07-28-1942: certificate as to water rights, tract c-18

CERTIFICATE AS TO WATER RIGHTS

I hereby certify that I acquired no water rights in connection with my ownership of Tract C-18 in Clallam (~~or Jefferson~~) County, Washington, either by instrument of conveyance, or by appropriation prior to June 15, 1917, or by permit granted by the Supervisor of Hydraulics of the State of Washington, subsequent to June 15, 1917, and that there were no water rights, other than reparian rights, appurtenant to said Tract C-18 at the time it was taken by the United States of America, except: no exceptions.

Dated at Seattle, Washington, July 28th, 1942.

(Signed) Andrew Carlson

07-31-1942: certificate as to water rights, tracts j-220 and j-221

CERTIFICATE AS TO WATER RIGHTS

I hereby certify that I acquired no water rights in connection with my ownership of Tracts J-220 and J-221 in ~~Clallam (or~~ Jefferson) County, Washington, either by instrument of conveyance, or by appropriation prior to June 15, 1917, or by permit granted by the Supervisor of Hydraulics of the State of Washington, subsequent to June 15, 1917, and that there were no water rights, other than reparian rights, appurtenant to said Tracts J-220 and J-221 at the time it was taken by the United States of America, except:

Dated at Hoquiam, Washington, July 31, 1942.

A. L. Johnson

C. W. Gunstone

CERTIFICATE AS TO WATER RIGHTS

I hereby certify that I acquired no water rights in connection with my ownership of Tracts J-220 and J-221 in ~~Clallam (or~~ Jefferson) County, Washington, either by instrument of conveyance, or by appropriation prior to June 15, 1917, or by permit granted by the Supervisor of Hydraulics of the State of Washington, subsequent to June 15, 1917, and that there were no water rights, other than reparian rights, appurtenant to said Tracts J-220 and J-221 at the time it was taken by the United States of America, exc

Dated at Gardiner, Washington, July 31, 1942.

A. L. Johnson

C. W. Gunstone

CERTIFICATE AS TO WATER RIGHTS

I hereby certify that I acquired no water rights in connection with my ownership of Tract Q-99 in Clallam (or Jefferson) County, Washington, either by instrument of conveyance, or by appropriation prior to June 15, 1917, or by permit granted by the Supervisor of Hydraulics of the State of Washington, subsequent to June 15, 1917, and that there were no water rights, other than reparian rights, appurtenant to said Tract Q-99 at the time it was taken by the United States of America, except:

None.

Dated at Seattle, Washington, June 18, 1942.

Martin Erickson

CERTIFICATE AS TO WATER RIGHTS

I hereby certify that I acquired no water rights in connection with my ownership of Tract Q-19 in Clallam (or Jefferson) County, Washington, either by instrument of conveyance, or by appropriation prior to June 15, 1917, or by permit granted by the Supervisor of Hydraulics of the State of Washington, subsequent to June 15, 1917, and that there were no water rights, other than reparian rights, appurtenant to said Tract Q-19 at the time it was taken by the United States of America, except:

Dated at Clearwater, Washington, June 13, 1942.

Norbt Megorden

CERTIFICATE AS TO WATER RIGHTS

I hereby certify that I acquired no water rights in connection with my ownership of Tracts J-202 and J-205 in Clallam (or Jefferson) County, Washington, either by instrument of conveyance, or by appropriation prior to June 15, 1917, or by permit granted by the Supervisor of Hydraulics of the State of Washington, subsequent to June 15, 1917, and that there were no water rights, other than reparian rights, appurtenant to said Tracts J-202 and J-205 at the time it was taken by the United States of America, except:

Dated at Sumner, Washington,
April 11, 1942.

J. T. Gear

06-18-1942: certificate as to water rights, tracts c-2, c-20, c-28, & c-56

CERTIFICATE AS TO WATER RIGHTS

I hereby certify that I acquired no water rights in connection with my ownership of Tracts C-2, C-20, C-28 & C-56 in Clallam (or Jefferson) County, Washington, either by instrument of conveyance, or by appropriation prior to June 15, 1917, or by permit granted by the Supervisor of Hydraulics of the State of Washington, subsequent to June 15, 1917, and that there were no water rights, other than riparian rights, appurtenant to said Tracts C-2, C-20, C-28 & C-56 at the time it was taken by the United States of America, except:

This certificate is based upon information and belief and the records and files of Henry & Larson Lumber Company.

Dated at Seattle, Washington,
June 18, 1942.

HENRY & LARSON LUMBER COMPANY
By L. L. Henry
Its President

CERTIFICATE AS TO WATER RIGHTS

I hereby certify that I acquired no water rights in connection with my ownership of Tract Q-4 in Clallam (or Jefferson) County, Washington, either by instrument of conveyance, or by appropriation prior to June 15, 1917, or by permit granted by the Supervisor of Hydraulics of the State of Washington, subsequent to June 15, 1917, and that there were no water rights, other than reparian rights, appurtenant to said Tract Q-4 at the time it was taken by the United States of America, except: Do not know anything about Tract Q-4 by this description. However have no records of any special water right in Jefferson or Clallam County.

Dated at Hoquiam, Washington, June 18, 1941.

E T Wood L W C

By George Kellogg

CERTIFICATE AS TO WATER RIGHTS

I hereby certify that I acquired no water rights in connection with my ownership of Tract Q-5 in Clallam (or Jefferson) County, Washington, either by instrument of conveyance, or by appropriation prior to June 15, 1917, or by permit granted by the Supervisor of Hydraulics of the State of Washington, subsequent to June 15, 1917, and that there were no water rights, other than reparian rights, appurtenant to said Tract Q-5 at the time it was taken by the United States of America, except: none

Dated at Sappho, Washington, July 16, 1941.

G Ray Coopers

CERTIFICATE AS TO WATER RIGHTS

I hereby certify that I acquired no water rights in connection with my ownership of Tract Q-6 in Clallam (or Jefferson) County, Washington, either by instrument of conveyance, or by appropriation prior to June 15, 1917, or by permit granted by the Supervisor of Hydraulics of the State of Washington, subsequent to June 15, 1917, and that there were no water rights, other than reparian rights, appurtenant to said Tract Q-6 at the time it was taken by the United States of America, except:

Dated at Clearwater, Washington, July 1, 1941.

Rosalia Cooper

CERTIFICATE AS TO WATER RIGHTS

I hereby certify that I acquired no water rights in connection with my ownership of Tract Q-7 in Clallam (or Jefferson) County, Washington, either by instrument of conveyance, or by appropriation prior to June 15, 1917, or by permit granted by the Supervisor of Hydraulics of the State of Washington, subsequent to June 15, 1917, and that there were no water rights, other than reparian rights, appurtenant to said Tract Q-7 at the time it was taken by the United States of America, except:

Dated at Hoquiam Route #1 Clearwater, Washington, June 17, 1941.

George A. Shaube

CERTIFICATE AS TO WATER RIGHTS

I hereby certify that I acquired no water rights in connection with my ownership of Tract Q-8 in Clallam (or Jefferson) County, Washington, either by instrument of conveyance, or by appropriation prior to June 15, 1917, or by permit granted by the Supervisor of Hydraulics of the State of Washington, subsequent to June 15, 1917, and that there were no water rights, other than reparian rights, appurtenant to said Tract Q-8 at the time it was taken by the United States of America, except: None

Dated at Seattle, Washington, June 18, 1941.

Charles E Mason

CERTIFICATE AS TO WATER RIGHTS

I hereby certify that I acquired no water rights in connection with my ownership of Tract Q-9 in Clallam (or Jefferson) County, Washington, either by instrument of conveyance, or by appropriation prior to June 15, 1917, or by permit granted by the Supervisor of Hydraulics of the State of Washington, subsequent to June 15, 1917, and that there were no water rights, other than reparian rights, appurtenant to said Tract Q-9 at the time it was taken by the United States of America, except:

none

Dated at Hoquiam, Route 1, Washington, June 23rd, 1941.

Phil. Mason

CERTIFICATE AS TO WATER RIGHTS

I hereby certify that I acquired no water rights in connection with my ownership of Tract Q-11 in Clallam (or Jefferson) County, Washington, either by instrument of conveyance, or by appropriation prior to June 15, 1917, or by permit granted by the Supervisor of Hydraulics of the State of Washington, subsequent to June 15, 1917, and that there were no water rights, other than reparian rights, appurtenant to said Tract Q-11 at the time it was taken by the United States of America, except: None.

Dated at Clearwater, Washington, June 16, 1941.

Robert E. Mason

CERTIFICATE AS TO WATER RIGHTS

I hereby certify that I acquired no water rights in connection with my ownership of Tracts Q-12, Q-88, Q-91, Q-94, Q-95 and Q-97 in Clallam (or Jefferson) County, Washington, either by instrument of conveyance, or by appropriation prior to June 15, 1917, or by permit granted by the Supervisor of Hydraulics of the State of Washington, subsequent to June 15, 1917, and that there were no water rights, other than reparian rights, appurtenant to said Tracts Q-12, Q-88, Q-91, Q-94, Q-95 and Q-97 at the time it was taken by the United States of America, except:

None

Montesano Wn

Dated at June 13, Washington, _____, 1941.

W. M. Kelly

CERTIFICATE AS TO WATER RIGHTS

I hereby certify that I acquired no water rights in connection with my ownership of Tract Q-13 in Clallam (or Jefferson) County, Washington, either by instrument of conveyance, or by appropriation prior to June 15, 1917, or by permit granted by the Supervisor of Hydraulics of the State of Washington, subsequent to June 15, 1917, and that there were no water rights, other than reparian rights, appurtenant to said Tract Q-13 at the time it was taken by the United States of America, except:

Dated at Hoquiam, Washington
Sept 24, 1941.

Ivar Chilman
Asa M Chilman

CERTIFICATE AS TO WATER RIGHTS

I hereby certify that I acquired no water rights in connection with my ownership of Tract Q-14 in Clallam (or Jefferson) County, Washington, either by instrument of conveyance, or by appropriation prior to June 15, 1917, or by permit granted by the Supervisor of Hydraulics of the State of Washington, subsequent to June 15, 1917, and that there were no water rights, other than reparian rights, appurtenant to said Tract Q-14 at the time it was taken by the United States of America, except:

None

Dated at Hoffmans, Washington, 6/14/, 1941.

Elton R Kelley

CERTIFICATE AS TO WATER RIGHTS

I hereby certify that I acquired no water rights in connection with my ownership of Tract Q-26 in Clallam (or Jefferson) County, Washington, either by instrument of conveyance, or by appropriation prior to June 15, 1917, or by permit granted by the Supervisor of Hydraulics of the State of Washington, subsequent to June 15, 1917, and that there were no water rights, other than reparian rights, appurtenant to said Tract Q-26 at the time it was taken by the United States of America, except: none

Dated at Hoquiam, Washington, June 10, 1941.

Louis P. Cole

CERTIFICATE AS TO WATER RIGHTS

I hereby certify that I acquired no water rights in connection with my ownership of Tract Q-29 in Clallam (or Jefferson) County, Washington, either by instrument of conveyance, or by appropriation prior to June 15, 1917, or by permit granted by the Supervisor of Hydraulics of the State of Washington, subsequent to June 15, 1917, and that there were no water rights, other than reparian rights, appurtenant to said Tract Q-29 at the time it was taken by the United States of America, except:

Dated at Hoquiam, Washington, May 22, 1942.

Henry I. Kittredge

CERTIFICATE AS TO WATER RIGHTS

I hereby certify that I acquired no water rights in connection with my ownership of Tract Q-31 in Clallam (or Jefferson) County, Washington, either by instrument of conveyance, or by appropriation prior to June 15, 1917, or by permit granted by the Supervisor of Hydraulics of the State of Washington, subsequent to June 15, 1917, and that there were no water rights, other than reparian rights, appurtenant to said Tract Q-31 at the time it was taken by the United States of America, except:

Dated at Hoquiam, Washington, February 7, 1941.

Russell Bigler

CERTIFICATE AS TO WATER RIGHTS

I hereby certify that I acquired no water rights in connection with my ownership of Tracts Q-32 & Q-33 in Clallam (or Jefferson) County, Washington, either by instrument of conveyance, or by appropriation prior to June 15, 1917, or by permit granted by the Supervisor of Hydraulics of the State of Washington, subsequent to June 15, 1917, and that there were no water rights, other than reparian rights, appurtenant to said Tracts Q-32 & Q-33 at the time it was taken by the United States of America, except:

Dated at Olympia, Washington, January 27, 1942.

Harley Simonsen

CERTIFICATE AS TO WATER RIGHTS

I hereby certify that I acquired no water rights in connection with my ownership of Tract Q-43 in Clallam (or Jefferson) County, Washington, either by instrument of conveyance, or by appropriation prior to June 15, 1917, or by permit granted by the Supervisor of Hydraulics of the State of Washington, subsequent to June 15, 1917, and that there were no water rights, other than reparian rights, appurtenant to said Tract Q-43 at the time it was taken by the United States of America, except:

Dated at None, Washington, June 16, 1941.

James Eastwood

CERTIFICATE AS TO WATER RIGHTS

I hereby certify that I acquired no water rights in connection with my ownership of Tracts Q-52 and Q-54 in Clallam (or Jefferson) County, Washington, either by instrument of conveyance, or by appropriation prior to June 15, 1917, or by permit granted by the Supervisor of Hydraulics of the State of Washington, subsequent to June 15, 1917, and that there were no water rights, other than reparian rights, appurtenant to said Tracts Q-52 and Q-54 at the time it was taken by the United States of America, except:

I did not aquire any title as to water rights when I purchased the property

Dated at Montesano, Washington,

_____, 1941.

_____

CERTIFICATE AS TO WATER RIGHTS

I hereby certify that I acquired no water rights in connection with my ownership of Tract Q-55 in Clallam (or Jefferson) County, Washington, either by instrument of conveyance, or by appropriation prior to June 15, 1917, or by permit granted by the Supervisor of Hydraulics of the State of Washington, subsequent to June 15, 1917, and that there were no water rights, other than reparian rights, appurtenant to said Tract Q-55 at the time it was taken by the United States of America, except:

Dated at Seattle, Washington, June 16th, 1941.

Mrs. Alice Lyman Clement

CERTIFICATE AS TO WATER RIGHTS

I hereby certify that I acquired no water rights in connection with my ownership of Tract Q-56 in Clallam (or Jefferson) County, Washington, either by instrument of conveyance, or by appropriation prior to June 15, 1917, or by permit granted by the Supervisor of Hydraulics of the State of Washington, subsequent to June 15, 1917, and that there were no water rights, other than reparian rights, appurtenant to said Tract Q-56 at the time it was taken by the United States of America, except:

Dated at Bucoda, Washington, January 28, 1942.

Sadie G. Read

CERTIFICATE AS TO WATER RIGHTS

I hereby certify that I acquired no water rights in connection with my ownership of Tract Q-57 in Clallam (or Jefferson) County, Washington, either by instrument of conveyance, or by appropriation prior to June 15, 1917, or by permit granted by the Supervisor of Hydraulics of the State of Washington, subsequent to June 15, 1917, and that there were no water rights, other than reparian rights, appurtenant to said Tract Q-57 at the time it was taken by the United States of America, except:

N O N E

Dated at Seattle, Washington, May 1st, 1941.

Selma L. Boe

CERTIFICATE AS TO WATER RIGHTS

I hereby certify that I acquired no water rights in connection with my ownership of Tract Q-59 in Clallam (or Jefferson) County, Washington, either by instrument of conveyance, or by appropriation prior to June 15, 1917, or by permit granted by the Supervisor of Hydraulics of the State of Washington, subsequent to June 15, 1917, and that there were no water rights, other than reparian rights, appurtenant to said Tract Q-59 at the time it was taken by the United States of America, except: none

Dated at Hoquiam, Washington, June 15, 1941.

S. Goldthwaite

CERTIFICATE AS TO WATER RIGHTS

I hereby certify that I acquired no water rights in connection with my ownership of Tract Q-60 in Clallam (or Jefferson) County, Washington, either by instrument of conveyance, or by appropriation prior to June 15, 1917, or by permit granted by the Supervisor of Hydraulics of the State of Washington, subsequent to June 15, 1917, and that there were no water rights, other than reparian rights, appurtenant to said Tract Q-60 at the time it was taken by the United States of America, except: None.

Dated at Hoquiam, Washington, Sept. 25, 1941.

Charles Brooks.

CERTIFICATE AS TO WATER RIGHTS

I hereby certify that I acquired no water rights in connection with my ownership of Tract Q-61 in Clallam (or Jefferson) County, Washington, either by instrument of conveyance, or by appropriation prior to June 15, 1917, or by permit granted by the Supervisor of Hydraulics of the State of Washington, subsequent to June 15, 1917, and that there were no water rights, other than reparian rights, appurtenant to said Tract Q-61 at the time it was taken by the United States of America, except:

none

Dated at Aloha, Washington, June 13, 1941.

Sarah A Dean

CERTIFICATE AS TO WATER RIGHTS

I hereby certify that I acquired no water rights in connection with my ownership of Tract Q-62 in Clallam (or Jefferson) County, Washington, either by instrument of conveyance, or by appropriation prior to June 15, 1917, or by permit granted by the Supervisor of Hydraulics of the State of Washington, subsequent to June 15, 1917, and that there were no water rights, other than reparian rights, appurtenant to said Tract Q-62 at the time it was taken by the United States of America, except:

Dated at Bucoda, Washington, January 28, 1942.

William C. Reed

CERTIFICATE AS TO WATER RIGHTS

I hereby certify that I acquired no water rights in connection with my ownership of Tract Q-65 in Clallam (or Jefferson) County, Washington, either by instrument of conveyance, or by appropriation prior to June 15, 1917, or by permit granted by the Supervisor of Hydraulics of the State of Washington, subsequent to June 15, 1917, and that there were no water rights, other than reparian rights, appurtenant to said Tract Q-65 at the time it was taken by the United States of America, except:

None

Dated at Hoquiam, Washington, June 14, 1941.

Dorothy L. Warnken

CERTIFICATE AS TO WATER RIGHTS

I hereby certify that I acquired no water rights in connection with my ownership of Tract Q-68 in Clallam (or Jefferson) County, Washington, either by instrument of conveyance, or by appropriation prior to June 15, 1917, or by permit granted by the Supervisor of Hydraulics of the State of Washington, subsequent to June 15, 1917, and that there were no water rights, other than reparian rights, appurtenant to said Tract Q-68 at the time it was taken by the United States of America, except:

None

Charles Streater owned the place 1917 Dont know if he had water rights in M.

Dated at Ocean City, Washington,

June 16th, 1941.

Mrs. K. E. Nolan

CERTIFICATE AS TO WATER RIGHTS

I hereby certify that I acquired no water rights in connection with my ownership of Tract Q-76 in Clallam (or Jefferson) County, Washington, either by instrument of conveyance, or by appropriation prior to June 15, 1917, or by permit granted by the Supervisor of Hydraulics of the State of Washington, subsequent to June 15, 1917, and that there were no water rights, other than reparian rights, appurtenant to said Tract Q-76 at the time it was taken by the United States of America, except:

Dated at Berkeley Calif, ~~Washington~~, Sept 27th, 1941.

Jennie Forbes Brown

CERTIFICATE AS TO WATER RIGHTS

I hereby certify that I acquired no water rights in connection with my ownership of Tract Q-77 in Clallam (or Jefferson) County, Washington, either by instrument of conveyance, or by appropriation prior to June 15, 1917, or by permit granted by the Supervisor of Hydraulics of the State of Washington, subsequent to June 15, 1917, and that there were no water rights, other than reparian rights, appurtenant to said Tract Q-77 at the time it was taken by the United States of America, ~~except~~ so far as I know and that if the record discloses that I have any such rights I agree to surrender release and transfer same to the U.S.A.

Dated at Elma, Washington, June 13, 1941.

A. H. Callow Executor
Estate of A. H. Callow, Deceased.

CERTIFICATE AS TO WATER RIGHTS

I hereby certify that I acquired no water rights in connection with my ownership of Tract Q-79 in ~~Clallam (or~~ Jefferson) County, Washington, either by instrument of conveyance, or by appropriation prior to June 15, 1917, or by permit granted by the Supervisor of Hydraulics of the State of Washington, subsequent to June 15, 1917, and that there were no water rights, other than reparian rights, appurtenant to said Tract Q-79 at the time it was taken by the United States of America, except:

WYNOOCHE TIMBER COMPANY, a corporation

By _____
Treasurer and Manager

Dated at Hoquiam, Washington,
April 26th, 1941.

Signature Witnessed by:
D Mayfield

CERTIFICATE AS TO WATER RIGHTS

I hereby certify that I acquired no water rights in connection with my ownership of Tract Q-80 in Clallam (or Jefferson) County, Washington, either by instrument of conveyance, or by appropriation prior to June 15, 1917, or by permit granted by the Supervisor of Hydraulics of the State of Washington, subsequent to June 15, 1917, and that there were no water rights, other than reparian rights, appurtenant to said Tract Q-80 at the time it was taken by the United States of America, except: (No exceptions)

Dated at Seattle, , Washington,

May 28, , 1942.

Bertha A. Hoard

Charles E. Hoard

CERTIFICATE AS TO WATER RIGHTS

I hereby certify that I acquired no water rights in connection with my ownership of Tract Q-85 in Clallam (or Jefferson) County, Washington, either by instrument of conveyance, or by appropriation prior to June 15, 1917, or by permit granted by the Supervisor of Hydraulics of the State of Washington, subsequent to June 15, 1917, and that there were no water rights, other than reparian rights, appurtenant to said Tract Q-85 at the time it was taken by the United States of America, except:

Dated at Aberdeen, Washington, Jan 9th, 1941.

George A Hill

CERTIFICATE AS TO WATER RIGHTS

I hereby certify that I acquired no water rights in connection with my ownership of Tract Q-87 in Clallam (or Jefferson) County, Washington, either by instrument of conveyance, or by appropriation prior to June 15, 1917, or by permit granted by the Supervisor of Hydraulics of the State of Washington, subsequent to June 15, 1917, and that there were no water rights, other than reparian rights, appurtenant to said Tract Q-87 at the time it was taken by the United States of America, except:

Dated at ~~Hoquiam~~, Washington, June - 20 -, 1941.

Carrie H. Klein

CERTIFICATE AS TO WATER RIGHTS

I hereby certify that I acquired no water rights in connection with my ownership of Tract Q-89 in Clallam (or Jefferson) County, Washington, either by instrument of conveyance, or by appropriation prior to June 15, 1917, or by permit granted by the Supervisor of Hydraulics of the State of Washington, subsequent to June 15, 1917, and that there were no water rights, other than reparian rights, appurtenant to said Tract Q-89 at the time it was taken by the United States of America, except:

None

Dated at Seattle, Washington, Sept 24, 1941.

Carl Bjornson

CERTIFICATE AS TO WATER RIGHTS

I hereby certify that I acquired no water rights in connection with my ownership of Tract Q-90 in Clallam (or Jefferson) County, Washington, either by instrument of conveyance, or by appropriation prior to June 15, 1917, or by permit granted by the Supervisor of Hydraulics of the State of Washington, subsequent to June 15, 1917, and that there were no water rights, other than reparian rights, appurtenant to said Tract Q-90 at the time it was taken by the United States of America, except:

Dated at Seattle, Washington,
7-5, 1941.

None

Hans E. Gerhein

CERTIFICATE AS TO WATER RIGHTS

I hereby certify that I acquired no water rights in connection with my ownership of Tract Q-92 in Clallam (or Jefferson) County, Washington, either by instrument of conveyance, or by appropriation prior to June 15, 1917, or by permit granted by the Supervisor of Hydraulics of the State of Washington, subsequent to June 15, 1917, and that there were no water rights, other than reparian rights, appurtenant to said Tract Q-92 at the time it was taken by the United States of America, except: None to my knowledge

Dated at Seattle, Washington, June 14, 1941.

Gerald L. Garno as
one of Administrators de bonis
non Estate Charles A Matthews,
Dec'd.

CERTIFICATE AS TO WATER RIGHTS

I hereby certify that I acquired no water rights in connection with my ownership of Tract Q-96 in Clallam (or Jefferson) County, Washington, either by instrument of conveyance, or by appropriation prior to June 15, 1917, or by permit granted by the Supervisor of Hydraulics of the State of Washington, subsequent to June 15, 1917, and that there were no water rights, other than reparian rights, appurtenant to said Tract Q-96 at the time it was taken by the United States of America, except:

None

Dated at Montesano, Washington, June 12th, 1941.

M. M. Kelly

CERTIFICATE AS TO WATER RIGHTS

I hereby certify that I acquired no water rights in connection with my ownership of Tract Q-98 in Clallam (or Jefferson) County, Washington, either by instrument of conveyance, or by appropriation prior to June 15, 1917, or by permit granted by the Supervisor of Hydraulics of the State of Washington, subsequent to June 15, 1917, and that there were no water rights, other than reparian rights, appurtenant to said Tract Q-98 at the time it was taken by the United States of America, except: None

Dated at Port Angeles, Washington, June 23, 1941.

Mr. Earl V. Zustant

CERTIFICATE AS TO WATER RIGHTS

I hereby certify that I acquired no water rights in connection with my ownership of Tract Q-101 in Clallam (or Jefferson) County, Washington, either by instrument of conveyance, or by appropriation prior to June 15, 1917, or by permit granted by the Supervisor of Hydraulics of the State of Washington, subsequent to June 15, 1917, and that there were no water rights, other than reparian rights, appurtenant to said Tract Q-101 at the time it was taken by the United States of America, except:

Dated at Fall City, Washington, July 2, 1941.

Charles Victor Hanson

Great Falls Montana, June 16, 1941

Mr H I Kyle,
Seattle Wash.

Dear Sir::

Acknowledgeing receipt of your letter of June 11th, as to water rights in connection with the Olympic land.

The only reference to water right in this matter is contained in a paragraph in the original patent, following the statement of the grant to Bixler and is in part as follows:::

''Subject to any vested right and accrued water rights for mining, agricultural, manufacturing, or other purposesand for rights to ditches and reservoirsused in connection with suchwater rights as may be recognized and acknowledged by the local custon and lawsand court decisions, etc.''

I trust that this will give you the information you may desire.

Yours Truly

HHeath

CERTIFICATE AS TO WATER RIGHTS

I hereby certify that I acquired no water rights in connection with my ownership of Tract Q-104 in Clallam (or Jefferson) County, Washington, either by instrument of conveyance, or by appropriation prior to June 15, 1917, or by permit granted by the Supervisor of Hydraulics of the State of Washington, subsequent to June 15, 1917, and that there were no water rights, other than reparian rights, appurtenant to said Tract Q-104 at the time it was taken by the United States of America, except:

Dated at _____, Washington,

_____, 1941.

_____

CERTIFICATE AS TO WATER RIGHTS

I hereby certify that I acquired no water rights in connection with my ownership of Tracts Q-107 & Q-110 in ~~Clallam~~ (or Jefferson) County, Washington, either by instrument of conveyance, or by appropriation prior to June 15, 1917, or by permit granted by the Supervisor of Hydraulics of the State of Washington, subsequent to June 15, 1917, and that there were no water rights, other than reparian rights, appurtenant to said Tracts Q-107 & Q-110 at the time it was taken by the United States of America, except: -none-

Dated at Aberdeen, Washington, June 14, 1941.

O. R. Austin

CERTIFICATE AS TO WATER RIGHTS

I hereby certify that I acquired no water rights in connection with my ownership of Tract Q-108 in Clallam (or Jefferson) County, Washington, either by instrument of conveyance, or by appropriation prior to June 15, 1917, or by permit granted by the Supervisor of Hydraulics of the State of Washington, subsequent to June 15, 1917, and that there were no water rights, other than reparian rights, appurtenant to said Tract Q-108 at the time it was taken by the United States of America, except:

None to my knowledge

Dated at Olympia, Washington, June 14, 1941.

Henry L Kase

CERTIFICATE AS TO WATER RIGHTS

I hereby certify that I acquired no water rights in connection with my ownership of Tract Q-109 in Clallam (or Jefferson) County, Washington, either by instrument of conveyance, or by appropriation prior to June 15, 1917, or by permit granted by the Supervisor of Hydraulics of the State of Washington, subsequent to June 15, 1917, and that there were no water rights, other than reparian rights, appurtenant to said Tract Q-109 at the time it was taken by the United States of America, except:

None

Dated at Hoquiam, Washington, Sept. 25, 1941.

Floyd A. Patton

CERTIFICATE AS TO WATER RIGHTS

I hereby certify that I acquired no water rights in connection with my ownership of Tract Q-111 in Clallam (or Jefferson) County, Washington, either by instrument of conveyance, or by appropriation prior to June 15, 1917, or by permit granted by the Supervisor of Hydraulics of the State of Washington, subsequent to June 15, 1917, and that there were no water rights, other than reparian rights, appurtenant to said Tract Q-111 at the time it was taken by the United States of America, except:

Dated at Aberdeen, Washington, July 25, 1941.

Osear Smith

CERTIFICATE AS TO WATER RIGHTS

I hereby certify that I acquired no water rights in connection with my ownership of Tract J-245B in Clallam (or Jefferson) County, Washington, either by instrument of conveyance, or by appropriation prior to June 15, 1917, or by permit granted by the Supervisor of Hydraulics of the State of Washington, subsequent to June 15, 1917, and that there were no water rights, other than reparian rights, appurtenant to said Tract J-245B at the time it was taken by the United States of America, except:

Dated at Kalaloch, Washington, June 26, 1941.

C. N. Becker

CERTIFICATE AS TO WATER RIGHTS

I hereby certify that I acquired no water rights in connection with my ownership of Tract J-266 in Clallam (or Jefferson) County, Washington, either by instrument of conveyance, or by appropriation prior to June 15, 1917, or by permit granted by the Supervisor of Hydraulics of the State of Washington, subsequent to June 15, 1917, and that there were no water rights, other than reparian rights, appurtenant to said Tract J-266 at the time it was taken by the United States of America, except: we used the waters for domestic purposes while we owned the property or that is all the Rights that I know of.
C.C. Ross.

Dated at Everett, Washington, June 22, 1941.

C.C. Ross.

CERTIFICATE AS TO WATER RIGHTS

I hereby certify that I acquired no water rights in connection with my ownership of Tract C-11 in Clallam (or Jefferson) County, Washington, either by instrument of conveyance, or by appropriation prior to June 15, 1917, or by permit granted by the Supervisor of Hydraulics of the State of Washington, subsequent to June 15, 1917, and that there were no water rights, other than reparian rights, appurtenant to said Tract C-11 at the time it was taken by the United States of America, except:

None

Dated at Arlington, Washington, June 16, 1941.

Brit Borseth

CERTIFICATE AS TO WATER RIGHTS

I hereby certify that I acquired no water rights in connection with my ownership of Tract C-14 in Clallam (or Jefferson) County, Washington, either by instrument of conveyance, or by appropriation prior to June 15, 1917, or by permit granted by the Supervisor of Hydraulics of the State of Washington, subsequent to June 15, 1917, and that there were no water rights, other than reparian rights, appurtenant to said Tract C-14 at the time it was taken by the United States of America, except:

Dated at Arlington, Washington, June 17, 1941.

Ben L Oberg

OCT 7 1941

CERTIFICATE AS TO WATER RIGHTS

I hereby certify that I acquired no water rights in connection with my ownership of Tract C-16 in Clallam (or Jefferson) County, Washington, either by instrument of conveyance, or by appropriation prior to June 15, 1917, or by permit granted by the Supervisor of Hydraulics of the State of Washington, subsequent to June 15, 1917, and that there were no water rights, other than reparian rights, appurtenant to said Tract C-16 at the time it was taken by the United States of America, except: None

Dated at Ogette, Washington, October 2, 1941.

Peter A. Raose

CERTIFICATE AS TO WATER RIGHTS

I hereby certify that I acquired no water rights in connection with my ownership of Tract C-25 in Clallam (or Jefferson) County, Washington, either by instrument of conveyance, or by appropriation prior to June 15, 1917, or by permit granted by the Supervisor of Hydraulics of the State of Washington, subsequent to June 15, 1917, and that there were no water rights, other than reparian rights, appurtenant to said Tract C-25 at the time it was taken by the United States of America, except:

Dated at Seattle, Washington, June 12 1941.

Arnold Wirk

CERTIFICATE AS TO WATER RIGHTS

I hereby certify that I acquired no water rights in connection with my ownership of Tracts C-30 & C-67 in Clallam (or Jefferson) County, Washington, either by instrument of conveyance, or by appropriation prior to June 15, 1917, or by permit granted by the Supervisor of Hydraulics of the State of Washington, subsequent to June 15, 1917, and that there were no water rights, other than reparian rights, appurtenant to said Tracts C-30 & C-67 at the time it was taken by the United States of America, except:

Dated at Cambridge, Massachusetts
July 1, 1941.

Richard Mansfield Jr.

CERTIFICATE AS TO WATER RIGHTS

I hereby certify that I acquired no water rights in connection with my ownership of Tract C-33 in Clallam (or Jefferson) County, Washington, either by instrument of conveyance, or by appropriation prior to June 15, 1917, or by permit granted by the Supervisor of Hydraulics of the State of Washington, subsequent to June 15, 1917, and that there were no water rights, other than reparian rights, appurtenant to said Tract C-33 at the time it was taken by the United States of America, except:

None

Dated at Seattle, Washington, June 11, 1941.

UNITED STATES FIDELITY AND GUARANTY COMPANY

By: R. M. McAllister

Agent.

CERTIFICATE AS TO WATER RIGHTS

I hereby certify that I acquired no water rights in connection with my ownership of Tract C-36 in Clallam (or Jefferson) County, Washington, either by instrument of conveyance, or by appropriation prior to June 15, 1917, or by permit granted by the Supervisor of Hydraulics of the State of Washington, subsequent to June 15, 1917, and that there were no water rights, other than reparian rights, appurtenant to said Tract C-36 at the time it was taken by the United States of America, except:

Dated at Clallam Bay, Washington,
July 10, 1941.

B J. Murray

CERTIFICATE AS TO WATER RIGHTS

I hereby certify that I acquired no water rights in connection with my ownership of Tract C-37 in Clallam (or Jefferson) County, Washington, either by instrument of conveyance, or by appropriation prior to June 15, 1917, or by permit granted by the Supervisor of Hydraulics of the State of Washington, subsequent to June 15, 1917, and that there were no water rights, other than reparian rights, appurtenant to said Tract C-37 at the time it was taken by the United States of America, except:

None

Dated at Port Angeles, Washington, June 23, 1941.

Philip Talbot

00-00-1941: certificate as to water rights, tracts c-39 & c-41

CERTIFICATE AS TO WATER RIGHTS

I hereby certify that I acquired no water rights in connection with my ownership of Tracts C-39 & C-41 in Clallam (or Jefferson) County, Washington, either by instrument of conveyance, or by appropriation prior to June 15, 1917, or by permit granted by the Supervisor of Hydraulics of the State of Washington, subsequent to June 15, 1917, and that there were no water rights, other than reparian rights, appurtenant to said Tracts C-39 & C-41 at the time it was taken by the United States of America, except:

None

Mary Ward McCormick

Dated at _____, Washington,

_____, 1941.

_____

CERTIFICATE AS TO WATER RIGHTS

I hereby certify that I acquired no water rights in connection with my ownership of Tracts C-40 and C-51 in Clallam (or Jefferson) County, Washington, either by instrument of conveyance, or by appropriation prior to June 15, 1917, or by permit granted by the Supervisor of Hydraulics of the State of Washington, subsequent to June 15, 1917, and that there were no water rights, other than reparian rights, appurtenant to said Tracts C-40 and C-51 at the time it was taken by the United States of America, except:

None

Dated at Seattle, Washington,
May 29, 1941.

David W Douglas

CERTIFICATE AS TO WATER RIGHTS

I hereby certify that I acquired no water rights in connection with my ownership of Tract C-45 in Clallam (or Jefferson) County, Washington, either by instrument of conveyance, or by appropriation prior to June 15, 1917, or by permit granted by the Supervisor of Hydraulics of the State of Washington, subsequent to June 15, 1917, and that there were no water rights, other than reparian rights, appurtenant to said Tract C-45 at the time it was taken by the United States of America, except: None.

Dated at Anacortes, Washington, June 18, 1941.

Byrd L Decker

CERTIFICATE AS TO WATER RIGHTS

I hereby certify that I acquired no water rights in connection with my ownership of Tract C-47 in Clallam (or Jefferson) County, Washington, either by instrument of conveyance, or by appropriation prior to June 15, 1917, or by permit granted by the Supervisor of Hydraulics of the State of Washington, subsequent to June 15, 1917, and that there were no water rights, other than reparian rights, appurtenant to said Tract C-47 at the time it was taken by the United States of America, except:

Dated at Los Angeles, Calif., Washington,
June 14, 1941.

Gida E. Hoods
841 - N. Ave 63
Los Angeles
Calif.

CERTIFICATE AS TO WATER RIGHTS

I hereby certify that I acquired no water rights in connection with my ownership of Tract C-55 in Clallam (or Jefferson) County, Washington, either by instrument of conveyance, or by appropriation prior to June 15, 1917, or by permit granted by the Supervisor of Hydraulics of the State of Washington, subsequent to June 15, 1917, and that there were no water rights, other than reparian rights, appurtenant to said Tract C-55 at the time it was taken by the United States of America, except:

Dated at Redondo Beach, ~~Washington~~ California, March 7th, 1941.

Mary L. Leake

CERTIFICATE AS TO WATER RIGHTS

I hereby certify that I acquired no water rights in connection with my ownership of Tract C-57 in Clallam (or Jefferson) County, Washington, either by instrument of conveyance, or by appropriation prior to June 15, 1917, or by permit granted by the Supervisor of Hydraulics of the State of Washington, subsequent to June 15, 1917, and that there were no water rights, other than reparian rights, appurtenant to said Tract C-57 at the time it was taken by the United States of America, except: none.

Dated at Seattle, Washington, June 20, 1941.

Alfred P. Johnson

CERTIFICATE AS TO WATER RIGHTS

I hereby certify that I acquired no water rights in connection with my ownership of Tract C-59 in Clallam (or Jefferson) County, Washington, either by instrument of conveyance, or by appropriation prior to June 15, 1917, or by permit granted by the Supervisor of Hydraulics of the State of Washington, subsequent to June 15, 1917, and that there were no water rights, other than reparian rights, appurtenant to said Tract C-59 at the time it was taken by the United States of America, except: None.

Dated at East Stanwood, Washington, June 17, 1941.

Bessie Birkstol

CERTIFICATE AS TO WATER RIGHTS

I hereby certify that I acquired no water rights in connection with my ownership of Tract C-80 in Clallam (or Jefferson) County, Washington, either by instrument of conveyance, or by appropriation prior to June 15, 1917, or by permit granted by the Supervisor of Hydraulics of the State of Washington, subsequent to June 15, 1917, and that there were no water rights, other than reparian rights, appurtenant to said Tract C-80 at the time it was taken by the United States of America, except:

None

Dated at Seattle, Washington, June 11th, 1941.

Mrs E. M. Marsh

CERTIFICATE AS TO WATER RIGHTS

I hereby certify that I acquired no water rights in connection with my ownership of Tract C-82 in Clallam (or Jefferson) County, Washington, either by instrument of conveyance, or by appropriation prior to June 15, 1917, or by permit granted by the Supervisor of Hydraulics of the State of Washington, subsequent to June 15, 1917, and that there were no water rights, other than reparian rights, appurtenant to said Tract C-82 at the time it was taken by the United States of America, except: NONE.

Dated at Butte, Montana, Washington, June 13, 1941.

ANACONDA COPPER MINING COMPANY,.

By A. M. Kelly.

Vice President.

CERTIFICATE AS TO WATER RIGHTS

I hereby certify that I acquired no water rights in connection with my ownership of Tracts C-84 & C-87 in Clallam (or Jefferson) County, Washington, either by instrument of conveyance, or by appropriation prior to June 15, 1917, or by permit granted by the Supervisor of Hydraulics of the State of Washington, subsequent to June 15, 1917, and that there were no water rights, other than reparian rights, appurtenant to said Tracts C-84 & C-87 at the time it was taken by the United States of America, except:

None

Dated at Seattle, Wash. 4, Washington,
Nov. 4, 1941.

Harvey B. Smith.

CERTIFICATE AS TO WATER RIGHTS

I hereby certify that I acquired no water rights in connection with my ownership of Tract C-86 in Clallam (or Jefferson) County, Washington, either by instrument of conveyance, or by appropriation prior to June 15, 1917, or by permit granted by the Supervisor of Hydraulics of the State of Washington, subsequent to June 15, 1917, and that there were no water rights, other than reparian rights, appurtenant to said Tract C-86 at the time it was taken by the United States of America, except:

Dated at Forks, Washington, 11-24, 1941.

William G. Taylor

OCT 24 1941

CERTIFICATE AS TO WATER RIGHTS

I hereby certify that I acquired no water rights in connection with my ownership of Tract C-88 in Clallam (or Jefferson) County, Washington, either by instrument of conveyance, or by appropriation prior to June 15, 1917, or by permit granted by the Supervisor of Hydraulics of the State of Washington, subsequent to June 15, 1917, and that there were no water rights, other than reparian rights, appurtenant to said Tract C-88 at the time it was taken by the United States of America, except:

Dated at Portangeles, Washington, Oct 2nd, 1941.

Mary Gertrude Maxfield.

CERTIFICATE AS TO WATER RIGHTS

I hereby certify that I acquired no water rights in connection with my ownership of Tract C-89 in Clallam (or Jefferson) County, Washington, either by instrument of conveyance, or by appropriation prior to June 15, 1917, or by permit granted by the Supervisor of Hydraulics of the State of Washington, subsequent to June 15, 1917, and that there were no water rights, other than reparian rights, appurtenant to said Tract C-89 at the time it was taken by the United States of America, except:

Dated at Palo Alto, California, ~~Washington,~~

June 13, 1941.

William H. Edwards

CERTIFICATE AS TO WATER RIGHTS

I hereby certify that I acquired no water rights in connection with my ownership of Tract C-90-a in Clallam (or Jefferson) County, Washington, either by instrument of conveyance, or by appropriation prior to June 15, 1917, or by permit granted by the Supervisor of Hydraulics of the State of Washington, subsequent to June 15, 1917, and that there were no water rights, other than reparian rights, appurtenant to said Tract C-90-a at the time it was taken by the United States of America, except:

Dated at Salt Lake City ~~Washington,~~ Utah
Jan. 24, 1941.

William L Edmonds

CERTIFICATE AS TO WATER RIGHTS

I hereby certify that I acquired no water rights in connection with my ownership of Tract C-91 in Clallam (or Jefferson) County, Washington, either by instrument of conveyance, or by appropriation prior to June 15, 1917, or by permit granted by the Supervisor of Hydraulics of the State of Washington, subsequent to June 15, 1917, and that there were no water rights, other than reparian rights, appurtenant to said Tract C-91 at the time it was taken by the United States of America, except:

Dated at Port Angeles, Washington, December 29th, 1941.

William L Hudson

CERTIFICATE AS TO WATER RIGHTS

I hereby certify that I acquired no water rights in connection with my ownership of Tract C-99 in Clallam (or Jefferson) County, Washington, either by instrument of conveyance, or by appropriation prior to June 15, 1917, or by permit granted by the Supervisor of Hydraulics of the State of Washington, subsequent to June 15, 1917, and that there were no water rights, other than reparian rights, appurtenant to said Tract C-99 at the time it was taken by the United States of America, except:

None

Dated at Richmond, ~~Washington,~~ California, June 16, 1941.

Hazel J Rule

CERTIFICATE AS TO WATER RIGHTS

I hereby certify that I acquired no water rights in connection with my ownership of Tracts J-8B and J-18 in Clallam (or Jefferson) County, Washington, either by instrument of conveyance, or by appropriation prior to June 15, 1917, or by permit granted by the Supervisor of Hydraulics of the State of Washington, subsequent to June 15, 1917, and that there were no water rights, other than reparian rights, appurtenant to said Tracts J-8B and J-18 at the time it was taken by the United States of America, except:

Dated at St Paul Minn, Washington,
June 19, 1941.

