

8.2 Nesting

Canada Geese are the earliest of all waterfowl to breed (MoE, 1979). They may begin defending territories up to 6 weeks prior to egg laying (Brakhage 1965). Canada Geese that nested in southwestern B.C. typically established nesting territories by mid-March (CWS 2010).

Conflict over nest sites begins as soon as the flock arrives on the nesting grounds (Howard Breen 1990). The most aggressive birds hold the largest territories (Brakhage 1965). Brakhage (1965) found that territory size decreased

as incubation progressed; Cooper (1978) disputed this, albeit anecdotally.

Pairs that nested the previous year typically reclaim the same nest site. Other breeding females try to nest near the place where they were hatched (Granholtm 1988). If suitable sites are unavailable, geese may forego nesting that season, rather than venture far from the original site (Howard Breen 1990).

Young or inexperienced geese begin nesting later than older females, perhaps because of the

time taken to establish territories, or because older birds are in better condition, as the condition of the female is known to influence the timing of nesting (Perrin & Birkhead 1983; Johnson et al. 1992). Brakhage (1965) found that females 5 years and older arrived on the nesting grounds earliest, and began laying first; laying followed an age-based hierarchy of dominance among females. The size of family groups is also linked to hierarchical position (which is probably correlated to the age of the dominant female) (Raveling

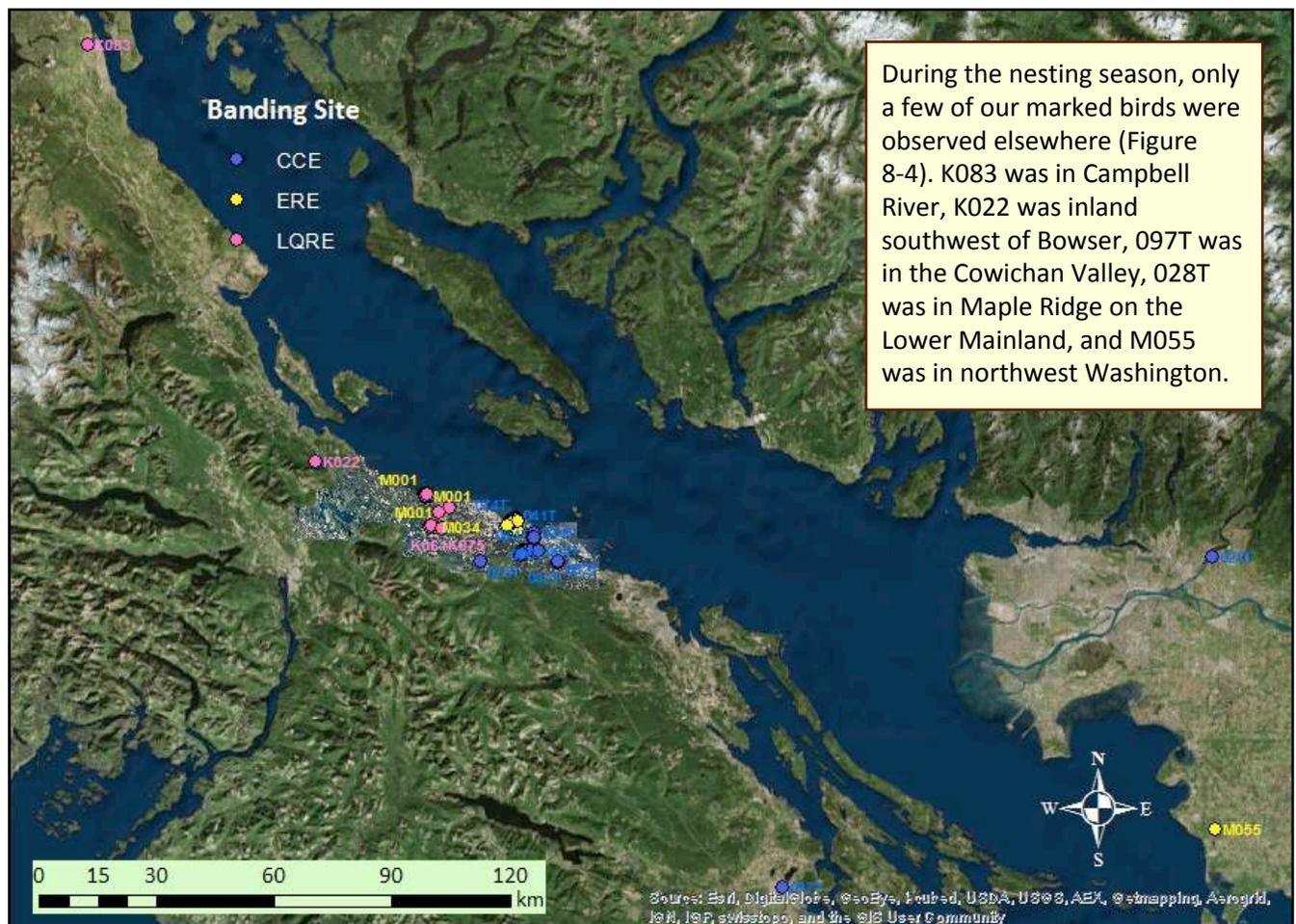


Figure 8-4. Nesting season (April/May) re-sights of marked Canada Geese, 2008-2014.

1970 in Anderson & Titman 1992). Weather (e.g., cold or hot temperatures, wind, rain) also affects the timing and occurrence of nesting (Johnson et al. 1992).

Yearlings and juveniles gather at the edge of the nesting territories (Granholm 1988). One and two-year old females stay near the natal area (Johnson et al. 1992). They may try to mimic older birds, attempting to pair-bond or build and tend nests. The next year, they may return to the same site to nest in earnest (Granholm 1988). Yearlings and unpaired males often disperse (MoE 1979; Johnson et al. 1992).

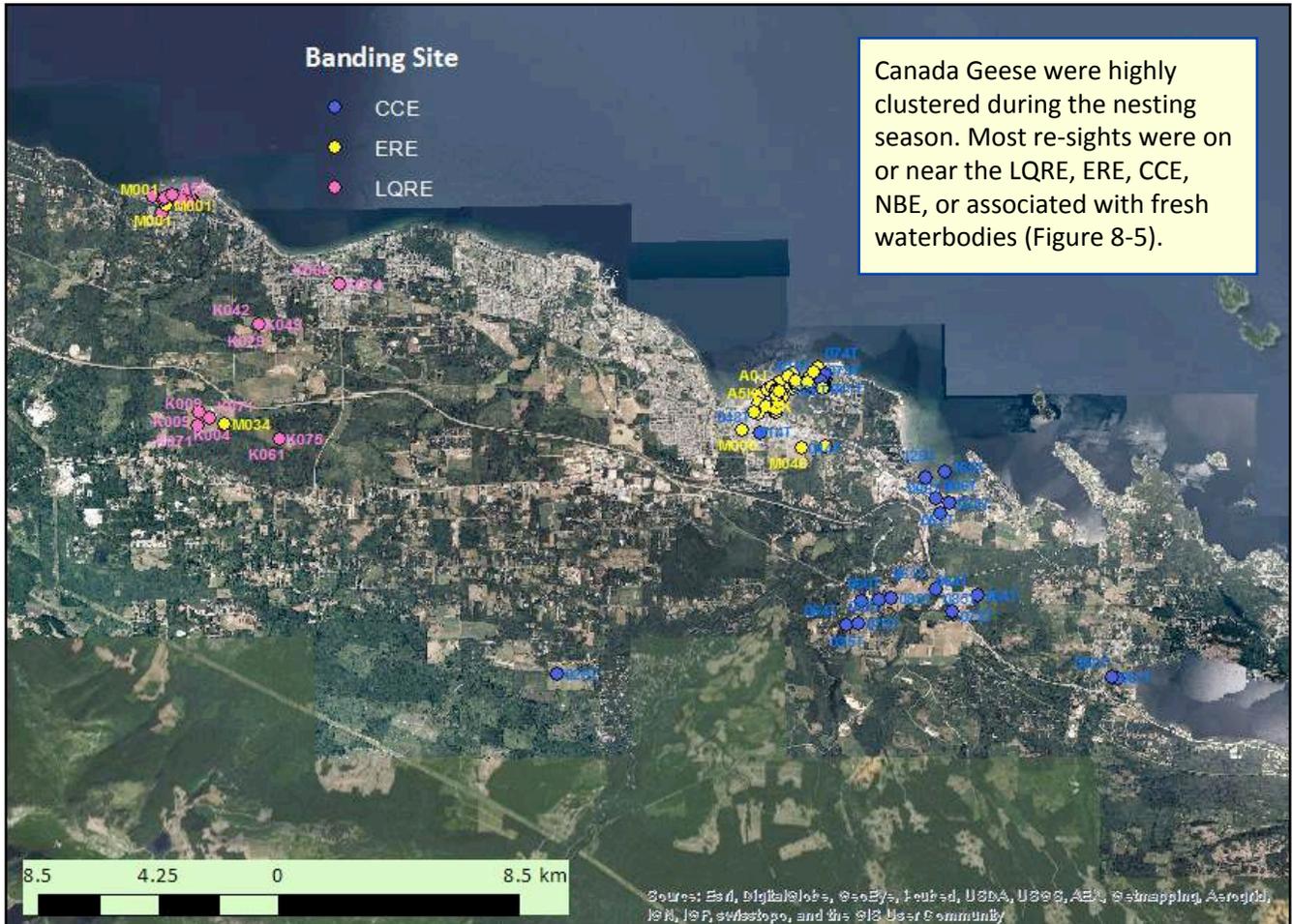


Figure 8-5. Nesting season (April/May) re-sights of marked Canada Geese in the study area, 2008-2014.



Nesting Canada Goose, April 21, 2011. Photo by Danielle Morrison.



Figure 8-8. Nesting season (April/May) re-sights of marked Canada Geese at the Englishman River estuary, 2008-2014.

At the ERE, most observations were of M-collared or yellow leg-banded Canada Geese (Figure 8-8). Thirteen CCE-banded birds also nested at the ERE, including 6 paired with one another, and one paired with an ERE-banded bird. The lone LQRE-banded bird found on the ERE during the nesting season was a returned juvenile; it was observed April 17, 2013 at the ERE, then found at the LQRE on May 2, 2013. Outliers, e.g., Canada Geese found in downtown Parksville, were comprised of local resident, emigrant, migrant, U.S. moult migrant, and perhaps other migrant types.

