

LOCATING UNPERMITTED IRRIGATION WATER USE IN WHATCOM COUNTY

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INTRODUCTION

With rare exceptions, everyone must have a water right before taking water from streams, rivers, and lakes or from groundwater wells. However, some farmers in Whatcom County are using water without state authorization; estimates of unpermitted agricultural water use include “up to 70%” and “30 to 60%.”² The degree of noncompliance with state law varies greatly, with some water uses differing from their rights only in the locations of withdrawal/diversion or application, but some water uses lack any right at all.

The primary purpose of this project is to develop a methodology to identify the extent and locations of unpermitted water use in the Whatcom County agricultural sector. A secondary objective is to quantify the extent of unpermitted water use.

I used data on water rights and land-use patterns along with GIS (Geographical Information Systems) software to identify the locations and extent of lands that *might* be using water without the right to do so. Because of limitations and deficiencies in the various datasets (discussed below), it is not possible to make definitive statements about who is and is not using water legally.

BACKGROUND

The issue of unpermitted water use may have no villains. The farmers using water without authorization have been trying to get permits for 30 years. The Washington State Dept. of Ecology (Ecology) notes that water in the Nooksack River basin is overappropriated, so that state law does not allow the department to issue new water rights. And the state legislature has been unwilling or unable to deal with the issue.

Unfortunately, the current situation, while understandable, creates serious environmental and legal problems. Summer flows in the Nooksack River and many of its tributaries are below the minimum requirements set by Ecology:³ “From 1986 to 2009, flows in the Nooksack River failed to meet instream flow-rule requirements 72% of the time during the July-September flow

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² These informal estimates are from Whatcom Farm Friends and the Dept. of Ecology Bellingham Field Office.

³ Ecology, *Instream Resource Protection Program—Nooksack Water Resource Inventory Area (WRIA) I*, Chapter 173-501 WAC, June 9, 1988.

period.”⁴ ⁵ “Most water in the Nooksack watershed is already legally spoken for. Increasing demands for water from ongoing population growth, diminishing surface water supplies, declining groundwater levels in some areas during peak use periods, and the impacts of climate change limit Ecology’s ability to issue new water rights in this watershed.”⁶ In part because of these low flows, the number of salmon and steelhead in our waters is very low relative to historical levels, leading to their listing as threatened under the federal Endangered Species Act.

The Lummi Nation and Nooksack Indian Tribe have treaty rights dating to 1855 and perhaps to “time immemorial” that guarantee them the right to harvest salmon. These treaty rights are meaningless unless salmon populations can support a harvestable surplus of salmon.

Because agriculture accounts for 72% of Whatcom County summer use (July, August, and September), bringing farmers into compliance with water law is an important issue.⁷ That is, increasing summertime instream flows in the three forks, tributaries, and mainstem of the Nooksack River likely requires less human use of water during that period.

DATA SOURCES

The data used for this project include:

- Water rights from Ecology, its Geographic Water Rights Information System (GWIS),⁸
- Land-use data for 2010 from the Coastal Change Analysis Program (CCAP) provided by the National Oceanic and Atmospheric Administration (NOAA),
- Lands zoned for agricultural purposes from the Whatcom County Dept. of Planning and Development Services,⁹
- Land-use codes for agriculture from the Whatcom County Assessor’s office
- Crop distribution data for 2015 from the Washington State. Dept. of Agriculture (WSDA),¹⁰
- Shapefile¹¹ for Washington and Whatcom County from Western Washington University.

I used multiple sources of data on land use because each source obtains its data in a different way (e.g., satellite imagery, aerial photographs, zoning maps, human observation). These sources also define agriculture differently (e.g., land that is zoned for agriculture or land that is actually used for agriculture).

⁴ Northwest Indian Fisheries Commission, *2012 State of our Watersheds*, p. 73, August 2012.

⁵ Low flows affect the mechanical, thermal, and chemical environment in which fish swim, i.e., slower currents, warmer temperatures, and higher concentrations of pollutants.

⁶ Ecology, *Focus on Water Availability: Nooksack Watershed WRIA 1*, August 2012.

⁷ E. Hirst, *Whatcom Irrigation Water Use*, May 2016.

⁸ <http://www.ecy.wa.gov/services/gis/data/data.htm>

⁹ Whatcom County Assessor’s Office, Assessor Parcel Data, March 2016.

¹⁰ <http://agr.wa.gov/pestfert/natresources/aglanduse.aspx>

¹¹ Shapefile is a popular geospatial vector data format (location, shape, and attributes of geographic features) used for GIS software.

Whatcom County uses two land-use classification systems: zoning and land use. Almost 83,000 acres are zoned for Agriculture, but only 84% of this acreage is actually used for agriculture. The rest are residential, undeveloped, forestry/mining/fishing, and other purposes. Of the nearly 112,000 acres with agricultural land-use codes,¹² 70,000 acres (63%) are zoned for agriculture, 33,000 acres are rural residential, and the remainder are industrial or urban residential.¹³

The WSDA data identify almost 41,000 acres of irrigated land with crops growing on them.¹⁴ These data seemed the most useful and relevant for this study. These data are collected through on-the-ground observations made by the Whatcom Conservation District. And they identify lands that have crops (rather than lands with livestock or agricultural processing) and are irrigated. Because this project aims to identify irrigated areas that might lack a water right, I include only lands that are used for crops (e.g., hay, corn, blueberries, raspberries, etc.) and are irrigated.