David Tozer

CERTIFICATE AS TO WATER RIGHTS

I hereby certify that I acquired no water rights in connection with my ownership of Tract J-10 in Clallam (or Jefferson) County, Washington, either by instrument of conveyance, or by appropriation prior to June 15, 1917, or by permit granted by the Supervisor of Hydraulics of the State of Washington, subsequent to June 15, 1917, and that there were no water rights, other than reparian rights, appurtenant to said Tract J-10 at the time it was taken by the United States of America, except:

None.

Dated at Seattle, Washington, Sept 24 —, 1941.

Luella M. Held

Formerly Luella M. Toontz

CERTIFICATE AS TO WATER RIGHTS

I hereby certify that I acquired no water rights in connection with my ownership of Tract J-12 in Clallam (or Jefferson) County, Washington, either by instrument of conveyance, or by appropriation prior to June 15, 1917, or by permit granted by the Supervisor of Hydraulics of the State of Washington, subsequent to June 15, 1917, and that there were no water rights, other than reparian rights, appurtenant to said Tract J-12 at the time it was taken by the United States of America, except: From such records as found after death of C.W. Greenlee, Dec. 9, 1940 I would say that no water rights of any kind were ever aquired by him in connection with the above mentioned property.

Dated at Seattle, Washington, June 17, 1941.

C. W. Greenlee, deceased
C. Greenlee Executor.
1038 Exchange Bldg. Seattle.

CERTIFICATE AS TO WATER RIGHTS

I hereby certify that I acquired no water rights in connection with my ownership of Tracts J-16, J-33, J-264, Q-15, Q-93 and Q-100 in Clallam (or Jefferson) County, Washington, either by instrument of conveyance, or by appropriation prior to June 15, 1917, or by permit granted by the Supervisor of Hydraulics of the State of Washington, subsequent to June 15, 1917, and that there were no water rights, other than reparian rights, appurtenant to said Tracts J-16, J-33, J-264, Q-15, Q-93 and Q-100 at the time it was taken by the United States of America, except:

Dated at Seattle, Washington, April 10, 1942.

Thomas L. Boeing

CERTIFICATE AS TO WATER RIGHTS

I hereby certify that I acquired no water rights in connection with my ownership of Tract J-23 in Clallam (or Jefferson) County, Washington, either by instrument of conveyance, or by appropriation prior to June 15, 1917, or by permit granted by the Supervisor of Hydraulics of the State of Washington, subsequent to June 15, 1917, and that there were no water rights, other than reparian rights, appurtenant to said Tract J-23 at the time it was taken by the United States of America, except:

None

Dated at Montesano Washington, June 17, 1941.

W. A. France

CERTIFICATE AS TO WATER RIGHTS

I hereby certify that I acquired no water rights in connection with my ownership of Tract J-25 in Clallam (or Jefferson) County, Washington, either by instrument of conveyance, or by appropriation prior to June 15, 1917, or by permit granted by the Supervisor of Hydraulics of the State of Washington, subsequent to June 15, 1917, and that there were no water rights, other than reparian rights, appurtenant to said Tract J-25 at the time it was taken by the United States of America, except:

Dated at Seattle, Washington, April 27, 1941.

J. P. Messin

CERTIFICATE AS TO WATER RIGHTS

I hereby certify that I acquired no water rights in connection with my ownership of Tract J-34 in Clallam (or Jefferson) County, Washington, either by instrument of conveyance, or by appropriation prior to June 15, 1917, or by permit granted by the Supervisor of Hydraulics of the State of Washington, subsequent to June 15, 1917, and that there were no water rights, other than reparian rights, appurtenant to said Tract J-34 at the time it was taken by the United States of America, except:

Dated at Seattle, Washington, June 3rd, 1942.

Ward E. Buzzell

CERTIFICATE AS TO WATER RIGHTS

I hereby certify that I acquired no water rights in connection with my ownership of Tracts J-207 and J-228 in Clallam (or Jefferson) County, Washington, either by instrument of conveyance, or by appropriation prior to June 15, 1917, or by permit granted by the Supervisor of Hydraulics of the State of Washington, subsequent to June 15, 1917, and that there were no water rights, other than reparian rights, appurtenant to said Tracts J-207 and J-228 at the time it was taken by the United States of America, except: None Known of

W E Irwin

Dated at Seattle, Washington,
July 26th, 1941.

CERTIFICATE AS TO WATER RIGHTS

I hereby certify that I acquired no water rights in connection with my ownership of Tract J-212 in Clallam (or Jefferson) County, Washington, either by instrument of conveyance, or by appropriation prior to June 15, 1917, or by permit granted by the Supervisor of Hydraulics of the State of Washington, subsequent to June 15, 1917, and that there were no water rights, other than reparian rights, appurtenant to said Tract J-212 at the time it was taken by the United States of America, except: None

Dated at Forks, Washington, Aug. 13, 1941.

L. Alma Wahlgren

CERTIFICATE AS TO WATER RIGHTS

I hereby certify that I acquired no water rights in connection with my ownership of Tract J-213 in Clallam (or Jefferson) County, Washington, either by instrument of conveyance, or by appropriation prior to June 15, 1917, or by permit granted by the Supervisor of Hydraulics of the State of Washington, subsequent to June 15, 1917, and that there were no water rights, other than reparian rights, appurtenant to said Tract J-213 at the time it was taken by the United States of America, except:

Dated at St Louis Mo ~~Washington~~, July 5th, 1941.

James N Davie

Keturah F. Davie

CERTIFICATE AS TO WATER RIGHTS

I hereby certify that I acquired no water rights in connection with my ownership of Tract J-214 in Clallam (or Jefferson) County, Washington, either by instrument of conveyance, or by appropriation prior to June 15, 1917, or by permit granted by the Supervisor of Hydraulics of the State of Washington, subsequent to June 15, 1917, and that there were no water rights, other than reparian rights, appurtenant to said Tract J-214 at the time it was taken by the United States of America, except:

Dated at Seattle, Washington, April 24, 1941.

Olive S Morris

00-00-1941: certificate as to water rights, tract j-215

CERTIFICATE AS TO WATER RIGHTS

I hereby certify that I acquired no water rights in connection with my ownership of Tract J-215 in Clallam (or Jefferson) County, Washington, either by instrument of conveyance, or by appropriation prior to June 15, 1917, or by permit granted by the Supervisor of Hydraulics of the State of Washington, subsequent to June 15, 1917, and that there were no water rights, other than reparian rights, appurtenant to said Tract J-215 at the time it was taken by the United States of America, except:

THE FIRST NATIONAL BANK OF EVERETT, WASH

by W. A. Burke V.P.

Dated at Everett, Washington,
6/13, 1941.

CERTIFICATE AS TO WATER RIGHTS

I hereby certify that I acquired no water rights in connection with my ownership of Tract J-219 in Clallam (or Jefferson) County, Washington, either by instrument of conveyance, or by appropriation prior to June 15, 1917, or by permit granted by the Supervisor of Hydraulics of the State of Washington, subsequent to June 15, 1917, and that there were no water rights, other than reparian rights, appurtenant to said Tract J-219 at the time it was taken by the United States of America, except:

Dated at Seattle, Washington, July 11th, 1941.

Olive E. McCracken.

CERTIFICATE AS TO WATER RIGHTS

I hereby certify that I acquired no water rights in connection with my ownership of Tracts J-231 & J-234 in Clallam (or Jefferson) County, Washington, either by instrument of conveyance, or by appropriation prior to June 15, 1917, or by permit granted by the Supervisor of Hydraulics of the State of Washington, subsequent to June 15, 1917, and that there were no water rights, other than riparian rights, appurtenant to said Tracts J-231 & J-234 at the time it was taken by the United States of America, except:

NONE

Dated at Seattle, Washington,
April 30, 1941.

Ruth Abel Vance

CERTIFICATE AS TO WATER RIGHTS

I hereby certify that I acquired no water rights in connection with my ownership of Tract J-236 in Clallam (or Jefferson) County, Washington, either by instrument of conveyance, or by appropriation prior to June 15, 1917, or by permit granted by the Supervisor of Hydraulics of the State of Washington, subsequent to June 15, 1917, and that there were no water rights, other than reparian rights, appurtenant to said Tract J-236 at the time it was taken by the United States of America, except: None

Dated at Yakima, Washington, June 19, 1941.

Yakima First National Bank
By Walter J. Funk
Liquidating agt

00-00-1941: letter to attorney from ms. bradley regarding the water rights to tract c-38

Oct- -41.
Waukesha
Wise.

Henery J Kyle. Atty.
Seattle Wash.

Dear Sir.
Receiving your letter in regard
to the water rights to tract C-38.
when we bought the land it was
with the understanding that we
also had the water rights, other wise
the land would be of no use to us.
but; I have no record of it.
Sorry I can be of no help to you.
Sincerely Yours.
Emily Bradley.
431. W. Main St-
Waukesha
Wisconsin

CERTIFICATE AS TO WATER RIGHTS

I hereby certify that I acquired no water rights in connection with my ownership of Tract C-38 in Clallam (or Jefferson) County, Washington, either by instrument of conveyance, or by appropriation prior to June 15, 1917, or by permit granted by the Supervisor of Hydraulics of the State of Washington, subsequent to June 15, 1917, and that there were no water rights, other than reparian rights, appurtenant to said Tract C-38 at the time it was taken by the United States of America, except:

Dated at _____, Washington,

_____, 1941.

_____

CERTIFICATE AS TO WATER RIGHTS

I hereby certify that I acquired no water rights in connection with my ownership of Tract C-100 in Clallam (or Jefferson) County, Washington, either by instrument of conveyance, or by appropriation prior to June 15, 1917, or by permit granted by the Supervisor of Hydraulics of the State of Washington, subsequent to June 15, 1917, and that there were no water rights, other than reparian rights, appurtenant to said Tract C-100 at the time it was taken by the United States of America, except: None

Dated at Portland, Oregon ~~Washington~~, June 17, 1941.

Agnes M. Veazie

CERTIFICATE AS TO WATER RIGHTS

I hereby certify that I acquired no water rights in connection with my ownership of Tract C-105 in Clallam (or Jefferson) County, Washington, either by instrument of conveyance, or by appropriation prior to June 15, 1917, or by permit granted by the Supervisor of Hydraulics of the State of Washington, subsequent to June 15, 1917, and that there were no water rights, other than reparian rights, appurtenant to said Tract C-105 at the time it was taken by the United States of America, except:

Dated at Chicago, Ill., Washington,
October 22, 1941, 1941.

ILLINOIS TIMBER COMPANY,

By _____
Pres.

CERTIFICATE AS TO WATER RIGHTS

I hereby certify that I acquired no water rights in connection with my ownership of Tract C-107 in Clallam (or Jefferson) County, Washington, either by instrument of conveyance, or by appropriation prior to June 15, 1917, or by permit granted by the Supervisor of Hydraulics of the State of Washington, subsequent to June 15, 1917, and that there were no water rights, other than reparian rights, appurtenant to said Tract C-107 at the time it was taken by the United States of America, except: None

Dated at Mora, Washington, June 13, 1941.

Bertha Leyendecker

CERTIFICATE AS TO WATER RIGHTS

I hereby certify that I acquired no water rights in connection with my ownership of Tract C-108 in Clallam (or Jefferson) County, Washington, either by instrument of conveyance, or by appropriation prior to June 15, 1917, or by permit granted by the Supervisor of Hydraulics of the State of Washington, subsequent to June 15, 1917, and that there were no water rights, other than reparian rights, appurtenant to said Tract C-108 at the time it was taken by the United States of America, except: None

Dated at Seattle, Washington, June 29th, 1941.

Gabriel Toogey

CERTIFICATE AS TO WATER RIGHTS

I hereby certify that I acquired no water rights in connection with my ownership of Tract C-109 in Clallam (or Jefferson) County, Washington, either by instrument of conveyance, or by appropriation prior to June 15, 1917, or by permit granted by the Supervisor of Hydraulics of the State of Washington, subsequent to June 15, 1917, and that there were no water rights other than reparian rights, appurtenant to said Tract C-109 at the time it was taken by the United States of America, except: None N/E

Dated at Seattle, Washington, 6/16, 1941.

(None)

P Rust

CERTIFICATE AS TO WATER RIGHTS

I hereby certify that I acquired no water rights in connection with my ownership of Tract J-1 in Clallam (or Jefferson) County, Washington, either by instrument of conveyance, or by appropriation prior to June 15, 1917, or by permit granted by the Supervisor of Hydraulics of the State of Washington, subsequent to June 15, 1917, and that there were no water rights, other than reparian rights, appurtenant to said Tract J-1 at the time it was taken by the United States of America, except:

None.

Dated at Bellingham, Washington, June 8, 1941.

Fredrick B. Abbott

CERTIFICATE AS TO WATER RIGHTS

I hereby certify that I acquired no water rights in connection with my ownership of Tract J-2 in Clallam (or Jefferson) County, Washington, either by instrument of conveyance, or by appropriation prior to June 15, 1917, or by permit granted by the Supervisor of Hydraulics of the State of Washington, subsequent to June 15, 1917, and that there were no water rights, other than reparian rights, appurtenant to said Tract J-2 at the time it was taken by the United States of America, except:

None

Dated at Port Angeles, Washington, June 24, 1941.

Gertrude T. Rixon

CERTIFICATE AS TO WATER RIGHTS

I hereby certify that I acquired no water rights in connection with my ownership of Tracts J-5 and J-6 in Clallam (or Jefferson) County, Washington, either by instrument of conveyance, or by appropriation prior to June 15, 1917, or by permit granted by the Supervisor of Hydraulics of the State of Washington, subsequent to June 15, 1917, and that there were no water rights, other than reparian rights, appurtenant to said Tracts J-5 and J-6 at the time it was taken by the United States of America, except:

Dated at None, Washington,
JUN 16 1941, 1941.

William H. Taylor

CERTIFICATE AS TO WATER RIGHTS

I hereby certify that I acquired no water rights in connection with my ownership of Tract J-237 in Clallam (or Jefferson) County, Washington, either by instrument of conveyance, or by appropriation prior to June 15, 1917, or by permit granted by the Supervisor of Hydraulics of the State of Washington, subsequent to June 15, 1917, and that there were no water rights, other than reparian rights, appurtenant to said Tract J-237 at the time it was taken by the United States of America, except:

None

Dated at Montesano, Wash. June 13, Washington, _____, 1941.

Lloyd Pickering

CERTIFICATE AS TO WATER RIGHTS

I hereby certify that I acquired no water rights in connection with my ownership of Tract J-240 in Clallam (or Jefferson) County, Washington, either by instrument of conveyance, or by appropriation prior to June 15, 1917, or by permit granted by the Supervisor of Hydraulics of the State of Washington, subsequent to June 15, 1917, and that there were no water rights, other than reparian rights, appurtenant to said Tract J-240 at the time it was taken by the United States of America, except:

Dated at Portland, ~~Washington,~~ Oregon

June 18th, 1941.

Thos. Autzen

CERTIFICATE AS TO WATER RIGHTS

I hereby certify that I acquired no water rights in connection with my ownership of Tract J-245A in Clallam (or Jefferson) County, Washington, either by instrument of conveyance, or by appropriation prior to June 15, 1917, or by permit granted by the Supervisor of Hydraulics of the State of Washington, subsequent to June 15, 1917, and that there were no water rights, other than reparian rights, appurtenant to said Tract J-245A at the time it was taken by the United States of America, except: Water rights were held for a short time after we purchased the tract by Mr. Becker picked up our rights after we let them lapse - no exact date.

Dated at Aberdeen, Washington, June 16, 1941.

R. Ellison

CERTIFICATE AS TO WATER RIGHTS

I hereby certify that I acquired no water rights in connection with my ownership of Tract J-246 in Clallam (or Jefferson) County, Washington, either by instrument of conveyance, or by appropriation prior to June 15, 1917, or by permit granted by the Supervisor of Hydraulics of the State of Washington, subsequent to June 15, 1917, and that there were no water rights, other than reparian rights, appurtenant to said Tract J-246 at the time it was taken by the United States of America, except:

Dated at Bellingham, Washington, June 12, 1941.

None.

Ethel L. Murrow.
R. C Murrow

CERTIFICATE AS TO WATER RIGHTS

I hereby certify that I acquired no water rights in connection with my ownership of Tract J-247 in Clallam (or Jefferson) County, Washington, either by instrument of conveyance, or by appropriation prior to June 15, 1917, or by permit granted by the Supervisor of Hydraulics of the State of Washington, subsequent to June 15, 1917, and that there were no water rights, other than reparian rights, appurtenant to said Tract J-247 at the time it was taken by the United States of America, except:

Dated at Hoquiam, Washington, None June 17, 1941.

Ella M. Grenthuf

CERTIFICATE AS TO WATER RIGHTS

I hereby certify that I acquired no water rights in connection with my ownership of Tracts J-248 & J-254 in Clallam (or Jefferson) County, Washington, either by instrument of conveyance, or by appropriation prior to June 15, 1917, or by permit granted by the Supervisor of Hydraulics of the State of Washington, subsequent to June 15, 1917, and that there were no water rights, other than reparian rights, appurtenant to said Tracts J-248 & J-254 at the time it was taken by the United States of America, except: None

Dated at Copalis Beach Washington, June 14, 1941.

Dale V. Northup Sr.

CERTIFICATE AS TO WATER RIGHTS

I hereby certify that I acquired no water rights in connection with my ownership of Tract J-250 in Clallam (or Jefferson) County, Washington, either by instrument of conveyance, or by appropriation prior to June 15, 1917, or by permit granted by the Supervisor of Hydraulics of the State of Washington, subsequent to June 15, 1917, and that there were no water rights, other than reparian rights, appurtenant to said Tract J-250 at the time it was taken by the United States of America, except:

Dated at Neah Bay, Washington,
May 28, 1941.

E. M. Cook

CERTIFICATE AS TO WATER RIGHTS

I hereby certify that I acquired no water rights in connection with my ownership of Tract J-255 in Clallam (or Jefferson) County, Washington, either by instrument of conveyance, or by appropriation prior to June 15, 1917, or by permit granted by the Supervisor of Hydraulics of the State of Washington, subsequent to June 15, 1917, and that there were no water rights, other than reparian rights, appurtenant to said Tract J-255 at the time it was taken by the United States of America, except:

Dated at June 16, Washington, Forks, Wash., 1941.

Theodor Heyder

DEPARTMENT OF JUSTICE

538 Central Building
Seattle, Washington
June 12, 1941

Mr. Theodor Heyder
c/o Miss Eileen Hamilton
Forks, Washington

In re: Olympic Project
Tract J-255

Dear Mr. Heyder:

There is enclosed herewith a certificate as to water rights which may have been acquired by you as former owner of Tract J-255 in Jefferson County. If you know of any such water rights which were owned by you in connection with this property, will you please state briefly on the enclosed certificate such information as you have concerning such water rights? If you know of no such rights, kindly insert the word "None" in the blank space before signing the paper.

Prior to June 15, 1917 water rights could be acquired by simply appropriating water from any stream or lake and using it. Such water rights were acquired for irrigation, industrial or domestic purposes.

A self-addressed franked envelope is enclosed for your convenience in returning this certificate.

Yours very truly,

H. I. Kyle

H. I. Kyle
Special Attorney

HIK:H
Encs.

For further information write
To Al Hamilton at Glenoma
near Morton Wash
Heyder

CERTIFICATE AS TO WATER RIGHTS

I hereby certify that I acquired no water rights in connection with my ownership of Tract J-256 in Clallam (or Jefferson) County, Washington, either by instrument of conveyance, or by appropriation prior to June 15, 1917, or by permit granted by the Supervisor of Hydraulics of the State of Washington, subsequent to June 15, 1917, and that there were no water rights, other than reparian rights, appurtenant to said Tract J-256 at the time it was taken by the United States of America, except: None

Dated at Kerrville, Oregon, ~~Washington,~~ June 18, 1941.

Dale O. Northup Jr

CERTIFICATE AS TO WATER RIGHTS

I hereby certify that I acquired no water rights in connection with my ownership of Tracts J-257 and J-258 in Clallam (or Jefferson) County, Washington, either by instrument of conveyance, or by appropriation prior to June 15, 1917, or by permit granted by the Supervisor of Hydraulics of the State of Washington, subsequent to June 15, 1917, and that there were no water rights, other than reparian rights, appurtenant to said Tracts J-257 and J-258 at the time it was taken by the United States of America, except:

None

Dated at Copalis Beach, Washington,
June 13, 1941.

Lawrence Horne

CERTIFICATE AS TO WATER RIGHTS

I hereby certify that I acquired no water rights in connection with my ownership of Tracts J-261, J-262 and J-263 in Clallam (or Jefferson) County, Washington, either by instrument of conveyance, or by appropriation prior to June 15, 1917, or by permit granted by the Supervisor of Hydraulics of the State of Washington, subsequent to June 15, 1917, and that there were no water rights, other than reparian rights, appurtenant to said Tracts J-261, J-262 and J-263 at the time it was taken by the United States of America, except: None

Elmer Hornsby
Audra Hornsby
Olive Hornsby
Maud Hornsby
Richie M. McNicol
Ella L. McNicol

Dated at ~~July~~, Washington, 29th, 1941.

CERTIFICATE AS TO WATER RIGHTS

I hereby certify that I acquired no water rights in connection with my ownership of Tract J-267 in Clallam (or Jefferson) County, Washington, either by instrument of conveyance, or by appropriation prior to June 15, 1917, or by permit granted by the Supervisor of Hydraulics of the State of Washington, subsequent to June 15, 1917, and that there were no water rights, other than reparian rights, appurtenant to said Tract J-267 at the time it was taken by the United States of America, except:

Dated at Aberdeen, Washington, May 20, 1941.

x Robert D. Skelley

CERTIFICATE AS TO WATER RIGHTS

I hereby certify that I acquired no water rights in connection with my ownership of Tract J-268 in Clallam (or Jefferson) County, Washington, either by instrument of conveyance, or by appropriation prior to June 15, 1917, or by permit granted by the Supervisor of Hydraulics of the State of Washington, subsequent to June 15, 1917, and that there were no water rights, other than reparian rights, appurtenant to said Tract J-268 at the time it was taken by the United States of America, except:

None

Dated at Centralia, Washington, July 10, 1941.

Effie B. Fitzgerald

CERTIFICATE AS TO WATER RIGHTS

I hereby certify that I acquired no water rights in connection with my ownership of Tract J-272 in Clallam (or Jefferson) County, Washington, either by instrument of conveyance, or by appropriation prior to June 15, 1917, or by permit granted by the Supervisor of Hydraulics of the State of Washington, subsequent to June 15, 1917, and that there were no water rights, other than reparian rights, appurtenant to said Tract J-272 at the time it was taken by the United States of America, except:

None

Dated at Hoquiam R4, Washington, June 13, 1941.

(Mrs) Ida G. Iverson

CERTIFICATE AS TO WATER RIGHTS

I hereby certify that I acquired no water rights in connection with my ownership of Tract J-274 in Clallam (or Jefferson) County, Washington, either by instrument of conveyance, or by appropriation prior to June 15, 1917, or by permit granted by the Supervisor of Hydraulics of the State of Washington, subsequent to June 15, 1917, and that there were no water rights, other than reparian rights, appurtenant to said Tract J-274 at the time it was taken by the United States of America, except: no Exceptions

Dated at Hoquiam, Washington, July 25th, 1941.

Anton Askenbrenner

CERTIFICATE AS TO WATER RIGHTS

I hereby certify that I acquired no water rights in connection with my ownership of Tract J-275 in Clallam (or Jefferson) County, Washington, either by instrument of conveyance, or by appropriation prior to June 15, 1917, or by permit granted by the Supervisor of Hydraulics of the State of Washington, subsequent to June 15, 1917, and that there were no water rights, other than reparian rights, appurtenant to said Tract J-275 at the time it was taken by the United States of America, except: None.

Dated at Clearwater, Washington, June 14, 1941.

Guy La. Stratton

By Mary Dn. Stratton

CERTIFICATE AS TO WATER RIGHTS

I hereby certify that I acquired no water rights in connection with my ownership of Tract J-277 in Clallam (or Jefferson) County, Washington, either by instrument of conveyance, or by appropriation prior to June 15, 1917, or by permit granted by the Supervisor of Hydraulics of the State of Washington, subsequent to June 15, 1917, and that there were no water rights, other than reparian rights, appurtenant to said Tract J-277 at the time it was taken by the United States of America, except:

Dated at June 17, Washington, None, 1941.

James R. Roberts

CERTIFICATE AS TO WATER RIGHTS

I hereby certify that I acquired no water rights in connection with my ownership of Tract J-278 in Clallam (or Jefferson) County, Washington, either by instrument of conveyance, or by appropriation prior to June 15, 1917, or by permit granted by the Supervisor of Hydraulics of the State of Washington, subsequent to June 15, 1917, and that there were no water rights, other than reparian rights, appurtenant to said Tract J-278 at the time it was taken by the United States of America, except: None

Dated at Olympia, Washington, June 14, 1941.

Jane T. Hickey

CERTIFICATE AS TO WATER RIGHTS

I hereby certify that I acquired no water rights in connection with my ownership of Tract J-279 in Clallam (or Jefferson) County, Washington, either by instrument of conveyance, or by appropriation prior to June 15, 1917, or by permit granted by the Supervisor of Hydraulics of the State of Washington, subsequent to June 15, 1917, and that there were no water rights, other than reparian rights, appurtenant to said Tract J-279 at the time it was taken by the United States of America, except: None

Dated at Clearwater, Washington, June 14, 1941.

Ernest Potter

CERTIFICATE AS TO WATER RIGHTS

I hereby certify that I acquired no water rights in connection with my ownership of Tract J-280 in Clallam (or Jefferson) County, Washington, either by instrument of conveyance, or by appropriation prior to June 15, 1917, or by permit granted by the Supervisor of Hydraulics of the State of Washington, subsequent to June 15, 1917, and that there were no water rights, other than reparian rights, appurtenant to said Tract J-280 at the time it was taken by the United States of America, except:

Dated at NEILTON, Washington, JUNE 16, 1941.

Joe Ashenbrenner

09-18-1969: memorandum to district chief, wrd, u.s. geological survey from supervisory hydrologist, division of water resources, s

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USGS File

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(USGS)

September 18, 1969

AIRMAIL

Memorandum

To: District Chief, WRD, U. S. Geological Survey, Tacoma

From: Supervisory Hydrologist, Division of Water Resources, SSC

Subject: USGS report on Olympic

In response to your August 18 letter and in reference to Mr. J. Ritchie's March 18 memorandum, this is to acknowledge receipt of the revised copy of the report, "Water Supplies for Selected Sites in Olympic National Park, Washington."

The report has been reviewed, and the revisions appear to adequately clarify any previous discrepancies. Our office has no objections as to releasing this report to the open file. We would appreciate five copies of the final report for distribution within the Park Service.

(SGD) GERARD S. WITUCKI

cc:
Chief, Div. of Wtr. Resources, WASO
Regional Director, Western
Superintendent, Olympic
Chief, DCSSC

OLYm

08-18-1969: letter to chief, office of land and water rights, ssc from district chief regarding report 'water supplies for selected sites i

UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY

Water Resources Division
1305 Tacoma Avenue South
Tacoma, Washington 98402

August 18, 1969

Chief, Office of Land and Water Rights, SSC
National Park Service
450 Golden Gate Avenue, Box 36025
San Francisco, California 94102

Attention: Mr. Gerard S. Witucki
Supervisory Hydrologist

Dear Sir:

We have made revisions in response to the comments of your office on the report by Kenneth L. Walters, "Water Supplies for Selected Sites in Olympic National Park, Washington." We enclose a copy of the report for your final approval prior to processing it to The Director, USGS.

The report will be released as an open-file report when fully approved.

Sincerely yours,

L. B. Laird
District Chief

Enclosures

03-04-1968: memorandum to chief, office of land and water rights, ssc from chief, branch of water resources regarding review of u

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MAR 4 - 1968

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Memorandum

To: Chief, Office of Land and Water Rights, SSC
Attention: Mr. Witucki

From: Chief, Branch of Water Resources

Subject: Review of U. S. Geological Survey report, Olympic

The report "Water Supplies for Selected Sites in Olympic National Park," has been reviewed here. Although only one or two minor technical comments have been made, the report suffers from a lack of consistency, which limits its usefulness.

The report states that water quality was evaluated in relation to its natural state, but no general discussion of water quality is given. Specific references to water quality are often sketchy or omitted altogether, for example, in the Hurricane Ridge section. The table of analyses includes determinations of manganese content, a number of which are high enough to cause problems, but the report itself does not mention manganese and only mentions iron in a few places.

The ground water potentials are shown on Figure 3 in color (except for one area) and the terms are defined in the explanation. However, the text, in places, uses terms not defined in Figure 3 and in at least one instance, the text describes the potential as "poor" whereas the map shows it to be "moderate."

The report also uses a number of place names not on the map. In a few cases, the place name is followed by the parenthetical phrase "not shown on map," but most place names not on the map are not followed by the phrase. It appears that an attempt was made to check place names with the map but the task was not completed.

Specific comments are listed in the enclosed pages.

(Signed)

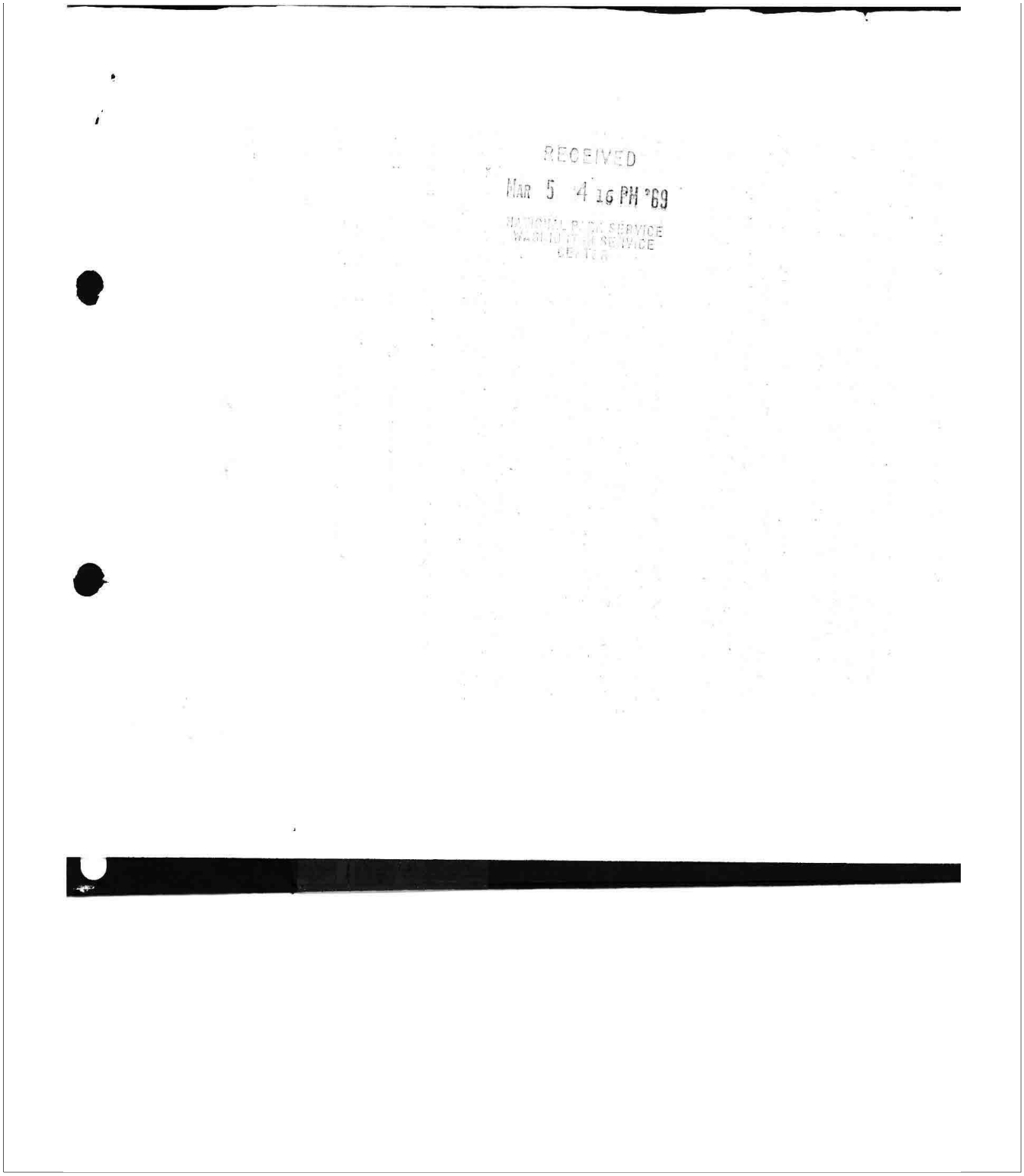
E. W. Reed

Enclosure

cc:
Regional Director, Western 2, w/c enc.
Chief, DC-SSC, w/c enc.
WSC-OLWC-Mr. Rinaldi, Room 901
WSC-OLWW-Mr. Reed, Room 103

EWReed:ljd

03-05-1969: received stamp, washington service center



OLYMPIC NATIONAL PARK

Page 10, paragraph 1, line 8. Substitute "needed" for "available."

Page 19, paragraph 1, line 5. The statement "between Queets River and Cape Alava" is not consistent with page 19, paragraph 2 that the northern part of the coastal area extends "beyond Cape Alava."

Page 25, paragraph 1, line 2. Term "fair" potential should be "moderate" potential to be consistent with Figure 3.

Page 29, line 1. Term "good" rather than "moderately large" would be consistent with Figure 3.

Page 33, paragraph 3, line 4 and 5. The statement concerning residual effect of sea water appears to be rather far fetched in view of the high rainfall (more than 100 inches) and relatively high yield of the test hole (60 gpm).

Page 46, paragraph 1. Check location of wells described in this paragraph. Should it be T. 22 N., rather than T. 23 N., or is Figure 3B in error?

Page 47, paragraph 1, line 3 and 4, paragraph 2, line 4. Sems River, Matheny Creek, and Boulder Creek are not shown on Figure 3C.

Paragraph 2, line 6. Should section 11 be section 10?

Page 49, paragraph 1, line 4. Figure 3C shows the test hole in section 6. Also, R. 10½ W is not shown on Figure 3C.

Page 49, paragraph 1, line 7 and 8. Suggest changing "below 271" to "from 271 to 301."

Page 55, paragraph 1, line 10. Give temperature in Fahrenheit as done on page 63.

Page 57, paragraph 2, line 2. Why isn't LaPoel Picnic Area shown on map?

Page 59, line 4. Lyre Valley not shown on map.

Page 68. No colors shown on map. Show springs.

Page 70, paragraph 1, line 2. "Poor" potential but map shows "moderate."

Page 73, paragraph 2, line 6 - 9. Refers to yields "up to 5 gpm" whereas Figure 3 shows 5 - 25 gpm.

Table 3. Footnote a/ is not entirely clear. Public Health Service has been crossed out in the remarks column, but not in the footnote itself. If the manganese contents were less than 0.1 mg/l and more than 0.05 this should be entered in the table.

"Test hole augered at Burnes Point." Two test holes were augered. Which one was sampled?

Table 5. Should include logs of all test holes on Figure 3, and should give location by section, township, and range.

Figure 3. In addition to the test holes for which logs are given in Table 5, the location of wells for which logs are given in Table 5 should be indicated also on Figure 3.

The township and range designation in Figure 3B do not check with text.

10-31-1968: letter to supervisory hydraulic engineer from district chief regarding the report on 'water supplies for selected sites in c

BTV-11-8-68

L. R. Cagg

San Francisco Planning and Service Center
Office of Land and Water Rights
NATIONAL PARK SERVICE
NOV 1 - 1968

ACT.	INFO.		INITIALS	DATE
		CHIEF		
		ASST. CHIEF		
		STAFF ASST.		
		SUPV. ANAL.		
		FIELD STN.		
		TITLE		
		CLERICAL		
		SUPV. HYD. ENG.		
		DOCKET		
		FILE		

L54

UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY
Water Resources Division
1305 Tacoma Avenue South
Tacoma, Washington 98402

CERTIFIED

October 31, 1968

Mr. William E. Fields
Supervisory Hydraulic Engineer
National Park Service
San Francisco Planning and Service Center
450 Golden Gate Avenue, Box 36025
San Francisco, California 94102

Dear Mr. Fields:

As per your request during our telephone conversation of October 29, we are enclosing four copies of the report, "Water Supplies for Selected Sites in Olympic National Park, Washington," by Kenneth L. Walters.

Upon approval of the report by the National Park Service, for release as a USGS Water-Supply Paper, we can process the report to the Regional Hydrologist in Menlo Park. To expedite publication, we would appreciate your review at your earliest convenience.

Sincerely yours,

L. B. Laird
District Chief

Enclosures

COPY for WRSO DATE 11-5-68
FOR YOUR X INFORMATION ☐ ACTION
OFFICE OF LAND & WATER RIGHTS, SSC

Water Supplies for Selected Sites

in Olympic National Park, Washington

GEOLOGICAL SURVEY WATER-SUPPLY PAPER

Prepared in cooperation with the

National Park Service

COPY FOR WASO DATE 11-5-68
FOR YOUR X INFORMATION ☐ ACTION
OFFICE OF LAND & WATER RIGHTS, SSC

Walters--WATER SUPPLIES FOR SELECTED SITES IN OLYMPIC NATIONAL PARK, WASHINGTON--
Geological Survey Water-Supply Paper

Water Supplies for Selected Sites

in Olympic National Park, Washington

By KENNETH L. WALTERS

GEOLOGICAL SURVEY WATER-SUPPLY PAPER

Prepared in cooperation with the

National Park Service

UNITED STATES GOVERNMENT PRINTING OFFICE, WASHINGTON : 196

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5.	Logs of wells and test holes in Olympic National Park----------	Do.

WATER SUPPLIES FOR SELECTED SITES IN OLYMPIC NATIONAL PARK, WASHINGTON

By Kenneth L. Walters

Abstract

Olympic National Park, on the Olympic Peninsula in northwestern Washington, comprises a rugged mountainous interior area and an elongate coastal area that includes the westernmost point of the conterminous United States.

The use of Olympic National Park, and modernization of the park facilities is increasing to the extent that existing water-supply systems are becoming inadequate. In cooperation with the National Park Service, the present appraisal of the water resources was made to meet these increasing needs. Attention was given primarily to areas of the park where water-supply improvements were planned, but the overall water resources of the park were also considered. Wells, springs, and streams were evaluated as possible sources of supply.

Recorded average annual precipitation within or near the park ranges from about 17 inches to about 134 inches, but locally the annual precipitation may exceed 200 inches. The great range in precipitation is due to orographic effects of the Olympic Mountains. The greatest precipitation occurs at the higher elevations in the western interior of the park, and the least occurs in the lowlands in the northeast part of the park, near Sequim.

The generally abundant precipitation produces several large rivers and many smaller streams in the park area. However, several of the large rivers are undesirable as sources of water supply because they are fed by glacier melt water that contains much finely divided rock material. Also, many of the smaller streams, especially those near the Pacific Coast and in the areas of highest precipitation in the interior area, often carry water that is highly colored by decomposing vegetation. For these reasons, and because some facilities are not near perennial streams, the surface water has been unsuitable for some facilities and ground water must be considered as the principal source of supply.

The bedrock that underlies much of Olympic National Park is either fine-grained sedimentary rock of marine origin or igneous rock, and generally is capable of yielding only a few gallons of water per minute to wells. Aquifers of potentially substantial yields are restricted largely to alluvial or glacial deposits. Yields of several hundred gallons per minute probably are available only from wells tapping the alluvium of the lower Quinault and Quillayute valleys, or deltaic deposits at Fairholm and Barnes Point on Lake Crescent. Only a few gallons per minute are available from wells or springs at Ozette Lake, in much of the Queets valley, and at Hurricane Ridge and Deer Park.

Purpose and scope

An investigation of the water resources in the Olympic National Park was begun by the U.S. Geological Survey in September 1965 at the request of the National Park Service. The purpose of this report is to (1) present a general description of the water resources in the park and (2) describe in detail the quantity and quality of water available at selected sites where water is now or ultimately needed? will be available for visitor and park use.

An evaluation was made of streams, springs, and wells presently in use or offering potential as sources of water supply. Surface-water data include streamflows and chemical quality. Ground-water data include well yields and specific capacities, spring discharges, chemical quality, and drillers' logs of wells and test holes. Estimates of the quantity of water presently used at various sites in the park also are given.

The present and anticipated needs consist of water for drinking and sanitary facilities for park visitors, and household use by park staff, and for a small amount of fire protection of facilities. Therefore, sources that would yield water of good quality perennially at a rate of only a few tens of gallons per minute even without large reservoirs or storage tanks would be adequate in most cases, and were investigated during this study.

In view of the generally high precipitation over the study area, the assumption is made that long-term natural recharge will be adequate for any well supply that can be obtained. Also, it was assumed that the aquifers considered to be potential sources of supply for park facilities are not likely to be affected by future pumpage on privately owned adjacent land.

Water quality was evaluated, for the most part, in relation to its natural state--no attempt was made to determine the feasibility of possible methods of treatment, which could be a significant consideration in choosing between alternative sources of supply. The principal consideration in this regard is that most streams in the coastal area have their headwaters on privately owned lands and, therefore, their water quality could be adversely affected by development of these lands.

//

Acknowledgments

The cooperation of personnel of the National Park Service during the study is greatly appreciated. For supplying data on existing water systems and offering suggestions on problem areas particular acknowledgment is extended to Manuel Morris, formerly supervisory hydraulic engineer, National Park Service Planning and Service Center, San Francisco, Calif.; William E. Fields, supervisory hydraulic engineer, National Park Service Planning and Service Center, San Francisco, Calif.; Bennett Gale, Superintendent, Olympic National Park, Port Angeles, Wash.; and Clifford B. Petersen, engineer, Olympic National Park, Port Angeles, Wash.

Constructive suggestions on improvement of this report were provided by U.S. Geological Survey colleagues B. L. Foxworthy of Tacoma, Wash., and A. H. Harder, Boise, Idaho.

Location and general description

Olympic National Park is on the Olympic Peninsula in the northwestern part of Washington. The park comprises an elongate coastal area adjacent to the Pacific Ocean (fig. 1)

Figure 1 (caption on next page) belongs near here.

and the central mountainous interior of the peninsula. The coastal area is about 50 miles long and extends from near the mouth of the Queets River northward beyond Cape Alava, the westernmost point of the conterminous United States. The interior area is roughly square, measuring about 35 miles on a side. Annual precipitation in Olympic National Park ranges from about 20 inches in the rain shadow near Sequim to over 200 inches in the mountainous interior. Most of the precipitation occurs during the period of November through May, and the summers generally are dry.

FIGURE 1.--Olympic National Park. Areas of ground-water investigations are shaded.

Coastal area

The southern part of the coastal area, from the Queets River to the Hoh River, is traversed by U.S. Highway 101 for about 14 miles. The central and northern parts are accessible largely by trail, except for county roads to La Push and to Ozette Lake.

The area generally is of low relief, although the altitude range from sea level to about 680 feet near Kalaloch occurs within less than a mile from the coast. Generally, the area is from 40 to 200 feet above sea level. The major streams are the Hoh and Quillayute Rivers which originate in the mountainous interior of the park, and the Ozette River which drains Ozette Lake. Several smaller streams originate in the low coastal hills and discharge along the beach.

The climate of this area is of the marine type, with typically cool summers and mild winters. The average annual rainfall at Forks, which is probably representative of much of the coastal area, is about 117 inches. Snow occurs rarely, and remains on the ground for only short periods.

Interior area

The Olympic Peninsula, and the interior area of the park, is encircled by U.S. Highway 101. From the highway, park roads extend part way up the major valleys and to Hurricane Ridge and Deer Park (fig. 3). Trails provide ready access by foot or horseback to some back-country areas, but much of the interior is difficult of access.

