How to complete Function Checklists.

Introduction

The term PCF refers to both the assessment process and the onground condition of an ecosystem (Lewis at.al. 2003). The condition of riparian and upland areas is a result of interaction among geology, soil, water, and vegetation and animals. An ecosystem is functioning properly when biotic, edaphic and hydrologic attributes:

- dissipate stream and raindrop energy, protect the soil from erosion, filter sediment, capture bedload, and aid floodplain development;
- improve water infiltration and retention; and,
- provide diverse habitats and support greater biodiversity.

PFC assessments qualitative and provide starting point for determining and prioritizing areas that require more intensive monitoring, restoration, or management. The assessments provide a consistent approach for assessing ecosystems by considering physical, hydrologic, biotic, and edaphic attributes of an ecosystem. Although proper functioning ecosystem may or may not be at the desired future condition, it is a prerequisite to achieving desired condition. PFC assessments indicate the condition of the ecosystem, more intensive monitoring and assessments may be required to determine the cause of the condition.

A PFC assessment is not a replacement for intensive methodologies and protocols or those that target specific components of an ecosystem. It, however, complements more detailed methods and protocols.

When conducting PFC assessments, it is important to have a reference site for comparison; for example, an ungrazed or slightly grazed site.

The checklists should be reviewed in advance of field work and any necessary file or historic information should be gathered and recorded at that time. Generally, you should get a feel of the area by walking a stream reach or traversing an upland area before filling in the checklists or forms; this will help to gain a broader perspective which otherwise may be lost if you become too concerned with making notes.

Use the following table to score the area being assessed. Pay particular attention to categories which give borderline answers as these indicate trend, and may serve as either early warnings or indicators of recovery in damaged systems.

% of Yes answers	Rating
Yes ≥ 80%	PFC
61-79%	Slightly at risk
41-60%	Moderately at risk
20- 40%	Highly at risk
Yes < 20%	Non-functional

Lakes, Ponds and Wetlands - Riparian Function Checklist

Hydrology

Question 1. Riparian soil moisture conditions are maintained.

Note: Do soils remain saturated and anaerobic for part of the growing season or have they dried and function as upland soils? Anaerobic conditions are important in the denitrification processes. **Consider:** upland species growing in the wetlands; a decrease in obligate wetland/hydrophytic plants, plant vigour, or mottles or gleyed horizons in the soil. Where possible dig a hole to look for evidence of mottles or gleying.

Question 2. Water levels have remained unchanged over time.

Note: Willows indicate the average high water mark for many wetland types. Check for vigour and recruitment of phreatophytes. What is the source of water for this wetland? Is it overland flow, groundwater or channel flow? Is this a beaver-influenced wetland? Has the hydrology been influenced by land management practices in the watershed? Look at both the riparian and upland areas for evidence of land use change. Distinguish seasonal draw down from changes in water level due to land use.

Biotic/Vegetation

Question 3. Diversity and structure of the riparian and emergent vegetation zone has been maintained.

Note: Widths of riparian and emergent native vegetation bands will fluctuate annually. Monitor for long-term changes.

Question 4. The plant community is adequate to filter sediments and pollutants.

Note: Healthy bands of riparian and emergent vegetation are effective in reducing turbidity and capturing pollutants.

Soils/Erosion-Deposition

Question 5. Bank shearing, soil compaction, and bare ground are uncommon.

Note: If bank shearing, soil compaction, and bare ground are evident, is it to a watering site, or does it occur around the entire wetland.

Question 6. Soil erosion and deposition in the wetland and riparian area are within natural levels.

Note: Indicates a problem with the surrounding uplands. Infer natural soil erosion and deposition levels from the reference conditions.

Question 7. Hummocks are rounded and completely vegetated.

Note: Hummocks can be created by livestock trampling. However, some species of sedge create their own hummocks to avoid prolonged saturation. Hummocks should be rounded and completely vegetated.

Question 8. Shoreline characteristics (vegetation, rocks, woody debris) are adequate to dissipate wave and wind event energies.

Note: There should be adequate vegetation to protect the banks from the actions of winds and waves.

Nutrient Inputs and Water Quality

Question 9. Inputs of fine organic matter for the detritus food chain are appropriate.

Note: Does detritus form an integral part of the food chain? Look for build up of leaves and organic matter. Note presence or lack of accumulation of organic matter and leaves.

Question 10. Nutrient levels are normal (there is a lack of algae mats).

