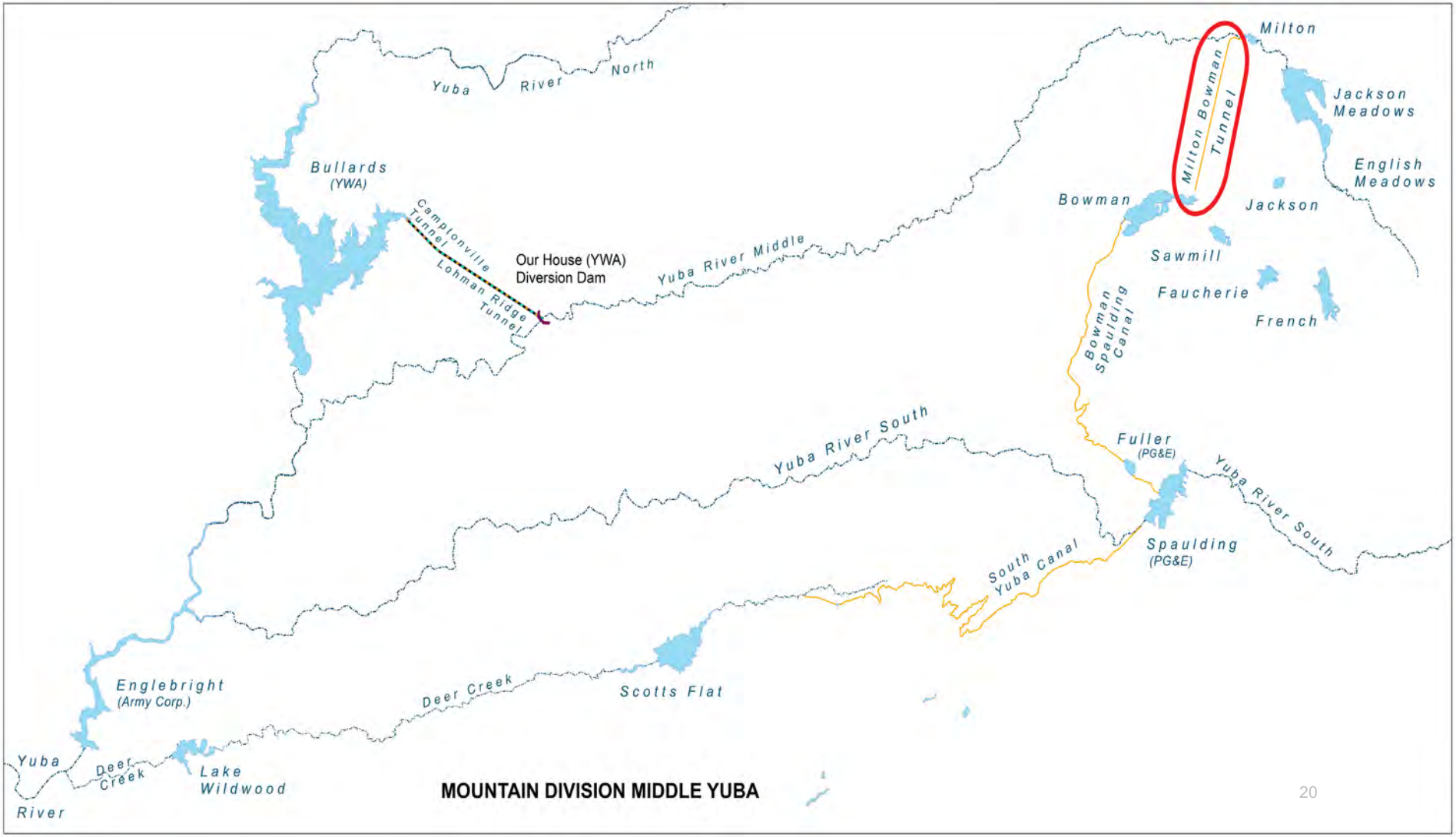
Milton Diversion

- Instream Diversion in Middle Yuba River
- Constructed to Build Head and Push Water into Milton Bowman Conduit
- Constructed in 1926
- Concrete Diversion
- Capacity of 295 Acre Feet
  - Not Considered a Storage Facility
- Normal Max Elevation 5,690 ft.
- Environmental Flow Requirements to Middle Yuba
  - Current Requirement =3 CFS
  - Post FERC License Renewal = 4-70 CFS depending on month and water year type
- Known for Trophy Trout Fishing (Catch and Release)
- Supports Dispersed Camping and Fishing


MILTON DIVERSION DAM
Dam Height: 37 feet
Crest Elevation: 5,690.0 ft
Spillway: Ungated
Fish Release
Middle
Yuba River
09 17 2020

MILTON DIVERSION IMPOUNDMENT

MIDDLE YUBA RIVER SYSTEM



MILTON-BOWMAN CONDUIT PIPE INTAKE

Milton Bowman Conduit

- Transfers Water From Milton to Bowman Reservoir
- Middle Yuba Watershed to Canyon Creek Watershed in the South Yuba Watershed
- Constructed 1926 – Pipeline Portion Rebuilt in 1965
- 3,315 ft of Pipeline and 22,623 ft Tunnel
- 450 cfs Maximum Capacity

Milton Bowman Conduit Inlet

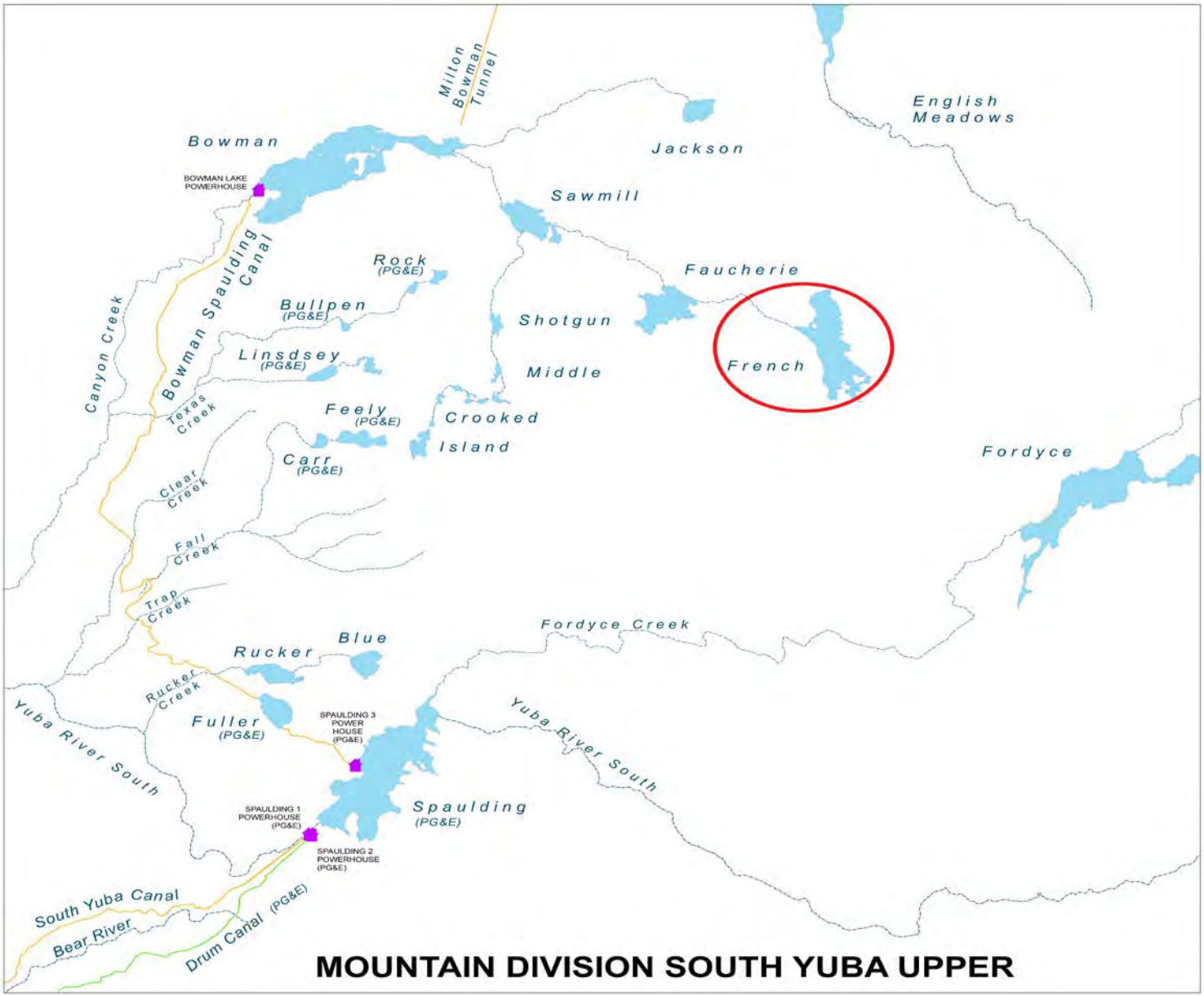
WILSON CREEK DIVERSION

Wilson Creek Gage Station

- Tributary in the Middle Yuba Watershed
- NID Water Rights Allow Capture of 1,580 Acre Feet into Milton Bowman Pipeline
- Environmental Flows to Wilson Creek
  - Current Requirements = None
  - Post FERC License Renewal = 0.25 CFS or natural flow, whichever is less

MILTON-BOWMAN TUNNEL OUTLET

SOUTH YUBA RIVER SYSTEM

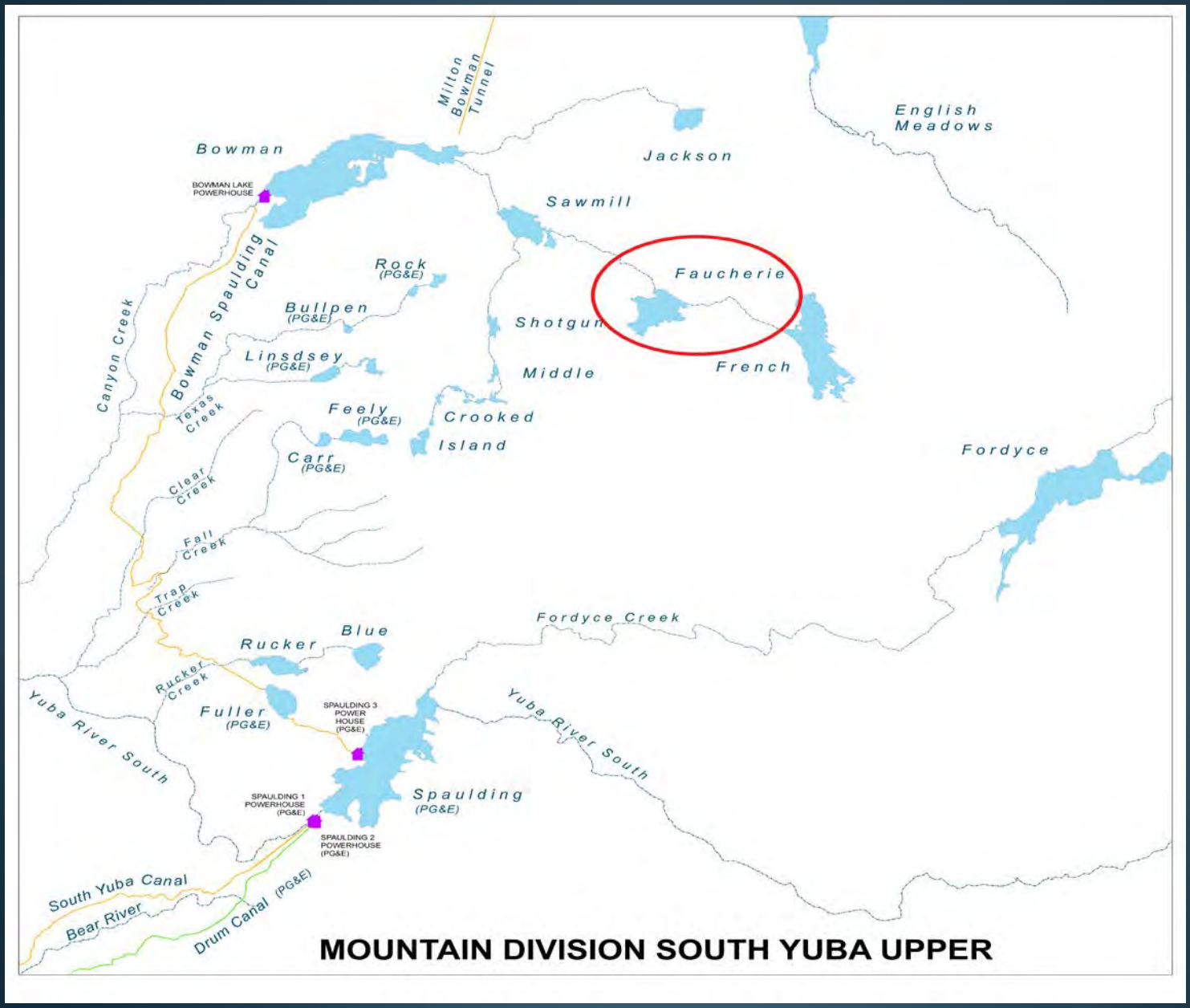


FRENCH RESERVOIR

French Reservoir

- Instream Canyon Creek Reservoir
- Part South Yuba Watershed
- Constructed in 1859 – Raised in1948
- Concrete faced rockfill
- Capacity = 13,940 Acre Feet
- Maximum Normal Elevation 6,660 ft.
- Pre-1914 Water Rights Allow for Storage of 13,940 Acre Feet
- Typical Low Elevation is approximately 6,636 ft.
- Environmental Flows to Canyon Creek
  - Current Requirements = 2.5 CFS
  - Post FERC License Renewal = 5-18 CFS depending on month and water year type
- No Power Generation
- Supports Walk In Dispersed Camping

SOUTH YUBA RIVER SYSTEM

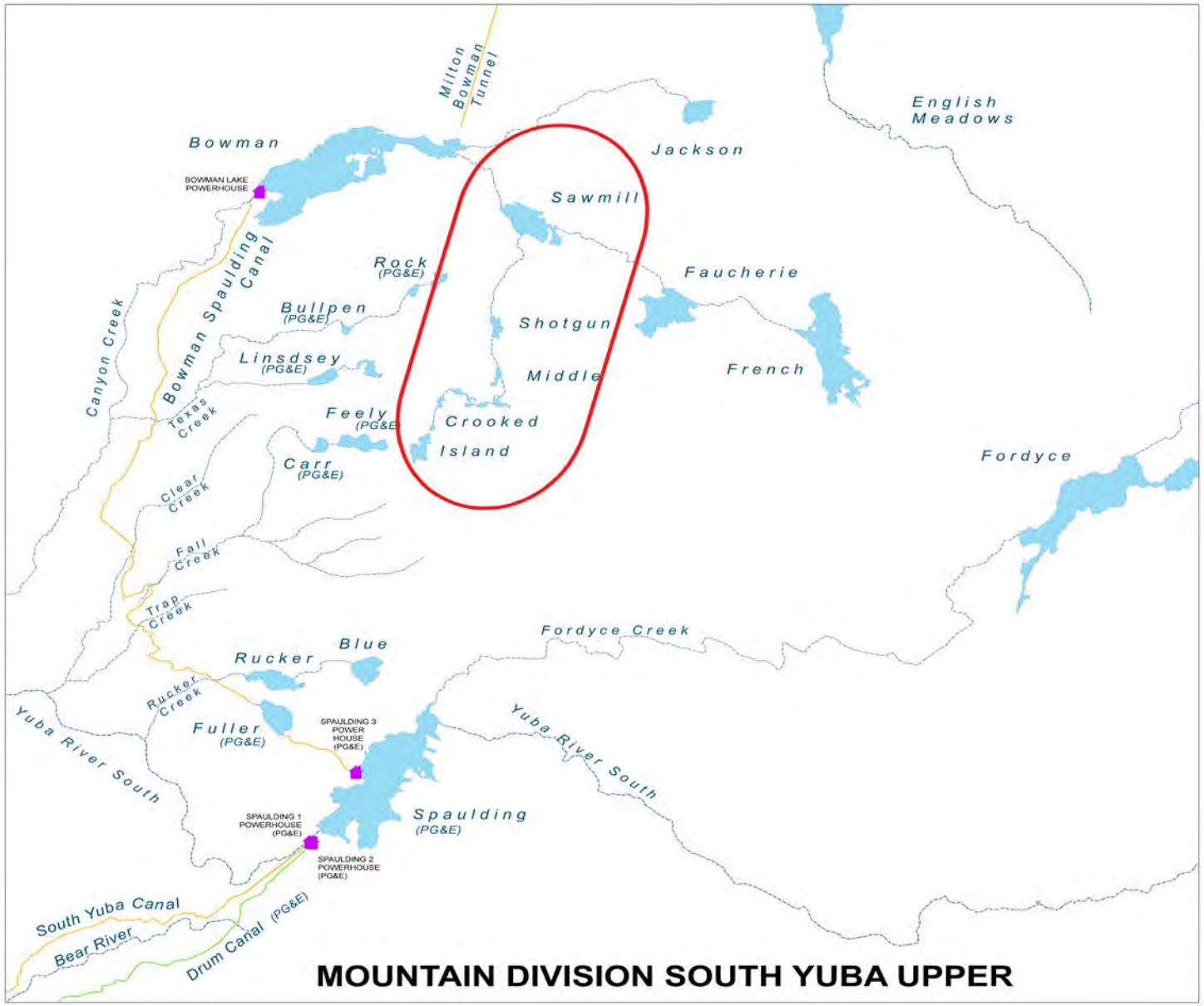



Faucherie Reservoir

Faucherie Reservoir

- Instream Canyon Creek Reservoir
- Part of South Yuba Watershed
- Constructed in1872 – Reconstructed 1964-65
- Earth core, rockfill
- Capacity = 3,980 Acre Feet
- Maximum Normal Elevation 6,123 ft.
- Pre 1914 Water Rights Allow for Storage of 2,600 Acre Feet
- Typical Low Elevation
- Environmental Flow Release to Canyon Creek
  - Current Requirements = 2.5 CFS
  - Post FERC Requirements = 5 –18 CFS depending on month and water year type
- No Power Generation
- Camping, Day Use and Boating Roughly 7,000 Visitors Annually

