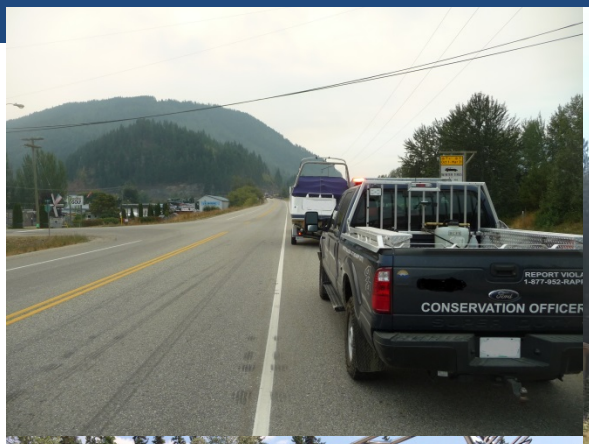
B.C. Invasive Mussel Defence Program: 2017 Final Report



BRITISH COLUMBIA | Ministry of Environment and Climate Change Strategy

Prepared by: Ecosystems Branch
B.C. Ministry of Environment and Climate Change Strategy

June 2018

ACKNOWLEDGEMENTS

The Watercraft Inspection Program (the Program) was funded by BC Hydro, Columbia Basin Trust, Columbia Power Cooperation, Fortis BC, and the Province of BC. The East Kootenay Invasive Species Society and the Columbia Shuswap Regional District generously loaned pressure washers that were used by the Program to decontaminate watercraft. The report was completed by the Ecosystems Branch, BC Ministry of Environment and Climate Change Strategy (June 2018).

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GLOSSARY

Acronym	Definition
AGR	Ministry of Agriculture
AIS	aquatic invasive species
BISS	Boundary Invasive Species Society
CAS	Controlled Alien Species Regulation
CBSA	Canada Border Services Agency
CBT	Columbia Basin Trust
CDD	Clean, Drain, Dry
CLSS	Christina Lake Stewardship Society
CO	Conservation Officer
COS	Conservation Officer Service
CSISS	Columbia Shuswap Invasive Species Society
DFO	Fisheries and Oceans Canada
EKISS	Eastern Kootenay Invasive Species Society
ENV	Ministry of Environment and Climate Change Strategy
FLNR	Ministry of Forests, Lands and Natural Resource Operations and Rural Development
IMISWG	Inter-Ministry Invasive Species Working Group
MOTI	Ministry of Transportation and Infrastructure
NAD	North American datum
NWIPC	Northwest Invasive Plant Council
OASISS	Okanagan and Similkameen Invasive Species Society
RAPP	Report All Poachers and Polluters; refers to a toll free number used to report suspected poachers, polluters, or other infractions of the *Wildlife Act*.
RCMP	Royal Canadian Mounted Police
ZQM	Zebra and Quagga mussels

Term	Definition
High-risk watercraft	Any watercraft or piece of equipment that was in any province or U.S. state known or suspected of having ZQM in the past 30 days.

EXECUTIVE SUMMARY

For the 2017 season 35,500 watercraft were inspected between April and November across the ten provincial watercraft inspection stations. The crews had approximately 73,000 interactions with the public to promote Clean, Drain, Dry and raise awareness about Aquatic Invasive Species. Of the total watercraft inspected, 2,071 were identified as high risk, 286 Decontamination Orders were issued, and 200 watercraft were issued quarantine periods to meet the required 30-day drying time.

A significant operational change from the 2016 to 2017 season was the addition of Montana and Saskatchewan as high risk jurisdictions under Schedule 5 of the Controlled Alien Species Regulation. This resulted in increased numbers of high risk boats being intercepted at the inspection stations with 41% (842 boats) of the high risk boats coming from Montana and Saskatchewan.

Of the more than 35,500 watercraft inspected, 25 were confirmed to have adult invasive mussels. These came from Ontario (14), Quebec (2), Michigan (2), Texas (2), New York (2) Arizona (1), Ohio (1), and Illinois (1), and were destined for the Lower Mainland (11), Okanagan (7), Vancouver Island (4), Kootenays (1), Thompson-Nicola (1) and Alaska (1). The Program received advanced notification on 20 of the 25 mussel fouled boats either from another jurisdiction (e.g., AB, MT, Idaho, WA) or by Canada Border Services Agency (CBSA). For two of the boats the owners actually contacted the Program in advance to arrange for inspection when they arrived in BC.

