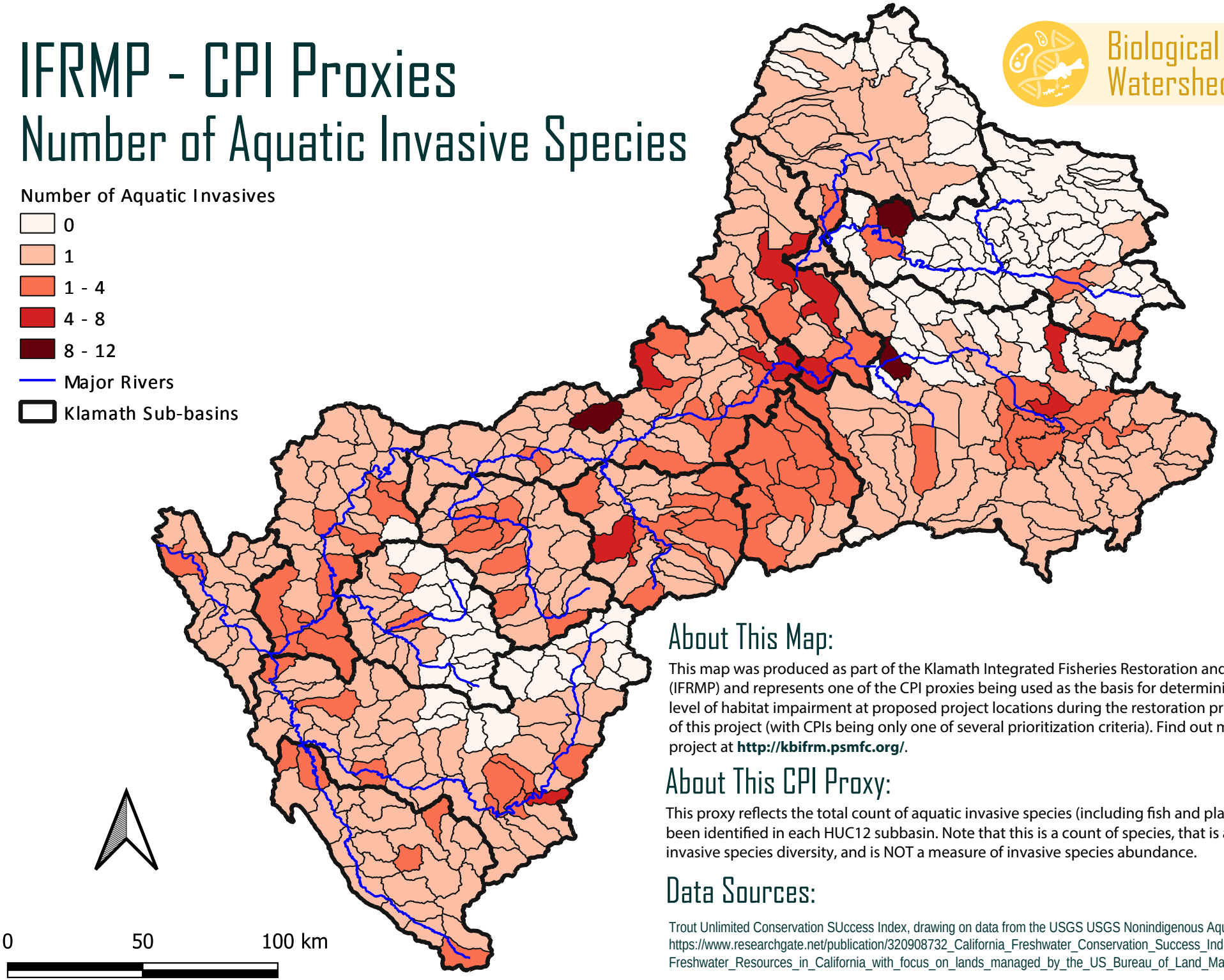
IFRMP - CPI Proxies

Number of Aquatic Invasive Species

Biological Interactions
Watershed Tier



About This Map:

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About This CPI Proxy:

This proxy reflects the total count of aquatic invasive species (including fish and plants) that have been identified in each HUC12 subbasin. Note that this is a count of species, that is a measure of invasive species diversity, and is NOT a measure of invasive species abundance.

Data Sources:

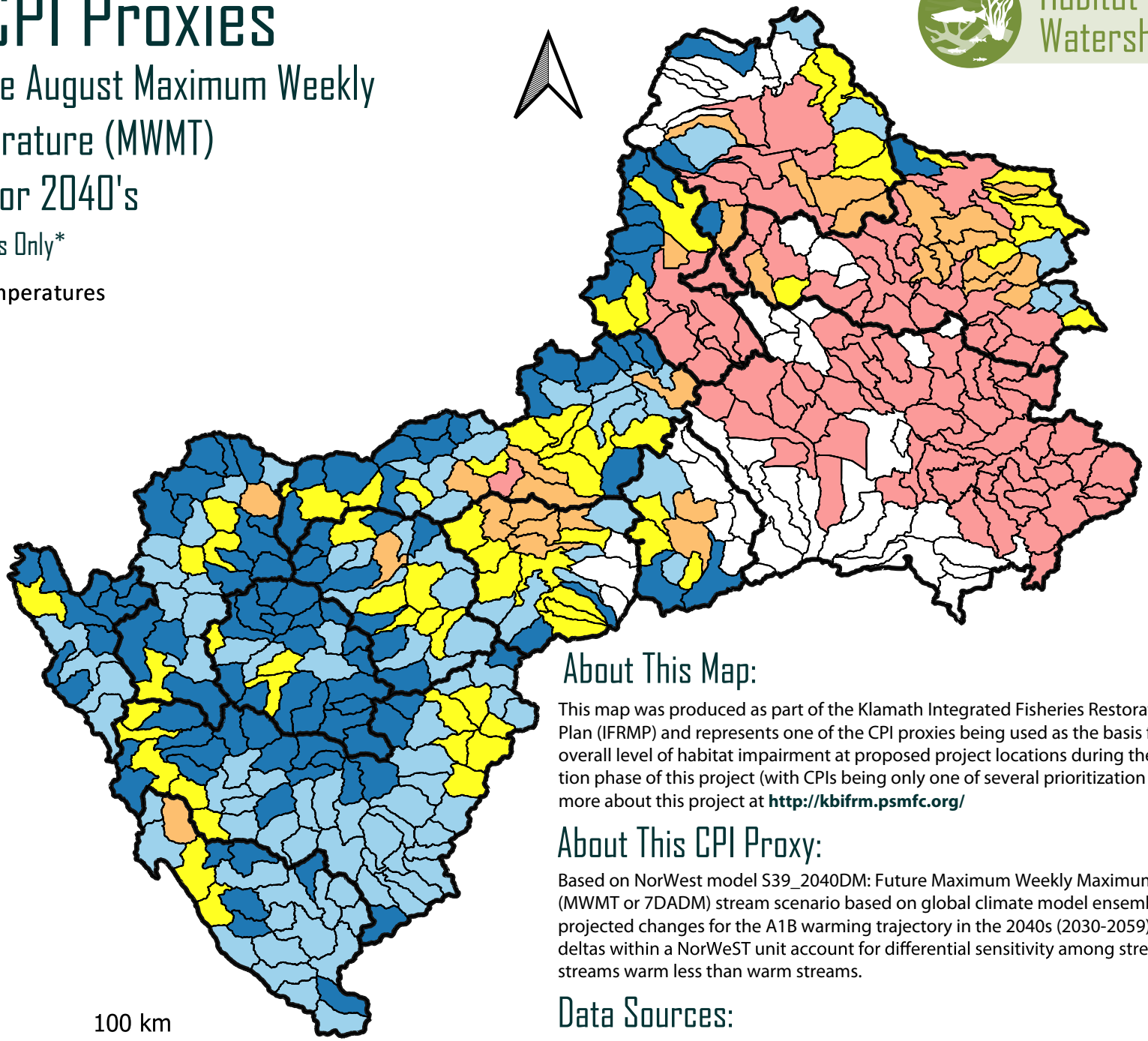
Trout Unlimited Conservation SUccess Index, drawing on data from the USGS USGS Nonindigenous Aquatic Species Database. https://www.researchgate.net/publication/320908732_California_Freshwater_Conservation_Success_Index_An_Assessment_of_Freshwater_Resources_in_California_with_focus_on_lands_managed_by_the_US_Bureau_of_Land_Management

IFRMP - CPI Proxies

Modelled Average August Maximum Weekly Maximum Temperature (MWMT) (°C), Projected for 2040's

Showing HUC12 Averages Only

Habitat
Watershed Tier



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About This CPI Proxy:

Based on NorWest model S39_2040DM: Future Maximum Weekly Maximum Temperature (MWMT or 7DADM) stream scenario based on global climate model ensemble average projected changes for the A1B warming trajectory in the 2040s (2030-2059). Future stream deltas within a NorWeST unit account for differential sensitivity among streams so that cold streams warm less than warm streams.

Data Sources:

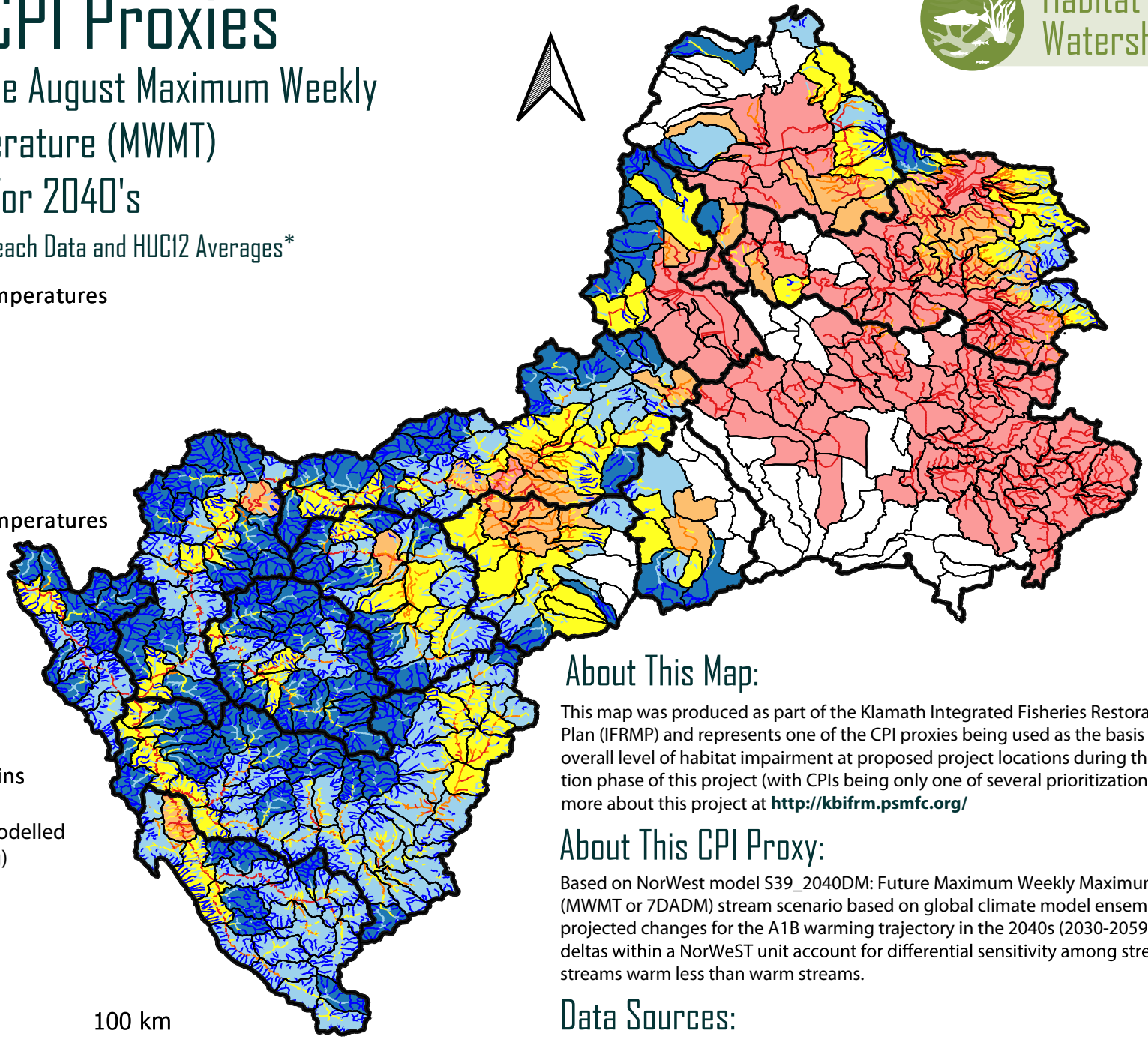
USDA Forest Service NorWeST Regional Database and Modelled Stream Temperatures
https://www.fs.fed.us/rm/boise/AWAE/projects/NorWeST/ModeledStreamTemperatureScenarioMaps.shtml

IFRMP - CPI Proxies

Modelled Average August Maximum Weekly Maximum Temperature (MWMT) (°C), Projected for 2040's

Showing Raw Stream Reach Data and HUC12 Averages

Habitat
Watershed Tier



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Data Sources:

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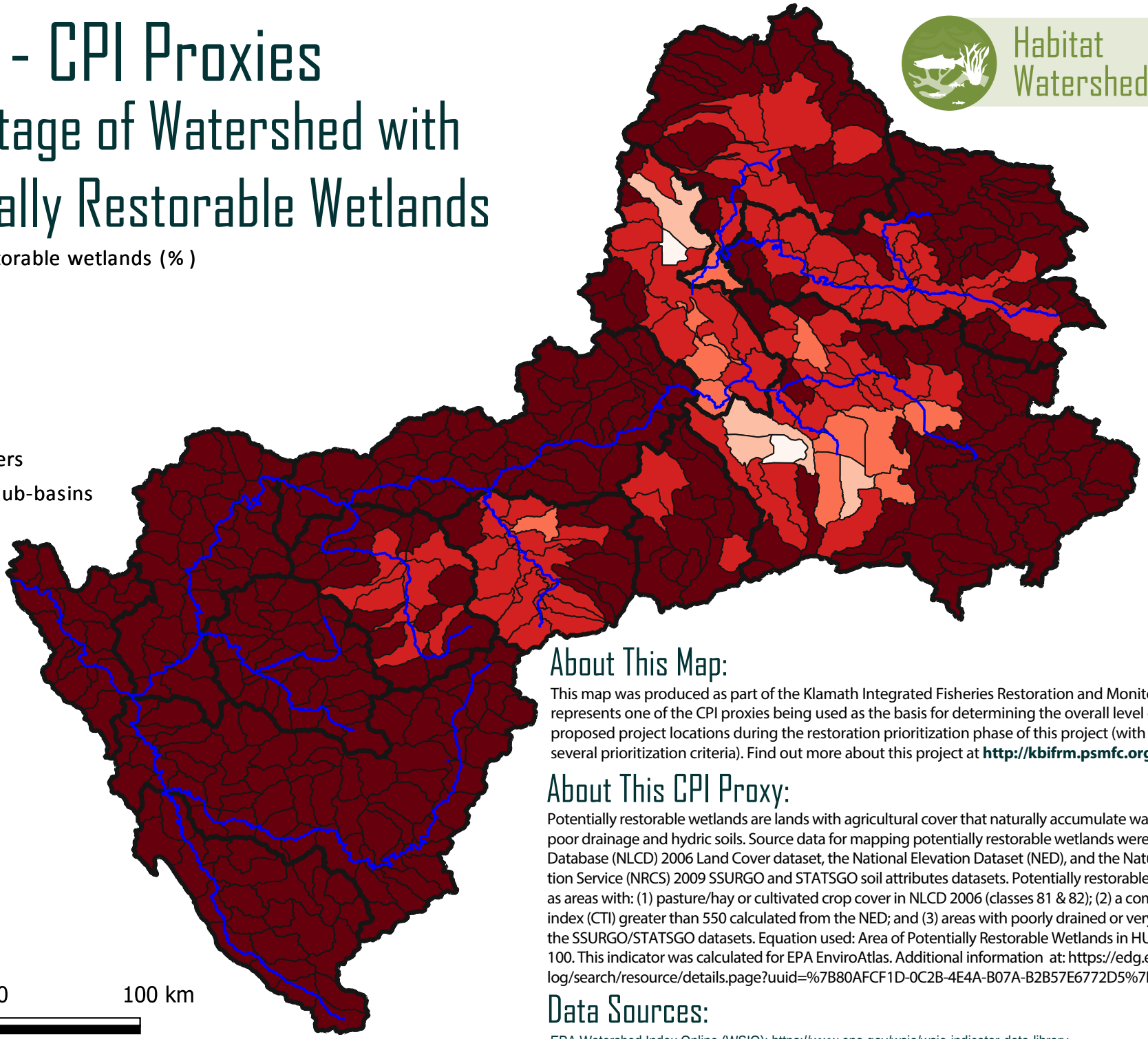
https://www.fs.fed.us/rm/boise/AWAE/projects/NorWeST/ModeledStreamTemperatureScenarioMaps.shtml

IFRMP - CPI Proxies

Percentage of Watershed with Potentially Restorable Wetlands

Habitat
Watershed Tier



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About This CPI Proxy:

Potentially restorable wetlands are lands with agricultural cover that naturally accumulate water and historically had poor drainage and hydric soils. Source data for mapping potentially restorable wetlands were the National Land Cover Database (NLCD) 2006 Land Cover dataset, the National Elevation Dataset (NED), and the Natural Resources Conservation Service (NRCS) 2009 SSURGO and STATSGO soil attributes datasets. Potentially restorable wetlands were mapped as areas with: (1) pasture/hay or cultivated crop cover in NLCD 2006 (classes 81 & 82); (2) a compound topographic index (CTI) greater than 550 calculated from the NED; and (3) areas with poorly drained or very poorly drained soils from the SSURGO/STATSGO datasets. Equation used: Area of Potentially Restorable Wetlands in HUC12 / HUC12 Land Area * 100. This indicator was calculated for EPA EnviroAtlas. Additional information at: https://edg.epa.gov/metadata/catalog/search/resource/details.page?uuid=%7B80AFCF1D-0C2B-4E4A-B07A-B2B57E6772D5%7D.

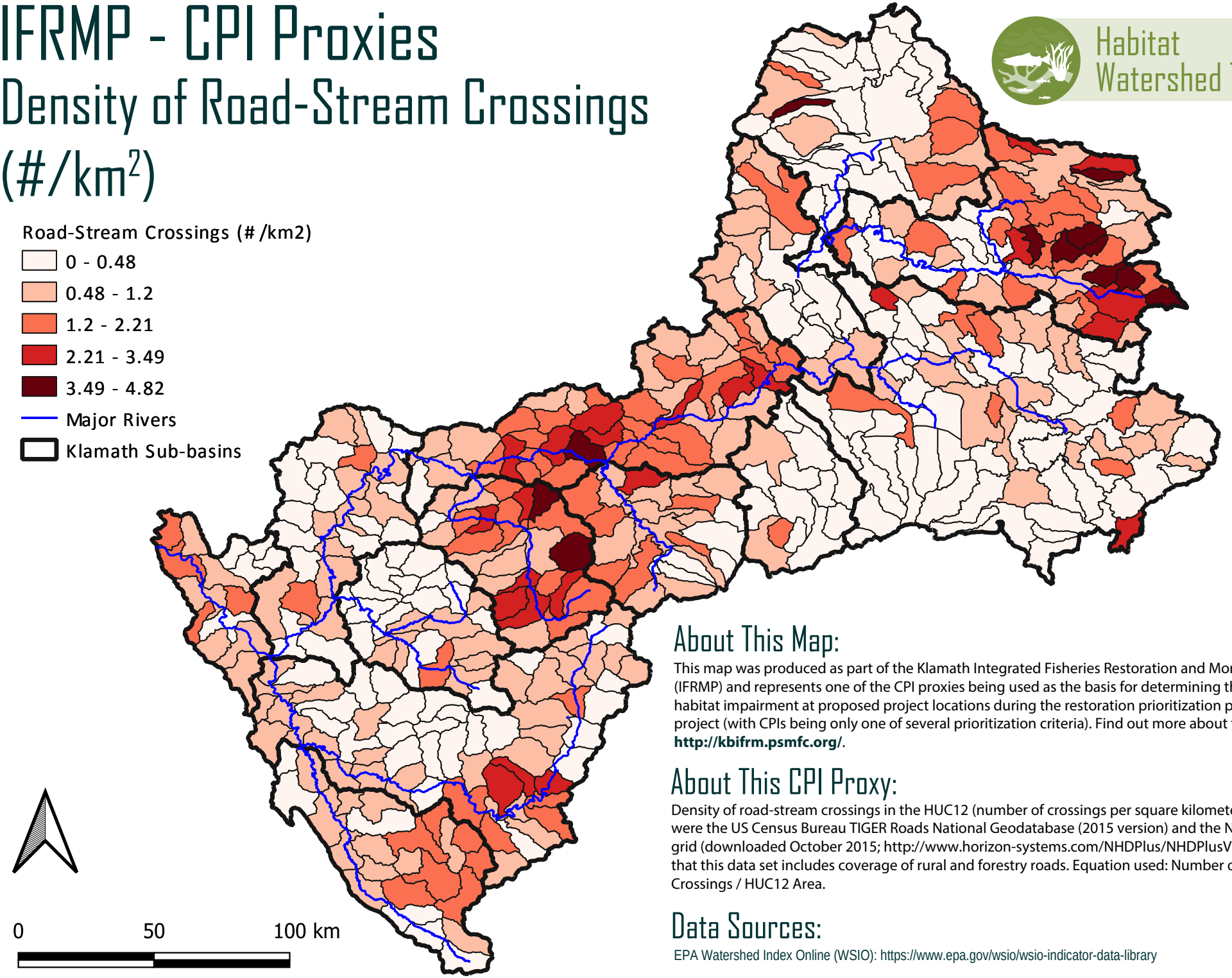
Data Sources:

EPA Watershed Index Online (WSIO): https://www.epa.gov/wsio/wsio-indicator-data-library

IFRMP - CPI Proxies

Density of Road-Stream Crossings (#/km^2)

Habitat
Watershed Tier



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About This CPI Proxy:

Density of road-stream crossings in the HUC12 (number of crossings per square kilometer). Source data were the US Census Bureau TIGER Roads National Geodatabase (2015 version) and the NHDPlus2 CatSeed grid (downloaded October 2015; http://www.horizon-systems.com/NHDPlus/NHDPlusV2_data.php). Note that this data set includes coverage of rural and forestry roads. Equation used: Number of Road-Stream Crossings / HUC12 Area.

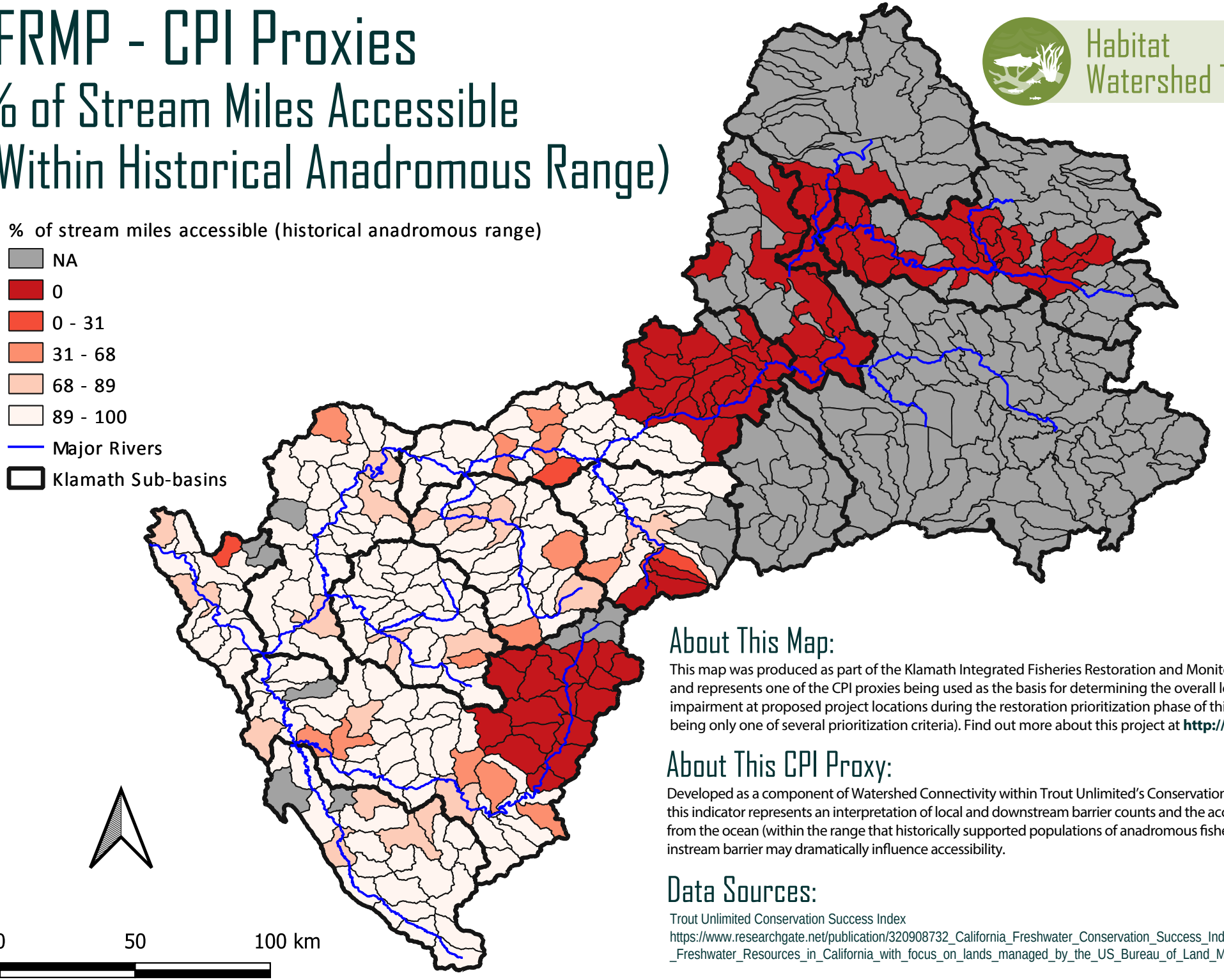
Data Sources:

EPA Watershed Index Online (WSIO): https://www.epa.gov/wsio/wsio-indicator-data-library

IFRMP - CPI Proxies

% of Stream Miles Accessible (Within Historical Anadromous Range)

Habitat
Watershed Tier



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About This CPI Proxy:

Developed as a component of Watershed Connectivity within Trout Unlimited's Conservation Success Index (CSI) this indicator represents an interpretation of local and downstream barrier counts and the accessibility of habitats from the ocean (within the range that historically supported populations of anadromous fishes). Note that a single instream barrier may dramatically influence accessibility.

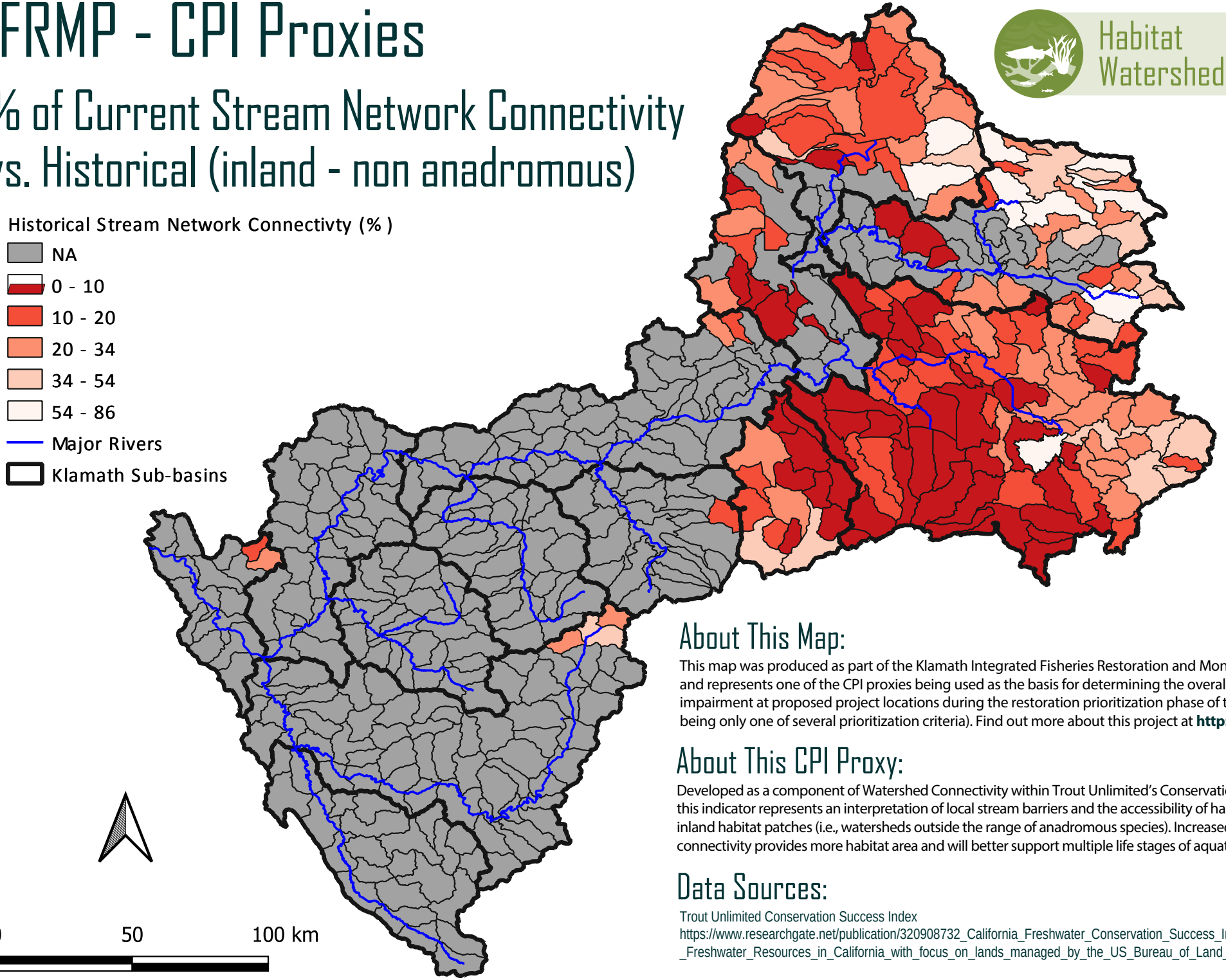
Data Sources:

Trout Unlimited Conservation Success Index
https://www.researchgate.net/publication/320908732_California_Freshwater_Conservation_Success_Index_An_Assessment_of_Freshwater_Resources_in_California_with_focus_on_lands_managed_by_the_US_Bureau_of_Land_Management

IFRMP - CPI Proxies

% of Current Stream Network Connectivity vs. Historical (inland - non anadromous)

Habitat
Watershed Tier



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About This CPI Proxy:

Developed as a component of Watershed Connectivity within Trout Unlimited's Conservation Success Index (CSI) this indicator represents an interpretation of local stream barriers and the accessibility of habitats within connected inland habitat patches (i.e., watersheds outside the range of anadromous species). Increased hydrologic connectivity provides more habitat area and will better support multiple life stages of aquatic species.

