

EXISTING ENVIRONMENT

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A fishing survey was not carried out in GL-9; suitable fish habitat was observed and the stream is anticipated to provide habitat to small bodied minnow species.



**PHOTOS 11 & 12    GL-9 crossing location**

**GL-10 – Unnamed Channel**

GL-10 was deemed to not be a watercourse by the conditions present at the time of the survey. GL-10 drains runoff to a small wetland north of the CL through a corrugated steel culvert which passes under a logging road. Several small channels converge at the mouth of the culvert. At the time of the survey the channel downstream of the culvert was dry along the majority of the reach with intermittent ponding immediately downstream of the logging road. As the channel continues downstream it becomes increasingly defined until dissipating into the wetland. The forest surrounding the channel is mostly coniferous forest with areas of clearing for old access roads. Vegetation along the banks includes mosses and other bryophytes in the areas with increased canopy cover, nearing the road grasses and sedges are the predominant vegetation as canopy cover decreases. The substrate varies from gravel to cobble with siltation heaviest adjacent to the logging road but evident along the entire channel. Water quality was not measured as a representative wet area could not be located during the survey.

A fishing survey was not carried out in GL-10, as no suitable habitat was observed.

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**PHOTOS 13 & 14 GL-10 crossing location****GL-14 – Unnamed Stream**

Watercourse crossing GL-14, a 1<sup>st</sup> order intermittent stream, was dry during the survey period. At the crossing location the bankfull width measured 0.75 m. This channel was deeply entrenched along the entire 200 m surveyed and the bottom of the channel varied from 0.5 - 0.75 m below ground level. Downstream the watercourse braided into multiple smaller channels which would frequently converge and separate. Upstream the channel became less defined, at one point the flow went subterranean for 5 m in an area of loose cobble and appeared to drain from a wetland upstream. The substrate was primarily silt with areas of cobble where the streambed was disturbed by uprooted trees, or turbulent flow. Canopy cover from the surrounding coniferous forest was between 25-50%. Water quality was not measured as the channel was dry during the survey.

A fishing survey was not carried out in GL-14, as no suitable habitat was observed.

**PHOTOS 15 & 16    GL-14 crossing location****GL-15 Tributary to St. Andrew's River**

Crossing GL-15 was a perennial stream with low flow during the survey. At the crossing location, the channel was 2.14 m wide with an average depth of 0.08 m. Substrate was predominantly sand interspersed with gravel. Upstream approximately 120 m from the crossing location was a washed out logging road with a large beaver dam built into the gap. The culvert which had been washed out was impacting flows further downstream. The dam had increased water depths on the upstream side of the road and the pond created was deeper than 1 m. The flow downstream was regulated by the impoundment and at the time of the survey appeared to be sufficient for maintenance flows. An additional beaver dam had been built downstream of the aforementioned dam which created a pool 10 m wide and 0.5 m deep; there was heavy sediment deposited in this pool with deposition continuing downstream of the dam creating a river island downstream of the dam. Downstream of the crossing location the channel begins to meander with undercutting occurring along the banks with the scoured material deposited along a couple of point bars. The stream narrows further downstream and water velocity increases. The substrate along the stream is similar along the entire length surveyed with cobble, surrounded by gravel and sand; the cobble is only slightly embedded along areas with low flow. The rock portion of the substrate presents algae in the form of slimes and crusts, with submergent vegetation present at the CL and upstream. The riparian vegetation is coniferous forest along the entire length and opens slightly upstream as the stream nears the road, Canopy coverage ranges from 25-50% at the road to nearly 75% at the centerline and downstream.

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A fishing survey was not carried out in GL-15. Fish habitat was observed to be present throughout GL-15 and anticipated fish species include salmonids and small bodied minnows.



**PHOTOS 17 & 18    GL-15 crossing location**

**GL-16 – Stewiacke River**

GL-16 is located on the Stewiacke River. The width along the surveyed area varies from 29.76 – 30.30 m with an average depth of 1.06 m and maximum depth of 1.71 m in the thalweg. Flow was measured in the thalweg at several locations with a flowmeter and ranged from 0.66-1.07 m/s. The substrate was primarily large cobble with surrounding sand/gravel. There was slight undercutting with enough flow to avoid settling out in the reach surveyed. Aquatic macrophytes included submerged grasses and bryophytes. There were several dwellings downstream, approximately 500 m from the CL of GL-16. For both sites the riparian zone consisted primarily of coniferous forest, which due to the size of the watercourse had little effect on stream cover. Young of the year fish were observed upstream and downstream of both crossings; these were most likely salmonids due to body morphology. Water quality was measured by a multiparameter unit (YSI Model 556). Measurements were indicative of a freshwater system. At the time of the survey dissolved oxygen (DO) was within guidelines for the protection of aquatic life as given by the CCME and pH was neutral at 7.00.

A fishing survey was not carried out in the Stewiacke River. Fish habitat was observed to be present throughout the survey area. Anticipated fish species include salmonids, temperate species and small bodied minnows.

The Stewiacke River crossing is considered to be navigable at the location of GL-16.

**PHOTOS 19 & 20    GL-16 crossing locations****GL-18 – Unnamed Tributary to Watering Brook**

Watercourse crossing GL-18, a 1<sup>st</sup> order intermittent stream, had a low water level during the survey period. At the crossing location the bankfull width measured 1.75 m. This channel was moderately entrenched along the entire 200 m surveyed and the bottom of the channel varied from 0.25 – 0.50 m below ground level. The watercourse passes through Wetland 5 upstream of the centerline and runs alongside the road offset approximately 10 m. Downstream the watercourse continues to run alongside the road before connecting to Watering Brook. The channel is well defined throughout the assessment area, provides some fish habitat, and is dominated by a substrate of organic material and sand. Canopy cover from the surrounding wetland and low lying shrubland is low at 0 – 10%. Water was of a quality to support aquatic life, including fish, with a slightly acidic pH of 6.75 and a dissolved oxygen concentration of 7.75 mg/L.

**GL-19 – Unnamed Channel**

A small, shallow intermittent headwater stream that meanders through mostly coniferous forest and flows toward the unnamed stream GL-19. The channel originates from Wetland 10 approximately 90 m upstream the centerline of the RoW where it forms a channel on average 1 m wide and shallow with depths averaging 3 cm, depth within the upstream section remained uniform. The substrate was composed of silt and gravel with no scouring indicative of constant low flow. Vegetation was present within the channel at the centerline and upstream transects. Vegetation included mosses and grasses. The riparian zone showed evidence of previous logging operations along the left bank from 30 m back, overall riparian cover was estimated between 50-75%. Fish passage to the centerline and upstream sections would be blocked by steep slopes and cascades. Discharge during the assessment period was non detectable. A fishing survey was not carried out in GL-19, as no suitable fish habitat was observed.

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**PHOTOS 21 & 22 GL-19 crossing locations****GL-20 – Unnamed Channel**

Crossing GL-20 at the time of the survey had very little water and appeared to be a drainage channel from Wetland 11. Upstream from the crossing location the channel becomes poorly defined with little entrenching and eventually the channel dissipates into a wetland. The channel was dry with a bankfull width of 1.32 m. The substrate, in the areas where the channel was visible, consists of silt with organic material, there has been insufficient flow to scour silt and organic debris from the rocks. Terrestrial grasses were present in the channel indicating prolonged periods with little to no flow. Coniferous forest encompasses the riparian zone along the entire length of the channel providing a thick canopy over the channel. Water Quality was not measured the channel was dry during the survey.