SOUTH YUBA RIVER SYSTEM




Sawmill Reservoir

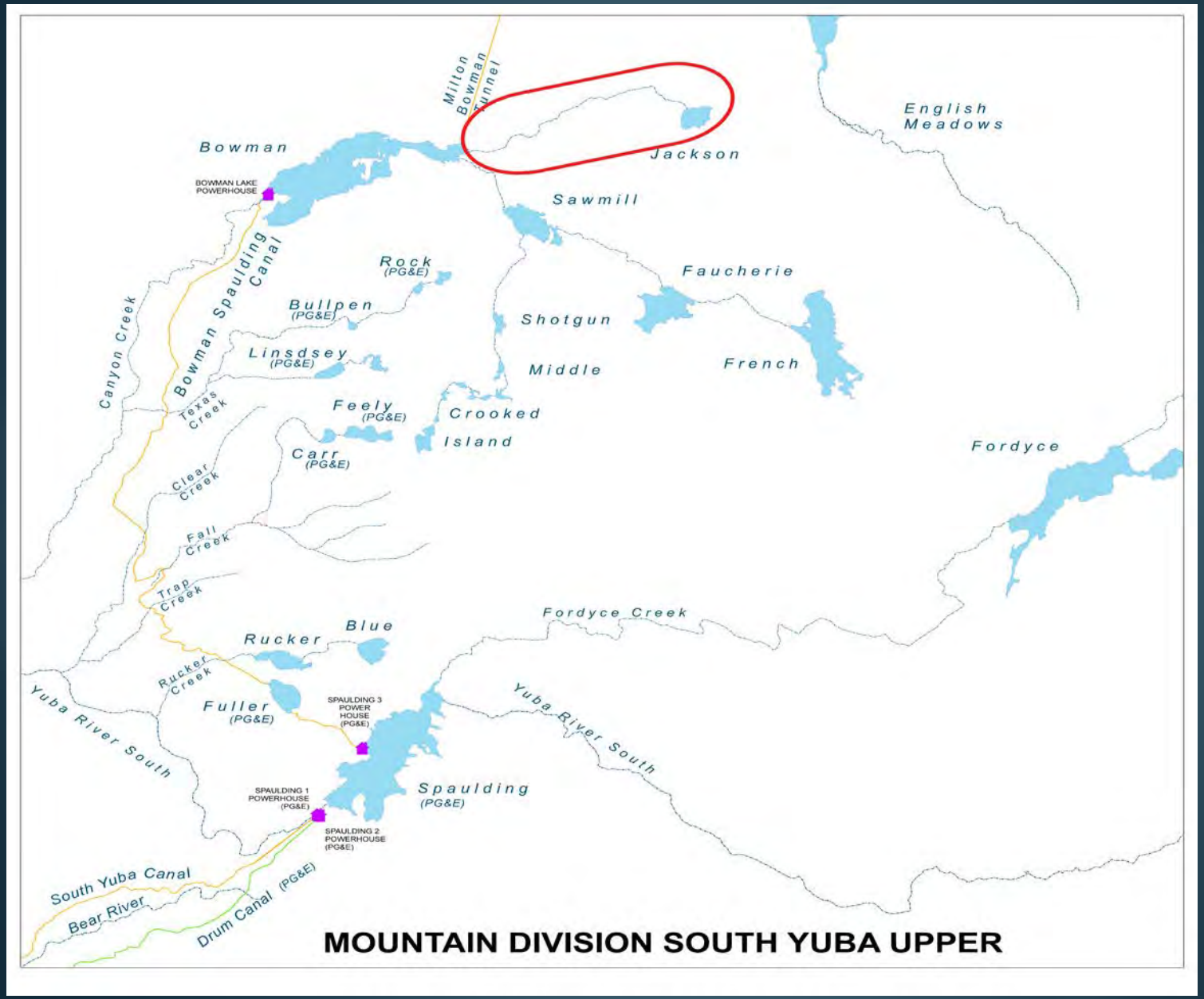
SAWMILL DAM

Dam Height: 60 ft
Crest Elevation: 5,865.0 ft
Spillway Type: Ungated

Sawmill Reservoir

- Instream Canyon Creek Reservoir
- Part of South Yuba Watershed
- Constructed in 1910
- Stacked Rock Dam
- Capacity = 3,030 Acre Feet
- Maximum Normal Elevation 5,860 ft.
- Typical Low Elevation 6,105 ft.
- Pre 1914 Water Rights for Storage of 2,760 Acre Feet
- Environmental Flow to Canyon Creek
  - Current Requirement = 2.5 CFS
  - Post FERC License Renewal = 5 –18 CFS depending on month and water year type
- No Power Generation
- Dispersed Camping Approximately 5,000 Visitors Annually

SOUTH YUBA RIVER SYSTEM



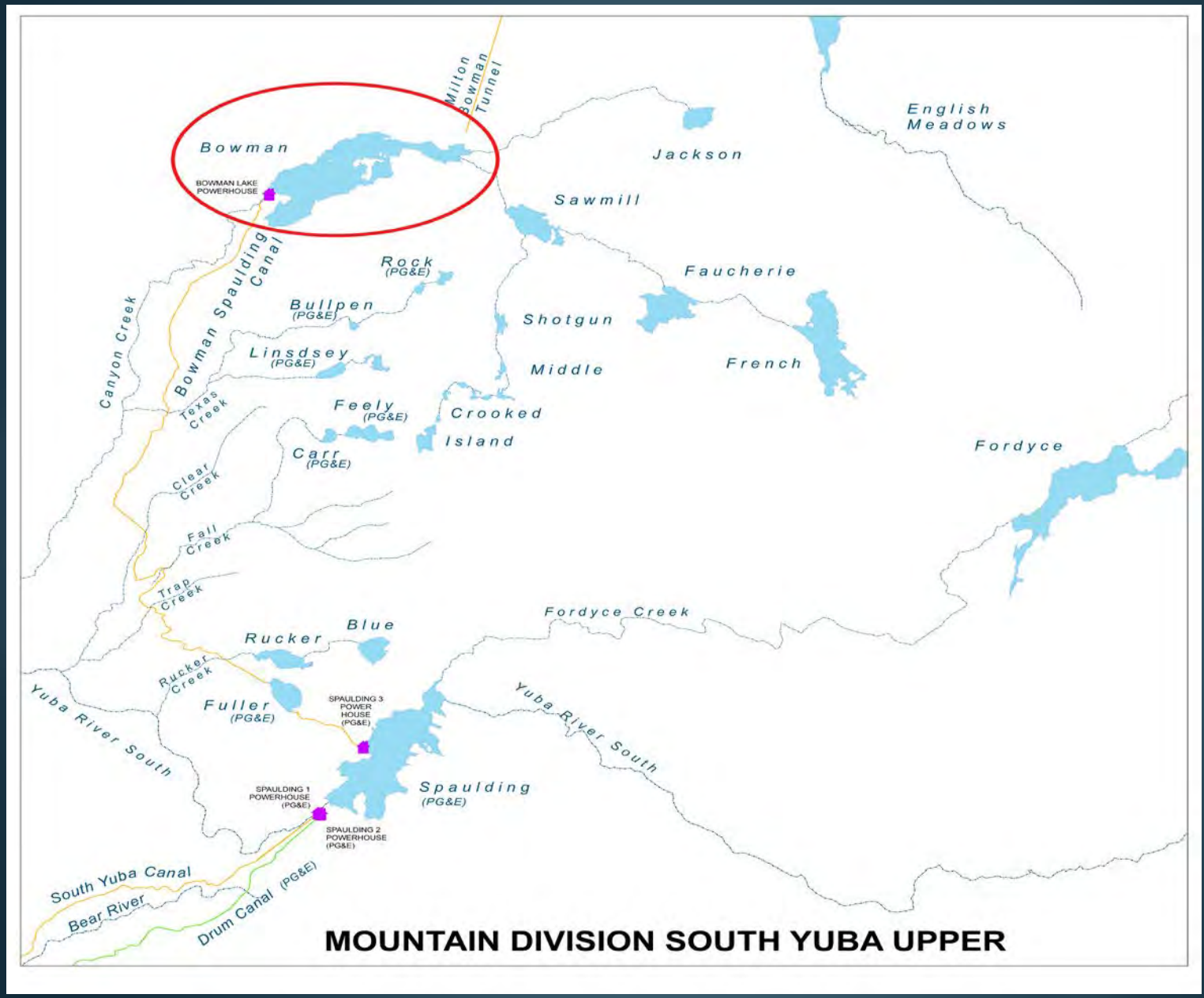
Jackson Reservoir


JACKSON RESERVOIR AND DAM
Dam Height: 28 ft
Crest Elevation: 6,596.0 ft
Spillway Type: Ungated
Constructed: 1941-42

Jackson Reservoir

- Instream Reservoir @ Head of Jackson Creek
- Part of Jackson Creek & South Yuba Watershed
- Constructed in 1941-42
- Earthen Dam
- Capacity = 1,330 Acre Feet
- Max Elevation 6,592 ft.
- Typical Low Elevation 6,584 ft.
- Pre 1914 Water Rights to Store 1,330 Acre Feet
- Environmental Flow Release to Jackson Creek
  - Current Requirement = 0.75 CFS
  - Post FERC License Renewal = 0.5 - 3 CFS depending on month and water year type
- No Power Generation

SOUTH YUBA RIVER SYSTEM



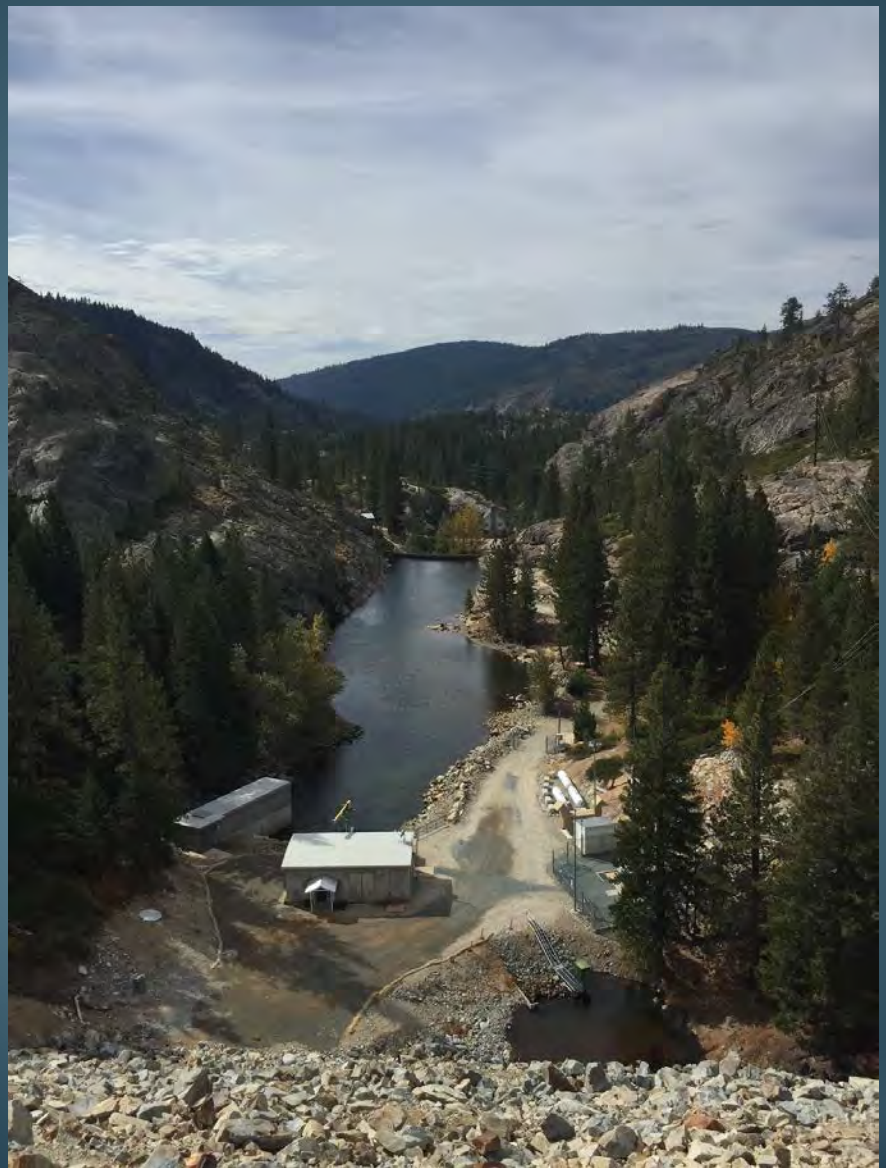

BOWMAN RESERVOIR

Bowman Reservoir

- Instream Canyon Creek Reservoir
- Part of South Yuba Watershed
- Constructed in 1869 – Reconstructed 1926-27
- Earthen & Concrete Dam
- Capacity = 68,510 Acre Feet
- Maximum Elevation 5,562 ft.
- Typical Low Elevation 5,521 ft.
- Pre 1914 Water Rights to Store 21,350 Acre Feet
- Supports Dispersed Camping and Boating
- Supplies Water & Head for Bowman Power House

