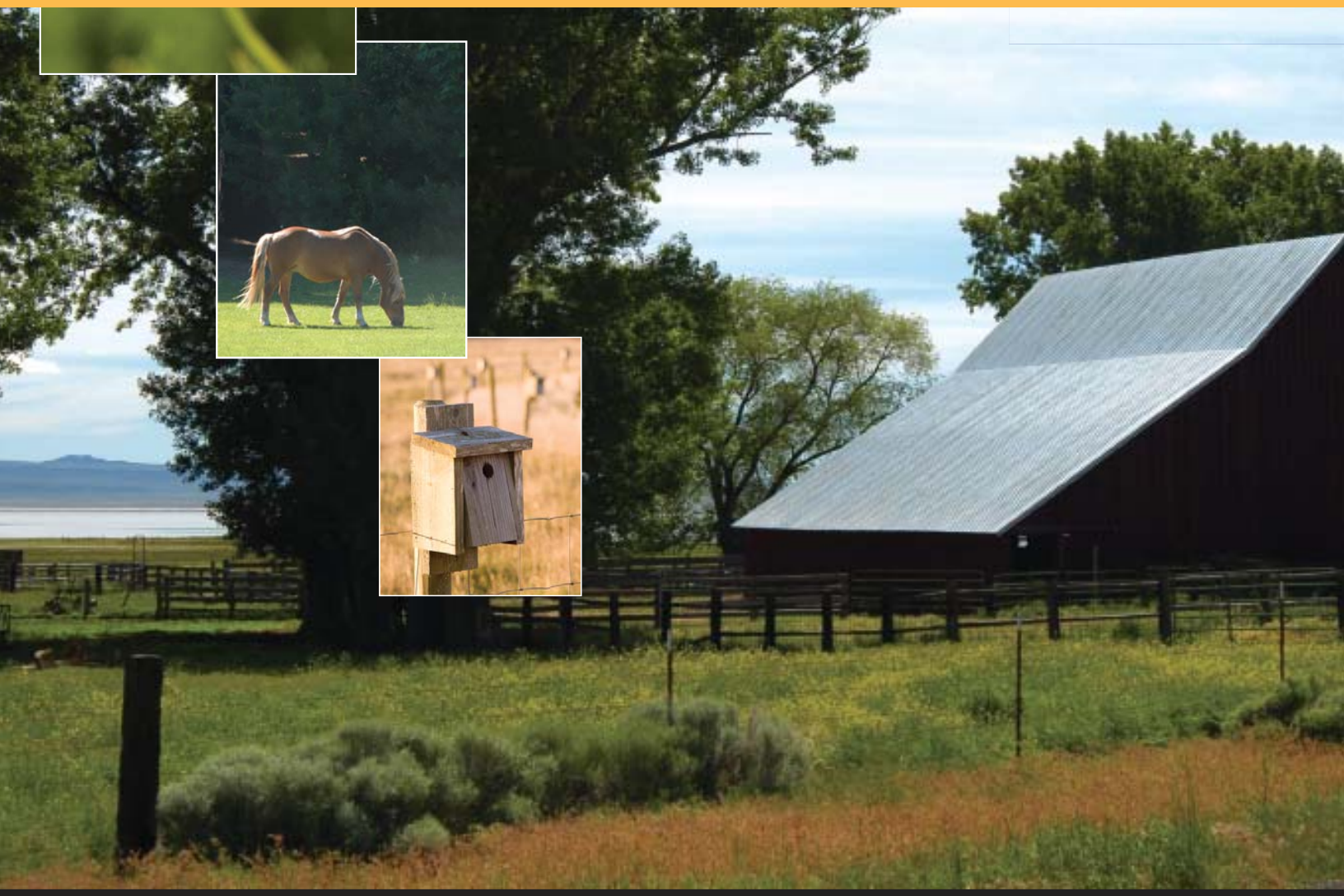
Version 1, 2008

STEPS

for HEALTHY & SUSTAINABLE RURAL LIVING on SMALL ACREAGES in Oregon

Tools and Resources to Design a Customized Land Management Strategy for Your Small Acreage Property...



NRCS

Helping Small Acreage Landowners Help the Land

United States Department of Agriculture
Natural Resources Conservation Service
OREGON

www.or.nrcs.usda.gov

HOW To Use the STEPS Worksheets

Reference TIPS brochure, pg. 1

About the STEPS Worksheets

The STEPS worksheets were developed as a companion piece to the ***TIPS on Land & Water Management for Small Acreages in Oregon*** brochure provided in this packet. The STEPS and TIPS publications were created to provide small acreage landowners with a starting point to develop their knowledge of natural resources and improve their land management skills.

Since each landowner—and each piece of land—is unique, it is up to you to decide how to use the STEPS packet. Some of the items, such as the ***Soil Condition Assessment*** worksheet, are useful for all landowners. Other worksheets may not relate to your goals or needs. Complete only the relevant worksheets.

STEP 1: Read the TIPS brochure.

Where applicable, the STEPS worksheets indicate corresponding pages in the TIPS brochure. The TIPS brochure provides additional information that may be helpful as you complete the STEPS worksheets.

STEP 2: Complete the *Land Management Goals* worksheet.

This worksheet was developed to help you focus your efforts. Each goal includes common considerations that you may need to address. Space is provided to add additional items specific to your unique situation.

STEP 3: Inventory the resources on your land.

Complete the ***Property Map*** and ***Natural Resource Inventory*** pages. These will provide a base of information for you to reference as you work through the other worksheets. Your property map and natural resource inventory will help you move forward in planning strategies, actions and improvements.

STEP 4: Complete the worksheets that relate to your land.

Each worksheet contains a set of questions to help you assess conditions and evaluate how your management decisions affect natural resources. The worksheets include alternative actions for improvement and resources for more information.

STEP 5: Identify the options and actions right for you.

On each worksheet, you will find management options, information resources and contact information. You may find you can make improvements on your own, or you may decide to obtain professional assistance for more intensive treatments, such as structural or engineered practices. Whatever options you choose, each section of the STEPS packet will help you find more information and assistance.

SET

Land Management Goals

Reference TIPS brochure, pg. 1

If you live in rural Oregon, you likely enjoy the peaceful countryside and scenic landscapes. You have a connection to your land, and you want to do all you can to care for it. The worksheets in this packet will help you identify strategies to maintain and improve the natural resources on your property. To begin, you should develop your vision for the future and how you want your land to look in the coming years. You may want to improve conditions or maintain the land as it is. Whatever your goals, planning for specific outcomes will help you make good decisions now and in the future. This is the first step to a land management strategy that is right for you, your family and your property.

Instructions: First, record your vision for the land in the coming years. Include what you want the property to look like and how you plan to use the land. Then, identify the specific land management goals that relate to your overall vision. Corresponding outcomes are provided on the right to help you focus and prioritize your efforts to reach each goal. Use the blank space provided to list more details relevant to your situation.

Site	Date

Vision for the Land in 5 to 10 Years

For example: *The water in our stream is clean and provides habitat for native fish. Blackberries and weeds have been eliminated and/or controlled on our property. We have established a productive pumpkin patch in the northeast field. We are able to keep and graze four horses while protecting the condition of our pastures and streams.*

Goals	Outcomes
☐ **Improve or maintain the aesthetic beauty of the property and the quality of life for your family.**	• Selected land uses are carried out in a sustainable manner that helps you maintain a desirable quality of life over time. • Plant and animal pests are kept in check. • Healthy plant communities and a scenic landscape are maintained over time. • Excess water from heavy rains does not damage structures, roads, streambanks, livestock or crops; runoff does not convey contaminants to ground and surface waters. • •
☐ **Keep healthy horses, cattle or other livestock on the property.**	• Animals stay healthy with proper diet and conditions. • Animals have plenty of high quality forage to graze. • Streams are protected from animal waste and trampled streambanks. • Manure is properly handled and does not present a hazard to people, water bodies or animals. • Livestock odors are managed appropriately for the area. • •

continued on next ➡

SET

Land Management Goals

Goals	Outcomes
☐ **Maintain healthy soil to support plants and animals as well as natural water and nutrient cycles.**	• The soil is fertile and contains a healthy mix of organic matter to support plant growth. • Healthy plant communities provide cover at the appropriate times of the year. • Soil erosion is controlled. • Animals are rotated among pastures to prevent heavy traffic and overuse from causing soil compaction and poor infiltration of water. • •
☐ **Protect the quality and quantity of water in local streams, groundwater sources and other water bodies.**	• Streambanks are protected from erosion with thick, diverse streamside vegetation. • Fertilizer and pesticide applications are managed to keep chemicals out of water bodies. • Those with an irrigation right use only the water needed at the right times to optimize plant health and conserve water in streams. • Irrigation systems are maintained and updated for maximum efficiency. • Floodplains, wetlands and unpaved natural areas help to recharge groundwater supplies and act as buffers for surface water runoff. • •
☐ **Provide healthy habitats for native wildlife.**	• Natural cover and nesting habitat for desired wildlife species are provided by a variety of plants. • Food and water sources are available year-round. • Fish have plenty of clean, cool water to support migration, spawning and rearing. • Fish screens protect aquatic species from irrigation intakes. • Wildlife is not threatened by human activity, roadways or domestic pets. • •
☐ **Other:**	• • • •

The Next Steps

Congratulations! You have taken the first step in developing a customized land management strategy. As you work through the following STEPS worksheets, keep these goals and outcomes in mind and look for activities that will help you address these priorities.

COMPLETING Your STEPS Worksheets

Reference TIPS brochure, pg. 1

Worksheets

Once you have established your land management goals and have inventoried your property, you are ready to complete the STEPS worksheets on the following pages.

As you go through the following worksheets, keep in mind that helpful information can be found in the TIPS brochure. Also consider contacting local natural resource professionals and conservation groups to locate additional information that may be useful.

As you answer the questions provided on the STEPS worksheets, you will begin to assess conditions on your land and learn about a number of management options. Keep in mind that the alternatives provided are general in nature. The distinct features of your land—and the specific uses and goals you have for it—make each situation unique. As you begin to identify actions that may be appropriate, consider whether you can begin to make these improvements on your own. Many options will require specific considerations pertaining to the unique geography, hydrology, plants, wildlife and other features and conditions on your property. Some of these activities could require technical expertise; you may want to contact a natural resource professional for detailed assessments, conservation planning and recommendations. Sources for more information and assistance are listed in each section.

In addition, you should know that regulations and permit requirements vary depending on location, land use and other factors. As a landowner, it is your responsibility to learn about the regulations applicable in your area.

As you move forward with your land management goals, remember that an abundance of information and assistance is available through natural resource agencies and businesses.

If You Want to Go a Few More Steps

You may find that while the STEPS worksheets have helped you advance your land management goals, you would also like to address additional objectives or more complex issues.

More detailed evaluation processes are available through a variety of outlets. In addition, more comprehensive technical assistance is available through businesses and local, state, federal and non-profit entities. If you would like to additional assistance, contact one of the entities listed below:

- *Local Soil and Water Conservation District (SWCD):* **www.oacd.org**
- *Natural Resources Conservation Service (NRCS):* **www.or.nrcs.usda.gov**

Additional information and assistance can also be found through the many other organizations listed in the worksheets and the ***Resources*** section on page 57.

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MAP Your Property

Reference TIPS brochure, pg. 1

The next step in designing a customized management strategy is to inventory the features and uses of your property on a land use map. Below is an example that illustrates the types of features to include when developing a map of your own property. The base image of the schematic below is a print out from the ***Web Soil Survey***, a free online natural resource information system. Web Soil Survey is available to the public at:

http://websoilsurvey.nrcs.usda.gov/app/

To create your map, download an image from the *Web Soil Survey* or another map source as your base. Then, mark the fields, structures, land forms, water bodies, problem areas, and other notable uses and features. Or, you can sketch a basic hand drawing of the property's main features on the following page.