A fishing survey was not carried out in GL-20 as no suitable habitat was observed.

**PHOTOS 23 & 24 GL-20 crossing locations**

**5.3.4 Fish Populations**

Fish sampling was not performed by Stantec within the Study Corridor based on the potential of capturing a SARA listed species (iBoF Atlantic salmon). Based on desktop review, a total of 18 different species could be present within the Study Corridor including: Atlantic salmon, American eel, American shad (*Alosa sapidissima*), banded killifish (*Fundulus diaphanous*), blacknose dace (*Rhinichthys atratulus*), brown bullhead (*Ameriurus nebulosus*), brook trout, brown trout (*Salmo trutta*), Common Shiner (*Notropis cornutus*), Golden Shiner (*Notemigonus crysoleucas*), mummichog (*Fundulus heteroclitus*), threespine, fourspine and ninespine stickleback (*Gasterosteus aculeatus*, *Apeltes quadracus* and *Pungitius pungitius* respectively), smallmouth bass (*Micropterus dolomieu*), striped bass, white sucker (*Catostomus commersoni*) and Yellow Perch (*Perca flavescens*) (Scott and Crossman 1998, COSEWIC 2006a, COSEWIC 2006b, NSSA 2011, COSEWIC 2005, NSNMH).

The majority of the species would be associated with the Stewiacke River (GL-16), and potentially its tributaries (GL-1), Watering Brook. The unnamed Tributary to St. Andrew's River would also likely provide salmonid populations in addition to species of small minnows such as killifish, dace and shiners. A range of spawning periods utilized by these various fish species is listed in Table 5.6.

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**TABLE 5.6 Summary of spawning times (Scott and Crossman 1998) for all fish anticipated within the Study Corridor**

Scientific Name	Common Name	Jan	Feb	Mar	Apr	May	Jun	July	Aug	Sept	Oct	Nov	Dec
<i>Alosa pseudoharengus</i>	Alewife					Spawning	Eggs/Sacry in substrate						
<i>Salmo salar</i>	Atlantic salmon	Eggs/Sacry in substrate	Eggs/Sacry in substrate	Eggs/Sacry in substrate	Eggs/Sacry in substrate						Spawning	Spawning	Eggs/Sacry in substrate
<i>Anguilla rostrata</i>	American eel					1			2	2			
<i>Alosa sapidissima</i>	American shad				Spawning	Eggs/Sacry in substrate	Eggs/Sacry in substrate						
<i>Ameiurus nebulosus</i>	Brown bullhead					Spawning	Spawning	Eggs/Sacry in substrate					
<i>Salvelinus fontinalis</i>	Brook trout	Eggs/Sacry in substrate	Eggs/Sacry in substrate							Spawning	Spawning	Spawning	Eggs/Sacry in substrate
<i>Salmo trutta</i>	Brown trout	Eggs/Sacry in substrate	Eggs/Sacry in substrate	Eggs/Sacry in substrate							Spawning	Spawning	Spawning
<i>Cyprinids</i>	Dace, Shiners, Chubs					Eggs/Sacry in substrate	Spawning	Eggs/Sacry in substrate					
<i>Gasterosteus aculeatus</i>	Threespine stickleback						Spawning	Eggs/Sacry in substrate	Eggs/Sacry in substrate				
<i>Apeltes quadracus</i>	Fourspine stickleback					Spawning	Eggs/Sacry in substrate	Eggs/Sacry in substrate					
<i>Pungitius pungitius</i>	Ninespine stickleback						Spawning	Eggs/Sacry in substrate	Eggs/Sacry in substrate				
<i>Micropterus dolomieu</i>	Smallmouth bass					Eggs/Sacry in substrate	Spawning	Eggs/Sacry in substrate					
<i>Morone saxatilis</i>	Striped bass				Eggs/Sacry in substrate	Spawning	Eggs/Sacry in substrate						
<i>Osmerus mordax</i>	Rainbow Smelt			Spawning	Eggs/Sacry in substrate	Eggs/Sacry in substrate							
<i>Catostomus commersoni</i>	White sucker				Eggs/Sacry in substrate	Spawning	Eggs/Sacry in substrate						
<i>Perca flavescens</i>	Yellow perch				Eggs/Sacry in substrate	Spawning	Eggs/Sacry in substrate						
<i>Morone americana</i>	White perch					Eggs/Sacry in substrate	Spawning	Eggs/Sacry in substrate					
<i>Fundulus diaphanus</i>	Banded killifish					Eggs/Sacry in substrate	Spawning	Eggs/Sacry in substrate					
<i>Fundulus heteroclitus</i>	Mummichog						Spawning	Eggs/Sacry in substrate	Eggs/Sacry in substrate				

1 Upstream Migration of immature fish

2 Downstream migration of mature spawners

 Spawning  
 Eggs/Sacry in substrate

Source: Scott and Crossman 1998, COSEWIC 2005, COSEWIC 2006a, COSEWIC 2006b.



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Eight of 18 species are anadromous or sea-run, adults of these species reside in saltwater and migrate to freshwater to spawn. These species constitute the majority of the sportfish in the assessment area. There are two general spawning periods of these species, fall and spring salmonids - Atlantic salmon and brook trout - spawn in the fall with the eggs incubating in the gravel substrate throughout winter and emerging in April to June the following year. Other anadromous species such as alewife and American shad spawn in the spring. The incubation period for these spring spawners is considerably shorter based on the warmer water temperatures in early spring as compared to winter.

Recreational fishing occurs within the Stewiacke River for American shad, brook trout, brown trout and striped bass (NSFA 2011a). With a “Special Management Area”, as designated by the Nova Scotia Department of Fisheries and Aquaculture (NSFA), within the Proposed RoW on the Stewiacke River. These Special Management Areas are generally located in productive fish habitat with regulations pertaining to daily catch, angling season length, length limit of fish retained and gear type, these special management areas have been created to protect Atlantic salmon, brown trout, brook trout and striped bass from overfishing and reduction in population size.

The NSFA has initiated salmonid stocking programs within the province for Rainbow trout; none of the watercourses within the Proposed RoW are currently covered under this program (NSFA2011b).

## **5.4 RARE VASCULAR PLANTS**

The Study Corridor was surveyed by experienced Stantec botanists during June, July and August 2007 and during early September 2008. The Proposed RoW (2011 alignment) was also surveyed in October 2011. All species of vascular plants encountered during the surveys were identified and their population status in Nova Scotia was determined through a review of the species rankings provided by NSDNR (2011), ACCDC (2011), COSEWIC (2011), and those provided by SARA and the Nova Scotia *Endangered Species Act*.

A total of 454 vascular plant taxa were recorded within the Study Corridor, approximately 85% of which are native to the province of Nova Scotia. Vascular plants recorded during the surveys, including information on their population status, are provided in Table C1 of Appendix C.