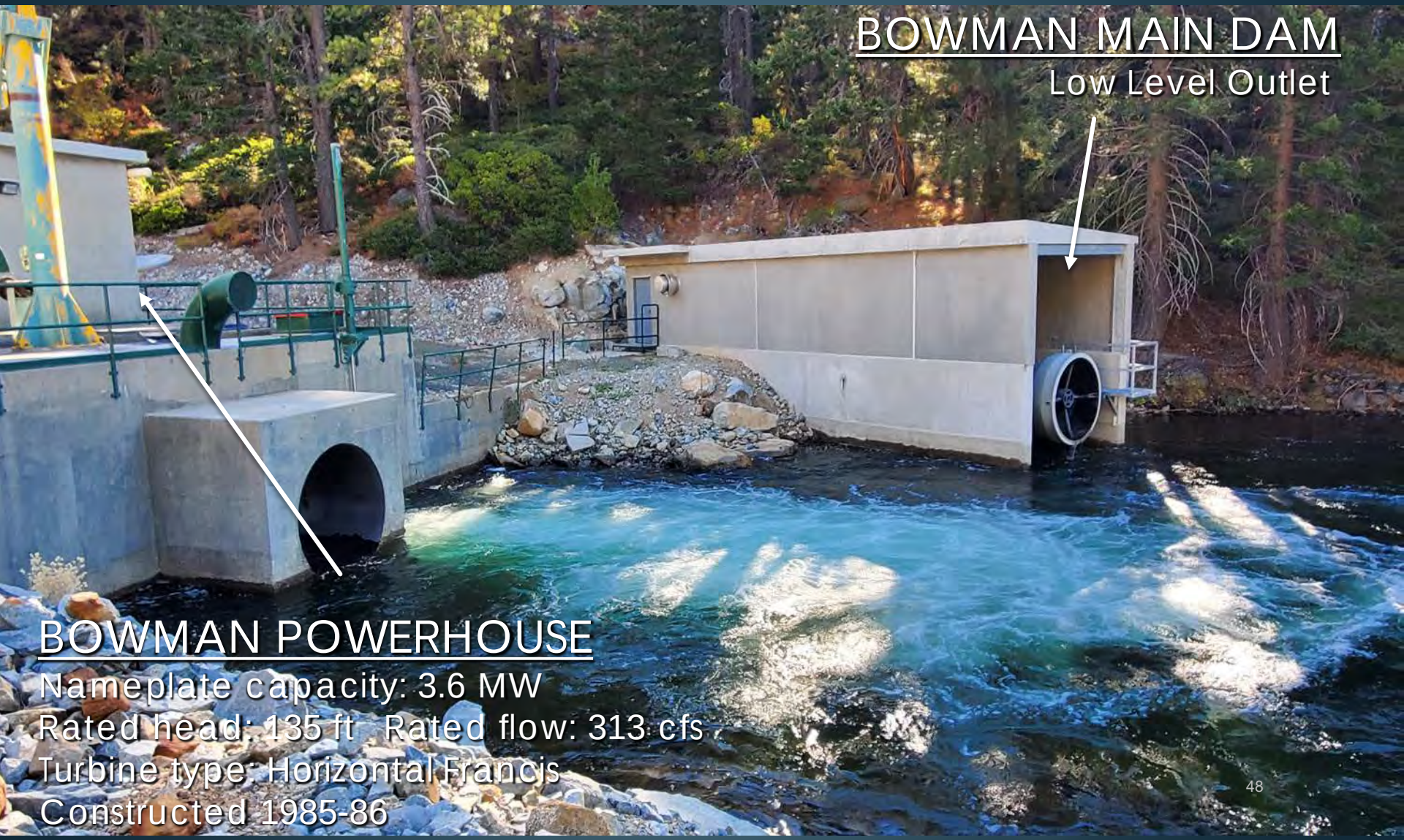

BOWMAN NORTH DAM
Height: 175 ft
Crest Elevation: 5,567.0 ft
BOWMAN SOUTH ARCH DAM
Height: 135 ft
Crest Elevation: 5,563.6 ft
Canyon Creek

Bowman Powerhouse

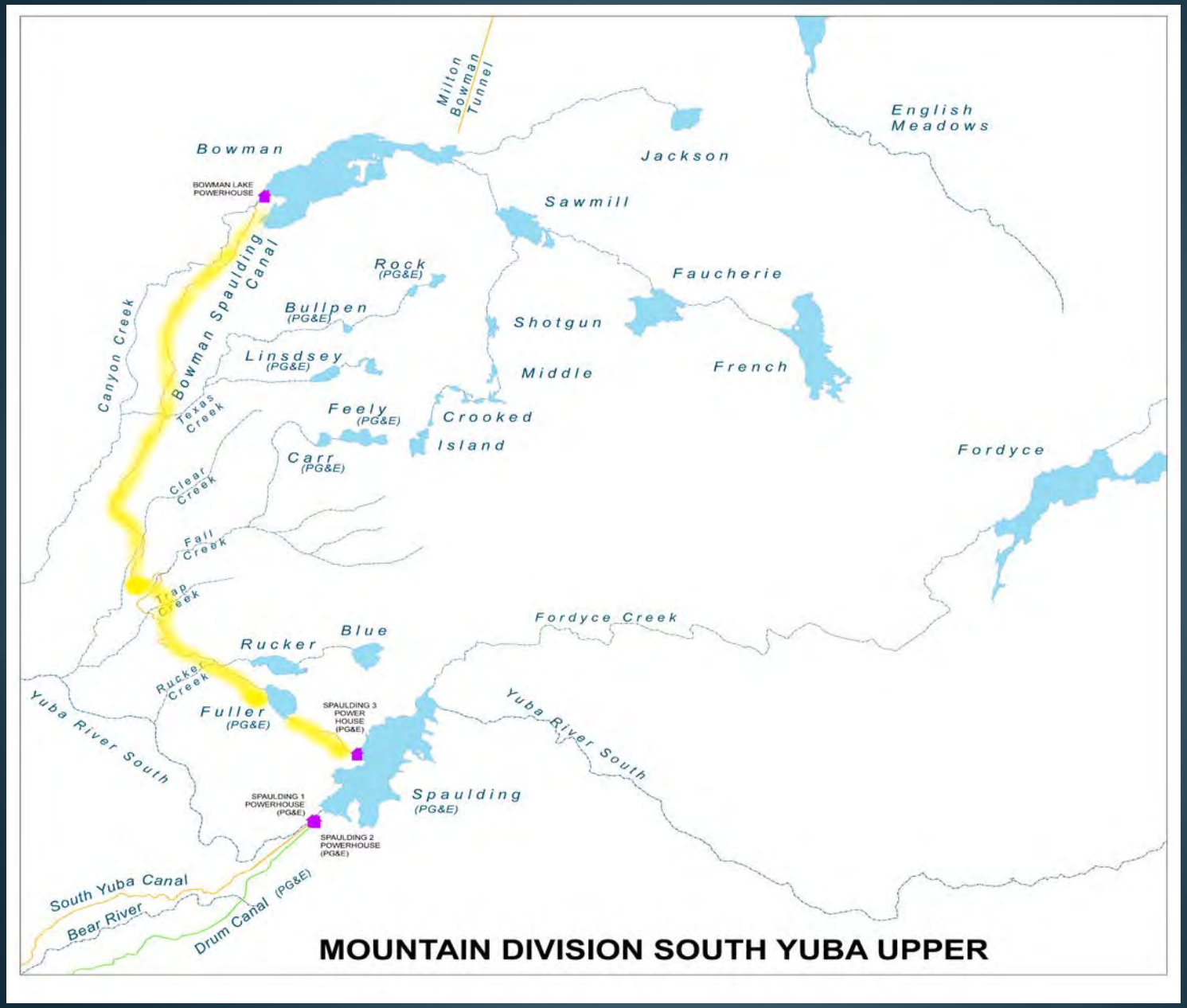


Bowman Powerhouse

- Instream Canyon Creek Powerhouse
- Within the South Yuba Watershed
- Constructed in 1985-86
- Rated at 3.6 MW
- Power Generated Via Consumptive & Environmental Demand Flows From Bowman
- PPA with PG&E Through June 2033


BOWMAN MAIN DAM
Low Level Outlet
BOWMAN POWERHOUSE
Nameplate capacity: 3.6 MW
Rated head: 135 ft Rated flow: 313 cfs
Turbine type: Horizontal Francis
Constructed 1985-86

SOUTH YUBA RIVER SYSTEM




BOWMAN-SPAULDING CANAL

Bowman-Spaulding Conduit

Bowman-Spaulding Conduit Diversion

Bowman North Dam

Bowman Spaulding Canal

- Transfers Water From Discharge of Bowman & Canyon Creek to Lake Spaulding
- Located Within the South Yuba Watershed
- Constructed 1926 – Capacity Expanded 1964-65
- 7.7 Miles of Canal and Flume & 3.1 Miles of Tunnel
- 300-325 CFS Maximum Capacity depending on location
- Contains 5 Tributaries Along Route to Lake Spaulding
- Environmental Flow Release to Canyon Creek below Diversion Dam
  - Current Requirement = 2-3 CFS
  - Post FERC License Renewal = 4-60 CFS depending on month and water year type

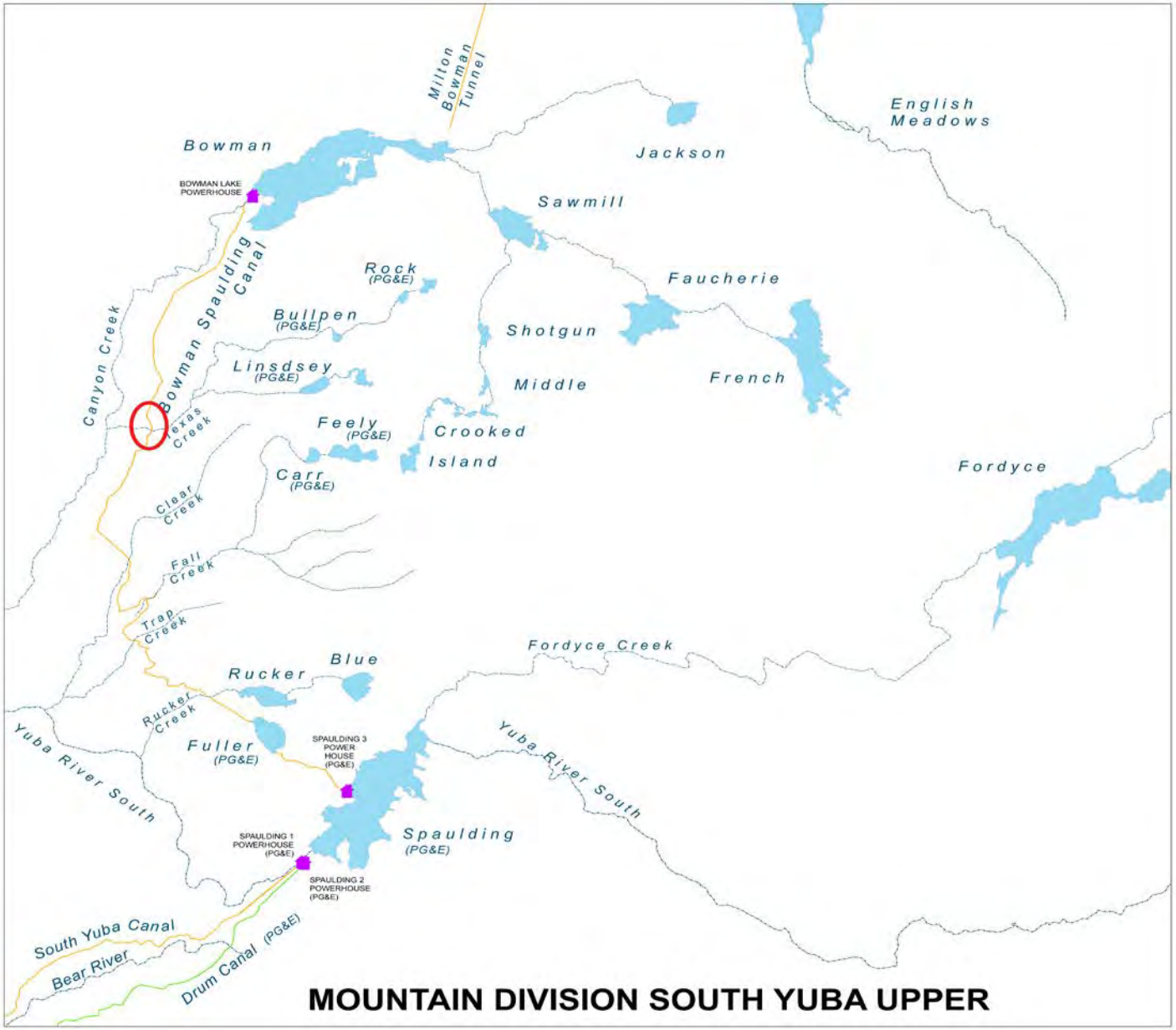
Regulating Gate to the Bowman Spaulding Canal