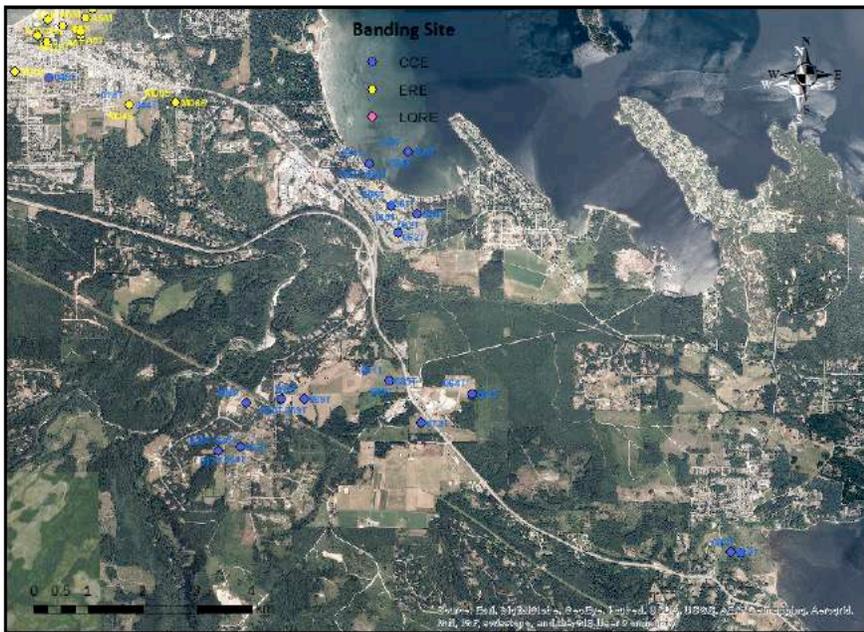


Figure 8-9. Nesting season (April/May) re-sights, 2008-2014, of Canada Geese marked at the Craig Creek estuary.

CCE-banded Canada Geese were also found near the CCE, at the NBE, within Nanoose Bay's River's Edge community (Figure 8-9), and at the French Creek estuary.

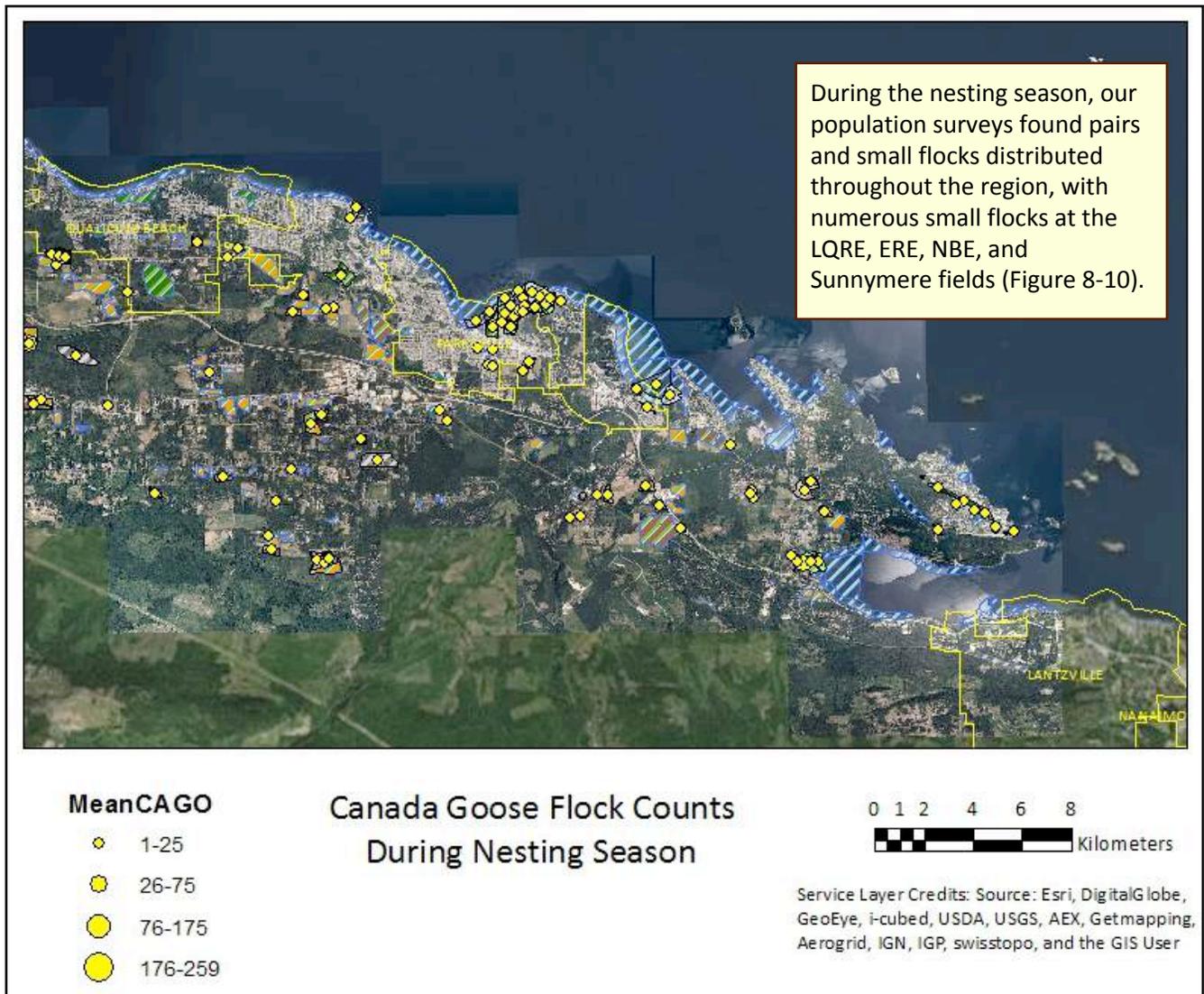


Figure 8-10. Canada Goose flock counts during the nesting season, weighted for the number of surveys (n=570).



Pair of Canada Geese defending their nest, Englishman River estuary, April 21, 2011



Goose nest in a stump at the Little Qualicum River estuary, 2013

Typically, egg-laying begins by the end of March and continues into late May (CWS 2010). In our area, new eggs were observed from March 30 to May 30. For 1,405 clutches in B.C., laying was found to occur from March 13 to July 6, with 52% recorded between April 18 and May 2 (Campbell et al. 1990); the June and July records were probably from northern B.C.

It takes about a week to lay a complete clutch (Howard Breen 1990; CWS 2010), or 1-2 days to lay each egg (Cooper 1978). Once laying is completed, the goose incubates the eggs for 25 to 28 days, while the gander stands guard nearby. He vigorously defends the nesting territory from intruders (MoE 1979; Howard Breen 1990; CWS 2010).

Once nesting, foraging usually occurs near the nest. However, geese tending a nest may take 'recesses' to forage and drink; these have been recorded as far as 8 km away (Cooper 1978; Granholm 1988). Brakhage (1965) observed that pairs left their nest together, usually during the first and last 2 hours of daylight; the goose fed ravenously and occasionally preened briefly while the gander rarely fed. Cooper (1978) found that females had a fixed routine, which included drinking, bathing,

preening, and feeding, always at a hurried pace. Feeding areas consistently supported an abundance of new plant growth and were absent of dense, decadent vegetation. Back at the nest, the goose preened water from her breast to moisten the down around the eggs, likely to increase humidity. Cooper also noted that pairs had days without recesses, and days that included up to 5 recesses. Time away from the nest varied from 1 to 68 minutes, with an average of 15 minutes (Brakhage 1965; Cooper 1978). With each additional egg, time spent away from the nest was reduced (Brakhage 1965).

The hatch peaks in early to mid-May (CWS 2010). On average, it takes approximately 24 hours for the clutch to hatch, but hatching time can range anywhere from 8 to 36 hours (Kossack 1950; Brakhage 1965; Cooper 1978). Depending on the timing of the final emergence, goslings may be off the nest by the next morning (Brakhage 1965; Cooper 1978). They are closely guarded by both parents. Initially, the new family stays near the nesting grounds (MoE 1979; Howard Breen 1990; CWS 2010), but the adults do not defend the nest site or territory (Brakhage 1965). If forage and water are

To avoid being seen, a nesting goose lowers her profile, while the gander stands guard a short distance away. Photo by Guy Monty.



limited, they may move several km to a more suitable rearing area (Kossack 1950; Granholm 1988).

If the first clutch is destroyed, pairs may re-nest. Over the period 2008-2014, three different pairs re-nested, in 2012, 2013, and 2014, all on the ERE. Eggs in two of the original nests had not been added, and one had been visibly predated. In 2015, there were two confirmed re-nests on the ERE and one on the LQRE.

Atwater (1959) found that unsuccessful nesting pairs in Montana moved away from the nest sites and were quite solitary, often wandering from one waterbody to another. Cooper (1978) found unsuccessful pairs in Manitoba remained within 500 m of the nest site for 2 days to 4 weeks, with an average of 2 weeks. In Quebec, females that had lost their nests or abandoned their young left the area before moulting and returned in November (Beaumont, Rodrigues, & Giroux 2013). Unsuccessful nesters in South Dakota formed flocks with non-breeding geese that had remained in the nesting area until mid to late May (Dieter & Anderson 2009).

8.3 Brood-rearing

The moulting season encompasses the latter part of the brood-rearing period, as the parents are replacing their flight feathers (i.e., moulting) while their goslings are growing, developing flight feathers, and learning to fly (CWS 2010). For 2,076 Canada Geese broods in B.C., brood-rearing (hatching to fledging) occurred between April 15 and August 24 (Campbell et al. 1990).

A pair with its brood may be solitary for 5-7 days, then loosely associates with other pairs with similar-aged young (Brakhage 1965). Broods may mix for several (e.g., 3 to 6) weeks before reorganizing into their original families (Bellrose 1976; Dieter & Anderson 2009). They may also form crèches (sometimes called gang broods). One might see 10-20 goslings under the care of a single

pair of adults, typically when young females give up their goslings to older birds (Bellrose 1976; Howard Breen 1990). Crèches may also be accompanied by 2-5 productive pairs and additional, non-breeding females (Brakhage 1965). Brakhage (1965) found that pairs which gave up their broods returned to the vicinity of their nesting territories.



Pair with large brood at the Little Qualicum River estuary, May 21, 2009

8.4 Moulting



Flightless Canada Geese make their way from the main trail in Rath Trevor Beach Provincial Park to the foreshore.

During the summer, adult Canada Geese replace their flight feathers and are unable to fly, or fly well, and are more vulnerable to predation (Howard Breen 1990; CWS 2010). Non-breeding juveniles and adults, and adults whose nests have been destroyed, are usually the first to moult (Smith, Craven, & Curtis 1999). Successful nesters begin to moult when the goslings are about two weeks old; both parents and young are able to fly at approximately the same time, 4-6 weeks later. Initially, they confine their movements to secluded areas near their nesting grounds. Later, they move to prime grazing areas where they can better address the high nutritional demands required for feather production, and to mudflats or riverbanks where they can find grit for digestion (Bellrose 1976; Howard Breen 1990; CWS 2010). As the young reach adult-size, the family may venture further and join other flocks. Near the end of the moulting season, the combination of warm temperatures, high quality food resources, and decreasing nutritional demands allow more time for loafing and preening (Winn

2001).

Although CWS (2010) delimited the moult period from mid-May to late July, and we defined a moulting season from June 1 to August 15, a few birds were flightless as late as August 22.