### **5.4.1 Species at Risk**

No vascular plant species encountered during the field surveys are considered “At Risk”, as previously defined (see Section 4.3 and Appendix B).

### **5.4.2 Species of Conservation Concern**

A total of 18 plant Species of Conservation Concern were found during the field surveys (Table 5.7 and Figures 5.3A and 5.3B). None of these species are ranked as “At Risk” or “May be at Risk” by NSDNR but seven are considered to be “Sensitive” to human activities or natural

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events. With the exception of one species whose NSDNR status is currently “Undetermined”, the remaining plants have populations that are regarded as “Secure” by NSDNR, but have been assigned rankings of “S3” by the ACCDC indicating that they are uncommon throughout their range in the province and are of long-term concern. Species which have been assigned numeric range ranks of “S3S4” (denoting some uncertainty about their rank) are also included in Table 5.7.

**TABLE 5.7 Species of Conservation Concern recorded during 2007-2008 field surveys and information on their population status**

Common Name	Scientific Name	NSDNR Rank	ACCDC S-Rank
Nova Scotia Agalinis	<i>Agalinis neoscotica</i>	Secure	S3
Triangle Moonwort	<i>Botrychium lanceolatum</i>	Sensitive	S2S3
Lesser Brown Sedge	<i>Carex adusta</i>	Sensitive	S2S3
Hay Sedge	<i>Carex foenea</i>	Secure	S3?
Houghton's Sedge	<i>Carex houghtoniana</i>	Sensitive	S2?
Pennsylvania Sedge	<i>Carex pennsylvanica</i>	Undetermined	S1S2
Bicknell's Crane's-bill	<i>Geranium bicknellii</i>	Secure	S3
Clammy Hedge-Hyssop	<i>Gratiola neglecta</i>	Sensitive	S1S2
Woodland Rush	<i>Juncus subcaudatus</i>	Sensitive	S3
Yellow-seeded False Pimperel	<i>Lindernia dubia</i>	Secure	S3S4
Northern Clubmoss	<i>Lycopodium complanatum</i>	Secure	S3S4
Canada Rice Grass	<i>Piptatherum canadense</i>	Sensitive	S2
Large Purple Fringed Orchid	<i>Platanthera grandiflora</i>	Secure	S3
Hooker's Orchid	<i>Platanthera hookeri</i>	Secure	S3
Gmelin's Water Buttercup	<i>Ranunculus gmelinii</i>	Secure	S3
Alder-leaved Buckthorn	<i>Rhamnus alnifolia</i>	Sensitive	S3
Yellow Ladies'-tresses	<i>Spiranthes ochroleuca</i>	Sensitive	S2S3
Blue Vervain	<i>Verbena hastata</i>	Secure	S3

Nova Scotia agalinis (*Agalinis neoscotica*) is a small herb that is endemic to Nova Scotia. Although not found elsewhere, it is fairly common within the province where its population is considered “Secure” by NSDNR and is assigned a ranking of “S3” by the ACCDC. Typically associated with moist, especially sandy soil (Gleason and Cronquist 1991), it was found at one location within the Study Corridor and was associated with Wetland 11.

Triangle moonwort (*Botrychium lanceolatum*) is a small fern which is known from rich, wooded hillsides of the province (Zinck 1998). Its population is considered “Sensitive” by NSDNR and is ranked as “S2S3” by the ACCDC. This species was found at one location within the Study Corridor and was associated with the edge of Wetland 15 and the adjacent mature mixedwood forest.

Lesser brown sedge (*Carex adusta*) is a tall graminoid associated with acidic soils of dry open woods, clearings and rocky areas (Zinck 1998). Its population is considered “Sensitive” by NSDNR and is ranked as “S2S3” by the ACCDC. This species was encountered at two locations during field surveys and was growing in recent clear cuts. It was observed to be

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particularly abundant in a section of clear cut immediately west of Wetland 6 and was also encountered approximately 200 m north of the Stewiacke River. Lesser brown sedge is likely to be found in other clear cuts within the Study Corridor.

The population of hay sedge (*Carex foenea*) in Nova Scotia is considered “Secure” by NSDNR and is assigned a ranking of “S3?” by the ACCDC indicating that it is considered uncommon, but that there is some uncertainty regarding its abundance. Hay sedge is found scattered throughout the province and is typically associated with dry barrens and sandy areas (Zinck 1998). A few plants of this species were encountered in a clearcut of the Study Corridor during August of 2008 but because this species is difficult to identify while in the field (it closely resembles other species within the *Carex* section Ovals and is best identified with the aid of a microscope), it is expected to be more abundant than the single record indicates.

Houghton's sedge (*Carex houghtoniana*) is considered “Sensitive” by NSDNR and is ranked as “S2?” by the ACCDC, indicating that although it is considered rare within the province, there is uncertainty regarding its distribution and / or abundance. This species is associated with sandy soils and roadside banks and is known to be scattered throughout the province from Queens to Colchester counties (Zinck 1998). Houghton's sedge was found to be particularly abundant within clear cuts of the north-central portion of the Study Corridor (with some mapped records indicating patches of up to 200 plants) but was also recorded in similar habitat elsewhere.

The status of Pennsylvania sedge (*Carex pensylvanica*) is currently considered “Undetermined” by NSDNR but the ACCDC has assigned a ranking of “S1S2” to this species, indicating that it is considered to be rare throughout its range in the province. Within Nova Scotia, it is known to be associated with dry, rocky or gravelly soil and dry, open forests (Zinck 1998). A single observation of this species was made within a clear cut along the alternate route at the southern end of the Study Corridor.

The provincial population of Bicknell's crane's-bill (*Geranium bicknellii*) is ranked as “Secure” by NSDNR and as “S3” by the ACCDC. This species is scattered throughout central and southern parts of Nova Scotia and is usually associated with recently burned or cleared areas (Zinck 1998). It was encountered within clear cuts during field surveys, and was found to be particularly abundant towards the center of the Study Corridor. This species was also recorded within the relatively dry draw-down of a beaver flood at Wetland 12.

Clammy hedge-hyssop (*Gratiola neglecta*) is considered “Sensitive” by NSDNR and is ranked as “S1S2” by the ACCDC. Within Nova Scotia, this species is associated with wet or muddy habitats and has been previously recorded in the vicinity of the Project (Zinck 1998). Clammy hedge-hyssop was observed to be abundant in and around puddles of a woods road located towards the northern end of the Study Corridor. In this area, approximately 300 plants were found to be distributed throughout a section of the woods road that was less than 100 m in length.

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The population of woods-rush (*Juncus subcaudatus*) is considered “Sensitive” by NSDNR and is ranked as “S3” by the ACCDC. Woods-rush is typically associated with wet woods and swamps within the province (Zinck 1998) and was encountered within Wetland 12.

Yellow-seeded false pimperel (*Lindernia dubia*) is an annual herb associated with wet areas such as the muddy edges of streams, drained millponds and gravel pits (Zinck 1998). The population of this species is considered “Secure” by NSDNR and has been assigned a ranking of “S3S4” by the ACCDC indicating that its population is considered uncommon to fairly common within Nova Scotia. Yellow-seeded false pimperel was encountered along a woods road at the northern end of the Study Corridor (in close proximity to the population of Clammy hedge-hyssop previously noted).

