

Accessing Water Rights Information

1ST ANNUAL WATER LAW
CONFERENCE IN EASTERN WA
MAY 15, 2024



// Roadmap

1. How to research a water right (*know what is authorized*)
2. How to evaluate extent & validity of a water right (*know what has happened*)



// Researching a Water Right

- Ecology's Water Right Tracking System
- Ecology Public Records Request
- Third Party WebApp
- Court Adjudication
- Title/Deed Resources
- *And more!*

E C O L O G Y

Document Title: Superseding Certificate of Water Right

Agency: Department of Ecology
Eastern Regional Office
4601 North Monroe
Spokane, WA 99205-1295

Applicant: David Stevens
PO Box 56
Wilson Creek, WA 98860

Reference Number:

THIS CERTIFICATE SUPERSEDES GROUND WATER CERTIFICATE # G3-23213 ISSUED
DECEMBER 13, 1984.

PRIORITY DATE	APPLICATION NUMBER	PERMIT NUMBER	CERTIFICATE NUMBER
May 20, 1974	G3-23213	G3-23213	G3-23213(A)

This is to certify that the herein named applicant has made proof to the satisfaction of the Department of Ecology of a right to the use of the public waters of the State of Washington as herein defined, and under and specifically subject to the provisions contained in the Permit issued by the Department of Ecology, and that said right to the use of said waters has been perfected in accordance with the laws of the State of Washington, and is hereby confirmed by the Department of Ecology and entered of record as shown, but is limited to an amount actually beneficially used.

PUBLIC WATERS TO BE APPROPRIATED

SOURCE	TRIBUTARY OF (IF SURFACE WATERS)
4 wells	----

MAX. CUBIC FEET PER SECOND	MAX. GALLONS PER MINUTE	MAX. ACRE-FEET PER YEAR
----	2406	1347

QUANTITY/TYPE OF USE/PERIOD OF USE

2406 gallons per minute, 1347 acre-feet for irrigation of 770 acres

LEGAL DESCRIPTION OF LOCATION OF DIVERSION/WITHDRAWAL

1/4 1/4	SECTION	TOWNSHIP N.	RANGE (E. OR W.) W.M.	W.R.I.A.	COUNTY
		23	28	42	Grant

PARCEL #

ADDITIONAL LEGAL IS ON PAGE 2

LEGAL DESCRIPTION OF PROPERTY ON WHICH WATER IS TO BE USED

1/4 1/4	SECTION	TOWNSHIP N.	RANGE (E. OR W.) W.M.	W.R.I.A.	COUNTY
		23	28	42	Grant

PARCEL # 171372000, 171373000, 171356000


ADDITIONAL LEGAL IS ON PAGE 2



// Ecology's Water Right Tracking System (WRTS)

The screenshot shows the 'Water Rights Search - Production' interface. At the top left is the 'DEPARTMENT OF ECOLOGY State of Washington' logo. The main title is 'Water Rights Search - Production'. A navigation bar includes 'Home', 'Map Search', 'Text Search', 'Reports', 'More Info', and 'Water Resources'. Below this is a 'Water Right Record Search' section with a 'How to Video Clips' link and a checked 'Display Help for Text and Buttons' option. There are five search tabs: 'General Search' (selected), 'Location Search', 'Surface Water Search', 'Event Search', and 'Saved Searches'. The search form contains several fields: 'Record / Document Number' (text input with 'g3-23213C(A)'), 'Region' (dropdown), 'Device Type' (dropdown), 'WR Doc ID' (text input), 'WRIA' (dropdown), 'Stage' (dropdown), 'Person or Organization' (text input), 'County' (dropdown), 'Assignment Group' (dropdown), 'Role' (dropdown with 'Primary' selected), 'WR Class' (dropdown), 'Provision' (dropdown), 'Purpose' (dropdown), 'Phase' (dropdown), 'Water Bank' (dropdown), 'Priority Date / Claim First Use' (range input with 'to' separator), 'Status' (dropdown), 'Water Use Type' (dropdown), and 'Well Tag ID' (text input). A 'Related Records' dropdown is also present. A note at the bottom left states: 'Note: In the dropdown lists, to add or subtract more than one criteria at a time, hold down the shift or ctrl keys while clicking.' At the bottom right are 'General Search' and 'Clear General Search' buttons. The footer contains 'Combined Tab Search', 'Clear Combined Tab Search', and 'Display Results: 100 (at a time)' with a dropdown arrow.

// Ecology's Water Right Tracking System


DEPARTMENT OF ECOLOGY
State of Washington

Water Rights Search - Production

Home
Map Search
Text Search
Reports
More Info
Water Resources

Water Right Record Search
How to Video Clips
Display Help for Text and Buttons

General Search

Location Search

Surface Water Search

Event Search

Saved Searches

Record / Document Number

WR Doc ID

Person or Organization

Role


Purpose

Priority Date / Claim First Use to

Well Tag ID

Note: In the dropdown lists, to add or subtract more at a time, hold down the shift or ctrl keys while clicking.

[Combined Tab Search](#) [Clear Com](#)


DEPARTMENT OF ECOLOGY
State of Washington

Water Rights Search - Production

Home
Map Search
Text Search
Reports
More Info
Water Resources

Record/Document Number G3-23213C(A)
Back to Search

At A Glance

Life Cycle

Record/Document Number	G3-23213C(A)	Phase	Superseding Certificate	Priority Date	5/20/1974	View Documents
Application Number		Stage	Final	WRIA	42	View in Metering
Permit Number		Status	Active	County	Grant	View on Map
Certificate Number	G3-23213C(A)	WR Class	Groundwater	Region	ERO	Not in WRAD
Consrv Bd Number						Submit Record Correction
WR Doc ID	4498371					

Persons or Organizations [Click to Show Contacts](#)

Last or Organization Name	First Name	MI	Role	Address	Zip	Phone	Email
Stevens	Rose	M	Primary	PO Box 730, Ephrata WA	98823-0730	(509) 770-1045	buckrunlimited@outlook.com

Phase Quantities

Phase	Qi	Units	Qa	Irr Acres
Superseding Certificate	2406	GPM	1347	770

Assignment Groups

Assignment Group
Wilson Creek

Provisions

Provision
Meter Recording Weekly Reqd
Meter Annual REPORTING Require

Water Banks

No water banks found.

Purposes of Use

Basic Information

Additional Information

Purpose	From	To	Qi	Units	Use Type	Qa	Use Type	Irr Acres	Use Type
Irrigation	04/01	09/30	2406	GPM	Primary	1347	Primary	770	Primary



// Ecology's Water Right Tracking System

DEPARTMENT OF ECOLOGY
State of Washington

Water Rights Map Search

Home Map Search Record Search Person Search GIS Spatial Data Contact Us Data Disclaimer Help Privacy Notice Water Resources

Map Navigation Menu

Search Options Legend/Layers Record Details

How to Video Clips

Topo Map Aerial Map

Water Right Layers

- Water Device Points
 - Ground Water Collector
 - Headworks Gravity Flow
 - Irrigation Dam
 - Monitoring Well
 - Reservoir Dam
 - Surface Water Pump
 - Well
 - Other
- Unmapped Water Device Points
 - Headworks Gravity Flow
 - Reservoir Dam
 - Well
- Water Places of Use
 - New Application
 - Certificate
 - Certificate of Change
 - Change Application
 - Change Report of Examination
 - Permit
 - Claim
 - Superseding Permit
 - Report Of Examination
 - Other

La/Long: 47.5303, -119.2930

Current Scale: 1:144,448

Export Search Result Display in Text Search Result

View Record	Record/Doc No.	WR Doc ID	Person or Organization	Priority Date/Claim First Use	Phase	Status	Images	Qi	Qa	Open in WRTS
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// Ecology's Water Right Tracking System

The screenshot displays the 'Water Rights Map Search' interface from the Department of Ecology, State of Washington. The main map shows an aerial view of the Douglas area with several red-hatched polygons representing water rights. A pop-up window titled 'Water Rights Search - Production' is overlaid on the map, showing document details for 'G3-23213C(A)' with 'WR Doc_ID 4498371'. The pop-up includes a table of image files and scan dates, along with buttons for 'Image Viewer', 'Download Images', and 'Close'.