BOWMAN-SPAULDING CONDUIT DIVERSION DAM

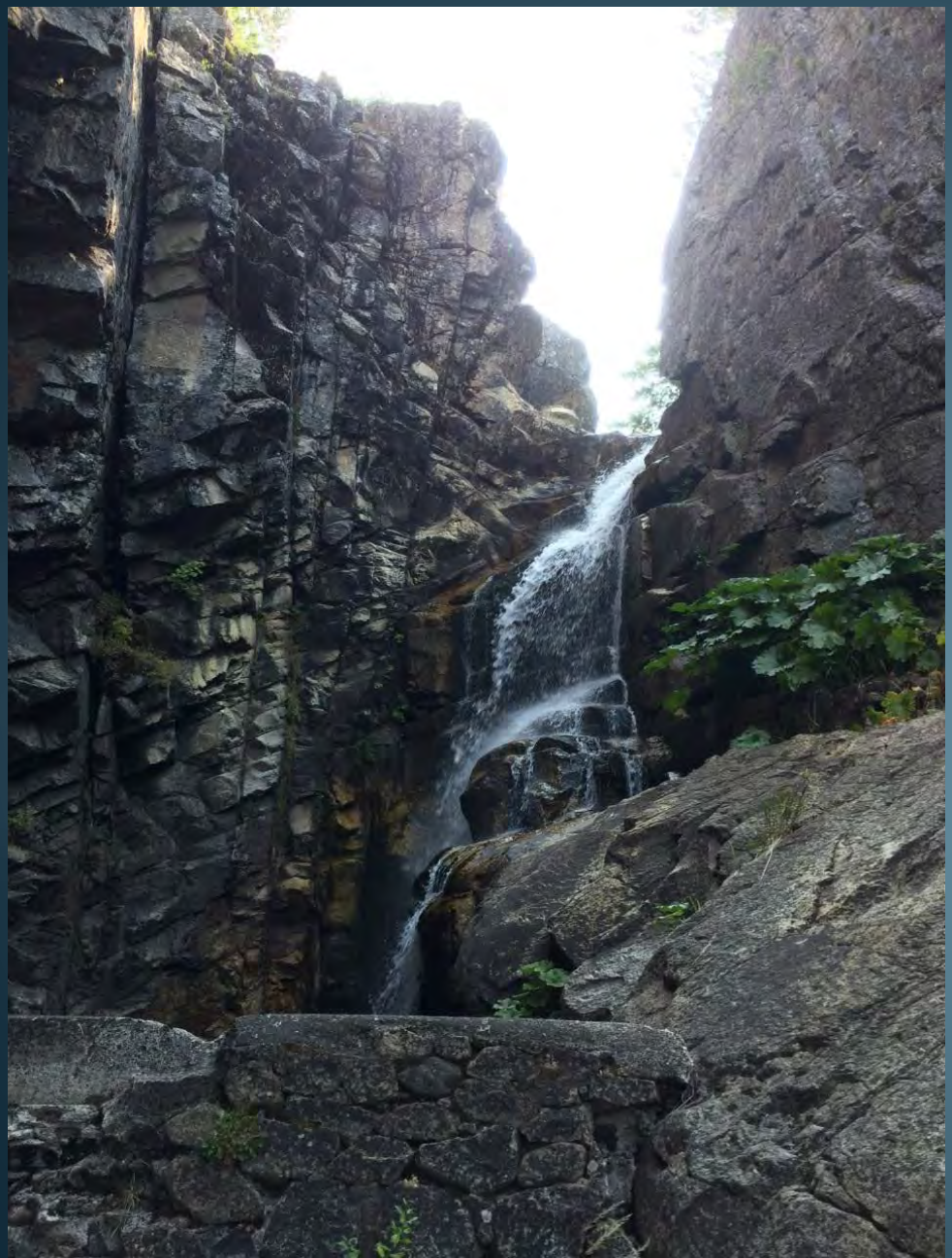
Height: 21 ft

Crest Elevation: 5,400.0 ft

SOUTH YUBA RIVER SYSTEM



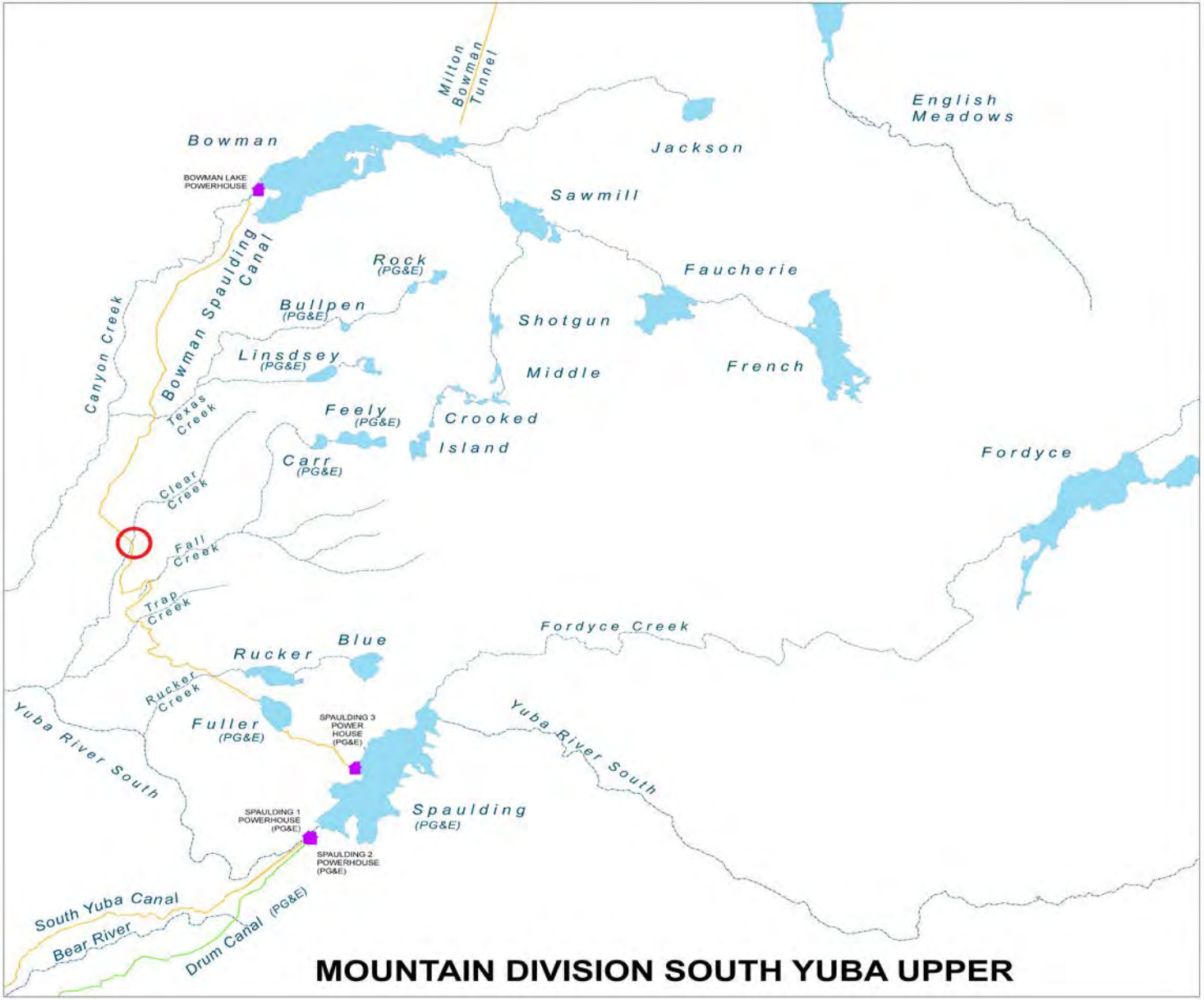
Texas Creek Diversion



- Includes NID & PG&E water Rights
- PG&E's Rock Bullpen and Lindsey Lakes at Head
- Instream Flows Past BS Canal
  - Current Flow = 0 CFS
  - Post FERC Relicense Flow = 0.6-3 CFS depending on month and water year type


TEXAS CREEK DIVERSION DAM
Height: 10 ft. Crest Elevation: 5,385.75 ft.
Spillway: Ungated
BOWMAN-SPAULDING CONDUIT
TEXAS CREEK

SOUTH YUBA RIVER SYSTEM



Clear Creek Diversion

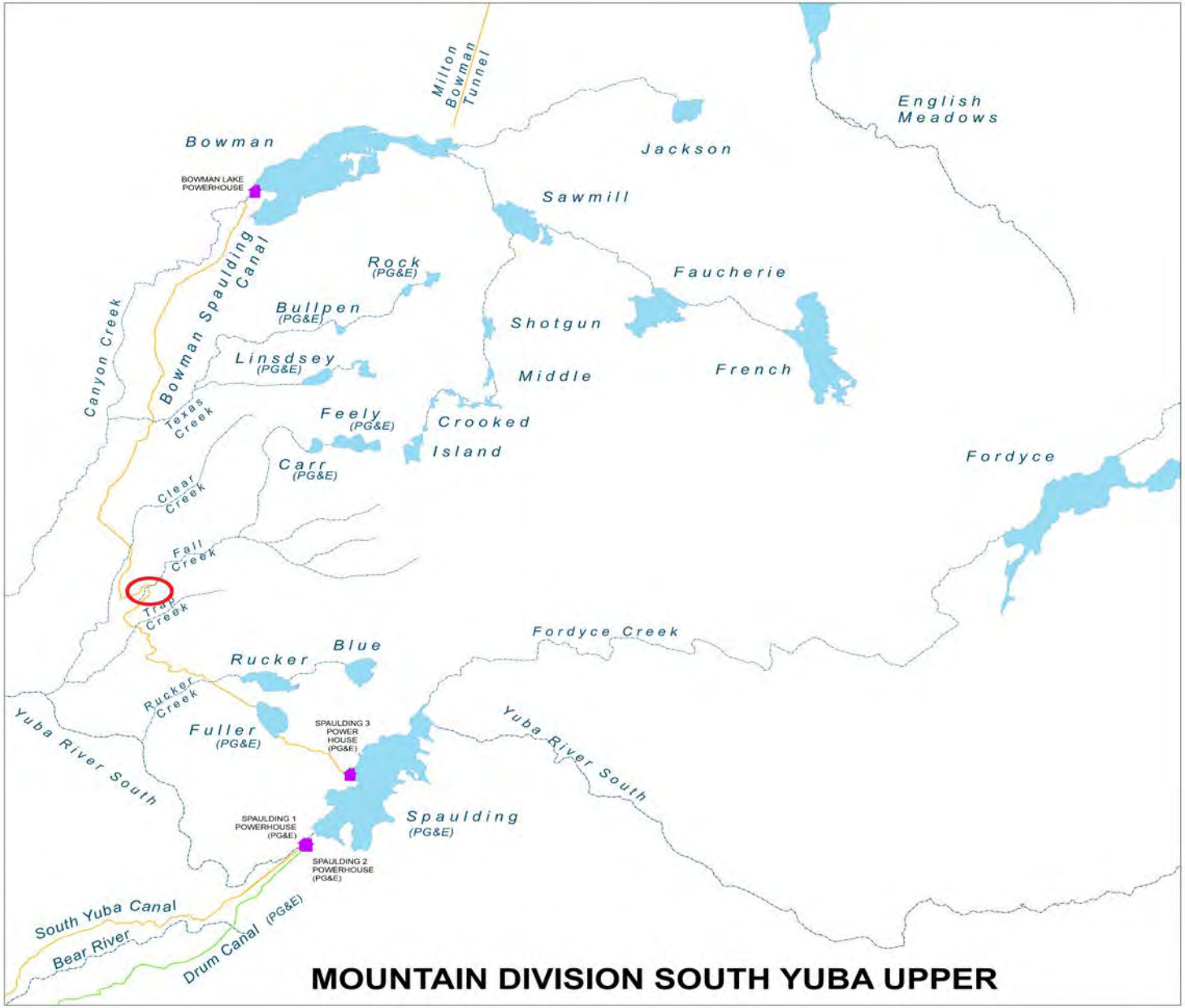
- Instream Flows Past BS Canal
  - Current Requirement = 0 CFS
  - Post FERC License Renewal = 1-6 CFS

CLEAR CREEK DIVERSION DAM

Height: 5 ft. Crest Elevation: 5,375 ft.


CLEAR CREEK DIVERSION DAM
Height: 5 ft. Crest Elevation: 5,375 ft
Type: Concrete
CLEAR CREEK
OVERFLOW
BOWMAN-SPAULDING CONDUIT

SOUTH YUBA RIVER SYSTEM



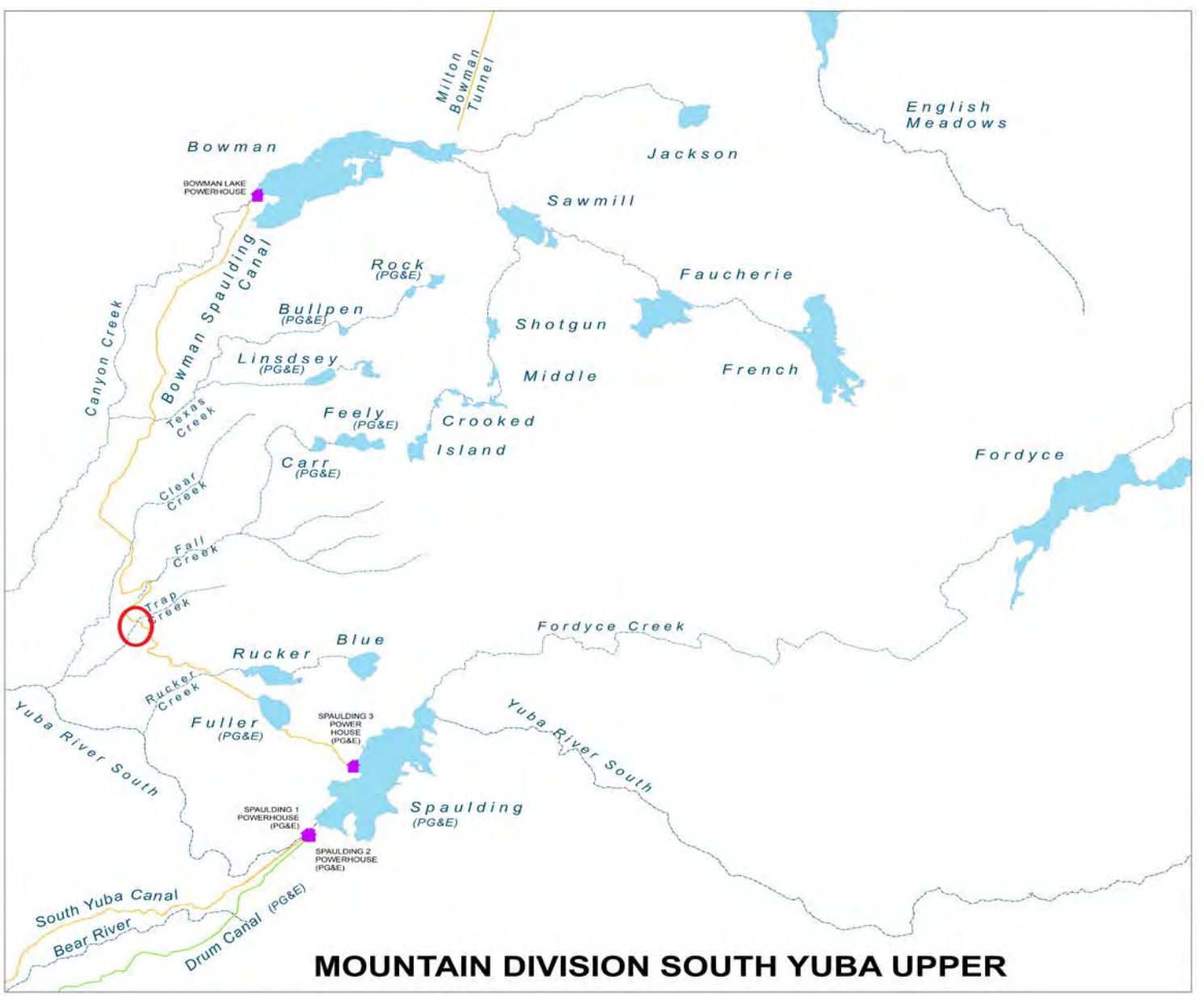
Fall Creek Diversion

- Includes NID & PG&E water rights
- PG&E's Carr and Feeley Lake at Head
- Instream Flows Past BS Canal
  - Current Flow Requirement = 0 CFS
  - Post FERC License Renewal = 2-30 CFS or natural flow which ever is less


FALL CREEK
FALL CREEK DIVERSION DAM
Height: 5.5 ft. Crest Elevation: 5,368.68 ft.


BOWMAN-SPAULDING CONDUIT
FALL CREEK DIVERSION FLUME

SOUTH YUBA RIVER SYSTEM



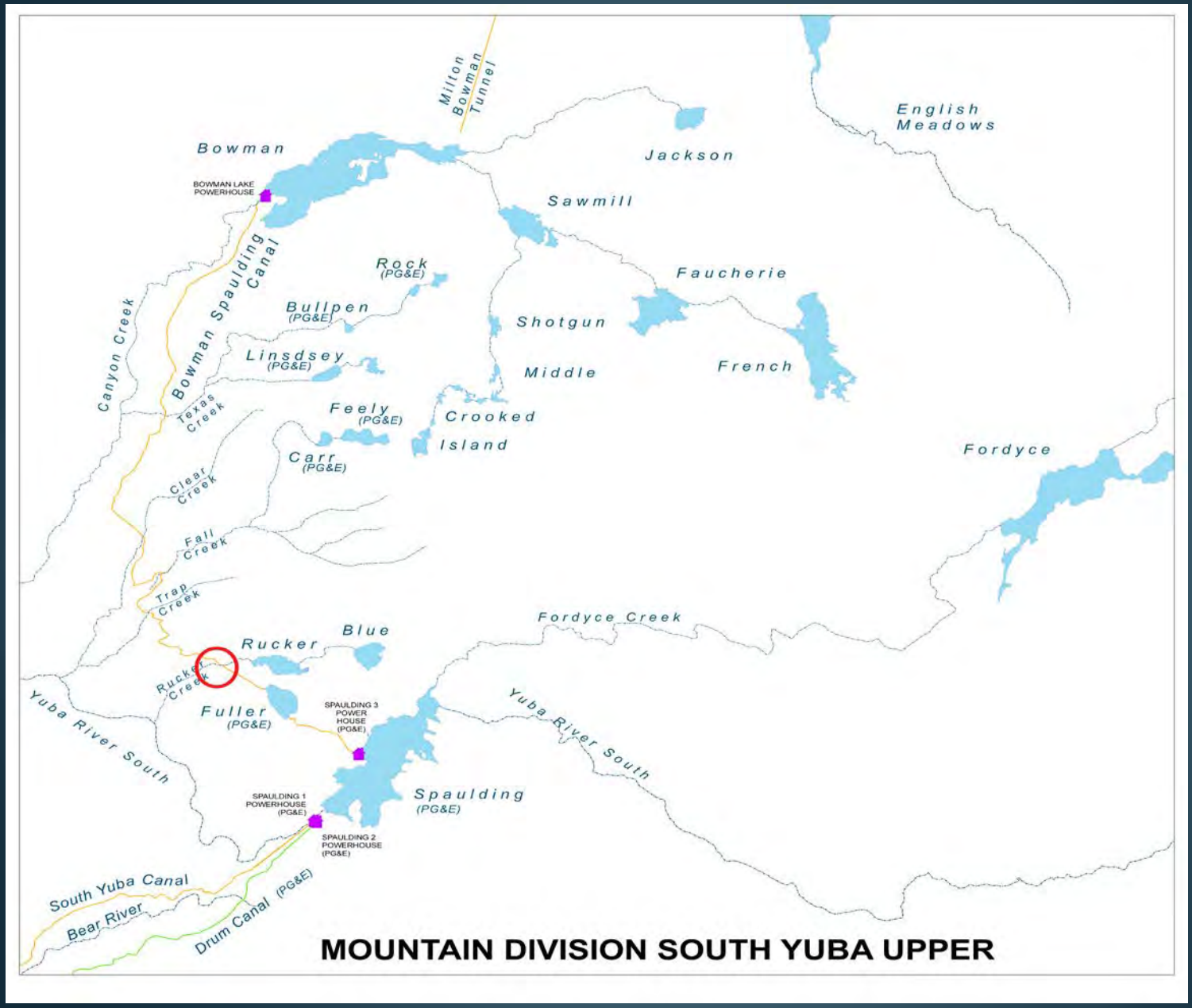
Trap Creek Diversion

- Instream Flow Requirement Past BS Canal
  - Current Flow Requirement = 0 CFS
  - Post FERC License Renewal = 0.25-3 CFS depending on month and water year type