Northern clubmoss (*Lycopodium complanatum*) may be found in a diversity of habitats within the province, including deciduous forests, on hillsides under brush, and within neglected fields (Zinck 1998). The population of this species is considered “Secure” by NSDNR and has been assigned a ranking of “S3S4” by the ACCDC. It was encountered in one location towards the south-central portion of the Study Corridor during field surveys.

Canada rice grass (*Piptatherum canadense*) is considered “Sensitive” by NSDNR and is ranked “S2” by the ACCDC indicating that it is rare throughout its range in the province. This species is known to be scattered throughout several parts of the province where it is associated with dry, sandy soils (Zinck 1998). During field surveys, Canada rice grass was encountered towards the center of the Study Corridor where it was found within a regenerating clear cut and other relatively open habitats.

Large purple fringed orchid (*Platanthera grandiflora*) is a relatively large orchid found in wet meadows and along streams. It is considered “Secure” by NSDNR and ranked “S3” by the ACCDC. This species was encountered within wetlands in the southern half of the Study Corridor, including Wetlands 10, 13, 14, 16, and 18.

Hooker's orchid (*Platanthera hookeri*) is scattered throughout many parts of the province where it prefers open, dry conditions and is typically found in mixed woods, frequently under conifers (Zinck 1998). It is considered “Secure” by NSDNR, ranked “S3” by the ACCDC and was encountered in a mature mixedwood forest towards the southern end of the Study Corridor.

The provincial population of Gmelin's water buttercup (*Ranunculus gmelinii*) is considered “Secure” by NSDNR but is given a ranking of “S3” by the ACCDC indicating that it is uncommon. This species is scattered throughout much of Nova Scotia where it may be found in a variety of aquatic habitats, including marshes, slow-moving streams, ditches, shallow pools, and ponds in relatively alkaline areas (Zinck 1998). Gmelin's water buttercup was encountered in Wetlands 1 and 12, and was particularly associated with the watercourse flowing through the former.

The shrub alder-leaved buckthorn (*Rhamnus alnifolia*) is scattered throughout central Nova Scotia where it may be found in swampy woods and boggy meadows, particularly in alkaline areas

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(Zinck 1998). This species is considered “Sensitive” by NSDNR and is ranked as “S3” by the ACCDC. One clump of alder-leaved buckthorn was encountered during field surveys and was located with Wetland 3.

Yellow nodding ladies'-tresses (*Spiranthes ochroleuca*) is considered sensitive by NSDNR and is assigned a ranking of “S2S3” by the ACCDC indicating that it is rare to uncommon throughout its range in the province. Within Nova Scotia, yellow nodding ladies'-tresses are typically associated with the dry sand barrens in southwestern counties but are also found in other habitats such as roadsides and fields, as well as along rivers (Zinck 1998). Yellow nodding ladies'-tresses was identified to be rather common along a woods road at the northern end of the Study Corridor (the majority of which were in close proximity to the population of clammy hedge-hyssop noted previously) and also along a road at the far southern end of the route, within the Proposed Alternate Corridor. The later population was found to be particularly concentrated in the turnaround for the woods road.

Blue vervain (*Verbena hastata*) is a tall herbaceous plant found on river terraces and in rich, mucky soils of the province. This species is considered “Sensitive” by NSDNR and is ranked as “S3” by the ACCDC. Blue vervain was encountered in open habitats at the northern end of the Study Corridor. Within this general area, a patch of approximately 20 plants was observed in close proximity to a stream off the western side of a road and three other plants were found close by off the northern side of a road junction.

### **5.4.3 Secure Species**

The vast majority of vascular species identified during the field surveys are considered here to have Secure populations within the province. Included here are those whose populations are considered by NSDNR to be “Secure”, “Exotic”, or have not been assessed, and whose ACCDC rank does not qualify them as a Species of Conservation Concern, as previously defined. Of the plants encountered during field surveys which are considered to have Secure populations, 326 have been given a ranking of “Secure” by NSDNR, 66 are considered “Exotic”, three are “Undetermined”, and the remainders have not been assessed. Species which have been assigned an “Undetermined” status include field pussytoes (*Antennaria neglecta*) and mouse-ear chickweed (*Cerastium arvense*). Both of these plants are ranked as “SNR” by the ACCDC indicating that they are acknowledged to be present within the province, but have yet to be ranked. Field pussytoes is associated with sterile soils in stony pastures, fields, thickets, and roadsides; and was recorded at two locations during field surveys. Mouse-ear chickweed is found in fields and meadows of the province and may not be native to the province – it was recorded once during surveys. Because neither of these species was identified as being of interest during 2007-2008 surveys, they are likely to be more abundantly distributed along the proposed routes than current records indicate.

## **5.5 WILDLIFE AND WILDLIFE HABITAT**

Information regarding use of the Study Corridor by wildlife was derived from several sources including field surveys and reviews of existing data sources. Field surveys were conducted during late June and the last two weeks of August 2007 and late June, and early September 2008 by three terrestrial ecologists). During these surveys, information was collected regarding the presence of birds, mammals and herpetiles (amphibians and reptiles).

Reference sources such as the Atlas of Breeding Birds of the Maritime Provinces (Erskine 1992), Amphibians and Reptiles of Nova Scotia (Gilhen 1984) and online data bases such as the Nova Scotia Department of Natural Resources Significant Habitats of Nova Scotia data base were also used.

### **5.5.1 Birds**

Breeding bird surveys were conducted in the Study Corridor on June 26, June 27, June 29 and July 3, 2007. Additional surveys were conducted on June 25 and June 26, 2008. Additional bird observations were recorded during the early and late vegetation surveys and wetland surveys conducted between late June and late August in 2007 and late June and early September in 2008. The breeding bird surveys were conducted between the hours of 05:30 and 12:00. During the breeding bird surveys all habitats found within the Study Corridor were visited by birders experienced in conducting auditory breeding bird surveys. Table C2 of Appendix C lists the number of birds of each species observed in each of the habitats present in the Study Corridor. Examples of all habitat types present in the Study Corridor were surveyed. The breeding status of each species recorded was determined using the methodology employed by the Atlas of Breeding Birds of the Maritimes program (Erskine 1992). Species identified but not exhibiting signs of breeding (such as flyovers) were classified as non-breeders. Species observed or heard singing in suitable nesting habitat was classified as possible breeders. Species exhibiting the following behaviors were classed as probable breeders:

- Courtship behaviour between a male and female;
- Birds visiting a probable nesting site;
- Birds displaying agitated behaviour; and
- Male and female observed together in suitable nesting habitat.

Species were confirmed as breeding if any of the following items or activities were observed:

- Nest building or adults carrying nesting material;
- Distraction display or injury feigning;
- Recently fledged young;
- Occupied nest located; and
- Adult observed carrying food or faecal sac for young.

