

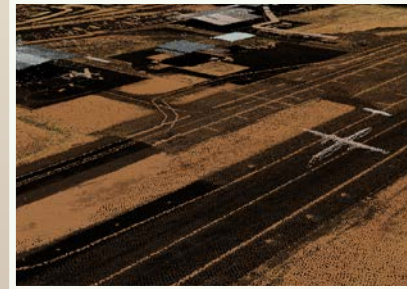


Lidar Landscapes 2011 Calendar

Lidar Technology & Coverage in Oregon

The Oregon Department of Geology and Mineral Industries (DOGAMI) is using a laser-based terrain mapping system called lidar (light detection and ranging) to create a new generation of maps that are more accurate and comprehensive than any in the past.

As shown in this image of Rogue Valley International-Medford Airport (right), **lidar point cloud data** offer unprecedented views of the ground surface and the built environment. DOGAMI, via the Oregon Lidar Consortium (OLC), is continually acquiring new lidar data throughout the state.



DOGAMI Uses of High-Resolution Lidar

•Resource Mapping

- Base Maps
- Geologic Mapping
- Shoreline Monitoring
- Aggregate
- Mine Site Reclamation
- Mineral Exploration
- Geothermal Development

•Asset Mapping

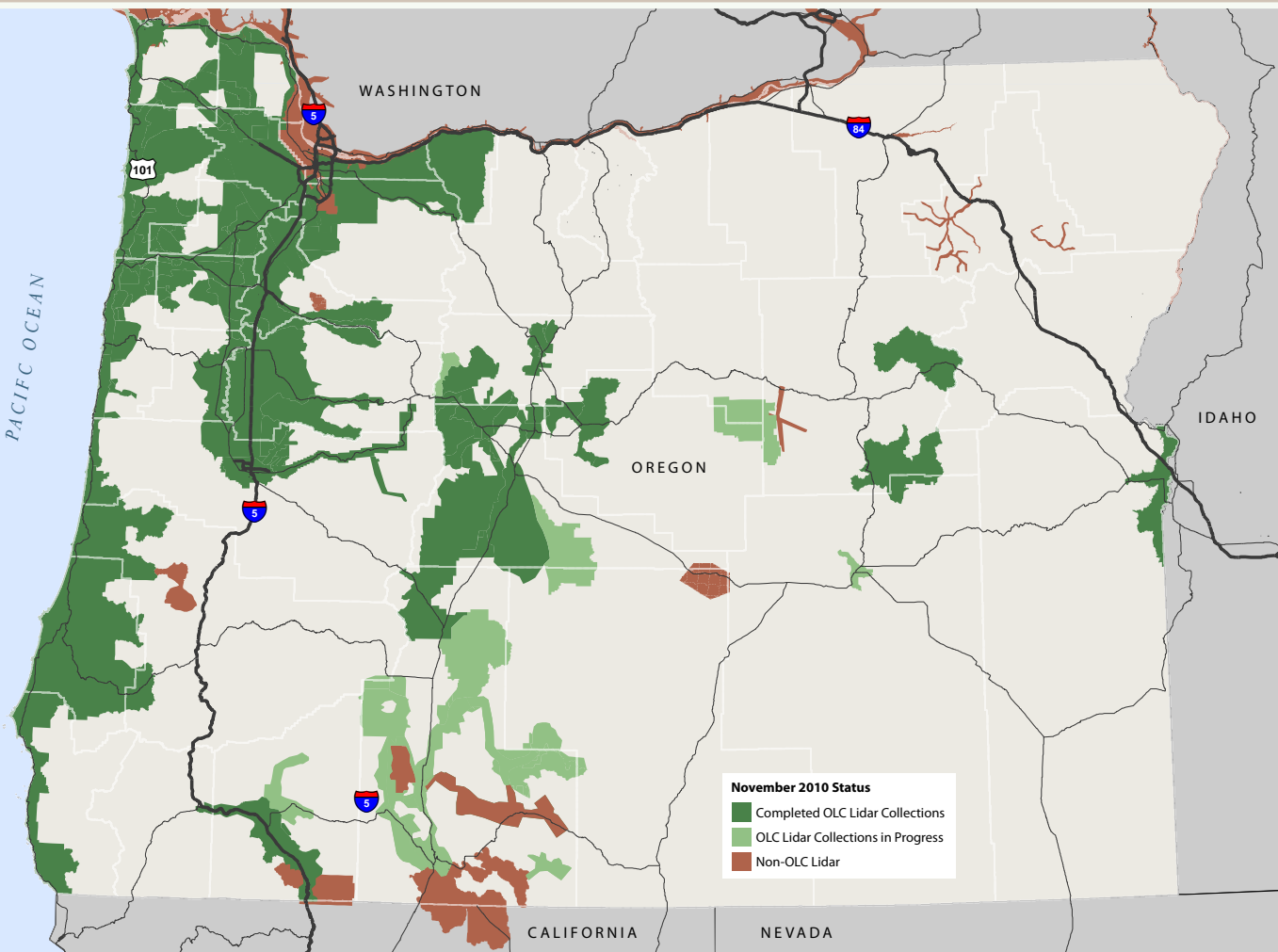
- Building Extraction
- State-owned Facilities
- Essential & Critical Facilities
- Utilities & Energy Site Development
- Population Distribution
- Transportation Corridors

