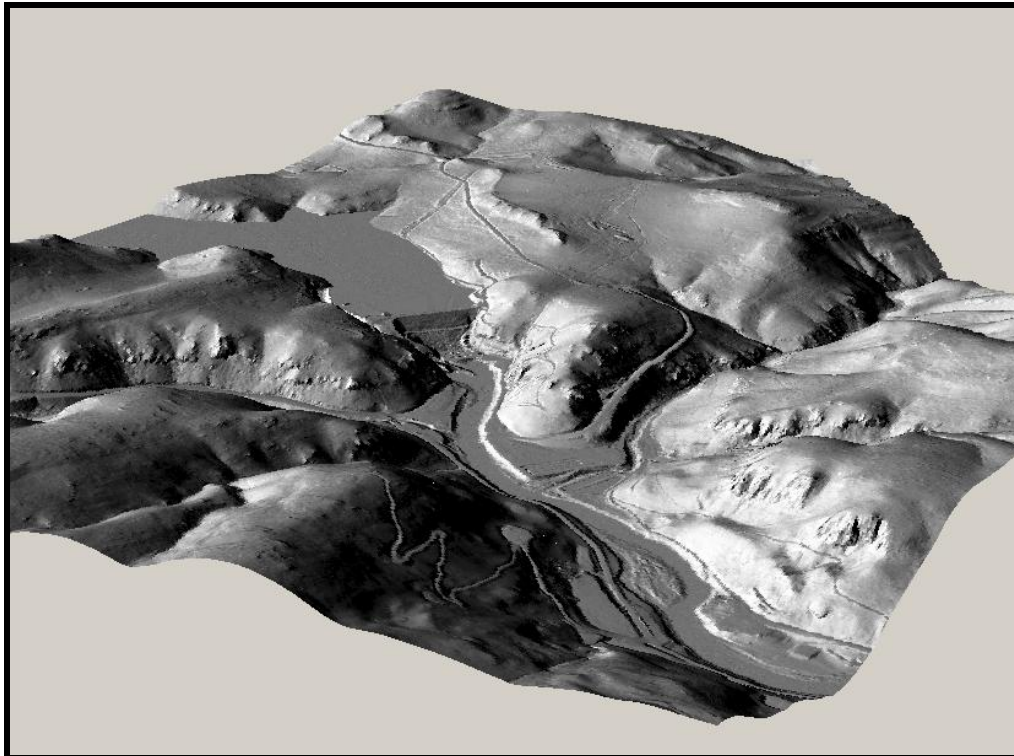


# RECLAMATION

*Managing Water in the West*

## **Klamath River Dams Project Geospatial Base Map Data Dictionary**



U.S. Department of the Interior  
Bureau of Reclamation  
Denver, Technical Service Center, Environmental Services Division  
Mid-Pacific Region, MP-180

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## **Mission Statements**

The U.S. Department of the Interior protects America's natural resources and heritage, honors our cultures and tribal communities, and supplies the energy to power our future.

The mission of the Bureau of Reclamation is to manage, develop, and protect water and related resources in an environmentally and economically sound manner in the interest of the American public.

This report was prepared for the United States Bureau of Reclamation, Mid-Pacific Region by the Remote Sensing and GIS Team of the Bureau of Reclamation's Technical Service Center, Denver, CO. 86-68251

Cover Figure: Looking upstream at the Iron Gate Dam (LiDAR acquired, 2009)

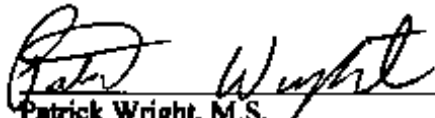
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## Peer Review

Peer Review Certification: This document has been peer reviewed per guidelines established by the Technical Service Center and is believed to be in accordance with the service agreement and standards of the profession. Questions concerning this report should be addressed to Dave Fisher, Group Manager of the Flood Hydrology Emergency Management Group (86-68250) at 303-445-2542.

