A wetland system is considered nonfunctional (NF) if it is clearly not providing adequate vegetation, landform, or debris to dissipate energies associated with overland flows and wind and wave action.

How can I learn more?

Further information on the PFC process can be obtained from your local land management agencies, including the Bureau of Land Management (BLM), Forest Service (FS), and Natural Resource Conservation Service (NRCS). State and county agricultural extension agents can provide information as well.

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U.S. Department of the Interior
Bureau of Land Management

ASSESSING

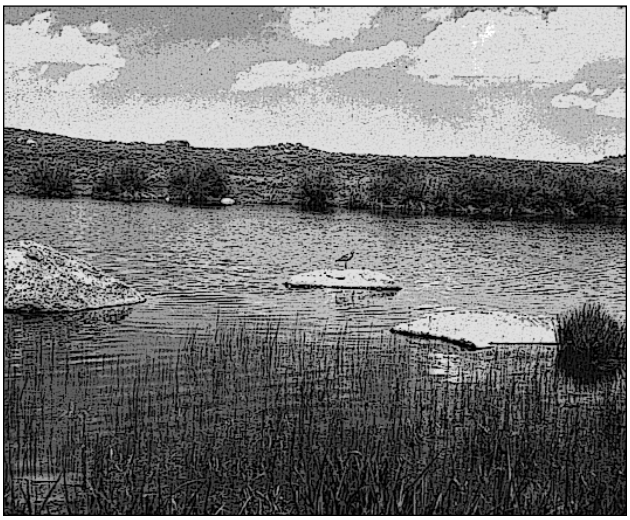
Lentic Wetland Health

Using the Proper Functioning Condition Method

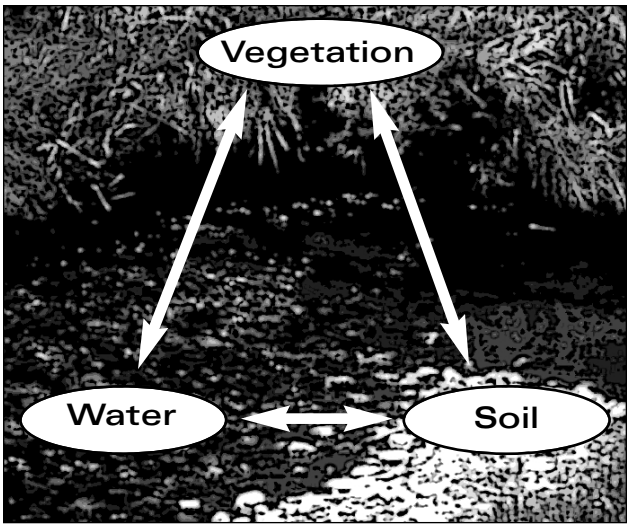
USDA NRCS

What are lentic wetlands?

Lentic wetlands are standing water wetlands or lands that are constantly or more frequently saturated with water than the surrounding lands. They are exceptional because of the interactions that occur between the **water, soil,** and **vegetation**. The prolonged contact between the water and soil creates conditions that some vegetation has adapted to. Vegetation affects the structure and composition of soil and the energy and flow of water.



Other organisms such as birds, insects, and amphibians can inhabit a wetland, but they are not directly involved in the basic interactions between **soil, water,** and **vegetation** that a wetland is dependent upon.



2) *filter sediment and aid floodplain development;*

3) *improve flood-water retention and ground-water recharge;*

4) *develop root masses that stabilize islands and shoreline features against cutting action;*

5) *restrict water percolation;*

6) *develop diverse ponding characteristics to provide the habitat and water depth, duration, and temperature necessary for fish production, waterbird breeding, and other uses;*

7) *and support greater biodiversity.*

Technical Reference 1737-16"

A wetland system is considered functional at risk (FAR) if one or more of its attributes is not fully adequate for the job and makes the area subject to degradation. Functional at risk wetlands are usually the best locations to focus restoration efforts as it is much easier to help a system recover than to build a new system from scratch.