•Hazard Inventory Mapping

- Landslides
- Debris Avalanches
- Fault Displacement
- Channel Migration
- Volcanic Flows
- Coastal Erosion
- Climate Change

•Hazard & Risk Mapping

- Tsunami Inundation
- River & Coastal Flooding
- Volcanic Lahars
- Evacuation Planning
- Energy Assurance
- Natural Hazardous Materials



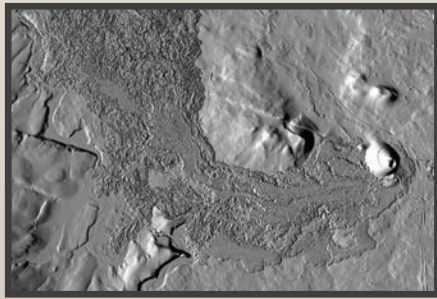
How can DOGAMI help you?

Contact us to find out!

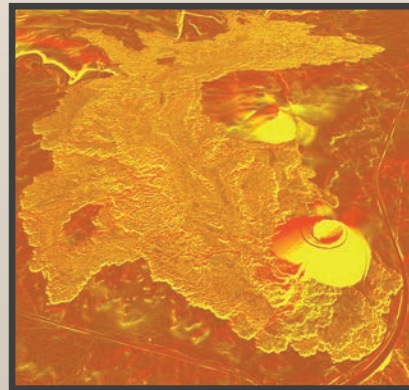
Ian Madin, DOGAMI Chief Scientist
telephone (971) 673-1542
Ian.Madin@dogami.state.or.us

Creating a Lidar Landscape

Each lidar landscape image shown in this calendar required a series of steps to create.



1 Original Lidar Bare Earth Image



2 Rotated Lidar Bare Earth Image with Color Gradient Applied



3 Orthophoto Draped over Lidar Image



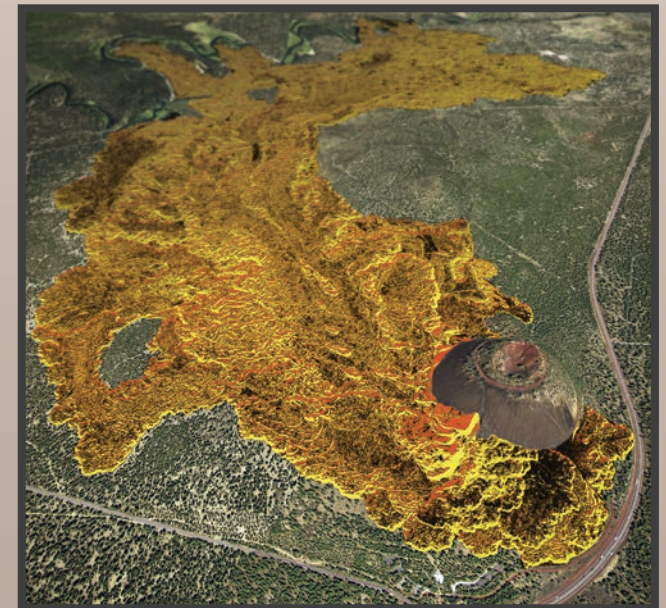
4 Final Lidar Image

[1] The lidar bare earth raster image is opened in a 3D GIS application.

[2] The attitude of the scene is adjusted to the desired angle. In the example above, a yellow to orange gradient is also applied to the bare earth raster to simulate the color of actively flowing lava. This image is exported as a raster file.

[3] An orthophoto of the same area is draped over the lidar bare earth raster and also exported as a raster file.

[4] The exported files are opened in a photo-editing application and the orthophoto image is layered on top of the bare earth image. A mask is applied so that portions of the bare earth image show through the orthophoto. Additional filters and color enhancements are applied to add visual depth and to emphasize certain features.