Water Right Layers

- Water Device Points
 - Ground Water Collector
 - Headworks Gravity Flow
 - Irrigation Dam
 - Monitoring Well
 - Reservoir Dam
 - Surface Water Pump
 - Well
 - Other
- Unmapped Water Device Points
 - Headworks Gravity Flow
 - Reservoir Dam
 - Well
- Water Places of Use
 - New Application
 - Certificate
 - Certificate of Change
 - Change Application
 - Change Report of Examination
 - Permit
 - Claim
 - Superseding Permit
 - Report Of Exammiation
 - Other

Water Rights Search - Production

Document Number G3-23213C(A)
WR Doc_ID 4498371
DOCUMENT VIEWER - DATA AND IMAGES ARE "AS IS" WITH NO WARRANTY. See [General Disclaimer](#)

	Image Type	Image File Name	Image Scan Date
View	Post Certificate Documents	ERO60000871C.pdf	10/04/2013
View	Post Certificate Documents	449837117_10030.pdf	06/24/2014
View	Superseding\Amended Certificates	ERO6000021FB.pdf	06/30/2008

[Download Images](#) [Close](#)



// Ecology Public Records Request

The screenshot shows the Ecology Public Records Request Center website. At the top left is the Department of Ecology logo for the State of Washington. The main heading is "Public Records Request Center". Below this is a navigation bar with links: "Public Records Request Center Home", "Common Questions (FAQs)", "Submit Request", "Search Available Records", and "My Records Center". A red "URGENT NOTICE" banner states: "Beginning April 15th, our agency is undertaking the migration of email from one system to another. Please be aware that our responses may be delayed and that requests may be extended beyond the standard five week deadline during this period." Three main action buttons are displayed: "SUBMIT A PUBLIC RECORDS REQUEST" (with a pencil icon), "MY RECORDS CENTER" (with a person icon), and "SEARCH AVAILABLE RECORDS" (with a folder icon). A "Common Questions (FAQs)" section is visible at the bottom, listing "Browsers", "How are the five business days calculated when responding to a public records request?", and "What is a public record?". A "See More FAQs" link is located at the bottom right of this section. The footer includes the "Powered by GovQA" logo.

// Third Party WebApp

The screenshot displays a web application interface for 'Buck Run Farm' by LANDAU ASSOCIATES. The main map area shows a satellite view of agricultural land with yellow outlines representing parcels and various colored circles (blue, green, purple, yellow) indicating different data points. A search bar at the top left contains the text 'Find address or place'. The bottom left corner shows the coordinates '-119.238 47.489 Degrees'. On the right side, a 'Layer List' panel is visible, listing various data layers with checkboxes and expand/collapse icons.

Layer List	
Layers	
<input checked="" type="checkbox"/>	Wells
<input type="checkbox"/>	Mainlines
<input type="checkbox"/>	Seasonal Change Permit
<input checked="" type="checkbox"/>	Irrigated Areas
<input type="checkbox"/>	Irrigated Areas - Stevens/Round Lake
<input checked="" type="checkbox"/>	Irrigated Areas - Places of Use
<input type="checkbox"/>	Irrigated Areas - Farms
<input checked="" type="checkbox"/>	ParcelsAll
<input type="checkbox"/>	WRIA
<input type="checkbox"/>	ParcelsOwners
<input type="checkbox"/>	Parcels - Columbia Basin Project
<input type="checkbox"/>	CRP Land
<input type="checkbox"/>	Leased Parcels
<input type="checkbox"/>	Crops (WSDA 2021)
<input type="checkbox"/>	Point of Withdrawal/Diversion (from WRTS)
<input type="checkbox"/>	QB Permits
<input type="checkbox"/>	Water Right Places of Use
<input type="checkbox"/>	Main Canals (Columbia Basin Irrigation District)
<input type="checkbox"/>	East Columbia Basin Irrigation District (ECBID)
<input type="checkbox"/>	Quincy-Columbia Basin Irrigation District (QCBID)

// Adjudication- Ecology Publication 19-11-073

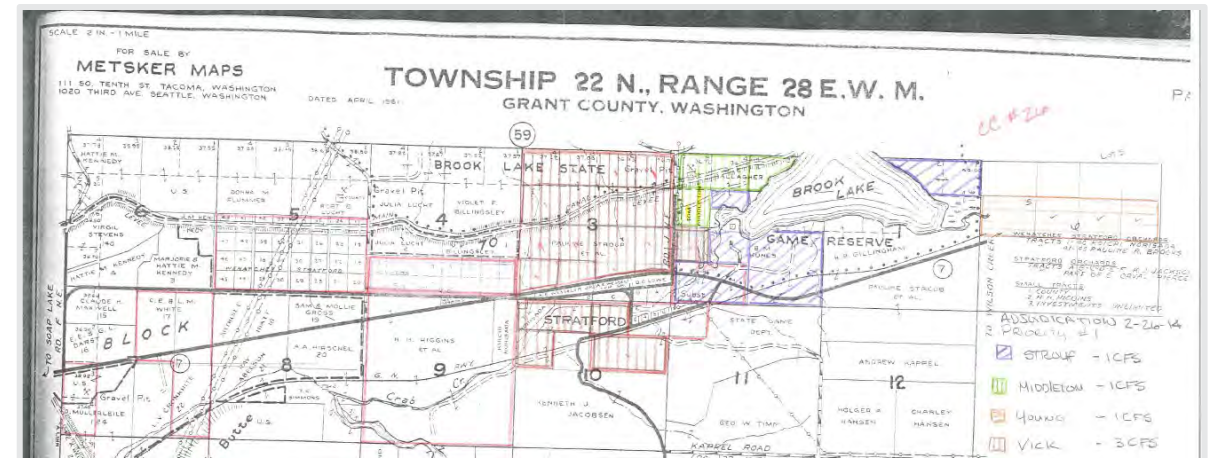


Completed Adjudications in Washington

As of May 9, 2019, there are 83 completed adjudications since the adoption of the 1917 water code. These adjudications resulted in final decrees. Certificates were issued to parties who were confirmed rights. See the complete list below.

Code	Watercourse	County	Region	WRIA	Decree Filed
01	Similkameen River	Okanogan	Central	49	11/26/1918
02	Roaring Creek	Chelan	Central	46	10/24/1919
03	Wenas Creek	Kittitas, Yakima	Central	39	02/23/1921
04	Bird & Frazier Creeks	Klickitat, Yakima	Central	30	03/14/1921
05	Teanaway River	Kittitas	Central	39	06/16/1921
06	Cooke Creek	Kittitas	Central	39	08/13/1921
07	Beaver Creek	Okanogan	Central	48	09/20/1921
08	Libby Creek	Okanogan	Central	48	11/18/1921
09	Cowiche Creek	Yakima	Central	38	05/18/1922
10	Meadow Gulch Creek	Garfield	Eastern	35	06/06/1922
11	McFarland Creek	Okanogan	Central	48	11/16/1922
12	Alpowa Creek	Asotin, Garfield	Eastern	35	03/26/1923
13	Upper Stone Creek	Walla Walla	Eastern	32	07/10/1923
14	Doan Creek	Walla Walla	Eastern	32	06/01/1923
15	Alder Creek	Stevens	Eastern	58	02/19/1924
16	Cheweka Creek	Stevens	Eastern	58	02/19/1924
17	Dungeness River	Clallam	Southwest	18	03/07/1924
18	Big Creek	Kittitas	Central	39	03/27/1924
19	Crab Creek & Moses Lake	Adams, Grant	Eastern	41	03/27/1924
20	Ahtanum Creek	Yakima	Central	37	05/05/1924
21	Safety Harbor Creek	Chelan	Central	47	06/20/1925
22	Sternitt Creek	Chelan	Central	40	01/22/1926
23	Salmon Creek, North Fork	Okanogan	Central	49	04/06/1926
24	Johnson Creek	Okanogan	Central	49	05/20/1926
25	Squillchuck Creek	Chelan	Central	40	06/14/1928
26	Lower Antoine Creek	Okanogan	Central	49	07/09/1928
27	Bigelow Gulch Creek	Spokane	Eastern	55	08/31/1928
28	Walla Walla River	Walla Walla	Eastern	32	09/12/1928
29	Corus Creek	Stevens	Eastern	58	10/03/1928
30	Deadman Creek	Garfield	Eastern	35	01/04/1929
31	Quillisascut Creek	Stevens	Eastern	58	01/19/1929
32	Gold Creek	Okanogan	Central	48	05/07/1929
33	Black Canyon Creek	Okanogan	Central	48	06/20/1929

- Can contact adjudication coordinator or watermaster
- Public records request
- Court records



RECEIVED
JUL 29 1975
DEPARTMENT OF ECOLOGY
SPOKANE REGIONAL OFFICE

308 Record of Water Appropriations

place indicated therein, on the 6th day of May, A. D., 1912.

John W. Sprague.

JAN 20 1975

Subscribed and sworn to before me this 6th day of May, A. D., 1912.

Notary Seal, Daniel F. Gross. Daniel F. Gross, Notary

Commission expires May 4, 1913. In and for the State of Washington.

Filed for record at the request of Daniel F. residing at Ephrata, in said State.