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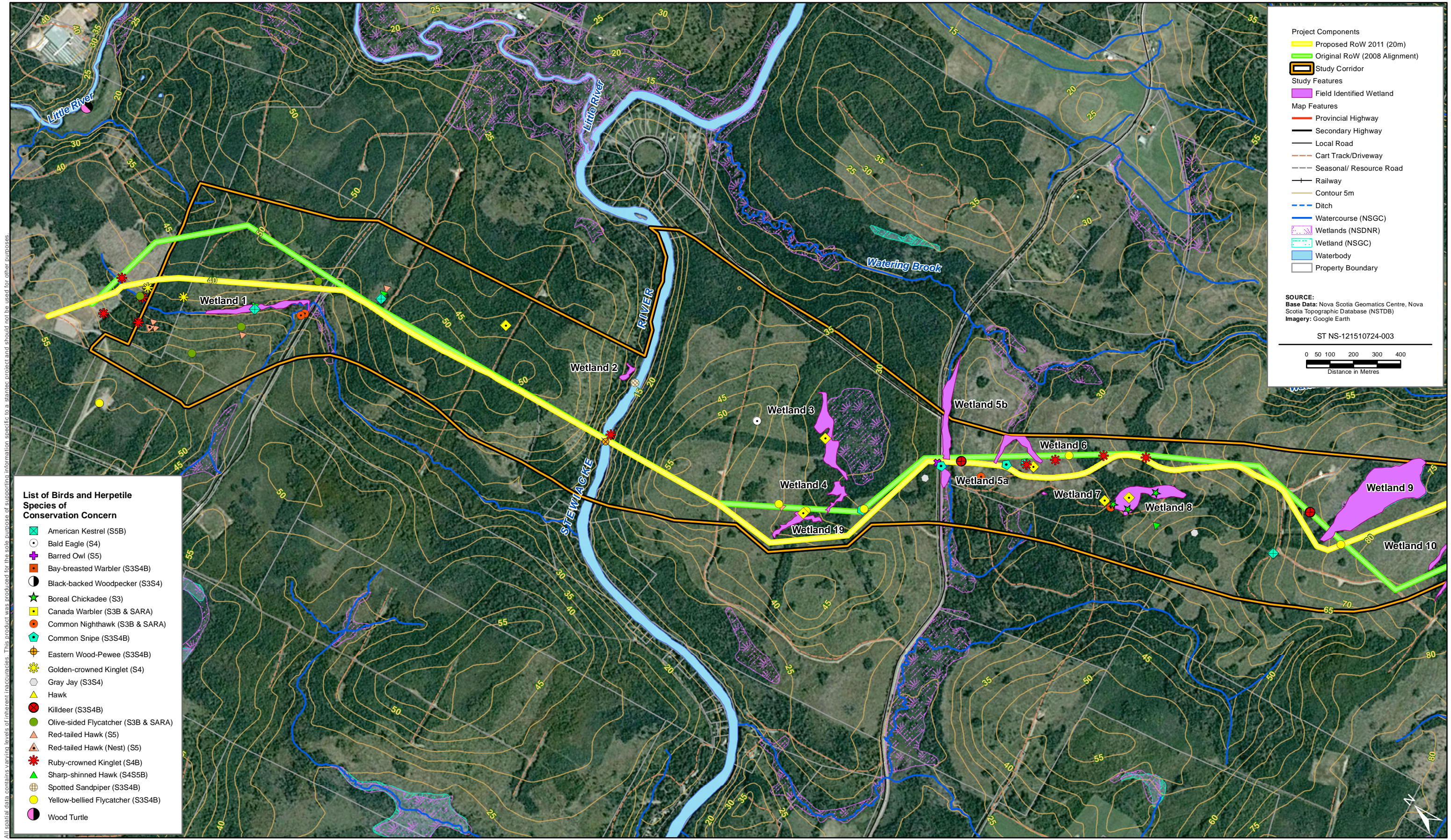
The population status of each species was determined from existing literature. Lists of provincially rare or sensitive birds were derived from the General Status of Wildlife in Nova Scotia (NSDNR 2010) and Species at Risk in Nova Scotia (NSDNR 2009) while nationally rare species were derived from COSEWIC (2010) and the SARA.

Field survey data were collected on a Hewlett Packard iPAQ PDA during the 2007 field survey. Bird data entries for species of conservation concern (as of 2007) were annotated with geographic coordinates collected with a GPS (Garmin 76). In 2008, bird field survey data were collected on a Trimble Nomad equipped with an onboard GPS. This system allowed all bird records to be georeferenced. Between 2008 and 2010, the population statuses of a number of bird species previously listed as Secure in Nova Scotia were changed to Sensitive. The locations of these species were not recorded during the 2007 field surveys since they would not have been considered to be species of conservation concern at that time. The locations of these species were recorded in 2008. Wherever possible, the approximate locations of Sensitive species recorded during the 2007 surveys were plotted on mapping of the Study Corridor.

**Breeding Bird Survey Results**

The breeding status and population status of each bird species recorded during the breeding bird surveys is presented in Table C3, Appendix C. A total of 773 birds of 65 species were recorded during the breeding bird surveys. The most abundant species in descending order of abundance were Black-throated Green Warbler (9.8% of all birds recorded), Dark-eyed Junco (8.4%), Hermit Thrush (6.6%), Ovenbird (6.3%), White-throated Sparrow (5.9%), Red-eyed Vireo (5.3%), Magnolia Warbler (4.1%), American Robin (3.4%), Ruby-crowned Kinglet (2.6), and Yellow-bellied Flycatcher (2.6%). Together these species accounted for 55% of the total number of birds recorded during the surveys. The species composition of the dominant species reflects the abundance of the most abundant habitat types in the area which were clear-cut, mature mixedwood forest and immature mixedwood forest. Of the 67 species recorded during the breeding bird surveys, 7 species were confirmed as breeding on the site, 6 were listed as probable breeders, 48 were listed as possible breeders, and no evidence of breeding activities were found for 6 species.

One of the bird species recorded during the breeding bird surveys, Common Nighthawk, is listed under the Nova Scotia *Endangered Species Act*. Three species listed as Threatened under SARA were recorded during the field surveys. These included Common Nighthawk, Canada Warbler and Olive-sided Flycatcher. All three of these species are listed as At Risk under the NSDNR General Status Ranks. Eleven species listed as Sensitive species under the NSDNR General Status Ranks (NSDNR 2010) were recorded during the breeding bird surveys. These included Killdeer, Spotted Sandpiper, Wilson's Snipe, Yellow-bellied Flycatcher, Eastern Wood Pewee, Black-backed Woodpecker, Golden-crowned Kinglet, Ruby-crowned Kinglet, Boreal Chickadee, Gray Jay, and Bay-breasted Warbler. Each of these species is discussed below. All other species recorded during the breeding bird surveys are considered to be Secure in Nova Scotia by NSDNR. The distribution of wildlife species of conservation concern encountered during 2007-2008 field surveys is shown in Figures 5.4A and 5.4B.