The map you create will be your reference point for planning future activities, such as placement of fences or tree plantings. Keep the map as a record of your baseline, or starting point. As you implement changes, update your property map to indicate any added measures.

Using Web Soil Survey

You can do much more than generate a map with *Web Soil Survey*. Go to the ***Suitabilities and Limitations for Use*** section under the ***Soil Data Explorer*** tab. The information available here includes:

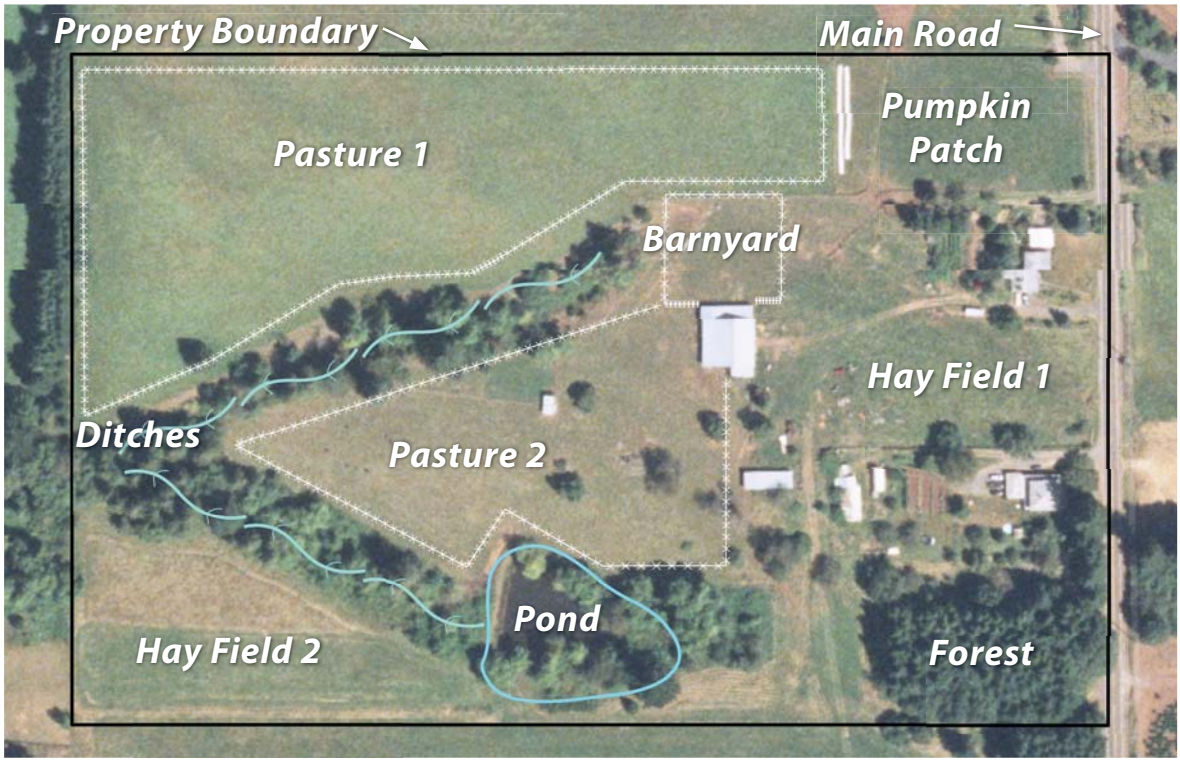
Land Classification: Maps and reports for Farmland Classification to identify areas of prime farmland or Capability Class (a ranking of soil suitability for cropland).

Vegetative Productivity: Maps and reports of expected crop yields for a variety of crops, including hay and pasture.

Building Site Development: Maps and reports with information on soil limitations for home sites.

Soil Properties and Qualities: Information on depth to seasonal high water tables as well as flooding and ponding frequency.

Site *Breezy Hills Farm* **Date** *Sept. 2008*



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Your Property

Property Map | **Site** | **Date**

Legend (common symbols to use for hand-drawn maps):

Fence	Stream	Manure Storage	Pasture
Property Boundry	Pond	Forest	Field Number
Cropland	Well	Slope	

INVENTORY

Your Natural Resources

Reference TIPS brochure, pg. 1

Now that you have mapped your property, use this worksheet to capture more detailed information about each distinct section of the property, including land use, size, soils, plants, problems and general observations about conditions. The example below is based on the sample property that was mapped in the previous section.

Field/Acres: List each distinct section of the property and the approximate size.

Land Uses: List the major land uses for each section.

Soil: Look up your soil types online at the *Web Soil Survey* Web site at: **http://websoilsurvey.nrcs.usda.gov/app/**. While you are there, be sure to take notes on—or print out—the soil suitabilities, limitations, properties and reports for soils in your area as appropriate. You may also want to print and attach a soil map. Further information on using Web Soil Survey can be found on pages 7 and 14, on the Web Soil Survey home page, or from your local NRCS or SWCD office.

Concerns: Note anything about each section of property that may be an eyesore, natural resource concern, seasonal problem, maintenance hassle or production issue. Or, simply note those things that you would like to improve over time.

Site *Breezy Hills Farm* **Date** *Sept. 2008*

Field	Acres	Land Use	Soil Type & Characteristics	Concerns: Natural Resource, Maintenance & Others
pasture 1	*5 ac*	*grazing*	*mapped as clay surface layer 8-15% slope slow intake rate*	• *uneven grazing* • *poor grass stands* • *muddy area on south side*
pasture 2	*3 ac*	*grazing*	*same as above*	• *uneven grazing* • *poor grass stands* • *muddy area on north side* • *weeds*
hay field 1	*1.25 ac*	*hay*	*same as above*	• *weeds* • *lack of water during dry months*
hay field 2	*2 ac*	*hay*	*sandy surface 5% slope*	• *weeds* • *lack of water during dry months* • *erosion into ditch* • *voles*
forest land	*1 ac*	*wildlife*	*unknown*	• *weeds* • *excess debris on the ground*
barnyard	*.75 ac*	*feeding livestock*	*unknown*	• *mud* • *removal and storage of manure* • *dirty runoff into other areas*
pumpkin patch	*1.25 ac*	*pumpkins*	*mapped as clay surface layer slow intake rate*	• *weeds* • *soil fertility* • *sprayed chemicals could drift over homestead*

continued on next ➡

Your Resources

Natural Resource Inventory **Site** **Date**

Field	Acres	Land Use	Soil Type & Characteristics	Concerns: Natural Resource, Maintenance & Others

COMPLETING Your STEPS Worksheets

Reference TIPS brochure, pg. 1

Worksheets

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As you go through the following worksheets, keep in mind that helpful information can be found in the TIPS brochure. Also consider contacting local natural resource professionals and conservation groups to locate additional information that may be useful.

As you answer the questions provided on the STEPS worksheets, you will begin to assess conditions on your land and learn about a number of management options. Keep in mind that the alternatives provided are general in nature. The distinct features of your land—and the specific uses and goals you have for it—make each situation unique. As you begin to identify actions that may be appropriate, consider whether you can begin to make these improvements on your own. Many options will require specific considerations pertaining to the unique geography, hydrology, plants, wildlife and other features and conditions on your property. Some of these activities could require technical expertise; you may want to contact a natural resource professional for detailed assessments, conservation planning and recommendations. Sources for more information and assistance are listed in each section.

In addition, you should know that regulations and permit requirements vary depending on location, land use and other factors. As a landowner, it is your responsibility to learn about the regulations applicable in your area.

As you move forward with your land management goals, remember that an abundance of information and assistance is available through natural resource agencies and businesses.

If You Want to Go a Few More Steps

You may find that while the STEPS worksheets have helped you advance your land management goals, you would also like to address additional objectives or more complex issues.

More detailed evaluation processes are available through a variety of outlets. In addition, more comprehensive technical assistance is available through businesses and local, state, federal and non-profit entities. If you would like to additional assistance, contact one of the entities listed below:

- *Local Soil and Water Conservation District (SWCD):* **www.oacd.org**
- *Natural Resources Conservation Service (NRCS):* **www.or.nrcs.usda.gov**

Additional information and assistance can also be found through the many other organizations listed in the worksheets and the ***Resources*** section on page 57.

FOREST Condition Assessment

Reference TIPS
brochure, pg. 9

Worksheet

With proper management, you can maintain healthy forest land. All forests can be managed for a single use, such as timber production, or for multiple uses, such as wildlife habitat, recreation, livestock grazing and/or timber production. To help you manage your forest land, you need to decide which of these uses are important to you. You likely have a primary use planned that will guide your overall management and decision-making processes. If secondary and tertiary uses are also important to you, allow these to guide your decisions as well. This worksheet will help you ensure that the vegetation and ecosystems on your forest land function properly for the land uses you have identified.

In a healthy forest, the larger overstory trees, smaller understory trees, and ground vegetation are all in good condition. The distribution of vegetation and the number of trees per acre will differ depending upon where your property is located within the state. Soil type, precipitation, temperature, tree species, and your land use objectives are also factors that affect the density and distribution of vegetation on your forest land.

Instructions: Conduct a basic assessment of your forest land by answering the following questions. Suggestions to help you address specific management issues are listed directly under each section. If you identify management needs and issues that may require professional assistance, refer to the last page of this ***Forest Condition Assessment*** for a list of resources.

Site **Date**

1. Identify the tree species on your forest land.

Select all that are present:

- ☐ **Douglas fir**
- ☐ **Ponderosa pine**
- ☐ **Grand fir**
- ☐ **White fir**
- ☐ **Western hemlock**
- ☐ **Western larch**
- ☐ **Bigleaf maple**
- ☐ **Red alder**
- ☐ **Sitka spruce**
- ☐ **Oregon white oak**

Others:

_____

_____

_____

_____

↳ There are many references to help you identify the tree species present in Oregon. A good place to start is the *Common Trees of the Pacific Northwest* page on the Oregon State University Web site at:

http://oregonstate.edu/trees/

↳ Your local natural resources contact may suggest additional sources of information. List these other useful tree identification and forestry Web sites below for future reference:

_____

_____

_____

_____

_____

2. What type of trees will your soil support?

If you do not know, refer back to the ***Inventory Your Natural Resources Worksheet***, which refers you to the *Web Soil Survey*. If you have not already completed this section, it will be helpful to visit the *Web Soil Survey* to find detailed soil information. Print out the reports available on this site or take notes on the following:

☐ **Descriptions of the soils present on your property**

↳ After you delineate your property in *Web Soil Survey*, click on the "Soil Map" tab. On the left hand side of the screen, you will see a list of the soils present on your land. Click on a soil name to view the description, which will provide information on the soil's properties and qualities, major land uses, as well as use and management suggestions for timber, crops, livestock, wildlife and other uses.

☐ **Site index values for the tree species on each soil**

↳ Next, click on the "Soil Data Explorer" tab. On the left hand side of the screen, you will see a list of the soil reports available to you. Under "Vegetative Productivity," select "Forest Productivity," then click "View Soil Report." Scroll down to the bottom right hand side of the screen to view the site index values for relevant tree species. The site index value gives you the average height trees will attain at a given age (either 50 or 100 years) on a specific soil. Generally, a higher site index value means the soil can support more trees per acre. The value allows you to compare the growth potential for trees on different soils. The site index will also help you evaluate your current stand.

☐ **Trees to manage for**

↳ On the same table with the site index values, you will also find a column titled "Trees to Manage." The species listed here are preferred for planting, seeding or natural regeneration on the respective soils.

☐ **Other data that you feel is important**

3. Evaluate the health of your trees.

Eliminating conditions that make trees unhealthy is important. Record any indications of possible problems by answering the questions below. For any YES answer, provide descriptions in the space provided.

