# SHARPSHOOTER

OREGON SOCIETY OF SOIL SCIENTISTS

VOL. XVII NO. 4


**INDEX**
**Fall 2004**



## O.S.S.S. 2005 Annual Meeting

*February 17 - 18, 2005 at*


*(Details will be in the next issue of the Sharpshooter. The following information comes from: http://www.innatottercrest.com, and is reprinted here to build interest in the O.S.S.S. Winter meeting in February.)*

The Inn at Otter Crest sits on the cliff's edge of the spectacular Oregon Coast and is only a short scenic drive from downtown Portland and Salem. It's a place where the gorgeous Central Oregon coastline meets towering dense forests, and miles of sandy beach; the vistas create a magic merger of spectacular natural beauty. Welcome to the Inn at Otter Crest at Otter Rock.

They offer unmatched panoramic views of the Oregon coastline, condominium style accommodations, full service meeting facilities, ocean view dining, whale watching, and an endless array of nearby recreation and scenic attractions.

Escape to the tranquil and dramatic Central Oregon coast, to the awesome beauty of the great Pacific Ocean, to the Inn at Otter Crest.

Otter Crest offers a wide variety of outdoor activities including charter fishing, hiking, biking, swimming, tennis, golf, whale watching, beach combing, wine tasting, and of course, shopping in Newport and Lincoln City. They also suggest taking a short trip and visit the famous Blue Heron French Cheese Company in Tillamook.

There are many local events and festivals that take place all year round on the Oregon Coast and in the Willamette Valley. To find out everything there is to do in and around Otter Rock please refer to the Lincoln City Visitor & Convention Bureau, the Oregon Coast Guide,or the Newport Chamber of Commerce.

Otter Crest provides fun for the whole family - including a wonderful waterview children's playground and an outdoor pool, and miles of sandy beach and forest trails for a full day of adventure and enjoyment!

## Road Decommissioning

***It isn't always about blocking traffic, hydrological connections or getting trees or grass to grow.***

*By Dale A. Stewart and Kevin McCabe, Coos Bay District, Bureau of Land Management, North Bend, Oregon*

When the Coos Bay District of the Bureau of Land Management started to decommission roads in 1994 there were several disciplines using various methods to accomplish what they envisioned to be a proper road closure program. Because the work was designed by a host of disciplines from engineers to fish biologists the goals and implementation were drastically different. Some individuals closed roads with no intent of ever using them again, where others simply installed a gate to allow access for administrative purposes.

(Continued on page 6.)

# President's Message

**Mark Keller**
**OSSS President**

One of the themes for the OSSS annual meeting in February is earthquakes and tsunamis. The first part of this article was gleaned from *Living with Earthquakes in the Pacific Northwest, A Survivors Guide*, by Robert Yeats. Dr. Yeats will be participating in the OSSS annual meeting.

Twenty years ago Oregon and the Pacific Northwest were thought to be earthquake quiescent. But in the mid 1980's evidence started accumulating that showed a past of catastrophic earthquakes.

Geologist John Adams compared highway benchmark re-levelings by the National Geodesic Survey. The benchmark elevations were changing! The earth's surface is moving. Bowing under the strain of subducting continental plates, the earth's surface is tilting the Coast Range toward the Willamette Valley and Puget Sound.

Next, Brian Atwater, studying sediments in a Willapa Bay marsh made another astounding discovery. Under the soil surface was a "gray clay" containing marine fossils. But underneath that was a peat layer with drowned spruce stumps! He proposed a large earthquake had caused this 10 foot subsidence! Additional similar evidences soon came to light. Subduction zone earthquakes were not a mere possibility, but past events were actually recorded in sediments and deposits both onshore and offshore. (See Goldfinger, Nelson, Johnson; "Holocene earthquake records from the Cascade Subduction Zone and the northern San Andreas Fault based on precise dating of offshore turbidites" Annual Reviews of Earth and Planetary Sciences, v31, p. 555-77

Accompanying these catastrophic earthquakes were tsunamis. In the idyllic inlets and fiords of Vancouver Island, evidences of two catastrophic tsunamis were discovered by researchers Benson, Grimm, and Clague. Their research paper, a nice bit of detective work, showed the tsunamis record in tidal marsh sediments.

Three meter deep trenches transecting tidal marshes showed two discrete "sand sheets." Apparently mantling a paleo land surface, one deposit was at about 60 cm depth, the other at about the 10 cm depth. Both these deposits fine landward and simultaneously fine away from tidal channels. The sheets get thinner toward land and rise in elevation as they approach the forests ringing the inlets.

