Keeping NATURE in Our Future

Case Studies from North and Central Okanagan that support the Biodiversity Conservation Strategy for the Okanagan Region

Okanagan Collaborative Conservation Program

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ACKNOWLEDGEMENTS

This document is a compilation of case studies that demonstrate the use of the data and concepts from A Biodiversity Conservation Strategy for the Okanagan Region (the Strategy) to protect biodiversity. The Strategy was developed through a collaborative process led by the South Okanagan Similkameen Conservation Program (SOSCP) and the Okanagan Collaborative Conservation Program (OCCP). The SOSCP and OCCP thank the many partners, advisors, agencies, technical experts, observers and funders that supported the development of the Strategy.

Many thanks to the OCCP project manager, Susan Latimer who coordinated the Strategy and the case studies. We would also like to thank members of the OCCP Biodiversity Conservation Strategy Steering Committee (Margaret Bakelaar, Jan Kirkby, Anthony Kittle, Carie Liefke, Brooke Marshall, Ann Jackson, Brian Robertson, and Carolina Restrepo Tamayo) who helped identify possible case studies, provided valuable input and review of the case studies, as well as input and review of the Strategy.

The case studies describe projects that were undertaken by various organizations including governments, non-profit organizations and academic institutions. The case studies would not have been possible without the involvement, dedication, in-kind support and funding provided by the various partners and individuals who contributed to the case studies. Thank you to Rob Miles, Laura Frank, Dr. Lael Parrot, Maryssa Soroke, Alison Peatt, Todd Cashin, Wayne Darlington, David Widdis, Mark Koch, Joanne DeVries, Lee Hesketh, Pete Spencer, Rochelle Eisen, Ann Blyth and Ian Laing.

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INTRODUCTION

In 2014, the Okanagan Collaborative Conservation Program and the South Okanagan Similkameen Conservation Program developed A Biodiversity Conservation Strategy for the Okanagan Region[1] (the Strategy). The Strategy builds on analyses of biodiversity in the North, Central and South Okanagan-Similkameen regional districts and the Biodiversity Conservation Strategy for South Okanagan-Similkameen. The Strategy is holistic, providing a vision, goals, guiding principles, analyses, key findings, strategic directions and opportunities for action to support the strategic directions.

This document is a compilation of case studies from the north and central Okanagan that demonstrate the use of the data and concepts from the Strategy. All of the case studies provide examples of how the strategy information can be implemented to further biodiversity protection within the region. This compilation is only intended to provide some examples. There are many other projects and initiatives currently underway to protect biodiversity in the region. Examples of additional tools that support the goals and strategic directions of the Strategy (e.g. conservation covenants, large lot zoning, conservation funds, security deposits) are described in the Strategy document.

[1] For the purposes of the Strategy, the Okanagan Region includes drainages flowing into the Okanagan River, and the portions of the Similkameen, Kettle and Shuswap Rivers that lie within the three Okanagan regional districts: Regional District of North Okanagan (RDNO), Regional District of Central Okanagan (RDCO) and Regional District of Okanagan – Similkameen (RDOS).

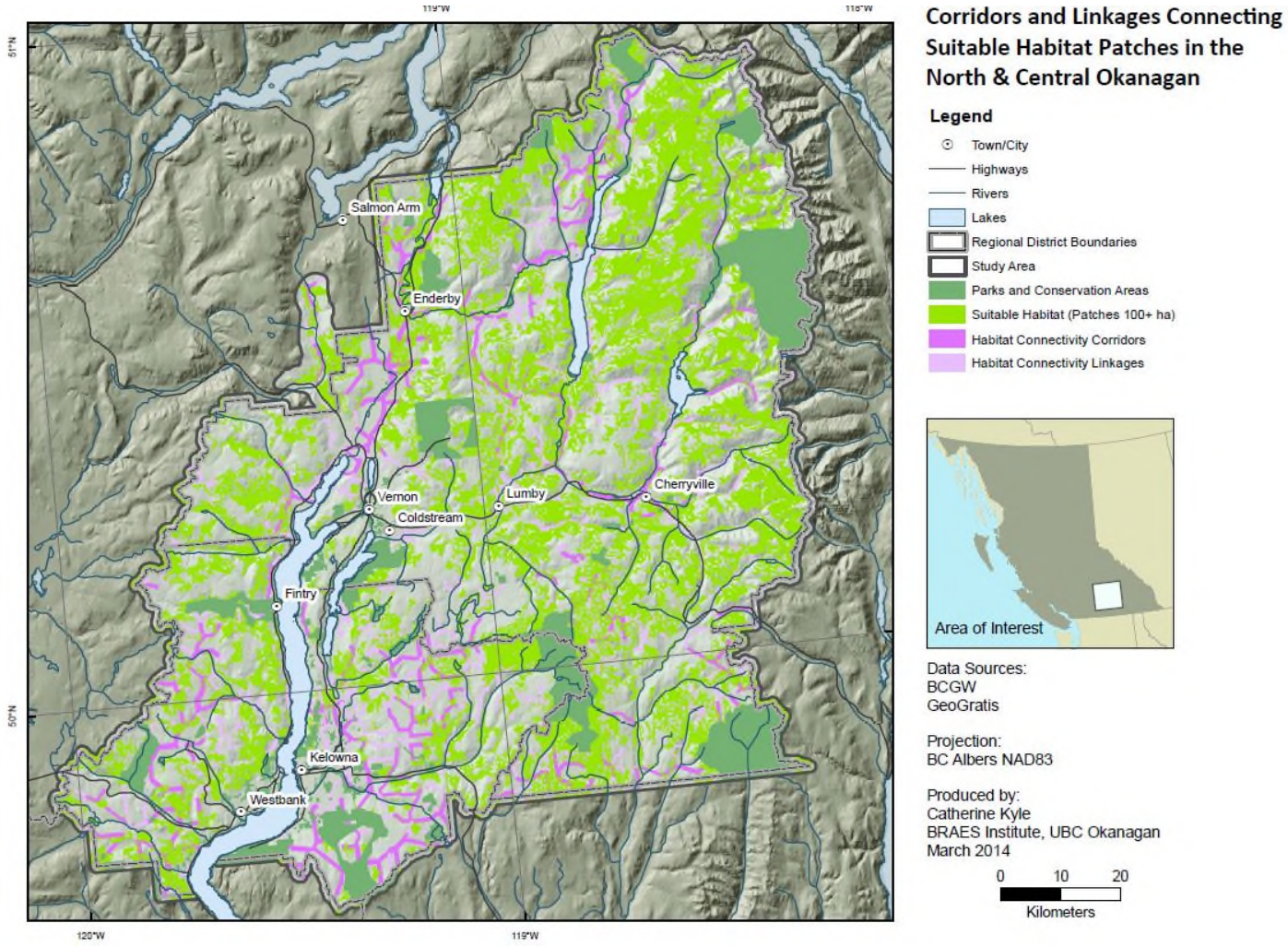
Case Study 1: Identification of Regional Habitat Corridors for the Okanagan Basin

The objective of this project was to identify key linkages between areas of suitable natural habitat in the Okanagan Basin that, if restored or conserved, would help to maintain ecological resilience and functioning at the landscape scale.