Sand Dunes, Honeyman State Park







2010 Oregon Department of Geology and Mineral Industries Lidar imagery and graphic design by Daniel Coe

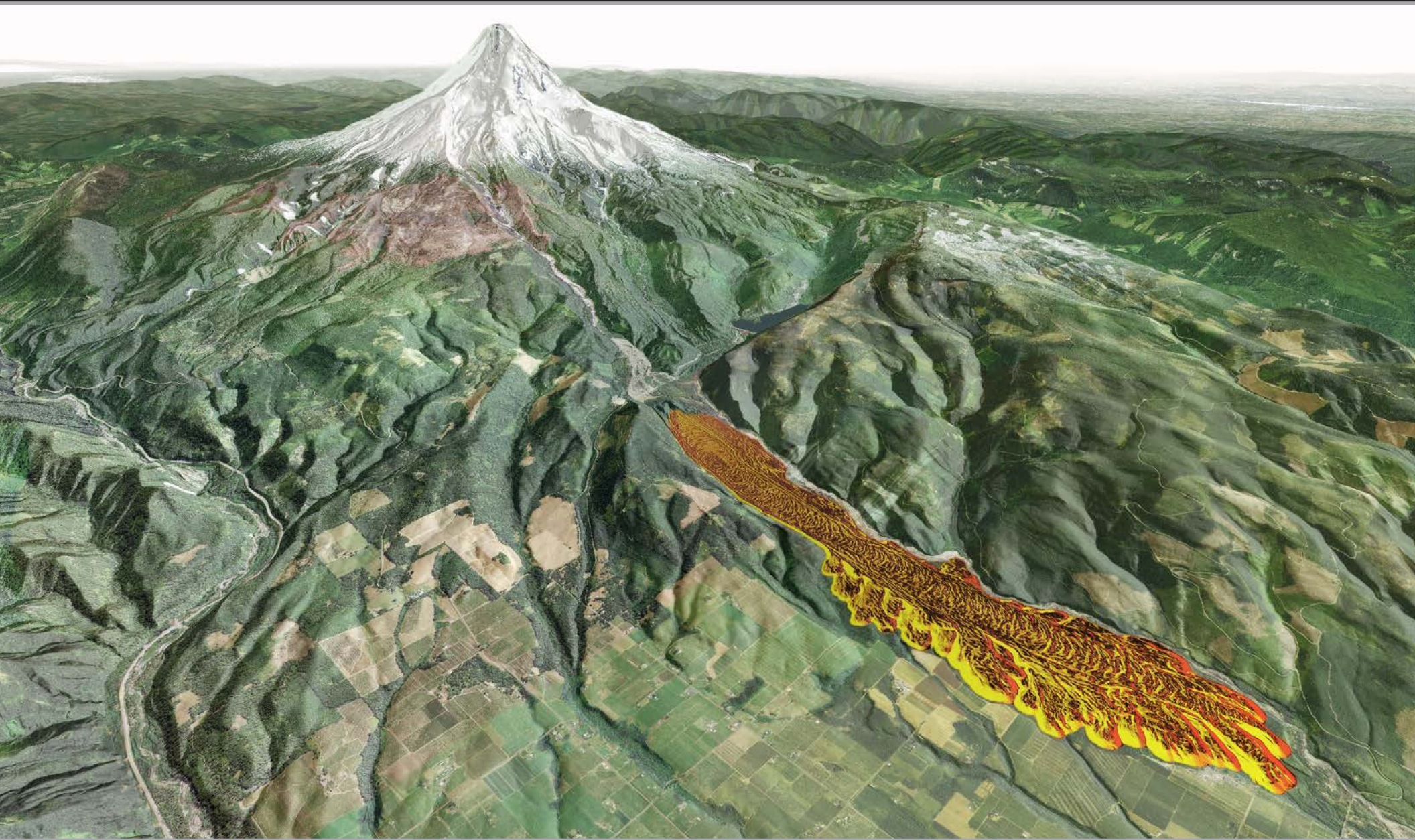
▲ Honeymen State Park, Lane County, on the Oregon coast. Here sand dunes bury islands of forest, while behind them beach grass and scrub pines colonize the sand. Cleawox Lake, in the upper right, formed as the moving sand blocked the outlet to a coastal stream. This enhanced 3D image is a composite of lidar-derived shaded relief and orthorectified aerial photography.

DECEMBER 2010
S M T W T F S
28 29 30 1 2 3 4
5 6 7 8 9 10 11
12 13 14 15 16 17 18
19 20 21 22 23 24 25
26 27 28 29 30 31 1

JANUARY 2011

FEBRUARY 2011
S M T W T F S
30 31 1 2 3 4 5
6 7 8 9 10 11 12
13 14 15 16 17 18 19
20 21 22 23 24 25 26
27 28 1 2 3 4 5

Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
26	27	28	29	30	31	1 New Year's Day
2	3	4 	5	6	7	8
9	10	11 	12	13	14	15
16	17 Martin Luther King Jr.'s Birthday	18	19	20 	21	22
23	24	25	26	27 	28	29
30	31	1	2	3	4	5



Mount Hood and the Parkdale Lava Flow, Hood River County, Oregon







2010 Oregon Department of Geology and Mineral Industries Lidar imagery and graphic design by Daniel Coe

▲ Mount Hood and the Parkdale Lava Flow on the mountain's northeast flank in Hood River County, Oregon. This basaltic andesite flow occurred approximately 7,700 years ago. This 3D enhanced image was created using a combination of lidar-derived shaded relief and aerial orthophotography.

JANUARY 2011
S M T W T F S
26 27 28 29 30 31 1
2 3 4 5 6 7 8
9 10 11 12 13 14 15
16 17 18 19 20 21 22
23 24 25 26 27 28 29

FEBRUARY 2011

MARCH 2011
S M T W T F S
27 28 1 2 3 4 5
6 7 8 9 10 11 12
13 14 15 16 17 18 19
20 21 22 23 24 25 26
27 28 29 30 31 1 2

Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
30	31	1	2 Groundhog Day	3 	4	5
6	7	8	9	10 	11	12 Lincoln's Birthday
13	14 Valentine's Day	15	16	17	18 	19
20	21 President's Day	22 Washington's Birthday	23	24	25 	26
27	28	1	2	3	4	5