7.41 Moulnt Migration

Canada Geese that leave the nesting grounds and travel considerable distances to return to favoured moulting areas year after year are known as moult migrants. Both Arctic/sub-arctic and temperate-nesting Canada Geese populations may undertake moult migrations (cf. Sheaffer, Malecki, Swift, & Dunn 2004). Distances recorded have ranged from 40 km to more than 2,500 km (Dieter & Anderson 2009). Most moult migrants are believed to be juvenile, non-breeding Canada Geese (Salomonsen 1968; Sheaffer et al. 2004). However, some are unsuccessful nesters or pairs that have lost their broods to predation or gang broods (Sheaffer et al. 2007; Dieter & Anderson 2009). Moulnt migration tends to occur in June (Sheaffer et al. 2007).

Annette Lucas of Blonde Ambition Communications films Canada Geese loafing on the sandstone near Pearl's Rock in Craig Bay for the Guardians' video *Mitigating Impacts of [Locally] Overabundant Canada Geese*.



Management techniques that cause nest failure, such as egg addling, may induce moult migration (Sheaffer et al. 2007; Dieter & Anderson 2009), reducing pressure on local moulting habitat and perhaps exposing more birds to hunting, but potentially increasing nuisance populations in other areas. In a variety of studies of satellite-tracked Canada Geese

in the eastern U.S., up to 73% of females whose nests had been destroyed subsequently moult-migrated. However, nest-failed females from rural areas were more likely to moult migrate than their coastal counterparts; authors attributed this to an abundance of good quality moulting habitat in coastal near-urban landscapes (Sheaffer et al. 2007).



Moulting Canada Geese on Craig Bay near Rath Trevor Park, summer 2014

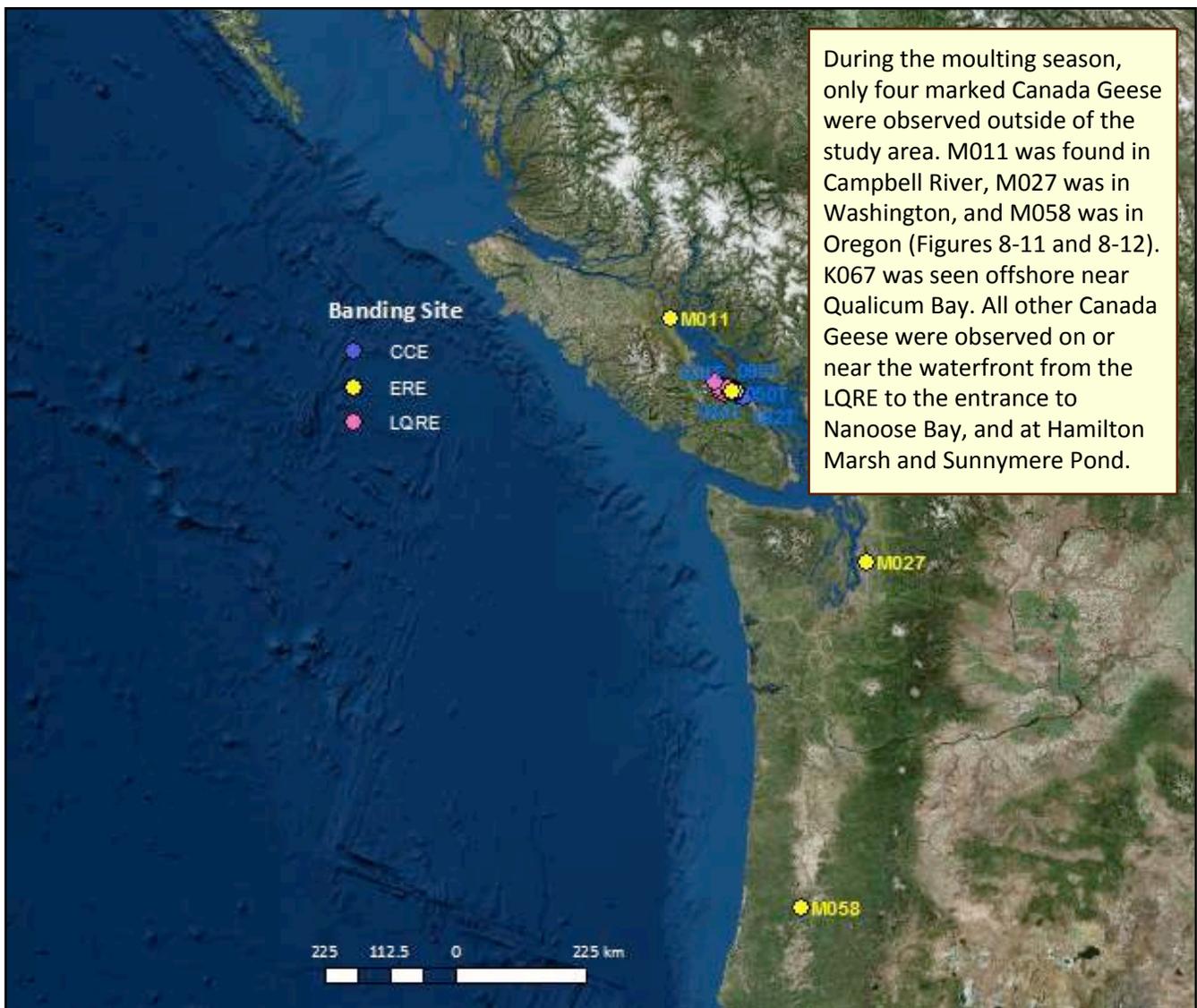


Figure 8-11. Moulting season (June/July) re-sights of marked Canada Geese, 2008-2014.



Most Canada Geese were distributed along the coastline during moult counts and routine population surveys over the moulting season (Figure 8-12 and 8-13). Geese were concentrated at the LQRE, along Qualicum Beach, at the French Creek estuary and shorelines north of the estuary, Parksville Bay east to Rath Trevor Beach, Craig Bay and nearby ponds, NBE, Sunnymere pond, and along the Snaw-naw-as First Nation reserve. Geese often congregated along the foreshore where there were freshwater flows (e.g., stormwater outfalls), presumably to drink.

Moulting geese at Craig Bay estates, June 11, 2014

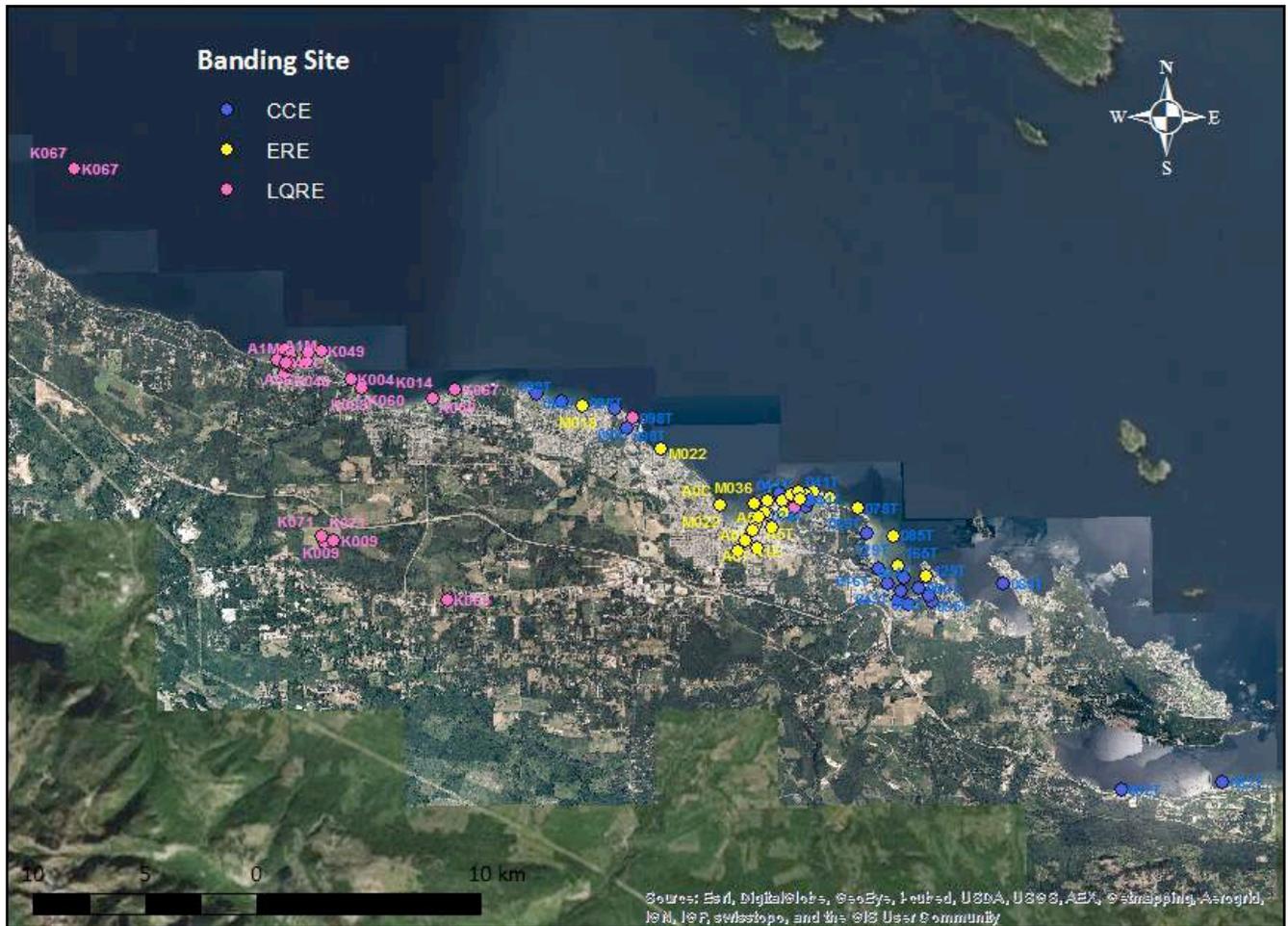


Figure 8-12. Moulting season (June/July) re-sights of marked Canada Geese, 2008-2014.