TRAP CREEK DIVERSION DAM

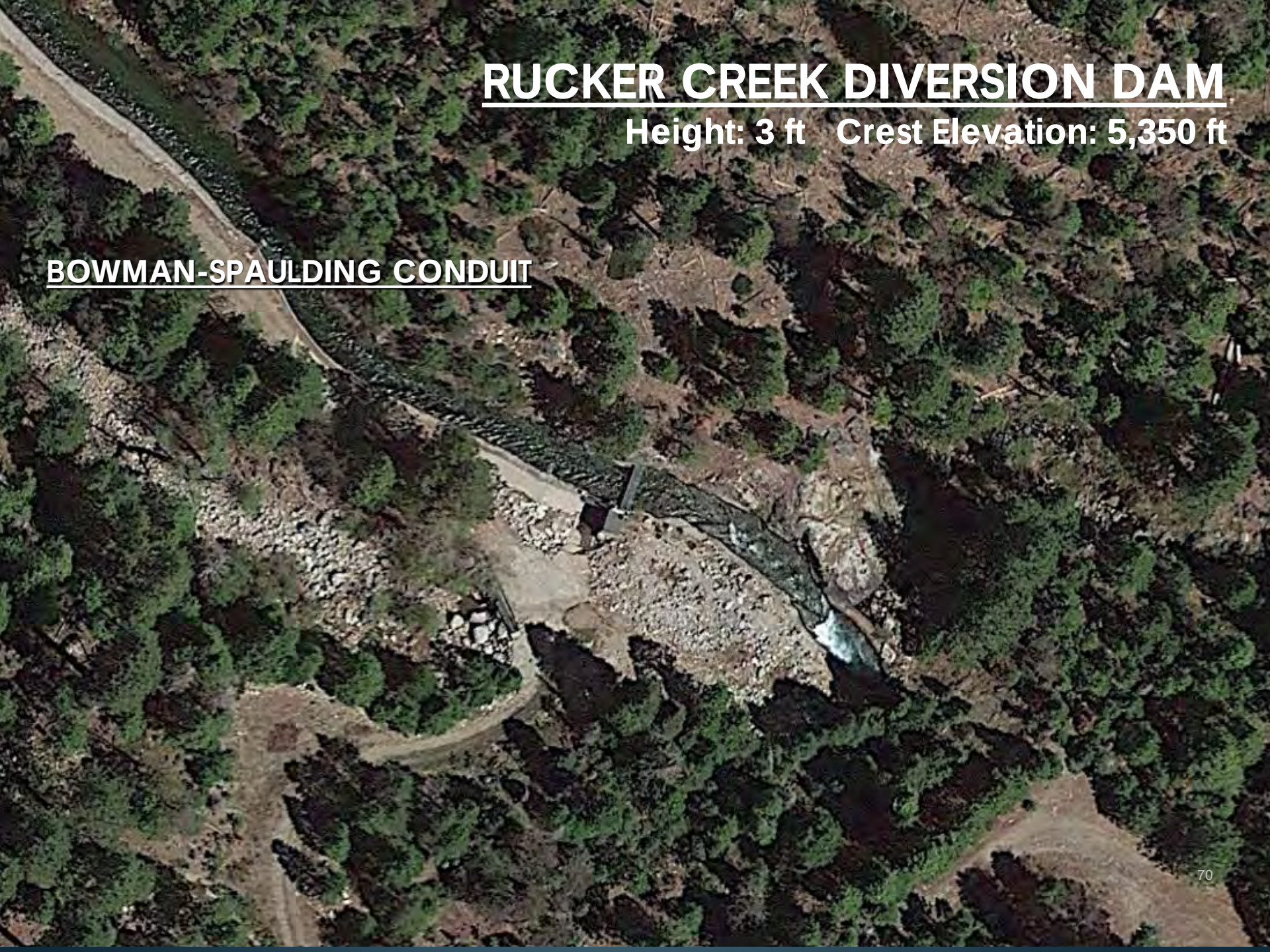
Height: 4 ft Crest Elevation: 5,360 ft

SOUTH YUBA RIVER SYSTEM

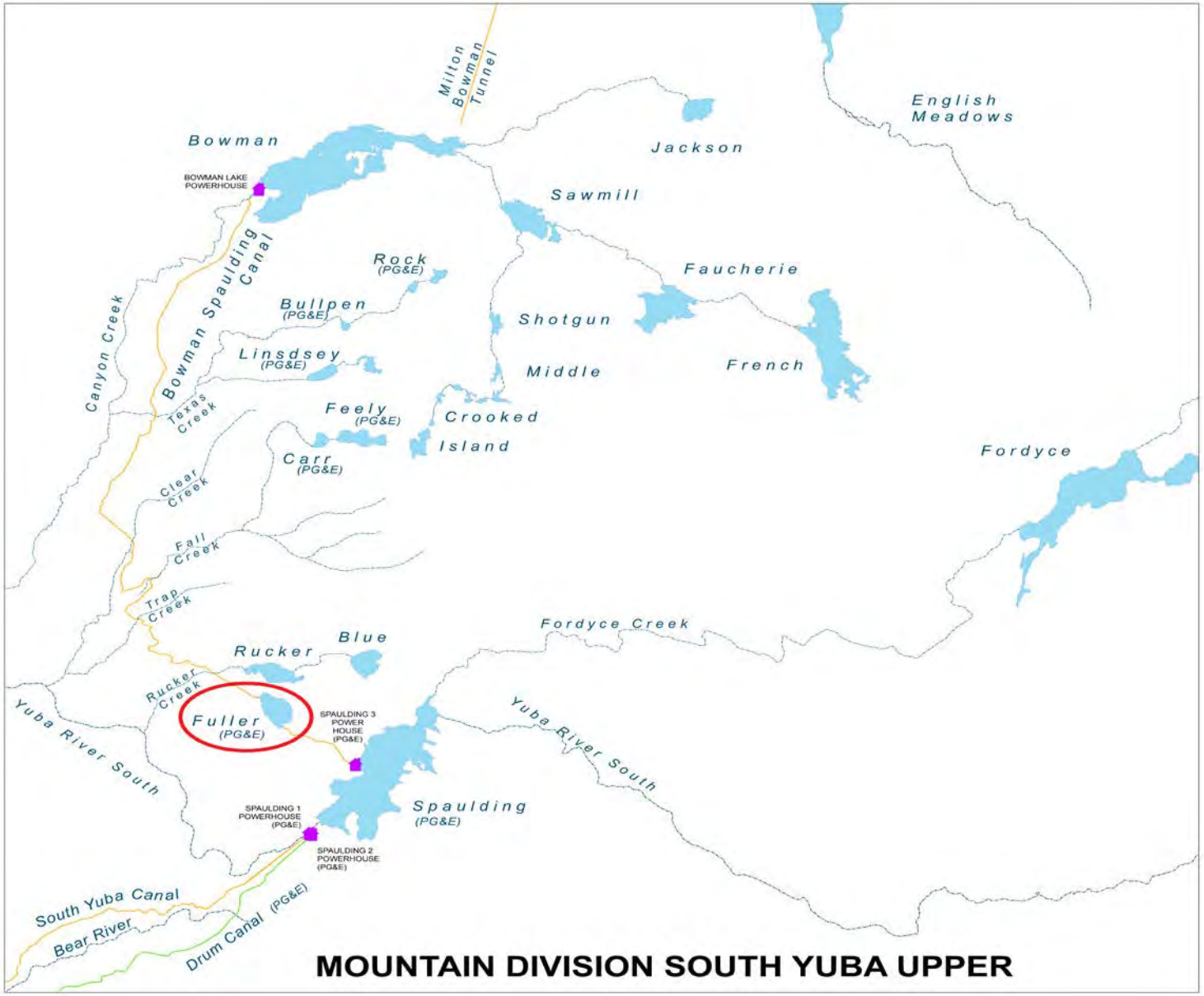


Rucker Creek Diversion

- Includes NID & PG&E water rights
- PG&E's Rucker and Blue Lake Provide Supply
- Instream Flow Past BS Canal
  - Current Requirement = 0 CFS
  - Post FERC License Renewal = 0.3-3 CFS depdning on month and water year type

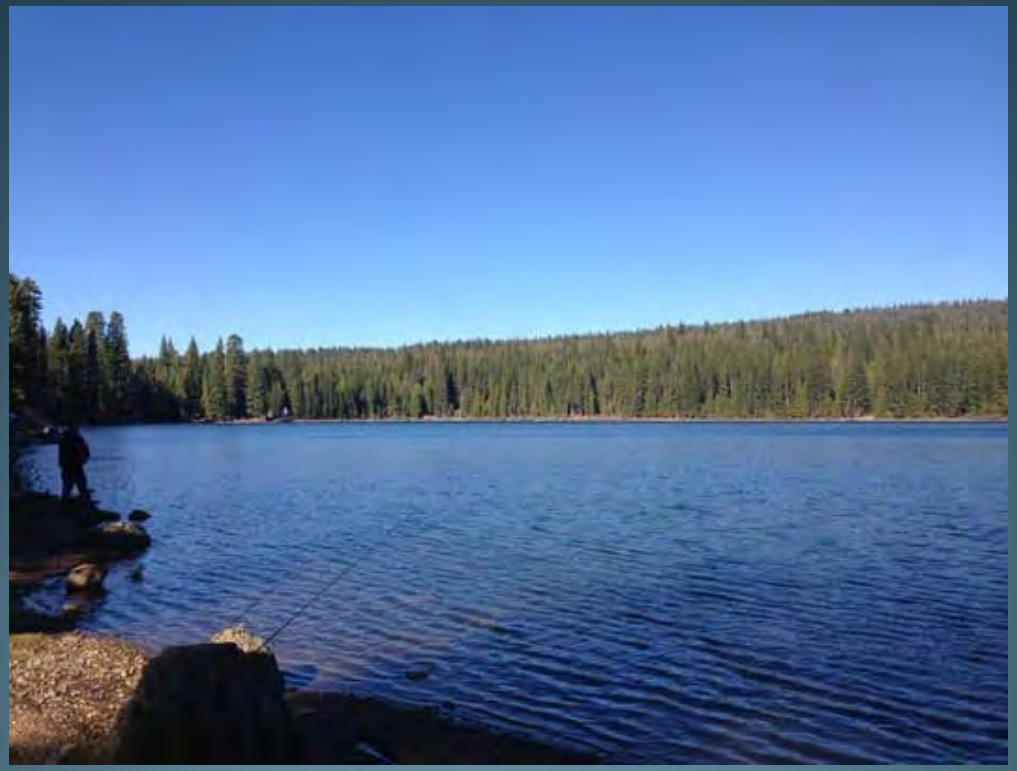

RUCKER CREEK DIVERSION DAM
Height: 3 ft Crest Elevation: 5,350 ft
BOWMAN-SPAULDING CONDUIT

SOUTH YUBA RIVER SYSTEM



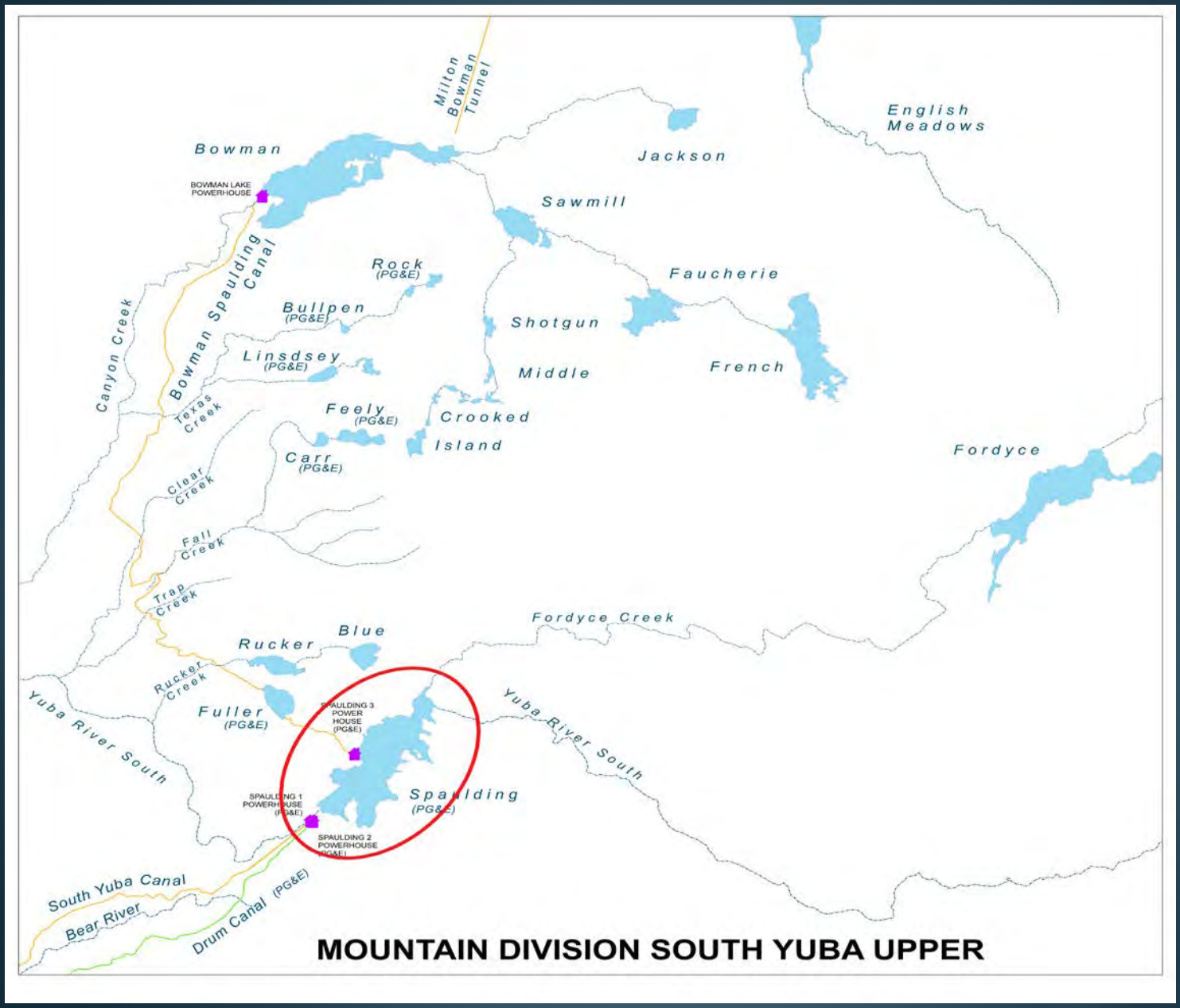
FULLER LAKE (PG&E)

Fuller Reservoir (PG&E)



- PG&E Reservoir on BS Canal
- Passes NID Water to Lake Spaulding
- Capacity = 1,150 Acre Feet
- NID is Responsible for Diversion into Bowman-Spaulding Canal

