

Oregon Terrestrial Raster Elevation Data Standard

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1.0 Introduction

The Oregon Framework Elevation Theme (OFET) is a spatially referenced vertical representation of the surface of Oregon above and or below a datum reference surface. The OFET is composed of raster and vector representations of surface elevation and subsurface water depth measurements (bathymetry). The Raster Elevation Geodata for Oregon (also known as a Digital Elevation Model (DEM)) is one component of OFET. OFET includes DEM's of 10, 30, and 90 meters, bathymetry, hypsography (contours), elevation bands (polygons), and spot elevations (points). Additionally these layers may be used to calculate derived layers such as slope, aspect, and flow direction.

1.1 Mission and Goals of Standard

The Oregon Terrestrial Raster Elevation Standard (OTRES) will provide a consistent structure for data producers and data users to ensure the compatibility of datasets within the same framework layer and between other framework layers and themes.

1.2 Relationship to Existing Standards

The Federal Geographic Data Committee (FGDC) has prepared a document entitled "*Framework Elevation Standard*" which serves as a reference for the Oregon standard.

1.3 Description of Standard

The OTRES describes the critical metadata elements necessary to adequately describe, produce, and use a DEM in Oregon. Unlike vector data standards that have multiple database fields attached to individual elements, a raster data set represents a range of values for a single value. The OTRES therefore focuses on the description of the dataset rather than the details of the database.

1.4 Applicability and Intended Use of Standard

For Oregon geospatial data, this standard is applicable to the themes/layers that represent the height of the earth's surface relative to a given hypothetical surface or datum such as mean high tide, or North American Vertical Datum 1988 (NAVD 88). The intended use of this standard is to guide accurate DEM documentation that will enable data users to understand how a DEM was produced and the appropriate uses the data set was developed to address.

1.5 Standard Development Procedures

The Oregon Framework Implementation Team for Elevation (FIT-Elevation) is comprised of representatives from federal, state, and local governmental agencies in Oregon. This team created the first draft of the OTRES, and published that draft standard via email lists and open meetings. The public review and comment period will commence with the first Oregon Standards Forum (December 4, 2002). In 1997 a group of agency representatives met on an informal basis to collaboratively develop an elevation model with a finer spatial resolution than

the existing 90-meter DEM data. This group recognized the value of developing additional elevation data sets other than the DEM's, and named the group Oregon Terrain Information System (OTIS). The first effort of the OTIS group was the collection, cleaning, merging, and distribution of the 30-meter DEM data produced by the United States Geological Survey (USGS).

Additional design contributions have been made by:

- US Forest Service (USFS)
- US Environmental Protection Agency
- US Bureau of Land Management
- US Fish & Wildlife Service
- Bonneville Power Administration
- Oregon Department of Forestry
- Oregon State University
- Oregon Department of Water Resources
- Oregon Department of Administrative Services
- Oregon Department of Environmental Quality
- Association of Oregon Counties

Future data standards will be developed through a combination of periodic framework meetings and documents shared on the Oregon Framework web site.

1.6 Maintenance of Standard

The OTRES will be revised as needed when initiated by members of the standards process. It is anticipated that as higher resolution elevation data becomes commonly available the standard will need to be updated.

2.0 Body of the Standard

2.1 Scope and Content of the Standard

The scope of the OTRES is to provide a standard for publicly available raster data in Oregon with a resolution of 10 meters or greater. The content is focused on the critical metadata elements required for individual data sets.

2.2 Need for the Standard

The Raster Elevation standard is needed in Oregon to ensure that when users acquire data from disparate sources, they can use, display, and analyze the data within the context of the stated resolution and appropriate use of the data. When followed the standard will also minimize the possible errors associated with inconsistent data.

2.3 Participation in Standards Development

The Raster Elevation standard process has been in development for five years. Agencies

interested in using elevation data are welcome to participate in the standards development. The Raster Elevation standard is also open to public review and comment.