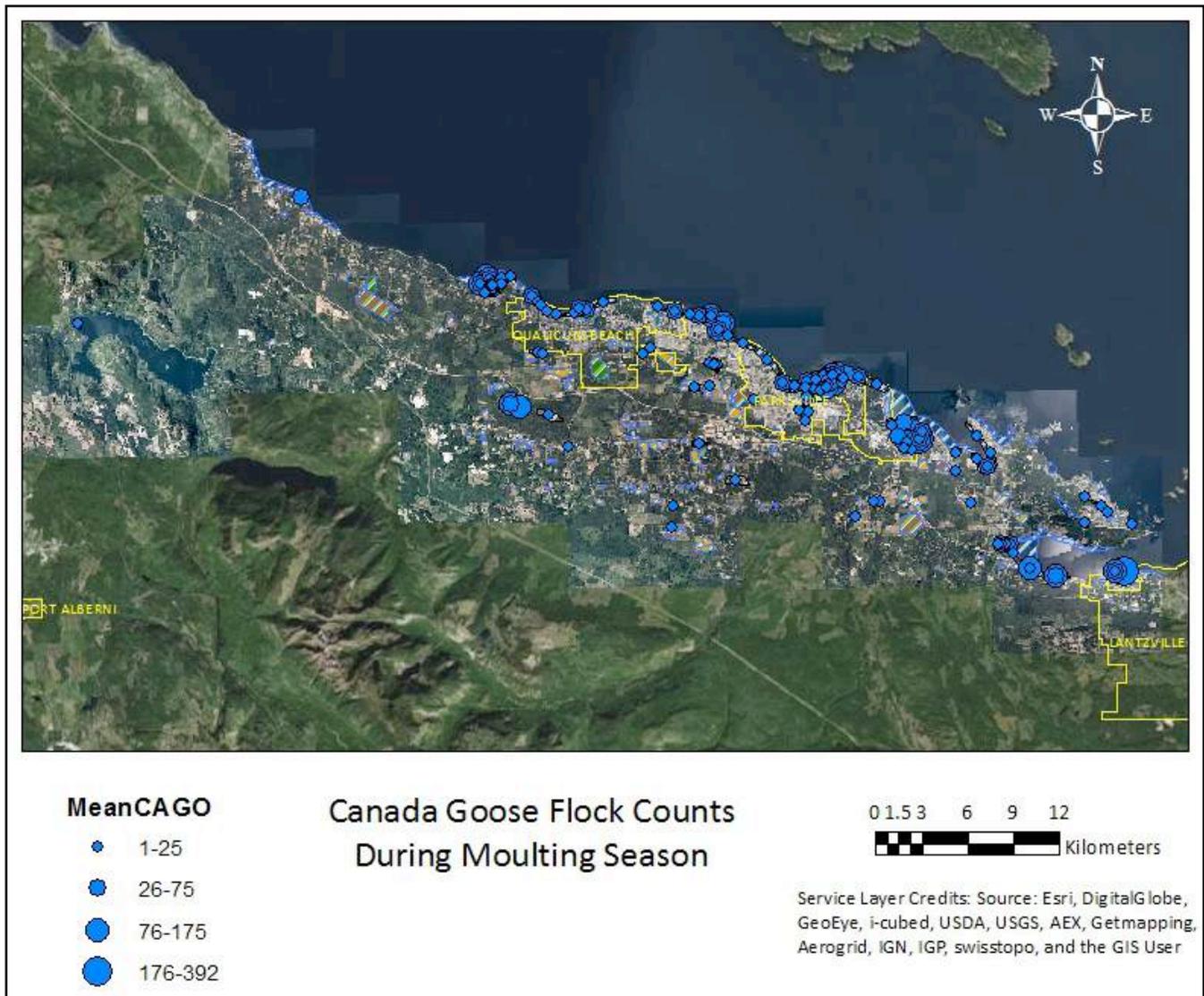


Figure 8-13. Canada Goose flock counts during the moulting season, weighted by the number of surveys (n=2,018).

In our study, 13 Canada Geese (4.4% of all marked Canada Geese, 6% of all Canada Geese assigned a migrant type) were assessed as moult in-migrants. (Moult in-migrants come to our region to moult, whereas moult-out migrants leave the region to moult.) Three were U.S. moult migrants; two of these were sighted in California in March, and the other was observed in Washington in

October, November, February, and May. Two were Vancouver Island moult migrants; one was seen in the Cowichan Valley in January, and the other was in Victoria in February. The others fit the definition of a moult migrant (i.e., present during at least 2 consecutive moult periods, not seen during nesting and in winter), but their whereabouts in other seasons were unknown. A 14th bird,

assigned a Vancouver Island migrant type, moulted in Campbell River in 2011. All are consistent with a body of literature that suggests **moult migrants typically migrate north to moult** (MoE 1979; Sheaffer et al. 2007).

Because most marked birds were captured during the moult, our data were heavily skewed to identifying in-migrants.

Annual moult counts found the greatest densities of Canada Geese were at the ERE, French Creek estuary, and LQRE (Figure 8-14). However, goose numbers (not considering the size of sites) were highest in the Craig Creek estuary/Craig Bay east area (Figure 8-15). A 2014 moult count that included Nanoose Bay east towards Lantzville boosted Canada Geese counts for Nanoose Bay sites.

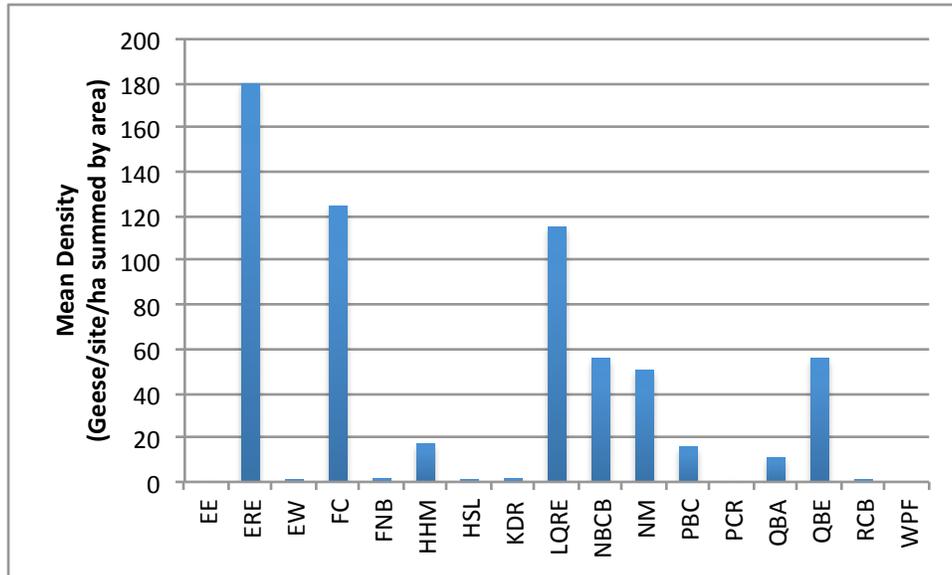


Figure 8-14. Canada Goose density (Canada Geese/site/ha summed by area) during the moult period, 2011-2014 (n=581 sites). FC=French Creek, NBCB=Northwest Bay/Craig Bay East. See Table 6-1 for other area descriptions.

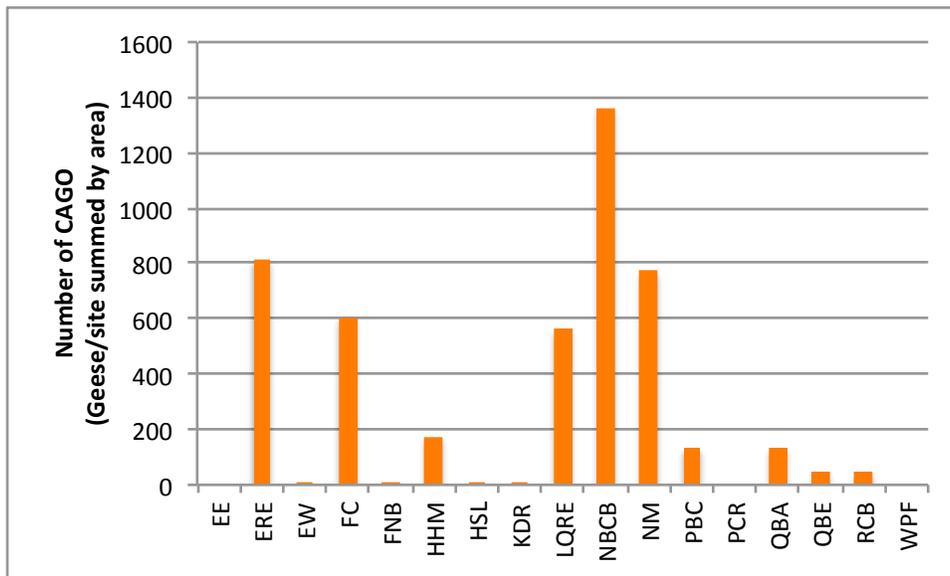


Figure 8-15. Mean Canada Geese counted during the moult period, 2011-2014 (n=581 sites). NM=Nanoose/Morello. See Figure 8-14 and Table 6-1 for other area descriptions.

During the moult, Canada Geese were found almost exclusively in estuarine, freshwater, and marine habitats (Figure 8-16). In marine and outer estuarine habitats, geese were either clustered or spread out over large areas; when goose numbers were tallied without consideration for density, totals were highest in these areas (Figure 8-17).

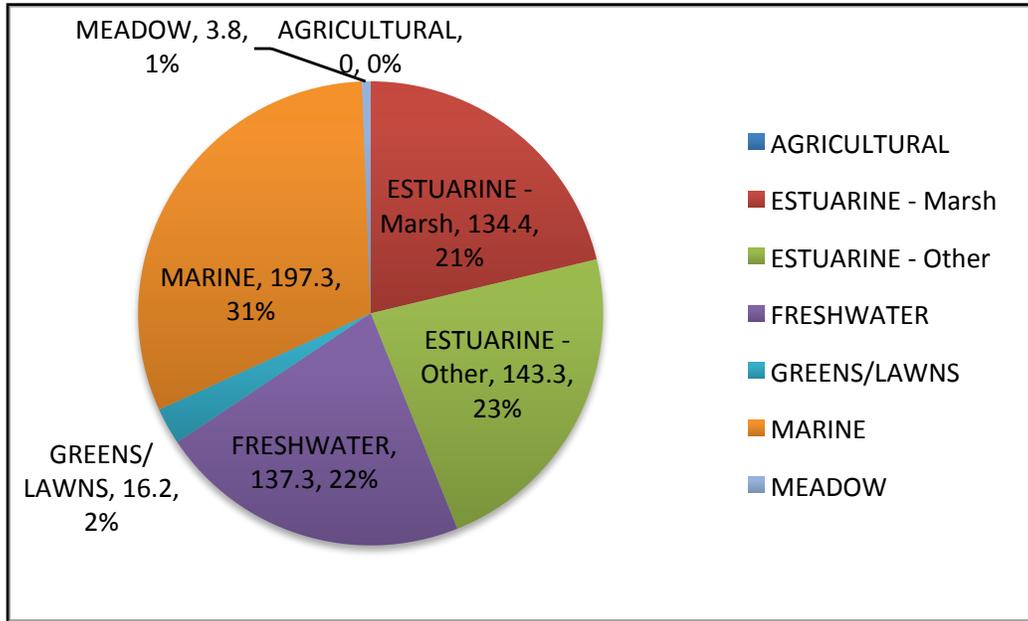


Figure 8-16. Canada Geese density during the moulting period, by habitat type, 2011-2014 (ha, %) (n=581). Area is in hectares (e.g., marine = 197.3 ha, 31% of total area used during the moult).