### PREPARED BY:



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Patrick Wright, M.S.  
Physical Scientist  
Flood Hydrology Emergency Management Group (86-68250)

DATE: 10/17/2010

### PEER REVIEWED BY:



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David Salas, M.S.  
Physical Scientist  
Flood Hydrology Emergency Management Group (86-68250)

DATE: 10/18/2010

## Contacts

- **Rhea L. Graham**  
**Program Manager, Klamath River Dams Project**  
**USBR, Mid-Pacific Region**  
**2800 Cottage Way, E-2710**  
**Sacramento, CA 95825-1898**  
**Phone: office (916) 978-5113**  
**mobile (916) 704-8865**  
**E-Mail: [rgraham@usbr.gov](mailto:rgraham@usbr.gov)**
  
- **Blair P. Greimann**  
**Hydraulic Engineer**  
**USBR, Denver Technical Service Center**  
**Sedimentation and River Hydraulics Group**  
**P.O. Box 25007 Mail Code 86-68240**  
**Phone: (303) 445-2563**  
**E-Mail: [bgreimann@usbr.gov](mailto:bgreimann@usbr.gov)**
  
- **Patrick Wright**  
**Physical Scientist / Data Steward**  
**USBR, Denver Technical Service Center**  
**Remote Sensing and Geographic Information Team**  
**P.O. Box 25007 Mail Code 86-68251**  
**Denver, CO 80225**  
**Phone: (303) 445-2288**  
**E-mail: [pwright@usbr.gov](mailto:pwright@usbr.gov)**
  
- **David Salas**  
**Physical Scientist**  
**USBR, Denver Technical Service Center**  
**Remote Sensing and Geographic Information Team**  
**P.O. Box 25007 Mail Code 86-68251**  
**Denver, CO 80225**  
**Phone: (303) 445-3619**  
**E-mail: [desalas@usbr.gov](mailto:desalas@usbr.gov)**

# Klamath River Dams Project Geospatial Base Map Data Data Dictionary

Prepared by  
Patrick Wright

## Introduction

Since 2003, the United States has spent over \$500 million in the Klamath Basin for irrigation, fisheries, National Wildlife Refuges, and other resource enhancements and management actions. Consequently, the United States, the States of California and Oregon, the Klamath, Karuk, and Yurok Tribes, Klamath Project Water Users, and other Klamath River Basin stakeholders negotiated the Klamath Basin Restoration Agreement (KBRA) and the Klamath Hydroelectric Settlement Agreement (KHSA) to resolve long-standing disputes between them regarding a broad range of natural resource issues.

The KHSA, signed on February 18, 2010, describes the conditions that need to be satisfied in advance of the Secretarial Determination and lays out the process for additional studies and environmental review. The Secretarial Determination is a decision by the Secretary of the Interior regarding whether removal of four dams owned by PacifiCorp: 1) will advance restoration of the salmonid fisheries of the Klamath Basin; and 2) is in the public interest, which includes, but is not limited to, consideration of potential impacts on affected local communities and tribes. The four dams are J.C. Boyle, Copco 1, Copco 2, and Iron Gate dams on the Klamath River. The KHSA includes provisions for the interim operation of the dams and the process to transfer, decommission, and remove the dams.

Facilities removal is defined as the physical removal of all or part of each of the four PacifiCorp dams to achieve, at a minimum, a free-flowing condition and volitional fish passage, site remediation and restoration (including previously inundated lands) measures to avoid or minimize adverse downstream impacts, and all associated permitting. The Secretarial Determination requires studies of dam removal effects on fish, sediment, the regional economy, and other resources. These studies are ongoing and are being conducted in coordination with the parties to the KHSA and the public.

The purpose of this project is to provide digital mapping products for documenting the current site conditions for future studies. Woolpert Inc. & Watershed Sciences Inc. were contracted in 2009 to collect LiDAR and 3D breaklines for approximately 170 miles on the Klamath River from Link River Dam, OR to the confluence with Elk Creek south of Happy Camp, CA, and surveys along with above and in-water cross-sections at each of nine bridges. The scope of the project included ortho-imagery and 2 foot contour generation. The geo-spatial base map products described in this document are the

products of this effort and are available from the USBR Remote Sensing and Geographic Information Team based in Denver CO. As more data is produced and made available by contributing stakeholders this document and the data base that accompanies it will be updated. This document is intended to be used as an information and navigation tool. Fully compliant FGDC metadata and geodetic control results can be found within the database.

