# NorWeST Modeled Stream Temperature for Utah State-Wide Layers

**Shapefile**

**Tags**

stream, water, temperature, hydrography, stream temperature model, future scenarios

## Summary

These data are intended to be used for managing biological resources and predicting aquatic species distributions affected by mean monthly temperature metrics and the annual maximum weekly maximum temperature metric.

## Description

These data represent modeled stream temperatures for a portion of a larger dataset known as the Great Northern Landscape Conservation Cooperative (GNLCC) (http://greatnorthernlcc.org/) and the expanded NorWeST modeled stream temperature dataset (https://www.fs.usda.gov/rm/boise/AWAE/projects/NorWeST.html). This metadata record is a combined description for two spatial data feature types, vector lines and points, which cover the same geographic area. The line features are derived from NHDPlus (https://nhdplus.com/NHDPlus/) (USEPA and USGS, 2012) stream lines and the point data represent 1 km intervals along the NHDPlus version 2 (NHDPlusV2)stream network. Flowlines from portions of the following NHDPlusV2 regions comprised the Utah state-wide processing unit: Regions 14, 15, 16, and 17.

Both the streamline and point datasets contain identical modeled stream temperature attributes. These modeled stream temperatures were generated as part of the U.S. Forest Service NorWeST stream temperature project https://www.fs.usda.gov/rm/boise/AWAE/projects/NorWeST.html These data reside in ESRI shapefile format, ArcGIS version 9.5. The line and point shapefile extents correspond to the Utah state boundary. Mean monthly stream temperature (Jan-Dec) and maximum weekly maximum temperature were the metrics selected to be modeled for this processing unit. Use of these metrics allowed the largest proportion of data in the NorWeST observed temperature database to be used (~80%), which facilitated calibration of the model to thousands of unique stream sites across the region. The vector stream line data were derived from the NHDPlus data through a process referred to as reconditioning. This reconditioned data set was modified from the original NHDPlus data to ensure stream connectivity, which was required to fit spatial statistical models to the stream network data. Braided channels, most canals, and disconnected streams were deleted from NHDPlus.

Additionally, where three or more stream segments converged into a single downstream segment the stream layer was manually edited to offset two of the three segments. Because many stream segments were deleted, this dataset does not contain all of the line features of the original NHDPlus data. The FLoWS and STARS toolboxes (https://www.fs.usda.gov/rm/boise/AWAE/projects/SpatialStreamNetworks.shtml) were used to identify topological errors and generate the final spatial layer. The stream lines were further processed into 1 km segments to be used as input for the NorWeST stream temperature model. The point shapefiles correspond to the mid-point location for each 1 km stream segment. Stream temperatures were modeled at each point location. Modeled temperature values were subsequently attributed back to the 1 km stream line dataset. Stream temperatures were modeled from a set of covariate predictors using spatial statistical software called SSN and STARS (Ver Hoef et al. 2006). (https://www.fs.usda.gov/rm/boise/AWAE/projects/SpatialStreamNetworks.shtml).

The spatial covariates used for modeling stream temperature were derived from various sources as described below:

1. Air temperature_month (degrees C). Mean monthly air temperature and maximum weekly maximum temperature (MWMT) across the river basin derived from the dynamically downscaled NCEP RegCM3 reanalysis (Hostetler et al. 2011). Data were downloaded from the USGS Regional Climate Downscaling website (http://regclim.coas.oregonstate.edu/index.html).

2. Stream discharge_August (m3/s). Monthly mean stream discharge across the river based derived from USGS flow gages on streams with minimal water abstraction or storage reservoirs. Data were downloaded from the NWIS website (http://waterdata.usgs.gov/nwis/rt).

3. Elevation (m). Elevation at stream temperature sites was used to represent the vertical trend towards cooler air temperatures. Data were obtained from the 30-m resolution digital elevation model associated with NHDPlus (USEPA and USGS, 2012). Data were downloaded from https://nhdplus.com/NHDPlus/NHDPlusV2_home.php.

4. Latitude (m). The y-coordinate at stream temperature sites from the Albers Equal Area projection was used to represent latitude and the poleward trend towards cooler air temperatures.

5. Canopy %. %. The percent canopy variable from the 2016 version of the National Land Cover Database (NLCD; Homer et al., 2007) was used to represent stream shade at each temperature site. NLCD data were downloaded from https://www.mrlc.gov/data.