Note: Is there excessive livestock dung? Are there thick algal mats? Is there evidence of organism die-offs? Does the invertebrate population indicate a worsening in habitat or water quality (species shifts, lower diversity). Potential sources of nutrient input include manure, urine, nutrient from agricultural operations, and erosion.

Question 11. Vertebrate and invertebrate life indicate good water quality.

Note: Amphibians, fish and aquatic macro invertebrates are indicators of water quality and habitat. Low species diversity may indicate a problem. Consider both the wetland and in the riparian zone. Refer to Fraser (2007) for a description, and pollution tolerance of some common macro invertebrates.

Notes:

Current and Desired Plant Communities: Describe both the current and desired plant communities in enough detail to create a word picture.

Anaerobic soils are important in filtering and modifying pollutants. Willows will not grow under totally anaerobic conditions. They will withstand some flooding, but will die in the absence of oxygenated conditions. Willows will usually root over coarse textured materials where oxygenation is possible.

Land uses that are beyond the control of the range user must be identified. For example, a road might sever a shrub carr from a wetland complex thereby affecting the wetland's hydrology/water levels.

Streams Riparian Function Checklist

Channel Structure, Function and Diversity

Question 1. Channel characteristics and associated floodplain are adequate to dissipate energy.

Note: Is stream energy naturally dissipated through the presence of rocks/boulders, large woody debris, shrubs/sedges or natural sinuosity? Does the stream have easy access to its floodplain during high flow? See Fraser (2007).

Question 2. Lateral movement is associated with natural sinuosity.

Note: Do not confuse natural sinuosity with accelerated lateral movement across the floodplain. Lateral erosion leads to an increase in channel width. Channels and banks are not static; it is natural for channels to move and evolve over time. Do not confuse natural channel movement with accelerated change. Bank undercutting should be balanced by bank building on the opposite side. Channels that migrate laterally through meandering without changing their width-to-depth ratio are dynamically stable. Channels that move laterally with an increase in the width-to-depth ratio are generally unstable and have lost deep-rooted riparian vegetation.

Question 3. Erosion, deposition, embeddedness, and movement of bed materials are normal for this reach.

Note: Is meander erosion balanced by point bar deposition? Are point bars revegetating? Is there evidence of excessive movement of bed materials as indicated by extensive riffles? Check to see if cobbles and boulders are embedded with fine sediments.

Question 4. Aspects of channel geometry are in balance with landscape position.

Note: Sinuosity should be balanced with the slope and landscape position of the stream. Is the channel deep relative to its width? Pools should represent 2/3 of the length of any reach; riffles should represent 1/3 the length of any reach. The sequence of pools and riffles should repeat itself every 5 to 7 bank widths. Pools should be fine textured and deep, and riffles should be coarse-textured and shallow. Excessive riffle length is evidence of excessive movement of bed materials. Channel bars should be at the margins, not in mid-channel.

Question 5. Inputs of large organic debris from adjacent riparian area and subsequent incorporation into the channel are normal for the area.

Note: Are trees and shrubs being incorporated by natural mortality and windfall at a normal rate?

Question 6. Banks are undercut. (meandering and riffle-pool streams)

Note: Are undercut banks appropriate for the stream segment? Consider the gradient, bank texture and bed materials.

Question 7. Riffle bed materials and gravels are free of sediment. Fish spawning and use of rock undersides by insects and other invertebrates are possible.

Note: Looks at rock undersides for evidence of invertebrate life. Water temperature, purity and turbidity will influence the invertebrate species found there.

Question 8. Boulders in streambed are moss covered (Step-pool streams).

Note: This indicates that boulders have not been moved by high flow or by ice scouring.

Biotic Community

Question 9. Roots of trees, shrubs and graminoids extend into the stream. Root masses are capable of withstanding high stream flow events and allowing formation of overhanging banks.

Note: Consider stream type and site potential when answering this question. Are there overhanging banks? Are there deep rooted sedges as opposed to shallow rooted grasses on the stream bank? Do the root masses of shrubs or trees extend into the channels influencing its depth and direction of flow? Check the soil texture. Willows require coarse textured substrates and will not grow in oxygen poor soils. Sedges will grow in anaerobic conditions.

Question 10. There is recruitment of riparian tree and shrub species that will contribute to replacement woody debris in the foreseeable future.

Note: Plant community exhibits high vigour and indicates maintenance of riparian soil moisture characteristics. Woody species are present and able to contribute to the stream system. There are new recruits to replace those that have fallen.

