



UPDATE OF THE NOSE CREEK WATERSHED WATER MANAGEMENT PLAN

KEY *draft* UPDATES DISCUSSION DOCUMENT ENGAGEMENT SESSION II

1.0 BACKGROUND

The Nose Creek Watershed Partnership (NCWP or the Partnership) was established in 1998 with the goal to:

“Protect the riparian areas and improve water quality in the Nose Creek watershed.”

In 2007, the Partnership completed the Nose Creek Watershed Water Management Plan (the Plan), in consultation with stakeholders, as a guide and planning tool for resource management in the watershed.

The Partnership is currently working to update the Plan in 2016-17. The purpose of this scheduled update is to:

- Review the implementation status of recommendations made within the Plan,
- Update recommendations to reflect current legislation, plans, policies and guidelines, and
- Identify and recommend actions to address new challenges and opportunities within the watershed.

The updated Plan will:

1. Continue to guide all levels of government, individuals, landowners and non-profit organizations when making land and water management decisions in the Nose Creek watershed.
2. Reflect and build on current plans and policies from relevant jurisdictions, current watershed research, and consider stakeholder input.

An important part of the update is engaging with stakeholders. Engagement sessions give stakeholders the opportunity to provide input into the process at key stages.

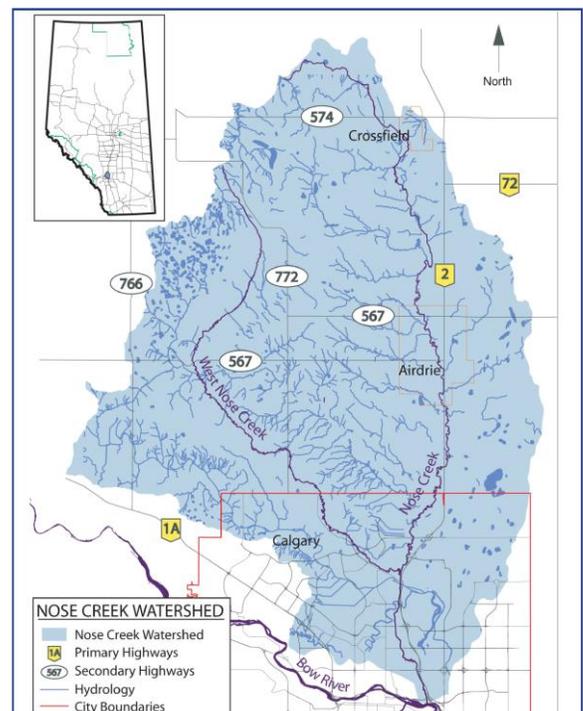
This document summarizes key draft updates from the Nose Creek Watershed Water Management Plan working draft. It was created to support discussion during the second series of engagement in November/December 2016. The content of this document is subject to change.

2.0 PLANNING AREA

Nose Creek originates near the northern boundary of Rocky View County and the Town of Crossfield, and flows south through the City of Airdrie, joining the Bow River in The City of Calgary near the Calgary Zoo. Nose Creek is fed by numerous intermittent streams; the most notable is McPherson Coulee. The main permanent tributary to Nose Creek is West Nose Creek. The watershed drains a gross area of 989 km², including West Nose Creek.

The mainstem of West Nose Creek originates in Rocky View County, northwest of The City of Calgary. The creek flows about 65 km before joining Nose Creek near Deerfoot Trail (Hwy 2), directly west of the Calgary International Airport. This sub-watershed drains a gross area of 325 km².

Nose Creek is an important tributary to the Bow River. The Nose Creek watershed is characterized by agriculture, country-residential developments, and growing urban centres.



3.0 SCOPE OF ISSUES

The following issues were identified by the NCWP, the Partnership Technical Team, by stakeholders during the first Engagement Sessions, and in follow-up conversations with municipal staff.

Water Quantity

- Challenges implementing the 2013 Runoff Volume Control Targets for certain types of development, and concern regarding the implementation of the more stringent 2017 targets
- Lack of tools at the municipal level to implement stormwater targets
- Lack of Provincial guidance on water reuse and stormwater use
- Lack of guidance for managing stormwater in areas proposed for redevelopment
- Low Impact Development (LID)
 - Limited uptake of LID practices by industry
 - Questions about cold-climate LID practice implementation and experience
 - The process for approval of LID, necessary to achieve stormwater targets, is not smooth and is surrounded by uncertainty (e.g., Approvals through the *Water Act* are difficult and time consuming)
- Need to integrate Internal Drainage Areas into existing and future policies to minimize discharge and protect property
- Lack of ability to maintain ephemeral and intermittent streams as important ecological features
- Lack of knowledge regarding springs and seeps in the headwaters

Water Quality

- High nutrient concentrations in Nose and West Nose creeks that contribute to algal growth and poor water quality downstream
- Channelization (straightening) of Nose and West Nose creeks that reduces channel lengths, accelerates streamflow, increases erosion, and decreases sediment deposition in the floodplain
- Discharge of treated effluent to Nose Creek from the Town of Crossfield, and the subsequent impacts to water quality and downstream users
- Limited monitoring being undertaken to measure improvements in water quality, streamflow and

channel morphology resulting from the Plan implementation.

- Lack of incentives for uptake of new practices to achieve goals for water quantity, water quality and riparian health

Wetlands

- Continuing loss of wetlands using the avoidance, mitigation, and compensation approach
- The lack of knowledge about the rate of loss of wetlands and the impact of that loss
- Wetland integration in development; lack of guidance on how to mitigate impacts on wetlands in new developments, or how to integrate water management and wetlands in developments without creating delays in the approval process

Riparian Areas

- Understanding costs and benefits of implementing strategies to protect riparian areas and improve water quality
- Implementation of riparian setbacks and over-interpretation of maps, particularly for ephemeral streams with poorly defined channels
- Encroachment of development into riparian areas and relaxations of setbacks

Biodiversity

- Protection for Brown Trout spawning habitat in West Nose Creek
- Invasive species (e.g., Prussian carp, crayfish) in storm ponds, creeks, and tributaries
- Prevention of new threats (e.g., zebra/quagga mussels, whirling disease)

Administration

- Discretionary decision-making that supersedes policy and deviates from the intent of the Plan
- Greater consideration of Public Utility Lands and Municipal Reserve Lands
- Plan to meet recommendations/targets earlier in the planning process (e.g., ASPs should show tributaries, green space)
- Difficult to track decisions to measure Plan implementation progress (e.g., wetland avoidance)
- Lack of enforcement for existing policy (e.g., erosion and sediment control)

4.0 NCWP GOALS AND OBJECTIVES

Goal

Since 1998, the goal of the NCWP has been “To protect the riparian areas and improve water quality in the Nose Creek watershed.” This goal is still relevant today. However, embedded in this goal is the knowledge that water quantity influences water quality – therefore, to improve water quality, water quantity must also be managed.

Revised Goal: *To protect riparian areas and maintain natural stream flows in the Nose Creek watershed to mitigate impacts of flood and drought, and improve water quality and conditions for aquatic life.*

Policy Statements

- A. Water Conservation Objectives should be implemented to maintain the quantity and quality of water for the management and protection of Nose and West Nose creeks.
- B. Integrated stormwater management practices should be implemented to improve stormwater quality, preserve the natural hydrology of the watershed, and to mitigate the negative impacts of urban development.
- C. Science-based riparian setbacks should be implemented to protect riparian functions in the Nose Creek watershed.
- D. **New Statement:** *Wetlands are critical to water balance, particularly for flood and drought mitigation. Increased effort should be made to retain natural wetlands in their natural state by taking active steps to integrate them into development designs.*
- E. **New Statement:** *Ephemeral and intermittent streams are valued as integral parts of the Nose Creek watershed. These waterways should be maintained to support local and regional drought and flood mitigation efforts, and to protect water quality, aquatic life, and upland biodiversity.*
- F. Source water protection measures should be used to maintain source water quality and quantity for downstream users and the aquatic environment.
- G. Other watershed protection measures should be implemented to address channelization and cumulative effect in the Nose Creek watershed.

5.0 OBJECTIVES FOR THE UPDATE OF THE NOSE CREEK PLAN

To provide a clear direction of the purpose for the scheduled update of the Nose Creek Watershed Water Management Plan (NCWWMP), five main objectives were identified.

Objective 1. Review the status of recommendations in the original NCWWMP.

Objective 2. Update the section on water quality to include Water Quality Objectives that consider existing provincial and local guidelines and objectives for Nose Creek (BRBC 2012; ESRD 2014).

Objective 3. Update recommendations regarding integrated stormwater management that may include:

- The policy for Internal Drainage Areas (IDA) (Jan 2015)
- Runoff Volume Control Targets
- Areas proposed for redevelopment
- Interim Stormwater Quality Targets
- Monitoring and performance evaluation

Objective 4. Update riparian protection strategies, including setbacks, permitted uses, and other management tools to reflect current policies, practices, and understanding of riparian condition.

Objective 5. Remove recommendations that have been achieved (i.e., reclassification of Nose Creek from Class D to Class C within the *Water Act* Codes of Practices) and respond to new issues identified.

6.0 INDICATORS

Environmental indicators are used to assess watershed condition through time. The updated Nose Creek Plan will identify indicators and associated measures (summarized in the table below) to track watershed condition and to evaluate success in achieving watershed management goals and objectives.

The updated Plan will also set targets and thresholds for indicators to determine how valued components in the

watershed compare to acceptable or desired ratings. Targets are either numerical or written statements. When a value falls below a target or threshold, management actions are triggered to bring the indicator back into acceptable range.

Table 1. Indicators and significance used to measure watershed condition.

Theme	Indicator	Measure	Significance
Water Quantity	Deviation from normal range of condition	Annual streamflow	Streamflows should reflect a normal range of condition and support channel processes (erosion/building), aquatic life, the riparian environment and communities.
		Runoff Volume	
		% Impervious Area	Increasing percentage of impervious surface area in watersheds may degrade stream quality (e.g., decreases baseflow, aquatic biodiversity (fish and macroinvertebrate diversity), and water quality; increases streambank erosion).
Water Quality	Deviation from baseline/normal concentration or load	Stormwater Quality Objectives	Deviation of quality from natural condition suggests a degrading (or improving) trend. Surface water quality should support designated or desired end uses.
		Surface Water Quality Objectives for nutrients, sediment, bacteria, and other parameters as data allows	
Riparian Areas	Riparian Function	Riparian Health Scores	Functioning riparian areas contribute to water supply, water quality, river channel stability, and biodiversity.
Wetlands	Wetland cover	Percentage of watershed area	
Biodiversity	Fish, Wildlife and Vegetation	Species composition No. of Trout redds	Aquatic and upland systems that support a diverse group of fish, wildlife, and plant species are more resilient to ecological adversity or changes to environmental condition.
		Invasive, disturbance and rare plants	
		Land cover (anthropogenic footprint, linear disturbance, critical habitat)	
		Riparian Health Scores	
Social Indicators	Green space, Parks, Open Space	Percentage area of open space in the watershed	Availability of open space supports community well-being.

7.0 *draft* RECOMMENDATIONS FOR THE UPDATE OF THE NOSE CREEK PLAN

Note to Reader: At this stage in the process of updating the Nose Creek Plan, all recommendations are considered draft. They are intended to form the basis for further discussion with the broader watershed community. These draft recommendations may be refined or removed based on further discussions.

Watershed management is a shared responsibility. There are numerous levels of government, agencies, organizations, and industries represented in the Nose Creek watershed; all have varying levels of responsibility for land and water resource management. An Implementation Strategy will accompany the updated Plan, highlighting who is responsible for the recommendation and the timeline for implementation.

Water Quantity

Runoff Volume Control Target

- a) The implementation date for the 2017 runoff volume control target for Nose Creek (11 mm) and West Nose Creek (16 mm) should be delayed, and the current 2013 targets should be maintained, according to Table 2. The delay addresses current implementation challenges, and allows time to:
- Advance Alberta’s Water Reuse and Stormwater Use policy that will provide clear and unified direction from the Government of Alberta;
 - Develop performance criteria for stormwater and rainwater reuse that will be based, in part, on the results of the study “Evaluating Microbial Risks and Performance Criteria for Safe Management of Stormwater and Rainwater Reuse”;
 - Advance a watershed-scale hydrologic/hydraulic model to evaluate streamflows and stormwater management strategies;
 - Complete the fluvial morphology study of Nose Creek and West Nose Creek;
 - Advance the City-wide loading project within The City of Calgary; and
 - Implement a water monitoring program to measure changes in stream channel morphology and water quality through time.

Table 2. Updated implementation schedule for the Runoff Volume Control Targets.

	Runoff Volume Control Target	
Implementation Date	Jan 2013	Delayed
Nose Creek mainstem	16 mm	11 mm
West Nose Creek	26 mm	17 mm
% Precipitation Volume Capture	93-95%	95-97%
% Increase in Channel Width	~50%	0-25%
Impacts of Runoff Volume on Creeks	Moderate	Low

- b) Integrate Internal Drainage Areas into existing and future policies to minimize discharges from these areas, and to protect property.

Integrated Stormwater Management

- c) Provincial and municipal governments, along with the development industry, should prepare to implement the delayed Runoff Volume Control Targets.
- i. Review progress on the development of enabling policies and supporting studies annually,
 - ii. Identify and investigate innovative tools and practices that will achieve targets,
 - iii. Consider the necessary infrastructure required to accommodate water reuse and stormwater use for multiple purposes in advance.
 - Include “purple pipes” in new housing, business, and industrial developments during the build-out phase when possible, as a fourth utility.

Purple pipe infrastructure carries stormwater (non-potable, semi-treated water) for purposes such as watering gardens, irrigation of golf courses and school grounds, washing cars, fire protection, or toilet flushing. The purple pipe can be a fourth utility that provides the mechanism for delivery of the stormwater and is separate from conventional infrastructure.

- Explore small, community-scale treatment of stormwater and grey water for the purpose of water reuse and stormwater use.
- d) Collaborate with partners to develop a watershed-scale predictive model to understand the consequences of alternative management actions on hydrological, ecological, economic and social systems.
 - e) Installation of rain barrels in all new developments should be mandatory. Clear instructions on the role of rain barrels and the proper use of rain barrels should be available.
 - f) Continue to work with the Alberta Low Impact Development Partnership (ALIDP)¹ to promote wider adoption of Low Impact Development practice in the watershed and reduce stormwater runoff volumes.
 - g) New developments and areas of redevelopment should reduce impervious surface area, where possible. Studies suggest that impervious surface area of greater than 10% causes substantial impairments to water quality and stream health. The City of Calgary maintains an impervious surface area target between 10% and 20%. In 1998, 32% of land cover was impervious.
 - h) Evaluate the need and options for runoff rate and volume control for redevelopment in established communities in the Nose Creek watershed.
 - i) Evaluate options to eliminate, reduce, or mitigate the need for relaxations of runoff volume control targets as part of the development approval process (e.g., cap-and-trade mechanism or fees for damages, etc.)

Ephemeral and Intermittent Streams

- j) Ephemeral and intermittent streams should be protected and maintained in new developments to moderate stormwater quality and volume. Compensation should be provided to rebuild streams removed for development.

- k) The width of the riparian setback for ephemeral and intermittent streams should include routinely flooded land adjacent to the creek (i.e., the flood prone zone), as well as the meander belt. Stormwater management facilities should be located outside of the riparian setback.

Water Quality

- l) Surface water quality in Nose Creek and West Nose Creek should meet water quality objectives (Table 3). The Water Quality Objectives reflect Alberta Surface Water Quality Guidelines (ESRD 2014) and BRBC Water Quality Objectives for Nose Creek (BRBC 2012).
- m) Stormwater quality in the Nose Creek watershed should not degrade water quality for irrigation, contact recreation, or aquatic life.
- n) Beneficial Management Practices (BMPs) to improve stormwater quality should be applied in the Nose Creek watershed. Applicable BMPs include, but are not limited to:
 - Continue with salt management planning to prevent over-use of de-icing agents as stormponds do not reduce salt loading to creeks (Table 4).
 - Construct salt storage facilities (indoors) that protect surface water and groundwater
 - Site snow dump locations away from creeks or ephemeral and intermittent streams
 - Retrofit existing infrastructure to include oil/grit separation and/or stormwater retention ponds
 - Apply on-farm BMPs in rural areas to reduce the transport of nutrients and sediments into waterways



¹ <https://alidp.org/>

Table 3. Select Surface Water Quality Objectives Compared to Observed Water Quality.

INDICATOR	WATER QUALITY OBJECTIVES	OBSERVED WATER QUALITY	
		OPEN WATER SEASON (April-October, monthly data)	
		BASELINE (1995-06) ^b	CURRENT (2009-15) ^c
Dissolved Oxygen ^a , mg/L	Acute Daily Minimum: > 5.0 Chronic 7-d Avg: >6.5 Spawning: ≥9.5	Median: 7.1 10 th Percentile: 4.8 Minimum: 2.3	Median: 8.79 10 th Percentile: 6.30 Minimum: 1.64
<i>E. coli</i> Bacteria ^a , cfu/100 mL	Meet recreation guideline. No single value to exceed 410 cfu/100 mL or ≤126 cfu/100 mL (geometric mean 5 samples/30 d)	Not reported.	Not calculated.
Fecal Coliform Bacteria, cfu/100 mL	100	Median: 350 ^d 90 th Percentile: 2540 ^d	Not calculated.
Total Phosphorus ^b , mg/L	0.05 Eliminate levels that cause nuisance aquatic plant growth.	Median: 0.170 90 th Percentile: 0.500	Median: 0.129 90 th Percentile: 0.246
Total Dissolved Phosphorus ^b , mg/L	0.02 Eliminate levels that cause nuisance aquatic plant growth.	Median: 0.020 90 th Percentile: (99-06 data - as DRP)	Median: 0.030 90 th Percentile: 0.141
Total Suspended Solids ^a , mg/L	Clear Flow Period: Max. increase of 25 mg/L from background levels for any short-term exposure (e.g., 24-h period). Max. average increase of 5 mg/L from background levels for longer term exposures (e.g., inputs lasting between 24 h and 30 d). High Flow Period: Max. increase of 25 mg/L from background levels at any time when background levels are between 25 and 250 mg/L. Should not increase more than 10% of background levels when background is ≥ 250 mg/L.	Median: 19.0 ^d 90 th Percentile: 62.1 ^d	Median: 37.8 90 th Percentile: 73.8 Median: 27.1 ^d 90 th Percentile: 63.3 ^d

^aEnvironmental Quality Guidelines for Alberta Surface Water (ESRD 2014)

^bBow River Basin Watershed Management Plan Phase II (2012) 1995-2006;

^cThe City of Calgary data for site Nose Creek at Mouth (2009-2015);

^dAnnual data (Jan-Dec)

Table 4. Summary of *draft* Interim Stormwater Quality Objectives.

Parameter	Interim Stormwater Quality Objectives		Statistic	Current Condition (2014-2016) ^a					
	Snowmelt	Rainfall		No BMP		BMP			
				Snowmelt (N=38)	Rainfall (N=65)	Snowmelt (N=5)	Rainfall (N=7)		
Conductivity, µS/cm	≤1000 ^b	≤1000 ^b	Median	1155	689	1460	1270		
			90 th Percentile	2254	2098	2660	2370		
Total Phosphorus, mg/L	Meet or improve current conditions.		Median	0.755	0.195	0.446	0.029		
90 th Percentile			1.399	0.642	2.180	0.110			
Total Dissolved Phosphorus, mg/L			Median	0.879	0.041	0.239	0.009		
90 th Percentile			0.363	0.244	0.553	0.054			
Total Suspended Solids, mg/L	Zero Human-Source Detections		Median	93	32	22	7		
			90 th Percentile	552	354	207	19		
Fecal Coliform Bacteria, cfu/100 mL			<410	≤126	Median	265	1100	139	10
					90 th Percentile	7920	11720	1040	400

^aPESL (Unpublished)

Riparian Areas and Wetlands

- o) Continue to apply riparian setbacks within each municipality to maintain the important ecological value (function) of these areas (i.e., bank stability, wildlife habitat protection, and water filtration and storage (i.e., aquifer recharge). Jurisdictions without a riparian setback policy are encouraged to adopt an existing partner policy or adapt one for future use.
- p) Relaxations of the riparian area setback should not occur. When encroachment on the setback cannot be avoided through alternative design or management, mitigation measures should be applied to minimize the impact, and compensation for impacts should be provided. Compensation may include one or a combination of the following activities:
 - new riparian plantings
 - removal of existing structures from within riparian areas
- q) To minimize encroachment and maintain the natural integrity of riparian areas, an additional 6 m development setback should be added to the riparian setback width. Activities permitted in the development setback may include:
 - Pathways – Direct impacts to the riparian area can be avoided by designing pathways and other future recreational infrastructure in the riparian buffer.
 - Mowing where short grass is desired to accommodate foot traffic or recreation activities.
 - Bioretention areas/bioswales/rain gardens
- r) Management actions should be taken to improve riparian condition when scores fall below the threshold rating of 70 using a priority approach for restoration.
- s) The City of Calgary should continue to monitor riparian areas according to the Riparian Management Strategy. Rocky View County and the City of Airdrie should develop a strategy to re-assess riparian areas systematically at benchmark sites. New sites should be identified in developing areas.

Stream Channel Structure

- t) Existing natural meander bends should be maintained and additional channelization of Nose Creek and West Nose Creek avoided. Planning associated with riparian areas should ensure that no additional stream length is lost, that floodwater can escape the channel into the floodplain, and that structures are outside of the meander belt unless they cannot be avoided (e.g., outfalls or water crossings).
- u) Meander bends should be re-introduced, where possible, to increase riparian habitat, slow stormwater flows, and improve fish habitat.
- v) Restore actively eroding or slumping streambanks using appropriate soil bioengineering techniques. Where possible, use “bioengineering” techniques, as opposed to armouring (i.e., riprap) to reduce impacts on fish habitat.²

Vegetation

- w) Protect and maintain existing native riparian plant communities, and continue to avoid and minimize new disturbance or clearing of native vegetation within the riparian zone.
- x) Avoid mowing in the riparian area, and allow for natural recovery of native plants or augment native plant cover using suitable native species.

Restoration³

- y) Clustered plantings of native trees and shrubs should be used in future landscaping or restoration projects to improve woody cover in the riparian area (e.g., balsam poplar, aspen, willows, red-osier dogwood, silverberry, and choke cherry).
- z) Maintain new soil bioengineering and riparian planting projects:

² Refer to the Design Guidelines for Erosion and Flood Control for Streambank and Riparian Stability Restoration (The City of Calgary) (<http://www.calgary.ca/UEP/Water/Pages/Watersheds-and-rivers/Riverbanks-and-Floodplains-in-Calgary.aspx>).

³ Recommendations were adapted from Cows and Fish 2014 and 2015 Riparian Health Inventory reports for Nose Creek and West Nose Creek.

- Water new plantings frequently until they are established.
- Apply cardboard and wood chip mulch around new plantings, where necessary, to reduce potential for competition with disturbance-caused non-native grasses.
- Replace dead plantings as needed.
- Install beaver and wildlife fencing (where needed) to protect new plantings.
- Minimize the use of chemical herbicides and fertilizers

aa) Monitor new soil bioengineering and riparian planting projects to assess survival and inform future projects. Monitoring and record keeping efforts should include:

- Source and type of plant materials used,
- Planting methods used,
- Assessment of survival rates of native plants,
- Site maintenance effort and cost
- A photo journal documenting before, during, and after conditions of the project
- Evaluate success and failure and use the findings to improve future riparian enhancement projects.

bb) Where reed canary grass is routinely mowed along streambanks (e.g., at golf courses, in manicured Environmental Reserves), sedges and non-suckering native shrubs tolerant to saturated soils should be planted to replace the reed canary grass and maintain bank stability and function.

Invasive Weeds²

cc) Continue efforts to control and monitor invasive plant species on an annual basis with due care to native plants and water resources. Weed control efforts should first focus on removing new invasive plant species infestations that are not yet widespread (e.g., Yellow clematis, nodding thistle, scentless chamomile, and ornamental geranium).

dd) Weed control efforts should be coordinated with the Canadian Pacific Railway (CPR), adjacent jurisdictions, and adjacent residential community associations.

ee) Avoid caragana root removal that may cause soil disturbance or undesirable impacts to bank stability. The priority for caragana management

should be to prevent its spread into intact native riparian plant communities.

Stewardship²

ff) Continue to encourage use of designated pathways. Sign and close undesigned trails which are contributing to bank erosion and slumping. Install educational signage in conjunction with restoration projects and trail closures.

gg) Encourage community involvement in creek clean-up events, weed pulls and other restoration projects when possible. Community involvement may come from community associations, golf clubs, shopping mall landscaping managers, or other.

hh) Avoid dumping of grass clippings or other landscaping debris into the Nose Creek riparian corridor to prevent the spread of weeds (NOS8).

ii) Continue to educate dog-owners about existing on and off-leash regulations and the sensitivity of the riparian zone, fish habitat and water quality to dog use impacts.

Wetlands (Lentic Systems)

jj) Multi-staff review of applications under the *Water Act* and the Alberta Wetland Policy for wetland restoration projects results in timing issues. A streamlined approach for wetland restoration project applications should be developed where clear benefits to Nose and West Nose creeks are identified.

Biodiversity

kk) Nose and West Nose creeks were classified as Class C waterbodies on the Code of Practice maps⁴ following a recommendation from the NCWP to the Province (PEL 2007). The restricted activity period (RAP) associated with this reclassification was established as April 1 to May 31 (ESRD 2012). Recently, Brown Trout were observed spawning

⁴ ESRD. 2012. Code of Practice Map for Pipelines and Telecommunication Lines Crossing a Water Body, for Water Course Crossings, and for Outfall Structures on Water Bodies, Calgary Management Area. Edmonton, AB.

and emerging in West Nose Creek (Bow Valley Habitat Development 2015, 2016).

The RAP for Nose and West Nose creeks should be made biologically relevant to Brown Trout that spawn in the fall (e.g., a RAP of Sep 16 to Apr 5 would help to protect important spawning areas).

ll) The area appropriate for the fall/winter RAP should be identified on the Code of Practice maps (e.g., West Nose Creek from the mouth upstream to Symons Valley Parkway NW).

mm) Protect and maintain critical spawning and rearing areas for Brown Trout in West Nose Creek by:

- i. Adhering to the Restricted Activity Period,
- ii. Maintaining appropriate water temperature and overall habitat condition by implementing the riparian recommendations.

nn) Consider wildlife habitat sensitivities (e.g., secure nesting habitat) in future land use plans.²

oo) Monitor beaver use as they can benefit riparian areas. Where possible, natural beaver activity should be permitted.²

pp) Protect mature trees from beaver use with appropriate 2" x 4" wire mesh cylinders to a

minimum height of 1.0 m (or taller depending on average snow depth).²

Aquatic Invasive Species

qq) A study should be undertaken to document the occurrence of invasive species (e.g., Prussian carp, crayfish) in storm ponds, and in Nose and West Nose creeks and their tributaries, to support future Plan recommendations and a detection program for aquatic invasive species.

rr) Educational resources should be developed for public users of Nose and West Nose creeks, that highlight the threat of aquatic invasive species:

- i. Crayfish – Crayfish captured in Nose and West Nose creeks should not be consumed by humans. Crayfish are filter feeders and can bioaccumulate metals and other toxins in tissue.
- ii. Release of aquarium fish (e.g., goldfish) is prohibited. These fish compete with native fish for food and can displace native species, simplifying aquatic systems.
- iii. Invasive aquatic plants observed in the watershed should be reported to municipal staff.

ss) Whirling disease is a relatively new threat in Alberta (summer 2016). Precautions should be taken to prevent the spread of this disease.

8.0 NEXT STEPS

The next steps for the update of the Nose Creek Watershed Water Management Plan are to:

- i. Consider input from the Engagement Sessions, local government meetings, and the Technical Team.
- ii. Complete the draft watershed plan and an Implementation Strategy to accompany the plan. The Implementation Strategy will outline, who is responsible for the recommendations, the timeline for implementation, resources, and costs where required.
- iii. Seek input on the completed draft Plan.
- iv. Final approval of the updated Plan by the NCWP
- v. The Plan will be reviewed and updated periodically to reflect current knowledge and activities in the watershed.

9.0 FOR MORE INFORMATION

Kristyn Smigelski, Rocky View County
NCWP Chair
Email: ksmigelski@rockyview.ca

Document Prepared by:



Palliser Environmental Services Ltd.