Close looks at the sand layers themselves also indicate history of deposition. Ominously, the sand layers are composed of "couplets," a coarser sand overlain by a finer sand, then another couplet of coarser sand to (Continued on page 4.)

# Westside Notes

*By Dan Cressy*

## New Road and Trail Subsoiling Technique

I would like to share with OSSS members a technique for tilling roads to ameliorate compaction that I find impressive. It was developed by the Roseburg Bureau of Land Management's road maintenance crew and Dennis Hutchison, the senior soil scientist there. Two pieces of equipment are used. One is a tractor-mounted self drafting winged subsoiler. It has a wing-shaped shoe attached to each of its three shanks. The tractor in this case is a D-6 cat. The other consists of two subsoiling shanks with winged shoes attached to a bucket of a tracked excavator. Clint Brown, the maintenance crew's equipment maintenance person did an excellent job designing and building the excavator subsoiler. The bucket had to be reinforced with welded-on steel plates to handle the extra stress. Subsoiling is a method of tilling in which the winged-

(Continued on page 8.)

# EASTSIDE NOTES

*By Ed Horn*

## Soil Product Development

This east side happening is in reference to the Crater Lake Soil Survey contracted by the National Park Service (NPS) and completed by the Natural Resources Conservation Service (NRCS) in 2003. Much of the material about soil product development in this article came from a talk that Pete Biggam (soil program lead for the National Park Service) gave at the "Advanced Technology and Soil Mapping" course in Phoenix, AZ March 2004.

In March of 2004 Jerry Weinheimer, project lead, and Tom Clark, project mapping soil scientist for the Crater Lake Soil Survey took a trip to Southern Oregon State College in Ashland, Oregon. They were to present their soil mapping experiences and expertise to members of the National Park Service and Southern Oregon State College. For their presentation, Tom and Jerry illustrated the major soil types of the park and answered questions from the audience on the technical aspects of completing the Crater Lake Soil Survey.

Pete Biggam, soil scientist and soil program lead for the National Park Service in Denver, Colorado was also at this meeting. Pete has been using the completed soil survey of Crater Lake National Park as a way to generate interest and show new soil product developments to other Park Service employees. One of Pete's duties as he tells it is to bring together Soil Survey contract mappers with Park Service employees. He wants to ensure that soil product development is meeting the needs of individual parks. Park service employees from Lassen National Volcanic Park, California were present to get ideas for mapping their park.

What soil products have we been producing?

- Past – Hard copy soil survey report and soil atlas sheets.
- Present – Hard copy soil survey report (hard copy and digital), Soil Atlas Sheets (hard copy and digital), Soil geospatial database with soil attribute database that can be used in a Geographical Information System.
- Future – Similar products but with more flexibility to produce any/all of the actual components developed within the soil survey process, as well as soil visualization products, and products to meet various customer needs in an ever-changing world.

Pete feels that for future products we need to consider making available all of the components used in generating soil maps.

(Continued on page 4.)

# DATES TO REMEMBER

**January 24 - 28. 2005**
National Society of Consulting Soil Scientists Annual NSCSS Meeting; Islands of Hawaii and Kauai. Information at: http://www.nscss.org/05.html

**February 17-18, 2005**
OSSS Winter Meeting at Otter Crest on the Oregon Coast.

**June 17-18, 2005**
Western Society of Soil Science Meeting; Ashland, Oregon

## LOOK AT THE JUNE COPY OF SCIENCE

If you have not done so, check out the June 11 "Science," vol. 304, No. 5677. There is a good soil profile on the cover and several soil articles. One article deals with the change of ecological sites as the Arctic permafrost melts. Will the changed vegetation communities cause a net loss of soil carbon or an increase in soil sequestered carbon? The jury is still out. Another article is a good description of the interactions between the soil microbiology and the vegetative communities.

(**Eastside Notes** from page 3.)

Things such as:

√ *Observations from soil mappers* such as soil/wildlife, or soil/plant community interrelations. This is information that leaves with the soil mapper, and does not get incorporated into the final soil survey product.

√ *Soil forming factors as separate geospatial themes* – separate out climate temperature moisture regimes, geologic parent material types, vegetation types, landforms, and soil age classes.

√ *Soil – Landscape – Vegetation model* with 3d illustrations, elevations, aspects, pictures and soil diagrams.