Gross; May 6, A. D., 1912, at 8 o'clock, A. M.

J. L. Ferrer, County Auditor.
By *[Signature]* Deputy.

FILE NO. 12,407.

NOTICE OF APPROPRIATION
OF WATER.

NOTICE IS HEREBY GIVEN. That the WENATCHES-STRAITFORD ORCHARD COMPANY, a corporation, organized under the laws of the State of Washington, does hereby claim and appropriate all of the unappropriated waters, lying, being and flowing in Grab Creek, and all of the unappropriated waters lying, being and flowing into and impounded and stored in the Reservoir commonly called Round Lake; said Grab Creek flowing in a westerly direction across Township 28 North, Range 28 East, W. M., and said reservoir called Round Lake, also being located in the same Township and Range in Grant County, Washington, to the extent of 1,000 cubic feet of water per second of time.

That said water is appropriated for the purposes of pumping the same into irrigation ditches, canals, pipes and flumes for irrigating the following described lands, to-wit:

Sections Numbered One (1), to Sixteen (16), inclusive in Township 28 North, Range 28 East, W. M., and Sections One (1), Twelve (12) and Thirteen (13), of Township 28 North, Range 27 East, W. M., and other lands adjoining or in the vicinity of the lands above described as may be irrigated by and with said water.

THAT IT IS INTENDED to store and divert said water by means of pumps, ditches, canals, pipes, dams, flumes and reservoirs heretofore and to be hereafter constructed and extended from said Grab Creek upon the lands described and from said Grab Creek, into said reservoir called Round Lake, and from said reservoir to pump said water and conduct the same to and upon the lands above described; that said pump and pumping machinery has been constructed and is now in operation, and is to be hereafter maintained at or near the the Northwest corner of the Northeast Quarter of Section Sixteen (16) 1, in Township 28 North, Range 28



// Preliminary Assessment of Extent & Validity

- Triggered when a water right is undergoing a change or transfer.
- Ecology needs to know if the water right is in good standing.

- **Extent** = *how much water has been used and where?*
- **Validity** = *is the water use valid? Any relinquishment?*

POL 1120 WATER RESOURCES PROGRAM POLICY FOR CONDUCTING TENTATIVE DETERMINATIONS OF WATER RIGHTS

<u>Resource Contact:</u>	Policy and Planning Section	Effective Date: August 30, 2004 Revised: NEW
<u>References:</u>	RCW 43.27A.190; RCW 90.03.290, 90.03.380, 90.03.390 & 90.03.397; RCW 90.44.100 & 105; RCW 90.14.130; and POL 1070 and 1200	
<u>Purpose:</u>	To define tentative determinations and describe situations in which a tentative determination of a water right is required. The policy sets forth methods and tools which can be used to conduct a tentative determination.	
<u>Application:</u>	This policy is applicable to the investigation of changes or transfers to existing water rights and enforcement actions.	

This policy supercedes any previous policy statement with which it conflicts.

Definition: The following definition is intended within this policy:

“**Tentative determination,**” means a determination of the extent and validity of an existing water right established pursuant to either chapter 90.03 RCW or 90.44 RCW, or claimed pursuant to chapter 90.14 RCW. Such determinations are tentative, as final determinations of the extent and validity of existing water rights can only be made by Superior Court through a general adjudication of water rights.¹

// “Fact Checking”

- Change/transfer is a public process.
- Your historical water use and all the water use from previous landowners will be scrutinized.
- Multiple lines of evidence are preferred.



// Extent & Validity Checklist

- Instantaneous Quantity
- Annual Quantity
- Point of Withdrawal/Diversion
- Place of Use
- Purpose of Use
- Period of Use
- Extent of Beneficial Use



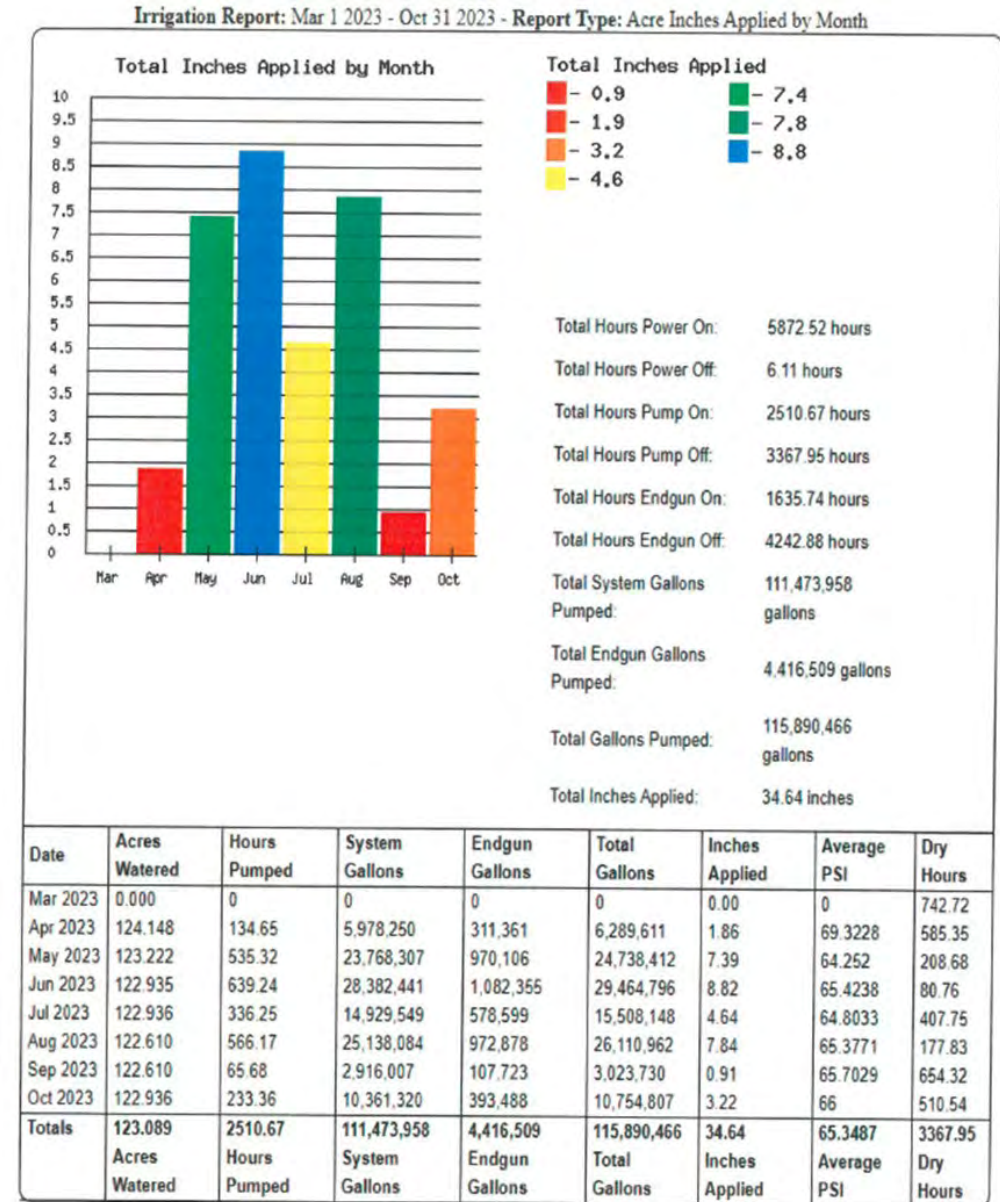
// How Much Water Has Been Used?- *Instantaneous Quantity*

- Water conservation & irrigation efficiencies can lower these values over time.
- **Data Sources:**
 - Flow meter*
 - Pump curves & capacity
 - Irrigation system demands
 - Aquifer testing data
 - Well Log
 - WagNet*



// WagNet- AgSense

- Remote pivot management (app)
- Pivot control & monitoring
 - *Pivot speed*
 - *Application rate*
- Real-time & historical data
 - *Flow rate*
 - *Gallons pumped*
 - *Inches applied*