SOUTH YUBA RIVER SYSTEM

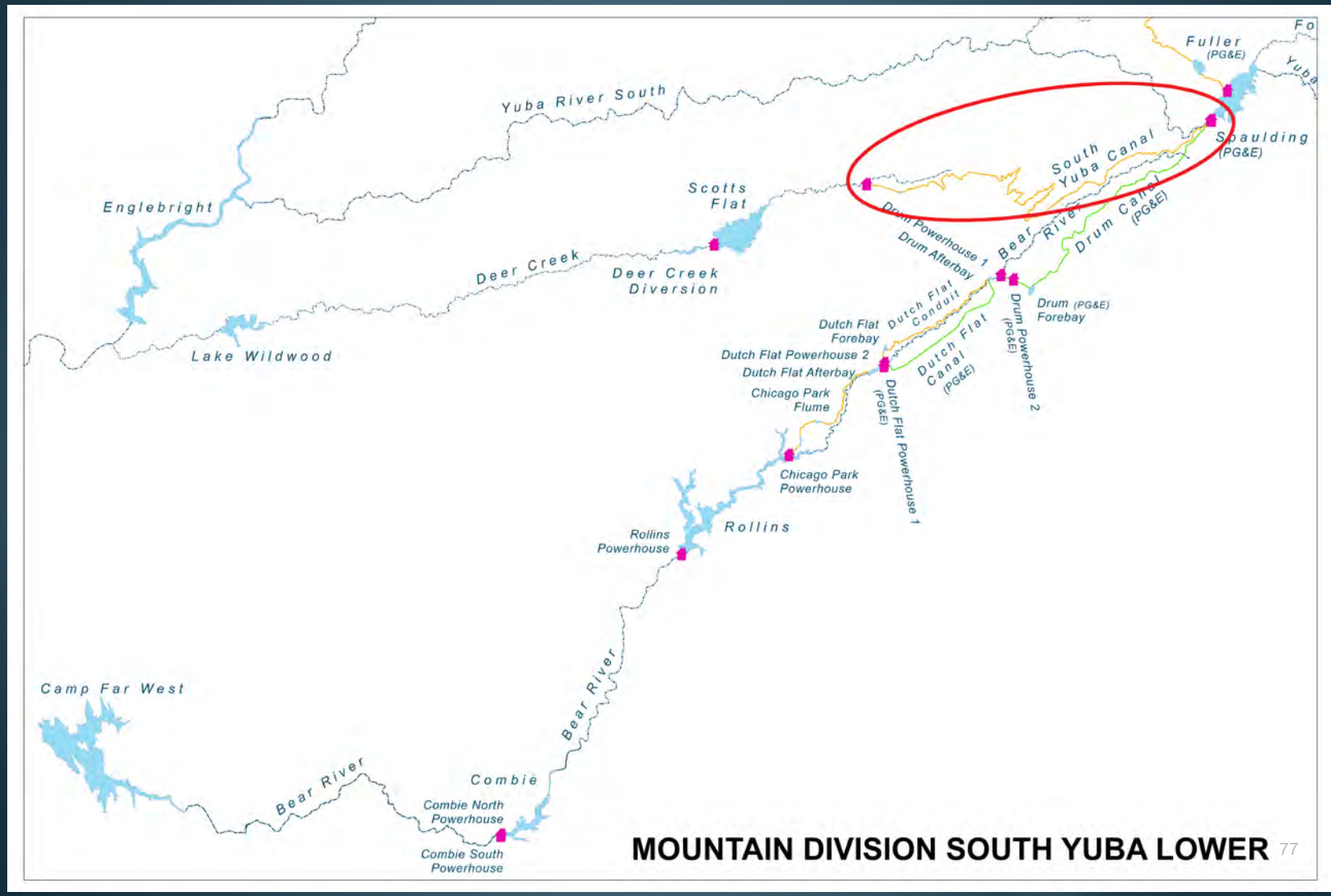



Lake Spaulding (PG&E)

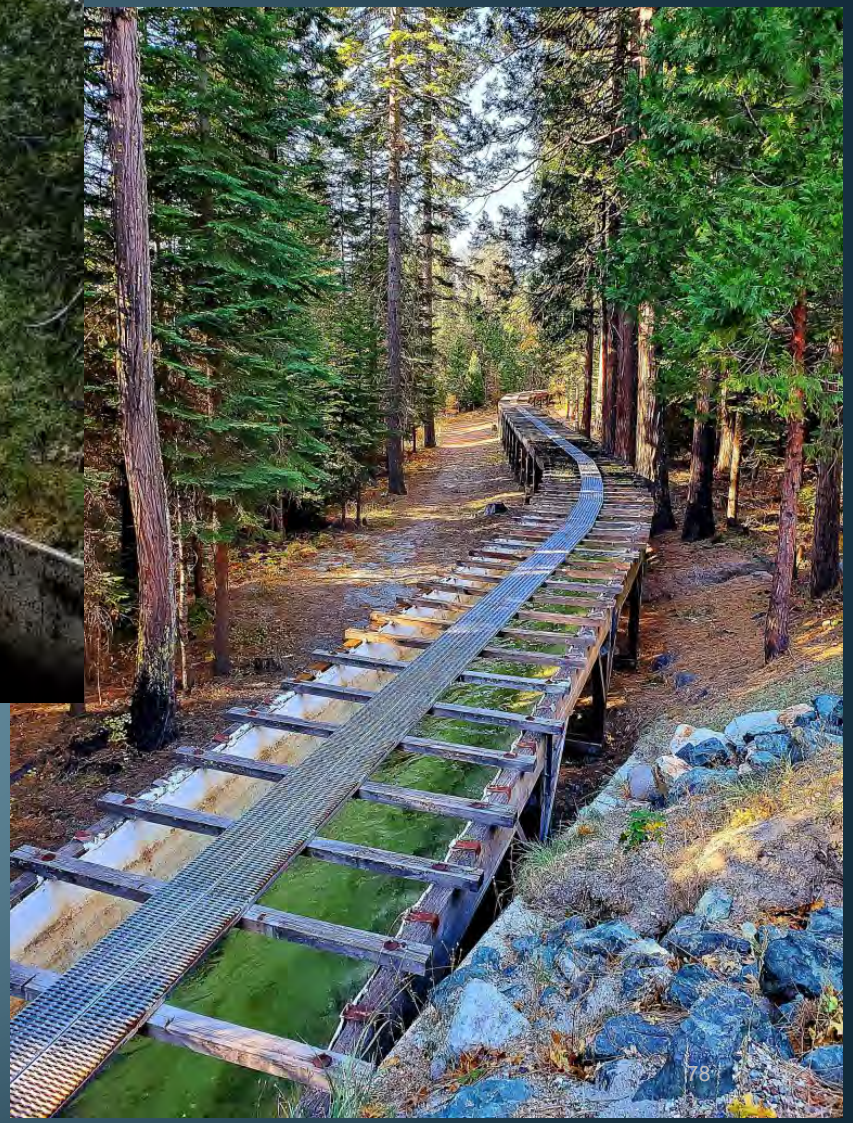
Lake Spaulding (PG&E)

- Instream Reservoir on South Yuba River
- Owned & Operated by PG&E
- Concrete Dam
- Maximum Capacity of 74,773 Acre Feet
- Includes 3 powerhouses; Spaulding 1,2,3
- Passes NID Water Though PG& E Powerhouses
  - Done Through the Coordinated Operating Agreement
  - Includes Weekly Coordination Calls
- Spaulding is the starting point for PG&E's South Yuba Canal and Drum Canal
- Typical Low Elevation 20,000 Acre Feet in Winter

SOUTH YUBA RIVER SYSTEM (LOWER)



South Yuba Canal (PG&E/NID)



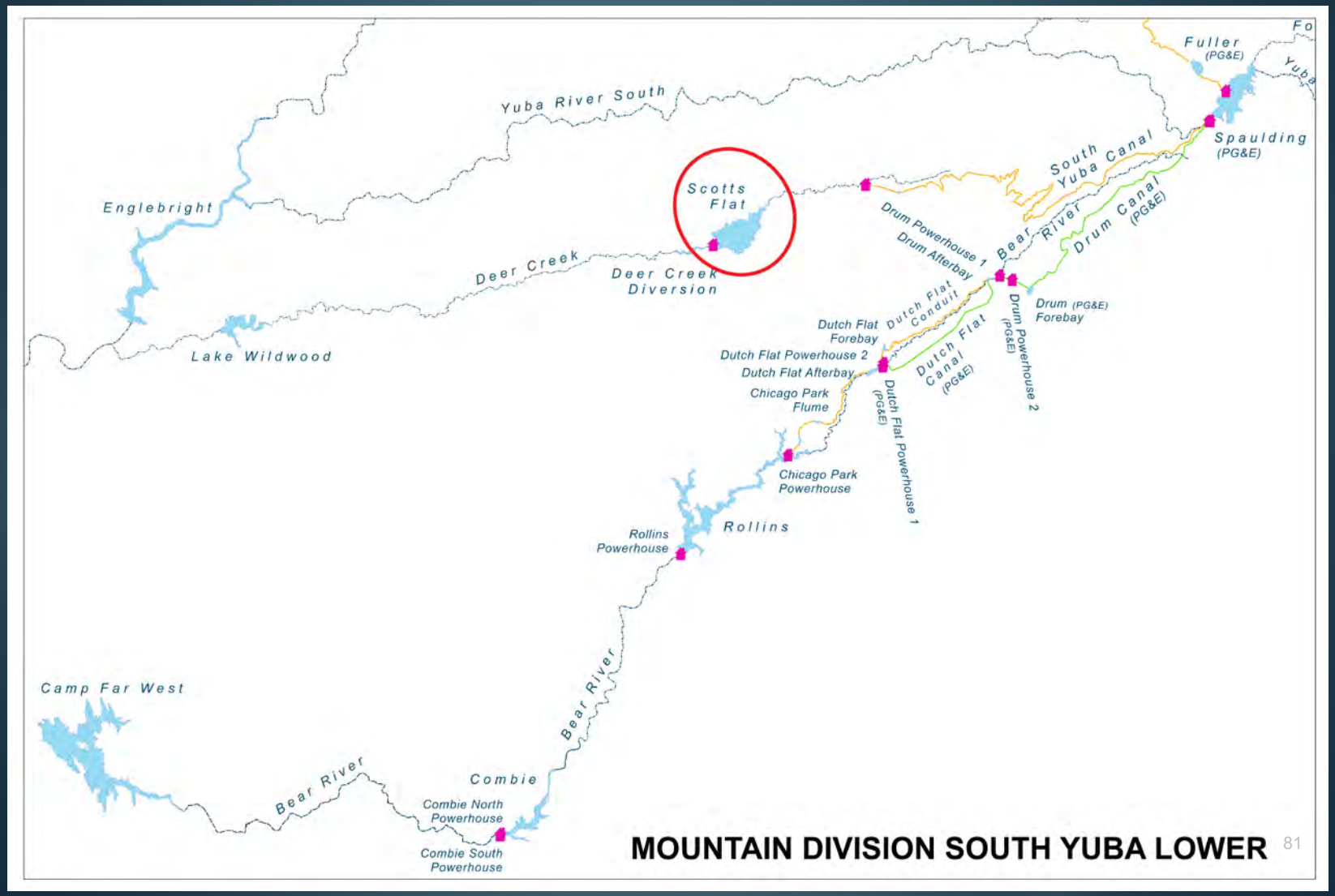
South Yuba and Chalk Bluff Canals (PG&E)

- Transfers NID Water from Lake Spaulding to Deer Creek (Above Scotts Flat)
- Currently Owned and Operated by PG&E
  - NID and PG&E Have Agreed on a Purchase Sale Agreement
    - Waiting on FERC Approval
- Hydraulic Design Capacity of 107 cfs, Actual Capacity of Approximately 85 cfs
- NID portion of South Yuba Canal
  - 13.98 miles (8.66 miles of open ditch, 4.61 miles of flume, and 0.71 miles of tunnel)
- Chalk Bluff Canal
  - 3.24 miles (2.99 miles of open ditch, 0.20 miles of flume, and 0.05 miles of pipe)
- Terminus of the Canal is the Deer Creek Powerhouse

Dear Creek Powerhouse (PG&E)

- Currently a PG&E Asset
  - Will Become NID's Upon Transfer of SYC
- Constructed in 1906
- Capacity = 6.9 MW

SOUTH YUBA RIVER SYSTEM (LOWER)



Scotts Flat Reservoir

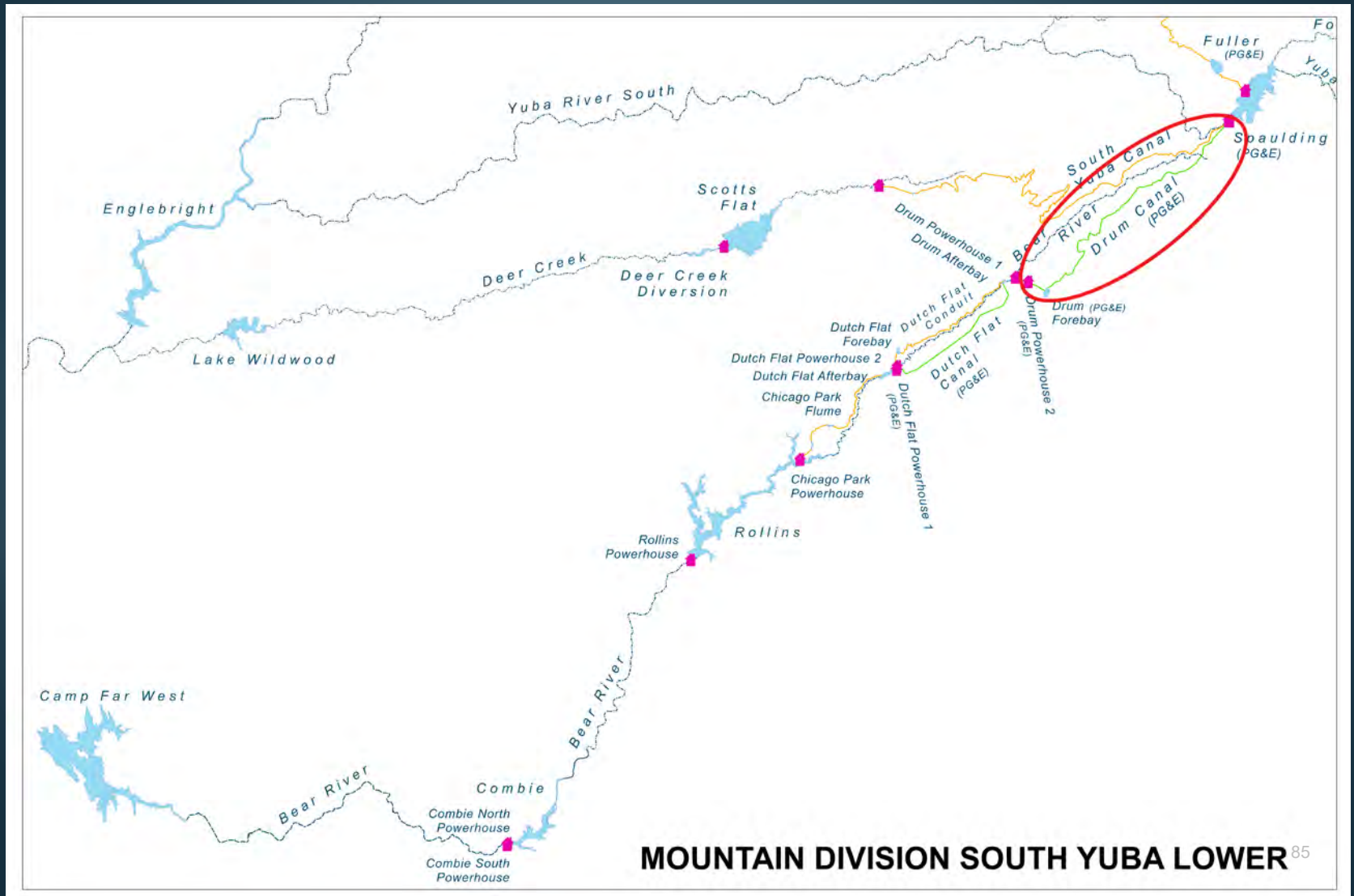
Scotts Flat Reservoir

- Instream Reservoir on Deer Creek
- Constructed By 1948 Raised in 1962-63
- Earth Dam
- Maximum Capacity of 48,547 Acre Feet
- Typical Low Elevation 3052 ft.
- Storage Water Rights include Consumptive and Non-Consumptive Uses
- Two Campgrounds and Day-Use 110,000 Annual Visitors
  - Three Boat Launches (one in Cascade Shores)
- Water Storage Supply for a Majority of Nevada County Canals