√ *Soil catena concept diagrams* on how soils change over a landscape. Greater use of illustrations and soil profile diagrams correlated to landscape diagrams.

√ *Locations and attributes of all soil observations*;

- Transects/Traverses
- Soil analyses
- Soil – crop yield correlation
- Soil – range correlation
- Soil – woodland forest correlation

The Crater Lake survey was one of the first Oregon soil surveys to extensively use Geographical Information System (GIS) and Geographical Positioning System (GPS) technology to complete the soil survey. The soils product developed from the Crater Lake Soil Survey includes a compact disc containing Adobe Acrobat electronic versions of the 1) Soil survey manuscript, 2) General soils map, 3) General vegetation map, and 4) Detailed soil maps. The soil survey manuscript includes detailed soil map unit descriptions, general soil map unit descriptions, and soil property and interpretation tables. The general soil map was produced from the detailed soil mapping and includes links from the general soil legend to the general soil descriptions in the manuscript. A color general vegetation map was also generated from the detailed soil mapping. A topographic quadrangle index, when clicked on, will display the detailed soil mapping and symbols within the index area. The soil map lines were displayed over 1994 digital black and white orthophotography. Other product deliverables, according to Tom Clark, were copies of soil note descriptions and digital pictures linked to latitude/longitude locations, geospatial polygon data for use in a GIS environment, along with the related National Soil Information System soil attribute data. The "Soil Data Viewer" is an application being developed by the NRCS to make it easier to generate soil interpretation maps from the geospatial data. The version of the Soil Data Viewer that will work with ArcGIS should be available some time this summer.

> **"The Crater Lake survey was one of the first Oregon soil surveys to extensively use [] GIS and [] GPS technology to complete the soil survey."**

Tom Clark said that there was talk of trying to incorporate soil diagrams and interpretation from the Crater Lake Soil Survey into the existing network of interpretations for Crater Lake. Stay tuned, this will be a future soil product development!

(**President's Message** from page 2.)

finer sand sequence. The upper sheet, correlated to the 1964 Alaska earthquake tsunamis, had three couplets. This corresponded to the 3 tsunamis waves recorded at the Tofino tide gauge. There the gauge recorded 3 waves 1 to 3m high over a 3 hour period.

Further evidences of the tsunami origin of deposition: The sand layers have marine diatoms. Leaf bases of marsh plants were entombed in the sand sheet. The two discrete sand sheets relate to two earthquake events. Cesium dating show dates of about 1700 AD for the lower sand sheet. Though adulterated by the atmospheric nuclear testing of the 1950's and 1960's, the upper sand sheet was correlated to year of 1964. Their paper: "Tsunami deposits beneath Tidal Marshes on Northwestern Vancouver Island, British Columbia," is published in Quaternary Research 48, 192-204 (1997)

There are important implications of this work for public safety. But for a soil mapper, compared to most pedogenic processes which progress slowly, this is a dramatic, graphic soil development!

# OSSS Summer Tour to Steens Mountain a Great Success

*by Steve Campbell*

OSSS President Mark Keller put together a great tour of the Steens Mountain area. We started at the BLM Page Springs Campground on the Donner and Blitzen River. Terri Geisler, BLM geologist, gave us an excellent overview of the geology of the region. At the first three stops, we looked at soils and vegetation that had been mapped and described during the course of the Harney County soil survey project.

***Ed Horn, OSSS Eastside Director, with Kiger Gorge in the background***

We had a great lunch at the Steens Mountain Packers Lake Creek Base Camp, then headed for the high country. We stopped for a view of the spectacular Kiger Gorge then proceeded to the top of Steens Mountain for great views of the Alvord Desert and Wildhorse Lake.

Thanks Mark for arranging such an excellent tour.

***Terri Geisler, BLM geologist explaining the geology of Steens Mountain and the Alvord Desert***

***Mark Keller, OSSS president, filling in soil pit on tour stop***

(**Road Decommissioning** from page 1.)

Technical expertise regarding sediment control, decompaction methods, and hydrologic function was expected from the Soil, Water and Air working group. Training sessions and workshops in Erosion Control and Compaction were being offered at this time and the Soil Scientist generally was attending them to acquire the most current thoughts and methods regarding this type of work. In 1996 the Coos Bay District was overwhelmed with storm damage to the road system, restoration projects and staff reductions in the engineering department. In addition, legal challenges and consultation with other agencies drew the Fisheries Biologists away from road projects. Thus the planning, design and implementation came to rest solely on the SWA group.