**Project Components**

- Proposed RoW 2011 (20m)
- Original RoW (2008 Alignment)
- Study Corridor

**Study Features**

- Field Identified Wetland

**Map Features**

- Provincial Highway
- Secondary Highway
- Local Road
- Cart Track/Driveway
- Seasonal/ Resource Road
- Railway
- Contour 5m
- Ditch
- Watercourse (NSGC)
- Wetlands (NSDNR)
- Wetland (NSGC)
- Waterbody
- Property Boundary

**SOURCE:**  
 Base Data: Nova Scotia Geomatics Centre, Nova Scotia Topographic Database (NSTDB)  
 Imagery: Google Earth

ST NS-121510724-003


0 50 100 200 300 400  
 Distance in Metres

- List of Birds and Herpetile Species of Conservation Concern**
- American Kestrel (S5B)
  - Bald Eagle (S4)
  - Barred Owl (S5)
  - Bay-breasted Warbler (S3S4B)
  - Black-backed Woodpecker (S3S4)
  - Boreal Chickadee (S3)
  - Canada Warbler (S3B & SARA)
  - Common Nighthawk (S3B & SARA)
  - Common Snipe (S3S4B)
  - Eastern Wood-Pewee (S3S4B)
  - Golden-crowned Kinglet (S4)
  - Gray Jay (S3S4)
  - Hawk
  - Killdeer (S3S4B)
  - Olive-sided Flycatcher (S3B & SARA)
  - Red-tailed Hawk (S5)
  - Red-tailed Hawk (Nest) (S5)
  - Ruby-crowned Kinglet (S4B)
  - Sharp-shinned Hawk (S4S5B)
  - Spotted Sandpiper (S3S4B)
  - Yellow-bellied Flycatcher (S3S4B)
  - Wood Turtle

All spatial data contains varying levels of inherent inaccuracies. This product was produced for the sole purpose of supporting information specific to a stantec project and should not be used for other purposes.

PREPARED BY:  
M. Huskins-Shupe

REVIEWED BY:  
K. Fraser

CLIENT:  


ALTON NATURAL GAS PIPELINE PROJECT

**Distribution of Wildlife Species of Conservation Concern Encountered During Field Surveys**

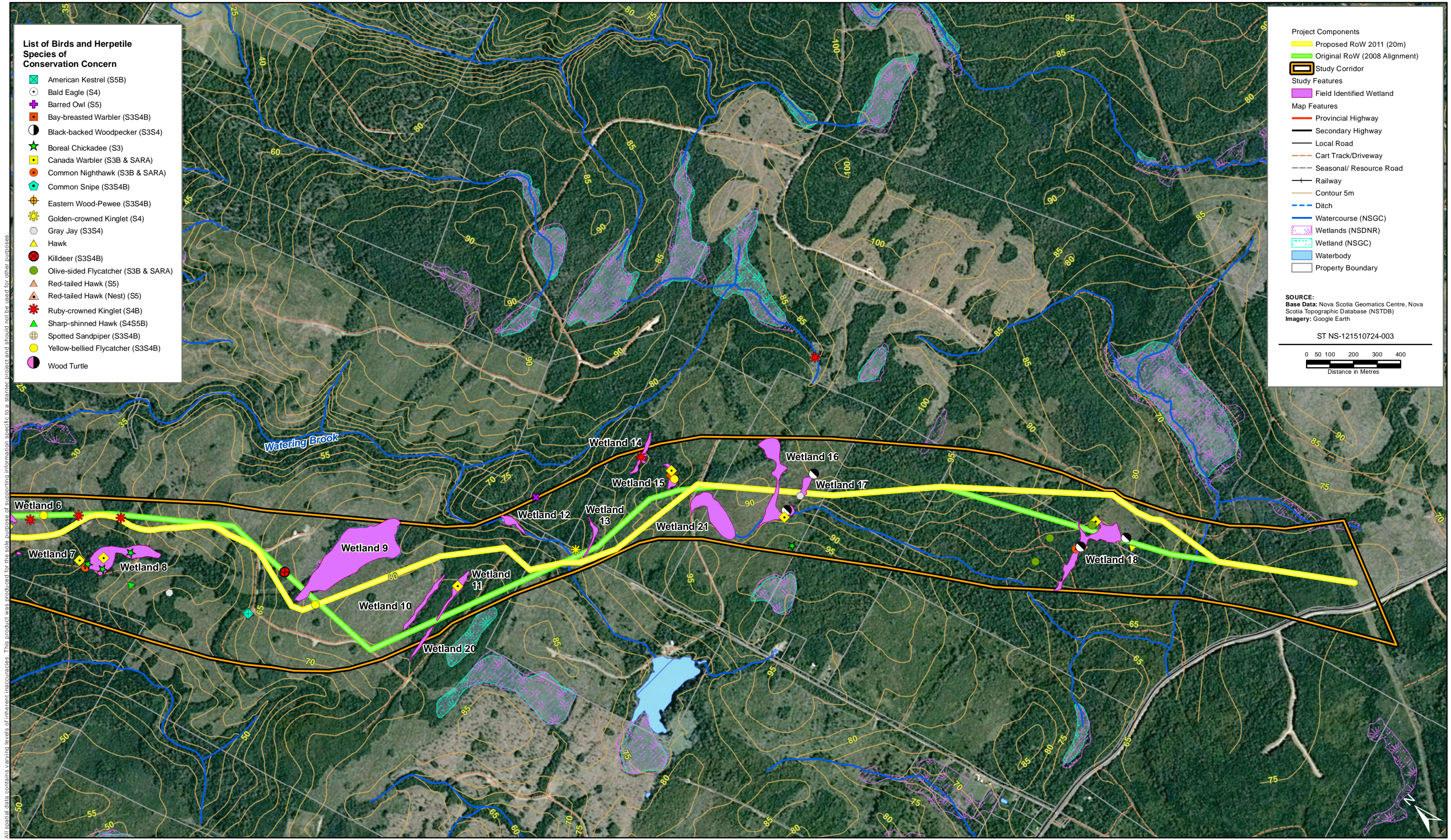
FIGURE NO.:  
5.4 A

DATE:  
Dec 13, 2011

  
 Stantec Consulting Ltd. © 2011







- List of Birds and Herpetile Species of Conservation Concern**
- American Kestrel (S5B)
  - Bald Eagle (S4)
  - Barred Owl (S5)
  - Bay-breasted Warbler (S3S4B)
  - Black-backed Woodpecker (S3S4)
  - Boreal Chickadee (S3)
  - Canada Warbler (S3B & SARA)
  - Common Nighthawk (S3B & SARA)
  - Common Snipe (S3S4B)
  - Eastern Wood-Pewee (S3S4B)
  - Golden-crowned Kinglet (S4)
  - Gray Jay (S3S4)
  - Hawk
  - Killdeer (S3S4B)
  - Olive-sided Flycatcher (S3B & SARA)
  - Red-tailed Hawk (S5)
  - Red-tailed Hawk (Nest) (S5)
  - Ruby-crowned Kinglet (S4B)
  - Sharp-shinned Hawk (S4S5B)
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- Project Components**
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- Provincial Highway
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  - Watercourse (NSGC)
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  - Wetland (NSGC)
  - Waterbody
  - Property Boundary

**SOURCE:**  
 Base Data: Nova Scotia Geomatics Centre, Nova Scotia Topographic Database (NSTDB)  
 Imagery: Google Earth

ST NS-121510724-003

0 50 100 200 300 400  
 Distance in Metres

All spatial data contains varying levels of inherent inaccuracies. This product was produced for the sole purpose of supporting information specific to a stantec project and should not be used for other purposes.