Scotts Flat Powerhouse

Constructed in 1984
Capaticy of 850 kW

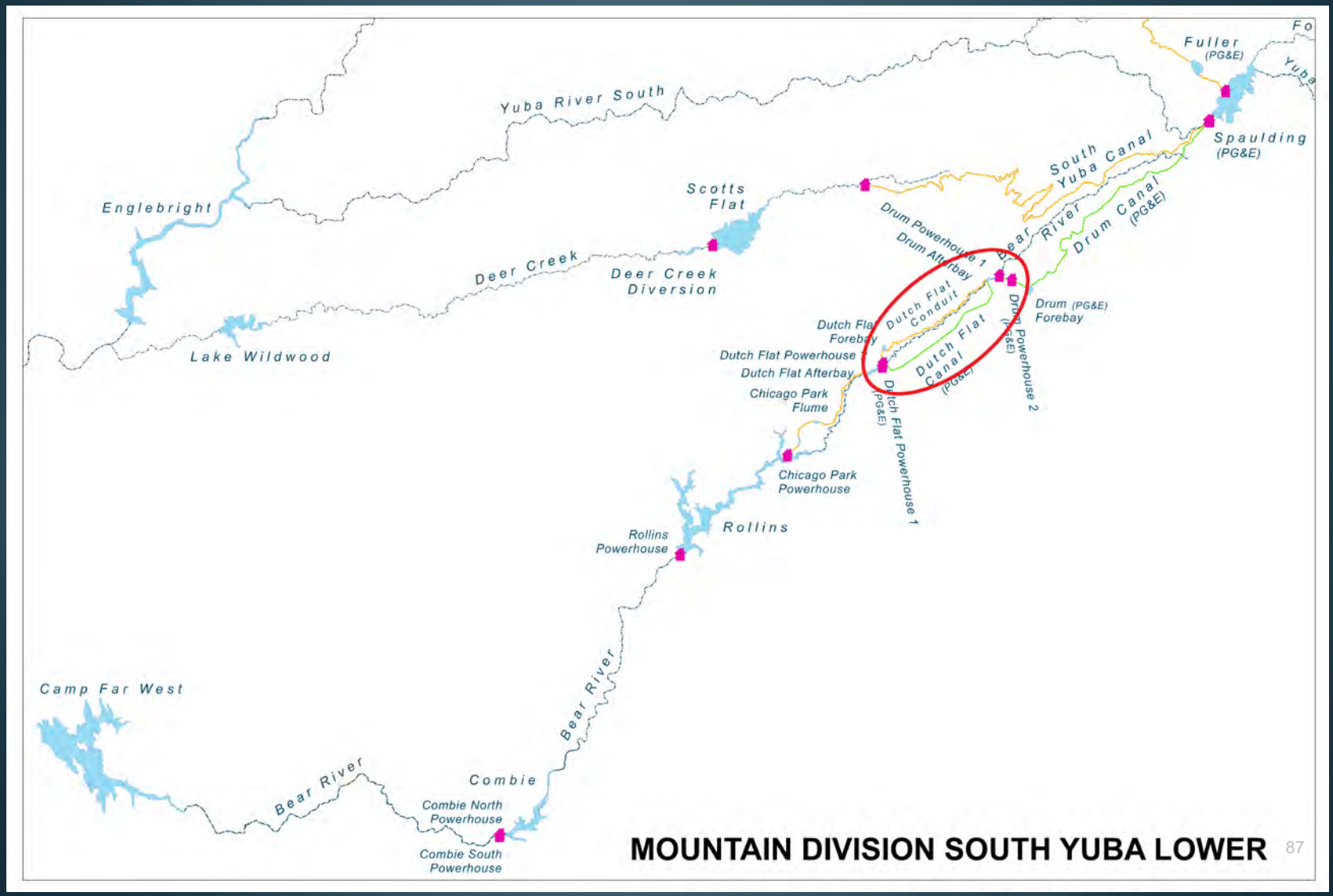
SOUTH YUBA RIVER SYSTEM (LOWER)



Drum Canal & Powerhouse (PG&E)

- Drum Canal Transfers Spaulding Water (Yuba System) Through Drum Powerhouse and Into Bear River
- Discharge Flows into in River Afterbay
  - Afterbay Provides Head for the Dutch Flat 1 & 2 Canals

SOUTH YUBA RIVER SYSTEM (LOWER)




DUTCH FLAT NO. 2 CONDUIT
Length: 4.7 mi
Capacity: 610 cfs
Constructed: 1964-65
Bear River
Drum Afterbay

DUTCH FLAT FOREBAY

Storage: 185 ac-ft
Normal Max Water Surface El.: 3,336.0 ft
Constructed: 1964-65

DUTCH FLAT No. 2 POWERHOUSE

Rated head: 581 ft Rated flow: 600 cfs
Turbine type: Vertical Francis
Nameplate Capacity: 24.57 MW

Dutch Flat #2 Powerhouse

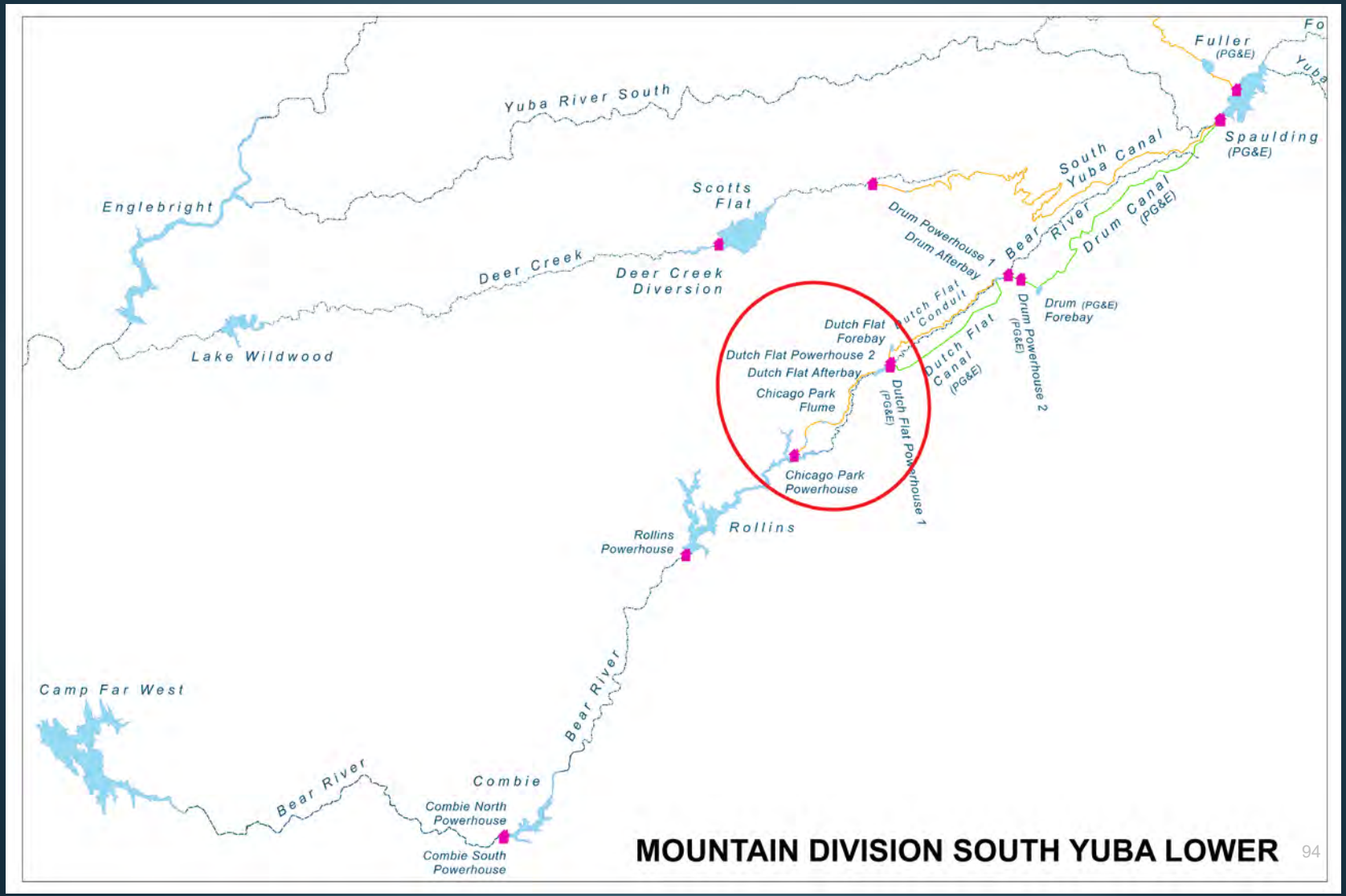
- Off Steam Bear River Powerhouse
- Constructed in 1964-65
- Rated at 24.57 MW
- Power Generated Via Consumptive & Run of River Flows
- PPA with PG&E Through June 2033
- Discharges to Dutch Flat Afterbay

Dutch Flat Afterbay

- Instream Reservoir on Bear River
- Both Dutch Flat #1 & Dutch Flat #2 Powerhouses Discharge to Afterbay
- Constructed in 1964-65
- Storage Capacity 2,037 Acre Feet
- Maximum Elevation 2741 ft.
- Dutch Flat Afterbay Environmental Flow to Bear River
  - Current Requirements = 5-10 CFS depending on season
  - Post FERC License Renewal = 7-45 CFS depending on month and water year type
- Afterbay Provides the Diversion in Bear River for Chicago Park Conduit


Bear River
DUTCH FLAT AFTERBAY
Height: 165 ft.
Crest Elevation: 2,755.0 ft.
Spillway: Ungated

SOUTH YUBA RIVER SYSTEM (LOWER)




CHICAGO PARK CONDUIT
Length: 7.2 mi (Concrete Flume/Gunite-Lined Ditch)
Capacity: 1,100 cfs
Constructed: 1964-65
Bear River
Dutch Flat Afterbay


Chicago Park
Flume

CHICAGO PARK FOREBAY

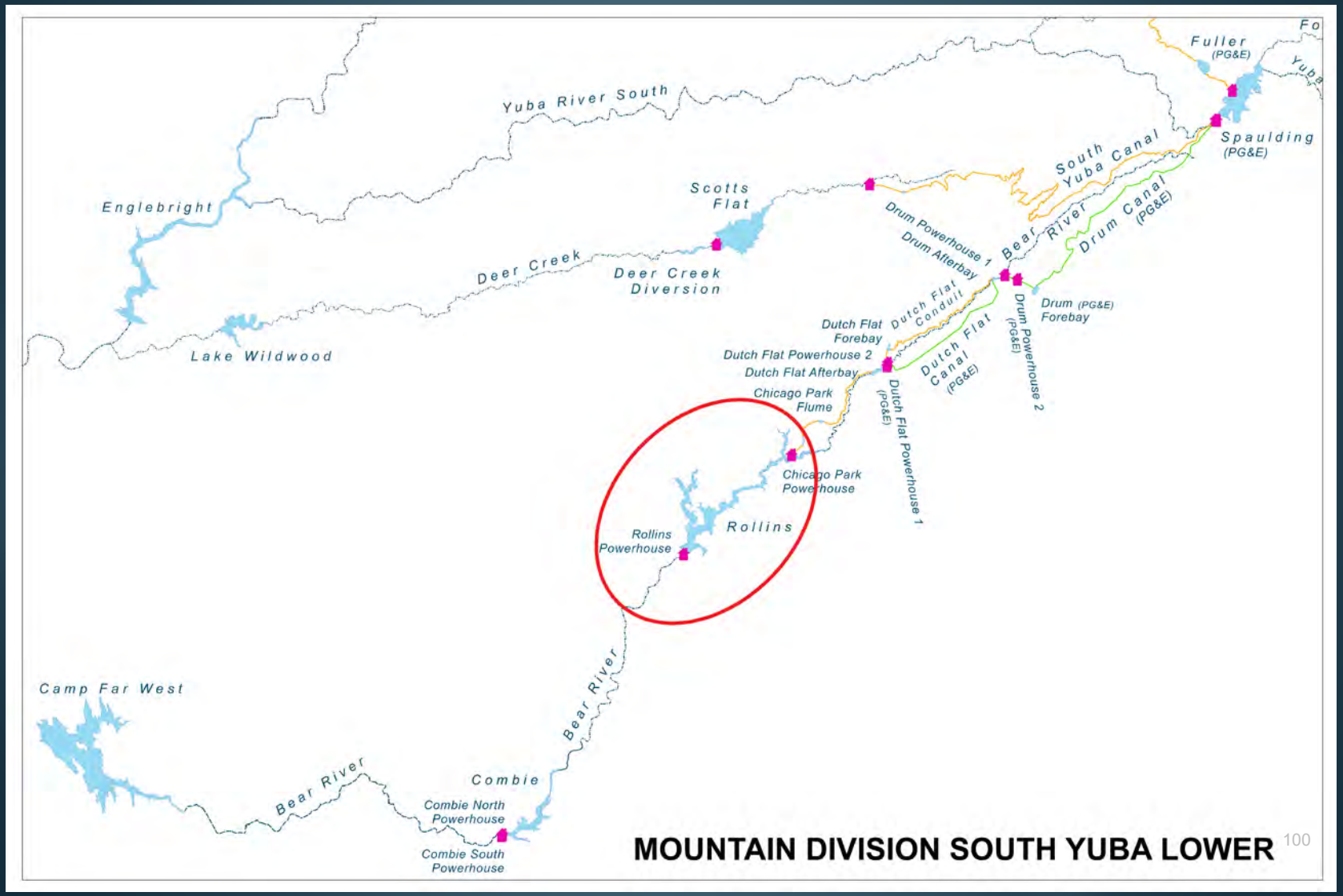
Storage: 117 ac-ft. Surface Area: 7 ac
Shoreline Length: 0.7 mi.
Normal Max Water Surface El.: 2,717.3 ft.
Provides Storage and Head for Chicago Park Powerhouse

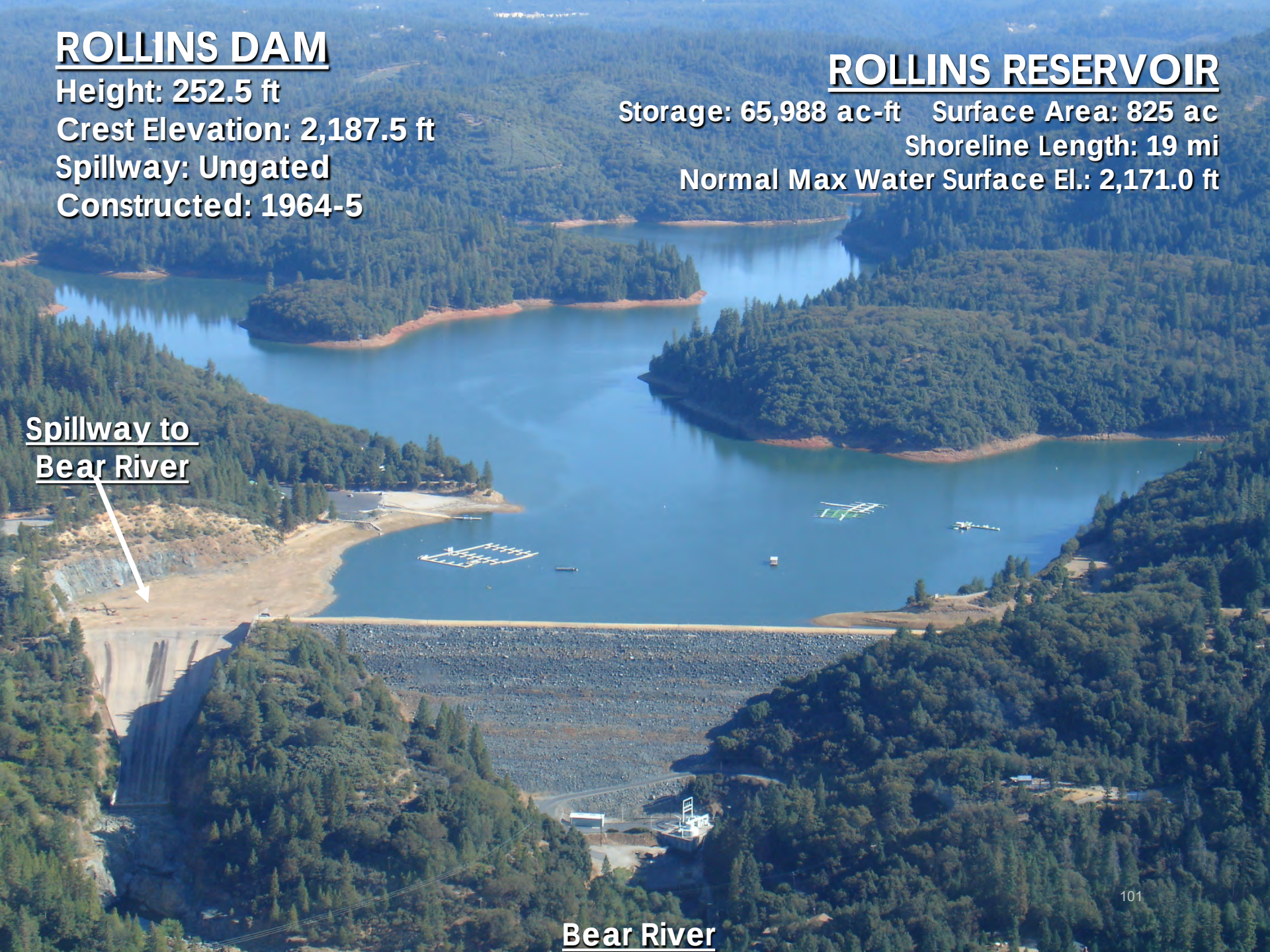
Chicago Park Powerhouse

- Off Steam Bear River Powerhouse
- Constructed in 1964-65
- Rated at 39 MW
- Power Generated Via Consumptive & Run of River Flows
- PPA with PG&E Through June 2033
- Discharges to Bear River Upstream of Rollins