6. Cumulative drainage area (km sq.). The value of CUMDRAINAG in NHDPlus (USEPA and USGS, 2012) at each stream temperature site was used to represent stream size and amount of insolation. It was assumed that larger streams had been exposed to insolation over a greater length and were less shaded by adjacent riparian vegetation. Data were downloaded from https://nhdplus.com/NHDPlus/NHDPlusV2_home.php.

7. Stream slope %. The stream slope value in NHDPlus (USEPA and USGS, 2012) at a stream temperature site. It was assumed that slope affects flow velocity and equilibration time to local heating conditions. Steeper slopes, therefore, should negatively affect stream temperatures because conditions further upstream at higher elevations have greater influence on local temperatures. Data were downloaded from https://nhdplus.com/NHDPlus/NHDPlusV2_home.php.

8. Mean annual precipitation (mm). The value of AREAWTMAP in NHDPlus (USEPA and USGS, 2012) at each stream temperature site. Areas with high annual precipitation may have higher water yields that cool streams. Data were downloaded from https://nhdplus.com/NHDPlus/NHDPlusV2_home.php.

9. Base flow index (BFI). The value of the base flow index (Wolock, 2003) at a stream temperature site. Streams with larger baseflows and groundwater contributions are thought to be colder than other streams and potentially less sensitive to climate warming. Data were downloaded from http://ks.water.usgs.gov/pubs/abstracts/of.03-263.htm.

10. Glacier %. Note that the glacier covariate was not used in the Utah state-wide unit. For other NorWeST units, the percentage of the catchment area classified as glacier at each temperature site. Summaries were computed using a standard flow accumulation routine. This covariate represents the local cooling effect that glaciers may have on downstream temperatures. Data were downloaded from http://glaciers.research.pdx.edu/Downloads.

11. Lake %. The value of NLCD11PC in NHDPlus (USEPA and USGS, 2012), which is the percentage of the catchment area classified as open water, at a temperature site. This covariate represents the warming effect that natural lakes and many reservoirs have on downstream temperatures. Data were downloaded from https://nhdplus.com/NHDPlus/NHDPlusV2_home.php.

12. Tailwater. Categorical predictor variable coded as 0/1 to indicate whether a stream temperature site is downstream from a reservoir that creates an anomalously cold tailwater. Using the SSN and STARS tools along with the covariate predictors, various mean August stream temperature scenarios were modeled. The scenarios include the 19 year average from 1993-2011, the 10 year average from 2002-2001, and single year scenarios for the years 1993 through 2011.

13. Canal Density. Density of NHDPlus line features classified as canal, ditch, or pipeline within the upstream watershed (km/sq. km) Derived from the metric CanalDensWs from the StreamCat Dataset https://www.epa.gov/national-aquatic-resource-surveys/streamcat-dataset-0.

14. Dam Density. Density of georeferenced dams within the watershed (dams/sq. km) based on National Inventory of dams. Derived from the metric DamDensWs from the StreamCat Dataset https://www.epa.gov/national-aquatic-resource-surveys/streamcat-dataset-0.

15. Agriculture %. Percent of watershed area classified as crop and hay land use. Derived from the metrics PctCrop2006Ws and PctHay2006Ws from the StreamCat Dataset https://www.epa.gov/national-aquatic-resource-surveys/streamcat-dataset-0.

## Referenced Cited:


Hill, Ryan A., Marc H. Weber, Scott G. Leibowitz, Anthony R. Olsen, and Darren J. Thornbrugh, 2016. The Stream-Catchment (StreamCat) Dataset: A Database of Watershed Metrics for the Conterminous United States. Journal of the American Water Resources Association (JAWRA) 52:120-128. DOI: 10.1111/1752-1688.12372.

Homer, C., Dewitz, J., Fry, J., Coan, M., Hossain, N., Larson, C., Herold, N., McKerrow, A., VanDriel, J.N., and Wickham, J. 2007. Completion of the 2001 National Land Cover Database for the Conterminous United States. Photogrammetric Engineering and Remote Sensing, 73:337-341.