The interior area is mountainous and characterized by deep, V-shaped valleys and snow-covered ridges. Altitudes range from less than 100 feet in the Queets River valley to almost 8,000 feet on Mount Olympus. Most of the peaks are between 5,000 and 6,000 feet high. Several rivers--the Quinault, Queets, Hoh, Elwha, Dosewallips, and Duckabush--are fed in part by glaciers located in the upper reaches of their valleys. These rivers may contain enough finely divided rock material to appear turbid in the summer when the melting rate of the glaciers is greatest. Other major rivers--the Bogachiel, Soleduck, Gray Wolf, and Skokomish--have their origin in snowfields that persist most of the summer or in highland lakes. In contrast to the glacier-fed streams, these rivers generally are clear.

The climate of this area is extremely diverse, largely because of the great range in altitude and the increasing effects of the rain shadow toward the northeast. Locally on the southwestern slopes of the Olympic Mountains, which intercept moist air from over the Pacific Ocean, and locally on Mount Olympus, the annual precipitation often exceeds 200 inches. At the Quinault Ranger Station (fig. 3), altitude 200 feet, the average annual precipitation is about 134 inches, whereas at Sequim, altitude 180 feet, in the rain shadow of the mountains but outside the northeast corner of the park, the average is only about 17 inches. The average monthly precipitation at these two stations is shown in figure 2. The driest months are April through October.

Figure 2 (caption on next page) belongs near here.

FIGURE 2.--Average monthly precipitation at Quinault Ranger Station and at Sequim, 1931-60. Data from U.S. Weather Bureau.

Water resources

In this report, the water resources of the coastal area and the interior area of Olympic National Park are discussed separately. As shown in figure 1, the coastal area includes that part of the coastal strip within the park that extends between the Queets River and Cape Alava. The interior area (fig. 1) includes several widely separated valleys and ridges of the Olympic Mountains.

Coastal area

Because of differences in accessibility, geologic setting, availability of water, and water requirements, the coastal area has been divided for this discussion into a northern and a southern section. The southern section extends from near the mouth of the Queets River northward to the Hoh River, and the northern section extends from the Hoh River northward beyond Cape Alava.

Southern section

Water from most streams in the southern section of the coastal area is unsuitable without extensive treatment because of the brownish color most of the year. The color is imparted by complex organic substances leached from decomposing plants and organic soil. The water is colored least both during times of high flow when the streams are carrying a larger percentage of direct storm runoff, and during low flow when a large part of the water is from spring discharge and ground-water seepage.

In the southern section, surface water is used for park facilities only at Kalaloch. There, water from Kalaloch Creek is pumped into an elevated 30,000-gallon storage tank after it is filtered and chlorinated. From the tank, which is near the Kalaloch Ranger Station, water is distributed by pipeline to the Park Service residence area and to the campground. Water is also supplied to a concessioner's lodge and motel area.

Water demand at Kalaloch is highly seasonal, fluctuating with tourist population. The demand reaches a peak in August of about 12,000-15,000 gallons per day, and a minimum in the winter of about 2,000 gallons per day. Kalaloch Creek is one of the streams whose water most of the year is colored by large amounts of decomposing vegetation in the swamps that it drains.

The areas of potential ground-water supplies in the southern section are shown in figure 3. The potential as

Figure 3 (caption on next page) belongs near here.

shown on this map and as discussed in the text is based on interpretation of reconnaissance geologic data, except in places where wells existed at the start of the study or where test drilling was done.

The southern section consists mainly of a marine terrace which ranges in width from a few feet to about a mile. The terrace is underlain by unconsolidated and stratified gravel, sand, silt, and clay. South of Kalaloch, and from Abbey Island to the Hoh River, these deposits extend below sea level. Between Kalaloch and Abbey Island the terrace has been eroded and bedrock is intermittently exposed along the beach. The bedrock was studied only to the extent necessary to determine its general water-bearing qualities. A fairly detailed discussion of the bedrock stratigraphy of the coast and offshore islands is given by Weissenborn and Snavely (1968).

A terrace as much as 1 mile wide along the coast in most of T. 24 N., has fair potential for ground-water supply. There, the terrace deposits contain gravel layers at altitudes low enough to be within the zone of saturation. The greatest thickness of saturated terrace deposits is likely to occur near the beach. However, production wells should be located far enough inland to prevent contamination by sea-water encroachment.

Between Kalaloch Ranger Station and the north end of the Kalaloch Campground only a thin mantle of clay and peaty material overlies fine-grained sandstone and siltstone, and an adequate ground-water supply probably cannot be developed here.

In T. 25 N., between Kalaloch Campground and Ruby Beach, bedrock is exposed in the sea cliffs up to about 35 feet above sea level. The terrace deposits that overlie the massive sandstone bedrock there are fine grained and contain numerous beds of peaty material. Significant ground-water supplies probably cannot be developed from either the bedrock or these terrace deposits except in the NE¼ sec. 5. There, a comparatively flat area about 120 feet above sea level appears to be underlain by 50 to 75 feet of sand and gravel. At the contact between the sandy gravel and the underlying sandstone, springs discharge ground water into Cedar Creek just upstream from its mouth and onto the beach just south of its mouth. The beach spring formerly supplied water for use at Ruby Beach.

Most of the coastal area south of the Hoh River in T. 26 N. has fair potential for a ground-water supply except where bedrock is at or near the surface, in sec. 32 southeast of the mouth of the Hoh River on the Hoh Reservation. Most of the area in secs. 28, 29, and 30, T. 26 N., is underlain by as much as 100 feet of well-stratified outwash sand and gravel. Many springs discharge from the base of the gravel, (which there) overlies till or clay in the sea cliff. Productive wells probably could be constructed in the gravel, and additional water-bearing sand and gravel beds may underlie the till and clay below sea level.

The hills and steep slopes above the terrace along the eastern margin of this southern section of the coastal area are composed of indurated sandstone and sandy shale. On these slopes, well yields of more than a few gallons per minute are unlikely. Locally, thin deposits of glacial outwash and till-like material mantle the lower slopes, but these deposits are generally unsaturated.

Prior to 1966 only one well existed in the southern coastal section. This well is at the extreme south end of the coastal area in the SE¼SW¼ sec. 22, T. 24 N., R. 13 W. It is 115 feet deep and is reported to penetrate unsaturated gravel in a zone between 30 and 40 feet deep, and saturated gravel from a depth of 110 to 115 feet. The well has not been used for several years, and little is known of its yield characteristics, but it is reported to have produced considerable sand and bits of decomposed wood when it was pumped.

In July 1966, a well was drilled at Kalaloch to replace the supply from Kalaloch Creek. The well (Kalaloch well 1) was drilled in the SW¼ sec. 3, T. 24 N., R. 13 W. The site is on a poorly drained terrace about one-eighth of a mile north of Kalaloch Creek and three-fourths of a mile from the ocean. The well, drilled to a depth of 78 feet (table 5), yields about 20 gpm (gallons per minute) from zones 24½ to 27 and 56 to 66½ feet below land surface. The water is somewhat colored and contains a considerable amount of iron and manganese (table 3).

In September 1967, a second well (Kalaloch well 2) was drilled in the valley of Kalaloch Creek about one-eighth of a mile north of Kalaloch well 1. Well 2 was intended to supplement the yield of well 1, and possibly to provide water of better quality; it yielded water similar in quantity and chemical quality to that of well 1 (table 3).

Quantity

Northern section

The major rivers that discharge into the Pacific Ocean in the northern section of the coastal area are, from south to north, the Hoh, the Quillayute, and the Ozette. These rivers generally are unsuitable as sources of water supplies because of their sediment load, contamination, and variations in flow, and because of the major expense of suitable intake and treatment facilities. Most of the smaller streams, as in the southern section, are unsuitable as sources of supply because of the brownish color of the water most of the year.

The present (1967) source of supply at La Push is a small stream about a mile south of the village. After chlorination, the water is distributed to the village, the Coast Guard Station, and a National Park concession. The entire flow of the stream (table 4) is not adequate to meet the demand during the late summer months.

The present water supply for the Rialto Beach picnic area is diverted from a small unnamed stream that originates on the point of land between Dickey River and the Pacific Ocean. The supply is barely adequate in the late summer of dry years. The flow of Ellen Creek, which discharges into the ocean about 1 mile north of Rialto Beach, would be adequate as an alternate supply, but the water is colored.

Water used at the Ozette Lake Campground is from a privately owned supply. There, water is pumped from the Ozette River near its point of discharge from Ozette Lake, then into a pressure-tank system such as that commonly used for domestic supplies.

Ground-water production in the northern section, as in the southern section, is likely to be limited to the sand and minor gravel deposits that immediately underlie the elevated marine terraces. These unconsolidated deposits are underlain by massive non-water-bearing sandstone, conglomerate, and sandy shale, which are exposed extensively in the sea cliffs as much as 100 feet above sea level.

Good?

Moderately large ground-water supplies (more than 25 gpm) are available from the alluvium north of the Hoh River near its mouth. The alluvial deposits are probably thicker, and larger yields probably could be obtained, east of where a test hole (table 5) was augered in the picnic area at the end of the road. When the test hole was pumped for 3 hours and 20 minutes at 40 gpm the water level was drawn down about 14 feet. The water contained 2.4 mg/l (milligrams per liter) of dissolved iron (table 3), and had a slight odor of hydrogen sulfide. Because the entire valley flat of the Hoh River within the coastal area is poorly drained, any ground-water supply is likely to contain much iron in solution. If a production well is needed to serve the campground near the mouth of the Hoh, consideration also should be given to locating it to the east of the picnic area to reduce the possibility of contamination from pit toilets and garbage pits.

Bedrock is extensively exposed in the sea cliffs between the mouths of the Hoh and Quillayute Rivers. As no wells have been drilled in this area, the water-bearing characteristics of the bedrock are unknown. However, examination of the bedrock at several localities revealed its dense compact nature and indicates that only meager supplies probably could be developed from it. Because the unconsolidated deposits that overlie the bedrock are thin, yields of only a few gallons per minute probably can be developed from wells tapping them (fig. 3). In this part of the northern coastal section, appreciably productive aquifers probably are restricted to valley fill that has limited occurrence along Goodman and Mosquito Creeks.

Thick water-bearing alluvial deposits occur in the valleys of the Quillayute and Dickey Rivers. Near the confluence of these rivers and seaward, the ground-water potential is defined as moderate (fig. 3), largely because of the possibility of sea-water intrusion. Also, the valley fill in this area is thinner and finer grained than that in the area to the east where, between the two rivers and north of the park boundary, larger yields may be obtained from wells drilled in an extensive terrace underlain by outwash gravel.

A well at the Quillayute auxiliary airfield in sec. 18, T. 28 N., R. 14 W., is typical of wells that can be constructed on the terrace. The well is 170 feet deep (log in table 5) and produces 197 gpm of water with 12 feet of drawdown from the static water level which is 108 feet below land surface (about 65 ft above sea level). The general movement of ground water probably is southwest toward Mora Campground.

A 38-foot dug well at Mora Campground is reported to yield 6 gpm with less than 1 foot of drawdown of the water level; its capacity probably is about 50 gpm or more. There is no indication that the well penetrated to the base of the gravel (table 5), and a deeper well at this location probably would be more productive.

Of three test holes augered near the south margin of the alluvium east of La Push, the first (La Push test hole 1), could not be developed sufficiently to permit a meaningful pumping test. When this 39-foot hole was pumped at 20 gpm the water level was drawn down to about 32 feet below land surface, the limit of lift for the centrifugal pump being used. A properly developed well of about 50 to 100 feet in depth, however, should yield several hundred gallons of water per minute. The high iron content (1.3 mg/l) of the water from this depth, as well as the low yield from the test hole indicate a restricted movement of the ground water, and suggest that the coarse gravel layer penetrated below 30 feet (table 5) may be mixed with silt or clay. Otherwise, the water is of acceptable quality (table 3).

La Push test hole 2 was pumped at 42 gpm with only 1.4 feet of drawdown of the water level. Water from this 25-foot test hole contained much less iron (0.08 mg/l) than that from test hole 1.

Test hole 3, 37 feet deep, is much closer to the coast than holes 1 or 2, and was augered to serve as a monitor for the chloride content of ground water in the Quillayute River valley. The test hole was pumped at 60 gpm and had only about 1.8 feet of drawdown of the water level, demonstrating that at this location the deeper gravel is at least as permeable as the shallower gravel tapped by test hole 2.

The chloride content of water from test hole 3 (table 3) was 78 mg/l as compared to 12 and 13 mg/l, respectively, for test holes 1 and 2. The 78 mg/l chloride concentration is greater than chloride concentrations in water from the other wells that were sampled (table 3) and in stream samples not affected by estuarine mixing with sea water.

The higher chloride content at test hole 3 could be the result of a mixing of the fresh ground water with a small amount of sea water, or of some other type of contamination. If it represents sea-water contamination, this could be a residual effect of sea water previously emplaced (as during a period of higher sea level) and not yet flushed out by seaward-moving fresh ground water, or it could mean that the well entered a normal zone of diffusion between fresh and salty ground water.

Doubtful - with 100" rain each year.

What is elev. of bottom of hole? -27 DR

The chloride content of the water might decrease with continued pumping if it represents a mixture of natural ground water and relic sea water; however, if it represents a contemporary zone of diffusion the chloride content ultimately would increase with pumping. The test hole was not pumped long enough to detect any increasing or decreasing trends in chloride concentration.

The iron content (more than 2 mg/l) of water from the deeper gravel tapped by test hole 3 also was higher than that from the shallower gravel tapped by test hole 2.

None of the three test holes in the alluvium east of La Push reached bedrock; therefore, it is not known to what depth the alluvial materials may extend, or if water of lower iron content may occur below the depth reached by test hole 1. or higher chloride?

Near Rialto Beach, at the mouth of the Quillayute River, bedrock is exposed at the surface and the area offers little possibility for development of an adequate ground-water supply.

From Rialto Beach northward, to the vicinity of Cedar Creek, a distance of about 7 miles, bedrock is well exposed in the sea cliffs. This section of the sea coast is deeply dissected by streams, and in general only a thin mantle of unconsolidated material overlies the bedrock. Except possibly in the vicinity of the mouth of Ellen Creek, appreciable ground-water supplies probably cannot be obtained in this area.

The coastal area between Cedar Creek and Ozette River--adjacent to Ozette Lake--is mantled by glacial deposits. Locally, bedrock is exposed in the sea cliffs, but generally the glacial deposits may extend below sea level and much of this area may have potential for a moderate ground-water supply (fig. 3); test drilling would be necessary to evaluate that potential.

Test drilling near Ozette Lake for this study was limited to the vicinity of Ozette Lake Ranger Station, the only part of the area accessible by road. Two holes were augered, one on the west road shoulder at the south end of the Coal Creek bridge, and the other 100 feet north of Coal Creek and 30 feet east of Ozette River. A third test hole was drilled by the standard rotary method near the center of the south side of the parking lot. Gravel may underlie the till locally to the west of Ozette Lake. However, the drilled hole encountered till at a depth of 38 feet, and passed into bedrock at 96 feet without penetrating any intervening gravel (table 5). A ground-water supply probably can be obtained only from a 30-foot-thick bed of fine sand that overlies the till. Production of water from this unit would be meager, however, and a large-diameter dug well possibly would be more suitable than a drilled well.

Present use of ground water by the park facilities within the northern section of the coastal area is limited to the Mora Campground and the Rialto Beach picnic area. The daily demand is highly seasonal, with the estimated maximum daily demand at Mora being about 7,000 gallons.

Interior area

The interior of Olympic National Park is an extremely rugged mountainous area. The central part of the mountains is composed principally of partly metamorphosed, fine-grained sedimentary rocks of marine origin. These rocks are bordered on the north, east, and south by rocks of volcanic origin (Huntting and others, 1961).

The mountains are characterized by a system of radiating ridges and intermontane valleys. The valley sides generally are forested and brush-covered slopes that rise steeply to the ridge crests. Only the lower parts of the major valleys are accessible by roads; the upper reaches are difficult of access except where trails have been constructed. Owing to the lack of development of public facilities in the remote upper valleys, the occurrence of water in these parts of the park was not investigated during this study.

As shown by streamflow records (table 1, fig. 4) all

Figure 4 (caption on next page) belongs near here.

major rivers of the interior area have two periods of high runoff. One, usually in December, coincides with the period of highest precipitation. The second period, usually in May or June, coincides with accelerated melting of snow or glaciers at the higher altitudes. The relative magnitude of the two runoff peaks depends on the median altitude of the drainage basin.

Chemical analyses of water from seven of the rivers (table 2) show that, in terms of dissolved iron and total dissolved solids, the chemical quality of the stream water (appears to be) superior to that of most of the ground water analyzed.

The short streams that drain areas underlain by bedrock in the lower parts of the interior area are characterized by very low flows during periods of drought. This is due both to little water being stored in the bedrock, and to rapid draining of the water stored in the thin mantle of overburden during wet periods.

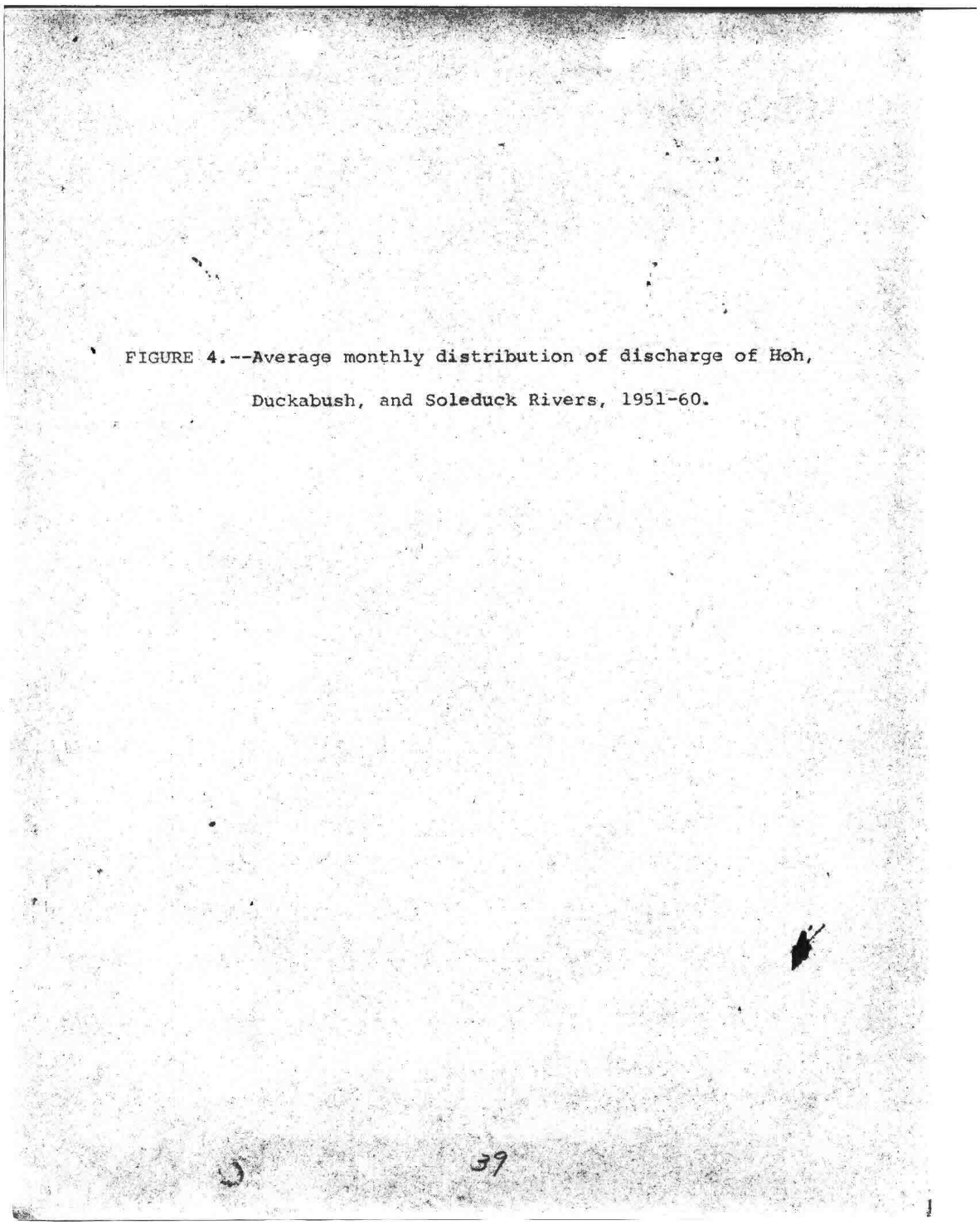


FIGURE 4.--Average monthly distribution of discharge of Hoh, Duckabush, and Soleduck Rivers, 1951-60.

The marine sedimentary rocks and volcanic rocks that occur in the interior area are dense and of poor permeability, and a well drilled into them will yield only small quantities of water, if any. Except where these rocks are highly fractured, as in a fault zone, springs of substantial yield are uncommon. Locally, shallow dug wells could be constructed in the thin alluvial deposits that border the stream channels, or in weathered zones on the bedrock surface. However, such wells would yield only a few gallons a minute, and could be very vulnerable to pollution.

Quinault valley

The water resources of the main stem of the Quinault River valley were studied as far upstream as 2 miles above Graves Creek Ranger Station, and the valley of the North Fork of the Quinault was studied to about 1 mile upstream from the North Fork Ranger Station. In the parts of the valleys investigated, coloration of the stream water is not so pronounced as in streams of the coastal area. Canoe and Kestner Creeks are about the only ones that have sufficient flow (table 4) to be considered as substantial sources of supply but the waters are too colored for most uses.

Surface water in the Quinault River valley is used for park facilities only at the July Creek Campground where water is diverted from July Creek just above the North Shore Road. The maximum daily demand at the campground is an estimated 4,000 gallons. Surface water also is used by the Lake Quinault Resort, the Kiwanis Camp, and a small community, all of which are located on the north shore of the lake.

The National Park Service presently (1967) has developed only two ground-water supplies in the Quinault valley. The Quinault Ranger Station is supplied from a dug well about 10 feet deep; according to the park ranger the well yields water containing objectionable amounts of iron. The Graves Creek Ranger Station and campground are supplied by a spring that discharges from glacial material on the slope just east of Graves Creek. The maximum daily demand on this system averages about 3,500 gallons. The existing supply is adequate. There are no existing water supplies at North Fork Ranger Station or North Fork Campground.

No analysis available?

The bedrock underlying the Quinault valley is principally fine-grained sedimentary rock of marine origin. Although numerous faults are believed to occur in the bedrock (Huntting and others, 1961), it is unlikely that a well in the bedrock would penetrate a zone sufficiently fractured to yield much water.

Above the mouth of Graves Creek where the Quinault valley narrows abruptly, the ground-water potential generally is poor (fig. 3). Locally, as near the footbridge crossing the Quinault River about 3 miles upstream from the Graves Creek Ranger Station, small springs discharge from a thin covering of glacial material and weathered bedrock that mantles the valley walls. These springs do not have well-defined orifices, and probably are unsuitable for development as dependable water supplies (table 4). However, wells or collection galleries dug in the thickest part of the material and located upgradient from the principal spring discharge, would provide at least meager supplies. Localities where this type of development may be possible are (1) in the draw overlooking the foot trail about 700 feet west of the footbridge, and (2) along the east side of the small flat area lying just south of the river and east of the foot trail as it approaches the bridge. Also, for a short distance above the mouth of Graves Creek, a terrace about 200 feet above river level is mantled with glacial materials that may have enough saturated thickness to yield water to a well.

Figure 3 indicates that the Quinault valley floor has good ground-water potential at most locations between Graves Creek and the mouth of North Fork Quinault River. At these locations, the alluvial and terrace deposits are thick enough and of sufficient areal extent to yield from 25 to several hundred gallons per minute. An auger hole at Graves Creek Ranger Station, which penetrated progressively coarser gravel to a depth of 16 feet, was dry at that depth, and additional penetration was not possible with the equipment being used. However, if the gravel is as much as 25 feet thick, the lower part probably is within the zone of saturation.

Yields of up to several hundred gallons per minute also may be available from the alluvial deposits that border the north side of the Quinault River for about 2 miles above the mouth of North Fork Quinault River. Elsewhere in the Quinault valley above its confluence with North Fork Quinault valley, occurrence of alluvial or terrace deposits are too restricted to be of much importance as possible sources of ground-water supplies.

The North Fork Quinault River valley has good ground-water potential from its mouth to at least a mile upstream from the North Fork Ranger Station. An auger hole at the ranger station penetrated 15 feet of progressively coarser gravel similar to that at Graves Creek Ranger Station. The thickness of the gravel is unknown, but the existence of springs just west of the ranger station suggests that a shallow well would penetrate enough saturated gravel to yield up to several hundred gallons per minute of water.

Much of the north side of the Quinault valley between Quinault Lake and North Fork Quinault River has moderate to good ground-water potential except where bedrock is exposed, as in parts of secs. 28 and 29, T. 24 N., R. 8 W. (fig. 3).

During this study a hole was augered about 250 feet west of the U.S. Geological Survey precipitation gauge in NW¼SW¼ sec. 27, T. 24 N., R. 8 W. The augering was retarded by boulders, imbedded in fine sand, that were encountered at a depth of 17 feet in this hole (table 5), but a dug well or properly screened drilled well should produce more than 25 gpm of water. A second auger hole about 0.9 mile to the west (not listed in table 5) penetrated boulders to a depth of 20 feet.

Although not tested, the ground-water potential in much of secs. 14, 15, 21, and 22, T. 24 N., R. 8 W., may be moderate to good, as suggested by evidence of coarse materials underlying the Quinault valley in this reach. Most of Irely Creek and the lower reaches of Big Creek probably mark a former course of the North Fork of the Quinault River. That the flow of a reach of Big Creek is principally underground in summer indicates that the underlying materials are highly permeable. The summer flow of Finley Creek also is mostly underground in the reach south of North Shore Road, indicating that the coarse materials extend at least that far down the Quinault valley.

An augered test hole at Quinault Ranger Station, about three-fourths of a mile west of Finley Creek, penetrated considerable thicknesses of fine-grained materials but also some water-bearing gravelly beds (table 5) and it did not reach bedrock. The hole was cased to 44 feet, with perforations from 34 to 44 feet. It was pumped at a rate of 33 gpm and had a resulting drawdown of water level of about 9 feet, which indicates a specific capacity of about 4 gpm per foot of drawdown. A chemical analysis of water from this hole (table 3) shows the water to be soft and to have unusually low concentrations of most dissolved constituents.

Bedrock is exposed or is near the surface in much of the area bordering the north shore of Quinault Lake, and the unconsolidated materials that overlie bedrock are much finer grained than in the area upstream. A domestic well near McCormick Creek, in NE¼NW¼ sec. 18, T. 23 N., R. 9 W., is reported to have penetrated only clay and fine sand before reaching a thin gravel bed at a depth of about 285 feet. Springs and shallow wells less than 50 feet deep produce only a few gallons per minute of water for domestic supplies in sec. 13, T. 23 N., R. 10 W. These shallow ground waters are subject to contamination; also, some are excessively high in iron. (See example in table 3.)

Quinault Lake is impounded by a glacial moraine that is composed of a mixture of clay, sand, and boulders. Interstratified beds of clean sand and gravel produce moderate to large quantities of water. A well at the Washington State Department of Highways maintenance shop, just outside the National Park boundary, is 133 feet deep and obtains water from gravel. Another well, located at the Olympic Truck Stop across the road from the maintenance shop well, is 105 feet deep. The yield of these wells could not be determined, but probably is several tens of gallons per minute. The iron content of water from these wells is low (table 3).

Queets valley

The water resources of the Queets River valley were studied from the park boundary to about a mile upstream from the mouth of Sams River. Three major streams--Salmon River, Matheny Creek, and Sams River--are tributary to the Queets River within this reach. These streams generally are unsuitable as sources of supply because of (1) variations in turbidity of the water, (2) use of stream by spawning salmon, and (3) the expense of suitable intake and treatment facilities to supply good-quality water for use of visitors and park personnel.

Several small tributaries of the Queets River have sufficient flow to be considered as small sources of supplies (table 4), but most are unsuitable because of the brownish color of the water most of the year. Waters of Boulder Creek, which is tributary to the Queets River at Sams Rapids, and of an unnamed stream that is tributary to the Queets in sec. 11, T. 24 N., R. 11 W., are less colored than those of most small streams in the Queets valley.

Surface water is not being used as a source of supply in the Queets valley. Surface-water supplies were in use only by a few ranches before the area was taken into the National Park.

No ground-water supplies currently are being used in the Queets valley. However, several dug wells were used for domestic and stock supply before the area became part of the park. A shallow dug well formerly supplied Queets Ranger Station but it is now reportedly contaminated and is unused. The Queets Campground has no water supply.

The floor of the Queets valley is underlain by alluvial silt, sand, and boulders. These deposits, less than about 20 feet thick, are capable of yielding a few gallons per minute to dug wells. Because the alluvium that borders the lower reaches of Matheny Creek is coarser and probably thicker than that in the main part of the upper Queets valley, shallow wells in this area probably will yield as much as 25 gpm (fig. 3).

The ground-water potential is generally poor in the area immediately adjacent to the Queets River upstream from Lyman Rapids (sec. 19, T. 24 N., R. 11 W.). A test hole at the Queets Ranger Station (sec. 2, T. 24 N., R. 10½ W.) penetrated 8 feet of silt and fine sand, and 10 feet of boulders, then only non-water-bearing clay and fine sand from 18 to 271 feet (table 5). The character of the material penetrated below 271 feet is uncertain, but it probably is shale. The rocks into which the Queets valley is eroded are chiefly indurated marine sediments, and contain no significant aquifers.

A long terrace about 200 feet above the valley floor on the south side of the valley in the area between Lyman Rapids and Sams River is underlain by stratified glacial drift and till. ~~these coarse materials probably were deposited while glacial ice occupied a part of the valley.~~ As the base of the coarse terrace deposits probably is below the valley floor, saturated gravel at about flood-plain level probably would yield as much as 25 gpm to wells.

The ground-water potential in the Queets River valley downstream from Lyman Rapids to the park boundary may be better than in the valley upstream from the rapids (fig. 3). Although the clay section penetrated by the test hole at Queets Ranger Station doubtless occurs in the lower reach too, it may be at greater depth and may be overlain by thicker deposits of the coarser water-bearing alluvial material. For example, because of the extreme coarseness of the alluvium in the lower valley, an auger hole in the SW¼ sec. 26, T. 24 N., R. 12 W. (not listed in table 5) reached a depth of only 15 feet.

In the lower reach of the valley, several springs discharge from materials that underlie a terrace ranging from about 160 to 240 feet above flood-plain level. Yields of as much as 25 gpm probably can be obtained from wells that tap these materials within the zone of saturation. Otherwise, with proper development and protection from pollution, the springs would be adequate for moderate demands.

Hoh valley

The investigation for potential water supplies in the Hoh River valley covered only a 6-mile reach of the valley that extends from the park boundary near the Lewis Ranch to the Hoh Ranger Station. The water resources of a short reach of the valley near the mouth of the river are described in a preceding section on the coastal area.

Of seven tributary streams visited in the summer of 1966, four were dry and the flow of the others were measured or estimated to range from 0.30 to 1.50 cfs (cubic feet per second). In only three, therefore, were the flows large enough to be considered as dependable sources of supply. None of those three carried water that was so colored to be unsuitable for domestic use.

Within the reach studied, surface water has been developed as a source of supply only at the Hoh Ranger Station. There, water is diverted from Taft Creek for use at the campground, visitor center, and ranger station. The estimated maximum daily demand is about 7,500 gallons.

Although no ground-water supplies are presently developed by the National Park Service in the Hoh valley, in most of the 6-mile reach the potential is good (fig. 3). However, because usable surface-water sources are available, the ground-water possibilities were studied in less detail than elsewhere.

The lowest part of the valley floor--a strip about 500 to 1,000 feet wide through which the river meanders--is composed of alluvium that doubtless is water bearing. Because this area is subject to flooding, however, it is unsuitable for well sites.

Low terraces border the alluvial area and are underlain by gravel of unknown thickness. About 2 miles west of the park boundary, clay is exposed locally near river level. This clay is similar to that exposed in the Queets valley and may be of comparable thickness. If so, and if the clay extends beneath the deposits of the low terraces, production from wells located on the low terraces would be from shallow depths. Several small streams that maintain substantial flows at the edge of the valley floor discharge into the low-terrace gravels, and have no surface flow across the terrace except at high flow. This indicates that the terrace gravels are, at least locally, highly permeable and should yield 25 or more gallons per minute of water to shallow wells.

Glaciofluvial deposits, chiefly gravel, are exposed in the valley walls up to an altitude of about 650 feet in some places. In the north valley wall in the lower 2 miles of the study area, clay beds locally impede the downward movement of water and small springs discharge from the coarser deposits at the top of the clay. Where not so badly dissected that they are drained, the glaciofluvial deposits would yield up to 25 gpm of water to wells.

The bedrock underlying the Hoh valley has very poor ground-water potential. Attempts to develop supplies from it should be limited to those areas where the unconsolidated deposits have been completely tested and found to be unproductive.

Soleduck Valley

Of 26 tributary streams on the northeast side of the Soleduck River valley between the Soleduck Campground and the park entrance, 16 were either dry or had flows too small--less than 0.10 cfs--to be considered as dependable sources of supply (table 4). Most of the larger tributaries join this reach of the river from the southwest side of the valley; the North Fork Soleduck River is the only major tributary on the northeast side. The water in most tributaries is not greatly colored even at times of low flow.

A small stream near Soleduck Ranger Station is the source of supply for the station and for the resort at Sol Duc Hot Springs. The estimated maximum daily demand on this system is about 12,000 gallons. The water supply for Soleduck Campground--about 2 miles upstream from the ranger station--is from a small spring that discharges from glacial drift in the lower part of the valley wall. The estimated maximum daily demand on this system is about 3,000 gallons.

The bedrock underlying the Soleduck valley is mostly fine-grained metamorphosed sediments that appear too dense to yield much water to wells. Sol Duc Hot Springs issue from the bedrock, but apparently under highly localized geothermal conditions. Probably through a system of intersecting faults, water from local precipitation infiltrates the rock to a depth where it is heated, then discharged from several orifices at an altitude lower than the point of infiltration. The temperatures of the several springs range about from 31° to 50° Celsius (centigrade). 87 to 122°F The water is moderately mineralized and is unsuitable for most consumptive uses. It is used in swimming pools and for some miscellaneous purposes at the resort. The total developed spring discharge is about 140 gpm.

Glacial drift underlies the lower part of the northeast wall of the valley, between the ranger station and the campground, and locally on both sides of the valley for about 2 miles above the mouths of the North and South Forks. These deposits are not extensive and include thick beds of impermeable till. Locally, however, gravel deposits may occur at low enough altitudes to be within the zone of saturation, and they may yield water to wells. Many small springs issue from the glacial deposits; some are as high as 50 feet above the valley floor.

Glacial deposits also underlie an area traversed by the Sol Duc Hot Springs road where it roughly parallels U.S. Highway 101 for about 2 miles before entering the Soleduck valley. In the lower areas between the two roads, outside the park boundary, the glacial deposits probably will yield several hundred gallons per minute of ground water to wells. Within the park, however, these deposits are thin and are mostly above the zone of saturation; the ground-water potential of this area is poor (fig. 3).

The alluvium and low-terrace deposits in the Soleduck valley are thinner than those in any of the valleys previously discussed. Bedrock is exposed in the river channel at several places: (1) about three-fourths of a mile northwest of the mouth of the North Fork; (2) in a 2-mile reach of the river just upstream from the mouth of the North Fork; and (3) at Sol Duc Hot Springs. The alluvium and low-terrace deposits are composed principally of highly permeable gravel and boulders, and, at least where their base is exposed, they rest on bedrock. Except where bedrock is exposed in or near the river channel, yields of up to several hundred gallons per minute probably could be obtained from wells. Because these deposits are thin and only partially saturated, dug wells or infiltration galleries would probably be more successful than drilled wells, but such water supplies might be subject to contamination from surface seepage.

Lake Crescent

The Lake Crescent area is not completely in the rain shadow of the Olympic Mountains as is Sequim. Nonetheless, precipitation is considerably less than in any of the areas previously discussed. Many streams that discharge into the lake are short and because they drain bedrock areas of low ground-water storage, they have little or no flow during the late summer. Of 22 streams flowing into Lake Crescent, 12 were either dry or discharging less than 0.10 cfs in September of 1966 (table 4). Coloration of the water in streams is slight, and the few streams that have sufficient flow in late summer are suitable as sources of supply.

On the south shore of Lake Crescent, at the Storm King Visitor Center and at Lapoel picnic area near LaPoel Creek (not shown on map), why not? the water demands are met by surface water. The water supply for the Storm King Visitor Center area is from Falls Creek, a tributary to Barnes Creek. Water is diverted from the creek just below Marymere Falls, and is supplied to the visitor center, lodge, and other concession facilities, and to residences of park personnel. Water is diverted from Lapoel Creek to supply the Lapoel picnic area.

Present (1967) use of ground water in the Crescent Lake area is limited to the supply for the Fairholm resort and campground, and a few individual domestic supplies that utilize springs or shallow wells. The Fairholm supply is from springs that discharge at the contact between glacial deposits and bedrock about half a mile west of the lake. The estimated maximum daily demand on this system is about 10,000 gallons.

The Lake Crescent area is underlain by basaltic rocks, except along the south shore between Fairholm and Barnes Point and at the extreme north end of the lake (Brown and others, 1960). The basalt and associated interbeds are intensely folded and fractured and may be capable of yielding as much as 25 gpm of water to wells. However, no wells are known to have been drilled into these rocks in the Lake Crescent area. The other bedrock units in the area are fine-grained sandstone, siltstone, and metamorphics that are virtually barren of water.

Near the northeast end of Lake Crescent, in the valley of Lyre River in sec. 14, T. 30 N., R. 9 W., glacial till and some outwash sand and gravel mantles the bedrock. Generally, the glacial deposits in the Lyre valley are too thin and limited in extent to be a major source of ground water, but at a few places they may yield some water to wells.

Near the west end of the lake west of Fairholm, springs issue from similar glacial deposits at altitudes as high as 1,100 feet. Shallow wells having yields as much as 25 gpm probably could be developed, but test drilling would be necessary to locate sites of optimum conditions of thickness, permeability, and saturation of the glacial deposits.

Thick accumulations of gravel, which represent deltas formed by Fairholm and Barnes Creeks, contain potentially the most productive aquifers in the Lake Crescent area (fig. 3). The Fairholm Creek delta occupies a small triangular area between U.S. Highway 101 and the Fairholm Campground. A test hole on the delta penetrated mostly gravel to a depth of 56 feet (table 5), and had a static water level of 11.8 feet below land surface. It was pumped at the rate of 37½ gpm for 3½ hours and had 9.30 feet of drawdown, or a specific capacity of about 4 gpm per foot of drawdown. The water is of good chemical quality (table 3). A properly constructed well near the location of the test hole should yield several hundred gallons of water per minute.

The Barnes Creek delta is much larger than that of Fairholm Creek. It includes all the flat area below an altitude of about 650 feet that extends from the visitor center to a point south of Lake Crescent Lodge.

Three test holes were augered into the deposits of the Barnes Creek delta. A log of the materials penetrated was maintained for only two (table 5). The third hole, about 300 feet south of test hole 1, penetrated materials identical to those in test hole 1. Test hole 1 was pumped for 3 hours at 60 gpm and had a 5.4-foot drawdown of the static water level which was 7.8 feet below land surface. The test indicated a specific capacity about 11 gpm per foot of drawdown. A properly constructed well of the same depth as the test hole should yield at least 500 gpm. As none of the test holes on the Barnes Creek delta encountered bedrock, it is probable that productive aquifers extend below the depths reached by the test holes.

how do you know? no log was kept?

Water from test hole 1 is of good chemical quality (table 3). Ground-water supplies less subject to possible future contamination from lakeshore development could be developed south of U.S. Highway 101. However, above the highway, above a land-surface altitude of about 625 feet, the delta deposits may be too thin to yield adequate quantities of ground water.

Very small deltas have formed at the mouths of Lapoel and Smith Creeks. These deltas are small, and the deposits may be too thin to be important as sources of ground water.

Elwha Valley

The water resources of the Elwha River valley were studied in the area between the park boundary and a point about 1 mile southeast (upstream) of Whiskey Bend. The valley of Boulder Creek, tributary to the Elwha valley, was examined between its mouth and Olympic Hot Springs. Of 11 streams in the Elwha valley that were visited in September 1966 (table 4), only 3 were dry or had a discharge of less than 0.10 cfs. At least during low flow, coloration of the streams in the Elwha and Boulder Creek valleys is not severe and, from this standpoint, most streams are suitable as sources of supply.

Present use of surface water is limited to a system that supplies Altair Campground and the Elwha Ranger Station. This supply is from a small spring-fed creek a few hundred feet southeast of the ranger station. The estimated maximum daily demand is 3,000 gallons.

The Elwha and Olympic Hot Springs Campgrounds are both presently supplied with ground water from springs. The estimated maximum daily demand at the Elwha Campground is about 2,000 gallons, and at the Olympic Hot Springs Campground it is about 4,000 gallons.

Several types of bedrock are exposed in the Elwha valley, are (Brown and others, 1960), but none / known to be good aquifers. Basaltic rocks in the valley walls and underlying the alluvium between the ranger station and park boundary may be capable of yielding as much as 25 gpm of water to wells, but no wells are known to have been drilled into them.

At Olympic Hot Springs heated water issues from bedrock under conditions similar to those at Sol Duc Hot Springs. The total discharge of Olympic Hot Springs is unknown but is reported to be considerably more than that of Sol Duc Hot Springs. The water is mineralized and discharges at a temperature of about 48°C (118°F); it is unsuitable for most domestic uses except in swimming pools.

Substantial ground-water supplies probably cannot be developed from wells in the Elwha valley above Upper Elwha Dam (north end of Lake Mills) or in the valley of Boulder Creek. However, in the valley walls many small springs issue from the contact between bedrock and overlying colluvium or glacial deposits. Such springs occur (1) at Michaels Ranch, (2) near Whiskey Bend, and (3) near the boat launching area on the west side of Lake Mills. At many places in the upper Elwha and Boulder Creek valleys, yields of as much as 25 gpm possibly can be developed from springs or from infiltration galleries constructed above small springs or seepage areas.

The floor of the Elwha valley below Lake Mills is mantled with alluvium of unknown thickness. Gravel, too coarse to penetrate with a power auger, was encountered within a few feet of the surface at both the Elwha Ranger Station and the campground. However, as indicated by the many bedrock exposures in the river channel, the gravel may not be thick anywhere in the valley. Where it extends below river level near the river, or where it is within a few feet of river level near the valley walls, the gravel is coarse enough that it may yield up to 25 gpm of water to shallow wells. Because the saturated gravel may be very thin, dug wells could be constructed to extend for a short distance into bedrock. Such large-diameter wells would thereby have the advantages of intersecting more potentially water-bearing fissures or joints in the bedrock, and providing a larger storage capacity between pumping cycles.

Heart O'the Hills

The water resources of the Heart O'the Hills area, near the park entrance on the Port Angeles-Hurricane Ridge highway, were not studied in detail as the present water supply is adequate. The low flows of several streams in the area (table 4) show that many appear to be perennial and that surface water can be used to supply any reasonable future demand.

The water supply for the Heart O'the Hills Campground is diverted from an unnamed tributary to Ennis Creek near the park entrance. The maximum daily demand of this system is about 8,000 gallons.

Moderate ground-water potential may exist in this area (fig. 3). In contrast to many other parts of the park, the bedrock here may be capable of yielding up to 25 gpm to wells. This has not been substantiated however, as no wells are known to have been drilled into the rocks that underlie the area (Brown and others, 1960). Surficial glacial deposits are too thin in most places to be significant as sources of ground water.