The project built upon the Biodiversity Conservation Analysis developed for the Okanagan Region as part of the Biodiversity Conservation Strategy. Suitable natural habitat was defined as any habitat in the study area having a relative biodiversity ranking of moderate, high or very high, according to the methods established for the analysis. For the purposes of this project, only patches of contiguous suitable habitat greater than 100 hectares and on non-agricultural land were retained. Possible wildlife corridors and linkages between patches of suitable habitat on the landscape were identified by using data from the Habitat Connectivity map. The original values used to create classes shown on the Habitat Connectivity map served as input to the Circuitscape program (www.circuitscape.org), which was used to identify "least cost" movement paths for wildlife through the study area. Further analysis of the Circuitscape output resulted in a network of lines on the map representing the most likely routes for species movement. Routes with a high volume of flow were identified as regional habitat corridors, and those with less flow as habitat linkages (equivalent to sub-regional or local corridors). It should be noted that these routes result from the assumptions and criteria inherent in the Biodiversity Conservation Analysis, notably the importance of elevation, terrain ruggedness and proximity to water in determining habitat connectivity rankings. In addition, this analysis is not species specific and therefore the suggested locations for corridors and linkages may not be appropriate for all species types. They do, however, indicate where the vast majority of species are likely to travel on the landscape.

The results are shown for the Regional Districts of the North and Central Okanagan. The maps of habitat corridors and linkages show the importance of certain low elevation valley bottoms and riparian areas in maintaining ecological connectivity. The results also identify locations of cross-elevation and upper elevation corridors that are important for maintaining north-south and east-west movement routes for wildlife. Future regional planning should consider the importance of maintaining these habitats and their connectivity on the landscape.

This research project was carried out by Dr. Lael Parrott (Project lead, UBC, Okanagan Campus), Dr. Jeffrey Cardille (McGill University), graduate research assistant Katey Kyle (UBC) and undergraduate students Maryssa Soroke (UBC) and Charles Bouchard (McGill). For further information contact Dr. Lael Parrott: lael.parrott@ubc.ca.



Map of suitable natural habitat patches greater than 100 hectares on non-agricultural land in the Regional Districts of the North and Central Okanagan with locations where regional habitat connectivity corridors (dark pink) and sub-regional habitat linkages (light pink) should be conserved. Maps are also being produced for the Regional District of South Okanagan-Similkameen.

Case Study 2: City of Vernon Environmental Management Areas Strategy

The City of Vernon, B.C. developed their Environmental Management Areas Strategy (EMA) in 2008 as a way to provide an effective, transparent and biophysically appropriate strategy to provide guidance in land use decisions within the city. The EMA Strategy identifies key critical ecosystems and natural features essential to the quality of life and attractiveness of Vernon. It provides guidelines aimed at the protection, maintenance and enhancement of the beauty of the area that provides the natural physical foundation for Vernon while acknowledging the need to accommodate growth.

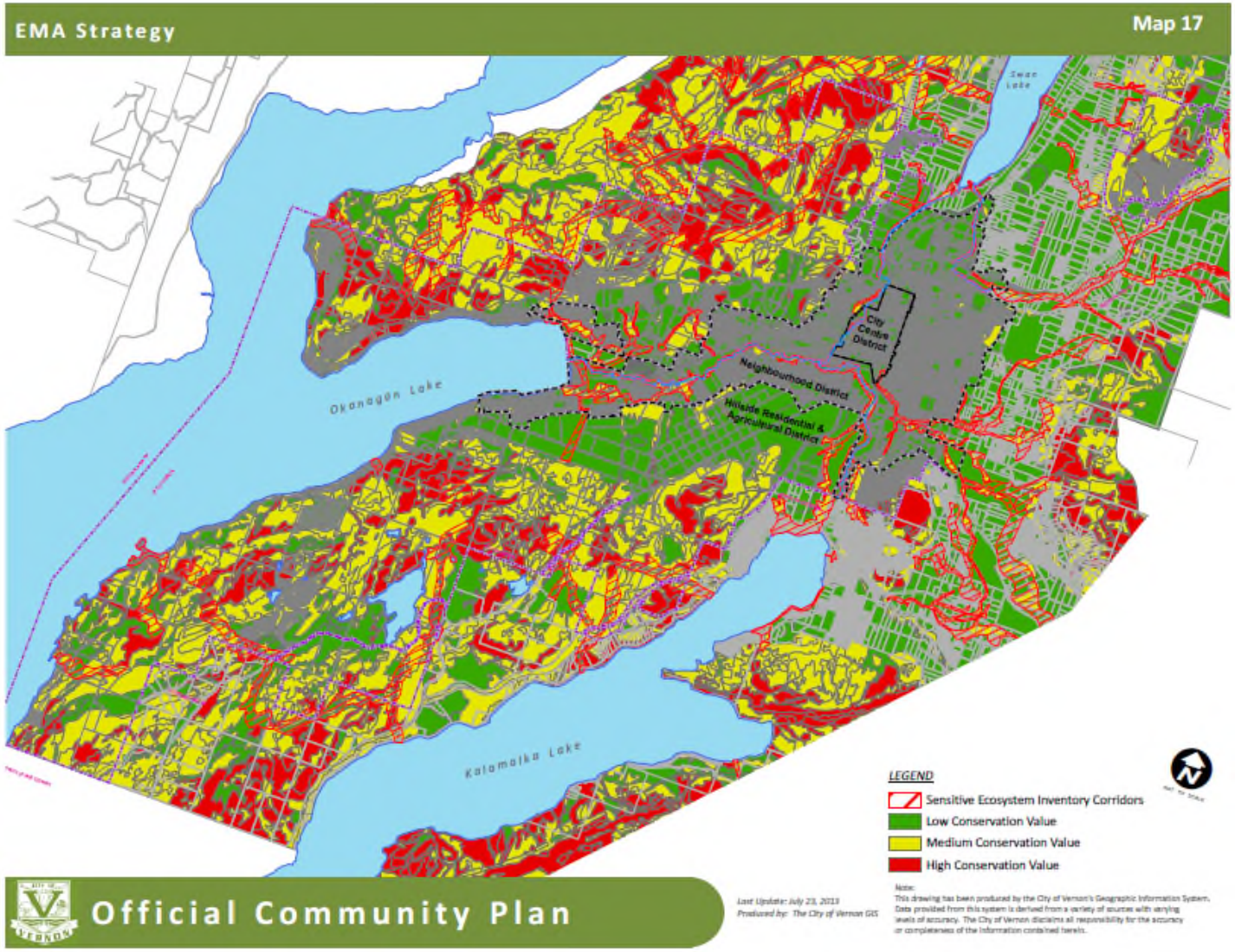
The Environmental Management Areas were chosen to act as an overlay to work in coordination with other zoning and development guidelines and procedures. The EMA strategy has been developed to provide clear direction of the treatment of existing natural area features, significant habitats and protected areas on an environmental management area (district) basis. These EMA areas align with existing development districts (#1: City Centre, #2 Neighbourhood District, and #3 Hillside Residential and Agricultural District). This management area approach is intended to simplify the process of identifying the areas which contain sensitive ecosystems and natural features, and to clarify expectations for environmental surveys, habitat assessments and land use requirements to be conducted as part of the development permit process.