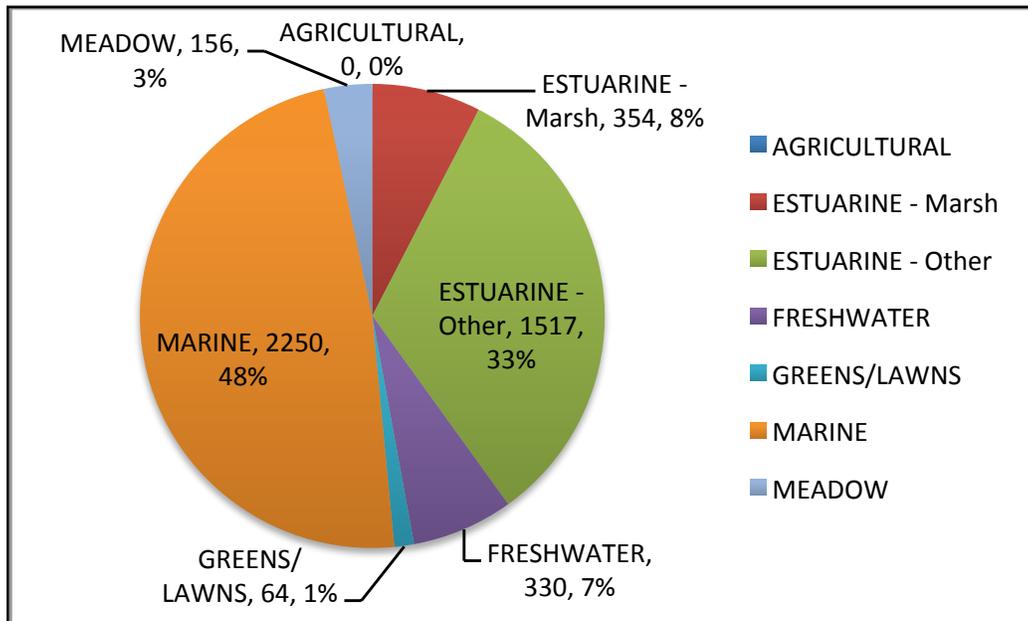


Figure 8-17. Canada Geese use of habitats during the moulting period, 2011-2014 (ha, %). (n=581).

8.5 Transition - Moulting to Autumn Migration

In August, many marked birds remained in their moulting areas (Figure 8-18). Although the second half of August is characterized as a migration period, only two marked birds were observed outside of the study area; 006T and 053T were spotted on the Saanich Peninsula. Most Canada Geese were mobile by this time, feeding beyond the moulting areas but returning to roost.



Canada Geese enjoying a leaking hose at a building site in Parkville, August 17, 2009



Figure 8-18. August re-sights of marked Canada Geese in the study area, 2008-2014

8.6 Autumn Migration

Autumn migration along coastal routes peaks in the first week of November and declines by the end of the month (Campbell et al. 1990). Most temperate-breeding geese do not migrate long distances, typically staying in the region or neighbouring regions (Smith, Craven, & Curtis 1999). If weather conditions are harsh or high quality food is unavailable, they will head south (CWS 2010).

Seven Canada Geese were found beyond Vancouver Island.

K021 was observed in *Alberta*; M027, M059 and M063 were seen in Oregon; M055 and M067 were found in Washington; and 028T was shot on the Lower Mainland (Figure 8-19).

On Vancouver Island, there were 9 Canada Geese observed or shot outside of the study area: K010 at Cowichan Bay; 048T and 071T near Saltspring Island; 001T and 088T at Chemainus; 067T at Gabriola Island; and K011, M007 and M045 in the Comox Valley.

Migratory geese are attracted to areas where local residents gather, and within a few days can have a startling impact on those habitats (Smith, Craven, & Curtis 1999). One survey respondent spoke of hosting 200 birds in the autumn, where there had been ~30 during the rest of the year.

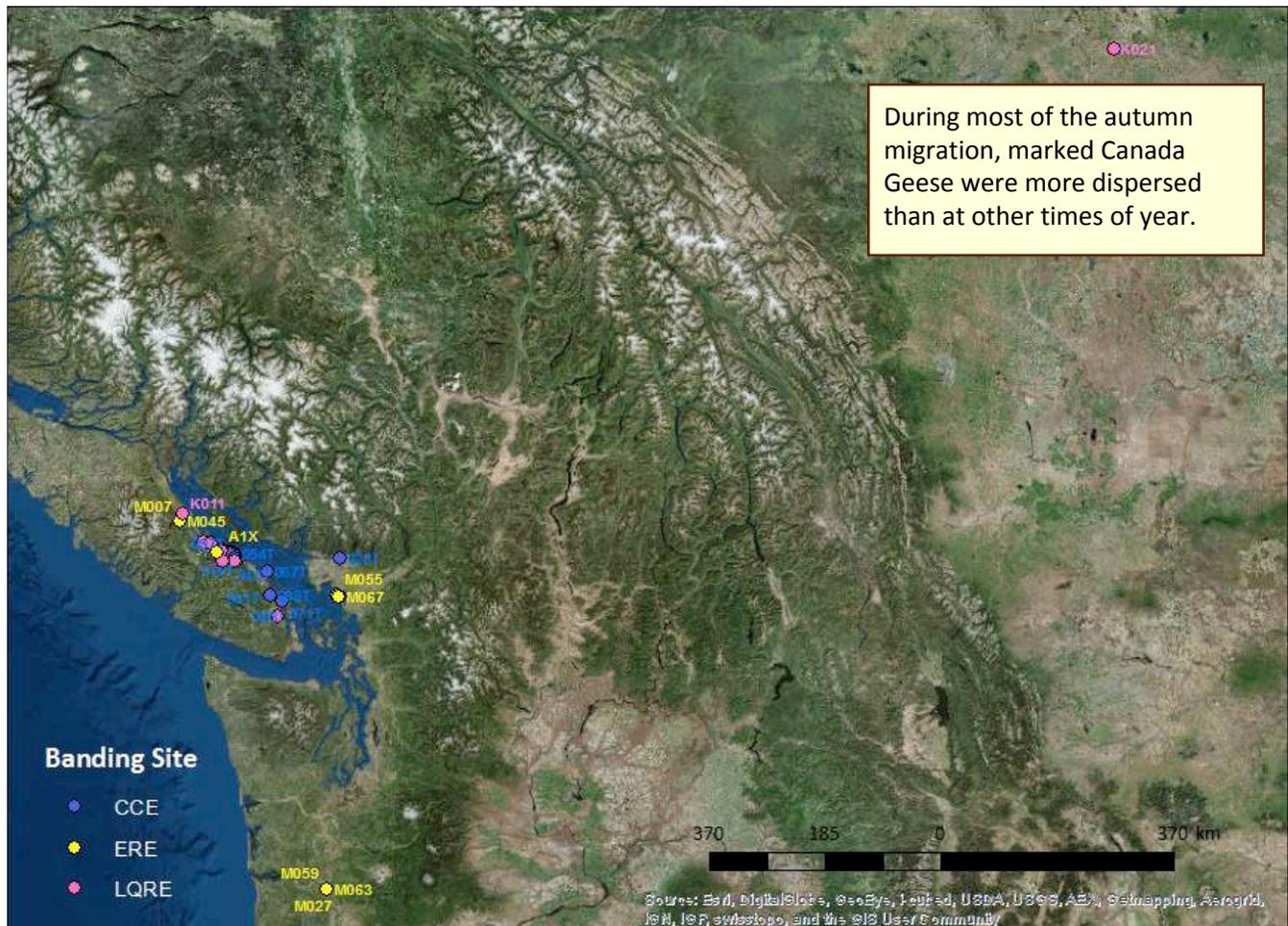


Figure 8-19. Autumn migration (September, October, November) re-sights of marked Canada Geese, 2008-2014.

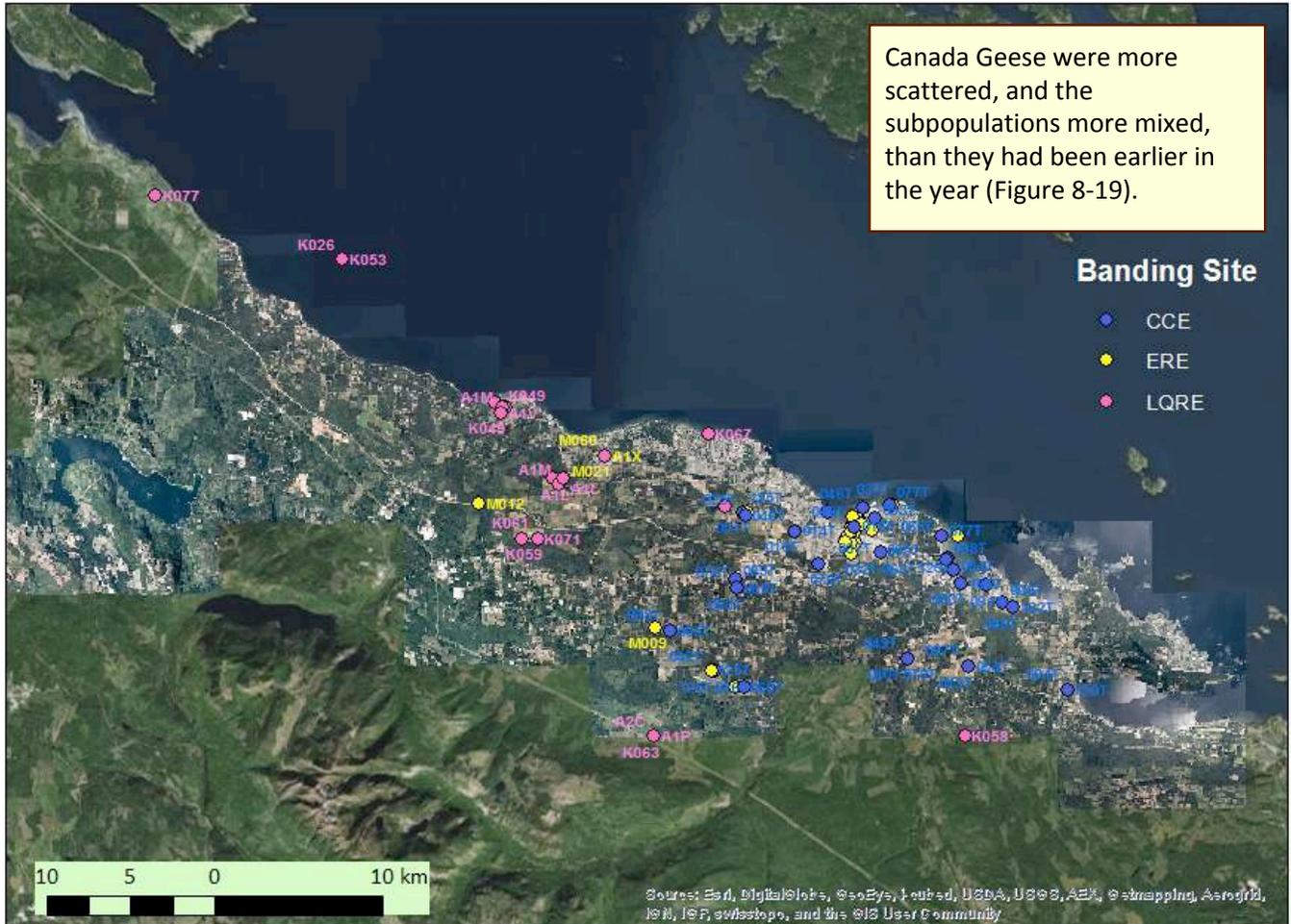


Figure 8-19. Autumn migration (September, October, November) re-sights of marked Canada Geese, 2008-2014.