These data were analyzed using ArcGIS programs, such as ArcMap and ArcCatalog.¹⁵

RESULTS

Although I conducted several analyses using different data sources, I focus here only on the one I found most relevant.

I used the WSDA crop distribution data for 2015, which showed 88,225 acres of crop land in Whatcom County. Eliminating lands that are not irrigated or are on the Lummi Nation Reservation reduced the total to 40,873 acres. I used Ecology's GWIS data and deleted all the applications for water rights and retained all the ground and surface water rights. I then overlay these irrigated crop lands with Ecology's GWIS data to show those areas that are irrigated and might not have a water right (Fig. 1). The 2,194 acres that, according to this analysis, lack a water right, amount to 5.3% of the irrigated acres in Whatcom County.

This estimate, 5.3% of irrigated acres using water without authorization, is much lower than the two informal estimates noted above. Two factors might explain the low number estimated here. First, the Ecology database did not show the allowed purposes of water use. A farmer might have the right to use water for dairy operations and/or domestic purposes but not for irrigation. Second, some farmers that have water rights for irrigation might use more water than allowed for in their permit or certificate. Additional analysis using other datasets from Ecology could clarify and quantify these two issues.

¹² These agricultural codes are the 8100 and 8300 series and do not include Agriculture related activities (8200).

¹³ For comparison, about 430,000 acres in Whatcom County are privately owned. The remaining 70% of the land mass is owned by federal, state, local, and tribal entities.

¹⁴ This total excludes golf courses, development, and shellfish beds. The 2012 Census of Agriculture identified 35,500 acres of irrigated farmland in Whatcom County, 15% less than the WSDA number.