> ***"As the planners, designers and implementers of road decommissioning projects we will also have to be the educators of the critics."***

Watershed Analysis (WA) recommendations generally proved to be the best planning tool (shopping list) to get at potential roads that could be decommissioned in some manner. The Soil and Water group would walk the road and develop a specific method by which the decommissioning would be accomplished. These methods then could be put forth to an Interdisciplinary Team to ensure other uses of the road were not planned in the near or long term future. If so, the method of decommissioning would change or the road dropped from the list of potential candidates. Getting input from others was instrumental in the successful and efficient use of available dollars.

Initially our efforts concentrated on closures on short spur roads that were no longer needed or could be easily opened for management actions. Bringing together an ID Team was not always successful. For example, some long sections of road recommended for closure were maintained for a specific contract at considerable expense. Had the project implementer consulted the WA recommendations it would not have been done. The best plans of mice and men go awry often in our organization.

Requiring timber sales to concentrate decommissioning efforts within the scope of contracts was successful early on. New roads necessary for harvest and transport of logs were planned for full decommissioning to return the land to productive forestland upon completion of the sale. Renovated roads necessary for management actions in the future were closed and storm proofed in a manner that reduced the maintenance required and could easily be reopened for fire suppression or service contract work. This was generally required by other agencies in consultation with our Fish or Wildlife Biologists. Road closure and storm proofing projects funded through Jobs in the Woods or Secure Rural Schools and Community Self-Determination Act of 2000 (RAC) funding concentrated efforts on roads that were generally scattered across a sub-watershed(s), were heavy sediment producers, or could be tied to fish access barriers.

Prior to 1996, the methods of closure were very high on cost effectiveness. The work was considered complete after only one barrier was built or a culvert was removed at the junction of a main road. After several years it was apparent that some individuals were successful in gaining access to roads closed in this manner and that more complex designs were required. Some changes were: Road prisms were not always removed from the landscape, and drainage features were changed from ditchlines to waterbars or waterdips. Individuals seemed to respect the closure concept if a series of waterbars were evident from the berm or pile of rocks closing the road. They could see considerable effort was expended on the road and would honor that closure.

Definitions have been a reoccurring problem. The term "decommission" is an example. Within our own District, Engineers using the Transportation Management Plan mean a different action when proposing to decommission a road than do the Fisheries Biologists working on a Consultation with NOAA Fisheries. Hydrologic recovery is only a requisite for the Fisheries Biologists. Wildlife Biologists are willing to accept decommissioning if it means no traffic on the road in lieu of hydrologic recovery. So, getting all the interested parties to agree to terms and to understand each others intents or meanings has been a hurtle for the last ten years.

In an effort to determine if early actions on decommission efforts (Pre-1996) had set up an unacceptable condition on some roads, the District Soil Scientist and a District Engineer reviewed the first several years of projects. The expectation was that those old roads would show signs of gullying on steep portions, ditchlines would be overwhelmed with bank slough, and culverts would be plugged diverting drainage down the roads. What was found instead was quite the opposite.

Because early efforts were confined to short spurs with little grade or to longer ridge-top roads, little to no degradation of the gravel surface, ditches or culverts had occurred in the resulting six to eight years since treatment. Removing the traffic seemed to be the key action allowing the accumulation of needles, twigs or leaves on the road surface. In areas where no canopy existed, such as adjacent to a young plantation, the road surfacing weathered to a resistant armor layer with larger sized gravel being predominate over smaller pieces. When this surface armor became sufficiently developed the weathering stopped.

The slope of the road appeared to have some relationship to

(Continued on next page.)

the amount of erosion. Most research has since shown a slope-squared-times-length equation is a good fit for determining the amount of sediment that could be eroded from a road surface. Since our early efforts did not establish water diversion structures on the roads but merely removed the traffic we decided to test our accomplishments through a review process. For our review process we measured the length of the road prior to where the erosion became evident. That information allowed us to determine a percent slope to length relationship to use for spacing between waterbars or dips.

Most of the decommissioning work that our District has undertaken in the past is in the 60 to 70 inches of precipitation per year zone. As we move to new areas that receive 120 to 140 inches per year we are more aggressive with the depth of the cut of drainage structures and choose to shorten the spacing between these structures. Getting others to accept a no-cookie-cutter approach to this type of work is a challenge in and of itself. Most people can accept a standard, such as 75 feet between structures when the slope is 12%, but have a hard time remembering only when the rainfall equals 60 inches/yr. We Soil Scientists have been told we can't make up our minds or that we are always changing our recommendations when in all practical aspects we are reading the response of the road to the climate and recommending what we hope will be a long term solution to an age old problem.