☐ **No** ☐ **Yes** **Do you see evidence of disease?** Are there dead or dying branches in the canopy of a tree and/or discolored leaves or needles?

_____

_____

☐ **No** ☐ **Yes** **Do you see evidence of insect attack?** This may include signs of whitish/pinkish colored pitch tubes on the bark, brown sawdust at the base of the tree, dead sections of a tree canopy, and/or large amounts of green needles on the ground.

_____

_____

☐ **No** ☐ **Yes** **In the tree canopy, are there thick masses of very dense foliage (witches brooms)?**

_____

☐ **No** ☐ **Yes** **Are there many dead standing trees or many dead trees lying on the ground?**

_____

_____

☐ **No** ☐ **Yes** **Do a majority of the trees have forked tops, dead tops with new leaders (dominant upright stems) growing, or dead tops with no new leader?**

_____

_____

↳ If any of the above raises a concern for you, contact a local forester with the Oregon Department of Forestry, NRCS, OSU Extension Service, or a private consulting forester.

4. Do you know the density of the forest stand (the number of trees per acre)?

☐ **No** ☐ **Yes**

Do you know the average diameter of the trees in the forest stand?

☐ **No** ☐ **Yes**

↳ If you answered NO to one or both of the above questions, then you may want to inventory your forest stand. There are several ways to conduct an inventory, but the simplest is to establish a "fixed size plot" as described below.

Forest Stand Inventory

1. Establish a fixed size plot. A fixed plot can be of any size, but should be large enough to be representative of the entire stand. Plots can be square, rectangular, or round. Round plots are the easiest to lay out. To do this, establish a center point and measure the radius out to the plot edge. Depending upon the plot size (e.g., 1/100 acre, 1/50 acre, 1/10 acre, etc.) the radius measurement will differ. A tenth-acre (1/10 acre) plot makes converting measurements to a full acre easy, just multiply by 10. The radius of a 1/10 acre plot is 37.2 feet.	**Plot size:**
2. After plot establishment, count the number of trees within in the plotted area.	**Number of trees:**
3. Compute the number of trees per acre. Count only the trees that are greater than 4 feet in height. (If you set a 1/10 acre fixed plot, then multiply the total number of trees by 10.)	**Trees per acre:**
4. **Record the average tree diameter.** Measure the diameter of only the trees that are taller than 4.5 feet and have a diameter of 3 inches or more. Measure the diameter of these trees at 4.5 feet above the ground.	**Average tree diameter:** (sum of all diameters measured ÷ number of trees measured)
5. Are there tree seedlings (trees less than 4 feet in height) on the ground? Note any new growth.	☐ **No** ☐ **Yes**

↳ The data you have collected in the Forest Stand Inventory above will help a professional forester answer your questions about forest management strategies.

5. Is wildfire a concern on your forest land?

☐ **No** ☐ **Yes**

↳ If you answered YES, consider possible measures to reduce the concern, including:

- ☐ **Reduce brush quantity on the property.**
- ☐ **Thin overstocked stands.**
- ☐ **Prune lower branches on the trees.**
- ☐ **Reduce tree material on the forest floor.**
- ☐ **Establish permanent firebreaks.**

↳ One or more of the above items may be needed. A professional forester can help you determine the actions that are most appropriate for your land.

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6. Will you have livestock graze in the forest?

☐ **No** ☐ **Yes**

↳ If you answered YES, you should also inventory the understory vegetation to determine the types and amounts of plants present. Contact a rangeland management specialist for assistance.

The Next Steps for Better Forest Management:

Review your answers to the questions above and identify where you can make improvements to the health of your forest land. If you would like additional information or assistance to help you further evaluate, inventory or plan management strategies for your forest land, consider working with one of the entities listed below:

- Oregon Department of Forestry (ODF)
- Natural Resources Conservation Service (NRCS)
- Oregon State University Extension Service
- Professional consulting forester

NOTES:

COMPLETING Your STEPS Worksheets

Reference TIPS brochure, pg. 1

Worksheets

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GRAZING Assessment

Worksheet

Reference TIPS
brochure, pg. 3-5

With good management, your pastures will produce vigorous grass stands with sufficient forage for the type and number of livestock you keep. The amount and quality of forage will depend on how you manage your land for grazing.

It is important to understand that livestock will graze less in areas that: contain plants that are not palatable as forage, are too far from water and mineral supplements, or are too large in size to encourage even use of the entire unit. With proper management, however, you can control how your animals graze and, therefore, improve pasture conditions and herd health. For example, many livestock owners fence large pastures into smaller units. Animals can then be rotated through the pastures on a planned schedule that gives forage time to rest and regrow vigorous stands. With rotational grazing, ranchers also have the opportunity to inspect animals more frequently and are often able to detect health problems in their herds earlier. At the same time, the soil benefits with less erosion and damage in heavy use areas. Also, controlling livestock movement results in better distribution of manure as plant fertilizer and reduces the risk of water contamination from concentrated nutrients in runoff.

Instructions: The following questions will help landowners conduct a basic self-assessment of their grazing management. Answer the questions below to identify areas where you may be able to improve grazing with pasture management strategies.

Site	Date

Grazing Assessment

1. On pastures and grazed land, how many of the plants are grazed by livestock, as compared to plants that livestock do not touch?

☐ **more than 80 percent**

↳ You are managing for uniform grazing use and likely have a healthy mix of plants.

☐ **50 to 80 percent**

↳ Grazing may be slightly improved with additional watering points, smaller grazing units, and/or targeted placement of salt/mineral supplements.

☐ **20 to 50 percent**:

↳ Grazing would likely be improved by incorporating additional watering points, smaller grazing units, and/or targeted placement of salt/mineral supplements.

☐ **less than 20 percent**:

↳ Consider replanting with forage species that are more suited to your livestock. Also consider adding additional watering points, smaller grazing units, and/or targeted placement of salt/mineral supplements.

2. Do you have a problem with livestock eating or coming into contact with noxious, invasive or undesirable plants? Check all that apply below, and then refer to the ***Weed Management Strategy*** section for information on weed control.

☐ **Noxious plants** (plants which are on state/county noxious weed lists)

↳ Consider control measures as recommended by a licensed pesticide consultant. Change management practices to favor desired plant species.

☐ **Invasive plants** (these plants may or may not be grazed, but will spread over time)

↳ Consider control measures as recommended by a licensed pesticide consultant. Change management practices to favor desired species.

☐ **Undesirable plants** (plants may be grazed, but are not the best option)

↳ Consider improving grazing uniformity. Replanting with more desirable species and adding additional watering points, smaller grazing units, and/or targeted placement of salt/mineral supplements may help.

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Grazing Assessment

3. At the beginning of the grazing season, usually in April, how tall is the forage on your pastures?

☐ **more than 8 inches**

↳ If the forage is leafy, this is a good height to begin grazing. If stems are present in the spring, you may consider earlier management activities, such as clipping, haying or increasing grazing to leave 4 to 8 inches of leafy material at the end of the season.

☐ **4 to 8 inches**

↳ Try to allow the forage to reach 8 inches in height before grazing.

☐ **less than 4 inches**

↳ Consider allowing more time without grazing in the summer/fall to encourage better regrowth of leaves and roots. This will improve the vigor of your grass stands in the spring.

4. During the grazing season in spring and summer, how tall is the forage when you typically decide to move livestock to graze a different area?

☐ **more than 8 inches**

↳ It may help to extend the grazing time in the pasture, reduce the size of the pasture, graze with more animals, or use one or more pastures for hay to increase grazing intensity.

☐ **4 to 8 inches**

↳ Depending on the grazed plant species, a height of 4 inches is preferable before you remove livestock from the pasture.

☐ **less than 4 inches**

↳ Consider reducing the grazing time and/or animal numbers, enlarging the grazed area, or adding supplemental feed.

5. When grazing is finished at the end of the season, usually in October, how tall is the forage?

☐ **more than 8 inches**

↳ If the forage is leafy, 8 inches is a good height to stop grazing in the fall. If stems are present, clipping, haying or increased grazing earlier in the season to leave 8 inches of leafy material in the fall may be useful.

☐ **4 to 8 inches**

↳ Try to allow forage to reach 8 inches in height before winter.

☐ **less than 4 inches**

↳ Allow more time without grazing in the summer and fall for better regrowth of leaves and roots.

continued on next ➡

Grazing Assessment

6. Are livestock allowed to graze on a pasture continuously, or do you rotate them from pasture to pasture to allow forage to rest and regenerate?

☐ **Livestock graze one pasture continuously.**

↳ Consider combining livestock into fewer groups and rotating them among your pastures. To do this, you may need to subdivide existing pastures. Rotational grazing allows the plants' leaves and roots to grow back prior to being grazed again.

☐ **Livestock are rotated among pastures.**

↳ Allow for 4 to 8 inches of plant height (mostly leaves) to improve forage quality and plant health.

7. How would you describe the condition of your livestock?

☐ **Livestock appear to be underweight or unhealthy for part or all of the year.**

↳ Work with your veterinarian to determine the causes. Contact a professional for help if poor animal health is associated with grazing conditions.

☐ **Livestock appear to be in good condition year round.**

↳ Maintain your grazing system and re-assess animal health whenever changes are made.

The Next Steps for Better Grazing Management:

As you review your responses on the ***Grazing Assessment*** above, consider taking actions to provide healthier conditions for your animals while protecting the soil, water and plants on your grazed land. There are some common actions you may consider taking to improve your pastures for livestock:

- ☐ Add permanent or temporary fencing to control grazing patterns and movement of livestock.
- ☐ Balance grazing pressure with plant growth by rotating animals among pastures based on the number of animals, height of grasses and timing of scheduled grazing.
- ☐ Re-plant pastures with more desirable forage species.
- ☐ Add or develop sources of water for livestock.
- ☐ Reduce the number of animals on your land.
- ☐ Graze less and increase the amount of feed you purchase.
- ☐ Secure additional pasture land.
- ☐ Control weeds.
- ☐ Implement a fertilizer program.

↳ For more information and assistance to identify additional measures or to design a customized grazing plan, contact one of the entities listed below:

- Natural Resources Conservation Service (NRCS)
- Local Soil and Water Conservation District (SWCD)
- Oregon State University Extension Service
- Other natural resource professional

continued on next ➡

NOTES:

WEEDS Your Management Strategy

Reference TIPS brochure, pg. 2

Worksheet

Steps for Safe & Effective Weed Control

Step 1: Know what you are looking for. To begin, review the information about Weed Control on page two of the TIPS brochure. Also, contact your county or local weed management area (listed below) or other local contact for information on the identification and eradication of species of concern in your area. The Web sites provided on the right contain weed lists and additional information on a number of species. Be sure to search for additional information relevant to your local area.