How is wetland health estimated?

Because wetlands are the result of complex interactions, there are many ways of assessing wetland health. One of the most frequently used and comprehensive methods is Proper Functioning Condition (PFC) as described in Technical Reference 1737-16. This method uses the attributes of soil, water, and vegetation to estimate the health of a wetland system.

As a minimum first step level of physical stability, a wetland system should be in proper functioning condition (PFC). If a system is in proper functioning condition, it has the physical attributes to withstand the normal energies of wind and water without excessive erosion. A riparian-wetland system can easily exceed PFC, but it must first have the basic characteristics to give it a physical foundation.

> *"Lentic riparian-wetland areas are functioning properly when adequate vegetation, landform, or debris is present to:*
>
> *1) dissipate energies associated with wind action, wave action, and overland flow from adjacent sites, thereby reducing erosion and improving water quality;*

Because different areas have different climates, vegetation, and amounts of water, there are many kinds of wetlands. Some wetlands exist because they are near a lake or a spring. Others exist because they are in a depression or there is a restricting layer of soil, rock, or ice that retains water for longer periods than the surrounding lands.

Why are wetlands important?

There are many reasons wetlands are important including:

- Wetlands provide a very productive environment for plants and animals. This is particularly evident in the arid west where the number and diversity of plants and animals that use wetlands are much greater than those that are exclusive to the surrounding drier areas, even though the wetland areas may make up only about 5 percent to 15 percent of a region.

- Wetlands filter water. The high degree of biological activity that wetlands can support can create environments that filter out sediment and chemical and biological contamination. Specially constructed wetlands are being used around the world to treat sewage, filter urban runoff, and clean contaminated water.

- Wetlands help recharge groundwater by retaining overland flows and allowing the water to percolate into the groundwater system.

- Wetlands prevent erosion by buffering the forces of wind waves and flowing water.

All of these aspects work best when the wetland is healthy and functioning properly.

What affects wetland health and functions?

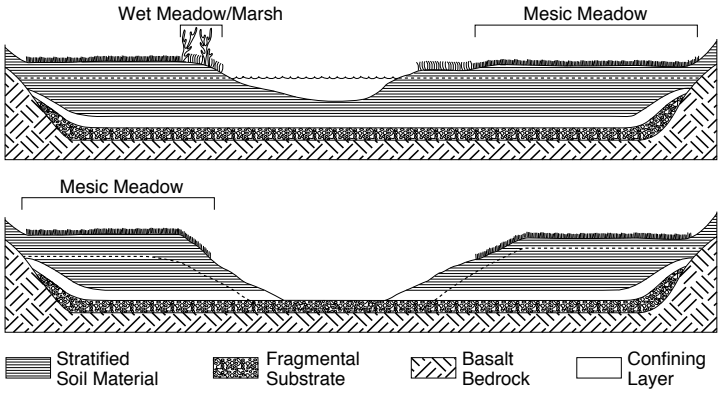
Because wetlands are created out of the interactions between **water, soil,** and **vegetation,** the health of

the wetland is dependent on the interactions of these three elements. The relations between these three elements are so intertwined that anything affecting one element affects all three.

Water is the most important aspect of wetland health. Its ***quantity, quality,*** *and* ***energy*** can affect the entire wetland environment.

Quantity

When a wetland loses its water source, its functions and health are affected as well. In many areas, the water that would normally supply wetlands has been diverted for other uses. Some wetlands have been adversely affected by intentional and unintentional draining from channelization of water flow or penetration of a confining layer.



makes the soil more susceptible to erosion and further water loss.

As a general rule, wetland vegetation is able to take advantage of the high moisture and high nutrition conditions they live in to produce vigorous growth. One reason they are able to be so aggressive is that obtaining adequate water is rarely a problem. This also means that they are limited to the water and soil conditions of riparian-wetland environments and do not do well where water is less abundant. This close relationship of wetland plants to their environment is often used to determine the extent of a wetland.