The Sensitive Ecosystem Ranking (SER)[2] maps which categorized ecosystems on high, moderate or low sensitivity were used as another layer in the strategy with increasing expectations on development. High areas would require highly detailed development permit applications, and would restrict development or increase environmental management demands based on site specific inventories and Sensitive Ecosystem Inventories (SEI). For more detailed information about this strategy visit http://www.vernon.ca/services/pde/documents/ema_strategy_final.pdf

Recently the Biodiversity Conservation Strategy Analyisis products have been incorporated into the EMA. Caslys Consulting Ltd. was contracted by the City of Vernon to improve both the spatial and temporal accuracy of the Sensitive Ecosystem Rankings (SER) dataset to yield a more effective planning tool for the City of Vernon (e.g., to better identify development permit areas). The SER for the City of Vernon was modified through two main tasks:

Task 1: Integrate Conservation Ranking and Sensitive Ecosystem Rankings (SER) Datasets
Task 2: Refine polygon boundaries to incorporate recent human disturbances based on recent air photo imagery.

[2] The SER is a simplified version of the SEI Conservation Value mapping, grouping the data into three classes.
Haney, A., & Iverson, K. (2009, March). *Conservation Analysis and Updated Ecosystem Mapping for the Central Okanagan Valley.* Retrieved July 2013, from EcoCat: The Ecological Reports Catalogue. http://a100.gov.bc.ca/pub/acat/public/viewReport.do?reportId=16043


EMA Strategy
Map 17
Swan Lake
Okanagan Lake
City Centre District
Neighbourhood District
Hillside Residential & Agricultural District
Kalamalka Lake
LEGEND
Sensitive Ecosystem Inventory Corridors
Low Conservation Value
Medium Conservation Value
High Conservation Value
Official Community Plan
Last Update: July 23, 2013
Produced by: The City of Vernon GIS
Note:
This drawing has been produced by the City of Vernon's Geographic Information System. Data provided from this system is derived from a variety of sources with varying levels of accuracy. The City of Vernon disclaims all responsibility for the accuracy or completeness of the information contained herein.

Developed in 2012 to support a regional scale biodiversity conservation strategy, the four-class Conservation Ranking dataset includes the Sensitive Ecosystems Inventory (SEI) and reflects the priorities of B.C. Conservation Framework.[3] Conservation Ranking provides an enhanced measure of ecosystem sensitivity and ranking of conservation values. For example, because the conservation rankings dataset included a riparian analysis, SER polygons falling within riparian areas were upgraded to the SER1 class. Conversely, lower ranked polygons in the 2012 conservation rankings dataset were used to moderate some SER polygons where it was obvious (in air photos) that natural ecosystem conditions have been degraded (i.e., impacted by human disturbance). Where sensible combinations (or agreement between datasets) occurred, an automated reclassification method was used, whereby a conservative approach was taken to derive modified SER classes. The newly modified SER polygons were examined across the dataset and assessed against 2010 air photos to ensure changes made were appropriate – a substantial majority of automated reclassification polygons represented conditions on the ground and, therefore did not require adjustment. For those irrational combinations of input values (e.g., SER1 - High with a Low conservation ranking), a manual interpretation and reclassification was done at a fine scale (~ 1:5,000). In all cases, these polygons were checked against 2010 air photos and where available, recent Google Earth imagery, to determine a modified SER class. Additional adjustments will be based on 2013 air photos.

[3] http://www.env.gov.bc.ca/conservationframework/

Case Study 3: District of Lake Country Considers Environmentally Sensitive Areas and Connectivity During Re-zoning