Hostetler, S.W., J.R. Alder, and A.M. Allan. 2011. Dynamically downscaled climate simulations over North America: Methods, evaluation and supporting documentation for users: U.S. Geological Survey Open-File Report

2011-1238, 64 p. website: http://regclim.coas.oregonstate.edu/index.html USEPA and USGS, 2010. NHDPlus Version 1 (NHDPlusV1) User Guide, available online at http://www.horizon-systems.com/NHDPlus/NHDPlusV1_documentation.php

McKay, L., Bondelid, T., Dewald, T., Johnston, J., Moore, R., and Rea, A., "NHDPlus Version 2: User Guide", 2012 ftp://ftp.horizon-systems.com/NHDplus/NHDPlusV21/Documentation/NHDPlusV2_User_Guide.pdf

Miller, J.D., E.E. Knapp, C.H. Key, C.N. Skinner, C.J. Isbell, R.M. Creasy, J.W. Sherlock, 2009. Calibration and validation of the relative differenced Normalized Burn Ratio (RdNBR) to three measures of fire severity in the Sierra Nevada and Klamath Mountains, California, USA. Remote Sensing of the Environment, 113:645-656.

Ver Hoef, J.M., E.E. Peterson, and D. Theobald. 2006. Spatial statistical models that use flow and stream distance. Environmental and Ecological Statistics 13:449-464. Wolock, D.M. 2003. Base - Flow Index Grid for the Conterminous United States. U.S. Geological Survey open-file report 03-263, USGS, Lawrence, KS.

### Credits

U.S. Forest Service; Rocky Mountain Research Station; Air, Water, and Aquatic Environments Program (AWAE). https://www.fs.usda.gov/rm/boise/awae_home.shtml

### Use limitations

These data should be used with the understanding that the stream temperature values contained herein are modeled temperatures, not actual temperatures, and are subject error. The USDA Forest Service makes no warranty, expressed or implied, including the warranties of merchantability and fitness for a particular purpose, nor assumes any legal liability or responsibility for the accuracy, reliability, completeness or utility of these geospatial data, or for the improper or incorrect use of these geospatial data. These geospatial data and related maps or graphics are not legal documents and are not intended to be used as such. The data and maps may not be used to determine title, ownership, legal descriptions or boundaries, legal jurisdiction, or restrictions that may be in place on either public or private land. Natural hazards may or may not be depicted on the data and maps, and land users should exercise due caution. The data are dynamic and may change over time. The user is responsible to verify the limitations of the geospatial data and to use the data accordingly.

### Extent

| | | | |
|---|---|---|---|
| **West** | -114.066853 | **East** | -108.637524 |
| **North** | 42.079515 | **South** | 36.837464 |

### Scale Range

| | |
|---|---|
| **Maximum (zoomed in)** | 1:5,000 |
| **Minimum (zoomed out)** | 1:150,000,000 |

## Fields ►

FIELD FID ►

* FIELD DESCRIPTION

Internal feature number.

FIELD Shape ►

* FIELD DESCRIPTION

Feature geometry.

FIELD OBSPRED_ID ►

FIELD DESCRIPTION

A unique ID for each feature

FIELD FTYPE ►

FIELD DESCRIPTION

This attribute is only for the predicted temperature locations. This attribute is the NHDPlus feature type and can have one of two values, either 'StreamRiver' or 'ArtificialPath'. This is an NHDPlus defined attribute,

### Field WATERBODY ▶

#### Field description

This attribute is only for the predicted temperature locations. This attribute is for prediction points that fall within an NHDPlus water body feature. Values may be 0 or 1. 1 represents a point or stream segment within a water body feature. This attribute was generated at the Boise Lab to designate line segments that fall within water bodies.

### Field TAILWATER ▶

#### Field description

Categorical predictor variable coded as 0/1 to indicate whether a stream temperature site is downstream from a reservoir that creates an anomalously cold tailwater.

### Field ELEV ▶

#### Field description

Elevation in meters obtained from the underlying 30-meter resolution DEM.

### Field CANOPY ▶

#### Field description

Percent canopy for each 1 km stream segment from the NLCD.

#### Field description

Slope (rise/run) for each NHDPlus stream reach.

### Field PRECIP ▶

#### Field description

NHDPlus precipitation measure (mm).

### Field CUMDRAINAG ▶

#### Field description

Cumulative drainage area (sq. km) for each NHDPlus stream reach.

### Field Y_COORD ▶

#### Field description

Y coordinate of Albers Equal Area projection with units in meters, used as surrogate for latitude.

### Field NLCD11PC ▶

#### Field description

Percent cumulative open water from NHDPlus, derived from National Land Cover Dataset

### Field GLACIER ▶

#### Field description

The percentage of the catchment area classified as glacier at each temperature site.

### Field BFI ▶

#### Field description

The value of the base flow index (Wolock, 2003) at a stream temperature site. Streams with larger baseflows and groundwater contributions are thought to be colder than other streams and potentially less sensitive to climate warming.

