

To: Dan Austin  
From: Will Kwan  
Date: February 4<sup>th</sup>, 2025  
RE: GISC480 Lab #3

This memo summarizes the methods, discussions, and results from Lab #3. The analysis focuses on the impacts of a road improvement project northwest of Kelowna, quantifying the project's impact on various ecosystems. Additional analysis summarizes the project's impact on the habitats of two key species—the Painted Turtle (*Chrysemys picta*) and the Townsend's Big-eared Bat (*Corynorhinus townsendii*).

## Executive Summary

A GIS analysis was conducted on the client's design plan in relation to Sensitive Ecosystem Inventory (SEI) and Wildlife Habitat Rating (WHR) data. The aim was to compare the ecosystem's baseline conditions with the predicted impacts of the proposed disturbance. The SEI is a method for systematically identifying and mapping rare, at-risk, and ecologically fragile terrestrial ecosystems according to the biodiversity they support, promoting land use decisions that protect sensitive ecosystems (Canadian Wildlife Service, 2000). Additionally, landscapes are classified using WHRs, which assess their ability to provide life requisites for particular species (Government of British Columbia, 2021). This analysis assesses the proposed impacts of the design to quantify ecosystem loss, the effects on key species, and evaluate potential compensation requirements.

## Methods

CAD data for the proposed road improvement project, reference points for accurate positioning, a subset of the BC Government's SEI Terrestrial Ecosystem Mapping polygon data, and a table defining WHRs were provided. Initially, the CAD data required georeferencing to ensure its correct positioning within the GIS, involving alignment with existing layers and known reference points. Once correctly positioned, a 500-meter buffer was created around the proposed road centerline to define the study area. The SEI data were subsequently clipped to the study area to define its ecosystems. An existing road, West Side Road, was not included in the SEI data, so the polygons were split about the road referencing the Regional District of Okanagan 2014 Orthophoto and reclassified to include the road surface. This data formed the baseline assessment. Impact polygons defining the right-of-way and footprint areas of the proposed design were created by referencing the CAD data. These impact polygons were intersected with the baseline SEI polygons to quantify the proposed design's effects on ecosystems. WHR data was then joined to these polygons to summarize the impact on key species' habitats.

## Results

With the analysis complete, the data could be meaningfully represented figuratively and tabularly. Figure 1 illustrates the project location northwest of the City of Kelowna, situated on the western shore of Okanagan Lake along West Side Road. Figure 2 depicts the baseline SEI zones within the study area, which spans approximately 2.27 km<sup>2</sup> and

consists of 19 unique SEI zones. The respective areas of each zone are detailed in Table 1. The study area is predominantly composed of PF (20.18%), PT (18.99%), and RO (10.90%).

Figure 3 illustrates the impacts of the proposed design's footprint and right-of-way on the SEI zones within the study area. The respective post-impact areas for each zone are detailed in Table 2. Of the 19 unique SEI zones present, 12 were affected by the proposed design. The SEI zones that experienced the greatest percentage loss relative to their baseline areas were RZ (83.18%), CF (36.97%), and PT (11.39%). In terms of the total area lost, the most affected zones were PT ( $49,028.12\text{ m}^2$ ), PF ( $34,195.7\text{ m}^2$ ), and RZ ( $31,125.93\text{ m}^2$ ). In total, 7.86% of the SEI zones, totalling  $178180.53\text{ m}^2$ , were lost to the proposed design.

Table 3 illustrates the impact on the Painted Turtle's high- and medium-rated security/thermal reproducing (eggs) (STRE) habitat areas. The proposed design does not affect the STRE Painted Turtle habitat. Table 4 outlines the impact on Painted Turtle living, all seasons (LIA) habitat, with the proposed design having no impact on the LIA habitat. Table 5 presents the impact on high- and medium-rated food, living, and growing (spring, summer, fall) (FDLIG) habitat for Townsend's Big-eared Bat. The proposed project results in the loss of  $6222.14\text{ m}^2$  of high-rated and  $108926.65\text{ m}^2$  of medium-rated FDLIG habitat. Table 6 presents the impact on Townsend's Big-eared Bat security/thermal, living, growing (spring, summer, fall) (STLIG) habitat, with the proposed project resulting in the loss of  $40680.71\text{ m}^2$  of high-rated and  $15959.48\text{ m}^2$  of medium-rated habitat.