Contacts

County Noxious Weed & County Weed Management Area Programs & Contacts

http://oregon.gov/ODA/PLANT/WEEDS/county_contacts.shtml

Deschutes County Weed Information

http://www.co.deschutes.or.us/go/objectid/8C9B69DC-BDBD-57C1-9C64DC53B659CBCE/index.cfm

Baker, Union and Wallowa County Weed Information

http://www.tricountycwma.org/index_files/Page770.htm

Local Oregon State University Extension Offices

http://extension.oregonstate.edu/index.php

Local Soil and Water Conservation District Offices

http://www.oacd.org/

Local Natural Resources Conservation Service (NRCS) Offices

http://www.or.nrcs.usda.gov/contact/

Other:

Online Weed Lists

INVADERS Database, University of Montana. Query by area to search the weeds in your county.

http://invader.dbs.umt.edu/

Oregon Department of Agriculture Weed Page. Weed lists with profiles, grant information, and more.

http://oregon.gov/ODA/PLANT/WEEDS/. shtml

100 Most Dangerous Invaders, State of Oregon Invasive Species Council. Priority concerns regarding invasives in Oregon.

http://www.oregon.gov/OISC/list_100_worst.shtml

Western Invasives Network Web Site. Interactive maps, Q & A forums, and weed lists for species that offer a high probability of invasion.

http://www.westerninvasivesnetwork.org/

Worst Weeds in the West, Center for Invasive Plant Management. Detailed weed information and management strategies.

http://www.weedcenter.org/management/weed_mgmt_profiles.html

Global Invasive Species Initiative Site, The Nature Conservancy. Plant alert postings and other tools.

http://tncweeds.ucdavis.edu/

Poisonous Weed Fact Sheet, Oregon State University Extension. Plants of concern to horse owners.

http://forages.oregonstate.edu/resources/publications/fs/PoisonFactSheet.pdf

Other:

continued on next ➡

Your Management Strategy

Step 2: Compile a list of targeted weeds for your property. These are invasive plants that are toxic to livestock, aggressive in crops or otherwise undesirable. Include plants that are known to occur or are expected to arrive in the region. You will find an abundance of information on the Web sites listed on the previous page. Take notes on identifying features, print photographs, and attach any information that will help you identify these plants.

Weed Watch List **Site** **Date**

Plant/Species	Season Visible	Notes

continued on next ➡

Your Management Strategy

Step 3: **Inventory the weeds on your land**. Carefully inspect your property for signs of weeds. Weeds often occur in areas that are highly disturbed, so check those areas closely. Be especially suspicious of plants that are prickly, thorny, hairy or that bleed milky sap, as many noxious plants will have these characteristics.

↳ Complete the first three columns of the ***Weed Inventory & Management Strategy*** worksheet on the following page to document the weeds present on your land.

Step 4: **Develop a strategy.** After documenting the weeds present or likely to occur on your land, refer to your local weed contacts for information on removal and management options.

↳ Complete the Management Strategy column of the ***Weed Inventory & Management Strategy*** worksheet. For each undesirable plant identified, note actions that will help you:

Control existing weeds.

- Identify removal methods that are appropriate for the species you are treating and that are safe for your family and neighbors, nearby water sources, livestock, wildlife, crops and desirable plants.
- If you are treating a large area for weeds, consider seeding or planting the area with desirable plant species to prevent weeds from becoming reestablished.
- Monitor and control weeds on an ongoing basis after the initial control or removal. It generally takes years of persistence to control problem weeds.

Reduce the potential for invasion by weed species. For example,

- If you manage your land to maintain complete cover of plants and minimize the amount or timing of bare soil (with year-round plantings or crop cover), there will be little available space for weedy species to become established and spread.
- Managing desirable grasses to maintain a three-inch minimum height will help them stay healthy. This will also reduce opportunities for weeds to invade.

Information on Weed Control Methods

PNW Weed Management Handbook, Oregon State University. Reference of weed control practices used in various situations and techniques to prevent herbicide resistance.

http://weeds.ippc.orst.edu/pnw/weeds

Controlling Noxious Weeds on the Farm, Washington State University Extension Service. Management techniques for weeds present in western Washington and western Oregon.

http://king.wsu.edu/foodandfarms/documents/NoxiousWeeds.pdf

Weed Control Methods Handbook, The Nature Conservancy. Tools and techniques for natural areas.

http://tncweeds.ucdavis.edu/handbook.html

Other:

continued on next ➡

Weed Management Strategy

Instructions: Complete the Weed Inventory (the first three columns of the worksheet). Then, refer to your local weed management contacts and online resources to help you assess your options. Then, complete the Management Strategy portion of the worksheet (column four). Refer to the example provided below as a guide when completing your ***Weed Management Strategy*** on the following page. The example is based on the sample property map provided on page seven.

Note: It is advisable to repeat the weed inventory during different seasons, as some plants are more prevalent or easily identifiable at different times of the year.

Weed Management Strategy **Site** *Breezy Hills Farm* **Date** *Sept. 2008*

Step 3: *Inventory the weeds on your land.* **Weed Inventory**				**Step 4:** *Develop a strategy.* **Management Strategy**
Field	**Species Present**	**Notes & Considerations**		**Control Method & Timing**
pasture 1	—	—	→	—
pasture 2	*Tansy ragwort*	*small patch*	→	• *repeated hand-pulling to remove all roots*
hay field 1	*Scotch broom*	*near road*	→	• *cut mature plants, pull or dig out young plants*
hay field 2	*1. Scotch broom* *2. Blackberries*	*1. fence line* *2. along E fence line*		*1. cut mature plants, pull or dig out young plants* *2. cut; remove roots when possible*
forest land	*3. Blackberries*	*along road*	→	• *cut; remove roots when possible*
barnyard	*Meadow knapweed*	*flowers in July*	→	• *herbicide application according to container label recommendations; apply after plant is at or beyond full bloom, but before seeds are produced* • *follow with seeding of desirable species* • *continue weed monitoring and removal*
pumpkin patch	*Morning glories*	—	→	• *prevent spread by pulling*

continued on next ➡

Your Management Strategy

Weed Management Strategy	Site	Date

Step 2: *Inventory the weeds on your land.* **Weed Inventory**			Step 3: *Develop a strategy.* **Management Strategy**	
Field	**Species Present**	**Notes & Considerations**		**Control Method & Timing**
			→	
			→	
			→	
			→	
			→	
			→	
			→	
			→	
			→	
			→	

Your Management Strategy

NOTES:

STREAM Condition Assessment

Reference TIPS brochure, pg. 6

Worksheet

This assessment will help you identify potential concerns for any stream or streamside area on your property. The questions below are designed to draw your attention to items that you may be able to improve. This tool was adapted from the Oregon State University Extension *Stream*A*Syst* [1] publication.

Instructions: Answer the questions below. For items to which you answer YES, read the following suggestions on how you can improve or protect your stream. A YES answer does not necessarily mean there is a problem, but it can help you focus your efforts as you learn more about the particular situation and possible courses of action. You can find resources for more information or assistance in the *Contacts* list at the bottom of each section.

Stream Condition Assessment	**Site**	**Date**

Issue	**Indicators**

Water Pollution

Are there ever any signs of pollution such as soap bubbles, oil sheen, unusual odors, manure, sewage or trash in or along the stream?

☐ No ☐ Yes

1. Use the *Home*A*Syst* [2] online assessment and/or the Manure Management worksheet in this packet to evaluate your situation.
2. Check with upstream neighbors and/or have your septic system pumped and inspected.
3. If problems with the septic system are found, make repairs.
4. Contact a natural resource professional to evaluate the stream and make recommendations.
5. Work with ODA to assess whether the problem requires notification of additional agencies.

Contacts: septic pumping company, OSU Extension, SWCD/NRCS, local watershed council, neighbors, ODA, DEQ [3]

Algae

Is the water green? Is there a green scum or thick, stringy, green clumps? Or, is there a heavy, dirty-brownish, slimy material coating underwater objects?

☐ No ☐ Yes

1. Determine whether nutrients from fertilizer or manure runoff are entering the stream from your property. If so, take preventative steps. If not, check with upstream neighbors.

Contacts: SWCD/NRCS, watershed council, OSU Extension, neighbors

Water Removal

Do water withdrawals or upstream dams ever result in extremely low water levels?

☐ No ☐ Yes

1. Improve the efficiency of water use on your property.
2. Check into financial incentives for returning allocated water to the stream.

Contacts: SWCD/NRCS, OSU Extension, OWRD

continued on next ➡

[1] The Stream Condition Assessment worksheet was adapted, with permission, from the Oregon State University Extension publication, EM 8671, *Stream*A*Syst: A tool to help you examine conditions on your property* (Oregon State University, Corvallis, Oregon, June 2000, reprinted March 2001), 16 pages; available online at: http://extension.oregonstate.edu

[2] *Home*A*Syst* is a homestead assessment system provided by the Oregon State University Extension developed to help evaluate possible risks to the groundwater and drinking water; available online at: http://wellwater.oregonstate.edu/ under "assessment tools."

[3] An acronym reference sheet is provided in the ***Resources*** section, beginning on page 57 of this packet.

Issue	Indicators

Muddy Water

A. Does the stream become muddy after storms and then take a long time to clear up again? Or, is the water in the stream muddier or cloudier when it leaves your property than when it enters?

☐ No ☐ Yes

1. Look into upstream land use practices that might be causing muddy runoff. Determine whether sediment is entering the stream from your property; look for runoff from unpaved roads, fields, severe bank erosion or other sources. When you find the problem, take steps to address it.

Contacts: SWCD/NRCS, watershed council

Long-Term Data

A. Do long-term data show that your stream is limited in any water quality measurements? (The Oregon 303(d) stream segment database is available on DEQ's Web site and at most libraries. If water quality information is unavailable for your stream, check with your watershed council to determine how you can help gather needed data).

☐ No ☐ Yes

1. Search for your stream in the bound copy of DEQ's 1998 303(d) database or online on the Oregon DEQ Web site at: http://www.oregon.gov/DEQ
2. Ask listed contacts for information.
3. Learn more about limiting factors and the connection with activities on your land.
4. Get involved with local efforts to improve water quality.

Contacts: watershed council, DEQ, SWCD/NRCS, OSU Extension

Barriers to Fish or Water Flow

A. Are there culverts, dams or other artificial structures in the stream that could block fish passage?

☐ No ☐ Yes

1. Contact ODFW for more information. If the barrier prevents fish passage, modify it as needed.

Contacts: ODFW

B. Are bridges or in-stream culverts inadequate in size to convey high, overbank flood flows?

☐ No ☐ Yes

1. Measure the culvert and contact an expert to help determine the culvert size required.

Contacts: ODF, OSU Extension forestry agent

continued on next ➡

Condition Assessment

Issue	Indicators

Ditches & Drainage

Are any irrigation ditches, tile lines, drainage ditches or other artificial waterways connected to the stream?

☐ No ☐ Yes

1. Create grass filter strips or other means to remove contaminants before drainage water enters the stream.
2. Screen pumps or irrigation diversions to prevent aquatic life from becoming trapped in the irrigation system. Screens must be designed according to ODFW standards.

Contacts: SWCD/NRCS, ODFW

Flood & Erosion Control Structures

Are there any berms, dikes, or riprap along the stream or has the stream been straightened?

☐ No ☐ Yes

1. With the help of a natural resources expert, determine how structures or straightening may be affecting the condition of the stream. If a problem exists, modify as recommended by the expert.

Contacts: SWCD/NRCS

Channel Condition

Is the channel much wider and shallower than in the past? Are gravel, sand or silt bars noticeably building? Are there high, vertical banks in straight sections? Or, are there major changes to the stream after large flow events? For example, are pools filled in, riffle areas moved, streambanks greatly eroded, or has the whole channel moved?

☐ No ☐ Yes

1. Do not be tempted to fix this on your own. Work with an expert to determine the causes and possible solutions.
2. The stream might be out of balance with the amount of water and sediment it is carrying. Ask about possible changes or restoration efforts. Keep in mind that changes might be needed up- and downstream, so coordinate your efforts with neighbors.

Contacts: watershed council, SWCD/NRCS, neighbors

Streambank Protection

Are there areas of bare soil along the stream that will come into contact with water during high or overbank flows?

☐ No ☐ Yes

1. Provide natural, long-term streambank protection with plantings that will introduce large wood and/or add stability from roots.
2. Determine whether artificial protection measures are needed while plants become established.

Contacts: SWCD/NRCS, watershed council

continued on next ➡

Issue	Indicators

Streambank Vegetation

Have activities such as construction, grazing, landscaping or tilling within 35 feet of the top of the streambank disturbed permanent vegetation?