### Field CanalWs ▶

#### Field description

Density of NHDPlus line features classified as canal, ditch, or pipeline within the upstream watershed (km/sq. km) Derived from the metric CanalDensWs from the StreamCat dataset.

### Field DamWs ▶

#### Field description

Density of georeferenced dams within the watershed (dams/sq. km) based on National Inventory of dams. Derived from the metric DamDensWs from the StreamCat dataset.

Field AgPctWs ▶
Field description
Percent of watershed area classified as crop and hay land use. Derived from the metrics PctCrop2006Ws and PctHay2006Ws from the StreamCat dataset.

Field Air_*Timeframe* ▶
Field description
Mean monthly air temperature and maximum weekly maximum temperature (MWMT) across the river basin derived from the dynamically downscaled NCEP RegCM3 reanalysis (Hostetler et al. 2011).

Field Flow_*Timeframe* ▶
Field description
Mean monthly stream discharge across the river based derived from USGS flow gages on streams with minimal water abstraction or storage reservoirs.

Field COMID ▶
Field description
COMID for the underlying 1:100,000 scale NHDPlus stream lines (version two).

Field GNIS_NAME ▶
Field description
GNIS_NAME for the underlying 1:100,000 scale NHDPlus stream lines (version two).

Field S1_93_11 ▶
Field description
Scenario 1, modeled stream temperature from 1993-2011.

Field S2_02_11 ▶
Field description
Scenario 2, modeled stream temperature from 2002-2011.

Field S3_1993 ▶
Field description
Scenario 3, modeled stream temperature for the year 1993.

Field S4_1994 ▶
Field description
Scenario 4, modeled stream temperature for the year 1994.

Field S5_1995 ▶
Field description
Scenario 5, modeled stream temperature for the year 1995.

Field S6_1996 ▶
Field description
Scenario 6, modeled stream temperature for the year 1996.

Field S7_1997 ▶
Field description
Scenario 7, modeled stream temperature for the year 1997.

Field S8_1998 ▶
Field description
Scenario 8, modeled stream temperature for the year 1998.

FIELD S9_1999 ►
FIELD DESCRIPTION
Scenario 9, modeled stream temperature for the year 1999.

FIELD S10_2000 ►
FIELD DESCRIPTION
Scenario 10, modeled stream temperature for the year 2000.

FIELD S11_2001 ►
FIELD DESCRIPTION
Scenario 11, modeled stream temperature for the year 2001.

FIELD S12_2002 ►
FIELD DESCRIPTION
Scenario 12, modeled stream temperature for the year 2002.

FIELD S13_2003 ►
FIELD DESCRIPTION
Scenario 13, modeled stream temperature for the year 2003.

FIELD S14_2004 ►
FIELD DESCRIPTION
Scenario 14, modeled stream temperature for the year 2004.

FIELD S15_2005 ►
FIELD DESCRIPTION
Scenario 15, modeled stream temperature for the year 2005.

FIELD S16_2006 ►
FIELD DESCRIPTION
Scenario 16, modeled stream temperature for the year 2006.

FIELD S17_2007 ►
FIELD DESCRIPTION
Scenario 17, modeled stream temperature for the year 2007.

FIELD S18_2008 ►
FIELD DESCRIPTION
Scenario 18, modeled stream temperature for the year 2008.

FIELD S19_2009 ►
FIELD DESCRIPTION
Scenario 19, modeled stream temperature for the year 2009.

FIELD S20_2010 ►
FIELD DESCRIPTION
Scenario 20, modeled stream temperature for the year 2010.

FIELD S21_2011 ►
FIELD DESCRIPTION
Scenario 21, modeled stream temperature for the year 2011.

FIELD S22_PredSE ►
FIELD DESCRIPTION
Standard errors of stream temperature predictions.

FIELD S23_1C ►
FIELD DESCRIPTION
Future scenario adds 1.00° C to S1_93-11.

FIELD S24_1C_D ►

FIELD DESCRIPTION

Future scenario adds 1.00 ℃ to S1_93-11 but also accounts for differential warming of streams by using historical temperatures to scale temperature increases so that cold streams warm less than warm streams.

FIELD S25_2C ►

FIELD DESCRIPTION

Future scenario adds 2.00° C to S1_93-11.

FIELD S26_2C_D ►

FIELD DESCRIPTION

Future scenario adds 2.00 ℃ to S1_93-11 but also accounts for differential warming of streams by using historical temperatures to scale temperature increases so that cold streams warm less than warm streams.