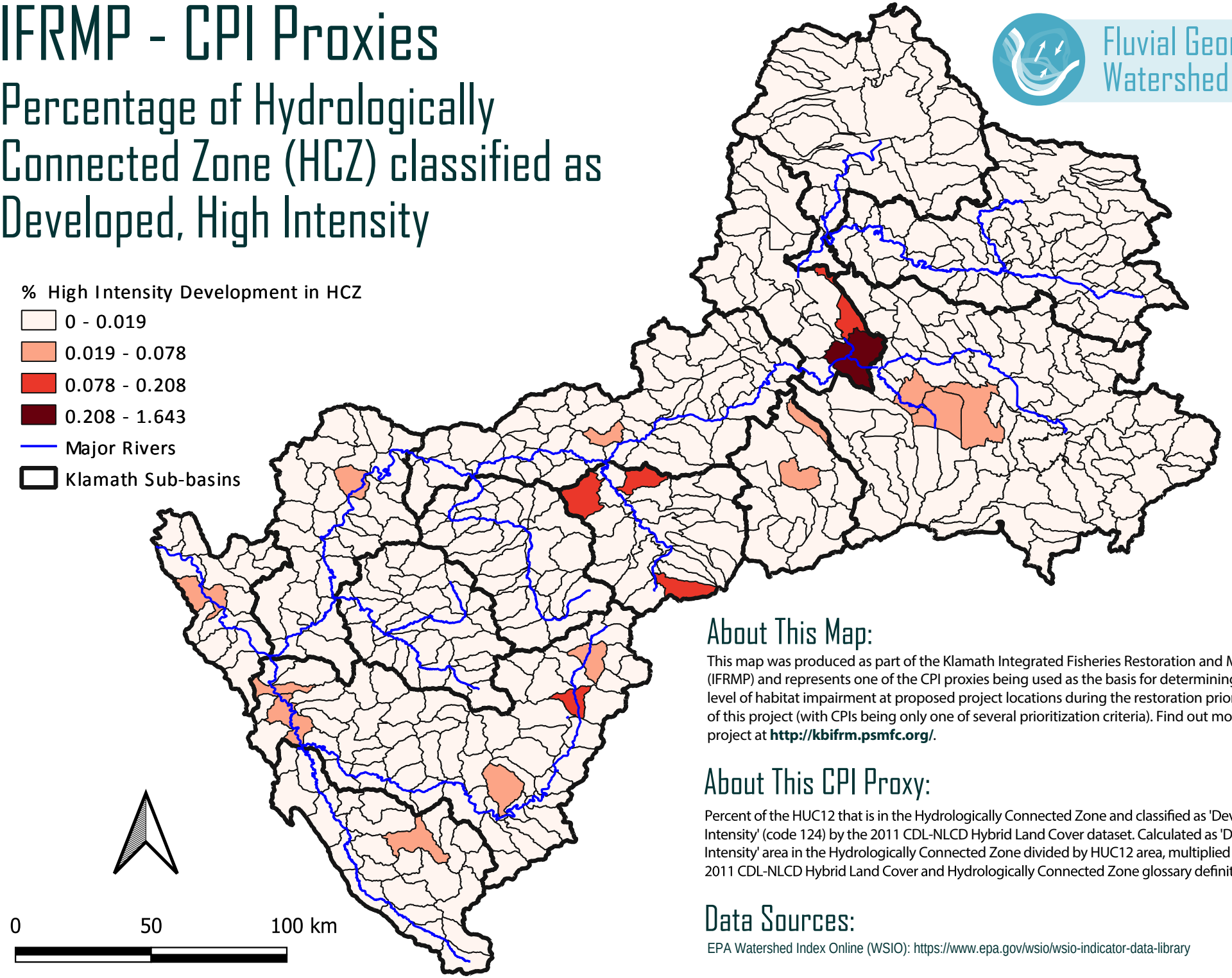
Data Sources:

Trout Unlimited Conservation Success Index
https://www.researchgate.net/publication/320908732_California_Freshwater_Conservation_Success_Index_An_Assessment_of_Freshwater_Resources_in_California_with_focus_on_lands_managed_by_the_US_Bureau_of_Land_Management

IFRMP - CPI Proxies

Percentage of Hydrologically Connected Zone (HCZ) classified as Developed, High Intensity

Fluvial Geomorphic Watershed Tier



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About This CPI Proxy:

Percent of the HUC12 that is in the Hydrologically Connected Zone and classified as 'Developed, High Intensity' (code 124) by the 2011 CDL-NLCD Hybrid Land Cover dataset. Calculated as 'Developed, High Intensity' area in the Hydrologically Connected Zone divided by HUC12 area, multiplied by 100. (See also 2011 CDL-NLCD Hybrid Land Cover and Hydrologically Connected Zone glossary definitions).

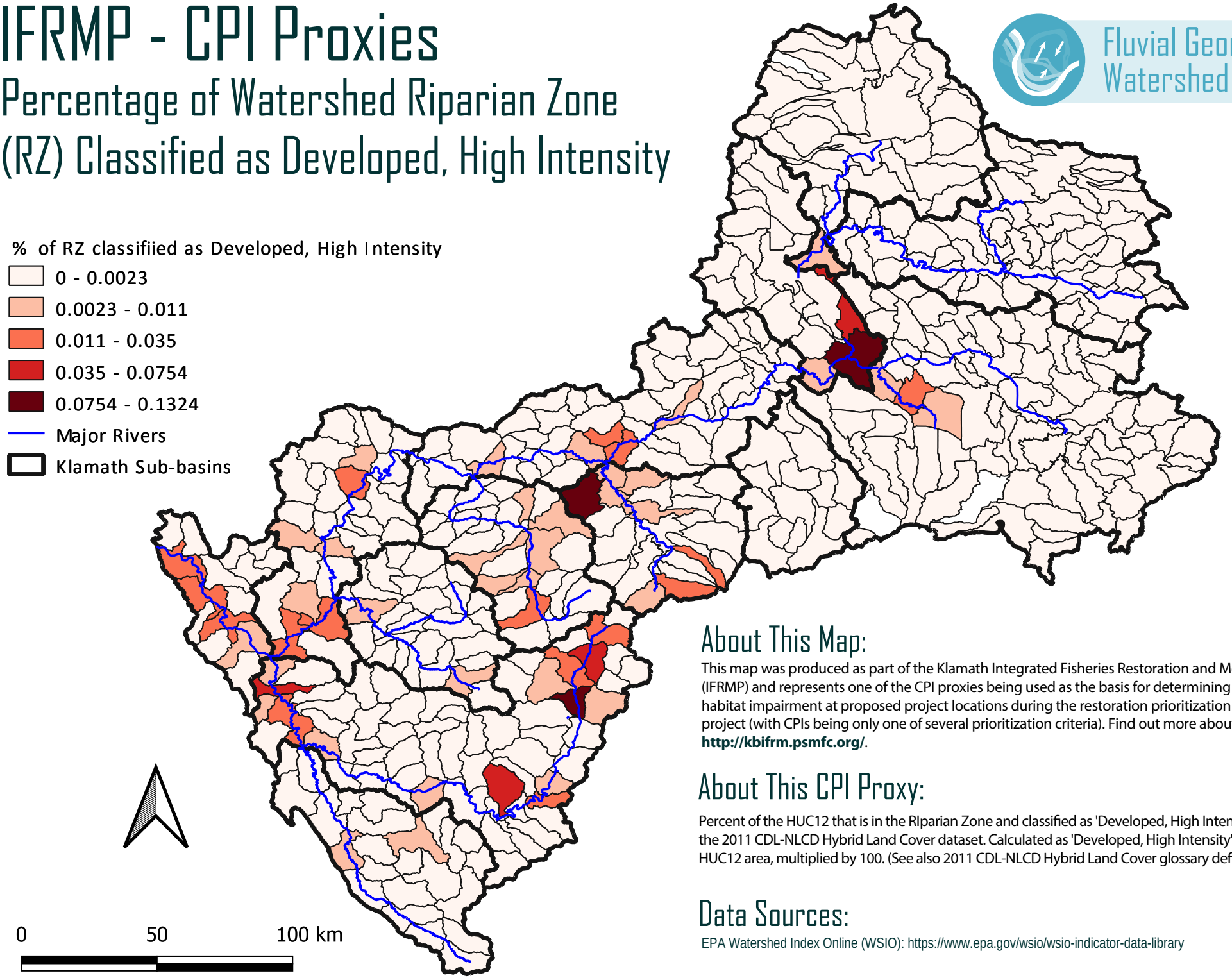
Data Sources:

EPA Watershed Index Online (WSIO): https://www.epa.gov/wsio/wsio-indicator-data-library

IFRMP - CPI Proxies

Percentage of Watershed Riparian Zone (RZ) Classified as Developed, High Intensity

Fluvial Geomorphic Watershed Tier



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About This CPI Proxy:

Percent of the HUC12 that is in the RIparian Zone and classified as 'Developed, High Intensity' (code 124) by the 2011 CDL-NLCD Hybrid Land Cover dataset. Calculated as 'Developed, High Intensity' area divided by HUC12 area, multiplied by 100. (See also 2011 CDL-NLCD Hybrid Land Cover glossary definition).