To keep abreast of our assumptions we are field-checking some of each road treatments we accomplish (waterbars or dips, sub-soiling, and planting) to validate our initial read of the situation and see if changes need to be made. The amount of road that was still in very good shape was impressive even though no other work beyond blocking the road to traffic was undertaken. Call it blind luck or skillful implementation, but once the disturbance from the traffic was taken away, the surface condition on both the graveled and dirt roads settled down and erosion was not a problem. Getting waterbars to flow water out the end, or connect to the ditchline seemed to be a hard thing to do for some operations. The equipment operator was not able to clear the outlet of some structures due to the brush and vegetation just off the road surface using his machine and no attempt was made to shovel the outlet clear later. Construction of a drivable water dip is best done as part of the initial building of the sub-grade. Coming in later on with a grader, front-end loader or small cat with a six-way blade all have there short comings, but the best result was obtained by the cat.

We in the Soil, Water and Air Group will continue to look for roads that are causing resource degradation, but the selection pool is getting smaller all the time. Having a land ownership pattern that is a checkerboard by design will always necessitate keeping some roads open for management reasons even though our needs are reduced over time as stands grow past the initial establishment and thinning stages. On road systems that we will maintain on a lower intensity or reduced frequency it makes economic sense to build structures into the road surface that will reduce the need for grading or cleaning ditchlines. There will be resistance to getting this work accepted by others that still want the old style roads to drive and can't understand that the extra time involved in travel is a benefit to the landscape, not to them trying to get to a project area quickly. As the planners, designers and implementers of road decommissioning projects we will also have to be the educators of the critics. This is a challenge that is greater than the road work itself and one that needs continued evaluation of as well.

***Road decommissioning project in the Coos Bay BLM district.***

(**Westside Notes** from page 2.)

shaped shoes slightly lift the compacted soil, causing it to shatter with little mixing of topsoil and subsoil. A good subsoiling job can get 80 percent of the compaction to shatter.

Both pieces of equipment start at the far end of the road to be tilled. The tractor mounted subsoiler with two passes (more for turnouts and timber harvest landings) tills the roadbed in a quick efficient manner (up to 0.5 miles in one hour). The excavator follows at a slower pace (about 300 feet per hour), subsoiling its own tracks and spots missed by the tractor-mounted subsoiler. Using the bucket, it then brings organic debris (slash on the forest floor and slash piles following timber harvest) on to the tilled roadbed. It also picks up a little topsoil and duff from off the road to sprinkle onto the roadbed as inoculant for soil organisms. Where needed the excavator removes ditchlines and constructs waterbars. The beauty of this technique is that all compacted surfaces can be tilled, the soil ecology is jumpstarted, good drainage and erosion control is ensured, insurmountable barriers are created to deter the off-road enthusiasts, and the covering and burning of slash piles is eliminated.

***Bucket of excavator with attached shanks and wings.***

For consistently good results, having an experienced operator who well knows the desired results sure helps. The Roseburg District is fortunate to have Darryl Jones from its Mrytle Creek Maintenance shop in this role. Funds are dedicated to him and the Roseburg District's subsoilers to do the tillage work, eliminating the uncertainty of results that comes with contracting. Contractors often can not secure the proper equipment to get acceptable shattering of the compaction. Dennis and I would like to use biosolids on tough-to-reclaim roadbeds to increase the jumpstart effect. A severely compacted roadbed in clayey subsoil or in paralithic material would be candidates.

Subsoiling with the excavator has been tried a few times in the Roseburg District on compacted old skid trails and on new harvester-forwarder trails inside timber harvest units. Damage to the roots of the residual trees in commercially thinned stands due to subsoiling and the resultant introduction of root disease has been a concern. Back in 1994 Forest Service forest pathologists Ellen and Don Goheen gave me their thoughts on the subject in a letter to me. At that time there were few studies established to look at the effects of such machinery on root systems and little data available. The Goheens believed healthy, vigorous Douglas fir can tolerate moderate levels of root wounding by subsoiling equipment based on the fact that these trees are relatively decay resistant and their root systems are usually not shallow. They, however, strongly recommended that subsoiling not occur within five feet of the tree boles. For stands composed of large percentages of shallow-rooted, decay prone species such as western hemlock and true firs, they suggested larger buffers and greater care taken during subsoiling operations. I need to do a literature search to learn if there is more up-to-date information on the subject.


***Subsoiling and reaching for slash at the Bear Buck commercial thin.***

Excavator subsoiling of skid trails and harvester-forwarder trails has been a big improvement over the tractor subsoiling. The excavator can maneuver through the residual trees much better avoiding damage to tree boles. The operator can be more selective where and at what depth he subsoils, lessening damage to the larger roots. He can also bring organic debris back over the trails. The Roseburg District would like to secure the use of a smaller excavator for this work, especially when Darryl begins subsoiling old compacted trails in dense unthinned mid-seral stands. Monitoring will be needed to get a handle on the amount of root damage.

Dale Stewart, a soil scientist at the BLM Coos Bay District, submitted observations about the challenges of road decommissioning in the wettest parts of western Oregon. (Read his and Kevin McCabe's article on page 1of this Sharpshooter.) We in the Roseburg District can complain about our 35 to 70 inches of mean annual precipitation. Dale and his coworkers must deal with mean annual precipitations twice that.

Many thanks go to Dale Stewart and Karin Baitis for responding to my request for articles and information to include in the Westside Notes.

*The Urban Interface between Soils and Critters.*

# URBISOL CORNER

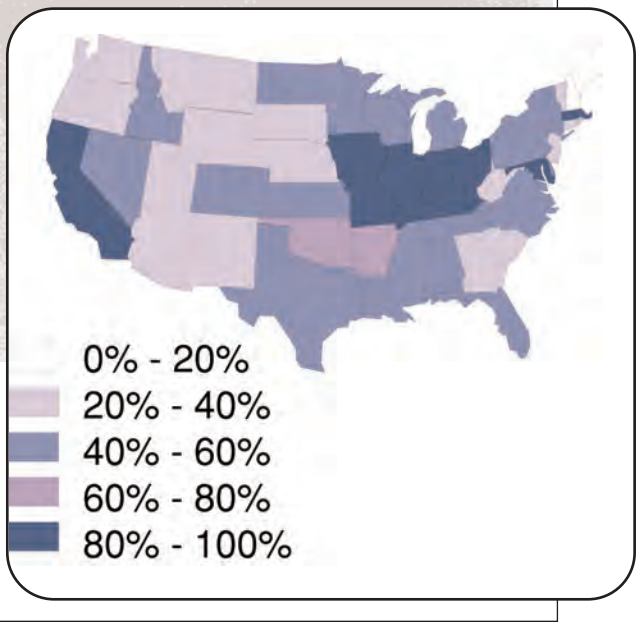
## Bats Dependent Upon (Vanishing) Wetlands Humans Dependent Upon Bats

*by John Good*

*On a recent visit to Colorado I picked up the book: Bats of the Rocky Mountain West. Surprised at the magnitude of our wetland losses over the last two centuries, I thought other soil enthusiasts might be interested in the statistic. If we are not careful we can become another "Easter Island," and consume our own homeland beyond recovery.*

*[From Rick A. Adams, Bats of the Rocky Mountain West, (University Press of Colorado, 2003)pp. 87-8.]*

*"Wetlands are also important for sustaining bat diversity. Unfortunately, these areas have been greatly reduced in the continental United States. More than 53 percent of total wetlands in the lower forty-eight states were forfeited between 1780 and 1990, with most losses occurring in the mid-western states for cropland conversion. Wetland areas include marshes, swamps, flood plains, peat bogs, and prairie potholes (formed from the retreat of the last glacier), all of which are important to ecosystem health because they filter out pollutants from surface water and act as reservoirs for rainfall and runoff. In addition, wetlands help extend stream flow during droughts and aid in preventing devastating floods. They also provide refuge for more than 50 percent of fish species, one-third of bird species, and one-sixth of mammal species presently listed as federally threatened or endangered in the United States."*




***Loss of wetlands between 1780 and 1990 throughout the lower forty-eight states***

## Sharpshooter

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OSSS
Box 2382
Corvallis, OR 97339

**Web site and email address:**
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# O.S.S.S. Annual Meeting

**Put February 17-18 on your calendar for the OSSS Annual Meeting. The meeting will be on the Oregon Coast. Details will be in the next issue of the Sharpshooter.**