¹⁵ <https://www.arcgis.com/features/>

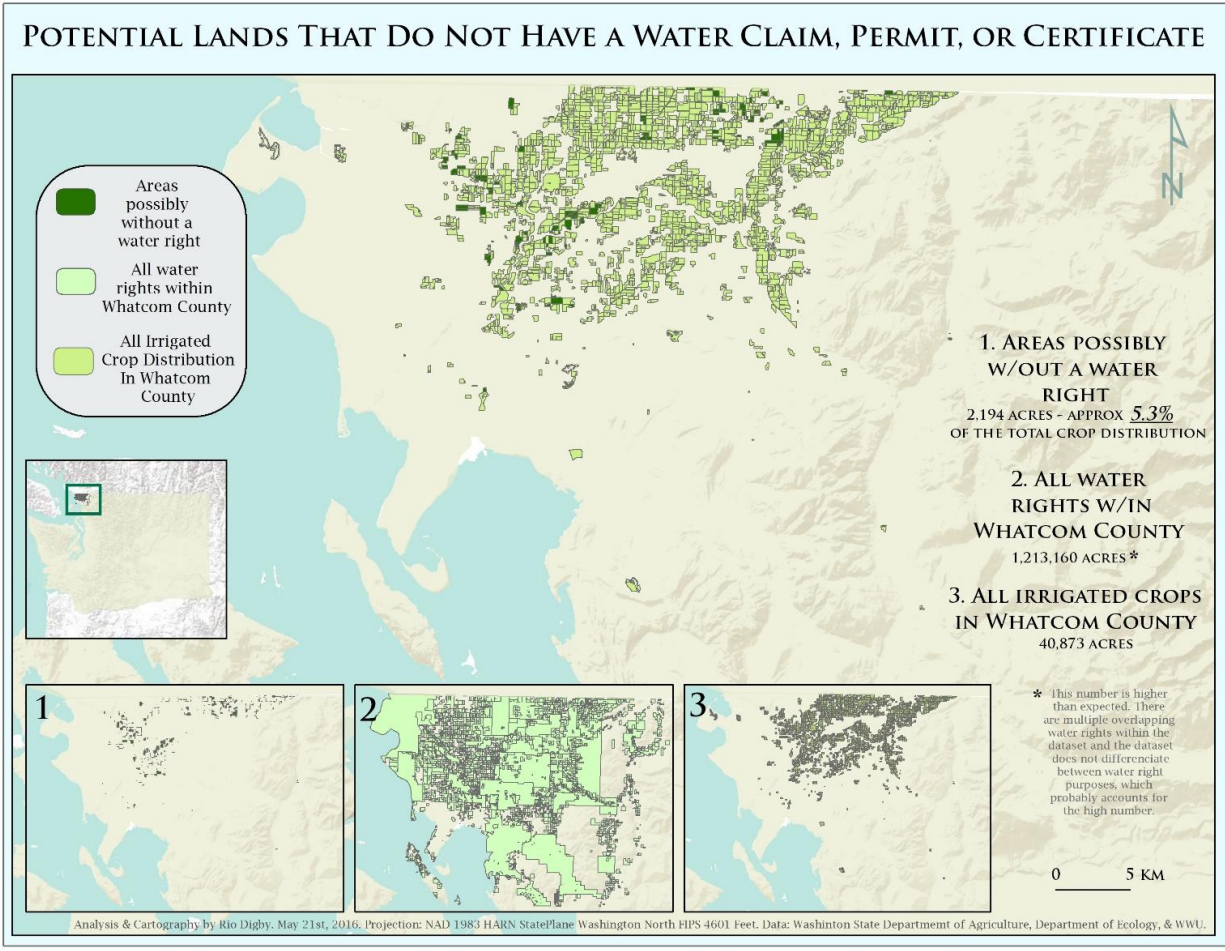


Figure 1: This is a map showing the lands that potentially do not have a water right in Whatcom County’s agricultural sector. The dark green areas are the lands that potentially do not have a water right, the light green are all the water rights within Whatcom County, and the medium green is the extent of the WSDA Crop Distribution data in Whatcom County.

APPENDIX: TECHNICAL DETAILS ON ANALYSIS WITH WSDA DATA

WSDA has data on crop distribution for 2015. It shows parcels of lands with the crop growing in that location.

1. “The geodatabase was creating in ArcGIS®. It provides crop information at the section level (Township/Range/Section) which is typically one mile square. It consists of (1) a CropSections feature class that includes all sections of land in Washington that contain crops; and (2) a relationship class that has a “one-to-many” relationship between it and (3) the CropData table. To help describe the attributes in the CropData table, the geodatabase also consists of three additional clarifying data tables including CropType, Irrigation, and Source.” (WSDA Crop Distribution Geodatabase Directions)
2. I chose to do analysis with these WSDA data because they show exact locations where crops are grown so we can assume irrigation is happening in those locations

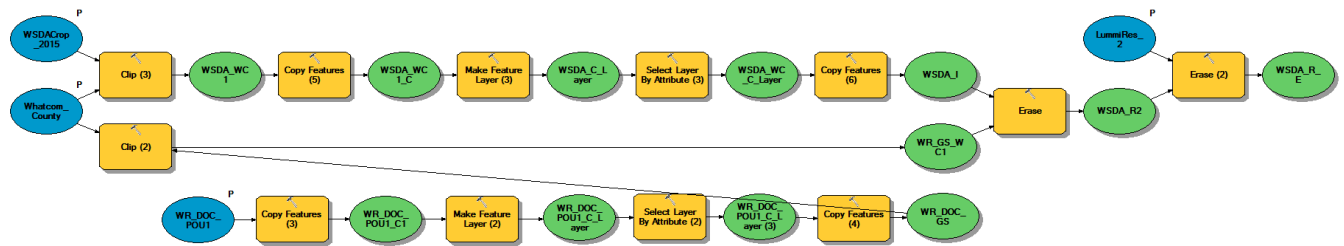


Figure 2: Model used to obtain the final results.

- Used 2015 WSDA Crop Distribution data, with 7,973,759 acres of crop land in Washington State. I clipped this data to the extent of Whatcom County. I called this result WSDA_WC, with a total of 88,225 acres.
- Excluded the ‘none’ category under irrigation to only use lands that are being irrigated. I did this through the ‘Select Layer by Attribute’ tool through SQL of Irrigation = ‘Big Gun’ OR Irrigation = ‘Big Gun/Drip’ OR Irrigation = ‘Big Gun/Sprinkler’ OR Irrigation = ‘Big Gun/Wheel Line’ OR Irrigation = ‘Drip’ OR Irrigation = ‘Drip/Big Gun’ OR Irrigation = ‘Hand/Sprinkler’ OR Irrigation = ‘Micro-Sprinkler’ OR Irrigation = ‘Sprinkler’ OR Irrigation = ‘Unknown’ OR Irrigation = ‘Wheel Line’. I named this output WSDA_I, with a total of 41,214 acres.
- Erased the Lummi Reservation from the total WSDA Crop Distribution in Whatcom County with only irrigated lands reduces the acreage to 40,873.
- Used the Ecology GWIS data, which gives a layer called WA_DOC_POU1 that has a column in the attribute table called WR_DOC_NR that documents ‘any of the possibly water right document number formats’. I extracted all the ground and surface water rights through the ‘Select Layer by Attribute’ tool through SQL of WR_DOC_NR LIKE ‘G%’ OR WR_DOC_NR LIKE ‘S%’. I named the output WR_DOC_POU1_C_T (Water rights, ground and surface). I then clipped WR_DOC_POU1_C_T to the extent of Whatcom County and called that result WR_DOC_GS.
- Used the ‘Erase Tool’ to find the left over lands that WSDA said had crop distribution but do not have a water right. I then erased WR_DOC_GS from the WSDA_I to get parcels of land that the WSDA says there is crop distribution but there is no ground or surface water right. I named this output WSDA_R2.
- Finally, erased the land for the Lummi Reservation from WSDA_R2 to exclude water rights located on tribal lands to get the final results: 2,194 acres of WSDA agricultural lands that potentially do not have a water right of a total 40,873 acres of irrigated crop land in Whatcom County.