## Data Dictionary

### The map projection for the Klamath River Dams Project Base Data:

**Projection: California State Plane**

**Zone: 1**

**Fipszone: 0401**

**Vertical Datum: NAVD 1988**

**Horizontal Datum: NAD83**

**Unit: Feet**

### Directory – Klamath\Elevation

#### 1) File Name: DEMs.gdb

Description: File Geodatabase containing a raster catalog of DEM data generated from LIDAR, collected March 2010.

Area of coverage: Link Dam to Happy Camp,

Approximate Width: 3,000 – 4,000 feet on either side of the river

Format: File Geodatabase / Raster Catalog

Location: LocalGeolibData\Klamath\Elevation

#### **Raster Catalog:**

##### a) Klamath\_DEM

Significant Entity & Attribute Fields:

NAME = raster name

#### **Cataloged Raster Data:**

##### a) KLM-1\_BE through KLM-10\_BE

Description: Raster DEM created from ground return LIDAR data

Area of coverage: Link Dam to Happy Camp

Approximate Width: 3,000 to 4,000 feet on either side of the river

Cell Size: 3x3 feet

Format: ESRI GRID

Location: LocalGeolibData\Klamath\Elevation\ESRI\_GRIDS

Significant Entity & Attribute Fields:

VALUE = elevation



2) **File Name: KlamathRiver\_Final.gdb**

Description: File Geodatabase and Feature Dataset containing several feature classes associated with or created from LIDAR, collected March 2010.

Area of coverage: Link Dam to Happy Camp,

Approximate Width: 3,000 to 4,000 feet on either side of the river

Format: File Geodatabase / Feature Dataset

Location: LocalGeolibData\Klamath\Elevation

**Feature Class:**

a) Boundary = area of coverage

Significant Entity & Attribute Fields:

NA

b) Mass Points = ground return multipoint LIDAR data

Significant Entity & Attribute Fields:

NA

Note, these data need to be converted from multipoint to singlepoint to access internal elevation values.

c) Spot Heights = ground return spot LIDAR

Significant Entity & Attribute Fields:

Elevation = point elevation in feet

d) Contours = 2ft. contours

Significant Entity & Attribute Fields:

Feature Type = contour index designation

Elevation = contour elevation in feet

Obscured = Yes – contour is estimated due to obscuring ground feature

No – contour is not obscured

e) Planimetrics = planimetric footprints

Significant Entity & Attribute Fields:

Feature Type = feature designation

f) Line Features = breaklines

Significant Entity & Attribute Fields:

Feature Type = feature designation

Elevation = line elevation in feet

g) KlamathRiver\_Terrain = ESRI Terrain

Significant Entity & Attribute Fields:

Edge Types = hard or soft breakline designation

Elevation = face elevation in feet

## **Directory – Klamath\Hydrography**

### **1) File Name: Bathymetry.gdb**

Description: File Geodatabase and Feature Dataset containing point feature classes representing surveyed cross sections in the proximity of bridges spanning the Klamath River and a longitudinal bathymetric profile. Surveyed January through March 2010.

Area of Coverage:

Cross sections - Iron Gate Dam to the Shasta River  
Profile – Running from I-5 to 3 miles downstream

Format: Geodatabase / Feature Class

Location: LocalGeolibData\Klamath\Hydrography

#### **Feature Class:**

- a) Bridge\_Xsect = cross sections associated with bridges below Irongate Dam

Significant Entity & Attribute Fields:

X = x axis coordinate

Y = y axis coordinate

Z = elevation in feet

- b) Profile = longitudinal profile running 3 miles downstream of I-5

Significant Entity & Attribute Fields:

X = x axis coordinate

Y = y axis coordinate

Z = subsurface elevation in feet

## **Directory – Klamath\Imagery**

### **1) File Name: Imagery.gdb**

Description: File Geodatabase containing a raster catalogs of true color orthophoto and LIDAR intensity imagery, collected March 2010.

