



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
<b>Available Water Holding Capacity</b>	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
<b>Compaction</b>	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
<b>Crop Vigor/ Appearance/ Crop Disease</b>	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
<b>Crusting</b>	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
<b>Earthworms/ Soil Organisms</b>	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
<b>Management Altered Drainage</b> (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
<b>Plant Roots</b>	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
<b>Salts/Sodium</b>	When soil starts to dry and weather gets hot; throughout the growing season	<b>Salts:</b> Visible salt/alkali; dead plants <b>Sodium:</b> Surface seals or severe crusting; little infiltration and fluffy surface when dry; high pH	<b>Salts:</b> Stunted growth; signs of leaf burn from salts <b>Sodium:</b> Only some spots with sealed surface	<b>Salts:</b> No visible salt, alkali or plant damage, especially after rains <b>Sodium:</b> No crusting or fluff at surface	L	M	H
<b>Soil Tilth/ Structure/ Porosity</b>	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
<b>Surface Organic Material/ Residue</b>	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
<b>Water Infiltration</b>	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
<b>Wind/ Water Erosion</b>	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. ➡



# 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)	
<b>Available Water Holding Capacity</b>	<ul style="list-style-type: none"> <li>• Sandy soil</li> <li>• Compaction</li> <li>• Low organic matter</li> <li>• Excessive drainage</li> <li>• Low aggregation</li> <li>• Low biological activity</li> </ul>	<input type="checkbox"/> Reduce compaction <input type="checkbox"/> Increase organic residues, diversify crop rotations <input type="checkbox"/> Add animal manure	<input type="checkbox"/> Use cover crops <input type="checkbox"/> Improve conditions for earthworms/soil life <input type="checkbox"/> Avoid tillage when soil is wet
	<ul style="list-style-type: none"> <li>• Working wet soil</li> <li>• Heavy machinery</li> <li>• Repeated tillage at same depth</li> <li>• Excess animal traffic</li> <li>• Poor aggregation</li> <li>• Low organic matter</li> </ul>	<input type="checkbox"/> Avoid working wet soil <input type="checkbox"/> Reduce traffic/tillage operations <input type="checkbox"/> Use controlled traffic patterns <input type="checkbox"/> Avoid using heavy machinery <input type="checkbox"/> Subsoil or rip when soil is not excessively wet or dry <input type="checkbox"/> Alter tillage depth	<input type="checkbox"/> Add organic residues <input type="checkbox"/> Diversify cropping system <input type="checkbox"/> Use conservation tillage <input type="checkbox"/> Add cover crops <input type="checkbox"/> Use crop rotations <input type="checkbox"/> Add animal manures <input type="checkbox"/> Use non-compacting tillage (e.g., chisel vs. moldboard)
<b>Crop Vigor/ Appearance/ Crop Disease</b>	<ul style="list-style-type: none"> <li>• Compacted layers</li> <li>• Saturated soil</li> <li>• Soil pathogen problems</li> <li>• Nutrient deficiencies or imbalance</li> <li>• Low organic matter</li> <li>• Monoculture</li> <li>• Low biological diversity</li> <li>• pH levels affecting nutrient availability</li> <li>• Use of ammonium fertilizers</li> </ul>	<input type="checkbox"/> Soil test and correct nutrient and pH levels <input type="checkbox"/> Check for pathogens/pests <input type="checkbox"/> Reduce compaction following harvest <input type="checkbox"/> Improve drainage	<input type="checkbox"/> Increase organic residue <input type="checkbox"/> Use animal manure <input type="checkbox"/> Add cover crops <input type="checkbox"/> Use crop rotation <input type="checkbox"/> Diversify cropping system
<b>Crusting</b>	<ul style="list-style-type: none"> <li>• Excess sodium</li> <li>• Low organic matter</li> <li>• Low crop residues</li> </ul>	<input type="checkbox"/> Increase organic residues <input type="checkbox"/> Reduce tillage depth <input type="checkbox"/> Use animal manure	<input type="checkbox"/> Add cover crops <input type="checkbox"/> For sodium problem, apply gypsum and flush with irrigation water
<b>Earthworms/ Soil Life/ Organisms</b>	<ul style="list-style-type: none"> <li>• Low organic matter</li> <li>• Low residues</li> <li>• Excess pesticides or fertilizers</li> <li>• Excess tillage</li> <li>• Poor aeration</li> </ul>	<input type="checkbox"/> Increase organic residues <input type="checkbox"/> Use conservation tillage	<input type="checkbox"/> Use crop rotations <input type="checkbox"/> Add cover crops
<b>Management Altered Drainage</b>	<ul style="list-style-type: none"> <li>• Tillage pan</li> <li>• High water table under natural conditions</li> <li>• Poor soil structure</li> </ul>	<input type="checkbox"/> Subsoil to break up tillage pan <input type="checkbox"/> Add cover crops to the rotation	<input type="checkbox"/> Reduce soil disturbance <input type="checkbox"/> Add high residue crops