☐ No ☐ Yes

1. Identify streamside areas that need vegetation and commit to management changes in that area.
2. If the area is grazed by livestock, develop and follow a prescribed grazing program, build off-stream watering facilities, and establish fencing as necessary.

Contacts: SWCD/NRCS, watershed council, OSU Extension

Types of Streamside Plants

A. Are there very few trees surviving or reproducing in the streamside area?

☐ No ☐ Yes

1. Determine whether the water level has dropped or the channel has deepened. If so, roots of young trees might not be able reach the water table.
2. If the water level is not the problem, remove brush that might be shading young conifers. Protect young trees with tubes to prevent animals from eating them. Plant only trees recommended for your site.

Contacts: SWCD/NRCS, OSU Extension, watershed council

B. Are there large areas with plants considered to be weeds or invasives, such as blackberry, scotch broom, reed canarygrass, English ivy, thistle, cheatgrass or others?

☐ No ☐ Yes

1. Refer to the ***Weed Management Strategy*** worksheet in this packet for information on how to identify the most appropriate method for removing weeds.
2. Determine whether grazing management changes are needed.

Contacts: SWCD/NRCS, OSU Extension, watershed council

C. Do bare soil or thin stands of grass dominate the area?

☐ No ☐ Yes

1. Identify the reason(s) for lack of vegetation and address the causes.
2. Restore vegetation to the streamside area. Make sure to plant trees and shrubs suited to your location and follow through with the project to ensure their survival.
3. Ask about any available financial assistance.

Contacts: SWCD/NRCS, watershed council

continued on next ➡

Condition Assessment

Issue	Indicators

Other

Do you have other concerns about the condition of your stream? If so, list them in the space provided below and contact a natural resource professional to discuss possible causes and solutions.

Other

Other

continued on next ➡

NOTES:

MANURE Management Assessment

Reference TIPS
brochure, pg. 3, 5, 10

Worksheet

The way livestock owners manage animal manure can have a dramatic effect on the quality of surface and ground water—including the water you drink. Livestock owners should evaluate the concentration of animals on the property, the amount and timing of manure applications to crop fields and the area's soils, slope, precipitation and water table. These and other factors contribute to the risks that animal waste might present to the soil, water, air quality, plant health and wildlife habitat—as well as to livestock and human health. This worksheet can help you assess your operation and identify areas for improvement.

Instructions: Complete the following assessment if you own horses, cattle, goats, sheep or other animals. Each of the 16 assessment areas below addresses a different aspect of animal waste management. For each question that relates to your operation, select the statement that best describes practices and conditions on your land.

Site	Date

1. Do you use a nutrient management plan for balanced manure applications to meet crop and pasture needs?

☐ N/A	☐ High Risk	☐ High-Moderate Risk	☐ Moderate-Low Risk	☐ Low Risk
	There is no nutrient management plan. (See definition below.)	Only commercial fertilizers are accounted for in the nutrient management plan.	Commercial fertilizers and soil residual nutrients are accounted for in the nutrient management plan.	Commercial fertilizers, soil residual nutrients, irrigation water nitrates, legumes and manure are accounted for in the nutrient management plan.

What you can do: A nutrient management plan is an assessment of manure produced on a farm, how much of that manure is appropriate to apply on crops, and how to safely apply, remove or store it. For assistance in developing a nutrient management plan that promotes vigorous plant growth and a healthy environment, contact your local Oregon State University Extension office, Soil and Water Conservation District (SWCD), or Natural Resources Conservation Service (NRCS).

Notes: _____

_____

2. Soil tests:

☐ N/A	☐ High Risk	☐ High-Moderate Risk	☐ Moderate-Low Risk	☐ Low Risk
	No soil testing is done.	Soil tests occur infrequently.	Soil tests are done every 2 to 5 years.	Soil tests are done every year.

What you can do: Contact your local Extension office or a natural resource professional for information on how to have soil tests done for your operation. Refer to the ***Soil Assessment & Management Options*** worksheet (page 47) for more information.

Notes: _____

_____

[1] The Manure Management Assessment worksheet was adapted, with permission, from the University of Nebraska Cooperative Extension publications, EC 98-750-S, EC 98-752-S, EC 98-756-S, EC 98-758-S, EC 98-761-S, *Farm*A*Syst* (University of Nebraska, Lincoln, Nebraska, July 1998, 16 pages.

[2] Contact information is provided in the ***Resources*** section beginning on page 57 of this packet.

continued on next ➡

3. Knowledge of the nutrient content in manure:

☐ N/A	☐ High Risk	☐ High-Moderate Risk	☐ Moderate-Low Risk	☐ Low Risk
	No manure analysis or book value estimate of nutrient value is used.	Book value for estimating nutrients is used.	Manure analysis is done once per year.	Manure analysis is done prior to each primary period of land application.

What you can do: To get a manure analysis or information on book value estimates, contact your local Extension, SWCD or NRCS office.

Notes: _____

4. Records on application of manure to fields:

☐ N/A	☐ High Risk	☐ High-Moderate Risk	☐ Moderate-Low Risk	☐ Low Risk
	Records of manure application are not kept.	Records of individual field applications for the past year are available.	Records of individual field manure applications for the past three years are available.	Permanent records of individual field manure applications are maintained and used in decision-making.

What you can do: Records of manure applications help growers track and make informed decisions on the amount of nutrients to apply for healthy plants while avoiding unintended nutrient loading in water bodies. Contact your local SWCD, NRCS or Extension office for examples of how to keep and use manure application records.

Notes: _____

5. Manure application rate (manure applied on fields):

☐ N/A	☐ High Risk	☐ High-Moderate Risk	☐ Moderate-Low Risk	☐ Low Risk
	Application rates for manure spreading equipment are not known.	A rough estimate of the manure application rate based on equipment settings is available.	A good estimate of the manure application rate is known. You have assessed the accuracy of your equipment settings and usage.	Manure application equipment has been calibrated within the past three years.

What you can do: Contact the equipment manufacturer or dealer for more information on the application rates for your equipment. Another option is to calibrate manure application equipment following procedures outlined in the associated NRCS job sheet. Contact your local NRCS office for more information.

Notes: _____

continued on next ➡

6. Field conditions during manure applications:

☐ N/A	☐ High Risk	☐ High-Moderate Risk	☐ Moderate-Low Risk	☐ Low Risk
	Manure is applied to ponded or saturated soils under winter conditions to snow-covered or frozen fields from which runoff is common.	Manure is applied under winter conditions to snow-covered or frozen fields with minimum slope and limited runoff potential.	Application is avoided in winter or when soil is saturated. Manure is applied in late summer or fall on land to be planted with spring crops.	Manure is applied primarily to growing crops or within several weeks prior to planting.

What you can do: Time manure applications to avoid or reduce nutrient-laden runoff and to provide for optimal crop use. Contact your local NRCS, SWCD or Extension office for more information.

Notes:

7. Manure stacked in-field or on bare soil:

☐ N/A	☐ High Risk	☐ High-Moderate Risk	☐ Moderate-Low Risk	☐ Low Risk
	Manure is stacked for more than 30 days OR is stacked on coarse-textured soils (gravels, sands or sandy loams). **- AND -** Fractured bedrock or water table is shallower than 20 feet OR the upslope surface water is not diverted.	Manure is stacked for less than 30 days **- AND -** is stacked on medium- or fine-textured soils (silt loam, loam, clay loam, silty clay). **- AND -** Water table is deeper than 20 feet, and upslope water is diverted around the pile.	Manure is stacked for less than 30 days **- AND -** is stacked on medium- or fine-textured soils (silt loam, loam, clay loam, silty clay). **- AND -** Water table is deeper than 20 feet, and upslope water is diverted around the pile. **- AND -** The pile is relocated each year.	Manure is never stacked on a field or bare soil.

What you can do: Contact your local SWCD, NRCS or Extension office for information on the soils, slope and water table in your area. A natural resource professional can help you assess conditions on your land and develop solutions that are right for you.

Notes:

continued on next ➡

8. Manure stacked in a feed yard:

☐ N/A	☐ High Risk	☐ High-Moderate Risk	☐ Moderate-Low Risk	☐ Low Risk
	The feedlot has no surface runoff containment and upslope surface flow of water is not diverted from flowing over the feed yard.	There is containment of surface runoff on the feedlot and upslope surface flow is partially diverted.	All feedlot surface runoff is directed to a settling basin and grass filter strip. All upslope surface flows during an average rainfall event are diverted.	All feedlot surface runoff is contained in an appropriately sized storage system designed to handle large or excessive rainfall events. All upslope surface flow is diverted.

What you can do: Contact your local SWCD, NRCS or Extension office for information on the soils, slope and water table in your area. A natural resource professional can help you assess conditions on your land and develop solutions that are right for you.

Notes:

9. Manure stacked on concrete:

☐ N/A	☐ High Risk	☐ High-Moderate Risk	☐ Moderate-Low Risk	☐ Low Risk
	There is no roof over the stacked manure, **- AND -** liquid runoff is allowed to enter farm drainage, road ditches, intermittent or continuous streams, or natural wetlands.	There is no roof over the stacked manure, **- AND -** liquid runoff is diverted to pastures or crop land where it is absorbed into the soil.	There is no roof over the stacked manure, **- AND -** liquid runoff is diverted to grass filter strips that are properly designed to handle the volume and direction of runoff flows.	A roof covers the stacked manure, AND no liquid exits the area. Upslope surface flow is diverted. **- OR-** There is no roof, but liquid runoff is collected in a liquid storage facility. Upslope surface flow is diverted.

What you can do: Contact your local SWCD, NRCS or Extension office for information and assistance to develop animal waste storage and runoff solutions for your operation.

Notes:

continued on next ➡

10. Manure stored in animal housing:

☐ N/A	☐ High Risk	☐ High-Moderate Risk	☐ Moderate-Low Risk	☐ Low Risk
	Manure is stored on an earthen floor or coarse textured soils (gravels, sands or sandy loams) **- AND -** is subject to surface water runoff. **- AND -** Water table or fractured bedrock is shallower than 20 feet.	Manure is stored on a concrete or compacted earthen floor of medium- or fine textured soils (silt loam, loam, clay loam, silty clay) **- AND -** is subject to surface water runoff. **- AND -** Water or fractured bedrock is shallower than 20 feet.	Manure is stored on a concrete or compacted earthen floor of medium- or fine textured soils (silt loam, loam, clay loam, silty clay) **- AND -** protected from surface water runoff. Water or fractured bedrock is deeper than 20 feet.	The building has a concrete floor, **- AND -** the site is protected from surface water runoff with curbs or walls.

What you can do: Contact your local SWCD, NRCS or Extension office for information and assistance to develop animal waste storage and runoff solutions for your operation.

Notes:

11. Distance from livestock manure storage to nearest surface water source:

☐ N/A	☐ High Risk	☐ High-Moderate Risk	☐ Moderate-Low Risk	☐ Low Risk
	Less than 100 feet	100 to 199 feet	200 to 500 feet	Greater than 500 feet

What you can do: Contact your local SWCD, NRCS or Extension office for information and assistance on options to protect water bodies, fish and wildlife from nutrient-laden runoff.

Notes:

continued on next ➡

12. Location of livestock manure storage in relation to well or drinking water source:

N/A	High Risk	High-Moderate Risk	Moderate-Low Risk	Low Risk
☐	☐	☐	☐	☐
	The well is within 100 feet of manure storage.	The well is 100 to 250 feet away AND downslope from manure storage.	The well is more than 250 feet away AND downslope from manure storage.	The well is more than 100 feet away AND upslope from manure storage.

What you can do: Contact your local SWCD, NRCS or Extension office for information on how to protect drinking water from contamination.