Area of Coverage: Link Dam to Happy Camp

Approximate Width: 3,000 to 4,000 feet on either side of the river

Format: Geodatabase / Raster Catalog

Location: LocalGeolibData\Klamath\Imagery

#### **Raster Catalog:**

- a) Intensity\_Tiles = LIDAR intensity returns

Significant Entity & Attribute Fields:

Name: raster name

- b) Ortho\_Mosaic = mosaic of orthophoto compressed MrSID files  
Significant Entity & Attribute Fields:  
Name: raster name
  
- c) Ortho\_Tiles = mosaic of orthophoto Tiff files  
Significant Entity & Attribute Fields:  
Name: raster name

**Cataloged Raster Data:**

- a) 177532.tif through 621694.tif

Description: LIDAR intensity return raster data  
Area of coverage: Link Dam to Happy Camp  
Approximate Width: 3,000 to 4,000 feet on either side of the river

Cell Size: 2x2 feet

Format: Tiff

Location: LocalGeolibData\Klamath\Imagery\Intensity

Significant Entity & Attribute Fields:  
VALUE = return signal strength

Note, this data set consist of project map tiles at 2,600 x 2,050 foot format for storage and display. The index map (Index\_map.gdb) depicting tile structure and numeric identifier can be located and accessed within the LocalGeolibData\Klamath\Reference directory.

- b) Klamath1.sid through Klamath3.sid

Description: Compressed true color orthophoto raster data collected by an ADS40 digital camera  
Area of coverage: Link Dam to Happy Camp  
Approximate Width: 3,000 to 4,000 feet on either side of the river

Cell Size: 1x1 feet

Format: SID

Location: LocalGeolibData\Klamath\Imagery\SID

Significant Entity & Attribute Fields:  
NA

c) 177532.tif through 621694.tif

Description: Orthophoto raster data collected by an ADS40 digital camera

Area of coverage: Link Dam to Happy Camp

Approximate Width: 3,000 to 4,000 feet on either side of the river

Cell Size: 1x1 feet

Format: Tiff

Location: LocalGeolibData\Klamath\Imagery\TIFFs

Significant Entity & Attribute Fields:

NA

Note, This data set consist of project map tiles at 2,600 x 2,050 foot format for storage and display. The index map (Index\_map.gdb) depicting tile structure and numeric identifier can be located and accessed within the LocalGeolibData\Klamath\Reference directory.

## **Directory – Klamath\Infrastructure**

### **1) File Name: Infrastructure.gdb**

Description: File Geodatabase and Feature Classes depicting infrastructure

Area of Coverage: Iron Gate Dam to the Shasta River

Format: Geodatabase / Feature Class

Location: LocalGeolibData\Klamath\Infrastructure

Feature Class:

- a) Bridge\_Survey = field survey data for several bridges below Iron Gate Dam containing point feature classes representing field survey data, surveyed January through March 2010. These data may be found as a complete DWG file in the Klamath\OtherContent\AutoCAD\Bridge\_Survey directory.

Significant Entity & Attribute Fields:

X = x axis coordinate

Y = y axis coordinate

Z = elevation in feet

DIS = description

- b) Bridge\_Index = these data represent bridges\structures that cross the

Klamath River between Link Dam and Happy Camp, developed for the Klamath Dams Project. Bridges are represented by points and attributed by road name and river mileage.

Significant Entity & Attribute Fields:

BRDG\_NAME = name of road or structure

RIVERMILE = estimated USGS river mileage

### **Directory – Klamath\OtherContent**

The “OtherContent” directory contains sub-directories populated by data that are not directly compatible with ArcMAP or repetitive information already provided in an ESRI compatible format within this data base.