PREPARED BY:  
M. Huskins-Shupe

REVIEWED BY:  
K. Fraser

CLIENT:

ALTON NATURAL GAS PIPELINE PROJECT

**Distribution of Wildlife Species of Conservation Concern Encountered During Field Surveys**

FIGURE NO.:  
5.4 B

DATE:  
Dec 13, 2011



*Common Nighthawk*

Common Nighthawks are insectivores that feed on flying insects on the wing. Unlike most species of the goat sucker family which are nocturnal, Common Nighthawks are active during the day with most activity occurring at dawn and dusk. This species nests on the ground in open habitats such as burns, clear-cuts, and disturbed areas. In urban areas they also nest on flat-roofed buildings with gravel covered roofs.

Common Nighthawks were listed as Threatened under SARA in 2010 and were also listed as Threatened under the NSESA in 2007. They are At Risk under the NSDNR general status ranks. The ACCDC lists Common Nighthawk as S3B indicating that breeding populations are uncommon throughout their range in the province and are of long-term concern. Breeding Bird Survey (BBS) (CWS 2010) data indicate that the Canadian Common Nighthawk population has declined significantly since the early 1980s although the population appears to have stabilized since 2001. The Nova Scotia population has generally decreased since the early 1970's with a large but short-lived recovery in the early 1980s. The causes for the decline of Common Nighthawk populations are unknown. One possible cause is a decline in the abundances of insect prey species possibly due to widespread pesticide use. Other contributing factors may include decreases in the amount of available nesting habitat caused by reforestation of abandoned agricultural land and clear-cut areas, effective suppression of forest fires, intensive agricultural practices, and reductions in the number of buildings with flat graveled roofs in urban areas. Increases in the abundance of generalist predators, particularly in urban areas, may have also contributed to the decline of Common Nighthawk populations.

Common Nighthawks were recorded at five locations during the field surveys. Only one Common Nighthawk was observed during the June breeding bird surveys. This bird was observed flying over the area adjacent to the Stewiacke River crossing site in June 2007. No evidence of breeding activity was observed; however, suitable breeding habitat in the form of recent clear-cuts was present in the general area. Two Common Nighthawks were observed near Wetland 1 on two days (August 10, 2007 and August 14, 2007). The presence of two birds at the same location four days apart could indicate that Common Nighthawks were potentially nesting in the area. Recent clear-cuts young enough to provide suitable nesting habitat are present in the area where the birds were observed. However, the timing of the sightings is somewhat late for the breeding season for Common Nighthawks and coincides with the period of peak Common Nighthawk migration in Nova Scotia. As such, it is also possible that the birds observed were two pairs of migrants passing through the area. Common Nighthawks were also observed near Wetlands 5, 8 and 18. All of these birds were observed during August 2007 and were likely migrants. No Common Nighthawks were observed during the 2008 field surveys. Given the presence of this species in areas of suitable breeding habitat during the breeding season, it was listed as a possible breeder (Table C3 in Appendix C).

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*Canada Warbler*

Canada Warblers have recently (2010) been assigned Threatened status by COSEWIC and are listed under Schedule 1 of the *SARA*, but are not listed as a “species at risk” under the Nova Scotia *Endangered Species Act*. They are, however, considered At Risk by NSDNR since 2010 and are ranked as “S3B” by the ACCDC indicating that breeding populations are uncommon throughout their range in the province and are of long-term concern. BBS data (CWS 2010) indicates that in Nova Scotia, Canada Warbler abundance has decreased steadily since the early 1980s and is currently at the lowest level recorded since 1970. Although this species has undergone significant population declines, it is still widely distributed in Nova Scotia. The factors responsible for the decline of the Canada Warbler are not fully understood. It is believed that loss or degradation of habitat in the wintering grounds in the northern Andes Mountains is likely the most important factor in the decline of this species. Human activities in the breeding grounds may also contribute to the decline of the Canada Warbler including urbanization, forest harvesting, silvicultural activities that remove or thin the forest understory, as well as road and pipeline construction.

Canada Warblers use a variety of habitat for nesting including both upland and wetland habitats. The key features of breeding habitat for Canada Warblers is a forested area with an open tree canopy with a dense understory and a structurally complex forest floor to provide sheltered nest sites. Canada Warblers will nest in both mature and immature forest stands provided the conditions described above are present. In Nova Scotia, treed swamps with dense understory shrub or tree cover are one of the habitats most frequently used by Canada Warblers.

Canada Warblers were encountered at nine locations during the field surveys. Males singing in suitable breeding habitat was the only breeding evidence collected during the field surveys and as such this species is listed as a possible breeder in the Study Corridor (Table C3 in Appendix C). Five of the Canada Warbler records were collected during the breeding bird surveys with three recorded in 2007 and two recorded in 2008. The other four records were collected during the wetland surveys conducted during June and August 2007. All but one of the Canada Warbler records was associated with wetlands. Canada Warblers were recorded in or near Wetlands 3, 4, 6, 8, 11, 15, 16, and 18. Wetland habitat types utilized by Canada Warblers in the Study Corridor included coniferous treed swamp, mixedwood treed swamp and tall shrub dominated treed swamp (Table C2 in Appendix C). The one Canada Warbler record not associated with a wetland was found in dense pole sized mixedwood forest approximately 500 m west of the Stewiacke River crossing site.

*Olive-sided Flycatcher*

Habitats where Olive-sided Flycatchers nest include forest clearings such as wooded swamps, the edges of rivers and streams, the edges of clear-cuts, and burned areas containing large numbers of snags. Suitable habitat includes a clearing with scattered snags or tall living trees with adjacent mature forest. The trees or snags in the clearing are used as perching sites by hunting Olive-sided Flycatchers which wait for flying insects to pass by and capture them on the

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wing. Hymenoptera such as flying ants, bees and wasps are the preferred food although other flying insects are eaten. Nests are situated in trees with conifers such as spruce and fir being preferred.

Olive-sided Flycatchers have recently (2010) been assigned Threatened status by COSEWIC and are listed under Schedule 1 of the *SARA*, but are not listed as a “species at risk” under the Nova Scotia *Endangered Species Act*. They are, however, considered At Risk by NSDNR since 2010 and are ranked as “S3B” by the ACCDC indicating that breeding populations are uncommon throughout their range in the province and are of long-term concern. BBS data (CWS 2010) indicates that Olive-sided Flycatcher abundance in Canada has declined steadily from the early 1970s until the early 2000s. The abundance of this species has remained relatively stable since then. In Nova Scotia, Olive-sided Flycatcher abundance increased from the early 1970s to 2000 after which there was a substantial decline.

The causes of the declines in Olive-sided Flycatcher populations are unclear but are probably related to loss of habitat. It is unclear if habitat loss on the breeding grounds is a significant factor affecting the abundance of this species since there has been relatively little loss of preferred habitat in the breeding grounds and a general increase in the abundance of some habitat types such as areas harvested for timber. Some research has indicated that breeding success in clear-cuts may not be as high as in natural habitats (*SARA* registry). Habitat loss in the wintering grounds in the montane forests (highland area below the subalpine zone) of the Andes may also be a factor affecting the abundance of this species. It is estimated that approximately 85% of this forest has been significantly altered. However, good estimates of the amount of habitat lost in the wintering grounds are not available. Declining insect populations in either the breeding or wintering areas may also be an important factor affecting the abundance of this species.