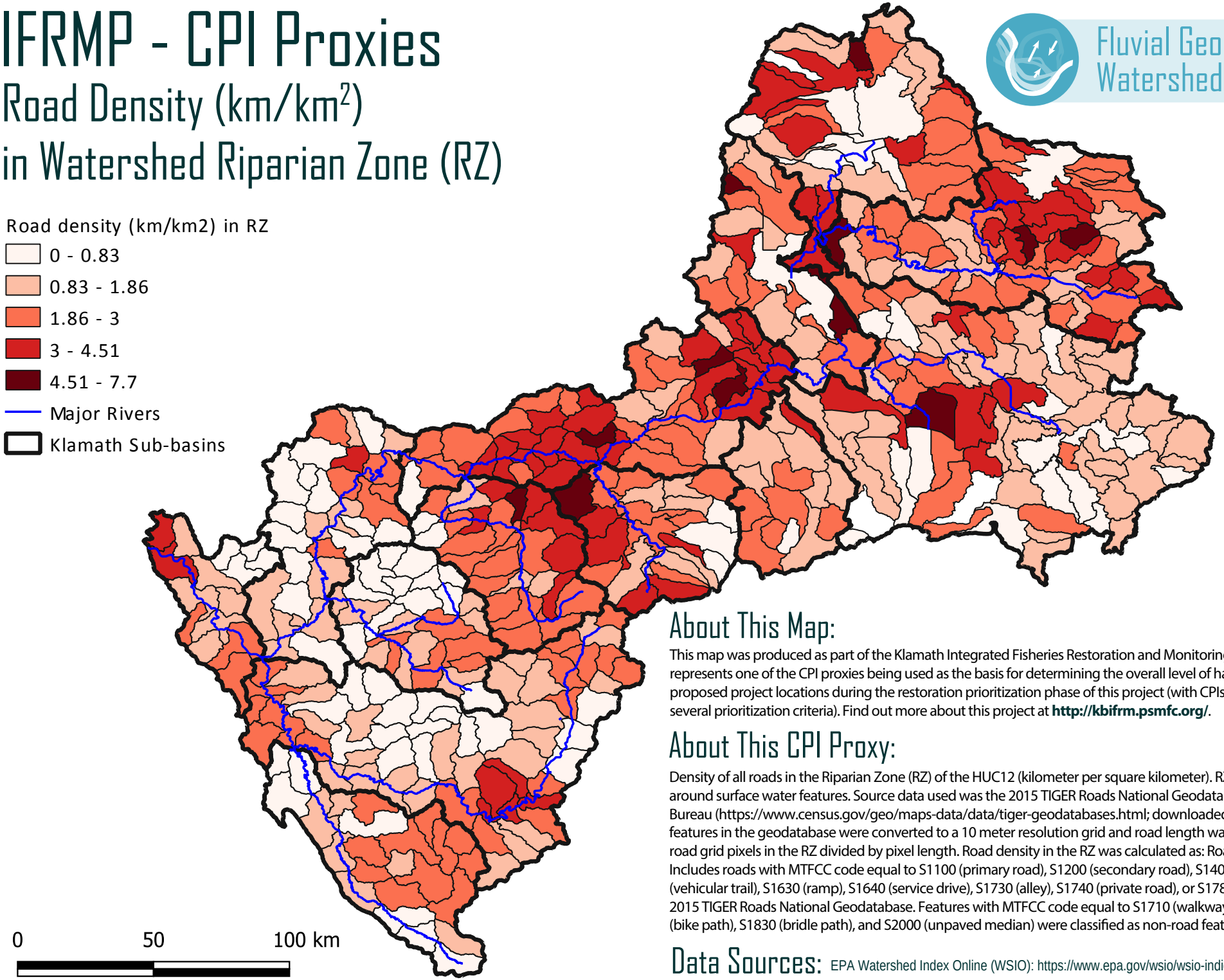
Data Sources:

EPA Watershed Index Online (WSIO): https://www.epa.gov/wsio/wsio-indicator-data-library

IFRMP - CPI Proxies

Road Density (km/km^2) in Watershed Riparian Zone (RZ)

Fluvial Geomorphic Watershed Tier



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About This CPI Proxy:

Density of all roads in the Riparian Zone (RZ) of the HUC12 (kilometer per square kilometer). RZ defined as 100m buffer around surface water features. Source data used was the 2015 TIGER Roads National Geodatabase from the US Census Bureau (https://www.census.gov/geo/maps-data/data/tiger-geodatabases.html; downloaded March 2016). Linear road features in the geodatabase were converted to a 10 meter resolution grid and road length was calculated as the area of road grid pixels in the RZ divided by pixel length. Road density in the RZ was calculated as: Road Length in RZ / RZ Area. Includes roads with MTFCC code equal to S1100 (primary road), S1200 (secondary road), S1400 (local road), S1500 (vehicular trail), S1630 (ramp), S1640 (service drive), S1730 (alley), S1740 (private road), or S1780 (parking lot road) in the 2015 TIGER Roads National Geodatabase. Features with MTFCC code equal to S1710 (walkway), S1720 (stairway), S1820 (bike path), S1830 (bridle path), and S2000 (unpaved median) were classified as non-road features and not counted.

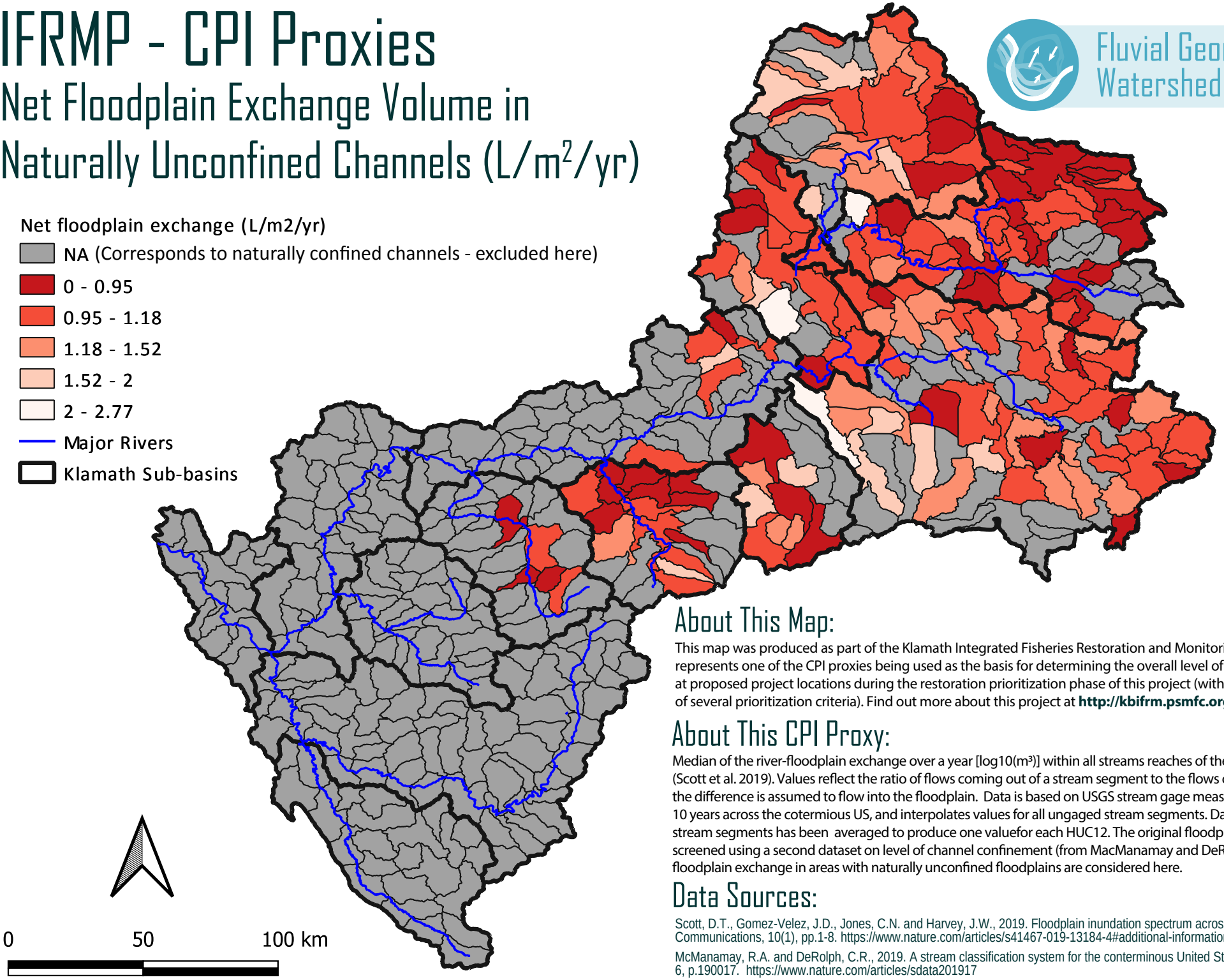
Data Sources:

EPA Watershed Index Online (WSIO): https://www.epa.gov/wsio/wsio-indicator-data-library

IFRMP - CPI Proxies

Net Floodplain Exchange Volume in Naturally Unconfined Channels (L/m²/yr)

Fluvial Geomorphic Watershed Tier



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About This CPI Proxy:

Median of the river-floodplain exchange over a year [log10(m³)] within all streams reaches of the NHD Plus V2 network (Scott et al. 2019). Values reflect the ratio of flows coming out of a stream segment to the flows coming into it, where the difference is assumed to flow into the floodplain. Data is based on USGS stream gage measurements over the last 10 years across the cotermious US, and interpolates values for all ungaged stream segments. Data for individual NHD stream segments has been averaged to produce one valuefor each HUC12. The original floodplain exchange data was screened using a second dataset on level of channel confinement (from MacManamay and DeRolph 2019), so that only floodplain exchange in areas with naturally unconfined floodplains are considered here.

Data Sources:

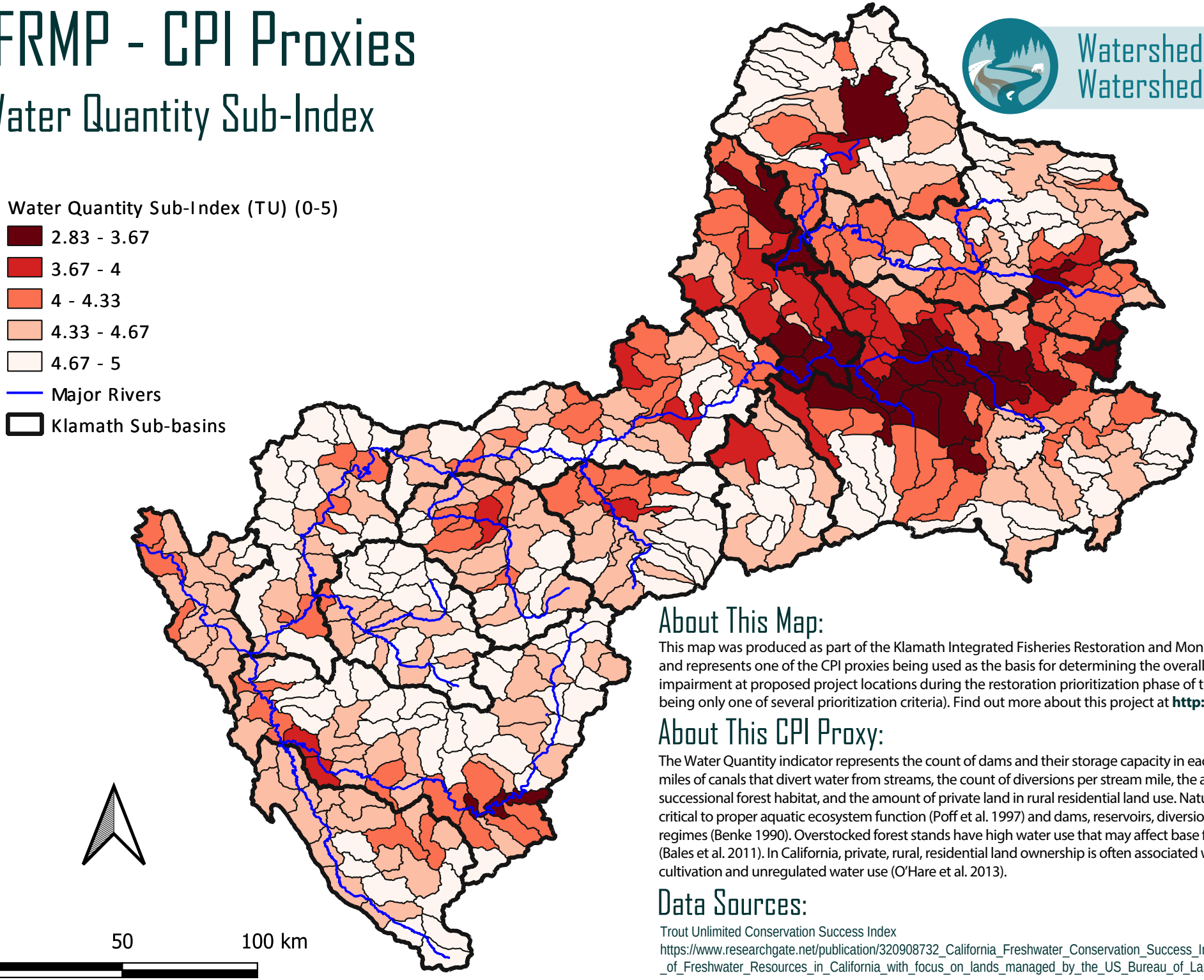
Scott, D.T., Gomez-Velez, J.D., Jones, C.N. and Harvey, J.W., 2019. Floodplain inundation spectrum across the United States. Nature Communications, 10(1), pp.1-8. https://www.nature.com/articles/s41467-019-13184-4#additional-information