Hurricane Ridge

Partly in the rain shadow of the Olympic Mountains, Hurricane Ridge is at an altitude of about 5,000 feet, and overlooks the Elwha and Lillian River valleys. Streams on both sides of the ridge originate about 500 feet below the crest and most do not maintain perennial flow within 1,500 feet of the crest. The low flows of the streams are maintained by seepage of ground water that is in temporary storage in the thin soil cover on the bedrock.

The existing water supply for the lodge and picnic area near the west end of Hurricane Ridge is pumped from Idaho Creek, a tributary to Elwha River. The diversion is at about the point where the flow of the creek becomes perennial, and in periods of peak demand in late summer almost the entire flow (table 4) is utilized. A larger supply could be obtained from Idaho Creek by moving the diversion downstream. The existing supply could be supplemented by installing similar diversions near the heads of other streams, but more lift would be required than that from the Idaho Creek installation.

Little ground water is available on Hurricane Ridge, except that which seeps from the soil covering the bedrock. The existing system on Idaho Creek could, in fact, be regarded as a collection gallery for ground water. The bedrock of the area is mostly fine grained, somewhat metamorphosed sedimentary rock of marine origin, and is virtually barren of water except in the zone of weathering.

Waterhole picnic area

The Waterhole picnic area is located at an altitude of about 5,000 feet on Hurricane Ridge, about 0.9 mile northwest of Eagle Point. The geologic and hydrologic setting in the area is almost identical to that in the lodge area. The Waterhole picnic area is in a saddle on the ridge, and ground water migrates from the peaks on the southeast through the soil cover and weathered zone. The water collects in the lowest part of the saddle and discharges at rates up to a few gallons per minute into the small stream that flows west from the area. The existing spring system could be improved by construction of an efficient collection gallery that would intercept a greater percentage of the migrating ground water before it is discharged. Because a water supply of this type is readily polluted by contaminants at the land surface, however, the discharge area and nearby areas upslope should be protected against contamination by public use or other means.

Deer Park

The Deer Park area is at an altitude of about 5,250 to 5,400 feet, near the summit of Blue Mountain in the northeast corner of the park. Like Hurricane Ridge, it is partly within the rain shadow of the Olympic Mountains, and receives considerably less precipitation than most of the park.

The low flows of three small streams tributary to Maiden Creek near Deer Park are given in table 4. Two of these streams, originating at small springs within the campground, have been developed as sources of supply.

The hydrologic setting at Deer Park is similar to that of Hurricane Ridge and the Waterhole area. The unweathered bedrock is impermeable and would not yield appreciable quantities of water to wells. The minimum summer flows of the small springs in the area are maintained by ground water that is temporarily stored in the soil cover on the bedrock. Water from rain and melting snow enters the soil in higher areas to the north of the campground and moves downslope until it discharges as springs where erosion has stripped off most of the soil cover.

No colors on fig. 3.

? on ridge?

Some ground water that is not presently being used is discharged at the surface in a marshy area about 300 feet southeast of the southernmost of the two springs that have been developed (not shown on map). A collection gallery, if constructed in the lower part of the marshy area at about the altitude of the developed spring and parallel to the stream, would probably yield enough water to supplement the existing supply. However, both the existing supply and the proposed collection gallery would be subject to pollution if a source for such pollution were allowed to develop at or near the land surface. Therefore, the nearby areas upgradient should be protected from contamination.

why not?

Dosewallips valley

The water resources of the Dosewallips River valley were investigated only between the park boundary and the Dosewallips Ranger Station, a distance of about 2 miles.

The low flows of Constance and Station Creeks (table 4) suggest that these creeks are adequate to meet foreseeable needs even during drought years. The present water supply for the ranger station and campground is from Station Creek. The supply is ample and is of satisfactory quality except for sediment that occasionally becomes a problem. The estimated maximum daily demand is about 2,750 gallons.

The potential for ground-water supplies in the Dosewallips valley is rather poor. Although no wells are known to have been drilled into the bedrock underlying the valley the dense rock probably will not yield more than a few gallons per minute to wells. Furthermore, water from springs that issue from fracture zones in the bedrock to the west of the area investigated is reported to be mineralized, although the extent of mineralization is not known.

The Dosewallips valley is narrow and steep sided, and contains an appreciable amount of alluvium only in the vicinity of the campground. Bedrock is exposed on the south side of the river at the west end of the campground, and on the north side of the river at the east end of the campground. Although these bedrock exposures suggest that the alluvium is thin, abandoned former channels of the stream, now filled with alluvium, might yield some water to shallow wells.

Valley of North Fork Skokomish River

The water resources of the valley of the North Fork Skokomish River were investigated for a distance of about 4 miles upstream from the park boundary. Of 11 streams whose low flows are recorded (table 4), nine appear to be perennial, even during a drought year. Coloration of the water in these streams during periods of low flow is not marked, and most streams that have sufficient discharge are suitable as sources of supply. Surface water is not presently being used as a source of supply within the park in the valley of the North Fork Skokomish River.

Ground water that supplies Staircase Ranger Station and the campground is from springs that discharge from glacial deposits in the lower part of the valley wall immediately northeast of the ranger station. The estimated maximum daily demand on this system is about 4,000 gallons.

Several types of bedrock are exposed within the area studied, but, in general, none appear to be capable of more than small yields to wells. The bedrock in the area of Staircase Ranger Station and campground--mostly marine sedimentary rocks--is jointed and fractured, and several small springs issue from it. None of the springs are adequate for more than a very small supply, but the presence of springs suggests that here the joints and fractures are sufficiently open and interconnected that wells would produce significant quantities of water from the bedrock. The depth to which open joints and fractures extend can be determined only by test drilling, but generally the fractures become tightly closed or do not exist due to the increased pressure at depth. Exploratory drilling into the bedrock to depths much more than about 100 feet probably would not be economically feasible.

Glacial deposits partly mantle the bedrock in the valley walls up to several hundred feet above river level. In most places these deposits are discontinuous and are too thin for the development of water supplies from wells. Locally, however, glacial deposits of sand and gravel are extensive enough and of sufficient thickness to collect and transmit water to springs that discharge at the top of the underlying bedrock. These glacial deposits are potentially the most productive aquifers in the valley, and water supplies could be developed at points of natural discharge or by construction of infiltration galleries.

In the area studied, the alluvium of the valley floor is very thin, and consists mostly of large boulders embedded in silt and fine sand. Nowhere is the bedrock surface known to be far below the riverbed, and wells in the alluvium throughout most of the valley floor would penetrate almost no saturated permeable zones. Locally, silt-free gravel may overlie the bedrock at about river level and near the channel, where yields of up to 5 gpm might be developed from the gravel and the upper few feet of bedrock. However, such wells would be very shallow and very vulnerable to contamination, not only from the land surface near the well but also from stream water that may become momentarily polluted by nearby campground use.

But fig 3 shows 5-25 gpm on both sides of stream.

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00-00-1964: chemical analyses of water in major rivers

TABLE 2.--Chemical analyses of water in major rivers

(Data from U.S. Geological Survey (1964))

River	c/	Milligrams per liter																				
		Silica (SiO_2)	Iron (Fe)	Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Bicarbonate (HCO_3)	Sulfate (SO_4)	Chloride (Cl)	Fluoride (F)	Nitrate (NO_3)	Phosphate (PO_4)	Dissolved solids (residue at 180°C)	Hardness as $CaCO_3$: Calcium, magnesium	Hardness as $CaCO_3$: Non-carbonate	Dissolved oxygen	Specific conductance (micromhos at 25°C)	pH	Color	MPN (most probable number coliform groups per 100 ml)
Quinault	Max	4.8	0.09	9.0	0.7	1.7	0.3	26	6.0	1.5	0.1	0.3	0.00	36	25	4	11.0	58	7.0	0	36
	Min	3.8	.09	9.0	.5	1.7	.2	26	5.6	1.2	.0	.1	.03	36	24	3	10.6	59	7.0	5	23
	Avg	4.3	--	9.0	.6	1.7	.2	26	5.8	1.4	--	.2	.02	36	24	3	10.8	58	7.0	--	30
Queets	Max	6.1	--	10.0	1.2	2.7	.5	30	9.2	3.0	.1	.4	.04	47	29	4	12.9	73	7.3	80	230
	Min	3.9	--	3.5	.3	2.1	.3	10	5.2	1.8	.0	.0	.00	26	10	2	9.4	30	6.4	5	23
	Avg	5.3	--	7.7	.8	2.5	.3	23	6.8	2.2	.1	.2	.01	40	22	3	11.4	59	7.0	20	102
Hoh	Max	5.7	.10	12	.8	2.2	.5	34	10	2.2	.1	.4	.04	53	34	7	12.9	82	7.5	20	230
	Min	3.2	.09	5.5	.2	1.3	.1	15	6.8	.8	.0	.0	.00	34	16	2	10.3	41	6.6	0	23
	Avg	4.6	--	10.9	.7	1.9	.3	30	8.8	1.4	.1	.2	.01	47	30	6	11.5	72	7.2	5	74
Soleduck	Max	5.9	.04	15	1.6	2.4	.4	44	8.2	1.8	.1	.3	.03	56	41	5	13.7	94	7.6	15	360
	Min	3.5	.00	5.0	.8	1.6	.2	18	3.2	.8	.0	.0	.01	27	16	0	10.2	38	7.0	0	23
	Avg	5.0	.02	10.3	1.1	2.0	.3	33	5.8	1.2	.1	.1	.02	45	35	3	11.8	71	7.3	5	75
Elwha	Max	6.8	.08	15	1.3	2.3	.4	44	8.6	1.0	.1	.3	.04	58	40	5	14.1	94	7.7	5	430
	Min	4.3	.05	10	.5	1.4	.0	32	5.8	.5	.0	.0	.01	43	29	3	10.0	63	7.2	0	23
	Avg	5.9	--	13.3	.9	1.9	.2	40	7.7	.7	.1	.1	.02	53	37	4	11.8	84	7.5	5	75
Dosewallips	Max	8.3	.17	16	1.4	2.1	.5	50	8.4	1.0	.1	.5	.01	66	45	4	13.6	102	7.7	10	230
	Min	4.3	.02	9.5	.4	1.1	.1	32	4.4	.2	.0	.0	.00	38	28	2	10.6	62	6.9	0	23
	Avg	6.3	--	13.2	1.0	1.7	.3	42	6.4	.6	.1	.2	.01	52	37	3	11.9	82	7.4	5	60
Duckabush	Max	7.2	.16	16	b/17	4.9	.4	40	7.4	b/235	.1	.3	.03	a/59	b/110	b/79	13.9	b/942	7.6	10	230
	Min	3.7	.01	6.5	.5	.9	.1	24	3.2	.2	.0	.0	.00	33	20	0	10.6	46	7.1	5	23
	Avg	5.7	--	10.3	2.9	2.0	.2	32	4.5	b/30.7	.1	.1	.01	43	38	b/11	12.0	b/175	7.3	5	54

a/ Calculated.

b/ Affected by sea-water intrusion.

c/ Maximum and minimum determined values, and average of all values determined.

TABLE 1.--Streamflow data for major rivers[1/]

River	Drainage area (sq mi)	Period of record	Average discharge (cfs)	Average discharge (acre-ft/yr)	Maximum discharge (cfs)	Maximum discharge Date	Minimum discharge (cfs)	Minimum discharge Date
Quinault[2/]	264	1911-22, 1926-64	2,793	2,022,000	50,200	11- 4-55	276	9-12-44
Queets[3/]	445	1930-49	4,115	2,979,000	130,400	1-22-35	368	9- 9-44
Hoh[4/]	208	1926-64	2,028	1,468,000	38,700	11-26-49	247	11-14-29
Soleduck[5/]	83.8	1917-21, 1933-64	626	453,200	23,500	11-26-49	51	9-11-44
Elwha[6/]	269	1897-1901, 1918-64	1,493	1,081,000	41,600	11-18-97	10	10- 3-38
Dosewallips[7/]	93.7	1930-60	445	322,200	13,200	11-26-49	65	12- 4-30
Duckabush[8/]	66.5	1910-11, 1938-64	413	299,000	8,960	11-26-49	45	10-26-42
Skokomish[9/]	57.2	1924-64	493	356,900	27,000	11- 5-34	16	9-23-30

1/ Data from U.S. Geological Survey (1964), except for data on Queets and Dosewallips Rivers which are from Washington State Department of Conservation and Development, Division of Water Resources (1955).

2/ On left bank at outlet of Quinault Lake, 50 feet downstream from bridge on U.S. Highway 101.

3/ On right bank 2 miles downstream from Clearwater River.

4/ On left bank 1 mile downstream from Maple Creek, 5 miles downstream from South Fork.

5/ On right bank 300 feet downstream from South Fork.

6/ On right bank half a mile upstream from Little River.

7/ On left bank half a mile upstream from Corrigenda Ranger Station, 7½ miles upstream from mouth.

8/ On left bank 4½ miles upstream from mouth.

9/ On left bank 1¼ miles upstream from Lake Cushman, 2 miles upstream from Dry Creek.

TABLE 3.--Chemical analyses of ground water from wells and test holes

Well or test hole	Depth (feet)	Date of sample collection	Temperature (°C)	Milligrams per liter: Silica (SiO_2)	Iron (Fe)	Manganese (Mn)	Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Bicarbonate (HCO_3)	Carbonate (CO_3)	Sulfate (SO_4)	Chloride (Cl)	Fluoride (F)	Nitrate (NO_3)	Dissolved solids: Calculated	Dissolved solids: Residue on evaporation at 180°C	Hardness (as $CaCO_3$)	Specific conductance (micromhos at 25°C)	pH	Color	Turbidity (Jackson candle units)	Remarks
Kalaloch well 1	66½	7-25-66	--	--	0.44	0.77	--	--	--	--	--	--	2.3	6.9	--	--	--	328	39	278	6.6	30	170	Collected upon completion of well, after pumping 4 hr at 15 gpm.
Do.	66½	7-26-66	--	--	.58	.58	--	--	--	--	--	--	2.8	14	--	--	--	223	32	218	6.5	10	100	Collected after pumping 4 hr at 15 gpm, 3 hr at 20 gpm, and 8 hr at 30 gpm.
Do.	66½	7-26-66	--	--	.40	.62	--	--	--	--	--	--	--	12	--	--	--	194	30	198	6.5	90	110	Collected after pumping 4 hr at 15 gpm, 8 hr at 30 gpm, and 27 hr at 20 gpm.
Do.	66½	8-18-66	9	34	1.90	.21	9.2	4.0	64	3.3	200	0	.4	14	0.4	1.0	228	232	40	338	7.9	--	--	PHS a/
Do.	66½	1-19-67	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Kalaloch well 2	--	9-12-67	--	25	b/.16	.12	8.1	4.0	42	2.5	134	0	1.0	12	.3	.1	161	171	36	290	6.7	--	--	Pumped at 40 gpm.
Do.	--	9-13-67	--	25	b/.42	.12	8.2	3.9	42	2.4	144	0	1.0	12	.2	.1	166	171	36	290	6.7	--	--	Pumped at 33.4 gpm, with drawdown of 16.17 feet.
Do.	--	9-13-67	--	25	b/.35	.08	8.6	3.9	46	2.7	155	0	1.0	12	.3	.2	176	182	38	282	6.7	--	--	Pumped at 33.4 gpm, with drawdown of 21.22 feet.
Well at private home in NW¼SW¼ sec. 13, T. 23 N., R. 10 W.	44	6-17-66	--	--	2.9	--	--	--	--	--	--	--	--	--	--	--	--	--	21	377	--	5	--	
Well at State Highway shop in SW¼NW¼ sec. 23, T. 23 N., R. 10 W.	133	6-17-66	--	--	.01	--	--	--	--	--	--	--	--	--	--	--	--	--	31	355	--	0	--	
Well at Olympic Truck Stop in SW¼NW¼ sec. 23, T. 23 N., R. 10 W.	105	6-17-66	--	--	.02	--	--	--	--	--	--	--	--	--	--	--	--	--	25	379	--	0	--	
Test hole augered at Quinault Ranger Station	44	9-13-67	8	7.1	b/.03	--	6.0	1.0	4.6	.6	30	0	.2	2.2	.1	.5	37	36	9	59	6.2	10	--	Collected after pumping 4 hr at 33 gpm; water has strong hydrogen sulfide odor; PHS a/
Test hole augered near mouth of Hoh River	21	9-14-67	9	9.5	b/2.4	--	8.3	2.6	16	1.0	47	0	.6	8.5	.1	1.5	74	110	31	149	7.2	100	--	Collected after pumping 1 hr at 40 gpm; water has slight hydrogen sulfide odor; PHS a/
Test hole 1 augered 1 mile east of La Push	39	9-19-67	9	28	1.3	--	15	6.6	8.3	.8	79	0	.4	12	.1	.0	110	118	65	167	6.5	5	--	Collected after pumping 3 hr at 20 gpm; PHS a/
Test hole 2 augered 1 mile east of La Push	25	9-19-67	8	20	.08	--	8.2	3.5	7.5	.8	38	0	.4	13	.1	.9	73	83	35	113	6.2	5	--	Collected after pumping 3 hr at 42 gpm; PHS a/
Test hole 3 augered 0.2 mile east of La Push	37	9-15-67	9	46	b/2.2	--	14	10	48	2.5	94	0	2.4	78	.1	.1	249	260	76	420	6.3	10	--	Collected after pumping 5 hr at 60 gpm; water has slight hydrogen sulfide odor; PHS a/
Test hole augered at Fairholm	44	9-20-67	7	14	.01	--	22	4.0	5.2	.5	92	0	5.6	8.0	.1	.2	86	86	72	163	7.5	5	--	Collected after pumping 3½ hr at 37½ gpm; PHS a/
Test hole augered at Barnes Point	46	9-20-67	7	11	.00	--	19	4.0	2.7	.4	78	0	5.8	1.0	.0	.3	82	84	64	136	7.2	5	--	Collected after pumping 3 hr at 60 gpm; PHS a/

a/ PHS (under remarks) indicates that the sample meets the requirements or recommendations of the U.S. Public Health Service (1962) in concentrations of copper, zinc, lead, silver, cadmium, barium, chromium, cyanide, selenium, phenol, alkyl benzene sulfonate, and arsenic. The concentrations of manganese were more than 0.05 mg/l (the recommended maximum), but were less than 0.1 mg/l.

b/ Iron in solution at time of analysis.

TABLE 4.--Low flows recorded for selected streams, 1965 and 1966

Stream	Tributary to	Location	Date	Discharge (cfs)	Remarks
Unnamed stream	Quinault River	Easternmost of two spring discharges along foot trail, about 700 feet west of Pony Bridge	9-17-65	0.05	
Do	--do	-----do	9-13-66	.05	
Do	--do	Westernmost of two spring discharges along foot trail, about 800 feet west of Pony Bridge	9-17-65	<.05	
Do	--do	-----do	9-13-66	*.03	
Graves Creek	--do	--	9-13-66	*20	
Unnamed stream	--do	About 4.00 miles northeast of Howe Creek bridge	10-10-66	Dry	
Do	--do	About 3.80 miles northeast of Howe Creek bridge	10-10-66	Dry	
Do	--do	About 3.25 miles northeast of Howe Creek bridge	10-10-66	Dry	
Do	--do	About 2.75 miles northeast of Howe Creek bridge	10-10-66	Dry	
Do	--do	SW¼SE¼ sec. 24, T. 24 N., R. 8 W., about 2.45 miles northeast of Howe Creek bridge	9-13-66	Dry	
Do	--do	SW¼SE¼ sec. 24, T. 24 N., R. 8 W., about 1.30 miles northeast of Howe Creek bridge	9-13-66	*.10	
Howe Creek	--do	NE¼SW¼ sec. 26, T. 24 N., R. 8 W., at road crossing	9-13-66	*10	
Canning Creek	--do	SE¼SE¼ sec. 27, T. 24 N., R. 8 W., at road crossing	9-13-66	*6	
Bunch Creek	--do	NW¼NW¼ sec. 34, T. 24 N., R. 8 W., at road crossing	9-13-66	*1	

*Estimated flow.

TABLE 4.--Low flows recorded for selected streams, 1965 and 1966--Continued

Stream	Tributary to	Location	Date	Discharge (cfs)	Remarks
Unnamed stream	Quinault River	NW¼SE¼ sec. 28, T. 24 N., R. 8 W., about 2.80 miles east of Big Creek bridge	9-13-66	*0.50	
Big Creek	---do----------	SE¼SE¼ sec. 25, T. 24 N., R. 8 W., at bridge	9-13-66	*20	
Unnamed stream	Big Creek	SE¼SW¼ sec. 25, T. 24 N., R. 8 W., at road crossing about 0.30 mile west of Big Creek bridge	9-13-66	.46	
Finley Creek	Quinault River	SW¼NE¼ sec. 3, T. 23 N., R. 8 W., at bridge	9-13-66	Dry	
Kestner Creek	Canoe Creek	SW¼SE¼ sec. 4, T. 23 N., R. 8 W., at bridge, just above confluence with Canoe Creek	9-13-66	.77	
Canoe Creek	Quinault River	SE¼SW¼ sec. 4, T. 23 N., R. 9 W., at bridge	9-13-66	1.95	
Unnamed stream	--do----------	NE¼NE¼ sec. 8, T. 23 N., R. 9 W., at road crossing about 1.10 miles northeast of Dawdy Creek	9-13-66	*.10	
Dawdy Creek	Quinault Lake	NW¼SW¼ sec. 8, T. 23 N., R. 9 W., at bridge	9-13-66	.71	
Unnamed stream	--do----------	NE¼SE¼ sec. 7, T. 23 N., R. 9 W., at culvert, about 0.10 mile southwest of Dawdy Creek bridge	9-13-66	*<.10	
July Creek	--do----------	SE¼SE¼ sec. 7, T. 23 N., R. 9 W., at culvert	9-17-65	.76	
Do----------	--do----------	-----do----------	9-13-66	.88	
Slide Creek	--do----------	NE¼NW¼ sec. 18, T. 23 N., R. 9 W., at culvert	9-17-65	.58	
Do----------	--do----------	-----do----------	9-13-66	.22	
McCormick Creek	--do----------	SE¼NW¼ sec. 18, T. 23 N., R. 9 W., at culvert	9-13-66	.06	

*Estimated flow.

TABLE 4.--Low flows recorded for selected streams, 1965 and 1966--Continued

Stream	Tributary to	Location	Date	Discharge (cfs)	Remarks
Unnamed stream	Quinault Lake	NW¼SE¼ sec. 13, T. 23 N., R. 10 W., at culvert about 0.50 mile east of Higley Creek	9-17-65	1.35	
Do	--do--	-----do-----	9-13-66	*.50	
Higley Creek	--do--	NE¼SW¼ sec. 13, T. 23 N., R. 10 W., at bridge	9-17-65	.95	
Do	--do--	-----do-----	9-13-66	.47	
Unnamed stream	--do--	NW¼SW¼ sec. 13, T. 23 N., R. 10 W., at culvert, about 0.30 mile southwest of Higley Creek bridge	9-13-66	*.10	
North Creek	Queets River	Sec. 2, T. 24 N., R. 10½ W., at road crossing	9-17-65	.55	
Do	--do--	-----do-----	9-14-66	*<.10	
Unnamed stream	--do--	Sec. 2, T. 24 N., R. 10½ W., at road crossing, about 1.20 miles southwest of Queets Ranger Station	9-14-66	*<.10	
Killea Creek	--do--	NE¼NE¼ sec. 12, T. 24 N., R. 11 W., at culvert, about 1.40 miles southwest of Queets Ranger Station	9-14-66	.15	
Phelan Creek	--do--	NW¼SW¼ sec. 11, T. 24 N., R. 11 W., at culvert, about 3.10 miles southwest of Queets Ranger Station	9-14-66	.88	
Drinkwater Creek	--do--	SW¼SW¼ sec. 11, T. 24 N., R. 11 W., at culvert, about 3.40 miles southwest of Queets Ranger Station	9-14-66	.30	
Unnamed stream	--do--	SE¼SE¼ sec. 10, T. 24 N., R. 11 W., at culvert, about 2.10 miles northeast of Matheny Creek bridge	9-14-66	1.21	
Newman Creek	--do--	NE¼NW¼ sec. 15, T. 24 N., R. 11 W., at culvert, about 1.30 miles northeast of Matheny Creek bridge	9-14-66	*.10	

*Estimated flow.

TABLE 4.--Low flows recorded for selected streams, 1965 and 1966--Continued

Stream	Tributary to	Location	Date	Discharge (cfs)	Remarks
Matheny Creek	Queets River	NW¼NW¼ sec. 22, T. 24 N., R. 11 W., at bridge	9-14-66	*18	
Unnamed stream	--do--	SW¼NW¼ sec. 20, T. 24 N., R. 11 W., at culvert, about 2.10 miles southwest of Matheny Creek bridge	9-14-66	*<.10	
Mud Creek	--do--	NE¼SE¼ sec. 19, T. 24 N., R. 11 W., about 3.40 miles northeast of Salmon River bridge	9-14-66	1.64	
Unnamed stream	--do--	SW¼SE¼ sec. 26, T. 24 N., R. 12 W., at culvert, about 0.60 mile east of Salmon River bridge	9-14-66	1.88	
Salmon River	--do--	NW¼SW¼ sec. 26, T. 24 N., R. 12 W.	9-14-66	*20	
Unnamed stream	Pacific Ocean	NW¼SW¼ sec. 22, T. 24 N., R. 13 W., at temporary camp and gravel pit, 0.2 mile north of south end of Pacific Coast area	9-17-65	.51	
Do	--do--	--do--	9-14-66	Dry	
Do	--do--	NW¼SW¼ sec. 22, T. 24 N., R. 13 W., 0.30 mile north of south end of Pacific Coast area	9-14-66	.15	
Do	--do--	NW¼NW¼ sec. 22, T. 24 N., R. 13 W., 0.80 mile north of south end of Pacific Coast area	9-14-66	Dry	
Do	--do--	SW¼SW¼ sec. 15, T. 24 N., R. 13 W., about 100 feet south of Beach Trail 1	9-17-65	.39	
Do	--do--	--do--	9-14-66	.10	
Do	--do--	SW¼SW¼ sec. 15, T. 24 N., R. 13 W., about 350 feet north of Beach Trail 1	9-17-65	.35	
Do	--do--	--do--	9-14-66	.12	

*Estimated flow.

TABLE 4.--Low flows recorded for selected streams, 1965 and 1966--Continued

Stream	Tributary to	Location	Date	Discharge (cfs)	Remarks
Unnamed stream	Pacific Ocean	NE¼NE¼ sec. 16, T. 24 N., R. 13 W., at Beach Trail 2	9-14-66	*<0.10	
Do	--do	SW¼SW¼ sec. 9, T. 24 N., R. 13 W., about 175 feet north of Beach Trail 2	9-14-66	Dry	
Do	--do	SE¼SW¼ sec. 21, T. 25 N., R. 13 W., at Beach Trail 4	9-14-66	*.20	
Do	--do	NE¼SW¼ sec. 21, T. 25 N., R. 13 W., about 0.45 mile north of Beach Trail 4	9-14-66	*.05	
Do	--do	NE¼SW¼ sec. 21, T. 25 N., R. 13 W., about 0.50 mile north of Beach Trail 4	9-14-66	*.05	
Do	--do	SE¼NW¼ sec. 21, T. 25 N., R. 13 W., about 0.70 mile north of Beach Trail 4	9-14-66	*<.05	
Do	--do	NW¼NW¼ sec. 21, T. 25 N., R. 13 W., about 1.25 miles south of Beach Trail 6	9-14-66	*.10	
Do	--do	SE¼NE¼ sec. 17, T. 25 N., R. 13 W., about 0.50 mile south of Beach Trail 6	9-16-65	3.46	
Do	--do	-----do-----	9-14-66	*.50	
Steamboat Creek	--do	SW¼SE¼ sec. 8, T. 25 N., R. 13 W., at Beach Trail 6	9-16-65	*2.00	Water dark brown, and foaming, some odor.
Do	--do	SW¼SE¼ sec. 8, T. 25 N., R. 13 W.	9-14-66	1.74	Water dark brown.
Unnamed stream	--do	NE¼SW¼ sec. 5, T. 25 N., R. 13 W., about 0.85 mile north of Beach Trail 7	9-14-66	Dry	
Do	--do	NE¼NW¼ sec. 5, T. 25 N., R. 13 W., about 1.45 miles north of Beach Trail 7	9-14-66	*<.05	

*Estimated flow.

TABLE 4.--Low flows recorded for selected streams, 1965 and 1966--Continued

Stream	Tributary to	Location	Date	Discharge (cfs)	Remarks
Cedar Creek	Pacific Ocean	SE¼SW¼ sec. 32, T. 26 N., R. 13 W.	9-16-65	13.8	
Do	--do	-----do	9-14-66	4.59	Water dark brown.
Unnamed stream	--do	NE¼SW¼ sec. 32, T. 26 N., R. 13 W., about 0.15 mile north of Cedar Creek	9-14-66	*<.05	
Do	--do	SE¼NW¼ sec. 32, T. 26 N., R. 13 W., about 0.45 mile north of Cedar Creek	9-14-66	Dry	
Taft Creek	Hoh River	NW¼SW¼ sec. 12, T. 27 N., R. 10 W., at road crossing	8-17-66	*10	Water clear.
Do	--do	-----do	9-14-66	*.30	Do.
Snider Creek	--do	NW¼SW¼ sec. 14, T. 27 N., R. 10 W., at road crossing	8-17-66	Dry	
Do	--do	-----do	9-14-66	Dry	
Unnamed creek	--do	SW¼NW¼ sec. 22, T. 27 N., R. 10 W., at road crossing	8-17-66	*.45	Water clear.
Do	--do	-----do	9-14-66	*.50	Do.
Twin Creek	--do	-----do	8-17-66	*8.25	Do.
Do	--do	-----do	9-14-66	*1.50	
Unnamed creek	--do	NE¼NW¼ sec. 28, T. 27 N., R. 10 W., about 1.6 miles east of park entrance	9-14-66	Dry	
Do	--do	NE¼NE¼ sec. 29, T. 27 N., R. 10 W., about 1.1 miles east of park entrance	9-14-66	Dry	
Do	--do	SW¼NW¼ sec. 29, T. 27 N., R. 10 W., about 0.2 mile east of park entrance, 400 feet north of road crossing	8-17-66	*.10	

*Estimated flow.

TABLE 4.--Low flows recorded for selected streams, 1965 and 1966--Continued

Stream	Tributary to	Location	Date	Discharge (cfs)	Remarks
Unnamed creek	Hoh River	SW¼NW¼ sec. 29, T. 27 N., R. 10 W., about 0.2 mile east of park entrance, at road crossing	8-17-66	Dry	
Do	--do	-----do	9-14-66	Dry	
Do	Pacific Ocean	SE¼SE¼ sec. 13, T. 26 N., R. 14 W., about 50 feet north of mouth of Hoh River	9-14-67	*0.20	Water light brown.
Do	--do	NE¼SE¼ sec. 13, T. 26 N., R. 14 W., about 0.3 mile north of mouth of Hoh River	9-14-67	*.10	Water slightly brown.
Do	--do	SE¼SW¼ sec. 27, T. 28 N., R. 15 W., at La Push water supply intake	9-16-65	.13	
Do	Soleduck River	NW¼NE¼ sec. 4, T. 28 N., R. 9 W., at road crossing, about 1.75 miles southeast of Soleduck Ranger Station	9-13-66	Dry	
Do	--do	SE¼SW¼ sec. 33, T. 29 N., R. 9 W., at road crossing, about 1.35 miles southeast of Soleduck Ranger Station	9-13-66	*.10	
Do	--do	SW¼SW¼ sec. 33, T. 29 N., R. 9 W., at road crossing, about 1.20 miles southeast of Soleduck Ranger Station	9-13-66	Dry	
Do	--do	NW¼SW¼ sec. 33, T. 29 N., R. 9 W., at road crossing, about 1.15 miles southeast of Soleduck Ranger Station	9-13-66	Dry	
Do	--do	NE¼SE¼ sec. 32, T. 29 N., R. 9 W., at road crossing, about 0.85 mile southeast of Soleduck Ranger Station	9-13-66	*.05	
Do	--do	SE¼SW¼ sec. 29, T. 29 N., R. 9 W., at road crossing, about 150 feet northwest of Soleduck Ranger Station	9-13-66	*.50	
Do	--do	SE¼SW¼ sec. 29, T. 29 N., R. 9 W., at road crossing, about 0.1 mile northwest of Soleduck Ranger Station	9-13-66	*.40	

*Estimated flow.

TABLE 4.--Low flows recorded for selected streams, 1965 and 1966--Continued

Stream	Tributary to	Location	Date	Discharge (cfs)	Remarks
Unnamed creek	Soleduck River	SW¼SW¼ sec. 29, T. 29 N., R. 9 W., at road crossing, about 0.2 mile northwest of Soleduck Ranger Station	9-13-66	Dry	
Do	--do	SW¼SW¼ sec. 29, T. 29 N., R. 9 W., at road crossing, about 0.35 mile northwest of Soleduck Ranger Station	9-13-66	*0.15	
Do	--do	SW¼SW¼ sec. 29, T. 29 N., R. 9 W., at road crossing, about 0.40 mile northwest of Soleduck Ranger Station	9-13-66	*.20	
Do	--do	Sec. 30, T. 29 N., R. 9 W., at road crossing, about 0.60 mile northwest of Soleduck Ranger Station	9-13-66	*.40	
Do	--do	Sec. 30, T. 29 N., R. 9 W., at road crossing, about 1.0 mile northwest of Soleduck Ranger Station	9-13-66	*.10	
Do	--do	Sec. 30, T. 29 N., R. 9 W., at road crossing, about 1.2 miles northwest of Soleduck Ranger Station	9-13-66	Dry	
Do	--do	Sec. 30, T. 29 N., R. 9 W., at road crossing, about 1.3 miles northwest of Soleduck Ranger Station	9-13-66	Dry	
Do	--do	Sec. 30, T. 29 N., R. 9 W., at road crossing, about 1.45 miles northwest of Soleduck Ranger Station	9-13-66	*.15	
Do	--do	Sec. 19, T. 29 N., R. 9 W., at road crossing, about 1.6 miles northwest of Soleduck Ranger Station	9-13-66	Dry	
Do	--do	Sec. 19, T. 29 N., R. 9 W., at road crossing, about 2.05 miles northwest of Soleduck Ranger Station	9-13-66	Dry	
Do	--do	Sec. 18, T. 29 N., R. 9 W., at road crossing, about 3.45 miles northwest of Soleduck Ranger Station	9-13-66	Dry	

*Estimated flow.

TABLE 4.--Low flows recorded for selected streams, 1965 and 1966--Continued

Stream	Tributary to	Location	Date	Discharge (cfs)	Remarks
Unnamed creek	Soleduck River	Sec. 18, T. 29 N., R. 9 W., at road crossing, about 3.75 miles northwest of Soleduck Ranger Station	9-13-66	Dry	
Do	--do	Sec. 18, T. 29 N., R. 9 W., at road crossing, about 3.90 miles northwest of Soleduck Ranger Station	9-13-66	Dry	
Do	--do	Sec. 18, T. 29 N., R. 9 W., at road crossing, about 4.05 miles northwest of Soleduck Ranger Station	9-13-66	*<0.05	
Do	--do	NE¼SW¼ sec. 1, T. 29 N., R. 10 W., at road crossing, about 0.70 mile southeast of North Fork Soleduck River bridge	9-13-66	Dry	
Do	--do	SW¼NW¼ sec. 1, T. 29 N., R. 10 W., at road crossing, about 0.70 mile southeast of North Fork Soleduck River bridge	9-13-66	Dry	
Do	--do	SE¼SW¼ sec. 35, T. 30 N., R. 10 W., at road crossing, about 0.70 mile northwest of North Fork Soleduck River bridge	9-13-66	*.20	
Do	--do	SW¼SW¼ sec. 35, T. 30 N., R. 10 W., at road crossing, about 0.75 mile northwest of North Fork Soleduck River bridge	9-13-66	*.25	
Do	--do	SE¼NE¼ sec. 28, T. 30 N., R. 10 W., at road crossing, about 1.95 miles from park entrance	9-13-66	*.05	
Do	Pacific Ocean	NW¼NW¼ sec. 26, T. 31 N., R. 16 W., at Cape Alava	10-13-65	*1.70	Water moderately brown.
Do	Lake Crescent	SW¼NW¼ sec. 27, T. 30 N., R. 9 W., at road crossing, about 1.45 miles east of Ovington Creek	9-13-66	Dry	

*Estimated flow.

TABLE 4.--Low flows recorded for selected streams, 1965 and 1966--Continued

Stream	Tributary to	Location	Date	Discharge (cfs)	Remarks
Ovington Creek	Lake Crescent	SW¼NE¼ sec. 29, T. 30 N., R. 9 W.,	9-13-66	Dry	
Unnamed stream	--do--	SW¼NW¼ sec. 29, T. 30 N., R. 9 W., about 0.3 mile west of Ovington Creek	9-13-66	Dry	
Do	--do--	Sec. 30, T. 30 N., R. 9 W., about 0.7 mile west of Ovington Creek	9-13-66	Dry	
Do	--do--	Sec. 30, T. 30 N., R. 9 W., about 1.3 miles west of Ovington Creek	9-13-66	Dry	
Do	--do--	Sec. 30, T. 30 N., R. 9 W., flume about 1.05 miles east of junction North Shore Road and U.S. Highway 101	9-13-66	*0.30	
Do	--do--	Sec. 30, T. 30 N., R. 9 W., about 0.25 mile northeast of junction North Shore Road and U.S. Highway 101	9-13-66	Dry	
Eagle Creek	--do--	Sec. 30, T. 30 N., R. 9 W., at U.S. Highway 101	9-13-66	*.30	
Cross Creek	--do--	Sec. 31, T. 30 N., R. 9 W., at U.S. Highway 101	9-13-66	*.30	
Lapoel Creek	--do--	SW¼NW¼ sec. 32, T. 30 N., R. 9 W., at U.S. Highway 101	9-13-66	.96	
Unnamed stream	--do--	NW¼SW¼ sec. 33, T. 30 N., R. 9 W., about 1.05 miles east of Lapoel Creek	9-13-66	Dry	
Aurora Creek	--do--	SW¼NE¼ sec. 33, T. 30 N., R. 9 W., at U.S. Highway 101	9-13-66	Dry	
Unnamed stream	--do--	SW¼NW¼ sec. 34, T. 30 N., R. 9 W., about 0.6 mile east of Aurora Creek	9-13-66	*.05	
Smith Creek	--do--	SW¼NE¼ sec. 34, T. 30 N., R. 9 W., at U.S. Highway 101	9-13-66	Dry	

*Estimated flow.

TABLE 4.--Low flows recorded for selected streams, 1965 and 1966--Continued

Stream	Tributary to	Location	Date	Discharge (cfs)	Remarks
Unnamed stream	Lake Crescent	NW¼SE¼ sec. 34, T. 30 N., R. 9 W., about 0.2 mile east of Smith Creek	9-13-66	*0.25	
Do	--do	NW¼SW¼ sec. 35, T. 30 N., R. 9 W., about 0.55 mile east of Smith Creek	9-13-66	*.20	
Do	--do	SE¼NW¼ sec. 35, T. 30 N., R. 9 W., about 0.65 mile southwest of Barnes Creek bridge on U.S. Highway 101	9-13-66	*.15	
Do	--do	SE¼NW¼ sec. 35, T. 30 N., R. 9 W., about 0.60 mile southwest of Barnes Creek bridge on U.S. Highway 101	9-13-66	Dry	
Do	--do	SE¼NW¼ sec. 25, T. 30 N., R. 9 W., about 0.85 mile northeast of Storm King Visitors Center	9-13-66	Dry	
Do	--do	NW¼NE¼ sec. 25, T. 30 N., R. 9 W., about 0.10 mile south of Sledge Hammer Point	9-13-66	*.10	
Do	--do	NW¼SW¼ sec. 19, T. 30 N., R. 8 W., about 0.80 mile northeast of Sledge Hammer Point	9-13-66	*.15	
Do	--do	SE¼NE¼ sec. 19, T. 30 N., R. 8 W., waterfall about 0.15 mile west of park entrance	9-13-66	*.30	
Log Cabin Creek	--do	SE¼NE¼ sec. 14, T. 30 N., R. 9 W., at road crossing	10-14-66	*.40	
Idaho Creek	Elwha River	About 50 feet downstream from Hurricane Ridge Lodge water intake	9-16-66	.01	
Crystal Creek	Boulder Creek	About 0.10 mile northeast of Olympic Hot Springs Campground	9- 9-66	.61	
Unnamed stream	--do	About 0.35 mile northeast of Crystal Creek	9- 9-66	Dry	
Hell Creek	--do	About 0.70 mile northeast of Crystal Creek	9- 9-66	*.30	

*Estimated flow.

TABLE 4.--Low flows recorded for selected streams, 1965 and 1966--Continued

Stream	Tributary to	Location	Date	Discharge (cfs)	Remarks
Cougar Creek	Boulder Creek	About 1.70 miles northeast of Crystal Creek	9- 9-66	1.47	
Deer Creek	--do--	About 2.10 miles northeast of Crystal Creek	9- 9-66	*<.01	
Deep Creek	--do--	About 2.50 miles northeast of Crystal Creek	9- 9-66	.75	
Deadmans Gulch	--do--	About 2.70 miles northeast of Crystal Creek	9- 9-66	Dry	
Unnamed stream	--do--	About 2.90 miles northeast of Crystal Creek	9- 9-66	*.15	
Stubey Creek	Elwha River	SW¼SW¼ sec. 17, T. 29 N., R. 7 W., flows into Lake Mills	9- 9-66	1.06	
Unnamed stream	--do--	About 0.15 mile south of Elwha Ranger Station	9- 9-66	1.26	
Griff Creek	--do--	At Elwha Ranger Station	9- 9-66	2.63	
Unnamed stream	Morse Creek	SW¼SW¼ sec. 7, T. 29 N., R. 5 W., about 0.75 mile southeast of Rocky Creek	9- 8-66	*<.05	
Do	--do--	SW¼SW¼ sec. 7, T. 29 N., R. 5 W., about 0.55 mile southeast of Rocky Creek	9- 8-66	*.10	
Do	--do--	SE¼SE¼ sec. 12, T. 29 N., R. 6 W., about 0.45 mile southeast of Rocky Creek	9- 8-66	*<.05	
Rocky Creek	--do--	NE¼SW¼ sec. 12, T. 29 N., R. 6 W.	9- 8-66	*.25	
Unnamed stream	--do--	SE¼NW¼ sec. 12, T. 29 N., R. 6 W., about 0.35 mile northwest of Rocky Creek	9- 8-66	*.25	
Do	--do--	SW¼NW¼ sec. 12, T. 29 N., R. 6 W., about 0.30 mile southeast of Lake Creek	9- 8-66	*.01	

*Estimated flow.

TABLE 4.--Low flows recorded for selected streams, 1965 and 1966--Continued

Stream	Tributary to	Location	Date	Discharge (cfs)	Remarks
Lake Creek	Morse Creek	NE¼NE¼ sec. 11, T. 29 N., R. 6 W.	9- 8-66	2.69	
Ennis Creek	Strait of Juan De Fuca	NE¼SE¼ sec. 3, T. 29 N., R. 6 W., about 0.25 mile southeast of Heart O'the Hills Ranger Station	9- 8-66	2.43	
Unnamed stream	Ennis Creek	SE¼NE¼ sec. 3, T. 29 N., R. 6 W., about 0.15 mile southeast of Heart O'the Hills Ranger Station	9- 8-66	*.10	
Do	--do	NE¼NE¼ sec. 3, T. 29 N., R. 6 W., about 200 feet south of entrance to Heart O'the Hills Campground	9-15-65	2.44	
Do	--do	-----do-----	9-15-65	*.15	
Do	West Fork Siebert Creek	NE¼NE¼ sec. 21, T. 29 N., R. 5 W., culvert about 0.30 mile south of park entrance	9-12-66	*.05	
Do	Maiden Creek	Culvert about 1.35 miles northwest of Obstruction Point trail head, Deer Park area	9-12-66	*.05	
Do	--do	Culvert about 0.55 mile northwest of Obstruction Point trail head, Deer Park area	9-12-66	*.05	
Do	--do	Culvert on loop road at Obstruction Point trail head, Deer Park area	9-12-66	*.10	
Station Creek	Dosewallips River	At Dosewallips Ranger Station	9-15-65	1.23	
Do	--do	-----do-----	9- 7-66	2.53	
Constance Creek	--do	At road crossing	9- 7-66	3.21	
Unnamed stream	North Fork Skokomish River	At bridge near end of road about 3.5 miles northwest of Ranger Station	9- 7-66	*.30	

*Estimated flow.

