Shell River Watershed – Wetland Data Submission
Ducks Unlimited Canada

Wetlands are areas of depression in the watershed that retain water for varying periods of time. There are different types and sizes of wetlands ranging from small, shallow temporary wetlands to deep, large permanent wetlands. Each type of wetland plays a significant role in the ecology of the watershed and it is very important to maintain the appropriate mixture of these wetland types to maintain the ecological function of the watershed. Temporary and seasonal wetlands typically hold water for only a week to couple of months, yet are very important to waterfowl as they warm up first in the spring time and provide a valuable food source for waterfowl. Also, waterfowl are very territorial by nature, and these shallow wetlands provide much needed pair space in the spring time for breeding waterfowl. The deeper semi-permanent and permanent wetlands typically hold water for the duration of the growing season/year round and provide much needed brood rearing water for breeding waterfowl as well as safe areas to stage and moult. Wetlands also provide habitat for wildlife and waterfowl and are one of the most biologically productive ecosystems in the world. In Canada, wetlands provide habitat for more than 200 species of birds, at least 50 mammal species and numerous reptile, amphibians, insects and other aquatic organisms (Canadian Geographic 2000).

Aside from there obvious habitat values for fish, waterfowl and wildlife, wetlands provide a variety of functions and values to the watershed. Wetlands are like sponges and capture water and release it slowly, thereby moderating runoff and water supplies during flood and drought periods. They also serve as huge water filters and are capable of removing 70-90 % of sediment, nutrients and bacteria. Wetlands also allow water to slowly percolate through soils and recharge underground water supplies.

There is a mixture of temporary, seasonal, semi-permanent and permanent wetlands are found in the Shell River watershed. From a hydrologic perspective, there are 2 forms of wetlands. Terminal basin/pothole type wetlands are wetlands that store all incoming water flowing into it and release no flows downstream. These wetlands are found in the non contributing portion of the watershed. These wetlands are important to the watershed from a water quality and a flood regulation standpoint, in that they store nutrients and water, thus reducing nutrient loadings and flood flows downstream. Riverine or flow through type wetlands, are found along waterways. These wetlands typically store water temporarily then release water downstream. These wetlands are generally found in the contributing portion of the watershed and are also important from a water quality and flood management standpoint. These wetlands filter and purify water flowing downstream as well as assist in reducing and regulating flood flows by providing water storage to the watershed.

Drainage of wetlands converts areas of the watershed that used to retain and purify water into areas that contribute water to flows on a frequent basis, and this changes the hydrologic function of the watershed. Drainage reduces the watersheds ability to store water and regulate flood flows, as well as reduces its ability to store and process nutrients before they reach receiving waters such as streams, rivers, lakes and reservoirs. In addition to loosing hydrologic function in the non contributing portion of the watershed, drainage also compromises wetlands ability to store and purify waters in the contributing portion of the watershed, as there is only a finite capacity within each wetland to store water and process nutrients.

Ducks Unlimited Canada (DUC) is a private, non profit organization with a mandate of conserving, restoring and managing wetlands and associated habitats for waterfowl as well as benefits for other wildlife and people. DUC began its conservation work in the Little Saskatchewan watershed with the Togo project in 1988.

For further information on the functions and values of wetlands provide a watershed, please consult the following documents:

i) Natural Values – The Importance of Wetlands and Upland Conservations Practices in Watershed Management; Ducks Unlimited Canada, February 2004.

ii) The Role Of Canadian Wetlands for Improving Water Quality – A review of the biological and economic value wetlands provide to society and our environment; Ducks Unlimited Canada.

iii) The Value of Natural Capital in Settled Areas of Canada; Olewiler, N. (2004).

i) Available Wetland Data

Ducks Unlimited Canada 1986 Habitat Inventory Data

Ducks Unlimited Canada developed a comprehensive wetland inventory for the greater part of Prairie Canada using landsat imagery and thermal mapping in 1986. The data collected was attributed to the quarter section, and delineated individual wetlands, identified small wetlands (less than 2 acres) and large wetlands (greater than 2 acres) as well as the various vegetation zones associated with mud flats, shallow and deep water.

1986 DUC Habitat Inventory Summary

	Small Wetlands	Large Wetlands	Total	Wetlands Within Parks
Number	25,566 (69.5 %)	11,208 (30.5 %)	36,774	2,020 (5.5 %)
Acres	15,173 (15.2 %)	84,573 (84.8 %)	99,746	15,354 (15.4 %)

note – numbers in brackets represent % of total

A portion of the watershed extends into Saskatchewan. The provincial breakdown of these statistics are as follows:

	Manitoba		Saskatchewan	
	Small Wetlands	Large Wetlands	Small Wetlands	Large Wetlands
Number	6,801 (26.6 %)	3,986 (35.6 %)	18,765 (73.4 %)	7,222 (39.2 %)
Acres	3,960 (26.1 %)	44,704 (52.9 %)	11,213 (73.9 %)	39,869 (26.7 %)

In the Shell River watershed, there are approximately 36,800 wetlands covering 99,750 acres. Upon review of the data, it became evident that there is an inverse relationship between small and large wetlands in relation to the number and area of wetlands. From a wetland basin perspective, 70 % of the total wetland basins were found to be small wetlands (ie less than 2 acres in size), yet in terms of area, 85 % of the total area was comprised of large wetlands. Distribution of smaller, shallower wetlands seems uniform and even throughout the watershed, whereas the deeper, larger wetlands were primarily found in the headwater portion of the watershed.

There are 2 provincial and 1 federal park located in the Shell River watershed. There are approximately 2,020 wetlands (5.5 % of total) covering 15,350 acres (15.4 % of watershed total) within the park portions of the watershed.

A review of the contributing and non contributing drainage areas for this watershed (also known and effective and gross drainage areas) revealed that approximately 50.7 % of the watershed contributes to runoff flows in an average year. Approximately 30 % of the total wetland basins, and 41 % of the total wetland area are located in the contributing portion of the watershed.

It should be noted that the contributing and non contributing drainage areas for the watershed are reconnaissance level delineations of each that were developed in the 1960's and do not accurately reflect changes to each of these areas from road construction and land drainage. A review of the noncontributing and contributing boundaries of the watershed should be conducted to determine changes within each, as well as the watershed hydrologic changes incurred as a result of this change. This information will provide guidance to future water management needs, decisions and actions.

It should be noted that there are other data sets that provide estimates for wetlands at a watershed scale. The PFRA 1994 and 2000 landsat images provide an estimate for various landcover types. It should be noted that the landcover classification system concentrated its efforts on identifying cropland areas, consequently, the identification of wetland areas within these data sets are somewhat inaccurate and should not be used to provide an accurate estimate of wetland areas. As well, the Province of Manitoba developed a 1:20,000 scale data set for wetlands based on manual planimetery of ortho photography. Evaluations of this data set has revealed inaccuracies and inconsistencies in planimetry resulting in an underestimation of wetlands on the landscape. Such inconsistencies and inaccuracies in data sets points to the need for an accurate up to date inventory of water resources in order to make informed management recommendations.

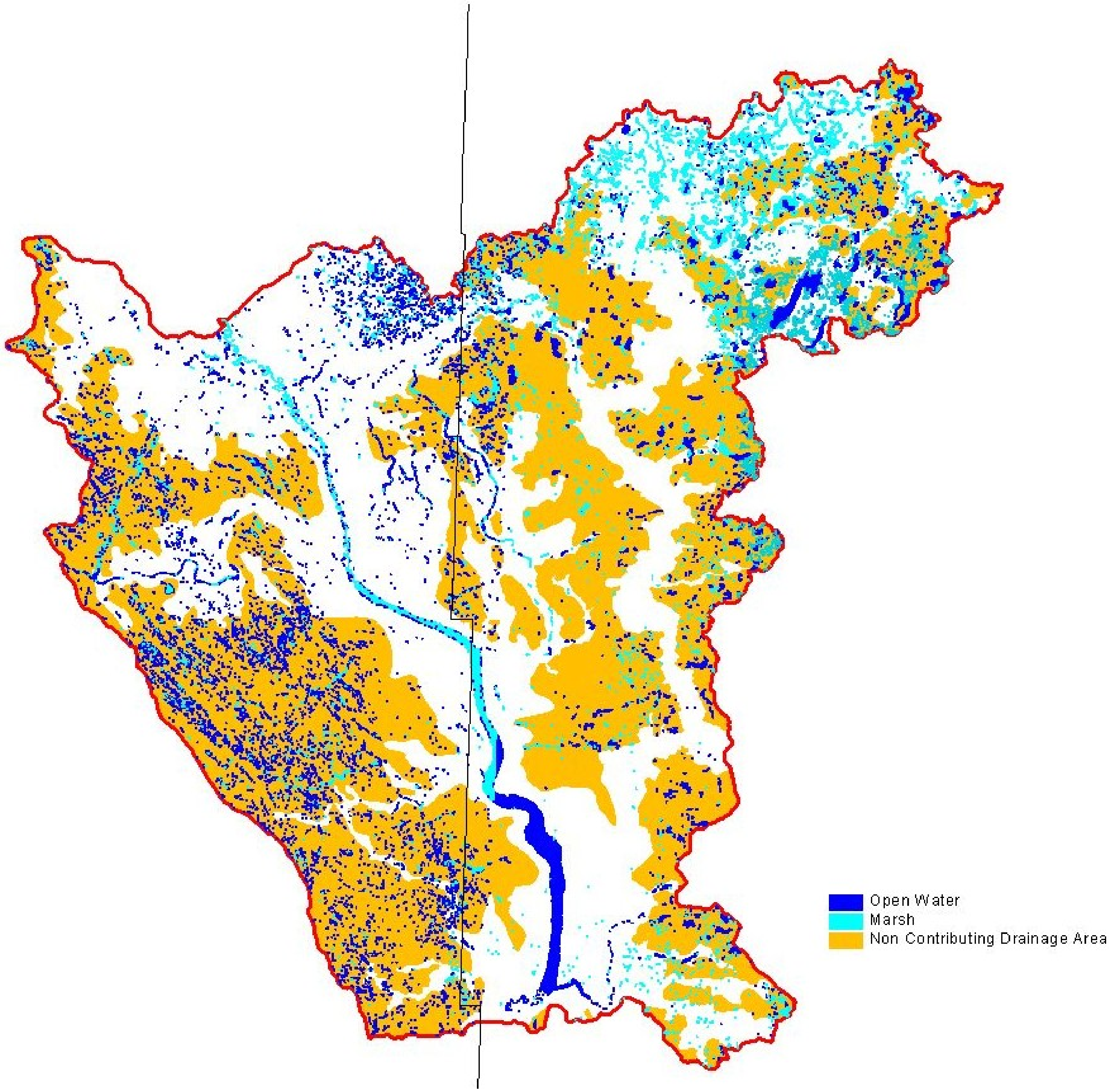


Illustration of Large, Deep Wetlands & Small, Shallow Wetlands vs Contributing and Non Contributing Areas of the Shell River Watershed

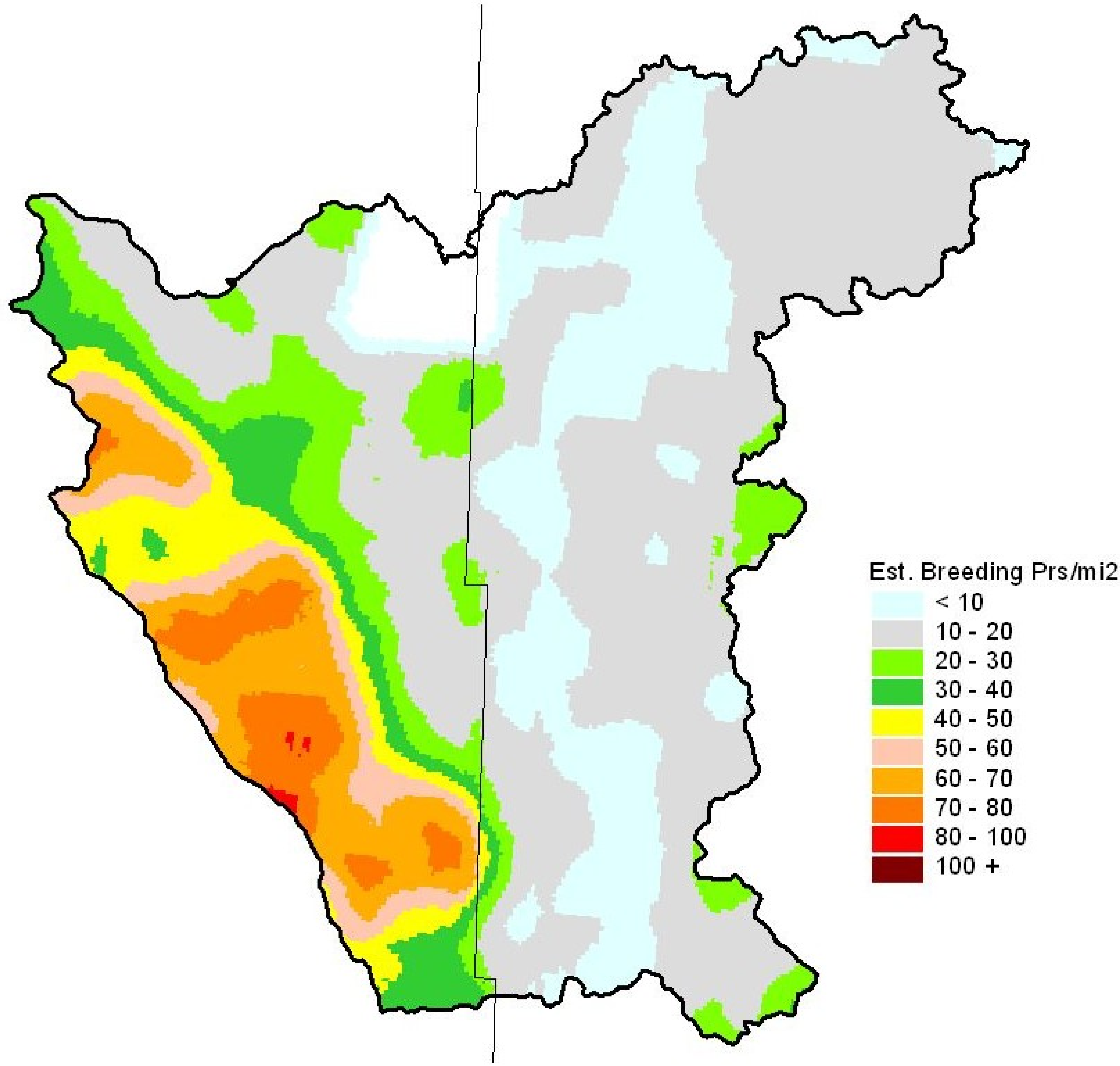
Decision Support System (DSS) data

Ducks Unlimited Canada developed a GIS-based Regional Conservation Decision Support System (DSS) to focus its resources on the areas with the greatest potential for waterfowl production in the prairie and parkland ecoregions of Western Canada.

The statistical model was developed to describe the relationship between waterfowl breeding pairs and various landscape habitat characteristics. The model uses DUC's habitat inventory data, CLI for Waterfowl Capability, drought sensitivity indices, landcover data, CWS Waterfowl Survey transect data, as well as waterfowl/wetland empirical relationships to generate an Estimated Waterfowl Breeding Pair map.

The estimated breeding pair density for waterfowl varies with wetland condition and density and in years of high run-off, waterfowl are abundant. The estimated long-term breeding pair density of waterfowl varies across the watershed from a low of less than 10 pairs per square mile to a high of 100 pairs per square mile.

The DSS indicates that approximately 36.5 % of the watershed has an estimated breeding pair density of 20 pairs/mile2 or greater, with most of this area being located in Saskatchewan.



Estimated Waterfowl Breeding Pair Density

ii) Watershed Trends

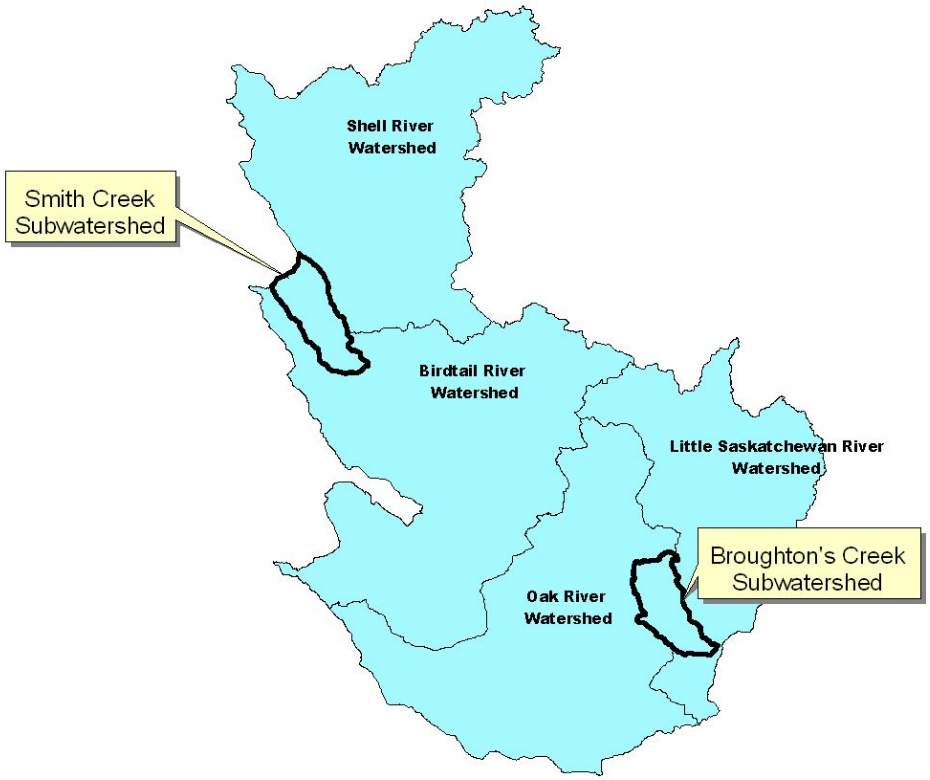
Despite over 65 years of intensive efforts by DUC and other conservation agencies to preserve and restore wetlands, and the multitude of ecological and societal values wetlands provide to the watershed, wetlands continue to be lost and/or degraded at a greater rate than they are being preserved and restored. Wetland loss occurs largely as a result of drainage, however, infilling of wetlands also occurs. Degradation of wetlands occurs in a variety of ways. Removal or conversion of native vegetation surrounding a wetland to cropland degrades the wetlands function as habitat, as there is a reduction in nesting cover and a subsequent increase in waterfowl depredation. Removal of ‘top water’ during wet periods, impacts the natural flood/drought cycle wetlands must go through to maintain healthy aquatic vegetation conditions. As well, draining additional water into a wetland increases the depth of water in the wetland. This increase in water depth changes the function of the wetland as its vegetation communities change to adapt to new water levels. As well, shallow wetlands that used to melt first in the spring time and provide a valuable food source to migrating waterfowl, now melt later and this results in a loss of food supply for waterfowl. Wetland consolidation occurs when one or more wetlands are drained or consolidated into one wetland. This activity results in both loss and degradation of habitat.

Wetland loss is highly variable across the landscape and the quantity of wetland area impacted fluctuates over time. A review of scientific literature and past wetland loss studies, indicates that up to 70 % of wetlands in the Canadian Prairies have been lost, with drainage being the greatest threat.

A recent wetland loss study was undertaken by the Canadian Wildlife Service (CWS). The CWS conducts wetland habitat and waterfowl population surveys on 52 transects across the Prairies. This study reviewed habitat loss on these transects from 1985-1999, and determined that up to 60 % of wetlands were lost on some transects in this time period alone.

As well, Ducks Unlimited Canada conducted detailed habitat loss studies on a watershed basis, in the 172 mi^2 Smith Creek subwatershed (located in the Shell River watershed) and the 153 mi^2 Broughtons Creek subwatershed, located in the Little Saskatchewan watershed. These detailed, intensive GIS based studies compared habitat conditions in each respective watershed from the years 1968 and 2000. After extensive groundtruthing to verify study findings, the studies shown that 64 % of the wetlands in the Smith Creek subwatershed, and 76 % of wetlands in the Broughtons Creek subwatershed had been either lost, degraded or altered.

As previously mentioned, loss of wetlands results in loss of hydrologic function to the watershed. A post-doctorate research team from the University of Guelph is currently conducting a study to estimate the impacts to waterfowl populations, water quality and water quantity. Results of this study will be presented to the watershed group at the completion of this study.



iii) Areas of Concern/Risks to the watershed

A risk assessment of wetlands is difficult as many factors affect wetland loss (ie weather cycles, landownership/farming practices, ag economics, drainage upstream,etc), and it can be said, that all wetlands are at risk to loss or degradation at some point in time. However, generally speaking (knowing full well there are always exceptions to the rule), wetlands located on crown land are generally at a lower level risk to loss or degradation than wetlands on private land, due to the inherent regulations that come with being on crown lands. Therefore, it may be suggested that wetlands located in RMNP and the various WMA's and other crown lands within the watershed have a reduced risk to loss than the same located on private land.

For wetlands on private land, wetlands located in pasture management or grazing systems are generally at a lower level risk to loss or degradation than the same located in cropland. The primary reasons being that pasture managers generally use wetlands a water source in cases of semi permanent or permanent wetlands, or as backflood grass production in a paddock rotational grazing system in cases of temporary and seasonal wetlands, and wetlands in cropland either flood out cropland or present themselves as obstacles when doing fieldwork.

For wetlands located on cropland, generally speaking, small, shallow temporary wetlands are at the highest risk of loss or degradation on the landscape. Reasons being that the water impounded either delays seeding or drowns out crops and these wetlands are the easiest to either drain or cultivate through.

Small, shallow wetlands in cropland not only possess the highest risk for loss, they have also been the most frequent type of wetland lost. This has resulted in a loss of ecological function within wetland complexes, as these wetlands provide vital food sources and breeding pair space for migrating waterfowl in the spring time.

Watershed concerns associated with wetland loss include loss of ecological function, wildlife habitat loss and the associated loss of biodiversity, degradation to water quality, increased flooding and the associated impacts to infrastructure downstream, degradation of local groundwater supplies and loss of recreation opportunities.

iv) Information Gaps

As previously mentioned, a current, accurate wetland inventory is needed to provide direction for watershed management decisions. In lieu of this, present data sets will have to be used and combined with field knowledge and experience to provide direction for targeting wetland preservation and restoration programming efforts.

Also, the location of the watersheds source water areas should be incorporated into the watersheds overall wetland preservation and restoration strategy to ensure wetlands in these areas are incorporated into a source water protection plan. As well, nutrient management zone information was not available at the time of submission, consequently, wetlands in areas that would most benefit nutrient management/water quality could not be identified. Wetlands should be included in the watershed’s overall nutrient management strategy to improve water quality.

v) Recommended BMP’s and Watershed Management Policies

Watershed Management Policies

a) No Loss of Wetland Policy - To assist in alleviating watershed wetland loss and degradation concerns, a No Net Loss of Wetland Policy should be drafted, adopted and implemented. This policy would ensure that any development that resulted in loss or degradation of wetlands would provide adequate levels of mitigation to ensure there is no loss of ecological and hydrological function to the watershed as a result of such development.

b) Endorsement, Enforcement and Ammendment of Current Licensing Process/Water Rights Act – The present Water Rights Act requires that a landowner apply and receive a license prior to conducting drainage works that result in water leaving the landowners land. The watershed group should seek to assist landowners in complying with this licensing requirement. Drainage licensing should be incorporated into the overall watershed management plan, and water management decisions should be made to ensure there is no further ecological or hydrological degradation to the watershed, as well as work towards restoring some of the function that has been lost by past drainage via implementing a wetland mitigation policy.

In addition to the above, there needs to be increased enforcement efforts to ensure that compliance to drainage licensing, and surface water management plans of the watershed are adhered to. When a surface water management plan is developed for the watershed, it is critical that all stakeholders adhere to this plan to achieve sustainable water management.

As well, the current licensing process does not account for loss of ecological function in the licensing process. Presently, the licensing process permits the drainage of temporary wetlands. Consequently over time, there develops an imbalance and subsequent degradation to ecological function, as the wetlands that provide the much needed feeding and breeding pair space sites are being lost and not replaced on the landscape. Further drainage works should be conducted only if the ecological and hydrological impacts of the proposed works have been adequately mitigated.

Recommended Best Management Practices

The following BMP's should be promoted and implemented to address wetland habitat concerns in the watershed:

a) Wetland retention and restoration – preservation and restoration of wetlands should be promoted to preserve and restore the hydrologic and ecological function of the watershed.

b) Promotion of Winter Wheat – Winter wheat should be promoted to assist producers in diversifying their cropping options and distribute the cropping workload over a longer time period. Winter what is also more wildlife friendly than conventional crop seeding practices.

c) Retention of Natural Areas – Natural areas provide a variety of benefits to the watershed – reduce erosion, help filter and purify water, increase infiltration into the groundwater, as well as provide habitat for wildlife.

d) Increase in Perennial Cover **–** in areas prone to erosion or salinity, grass mixtures should be sown down to address these concerns as well as provide habitat for wildlife

e) Use of Flushing Bars for Haying – to reduce the mortality rate of wildlife during haying season, the use of flushing bars should be promoted.

vi) Other information relevant to watershed planning

The following information was not available and would be useful in preparing an overall watershed management plan:

- water currently being allocated from wetlands for various water supplies; this information would assist in addressing loss of ecological function

- identification of point and non point nutrient sources – these would help identify where water quality and wetlands are currently being degraded, as well as help identify areas of the watershed where wetlands should be retained and restored to assist in watershed nutrient management.

- location of source water drinking areas – would identify key wetland areas that provide a natural filtration process for these water sources

- nutrient management zones – development of nutrient management strategy for the watershed to improve water quality.

- updated wetland inventory – would assist in determining overall wetland loss and change throughout the watershed.

- updated effective drainage area map – would assist in targeting various programs to areas of the watershed that contribute to flow on an average basis.