Researchers in Prince Edward Island found no evidence of the regular daily movements observed during the spring. Instead, autumn movements were determined by hunting pressure, weather, and agricultural activities. Geese foraged primarily on tidal flats once fields were cultivated, and during the hunting season, many geese loafed and fed in areas inaccessible to hunting (Martin & Guignon 1983).

Quebec researchers found that the movements of radio-collared local resident geese

were restricted to smaller areas once northern migrants arrived (Beaumont et al. 2013).

Some geese, particularly those accompanying juveniles, moved into areas with little or no hunting pressure *several weeks before* hunting season began in September (Beaumont et al. 2013). The effect of hunting on Canada Goose movement is further discussed in Chapter 12.12, Hunting.

Migrants are generally more wary and easily startled, and so may be differentiated from more

resident birds at this time of year (cf. Smith, Craven, & Curtis 1999).



Canada Geese drinking from a puddle in a Parksville parking lot, September 28, 2015

Canada Geese were as widely distributed in the autumn as they had been in spring (Figure 8-20). The large flocks observed at the French Creek and Craig Creek estuaries in spring were comparatively smaller in the fall. In autumn, the greatest concentrations of geese were on agricultural lands in Nanoose Bay, Errington, and Hilliers.



Canada Geese grazing in a Nanoose Bay farm field, September 28, 2015

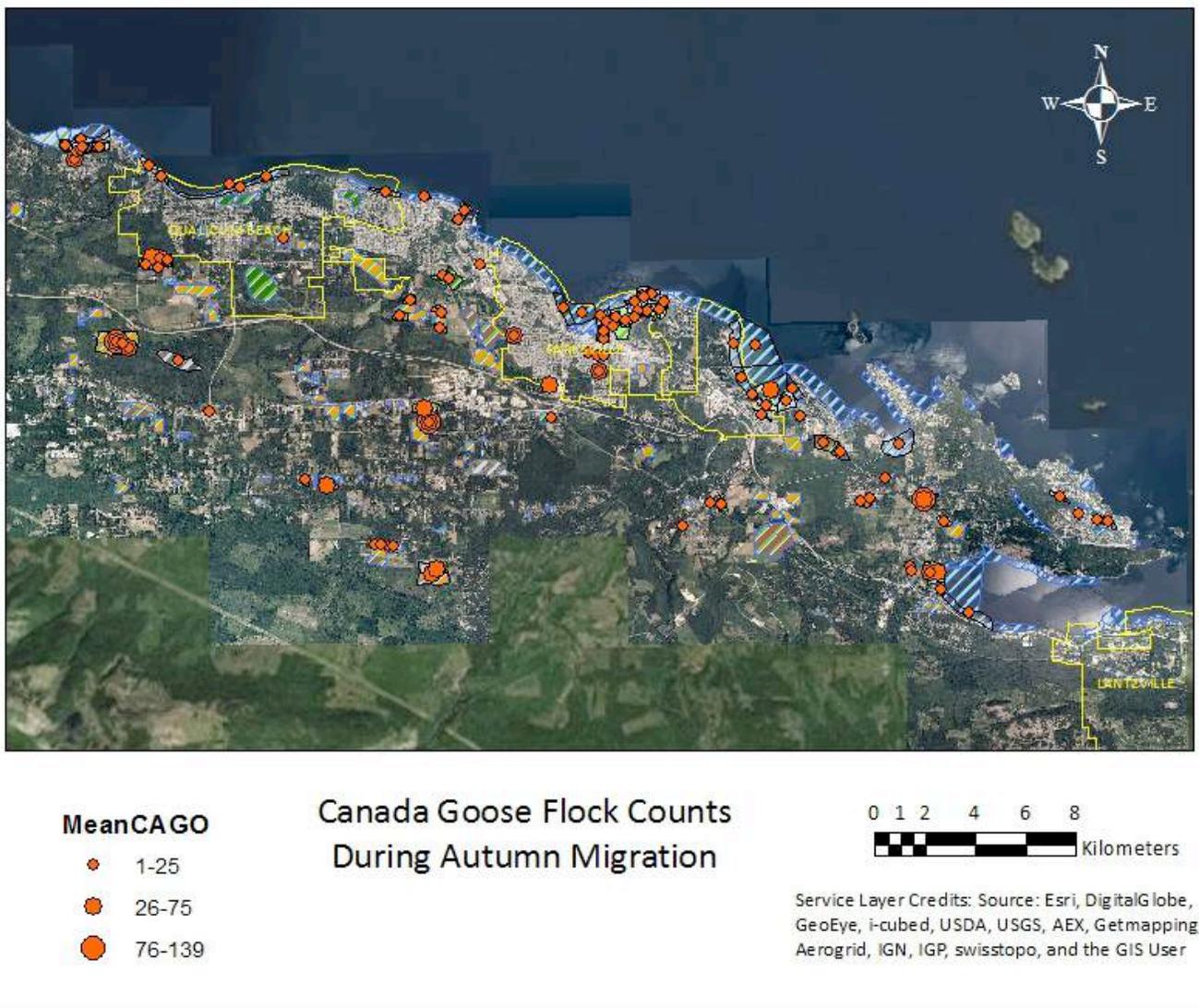


Figure 8-20. Canada Goose flock counts during autumn migration, weighted by the number of surveys (n=827).



Canada Geese were dispersed over the rarely flooded high marsh of the Craig Creek estuary, as well as the mid-marsh and low marsh at 1:43 p.m., November 13, 2014.

8.61 A Cold Day in November

In mid-November, 2014, more than 100 Canada Geese were loafing each afternoon at the Craig Creek Estuary. A cold snap lasting several days began on November 13th; the weather station at Springwood Middle School reported a low of -3.4 degrees Celsius that night. To assess how geese used the partly frozen estuary during a period when there was ice on freshwater sources and hunting was open (hunters had been on a nearby farm on November 14th), we surveyed the estuary every two hours from 1 p.m., November 16th to dusk, and from dawn, November 17th to 1 p.m.

November 16

1:00 p.m. Temperature 5 degrees C., mainly sunny, estuary partly frozen. Twenty-two geese were on Craig Bay, offshore from Pearl's Rock at Pacific Shores Nature Resort.

3:00 p.m. Temperature 4 degrees C., sunny and clear. No geese.

4:15 p.m. A resident of Craig Bay estates observed 141 geese, including 7 collared geese, on the south shore of the Three Bridges Pond. Two of the collared birds were moult-winter migrants, three were local residents plus, and two were local residents. He noted that the birds had been using the ponds and neighbouring grassy areas for the last four days. They generally left the ponds at ~4:30 p.m., returning ~8:30 a.m. each day.

4:35 p.m. Dusk

4:56 p.m. Temperature 1 degree C., nearly dark. From 4:56 to 5:15, geese flew into the estuary in

small flocks (7, 54, 27, 3, 23, 2, and 12 birds), a total of 138 in 7 groups.

November 17

7:00 a.m. Temperature -3 degrees C., sunny and clear, estuary partly frozen, upper marsh has thick frost. A total of 122 geese were mostly clustered at the entrance to Craig Bay (near Pearl's Rock).

7:30 a.m. dawn

7:15 to 8:17 a.m. Geese left in small flocks, 21, 3, 18, 10, 4, 1, 23, and 22 geese flew towards the direction of Craig Bay estates, 12 geese flew through the estuary towards Springford's farm, 3 more geese flew towards Craig Bay estates. Ten of the birds that had flown were collared. Five geese remained.

9:00 a.m. Temperature 0 degrees C., sunny and clear. No geese.

11:00 a.m. Temperature 5 degrees C., sunny and clear. No geese.

1:00 p.m. Temperature 5 degrees C., mainly sunny. No geese.

These observations provided several insights:

1) In autumn, fertilized, green lawns and fields were preferred feeding areas, as the quality of food in the estuary deteriorated. Yet, the estuary was favoured for loafing and especially roosting, regardless of icy conditions. (In past years, as cold snaps progressed and ice spread down the estuary, we found geese moved with the ice sheet, clustering just beyond the covered areas on open water.)

2) Hunting pushed the geese into non-huntable areas. It is

November 2014 was cold. The temperature at the Springwood Middle School weather station in Parksville was -6.3 degrees Celsius on November 30, 2014, the coldest November day since the station was installed in 2006. Minimum temperatures from November 12-18 ranged from -1.1 to -3.4 degrees, and from November 29-30 they ranged from -1.6 to -6.3. The mean monthly minimum was 2.5, and the daily average was only 5.8 degrees Celsius (Victoriaweather.ca 2015).



Fifty-five Canada Geese were counted at Craig Bay estates ponds, at 9:39 a.m., November 17, 2014. Photo by Mike Ingledew.

notable that moult-winter migrants were present, ahead of the overwintering period (December - January); if not for the cold weather, this might suggest that both the late November counts from 1989 to 2005, and the January winter counts thereafter, were indicative of overwintering populations.

3) Importantly, the exercise provided evidence that **the predominance of daytime surveys grossly underestimated the presence of Canada Geese in our estuaries.**

8.7 Overwintering

In winter, estuaries are preferred roosting sites. Geese will undergo daily excursions to feeding areas, such as farm fields and urban grassy areas (cf. Campbell et al. 1990). They generally make two foraging trips each day from their roosting sites, one shortly after sunrise and the other later in the afternoon, depending on temperature and light intensity (USFWS 2002). Flocks may forage up to 48 km

away from their roosting sites (Granholt 1988).

Ray (2011), who observed marked geese in Phoenix, Arizona, found she could differentiate migrants from local residents by their early morning behaviour; migrants left the overnight roosts at first light for daytime feeding sites, while residents began grazing after sunrise or continued to rest.

Warmer conditions may cause migrants to winter further north than usual (Hestbeck, Nichols, & Malecki 1991; Böhning-Gaese & Lemoine 2004). Despite known fidelity to overwintering sites, Canada Geese have been vacating southern wintering areas in favour of northern ones for decades (Reeves et al. 1968 in Hestbeck, Nichols, & Malecki 1999; USFWS 2002). With climate change, this trend is expected to continue.