Alsea Bay, Lincoln County, Oregon



2010 Oregon Department of Geology and Mineral Industries Lidar imagery and graphic design by Daniel Coe

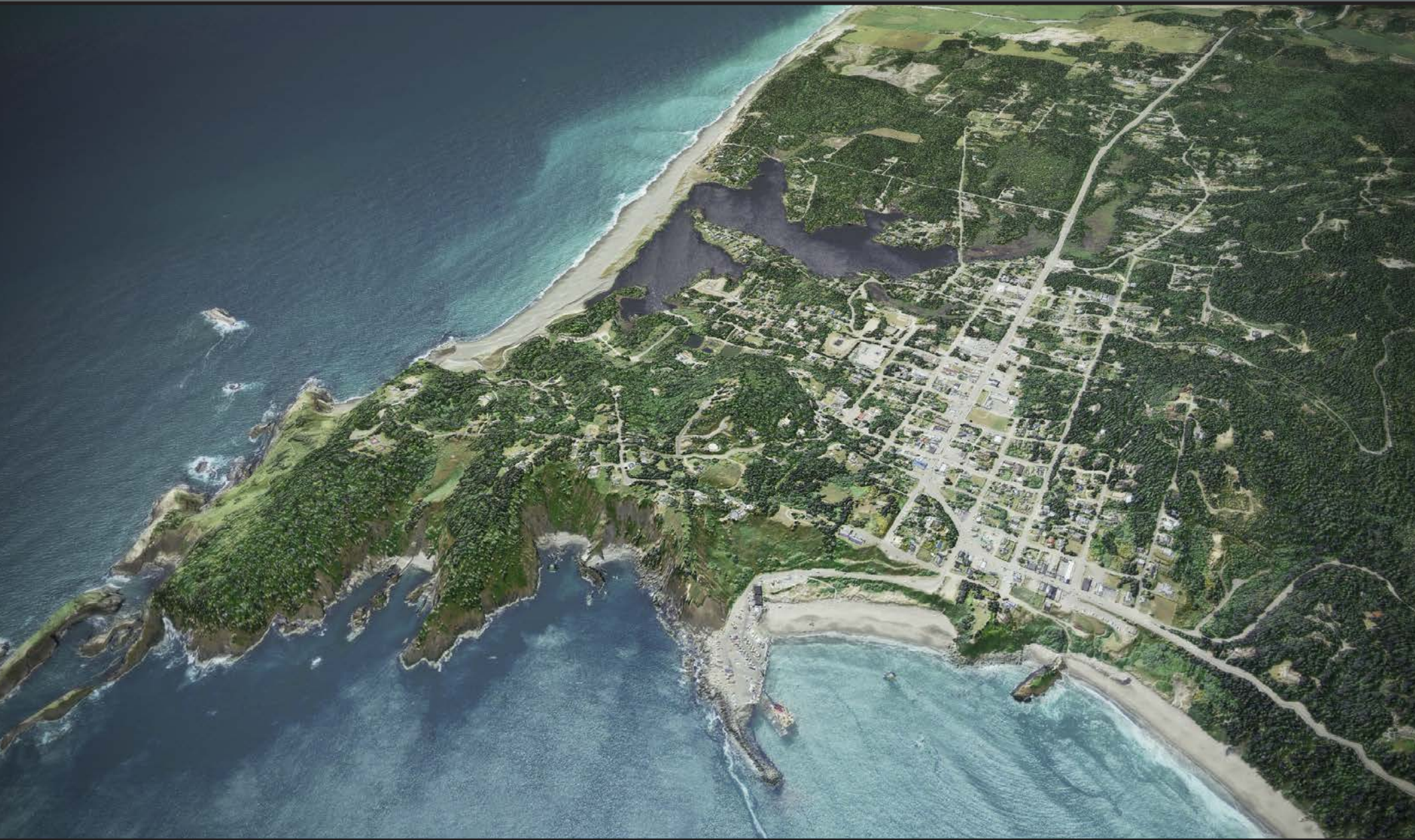
▲ Alsea Bay in Lincoln County, Oregon. Alsea Bay forms where the Alsea River enters the Pacific Ocean. This bay is one of many on the Oregon coast that records the history of a great earthquake in 1700 and the tsunami that resulted from it. The community of Waldport is in the upper center of the image. This enhanced 3D image is a composite of lidar-derived shaded relief and orthorectified aerial photography.

FEBRUARY 2011
S M T W T F S
30 31 1 2 3 4 5
6 7 8 9 10 11 12
13 14 15 16 17 18 19
20 21 22 23 24 25 26
27 28 1 2 3 4 5

APRIL 2011
S M T W T F S
27 28 29 30 31 1 2
3 4 5 6 7 8 9
10 11 12 13 14 15 16
17 18 19 20 21 22 23
24 25 26 27 28 29 30

MARCH 2011

Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
27	28	1	2	3	4	5
6	7	8	9	10	11	12
13	14	15	16	17	18	19
Daylight Savings Begins @ 2am						
20	21	22	23	24	25	26
First Day of Spring						
27	28	29	30	31	1	2



Port Orford, Oregon







2010 Oregon Department of Geology and Mineral Industries Lidar imagery and graphic design by Daniel Coe

MARCH 2011
S M T W T F S
27 28 1 2 3 4 5
6 7 8 9 10 11 12
13 14 15 16 17 18 19
20 21 22 23 24 25 26
27 28 29 30 31 1 2

MAY 2011
S M T W T F S
1 2 3 4 5 6 7
8 9 10 11 12 13 14
15 16 17 18 19 20 21
22 23 24 25 26 27 28
29 30 31 1 2 3 4

APRIL 2011

Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
27	28	29	30	31	1	2
 3	4	5	6	7	April Fool's Day 8	9
 10	11	12	13	14	15	16
17	 18	19	20	21	22	23
24	 25	26	27	28	Earth Day 29	30