// How Much Water Has Been Used?- *Annual Quantity*

- **Data Sources:**

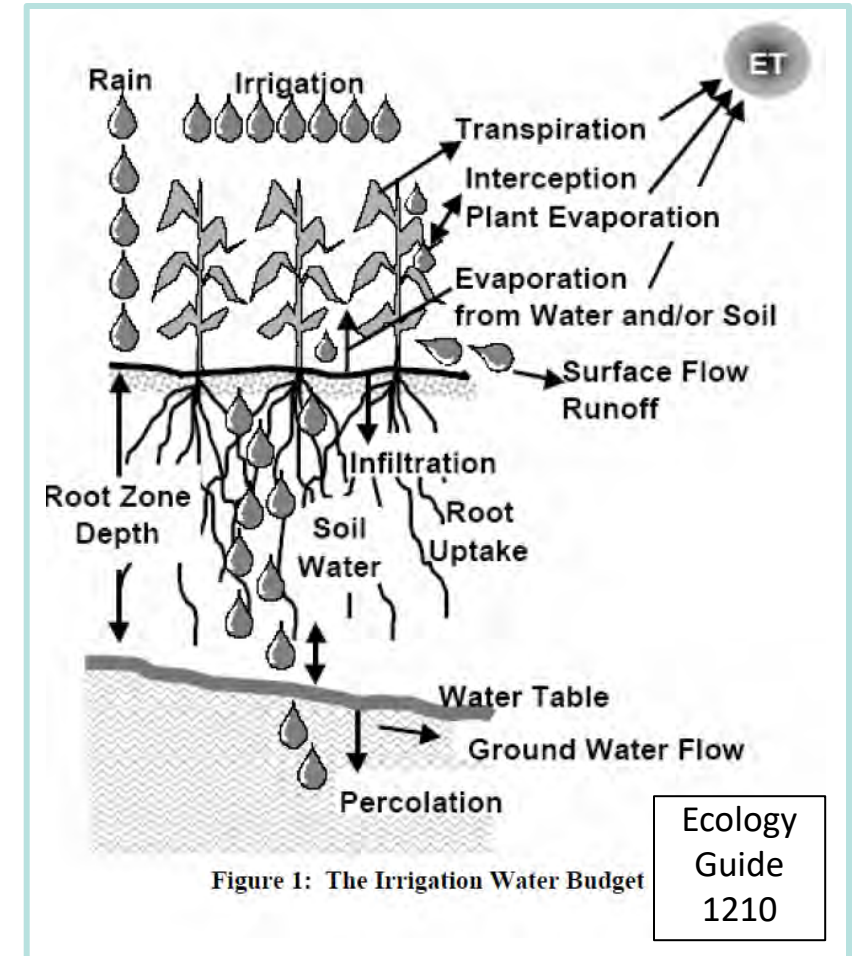
- Flow meter*
- Aerial imagery & photos
- Crop demand estimates
- Power meter records
- Wagnet*
- Farm or business records
- Personal affidavits or photos
- And more!



// Crop Demand Estimates

Crop Irrigation Requirement (CIR) = ET

- **Washington Irrigation Guide (WIG)**
 - Appendix A (*variety of crops*)- 1985
 - Appendix B (*field corn & pasture*)- 1992
- **Open ET**
- And more!



// Crop Demand Estimates- WIG

- 100 acres of cherries near Spokane

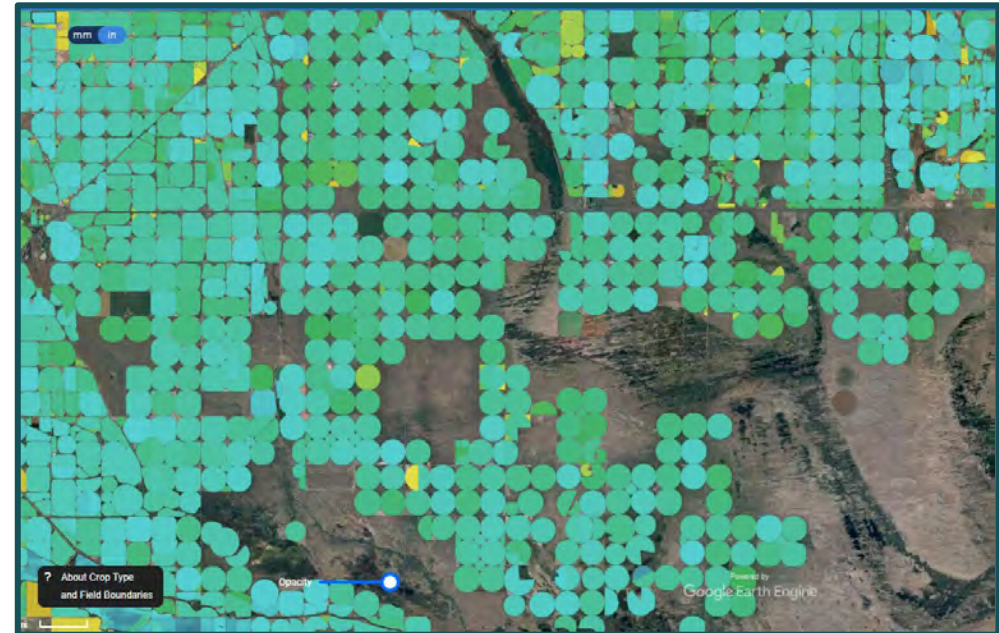
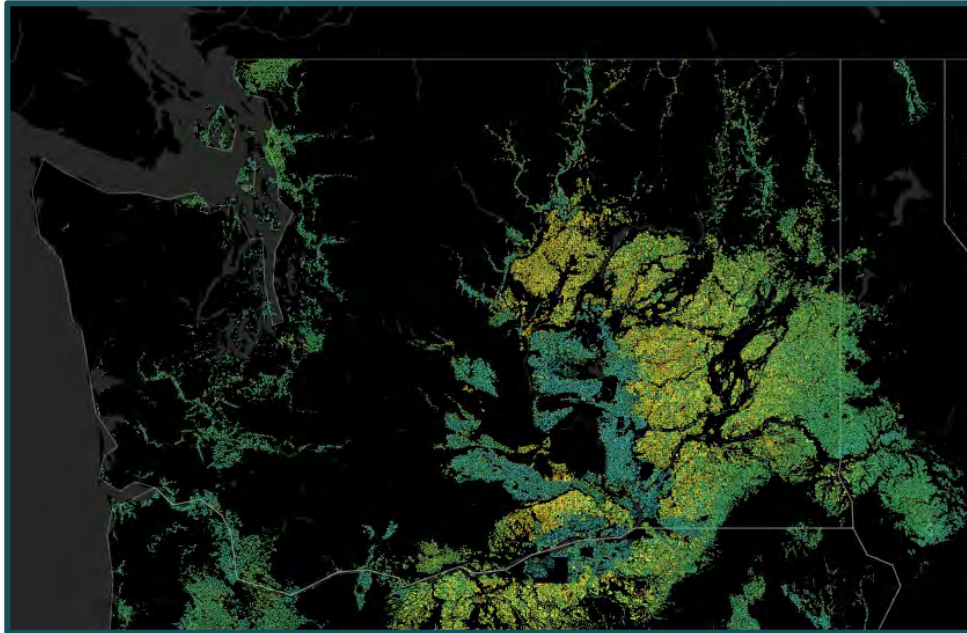
SPOKANE													
APRICOT W/O COVER	BEG 4/16		END 10/10										
	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	SEASON
MONTHLY NET IRRIG REQUIRE(IN)	.00	.00	.00	.12	1.84	4.09	7.95	6.34	2.89	.04	.00	.00	23.25
AV. PAN FACTOR	.32	.32	.32	.32	.44	.60	.72	.72	.56	.52	.32	.32	
CHERRY W/O COVER	BEG 5/ 4		END 10/10										
	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	SEASON
MONTHLY NET IRRIG REQUIRE(IN)	.00	.00	.00	.00	1.46	4.76	8.88	7.11	4.11	.07	.00	.00	26.39
AV. PAN FACTOR	.32	.32	.32	.32	.48	.68	.80	.80	.76	.56	.32	.32	
PEACH W/O COVER	BEG 4/25		END 10/10										
	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	SEASON
MONTHLY NET IRRIG REQUIRE(IN)	.00	.00	.00	.04	1.84	4.09	7.95	6.34	2.89	.04	.00	.00	23.17
AV. PAN FACTOR	.32	.32	.32	.32	.44	.60	.72	.72	.56	.52	.32	.32	

$$\text{Water Use (AF)} = \text{Irrigated Area (ac)} * \text{Net Irrigation Required} \left(\frac{\text{in}}{\text{yr}} \right) * \frac{1 \text{ ft}}{12 \text{ in}}$$