13

TABLE 4.--Low flows recorded for selected streams, 1965 and 1966--Continued

Stream	Tributary to	Location	Date	Discharge (cfs)	Remarks
Unnamed stream	North Fork Skokomish River	Culvert about 0.10 mile southeast of bridge near end of road	9- 7-66	*0.20	
Do	--do	Spring discharge about 0.60 mile southeast of bridge near end of road	9- 7-66	*.10	
Do	--do	Culvert about 1.70 miles northwest of Slate Creek	9- 7-66	*.20	
Do	--do	Culvert about 0.15 mile northwest of Slate Creek	9- 7-66	.92	
Slate Creek	--do	At road crossing, about 0.60 mile northwest of ranger station	9- 7-66	1.27	
Unnamed stream	--do	Culvert about 0.50 mile northwest of ranger station	9- 7-66	*.05	
Lincoln Creek	--do	At bridge about 0.30 mile southeast of ranger station	9- 7-66	Dry	
Unnamed stream	--do	Spring discharge about 0.30 mile northwest of park entrance	9- 7-66	*.10	
Do	--do	Spring discharge about 0.15 mile northwest of park entrance	9- 7-66	*.10	
Do	--do	Spring discharge about 0.05 mile northwest of park entrance	9- 7-66	*.10	

*Estimated flow.

Table 5. -- Logs of wells and test holes

	Thickness (feet)	Depth (feet)
Kalaloch well 1, Kalaloch Campground. Drilled by Stoican Drilling Co., 1966. Altitude about 50 ft. Casing: 10-inch to 59 ft, perforated 24.5-27 ft. Screen: 8-inch stainless steel, 0.060-inch slot 56-61 ft, 0.030-inch slot 61.5-66.5 ft.		
Gravel, pebble to cobble size (road fill)----------	3	3
Clay, sticky, tan, very little sand----------	8	11
Clay, sticky, layered, red-brown, tan, and blue-gray, some fine sand----------	3	14
Clay and sand, blue-gray, water-bearing at 14 ft----	7	21
Gravel, weathered, fine to medium, and medium to coarse sand, water-bearing----------	5	26
Clay, very sandy, blue-gray, with some small rounded pebbles----------	10	36
Gravel, weathered, fine to medium, and fine to coarse sand and some clay, slightly water-bearing-	4	40
Clay, sandy, soft, blue-gray----------	5	45
Clay, soft, blue-gray----------	9½	54½
Gravel, weathered, fine to coarse, rounded, and some sand and clay, water-bearing----------	2	56½
Gravel, weathered, fine to medium, and medium sand, water-bearing----------	2	58½
Sand, weathered, fine to medium, water-bearing------	6½	65
Sand, weathered, medium, water-bearing----------	½	65½
Clay, sandy, hard (decomposed rock)----------	2½	68
Rock (very fine-grained sandstone or mudstone), greenish-gray, contains veinlets of calcite, not water-bearing----------	10	78

	Thickness (feet)	Depth (feet)
Test hole, lower Hoh River. Augered January 1967. Altitude about 10 ft. Casing: 4-inch to 21 ft, perforated 14-21 ft.		
Silt----------	3	3
Gravel----------	8	11
Clay, soft----------	2	13
Gravel, fine----------	5	18
Gravel and some clay----------	7	25
Gravel, fine----------	3	28
Gravel, coarse, or decomposed bedrock----------	2	30
Well, Quillayute auxiliary airfield. Drilled 1943. Altitude 173.3 ft. Casing: 10-inch, perforated 123-163 ft.		
Soil, black----------	4	4
Clay, yellow----------	10	14
Sand, packed, with gravel and boulders----------	91	105
Sand, with gravel and some boulders----------	59	164
Clay, blue----------	6	170

GPO 985206

Table 5. — Logs of wells and test holes--Continued

	Thickness (feet)	Depth (feet)
Well, Mora Campground. Dug December 1961. Altitude about 25 ft. Casing: 36-inch to 38 ft, perforated 26-38 ft.		
Sand and clay, reddish-brown, with rotted vegetation	4	4
Sand, gravel, and silt	2	6
Sand, fine, clean, gray	6	12
Sand, and gravel to 3-inches diameter	6	18
Sand, and gravel to 12-inches diameter	10	28
Gravel, to 18-inches diameter	10	38
Test hole 1, La Push. Augered January 12, 1967. About 1 mile east of La Push, 50 ft inside pasture gate at end of road along south side of sec. 22, T. 28 N., R. 15 W. Altitude about 10 ft. Casing: 4-inch to 39 ft, perforated 32-39 ft.		
Clay, sandy, brown	10	10
Gravel	3	13
Clay	5	18
Gravel, fine	12	30
Gravel, coarse	18	48
Test hole 2, La Push. Augered January 13, 1967. About 1 mile east of La Push, about 100 ft east and 80 ft south of pasture gate at end of road along south side of sec. 22, T. 28 N., R. 15 W. Altitude about 10 ft. Casing: 4-inch to 25 ft, perforated 18-25 ft.		
Clay, sandy, soft, brown	8	8
Sand, fine, clayey, brown	6	14
Gravel, sandy	6	20
Gravel and fine to medium sand	8	28

	Thickness (feet)	Depth (feet)
Test hole 3, La Push. Augered January 17, 1967. About 0.2 mile east of east boundary of village, on north shoulder of road along south side of sec. 22, T. 28 N., R. 15 W., about 150 ft west of abandoned boat hull. Altitude about 10 ft. Casing: 4-inch to 37 ft, perforated 30-37 ft.		
Clay, sandy, soft	9	9
Clay and scattered gravel	4	13
Sand and gravel	27	40
Gravel, coarse	15	55
Test hole 1, Ozette. Augered January 11, 1967. On west shoulder of road, at south end of the Coal Creek bridge. Altitude about 40 ft.		
Clay, sandy, brown, with wood at 9 ft	13	13
Sand, fine	9	22
Clay, soft	6	28
Sand, fine, and soft clay	26	54
Till, clayey, blue, with fine angular pebbles	24	78
Test hole 2, Ozette. Augered January 11, 1967. 100 ft north of Coal Creek and 30 ft east of Ozette River. Altitude about 35 ft.		
Clay, brown	8	8
Sand, fine	6	14
Gravel(?)	2	16
Clay	2	18
Till, clayey, blue	55	73

GPO 985206

Table 5. -- Logs of wells and test holes--Continued

	Thickness (feet)	Depth (feet)
Test hole 3, Ozette. Drilled March 7, 1967 by Stoican Drilling Co. Near center of south side of parking lot. Altitude about 40 ft.		
Clay and sand, blue, with some wood	8	8
Sand, fine to very fine, blue	30	38
Till, clayey, blue	58	96
Rock, medium-hard, gray and white	8	104
Test hole, Quinault. Augered January 26, 1967. About 250 ft west of USGS precipitation gauge in NW¼SW¼ sec. 27, T. 24 N., R. 8 W. Altitude about 370 ft.		
Sand	8	8
Clay	2	10
Sand	4	14
Clay	2	16
Sand	1	17
Boulders, imbedded in fine sand	6	23
Test hole, Quinault Ranger Station. Augered January 24, 1967. In southwest corner of ranger station work area. Altitude about 235 ft. Casing: 4-inch to 44 ft, perforated 34-44 ft.		
Clay, sandy, brown	15	15
Gravel, fine	3	18
Gravel, coarse	10	28
Gravel and clay	3	31
Clay	2	33
Clay and gravel, in layers	10	43
Sand and gravel	15	58
Test hole, Quinault Ranger Station--Continued		
Gravel, fine	10	68
Sand, fine, and clay	15	83
Clay and fine sand	22	105
Test hole, Queets Ranger Station. Drilled March 9, 1967 by Stoican Drilling Co. About 150 ft southwest of ranger's residence. Altitude about 280 ft.		
Silt and fine sand	8	8
Boulders	10	18
Sand, fine, and blue clay with pebbles	66	84
Clay, sticky, blue, and some very fine sand	14	98
Clay, blue, with pebbles, and some medium sand	70	168
Clay, blue, with pebbles, and some fine soft sand	26	194
Clay, blue, with some pebbles and sand	29	223
Sand, fine	8	231
Clay, sandy, blue	40	271
Shale(?), sandy, blue	30	301

(continued)

Table 3. – Logs of wells and test holes--Continued

	Thickness (feet)	Depth (feet)
Test hole, Fairholm. Augered January 10, 1967. 180 ft west of boat ramp and 25 ft south of center line of boat ramp road. Altitude about 590 ft. Casing: 4-inch to 44 ft, perforated 37-44 ft.		
Silt	3	3
Gravel, medium	5	8
Gravel, medium to coarse	5	13
Clay, sandy	9	22
Gravel, medium	16	38
Gravel, coarse	10	48
Gravel and boulders	8	56
Bedrock, decomposed (or till)	7	63
Test hole 1, Barnes Point. Augered January 4, 1967. About 200 ft south of boathouse near district ranger's residence. Altitude about 585 ft. Casing: 4-inch to 45 ft, perforated 38-45 ft.		
Gravel, medium to coarse	5	5
Gravel, fine to medium	3	8
Gravel, medium	20	28
Gravel and sand	10	38
Gravel, clayey	5	43
Gravel, medium	20	63

	Thickness (feet)	Depth (feet)
Test hole 2, Barnes Point. Augered January 8, 1967. About 40 ft east of junction of roads to boat ramp and to ranger's residence. Altitude about 595 ft.		
Gravel, coarse, and silt	8	8
Gravel, coarse to very coarse	16	24
Clay, sandy	4	28
Gravel, fine	12	40
Gravel, fine to medium	10	50
Sand and clay	3	53
Gravel, medium	12	65

GPO 9S3806

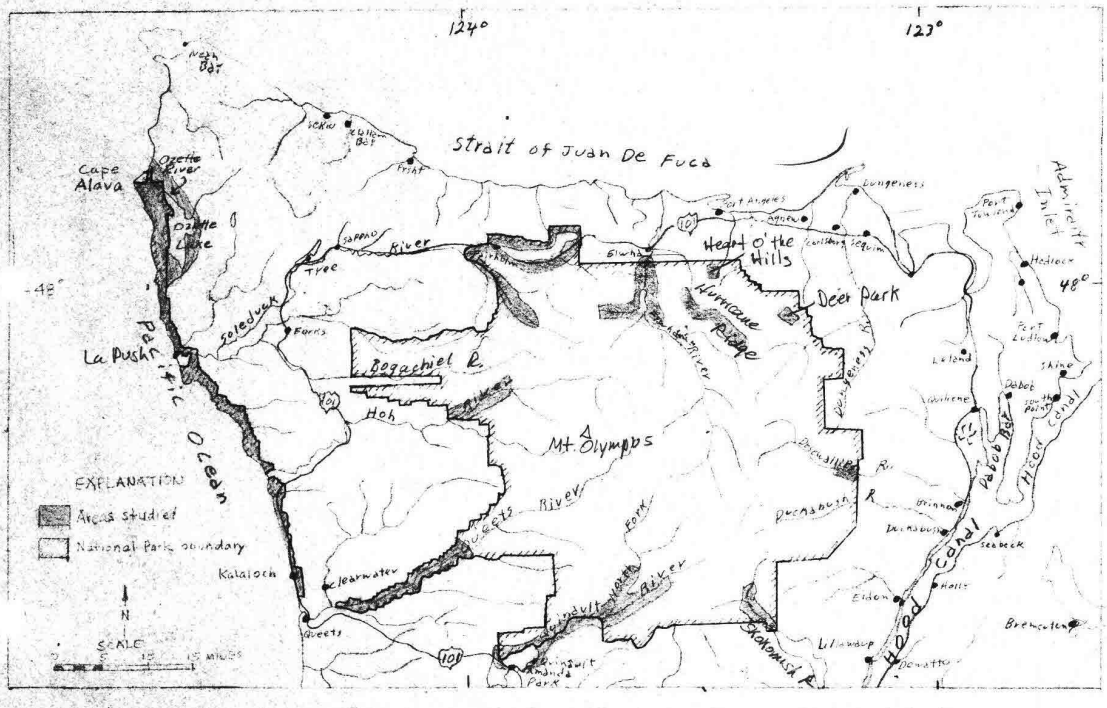
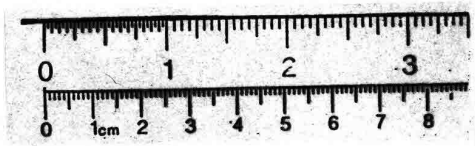


FIGURE 1.-- Areas of water-supply investigations, Olympic National Park.



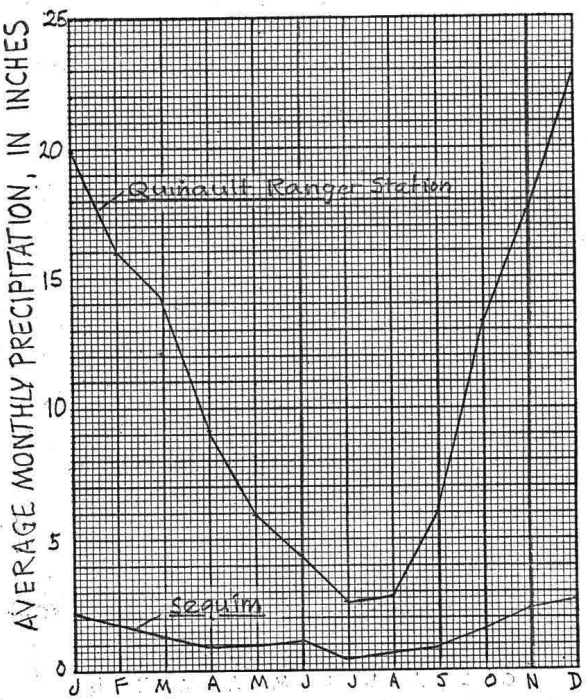


FIGURE 2.--Average monthly precipitation at Quinault Ranger Station and at Sequim, 1931-60. Data from U.S. Weather Bureau.

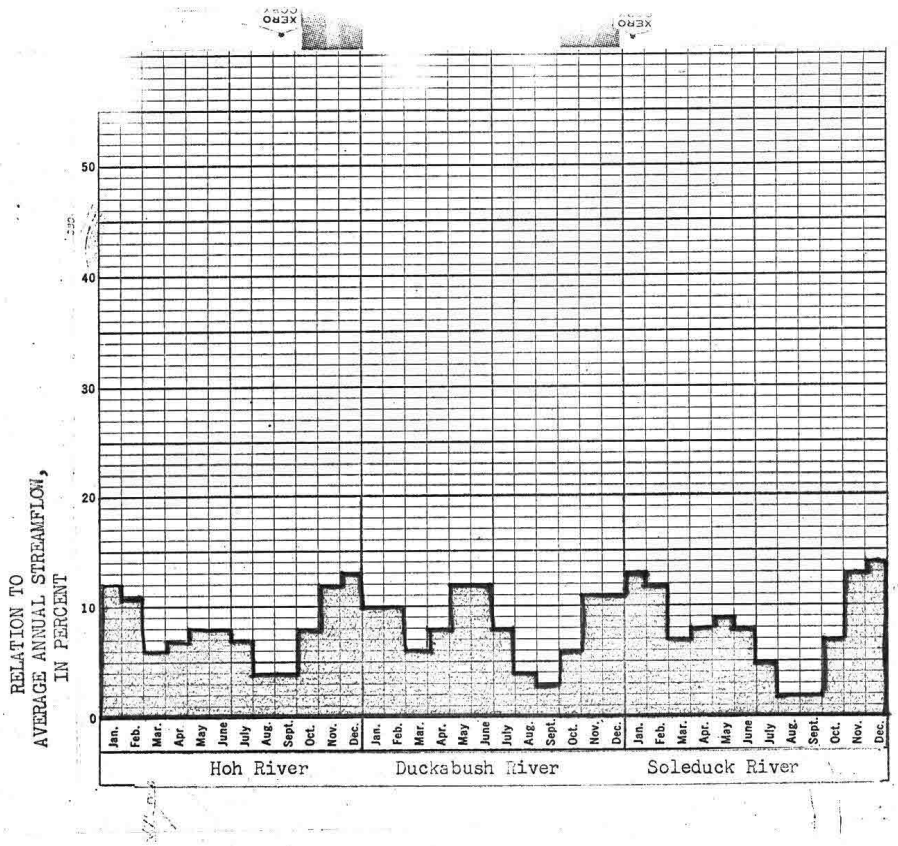


FIGURE 4. -- Average monthly distribution of discharges of Hoh, Duckabush, and Soleduck Rivers, for the period 1951-60.

00-00-0000: figure 3 - potential ground water yields in study areas

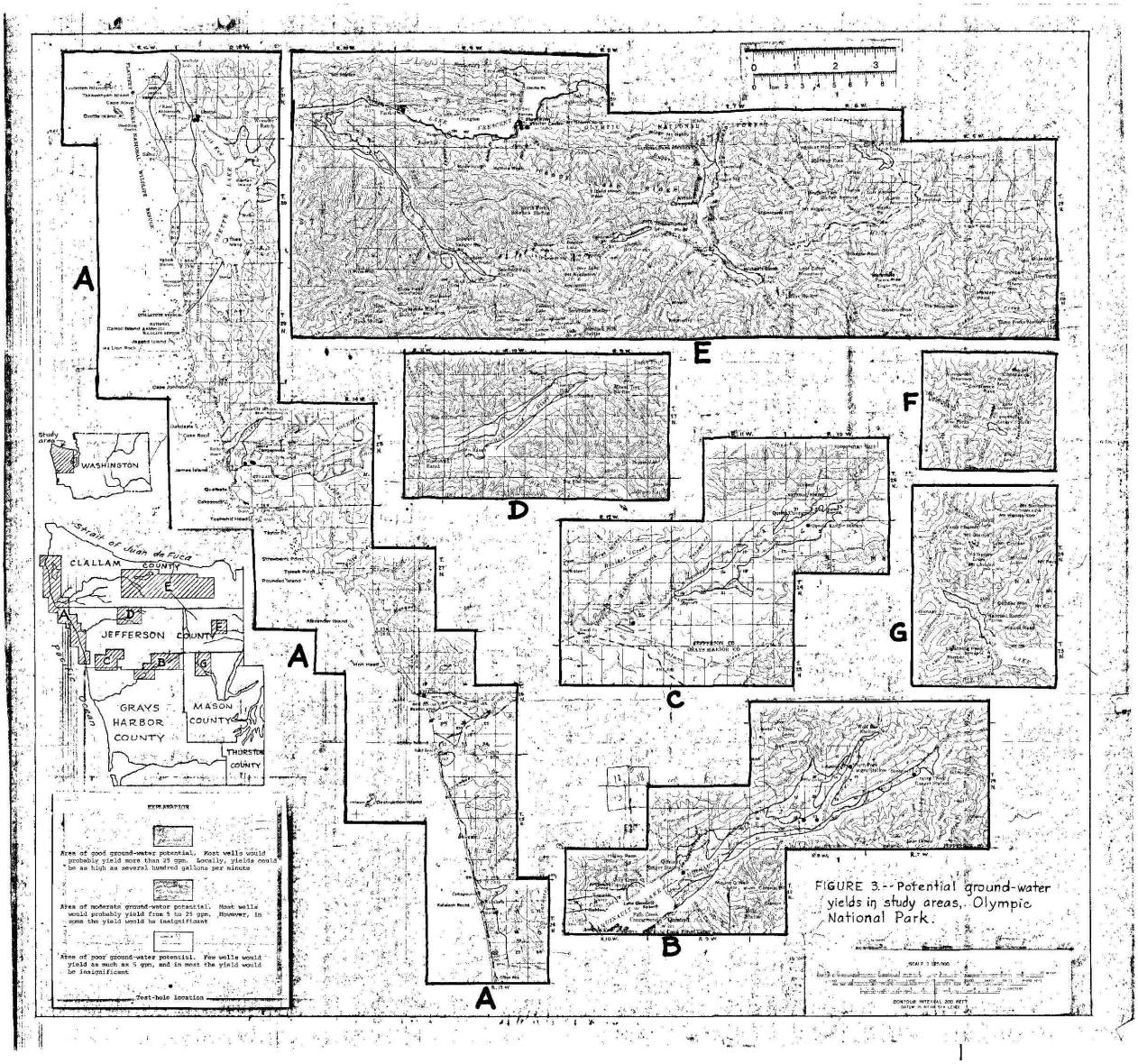


FIGURE 3.--Potential ground-water yields in study areas, Olympic National Park.

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FORM 10-23
(Rev. Oct. 61)

UNITED STATES
DEPARTMENT OF THE INTERIOR
NATIONAL PARK SERVICE

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PLEASE RETURN THIS FILE PROMPTLY TO

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This file constitutes a part of the official records of the National Park Service and should not be separated or papers withdrawn without express authority of the official in charge.

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(Date)

TO: _____
(Date)

GSA DC 65-13795

12-07-1967: memorandum to chief, office of land and water rights, ssc from chief, branch of water resources regarding progress re

OLW 12/11

December 7, 1967

L54-OLW

Memorandum

To: Chief, Office of Land and Water Rights, SSC
Attention: Mr. Fields

From: Chief, Branch of Water Resources

Subject: Progress report - Olympic National Park and Coulee Dam National Recreation Area

This will acknowledge receipt of Mr. Fields' memorandum of November 29, 1967, and the copy of the Geological Survey report.

Although I have not reviewed the report in detail, it appears to be an excellent summary of the progress of the water resources studies at Olympic and Coulee Dam and is very helpful in keeping this Office informed of their status. However, we have not been able to locate the individual reports on Spring Canyon and San Poil Bay at Coulee Dam, which are mentioned. It would be appreciated if copies were sent to this Office for our files.

If, upon more detailed review, other questions or comments seem pertinent, I shall communicate with you further.

(Signed)

E. W. Reed

cc:
Regional Director, Western
Superintendent, Olympic
Superintendent, Coulee Dam
Mr. Reed - OLWW (2)

EWReed:ljc

12-08-1967: received stamp for the washington service center

RECEIVED
DEC 8 2 47 PM '67
NATIONAL PARK SERVICE
WASHINGTON SERVICE
CENTER

11-29-1967: memorandum to chief, division of land and water rights, waso from supervisory hydraulic engineer, ssc regarding pro

W.R. Copy. Read

UNITED STATES
DEPARTMENT OF THE INTERIOR
NATIONAL PARK SERVICE

SAN FRANCISCO PLANNING AND SERVICE CENTER
450 GOLDEN GATE AVENUE, BOX 36025
SAN FRANCISCO, CALIFORNIA 94102

IN REPLY REFER TO:

L54 LWSSC ~~O~~ OLW

November 29, 1967

Memorandum

To: Chief, Division of Land and Water Rights, WASO
Attention: Chief, Branch of Water Resources,

From: Supervisory Hydraulic Engineer, SSC

Subject: Progress Report - Olympic NP and Coulee Dam NRA

Enclosed is a copy of subject report received from U. S. Geological Survey in Washington.

Because of the magnitude of the geological appraisals in these areas, we thought that periodic interim reports would be most helpful in evaluating the over-all projects. This report is not intended for release to the open file but is for informational use only.

William E. Fields
William E. Fields

Enclosure

cc: Reg. Dir., WRO w/enc
Supt., Olympic NP w/enc
Supt., Coulee Dam NRA w/enc

WER

11-02-1967: letter to supervisory hydraulic engineer, western regional office from district chief regarding progress report - olym an

UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY
Water Resources Division
1305 Tacoma Avenue South
Tacoma, Washington 98402

November 2, 1967

Mr. William Fields
Supervisory Hydraulic Engineer
Western Regional Office
National Park Service
450 Golden Gate Avenue
San Francisco, California 94102

Dear Mr. Fields:

Reference is made to your request of September 19, 1967 for a progress report describing our activities to the present time in Olympic National Park and in Coulee Dam National Recreation Area. Progress of work in both areas is described in the enclosed material.

Sincerely yours,

L. B. Laird
District Chief

Enclosures

RECEIVED
San Francisco Planning and Service Center
Office of Land and Water Rights
NATIONAL PARK SERVICE
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SUP. Hyd. Eng.
DOCKET
FILE

OLYMPIC NATIONAL PARK

Table 1 lists the valleys where reconnaissance has been done and it also lists the places within the valleys that have been studied in greater detail. In all, 11 valleys or areas were investigated, as well as 23 places where more detail was desired.

In addition to the geologic reconnaissance of valley areas, 18 test holes were augered or drilled at various places within the Park for a total depth of 1,157 feet. Casing was installed in 8 wells. Details concerning the test-well program are listed in table 2.

COULEE DAM NATIONAL RECREATION AREA

Surface-water investigation

Low-flows were measured in 16 streams and were estimated in several others. Six existing campgrounds were found to have streams whose low flows were adequate for campground use. Samples were collected for sanitary analysis from 22 streams; all tested unsatisfactory. At one campground, a spring could possibly be developed into an adequate supply.

General reconnaissance

Surface exposures of geologic formations have been studied along the entire shoreline of Lake Roosevelt. Along much of the shore the study was brief, of necessity; the study was more detailed in areas adjacent to each developed campground.

Production wells

Supervision was provided for drilling, developing, and test pumping of 4 water-supply wells.

Campground	Yield (gpm)	Drawdown (feet)
Spring Canyon	370	38
San Poil Bay	66	3
Hunters	23	64
Gifford	266	10

Individual reports for each were supplied the National Park Service at the time of well completion.

Test wells

In addition to the production-well program, 20 test wells were augered for an aggregate depth of 1,022 feet to determine the likelihood of adequate yield and to test the character of the materials penetrated. Four-inch casing was installed in 10 of the test holes. Details concerning the test-hole program are listed in table 3.

Table 1.--Areas in which a Reconnaissance of Water Resources have been made, Olympic National Park

Quinault Valley (general appraisal of entire lower valley)

Special consideration

- Pony Flat
- Graves Creek Campground
- North Fork Campground
- Junction of Quinault River and North Fork
- Quinault Ranger Station
- Park entrance on North Shore Road

Queets Valley (general appraisal of entire lower valley)

Special consideration

- Queets Campground
- Queets Ranger Station
- Salmon River valley near park entrance

Pacific Coast Area (general appraisal of entire area)

Special consideration

- Kalaloch
- Ruby Beach
- Mouth of Hoh River
- La Push area
- Cape Alava
- Lake Ozette Ranger Station

Soleduck Valley (general appraisal of entire lower valley)

Special consideration

- Sol Duc Hot Springs

Lake Crescent area (general appraisal of entire shoreline)

Special consideration

- Fairholm
- Barnes Point (Storm King)

Elwha Valley (general appraisal of entire lower valley)

Special consideration

Whiskey Bend
Altaire Campground
Elwha Campground and Ranger Station

Hurricane Ridge (general appraisal of entire summit area)

Special consideration

Heart-of-the Hills Campground

Deer Park (general appraisal of campground area)

Dosewallips Valley (general appraisal of entire lower valley)

Skokomish Valley (general appraisal of entire lower valley)

Table 2

SUMMARY OF TEST DRILLING IN OLYMPIC NATIONAL PARK, WASHINGTON

District or basin	Location	Depth (ft)	Permeable material penetrated	Zone of permeable material (ft below lsd)	Test yield (gpm)	Draw-down (ft)	Water sample collected	Remarks
Quinault	Quinault R.S.	105	Gravel	33-43	33	9.14	yes	Drilled to 105 feet, but only 44 ft of casing installed. Iron content appears to vary greatly with well depth. Adequate yields probably can be developed from wells ranging in depth from 15 to 105 ft or more.
- -do - -	N. Fork R.S.	15	Boulders	5-15	0	--	no	Cased to total depth. Large yields probably can be developed from dug wells 20-30 ft deep. Surface contamination may be a problem.
- -do - -	Junction of N. Fork & Quinault River	23	- -do- -	18-23	0	--	no	Test hole not cased. Located 250 ft west of USGS precipitation gage. Large yields probably can be developed from dug wells 25-35 ft deep.
- -do- -	See remarks	10	- -do- -	5-10	0	--	no	Test hole not cased. Located 0.9 mile west of USGS precip. gage. Large yields probably can be developed from dug wells 20-30 ft deep.

SUMMARY OF TEST DRILLING IN OLYMPIC NATIONAL PARK, WASHINGTON--Con.

District or basin	Location	Depth (ft)	Permeable material penetrated	Zone of permeable material (ft below lsd)	Test yield (gpm)	Draw-down (ft)	Water sample collected	Remarks
Quinault	Graves Creek R.S.	16	Gravel	10-16	0	--	no	Test hole not cased. Large yields probably can be developed from dug wells 25-35 ft deep.
Queets	Queets R.S.	301	None	--	0	--	no	Test hole not cased. Significant ground-water supplies probably cannot be developed in the valley between Sams River and North Creek
- -do- -	See remarks	15	Gravel	12-15	0	--	no	Test hole not cased. Located at horse barn near Salmon River in the SW¼, sec. 26, T. 24 N., R. 11 W. Meager ground-water supplies possibly can be developed from dug wells 20-25 ft deep. Surface contamination may be a problem.
Hoh	Near mouth of Hoh River	30	Gravel	13-30	40	14	yes	Drilled to depth of 30 ft, but only 21 ft of casing installed. Test hole was located near pit toilets because ownership of other areas doubtful. Entire area is swampy and quality of

SUMMARY OF TEST DRILLING IN OLYMPIC NATIONAL PARK, WASHINGTON--Con.

District or basin	Location	Depth (ft)	Permeable material penetrated	Zone of permeable material (ft below lsd)	Test yield (gpm)	Draw-down (ft)	Water sample collected	Remarks
Quillayute	1 mile east of La Push	48	Gravel	18-48	20	17	yes	La Push test hole 1. Drilled to depth of 48 ft, but only 39 ft of casing installed. Large ground-water supplies could be developed from this depth but iron content is high.
- -do- -	- -do- -	28	- -do- -	20-28	42	1.4	yes	La Push test hole 2. Drilled to 28 ft, but only 25 ft of casing installed. Large ground-water supplies could be developed at this dep Iron content low, surface contamination may be a problem.
- -do- -	.2 mile east of La Push	55	- -do- -	13-55	60	1.8	yes	La Push test hole 3. Drilled to 55 ft, but only 37 ft of casing installed. Large ground-water supplies could be developed from this depth but high iron and chloride content would be a problem

SUMMARY OF TEST DRILLING IN OLYMPIC NATIONAL PARK, WASHINGTON--Con.

District or basin	Location	Depth (ft)	Permeable material penetrated	Zone of permeable material (ft below lsd)	Test yield (gpm)	Draw-down (ft)	Water sample collected	Remarks
Ozette	See remarks	78	Quicksand	13-22	0	--	no	Ozette test hole 1. Test hole not cased. On west road shoulder, 20 ft south of Coal Creek bridge. Ground-water supply cannot be developed.
- -do- -	- -do- -	73	Quicksand Gravel?	8-14 14-16	0	--	no	Ozette test hole 2. Test hole not cased. In pasture north of Coal Creek, 30 ft east of Ozette R. Ground-water supply probably cannot be developed.
- -do- -	- -do- -	104	Quicksand	8-38	0	--	no	Test hole not cased. Ozette test hole 3. Near center south side of parking. Ground-water supply cannot be developed.
Crescent Lake	Fairholm	63	Gravel	23-56	37	9.36	yes	Test hole was drilled to 63 ft, but only 44 ft of casing installed. Large supplies of ground water can be developed.
- -do- -	Barnes Point	63	- -do- -	0-63	60	5.40	yes	Located 200 ft s. of NPS boathouse. Drilled to 63 ft, but only 45 ft of casing installed. Large

SUMMARY OF TEST DRILLING IN OLYMPIC NATIONAL PARK, WASHINGTON--Con.

District or basin	Location	Depth (ft)	Permeable material penetrated	Zone of permeable material (ft below lsd)	Test yield (gpm)	Draw-down (ft)	Water sample collected	Remarks
Crescent Lake	Barnes Point	65	Gravel	0-65	0	--	no	Located 500 ft s. of NPS boathouse. Test hole not cased. Large supplies of ground water can be developed.
- -do- -	- -do- -	65	- -do- -	0-65	0	--	no	Located 1,000 ft s. of NPS boathouse. Test hole not cased. Large supplies of ground water can be developed.

Table 3

SUMMARY OF TEST DRILLING IN COULEE DAM NATIONAL RECREATION AREA, WASHINGTON

District	Campground	Total depth (ft)	Cased depth (ft)	Permeable material: Description	Permeable material: (ft below lsd)	Test yield (gpm)	Draw-down (ft)	Water sample collected	Remarks
Coulee Dam	Keller Ferry								
	Test hole 1	27	--	--	--	--	--	--	Auger stopped by large cobbles
	" 2	24	--	--	--	--	--	--	---Do---
	" 3	19.5	--	--	--	--	--	--	---Do---
	" 4	63	55.5	Gravel and sand	15-63	20	0.05	yes	Auger stopped by large cobbles at 63 ft. Casing stopped at 55.5 ft. Drilled well within the area of the test wells could obtain adequate water from greater depth.
Ft. Spokane	Hawk Creek								
	Test hole 1	19	--	--	--	--	--	--	Auger stopped by coarse broken basalt
	" 2	29	--	--	--	--	--	--	---Do---
	" 3	63	43.8	Brkn basalt	33-63	4	21	yes	Auger stopped by coarse broken basalt at 63 ft. Casing stopp at 43.8 ft. Larger yield possibly available from deeper well in surficial material, or probably from basalt bedrock well.
Ft. Spokane	Rogers Bar								
	Test hole 1	88	79.8	Sand, med. to very coarse	60-80	25	12	yes	Clay at 80 ft; probably more than 100 ft thick. Much med. sand when test pumped. For additional test pumping, a 10-slot screen or sand point should be installed on intake pipe opposite the perforations Iron content exceeds recommend limit. Sulfate content, 99 mg (noticeable but not greater than recommended limit)

SUMMARY OF TEST DRILLING IN COULEE DAM NATIONAL RECREATION AREA, WASHINGTON--Con.

District	Campground	Total depth (ft)	Cased depth (ft)	Permeable material		Test yield (gpm)	Draw-down (ft)	Water sample collected	Remarks
				Description	(ft below lsd)				
Ft. Spokane	Rogers Bar Test hole 2	83	55.9	Sand, medium	53-60	7.5	23	yes	Clay at 73 ft probably more than 100 ft thick. Much med. sand produced when test)mped For additional test pumping, a 10-slot screen or sand point should be installed on intake pipe opposite the perforations Iron content exceeds recommend limit.
Kettle Falls	West Bissell Test hole 1	93	73.9	Sand, medium to very coarse	56-76	30	3.29	yes	Water may be available at slightly greater depths. The auger penetrated to a depth of 93 ft, and did not reach underlying clay. Much med. sand produced when test pumped. Fo additional test pumping, a 10-slot screen or sandpoint shoul be installed on intake p) opposite the perforations. Iro content exceeds recommended limit.
	Test hole 2	83	43.8	Sand, very fine to very coarse	28-42	14	9.81	yes	Clay at 78 ft, probably more than 100 ft thick. Deeper well would need to extend belo this clay.
Kettle Falls	Haag Cove Test hole 1	63	44.1	Grvl, sandy; with sand layer	30-62	25	.32	yes	Clay at 62 ft, probably more than 100 ft thick.

SUMMARY OF TEST DRILLING IN COULEE DAM NATIONAL RECREATION AREA, WASHINGTON--Con.

District	Campground	Total depth (ft)	Cased depth (ft)	Permeable material: Description	Permeable material: (ft below lsd)	Test yield (gpm)	Draw-down (ft)	Water sample collected	Remarks
Kettle Falls	Haag Cove Test hole 2	48	--	Gravel, sandy	25-36	--	--	--	Hole not cased. Well at this location would probably be similar to test hole 1.
Kettle Falls	Kettle Falls Test hole 1	83	67.3	Sand and gravel layers	21-83	20	0.37	yes	Auger became too tight to penetrate beyond 83 ft. Casing stopped by crooked hole at 67.3 ft. Permeable material extends an unknown but probably short distance below 83 ft.
	Test hole 2	58	--	Sand, med. to coarse with gravel layers	13-35	--	--	--	Clay and silt at 35 ft, probably more than 100 ft thick
	Test hole 3	38	--	Sand and gravel	16-31	--	--	--	Clay at 31 ft, probably more than 100 ft thick.
	Test hole 4	83	64.4	Gravel, med. to coarse, sandy, some silty layers	44-83	15	13.31	yes	Auger stopped at 83 ft, casing stopped at 64.4 ft. Permeable material extends an unknown but probably short distance below 83 ft.
Kettle Falls	Marcus Island Test hole 1	22	--	--	--	--	--	--	Auger stopped by cobble gravel at 22 ft.

SUMMARY OF TEST DRILLING IN COULEE DAM NATIONAL RECREATION AREA, WASHINGTON--Con.

District	Campground	Total depth (ft)	Cased depth (ft)	Permeable material: Description	Permeable material: (ft below lsd)	Test yield (gpm)	Drawdown (ft)	Water sample collected	Remarks
Kettle Falls	Marcus Island Test hole 2	18	--	--	--	--	--	--	Auger stopped by cobble gravel at 18 ft.
	Test hole 3	18	15.4	Gravel, very coarse and med. sand	8-18	4	293	yes	Auger stopped by cobble gravel at 18 ft. Casing stopped at 15.4 ft. Permeable material extends an unknown depth below 18 ft.

Other Supporting Information

UNITED STATES
DEPARTMENT OF THE INTERIOR
NATIONAL PARK SERVICE
REGION FOUR
SAN FRANCISCO. CALIFORNIA

January 28, 1941.

Memorandum of Transmittal:

The accompanying report on "General Aspects of Olympic Peninsula Water Rights and Their Relation to Olympic National Park" is the result of a one and one-half day visit to that park during the summer of 1940 for the limited purpose of perfecting four existing water right applications. All other data obtained during that visit, or from the water rights files, is purely accidental, but it is of such magnitude and importance that the report seemed essential as a record.

The most surprising discovery to the writer was the vast extent of existing water rights in an area where such rights were reported to be of minor importance. The number of rights and federal precedent of Forest Service filings seem to indicate that the Park Service should perfect all, or most, of its claims in accordance with the State Code. It should also take steps to acquire all of the existing Forest Service rights in the park -- an activity which has been only partially attempted. Legal concurrence and an outline of policy seem needed.

The study also showed that the park water use conflicts with that of private interests in many cases. These conflicts, even if now non-injurious, should be recorded. Data for such records, and their further study, was obtained in some cases after the writer's visit. Individual maps and engineering analyses will be completed later in the year. Meantime the Regional Engineers should be advised to continue the survey of conflicting systems in other areas as they visit the areas for other purposes, or as soon as they have the time. Low Divide, Enchanted Valley, and Soleduck Hot Springs, are three areas in which surveys are needed.

The use of special use permits covering private pipe line rights of way across park lands creates another problem needing immediate attention. These rights of way were described very poorly in the Forest Service permits, and the few which were drawn in more detail seem to be in error. Further, the extent of such rights of way will change with the federal acquisition of additional lands. All should be checked and amended to proper standard before permanent renewal by the Park Service.

Finally, the Forest Service has filed, and in many cases perfected, water rights in excess of present or probable future use. A complete master plan of water demand is needed within the next two years, in order to make such transfers of rights as are desirable to permit the perfection and protection of the full quantities.

Various more important activities have delayed the completion of the report. Hence, conditions may have altered already. Comments of the Superintendent and Park Engineer are requested, together with any additional data which may have been obtained in the interim.

(SGD.) A. VAN V. DUNN

A. van V. Dunn,
Hydraulic Engineer.

cc: Director, with copy of report.
Reg. Director, Reg. IV, with copy of report.
Supt., Olympic National Park, with copy of report.
Reg. Atty. Taylor, with copy of report.

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NATIONAL PARK SERVICE

WATER RIGHTS SECTION, OFFICE OF CHIEF COUNSEL

GENERAL ASPECTS

OF

OLYMPIC PENINSULA WATER RIGHTS

AND THEIR RELATION TO

OLYMPIC NATIONAL PARK

By

A. van V. Dunn
Hydraulic Engineer

601 Sheldon Building,
San Francisco, Calif.,
October 12, 1940.

Introduction

The writer visited Olympic National Park and interviewed the State Supervisor of Hydraulics late in July 1940, for the purpose of arranging for the perfection of four park-owned water rights which had been developed under applications initiated by the Forest Service. The investigations resulted in the perfection of one right and the granting of extension of time in which to perfect the others, and also led to the realization that the general water right problems on the Olympic Peninsula are unique and quite different from previous conceptions held by those in the Water Rights Section. This report is offered as a record of the data obtained and a general appraisal of the major influences which may control park development.

Olympic National Park is the area in which nearly all peninsula water originates, but all water leaves the park before reaching the sea, and has been put to intensive private use in the small strip of

coastal development. The water flows in a number of independent streams and rivers, each with its own individual characteristics and problems. Time was too limited to investigate all, but the ones selected are typical and of major importance to the park.

The State water code was adopted in 1917 and is non-retroactive. Hence water use initiated prior to that date does not come under the jurisdiction of the State Supervisor of Hydraulics. He indicated an interest in the earlier uses, and is trying to tabulate them as data becomes available, but he also advised against any filing of applications on such uses.

The Water Rights Section has further considered deferring water right filings on its more recent systems, at least until the cession of park jurisdiction is accepted by Congress, and the extent of federal jurisdiction fully determined. However, the Park Service has acquired water systems and certificates of water right, which the Forest Service, with far less past jurisdiction, has perfected under the present water code.

Further, the Dungeness River, draining the northeast corner of the park, has been adjudicated, and the Elwha has been extensively developed without adjudication, by power companies and pulp mills which claim large quantities of water priorities both before and after 1917. These vested rights are an important influence on the federal jurisdiction as it may apply to the waters of the park.

The following discussion, and accompanying map, constitute an initial step toward the investigation of the status of water rights at the time of cession. It should be expanded as data becomes available, and the writer will appreciate any information which may be offered for that purpose.

Dungeness River Water Claims

The Dungeness River is an adjudicated stream. The decree, included as Appendix I, was rendered on March 7, 1924, with priorities ranging from 1895 to 1921. At least three administrative rights have been certified or received and rejected by the State Supervisor of Hydraulics since that date.

From Water Supply Bulletin No. 5, of the State Department of Conservation and Development, the river has a recorded maximum flow near Sequim of 5140 second feet as of February 12, 1924, and a minimum of 77 second feet as of September 12, 1928. The record of 1897-1898 and those from June 1923 to September 1930 give the following mean monthly flows:

Monthly	Highest	Average	Lowest
October	379 s.f.	206 s.f.	96.7 s.f.
November	636	314	86.6
December	702	376	186.0
January	609	310	105.0
February	1040	396	106.0
March	306	233	134.0
April	519	312	201.0
May	800	500	307.0
June	978	573	289.0
July	624	393	179.0
August	341	235	134.0
September	223	157	93.8
Annual	452 s.f.	322 s.f.	210.0 s.f.