FIELD S27_3C ►

FIELD DESCRIPTION

Future scenario adds 3.00° C to S1_93-11.

FIELD S28_3C_D ►

FIELD DESCRIPTION

Future scenario adds 3.00 ℃ to S1_93-11 but also accounts for differential warming of streams by using historical temperatures to scale temperature increases so that cold streams warm less than warm streams

FIELD S29_2040 ►

FIELD DESCRIPTION

Future scenario based on global climate model ensemble averages that represent the A1B warming trajectory for 2040s (2030-2059). Future stream deltas within a processing unit were similar and based on projected changes in August air temperature and stream discharge.

FIELD S30_2040D ►

FIELD DESCRIPTION

Future scenario based on global climate model ensemble averages that represent the A1B warming trajectory for 2040s (2030-2059). Future stream deltas within a processing unit were based on similar projected changes in August air temperature and stream discharge, but also accounted for differential warming of streams by using historical temperatures to scale temperature increases so that cold streams warm less than warm streams.

FIELD S31_2080 ►

FIELD DESCRIPTION

Future scenario based on global climate model ensemble averages that represent the A1B warming trajectory for 2080s (2070-2099). Future stream deltas within a processing unit were similar and based on projected changes in August air temperature and stream discharge.

FIELD S32_2080D ►

* ALIAS S32_2080D

FIELD DESCRIPTION

Future scenario based on global climate model ensemble averages that represent the A1B warming trajectory for 2080s (2070-2099). Future stream deltas within a processing unit were based on similar projected changes in August air temperature and stream discharge, but also accounted for differential warming of streams by using historical temperatures to scale temperature increases so that cold streams warm less than warm streams.

FIELD S33_2012 ►

FIELD DESCRIPTION

Scenario 33, modeled stream temperature for the year 2012.

Field S34_2013 ►
Field description
Scenario 34, modeled stream temperature for the year 2013.

Field S35_2014 ►
Field description
Scenario 35, modeled stream temperature for the year 2014.

Field S36_2015 ►
Field description
Scenario 36, modeled stream temperature for the year 2015.

Field S37_2016 ►
Field description
Scenario 37, modeled stream temperature for the year 2016.

Field S38_2017 ►
Field description
Scenario 38, modeled stream temperature for the year 2017.

Field S39_2018 ►
Field description
Scenario 39, modeled stream temperature for the year 2018.

Field S40_2019 ►
Field description
Scenario 40, modeled stream temperature for the year 2019.

## Topics and Keywords ►

Themes or categories of the resource biota, climatologyMeteorologyAtmosphere, environment, inlandWaters

Place keywords Utah State-Wide Stream Temperature Scenarios, (HUCs 140300, 140401, 140500, 140600, 140700, 140802, 050100, 160101, 160202, 160201, 160202, 160203, 160300, 170402), Utah, NHDPlusV2 Region 14, NHDPlusV2 Region 15, NHDPlusV2 Region 16, NHDPlusV2 Region17

Theme keywords NorWeST, stream temperature database, stream temperature records, modeling, Spatial Stream Network, stream network, GIS, aquatic vulnerability assessments, decision support, stream temperatures, river temperatures, hobo, thermographs, data loggers, temperature model, covariate predictors, climate change, global warming, climate change, water, river network, stream network, stream temperature model, river temperature model, modeled temperature, observed temperature, climate scenarios, temperature sensor, microclimate, topoclimate, big data, citizen science, crowd sourcing

## Citation ►

Title *Timeframe* NorWeST Modeled Stream Temperature Stream Lines for Utah State-Wide
Publication date 2021-04-21 00:00:00

Presentation formats * digital map

Collection title NorWeST modeled summer stream temperature scenarios for the western U.S.

Other citation details
Citation to use with these scenarios: Isaak, D.J.; Wenger, S.J.; Peterson, E.E.; Ver Hoef, J.M.; Hostetler, S.W.; Luce, C.H.; Dunham, J.B.; Kershner, J.L.; Roper, B.B.; Nagel, D.E.; Chandler, G.L.; Wollrab, S.P.; Parkes, S.L.; Horan, D.L. 2016. NorWeST modeled summer stream temperature

scenarios for the western U.S. Fort Collins, CO: Forest Service Research Data Archive. https://doi.org/10.2737/RDS-2016-0033.