Brookings, Oregon



2010 Oregon Department of Geology and Mineral Industries Lidar imagery and graphic design by Daniel Coe

APRIL 2011
S M T W T F S
27 28 29 30 31 1 2
3 4 5 6 7 8 9
10 11 12 13 14 15 16
17 18 19 20 21 22 23
24 25 26 27 28 29 30

MAY 2011

JUNE 2011
S M T W T F S
29 30 31 1 2 3 4
5 6 7 8 9 10 11
12 13 14 15 16 17 18
19 20 21 22 23 24 25
26 27 28 29 30 1 2

Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
1	2	3	4	5	6	7
8	9	10	11	12	13	14
Mother's Day						
15	16	17	18	19	20	21
22	23	24	25	26	27	28
29	30	31	1	2	3	4
	Memorial Day					



Netarts Bay, Tillamook County, Oregon







2010 Oregon Department of Geology and Mineral Industries Lidar imagery and graphic design by Daniel Coe

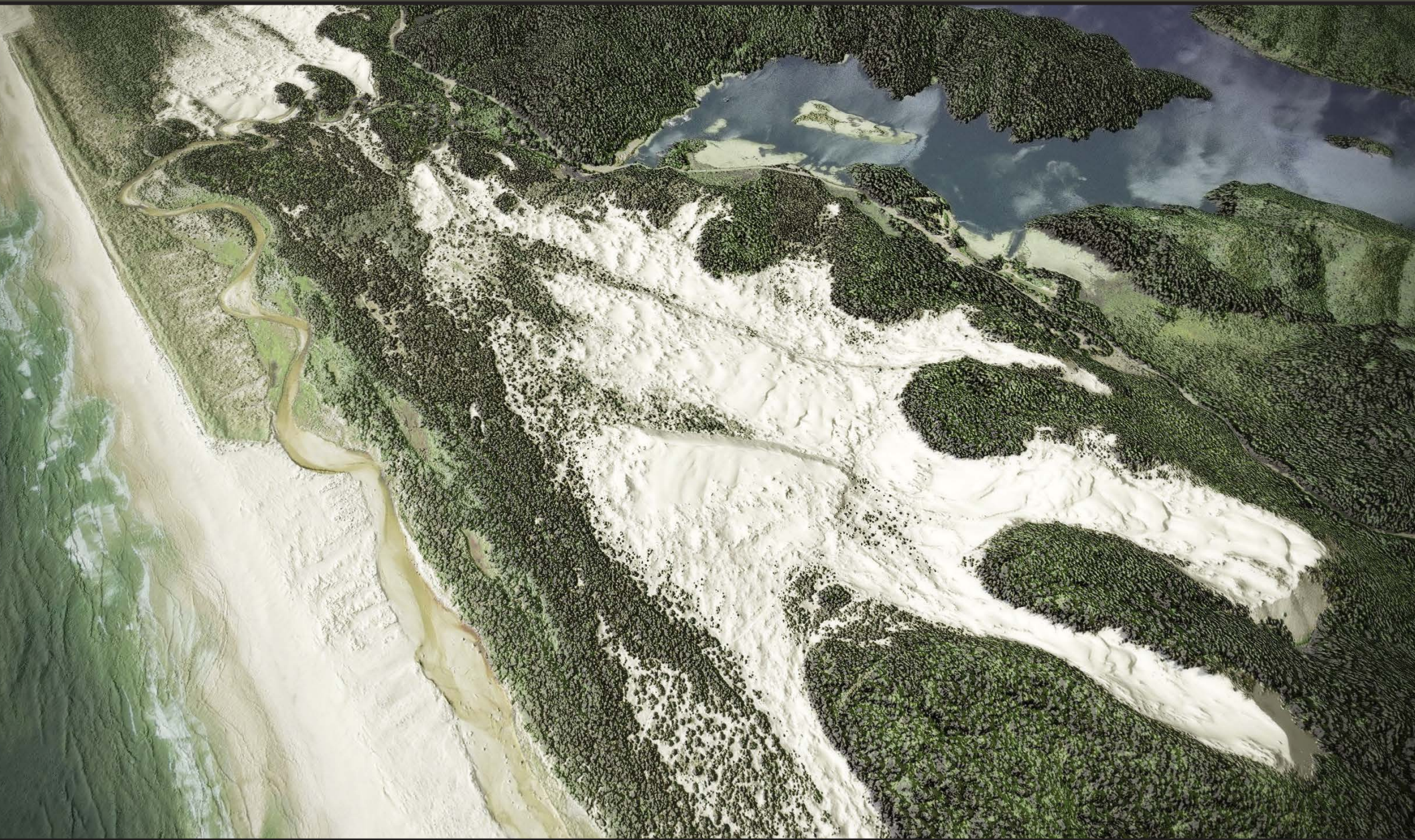
▲ Netarts Bay in Tillamook County, Oregon. Whereas all other major bays on the Oregon coast form where river valleys meet the ocean, Netarts Bay formed as a long sand spit enclosed a broad indentation in the coastal mountains. Wave erosion on the spit near the top of the image may soon cut a new entrance to the bay. The community of Netarts is at the bottom of the image. This enhanced 3D image is a composite of lidar-derived shaded relief and orthorectified aerial photography.