2.4 Integration with Other Standards

The Raster Elevation standard follows the same format as other Oregon Framework layers. The specifics of the Raster Elevation standard are related to the Vector and Bathymetric Elevation standards, which will be developed at a future point. The relationship with other non-elevation data standards is primarily geo-referencing.

2.5 Technical and Operation Context

2.5.1 Data Environment

The data environment for OTRES is a raster, or cell based model

2.5.2 Reference Systems

The coordinate reference systems typically used in Oregon are the Universal Transverse Mercator (UTM) the Oregon State Plane system and the custom Oregon Lambert coordinate system. The UTM zones are zone 10, which comprises all land in Oregon to the west of 120 degrees west longitude, and zone 11, which comprises all land to the east of 120 degrees west longitude. The State Plane North and State Plane South zones are divided along the county boundaries near 44 degrees north latitude. The custom Oregon Lambert coordinate system is described at <http://www.gis.state.or.us/data/format.html>.

2.5.3 Global Positioning Systems (GPS)

GPS data-capturing devices enable data collection systems on the ground and above the earth to determine precise X & Y coordinate values, as well as a less precise Z value. As of version 1.04 of the OTRES, no standard has been adopted for the use of GPS technology. However, this does not preclude the use of GPS technology for the capture of surface elevation. This standard recommends the inclusion of the local GPS collection method as a component of the OTRES metadata documentation where appropriate.

2.5.4 Integration of Themes

The primary related Framework data layer used to supplement the construction of OTRES DEM is Hydrography. The hydrography layer is used to ‘etch’ the elevation model to ensure that the surface flows to the low point represented by the hydrography. This process is commonly known as ‘drainage enforcement’.

2.5.5 Encoding

N/A

2.5.6 Resolution

The following are the resolutions for the OTRES DEM's:

- 10 meter
- 30 meter
- 90 meter

2.5.7 Accuracy

The accuracy of the OTRES data is half the cell size of the DEM

2.5.8 Edge Matching

The OTRES is designed to be seamless across Oregon. Similar data sets from adjacent states using the same vertical datum should merge with the OTRES data without gaps.

2.5.9 Feature Identification Code

N/A

2.5.10 Attributes

The only attributes needed are the cell size of the raster and the units of measure (feet or meters). It is important that the vertical units match the horizontal units.

- 2.5.10.1 Points
- 2.5.10.2 Lines
- 2.5.10.3 Associated Characteristics

2.5.11 Transactional Updating

Occasional changes to the surface of the earth will occur due to human activities or periodic natural events such as volcanoes, earthquakes, or landslides. Additionally, more precise forms of measurement may be able to correct data discrepancies where vegetation has obscured the ground profile. When new measurements become available to more accurately portray the earth's surface the OTRES should be updated. These updates will be infrequent, and can be done by an individual agency or contractor.

2.5.12 Records Management

Past versions of OTRES should be maintained for areas where the earth's surface has changed. For geographic areas of increased precision previous versions of the data are not necessary to archive.

2.5.13 Metadata

The OTRES standard follows the Framework Metadata Standard for geospatial data.

3.0 Data Characteristics

The data characteristics specified below are subject to revision based on the documented experiences of the FIT-Trans Pilot Projects. Several related standards (e.g., an Oregon Addressing Standard, an Oregon Structural Footprint Standard, and others) may be required in order to systematically support the emergency planning and routing applications mentioned earlier.

3.1 Minimum Graphic Data Elements

Raster size

3.2 Minimum Attribute or Non-graphic Data Elements

Elevation
Surface type
Units (horizontal and vertical)
Vertical datum
Horizontal datum
Accuracy
Precision
Geodetic control
Source of measurements
Raster size
Time

3.2.1 Points

N/A

3.2.2 Lines

N/A

3.3 Optional Graphic Data Elements

N/A

3.4 Optional Attribute or Non-graphic Data Elements

N/A

References

FGDC “*Framework Elevation Standard*”

Appendices

N/A