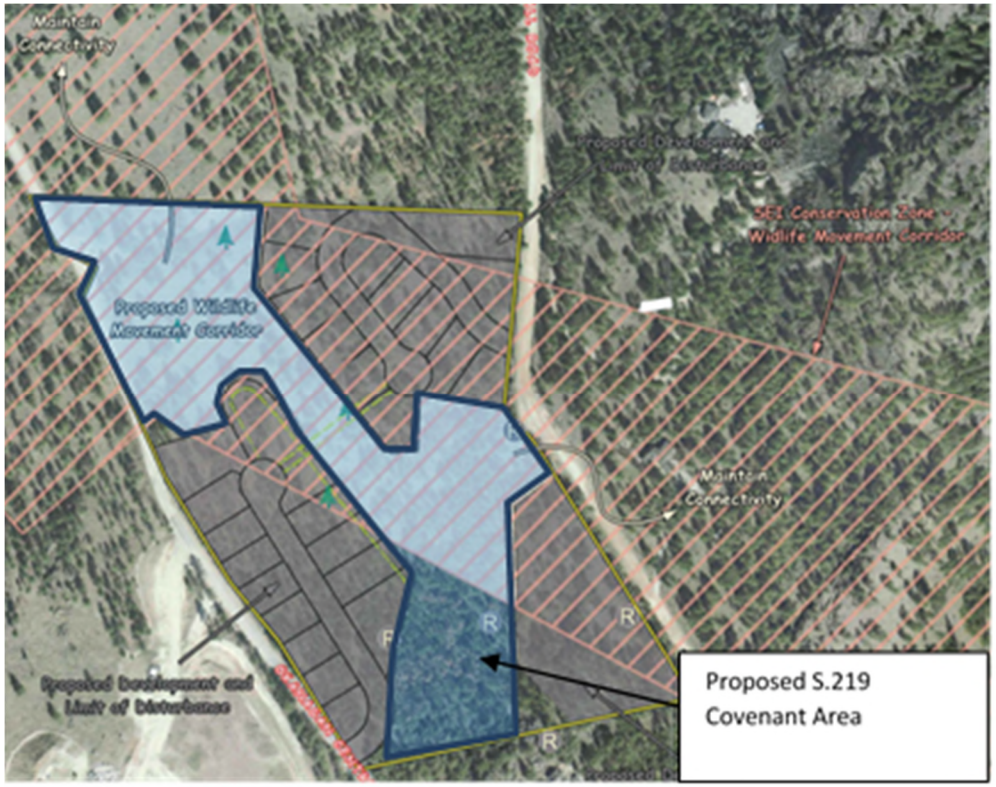
The District of Lake Country worked with a local developer in an environmentally sensitive area to define a local connectivity corridor, reserved from development. This protected a valuable natural area, while also increasing the development density permitted on the applicable private land parcels. The case study began when an application was submitted to propose amendment of the Zoning Bylaw. The amendment recommended a change to the zoning designation of two properties from RR1 – Rural Residential, to RM2- Low Density Row Housing, a higher density option. Various constraints were identified within property boundaries; mapping showed the area overlapped with a Natural Environment Development Permit (DP) Area, Erosion Hazard DP Area, Hillside DP Area, Natural Environment DP Area, Stability Hazard DP Area, Greenhouse Gas Reduction & Resource Conservation DP Area, Wildland Fire DP Area, and Multiple Unit DP Area. Hazard, environmental and archeological assessments were completed to provide supporting information and determine if increased density could be accommodated.

Development Permit requirements were deferred until the Subdivision or Development stage, but a mapping exercise was completed to define where the development could be located, consistent with known and mapped values. Maps identified areas suitable for development, areas of environmental sensitivity, hazard mapping and a wildlife movement corridor. The Geotechnical Hazard map (below) and the wildlife movement corridor (shown on Proposed Covenant Map below) were particularly important in determining the lands reserved from development (blue area).

Geotechnical Hazard map

By comparing the site hazard map with the proposed development permit area map, the influence of hazard mapping on corridor design is evident. Connectivity is located within the area suitable for wildlife movement, but focused where development is already constrained by geotechnical hazards.

A covenant registered on the land titles of the two properties would help reserve sensitive lands from development, while also specifically highlighting where and how wildlife connectivity could be maintained on the two private lots. While this example describes a site development case study that occurred prior to the completion of the Biodiversity Conservation Strategy maps, a similar approach could be used with the refined biodiversity mapping products now available.



Map of Proposed Covenant on Area.

Case Study 4: Mission Creek Corridor Helps to Protect an Important Riparian Corridor

The Mission Creek Restoration Initiative http://www.missioncreek.ca/ is a multi-disciplinary, multi-stakeholder undertaking aimed at restoring and protecting the lower reaches of Mission Creek to enrich historical, ecological, and recreational values for the Okanagan.

From East Kelowna Road Bridge downstream to Okanagan Lake, substandard dikes will be replaced and set back to increase channel capacity and enhance riparian function.

The project was formalized in 2008 and is spearheaded by a dedicated working group comprised of representatives from all levels of government, First Nations, and non-government organizations.

ECOLOGICAL IMPERATIVE: Mission Creek is the largest stream for creek-spawning kokanee salmon in the Okanagan. Kokanee salmon are considered a keystone species for their numerous interactions with other species. The creek and its associated riparian zone are known to host numerous species at risk or of concern. 'Red-listed' (endangered) species associated with this area include Black Cottonwoods, Lewis' Woodpecker, Western Screech-owl, and Yellow-breasted Chat. In addition, 'blue-listed' (at-risk) species include Gopher snake, Racer, Western Rattlesnake, Painted Turtle, Great Basin Spadefoot, Great Blue Heron, Long-billed Curlew, Townsend's Big-eared Bat and Spotted Bat.

The total project proposes to include a variety of cost-shared initiatives that will provide both regional and provincial benefits. This project is a good example of addressing both community needs and protecting critical habitat, while increasing connectivity to the landscape. Other benefits include:

1. Flood Risk Reduction
   - Replace substandard dykes
   - Increase stream channel capacity

2. Species at Risk Protection and Recovery
   - Protect critical habitat
   - Recover and reintroduce species at risk

3. Fish and Aquatic Species Enhancement
   - Increase fish habitat
   - Increase suitable spawning areas

4. Cultural Enhancement
   - Enhance First Nation cultural heritage
   - Restore First Nation connection to salmon
   - Restore and protect historical values

5. Greenhouse Gas Sequestration
   - Increase urban forest and the sequestration of greenhouse gases (i.e. CO_2)

6. Biodiversity Enhancement
   - Increase biodiversity in city and region
   - Create east-west connectivity for wildlife

7. Tourism Enhancement
   - Enhance the already successful greenway
   - Increase recreational fishing tourism

8. Education & Engagement
   - Educate children and adults about aquatic and riparian ecosystems
   - Engage citizens in ongoing activities to protect and preserve Mission Creek.

Case Study 5: Regional District of the Central Okanagan Environmental Discussion Paper – Background for the Preparation of a New Regional Growth Strategy

The Regional District of Central Okanagan (RDCO) has updated its Regional Growth Strategy (RGS) that was adopted in 2000. Part of the updating process involved the creation of an Environmental Protection Discussion Paper which is a companion to five other discussion papers that address population growth, development issues and concerns throughout the region. The discussion paper summarizes issues as they pertain to environmental protection concerns in the areas of air and water quality, climate change, biodiversity, aquatic ecosystems and patterns of growth.