Canada Geese roosting/resting with Mallards, scaup, and other waterfowl at the mouth of Craig Creek. Much of the estuary was frozen, early February, 2014

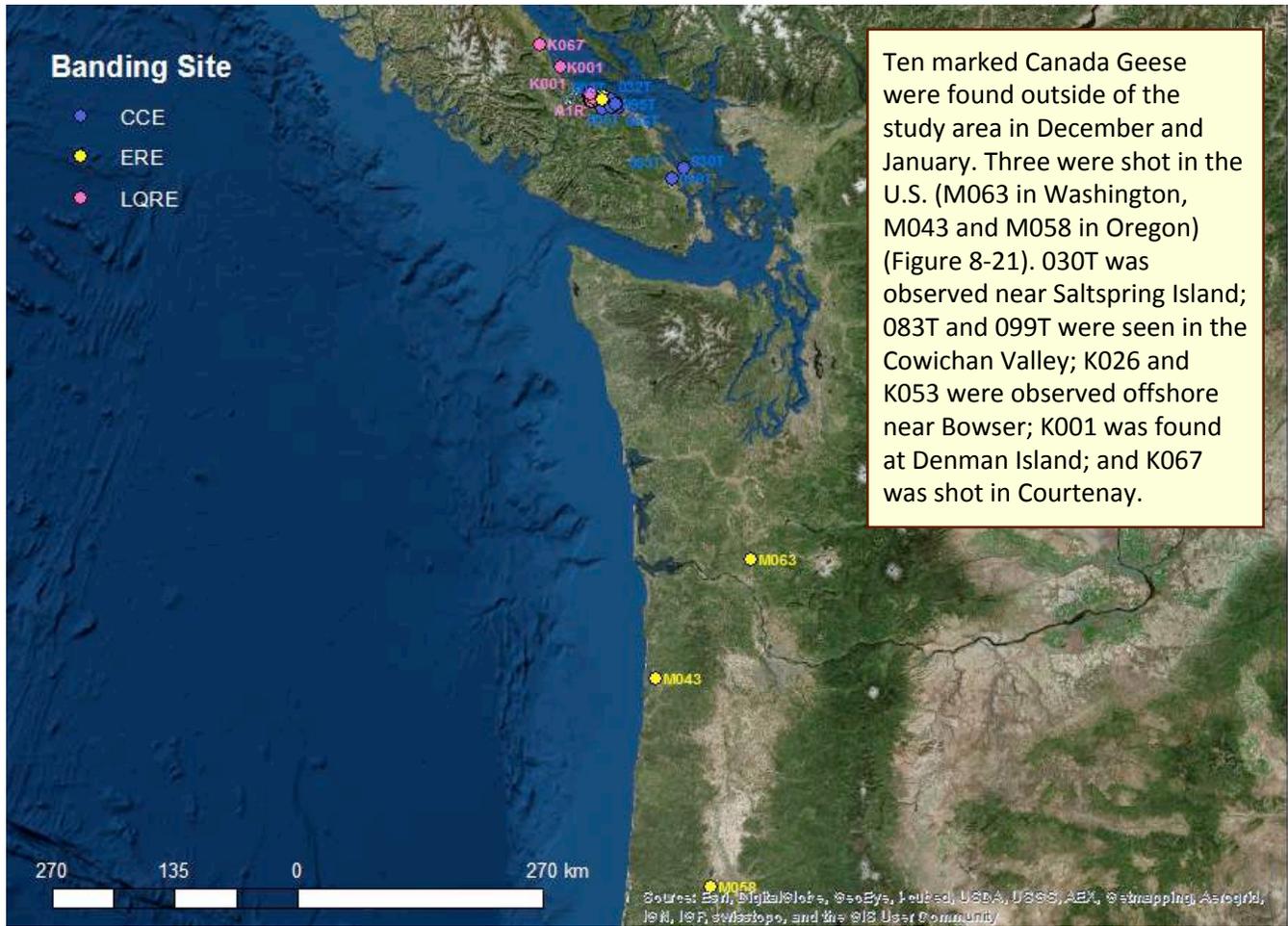


Figure 8-21. Overwintering (December, January) re-sights of marked Canada Geese, 2008-2014.



Canada Geese in the frozen Craig Creek estuary, January 8, 2005

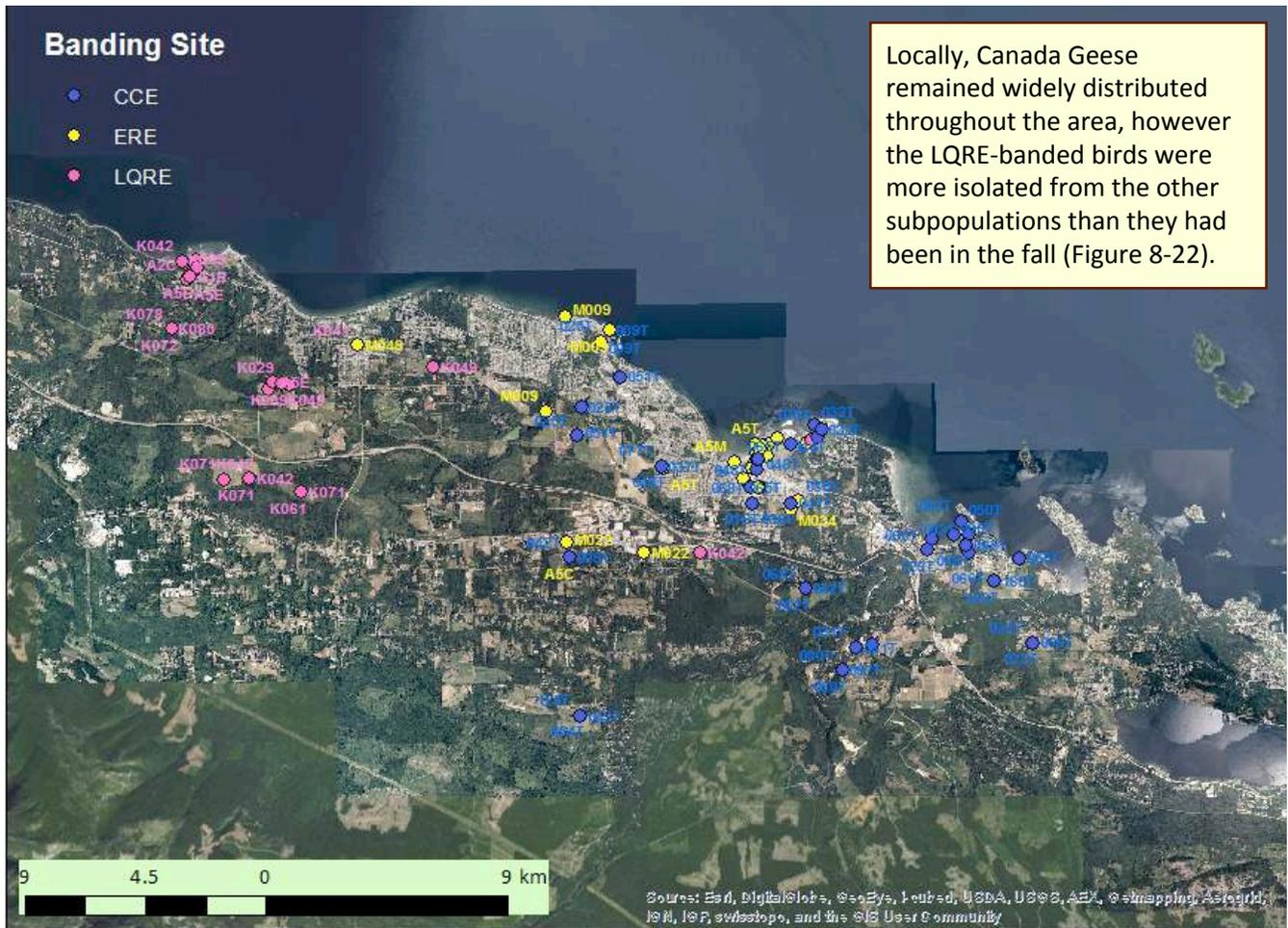


Figure 8-22. Overwintering (December, January) re-sights of marked Canada Geese in the study area, 2008-2014.



Canada Geese in the Craig Creek estuary, January 8, 2005

Population surveys and annual winter counts found large flocks at the Big Qualicum River estuary, LQRE, CCE, and NBE; smaller flocks occurred at the French Creek estuary, and there were many small flocks at the ERE (Figure 8-23). At the same time, large flocks of Canada Geese were using agricultural fields in Qualicum Bay, Qualicum Beach, French Creek, Errington, Hilliers, and Nanoose Bay. Smaller flocks were distributed over other farm fields, sports fields, golf courses, and other sites.



Canada Geese roosting/resting with Mallards, scaup, and other waterfowl at the mouth of Craig Creek. Much of the estuary was frozen, early February, 2014

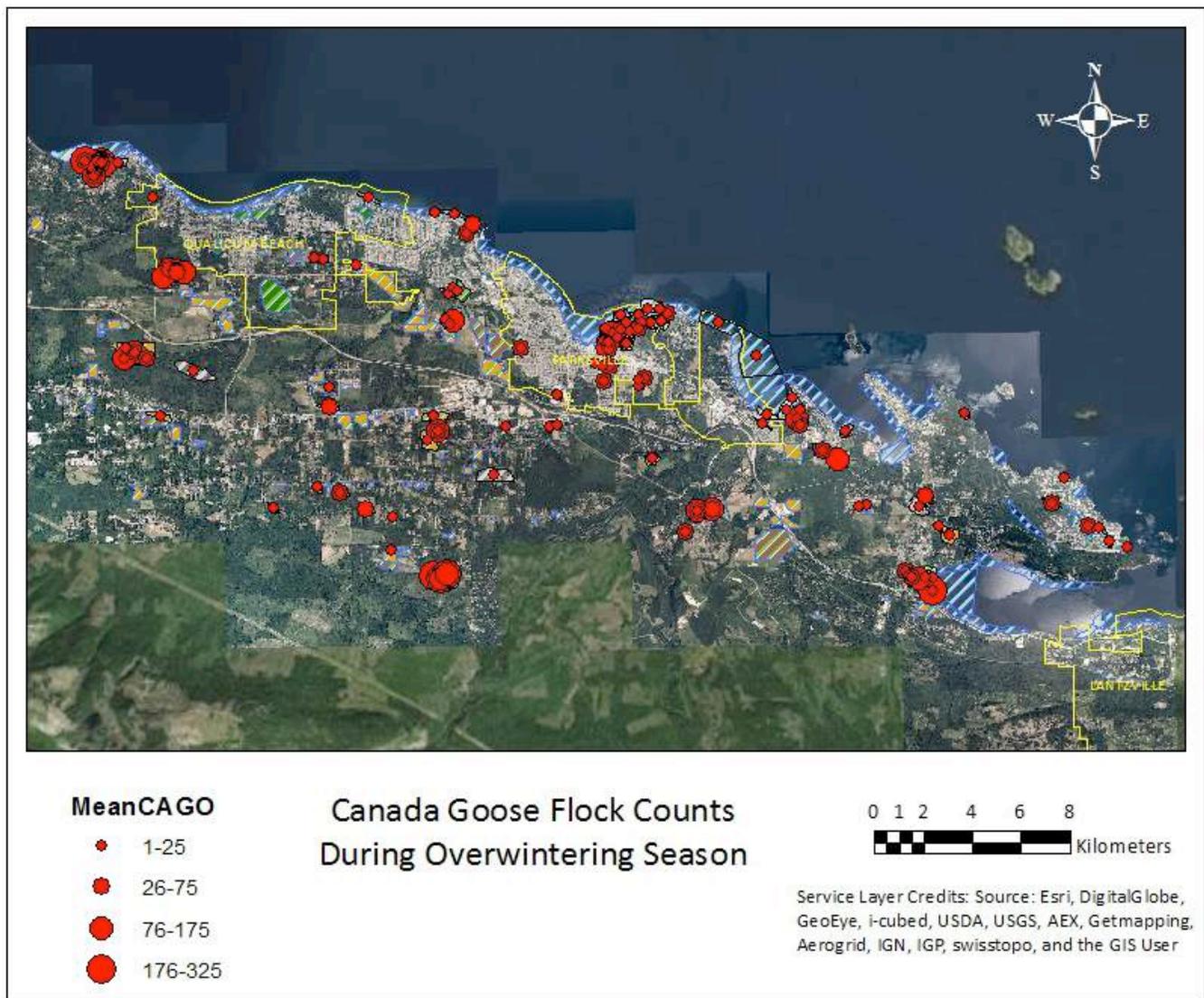


Figure 8-23. Canada Goose flock counts during the overwintering season, weighted by the number of surveys (n=1,757).