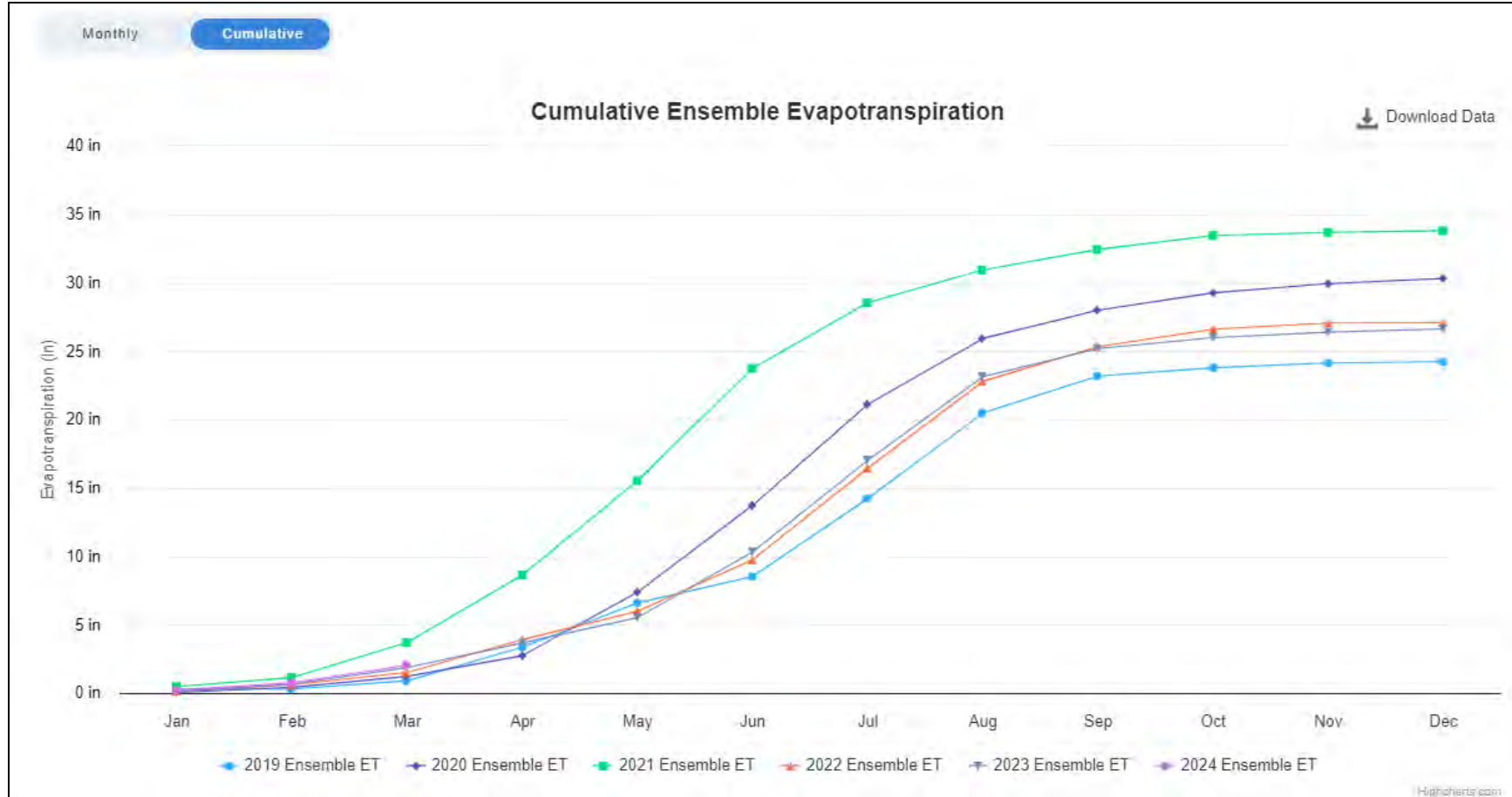
$$219.9 \text{ AF} = 100 \text{ ac} * 26.39 \frac{\text{in}}{\text{yr}} * \frac{1 \text{ ft}}{12 \text{ in}}$$

// Open ET

Open ET is a publicly available satellite-based water data resource which **reports ET** for areas as small as a $\frac{1}{4}$ acres at daily, monthly, and yearly intervals.



// Open ET



// Crop Demand Estimates

Variables impacting irrigation efficiency:

- Spray evaporation loss
- Canopy loss
- Wind drift
- Runoff
- Deep percolation



// Crop Demand Estimates

- **Washington Irrigation Guide (WIG)** = crop irrigation requirement (CIR)
- **Ecology Guide 1210** = guide for estimating irrigation consumptive use and efficiency

Actual Efficiency (E_a)

$$E_a = \frac{CIR}{Total\ Water\ Use}$$

Or

$$Total\ Water\ Use = \frac{CIR}{E_a}$$



// Crop Demand Estimates- Ecology Guide 1210

Table 1: Summary of Application Efficiency Ranges, Consumptive Use, and Return Flows¹

Method		Application Efficiency, E_a (%) ²		% Total Evaporated	% Total Use Consumed	Return Flow
		Range	Average, $E_{a,avg}$	%Evap	%CU, Average ³	%RF, Average ⁴
Surface:	Graded Furrow	50 – 80	65	5	70	30
	w/ tailwater reuse	60 – 90	75	5	80	20
	Level Furrow	65 – 95	80	5	85	15
	Graded Border	50 – 80	65	5	70	30
	Level Basins	80 – 95	85	5	90	10
	Flood	35 – 60	50	5	55	45
Sprinkler:	Periodic Move (Handline)	60 – 85	75	10	85	15
	Side Roll (Wheelline)	60 – 85	75	10	85	15
	Moving Big Gun	55 – 75	65	10	75	25
	Solid-Set—Overtree	55 – 80	70	15	85	15
	Solid Set--Undertree	60 – 85	75	10	85	15
	Pop-Up Impact	60 – 85	75	10	85	15
Center-Pivot	Impact heads w/end gun	75 – 90	80	15	95	5
	Spray heads w/o end gun	75 – 95	90	10	100	0
	LEPA ⁵ w/o end gun	80 – 98	92	5	97	3
Lateral-Move	Spray heads w/hose feed	75 – 95	90	10	100	0
	Spray heads w/canal feed	70 – 95	85	10	95	5
Microirrigation:	Trickle/Drip	70 – 95	88	5	93	7
	Subsurface Drip	75 – 95	90	0	90	10
	Microspray	70 – 95	85	10	95	5

1. Calculate the actual water use from water meter data, power meter, or run-time data. In the absence of such data, the TIR (total irrigation requirement) = CIR / E_a , where CIR is the crop irrigation requirement from the WIG (Appendix B) and E_a is the case-specific application efficiency above.
2. %Evap is the portion of the total irrigation requirement that is evaporated due to factors other than crop ET.
3. Select appropriate %CU based on type of irrigation system. If calculated E_a is greater or less than $E_{a,avg}$, then %CU = $E_a + \%Evap$. $CU = TIR \times \%CU$.
4. Select appropriate %RF based on type of irrigation system. If calculated E_a is greater or less than $E_{a,avg}$, then %RF = $100 - \%CU$. $RF = TIR \times \%RF$
5. Low Energy Precision Application.



// Crop Demand Estimates

- 100 acres of cherries near Spokane
- **CIR** = 220 acre-ft (*from the VMG*)
- **Ea** = 75% (*from GUIDE 1210*)

$$\text{Total Water Use} = \frac{\text{CIR}}{\text{Ea}}$$

$$\text{Total Water Use} = \frac{220 \text{ acre-ft}}{75\%}$$

Total water use = 290 acre-ft



// Power Meter Records- KWH to Gallons

GRANT COUNTY PUBLIC UTILITY DISTRICT Premise History For the period 01/01/2020 through 11/13/2023

Premise ID: 9167204619
KWH Meter: KZD78958455

Address 1	Address 2	City	State	Zip	Premise Type
222706	700 Hp IPA YES	Soap Lake	WA	98851-0000	IRR

Read Date	Estimated	Rate	KWH	KVr	Meter Demand	Bill Demand	PF	Amount	Days	Discount Applied
10-01-2023	N	RATE3	132,372		524.256			5,793.48	30	
09-01-2023	N	RATE3	292,902		524.256			10,598.17	31	
08-01-2023	N	RATE3	363,750		524.256			12,718.65	31	
07-01-2023	N	RATE3	359,837		524.256			12,601.53	30	
06-01-2023	N	RATE3	278,355		524.256			10,162.76	31	
05-01-2023	N	RATE3	55,560		522.624			3,494.52	30	
04-01-2023	N	RATE3	10,705		520.544			309.90	43	
02-17-2023	N	RATE3	0		0.000			0.00	47	
01-01-2023	N	RATE3	3,978		6.176			115.16	31	
12-01-2022	N	RATE3	19,362		517.696			560.54	30	
11-01-2022	N	RATE3	142,484		520.096			5,898.32	31	
10-01-2022	N	RATE3	236,424		523.648			8,617.90	30	
09-01-2022	N	RATE3	359,363		522.848			12,176.98	31	
08-01-2022	N	RATE3	338,561		522.848			11,574.75	31	
07-01-2022	N	RATE3	318,253		524.256			10,986.85	30	
06-01-2022	N	RATE3	219,758		524.256			8,135.43	31	
05-01-2022	N	RATE3	76,226		515.936			3,980.17	30	
04-01-2022	N	RATE3	27,011		518.016			781.96	42	
02-18-2022	N	RATE3	5,700		6.336			165.03	48	
01-01-2022	N	RATE3	4,330		6.272			125.36	31	
12-01-2021	N	RATE3	4,430		515.264			128.24	30	
11-01-2021	N	RATE3	23,824		513.856			2,463.12	31	
10-01-2021	N	RATE3	131,097		516.384			5,568.67	30	
09-01-2021	N	RATE3	284,438		516.768			10,007.90	31	
08-01-2021	N	RATE3	315,132		518.112			10,896.50	31	