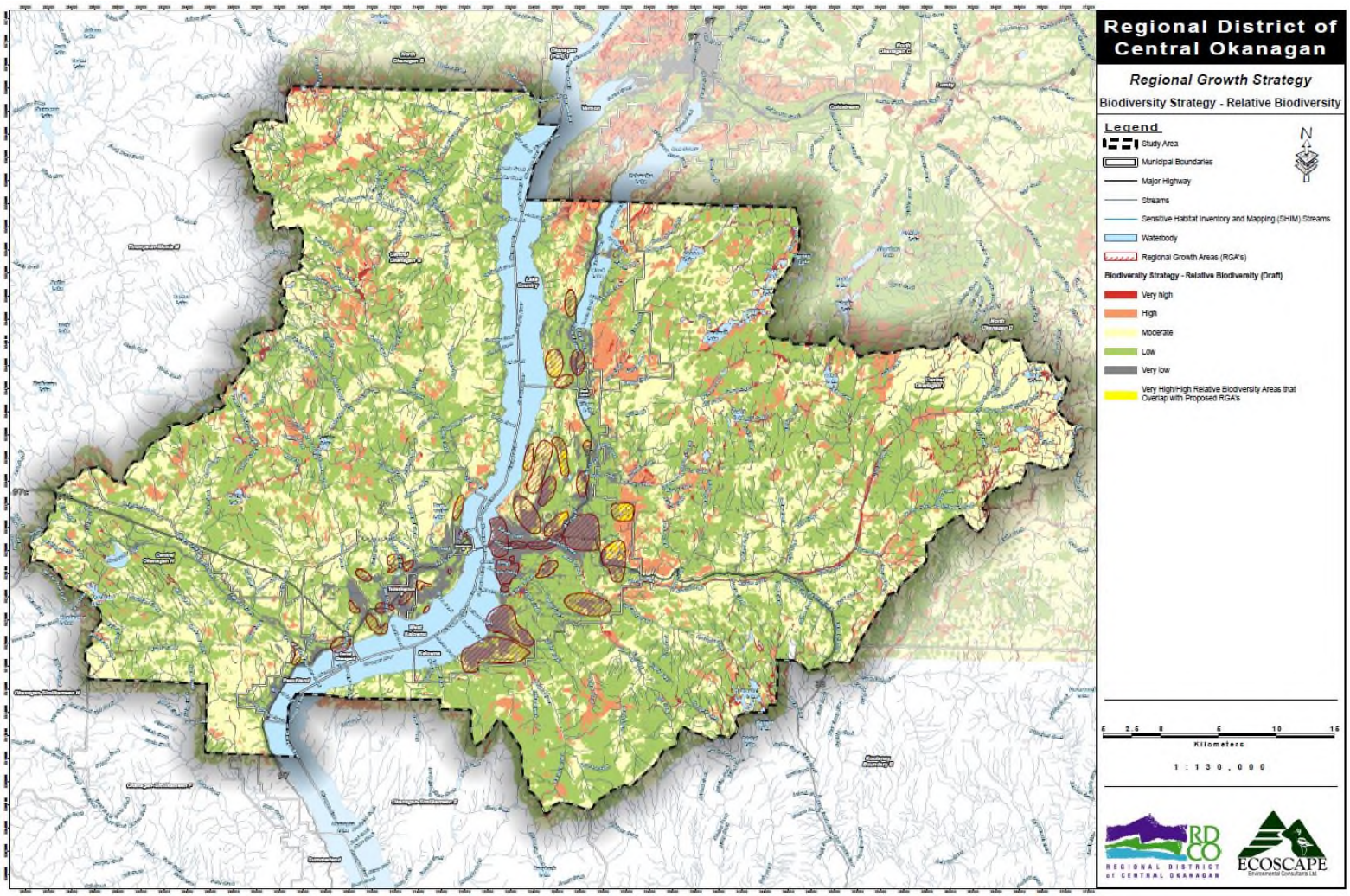
One of the reoccurring themes throughout the preparation of the discussion paper was the effect of land development and habitat loss on the natural resources and aesthetic values of the region. Urban sprawl was frequently noted as a concern to residents, as a threat to the overall beauty of the region, as well as to important ecosystem functions and services including water, air quality and wildlife habitat. The mapping developed for the *Keeping Nature in Our Future: Part 2: Volume 1 - A Biodiversity Conservation Analysis for the North and Central Okanagan Region* was used to understand where key biodiversity habitats occur in the Central Okanagan.

Areas of high biodiversity were overlain with identified future growth areas at a regional scale to better understand where potential environmental conflicts exist. This mapping shows that many of the future growth areas occur within identified high value habitats and biodiversity hot spots. Conflicts tend to occur within outlying natural areas and along sensitive features such as shorelines, streams, wetlands, grasslands, and other unique ecosystems.

Another issue to come out of the discussion paper was a need to develop an overall environmental management plan for the region. Concerns were expressed that the current 'development by development' approach will lead to cumulative impacts and an inconsistent system of policies throughout the region leading to confusion and frustration for planners, regulators, developers and the public.

A key suggested policy included encouraging a regional approach to biodiversity conservation as outlined in the Okanagan Collaborative Conservation Program, *Keeping Nature in Our Future: A Biodiversity Conservation Strategy for the Okanagan Region.* The strategy can be used as a foundation to encourage member municipalities and neighbouring regional districts to adopt a unified and prioritized approach to conservation. This would involve collaboration with First Nations, Non-Governmental Organizations, and other agencies to develop partnerships for maintaining regional biodiversity. The strategy supports policy development to promote conservation of a network of corridors, buffers, and other critical or core habitat areas to ensure connectivity between identified sensitive habitats while also sustaining wildlife refuges, migration and restoration of previously impacted and degraded areas.

The paper includes discussion of a number of different options and opportunities that were identified which also support strategic directions and actions for local government in *Keeping Nature in Our Future: a Biodiversity Conservation Strategy for the Okanagan Region*. For more information about the discussion papers content and RDCO Regional Growth Strategy see http://www.futureok.ca/phase-2/updated-discussion-papers.aspx.