The decreed rights total 579.56 second feet, or roughly double the available supply of average years except in May and June. The first eight classes of rights, or those with priorities of 1911 and earlier, have a total demand of 223.06 second feet and define the rights to the normal flow.

However, the adjudication and decree seem to cover irrigation rights entirely, though some irrigation districts may supply municipalities under contract and any irrigation right entitles the owner to nominal domestic use at his home. An analysis of the three subsequent filings is interesting:

Application No. 604, by Dungeness Irrigation District

This application was for the diversion of 35 second feet of water at a point in the SE¼ NE¼ of Section 26, T. 30 N., R. 4 W., apparently for irrigation purposes. The Dungeness Irrigation District also has decreed rights for 70.94 second feet with priority of 1911, class No. 8, and for 42.0 second feet with priority of March 1921, class No. 13.

Application No. 604 has been cancelled, but we do not know the reason. It happens that the class 8 right for 70.94 second feet is the last of the decreed rights falling within the normally available supply. The class 13 right was the lowest in the decreed list, and application No. 604 would have become class 14 if perfected. This suggests that cancellation may have been voluntary by the District when it realized how rarely water could be obtained after making the investment in fees and surveys to perfect the right. On the other hand, the application may have been a rejection by the State as its recognition of the full appropriation of the river for irrigation purposes.

Certificate No. 1316 by the Town of Sequim

This certificate is for the diversion of 1.4 second foot of water through the Highland Ditch at a point on the Dungeness River in the SW¼ SW¼ Section 1, T 29 N, R 4 W. The writer did not obtain detailed notes on this right, but it seems to be for municipal use, and to have been granted subsequent to certificate 1168, although use is probably much older.

The justifications for granting this certificate are its preferred status and possible inapplicability of the decree to all but irrigation rights.

Certificate No. 3-1168 by U. S. Forest Service

This certificate is for the diversion of 0.05 second foot of water at a point on an unnamed tributary of the Greywolf River, a tributary of the Dungeness, whence the SE corner of SE¼ SW¼ Section 30, T. 29 N., R. 3 W., bears S. 30 degrees E. 120 feet. This right, with a priority date of April 16, 1937, is for domestic or public campground purposes at the Dungeness Forks Forest Campground, in the SE¼ SW¼, SW¼ SE¼, and NW¼ SE¼ of said Section 30. The system apparently has several branches, as water is returned in both the SE¼ SW¼ and NE¼ SE¼ of that section. The certificate was preceded by permit No. 2518.

This certificate may have been granted because the adjudication was only intended to apply to irrigation, though the decree does not indicate this limitation. Other possible reasons for the perfection of the right are the preferred type of use, small quantity of water involved at a point where its return is again available for the irrigation, and liberal attitude of the State toward federal claims.

The towns of Sequim, Carlsborg, and Dungeness are all potential consumers of water from the Dungeness River, but only the one certificate No. 1316 for municipal use is on record. Those rights which predate the water code of 1917 do not come under the jurisdiction of the State Supervisor of Hydraulics and would not, therefore, be expected to have belated filings and certificates; but it seems a little queer that they do not appear in the adjudicated decrees unless that adjudication did not have jurisdiction over any but irrigation rights, or unless all municipal water was from other sources until Sequim initiated the development resulting in certificate No. 1316. The writer's fragmentary data suggests the need for more study of the status of municipal and domestic rights, but it also suggests certain possible immunity of such use from the over-appropriation for irrigation.

The park files include a copy of a memorandum of February 8, 1939, by Ward H. Ellis of the Forest Service, discussing their plans to change the source and point of diversion of the Dungeness Forks Forest Camp water system covered by certificate No. 3-1168. This memorandum advises that the State will make no charge for the changes, and require no advertising. The records also show an amendment of February 28, 1939, changing the point of diversion from N. 30 degrees W. 120 feet from the SE corner of SE¼ SW¼ of Section 30 to a point 420 feet therefrom in the same direction. It is not clear whether this was the change in source or an independent correction.

By memorandum of May 9, 1940, the Superintendent advised that the Dungeness Forks Forest Camp was in the national park, and that arrangements would be made to have the certificate of water right for its water system conveyed to the National Park Service. The certificates were in the park records in late July, but the writer failed to find any instrument conveying title from Forest to Park Service similar to the one conveying the rights to the Soleduck, Graves Creek, Lapoel and Jackson Guard Systems.

Reference to the map shows that the Dungeness Forks Forest Camp is approximately 6 miles east of the park boundary, according to the writer's records. The Superintendent's memorandum, and the Forest Service release of the certificate and plan to change the source and point of diversion, all indicate that the campground may have been moved since 1938 when the Olympic National Forest map showed its location to agree with the water right.

The 1938 edition of the map of the Olympic National Forest shows several other camps and shelters in the Dungeness drainage between the end of present motor travel and the park boundary. Recent park expansion in the same area, and plans to connect the park road from Obstruction Point to Deer Park, both change the general administrative problem in the vicinity materially. In fact, the Park Service has plans to develop more elaborate public facilities at the site of the present shelter at Deer Park, construct shelter facilities at Moose Lake, and provide a ranger patrol cabin in addition to the Greywolf Shelter now located at the junction of Cameron Creek and the Greywolf River. The park has also acquired jurisdiction over the Three Forks Forest Camp just above the Greywolf Shelter. The water systems to serve all these facilities are in the Greywolf drainage, a tributary of the Dungeness, except that there seems to be some difference of opinion between regional engineers as to whether the spring at Deer Park is in the Greywolf or McDonald Creek drainage. None of these systems, present or proposed, has a water right unless some of the old Forest Service facilities are older than 1917, which is very doubtful.

It seems quite probable that all necessary water rights can be perfected by application and certificate if the recent history of those for Dungeness Forks and the town of Sequim offer a criterion. However, if the Dungeness Forks Forest Camp is to be abandoned and its rights transferred to the Park Service, these rights should be transferred to systems within the park. A thorough analysis should be made of the conditions back of the Forest Service plans to change the point of diversion, its release of the certificate, and the Superintendent's suggestion that the present facilities are now within the park.

The following surveys and investigations are suggested first to determine what rights in the Dungeness Forks system may be available for park purposes, and secondly to provide data for the preparation of applications for transfer or the perfection of new rights as the case may be. The extent of surveys and investigation at Dungeness Forks may be radically reduced, of course, if it is found that it should remain under Forest Service supervision beyond the park boundary.

1. Survey of each of the Park Service water systems, and of the Dungeness Forks Forest Camp water system, or survey from which to design system, including general alignment, profile, pipe diameter, and tie to a section corner.

2. General description of each system, giving type, size, and capacity of headworks and reservoirs.

3. Sufficient stadia shots around limits of proposed area of use to identify it by 40-acre subdivisions on the map which will be prepared.

4. At Deer Park determine positively whether spring is tributary to Dungeness and give sequence of streams by name through which it drains into that river.

5. Determine maximum population which has used each of the existing systems, including Dungeness Forks, type of sanitary facilities and limit to which demand may increase due to restricted area.

6. If source of supply limits development, its flow should be measured.

All of the above surveys may be made by stadia. In the case of the Dungeness Forks system, the first problem is to determine whether it is on Park or Forest land, and further investigation will be dependent on whether it is under park jurisdiction or has an excess of right which may be transferred.

Morse Creek

Morse Creek enters Juan de Fuca Strait between the Dungeness and Elwha Rivers; and like McDonald Creek to its east, might be the drainage from which the Deer Park Water System will derive its water. For this discussion, however, it is of primary interest as one of the sources of supply for the industrial community of Port Angeles.

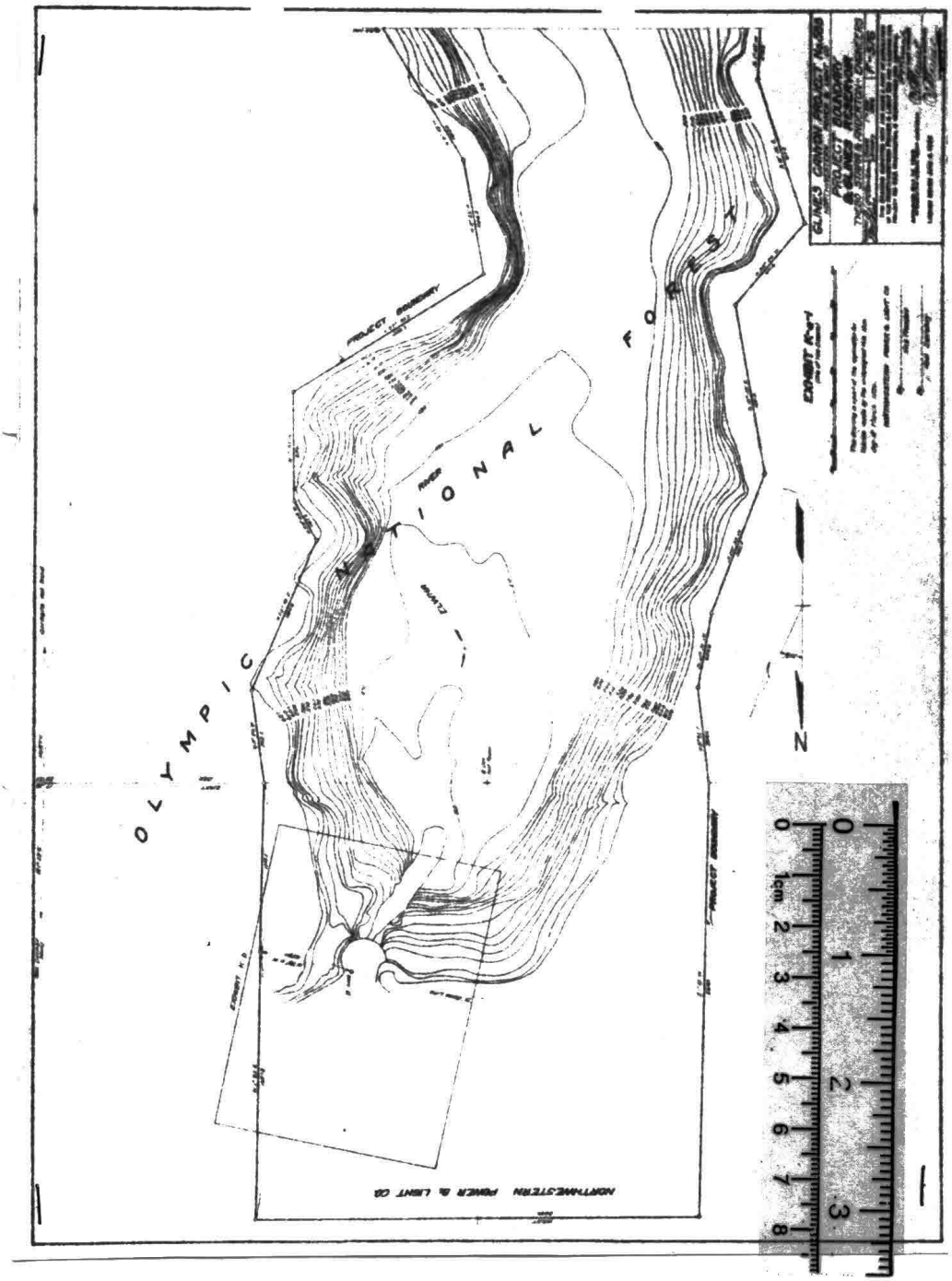
The map shows the following permits by the Supervisor of Hydraulics permitting the City of Port Angeles to divert from Morse Creek:

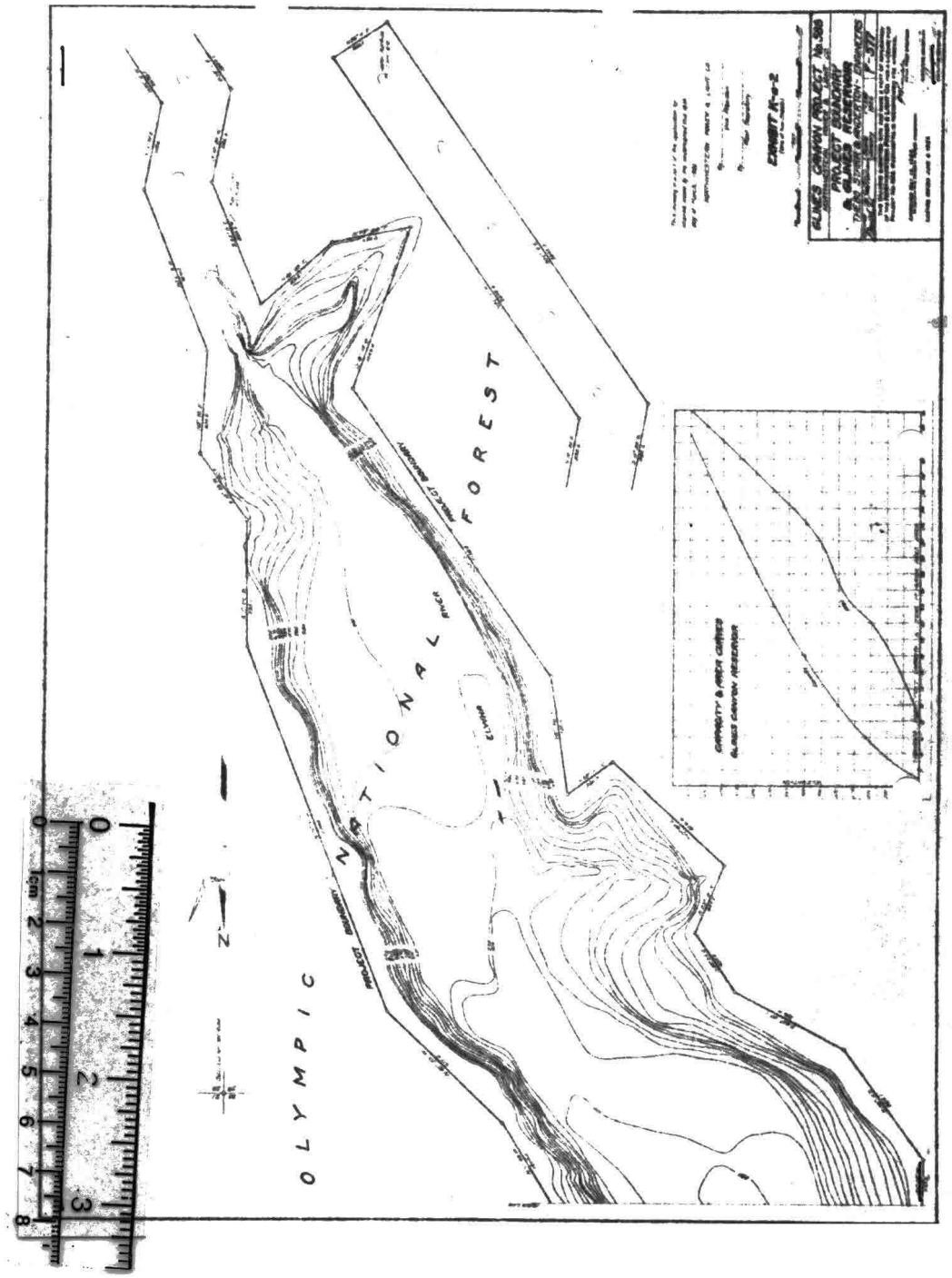
Permit 698 at a point in NW¼	Sec. 5, T.29 N., R.5W.,	15.0 sec.ft.
Permit 1477 at a point in NW¼ NE¼	Sect.5, T.29 N., R.5W.,	20.0 sec.ft.
Total		35.0 sec.ft.

Water upply Bulletin No. 5 does not give the available flow; but from the small drainage area, chiefly north of the park, it cannot be much in excess of the requested diversion. It may supply a less polluted supply with slightly less pipe, but the length of pipe cannot be important when there are also pipes to the Elwha River. The more probable answer is that the town and its industries are appropriating from their various sources of supply in such order that they will have the most reliable all-year supply. By the time all existing applications are perfected the Elwha River, as well as Morse Creek, will have little reliable unappropriated water.

Elwha River

The Elwha River flow is recorded in the Water Supply Bulletin No. 5 for the 19 years 1898-1901 and 1919-1933 with a recorded maximum at McDonald Bridge of 23,800 second feet on November 27, 1901, and no reference to the daily minimum. The mean monthly flows were as follows:


OLYMPIC
NATIONAL
FOREST
EXHIBIT "A"
N
0
1
2
3
cm


OLYMPIC
NATIONAL
FOREST
N
0
1
2
3
cm
0
1
2
3
4
5
6
7
8

Natural River Flow
(Corrected for Glines Reservoir)

Month	Highest	Average	Lowest
October	2770 sec.ft.	1030 sec.ft.	313 sec.ft.
November	4040 " "	1640 " "	292 " "
December	4170 " "	1990 " "	766 " "
January	2820 " "	1720 " "	550 " "
February	3830 " "	1620 " "	416 " "
March	2850 " "	1220 " "	559 " "
April	1930 " "	1220 " "	689 " "
May	2600 " "	1860 " "	962 " "
June	3670 " "	2250 " "	922 " "
July	2810 " "	1550 " "	595 " "
August	1510 " "	867 " "	444 " "
September	1530 " "	660 " "	330 " "

The regulation of the river is determined by the operation of the Glines Hydroelectric Plant of the Northwest Power and Light Company, which has the following recorded water claims:

Certificate No. 610 for 600 sec. ft. of water from the Elwha River at point in Sec. 17, T. 29 N., R. 7 W., for power with priority of March 6, 1925.

Certificate No. 613 for 50,000 Ac. Ft. of storage from the Elwha River in same section for power with priority March 10, 1926.

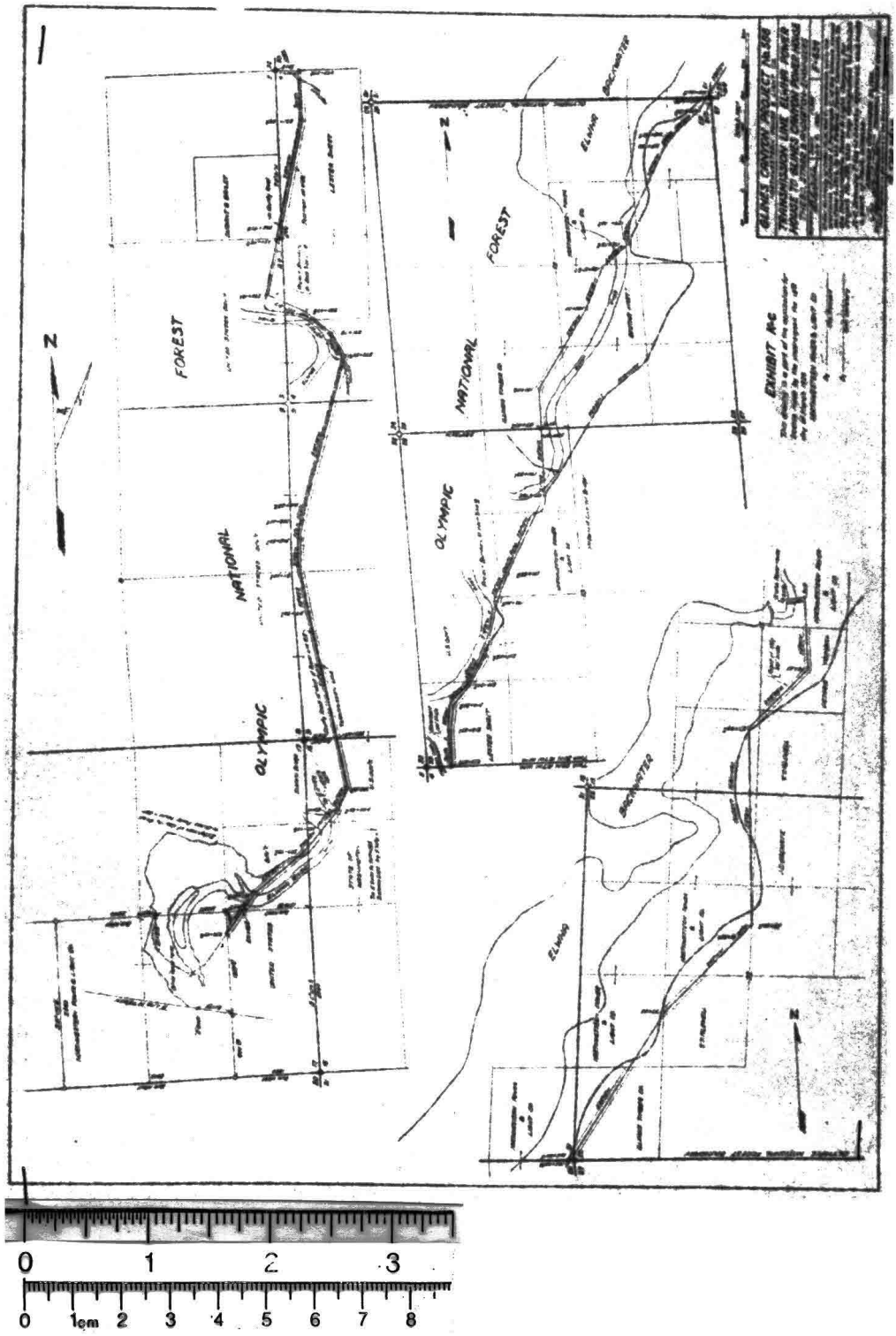
Certificate No. 611 for 200 sec. ft. of water from the Elwha River in same section for power with priority July 1, 1932.

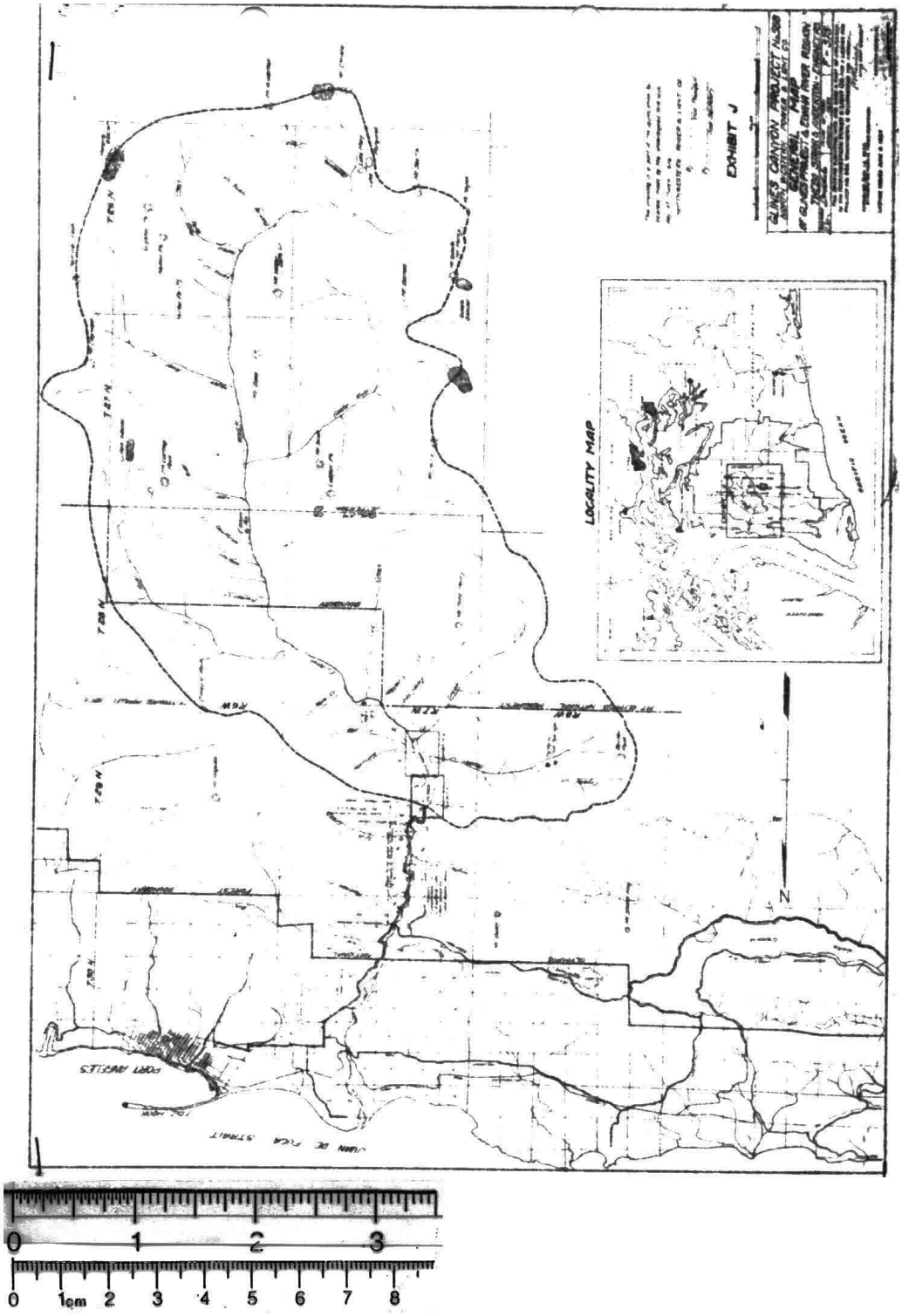
Certificate No. 612 for 15,000 Ac. Ft. of storage from the Elwha River in same section, also with priority of July 1, 1932.

This power plant has been constructed under permit from the Federal Power Commission as Project No. 588. Exhibits K-a, in 2 sheets; K-c; and J of the application are attached; and the following data was copied from the Superintendent's copy of the application:

Application prepared by Philip H. Dater, June 1925.

Approved November 7, 1925; license granted June 4, 1926.


FOREST
NATIONAL
OLYMPIC
FOREST
NATIONAL
OLYMPIC
ELWHA
ELWHA
N
0 1 2 3
0 1cm 2 3 4 5 6 7 8


EXHIBIT J
LOCALITY MAP
N
0 1 2 3
0 1cm 2 3 4 5 6 7 8

The reservoir is known as Lake Mills in Sections 17, 20 and 29, T. 29 N., R. 7 W.

Power house in SW¼ NW¼ SE¼ said Section 17, using 800' penstock.

Transmission line extends along right bank of Elwha River to "existing power plant" in NE¼ Section 15, T. 30 N., R. 7 W.

The capacity curve on Exhibit E-a-2 shows a dam height of 140 feet and capacity of 43,000 acre-feet. The application calls for only 15,000 acre-feet of storage which may be the live storage or draw-down which would give a water surface fluctuation of 35 feet; it may be that the dam was only built to a height of about 70 feet. The gross storage of 43,000 acre-feet is roughly the 50,000 acre-feet granted in Water Right Certificate No. 613 while the live storage of 15,000 acre-feet is exactly covered by Water Right Certificate No. 612.

The application indicates a static head with full reservoir of 165 feet, and an average of 159.1 feet. This suggests that Water Right Certificate No. 612 is for the live storage and Certificate No. 613 is to include dead storage or permanent pondage.

Based on 1923 low flow the plant was designed to operate with a continuous flow of 557 sec. ft. Two earlier and four later years, through 1933, have lower annual run-off with a minimum of about 70% of the 1923 value. With a recorded minimum annual run-off of 683,000 acre-feet in 1926 and an average of 1,060,000 acre-feet, this continuous diversion is only reduced to the extent that storage is inadequate. Water Supply Bulletin No. 5 shows two annual storage losses of 5,460 acre-feet in 1928, and 1,680 acre-feet in 1932. These shortages are total on the river and may not be so great for the particular plant.

The application refers to a power plant existing in 1925. The power house is 3 miles below (north) of McDonald Bridge with a reservoir of 369 acres and capacity of 3500 acre-feet which backs nearly to said bridge. There are 4 units with a total of 12,600 horse power. The operating head is not given, but by comparison with the proposed 15,000 horse power installation for the Glines unit the diversion is probably close to 600 second feet.

This lower plant is known as the Elwha Power Plant and is owned by the Crown Zellerbach Company, which has also acquired the Glines Plant, and operates locally under the name of Washington Pulp and Paper Corporation. The writer has failed to find a water right license for this plant, and assumes that none exists which would indicate a use prior to 1917.

The Park and Regional files also include correspondence regarding the Zellerbach plan to construct a reservoir in Rica Canyon, just above the Lake Mills Reservoir of the Glines Plant. A portion of the site at the proposed dam is owned by the company and the rest is public land and was considered as a corridor in the Park as recently as January 1939, but finally included in the Park.

The reservoir is to flood approximately 525 acres with a dam height of 225 feet, which should provide approximately 50,000 acre-feet of storage. There is no water right application to cover this site in Sections 33 and 34, T. 29 N., R. 7 W.; and Sections 2, 3 and 4, T. 28 N., R. 7 W.; but there is a curious coincidence of capacity in Certificate No. 613 at the Glines site where developed capacity is only that of Certificate No. 612.

The Rica Canyon seems to have been taken into the park with the implied plan to permit the reservoir construction when desirable. Correspondence before this decision refers to the Federal Power Permit No. 588 for the Glines Plant in such a way that it implies that the same permit applied to the Rica Development. The writer did not see the same application of Permit 588, or any other, to this Rica Reservoir and feels that further study of the permit should be made.

The Crown Zellerbach Corporation (Washington Pulp and Paper Corporation) also holds Certificate No. 30 for 20.0 second feet of water from Little River in Section 6, T. 29 N., R. 6 W., for manufacturing with a priority of October 21, 1919. Data at hand does not indicate whether this is non-consumptive use on the South Branch of Little River, or a conflict with lower appropriators by conveyance to mills at Port Angeles.

The town of Port Angeles is the only recorded lower appropriator, as follows:

Permit No. 1397 for 150.0 second feet from the Elwha River from point in SE¼ Section 3, T. 30 N., R. 7 W.

This large appropriation is clearly for industrial use and probably it is the right covering the large wood stave pipe which extends from the town to Ediz Hook along the water front. Much of the use is doubtless by the Crown Zellerbach Corporation which holds the other large rights.

To summarize these water demands there are now licenses for the storage of 18,500 acre-feet a year, and an apparent Park Service obligation to permit an additional storage of 50,000 acre-feet. There are also licenses for direct diversion, but as nonconsumptive the 600 second feet diversion at the Glines Power Plant, and the 20 second feet from Little River will provide all further demand on the river below the Elwha Power Plant. In addition to the Port Angeles Permit No. 1397, these demands, all apparently older than 1917, include water for a State Fish Hatchery at the mouth of the river.

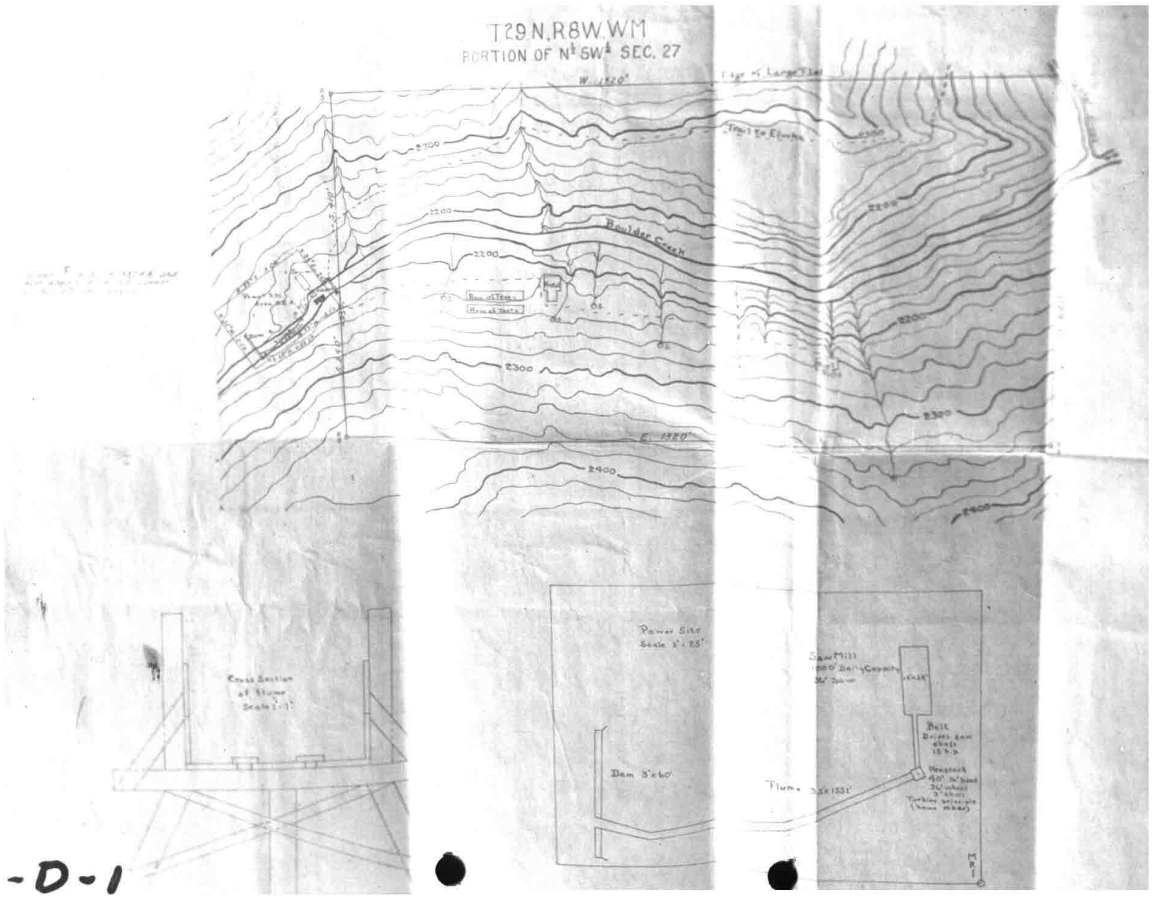
The Park Service has acquired the following water rights, previously perfected by the Forest Service, which cover diversions from tributaries of the Elwha River between the Elwha and Glines Power Plants of the Crown Zellerbach Company:

Certificate 3-1249, Permit No. 2514, Application No. 4380, for the diversion of 0.05 second foot from a small tributary brook at point S. 70° E. 1221 feet from NW corner Section 9, T. 29 N., R. 7 W. for public use at the Elwha Forest Camp in SW¼ SW¼ Section 4, T. 29 N., R. 7 W., with priority of April 16, 1937.

Certificate 2-594, Permit No. 1849, Application No. 3361 for the diversion of 0.02 second foot from Griff Creek, a tributary of the Elwha, at a point No. 60° E. 1500 feet from SW corner Section 9, T. 29 N., R. 7 W., for domestic use at the Elwha Ranger Station in SW¼ SW¼ of said Section 9, with priority of April 22, 1931. This system also serves the Elwha CCC Camp.

Certificate 2-822, Permit No. 2120, Application No. 3938, for the diversion of 1.0 second foot from Griff Creek at a point N. 36°30' W. 1375 feet from S¼ corner Section 9, T. 29 N., R. 7 W., for power and domestic purposes, with return flow in SW¼ SW¼ Section 9, and priority of February 20, 1934. The unit includes a 9 KW generator.

00-00-0000: topographical map of portion of n1/2sw1/2 sec. 27, t29n, r8w



Certificate 3-1252, Permit No. 2527, Application No. 4393, for the diversion of 0.1 second foot from a small brook tributary to the Elwha at a point S. 86°40' W. 1056 feet from NE corner Section 17, T. 29 N., R. 7 W., for public use at Altaire Forest Camp in NE¼ NE¼ of said Section 17, with priority of April 16, 1937. Use limited to May 15 to October 31.

There is reported to be a map of the Elwha Ranger Station water system on file with the State Supervisor of Hydraulics, but none is mentioned in the other permits. A photostatic copy of the filed map is needed for Park Service records, and maps of the others should be prepared, for which surveys are now in progress. As the systems are all close together and near the Glines power plant, all should be tied together for reference, but no conflicts exist.

The park also acquired the Forest Service right covering the Olympic Hot Springs Forest Camp water system as follows:

Certificate 3-1251, Permit No. 2526, Application No. 4392, for the diversion of 0.05 second foot from a small tributary of Boulder Brook, which is tributary to Lake Mills on the Elwha, at a point S. 73°30' W. 1848 feet from Forest Monument No. 8 on 12" Douglas Fir as located by 1928 timber survey, being approximately in Section 27, T. 29 N., R. 8 W., in unsurveyed land, said pipe extending to a point S. 39° 20' E. 507 feet from said Monument No. 8; for public campground use at Olympic Hot Springs Forest Camp from May 15 to October 31 with priority of April 16, 1937.

This campground also seems to include a ranger station and is adjacent to the Olympic Hot Springs Resort. There seems to be no water right filing covering the water system of this resort, but a power filing was made with the Forest Service by Shofell, Everett and Leppert of the Olympic Hot Springs Company, as follows:

Application dated June 1, 1914 and filed with Forest Service July 27, 1915, for final permit under act of February 15, 1901 (31 Stat. 790) by Secretary of Agriculture. (The application included map of which a photograph is attached.) The date being prior to 1917 implies that all water rights of the resort are too old for appropriative filings.

As Exhibit B, the application offers evidence of water right which may be studied when necessary. The area occupied is described as starting from M R of Olympic Ranger Station, near center of I Section 27, T 29 N, R 8 W, thence S 55° W 3 chains, N 35° W 2 chains, N 55° E 3 chains, and thence S 35° E 2 chains to P.O.B. The center of penstock is N 64° 45' W 87 links from said M, said P.O.B. I

also being South 3304.6 feet and West 4060.3 feet from NE corner of Section 27 unsurveyed.

The dam is 60 feet long and 3 feet high, with 40 foot backwater, from which a timber flume 154 feet long conveys the water to a 40-inch penstock. The home-made, turbine type, 36-inch wheel operates under a 16-foot head to generate 15 horse power. The quantity of water involved is not given, but should be at least 11 second feet.

Domestic rights are also probably older than the water code, and may apply to the same point of diversion or another. They are also senior to the Glines Reservoir development, and like the Park Service diversions in this area, are from a stream tributary to that reservoir. If the resort is acquired by the Park Service, its water systems and rights should be fully utilized as the only reliable ones in dry years.

The Forest Service map of 1938 shows the following outpost stations on the Elwha above Lake Mills:

Elkhorn Guard Station.
Hayes River Guard Station.
Hayes River Shelter.

There are no recorded water rights at these areas, and the writer is not even sure that there are pipe lines by which to perfect such water rights. The status of such developments should be determined for record purposes.

In order to complete records of water use and water rights on the Elwha, additional surveys seem desirable. Of most importance to the Park Service are maps of the Olympic Hot Springs area, showing all park and resort systems. This map should also show the ties M between R, Forest Monument No. 8, and the NE corner of Section 27, I

together with description and proof of identity of the corner if it is not a G.L.O. marker. We should also have the hydraulic properties of the resort systems, and date of construction of the domestic line.

In the case of all Park Service rights listed on pages 12 and 13, the surveys are largely for record, and since there are no close conflicts the immediate urgency is not so great except where the Park Service has altered the system. One of the later cases is the Elwha Ranger Station system which has been extended to serve the CCC camp whose filing should be amended to include the new area of use. Drawing Olympic 5453 can be revised to give the needed data with little additional survey.

Crescent Lake and Lyre River

The Lyre River originates in Crescent Lake. The lake is entirely within, and the river is nominally all outside, the park. We have no records of the water claims on the river, but are supposed to have a list of all filings on the portion of the drainage within the park. The town of Piedmont has a population of approximately 50 near the outlet of the lake, and Gettysburg has approximately 25 at the mouth of the river. Both suggest relatively small total diversions from the river.

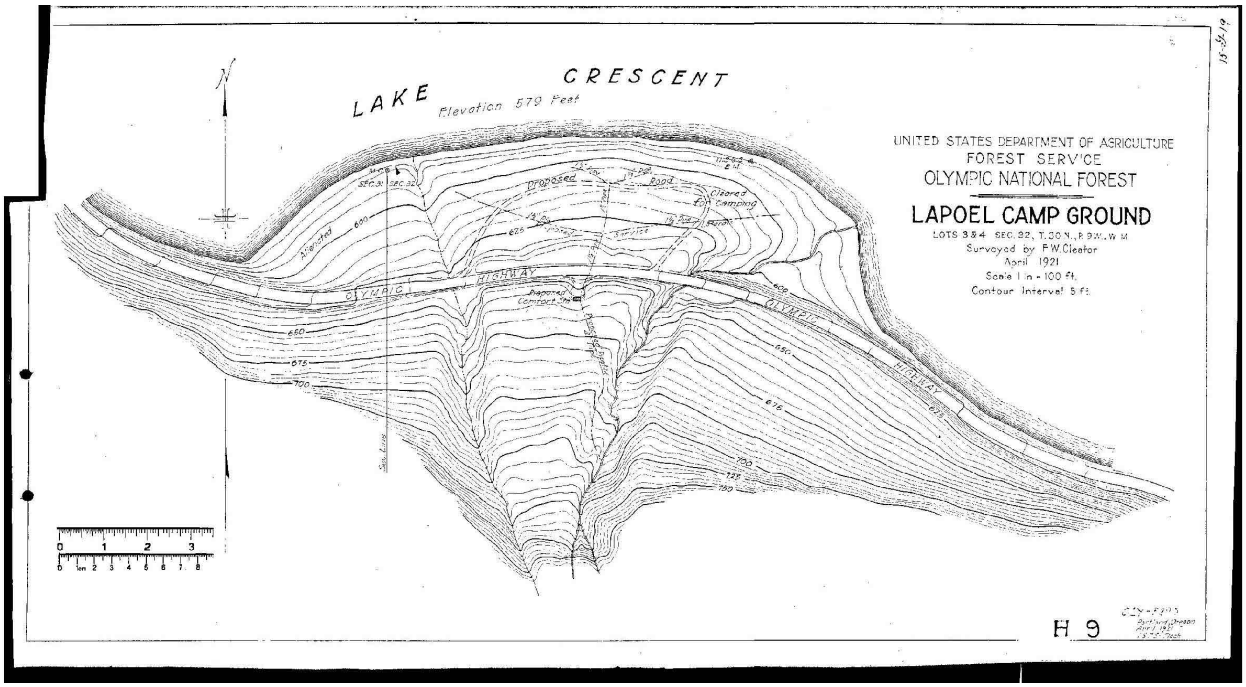
State Water Supply Bulletin No. 5 includes records of the flow of the Lyre River near Piedmont from October 1918 through September 1927 with the following limitations:

Maximum.....1180 sec.ft., Jan. 10 and 11, 1923.
Minimum..... 18 sec.ft., Sept. 19, 1924.
Average monthly maximum,... 430 sec. ft. in January.
Average monthly minimum,... 58.6 sec. ft. in September.
Mean run-off..... 158,000 acre-feet.

The fact that the record was not continued after 1927 suggests that commercial use of the river may have been considered, but later abandoned.

Crscent Lake is very largely bordered by private land which has been developed as home sites and commercial summer resorts. The water rights and claims are probably far in excess of those recorded since 1917. In fact, all water rights for the town of Piedmont are either older than 1917 or for diversions from direct tributaries of the Lyre River outside the park, for which recorded rights have not been tabulated.

04-00-1921: topographic map of lapoel campground



The immediate water right problem on Crescent Lake seems to be chiefly to determine vested rights rather than to evaluate them on the basis of supply and demand, although the one park right is not as strong as it might be. By memorandum of December 14, 1939, the Chief Counsel advised the Regional Attorney of eight former Forest Service permits for pipe line rights of way for which the Director was approving extensions of time until "December 31, 1939", but suggesting that further extensions or renewals be subject to an investigation of the related water right status and possible park uses. By the date of the memorandum it is believed that the approved renewals were to December 31, 1940, instead of 1939.

The Forest Service prepared maps of the Sapolill Forest Camp, in Section 34, and Lapoel Campground, in Section 32, both in T. 30 N., R. 9 W., W. M., during the spring of 1921. The former is designated as R-22, and now filed as OLY-5391 by the Regional Engineer. The latter is designated as H-9 and filed as OLY-5390. The two areas seem to be the only potential places of water use to have been considered by the United States to date.