// Power Meter Records- WAC 173-173-160

$$V = \frac{318,600(kWh)(P_{eff})(M_{eff})}{TDH}$$

Where:

318,600 = conversion factor

V = volume of water pumped in gallons

kWh = number of kilowatt-hours for the time period in question

P_{eff} = pump efficiency as a decimal

M_{eff} = motor efficiency as a decimal

TDH = total dynamic head

PUMP EFFICIENCY

$$\eta = \frac{P_{out}}{P_{in}}$$

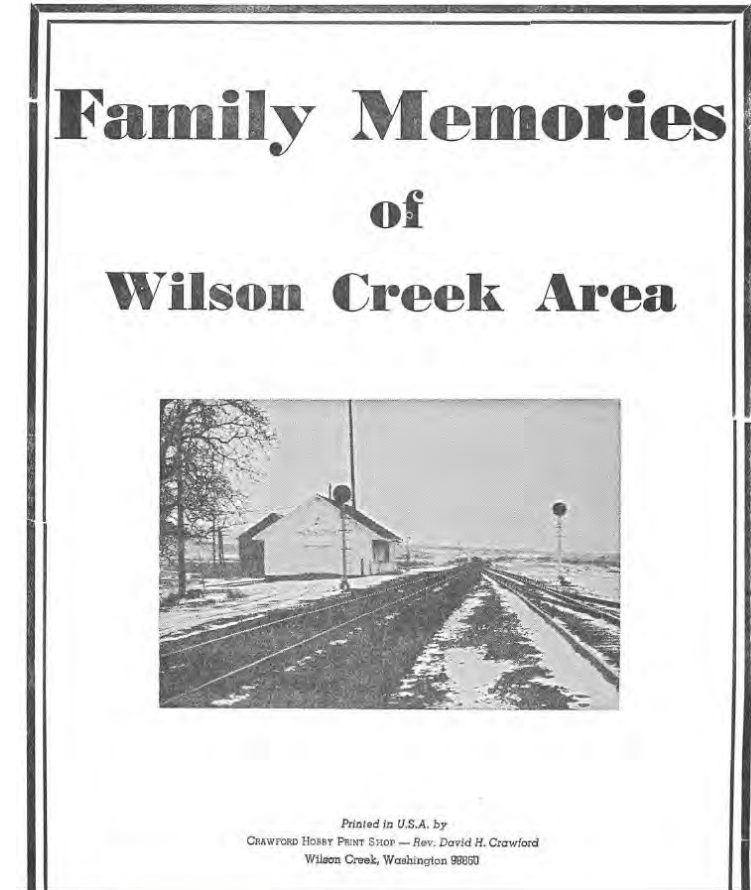
$$P_{out} = Q\rho gH$$

MOTOR EFFICIENCY

$$\eta = \frac{0.7457 \times hP \times load}{P_{in}}$$

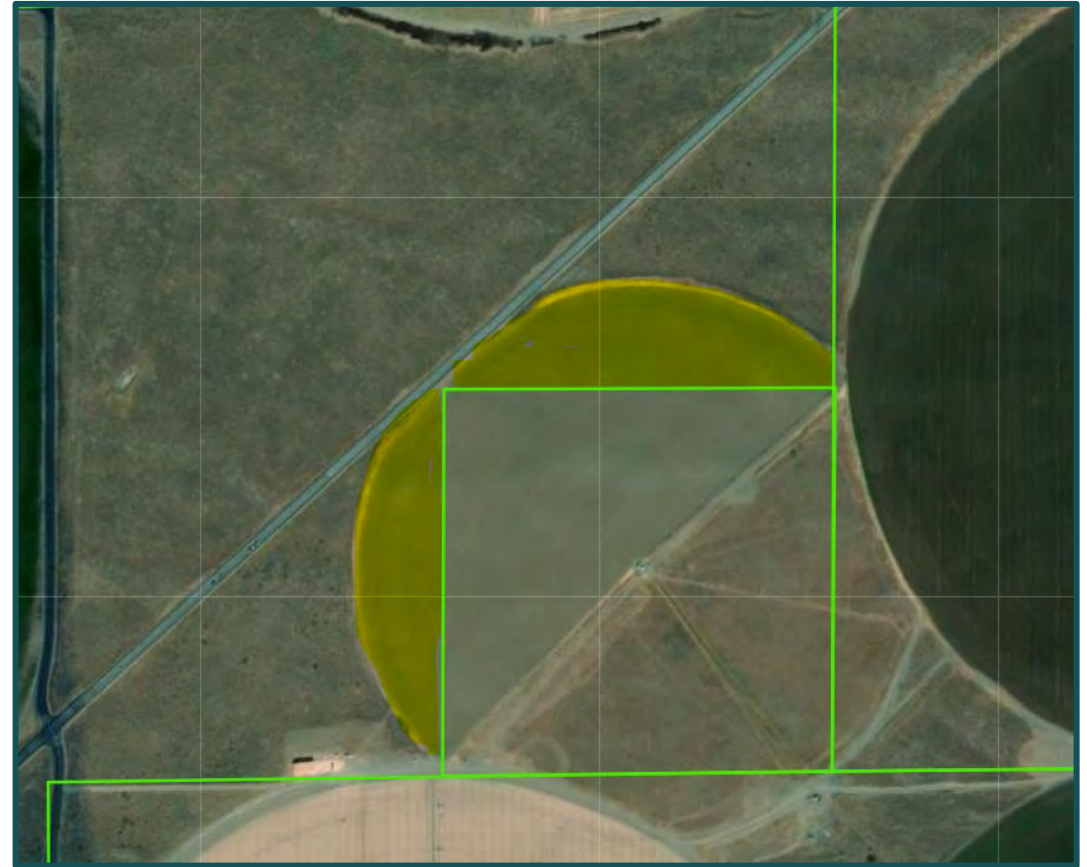
// Personal Affidavits or Farm/Business Records

16 of Round Lake for irrigation puposes to irrigate the nearby or-
17 chards.
18 In the summer of 1915, when I was ^{five (5) LMB} ~~four (4)~~ years old, we
19 moved into a little wood shack located right at Round Lake and we
20 stayed there all summer long through the irrigation season. ~~I can~~
21 ~~remember my father getting out the horses and taking me with him~~
22 ~~over to the pumps.~~ I spent most of that summer with my father over
23 at the pumping station. Attached hereto, as Exhibit "A", and in-
24 cluded herein by this reference is a true and correct copy of a
25 photograph of my father, standing by the pumps at the pumps at
26 Round Lake that he operated. This photograph was taken in approxi-
27 mately 1916 or 1917.
28 I know from first hand knowledge that water was being
29 pumped from Round Lake for irrigation purposes at least as early
30 as 1912. My grandfather, John Wesley Dudley, moved to the Strat-
31 ford, Washington, area in 1912 for the purpose of managing an
32