McManamay, R.A. and DeRolph, C.R., 2019. A stream classification system for the conterminous United States. Nature Scientific Data, 6, p.190017. https://www.nature.com/articles/sdata201917

IFRMP - CPI Proxies

Water Quantity Sub-Index

Watershed Inputs
Watershed Tier



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About This CPI Proxy:

The Water Quantity indicator represents the count of dams and their storage capacity in each subwatershed, the miles of canals that divert water from streams, the count of diversions per stream mile, the amount of dense, early successional forest habitat, and the amount of private land in rural residential land use. Natural flow regimes are critical to proper aquatic ecosystem function (Poff et al. 1997) and dams, reservoirs, diversions, and canals alter flow regimes (Benke 1990). Overstocked forest stands have high water use that may affect base flows and water yields (Bales et al. 2011). In California, private, rural, residential land ownership is often associated with marijuana cultivation and unregulated water use (O'Hare et al. 2013).

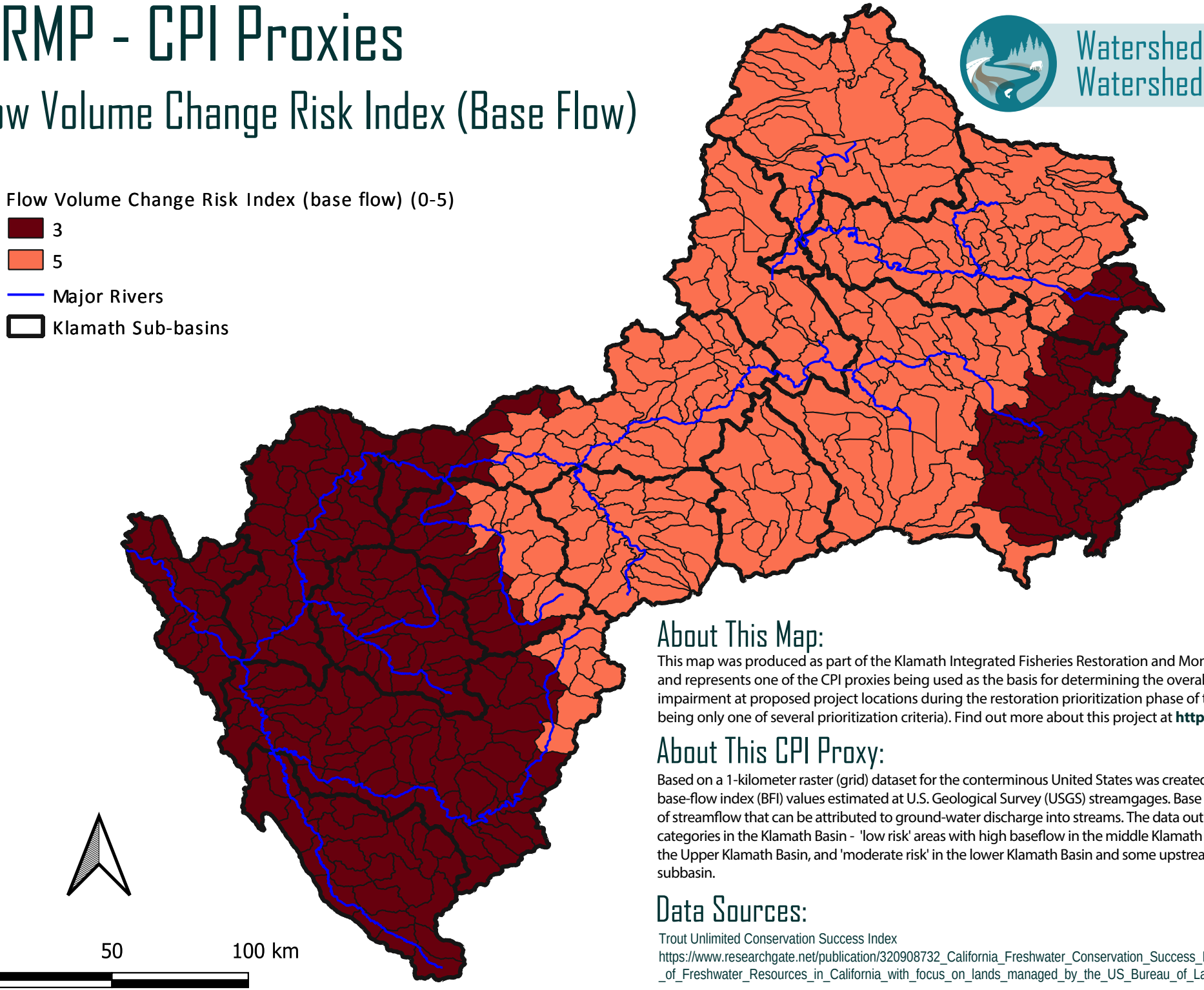
Data Sources:

Trout Unlimited Conservation Success Index
https://www.researchgate.net/publication/320908732_California_Freshwater_Conservation_Success_Index_An_Assessment_of_Freshwater_Resources_in_California_with_focus_on_lands_managed_by_the_US_Bureau_of_Land_Management

IFRMP - CPI Proxies

Flow Volume Change Risk Index (Base Flow)

Watershed Inputs
Watershed Tier



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About This CPI Proxy:

Based on a 1-kilometer raster (grid) dataset for the conterminous United States was created by interpolating base-flow index (BFI) values estimated at U.S. Geological Survey (USGS) streamgages. Base flow is the component of streamflow that can be attributed to ground-water discharge into streams. The data outlines two main risk categories in the Klamath Basin - 'low risk' areas with high baseflow in the middle Klamath subbasins and much of the Upper Klamath Basin, and 'moderate risk' in the lower Klamath Basin and some upstream reaches of the Lost subbasin.

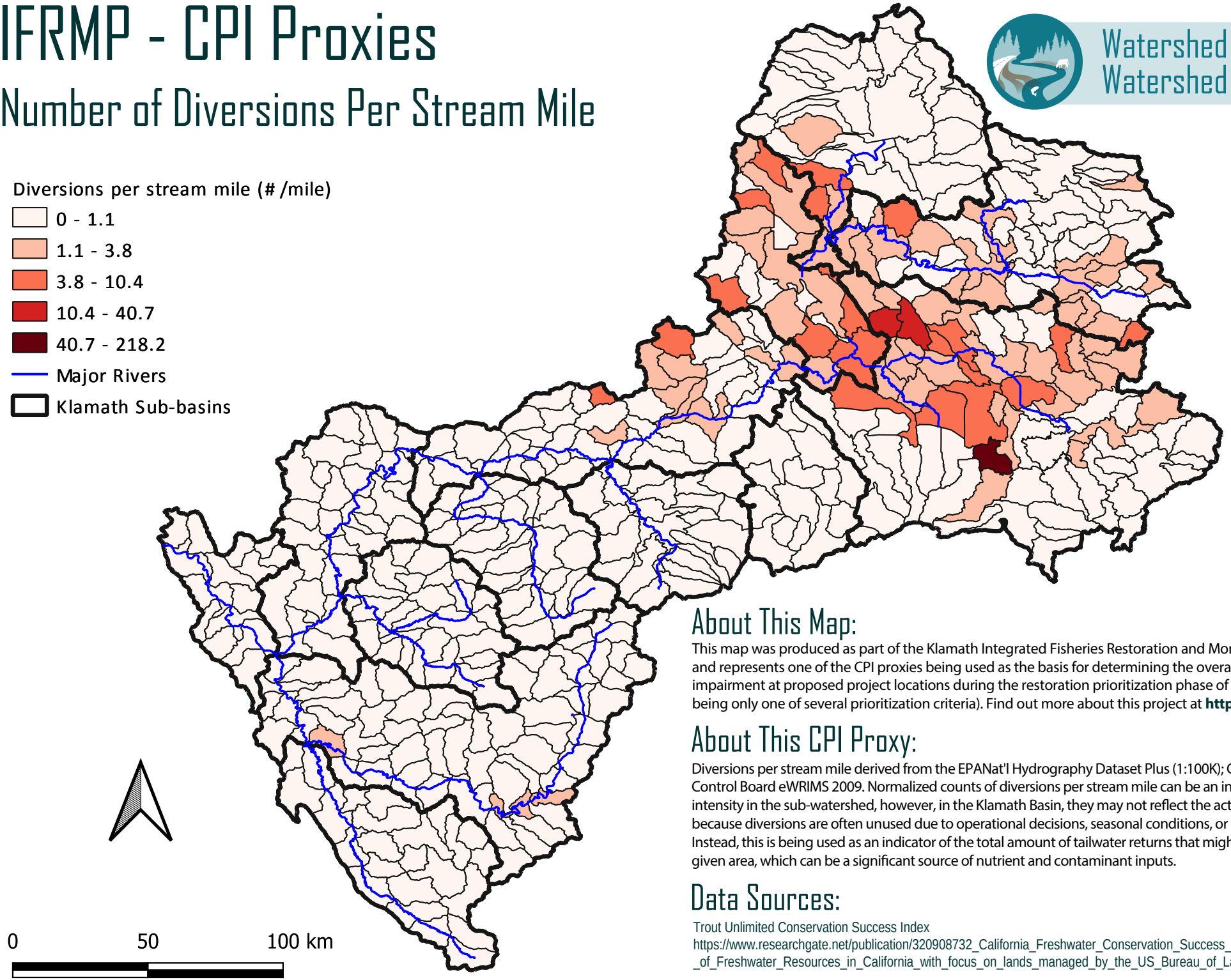
Data Sources:

Trout Unlimited Conservation Success Index
https://www.researchgate.net/publication/320908732_California_Freshwater_Conservation_Success_Index_An_Assessment_of_Freshwater_Resources_in_California_with_focus_on_lands_managed_by_the_US_Bureau_of_Land_Management

IFRMP - CPI Proxies

Number of Diversions Per Stream Mile

Watershed Inputs
Watershed Tier



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About This CPI Proxy:

Diversions per stream mile derived from the EPANat'l Hydrography Dataset Plus (1:100K); CA Water Resources Control Board eWRIMS 2009. Normalized counts of diversions per stream mile can be an indicator of water use intensity in the sub-watershed, however, in the Klamath Basin, they may not reflect the actual level of diversion because diversions are often unused due to operational decisions, seasonal conditions, or calls on water rights. Instead, this is being used as an indicator of the total amount of tailwater returns that might be expected from a given area, which can be a significant source of nutrient and contaminant inputs.

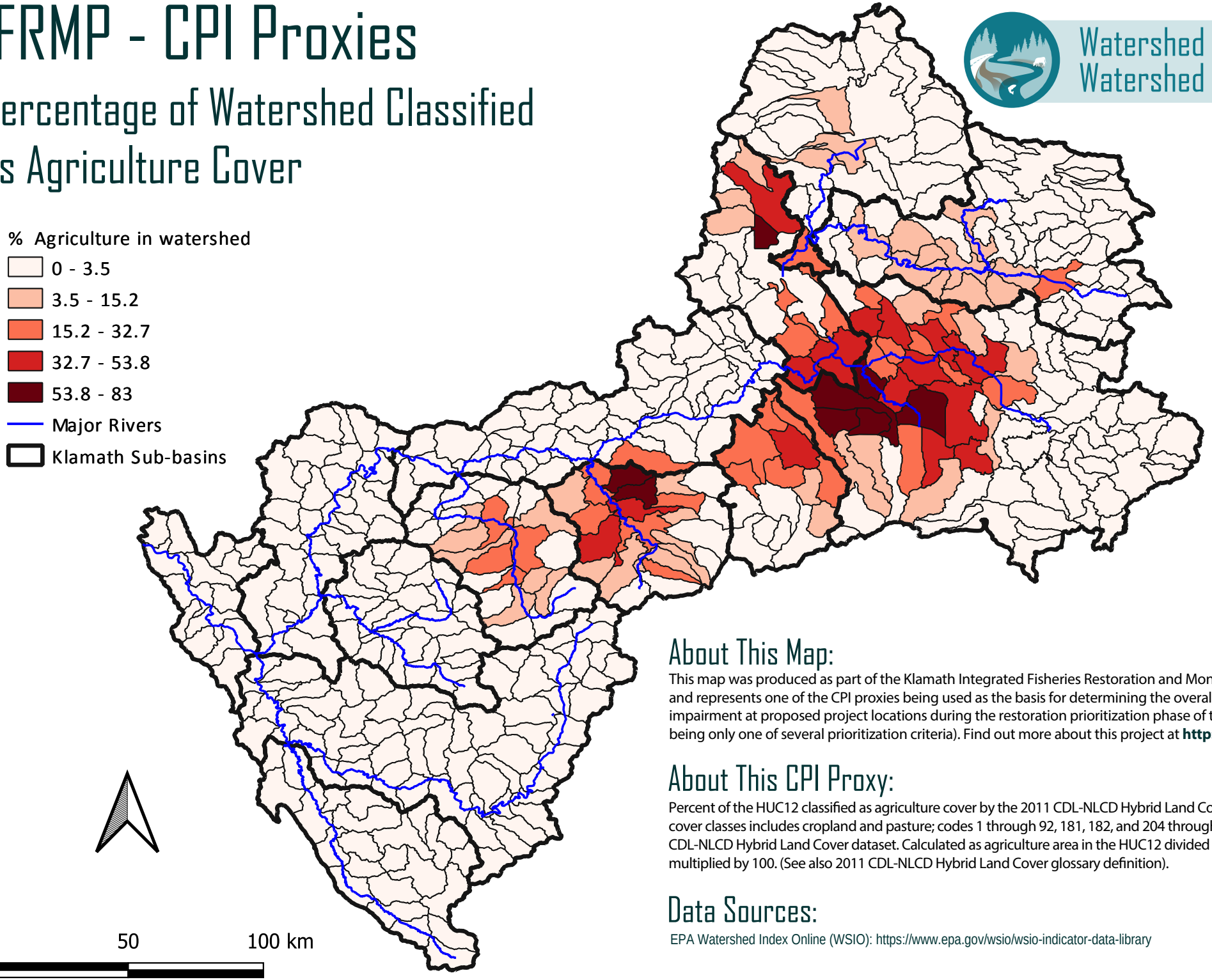
Data Sources:

Trout Unlimited Conservation Success Index
https://www.researchgate.net/publication/320908732_California_Freshwater_Conservation_Success_Index_An_Assessment_of_Freshwater_Resources_in_California_with_focus_on_lands_managed_by_the_US_Bureau_of_Land_Management

IFRMP - CPI Proxies

Percentage of Watershed Classified as Agriculture Cover

Watershed Inputs
Watershed Tier



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About This CPI Proxy:

Percent of the HUC12 classified as agriculture cover by the 2011 CDL-NLCD Hybrid Land Cover dataset. Agriculture cover classes includes cropland and pasture; codes 1 through 92, 181, 182, and 204 through 254 in the 2011 CDL-NLCD Hybrid Land Cover dataset. Calculated as agriculture area in the HUC12 divided by HUC12 area, multiplied by 100. (See also 2011 CDL-NLCD Hybrid Land Cover glossary definition).

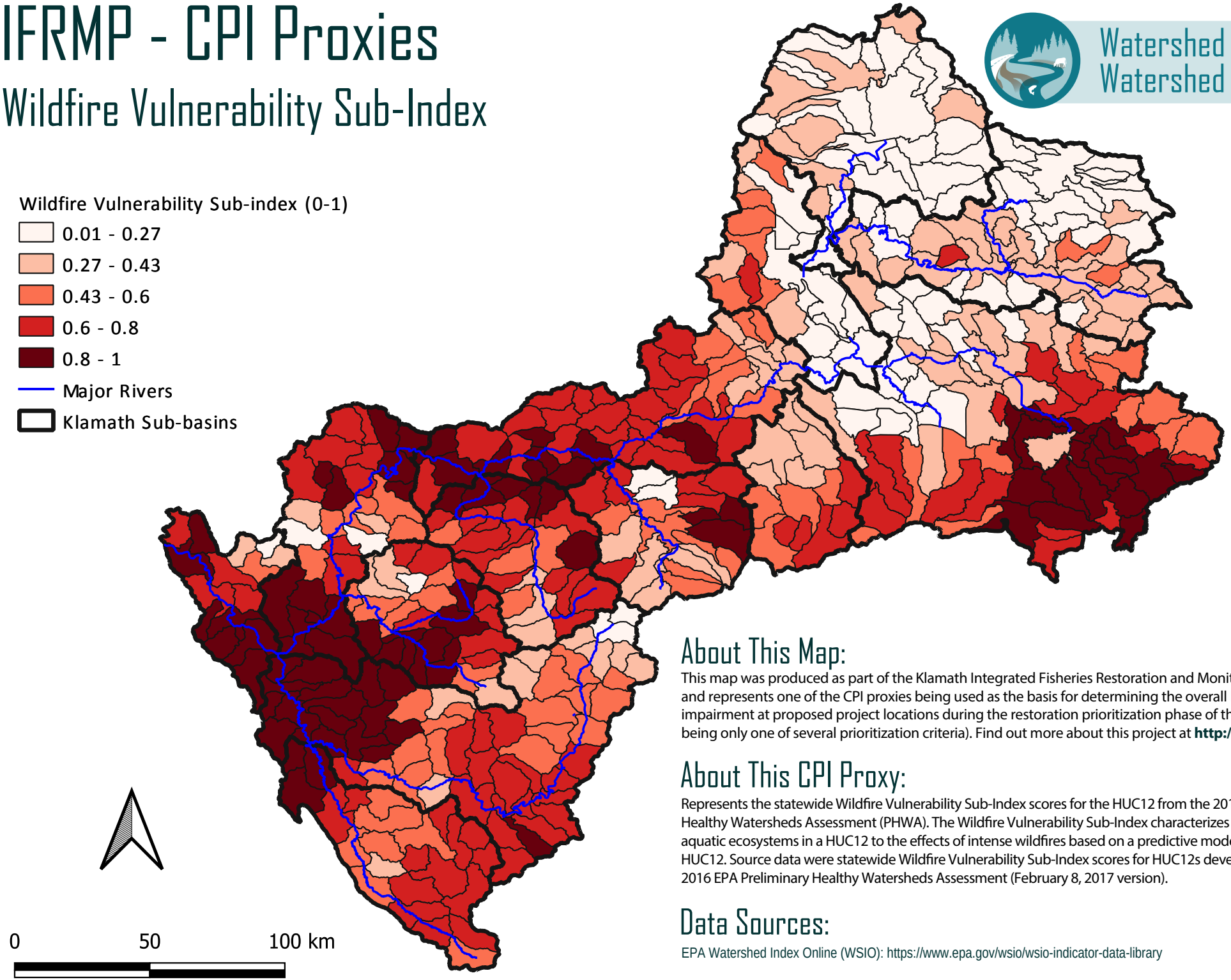
Data Sources:

EPA Watershed Index Online (WSIO): https://www.epa.gov/wsio/wsio-indicator-data-library

IFRMP - CPI Proxies

Wildfire Vulnerability Sub-Index

Watershed Inputs
Watershed Tier



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About This CPI Proxy:

Represents the statewide Wildfire Vulnerability Sub-Index scores for the HUC12 from the 2016 EPA Preliminary Healthy Watersheds Assessment (PHWA). The Wildfire Vulnerability Sub-Index characterizes the vulnerability of aquatic ecosystems in a HUC12 to the effects of intense wildfires based on a predictive model of wildfire risk in the HUC12. Source data were statewide Wildfire Vulnerability Sub-Index scores for HUC12s developed as part of the 2016 EPA Preliminary Healthy Watersheds Assessment (February 8, 2017 version).