Sapolill Forest Camp does not seem to have been developed to date, and no use seems to be contemplated by the Park Service. If it should be developed, the water supply would probably come from Smith Creek on which no other filed water rights exist.

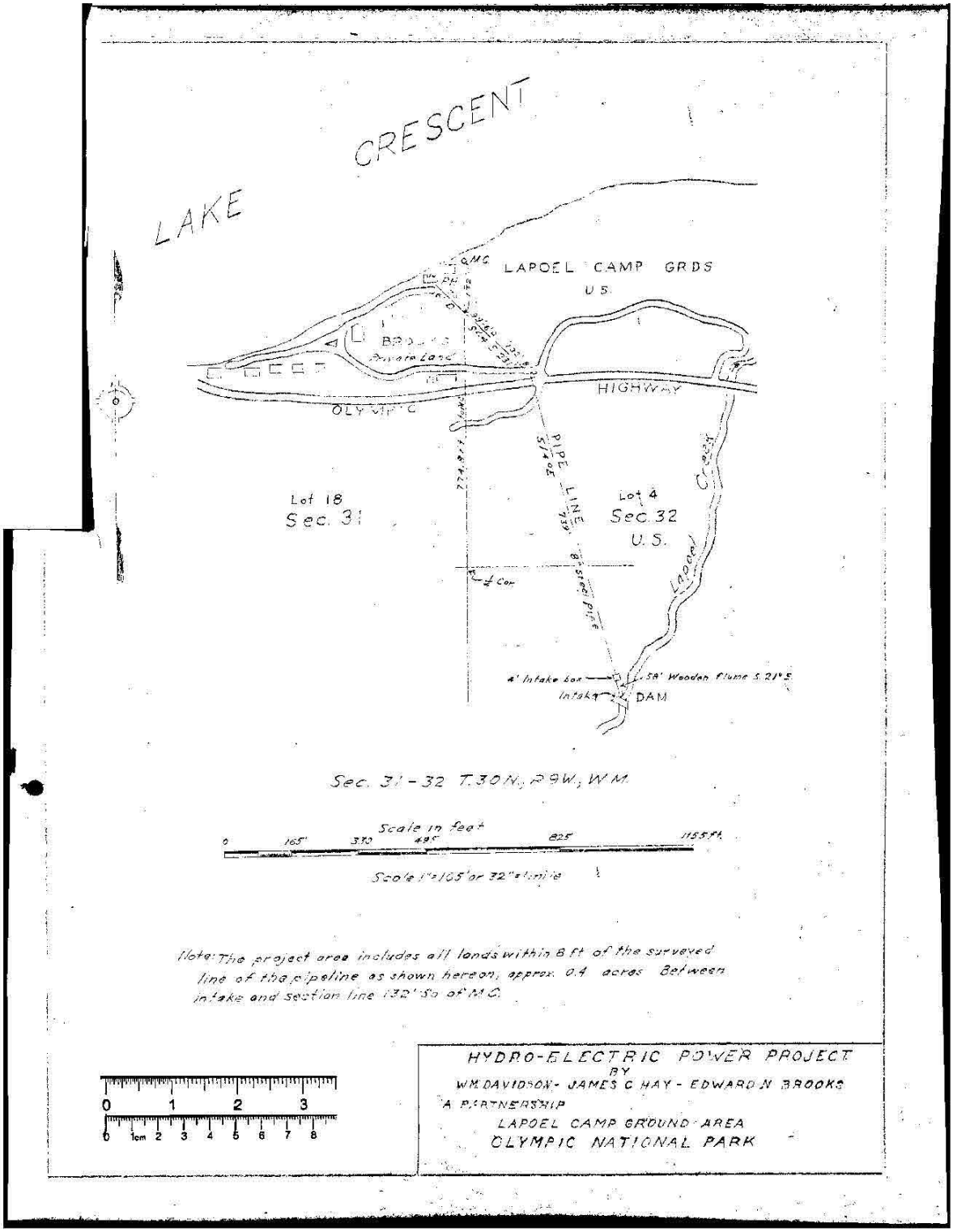
The Lapoel Campground is now the site of all Park Service water use. The attached print of drawing OLY-5390 does not show all latest developments, but is approximately correct. There is a conflicting water use from Lapoel Creek shown on attached map of the Brooks tract in Section 31, now known as the LaPoel Resort.

The two uses are covered by recorded water rights as follows:

Permit No. 1974, Certificate No. 876, by Edward N. Brooks, for 1.0 second foot from LaPoel Creek for domestic and power purposes with diversion in Section 32, and place of use in Section 31, T. 30 N., R. 9 W., W. M., with priority of October 21, 1932.

Application No. 4386, Permit No. 2520, Certificate due Oct. 1, 1943, by the United States of America, for 0.05 sec. ft. from LaPoel Creek at point approximately N. 36° E. 490 ft. from 1/4 corner between Sections 32 and 31, T. 30 N., R. 10 W., W. M., being within Lot 4, Section 32, T. 30 N., R. 9 W., W. M., for public campground supply at LaPoel Campground in said Lot 4, with date of priority of April 16, 1937.

00-00-0000: map of the hydro-electric power project - lapoel campground area



The campground has had a maximum attendance of 175 on July 14, 1940, and now has a caretaker's quarters. The potential water demand to date is thus approximately 5,000 g.p.d. or 0.01 second foot. It is doubtful if proof of full beneficial use of 0.05 second foot can ever be made, but an extension of time to October 1, 1943, has recently been obtained to permit all possible increase in use, or time in which to arrange to transfer part of the right if such is practical.

The conflicting claim of Edward N. Brooks is a perfected right with senior priority and point of diversion above that for the campground system. The attached map of this claim seems to have been prepared as part of an application to the Forest Service (Federal Power Commission) for a hydro-electric permit, and the Regional file No. 201 from Jan. 1, 1939 to Jan. 1, 1940, includes a record that the Federal Power Commission granted License No. 1312 with date of October 6, 1936, for the generation of 20 horse power. The map claims a 16-foot pipe line right of way across Section 32, but no request for its extension under Park Service permit was mentioned in the Chief Counsel's memorandum of December 14, 1939.

The writer seems to recall a verbal suggestion by the Superintendent that the private power diversion might be extended to a higher point to provide extra power to serve the public campground. All these features should be investigated further. Whether further right of way permits are needed or not, the data should be shown on the campground water system map when it is revised to cover recent extensions. Apparently there is usually enough leakage at the Brooks dam to serve Park Service needs, but, with the stream flow varying from near zero to about 2 second feet, an improved dam at a higher elevation might be very disastrous to the park interest. Hence, any renewal of rights of way should be conditional on provision for the Park Service to extend its pipe and divert 0.01-0.02 second foot at the same point with parity of priority with the domestic demands of the LaPoel Resort.

Available data does not permit the plotting of the following list of water rights and rights of way in Section 30, T. 30 N., R. 9 W., W. M., closer than to show that they exist in that oversized, extensively subdivided section. The writer has also failed to find a complete list of the land ownership by name or description from which to determine which rights may be acquired in whole or in part by the United States in the land purchases which have been in progress for the past year or two. It also seems possible that the purchase of private land may have made it desirable to amend the rights of way which are not now adequately described as parcels of land if the Chief Counsel's memorandum is an exact copy of the descriptions in permits.

Certificate No. 896 to E. H. Eckert for the diversion of 0.02 sec. ft. from an unnamed stream in said Section 30 for domestic and irrigation purposes with a priority of August 5, 1932. There is no permit for right of way, and it is not known whether one is needed or not.

Certificate No. 1000 to Mrs. William Lenoir for the diversion of 0.03 second feet from an unnamed tributary of Lake Crescent in said Section 30 for domestic purposes with a priority of May 10, 1934. This also lacks a right of way which it may or may not need.

Certificate No. 23 to Peter Grubb for the diversion of 0.05 second feet from Cedar Point Creek in said Section 30 for domestic purposes with priority of November 7, 1917.

This seems to be covered by the fourth right of way in the Chief Counsel's memorandum as follows: "A right of way beginning in the NW¼ SW¼ NE¼ NE¼, Section 30, T. 30 N., R. 9 W., thence South 1550 ft. to the southern boundary of the SW¼ SW¼ SE¼ NE¼ of said Section 30, where it enters alienated land in Lot 17 of said Section 30." This description could be more definite by using bearings and distances and tying it to section or lot corners. It is also in error, and should be corrected to terminate in Lot 16, or to traverse the NW¼ NE¼ and Lot 15 of said section. The right of way should also be assigned a width.

Right of Way to Board of County Commissioners of Clallam County (fifth in Chief Counsel's memorandum) "for the purpose of maintaining pipe line for the generation of hydro-electric power, irrigation and domestic water supply on land described as follows: A right of way across lots 3 and 4, Section 30, T. 30 N., R. 9 W., W. M., for pipe line purposes from a point on Sanborn Creek in a general southeasterly direction to an intersection with the north line of lot 12 of said section, township and range."

There is no recorded water right, and seems to be no power permit from the Federal Power Commission. This suggests that the use predates both the State Water Code and Federal Power Act, but further investigation seems desirable. Like Mr. Grubb's right of way, a description by traverse and a designated width would be desirable.

The community at Fairholm, at the west end of the lake, seems to have no water rights. This may be due to very old use or inability to identify definitely the rights of Eckert and Lenoir, though neither of these rights is large enough to serve many people even without irrigation.

There are three recorded water users from Ovington Creek, in Section 29, T. 30 N., R. 9 W., W. M. All are mentioned in the Chief Counsel's memorandum regarding rights of way, but there is at least one case in which the right of way does not seem to apply to the recorded water right and some water rights are of questionable status.

Anna E. Ovington claims:

Permit No. 1275 was granted for the diversion of 0.10 sec. ft. from Ovington Creek in Section 29, T. 30 N., R. 9 W., W. M., for domestic and irrigation purposes with priority of August 23, 1928. After 12 years the State Supervisor of Hydraulics advises that he has not even received a notice of beginning of construction.

Right of Way "for purpose of operating a pipe line on land described as follows:

Commencing at the center of Section 29, T. 30 N., R. 9 W., W. M., and running 1200 ft. in a westerly direction to a spring located on the mountainside in the same section, township and range."

If the spring and Ovington Creek diversions are identical, the right of way should be described by the pipe line description from the permit, and a width should be given. Further, from suggestion of the Chief Counsel the right of way renewal might be denied until water right is perfected.

Power application by Anna Ovington, William Davidson and James C. May, filed with Federal Power Commission. Details of this request were not given in Acting Director A. E. Demaray's memorandum of November 7, 1939, to the Regional Director advising that applicants had requested transfer of the application from the Federal Power Commission to the Department of the Interior. Right of way would be granted as part of permit, but the first requirement is to determine what actions have been taken during the past year.

Dr. Harold H. Butler claims:

Permit No.723 for diversion of 0.01 sec. ft. from Ovington Creek in Section 29, T. 30 N., R. 9 W., N. M., for domestic and irrigation purposes with priority of Nov. 12, 1924. Proof of construction made, but no proof of beneficial use.

Certificate No. 225 on Permit No. 969 for diversion of 0.05 sec. ft. from Ovington Creek in said Section 29 for domestic and irrigation purposes with priority of May 6, 1927. Apparently Permit 969 superseded 723 with later priority because of increase in quantity of water.

Right of way "for the purpose of maintaining pipe line for domestic water supply, on land necessary for a pipe line in the SE¼ NE¼, Sec. 29, T. 30 N., R. 9 W., N. M., a distance of 19 chains." This description is not very specific, and should be made to agree with description in one or both of permits.

George Brooks claims:

Certificate No. 64 for the diversion of 1/20 (0.05) sec. ft. from Ovington Creek in Section 29, T. 30 N., R. 9 W., N. M., for domestic purposes with priority of October 23, 1922.

Right of Way "for the purpose of maintaining pipe line for domestic use, on property described as follows: Right of way for pipe line across National Park Service land in Section 29, T. 30 N., R. 9 W., N. M., starting from a point on the north side of the railroad tract (track?) 41 chains and about 38 feet east of the quarter corner between Sections 29 and 30, thence running (?) 23° E 3 chains, thence N 44° E 5 chains, thence N 27° E 2 chains, thence N 40° E 9.80 chains to a point in the creek bed known as Ovington Creek, where a cedar tree

12" in diameter bears the mark U/1 and from which a cedar 30" in diameter bears S 66° W 21 links W/U 1."

This is a more definite description than most except that no width is given, but with mixed units of chains, links and feet, and misspelling and incomplete bearings, it should probably be checked.

The following claim has never been perfected by proof of appropriation, nor by request for renewal of any right of way. It seems quite probable that the development was abandoned.

Permit No. 1102 by R. W. Puryear & Byron Winter for the appropriation of 0.05 sec. ft. from June Creek in Section 27, T. 30 N., R. 9 W., W. M., for domestic, irrigation and power purposes with a priority of May 22, 1929.

There are no recorded rights or requests for right of way renewals for water systems on the lower arm of the lake near Piedmont, or for water systems to serve most of the real estate subdivisions. The lack of water rights is largely explained by the dates of subdivision ranging from 1906 to 1910. These old systems may be entirely on private land, thus needing no special rights of way, but this seems highly improbable. It may be desirable to check with the Forest Service to determine what other rights of way may need renewal, and if possible what water claims it may have on record, as they would be larger than most of the later ones.

The tabulation of claims included one by R. K. Greene which falls on the drainage of the East Twin River and outside of the park, and one by J. H. Dietz on the drainage of the northeast corner of Crescent Lake. It is believed that both should be in Range 8 West, within the park, which could be verified but is not at the moment important.

Certificate 331, Permit 1121 to R. K. Greene for the diversion of 0.02 sec. ft. from an unnamed stream in Section 18, T. 30 N., R. 9 W., W. M., for domestic purposes with priority of June 28, 1927. Should probably be in Range 8 West.

Certificate 643, Permit 1606, to J. H. Dietz for the diversion of 0.005 sec. ft. from an unnamed stream in Section 18, T. 30 N.,R. 8 W., W. M., for domestic purposes with a priority of July 10, 1930.

Neither claim is covered by request for pipe line right of way from the Park Service, and both involve unimportant quantities of water. If no rights of way are needed, they are of interest to the Park Service only as the owners' land may be purchased, in which case the water rights should be included.

There are three recorded water rights and two requests for pipe line rights of way in the vicinity of Barnes Cove in Section 35, T. 30 N., R. 9 W., and only one water right and right of way can be identified as covering the same system. There are also real estate subdivisions which were started in 1924 and 1926, a fish hatchery, and an old Forest Service guard station. Although all water use may be covered by adequate rights and rights of way, the following list suggests a need for more investigation:

Rosemary Inn Water System:

Certificate No. 806, Permit No. 1220, to Rose E. Littleton, owner, for the diversion of 0.20 sec. ft. from Barnes Creek in said Section 35, for domestic and irrigation purposes with priority of September 20, 1928.

Right of way to Rosemary Inn, Star Route, Port Angeles, "for the purpose of maintaining a pipe line on land described as follows: From a point N. 15°53' E. 2035.22 ft. from the corner to Sections 25, 26, 35, and 36, T. 30 N., R. 9 W., W. M., S. 16°48' E. 804.20 ft.; thence S. 23°58' E. 1248.03 ft. to a point approximately 20 chains west of corner to Sections 25, 26, 35, and 36, T. 30 N., R. 9 W., W. M., a distance of 2088.23 ft." This description is in error, apparently having all bearings 180 degrees off, and should be checked and corrected before the right of way is renewed again, and also tied to water right description.

Lake Crescent Tavern Water System:

Right of Way (Frank E. Maltby is manager, but agent requesting renewal was not given), "for the purpose of maintaining a pipe line to supply water for domestic purposes and fire protection. Length of R/W 150 feet, land to be used described as Storm King Ranger Station in Section 35, T. 30 N., R. 9 W., W. M."

This is Bruce property (Seattle Trust ...)

Either of the water rights, to follow, might apply to the same system, but it is also possible that no recorded right exists because of the age of the system. The description is very indefinite and suggests a possible relation between the Tavern water claims, and those of a ranger station now probably owned by the Park Service.

Possible water rights for real estate subdivisions:

Certificate No. 381, Permit 730, to Harvey G. LaGear for the diversion of 0.1 sec. ft. from unnamed stream in said Section 35 for domestic purposes with priority of April 16, 1925.

Certificate No. 820, Permit 1159, to Sarah McAllyde for the diversion of 0.15 sec. ft. from unnamed stream in said Section 35 for domestic purposes at a campground with a priority of June 26, 1928.

These two rights are practically contemporary with the following subdivisions for which they may have been perfected:

1. Barnes Cove in Section 35, recorded October 10, 1924.

2. Point Pleasant in Section 26, recorded January 11, 1924.

3. Villa Point in Section 35, recorded April 12, 1926.

There are not water right filings for the following:

Storm King Ranger Station.
Fish Hatchery.

If water use started before 1917 no filings are needed, but the Park Service is interested in a record of the ranger station use if it has been acquired by the park. It may also be interested in renewing or recording a pipe line right of way for either or both systems, but more should first be known of the ownership of the fish hatchery.

Historical Notes Influencing Status of
Old Rights and Rights of Way

It has already been stated that water rights initiated prior to 1917 by construction and use are recognized without further recording. The State Supervisor of Hydraulics does not have jurisdiction over them, but he is gradually listing them for reference, particularly those larger ones for power.

A clue to the priority of some of the early domestic and irrigation rights may be obtained by reference to the filing for power for the same system. In this connection, referring to the bottom of page 13, power filings with the United States have been required since at least as early as February 15, 1901.

The Olympic National Forest was established on February 22, 1897. Mt. Olympus National Monument was created out of a part of the Forest in 1909, and converted to Olympic National Park in 1938. The additional portions of the Forest are being taken into the park at this time as part of an expansion program which started when the park was created.

The Federal Power Commission was established on June 10, 1920; at first composed of the Secretaries of War, Agriculture, and Interior with a secretary, but later changed to a five-man Commission. Prior to 1920 the Forest Service had full jurisdiction over power development within Olympic National Forest; there was no development in the National Monument; and thereafter the Federal Power Commission accepted the permits previously granted by the Forest Service.

The Forest Service seems to have been fairly successful in placing even small power plants under federal permit on the Olympic Peninsula, but according to Mr. E. W. Kramer, Regional Director of the Federal Power Commission, there are examples in nearly every area of small systems which have been overlooked. He does not know whether there are power developments without permit in the original area of Olympic National Forest, but if so he would class them as trespassers except where the same water system might also provide irrigation and have some claims under the irrigation law of 1898.

On the basis of this discussion, water rights in the area of the expanding National Park can be classified as follows:

1. All rights initiated under the provisions of the Water Code since 1917 are good when perfected to the status of certificate. (This does not establish the status of applications of 1928 which show lack of diligence if proof of construction and use have not been filed to date.)

2. Domestic and irrigation systems to serve areas where power is also developed by the same or another system, have reasonably evident rights in good standing without being recorded in the State if the power development was made under federal permit between 1901 and 1917.

3. Domestic systems also have claims for a full right when serving an area also served by an unlicensed power development constructed between 1898 and 1920 if the power diversion also provides bona fide irrigation of the same early date.

4. Water systems which include power generation which can be classed as trespass may have good standing so far as uses other than power are concerned, but by evidence of bad faith may be protested. ?

This evaluation makes it highly desirable that the status of power developments be thoroughly investigated wherever it involves the use of park land. The Park Service renewal of rights of way for such developments should be issued with care. [illegible] ?

Soleduck River

Only the headwaters of the Soleduck River are now within the park, and no attempt has been made to evaluate water use on the forty or fifty miles between the boundary and its confluence with the Quillayute River near the Pacific Ocean. From Bulletin No. 5 it has a flow of approximately 700 second feet at Snyder Ranger Station, about 7 miles below the park; and 1200 second feet near its mouth. Practically all flow in excess of 600 second feet is derived from sources outside the park.

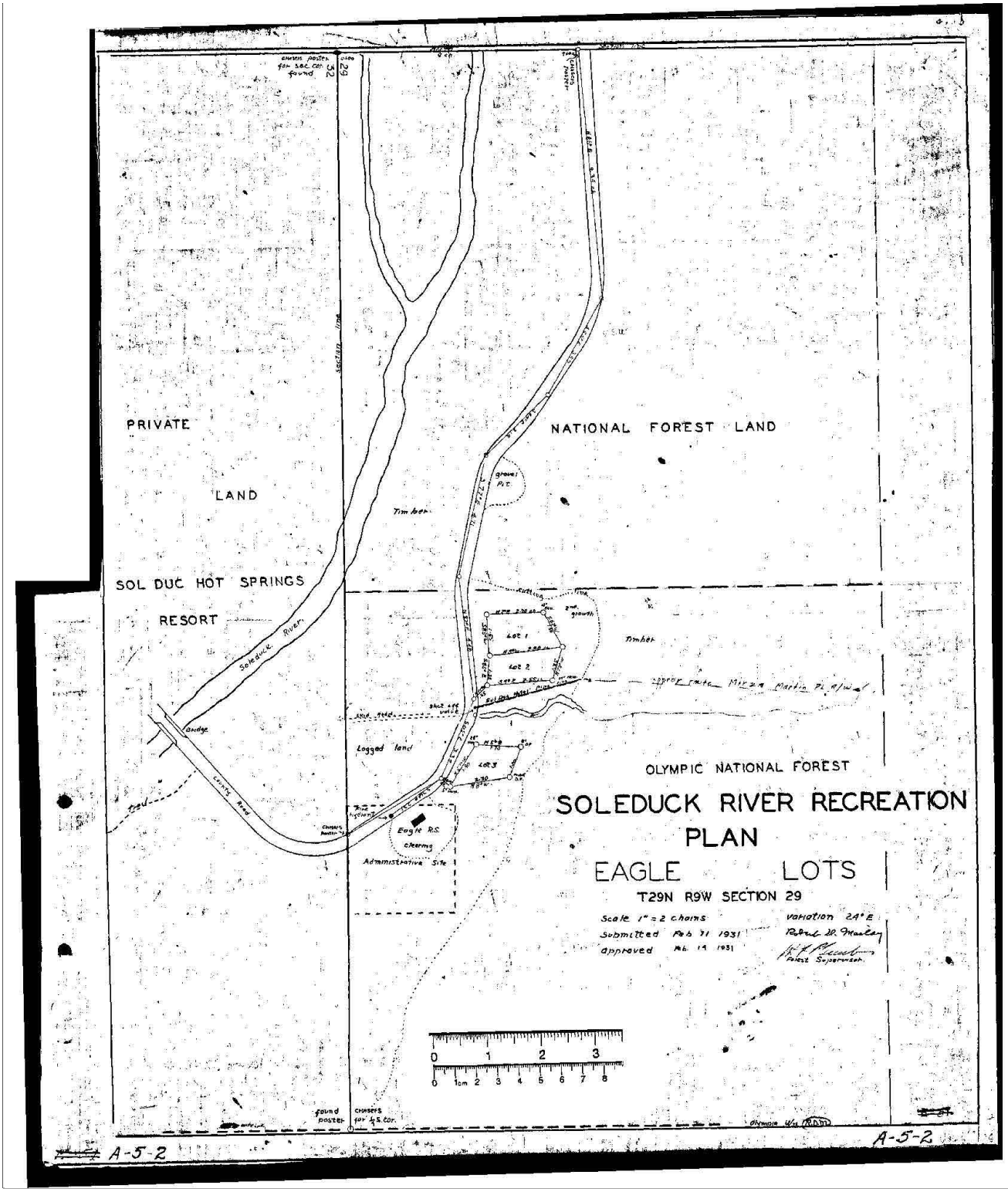
The stream is a potential supply for the towns of Quillayute and La Push, and Quillayute Indian Reservation, all near its mouth. However, the State Supervisor of Hydraulics has advised that there is not any water problem and little chance that one will develop.

The only recorded water right within the park was initiated by the U. S. Forest Service and conveyed to the National Park Service before completion, as follows:

Application No. 2523, for 0.01 sec. ft. of water from an unnamed tributary of the Soleduck River at a point N 77° E 760 feet from the SW corner of NW¼ NE¼ Section 32, T. 29 N., R. 9 W., W. M., for public campground use at Soleduck Hot Springs with priority of April 16, 1937.

Final proof of application of water to beneficial use was made in September 1940, and the Park Service is now awaiting the issuance of a license.

02-19-1931: map of the soleduck river recreation plan - eagle lots



The Chief Counsel's memorandum of December 14, 1939, lists the following application for renewal of old Forest Service right of way permit for a water system:

> Right of way to Mirz A. Martin, Port Angeles, for the purpose of maintaining pipe line on land described as follows: From a point on the north side of SE¼ SW¼ of Section 29, T. 29 N., R. 9 W., W. M., to the Soleduck Hot Springs Hotel to follow along the wagon road for 300 feet, through logged off lands for 700 feet, and 500 feet through heavy timber: Total distance 1200 feet.

This right of way is quite meaningless, but its intent can be determined by reference to attached Forest Service drawing A-5-2. The distances are evidently from the hotel to north side of SE¼ SW¼, Section 29, running from point on south line of Section 29 approximately 1000 feet west of S¼ corner, thence northerly 300 feet along what was a skid road when map was made in 1931, thence northerly 700 feet across the clearing (enlarged since 1931) allocated to summer home sites; and thence northerly 500 feet through heavy timber to a point on the west bank of a nameless stream which flows down through said clearing. A much more specific description could be made at little cost, and is recommended before the right of way is granted permanently by the Park Service.

The writer has found no recorded water right or power permit. Further investigation is needed to determine whether the domestic use predates the water code, and whether either the Federal Power Commission or the Forest Service has issued a power permit.

The lots in the Soleduck River Recreation Area, shown on Forest Service map A-5-2 are probably under lease as summer home sites. The Eagle Ranger Station is now a Park Service administration area. Both may be on the same Park Service water system or obtain water from the hotel line under agreement. Some lessees may even have individual diversions from the stream or springs. All these water uses lack water rights which should be in the name of the United States. There are potential conflicts with the hotel rights, and it is quite probable that the Park Service diversions are below that of the hotel and of questionable reliability. All systems, including that of the hotel, should be mapped at the first opportunity.

The base map also shows 5 shelters in the drainage above the Hot Springs, and on the North Fork of the River. If these shelters are served by pipe lines or other constructed systems, these should be surveyed and be covered by water rights.

Hoh River

The Hoh River, like the Soleduck, drains a large area below the park boundary and the extent of water use by the town of Hoh, and Hoh Indian Reservation, have not been determined. Half of the river is within the park, and Water Supply Bulletin No. 5 indicates an average flow of over 1000 sec. ft. near Spruce, just below the park. A seven year record included a maximum of 22,800 sec. ft. and a minimum of 247 sec. ft.

There is a great deal of patented land along the river within the park for a distance of approximately 12 miles, but no records of private water claims have been found. It seems probable that most of the water use is vested in rights initiated prior to the enactment of the water code, as the homestead entries are all shown on township plats of 1919 resurvey, just a few years after the code was adopted. Thus, a study of water rights on the river would require extensive surveys.

The most immediate problem is to be sure to cover water rights adequately in any deed to such private land as the Park Service may purchase. When such land and appurtenant water systems are acquired, the water systems should be surveyed, their dates of construction noted, and data on place and quantity of use recorded. When new park development is made, or an area is "restored to nature," the water system should be maintained until a new one can be built to maintain the valuable priority.

The Park Service acquired one recorded water right from the Forest Service, as follows:

> Application No. 4385, Permit No. 2519, to the United States of America for 0.05 sec. ft. of water from an unnamed tributary of Taft Creek at a point S. 23° E 1120 feet from the N¼ corner of Section 12, T. 27 N., R. 10 W., W. M., for domestic purposes at Jackson Guard Station with priority of April 16, 1937.

The Park Service obtained an extension of time to October 1, 1943, in which to prove full beneficial use of the water, on request in August 1940. Present use is only 0.001-0.002 second foot, and it will require the development of an extensive campground or resort area to perfect the right to the full claim of 32,000 gallons per day. As an alternate, part of the right can be transferred to another water system in the Hoh River drainage.

It is urgently recommended that a study of park water needs on the Hoh River be made during 1941 and 1942 in order that the Water Rights Section may arrange for possible transfer of rights or determine its procedure when proof of beneficial use is again needed in 1943. Two shelters near the park boundary, the Olympus Ranger Station and various other shelters above, offer potential recipients for such transfers.

Queets River and Corridor

The Queets River is now approximately half in the park, and half outside, but the pending project to acquire the Queets Corridor will bring most of it within the park. The same project will bring in the mouths of the Hoh, Quillayute, Soleduck, and Ozette Lake. There are no recorded water rights within the park, and the five shelters in the area are probably without constructed water systems. For these reasons, the whole water problem of the Queets River, Corridor and Coastal Strip are left for a separate report, giving only a few general comments here.

Bulletin No. 5 gives only a three year record of flow two miles above the mouth, with a maximum of 70,000 and a minimum of 420 second feet. The township plats show the river to have been meandered, placing property lines at high water level. Surveys as old as 1896 show extensive entry by homesteaders below the present park boundary, which implies a potentially large number of water rights older than the water code which will not be recorded with the State Supervisor of Hydraulics. The river has also been studied as a source for power and at least two dam sites have been reported favorably, although their potential value is greatly reduced by the market saturation by the Bonneville and Grand Coulee projects.

The coast strip is largely a recreational area, but includes Indian reservations and a coast guard station. The following list gives some idea of the limited water demand other than on Indian reservations:

U. S. Coast Guard located on corner of Indian reservation has approximately 25 employees.

Washburn's Camp at LaPush has about 25 cabins, derives its water from surplus capacity of coast guard pipe line.

Ruby Beach Resort has about 10 cabins and derives its water from neighboring creek.

Becker's at Kalaloch has about 20 cabins and a well for water supply.

Mora Park has 10 cabins and little use, and a well supply.

Rialto Beach has 14 cabins, little use, and derives its water from springs. Six of the cabins are on land leased from the State, which may place them under federal title on completion of the park extension.

There are other small resorts and private homes, but if these are the major developments in so large an area, they indicate a low water demand with their particular needs not over a total of 0.1 second foot.

Throughout the extension, land purchases should include water rights, and these rights should be exercised until new uses are found for them. At the same time, there is a unique feature with regard to diversions in the coast strip in that many of them are the lowest possible on the streams. Water right filings will be of value only where they are on main streams originating in the park proper, or in the area between the park and the coast strip.

Quinault River

The Quinault River originates near the southeast corner of the park, traverses the south central portion, bounds the southwest edge, and then flows for nearly 30 miles through the Quinault Indian Reservation to the sea. Quinault Lake is a natural portion of the main river along part of the park boundary.

Water Supply Bulletin No. 5 includes records of the flow at the outlet of Quinault Lake, nominally the flow of the river at the park boundary, from 1912 to 1933 with the following values:

Maximum.....37,000 second feet.....Dec. 13, 1921.
Minimum..... 285 second feet.....Sept. 20, 1924.
Annual Mean.... 2,670 second feet.
Annual Mean
Run-off.1,940,000 acre feet.

Lake Quinault, like the river below, seems to be in the Indian reservation; but the shore, particularly on the north within the park, has been patented and extensively subdivided as homesites. There are also several private holdings along the river above the lake, but they terminate at a meander along the highwater line.

Investigations covered by this report did not determine the extent of water use on the Indian reservation, nor determine the unrecorded rights with priorities older than the water code. Recorded private rights are quite numerous, but small in proportion to the flow, as follows:

Certificate No. 415, to Karl M. Hanson, for 0.05 sec. ft. from Dawdy Creek (tributary to Quinault Lake), in Section 8, T. 23 N., R. 9 W., W. M., for domestic purposes with priority of June 17, 1929.

Certificate No. 531, to Marie Cagley, for 0.01 sec. ft. from nameless tributary of Quinault Lake in Section 8, T. 23 N., R. 9 W., W. M., for domestic purposes with priority of April 2, 1929.

Certificate No. 532, to Fred W. Thurber, for 0.01 sec. ft. from nameless tributary of Quinault Lake in Section 8, T. 23 N., R. 9 W., W. M., for domestic purposes with priority of May 9, 1928.

Certificate No. 917, to Thomas Kilkelly for 0.01 sec. ft. from unnamed tributary of Quinault Lake in Section 8, T. 23 N., R. 9 W., W. M., for domestic purposes with priority of May 15, 1934.

Permit No. 1297, to R. L. Higley for 0.53 sec. ft. from Cogan Creek (tributary to Quinault Lake) in Section 8, T. 23 N., R. 9 W., W. M., for power purposes with priority of January 15, 1929. The certificate had not been issued by February 1940, and the status of a Federal Power Commission permit has not been determined, but it seems quite probable that perfection of the right is dependent on increased power demand as more land is developed.

Section 8, in which the five preceding rights are located, is less than half a square mile in extent along the north side of Quinault Lake. At least half of it has been developed as Higley's Subdivision. The map shows three small streams crossing it and emptying into the lake. All of these conditions suggest closely related community interest; but without more description of the points of diversion and the names of the streams it is not possible to determine their full scope. They will not concern the Park Service until the land is acquired.

There are no records of private water rights in Section 7, the next to the west, but it does include the July Creek Forest Camp which was conveyed from the Forest Service to the Park Service when the park was enlarged. The water system for this camp is covered by the following perfected water right whose record of ownership should be amended:

Application No. 4383, Permit No. 2517, Certificate 3-1167, all in name of the Department of Agriculture, Forest Service, for the appropriation of 0.05 sec. ft. of water from July Creek, tributary to Quinsult Lake at point S. 46° W. 1485 feet from N¼ Section 7, T. 23 N., R. 9 W., W. M., for public use at said Forest Camp in Lot 3 of said section, with priority of April 16, 1937.

Section 13, T. 23 N., R. 10 W., W. M., the next section to the west, has been largely developed as the Viewpoint Subdivision. There are three recorded water claims as follows:

Certificate No. 485 to O. L. Higley for 0.15 sec. ft. from Orlo Creek in said section for domestic purposes with priority of December 21, 1926.

Certificate No. 1067 to Howard O. Elder for 0.01 sec. ft. from an unnamed stream tributary to Quinsult Lake in said section for domestic purposes with priority of August 12, 1937.

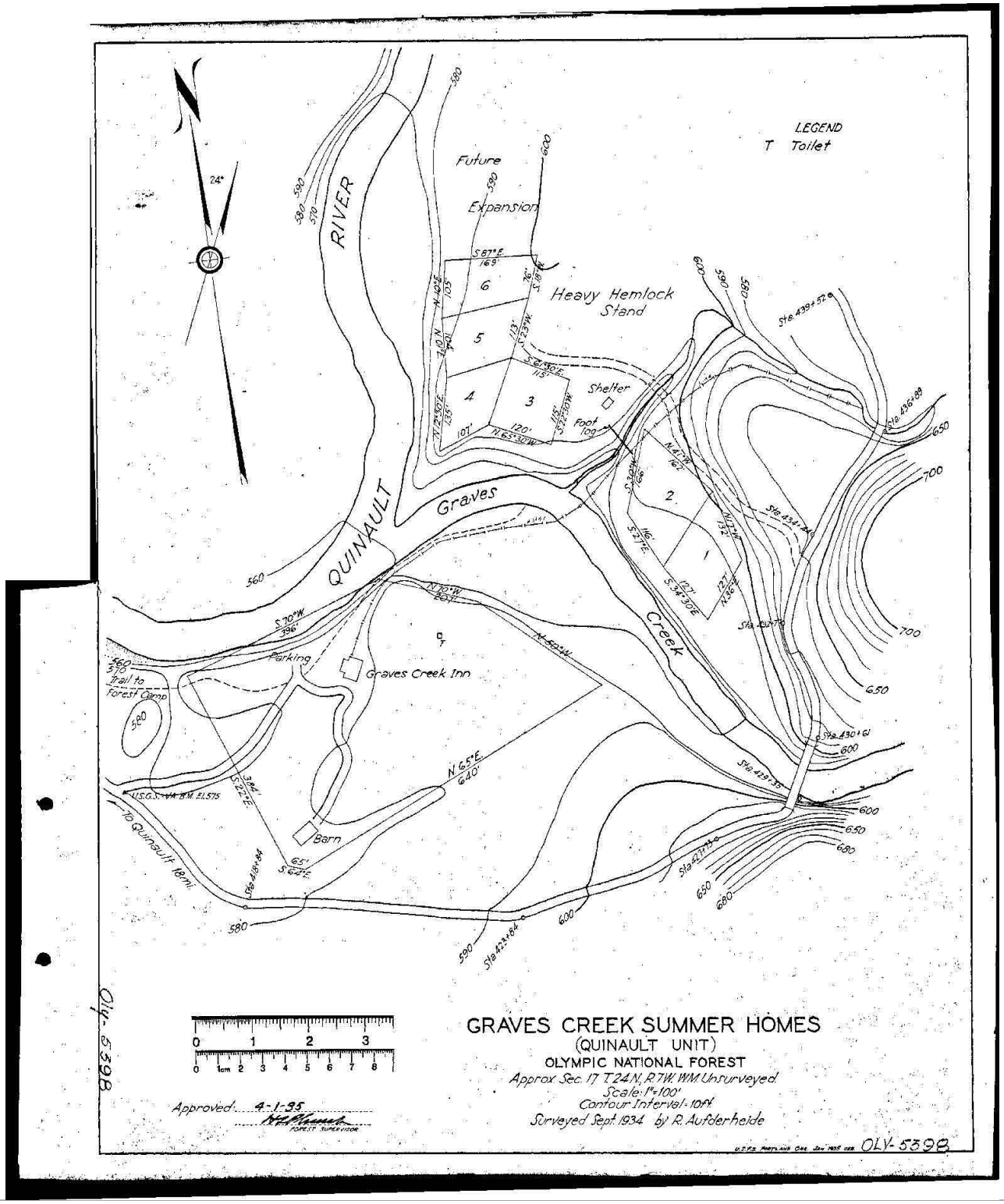
Permit No. 775 to H. A. Collison for 1.5 sec. ft. from Higley Creek in said section for domestic and power purposes with priority of December 1, 1925.

The last claim, which is the oldest, has had time to lapse, but it seems more probable that it is the main supply for the subdivision, is probably further covered by a power permit from the Federal Power Commission or Forest Service, and the domestic rights are being perfected as lots are sold and developed.

The following claim may involve a tributary of the lake, or of the river proper, just east of the lake:

Permit No. 1943, to John M. Evans, for 0.03 sec. ft. from an unnamed stream in Section 9, T. 23 N., R. 9 W., W. M., for domestic and irrigation purposes, with priority of December 22, 1931.

09-00-1934: map of the graves creek summer homes - quinault unit



The only other recorded water right within the park is that by the United States, as follows:

> Application No. 4388, Permit No. 2522, for the appropriation of 0.05 sec. ft. of water from an unnamed tributary of Graves Creek, a tributary of the Quinault River, in unsurveyed land approximately 900 feet south of section corner common to Sections 9, 10, 15, and 16, T. 24 N., R. 7 W., W. M., for public use for Graves Creek Forest Camp with priority of April 16, 1937.

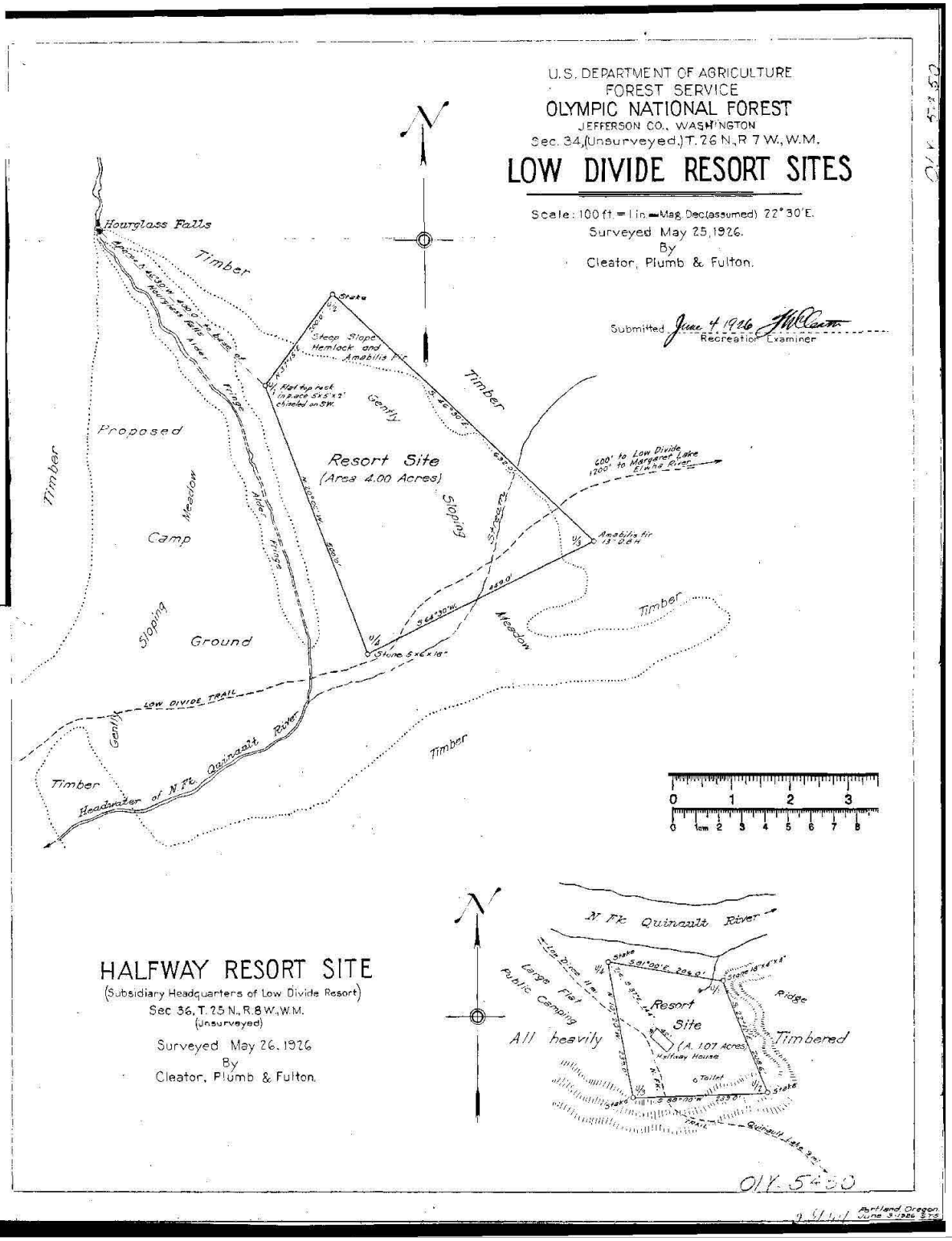
This application was initiated by the Forest Service and conveyed to the Park Service when the park was enlarged. Final proof of beneficial use was due in October 1940, but it was necessary to obtain an extension of time to October 1, 1943, because only a small portion of the water has been so used to date. Attached drawing OLY-5398 shows, however, that there is a potential demand for the full amount if modern improvements are made, the 18-mile approach road is brought to Park Service standards, and extensions of time can be made until these features are completed.

Drawing OLY-5398 shows the Graves Creek Inn and six summer home sites between the Park Service and Forest Camp. The Inn pipe line is shown to divert from the same stream which serves the Forest Camp, but below the road while National Park Service diversion is shown to be above the road on the map accompanying Permit 2522. Actually, the Inn is reported to be served by the Park Service system. Presumably the summer home sites are also served by this system, as they are probably under long term lease from the United States. The writer obtained the impression from discussion, that the Inn area is actually the property of Mrs. Olson and her daughter, but this may not have been the intent of his informant.