Notes:

13. Yard runoff control system in holding lot or yard *(not fields or pastures):*

N/A	High Risk	High-Moderate Risk	Moderate-Low Risk	Low Risk
☐	☐	☐	☐	☐
	Runoff from the yard is uncontrolled and solids (manure) are rarely collected in a storage facility.	Most yard runoff is collected in a storage facility. The solids (manure/bedding) are settled out. There is no filter strip for released liquids.	All runoff is collected. Solids (manure/bedding) are settled out. Water is released directly onto a filter strip.	The yard is roofed **- OR-** all runoff is collected and held in a liquid waste storage facility **- OR-** there is no yard runoff.

What you can do: Contact your local SWCD, NRCS or Extension office for information and assistance to develop a conservation system that addresses runoff issues.

Notes:

14. Manure mixed with milking center effluent/waste water *(if you have a milking center):*

N/A	High Risk	High-Moderate Risk	Moderate-Low Risk	Low Risk
☐	☐	☐	☐	☐
	Most manure, excess feed, and other solids from the milking parlor and holding pen are mixed with effluent from the milking center.	*Some* manure, excess feed, and other solids from the milking parlor are mixed with effluent from the milking center.	*Most* manure, excess feed, and other solids are scraped from the milking parlor before cleanup. Holding pen manure and cleanup water are not mixed with effluent from the milking center.	*All* manure, excess feed, and other solids are scraped from the milking parlor before cleanup. Holding pen manure and cleanup water are not mixed with effluent from the milking center.

What you can do: Contact your local SWCD, NRCS or Extension office for information and assistance to develop solutions that are right for you and your operation.

Notes:

continued on next ➡

15. Distance from silage storage to nearest surface water source:

☐ N/A	☐ High Risk	☐ High-Moderate Risk	☐ Moderate-Low Risk	☐ Low Risk
	Less than 100 feet **- OR-** leachate drains into road ditch or surface water.	100 to 500 feet	Greater than 500 feet	Silage effluent is collected and stored for field application.

What you can do: Contact your local SWCD, NRCS or Extension office for information and assistance on options to protect water bodies, fish and wildlife from nutrient-laden runoff.

Notes:

16. Livestock water source:

☐ N/A	☐ High Risk	☐ High-Moderate Risk	☐ Moderate-Low Risk	☐ Low Risk
	Livestock are allowed to drink directly from a live stream or irrigation ditch.	Streams and ditches are fenced or livestock access is prevented.	Stock water is provided in troughs where overflow does not come in contact with manure. Stock are excluded from streams and ditches.	Stock water is provided in troughs with overflow diverted to a liquid waste storage facility.

What you can do: Contact your local SWCD, NRCS or Extension office for assistance developing livestock watering facilities and controlled access to surface water bodies. Ask about the availability of planning assistance and funding to help make improvements.

Notes:

The Next Steps for Better Manure Management:

Review your answers to the questions above and identify where you can make improvements to your animal waste handling procedures. If you would like to take additional steps to address issues with manure management, consider working with a natural resource professional to develop a nutrient management plan. Conservation planning assistance is available from your local SWCD, NRCS or Extension office, as well as through a number of private natural resource consultants.

NOTES:

IRRIGATION Assessment

Reference TIPS
brochure, pg. 4

Worksheet

The way you water your lawn, gardens, pastures and crops can have a significant impact on the quantity and quality of water in local streams and wells. In addition, excessive irrigation can be needlessly expensive and detrimental to plants. According to the U.S. Geological Survey, irrigation accounts for the largest use of fresh water in the United States, totaling 137 billion gallons of this precious resource used each day. The pumps and sprinklers powering these irrigation systems require fossil fuels and electricity to operate. In addition, when homeowners water their lawns and farmers irrigate their crops and pastures, the water not absorbed by plants eventually runs off into surface waters or seeps into groundwater supplies and can carry with it fertilizers, pesticides and a number of other pollutants. You can save water and help keep your streams and groundwater clean by adjusting the way you irrigate. Irrigation Water Management (IWM) is a term for the irrigation strategies landowners and farmers employ to help them save water, conserve energy and reduce the amount of contaminants entering water supplies. This worksheet will help you determine which irrigation water management strategies could improve conditions on your property.

Instructions: Complete the following worksheet to identify areas where you may be able to improve irrigation effectiveness and efficiency. This information will also be useful if you choose to work with a natural resource professional to develop a detailed irrigation plan.

Site	Date

1. Do you irrigate on a regular schedule or only when your plants need water?

☐ **Only when needed** ☐ **On a regular schedule**

↳ Scheduling regular irrigation by the calendar is less effective than watering according to actual plant needs. You can make your irrigation applications more efficient by understanding the relationship between how much irrigation water is applied and how much water is actually beneficial to the plants you are growing. The weather, plant size, plant condition, rooting depth, soil type and soil moisture at a given time all affect how much and how often you need to water. Generally speaking, plants use half as much water in May, June, September and October as they do in July and August.

Over-watering can reduce plant quality by drowning roots, stressing plants, causing root diseases, reducing nutrient uptake, and leaching nutrients and pesticides away from the root zone and into water supplies where they may be harmful. Applying only the amount of water that plants need will produce healthier plants that will be more resistant to disease and pests.

↳ Below are some of the steps you can take to determine when to irrigate. More information on each of these items can be found through the contacts listed at the end of this worksheet.

☐ **Gather information to help you time irrigation applications with:**

- **Weather monitoring equipment**
- **Historical evapotranspiration (ET)** (the combined rate of water use by plants and evaporation from the soil surface, which can easily be found online)
- **Soil-moisture sensors**
- **Crop observations**
- **Other methods**

☐ **Assess soil moisture by feel or by using field probes or other instruments.**

☐ **Adjust your irrigation schedule according to seasonal changes.**

2. Does your system irrigate in a uniform manner across the entire area needing water so that there are no areas that are too dry or too wet?

☐ **No** ☐ **Yes**

↳ Properly functioning irrigation equipment that applies water in a uniform manner will have a tremendous impact on irrigation efficiency and plant health. When sprinklers and nozzles deliver water to the ground evenly, you can avoid creating areas that become too wet while others remain too dry. However, when equipment delivers water unevenly, it is difficult to determine when and how much to water.

↳ If you do not know whether your irrigation system delivers water evenly across the entire area, you can easily conduct an irrigation system field test, as described below:

Irrigation System Field Test

1. **To easily assess your irrigation uniformity, place "catch cans" in different spots within the irrigated area. Empty tuna cans or other similar vessels will work well; just be sure that the catch cans you use are all the same size. Also, be sure to conduct the test only when the wind speed is less than 8 mph to ensure accurate results.**

2. **Place the catch cans evenly across the irrigated area you are evaluating. The number of cans needed will depend on the size of the area you are testing. Generally, you will want to use as many as possible.**

3. **Run your irrigation system for the usual amount of time. As it runs, note which catch cans are in an area that receives water from more than one sprinkler or nozzle.**

4. **After irrigating, compare the water level in the different catch cans to identify where adjustments are needed.**

5. **At this time, you may also want to dig small holes in the ground in different areas to compare soil moisture below the surface. You may notice areas where the soil has absorbed more or less water than other areas. If this is the case, you might decide to adjust your irrigation system to account for the different soils.**

3. Do you inspect your irrigation system (sprinklers, nozzles, pumps, hoses, etc.) to ensure it is functioning properly?

☐ **No** ☐ **Yes**

↳ You may be able to reduce water use, chemical applications, and energy needs simply by keeping your irrigation equipment in good repair.

Some problems to look for include:

- ☐ Pressure that is too low or too high
- ☐ Nozzles that are mismatched
- ☐ Bad, broken or worn sprinkler nozzles
- ☐ Nozzles that are not adjusted properly
- ☐ Plugged nozzles
- ☐ Spray deflection or other obstruction to the flow of water

↳ A useful tool to help you conduct a more thorough evaluation of your irrigation system is the *Irrigation System Walk-through Inspection Analysis,* publication number PNW 293 developed by the Pacific Northwest Extension (Oregon, Idaho and Washington). This can be found online at:

http://extension.oregonstate.edu/catalog/pdf/pnw/pnw293.pdf

The Next Steps for Better Irrigation Management:

Review your answers to the questions above and identify where you can make improvements to your irrigation operations. Consider seeking professional assistance to develop a detailed Irrigation Water Management plan. If you would like additional information or assistance, contact one of the entities listed below:

- Natural Resources Conservation Service (NRCS)
- Your local Soil and Water Conservation District (SWCD)
- Oregon State University Extension Service
- Other natural resource professionals
- Irrigation equipment vendors

NOTES:

Soil Assessment & Management Options

Reference TIPS brochure, pg. 2

Worksheet

Now that you have completed the other worksheets that relate to your property, you have likely learned that most of your management decisions should take into account the qualities of the soils present on your land. The soil is inherently related to all other natural resources on your land. This worksheet was developed to help you identify the attributes of the soils, improve soil conditions, and make informed management decisions for your overall property.

Step 1: Conduct a visual soil assessment. For each distinct section of your property, answer the questions below that are appropriate for your land. Select the best time for assessment and take measurements at the same time every year. Take all measurements under adequate moisture conditions (i.e., not excessively dry or wet). Certain measurements, such as soil life, earthworms, structure and tillage are affected greatly by field operations and should be assessed before major tillage. Remember, this list is not all-inclusive, so be sure to take additional notes on the condition of the soil as necessary.

Soil Condition Assessment

Field **Date**

Indicator	When to Evaluate	Rating Description			Rating (circle one)		
		Low	Medium	High	Low	Med	High
Available Water Holding Capacity	Any time plants are actively growing; also when management changes	Plants are stressed immediately after rain or irrigation; soil has limited capacity to hold water; requires frequent irrigation	Crops are not the first in the area to suffer from a dry spell; soil requires average irrigation	Soil holds water well over time; deep topsoil for water storage; crops do well in dry spells; soil requires less than average irrigation	L	M	H
Compaction	When soil is moist but not wet; when roots have penetrated to tillage depth	Hard layers and tight soil; restricted root penetration; obvious hardpan; roots turned awkwardly	Firm soil; slightly restricted root penetration; moderate shovel resistance and penetration of wire flag beyond tillage layer	Loose soil; unrestricted root penetration; no hardpan; mostly vertical root plant growth	L	M	H
Crop Vigor/ Appearance/ Crop Disease	When plants are actively growing and soil moisture is adequate	Stunted growth, uneven stand, discoloration, low yields	Some uneven or stunted growth, slight discoloration, signs of stress	Healthy, vigorous, and uniform stand	L	M	H
Crusting	Before planting or during active growth and when soil moisture is adequate	Soil surface seals easily; seed emergence inhibited	Some surface sealing	Soil surface has open or porous surface all season	L	M	H
Earthworms/ Soil Organisms	Before planting or tillage; when soil is moist	Few worms, insects, fungi, or instances of soil life per shovel; no casts or holes	More worms, insects, fungi, or soil life per shovel; some casts or holes	Many worms, insects, fungi, and/or soil life per shovel; many casts or holes	L	M	H
Management Altered Drainage (wetter soil surface and decreasing wetness with depth)	Late wet season; beginning of growing season	Excessive wet spots in field, ponding, root disease	Some wet spots in field and profile; some root disease	Water is evenly drained through field and soil profile; no evidence of root disease	L	M	H