Case Study 6: The North and Central Okanagan Biodiversity Conservation Mapping as Utilized in the Electoral Areas "B" and "C" Official Community Plan

The North and Central Okanagan Biodiversity Conservation Strategy and Analysis identified potential areas of high biodiversity within the region. The purpose of the project was to identify potential biodiversity 'hot spots' and create an overview to guide conservation efforts and assist agencies, **stewardship** groups and local governments in integrating biodiversity considerations into policy development, land management and stewardship activities.

The maps, categorized the region's habitats into a five point scale of relative biodiversity, from very low to very high. These maps have established the relative importance of habitat types to relative biodiversity and identified larger habitat areas and the connectivity between them.

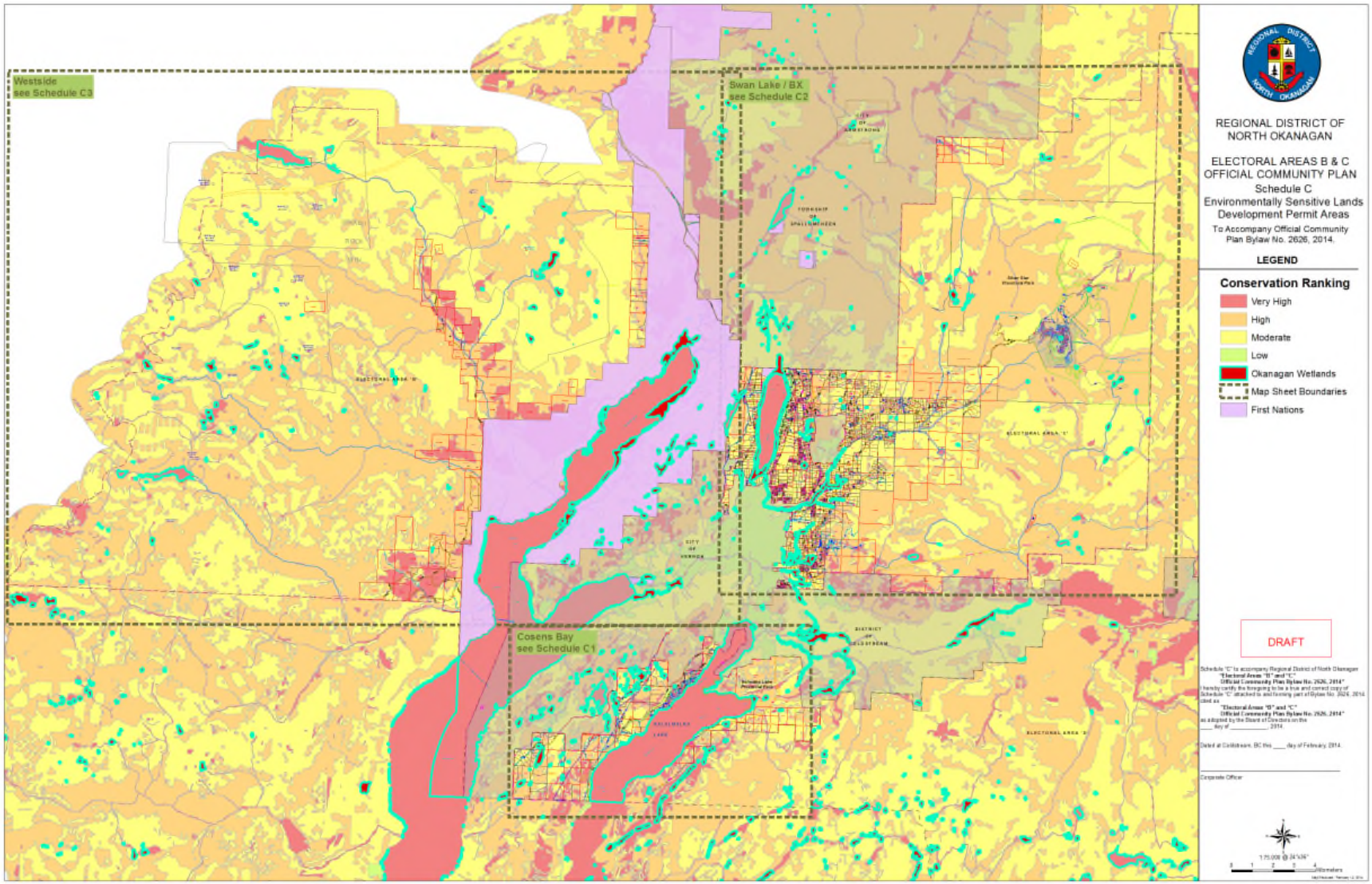
In late 2012 Caslys Consulting produced the following maps:

- North and Central Okanagan Conservation Ranking Map
- North and Central Okanagan Habitat Connectivity Map
- North and Central Okanagan Management Class Map
- North and Central Relative Biodiversity Map

These maps have formed the basis of a newly created **Environmentally Sensitive Lands Development Permit Area**. Lands identified as having High (Orange) or Very High (Red) conservation value will require an Environmentally Sensitive Development Permit prior to the issuance of a Building Permit, approval of Subdivisions and or Land Alteration. This will enable staff to review development proposals with due regard to the natural features, habitat and species present on private lands. The Electoral Areas "B" and "C" Official Community Plan, Bylaw 2626, 2014 is going forward for first reading on March 6th, 2014.

Areas of greatest conservation concern that were identified through the Biodiversity Conservation analysis process continue to be wetlands, valley bottoms, grasslands, stream corridors and steep slopes. The information contained in **Section 11.0 Environment and Natural Lands** and **Section 16.3 Environmentally Sensitive Lands Development Permit Area** has been supplemented and informed by the data and values collected through the development of the Biodiversity Conservation Mapping and Strategy.

For further information on specific policies and the guidelines developed for the Environmentally Sensitive Lands Development Permit Area check out the RDNO website at http://www.rdno.ca/index.php/services/planning-building/planning-projects/official-community-plan-for-electoral-areas-b-c-review.


Westside
see Schedule C3
Swan Lake / BX
see Schedule C2
Cosens Bay
see Schedule C1
REGIONAL DISTRICT OF
NORTH OKANAGAN
ELECTORAL AREAS B & C
OFFICIAL COMMUNITY PLAN
Schedule C
Environmentally Sensitive Lands
Development Permit Areas
To Accompany Official Community
Plan Bylaw No. 2626, 2014.
LEGEND
Conservation Ranking
Very High
High
Moderate
Low
Okanagan Wetlands
Map Sheet Boundaries
First Nations
DRAFT

Case Study 7: Regional District of Central Okanagan Parks Acquisition Planning Pilot Project

Project Overview

The goal of the project was to develop a method of identifying optimal locations for park acquisition within the Regional District of Central Okanagan (RDCO) through the application of datasets developed for the Okanagan Collaborative Conservation Program's Biodiversity Conservation Strategy. RDCO Parks wanted to conduct a pilot project that considered both the protection of natural resources and the promotion of public recreation and interpretation activities.

Approach

To address the project objectives, a model was developed integrating a variety of different parameters:

- Slope
- Aspect
- Distance to roads
- Distance to lake and pond shorelines
- Distance to riparian habitats
- Distance to existing conservation lands and dedicated open space
- Parcel size
- Relative biodiversity
- Wildlife connectivity corridors
- Scenic vistas (the visibility of lakes)
- The Aquatic Habitat Index (applied within 30 metres of the shoreline)
- Zoning

Spatial data for each of these parameters was obtained and the attributes for each parameter were grouped into classes. Scores were then assigned to each of the classes to rank the suitability of the land base to identify potential opportunities for park acquisition. To address the potential conflicts from competing park use types (i.e., recreational use may conflict with habitat conservation goals), the model was developed to assess the data from three different perspectives:

- habitat conservation,
- enhancement of the region's greenways (trails), and
- recreation/cultural/waterfront parks.

For example, lands identified as having very high relative biodiversity were rated as being optimal for park acquisition when the goal is to protect critical habitats and environmentally sensitive areas, whereas these same areas received a low score if the goal was to identify opportunities for recreational parks (e.g., playing fields). Figures 1 and 2 illustrate the results of the model from the greenways and habitat conservation perspectives respectively.

Figure 1. Greenways Perspective - Park Acquisition Opportunities Example

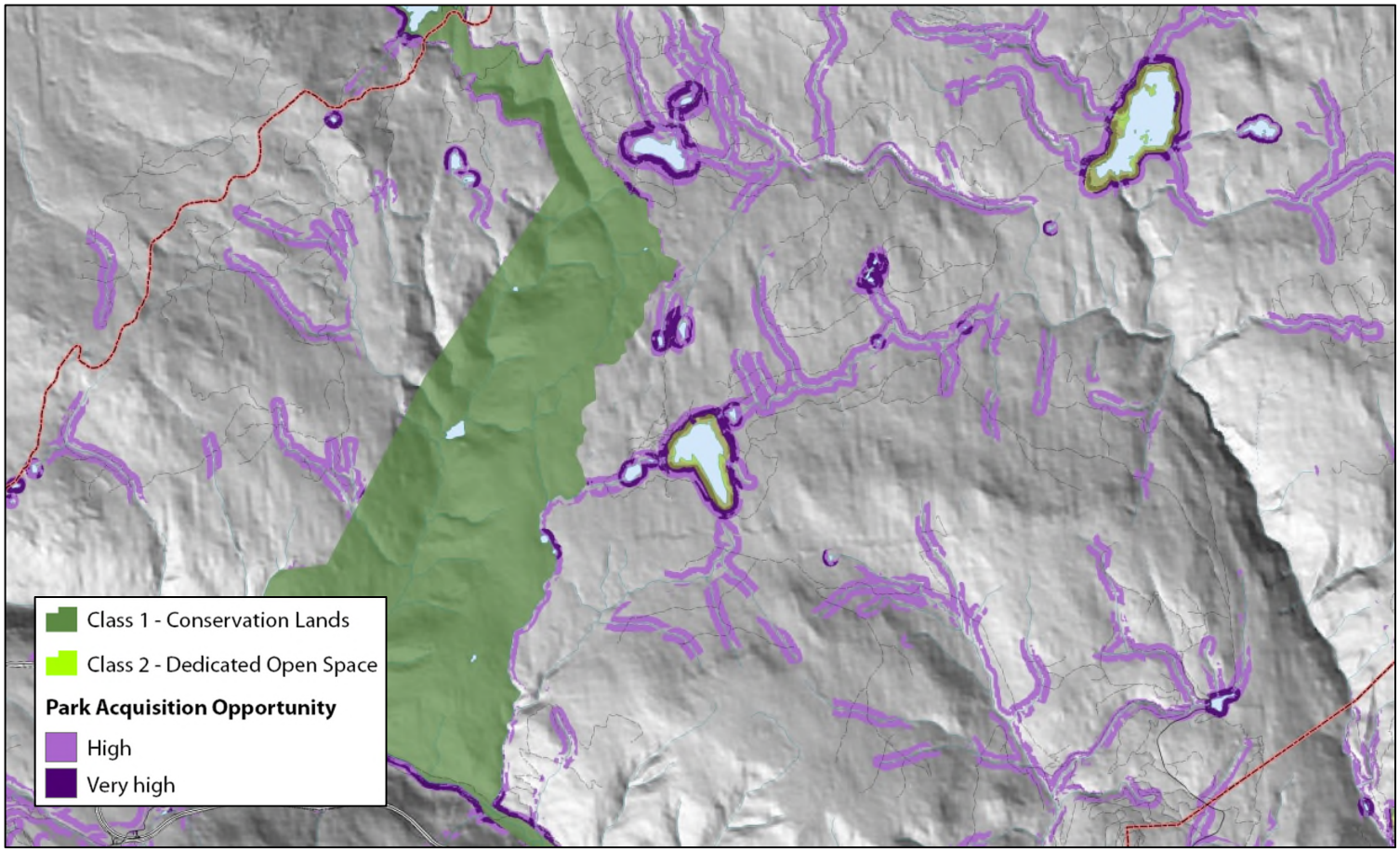
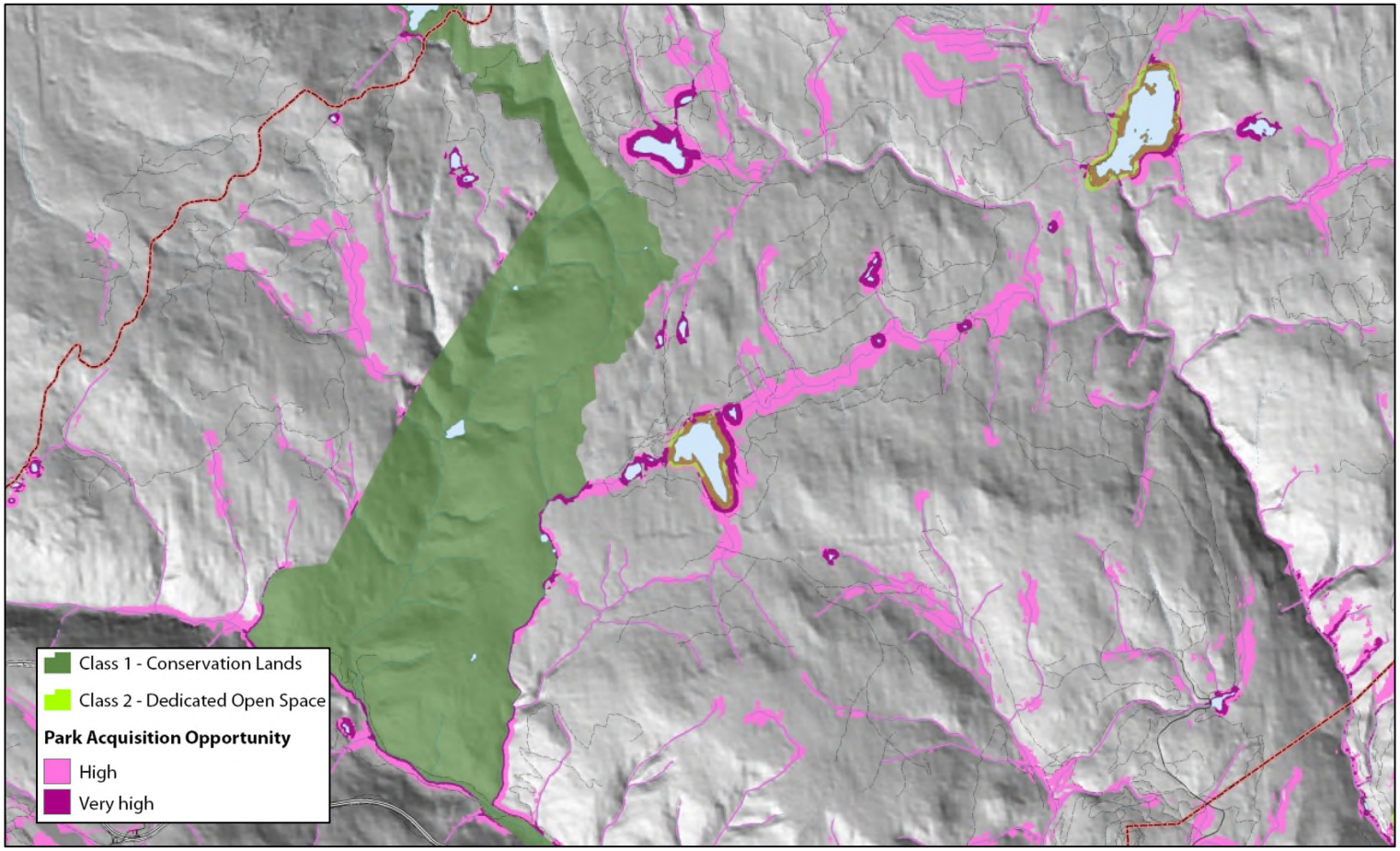


Figure 2. Habitat Conservation Perspective – Park Acquisition Opportunities Example



Case Study 8: Projects in the Agricultural Sector

Data and mapping from the Biodiversity Conservation Analysis is being used by a number of groups to input into agricultural plans.

Salmon Safe Certification:

Discussions have been held with Salmon Safe staff and contractors to see how this information could be used to highlight important areas and connections for biodiversity on the landscape in properties undergoing the certification process in the Okanagan Region.

Environmental Farm Planning for Biodiversity:

Mapping from the Biodiversity Conservation Analysis has been used by Planning Advisor, Pete Spencer to guide at least six agricultural operations undertaking Biodiversity Farm Plans.

Wetland on agricultural property where an Environmental Farm Plan is addressing biodiversity.

These include a cow calf beef operation, mixed livestock, tree fruits orchard, vineyard and a forage operation. One example is the Silver Hills Ranch, a cow calf operation located on the Middle Shuswap River, near Lumby B.C. The biodiversity mapping has identified that a number of ecosystems with high and very high values are located on the ranch. These are largely associated with riparian and grassland open forest habitats. The areas with highest relative biodiversity are primarily located within riparian and wetland areas along the river, with some areas showing high in the central and NE sectors of the farm. The biodiversity planning already completed for the ranch focuses on the key riparian areas which are also important connectivity corridors for wildlife. The high biodiversity in the NE sector should also be flagged as an important connection as it straddles the lot boundary. Lee Hesketh, the ranch owner has identified a willingness to work with conservation partners to increase biodiversity protection and important ecosystem connections on his ranch.

For more information on Environmental Farm Planning and planning for biodiversity see
http://www.agf.gov.bc.ca/resmgmt/EnviroFarmPlanning/EFP_Biodiversity_Guide/Biodiversity_Guide_toc.htm

University of British Columbia Okanagan - B.C. Ministry of Agriculture Project

The UBC Okanagan B.C. Ministry of Agriculture Project is looking into identifying priority areas for biodiversity conservation initiatives on agricultural land in the Okanagan. It is a collaborative project between the B.C. Ministry of Agriculture (David Trotter) and UBC Okanagan Campus (Dr. Lael Parrott). Project proponents will be using agriculture data sets supplied by the Ministry of Agriculture and data from the Biodiversity Conservation Analysis carried out by the SOSCP and OCCP. Proponents will also use data from an OCCP/RDCO/UBCO project to identify regional and sub-regional corridors.

Using the Okanagan Valley as a pilot region, the objective of this project is to identify areas on the landscape that could be targeted for biodiversity conservation initiatives for Species at Risk on privately owned agricultural land. This research project is a collaborative research initiative focused on identifying and assessing how to apply a regional/landscape level ecosystem management approach to agricultural lands.

The project will involve data analysis to identify areas where biodiversity is at risk and for which private land conservation initiatives might have maximum benefit species of concern (e.g. properties closest to proposed conservation corridors). There will be a summary report including preliminary recommendations to identify areas in the Okanagan that should serve as initial case studies. Next steps will also be identified to describe potential actions to improve biodiversity conservation on targeted agricultural properties.