Winter counts revealed high densities of geese in Nanoose Bay (Figure 8-24), and high numbers of Canada Geese in agricultural areas throughout the region (Figure 8-25).

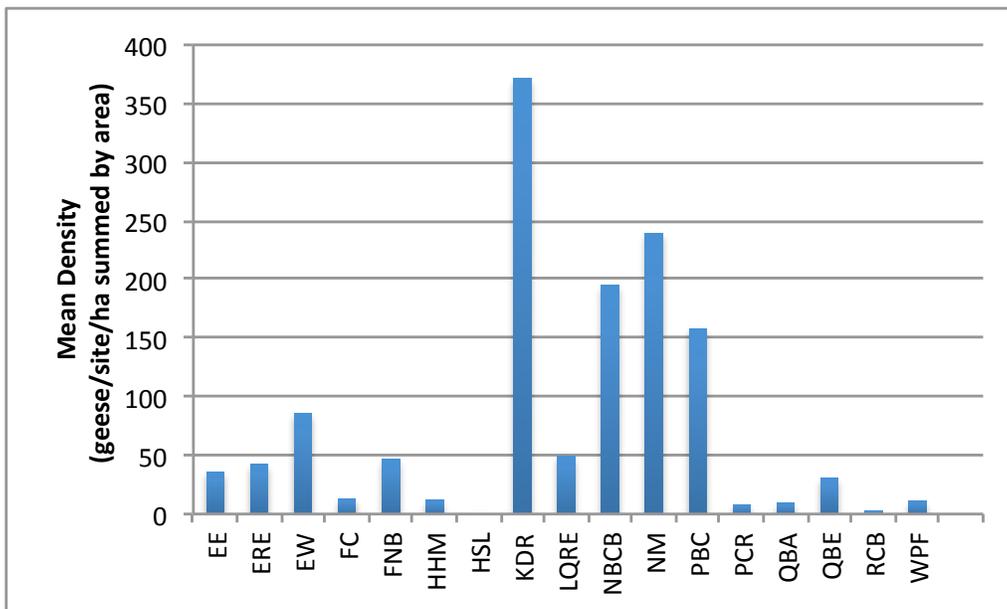


Figure 8-24. Canada Goose density during the overwintering season, 2012-2014 (Canada Geese/site/ha summed by area)(n=651 sites). KDR=Kaye Road/Dawson Road, NBCB=Northwest Bay/Craig Bay East, NM=Nanoose/Morello, PBC=Parksville Bay/City. See Table 5-1 for other area descriptions.

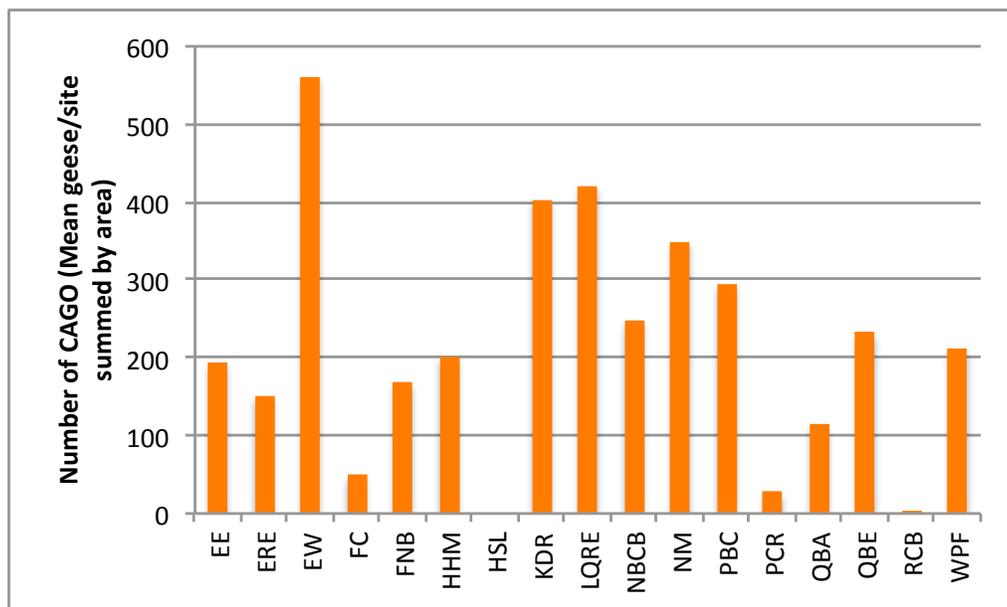


Figure 8-25. Canada Geese counted during the overwintering season, 2012-2014 (n=651 sites). EW=Errington West. See Figure 8-24 and Table 6-1 for other area descriptions.

Meadows and greens/lawns associated with freshwater were important overwintering sites (Figures 8-26 and 8-27). Marine sites were used far less in the winter than in other seasons.

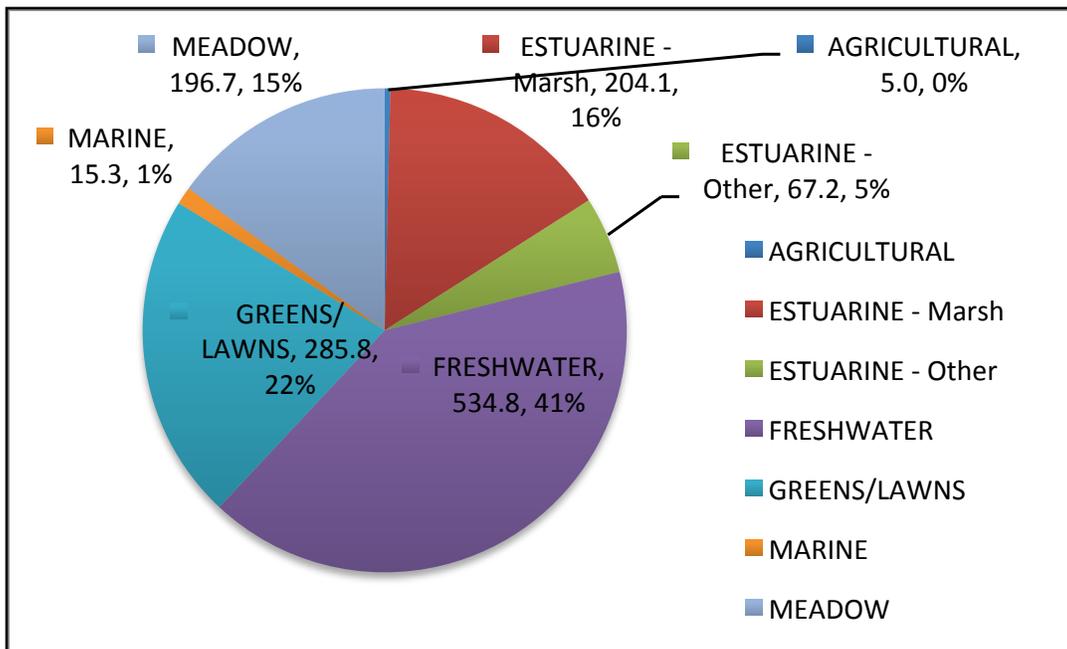


Figure 8-26. Canada Geese density during the overwintering season, by habitat type, 2012-2014 (ha, %)(n=651). Area is in hectares (e.g., marine = 15.3 ha, 1% of total area used during the overwintering period).

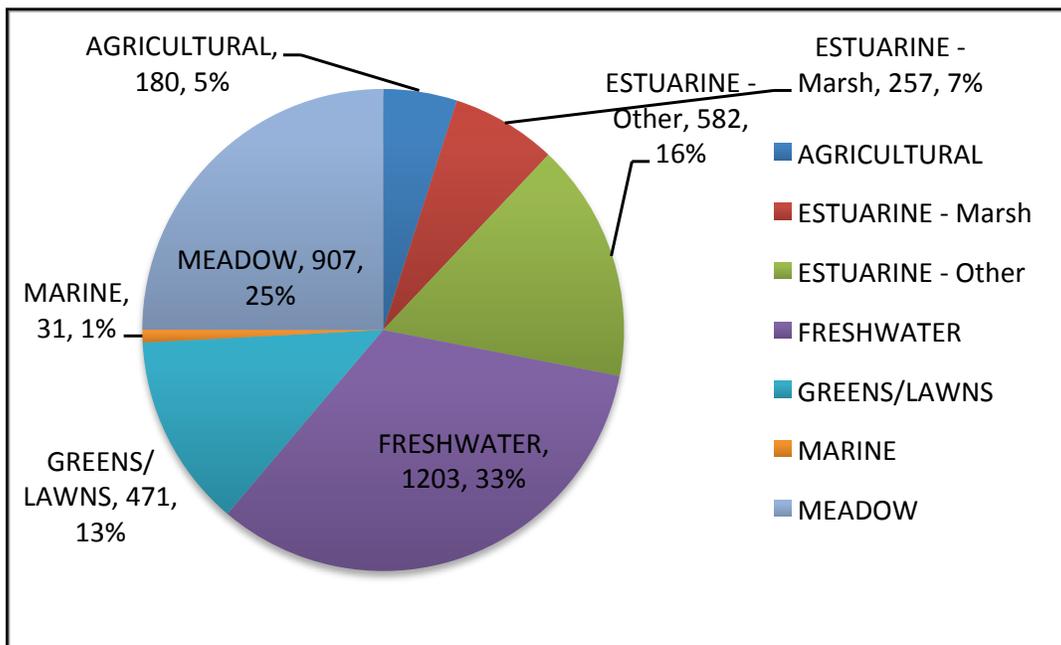


Figure 8-27. Canada Geese use of habitats during the overwintering season, 2012-2014 (n=651).