continued on next ➡

Condition Assessment

Indicator	When to Evaluate	Rating Description			Rating (circle one)		
		Low	Medium	High	Low	Med	High
Plant Roots	Crop is actively growing; moisture is similar for each assessment	Poor growth/ structure, brown or mushy roots; roots are mostly horizontal	Some fine roots, mostly healthy; some horizontal roots	Vigorous, healthy root system; deep roots; good color; many vertical and horizontal roots	L	M	H
Salts/Sodium	When soil starts to dry and weather gets hot; throughout the growing season	**Salts**: Visible salt/ alkali; dead plants **Sodium**: Surface seals or severe crusting; little infiltration and fluffy surface when dry; high pH	**Salts**: Stunted growth; signs of leaf burn from salts **Sodium**: Only some spots with sealed surface	**Salts**: No visible salt, alkali or plant damage, especially after rains **Sodium**: No crusting or fluff at surface	L	M	H
Soil Tilth/ Structure/ Porosity	Soil is moist and not extremely wet or dry; after a period without soil disturbance (note the time since last tillage)	Soil clods difficult to break; crusting; tillage creates large clods; soil falls apart in hands; very powdery; few worm and root channels	Moderate porosity; some crusting; small clods; soil breaks apart with medium pressure; few aggregates; some old and new root and worm channels	Soil crumbles well; is friable, porous; many small, soft aggregates; many worm and root channels	L	M	H
Surface Organic Material/ Residue	After harvest and again before tillage/ spring planting	No visible roots or residue; very slow or rapid decomposition	Some residue	Lots of roots/residue in many stages of decomposition	L	M	H
Water Infiltration	After rain or irrigation; evaluate crusting as soil surface dries	Water on surface for long period of time after rain or irrigation; may have crust on surface when dry	Water drains slowly after rain or irrigation; some ponding	No ponding after heavy rain or irrigation; water moves steadily through soil	L	M	H
Wind/ Water Erosion	Early season before any tillage; after wind or rain events; after irrigation	Obvious soil deposition; large gullies joined; obvious soil drifting	Some deposition; few gullies; some discolored runoff; some evidence of soil drifting	No visible soil movement; no gullies; clear or no runoff; no obvious soil drifting	L	M	H

Step 2: Evaluate your soil quality. Review your assessment of each indicator and determine where you want to improve your land. List the targeted soil quality improvements:

After you have identified areas for improvement, go to the next sheet, ***Soil Management Options***, to identify solutions that will help address these issues. ➡

continued on next ➡

Management Options

Step 3: Identify soil management options. For each issue you identified in your soil assessment, review the associated management options below. Remember, soil quality is specific to the type of soil you have and the goals you have for it. Depending on your overall goals for your land, you may want to look into activities to:

- Improve soil quality,
- Maintain soil quality,
- Stop or reverse soil degradation, and/or
- Troubleshoot problem areas.

Soil Management Options

Field **Date**

Problem	Possible Causes	Management Options (select all that apply)	
Available Water Holding Capacity	• Sandy soil • Compaction • Low organic matter • Excessive drainage • Low aggregation • Low biological activity	☐ Reduce compaction ☐ Increase organic residues, diversify crop rotations ☐ Add animal manure	☐ Use cover crops ☐ Improve conditions for earthworms/ soil life ☐ Avoid tillage when soil is wet
Compaction	• Working wet soil • Heavy machinery • Repeated tillage at same depth • Excess animal traffic • Poor aggregation • Low organic matter	☐ Avoid working wet soil ☐ Reduce traffic/tillage operations ☐ Use controlled traffic patterns ☐ Avoid using heavy machinery ☐ Subsoil or rip when soil is not excessively wet or dry ☐ Alter tillage depth	☐ Add organic residues ☐ Diversify cropping system ☐ Use conservation tillage ☐ Add cover crops ☐ Use crop rotations ☐ Add animal manures ☐ Use non-compacting tillage (e.g., chisel vs. moldboard)
Crop Vigor/ Appearance/ Crop Disease	• Compacted layers • Saturated soil • Soil pathogen problems • Nutrient deficiencies or imbalance • Low organic matter • Monoculture • Low biological diversity • pH levels affecting nutrient availability • Use of ammonium fertilizers	☐ Soil test and correct nutrient and pH levels ☐ Check for pathogens/pests ☐ Reduce compaction following harvest ☐ Improve drainage	☐ Increase organic residue ☐ Use animal manure ☐ Add cover crops ☐ Use crop rotation ☐ Diversify cropping system
Crusting	• Excess sodium • Low organic matter • Low crop residues	☐ Increase organic residues ☐ Reduce tillage depth ☐ Use animal manure	☐ Add cover crops ☐ For sodium problem, apply gypsum and flush with irrigation water
Earthworms/ Soil Life/ Organisms	• Low organic matter • Low residues • Excess pesticides or fertilizers • Excess tillage • Poor aeration	☐ Increase organic residues ☐ Use conservation tillage	☐ Use crop rotations ☐ Add cover crops
Management Altered Drainage	• Tillage pan • High water table under natural conditions • Poor soil structure	☐ Subsoil to break up tillage pan ☐ Add cover crops to the rotation	☐ Reduce soil disturbance ☐ Add high residue crops

continued on next ➡

Management Options

Problem	Possible Causes	Management Options (select all that apply)	
Plant Roots	• Compaction • Low biological activity • Poor soil structure/ aggregation • Nutrient imbalance • Incorrect pH range	☐ Avoid tillage when soil is wet ☐ Increase organic residues ☐ Diversify crop rotations	☐ Reduce compaction ☐ Soil test and correct nutrient and pH levels
Salts/Sodium	• Saline or low calcium irrigation water/well • Shallow water table • Poor drainage • Excess evaporation	☐ Leach excess salts ☐ Plant deep-rooted crops ☐ Grow salt tolerant crops ☐ For sodium, get a soil test and apply gypsum, if appropriate	☐ Increase vegetative cover to improve soil structure and lower soil temperature ☐ Manage irrigation water ☐ Improve drainage
Soil Tilth/ Structure/ Porosity	• Low residues • Low organic matter • Excess tillage • Fallow • Compaction	☐ Increase organic residues ☐ Use cover crops ☐ Add animal manure	☐ Reduce number of tillage passes ☐ Avoid tillage when wet ☐ Diversify crop rotation
Surface Organic Matter/ Residue	• Excess tillage • Residue burned off • Low residue crops • Too much fallow • Insufficient additions of crop residue	☐ Diversify or increase crop rotations ☐ Add animal manure ☐ Use cover crops	☐ Use high residue crops ☐ Reduce tillage
Water Infiltration	• Compaction • Surface crusting • Plow pan • Poor soil structure/ aggregation • Excess sodium	☐ Add organic residue ☐ Add animal manure ☐ Use cover crops ☐ Diversify crop rotations	☐ For sodium problem, apply gypsum and flush with irrigation water ☐ Subsoil or rip when soil is not excessively wet or dry ☐ Minimize tillage to preserve soil structure
Wind/Water Erosion	• Lack of cover/residue • Low organic matter • Poor aggregation • Tillage pan or compacted layer • Tillage practices that move soil downslope • Excessive tillage • Low diversity crop rotation	☐ Diversify crop rotations ☐ Reduce tillage ☐ Use animal manure ☐ Use cover crops ☐ Apply irrigation water management practices	☐ Increase surface residue or roughness ☐ Shorten slope length ☐ Plant strip crops ☐ Use windbreaks

Step 4: Now that you have identified some strategies that may be right for your land, talk to the specialists at your local Soil and Water Conservation District (SWCD), Natural Resources Conservation Service (NRCS), Oregon State University Extension, or other natural resource business or organization to plan appropriate management activities. Contact information is listed in the ***Resources*** section of this packet.

If you would like more extensive soils information, you may want to have a soil test done. A soil test processed by an accredited laboratory can provide detailed information on the soil's fertility and its ability to cycle water and nutrients. Contact a natural resource professional to learn where to obtain a sampling kit and how to collect and submit a soil sample. You can also visit the *Laboratories Serving Oregon: Soil, Water, Plant Tissue, and Feed Analysis* page on the OSU Extension Web site at:

http://extension.oregonstate.edu/catalog/html/em/em8677/

GLOSSARY of Terms

acid soil, alkaline soil, neutral soil — Acidity and alkalinity describe one aspect of the soil's chemical reaction. A pH of 7 means that the soil is neutral, neither acid nor alkaline. A pH below 7 indicates acidity, and above 7 indicates alkalinity. Many plants will grow well over a range of pH from slightly acid to slightly alkaline, but some are more particular.

aeration — The process of loosening or puncturing the soil by mechanical means in order to increase water and air permeability.

aggregation — How sand, silt and clay come together to form larger granules. Good aggregation is apparent in a crumbly soil with water-stable granules that do not disintegrate easily. Well-aggregated soil has greater water entry at the surface, better aeration, and more water-holding capacity than poorly aggregated soil.

annual — A plant that completes its life cycle in one growing season or a single year. The seed germinates and the plant grows, blooms, fruits/sets seed and dies all in one growing season. The phrase "grow as an annual" or "treat as an annual" refers to technically perennial plants that are most attractive only during their first year and, hence, are better grown as new plants each year.

aquifer — A sand, gravel or rock formation capable of storing or conveying water; an underground geological formation or group of formations containing usable amounts of groundwater that can supply wells or springs.

available nutrients — Minerals or chemicals in forms that plants can absorb and utilize for growth.

berm — A mound or bank of earth.

biennial — A plant that completes its life cycle in two years. Typically, plants grow vegetatively during the first year, then fruit and die the second year.

border — A soil berm 15 to 18 inches tall created by tillage to keep flood irrigation water inside a portion of the pasture.

broadcast seeding — The application of seed by hand or with the aid of a seed spreader.

buffer strip — Narrow area of permanent vegetation often planted at the edge of a field, typically to slow the flow of water, slow the velocity of the wind, or to filter sediment and chemicals from runoff.

buffer zone — A neutral area that acts as a protective barrier separating two conflicting forces; an area that acts to minimize the impact of pollutants on the environment or public. For example, a stream buffer is an area of trees, shrubs and/or grasses protecting a water body from erosion and filtering runoff from nearby farm fields or urban areas.

capability class — A classification system that shows, in a general way, the suitability of soils for most kinds of field crops.

claypan — A hard, compact layer in the subsoil consisting mainly of clay; separated from overlying materials by a sharply defined boundary in the soil profile. Claypans usually impede the movement of water, air and plant roots.

clay soil — Also known as "heavy" soil; a soil composed of extremely small mineral particles; sticky, heavy soil that is difficult to work. When clay soil gets wet, it dries out slowly because downward movement of water (drainage) is slow. Clay soil expands when wet and cracks when dry.

complete fertilizer — Any organic or inorganic materials, natural or synthetic, that supplies all three of the primary nutrient elements for plant growth: nitrogen (N), phosphorous (P) and potassium (K).

compost — A soil amendment made from organic waste materials (dead leaves, etc.). The materials are stored in a manner in which moisture, heat and microorganisms partially decompose them.

conifer — A plant that produces cones; a plant belonging to the family Coniferae, such as pines, junipers and cedars.

deciduous — Any plant that sheds all of its leaves at one time each year (typically autumn).

dike — Earth ridge built to guide or hold water within prescribed limits; a small levee.

dissolved oxygen (DO) — Oxygen dissolved in water and readily available to fish and other aquatic organisms.

diversion — A channel to slow, divert or collect water and/or reduce runoff.

drainage — Movement of water out of the soil profile. When this happens quickly, the drainage is "fast," or the soil is "well drained." When it happens slowly, the drainage is said to be "slow," or the soil is "poorly drained." Most plant roots need oxygen as well as water, and soil that remains saturated with water deprives the roots of necessary oxygen.

drip irrigation — A system for watering at points on or just below the soil surface so that a plant's root zone is thoroughly moistened without water being wasted. This is accomplished with very low pressure over a long period of time to achieve the necessary penetration.

ecosystem — A community of plants, animals, people and the physical environment in which they live.

effluent — Discharge or emission of a liquid or gas.