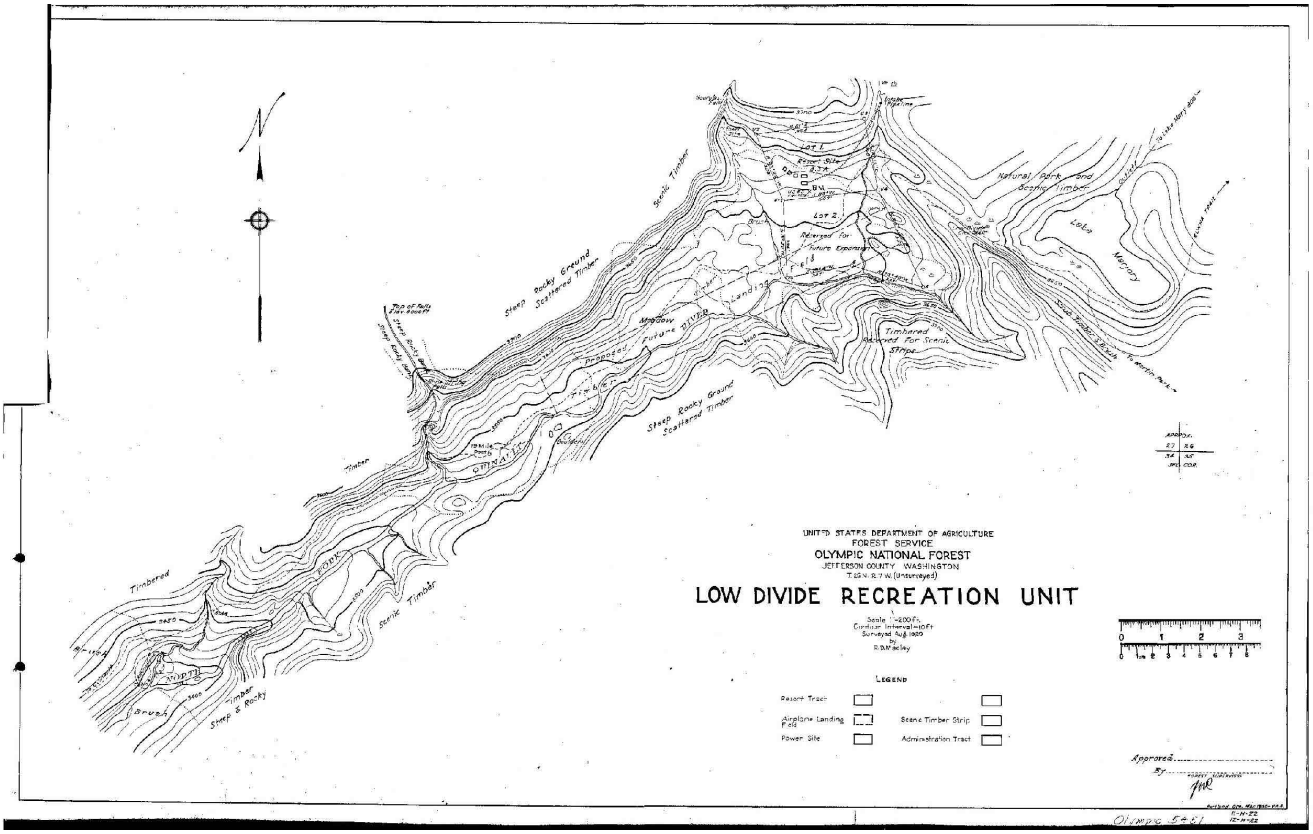
Both Inn and Forest Camp lack modern sanitation. On this basis, the following daily water use for 1940 can be determined:

Use	With Present Facilities	If Modern Facilities Had Existed
Forest Camp- 87 people @ 10 gpc	870 gpd	
" " " " " 35 gpc		3045 gpd
Graves Inn- 17 people at 50 gpc	850 gpd	
" " " " " 225 gpc		3825 gpd
6 summer home sites " --	?	
6 " " " "		2310 gpd
Total	1720 gpd	9180 gpd

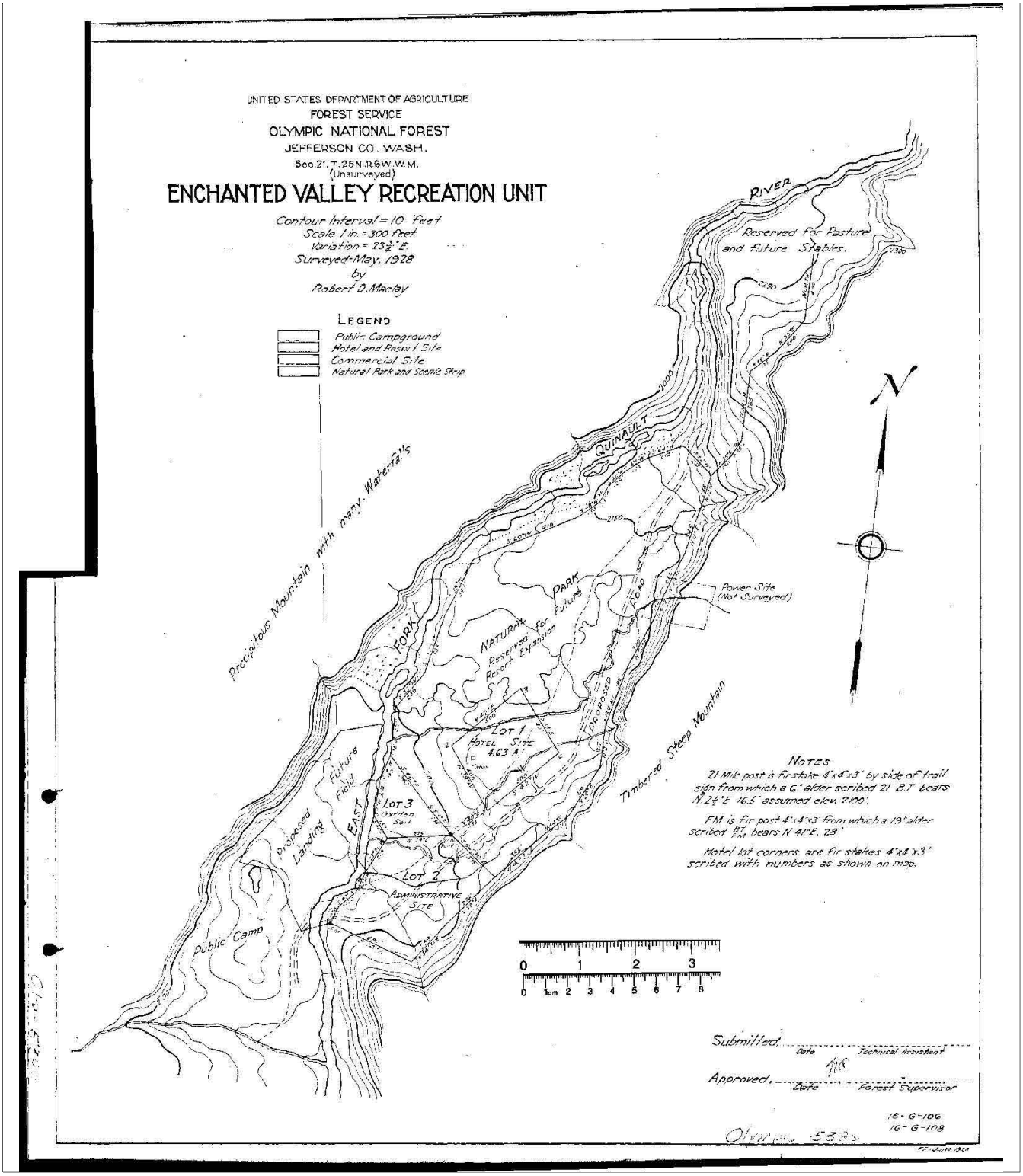
05-25-1926: map of the low divide resort sites and the halfway resort site



08-00-1929: topographic map of the low divide recreation unit



05-00-1928: topographic map of the enchanted valley recreation unit



The potential demand of 9180 gpd converts to 0.014 second foot. With normal increases in park attendance, and road improvements, there is every reason to believe that a 300% increase would be a conservative estimate of future needs, or 0.042. This is close enough to the 0.05 sec. ft. covered by Permit 2522 to justify careful preservation of the full amount. To do so, the park should expedite development, and keep records of attendance and use to support a request for further time extensions in 1943 and later. It will also be desirable to survey all water lines in the area and clarify differences in points of diversion existing on present maps.

There are two resorts in the Quinault drainage which are located on Park Service land, and operate under special use permits. No water rights are recorded for either.

Drawings OLY-5450 and 5451 show the development at the Low Divide Area and are not entirely consistent. More information is needed as to the extent that the later map supersedes the other. We should also determine:

1. Has power application for power permit been filed with Forest Service or Federal Power Commission, and if so, what procedure should be followed now that the area is under the supervision of the Park Service?

2. What water developments have been made, or planned, for proposed campground shown on OLY-5450?

3. Full master plan of water development in the area from which to prepare a water right filing if the United States is to make such a filing.

Drawing OLY-5399 shows the development in Enchanted Valley. The water development here, like that at Low Divide, should be completely described if the Park Service is to file water claims. The status of power applications should also be determined.

In addition to these major developments there are the following shelters and guard stations in the Quinault drainage which may have physical water systems for which water right filings may be desirable:

North Fork Guard Station
Shelter near Three Prune Creek
Graves Creek Basin Shelter
Wolf Bar Shelter
Sixteen Mile Shelter
O'Neil Creek Shelter.

North Fork Skokomis River

The North Fork of the Skokomis River had a maximum flow of 8830 second feet, minimum of 16 second feet, and mean of 434 second feet at the Lincoln Guard Station during the period 1924-1933. The monthly means vary from 600 second feet in May, to 120 second feet in August and September. This gauging station is just within the park and just above the Cushmen Reservoir of the Tacoma Power and Light Company.

The power company has two water rights, as follows:

Cushman No. 1 - Permit No. 252, on which certificate has been issued, for 1000 second feet, and 190,000 AF of storage, with priority of December 11, 1919. The effective power head is 242 feet.

Cushman No. 2, Permit No. 940, certificate not yet issued, for 600 second feet with priority of May 22, 1926. The point of diversion does not plot on the reservoir according to the writer's data, as shown on the map.

These filings constitute a fairly complete appropriation of the reliable flow of the river, yet the Park Service has the following potential water needs above:

Lincoln Guard Station	Big Log Shelter
Nine Stream Shelter	Six Stream Shelter

The Park Engineer had the idea that the Forest Service had perfected a right to water at the Lincoln Guard Station, but it has not been conveyed to the Park Service since the area was taken into the park. This should be investigated further. The immediate need for rights at the three shelters is dependent on the existence of physical systems; but the longer such rights are deferred, the more difficult it may be to obtain them.

Port Angeles Headquarters Area

The Park Headquarters is located in the City of Port Angeles on land acquired from that town in Section 15, T. 30 N., R. 6 W., W. M. The main reservoir of the city is located at the upper edge of the area, and the area is crossed by a 10 foot right of way of that city, on which the 24 inch wood stave water main is located.

The area is also crossed by a 10 inch overflow pipe from the reservoir for which no right of way is mentioned on the map at hand. If one pipe is covered by right of way, it would be more consistent to have both recorded in the same way. This, however, is not a water rights problem.

The headquarters water supply is purchased from the city, which makes the park a consumer of the waters of the Elwha River and Morse Creek; and gives it an indirect interest in the city water rights previously described. The city has also offered more or less free use of the reservoir overflow from the 10 inch wood stave pipe, but this is potentially, if not at the moment, an unreliable supply.

Conclusions

The preceding discussion is not a complete analysis of the water rights problem at Olympic National Park, but it is sufficient to permit the formulation of a water rights policy. This policy is already partially suggested by the precedent of the Forest Service, and the inconsistency of some perfected rights and other apparently ignored water uses makes the need for relatively immediate action more important than had been anticipated.

There are four major problems at the present time:

1. The determination of the extent to which water use should be covered by statutory appropriation.

2. A complete development plan for the park, as a basis for the perfection of water rights and determination of the desired disposition of old rights perfected by the Forest Service.

3. A check of all right of way and special use permits issued by the Forest Service, and their correction or amendment before being permanently renewed by the Park Service.

4. Preparation of complete maps of those water systems serving both park and operators' needs, and those with park and private diversions from a common source which may result in conflicts.

APPENDIX I.

C O P Y

IN THE SUPERIOR COURT OF THE STATE OF WASHINGTON

IN AND FOR THE COUNTY OF CLALLAM

IN THE MATTER OF THE DETERMINATION OF THE RIGHTS TO THE USE OF THE WATERS OF DUNGENESS RIVER AND ITS TRIBUTARIES IN CLALLAM COUNTY, WASHINGTON, IN ACCORDANCE WITH THE PROVISIONS OF CHAPTER 117 OF THE SESSION LAWS OF 1917 OF THE STATE OF WASHINGTON AND AMENDMENTS THERETO.

THE STATE OF WASHINGTON, Plaintiff,

vs.

L. GRETCHEN ANDERSON and JOHN DOE ANDERSON, her husband, whose true christian name is unknown, et al., Defendants.

The above entitled cause coming regularly on for hearing before the Court, without a jury, on the 3rd day of March, 1924, upon the report of the State Supervisor of Hydraulics, as Referee, heretofore filed in this Court pursuant to notice duly given as required by law, the State of Washington, Plaintiff, appearing by its attorney John H. Dunbar, Attorney General, and B. B. Adams, Assistant Attorney General,

Defendant Highland Irrigation District appearing by its attorney J. W. Lindsay,

And exceptions having been filed to the report of the referee by the defendant Highland Irrigation District, and the Court having heard the argument of counsel for said exceptions, and duly considered the same, said exceptions were by the Court sustained, and all and singular the Court being fully advised in the premises, and the law,

NOW, THEREFORE, it is ORDERED, ADJUDGED and DECREED:

1.

That the Report of the referee herein be and the same hereby is in all things approved and confirmed and adopted except as in this decree specifically modified.

2.

That the parties hereto and their successors in interest be and they hereby are entitled to divert from Dungeness River and its tributaries the amount of water specified in the classification hereinafter set forth for beneficial use upon their several lands described therein; that the rights and priorities of such described lands be and they hereby are as set forth in said classification; and that each and every party hereto be and he hereby is perpetually enjoined from interfering with the diversion and use upon said tracts of the amounts of water in said classification specified.

3.

That all waters in excess of the total amount apportioned and decreed to the several tracts of land described in the classification, belong to the public and are subject to appropriation.

4.

That the classification of the respective lands involved in this adjudication, together with the dates of settlement and first appropriation of water, the area of irrigable land and legal subdivision in which each is located, together with the amount of water to which each is entitled, be and the same hereby is as follows, to-wit:

DATE OF SETTLEMENT	DATE OF INITIATION OF WATER RIGHTS	NUMBER OF ACRES	AMOUNT OF WATER Cubic Feet Per Second	Miner's Inches 4-inch Pressure	DESCRIPTION OF LAND IN WHICH TRACT IS LOCATED
					Sec. Twp. N., R. W. W. M.
		CLASS 1			
Sequim Prairie Ditch Company					
	Nov. 1895	1000	20.0	1000	A corporation
		CLASS 2			
Eureka Irrigation and Milling Company					
	Jan. 1897	1154	23.08	1154	A corporation

DATE OF SETTLE-MENT	DATE OF INITIA-TION OF WATER RIGHTS	NUMBER OF ACRES	AMOUNT OF WATER Cubic Feet Per Second	Miner's Inches 4-inch Pressure	DESCRIPTION OF LAND IN WHICH TRACT IS LOCATED
					Sec. Twp. N., R. W. W. M.
			CLASS 3		
Samuel Woodcock					
	1899	200	4.0	200	E½ NW¼; W½ NE¼ and E½ SW¼ Sec. 11, and NW¼ NE¼ Sec. 14, Twp. 30 N., R. 4 W. W. M.
			CLASS 4		
George W. Lawrence					
1900	1900	50	1.0	50	Lot 4, SW¼ NW¼; NW¼ SW¼ and SW¼ SW¼ Sec. 1, T. 29 N., R. 4 W. W. M.
			CLASS 5		
Clallam Ditch Company					
	1902	3000	60.0	3000	A corporation
			CLASS 6		
Harry and Olive Heath					
1881	1903	52	1.04	52	W½ SW¼ 12; SW¼ NE¼ E½ SE¼ Sec. 11, and NE¼ NE¼ Sec. 14, all in T. 30 N., R. 4 W. W. M.
John Knutson					
1881	1903	30	0.6	30	NE¼ NE¼ and W½ NE¼ SE¼ and W½ SE¼ SW¼ and W½ SW¼, except 4 acres owned by Olive and Harry Heath, 5 acres in NW¼ SE¼ Sec. 11, all in T. 30 N. R. 4 W. W. M.

DATE OF SETTLE-MENT	DATE OF INITIA-TION OF WATER RIGHTS	NUMBER OF ACRES	AMOUNT OF WATER Cubic Feet Per Second	Miner's Inches 4-inch Pressure	DESCRIPTION OF LAND IN WHICH TRACT IS LOCATED
					Sec. Twp. N., R. W. W.M.
Mrs. Sarah Travers Ricketson					
	1903	20	0.4	20	Lot 3, Sec. 10, SE¼ SE¼ Sec. 9, NW¼ NW¼ EXCEPT 19.23 acres in Sec. 15, 7.58 acres in Lot 1 of Sec. 15, all in T. 30 N., R. 3 W.W.M.
George Brazil					
	1903	20	0.4	20	W½ SE¼ SW ¼ Sec. 12, T. 30 N.,R. 4. W. W. M.
L. L. Ramalin					
	1903	20	0.4	20	E½ NW¼ SW¼ Sec. 12, T. 30 N., R 4 W. W. M.
B. G. Wilcox					
	1903	20	0.4	20	W½ NW¼ SW¼ Sec. 12, T. 30 N, R 4. W. W. M.
Charles Brazil					
	1903	40	0.6	40	SW¼ SW¼ Sec. 12, T. 30 N., R 4 W. W. M.
		CLASS 7			
Independent Irrigation Company					
	1906	2000	40.0	2000	A corporation
Bessie & Thomas Tiller (Canyon Creek)					
	1906	10	0.2	10	NW¼ NW¼ EXCEPT 1 acre. SE¼ NW¼ and 10 acres in NE¼ SW¼, all in Sec. 12, T. 29 N., R. 4. W. W. M.

DATE OF SETTLE-MENT	DATE OF INITIA-TION OF WATER RIGHTS	NUMBER OF ACRES	AMOUNT OF WATER Cubic Feet Per Second	Miner's Inches 4-inch Pressure	DESCRIPTION OF LAND IN WHICH TRACT IS LOCATED
					Sec. Twp. N., R. W. W.M.
		CLASS 8			
Dungeness Irrigation Company					
	1911	3547	70.94	3547	A corporation
		CLASS 9			
Highland Irrigation District					
Sept.	1915	3507	70.14	3507	Lands within the boundaries of the irrigation district.
		CLASS 10			
Happy Valley Irrigation District					
	Jan. 1916	2618	52.36	2618	Lands within the boundaries of the irrigation district.
		CLASS 11			
Macleay-Lindsay Irrigation District					
	Oct. 1918	7300	146.0	7300	Lands within the boundaries of the irrigation district.
		CLASS 12			
Cline Irrigation District					
	July 1919	2300	46.0	2300	Lands within the boundaries of the irrigation district.
		CLASS 13			
Dungeness Irrigation District					
	Mar. 1921	2100	42.0	2100	Lands within the boundaries of the irrigation district.

5.

That rights in a higher class in the foregoing schedule be fully satisfied before water is given to those of a subordinate class, and in case of failure of the supply of water to completely satisfy the total amount awarded to a given class, the amount remaining for said class shall be apportioned to the appropriators in said class in the proportion which the number of cubic feet per second awarded to each person bears to the total number of cubic feet per second awarded to such class, subject to use by rotation.

6.

That any person taking water from Dungeness River, or its tributaries, shall provide and maintain at his own expense proper diversion works and measuring devices, as required by statute, Sec. 37, Chap. 117, Laws of 1917 and amendments thereto.

7.

That the Clerk of the above entitled Court and he is hereby directed to transmit forthwith to the State Supervisor of Hydraulics a certified copy of this decree.

8.

That upon receipt of such certified copy the State Supervisor of hydraulics shall prepare and file with the Clerk of the above entitled Court a statement of the expenses incurred by him in this determination, showing the total expense of the determination and apportioning such expense to the various rights as determined by the Court in this decree in proportion to the amount of such rights.

9.

That the State Supervisor of Hydraulics be and here hereby is directed to issue to the persons entitled thereto certificates of water right in accordance with the provisions of this decree, as provided in Sec. 26, Chap. 117 of the Session Laws of Washington for the year 1917 and subsequent amendments, provided said persons shall have first paid the amount of the expenses apportioned against their lands as provided in Section 9 of this decree.

Done in open Court this 7th day of March, 1924

JOHN M. RALSTON.
Judge.

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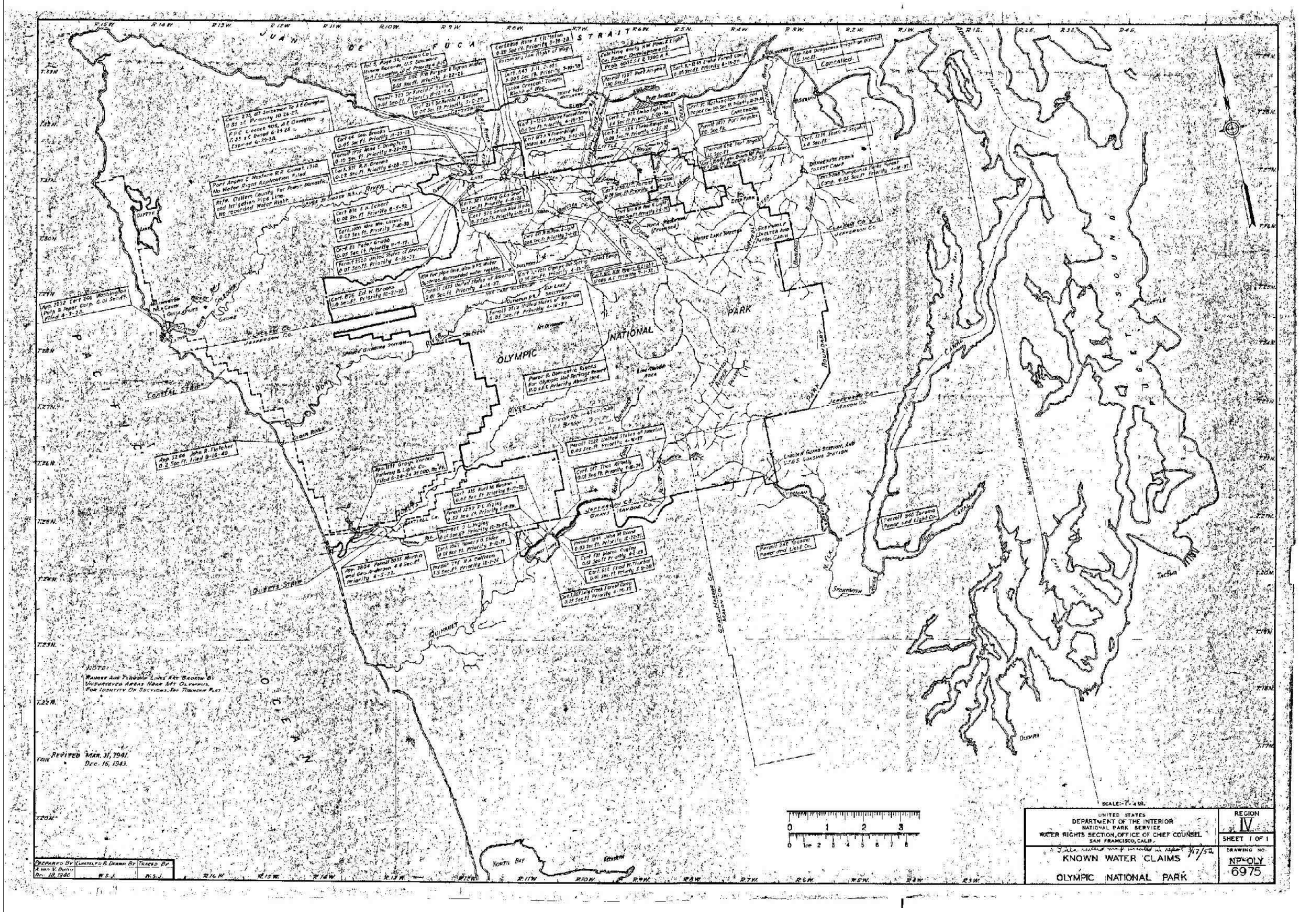
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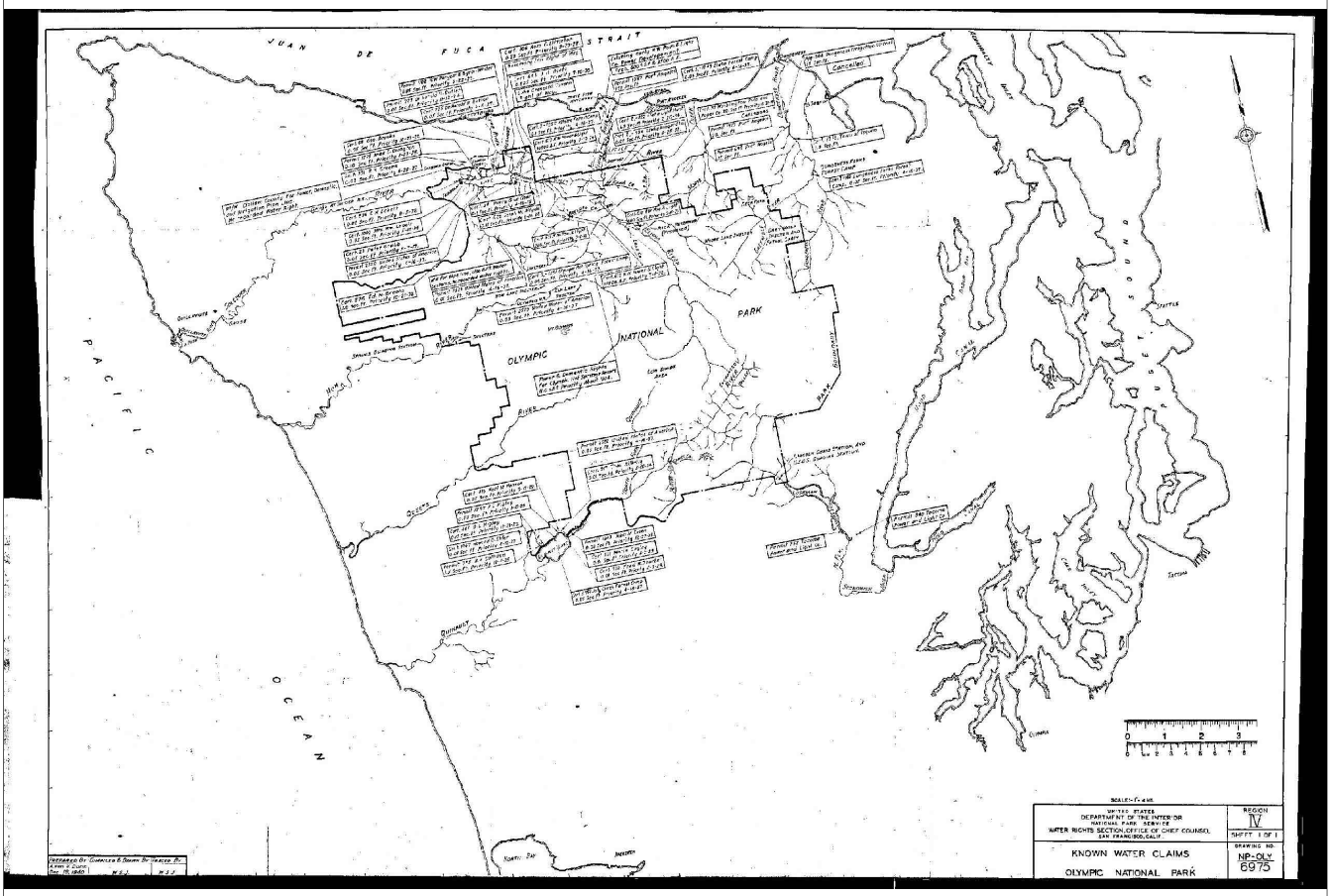
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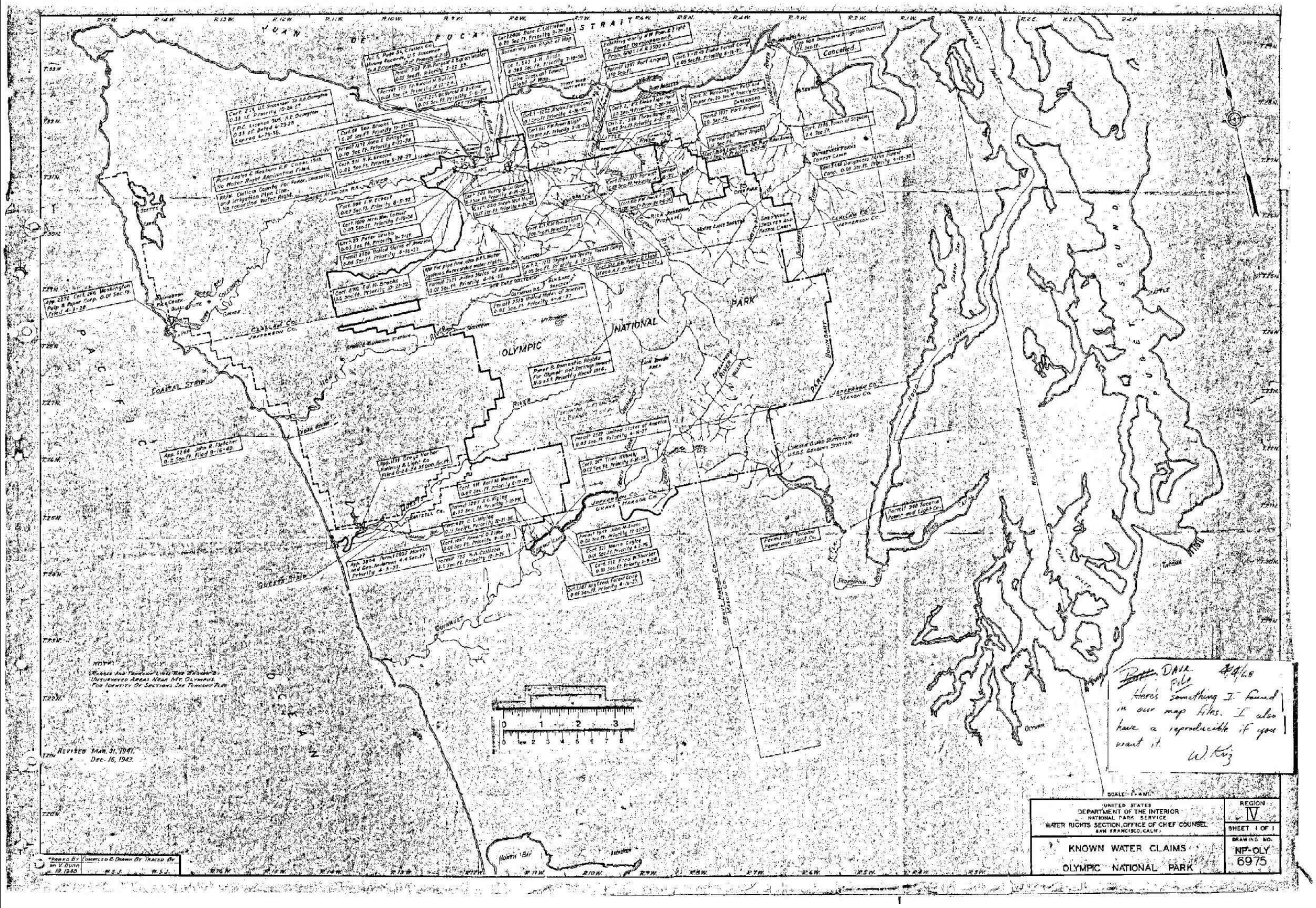
12-18-1940: map of the known water claims - olym

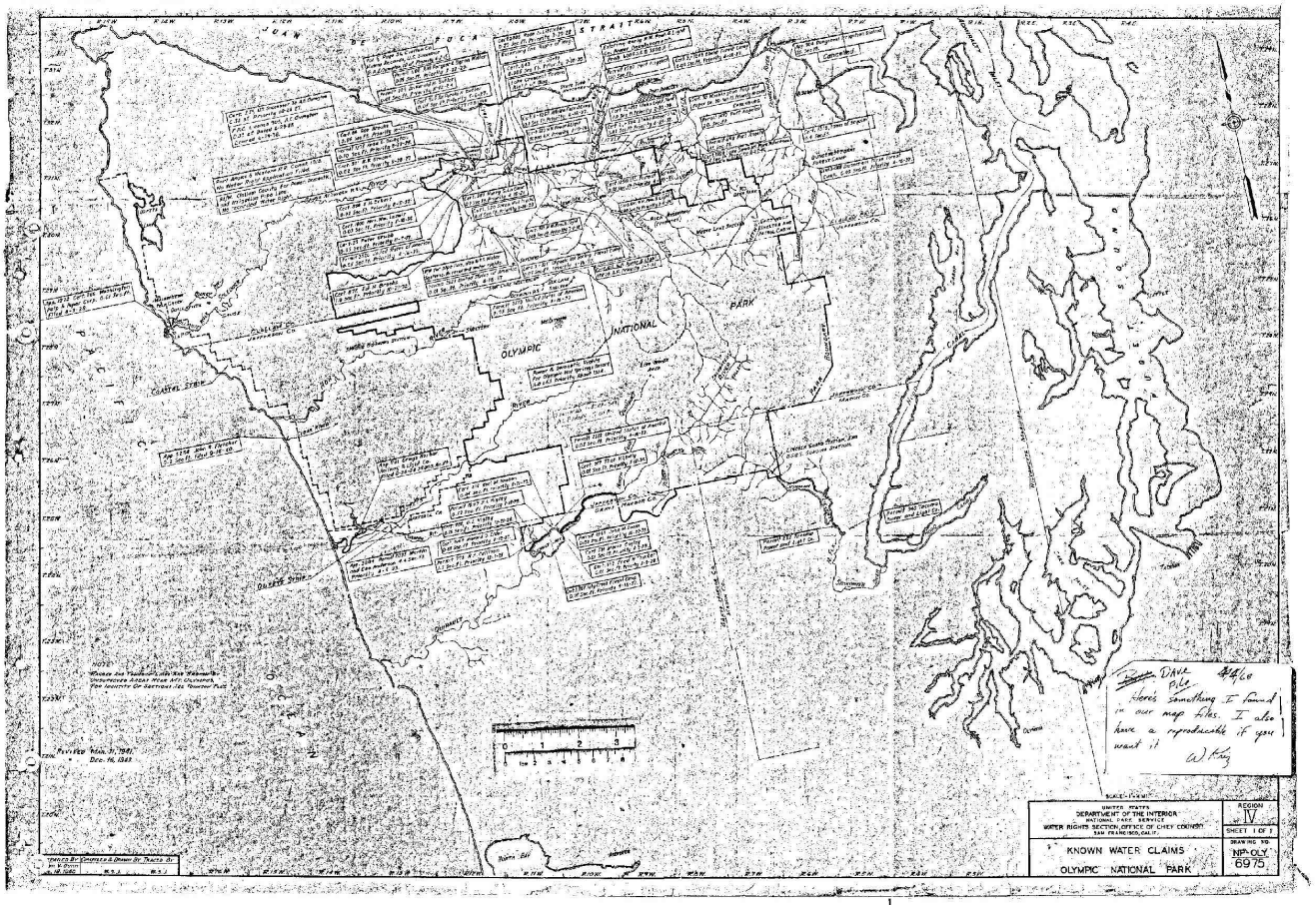




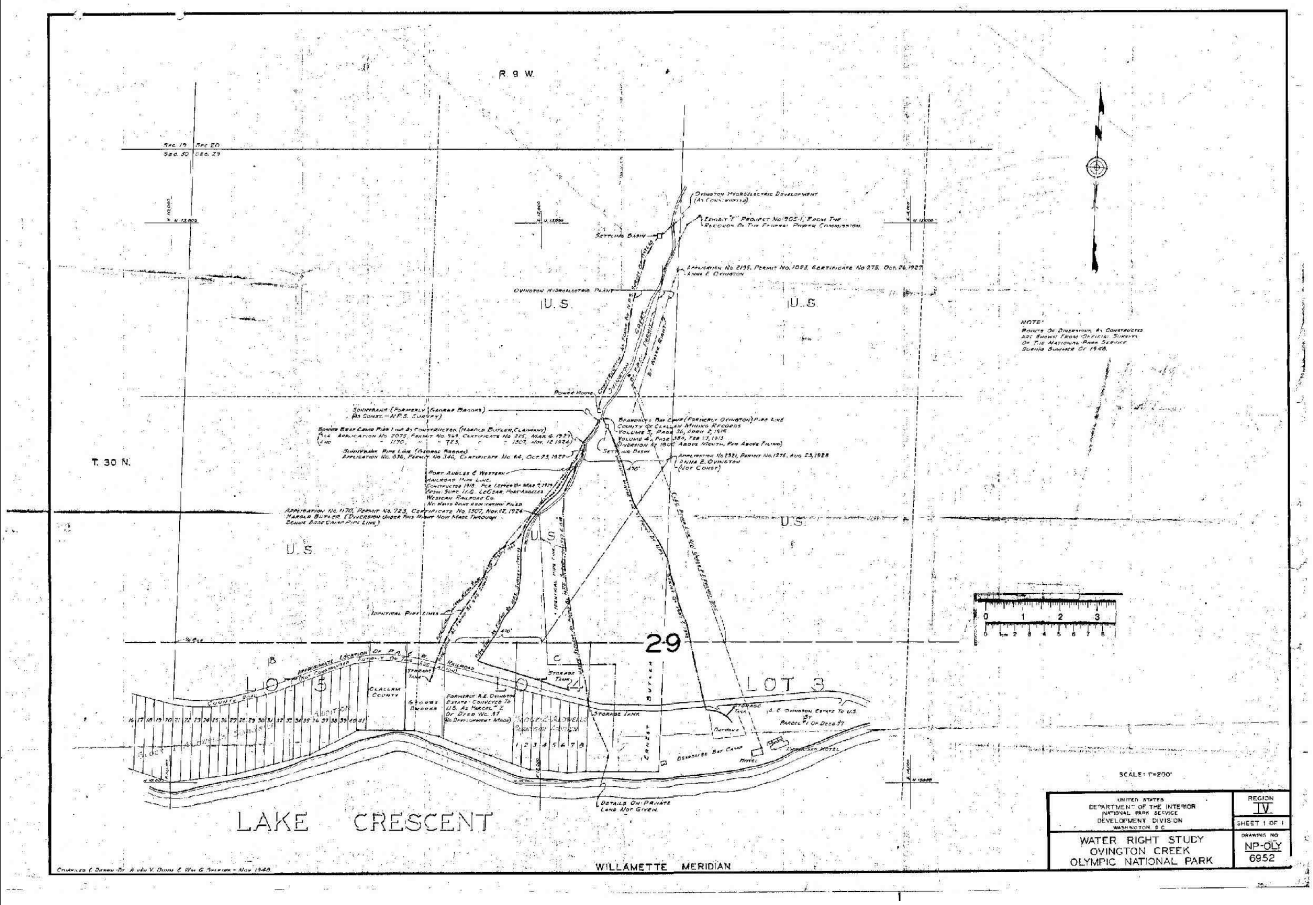
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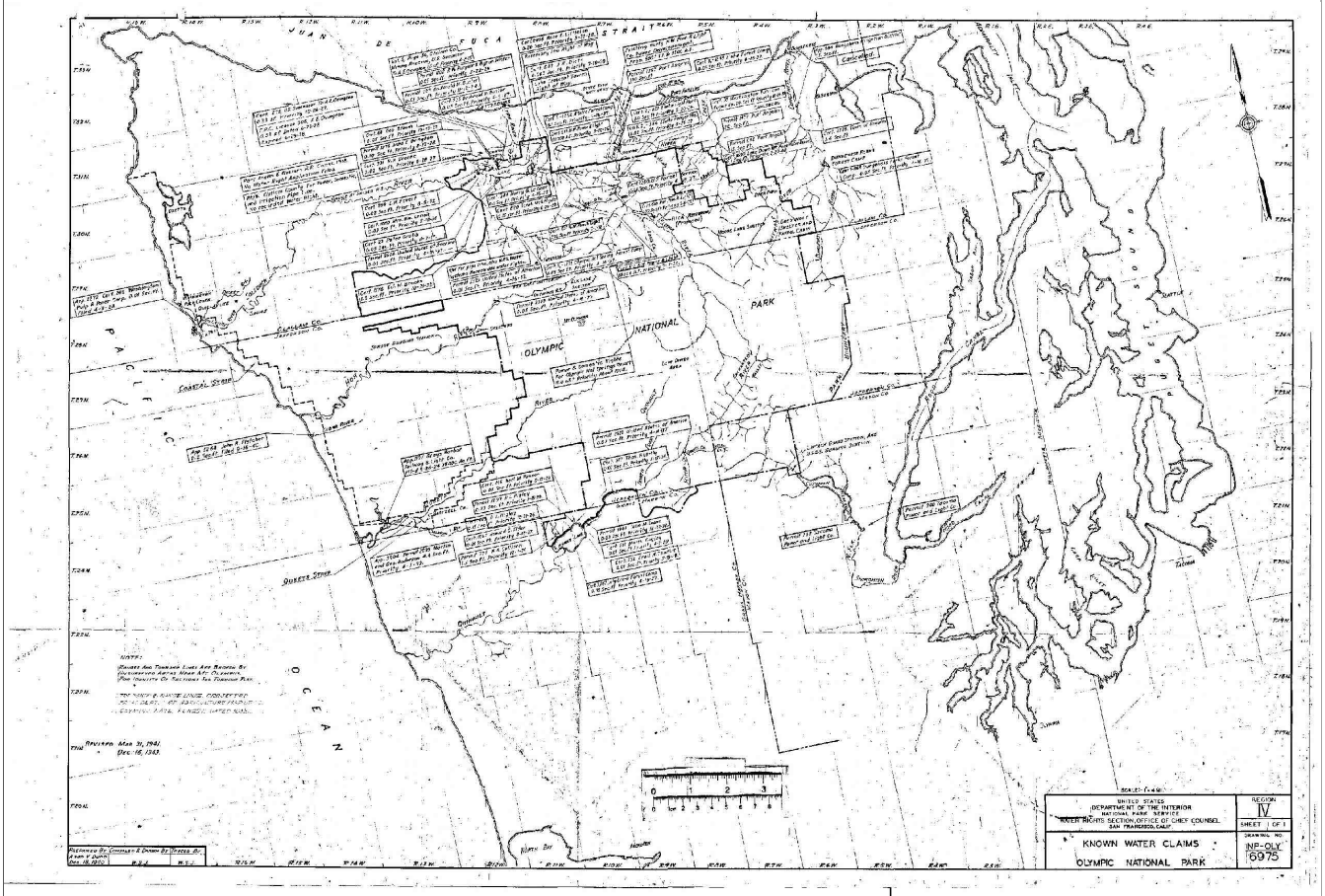
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JUAN DE FUCA STRAIT
OLYMPIC NATIONAL PARK
COASTAL STRIP
Dave
Pile
Here's something I found in our map files. I also have a reproducible if you want it
W Kay
UNITED STATES
DEPARTMENT OF THE INTERIOR
NATIONAL PARK SERVICE
WATER RIGHTS SECTION, OFFICE OF CHIEF CONSULT
SAN FRANCISCO, CALIF.
REGION IV
SHEET 1 OF 1
KNOWN WATER CLAIMS
OLYMPIC NATIONAL PARK
DRAWING NO.
NP-OLY 6975

11-00-1948: map of a water study - ovington creek





Docket Information

Number of Documents in Docket 316

Documents Dated from 4/15/1921 to 9/18/1969

Docket Compiled: 6/23/2011