CHICAGO PARK POWERHOUSE
Rated head: 480 ft Rated flow: 1,100 cfs
Turbine type: Vertical Francis
Bear River

SOUTH YUBA RIVER SYSTEM (LOWER)

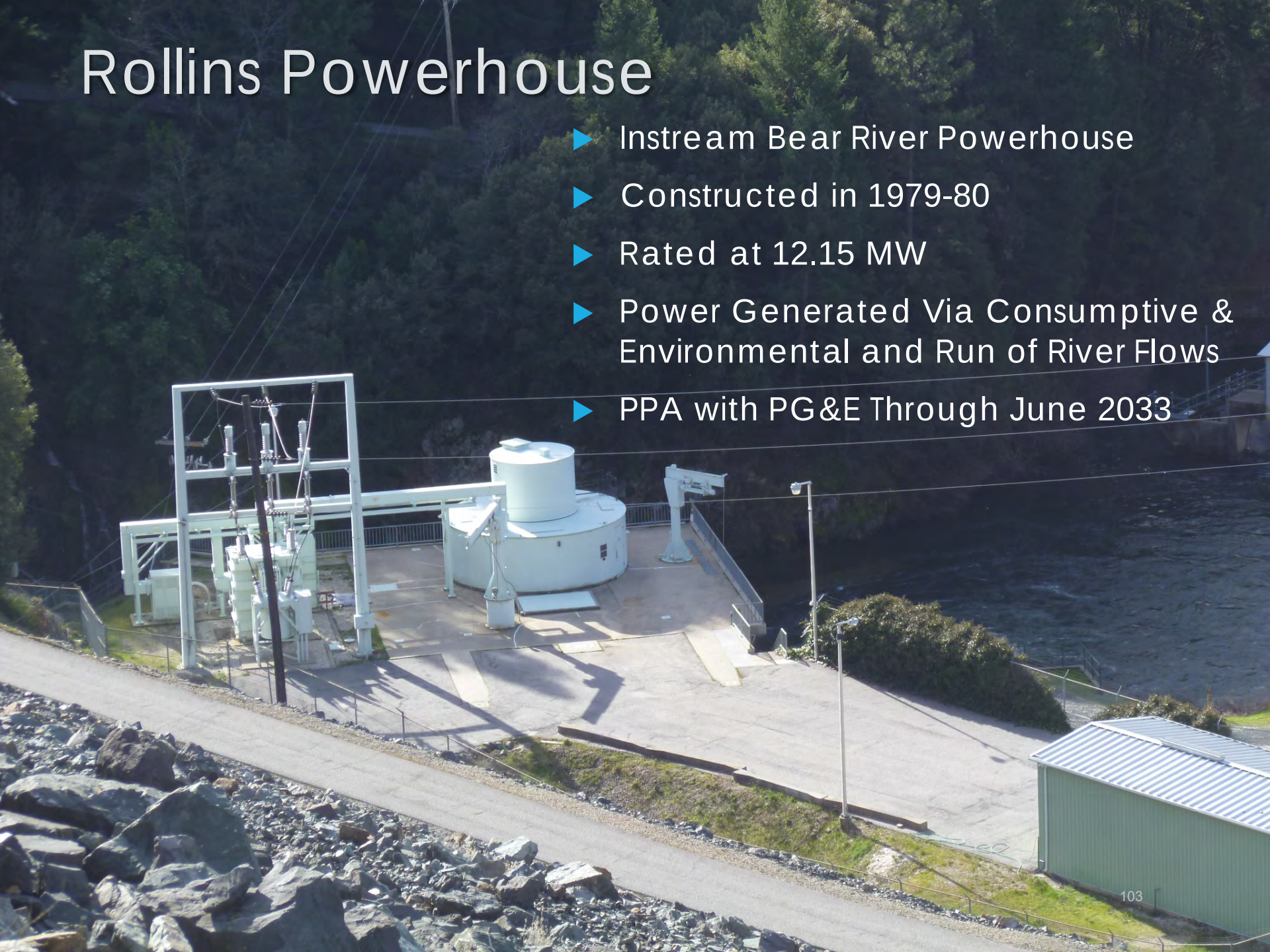



ROLLINS DAM
Height: 252.5 ft
Crest Elevation: 2,187.5 ft
Spillway: Ungated
Constructed: 1964-5
ROLLINS RESERVOIR
Storage: 65,988 ac-ft Surface Area: 825 ac
Shoreline Length: 19 mi
Normal Max Water Surface El.: 2,171.0 ft
Spillway to Bear River
Bear River

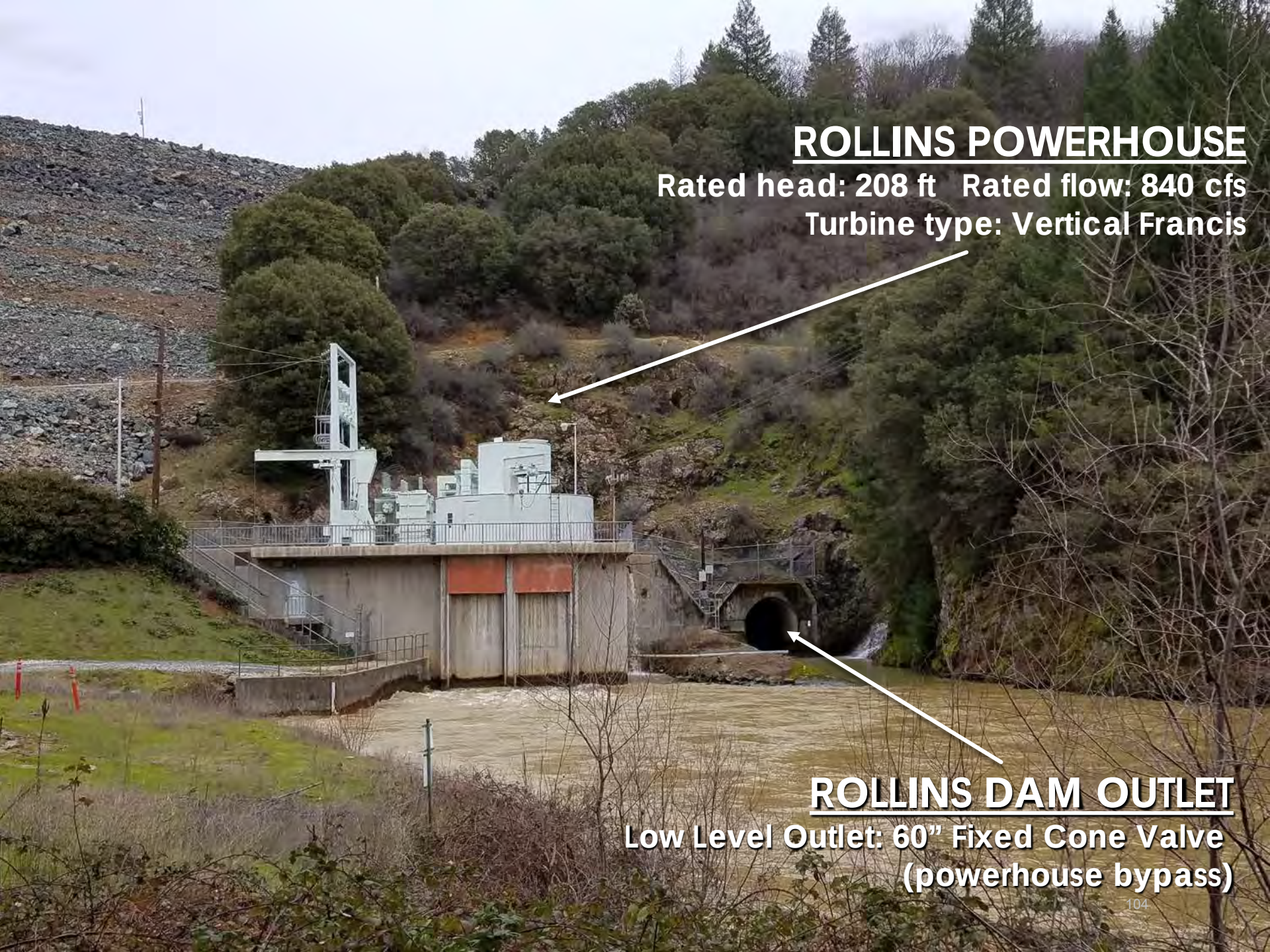
Rollins Reservoir

- Instream Bear River Reservoir
  - Includes Greenhorn and Steep Hollow Creeks
- Constructed in 1964-65
- Earthen Rock Fill Dam
- Maximum Capacity of 65,988 Acre Feet
- Typical Low Elevation 2,134 ft.
- Storage Water Rights include Consumptive and Non-Consumptive uses
  - Sources include the South Yuba River and Bear River
- Environmental Flow to Bear River
  - Current Required Flow = 15-75 depending on season and water year type
  - Post FERC Relicense Renewal = 15-125 depending on month and water year type
- Includes Four Campgrounds, Day Use and Boating
  - Greenhorn, Orchard Springs, Long Ravine, and Peninsula
  - Attract Roughly 120,000 Visitors Annually
- Discharges to Bear River & Rollins Powerhouse

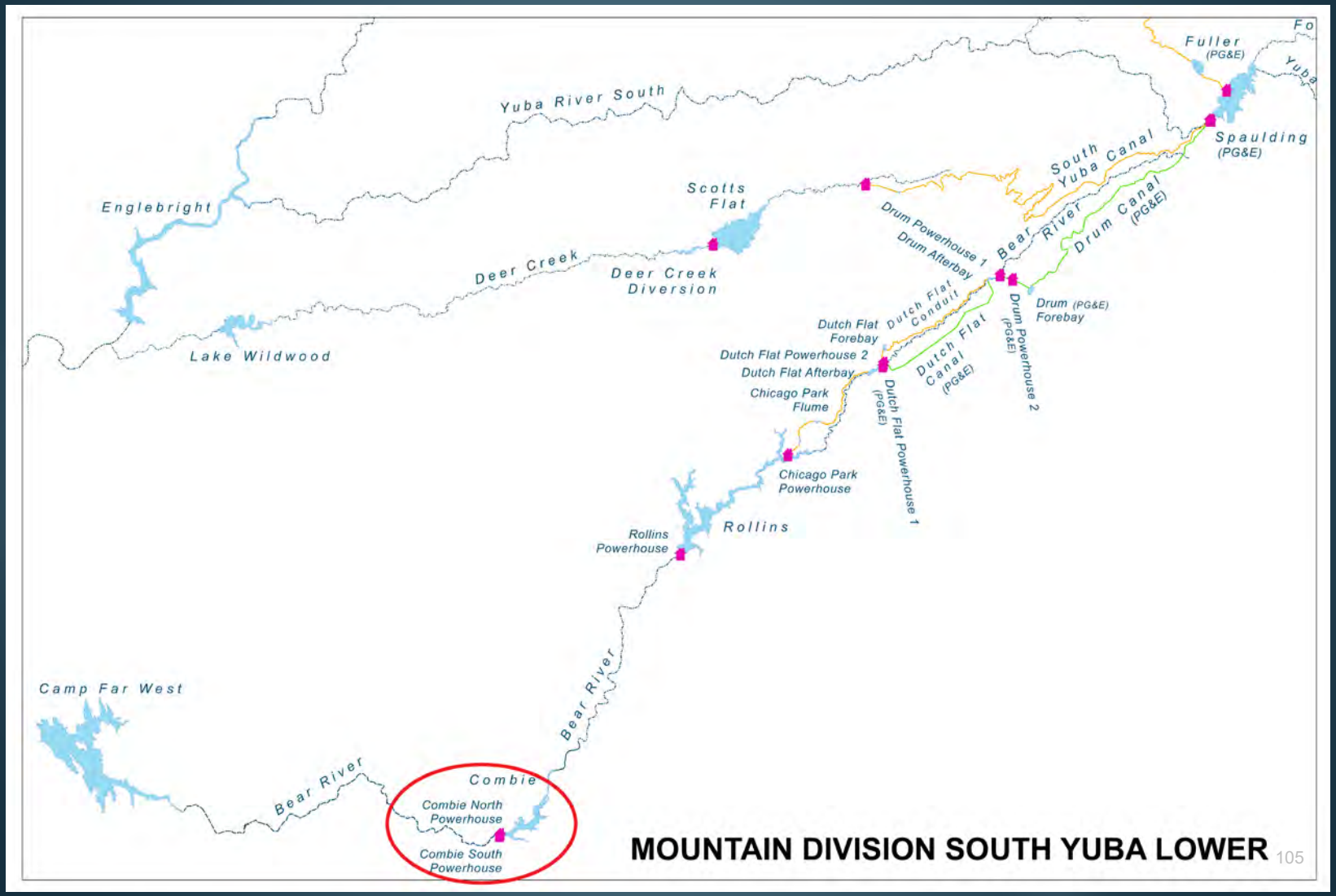
Rollins Powerhouse



- Instream Bear River Powerhouse
- Constructed in 1979-80
- Rated at 12.15 MW
- Power Generated Via Consumptive & Environmental and Run of River Flows
- PPA with PG&E Through June 2033


ROLLINS POWERHOUSE
Rated head: 208 ft Rated flow: 840 cfs
Turbine type: Vertical Francis
ROLLINS DAM OUTLET
Low Level Outlet: 60” Fixed Cone Valve
(powerhouse bypass)

SOUTH YUBA RIVER SYSTEM (LOWER)



Combie Reservoir

Combie Reservoir (Van Giesen Dam)

- Instream Bear River Reservoir
- Constructed in 1928
- Concrete Arch
- Maximum Capacity of 5,555 Acre Feet
- Typical Low Elevation 1590 ft.
- Water Rights to Store 5,555 Acre Feet
- Environmental Flow to Bear River
  - 5 cfs
- Discharges to Bear River & South Sutter Water District's Camp Far West Reservoir
- Boating

Combie Powerhouses

COMBIE NORTH POWERHOUSE

Rated head: 27 ft Rated flow: 180 cfs
Turbine type: Vertical Kaplan

COMBIE SOUTH POWERHOUSE

Rated head: 65 ft Rated flow: 339 cfs
Turbine type: Vertical Kaplan

Combie Powerhouses

Combie North

- Constructed in 2010
- Power Generated Via Consumptive and Run of River Flows
- PPA with PG&E Through October 5, 2024

Combie South

- Constructed in 1984
- Power Generated Via Run of River Flows
- PPA with City of Lodi via Norther California Power Agency Through December 31, 2023

THANKS FOR ATTENDING