Question 11. Riparian habitat and structure has been maintained.

Note: Are the species present vigorous riparian species, or have other species encroached? for example, upland and invasive alien species.

Hydrology/Soils

Question 12. Riparian soil moisture conditions have been maintained.

Note: Do soils remain saturated and anaerobic for part of the growing season or have they dried and function as upland soils? Anaerobic conditions are important in the denitrification processes.

Question 13. Bank shearing, soil compaction and bare ground are uncommon.

Note: Excessive trampling leads to soil compaction and poor water infiltration.

Nutrient Inputs and Water Quality

Question 14. Vertebrate and invertebrate life indicate good water quality

Note: Amphibians, fish and aquatic macro invertebrates are indicators of water quality and habitat. Low species diversity may indicate a problem. Refer to Fraser (2007) for a description and pollution tolerance of some common macro invertebrates.

Question 15. Nutrient levels are normal (lack of algae mats and organism die-offs).

Note: Is there excessive livestock dung? Are there thick algae mats? Is there evidence of organism die-offs?

Question 16. Inputs of fine organic matter for the detritus food chain are appropriate.

Note: Does detritus form an integral part of the food chain?

Notes:

Current and Desired Plant Communities: Describe both the current and desired plant communities in enough detail to create a word picture.

Anaerobic soils are important in filtering and modifying pollutants. Willows will not grow under totally anaerobic conditions. They will withstand some flooding, but will die in the absence of oxygenated conditions. Willows will usually root over coarse textured materials where oxygenation is possible.

Land uses that are beyond the control of the range user must be identified. For example roads, culverts and dams will affect stream function.

Uplands Function Checklist

Hydrology and Soils

Question 1. Organic matter protects soil surfaces from raindrop impact and evaporative effects of sun and wind.

Note: Most of the ground surface should be protected by live vegetation (including biological soil crusts) or dead plant material.

Question 2. Water will easily infiltrate the soil surface (absence of physical soil crusting, capping).

Note: Soil surface conditions should allow for precipitation to penetrate. Soil crusting or capping should not occur. Do not confuse physical crusting with biological soil crusts.

Question 3. Subsurface soil conditions support infiltration (compaction layers are uncommon).

Note: Check for soil compaction or impenetrable layers.

Question 4. Vegetation and plant litter detain overland flow.

Note: No sign of rilling. Sediment is trapped.

Biotic/Vegetation

Question 5. The plant community is showing good vigour (including recruitment of decreasers).

Note: Proper growth form and stature, community structure and species composition of native decreaser species.

Question 6. The plant community reflects a fully occupied root zone.

Note: Dig a soil pit. Roots should penetrate deeply into the soil profile.

Question 7. A diversity of habitat structure for vertebrate and invertebrate life is apparent

Note: If you build it they will come. Consider soil organisms, insects, and vertebrates.

Erosion/Deposition

Question 8. Evidence of rills, gullies, and other excessive soil movement is uncommon.

Note: Vegetation should prevent formation of these erosional features Old rills and gullies should be revegetated.

Mineral Cycle

Question 9. Plant cover and litter create a micro-site environment conducive to biological breakdown.

Note: Dead plant material should decompose rather than oxidize on the stem. In order for this to happen it needs contact with the soil surface. Is dung breaking down rapidly, or does it remain intact for years?

Question 10. Biological soil crusts and nitrogen fixing forbs and shrubs are present as in the reference condition.

Note: Nitrogen poor grasslands will be yellow-green in colour and dung/urine patches will show up as a deep green. Biological soils crusts are essential in the carbon and nitrogen cycles.

Notes:
Land uses that are beyond the control of the range user must be identified.
Current and Desired Plant Communities: Describe both the current and desired plant communities in enough detail to create a word picture.
S**eeps, springs and microsites.** Do springs and seeps support phreatophytic plants?

References

Fraser, D.A. 2007. Rangeland Health Field Guide. B.C. Ministry of Forests and Range, Range Branch, Kamloops, B.C.

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Prichard, D., J. Anderson, C. Correll, J. Fogg, K. Gebhardt, R. Krapf, S. Leonard, B. Mitchell, and J. Staats. 1998. Riparian area management: A user guide to assessing proper functioning condition and the supporting science for lotic areas. Technical Reference 1737-15. Bureau of Land Management, Denver, Colorado. 136 pp.