## **References**

- Canadian Wildlife Services. (2000). Sensitive ecosystems inventory: A method for identifying and mapping sensitive ecosystems in British Columbia.  
[https://publications.gc.ca/collections/collection\\_2009/ec/CW69-5-345E.pdf](https://publications.gc.ca/collections/collection_2009/ec/CW69-5-345E.pdf)
- Government of British Columbia. (2021). Wildlife habitat mapping.  
<https://www2.gov.bc.ca/gov/content/environment/plants-animals-ecosystems/wildlife/wildlife-habitats/wildlife-habitat-mapping>

## Figures

**Table 1**

*Baseline SEI Ecosystem Areas*

SEI Code	Total Area (m <sup>2</sup> )	% of Total
AS	10603.51	0.47%
CF	7520.67	0.33%
CL	40213.93	1.77%
DM	111556.45	4.92%
DP	70796.47	3.12%
DS	111465.47	4.92%
ES	15018.19	0.66%
PB	120796.41	5.33%
PC	72135.64	3.18%
PF	457199.99	20.18%
PT	430269.76	18.99%
RO	247008.34	10.90%
RW	29737.19	1.31%
RZ	37419.14	1.65%
SB	111663.48	4.93%
SO	164613.78	7.27%
SP	192071.37	8.48%
TA	11400.81	0.50%
UR	24124.89	1.06%
Grand Total	2265615.49	100.00%

Note: "% of Total" represents each zone's area as a percentage of the total study area.

**Table 2***Proposed Impact on SEI Areas*

Total Area (m <sup>2</sup> )	Impact Area					
SEI Code	Footprint	Right-of-Way	Study Area	Grand Total	Area Lost	% Lost
AS			10603.51	10603.51	0.00	0.00%
CF	1724.53	1055.91	4740.23	7520.67	2780.44	36.97%
CL			40213.93	40213.93	0.00	0.00%
DM	2849.87	3155.61	105550.97	111556.45	6005.48	5.38%
DP			70796.47	70796.47	0.00	0.00%
DS	5422.16	3480.22	102563.09	111465.47	8902.38	7.99%
ES			15018.19	15018.19	0.00	0.00%
PB			120796.41	120796.41	0.00	0.00%
PC		656.67	71478.97	72135.64	656.67	0.91%
PF	24832.58	9363.13	423004.28	457199.99	34195.71	7.48%
PT	18450.04	30578.08	381241.64	430269.76	49028.12	11.39%
RO	7206.53	4852.81	234949.00	247008.34	12059.34	4.88%
RW		1174.84	28562.35	29737.19	1174.84	3.95%
RZ	18104.23	13021.71	6293.20	37419.14	31125.93	83.18%
SB		28.20	111635.29	111663.48	28.20	0.03%
SO	10817.67	5205.21	148590.90	164613.78	16022.88	9.73%
SP	3815.00	12385.54	175870.83	192071.37	16200.54	8.43%
TA			11400.81	11400.81	0.00	0.00%
UR			24124.89	24124.89	0.00	0.00%
Grand Total	93222.60	84957.94	2087434.96	2265615.49	178180.53	7.86%

Note: "Footprint" and "Right-of-Way" represent the areas of SEI zones affected by the respective component of the proposed design, while "Study Area" indicates the remaining unimpacted areas. "Area Lost" quantifies the area lost from the baseline assessment to the impact assessment, while "% Lost" quantifies the percentage of area lost.

**Table 3***Affected High- and Medium-Rated Habitat Areas for Painted Turtle (*Chrysemys picta*) – Security/Thermal Reproducing (Eggs) (STRE) Habitat*

Total Area (m <sup>2</sup> )	RCHPI_STRE		
Impact Area	H	M	Grand Total
Footprint	0.00	0.00	0.00
Right-of-Way	0.00	0.00	0.00
Grand Total	0.00	0.00	0.00

Note: "H" and "M" denote high and medium, respectively. No high- or medium-rated Painted Turtle STRE habitat was affected by the proposed design. "RCHPI" is the species code for Painted Turtle.

**Table 4**

Affected High- and Medium-Rated Habitat Areas for Painted Turtle (*Chrysemys picta*) – Living, All Seasons (LIA) Habitat

Total Area (m <sup>2</sup> )	RCHPI_LIA		
Impact Area	H	M	Grand Total
Footprint	0.00	0.00	0.00
Right-of-Way	0.00	0.00	0.00
Grand Total	0.00	0.00	0.00

Note: “H” and “M” denote high and medium, respectively. No high- or medium-rated Painted Turtle LIA habitat was affected by the proposed design. “RCHPI” is the species code for Painted Turtle.

**Table 5**

Affected High- and Medium-Rated Habitat Areas for Townsend’s Big-eared Bat (*Corynorhinus townsendii*) – Food, Living, Growing (Spring, Summer, Fall) (FDLIG)

Total Area (m <sup>2</sup> )	MCOTO_FDLIG		
Impact Area	H	M	Grand Total
Footprint	4823.84	71009.78	75833.62
Right-of-Way	1398.30	37916.88	39315.18
Grand Total	6222.14	108926.65	115148.79

Note: “H” and “M” denote high and medium, respectively. “MCOTO” is the species code for Townsend’s Big-eared Bat.