// What Acreage Has Been Irrigated- *Place of Use*

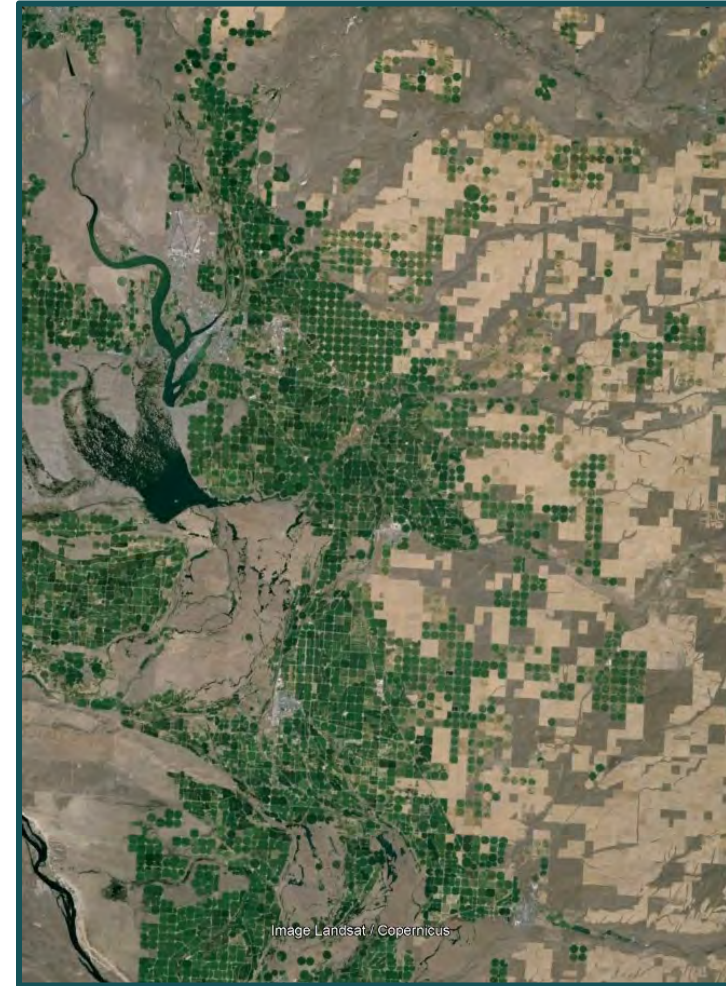
- When was water used?
- Where was water used?
- How many acres were irrigated?
- **Data Sources:**
 - Aerial imagery
 - Aerial photos
 - And more!



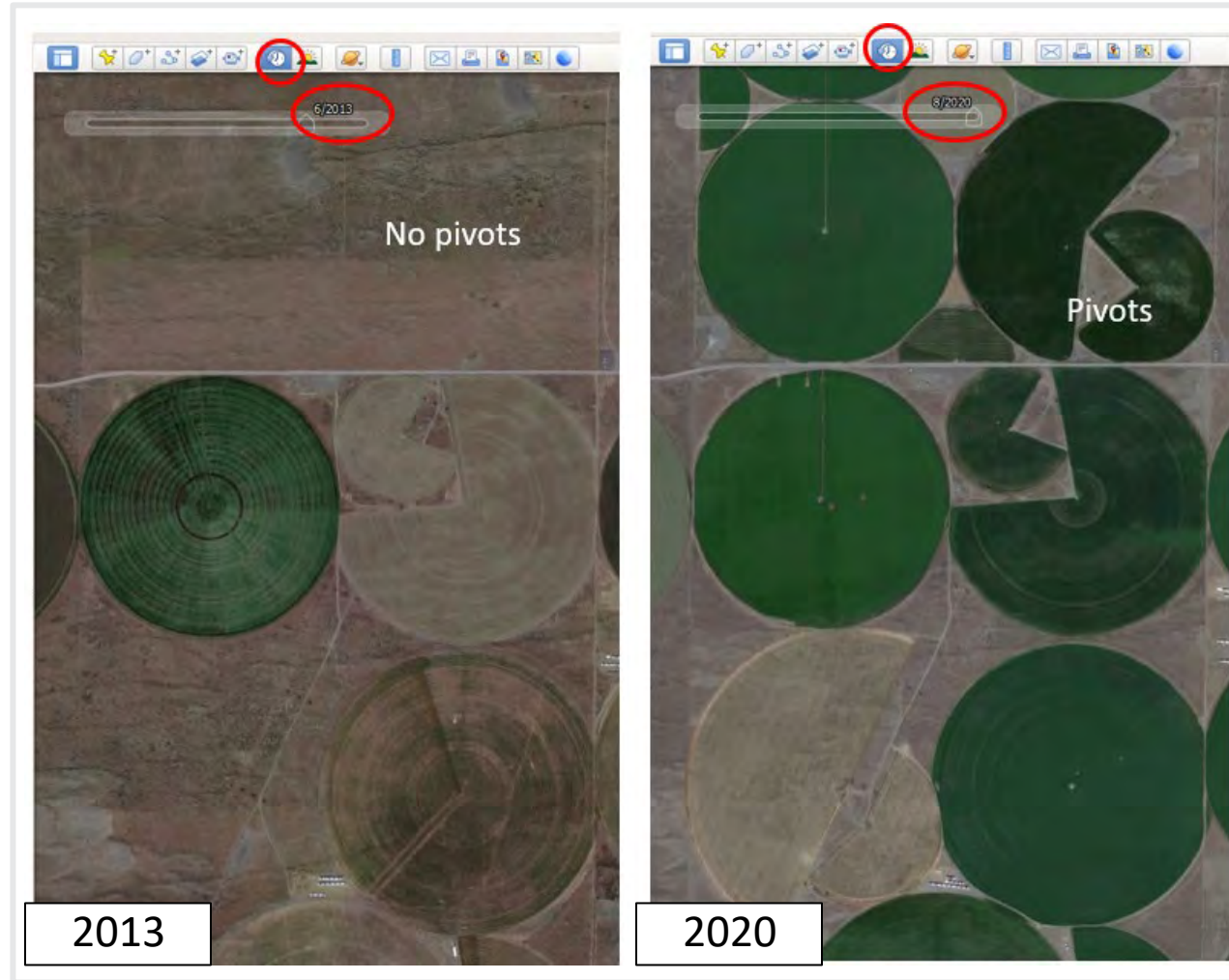
Can build a historical record from priority date to present to demonstrate use at least once every 5 years

// Aerial Imagery and Photos Data Sources

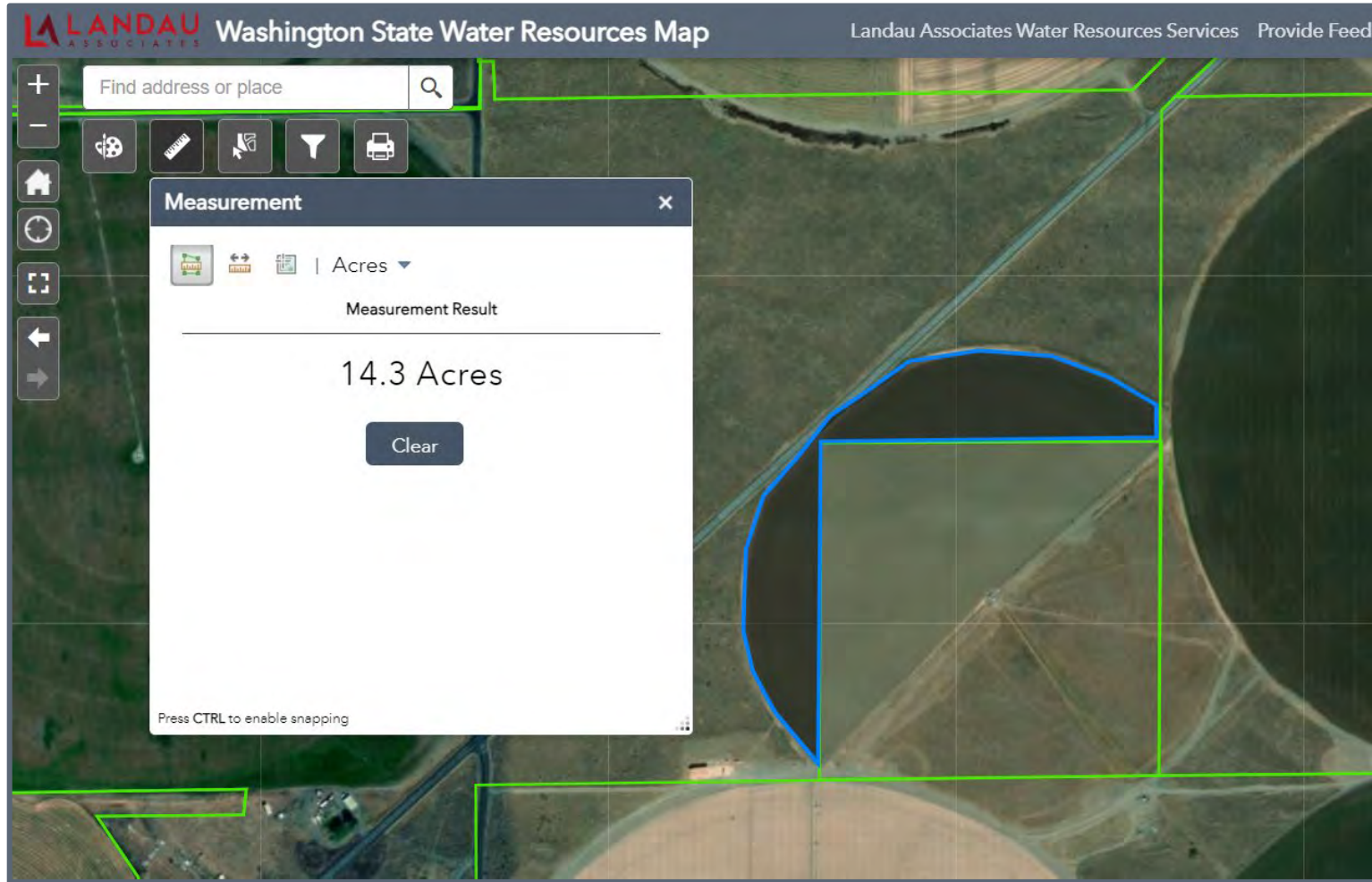
- Google Earth
- USGS Landsat Look
- USGS GloVis
- USGS Earth Explorer
- WDNR Records
- Library, University, Museum Records
- And more!