When wetland soils are dry, their level of biological activity drops. For most wetlands, this is not desirable. Soils dried long enough will not be able to support the vegetation they once did and will no longer be a wetland.

Soils can be dried in two ways, rasing the level of the soil surface or lowering the water table. The soil surface can be raised by deposition from areas that drain on to the wetland. The water level can be lowered by diverting water or allowing existing water to drain more rapidly than normal.

Wetlands can be drained by deliberate or accidental destruction of barriers, such as land forms or confining layers of soil or permafrost, that prevented the water in the wetland from draining too rapidly.

Vegetation

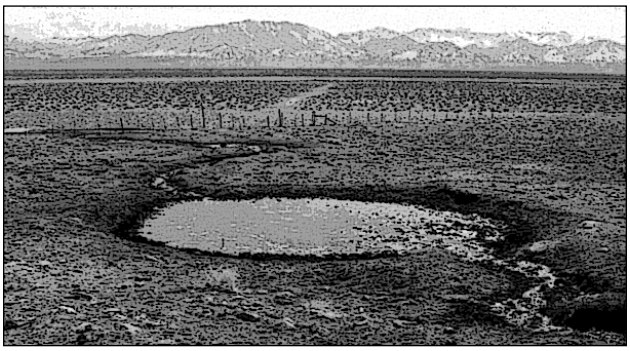
Vegetation is important to wetlands not only for organic matter and nutrient recycling, but for the strength and structures that root masses provide. Because of the nature of their environment, most wetland plants have developed strong root masses. These root masses protect the soil from erosive forces. A loss of water can weaken wetland plants allowing upland plants with less vigorous root systems to invade the site. This, in turn,

Draining and diversion can happen on small as well as large scales. Vast acreages have been intentionally drained to make room for farms and development.

On a smaller scale, there are the effects that excessive hydrologic heaving or hummocks can have on wetland vegetation.

Normal freeze/thaw cycles can produce bumps and ridges in wetlands. Grazing animals tend to walk around these bumps disrupting and compacting the soil between them. Thus, heavy grazing can lower the water table until the tops of the bumps and ridges are too dry to support wetland vegetation.

A rapidly changing water table can also cause problems. If the soil is under water one day and dry the next, vegetation has a tough time finding a stable environment to grow in. This occurs frequently near small reservoirs that are used for stock water as well as larger lakes and reservoirs that are used for electric energy production, water storage, and irrigation.



Quality

Most plants require fresh water. Some can tolerate higher levels of salt, but every plant has its limit. Evaporation and changing water tables can concentrate salts in the upper portion of the soil. The best way to clear these salts out is to flush them through with large quantities of water. This occurs in some wetlands and not in others. Thus, over time, a wetland that does not have sufficient drainage may be poisoned by the very water that makes it a wetland.

While the high level of biological activity in wetlands can metabolize a great many pollutants, they can be overwhelmed by large quantities and/or the high toxicity of pollutants. This can occur as a result of urban runoff and/or mine drainage, among other reasons.

Energy

Even though water within a wetland may not be flowing rapidly, it does contain energies. A wetland must be able to handle these energies. Wetlands next to large bodies of water may need to withstand as much or more energies than flowing water systems because of wind and wave actions.

On a smaller scale, a wet mountain meadow whose vegetation has been removed and soil

compacted as the result of improper grazing may be drained and eroded if it cannot withstand the energies of overland flows.

Soil

Most of the biologic activity in a wetland occurs in the soil. It is in the soil that organic matter is decomposed and the nutrients are recycled into living plants through extremely complex webs of life. Changes in the quality, quantity, and energy of *water* or the type and health of vegetation can affect these webs of life.

Water

The mixture of water and air is very influential on wetland soils. Different types of soils will be produced depending on the amount of time the ground is fully saturated and how much air is allowed to mix in. Some wetland soils may dry naturally on occasion, but their structure and composition are dominated by conditions that exist when the ground is fully or partially saturated with water.