MAY 2011
S M T W T F S
1 2 3 4 5 6 7
8 9 10 11 12 13 14
15 16 17 18 19 20 21
22 23 24 25 26 27 28
29 30 31 1 2 3 4

JULY 2011
S M T W T F S
26 27 28 29 30 1 2
3 4 5 6 7 8 9
10 11 12 13 14 15 16
17 18 19 20 21 22 23
24 25 26 27 28 29 30

JUNE 2011

Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
29	30	31	1 	2	3	4
5	6	7	8 	9	10	11
12	13	14	15	16 	17	18
19	20	21	22	23 	24	25
Father's Day		First Day of Summer				
26	27	28	29	30	1	2



Sand Dunes, Oregon Dunes National Recreation Area








2010 Oregon Department of Geology and Mineral Industries Lidar imagery and graphic design by Daniel Coe

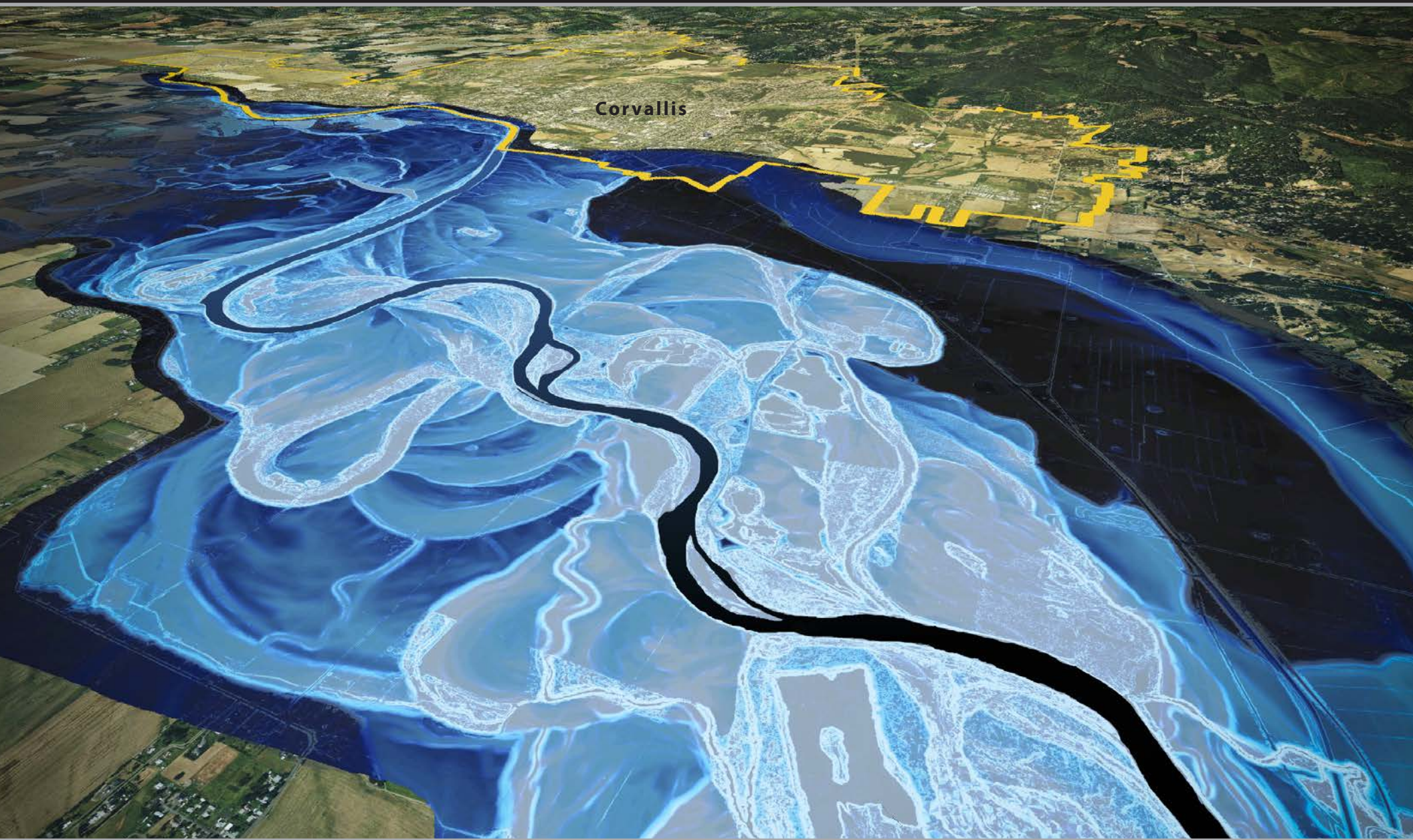
▲ Oregon Dunes National Recreation Area north of Winchester Bay in Lane County on the Oregon coast. In the Oregon Dunes N.R.A. abundant sand and strong winds that blow across the Pacific combine to build great piles of clean white sand. The moving sand and lush coastal forest fight a constant war for territory, as trees colonize the bare sand and dunes bury mature forests. This enhanced 3D image is a composite of lidar-derived shaded relief and orthorectified aerial photography.

JUNE 2011
S M T W T F S
29 30 31 1 2 3 4
5 6 7 8 9 10 11
12 13 14 15 16 17 18
19 20 21 22 23 24 25
26 27 28 29 30 1 2

JULY 2011

AUGUST 2011
S M T W T F S
31 1 2 3 4 5 6
7 8 9 10 11 12 13
14 15 16 17 18 19 20
21 22 23 24 25 26 27
28 29 30 31 1 2 3

Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
26	27	28	29	30	1 	2
3	4 Independence Day	5	6	7	8 	9
10	11	12	13	14	15	16 
17	18	19	20	21	22	23 
24	25	26	27	28	29	30 
31	1	2	3	4	5	6



Willamette River Historic Channels, North of Corvallis, Oregon







2010 Oregon Department of Geology and Mineral Industries Lidar imagery and graphic design by Daniel Coe

▲ The Willamette River and its former channels near Corvallis, Oregon. For thousands of years, the Willamette River meandered across the valley floor. This 3D enhanced image was created using a combination of lidar-derived elevation data and aerial orthophotography.