## Extents ►

EXTENT
GEOGRAPHIC EXTENT
BOUNDING RECTANGLE
EXTENT TYPE Extent used for searching
* WEST LONGITUDE -114.066853
* EAST LONGITUDE -108.637524
* NORTH LATITUDE 42.079515
* SOUTH LATITUDE 36.837464
* EXTENT CONTAINS THE RESOURCE Yes

EXTENT IN THE ITEM'S COORDINATE SYSTEM
* WEST LONGITUDE 1494464.474806
* EAST LONGITUDE 1944670.914922
* SOUTH LATITUDE 759127.750700
* NORTH LATITUDE 1325245.412000
* EXTENT CONTAINS THE RESOURCE Yes

## Resource Points of Contact ►

POINT OF CONTACT
INDIVIDUAL'S NAME Parkes, Sharon L.
CONTACT'S ROLE distributor
CONTACT INFORMATION ►
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TYPE both
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CITY Boise
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COUNTRY US
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## Resource Maintenance ►

RESOURCE MAINTENANCE
UPDATE FREQUENCY as needed

## Resource Constraints ►

CONSTRAINTS
LIMITATIONS OF USE

These data should be used with the understanding that the stream temperature values contained herein are modeled temperatures, not actual temperatures, and are subject error. The USDA Forest Service makes no warranty, expressed or implied, including the warranties of merchantability and fitness for a particular purpose, nor assumes any legal liability or responsibility for the accuracy, reliability, completeness or utility of these geospatial data, or for the improper or incorrect use of these geospatial data. These geospatial data and related maps or graphics are not legal documents and are not intended to be used as such. The data and maps may not be used to determine title, ownership, legal descriptions or boundaries, legal jurisdiction, or restrictions that may be in place on either public or private land. Natural hazards may or may not be depicted on the data and maps, and land users should exercise due caution. The data are dynamic and may change over time. The user is responsible to verify the limitations of the geospatial data and to use the data accordingly.

## Spatial Reference ►

ArcGIS coordinate system
* Type Projected
* Geographic coordinate reference GCS_North_American_1983
* Projection GNLCC
* Coordinate reference details
  Projected coordinate system
    X origin -13886400
    Y origin -7347800
    XY scale 292700022.57646328
    Z origin -100000
    Z scale 10000
    M origin -100000
    M scale 10000
    XY tolerance 0.001
    Z tolerance 0.001
    M tolerance 0.001
    High precision true

## Metadata Contacts ►

Metadata contact
  Individual's name Sharon (Parkes) Payne
  Organization's name USDA Forest Service, Rocky Mountain Research Station, Boise Aquatic Sciences Lab
  Contact's role custodian
    Contact information ►
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## Metadata Maintenance ►

Maintenance
  Update frequency as needed

## Metadata Constraints ►

Constraints
  Limitations of use

These scenarios and accompanying geospatial datasets were created using funding from the U.S. Government and can be used without additional permissions or fees. If you use these data in a publication, presentation, or other research product please use the following citation:

Isaak, Daniel J.; Wenger, Seth J.; Peterson, Erin E.; Ver Hoef, Jay M.; Hostetler, Steven W.; Luce, Charlie H.; Dunham, Jason B.; Kershner, Jeffrey L.; Roper, Brett B.; Nagel, David E.; Chandler, Gwynne L.; Wollrab, Sherry P.; Parkes, Sharon L.; Horan, Dona L. 2016. NorWeST modeled summer

stream temperature scenarios for the western U.S. Fort Collins, CO: Forest Service Research Data Archive. https://doi.org/10.2737/RDS-2016-0033.

*The stream temperature scenario shapefile data should be used with the understanding that the stream temperature values contained therein are modeled temperatures, not actual temperatures, and are subject to some imprecision associated with the modeling process. Stream temperatures were modeled based on instream recordings usually taken at hourly time steps during the month of August. The USDA Forest Service makes no warranty, expressed or implied, including the warranties of merchantability and fitness for a particular purpose, nor assumes any legal liability or responsibility for the accuracy, reliability, completeness or utility of these geospatial data, or for the improper or incorrect use of these geospatial data. These geospatial data and related maps or graphics are not legal documents and are not intended to be used as such. The data and maps may not be used to determine title, ownership, legal descriptions or boundaries, legal jurisdiction, or restrictions that may be in place on either public or private land. Natural hazards may or may not be depicted on the data and maps, and land users should exercise due caution. The data are dynamic and may change over time. The user is responsible to verify the limitations of the geospatial data and to use the data accordingly.