**Table 6**

Affected High- and Medium-Rated Habitat Areas for Townsend’s Big-eared Bat (*Corynorhinus townsendii*) – Security/Thermal, Living, Growing (Spring, Summer, Fall) (STLIG)

Total Area (m <sup>2</sup> )	MCOTO_STLIG		
Impact Area	H	M	Grand Total
Footprint	31195.79	8825.74	40021.53
Right-of-Way	9484.92	7133.75	16618.67
Grand Total	40680.71	15959.48	56640.20

Note: “H” and “M” denote high and medium, respectively. “MCOTO” is the species code for Townsend’s Big-eared Bat.

# Figure 1: Project Location

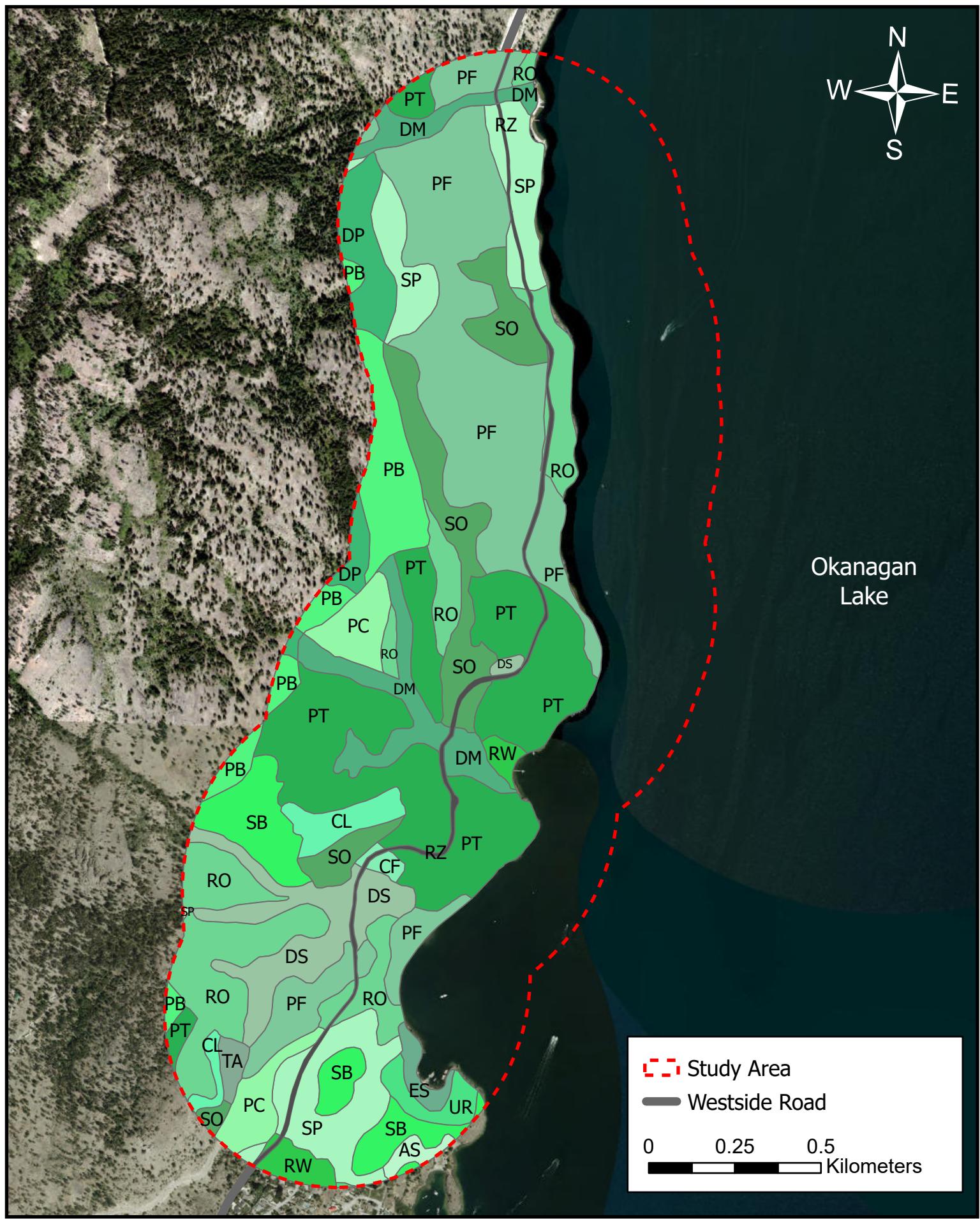


Study Area

0 0.5 1

Kilometers

# Figure 2: Study Area



# Figure 3: Proposed Impact