JULY 2011
S M T W T F S
26 27 28 29 30 1 2
3 4 5 6 7 8 9
10 11 12 13 14 15 16
17 18 19 20 21 22 23
24 25 26 27 28 29 30

AUGUST 2011

SEPTEMBER 2011
S M T W T F S
28 29 30 31 1 2 3
4 5 6 7 8 9 10
11 12 13 14 15 16 17
18 19 20 21 22 23 24
25 26 27 28 29 30 1

Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
31	1	2	3	4	5	6
 7	8	9	10	11	12	13
 14	15	16	17	18	19	20
 21	22	23	24	25	26	27
28	 29	30	31	1	2	3



Sand Lake Estuary Tillamook County, Oregon







2010 Oregon Department of Geology and Mineral Industries Lidar imagery and graphic design by Daniel Coe

▲ Sand Lake Estuary and the adjacent Sand Lake Recreation Area in Tillamook County, Oregon. Trapped between mountains and a massive sand dune, Sand Creek makes its way to the sea at Sand Lake. Whalen Island, in the middle ground of the image, was recently added to the Oregon State Park System and is a haven for coastal wildlife. This enhanced 3D image is a composite of lidar-derived shaded relief and orthorectified aerial photography.

AUGUST 2011
S M T W T F S
31 1 2 3 4 5 6
7 8 9 10 11 12 13
14 15 16 17 18 19 20
21 22 23 24 25 26 27
28 29 30 31 1 2 3

OCTOBER 2011
S M T W T F S
25 26 27 28 29 30 1
2 3 4 5 6 7 8
9 10 11 12 13 14 15
16 17 18 19 20 21 22
23 24 25 26 27 28 29

SEPTEMBER 2011

Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
28	29	30	31	1	2	3
4	5  Labor Day	6	7	8	9	10
11	12	13 	14	15	16	17
18	19	20 	21	22	23	24
25	26	27 	28	29	30 First Day of Autumn	1



Big Obsidian Flow and Other Major Lava Flows, Newberry Crater, Oregon



2010 Oregon Department of Geology and Mineral Industries Lidar imagery and graphic design by Daniel Coe

▲ Major lava flows in the caldera of the Newberry Crater in Deschutes County, Oregon. The Big Obsidian Flow at the bottom of the image occurred about 1,250 years ago. The East Lake Obsidian Flows in the upper right occurred about 3,500 years ago. The older Interlake, Crater, and Game Hut Obsidian Flows at the upper left of the image occurred between 7,200 and 7,100 years ago. This 3D enhanced image was created using a combination of lidar-derived shaded relief and aerial orthophotography.

SEPTEMBER 2011
S M T W T F S
28 29 30 31 1 2 3
4 5 6 7 8 9 10
11 12 13 14 15 16 17
18 19 20 21 22 23 24
25 26 27 28 29 30 1

OCTOBER 2011

NOVEMBER 2011
S M T W T F S
30 31 1 2 3 4 5
6 7 8 9 10 11 12
13 14 15 16 17 18 19
20 21 22 23 24 25 26
27 28 29 30 1 2 3

Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
25	26	27	28	29	30	1
2	3	4	5	6	7	8
9	10	11	12	13	14	15
	Columbus Day					
16	17	18	19	20	21	22
23	24	25	26	27	28	29
30	31	1	2	3	4	5
	Halloween					