continued on next ➡



# Management Options

Problem	Possible Causes	Management Options (select all that apply)	
<b>Plant Roots</b>	<ul style="list-style-type: none"> <li>• Compaction</li> <li>• Low biological activity</li> <li>• Poor soil structure/aggregation</li> <li>• Nutrient imbalance</li> <li>• Incorrect pH range</li> </ul>	<input type="checkbox"/> Avoid tillage when soil is wet <input type="checkbox"/> Increase organic residues <input type="checkbox"/> Diversify crop rotations	<input type="checkbox"/> Reduce compaction <input type="checkbox"/> Soil test and correct nutrient and pH levels
<b>Salts/Sodium</b>	<ul style="list-style-type: none"> <li>• Saline or low calcium irrigation water/well</li> <li>• Shallow water table</li> <li>• Poor drainage</li> <li>• Excess evaporation</li> </ul>	<input type="checkbox"/> Leach excess salts <input type="checkbox"/> Plant deep-rooted crops <input type="checkbox"/> Grow salt tolerant crops <input type="checkbox"/> For sodium, get a soil test and apply gypsum, if appropriate	<input type="checkbox"/> Increase vegetative cover to improve soil structure and lower soil temperature <input type="checkbox"/> Manage irrigation water <input type="checkbox"/> Improve drainage
<b>Soil Tilth/Structure/Porosity</b>	<ul style="list-style-type: none"> <li>• Low residues</li> <li>• Low organic matter</li> <li>• Excess tillage</li> <li>• Fallow</li> <li>• Compaction</li> </ul>	<input type="checkbox"/> Increase organic residues <input type="checkbox"/> Use cover crops <input type="checkbox"/> Add animal manure	<input type="checkbox"/> Reduce number of tillage passes <input type="checkbox"/> Avoid tillage when wet <input type="checkbox"/> Diversify crop rotation
<b>Surface Organic Matter/Residue</b>	<ul style="list-style-type: none"> <li>• Excess tillage</li> <li>• Residue burned off</li> <li>• Low residue crops</li> <li>• Too much fallow</li> <li>• Insufficient additions of crop residue</li> </ul>	<input type="checkbox"/> Diversify or increase crop rotations <input type="checkbox"/> Add animal manure <input type="checkbox"/> Use cover crops	<input type="checkbox"/> Use high residue crops <input type="checkbox"/> Reduce tillage
<b>Water Infiltration</b>	<ul style="list-style-type: none"> <li>• Compaction</li> <li>• Surface crusting</li> <li>• Plow pan</li> <li>• Poor soil structure/aggregation</li> <li>• Excess sodium</li> </ul>	<input type="checkbox"/> Add organic residue <input type="checkbox"/> Add animal manure <input type="checkbox"/> Use cover crops <input type="checkbox"/> Diversify crop rotations	<input type="checkbox"/> For sodium problem, apply gypsum and flush with irrigation water <input type="checkbox"/> Subsoil or rip when soil is not excessively wet or dry <input type="checkbox"/> Minimize tillage to preserve soil structure
<b>Wind/Water Erosion</b>	<ul style="list-style-type: none"> <li>• Lack of cover/residue</li> <li>• Low organic matter</li> <li>• Poor aggregation</li> <li>• Tillage pan or compacted layer</li> <li>• Tillage practices that move soil downslope</li> <li>• Excessive tillage</li> <li>• Low diversity crop rotation</li> </ul>	<input type="checkbox"/> Diversify crop rotations <input type="checkbox"/> Reduce tillage <input type="checkbox"/> Use animal manure <input type="checkbox"/> Use cover crops <input type="checkbox"/> Apply irrigation water management practices	<input type="checkbox"/> Increase surface residue or roughness <input type="checkbox"/> Shorten slope length <input type="checkbox"/> Plant strip crops <input type="checkbox"/> 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/>