Olive-sided Flycatchers were recorded at seven locations during the 2007 and 2008 field surveys. These records form two distinct clusters, one at the western end of the pipeline route centered around Wetland 1 and the second near the eastern end of the pipeline route around Wetland 18. Four Olive-sided Flycatcher records were associated with the western cluster. Three of the four records were collected on June 26, 2007 while the fourth record was from June 25, 2008. Two of the three Olive-sided Flycatchers observed in this area in 2007 were observed in mixedwood treed swamp habitat in Wetland 1. This linear wetland is flanked on two sides by young clear-cuts containing scattered large remnant trees and snags. These trees and snags along with the tall trees in the mixedwood treed swamp would provide suitable perching sites for foraging Olive-sided Flycatchers. The mixedwood treed stream swamp would provide suitable nesting sites for this species. It is likely that the three records from June 26, 2007 represent one individual singing from multiple sites. The eastern cluster of Olive-sided Flycatcher observations were situated on the western side of Wetland 18. Wetland 18 has been partially harvested providing open areas for foraging Olive-sided Flycatchers. The area west of the wetland consists of mature mixedwood forest that would provide suitable nesting habitat for this species. It is likely that the three Olive-sided Flycatcher observations at this location represent multiple records of a single breeding pair of Olive-sided Flycatchers. Males singing in

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suitable breeding habitat was the only breeding evidence collected during the field surveys and as such this species is listed as a possible breeder in the Study Corridor (Table C2 in Appendix C).

*Eastern Wood Pewee*

Eastern Wood Pewees are typically associated with deciduous or mixed wood forest although they often nest in ornamental groves, particularly those dominated by elms. They are often associated with forest edges. This species was listed as Sensitive under the NSDNR General Status Ranks in 2010 but is not listed under SARA or the Nova Scotia *Endangered Species Act*. ACCDC lists this species as S3S4B indicating that it is an uncommon to fairly common breeding bird species in Nova Scotia. BBS data for Canada (CWS 2010) reveals that Eastern Wood Pewee abundance has declined steadily since 1970. The trend for Nova Scotia is different with a rapid decline from 1970 to 1976 followed by slower decline between 1976 and 1989 followed by a period from 1989 until 2009 in which the population was relatively stable. The cause of the decline in Eastern Wood Pewee abundance are poorly understood but are believed to be related to habitat loss.

Three Eastern Wood Pewees were recorded during the 2007 (two records) and 2008 (one record) field surveys. The Eastern Wood Pewee recorded in 2008 was found in mature mixedwood dominated riparian forest along the banks of the Stewiacke River. The locations of the two Eastern Wood Pewees observed during the 2007 surveys are not known precisely since the 2007 data were not collected using the Nomad based breeding bird survey tool which georeferences all records. In 2007, Eastern Wood Pewee was considered to be secure in Nova Scotia and as such, no GPS way points were collected when this species was encountered. The general locations of the Eastern Wood Pewees recorded in 2007 were one bird just north of the Stewiacke River crossing site and one bird located between Wetlands 8 and 9. The first bird was found in mature softwood forest while the second bird was found in mature mixedwood forest (Table C2 in Appendix C). All of the Eastern Wood Pewees recorded during the 2007 and 2008 field surveys were heard singing in suitable nesting habitat. As such, this species is listed as a possible breeder in the Study Corridor (Table C3 in Appendix C).

*Yellow-bellied Flycatcher*

Yellow-bellied flycatchers were assigned a status of Sensitive by NSDNR in 2010. In addition, they have been assigned a rank of "S3S4B" by the ACCDC indicating that they are uncommon to fairly common throughout their range in the province and are of long-term concern. This species is associated with a variety of habitats, including swamps and damp coniferous woods. Yellow-bellied Flycatcher abundance in Nova Scotia has generally decreased since the mid-1980s. The Sensitive ranking assigned to this species by NSDNR is expected to reflect loss of lowland coniferous forest and possible long term loss of coniferous forest habitat as a result of climate change.

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Yellow-bellied Flycatchers were common in the Study Corridor with a total of 20 records for this species compiled during 2007 and 2008 (Table C2 in Appendix C). Yellow-bellied Flycatchers was encountered in a variety of habitat types including mature and immature softwood forest, mature mixedwood forest, coniferous treed swamp, mixedwood treed swamp, and clear-cuts; however, it was most frequently encountered in mature mixedwood forest (60% of observations). Figures 5.4A and 5.4B presents the distribution of the Yellow-bellied Flycatchers observed in 2008 and those recorded in wetlands in 2007. The locations of Yellow-bellied Flycatchers observed during the breeding bird surveys conducted in 2007 were not georeferenced since this species was listed as secure at that time. In general, Yellow-bellied Flycatchers were generally fairly evenly distributed throughout most of the Study Corridor in 2007. Five Yellow-bellied Flycatchers were observed between the cavern site and the Stewiacke River; three were observed between the Stewiacke River and Wetland 12; and five were observed between Wetland 12 and the Lanesville Road. The presence of males singing in suitable habitat was the only breeding evidence noted for this species and it is therefore listed as a possible breeder in the Study Corridor (Table C3 in Appendix C).

*Golden-crowned Kinglet*

Golden-crowned Kinglets were assigned a status of Sensitive by NSDNR in 2010. The ACCDC assigns a rank of "S4" to this species indicating that although they are fairly common throughout their range in the province, they are of long-term concern. BBS data (CWS 2010) indicate that Golden-crowned Kinglet abundance has declined over the past 20 years although abundance is still within ranges present in the 1970s and 1980s. There are concerns that extensive harvesting of softwood forest in recent decades and other factors such as possible reduction in softwood forest cover as a result of climate change could result in substantial long term reductions in the abundance of this species in Nova Scotia.

Golden-crowned Kinglets are typically found in dense coniferous stands of the province where they are year-round residents. This species was relatively common in the Study Corridor with 15 records compiled during the 2007 and 2008 field surveys (Table C2 in Appendix C). Golden-crowned Kinglets were found only in mature mixedwood and mature softwood habitat types with the vast majority (93%) found in the mature mixedwood forest habitat type. The relative lack of Golden-crowned Kinglets in mature softwood forest habitat reflects the fact that there was relatively little mature softwood forest in the Study Corridor while mature mixedwood forest was plentiful. Golden-crowned Kinglets were patchily distributed in the Study Corridor with the greatest concentrations present in areas where large stands of mature mixedwood or softwood forest were present. This is also reflected in the 2007 records which were not georeferenced. During these surveys no Golden-crowned Kinglets were noted between the cavern site and the Stewiacke River; two were observed between the Stewiacke River and Wetland 12; ten were observed between Wetland 12 and the Lanesville Road; and one was observed along the 2008 alternate corridor route. The portion of the pipeline route that contained the highest number of Golden-crowned Kinglets in 2007 was characterized by large contiguous stands of mature mixedwood and softwood forest. Newly fledged Golden-crowned Kinglets were observed during