Crater Lake Caldera, Crater Lake National Park, Oregon



2010 Oregon Department of Geology and Mineral Industries Lidar imagery and graphic design by Daniel Coe

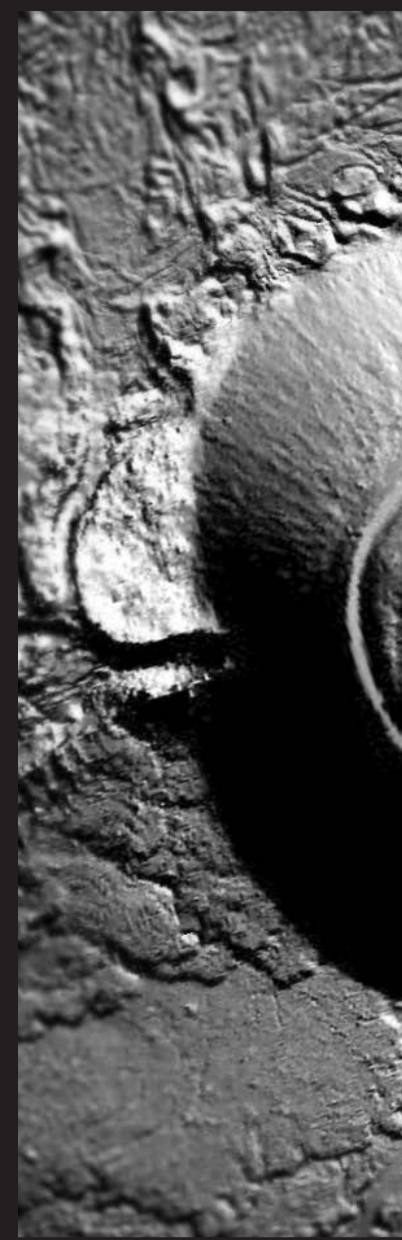
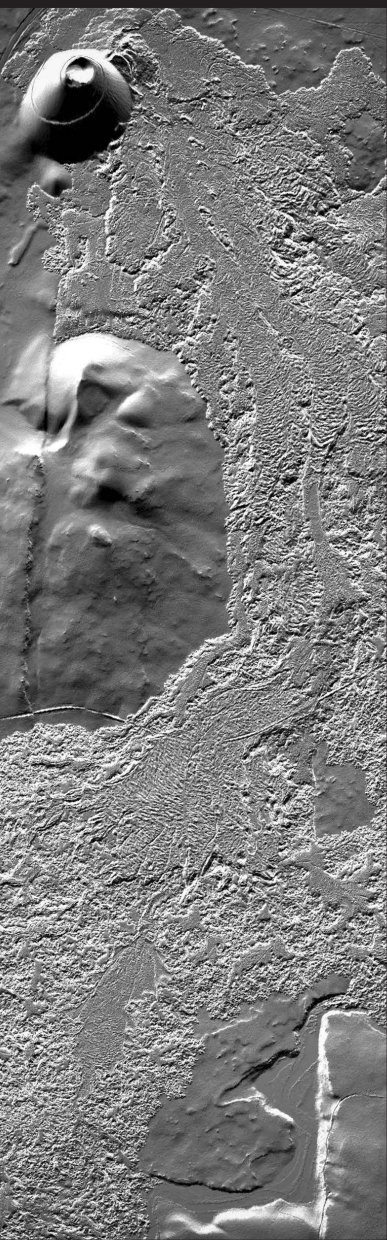
▲ Crater Lake caldera in Klamath County, Oregon, formed approximately 7,700 years ago during the eruption of Mount Mazama. The eruption expelled so much magma from the volcano that its core collapsed, forming the caldera. Crater Lake, which now occupies the caldera, is over 1,900 feet deep. This 3D enhanced image was created using a combination of lidar-derived shaded relief and aerial orthophotography.

OCTOBER 2011
S M T W T F S
25 26 27 28 29 30 1
2 3 4 5 6 7 8
9 10 11 12 13 14 15
16 17 18 19 20 21 22
23 24 25 26 27 28 29

DECEMBER 2011
S M T W T F S
27 28 29 30 1 2 3
4 5 6 7 8 9 10
11 12 13 14 15 16 17
18 19 20 21 22 23 24
25 26 27 28 29 30 31

NOVEMBER 2011

Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
30	31	1	2	3	4	5
6	7	8	9	10	11	12
Daylight Savings Time Ends					Veteran's Day	
13	14	15	16	17	18	19
20	21	22	23	24	25	26
27	28	29	30	Thanksgiving Day		
				1	2	3



Lava Butte, Newberry National Volcanic Monument, Oregon



▲ Lava Butte, Deschutes County, Oregon, erupted about 7,000 years ago. The resulting lava flow covered about nine square miles. The left and right images are lidar bare earth images of portions of the central image. This 3D enhanced image was created using a combination of lidar-derived shaded relief and aerial orthophotography.

NOVEMBER 2011
S M T W T F S
30 31 1 2 3 4 5
6 7 8 9 10 11 12
13 14 15 16 17 18 19
20 21 22 23 24 25 26
27 28 29 30 1 2 3

JANUARY 2012
S M T W T F S
1 2 3 4 5 6 7
8 9 10 11 12 13 14
15 16 17 18 19 20 21
22 23 24 25 26 27 28
29 30 31 1 2 3 4

DECEMBER 2011

Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
27	28	29	30	1	2	3
4	5	6	7	8	9	10
11	12	13	14	15	16	17
18	19	20	21	22	23	24
25	26	27	28	29	30	31
Christmas				First Day of Winter		New Year's Eve



Lidar Landscapes 2011 Calendar

Oregon Department of Geology and Mineral Industries

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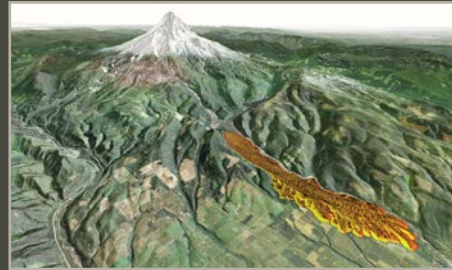
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Honeyman State Park



Mount Hood and Parkdale Lava Flow



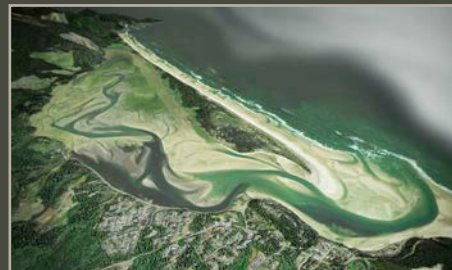
Alsea Bay



Port Orford



Brookings



Netarts Bay



Oregon Dunes Nat'l Rec. Area



Willamette River Channels



Sand Lake Estuary



Big Obsidian Flow



Crater Lake



Lava Butte