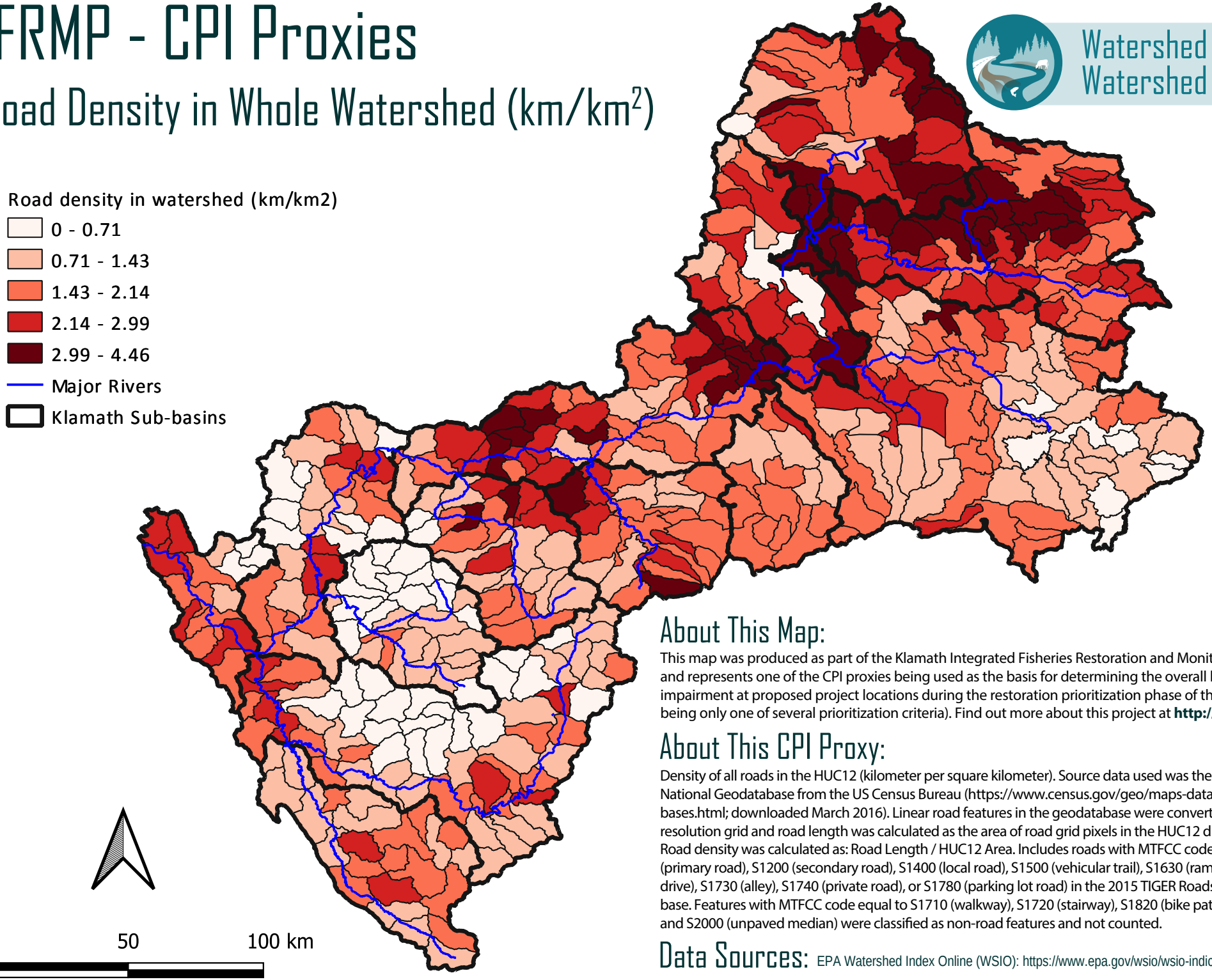
Data Sources:

EPA Watershed Index Online (WSIO): https://www.epa.gov/wsio/wsio-indicator-data-library

IFRMP - CPI Proxies

Road Density in Whole Watershed (km/km^2)

Watershed Inputs
Watershed Tier



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About This CPI Proxy:

Density of all roads in the HUC12 (kilometer per square kilometer). Source data used was the 2015 TIGER Roads National Geodatabase from the US Census Bureau (https://www.census.gov/geo/maps-data/data/tiger-geodata-bases.html; downloaded March 2016). Linear road features in the geodatabase were converted to a 10 meter resolution grid and road length was calculated as the area of road grid pixels in the HUC12 divided by pixel length. Road density was calculated as: Road Length / HUC12 Area. Includes roads with MTFCC code equal to S1100 (primary road), S1200 (secondary road), S1400 (local road), S1500 (vehicular trail), S1630 (ramp), S1640 (service drive), S1730 (alley), S1740 (private road), or S1780 (parking lot road) in the 2015 TIGER Roads National Geodata-base. Features with MTFCC code equal to S1710 (walkway), S1720 (stairway), S1820 (bike path), S1830 (bridle path), and S2000 (unpaved median) were classified as non-road features and not counted.

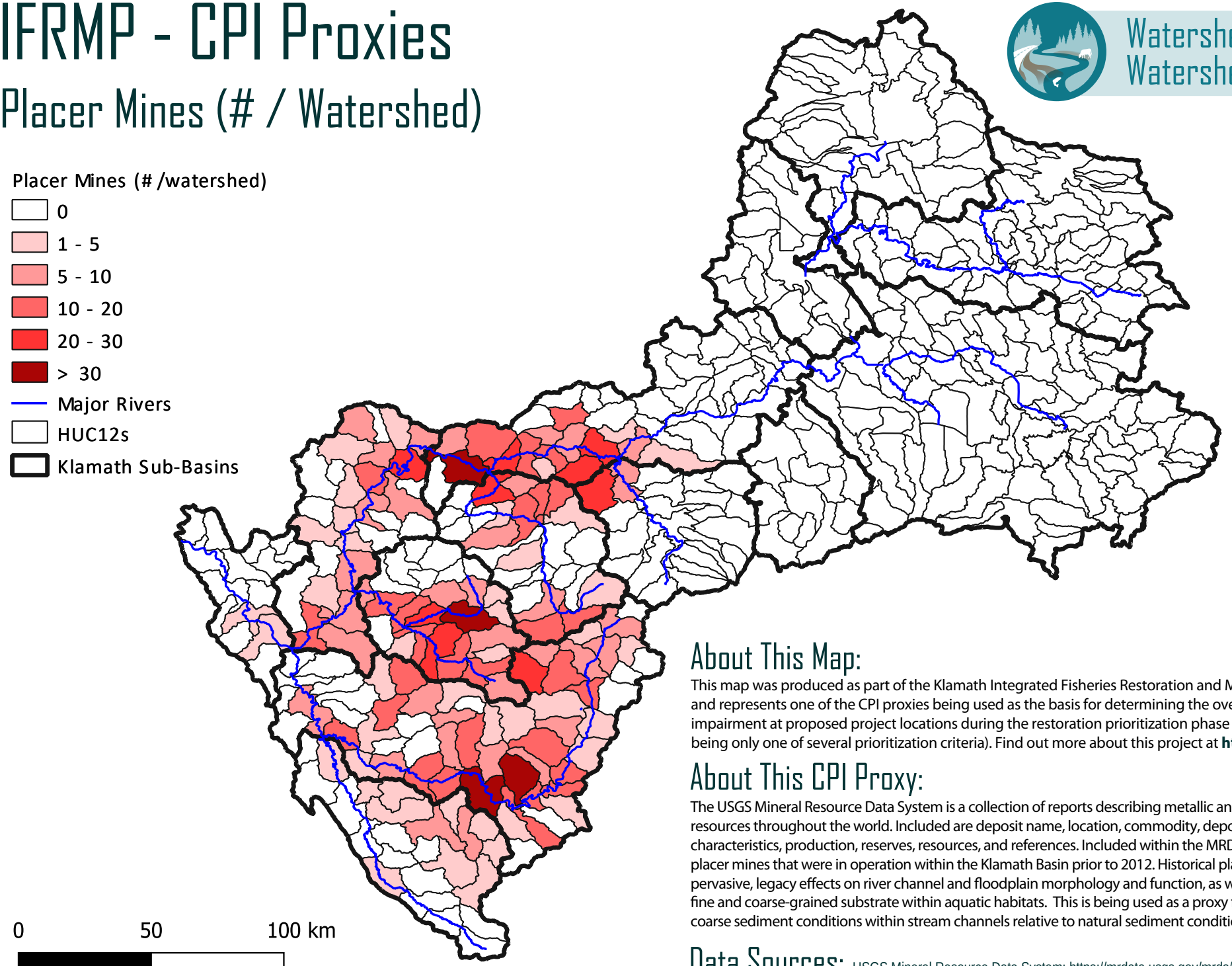
Data Sources:

EPA Watershed Index Online (WSIO): https://www.epa.gov/wsio/wsio-indicator-data-library

IFRMP - CPI Proxies

Placer Mines (# / Watershed)

Watershed Inputs
Watershed Tier



About This Map:

This map was produced as part of the Klamath Integrated Fisheries Restoration and Monitoring Plan (IFRMP) and represents one of the CPI proxies being used as the basis for determining the overall level of habitat impairment at proposed project locations during the restoration prioritization phase of this project (with CPIs being only one of several prioritization criteria). Find out more about this project at **http://kbifrm.psmfc.org/**.

About This CPI Proxy:

The USGS Mineral Resource Data System is a collection of reports describing metallic and nonmetallic mineral resources throughout the world. Included are deposit name, location, commodity, deposit description, geologic characteristics, production, reserves, resources, and references. Included within the MRDS is the location of past placer mines that were in operation within the Klamath Basin prior to 2012. Historical placer mining can have pervasive, legacy effects on river channel and floodplain morphology and function, as well as the distribution of fine and coarse-grained substrate within aquatic habitats. This is being used as a proxy for the overall condition of coarse sediment conditions within stream channels relative to natural sediment conditions.

Data Sources:

USGS Mineral Resource Data System: https://mrdata.usgs.gov/mrds/geo-inventory.php