#### **1) Sub-Directory Name: AutoCAD**

Description: Geo-Spatial data generated by the contractor

Area of Coverage: Link Dam to the Happy Camp

Approximate Width: 3,000 to 4,000 feet on either side of the river

Format: 2007 AutoCAD

Location: LocalGeolibData\Klamath\OtherContent

Sub-Sub\_directory:

- a) Bridges Drawing and Points = field survey data for several bridges below Iron Gate Dam depicting information on deck, soffit and other primary structural features.
- b) Contours\_only = 2ft. contour data, indexed and annotated. Note, these are the same data found in the KlamathRiver\_Final.gdb.
- c) DTM = elevation data derived from LIDAR ground return data including ground return points, 2ft. contours, breaklines and annotation. Note, these are the same data found in the KlamathRiver\_Final.gdb.

Note, the DTM and contour data sets consist of project map tiles at 2,600 x 2,050 foot format for storage and display. The index map (Index\_map.gdb) depicting tile structure numeric identifier can be located and accessed within the LocalGeolibData\Klamath\Reference directory.

#### **2) Sub-Directory Name: Lidar\_LAS**

Description: Geo-Spatial LIDAR return point clouds

Area of Coverage: Link Dam to the Happy Camp

Approximate Width: 3,000 to 4,000 feet on either side of the river

Format: Log ASCII Standard

Location: LocalGeolibData\Klamath\OtherContent

Sub-Sub\_directory:

- a) ALL = unprocessed return LIDAR point cloud
- b) Ground = processed ground return LIDAR point cloud

Note, these data consist of project map tiles at 2,600 x 2,050 foot format for storage and display. The index map (Index\_map.gdb) depicting tile structure numeric identifier can be located and accessed within the LocalGeolibData\Klamath\Reference directory.

### 3) **Sub-Directory Name: Metadata**

Description: Metadata information of data that do not contain internal metadata information

Area of Coverage: Link Dam to the Happy Camp

Approximate Width: 3,000 to 4,000 feet on either side of the river

Format: 2007 AutoCAD / Log ASCII Standard

Location: LocalGeolibData\Klamath\OtherContent

XML Files:

- a) Klamath\_AutoCAD = metadata on CAD data within the LocalGeolibData\Klamath\OtherContent\AutoCAD directory.
- b) Klamath\_LIDAR = metadata on the LAS data within the LocalGeolibData\Klamath\OtherContent\Lidar\_LAS directory.

### 4) **Sub-Directory Name: Reports**

Description: Documentation and verification on data collection & accuracy assessments

Area of Coverage: Link Dam to the Happy Camp

Approximate Width: 3,000 to 4,000 feet on either side of the river

Format: 2007 AutoCAD / Log ASCII Standard

Location: LocalGeolibData\Klamath\Reference\OtherContent

Report:

- a) Klamath\_2010 Survey Report.pdf = photogrammetric ground control survey report for 2010 data collection

- b) Klamath\_River\_2010\_LiDAR\_Report.pdf = LIDAR collection and mapping report for 2010 data collection
- c) RMile\_Tool.doc = documentation on mileage referencing tool

### **Directory – Klamath\Reference**

The “Reference” directory contains sub-directories populated by information on the data collection

#### **1) File Name: INDEX\_MAP.gdb**

Description: Geodatabase containing feature classes that are spatial references

Area of Coverage: Link Dam to the Happy Camp

Approximate Width: 3,000 to 4,000 feet on either side of the river

Format: File Geodatabase / Feature Class

Location: LocalGeolibData\Klamath\Reference\

Feature Class:

- a) LAS\_ORTHO\_CAD\_INDX = numerically attributed index map consisting of project map tiles at 2,600 x 2,050 foot format for storage and display of orthophotography, LAS, AutoCAD data sets.

Significant Entity & Attribute Fields:

Name = numeric tile code

- b) RMile\_Tool = a linear routing tool to be used to display and estimate river miles, geo-reference data by river mile add river mileage attributes to existing point line and polygon data.

Significant Entity & Attribute Fields:

NA