Aerial Videography Assessment for Selected Reaches of the South Heart and West Prairie Rivers, Alberta

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EXECUTIVE SUMMARY

Low-level aerial videography was used to assess the health and integrity of riparian areas along selected reaches of the South Heart River and West Prairie River. Videos were captured during a 2 hour flight on July 20, 2006. The South Heart River was flown from the South Heart River Dam to its outlet into Lesser Slave Lake (approximately 90 km). The West Prairie River was flown from its confluence with the South Heart River upstream approximately 16 km. In general, reaches assessed on the South Heart River were in good condition (62%). Scores were similar for both left and right banks. Riparian areas along the West Prairie were 43% good, 27% fair and 30% in poor condition. The lowest health scores were along the channelized section of the river downstream of the town of High Prairie.

ACKNOWLEDGEMENTS

We thank George Walker (Walker Environmental) for his expertise and assistance with delivering the project. We also thank the Lesser Slave Lake Watershed Council for providing financial support towards the project.

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1.0 INTRODUCTION

Low-level aerial videography is a tool collaboratively developed by Alberta Conservation Association and Alberta Sustainable Resource Development Fish and Wildlife Division to provide a method for spatially describing characteristics of riparian health and integrity. The benefit of this tool is that the entire riparian area of a lake or river can be assessed at one time while providing a permanent geo-referenced video record of the current status of shoreline. It provides an accurate spatial reference as to where areas of shoreline score 'unhealthy' and require remedial efforts.

Low-level aerial videography was used to assess the health and integrity of riparian areas along selected reaches of the South Heart and West Prairie Rivers. The South Heart River, a major tributary to Lesser Slave Lake is a key walleye spawning river for this watershed (Osokin and Tchir 2006). It's association with the Horse Lakes complex and Buffalo Bay also contributes to its importance to many wildlife species including migratory waterfowl. Concerns have been raised over the continued habitat viability of this river for walleye due to extensive agriculture operations, including cattle grazing and haying of the riparian areas. A basin-wide assessment is needed to fully educate public and private land managers and special interest groups of the total health of the South Heart system. Aerial video and riparian health information will provide all stakeholders with common terms of reference regarding current riparian land use practices, status of riparian health and opportunities for improvement.

2.0 STUDY AREA

2.1 Description

The South Heart River is located in north-central Alberta approximately 30 km north of the town of High Prairie (Figure 1). It has a drainage area of approximately 5,900 km^2. The river flows through large wetland areas (Horse Lakes and Buffalo bay) within the central and dry mixedwood natural sub-regions (Strong and Leggat 1992). Major tributaries include East and West Prairie Rivers. The West Prairie River flows north through the town of High Prairie where it convergences with the South Heart River (Figure 1.). Land-use in the watershed includes livestock grazing, haying and cultivation.

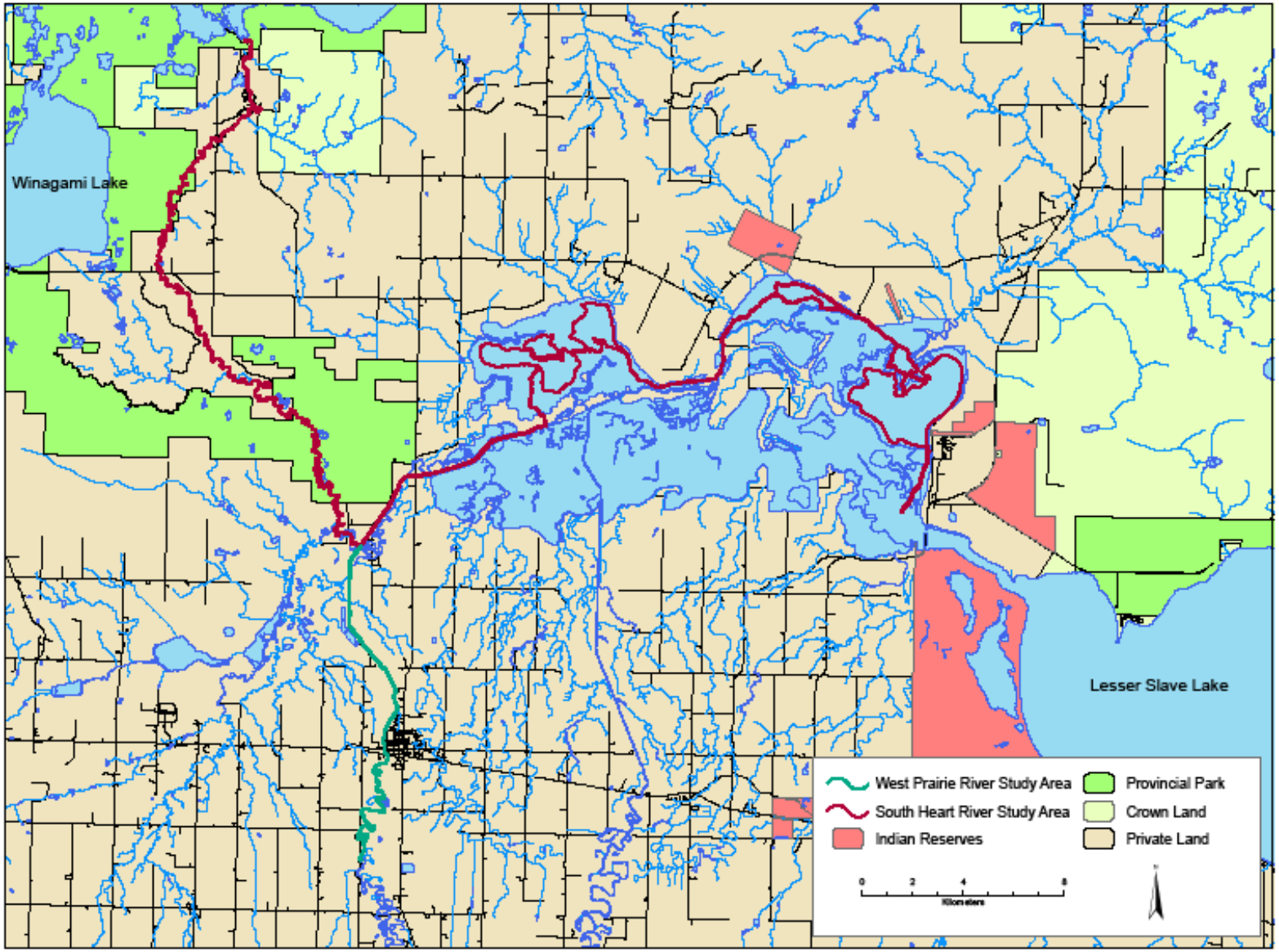

Figure 1. Map of study area on the South Heart and West Prairie Rivers, Alberta

3.0 MATERIALS AND METHODS

3.1 Aerial Videography

Low-level aerial videography was captured using a helicopter (Bell 206 Jet Ranger) flying in an upstream direction, at a height of 45-60 m above the ground and a speed of 30-35 knots. While the helicopter was flying a trained individual (George Walker of Walker Environmental) captured video footage of the rivers adjacent riparian zone using a hand-held SONY DCR-TRV 900 digital video camera linked to a VMS200 Video mapping unit developed by Red Hen Systems. The Red Hen System uses Global Positioning System (GPS) to capture locations (i.e., latitude and longitude) at one second intervals on the camera. The GPS location and time is referenced to that same time on the video by using the videos "universal time code;" thereby synchronizing the video image with the GPS location of the helicopter. Videos were later transferred from videotape to DVD, with health scores inserted onto the video image to indicate health score status.

Videos were captured during a 2 hour flight on July 20, 2006. The South Heart River was flown from the South Heart River Dam to its outlet into Lesser Slave Lake (approximately 90 km). The West Prairie River was flown from its confluence with the South Heart River upstream approximately 16 km.

3.4 Riparian Health Scores

Riparian areas captured during the flights were assessed using ACA's Aerial Videography – Lotic Riparian Assessment Scorecard (Appendix 1.) The scorecard follows the model used by Cows and Fish (Fitch et al. 2001 and Ambrose et al. 2004). While viewing the video a team of 3 individual discussed and answered a suite of questions related to the 'riparian management area' (Teichreb and Walker 2008) (Figure 2.) integrity and function. Values are then added together to generate a score for that polygon. Polygon length was defined as a change in the riparian management area category. Therefore, polygons ranged from 20 metres to many kilometres in length. Scores were assigned to both left and right banks of each river. Scores where converted

into a format where a coloured coded map was created, depicting riparian conditions (poor, fair and good).

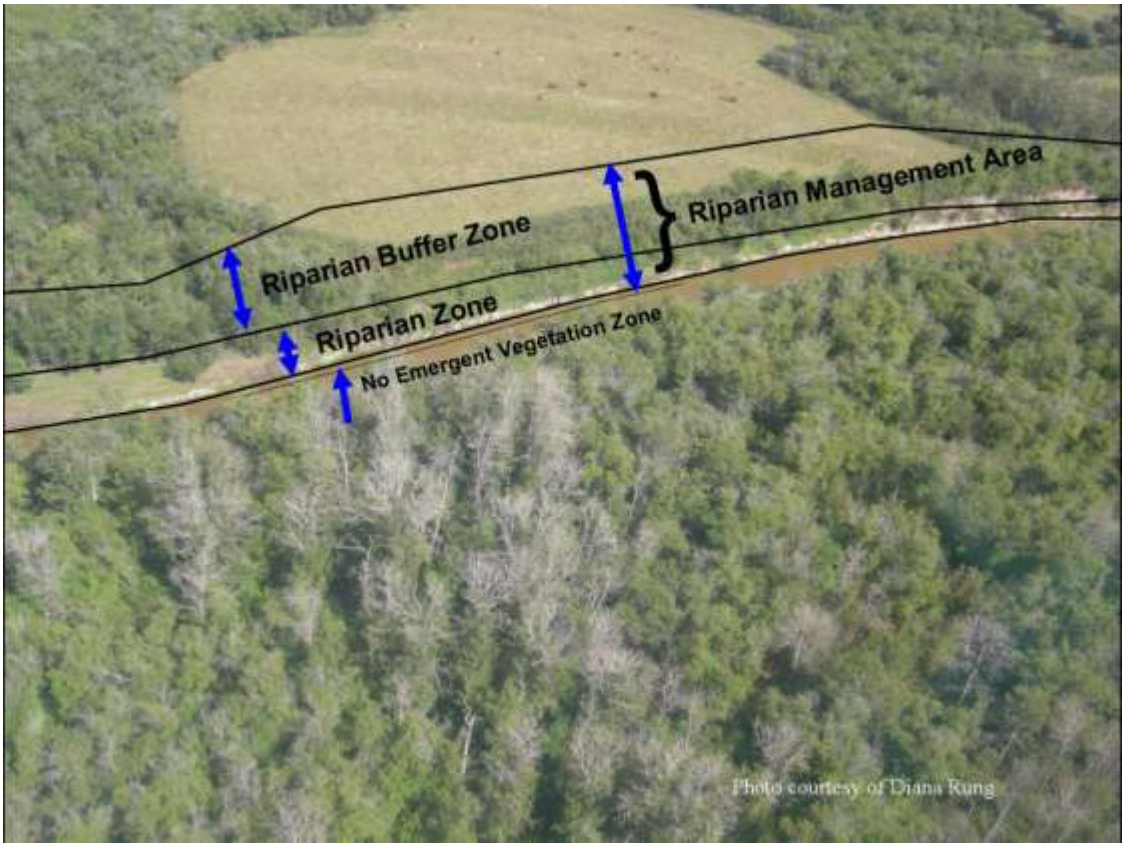

Figure 2. Riparian Management Area on a representative section of a river.

4.0 RESULTS

West Prairie River

Results from the aerial videography combined with the riparian health scorecard showed that 43% of the riparian areas adjacent to the banks of the West Prairie River are in good condition with 30% and 27% in fair and poor conditions respectively (Figure 3.). The lowest health scores were along the channelized section of the river downstream of High Prairie, within the town of High Prairie and where cultivation parallels the river. For a breakdown of the left and right bank scores see Appendix 2.

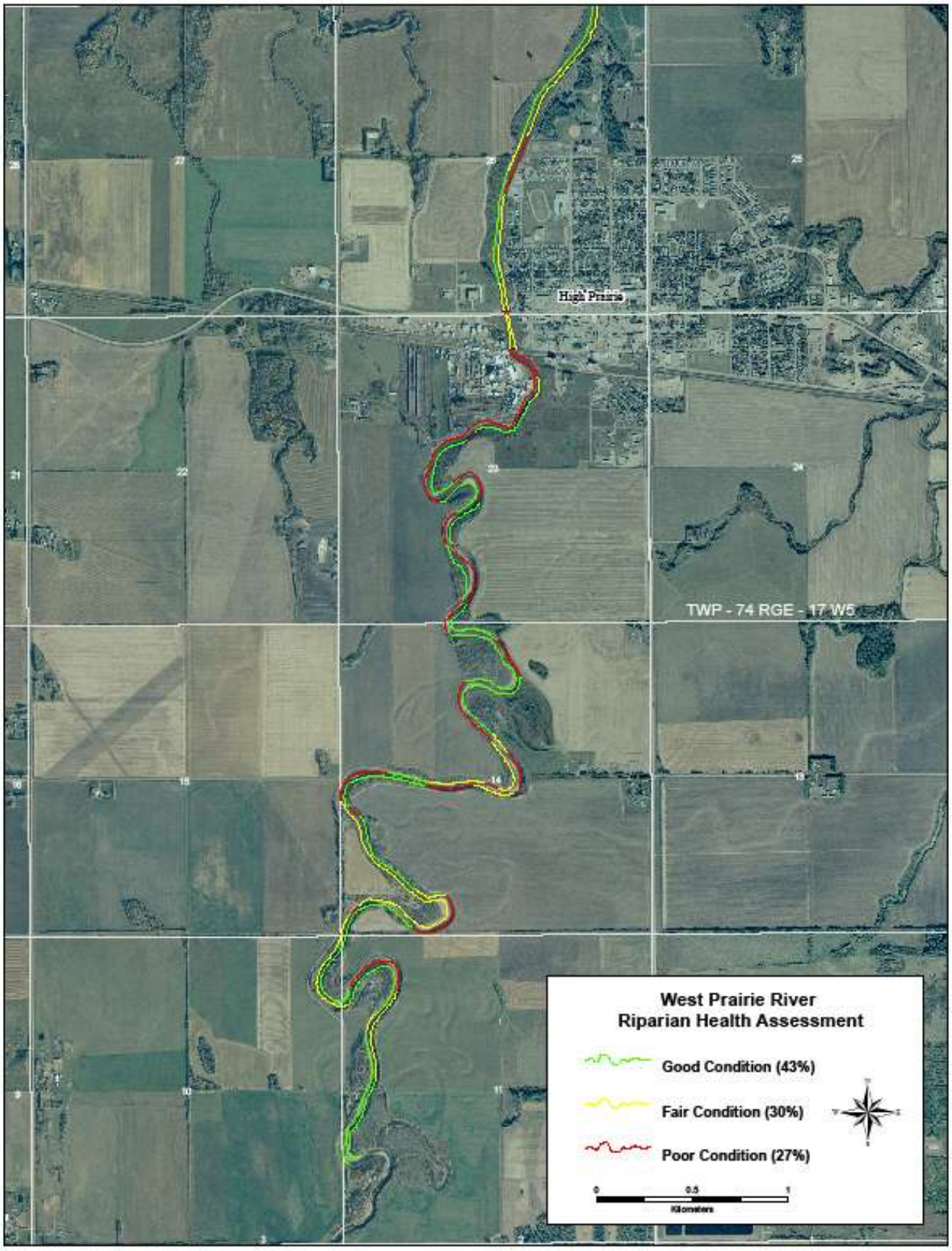

Figure 3. Riparian health scores for the upper section of West Prairie River (Map 1 of 2)

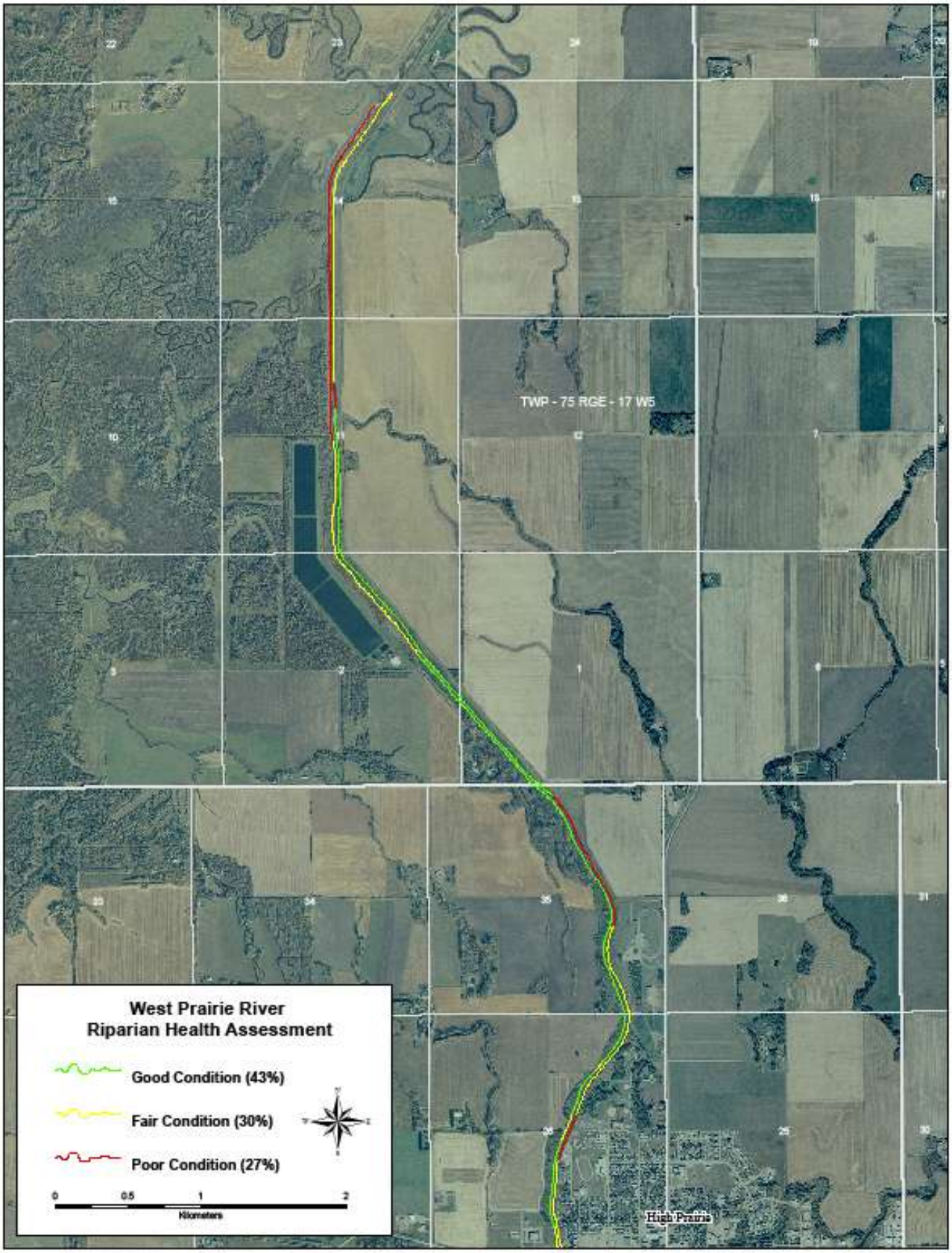

Figure 4. Riparian health scores for the lower section of West Prairie River (Map 2 of 2)

South Heart River

Results from the aerial videography combined with the riparian health scorecard showed that 62% of the riparian areas adjacent to the banks of the South Heart River are in good condition with 13% and 25% in fair and poor conditions respectively (Figure 4.). Riparian health scores were the highest along reaches in Winagami Lake Provincial Park and the lowest along the channelized section of the river or where heavy livestock grazing was apparent. For a breakdown of the left and right bank scores see Appendix 3.

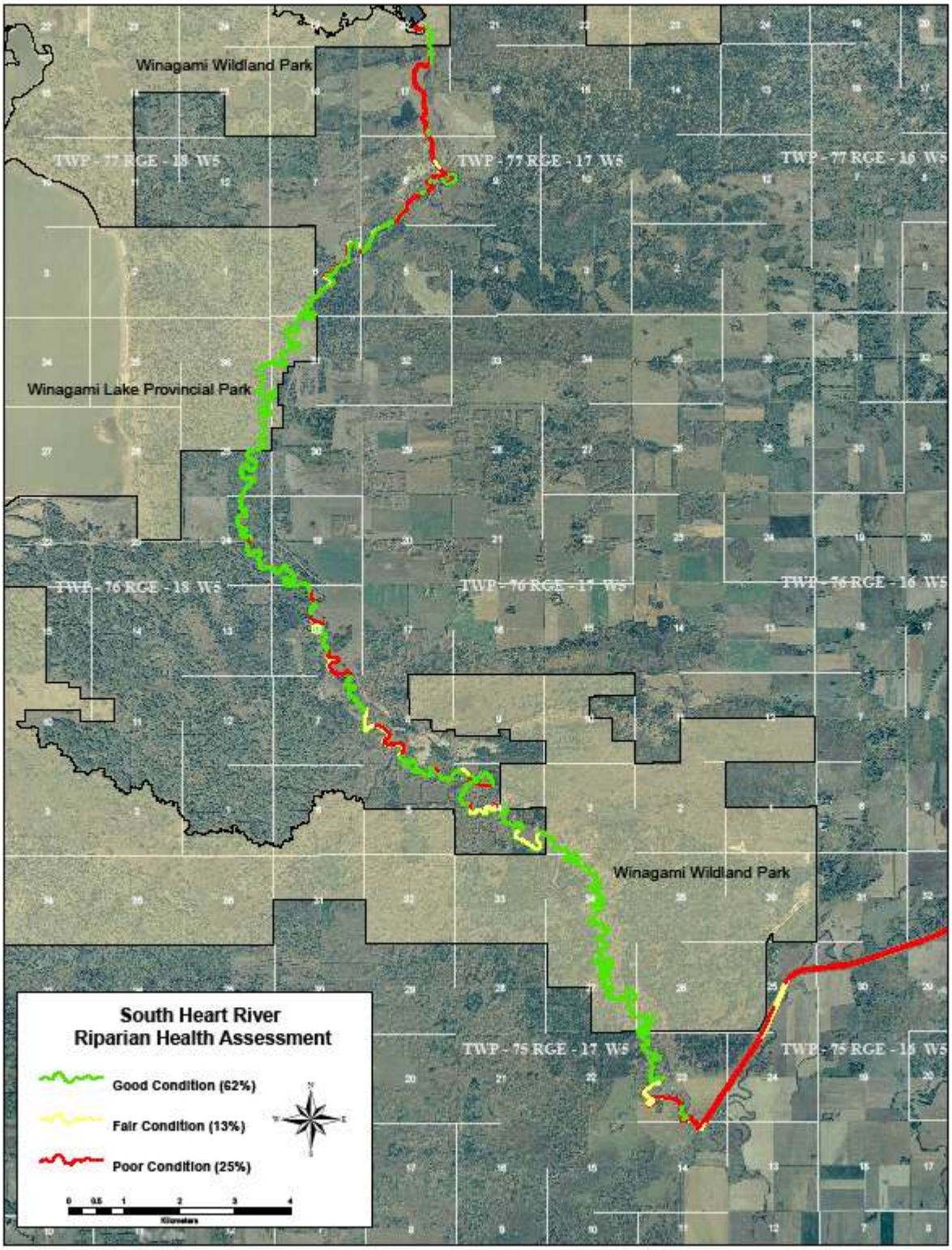

Figure 5. Riparian health scores for the upper section of South Heart River (Map 1 of 2)

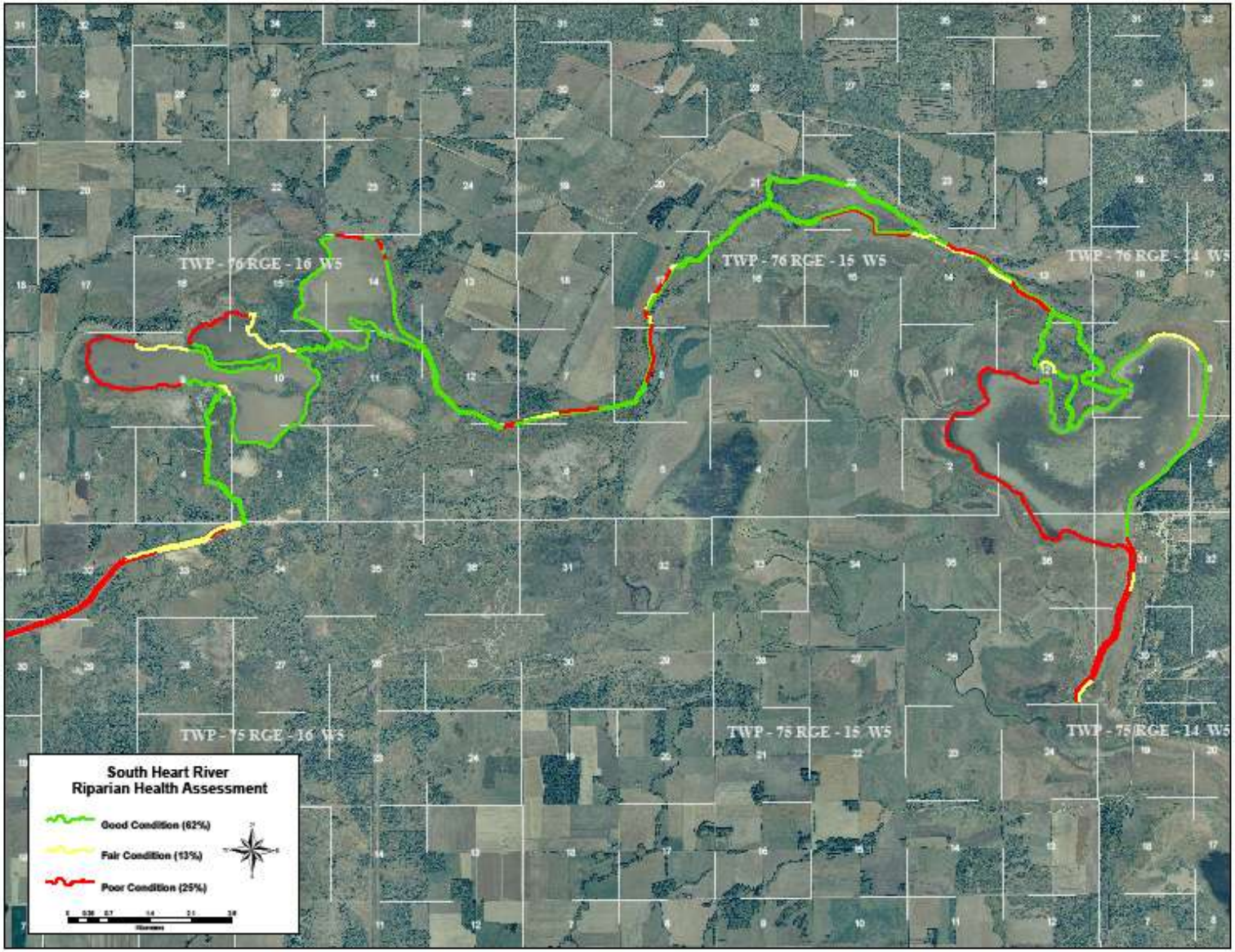

Figure 6. Riparian health scores for the lower section of South Heart River (Map 2 of 2)

5.0 SUMMARY/RECOMMENDATIONS

Data collected as part of this project will be used to gain insight into the current state of the watershed. It will be available to landowners and land managers to raise awareness and discussion as to what steps should be taken to protect the 'healthy' areas and to enhance the impaired areas.

We acknowledge that aerial videography assessments like this provide a coarse scale overview at the watershed level. That said, we recommend completing on-the-ground riparian health assessments when developing conservation projects. We also recommend completing the aerial assessment every 10 years to measure the overall success of on-the-ground projects.

6.0 LITERATURE CITED

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7.0 APPENDICES

Appendix 1. Alberta Conservation Association Aerial Videography – Lotic Riparian Assessment Scorecard

This scorecard follows the riparian assessment models used by Cows and Fish (Fitch *et al.* 2001 and Ambrose *et al. 2004*) and is based, in part, on ACA's work done on the aerial videography of lentic systems[1]. What follows is a definition of the assessment area polygon (called a reach), the assessment questions used, with guidelines and scoring tips, to determine the riparian condition of individual reaches of interest. All reaches surveyed and assessed in a watershed can then be presented together to illustrate the overall condition of the entire system.

Assessment Scorecard Questions:

How much of the polygon area is covered with vegetation?
Left Bank: **More than 90%** (2 pts) **75%-90%** (1 pts) **Less than 75%** (0 pts)
Right Bank: **More than 90%** (2 pts) **75%-90%** (1 pts) **Less than 75%** (0 pts)

Scoring Tips:

1) Vegetation cover includes all standing, rooted plants (live or dead). Do not include litter or downed wood.
2) Polygon area does not include area covered by water.
3) Bare soil, gravel, paved roads, cattle trails, or artificial surfaces are considered unvegetated. (Taken from Fitch *et al.* 2001)

How much of the polygon area is covered by woody plants like willow, birch, poplar or conifers cover 15%?
Left Bank: **More than 35%** (2 pts) **15%-35%** (1 pts) **Less than 15%** (0 pts)
Right Bank: **More than 35%** (2 pts) **15%-35%** (1 pts) **Less than 15%** (0 pts)

Note - In some cases riparian areas naturally do not have the potential for woody plants because of soil chemistry and other natural factors, i.e., saline and drainage. In some cases woody plants do not meet this threshold because of site and successional reasons.

Scoring Tip:

1) If you have established that the polygon has no natural potential for woody plants replace the score with N/A and adjust the total possible score accordingly. (Taken from Fitch *et al.* 2001)

Is there observable evidence of recruitment or persistence of woody species in the polygon?

Left Bank: **Yes** (2 pts) **No** (0 pts) Right Bank: **Yes** (2 pts) **No** (0 pts)

Scoring Tips:

1) Evidence of recruitment and persistence can include multiple age classes, seen as different sized individuals of a single species or the presence of a species highly prone to suckering (e.g. various willows sp.).
2) If you answered N/A for question 2. a) replace this score with N/A and adjust the total possible score accordingly.

How much of the polygon area shows visual signs of human-caused alteration of the vegetation community?

Left Bank: **Less than 5%** (4 pts) **5%-15%** (2 pts) **More than 15%** (0 pts)

Right Bank: **Less than 5%** (4 pts) **5%-15%** (2 pts) **More than 15%** (0 pts)

Note – An unaltered vegetation community contains multiple structural layers with varied plant heights. Tall trees, tall and short shrubs, medium to short forbs and grasses plus short flowers and grasses should be present in an unaltered riparian area Ambrose *et al.* 2004). At sites naturally lacking trees multiple vegetation layers, made up of different species, should still be observable. Alterations to vegetation communities to be assessed include (but may not be limited to) a loss of one or more of the above noted vegetation layers, the partial or complete replacement of plant species, a reduction in species diversity and distribution as a result of various human activities (e.g. conversion of native vegetation to lawn grass, mowing, recreational traffic, excessive grazing, removal of woody vegetation, etc.).

Scoring Tips:

1) Tree cover often obscures observation of ground level conditions. A dense stand of trees may hide a heavily altered vegetation community below. It is often useful to note the conditions directly adjacent to or surrounding dense stands of trees. Some ground truthing efforts may be required.
2) Short-term, transient removal of vegetation without changing the species distribution or diversity present, such as light to moderate grazing, is not included as altering the vegetation community (Ambrose *et al.* 2004).
3) Do not count the same area for question 3. and 4. unless both the vegetation community and the physical structural of that area have been altered.

How much of the polygon area shows visual signs of human-caused bare ground and physical alterations?

Left Bank: **Less than 5%** (4 pts) **5%-15%** (2 pts) **More than 15%** (0 pts)

Right Bank: **Less than 5%** (4 pts) **5%-15%** (2 pts) **More than 15%** (0 pts)

Note – Bare ground and physical alterations that effect the functions of a riparian area can result from (but are not limited to) livestock trailing and rutting, hoof shearing, pugging/hummocking, road construction, rail bed deposits, OHV trails, timber hauling, building construction, channelization,

stream diversions, etc. Consider all those activities that have resulted in cracking, slumping, shearing, compaction, removal or reconfiguration of streambanks and surrounding riparian area.

Scoring Tips:

1) Natural slides, slumps and eroding banks are not considered in this question (Fitch *et al.* 2001).
2) Do not count the same area for question 3. and 4. unless both the vegetation community and the physical structural of that area have been altered.

How would you categorize the current, overall bank stability within the polygon?

Left Bank: **Stable** (4 pts) **Moderately unstable** (2 pts) **Highly unstable** (0 pts)

Right Bank: **Stable** (4 pts) **Moderately unstable** (2 pts) **Highly unstable** (0 pts)

Note – Bank stability is highly influenced by slope, substrate type and presence of vegetation with binding root-mass. Cracking, slumping, sloughing and sliding are all indications of bank instability.

What picture does most of the polygon look like?

Left Bank: **Picture A** (4 pts) **Combination of A and B** (2 pt) **Picture B** (0 pts)

Right Bank: **Picture A** (4 pts) **Combination of A and B** (2 pt) **Picture B** (0 pts)

Total possible points =_____.
Actual points (sum from questions above) =
Left Bank_____ Right Bank_____ Combined_____.
Percent score (Actual points/Total possible pointsX100) =
Left Bank_____ Right Bank_____ Combined_____.

Summary of Question Scorecard

If the score is **80% or more** it is likely the Riparian Area is in **Good** condition.
If the score is **50% to 79%** it is likely the Riparian Area is **Fair** condition.
If the score is **less than 49%** it is likely the Riparian Area is **Poor** condition.

Footnotes:

[1] **Aerial videography and RIPARIAN MANAGEMENT AREA HEALTH AND INTEGRITY ASSESSMENT SCORECARD FOR LAKES scorecard developed by Blake Mills, Alberta Conservation Association and George Walker, Alberta Sustainable Resource Development, Fish & Wildlife Division.**

References Cited

Ambrose, N., G. Ehlert, K. Spicer-Rawe. 2004. Riparian health assessment for lakes, sloughs, and wetlands – field workbook. Modified from Fitch, L., B.W. Adams and G. Hale, 2001. Riparian health assessment for streams and small rivers – field workbook. Lethbridge, AB. Cows and Fish program. pp. 90.

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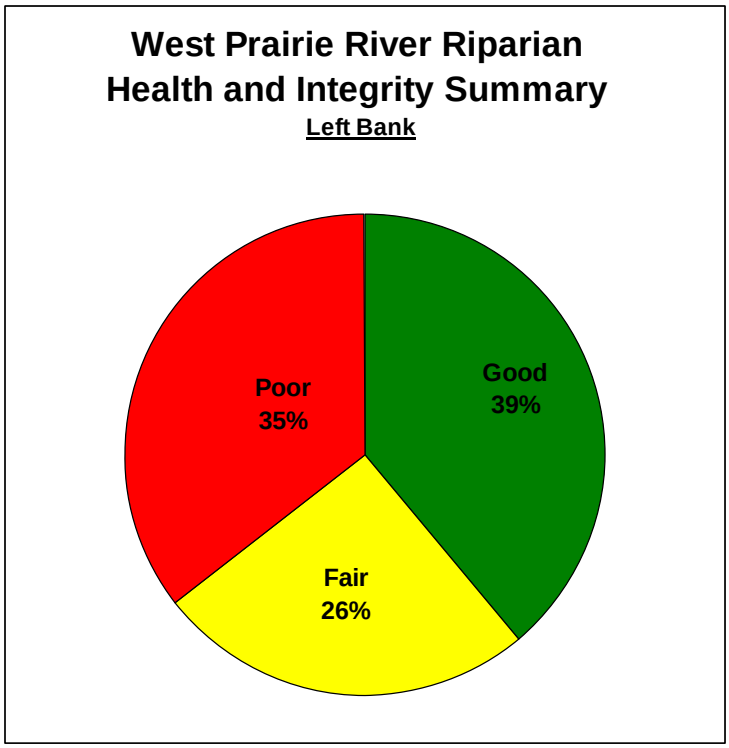
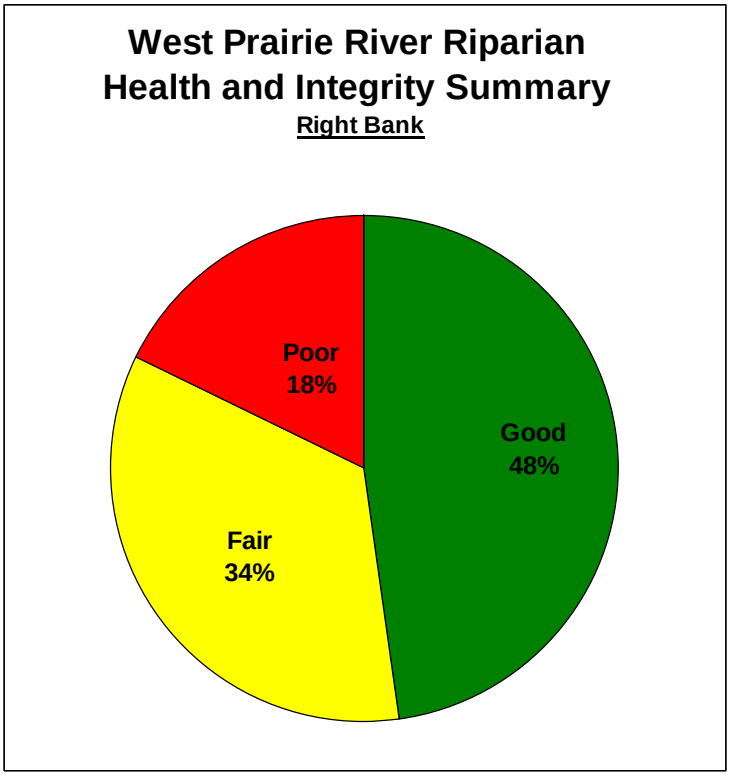
Appendix 2. Riparian health summary for the left and right banks of the West Prairie River





Appendix 3. Riparian health summary for the left and right banks of the South Heart River.