// Google Earth



// Google Earth + Earthpoint / WebApp

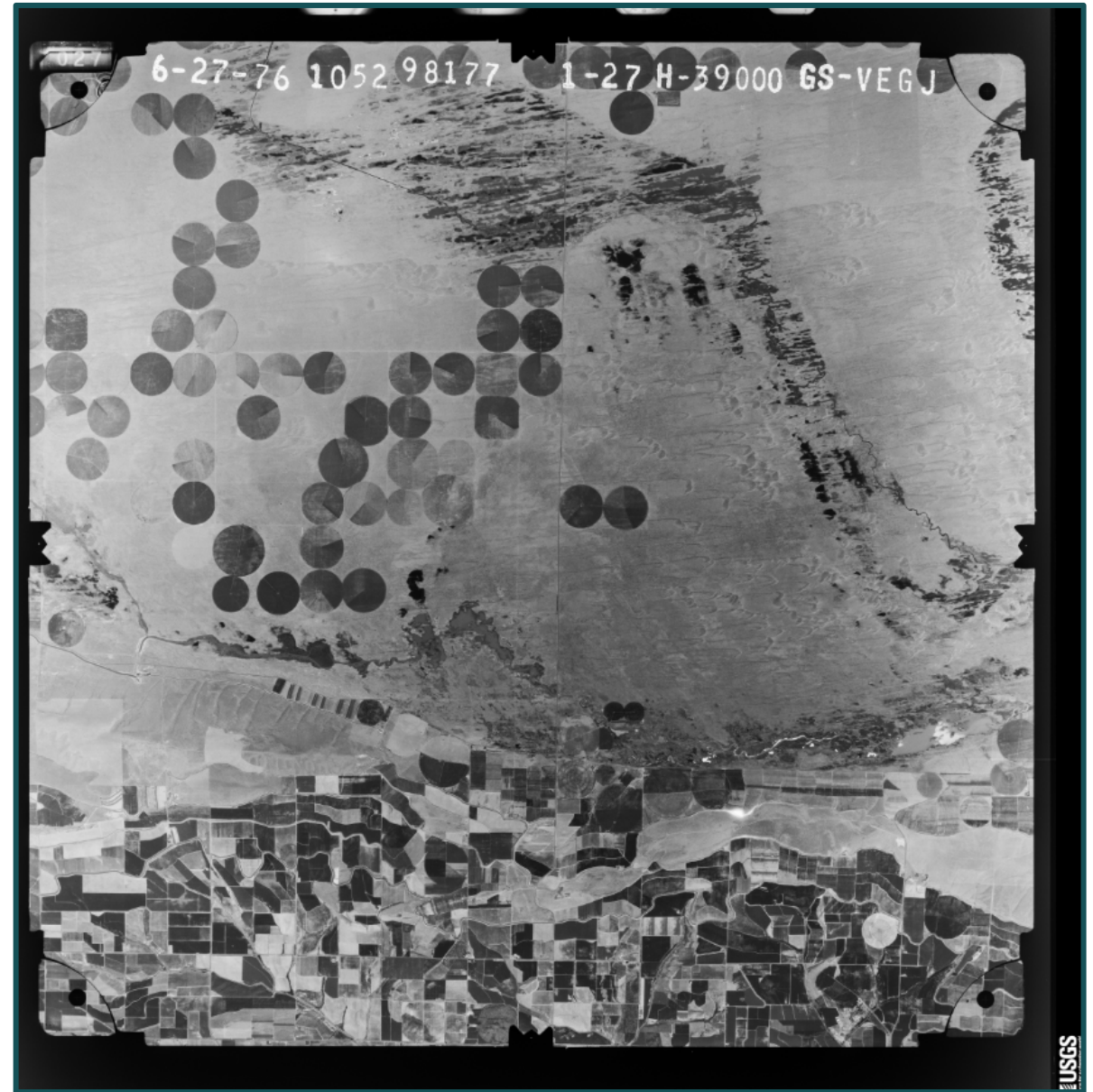


// USGS Earth Explorer

The screenshot shows the USGS Earth Explorer web interface. At the top left is the USGS logo with the tagline "science for a changing world". Below it, the "EarthExplorer" header includes a "Manage Criteria" link. The main content area is divided into a left sidebar and a central map. The sidebar has tabs for "Search Criteria", "Data Sets", "Additional Criteria", and "Results". Under "4. Search Results", there is a dropdown menu for "Data Set" currently set to "Aerial Photo Single Frames". Below this, a list of search results is displayed, each with a small thumbnail, a footprint icon, and a download icon. The third result is highlighted with a red box and a red arrow pointing to it. The central map shows a purple-tinted aerial view with numerous circular footprint icons overlaid. A red box on the map highlights the area corresponding to the selected search result.

Entity ID	Coordinates	Acquisition Date	Scale
AR1VEGJ00010026	46.941095, -119.5519	1977-07-07	78000
AR1VEGJ00010027	46.997638, -119.558554	1976-06-27	78000
AR1VEGJ00010028	47.064975, -119.561049	1976-06-27	78000
AR1VEGJ00010029	47.067305, -119.681201	1976-06-27	78000

- Imagery details (date, scale) shown next to each photo.
- Select footprint icon to see area covered by the aerial photograph.
- Click download button to view the photograph.



The screenshot displays the USGS GloVis web interface. At the top left is the USGS logo with the tagline "science for a changing world". The main header includes "GloVis" and a "Page Expires In 1:59:56" timer. A navigation bar contains links for "Home", "Take Tour", "Release Notes", "FAQ", "Preferences", "Feedback", "Logout [kanderson@landauinc.com]", and "Help".

The interface is divided into several sections:

- Interface Controls:**
 - Choose Your Data Set(s):** A list of data sets with radio buttons: DOQ, EO-1 ALI, EO-1 Hyperion, Global Land Survey (selected), IRS AWIFS, and IRS LISS-3. Below the Global Land Survey selection, it says "9 scenes match your criteria. Processing Scenes...".
 - Metadata Filter:** Includes a "Date Range" section with two date pickers (mm/dd/yyyy) and a "Cloud Cover" section with two input fields (0-100 or empty).
 - Months:** A list box showing "Jan" and "Feb".
 - Buttons for "APPLY" and "CLEAR" are at the bottom of the filter section.
- Selected Scenes (0):** A dropdown menu.
- Map:** A satellite image of a field with a grid of green circles. A crosshair cursor is positioned over one of the circles. The map includes a status bar at the top right showing "Lat: 47.0964, Lon: -119.4942" and navigation controls (home, location, settings, zoom in/out).
- Time Series Plot:** Located at the bottom of the map area, it shows a bar chart for "Global Land Survey" with data points for the years 1999, 2000, 2001, and 2002.

USGS GloVis

- Lower resolution, especially in 1980's-1990's
- Great in eastern WA where there is more contrast between irrigated and unirrigated land
- Important to define date range and desired cloud-cover percentage

Photo years:

- 1949
- 1954
- 1955
- 1957
- 1960
- 1961
- 1964

Central Washington Historical Aerial Photograph Project
Department of Geography
Central Washington University

Search for: Search term Year: USGS Topo Basemap

View photographs
Pan or zoom to your area of interest and click on photograph center points.

Search for locations
Search by place name, photograph ID, USGS quad name, or township-range-section. Click on a search result and the map will zoom to that location.

Filter by year
You can filter aerial photograph points by year and change basemaps using the drop-down lists at the top of the map.

Photo ID: AAR-3P-132
Project: Grant
Photo Date: 6/16/1955
Scale: 1:20,000
Image Quality: good picture
[Download \(25MB\)](#)

Leaflet | U.S. Department of the Interior | U.S. Geological Survey | Polci

// Aerial Photos & Imagery

June 2, 1948 (USGS)



October 17, 1952 (USGS)



November 2, 1964 (USGS)



February 28, 1968 (WA DNR)



July 1, 1973 (USGS)



April 6, 1976 (UW Libraries)



August 1, 1982 (UW Libraries)



December 31, 1984 (Landsat/Copernicus)





Nicole Mehr, LG

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