erosion — Detachment and movement of soil particles by wind or water; water erosion includes sheet and rill erosion as well as gully erosion.

eutrophication — Degradation of water quality due to enrichment by nutrients, primarily nitrogen (N) and phosphorous (P), which results in excessive plant (principally algae) growth and decay. When levels of N:P are about 7:1, algae will thrive. Low dissolved oxygen (DO) in the water is a common consequence.

evapotranspiration (ET) — Movement of water into the atmosphere by evaporation from the earth's surface and by transpiration from plants.

fallow — The practice of leaving land either uncropped and weed-free, or with volunteer vegetation during at least one period when a crop would normally be grown; the objective may be to control weeds or to accumulate water and/or available plant nutrients.

floodplain — The land bordering a stream, built up of sediments from stream flood deposits, and subject to inundation when the stream is at flood stage. Also, the surface of an alluvial fan subject to flash flooding from the canyon above.

fungicide Pesticide used to control fungi, including mold, rot and mildew.

groundwater Water from wells and underground aquifers.

gully erosion The erosion process whereby water accumulates and often recurs in narrow channels and, over short periods, removes the soil from this narrow area to considerable depths, often defined in terms of channels too deep to easily repair with ordinary farm equipment.

hard water Characteristic of water which describes the presence of dissolved minerals. Carbonate hardness is caused by calcium and magnesium bicarbonate; noncarbon hardness is caused by calcium sulfate, calcium chloride, magnesium sulfate and magnesium chloride.

hardpan A soil layer with physical characteristics that limit root penetration and restrict water movement.

heavy metals Metals that have high density. In agronomic use, these include copper, iron, manganese, molybdenum, cobalt, zinc, cadmium, mercury, nickel and lead. Some of these play a role with plant nutrition in very small quantities but can become toxic to plants when they accumulate at high levels in the soil.

herbicide Pesticide used to control undesirable vegetation. An herbicide can be applied as a pre-emergent to prevent germination of weed seeds or as a post-emergent to kill weeds after they have grown.

hydrologic cycle The movement of water in and on the earth and atmosphere through processes such as precipitation, evaporation, runoff and infiltration.

infiltration The downward entry of water into the soil profile from precipitation, irrigation or runoff; also called percolation.

insecticide Pesticide used to control insects.

invasive species A non-native species whose introduction causes, or is likely to cause, economic or environmental harm or harm to human health. An invasive species can be a plant, animal or any other biologically viable species that enters an ecosystem beyond its native range.

irrigation Application of water to soil when rainfall is insufficient to maintain desirable soil moisture for plant growth.

Irrigation Water Management (IWM) The suite of irrigation strategies that landowners and growers use to save water, conserve energy and prevent contaminants from entering water supplies.

leaching The process by which chemicals (fertilizers, pesticides, manure, etc.) are dissolved and transported through the soil by water; the washing out or flushing of a soluble substance from an insoluble one. Gardeners leach soil with water when they want to remove excess salts (see "salinity"). In high-rainfall areas, rainwater leaches both good and harmful substances from the soil.

loading The quantity of a substance (or a contaminant) entering receiving waters.

loam Soil that is rich in organic material, does not compact easily, and drains well after watering; an "ideal" garden soil; a mix of sand, silt and clay.

microclimate The climate of a small area or locality (such as a back yard or a portion of it), as opposed to the climate of a county or state.

monoculture — The cultivation or growth of a single crop or organism, especially on agricultural or forest land.

mulch — Any plant residue, by-product or other suitable material applied to the soil surface to conserve moisture, control erosion, suppress weed growth, moderate soil temperatures, improve soil condition or assist in establishing cover. Examples include bark, wood chips, sawdust, straw or plastic.

nitrogen — One of three major elements required for plant growth; the first nutrient listed in the formulation on a fertilizer label (such as 10-8-6).

nonpoint source — Entry of a pollutant into a water body from widespread or diffuse sources with no definite point of entry. The source is not a readily discernible point like a discharge pipe.

noxious weed — Invasive plants that cause economic loss and harm the environment. Noxious weeds choke out crops, destroy range and pasture lands, clog waterways, affect human and animal health, and/or threaten native plant communities.

nutrients, available nutrients — Elements in the soil that can be readily absorbed and assimilated to nourish growing plants, e.g., nitrogen, phosphorous, iron and potassium.

Nutrient Management Plan — An assessment of how nutrients (commercial fertilizers and animal wastes) are utilized on a farm; includes a determination of how much fertilizer is appropriate to apply on crops. For a livestock operation, this includes an assessment of manure production, collection, storage and utilization.

organic matter, soil organic matter — Term used to identify the organic components in soil, including undecayed and decaying plant and animal tissues. Sometimes, the word "humus" is used synonymously with regard to soil.

overstory — The larger and taller trees that occupy a forest area and shade the young trees, brush, grass, forbs, etc. that grow below them.

permeability — Capacity of soil to move water.

perennial — A plant that lives for more than two years. The top growth may die down each winter, followed by new growth.

pesticide — A chemical used to control pests, such as animals, weeds, insects and diseases.

pH — A value that indicates the acidity of the soil. The scale ranges from 0 to 14, with 0 being more acid, 7 as neutral, and greater than 7 as alkaline (basic).

phosphorous — The second of three nutrients listed on a fertilizer label (such as 10-8-6).

pitch tube — A tubular mass of resin that forms on the surface of a tree's bark as the tree attempts to "pitch out" an insect.

point source — The release of a pollutant from a pipe or discrete conveyance into a water body or a water course, e.g., a wastewater treatment plant.

porosity — The volume of pores in a soil sample (nonsolid volume) divided by the bulk volume of the sample.

recharge The periodic replacement of groundwater resources.

recharge area Land area over which precipitation infiltrates into the soil and percolates downward to replenish an aquifer.

riffle A rocky shoal or sandbar lying just below the surface of a waterway.

rill erosion An erosion process where numerous small channels, typically a few inches deep, are formed.

riparian zone The transition area between an aquatic ecosystem and the adjacent, upland area. These zones are identified by soil characteristics or plant communities and include the wet areas in and near streams, ponds, lakes, springs and other surface waters.

runoff That portion of precipitation or irrigation water which fails to infiltrate the soil and flows over the soil surface.

salinity Gardeners use this word when speaking of an excess of salts in the soil. Salinity can harm many plants, causing leaves to scorch and turn yellow and stunting plant growth.

sandy soil A soil with comparatively large particles that are rounded rather than flattened. Compared to clay soils, sandy soils contain much more soil and air, drain well and warm quickly. They also dry out quickly, which necessitates frequent watering that washes out valuable nutrients. Also referred to as "light" soil with a "gritty" feel.

saturated zone A portion of the soil profile in which all large pores are filled with water.

sediment The soil material, both mineral and organic, that is in suspension, is being transported, or has been moved from its site of origin by erosion (by air, water, gravity, etc.).

septic tank Sewage disposal tank in which a continuous flow of waste materials is decomposed by anaerobic (in the absence of oxygen) bacteria.

sheet erosion The removal of a relatively uniform thin layer of soil from the land surface by rainfall and largely unchanneled surface runoff (sheet flow).

silage A mixture of raw chopped materials such as field corn, sorghum, grass, or clover that is converted into winter feed for livestock through a process of fermentation; this feed can be stored for several years with little loss of nutrients.

silt An intermediate soil textural class between sand and clay. Silt consists of particles between 0.05 and 0.002 millimeters in diameter, has a smooth feel, and is not sticky when moist.

soil amendment Matter (organic or inorganic) added to soil to improve texture, aeration, drainage and retention of nutrients or moisture.

soil profile The arrangement of soil horizons or layers below the surface of the ground.

soil survey A soil survey is a detailed report on the soils of an area. A soil survey contains maps with soil boundaries and photos, descriptions and tables of soil properties and features. Soil surveys are used by farmers, real estate agents, land use planners, engineers and others who desire information about the soil's properties.

soil texture The texture of the soil resulting from the relative proportions of the various soil separates (sand, silt and clay) in a soil.

soluble	Capable of being dissolved easily.
strip crops	The practice of growing two or more crops in alternating strips along contours, often perpendicular to the prevailing direction of wind or surface water flow.
subsoil	*(noun)* The stratum of weathered material that underlies the surface soil. *(verb)* To plow or turn up the subsoil.
systemic pesticide	A pesticide that moves inside a plant through absorption; the movement is usually upward and outward. There are systemic insecticides, fungicides and herbicides.
taproot	A main root that grows straight down. Dandelions have taproots, so do oak trees. Taproots can go very deep if there is a lack of surface water.
tillage pan, plow pan	A layer or layers in the soil which are highly compacted, hardened or very high in clay content relative to the layer immediately above.
transpiration	The release of moisture (absorbed largely by plant roots) through leaves. Temperature and humidity affect the transpiration rate.
understory	Any vegetation (trees, shrubs, grasses, forbs, lichens, mosses, etc.) growing under a relatively continuous cover of branches and foliage formed by the overstory.
unsaturated zone	Portion of the soil profile which contains both air and water. Water in this zone cannot enter a well.
vole	A small, typically burrowing, mouselike rodent with a rounded muzzle.
water right(s)	The right to draw water from a particular source, such as a lake, irrigation canal or stream.
watershed (drainage basin)	The land area (catchment) which captures precipitation and conveys it to a particular water body. It is bounded by ridges or "divides." A large watershed is made up of the smaller watersheds of all its tributaries.
water table	The upper level of a saturated zone in an aquifer below the soil surface.
wellhead protection	The practice of preventing pollutants from seeping into well water at or near any active or abandoned well.
wetlands	Areas that are regularly wet or flooded; areas with a water table within the root zone or standing at or above the land surface for at least part of the growing season. These areas are host to a prevalence of water-loving plants.

RESOURCES

Contacts & Acronyms

Conservation District	Soil and Water Conservation District	www.oacd.org
DEQ	Oregon Department of Environmental Quality	www.oregon.gov/DEQ
Extension	Oregon State University Extension Service	http://smallfarms.oregonstate.edu/
FSA	Farm Service Agency	www.fsa.usda.gov
NOWC	Network of Oregon Watershed Councils	http://www.oregonwatersheds.org/
NRCS	USDA Natural Resources Conservation Service	www.or.nrcs.usda.gov
OACD	Oregon Association of Conservation Districts	www.oacd.org
ODA	Oregon Department of Agriculture	http://oregon.gov/ODA
ODF	Oregon Department of Forestry	www.oregon.gov/ODF
ODFW	Oregon Department of Fish and Wildlife	http://www.dfw.state.or.us/
OSU Extension	Oregon State University Extension Service	http://smallfarms.oregonstate.edu/
OWEB	Oregon Watershed Enhancement Board	www.oregon.gov/OWEB
OWRD	Oregon Water Resources Department	www.oregon.gov/OWRD
RC&D Council	Resource Conservation and Development Councils	www.or.nrcs.usda.gov/programs/rcd
RD	USDA Rural Development	www.rurdev.usda.gov
SWCD	Soil and Water Conservation District	www.oacd.org
USDA	United States Department of Agriculture	www.usda.gov

Contacts & Acronyms

USGS	United States Geological Survey	www.usgs.gov
Watermaster	listed on the Oregon Water Resources Dept. Web site	www.oregon.gov/OWRD/offices.shtml#Region_Watermaster_Map
Watershed Council	on the Oregon Watershed Enhancement Board Web site and the Network of Oregon Watershed Councils (NOWC) Web site	www.oregon.gov/OWEB http://www.oregonwatersheds.org/
Web Soil Survey	online soil information provided by NRCS	http://websoilsurvey.nrcs.usda.gov/
Weed Board	listed on the Oregon Department of Agriculture Web site	www.oregon.gov/ODA/PLANT/WEEDS

Others: