

Bonsall Creek Watershed Management Plan

June 8, 2016

DELIVERED BY



FUNDING PROVIDED BY



Canada

MUNICIPALITY OF

NORTH
Cowichan

Prepared by

SSG

**SUSTAINABILITY
SOLUTIONSGROUP**



Figure 1. Location and surrounding watersheds to the Bonsall Creek Watershed.

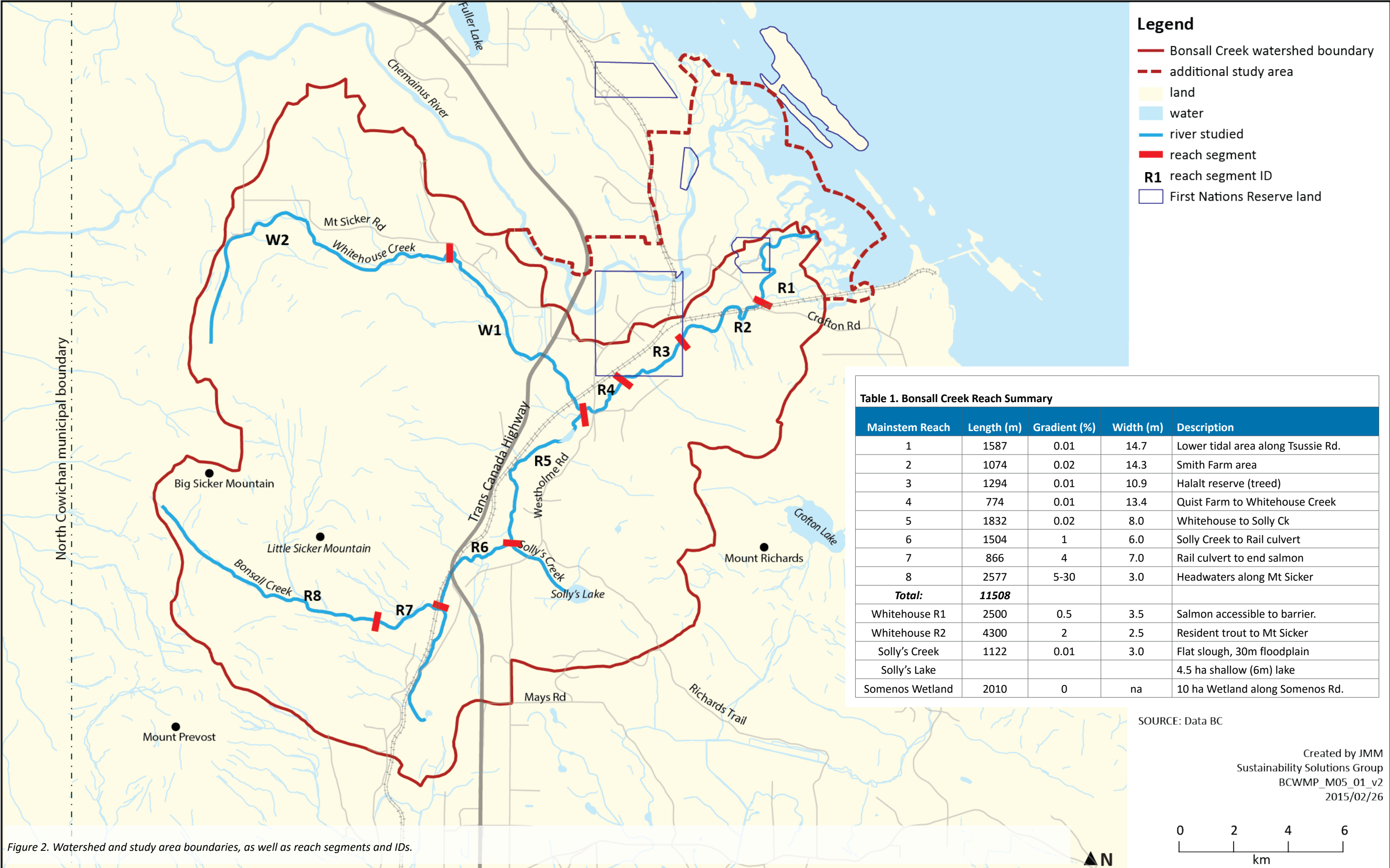


Figure 2. Watershed and study area boundaries, as well as reach segments and IDs.

The Bonsall Creek Watershed connects all ecosystems and inhabitants via clean waterways shaped by natural forces and maintained by a community of active stewards. The area's responsible agricultural operations and recreational uses complement the traditional and ongoing fishing activities in the rivers and on the shore. Through considerate cooperation of its users, the watershed provides pristine habitat, enjoyment and natural resources in perpetuity.

Contents

1. The Bonsall Creek Watershed Story	1
1.1 The Bonsall Creek Watershed Plan Project	1
1.2 Where the Waters Flow	1
1.3 Historical Background	2
1.4 Modern History of Watershed Streamworks	2
1.5 Surface Waterways Characteristics	3
1.6 Aquifer Characteristics	5
1.7 Watershed Ecosystems	6
1.8 Modern Watershed Planning Context	6
1.9 Climate Change Impacts Affecting the Watershed	9
1.10 Public Opinion of the Watershed	9
2.1 Getting a Clear Sense of the Issues	13
2. Watershed Planning for Everyone and Everything	13
2.3 Establishing Appropriate Actions	17
2.4 Actions Prioritization	18
2.5 Action Prioritization Discussion	25
3. Watershed Management Implementation Plan	26
3.1 Priority Actions	26
3.2 Comments on Remaining Actions	32
4. Conclusions	34
Appendix 1: Information for Work In and About a Stream	35

List of Figures

Figure 1. Location and surrounding watersheds to the Bonsall Creek Watershed.	iii
Figure 2. Watershed and study area boundaries, as well as reach segments and IDs.	iv
Figure 3. Topography defining the Bonsall Creek Watershed.	vii
Figure 4. Agricultural Land Reserve, farm land, and actual agriculture use in the Bonsall Creek Watershed.	viii
Figure 5. Depth to water table (annual).	7
Figure 6. Dominant drainage class.	8
Figure 7. Interpreted bedrock.	11
Figure 8. Mapped Aquifers (BC Ministry of Environment) and available well data.	12
Figure 9. Sample MCA prioritization showing a high preference for achieving the objective to improve drainage.	16
Figure 10. Sample MCA prioritization showing equal weighting for all objectives.	19
Figure 11. Sample MCA prioritization showing a high preference for achieving the objective to protect habitat.	20
Figure 12. Sample MCA prioritization showing a preference for achieving primarily ecosystem-related objectives.	21
Figure 13. Sample MCA prioritization showing a preference for achieving primarily agriculture-related objectives.	22
Figure 14. Sample MCA prioritization showing a preference for achieving primarily water quantity and quality improvements.	23

List of Tables

Table 1. Bonsall Creek Reach Summary	iv
Table 2. Watershed characteristics	4
Table 3. Estimates of mean monthly discharge and mean annual discharge (MAD)	4



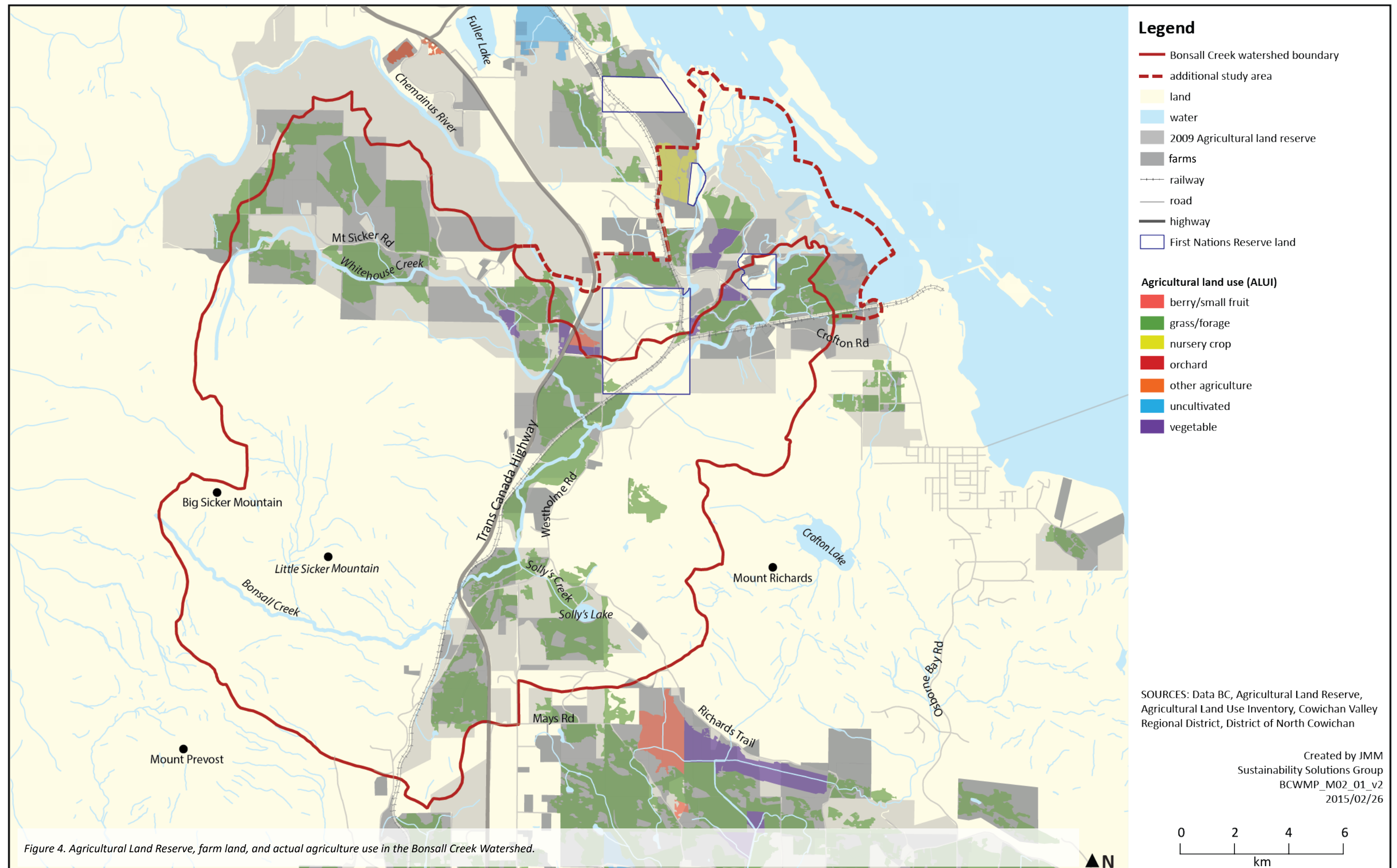


Figure 4. Agricultural Land Reserve, farm land, and actual agriculture use in the Bonsall Creek Watershed.

1. The Bonsall Creek Watershed Story

1.1 The Bonsall Creek Watershed Plan Project

The Bonsall Creek watershed is a scenic area of North Cowichan located between Chemainus and Somenos, and an important ecosystem in the Municipality of North Cowichan. It is also within the Traditional territory of the Hul'q'umi'num First Nations, which include present day Halalt First Nation, Penelakut Tribes, Lyackson First Nation, Stz'uminus First nation, and Cowichan Tribes.

The Bonsall Creek Watershed Management Plan provides a community vision for water use in this watershed, including how ground and surface water is used, how seasonal water shortages or surpluses are addressed, and how water-related decision-making is approached in the area. The vision and its supporting actions were established by citizens of North Cowichan, members of First Nations communities, professional watershed consultants, North Cowichan staff, and members of Council. The project was overseen by the Municipality of North Cowichan's Agricultural Advisory Committee of Council and the Advisory Working Group.

Figure 2 depicts the location of the watershed within the municipal borders of North Cowichan and the project study area. In addition to the watershed area, the study area includes the region northeast of the watershed, accounting for the greater estuary of the watershed as well as an aquifer that affects water availability in the northeast area of the Bonsall Creek Watershed.

1.2 Where the Waters Flow

Lands in North Cowichan are influenced by 5 watersheds: Cowichan River, Chemainus River, Bonsall Creek, Crofton Lake and Banon Creek. The Bonsall Creek watershed is considered a sub-watershed of the Chemainus River. Bonsall Creek watershed is approximately 3,595 hectares (36km²)—over 6700 American football fields in area. It drains from the slopes of Mount Sicker and Mount Prevost at over 700m elevation and travels 12km to the ocean. It drops quickly and the majority of the channel is in low gradient, farmed reaches. Several major roads cross it, as does the E&N railway (Figure 3 and Figure 4).

The headwaters area, primarily the entire area of Mount Sicker, is used for forestry operations. The Municipality of North Cowichan owns most of the land but there are other smaller land holders and patches of crown forest land. The municipality has been operating the woodlot on a sustainable basis since 1946.

The land in the eastern part of the watershed contains a significant flood plain area (550 hectares) much of which is either within the Agricultural Land Reserve (ALR) (~427 hectares) or upon which is located the Halalt First Nation (~107 hectares) and Tsussie (Penelakut First Nation) (~15 hectares) reserve land. These First Nations are both Coast Salish and part of the Hul'qumi'num

Treaty Group. The Halalt lands straddle the midreach (R3) of Bonsall Creek while the Penelakut Reserve on Tsussie Road is at the mouth of the creek. Both reserves consist of small residential areas and forested outlying areas.

The watershed contains three fish-bearing tributaries. Whitehouse Creek, the longest, joins mid-reach and drains the north side of Mt. Sicker from approximately 7km. Solly's Creek enters from the lower east side off the side of Mt. Richards and through Solly's Lake. A 10ha wetland along Somenos Road feeds a stream channel for 1.5km to the mainstem Bonsall above the highway. All of these low gradient stream channels result in a highly productive stream that supports high numbers of Coho and Cutthroat Trout, among other species of salmon and trout. Much of the watershed has been extensively developed for farming. The prime agricultural operations are pasture fields for dairy and beef production. There are several other smaller mixed hobby farms that offer farm gate products. A large vegetable market garden and a salmon hatchery are also found along the Whitehouse Creek area.

There are 580 properties and 259 dwellings in the Bonsall Creek watershed area. There are no urbanized or dense residential areas. The residential houses are all strung along the secondary roads with large lots partly due to being on septic and ground water well services. There are no heavy industrial operations in the watershed. The processing plant for agricultural animal products adjacent the Halalt Reserve has been closed for approximately 20 years. There is a gas station, restaurant and farmers market at the highway junction with Mt. Sicker Road.

This area includes a number of First Nations documented archaeological sites, graveyards, camping sites, hunting territories, fishing places, clam beds, medicinal and food plant harvesting areas, spiritual sites, and cultural sites (Morales 2007, Hul'qumi'num Elders).

The watershed consists of a number of critical components and land uses that reflect the variety of stakeholders with interest in and influence on water management within North Cowichan: private and municipal forest reserves, agriculture including a salmon hatchery, rural residential, farm market, and a small fishing industry, which includes crabs, prawn, long line (halibut), shell fish, as well as recreational fishing. There are a number of demands for the surface water resources of Bonsall Creek such as domestic drinking water, fish habitat, crop irrigation, and hatchery supplementation. Each demand varies in the amount, rate, and timing of the need.

A summary for each reach segment is provided in Table 1 and corresponds to those as shown in Figure 2. This information is gathered from past site surveys of different reaches, as well as recent site surveys along most of the Bonsall Creek reaches.

“

A watershed is an area of land where all of the water that is under it or drains off of it goes into the same place.

— US Environmental Protection Agency

”

“

An area of land, a bounded hydrologic system, within which all living things are inextricably linked by their common water course and where, as humans settled, simple logic demanded that they become part of a community.

**— John Wesley Powell
American scientist geographer**

”

1.3 Historical Background

Creeks Named After Early Settlers

Bonsall Creek was named after Henry and Anna Bonsall who settled in the Westholme District in 1874. Henry Bonsall was one of the 56 Petitioners that signed the Incorporation Petition presented to the Lieutenant-Governor in Council that led to the incorporation of North Cowichan on the 14th of June, 1873 under the name of “The Corporation of the District of North Cowichan.” At that time they were one of only 5 settlers in the Westholme District and their farm consisted of 30 acres that they cleared from the forest and diked from the sea.

Leonard Fordham Solly was a former banker whose 210 acre Lakeview Poultry Farm was developed in 1907. Solly’s Creek and Lake bear his namesake. He received many awards for his agricultural and community achievement including the Master Farmer of Canada Gold Medal in 1931 and the King George VI Coronation Medal in 1937.

Following in the footsteps of those early pioneers, farming flourished in the fertile soils of the watershed. Today the largest farming operations in the watershed are 4 family-run dairy farms,

2 of which span generations. The watershed also encompasses market garden, soft fruit, beef cattle, and poultry farms, as well as egg processing, and a slaughter and meat packing facility.

Bonsall Creek has been identified as a historically important site for fishing, and hunting ducks and beaver, and as an area of numerous traditional portage routes. The Sicker Mountain area within the Bonsall Creek watershed was used by the Hul’q’umi’num people to hunt large mammals such as deer, elk, and black bear, and Sicker Mountain is described in origin stories for some Hul’q’umi’num peoples. Currently, much of the lands in the watershed are used for agricultural production (Figure 4).

1.4 Modern History of Watershed Streamworks

Flooding over pastures has been a long-standing concern to farmers and property owners in the Bonsall Creek watershed. First Nations have also witnessed fish production declines. Both groups have been working on these issues.

Early drainage issues like beaver dam removals and the clearing of debris jams were taken care of by landowners. Over the past

100 years development pressures and changes in the watershed have resulted in sedimentation of the low gradient, agricultural areas of Bonsall Creek. With over 200 acres of farm land directly impacted, farmers would straighten and dike the creek to decrease flooding and to maximize the arable land available.

In 1992, the Ministry of Agriculture and Food (MAF) and partners conducted an engineering survey of the Bonsall Creek channel from Tidal to Reach 6 to determine the creek profile and cross sections (Schulz, 1992). This survey was requested by area farms to address the flooding that had been occurring on their land. The survey showed there was an overall elevation gain of 4.0m over 5km from the Crofton Road Bridge to Solly's Creek. This project was one of the first coordinated Provincial and local government efforts to regularly maintain Bonsall Creek.

The Bonsall Creek Pilot Project (1993-1996)

In March 1993, water issues on farmlands in Cowichan Valley were the catalyst for a Water Forum hosted by Community Futures, Cowichan Agripro and the Ministry of Agriculture. Restoration of Bonsall Creek near Westholme Road was chosen as a pilot project aimed at developing cooperative relationships between government agencies and local farmers. A Watershed Committee with representation from Halalt and Penelakut First Nations, MOA, farmers, property owners, not-for-profit organizations and the Municipality of North Cowichan was established. The project aimed to maintain and improve agricultural productivity while maintaining and enhancing fisheries and wildlife resources.

A Bonsall Creek in-stream work plan was developed in 1984. Gravel deposits were dredged from a portion of the upper section and a settling pond was dug to contain migrating gravel. The pond was cleaned out as needed, every 1-3 years. After its first year of activity, 1000m³ of gravel was removed. Further downstream, the creek was deepened and the choking Reed Canary grass was removed. Blockages were removed from the lower area of the system through the Halalt Band lands and a water line that was restricting flows was lowered by the Halalt Band.

Riparian zone replanting took place in 1994-1995, performed by local group volunteers including school groups and the Cowichan Valley Naturalists. The planted areas containing livestock were fenced. Other fish enhancement activities included spawning gravel placement and in-stream complexing (Ayers et al 1996). Funding for restoration work came from the BC Green Plan for Agriculture, the Municipality Of North Cowichan, local landowners, Tree Plan Canada and the Shell Environmental Fund. Timber West Forest Products Ltd supplied trees and logs for salmon enhancement work. BC Forest Services and Providence Farm donated trees for riparian restoration.

The Watershed Committee met frequently in the 1990s as there was much to do. Work included the construction of berms alongside the channel margins in some locations while at other locations riparian areas were replanted and sections of the

channel were enhanced with boulders and large pieces of wood.

The Watershed Committee is no longer, and current creek activities – primarily maintenance of problematic sections of the channel – is overseen by the Municipality and Province. Various maintenance occur mostly in an ad-hoc fashion, as funding becomes available and permission is granted, including:

- Installation of fencing and bridges to limit livestock access to the channel;
- Routine cleaning of sediment basins;
- Ongoing riparian planting and installation of rock and wood structure to the channel; and
- Removal of debris and other blockages from the channel.

The Bonsall Creek Habitat Restoration Project (2003-2004)

In 2003 John Funk's farm, containing 880m of Bonsall Creek's prime Coho spawning and rearing habitat, was identified for restoration work. The farm is located just below the high gradient section of stream above Highway 1 and the first property downstream of the highway culvert. It contains spawning gravels that were continuing to migrate down to the settling pond built in 1994. No works were completed on this property in the 1994-1996 Bonsall Creek project. The high velocity of the stream was also eroding its banks along the farm. This generated more sediment in the lower gradient sections downstream. Although this section contained the best spawning gravels it lacked the pool-riffle complexity required for ideal fish spawning habitat. Marc Gaboury, LGL Ltd. with data from a stream cross section survey drew up the plan for 13 Newberry weirs that were installed in this section of stream to create the needed complexity. With the installation of the weirs (that helped to reduce steam velocity and gravel movement downstream) the cleaning of the settling pond downstream of the weirs has been decreased to every 5 years (pers. comm. Wayne Haddow 2014). DFO Habitat Biologist Mel Sheng identified 6 sites requiring bank stabilization and made work recommendations for each. Other works included bridge construction, riparian livestock fencing and the digging of an off-stream well for cattle watering. Funding for this project came from the Pacific Salmon Foundation, Fisheries Renewal, Central Gas, District of North Cowichan, Island Farmers Alliance, Halalt First Nation and the property owner, John Funk. Assisting with the project were volunteers from Cowichan Valley Naturalists.

1.5 Surface Waterways Characteristics

Table 2 summarizes the watershed's hydrological characteristics, with two sub-watersheds considered within the Bonsall Creek watershed: i) Bonsall Creek above its confluence with Whitehouse Creek (hereinafter Bonsall Whitehouse), and ii) Whitehouse Creek above its confluence with Bonsall Creek (hereinafter Whitehouse). The watershed characteristics for all three of these drainages are provided in Table 2. The watershed characteristics of Bings Creek, which is southwest of Bonsall Creek, have also been provided.

Table 2. Watershed characteristics					
Watershed or Sub-watershed	Drainage area (km ²)	Mean elevation (m)	Min elevation (m)	Max elevation (m)	Lake area (%)
Bonsall Crofton	34.4	205	2	721	0.18%
Bonsall Whitehouse	20.3	242	6	721	0.29%
Whitehouse	11.2	168	6	708	0.02%
Bings Creek	17.5	201	29	769	0.11%

Table 3. Estimates of mean monthly discharge and mean annual discharge (MAD)				
Month	Mean Monthly Discharge (MMD) (m ³ /s)			
	Bonsall Crofton	Bonsall Whitehouse	Whitehouse	Chemainus WAP
January	1.968	1.159	0.639	3.600
February	1.777	1.047	0.577	3.300
March	1.478	0.871	0.480	2.700
April	0.810	0.477	0.263	2.500
May	0.414	0.244	0.135	0.240
June	0.247	0.145	0.080	0.140
July	0.157	0.092	0.051	0.070
August	0.124	0.073	0.040	0.030
September	0.121	0.071	0.039	0.010
October	0.239	0.141	0.078	1.500
November	0.945	0.557	0.307	3.600
December	1.919	1.130	0.623	4.300
MAD	0.850	0.501	0.276	1.800

Estimates of mean monthly discharge (MMD) and mean annual discharge (MAD) for Bonsall Crofton, Bonsall Whitehouse, and Whitehouse are provided in Table 3, along with the values provided for the Bonsall Creek watershed from the Chemainus River Water Allocation Plan (WAP) published in 1996.

MMD is the highest in the winter period, moderately high at the start of spring, and moderate in spring and late autumn. MMD is low in the months of May through to October, with more extreme lows in July through to September, which generally coincides with peak water use for irrigation.

Both the Chemainus River and Bonsall Creek floodplains are controlled primarily by geologic formations and the alluvial plain has many channel scars from former river paths. Both of these channels presently flow in an irregular meandering channel

pattern and historically they would have comprised a series of distributary channels that coalesced on the floodplain.

Prior to land clearing for farming, the floodplain would have had a mix of thick vegetation cover and marshland. Sediment that is carried by the creek would deposit in the low gradient floodplain, gradually filling the channel with sediment causing it to spill over its banks more and more frequently until it would form one or more new channels. The surrounding ground is generally poorly drained and is capable of storing floodwaters that would naturally recharge the stream after the flow levels dropped.

It is well suited to a variety of agricultural crops and farming goes back as far as the 1850s. As farming expanded in the area, the land was cleared, drained and ditched in an effort to lower the water table. Loss of wetland areas and channelization of the creek has increased rates of erosion and sedimentation during

floods and has contributed to the severity of low flow conditions during extended periods of low or no rainfall.

The lower part of Bonsall Creek, extending downstream of the highway and portions of Whitehouse Creek and other tributary channels extending both upstream and downstream of the highway are characterised as incised, irregularly meandering channels. These channels are frequently clogged with debris and vegetation, are prone to undercutting and erosion and the banks are often covered with grass, sparsely distributed ferns and other brush. The main channel splits into a series of distributary channels at its distal end downstream of Crofton Road. The land is primarily forested upstream of the railway, the gradient becomes steeper and Bonsall Creek transitions across an alluvial fan and the base of the slope into a step-pool morphology with a bed comprised of cobble and gravel further into the headwaters.

Bonsall Creek is flooded by the Chemainus River from 1:20 year return period floods, though it is likely to receive flow from the Chemainus River more frequently. Highway 1 lies above the Chemainus River floodplain, and when the land floods water is diverted into Whitehouse Creek, which is then conveyed into Bonsall Creek.

Bonsall Creek has a very low gradient downstream of Highway 1 and the water table is generally not far below the surface (Figure 5). Extensive areas of land between Highway 1 and Westholme Road are less than 0.5m above the water table. Given that the ground has such a low gradient and the composition of the soils are such that they are generally poorly drained, the area will be quick to flood and water will be slow to recede. (Figure 6)

There are many gaps in our understanding of how the watershed responds to changes in water supply, consumption, storage, and drainage, largely due to lack of monitoring. It is clear that many of the farms on the east side of Highway 1 are severely affected by high groundwater tables and surface water drainage issues due to their location in the watershed. Issues such as poorly drained soils, high water table, and convergences of surface and groundwater flows contribute to create challenging conditions for farmers. Increasing vegetation cover and storage capacity in the upper watershed would help to reduce peak floods. Planting of riparian vegetation and management of sediment sources in the upper watershed will help reduce the rate and degree that sediment is delivered to the channel, which will help improve water quality and maintain the capacity of the creek to convey flow.

1.6 Aquifer Characteristics

Three bedrock and two overburden aquifers have been mapped in the Bonsall Creek watershed (Figure 7). The Solly's Creek groundwater sub-basin can be identified by the groundwater divide at the dashed orange line. Aquifer recharge is likely

enhanced in areas where soil drainage is greater, which for the most part occurs in upland areas. The Bonsall Creek alluvial fan at "A" in Figure 7 is an area where recharge to upper aquifers 172 and 174 likely occurs. Upper Whitehouse Creek watershed is characterized by well to moderately well drained soils, likely contributing to recharge of the bedrock aquifer and the Chemainus aquifer (172). Solly's Creek groundwater basin is recharged locally and likely cannot sustain elevated groundwater extraction.

Seasonally elevated water table in lower Bonsall Creek are likely the result of the combined effect of a very gentle topography, very low horizontal hydraulic gradients, a bedrock high, and pinching of the Chemainus River Aquifer (Aquifer 172) towards the mouth of the creek.

Bedrock Topography

Upland areas are dominated by a thin overburden of till and colluvium over bedrock. Consequently, in these areas, groundwater is sourced from fractured bedrock. Deeper accumulations of overburden are found in the valley bottom. Two major depressions exist in the bedrock topography. One is located just south of the confluence of Solly's Creek and the Bonsall Creek main stem, with a maximum overburden depth of approximately 60m, corresponding to an elevation of 30 m below sea level at its deepest point. The other is located slightly north of the confluence of Bonsall Creek and Whitehouse Creek, with a maximum overburden depth of approximately 60m, corresponding to an elevation of 60 m below sea level at its deepest point. These deep depressions in the bedrock are likely only connected by a narrow "channel" characterized by thin overburden.

These features likely have a significant influence on both the hydraulic gradient and the groundwater flow within the study area. In particular, the overburden-bedrock interface beneath Bonsall Creek descends to about 60 m below sea level at the Bonsall Whitehouse low, and then rises to nearly the land surface towards the ocean. This bedrock high located close to the salt water margin likely creates a low permeability barrier to groundwater flux from the overburden aquifers (Aquifer 172 and Aquifer 174) to the ocean, likely exacerbating the seasonally high water table in the area.

Interpreted Bedrock

The groundwater flow direction within the main overburden aquifers overlying the bedrock is illustrated by the yellow arrows (Figure 7). The bedrock high at the mouth of Bonsall Creek watershed may act as a barrier to groundwater flow to the ocean (red arrow).

1.7 Watershed Ecosystems

The watershed is located in the Coastal Douglas Fir (CDF) Biogeoclimatic Zone, one of the smallest zones in B.C., covering approximately 0.3% of the province. Common vegetative species in the CDF are Douglas Fir, Western Red Cedar, Western Hemlock, Big Leaf Maple, Red Alder, Pacific Crab Apple, Pacific Dogwood, Gary Oak, and Arbutus. Indian Plum is a dominant understory plant in this area and not found commonly outside this zone. Intact examples of this ecotype are red listed (endangered).

There are 42 blue (special concern) or red listed (at risk/endangered) wildlife species with potential to occur in the watershed. Coastal Cutthroat Trout are present and are a blue-listed species. For its size, Bonsall Creek is considered to have a relatively high productivity and mix of spawning, rearing, and over-wintering habitat for coho, chum and sea-run cutthroat. Rare plants and ecological communities have not been observed in the watershed, although specific studies have not been performed.

Bonsall Creek is a relatively healthy watershed. It is certainly reliant on a long term clean water supply for both Farms and Fish. The long term efforts to restore and protect the water and maintain healthy farms has been successful but the efforts require, maintenance, monitoring and adjustments.

1.8 Modern Watershed Planning Context

The primary purpose of the Bonsall Creek Watershed Management Plan is to give consideration to supporting the needs of agriculture while considering the full water cycle of the area, protecting ecosystem health, water quality, fish and fish habitat, secure access to water when or where needed, address negative impacts of drainage, use water efficiently, and improve water quality entering and leaving properties.

In 2001, North Cowichan finalized its Strategic Agricultural Plan (SAP). It was initially intended to be supported and implemented by a variety of agricultural non-government organizations but, as time went on, farmers and others felt that it was not receiving sufficient focus. As a result, Council established the Agricultural Advisory Committee (AAC) by bylaw in 2005, in part to ensure the implementation of the SAP. Since 2005, the committee has provided input on North Cowichan development applications in the Agricultural Land Reserve and has raised concerns about agricultural issues; however, sufficient resources to address the priorities of SAP were not available. With support from Council and Administration the committee held a workshop in May of 2012 to discuss its role and priorities. As a result they established their key priorities, which received approval in principal from Council, and the committee met through the balance of 2012 to develop a work and implementation plan based on their priorities.

The first priority of the AAC is a water management plan, which is intended to address the particular needs of agriculture with respect to access to water, drainage and control, water use efficiency, and water quality. A number of water management approaches have been considered and tried in the past with limited success. The ongoing challenges of multiple jurisdiction and private landowner interests have made it difficult to find long term solutions.

The watershed is subject to Provincial legislation, including:

- The *Agricultural Land Commission Act*, which regulates land use, density and subdivision in the Agricultural Land Reserve.
- The *Right to Farm Act*, which protects farmers carrying out “normal farm practices” in the ALR, on lands zoned for agriculture and for licensed aquaculture operations from claims of nuisance.
- The *Water Act* (renamed the Water Sustainability Act as of May 2015) enables provincial control over all surface and ground water in BC.
- The *Environmental Management Act*, which regulates certain agricultural practices such as open burning and handling of waste from pesticide use and waste compost production.

Most in-stream works require provincial approval, through interpretation of these legislations.

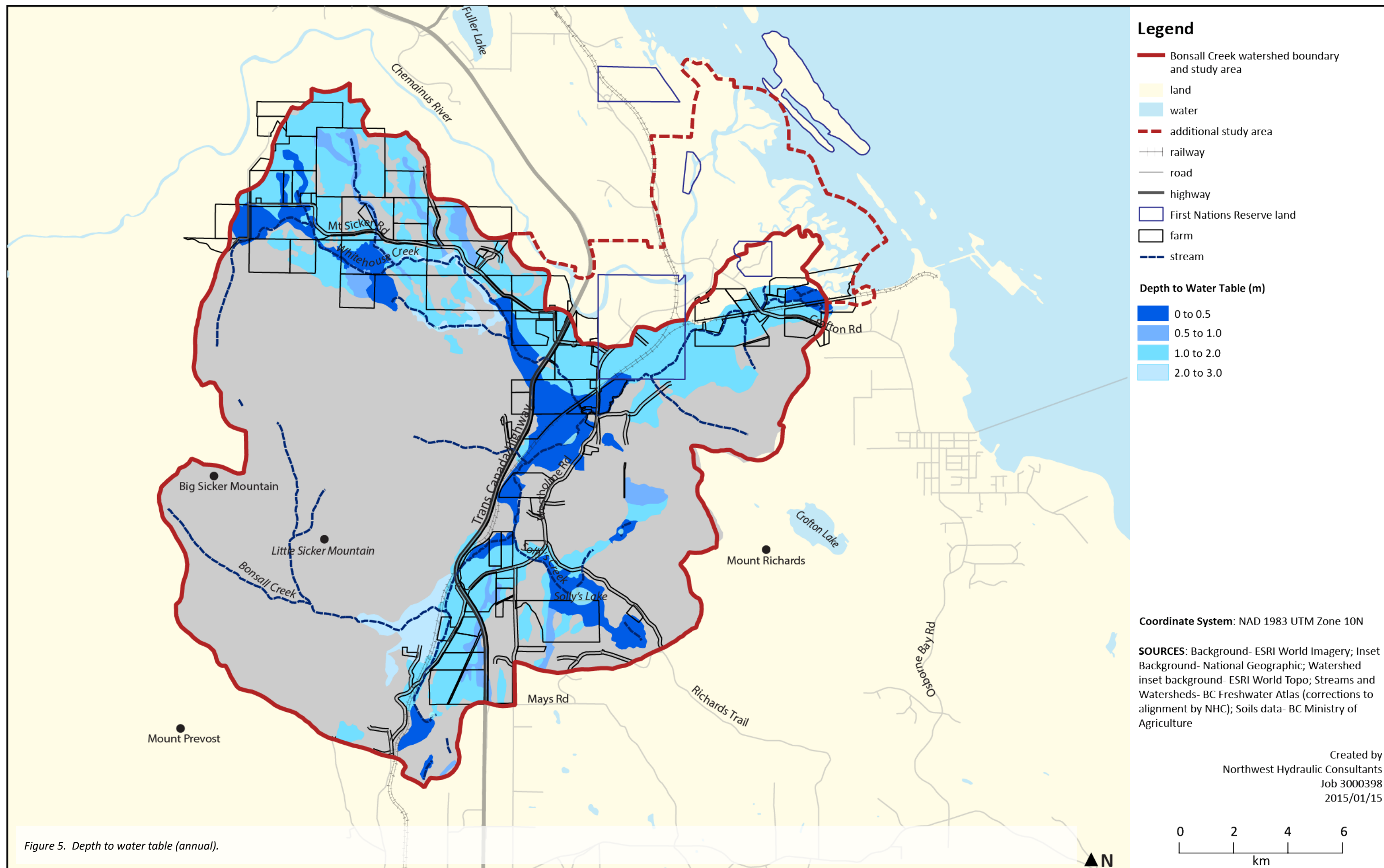
The watershed is also subject to local governance and policy, including:

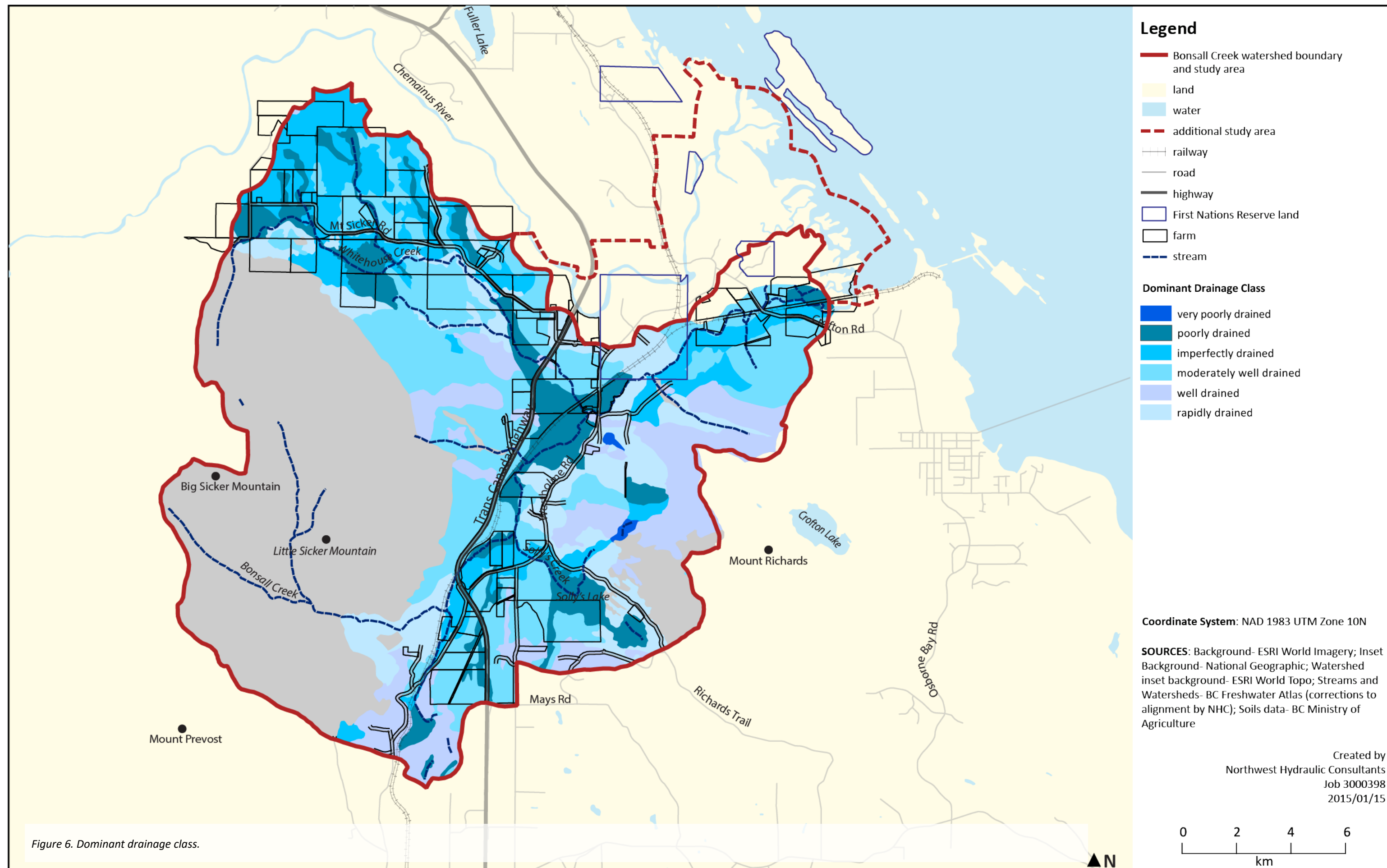
- The North Cowichan Official Community Plan (OCP) which is a legal policy document that manages growth and guides future development in the area.
- Five Development Permits Areas (DPA) that area identified in the OCP, in which land uses are subject to the DPA guidelines outlined in the Zoning Bylaw.

Agricultural lands, infrastructure and waterways are addressed by policies under various OCP categories, including:

- Forestry Lands
- Ecological Sensitive Areas
- Natural Hazard Areas
- Industrial and Commercial Areas
- TransCanada Highway Corridor Designation
- Urban Containment Boundary
- Road Network
- Scenic Roads
- Water Source Protection

The OCP also identifies climate change as a community-wide problem that will require mitigation and adaptation strategies.





1.9 Climate Change Impacts Affecting the Watershed

Anticipated climate change impacts will affect waterways and lands in the watershed. The annual average temperature in the Cowichan Valley is getting warmer. The annual number of frost-free days is also projected to increase. This will produce more new 'growing degree days', resulting in the potential for earlier planting periods, and later and multiple harvesting periods. It will also increase drought risk in the summers.

Although there is expected drought increase, overall precipitation is increasing throughout the year, with fewer consecutive dry days in non-summer months. High-intensity rainfall events are increasing in intensity and frequency. Less precipitation is falling as snow, decreasing the winter snowpack, which in turn decreases the duration of spring runoff flows, with peak flows occurring earlier in the year. These trends will increase the risk of flooding in the fall and spring months. South coast of BC projections show a decrease in storm frequency, but an increase in severe winter storm intensity. Together with rising temperatures and increased evaporation rates, there will be a lengthening dry season and low flow period between May and October, with a rise in the occurrence of drought conditions.

Flooding from sea water is a major projected climate change impact. Inundation along the coast presents the risk of soil salination and a reduction of fertile land base. Water sources could become salinated and unfit for irrigation and consumption by animals. Shoreline erosion is expected to increase, depleting farmable land. Higher tides and storm surges present a risk of farm infrastructure damage.

Warming, water flow decrease and increased drought hazard will increase the risk of wildfire hazard. As the presence of different tree species change due to changes in climate, fire risk may be elevated. Changing climate conditions are increasing the severity and duration of insect outbreaks that can exacerbate fire risk by increasing the amount of dead or dying woody debris in a forest system (e.g.: pine beetle). Projections indicate British Columbia will have five or six times as many fires in the near future. Not only will there be more fires, but they will be more intense, with many being too big and too hot to suppress using traditional fire-fighting methods.

All of these projected weather and climate trends pose significant challenges to farmers in the watershed. Appropriate adaptation actions need to be taken to lessen the risk posed by climate change impacts.

1.10 Public Opinion of the Watershed

Three sets of public open houses and three sets of First Nations open houses were held over the duration of the project. Many participants feel that parts of the Bonsall Creek Watershed

waterways and their estuary have deteriorated in recent years compared to their historical states. Many feel that occurrence of creek sedimentation and erosion, as well as the continuous presence of reed canary grass, are more common than in decades past, leading to further deterioration of waterways, and plants and trees along their banks. Observation of fungus on the bottom of parts of the creek was noted as an indicator of poor stream health. Stream debris was also noted as a major issue impacting waterway health. Additionally, it is felt that the watershed used to have more productive wetland areas, which have been dredged or filled in. These factors, in addition to agriculture and industrial practices, are felt to have a contamination effect on water quality and fish and shellfish in the watershed. Other fish and shellfish species are no longer present.

Some feel that the upper reaches of Whitehouse Creek were not historically dry in the summer, as they often are now. Others feel that riparian areas have degraded and that habitat for certain species, such as eagles and hawks, has been reduced, resulting in lesser presence of these animals. Similarly, it is felt by many that the salmon bearing capacity of Bonsall Creek and Whitehouse Creek are diminished compared to the perceived historical context.

Some feel that irresponsible agricultural practices in the area have negatively affected the water quality of watershed waterways. There was a feeling that logging practices of the past were destructive and had a negative impact on waterways and habitat. There was also some concern that the effluent from the aquaculture operation on Whitehouse Creek could be detrimental to water quality in that creek (the facility is mandated by the Province to meet stringent water quality standards). Others felt that this effluent yielded enough water quantity to make the creek amenable to salmon spawning.

Some First Nations participants feel that there is poor access to many traditionally accessed cultural areas in the watershed due to fencing associated with agricultural and other development.

Among those consulted, there is general consensus for striving for healthy waterways and habitat in the watershed. It is thought by the public that this could be achieved through actions including:

- Improving and maintaining riparian areas;
- Improving and maintaining fish habitat in the streams;
- Rejuvenating animal habitat, especially for large birds;
- Preserving the forests and requiring sustainable logging practices;
- Requiring responsible creek stewardship that ensures ecosystem health;
- Removing invasive species, such as reed canary grass;
- Ensuring agricultural practices do not negatively impact waterways;
- Preserving the estuary ecosystem, which would maintain the traditional shellfish harvesting of local First Nations;
- Improving and maintaining a prosperous farming

community;

- Improving the quality of the stream water and potable water in the area;
- Improving the consistency of flows throughout the year; and,
- Fostering a healthy watershed that can care for itself.

There is interest in improving the economic performance of the local agricultural community and in expanding agricultural operations in the area, as long as the operations are environmentally responsible. A sustainable water supply for agricultural use has been noted as a top priority, as has maintaining the viability of agriculturally productive lands, which have suffered from flooding in recent years. In relation to flooding and waterway maintenance, a need for easy-to-navigate and consistently-applied regulation has been expressed.

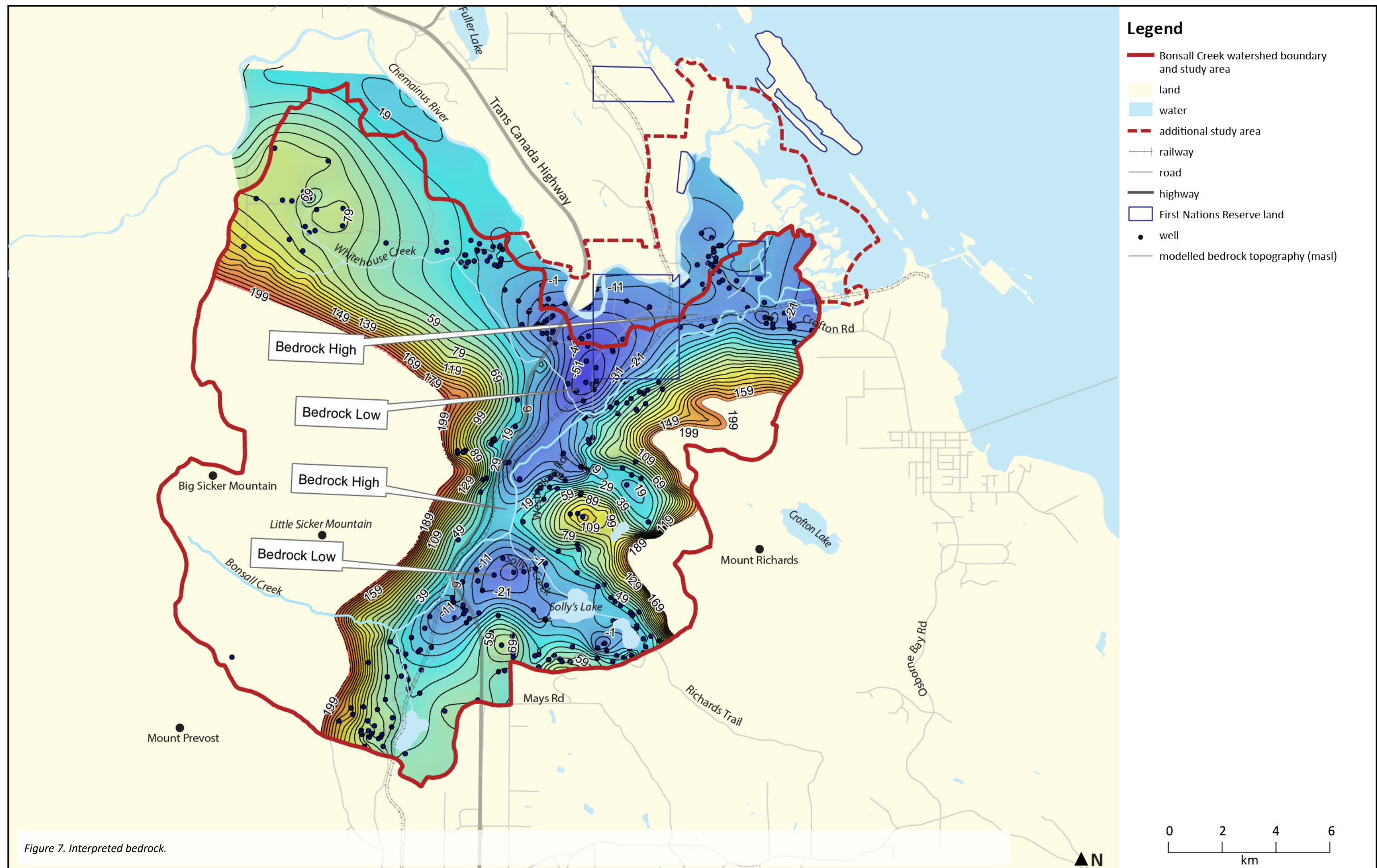
Many expressed frustration that works in and about streams required a convoluted approvals process involving multiple levels of government and departments within those levels. There was a desire to see a streamlined, straightforward process developed.

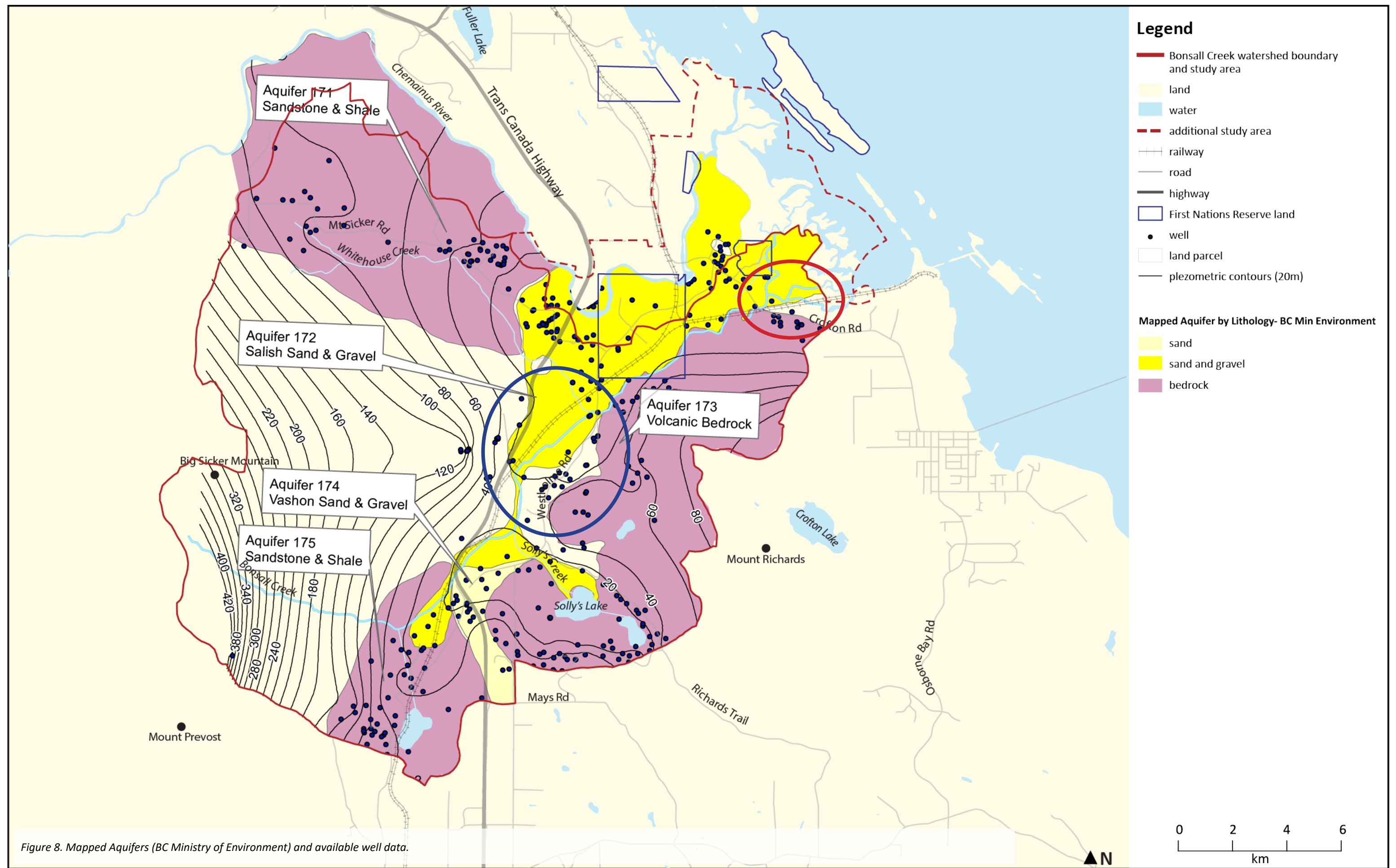
There was acknowledgement in the public discussions that there are differences in what property owners want and need in relation to the functioning of waterways along their properties. Some farmers want to avoid flooding so that their planting season is not delayed and so that their crops and soils aren't negatively affected. Other property owners are not adverse to flooding. There is a difference of opinion on beaver dams—some property owners want them removed to relieve flooding issues, while others are not bothered by their effects and would prefer they were not disturbed.

From these discussions there was a public sense that a balance needs to be determined between actions suiting individual property owner needs and those that work towards achieving and maintaining a healthy watershed overall.



Quist Farm





2. Watershed Planning for Everyone and Everything

2.1 Getting a Clear Sense of the Issues

Forty Bonsall Creek area residents attended an open house for the Watershed Management Plan addressing issues in the watershed. Most were farmers and land owners. There was very little First Nations representation at this event, although First Nations-specific open houses were also held to discuss the same issues. Participants were asked to provide their views on a variety of watershed elements by stating what they wanted to see in terms of watershed characteristics and human impacts by the year 2020.

The chart on page 15 summarizes the participants' views. The position of the red bar indicates the level of support for each statement. The more toward the right hand side of the graph the bar is, the greater the number of respondents replied 'yes'. The more toward the left hand side of the graph the bar is, the greater the number of respondents replied 'no'. Not all participants responded to every question.

The survey indicates that there is strong support for regulation on what types of works can occur in waterways, for sound environmental farming practices, and for coordinated municipal, land-owner and volunteer waterway stewardship. There is some support for letting floods occur naturally, although not those caused by beaver dams. There is little support for water metering, as well as drilling new wells. There is support for increasing farming and fishing in the area, but not timber operations. The one item that all participants agreed on is that there is currently insufficient regulatory requirements protecting access to water and the ecosystems of the watershed.

This exercise was useful in getting a sense of opinion on a variety of issues in the watershed and was used to help establish objectives for watershed management and actions to take.

2.2 Finding Balance

This Watershed Management Plan seeks to find balance between human uses of water in the area and ecological systems' water requirements. Major considerations include:

- Industrial, residential, aquacultural and agricultural activity have impacts on the quantity and quality of the water available to the area's ecosystems.
- The low gradients of rivers in eastern portions of the watershed encourage sedimentation and stagnation of certain reaches, causing flooding in the low-lying agricultural lands.
- Invasive species like reed canary grass have complicated waterway ecosystems, reducing stream flows and inhibiting native habitat and presence of species.
- The watershed comprises important salmon spawning grounds.
- There is a desire to increase the prosperity of agriculture in the area.

- The process for in-stream works approvals and implementation is not well understood, nor is it easy to coordinate between neighbouring land owners.
- Industrial, forestry and agricultural activities, as well as in-stream works, are not typically performed in a manner that holistically considers their effects on the entire watershed (which would typically be downstream effects).
- Various levels of government have jurisdiction over waterways, water use, land-use, reserve lands and ecosystems in the watershed; there is no specific watershed-level planning approach for the Bonsall Creek Watershed.
- First Nations' traditional fishing grounds and archaeological sites are present in the watershed.
- There are differences of opinion between land owners as to how waterway maintenance should be approached.
- There is a desire to perform creek maintenance to the extent that waterways are self-sustaining.
- There is a desire to increase the spiritual awareness and meaning of the watershed.
- There are different tolerances between land owners—and between farmers—as to whether or not flooding should occur on their lands.
- There are inconsistent, varying restrictions on how much water can be used under a water license.
- There are few restrictions on how surface water can be redirected or used by people.
- There is very little metering, measurement, tracking and evaluation of watershed and waterway characteristics and health, making informed decision-making for watershed and waterway issues challenging.
- There is little in the way of comprehensive decision-making processes for watershed and waterway issues.

Balancing all of these factors is a delicate task. Through the project's workshops, a vision statement was created for the watershed, which speaks to this balance. The Advisory Working Group, City staff and consulting team created a set of nine objectives that respond to the community-developed vision for the Bonsall Creek Watershed. The vision and objectives will guide action in the watershed.

Objectives Rationale

Continually improve forest, land and water management by implementing the latest science and research.

This objective seeks to inform land and resource use and management decision with up-to-date scientific findings and research. This includes forestry operations findings, agricultural studies, climate and meteorological records, academic studies, professional studies and measurements, etc. This objective seeks to improve watershed management by improving knowledge on watershed conditions and how they are affected by natural

Bonsall Creek Watershed Community Vision

The Bonsall Creek Watershed connects all ecosystems and inhabitants via clean waterways shaped by natural forces and maintained by a community of active stewards. The area’s responsible agricultural operations and recreational uses complement the traditional and ongoing fishing activities in the rivers and on the shore. Through considerate cooperation of its users, the watershed provides pristine habitat, enjoyment and natural resources in perpetuity.

Objectives

Continually improve forest, land and water management by implementing the latest science and research.	Establish a streamlined decision-making process for in-stream works and a list of acceptable stream interventions.	Ensure that land use decisions and actions do not degrade the watershed, and that downstream, upstream and cumulative impacts are considered in all decisions.
Increase staff and public understanding of watershed health, the connectedness of ecosystems, responsible human activities, and watershed cultural values.	Make hydrological impacts mitigation an explicit consideration in forestry & land-cover decisions.	Monitor & measure water levels, flows & usage and make the information available to the public.
Prepare for and adapt to anticipated climate impacts.	Improve drainage to limit the extent to which flooding adversely impacts agricultural production.	Increase and protect watershed biodiversity and habitat.

changes and human impacts. Such knowledge encourages evidence-based decision-making.

Establish a streamlined decision-making process for in-stream works and a list of acceptable stream interventions.

This objective seeks to address the common complaint of those looking to perform works in and about waterways—that the streamworks approval process is not intuitive and involves too many governmental jurisdictions. This objective seeks to remedy this situation by achieving a consistent, simple process for submittals and approvals.

Ensure that land use decisions and actions do not degrade the watershed, and that downstream, upstream and cumulative impacts are considered in all decisions.

This objective seeks to ensure that management of the watershed is performed holistically and in a coordinated fashion, so that no one action impairs the health of the watershed or the ability of others to reasonably operate within it. It seeks to foster collaboration between land owners, government and First Nations in watershed stewardship that is beneficial to people while ensuring ecosystems are not negatively impacted.

Increase staff and public understanding of watershed health, the connectedness of ecosystems, responsible human activities, and watershed cultural values.

This objective seeks to expand knowledge on the importance of watersheds and their functions, as well as the benefits of planning at the watershed scale. It seeks to ensure that activity and land use is respectful of and beneficial to watershed health. *Make hydrological impacts mitigation an explicit consideration in forestry & land-cover decisions.*

This objective seeks to ensure that water quantity and quality are preserved or improved whenever forestry and land-cover actions are taken. Through proper watershed health considerations during decision-making, forestry and land-cover changes will have no negative watershed impacts.

Monitor & measure water levels, flows & usage and make the information available to the public.

This objective seeks to provide the means of waterways information collection so that watershed health can be monitored and appropriate actions can be taken in the event of worsening watershed health, climate impact, infrastructure failure, property impact, etc. Making the information available to the public encourages public awareness of watershed functioning

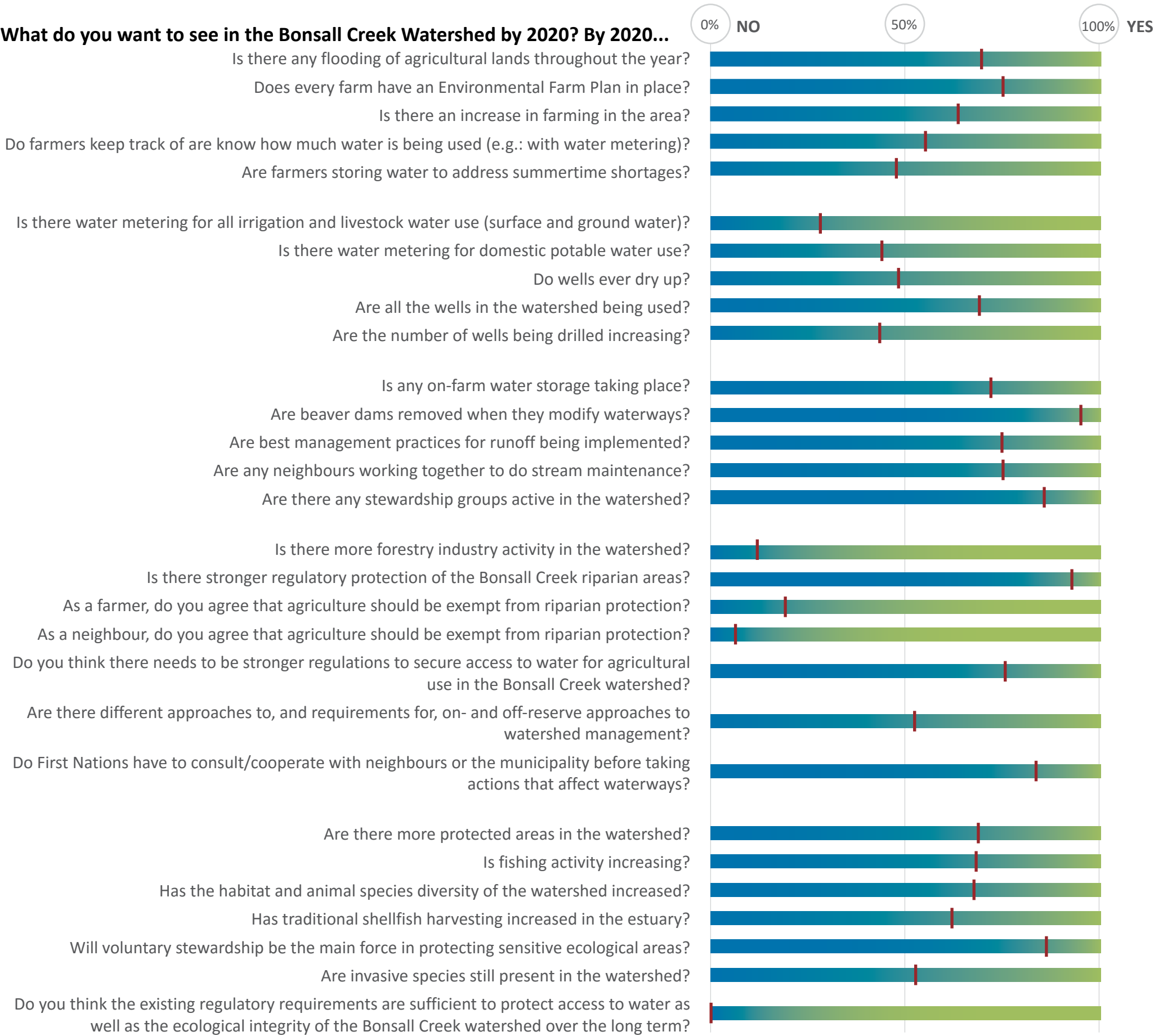
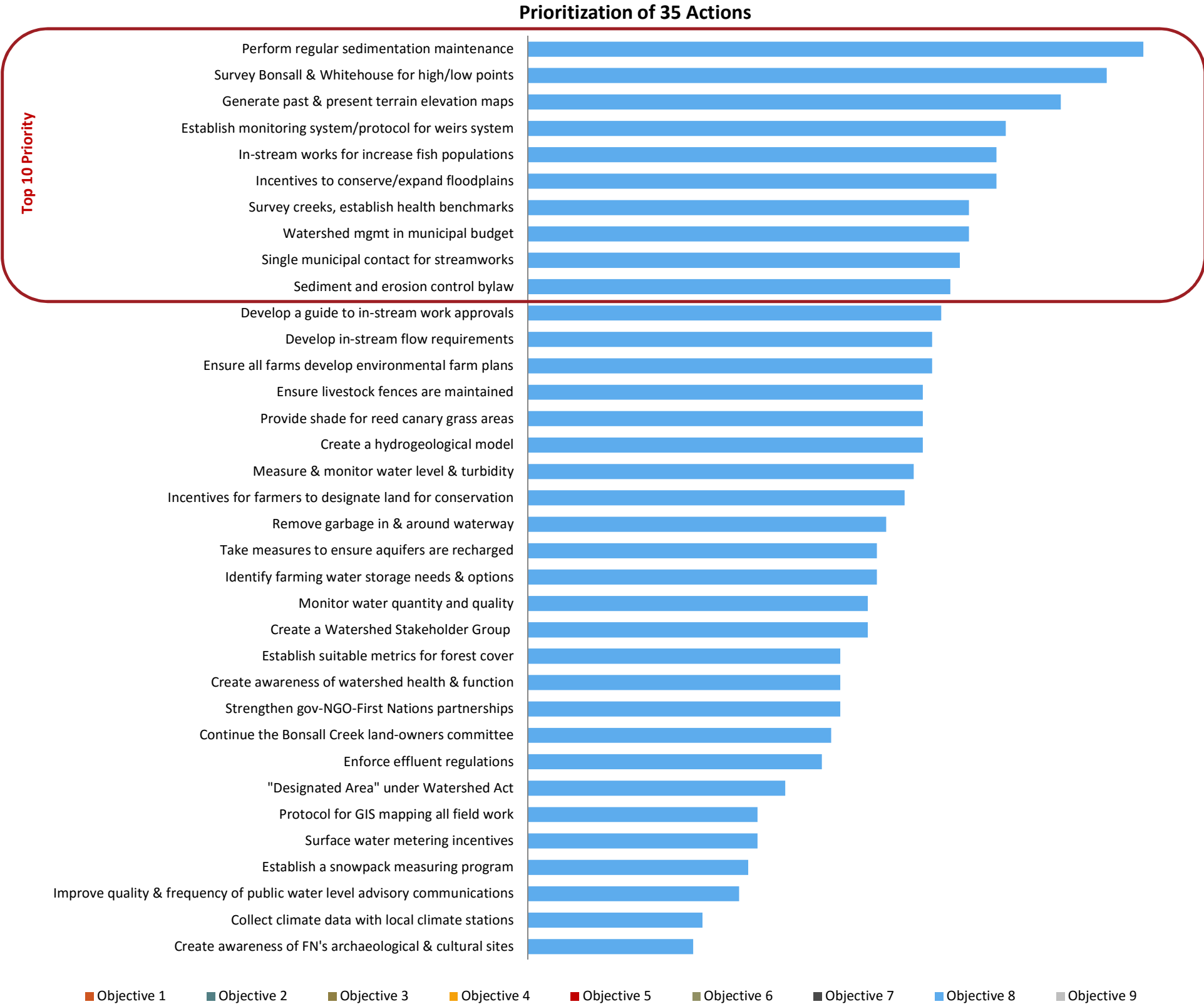
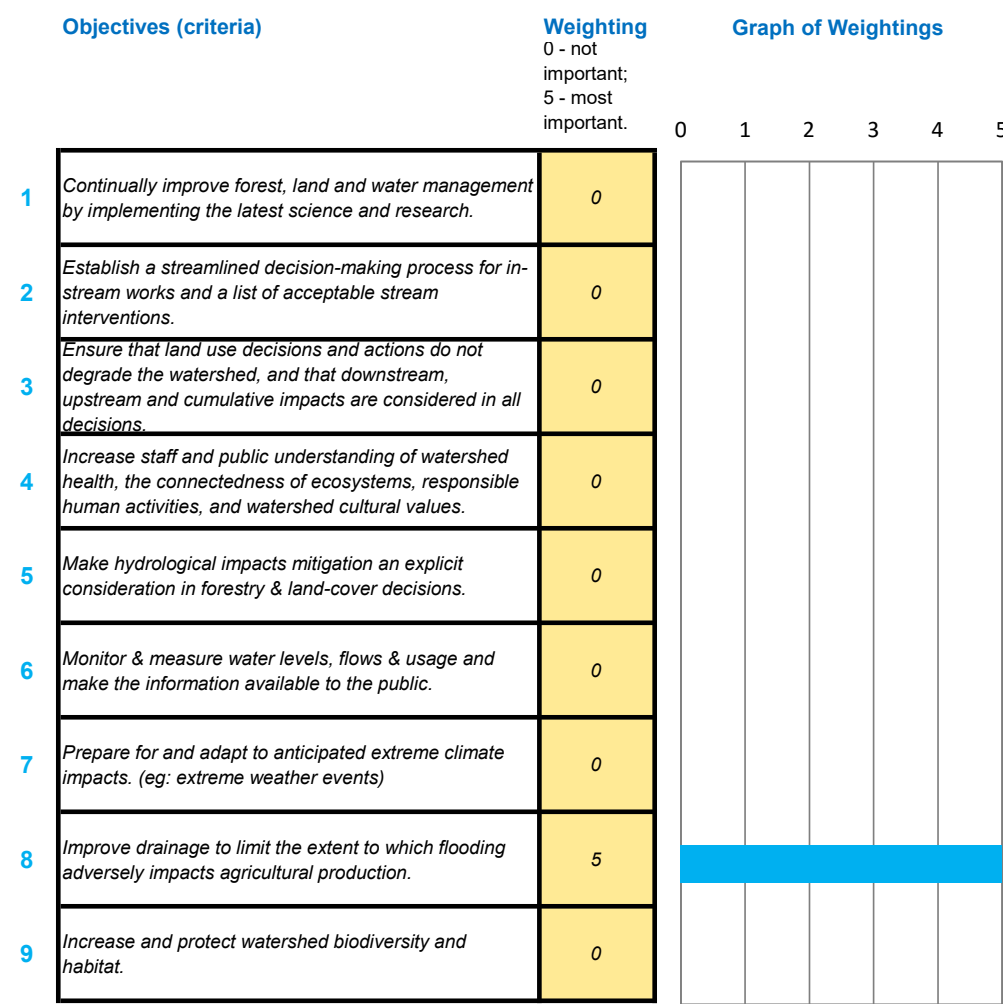


Figure 9. Sample MCA prioritization showing a high preference for achieving the objective to improve drainage.

This sample output of the MCA tool shows how the 35 actions are prioritized if only Objective 8 is considered of value. By valuing only this objective, the top 10 priority actions shown in the large chart all have to do with waterway monitoring and maintenance, waterway-related data collection, and governance related to in-stream works. This sample output of the MCA prioritization tool could be representative of a farmer whose only priority is securing adequate land drainage.



and issues, and makes the information accessible for study.

Prepare for and adapt to anticipated climate impacts.

This objective seeks to invest resources in anticipating and preparing for climate change impacts to ecosystems and properties.

Improve drainage to limit the extent to which flooding adversely impacts agricultural production.

This objective seeks to address agricultural concerns around flooding and change in location of waterways. It aims to establish actions that can relieve certain watershed lands from excess water, while maintaining the integrity of the watershed.

Increase and protect watershed biodiversity and habitat.

This objective seeks to protect and regenerate watershed habitat and plant and animal species, to ensure the ecosystem is healthy and functioning properly, to the benefit of all.

2.3 Establishing Appropriate Actions

Under these objectives, 35 key actions were established by the Advisory Working Group, City staff and the consulting team. The actions were chosen for their ability to respond to the objectives and vision. Many of the actions address multiple objectives.

Actions List

1. Enforce effluent (water discharge back into the environment) regulations from industry, home and farm operations.
2. Encourage and provide incentives for metering of surface water use by landowners.
3. Establish a sediment and erosion control bylaw.
4. Provide incentives for conserving and expanding floodplain areas.
5. Request the status of Designated Area under the new Water Sustainability Act to provide enforceable tools to better characterize, manage, and protect groundwater.
6. Allocate funds to watershed management in the municipal budget.
7. Establish a single municipal point of contact for in stream work requests.
8. Establish a protocol of translating field work in the watershed to GIS data and coordinate the data with provincial databases.
9. Identify opportunities and incentives for farmers to designate land as conservation land.
10. Perform a new profile survey of the major creeks, compare the data to the 1992-94 creek survey data, and reestablish creek health benchmarks (eg: habitat suitability, optimal flows and depths).
11. Generate maps comparing past and present terrain elevations in order to determine drainage issues and identify possible improvements.
12. Conduct repeated instream flow and suspended sediment measurements (during different flow conditions) and install continuous monitoring sensors to measure water level and turbidity.
13. Create a hydrogeological model for the watershed and enlist a groundwater steward to maintain the model information database.
14. Survey the Bonsall Creek and Whitehouse Creek main stems to determine high points and low points, which will inform drainage improvement works.
15. Conduct in-stream work where necessary to ensure fish populations flourish (eg: assess the Somenos road culvert barrier for fish passage opportunities)
16. Perform regular sedimentation maintenance (eg: emptying the sediment sump in Reach 6, bank maintenance, install channel bed erosion protection on unstable tributaries, install sediment ponds).
17. Establish a monitoring system/protocol for the system of weirs and update the structures as needed.
18. Provide shade to the sections of Bonsall Creek that are overgrown with Reed Canary Grass.
19. Remove garbage in and around waterway section around the Tsussie reserve.
20. Strengthen partnerships between municipal government, local ecosystem stewardship groups and First Nations. Agree to responsibilities and establish regular meetings with all groups to monitor their collective impact on watershed health.

21. Create a Watershed Stakeholder Group (with representation from both Penelakut and Halalt) to oversee progress with the watershed plan.
22. Ensure all farms develop environmental farm plans and minimize fertilizer runoff to minimize impacts on water quality and quantity.
23. Establish a municipal and public climate of awareness, accountability, and respect around documented and new archaeological sites and cultural areas, via education efforts in partnership with First Nations.
24. Create awareness of watershed health and function via public education programs like school forums, information for farmers and watershed tours.
25. Develop a guide to in-stream work approvals (online and print versions).
26. Identify farming water storage needs and options, and provide for these needs using existing agricultural incentive/support programs.
27. Improve the quality and frequency of public water level advisory communications.
28. Establish a snowpack measuring program.
29. Ensure livestock fences are maintained along the creek to prevent livestock entering the water/eroding the banks.
30. Continue the functioning of the Bonsall Creek land-owners committee.
31. Collect climate data through installation of local climate stations and in coordination with Provincial bodies and partners. Assess this data ongoingly and share with the public.
32. Develop in-stream flow requirements based on scientifically established linkages between flows and habitat suitability indices (such as depth, velocity, wetted width).
33. Create/optimize the means of storing/releasing water to ensure aquifers are recharged.
34. Monitor the quantity and quality of water in each reach of Bonsall Creek, Whitehouse Creek and the Somenos Lake reach.
35. Establish suitable metrics for forest cover to determine what the right amount of cover is and how to maintain it. Coordinate these metrics with the allowable annual cut on municipal and private lands.

2.4 Actions Prioritization

Given the varying priorities and opinions of land owners in the watershed, actions prioritization could prove difficult. To accommodate this reality, a multi-criteria analysis (MCA) tool was developed. The MCA tool is a matrix of actions versus objectives, objectively assessing how well each action responds to achieving each objective by assignment of a rating between 0 and 5 (5 meaning the action responds very well to achieving an objective). The action ratings for the tool were established via survey of Advisory Working Group members, City staff and consulting team members. Survey participants assigned a rating to each of the 35 actions for how well it responded to achieving each of the 9 objectives. The ratings are objective in nature—this was not in itself a prioritization exercise as the survey was not asking participants to choose their preferred actions. The average was taken for each survey response and used as each action's rating in the MCA tool. The MCA tool sums the ratings for an action against all objectives to determine the relative priority of each action. So, the higher the total of the ratings for an action, the higher priority it is.

Recognizing that decisions are not made exclusively on objective, quantitative inputs (i.e.: ratings), the MCA tool also incorporates a values input via weighting factors—qualitative inputs. Users of the tool can assign a weight between 0 and 5 to each of the 9 objectives, choosing which objectives they feel are more important. This way, different stakeholders can express their preferences and see how the actions are prioritized in response to these preferences. Several examples of action prioritization for different values are shown in Figure 9 through Figure 14.

Figure 10. Sample MCA prioritization showing equal weighting for all objectives.

This sample output of the MCA tool shows how the 35 actions are prioritized if all the objectives are assigned equal value. By valuing all objectives equally, the top 10 priority actions shown in the large chart reflect how each action scores purely based on the rankings given via the survey—the weightings have no effect on differentiating between the actions as they are all equal (in the example the weights are all 5, but they could all another number, yielding the same result). This sample output could be representative of a member of the public who does not have significant opinions on what actions are taken in the watershed or what objectives the Watershed Management Plan pursues.

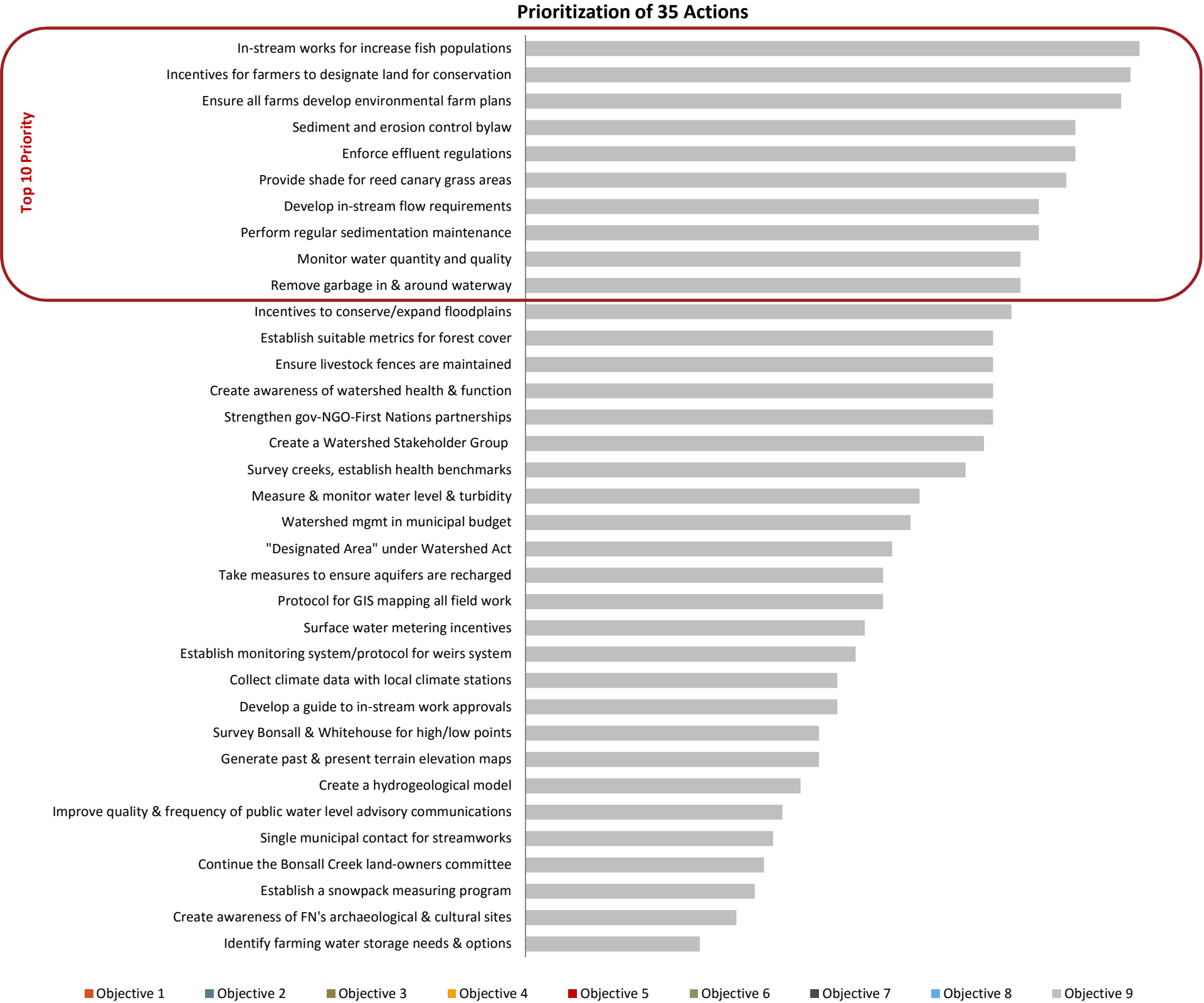
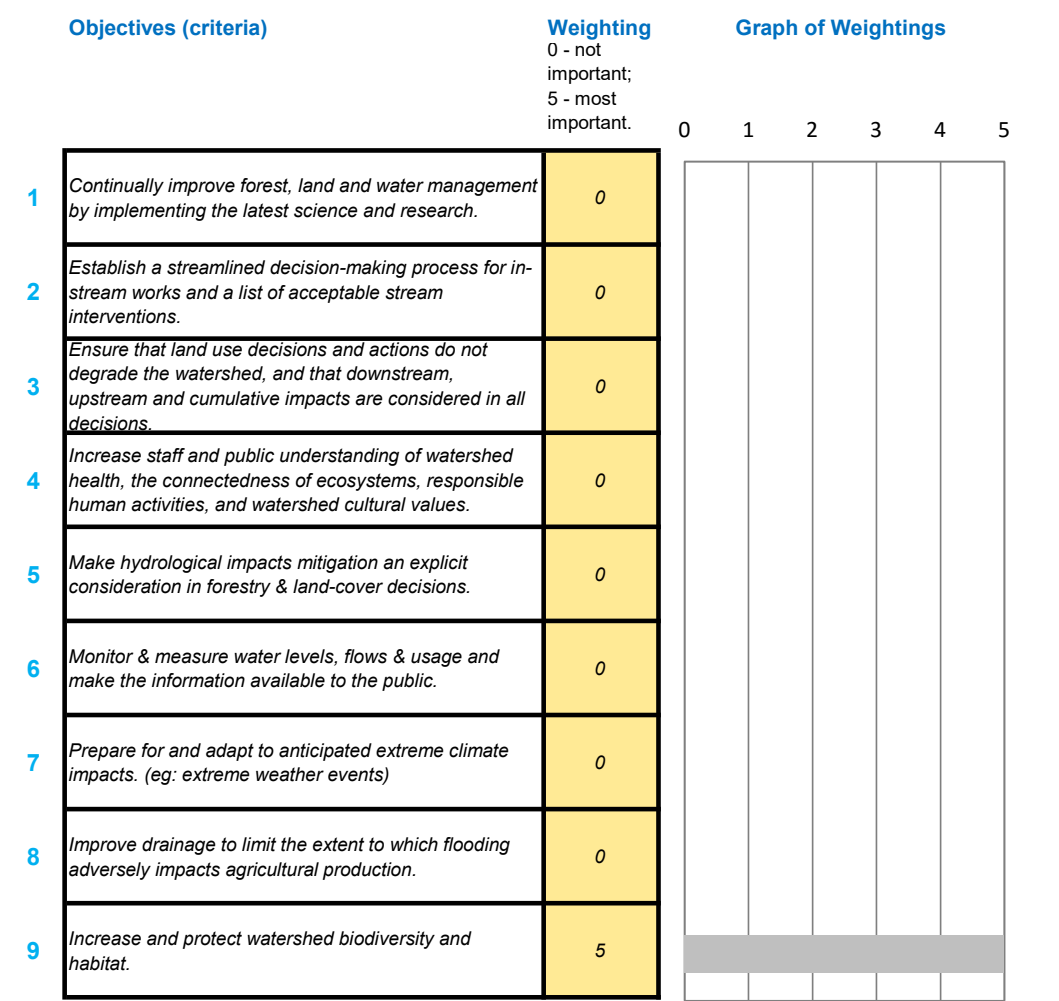


Figure 11. Sample MCA prioritization showing a high preference for achieving the objective to protect habitat.

This sample output of the MCA tool shows how the 35 actions are prioritized if only Objective 9 is considered of value. By valuing only this objective, the top 10 priority actions shown in the large chart all have to do with conservation, water quality regulations, stream health improvement, and monitoring. This sample output of the MCA prioritization tool could be representative of a biologist whose only priority is increasing stream health for biodiversity improvements.



Figure 12. Sample MCA prioritization showing a preference for achieving primarily ecosystem-related objectives.

This sample output of the MCA tool shows how the 35 actions are prioritized if ecosystem-related objectives are valued over other objectives. The top 10 priority actions shown in the large chart reflect the preferred options for improving the ecological conditions in the watershed. Many of the actions speak to stewarding and monitoring watershed health, government and stakeholder support for watershed health activities, and establishing benchmarks and conditions for stream behaviour that benefits wildlife and native plant life.

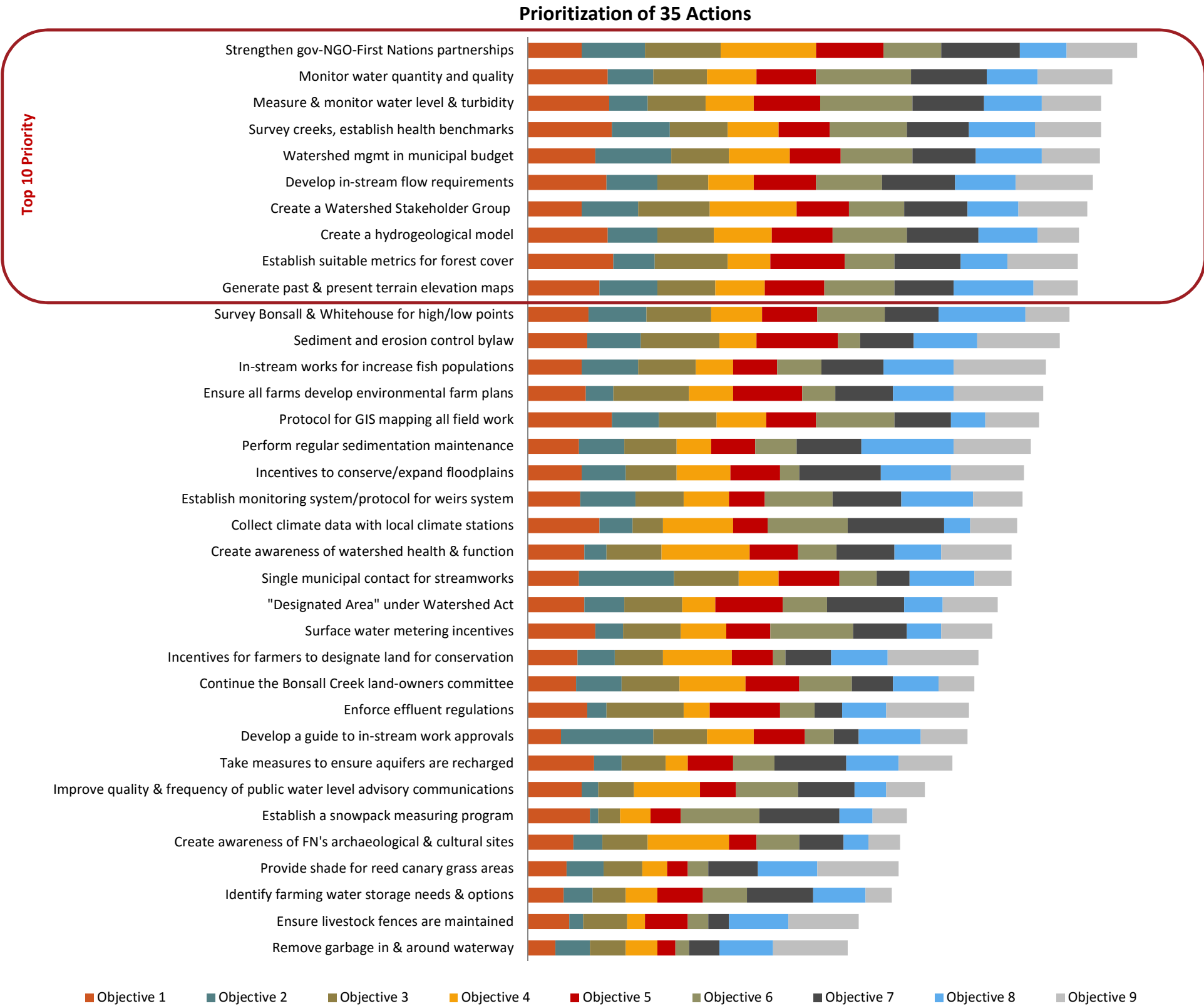
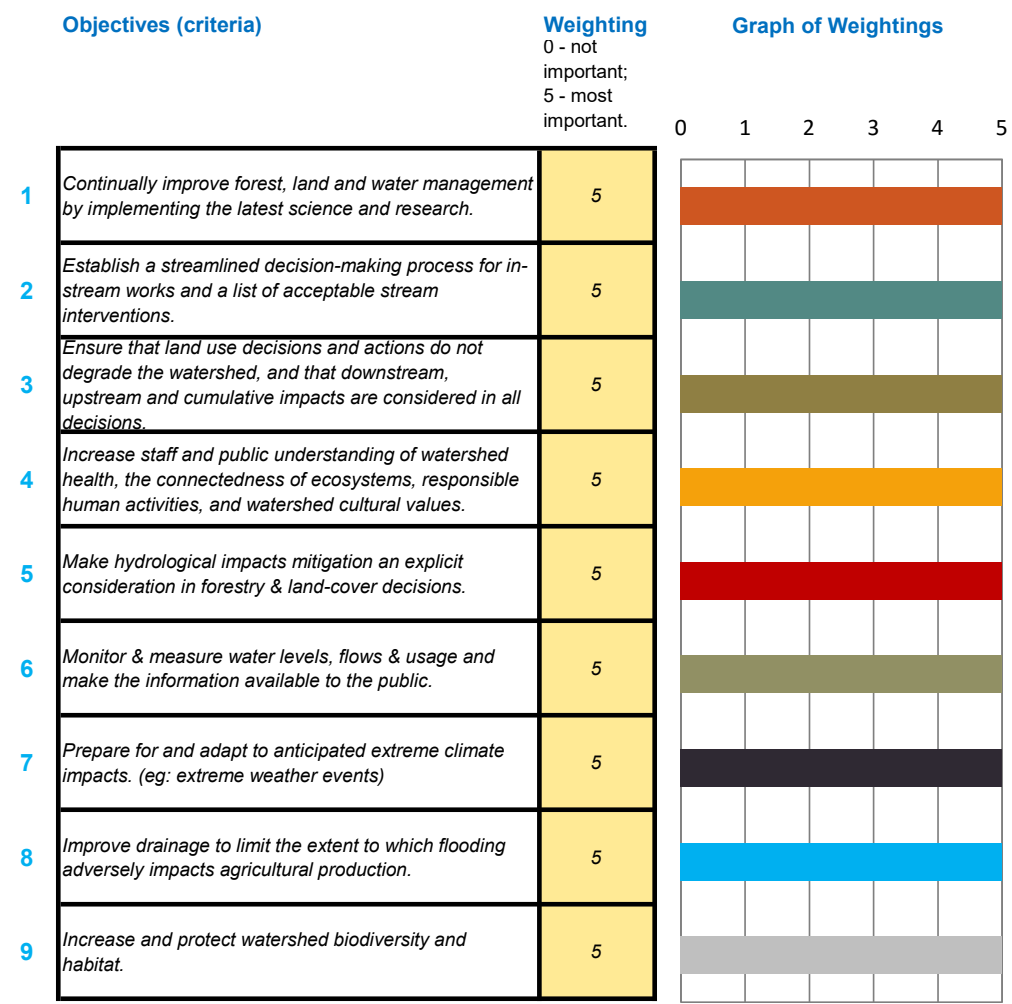


Figure 13. Sample MCA prioritization showing a preference for achieving primarily agriculture-related objectives.

This sample output of the MCA tool shows how the 35 actions are prioritized if agriculture-related objectives are valued over other objectives. The top 10 priority actions shown in the large chart reflect the preferred options for improving agricultural conditions in the watershed. Many of the actions speak to the desire for stream works and maintenance, support from government, and developing certainty in waterway conditions and flows. Of note, developing EFPs, identifying farm water storage needs, and ensuring livestock fences are maintained are not in the top ten actions list, as these actions do not score highly under this combination of rankings and weightings.

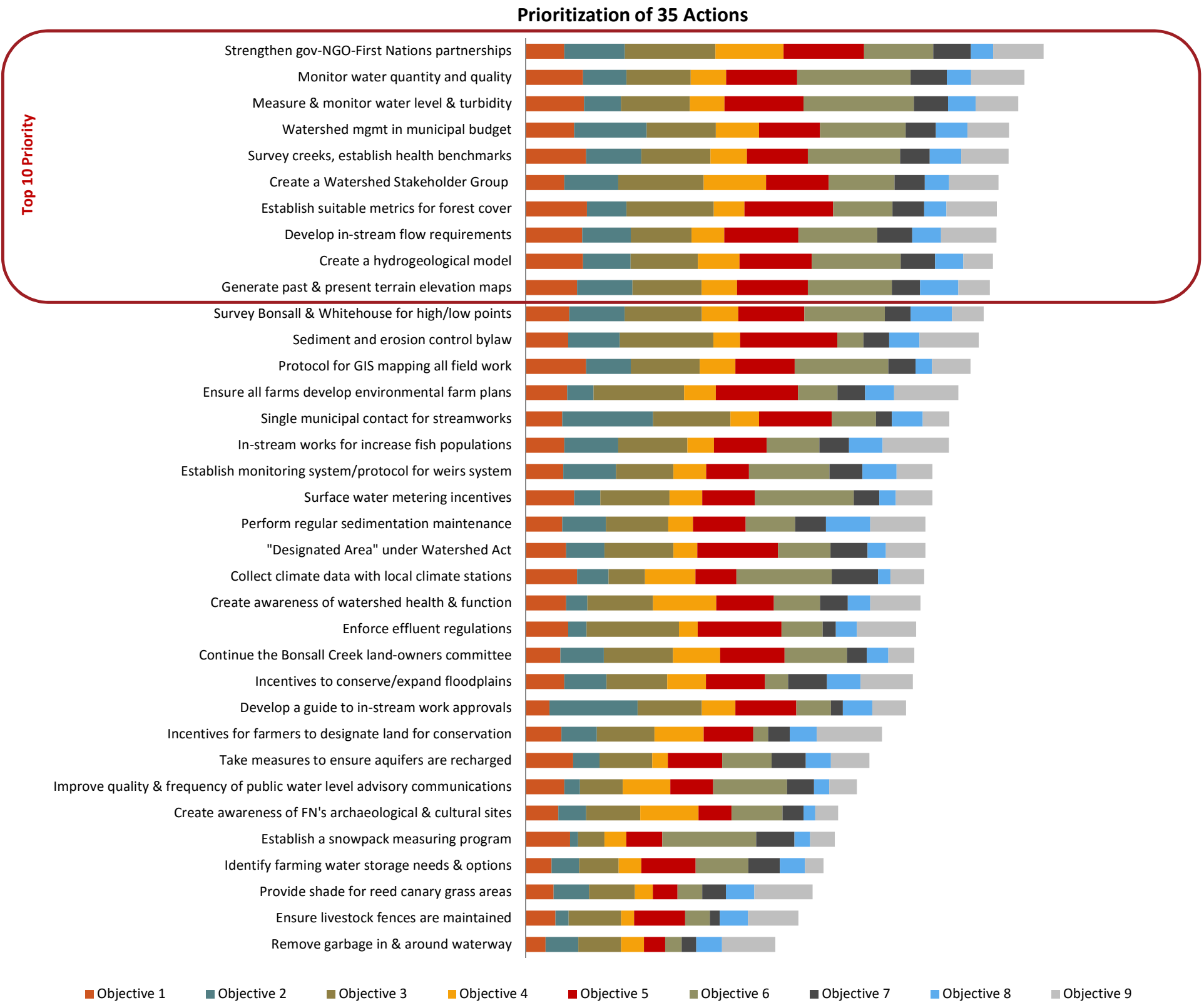
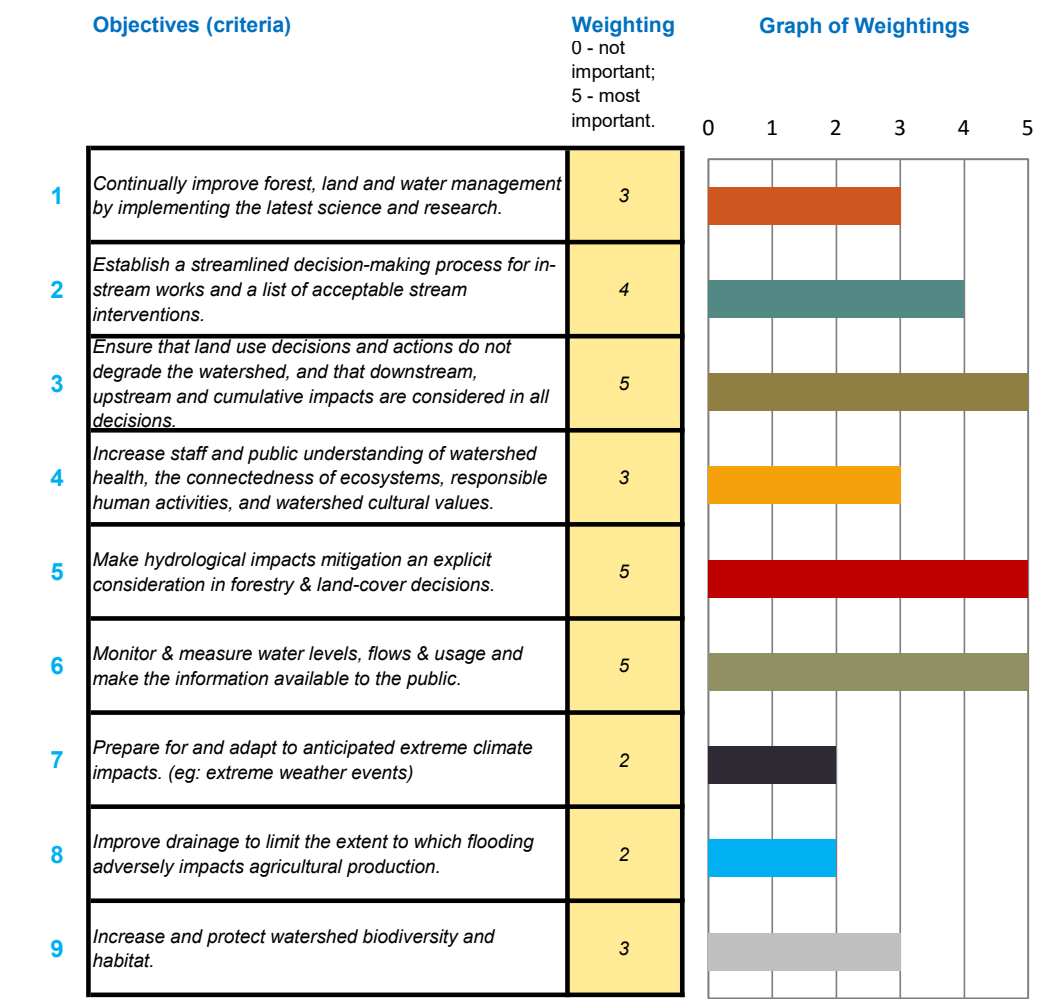
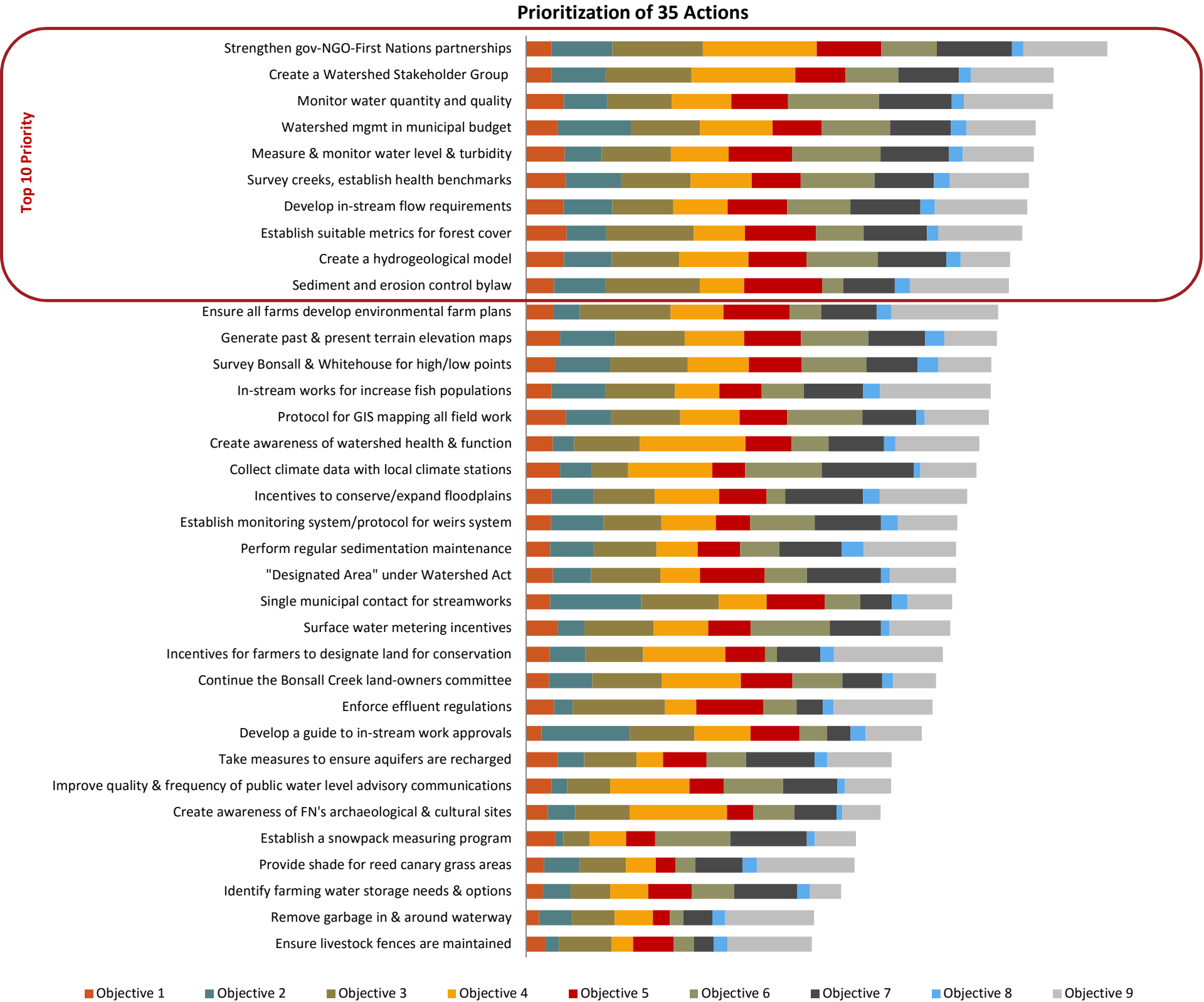
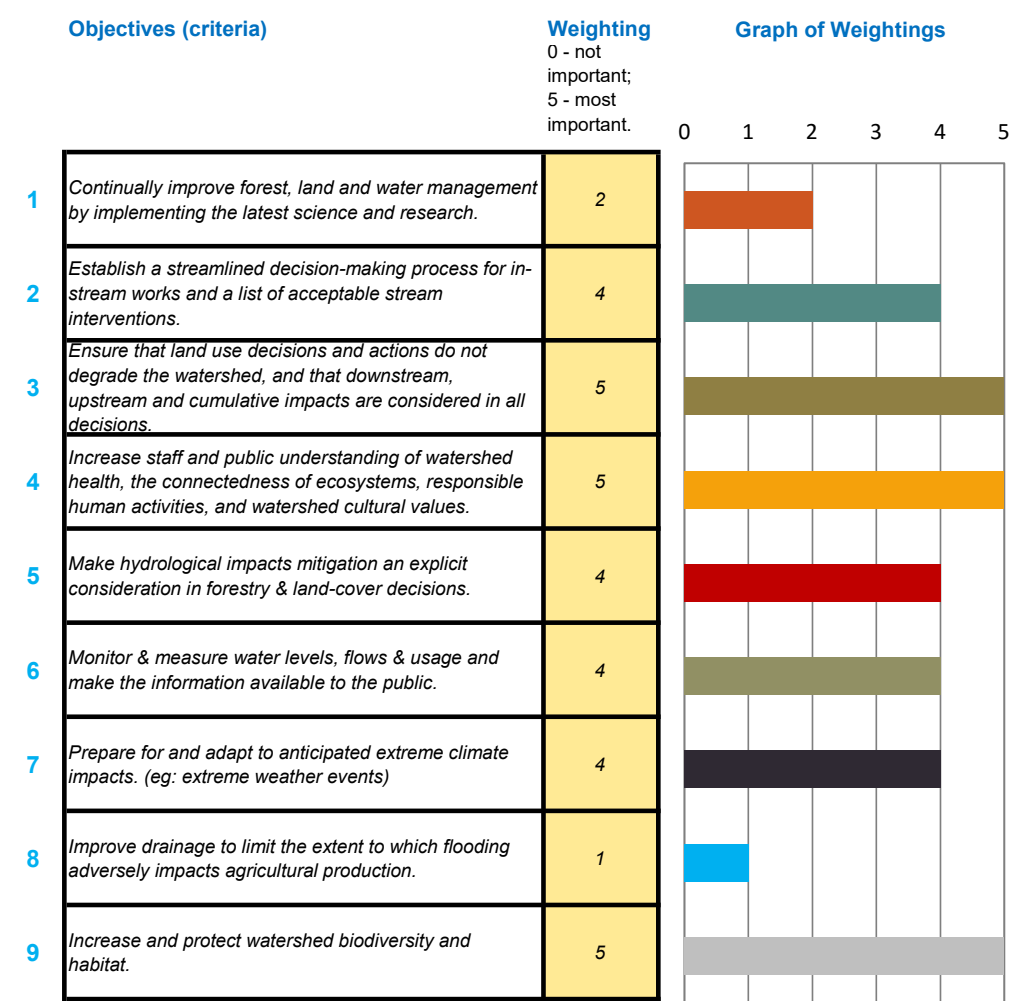


Figure 14. Sample MCA prioritization showing a preference for achieving primarily water quantity and quality improvements.

This sample output of the MCA tool shows how the 35 actions are prioritized if water quantity and quality-related objectives are valued over other objectives. Many of the actions involve monitoring and surveying watershed conditions, creating targets for watershed stream health, creating tools for projecting and assessing changes in the watershed, and strengthening partnerships for watershed stewardship.



2.5 Action Prioritization Discussion

High Agreement, High Priority Actions

The results of the multi-criteria analysis exercise help identify which actions should be made a priority. Taking the four examples that use multiple objective weightings (Figure 11 through 14), we see that there is a high degree of agreement between the top ten actions prioritized under each. Eight actions consistently appear in the top 10 list across all four examples:

- Create a hydrogeological model
- Create a Watershed Stakeholder Group
- Develop in-stream flow requirements
- Measure & monitor water level & turbidity
- Monitor water quantity and quality
- Strengthen government-NGO-First Nations partnerships
- Include watershed management in municipal budget

The high level of agreement on these actions between examples indicates that these actions should be priorities in Watershed Management Plan implementation.

Although not prioritized by the MCA process, numerous discussions with the public, stakeholders, the Agricultural Working Group and the Agricultural Advisory Committee indicate that agricultural water storage and creating a single point of contact for in-stream work requests should also be prioritized. This demonstrates the usefulness of the MCA tool when combined with rigorous project processes and decision-making approaches. The use of the MCA tool and the assessment of project discussions indicates the inclusion of these two actions to form the suite of top recommended actions.

Medium Agreement, Medium Priority Actions

Actions that fall within the top 10 list of three of the examples are:

- Establish suitable metrics for forest cover
- Generate past & present terrain elevation maps
- Survey creeks, establish health benchmarks

The medium level of agreement on these actions between examples indicates that these actions should be also be considered as priorities in Watershed Management Plan implementation.

High Agreement, Low Priority Actions

Actions that fall within the bottom 5 priority list consistently across all four examples are:

- Identify farming water storage needs & options
- Improve quality & frequency of public water level advisory communications
- Provide shade for reed canary grass areas
- Remove garbage in & around waterway
- Take measures to ensure aquifers are recharged

The high level of agreement between examples for these low-priority actions indicates that these actions are not seen to provide much benefit in achieving the objectives. That isn't to say that they should not be considered for implementation at all, but they are not currently seen as a place to focus efforts.

The outputs of the exercise may not seem intuitive, as it could be expected that by varying the weights of the objectives the actions prioritized would have more variance. What this means is that these actions have similar, high base ratings (i.e.: without considering the weightings) because the survey respondents deemed them to respond to achieving each objective very well. One interesting observation is the consistently low prioritization of identifying farming water storage needs and options, despite this action being one of the initial priorities for performing this study. This prioritization outcome is likely due to the choice of objectives, none of which directly address potential drought conditions. Objective 7: Prepare for and adapt to anticipated extreme climate impacts, encompasses drought conditions, and water storage would be considered an action to help meet this objective.

The results of the MCA exercise are encouraging. The similar outcomes of action prioritization between the four examples means that several actions can be undertaken with the assurance that their outcomes meet the demands and desires of multiple stakeholders while improving the state of watershed health. The actions that show up consistently in the top 10 lists across the examples (high and medium agreement actions) are thus the priority actions to take in order to best achieve the objectives and vision of the Bonsall Creek Watershed Management Plan.

3. Watershed Management Implementation Plan

3.1 Priority Actions

The priority actions resultant from the multi-criteria analysis exercise, in no particular order, are:

- Create a hydrogeological model
- Create a Watershed Stakeholder Group
- Develop in-stream flow requirements
- Establish suitable metrics for forest cover
- Generate past & present terrain elevation maps
- Measure & monitor water level & turbidity
- Monitor water quantity and quality
- Strengthen government-NGO-First Nations partnerships
- Survey creeks, establish health benchmarks
- Watershed management in municipal budget
- Provide agricultural water storage for drought-prone areas
- Establish a single point of contact for in-stream work requests

Most of the actions concern further study and investing resources in in-stream measurement and monitoring systems. The rest concern government action in allocating resources to watershed management and strengthening watershed stewardship partnerships.

Many of the actions have similar implementation considerations. Some will require mobilization of similar resources and support from the same government departments and stakeholder groups. The following tables for each priority action explore the details of their implementation.

Create a hydrogeological model				
1	A hydrogeological model is needed to help understand the hydrologic cycle in the watershed. Understanding this cycle watershed will help reveal the presence of water as snow, ice, fresh water, saline water and atmospheric water over time, yielding valuable inputs for watershed planning and assessment of impacts of residential, agricultural and industrial activities in the watershed. Use of the model over time will also provide critical insights on water trends, enabling increased precision in its predictive capacity.			
Next Steps	i. Coordinate with neighbouring jurisdictions on hydrogeological modelling that may be occurring there. ii. Allocate municipal budget to engage a hydrogeological modelling specialist and for maintaining the model over time. iii. Allocate staff time to engage in modelling oversight. iv. Engage a modelling specialist to develop a hydrogeological model and a protocol for keeping the model up to date with observed data. v. Allocate staff time to maintaining the model.			Begin Next 1-2 years Timeline 6 months
Lead & Support Development Services Department	Partners Hydrogeological Specialist	Costs \$50,000 for initial modelling	Potential Funding Investment Agriculture Foundation Ministry of Environment Forests, Lands and Natural Resource Management	Monitoring Metric Baseline: yes/no Monitor: Effectiveness of model in providing useful watershed planning inputs

2

Create a Watershed Stakeholder Group

A Watershed Stakeholder Group would be responsible for managing the implementation of the Bonsall Creek Watershed Plan and reporting to committees of Council on progress.

Next Steps	i. Consider transitioning the current Bonsall Creek Landowners Committee to a Watershed Stakeholder Group with increased representation from other community, business and First Nations stakeholders. ii. Establish the purpose, terms of reference, and mechanism for reporting to committees of Council for the group. iii. Solicit group membership.			Begin Next 1-2 years Timeline Ongoing
Lead & Support NC Planning & Sustainability Department NC Communications Staff	Partners Community, business, and First Nations stakeholders	Costs N/A	Potential Funding N/A	Monitoring Metric Baseline: yes/no Monitor: Effectiveness of the group in Watershed Plan implementation and reporting. Assess need for group annually.

3

Develop In-stream Flow Requirements

In order to ensure optimal conditions for ecosystems and wildlife, and set expectations throughout the year for flooding and stream flow conditions, in-stream flow requirements should be established for all major waterbodies in the watershed. This would entail researching and monitoring the waterbodies to determine optimal water volumes, stream flow speeds, and stream behaviour, and then setting flow requirements and determine the best methods to maintain them. This information would be made public on an ongoing, updated basis.

Next Steps	i. Engage the appropriate professionals (e.g.: biologist, engineer, water modeller, provincial government staff) for initial consultation on what developing in-stream flow requirements entails and what ongoing activities are necessary to maintain the requirements.			Begin 1-3 years from now Timeline 1 year
	ii. Based on initial consultations, coordinate with other levels of government and First Nations on establishing an operating framework for establishing and maintaining in-stream flow requirements.			
	iii. Contract consulting services to establish in-stream flow requirements and maintenance guidelines.			
Lead & Support	Partners	Costs	Potential Funding	Monitoring Metric
Development Services Department Engineering Department	Provincial Government Agencies: MOA, MOE, FLNR First Nations Community ecology groups	\$50,000	Investment Agriculture Fund Farmers Associations	Baseline: Current state of stream flows Monitor: Stream flow indicators

4	Establish Suitable Metrics for Forest Cover Healthy forest cover around waterways provides habitat, root systems that prevent erosion of river banks, and shade for flora and fauna. Shade is also beneficial in preventing the proliferation of the invasive reed canary grass species. Shaded waterways maintain more consistency in water temperature and keeps the water at a temperature amenable to salmon spawning.			
Next Steps	i. Coordinate with municipal staff, local biologists, forestry industry representatives, community groups and First Nations to establish a survey of forest cover around waterways in the watershed. ii. From the survey, perform a needs assessment of forest cover to identify priority areas for forestation. iii. Coordinate with landowners, the forestry industry and First Nations in planning and implementing forestation activities.			Begin Next 1-2 years Timeline 10 months
Lead & Support Forestry Department Development Services Department	Partners Local biologists Forestry industry Land owners First Nations Community Groups	Costs Honoraria Cost of preparing planting areas and planting trees, dependent on forestation needs.	Potential Funding Investment Agriculture Land owners Ducks Unlimited Community groups MOE	Monitoring Metric Baseline: Waterway forest cover area Monitor: Forest cover area Tree health Ecosystem health

5	Generate Past and Present Terrain Elevation Maps Historical terrain elevation maps would help farmers, landowners, biologists and the community understand changes in the watershed topography over time. This would help in understanding the resultant changes to waterway behaviour in the watershed and provide a tool for estimating future changes. The mapping would allow farmers and planners to assess best watershed planning and maintenance activities to undertake given current and anticipated conditions. It would also help further understand the nature of water behaviour, aquifer replenishment, and flooding in the watershed, leading to a better understanding of the watershed overall and allowing more detailed predictive water modelling.			
Next Steps	i. Coordinate with provincial government departments (e.g.: FLNR, GeoBC) and the CVRD to establish data sources for terrain elevation mapping. ii. Engage terrain mapping services as needed to update mapping data with current conditions. iii. Store and update maps on an ongoing basis, incorporating them into provincial, regional and municipal government data records, public-facing mapping systems and open data mapping applications.			Begin Next 1-2 years Timeline 1 year
Lead & Support Development Services Department Engineering Department	Partners FLNR GeoBC	Costs Dependent on data availability and mapping requirements	Potential Funding MOE VIU	Monitoring Metric Baseline: yes/no Monitor: Quality, completeness and accessibility of map data

Measure & Monitor Water Level & Turbidity

6

Turbidity in waterways has effects on stream health, ecosystem health and wildlife. It affects the ability of fish to absorb oxygen and the ability of light to penetrate to water depths where aquatic plant and animal life live. Changes in turbidity can affect the presence of certain habitats, plants and animals which has an effect on stream health. Turbid waters often indicate high levels of sedimentation and erosion, and instances of bare-soil river bottoms. Monitoring turbidity levels is thus a useful element in waterbody health monitoring.

Next Steps	i. Consult with waterbody engineers to determine what options exist for turbidity (suspended sediment) sensors and at what locations monitoring stations would be most useful in the watershed.			Begin 1-3 years from now Timeline 3 months
	ii. Establish a budget and expenditure approval for monitoring equipment purchase, installation, use and maintenance.			
	iii. Engage municipal staff or other professional to install the monitoring stations.			
	iv. Get training for municipal staff in the installation, maintenance and use of the monitoring stations.			
	v. Record and report on turbidity levels over seasons, noting the effects of weather events, industrial activities, farming, etc. Use the data collected to inform decisions on waterbody maintenance in the watershed.			
Lead & Support	Partners	Costs	Potential Funding	Monitoring Metric
Development Services Department Engineering Department	Community groups First Nations VIU	~\$6,000 for 12 turbidity sensors (one in each major stream reach) Costs for installation and ongoing maintenance (estimated to be \$4000/year for site visits and lab tests)	MOE Ducks Unlimited	Baseline: yes/no Monitor: Number of monitoring stations, quality of data produced

Monitor Water Quantity and Quality

7

In the same vein as monitoring turbidity and stream flows, monitoring water quantity and quality is useful for determining waterbody and ecosystem health, as well as being able to anticipate and prepare for draught conditions. This type of monitoring can help determine where stream water is lost or added, or used by surface licenses, as well as the origins of waterway contaminants.

Next Steps	i. Consult with partners (below) to determine the best placement for water monitoring stations. ii. Install water monitoring stations. iii. Host City staff training on the use and maintenance of the stations. iv. Establish a recording and reporting protocol and make the data publicly available.			Begin 1-3 years from now
				Timeline 3 months
Lead & Support	Partners	Costs	Potential Funding	Monitoring Metric
Development Services Department Engineering Department	Owners, farmers, First Nations, biologists, industry representatives, engineers and community groups	Cost of site investigation @ 1 hour/site using current meters, used in conjunction with water level loggers. Assume \$4000/year.	MOE Ducks Unlimited MOA FLNR	Baseline: yes/no Monitor: Number of monitoring stations, quality of data produced

Strengthen Government-NGO-First Nations Partnerships

8

Consistently one of the top priority actions, strengthening government-NGO-First Nations partnerships is estimated by many engaged in this project to have a very positive effect on watershed understanding and holistic approaches to watershed management. Representation from stakeholders in each of these parties on committees of Council, the Watershed Stakeholder Group, economic bodies, and other entities that contribute to watershed governance and maintenance will help ensure a well-distributed understanding of different landowners' watershed experiences and needs, and improved communications between stakeholders and the public.

Next Steps	i. Engage a cross-section of stakeholders and representatives in a structured dialogue to determine the best approaches to coordination, communication, data and knowledge sharing, and engagement in watershed planning and activities. Establish the best roles for the City to play in maintaining relationships and communications. ii. Make changes to committees of Council, consultation bodies, and community groups as necessary to improve relations between groups. iii. Assign responsibility for creating spaces, opportunities and mechanisms for these groups to meet, exchange information and communicate on an ongoing basis.	Begin This year Timeline Ongoing		
Lead & Support Development Services Department NC Communications Staff	Partners First Nations Farmers Community groups Professional facilitators	Costs N/A	Potential Funding N/A	Monitoring Metric Baseline: yes/no Monitor: Effectiveness of the groups' interactions and outcomes of their coordination.

Survey Creeks, Establish Health Benchmarks

9

In addition to water quality, quantity and turbidity monitoring, performing a reach-by-reach survey of creeks in the watershed would establish a greatly improved understanding of waterways. Comparing current conditions to benchmark conditions in regional healthy streams would enable establishing stream health metrics and targets.

Next Steps	i. Consult with local biologists and water engineers to determine a checklist of creek characteristics to survey, as well as appropriate stream health benchmarks. ii. Perform creek surveys and post the information for public access. Incorporate survey information into City and Regional GIS mapping data. iii. Create a plan to achieve the health benchmarks.	Begin This year Timeline One month Repeat every 2 years		
Lead & Support Development Services Department	Partners Community groups First Nations Pacific Salmon Foundation	Costs \$5,000 to develop the checklist \$50,000 for stream survey	Potential Funding N/A	Monitoring Metric Baseline: yes/no Performance on stream health metrics Monitor: Stream health metrics

10	Create Consideration in the Municipal Budget for Watershed Management To accommodate the costs of stream monitoring, maintenance and watershed governance, watershed management should be an explicit item in the municipal budget.			
Next Steps	i. Establish a recommended budget request for watershed maintenance to Council. Coordinate with the CFO and CAO. ii. Determine if the budget recommendation for watershed management falls within the current annual allocation of \$30,000 to the agricultural reserve fund. If so, manage the watershed from within this fund. If not, determine what portion of the watershed management funding will be covered by the fund and how the rest of the funding requirement will be met.			Begin By the end of the current fiscal year. Timeline Annual revisitation
Lead & Support Development Services Department	Partners Engineering Department, CAO, CFO, Council	Costs N/A	Potential Funding N/A	Monitoring Metric Baseline: yes/no Monitor: Adequacy of annual budget to deliver the watershed plan

11	Provide Agricultural Water Storage for Drought-Prone Areas Although the lower reaches of the main streams in the watershed can be prone to flooding, some of the upper reaches are prone to drought in the summers. The likelihood of drought in these areas is increasing with climate change impacts. For those agricultural operations affected by drought, storage solutions are critical. Coordination between drought-prone and flood-prone areas might be needed to accommodate summer water demands.			
Next Steps	i. Confer with land owners in the upper reaches of Whitehouse Creek whose irrigation practices are affected by drought in order to establish irrigation volume requirements. ii. Confer with land owners in the rest of the watershed to establish their amenability to hosting communal irrigation ponds that would fill during periods of rain or flooding. iii. Perform stream and area surveys to determine the options for natural water storage (ravine damming, ponds, unused ditches, etc.). iv. Perform well surveys to determine if irrigation needs can be met with new wells from plentiful aquifers. v. Engage in a group Environmental Farm Plan assessment in order to access funding for planning and projects. vi. Coordinate application to the Beneficial Management Practices funding program and perform the related work to achieve a Certified Irrigation Management Plan. vii. Investigate creative storage solutions such as communal storage, storage of flood waters, combination well/river/rain harvesting storage, pumping, etc. viii. Based on the planning processes' outcomes, implement the irrigation solutions. Access project funding to subsidize capital costs.			Begin By the end of the next fiscal year. Timeline 2 years
Lead & Support Development Services Department Cowichan Agricultural Society	Partners Farmers First Nations Cowichan Agricultural Society	Costs N/A	Potential Funding IAF ARDCorp MOE FLNR	Monitoring Metric Baseline: yes/no Monitor: Progression through the stages of planning and capital project funding.

Establish a Single Point of Contact for In-Stream Work Requests

A common challenge of farmers and First Nations is knowing what permits and approaches are required for different in-stream work projects. Although most in-stream work projects are processed through Front Counter BC, requests are often made to the Municipality, or go unmade due to confusion about the regulations and approval process. For timely and effective stream maintenance resulting in improved stream health and decreased flood potential, a knowledgeable Municipal point of contact for works in and about a stream is needed.

Next Steps	i. Establish the complete suite of responsibilities for the point of contact staff person.			Begin By the end of the next fiscal year.
	ii. Determine the staffing requirement for the position. Can the requirements be met by existing staff or is new staff needed?			
	iii. If new staff is needed, address this need in the municipal budget and human resources aspects of the affected departments.			
	iv. Establish the position and promote its existence throughout the community.			
	v. Create and distribute (online and print) a guide for in-stream works.			
Lead & Support	Partners	Costs	Potential Funding	Monitoring Metric
Development Services Department	Farmers	The cost of the annual salary for the point of contact, if new staff is required for the position.	N/A	Baseline: yes/no
Engineering Department	First Nations	The cost of guide preparation and distribution.		Monitor: Number of requests attended to by staff.

3.2 Comments on Remaining Actions

Enforce effluent (water discharge back into the environment) regulations from industry, home and farm operations.

These regulations exist, but need Municipal or Regional staff allocation to properly enforce.

Encourage and provide incentives for metering of surface water use by landowners.

Water users are reticent to metering, but there is great benefits to metering, including increased water efficiency and water data availability. Either a requirement or the proper incentive must be made for surface water metering.

Establish a sediment and erosion control bylaw or Development Permit Area.

Sediment is identified as a harmful substance under the Federal Fisheries Act and introducing it to fish bearing streams is illegal. Farming and industrial activities and practices that promote sedimentation must be explicitly avoided. This needs to be communicated at the municipal level through a legal framework such as a bylaw or DPA.

Provide incentives for conserving and expanding floodplain areas.

Farmers who have fallow or unused fields, as well as landowners with unused lands may be amenable to allowing flooding of these lands, which could increase the health of parts of the watershed and alleviate flooding in other areas at critical times of the year. A survey could be conducted to determine this.

Request the status of Designated Area under the new Water Sustainability Act to provide enforceable tools to better characterize, manage, and protect groundwater.

Following the process to become a Designated Area may have benefits to enforcing regulations beneficial to watershed health.

Establish a protocol of translating field work in the watershed to GIS data and coordinate the data with provincial databases.

With new sensors and surveys, a protocol should be developed for integrating data into GIS databases at local, regional and provincial levels. Coordinate with CVRD and GeoBC.

Identify opportunities and incentives for farmers to designate land as conservation land.

Giving land conservation status would protect certain critical terrestrial and waterway infrastructure and flooding in these areas would be tolerated.

Conduct in-stream work where necessary to ensure fish populations flourish (eg: assess the Somenos road culvert barrier for fish passage opportunities)

With information from creek surveys and water quality and quantity, the ideal approaches to fostering fish health should be achievable.

Perform regular sedimentation maintenance (eg: emptying the sediment sump in Reach 6, bank maintenance, install channel bed erosion protection on unstable tributaries, install sediment ponds).

Remove garbage in and around waterway section around the Tsussie reserve.

Some regular maintenance is required in certain waterbodies. Coordinate with community groups and the CVRD to establish ongoing responsibility for maintenance.

Ensure all farms develop environmental farm plans and minimize fertilizer runoff to minimize impacts on water quality and quantity.

Annual incentives to undertake Environmental Farm Plan certification should be created. There is no charge for EFPs and the EFP program has environmental incentives to help with projects and management plans, with a \$70,000 cap per farm. There are also opportunities for farmers to perform group EFPs for specific projects that encompass more than one farm.

Establish a municipal and public climate of awareness, accountability, and respect around documented and new archaeological sites and cultural areas, via education efforts in partnership with First Nations.

Create awareness of watershed health and function via public education programs like school forums, information for farmers and watershed tours.

New efforts will coordinate stakeholders and community groups, as well as collect watershed health information. These efforts and their outcomes should be communicated to the public. A communications strategy should be developed.

Improve the quality and frequency of public water level advisory communications.

This is perhaps an activity to be spearheaded by CVRD.

Establish a snowpack measuring program.

In addition to the in-stream monitoring, and in light of anticipated climate change impacts to snow pack depth, investing in a snowpack measuring program is wise. This can be coordinated with CVRD.

Ensure livestock fences are maintained along the creek to prevent livestock entering the water/eroding the banks.

The new protocols for works in and about a stream addresses fence maintenance. Along with offering EFP incentives, fence maintenance should be enforced.

Collect climate data through installation of local climate stations and in coordination with Provincial bodies and partners. Assess this data ongoingly and share with the public.

Given the anticipated increased frequency of extreme weather events and uncertainty in consistency of weather, it is wise to invest in climate monitoring stations. This can be coordinated with CVRD.

Create/optimize the means of storing/releasing water to ensure aquifers are recharged.

The hydrogeological model will be able to recommend the best approaches to storing and releasing water for best aquifer health.

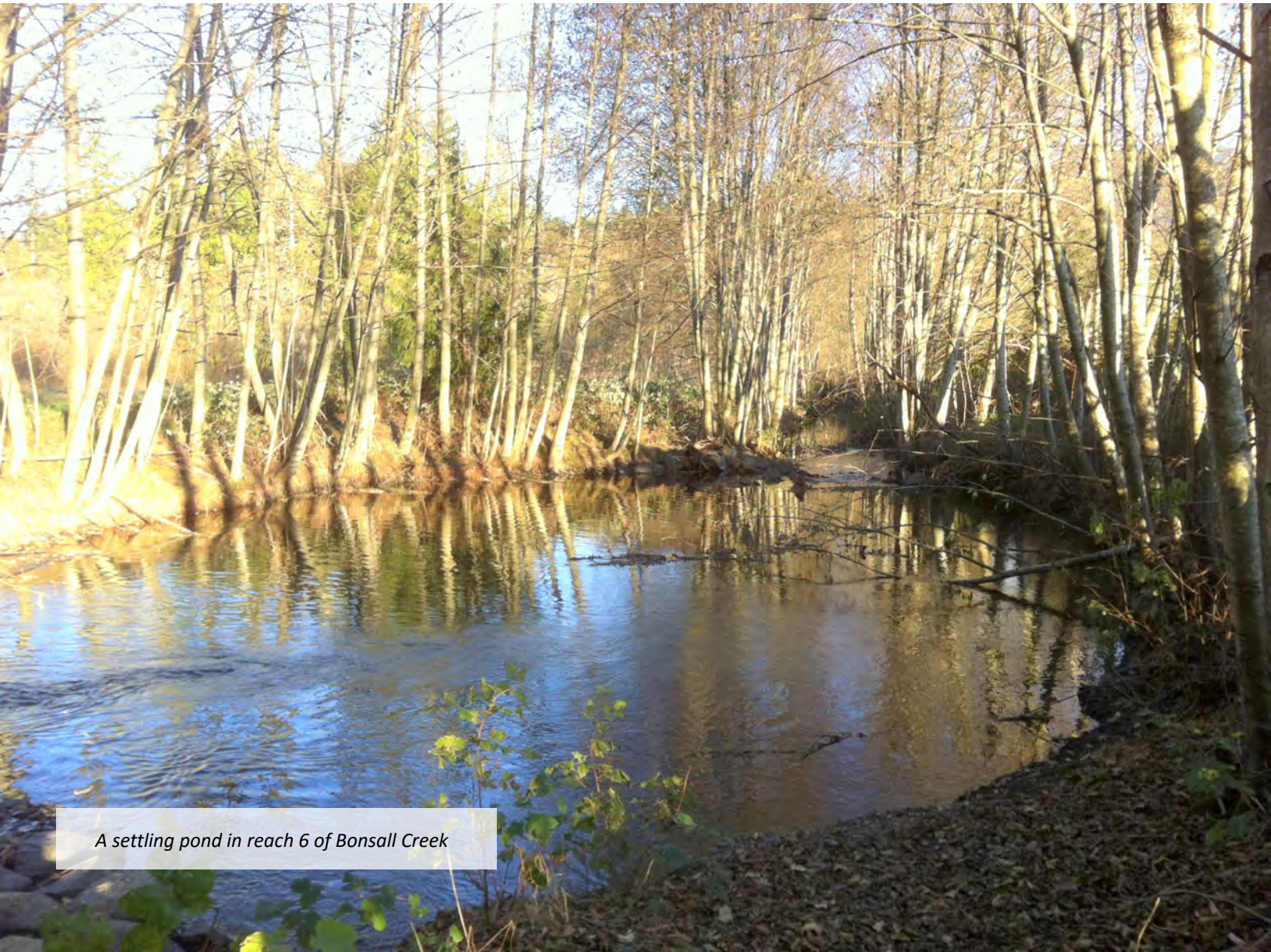
4. Conclusions

The Watershed Management Plan development process was very successful in community engagement, bringing farmers, land owners, community groups and First Nations together to discuss the watershed and contribute opinions and ideas on its maintenance. The long timeline of the project allowed for multiple engagements on different watershed topics, public education opportunities, and consultations on detailed aspects of the plan, as well as seasonal watershed observations.

The consulting team constituted local professionals well-versed in the watershed with specific on-the-ground knowledge. In combination with public inputs, consulting team inputs provided specific actions to incorporate into the Watershed Management Plan. As such, a detailed implementation plan could be produced which should serve North Cowichan well.

Watershed planning is a holistic approach to environmental, social and economic planning over a large region, paying attention to the needs of residents and ecosystems alike. Perhaps even moreso than other types or focuses of planning, it requires striking a balance between at-times competing interests. The implementation and updating of the Watershed Management Plan will require patience and sensitivity in order to achieve positive, holistic outcomes.

There is some confidence that can be enjoyed through the commonality of the action prioritization exercise outcomes. Many of the actions to be taken provide benefit to multiple parties and ecosystems. Properly implemented and monitored, the actions will iteratively improve the state of the watershed and address many of the concerns of the original individuals that initiated the planning process.



A settling pond in reach 6 of Bonsall Creek

Provincial Rules and Regulations for Water Licences and Approvals¹

At the provincial level, the *Water Sustainability Act* (WSA)² and the *Water Sustainability Regulation* (approved Feb 29, 2016)³ provide important and powerful rules and guidance for issuing water licences and approvals, and directing the allocation of surface water and groundwater.

Beneficial use

Under the WSA, anyone who diverts water must make beneficial use of that water. This means using the water as efficiently as practicable, and for the purpose(s) specified by the licence or approval. Beneficial use is covered in Section 30 of the WSA.

Water Licences

Water licences allow licensees to divert, store and use specific quantities of water for one or more water use purposes. A water licence may also authorize works related to the diversion and use of the water. Water licences are covered in sections 7 and 9 of the WSA.

Water Use Approvals

Use approvals (called Section 8 or short-term approvals under the previous *Water Act*) authorize holders to use water for a period of up to 24 months. This is now covered in Section 10 of the WSA.

Change Approvals

Changes in and about a stream are carried out under change approvals (called Section 9 approvals under the previous *Water Act*) and notifications. These authorize work in and around streams. This is now covered in Section 11 of the WSA.

Changes in and about a stream

Changes in and about a stream are carried out under change approvals (called Section 9 approvals under the previous *Water Act*) and notifications. These authorize work in and around streams. This is now covered in Section 11 of the WSA.

Change approvals are granted with terms and conditions attached. The terms and conditions may relate to the time of year in which you may do the work, and/or to other measures that protect the aquatic ecosystem, the hydraulic integrity of the stream channel and the rights of water users and landowners downstream.

The *Water Sustainability Act* (WSA) defines “Changes in and about a stream” as:

- Any modification to the nature of a stream, including any modification to the land, vegetation and natural environment of a stream or the flow of water in a stream, or
- Any activity or construction within a stream channel that has or may have an impact on a stream or a stream channel.⁴

The changes made in and about a stream can include activities (e.g., removal of invasive vegetation) or “works.” Under the WSA, “works” is defined to mean anything that can be or is used to divert, store, measure and convey water; and produce measure, transmit or use energy.

“Stream” is defined in the WSA as a natural watercourse, including a natural glacier course or natural body of water. Bodies of water described by the term “stream” can include a lake, pond, river, creek, spring, ravine, gulch, wetland features with open standing water, or glacier (whether or not the glacier usually contains water or ice).

1 <http://www2.gov.bc.ca/gov/content/environment/air-land-water/water/water-licensing-rights/water-licences-approvals>

2 <http://www.bclaws.ca/civix/document/id/complete/statreg/14015>

3 http://www.bclaws.ca/civix/document/id/oic/oic_cur/0110_2016

4 <http://www2.gov.bc.ca/gov/content/environment/air-land-water/water/water-licensing-rights/working-around-water>

Apply for a Change Approval or Submit Notification of Instream Work⁵

A change approval is written authorization to make complex changes in and about a stream. A notification is used for specified low risk changes in and about a stream that have minimal impact on the environment or third parties.

Application process

After you submit your application and all required fees and signatures at FrontCounter BC, your application will be reviewed by the Water Manager at the Ministry of Forests, Lands and Natural Resource Operations (FLNR). Applications for change approvals are typically referred to other provincial and federal regulatory agencies for comment during the adjudication process. Consultation with First Nations, other water users, community groups or other parties may be required if existing rights could be affected by your application. The Water Manager will notify you when a decision has been made.

Notifications

Notifications are used for specified low risk changes in and about a stream that have minimal impact on the environment or third parties. The work must meet the requirements of the Water Sustainability Regulation, and comply with any conditions set out by a habitat officer in response to a notification. Part 3 of the Water Sustainability Regulation describes the type of work that may be completed under notification.

Notification process

You must submit your notification of proposed work to FrontCounter BC a minimum of 45 days before beginning work (submitting more than 45 days ahead of time is recommended). Your notification will be sent to a habitat officer in the region in which you have proposed to make the change. If you have not heard from the habitat officer within 45 days of FrontCounter BC receiving your notification, you must make sure that your work meets the terms and conditions described in Part 3 of the Water Sustainability Regulation, and you may proceed with the proposed changes.

Instream Work Windows and Best Practices⁶

Instream work windows specify the best period(s) of time in the year to carry out work in order to minimize the impact on species and habitats in each region. The particular timing may be set by the habitat officer for a notification, or set as a condition of the change approval.

Regional Terms and Conditions and Timing Windows

Habitat officers in each region set the terms and conditions for work in and about a stream, as outlined in Section 44, Water Sustainability Regulation. A regional timing window is the period(s) during the year when work may be carried out with the lowest risk to fish and wildlife species and habitat. Timing windows and terms and conditions vary based on regional differences in fish and wildlife species and habitat, and geography. North Cowichan falls within the terms and conditions for the Vancouver Island & Gulf Islands region.

Best Management Practices

Applying best management practices (BMP) to instream work will help ensure fulfilling the terms and conditions for protecting habitat and water quality. The Ministry of Environment hosts an online guidebook that provides information on BMP's for in-stream works, as well as a Standards and Best Management Practices for Instream Works document published in March 2004.

5 <http://www2.gov.bc.ca/gov/content/environment/air-land-water/water/water-licensing-rights/water-licences-approvals/apply-for-a-change-approval-or-submit-notification-of-instream-work>

6 <http://www2.gov.bc.ca/gov/content/environment/air-land-water/water/water-licensing-rights/working-around-water>

Recommendations

The new Water Sustainability Act and recently published Water Sustainability Regulation provide much clearer guidance on works in and about a stream and the change approval process than at the start of the Bonsall Creek Watershed Management Plan process. The timing is quite apt. Given this recent publication, the following is recommended to be implemented as part of the BCWMP:

- That NC dedicate resources to establish a municipal point of contact who:
 - becomes familiar with the new regulations and approvals process; and,
 - assists land owners with their applications to Front Counter BC (in cases where land owners are to carry out work on their respective land).
- That NC consider, where appropriate, applying for a Water Licence, Water Use Approval, and/or Change Approval as required for an extended or entire length of the Bonsall and Whitehouse Creeks. This would allow for works in and about a stream to be conducted directly by NC at any point along the reach without submitting several applications. However, NC would need to work closely with land owners to to gain access and get easements.

If either land owners or NC intend to carry out works in and about a stream, NC should ensure that the intended works are in alignment with the goals and objectives outlined in the BCWMP.