Of the boaters whose watercraft were inspected, approximately 63% had previous knowledge of Clean, Drain, Dry and/or aquatic invasive species. Average compliance at the inspection stations for the 2017 season was 77%. Of the watercraft that failed to stop at the inspection station, 76% were non-motorized watercraft such as canoes, kayaks, and paddleboards which pose a much lower risk than motorized watercraft.

For the 2017 season, 59 tickets and 86 warnings were issued by Conservation Officers to motorists for failing to stop at inspection stations. Watercraft operators who fail to stop at an inspection station are being reported to the Report All Poachers and Polluters (RAPP) hotline and full time Conservation Officers are responding and following up.

1. BACKGROUND

1.1 HISTORY

The presence of Zebra and Quagga mussels can result in substantial economic, environmental, and social impacts. These impacts include increased maintenance costs to infrastructure such as hydropower, water-works, irrigation, and degradation of native ecosystems, thereby affecting fisheries, recreation, and tourism. Unlike BC's native mussels, Zebra and Quagga mussels (ZQM) attach to hard surfaces, allowing them to be moved between water bodies by boats and equipment. While not present in BC, ZQM could survive in BC freshwater systems if introduced and cause devastating impacts to BC's lakes and streams.

The introduction of these two aquatic invasive species (AIS) could lead to serious impacts on our native salmon populations, and could affect the viability of important commercial, recreational, and Aboriginal fisheries. A recent review of economic impacts attributed to Zebra mussels in the eastern U.S. between 1989 to 2004 estimated expenditures of US$268 million for affected drinking water and power plant facilities. An economic risk assessment specific to BC estimates annual costs of C$43 million if ZQM are introduced to BC This assessment does not include impacts to fisheries or property values.

In March 2015, the pilot season of the provincial Invasive Mussel Defence Program (the Program) was launched through funding provided by the Ministry of Forests, Lands and Natural Resource Operations and Rural Development (FLNR), Ministry of Agriculture (AGR), BC Hydro, the Columbia Basin Trust and in-kind funding from Ministry of Environment and Climate Change Strategy (ENV). The pilot season included six mobile decontamination units, 12 trained auxiliary Conservation Officers (inspectors), lake monitoring for ZQM, and "Clean, Drain, Dry" education and outreach activities.

In 2016, the program expanded to 32 inspectors staffed at eight watercraft inspection stations strategically situated along eastern and southern border locations to target boaters entering BC This expansion was funded through partnerships with BC Hydro, Columbia Power Corporation, Fortis BC, and Columbia Basin Trust.

For the 2017 season, Program operations commenced in March with 32 inspectors staffed at eight watercraft inspection stations. On March 30, 2017 it was announced that the program was expanding from 32 inspectors to 65 inspectors. The expanded operations included two new stations, bringing the total to ten inspections stations. The hours of operation were extended to dawn to dusk for nine of the stations, and the province's busiest station at Golden was operational 24 hrs per day. The two new stations and expanded hours of operation started in mid-June and all stations were operational until mid-November. This document reports on the logistics, activities, and findings of the 2017 season of the Program for the operational period of March to November 2017.

1.2 REGULATORY AND JURISDICTIONAL FRAMEWORK

The Program is designed to prevent the spread of ZQM by intercepting and inspecting watercraft travelling into or through BC

The Program consists of three main components:

- **A watercraft inspection program** to detect and respond to high-risk watercraft potentially transporting ZQM in BC;
- **Lake monitoring** to assess for the continued absence of ZQM in BC waters; and
- **Outreach and education** to promote the message of CLEAN, DRAIN, DRY to the boating community, in collaboration with the Invasive Species Council of BC and regional invasive species committees.

Program success depends on:

- Multi-agency collaboration (within BC) for the delivery of program operations;
- Cross-jurisdictional collaboration to coordinate inspection locations, training, policy and procedures, lake monitoring, and immediate notification of high-risk boats; and
- Stakeholder engagement to work collaboratively with the boating industry to prevent the introduction of ZQM into the Province of BC

Provincial legislation gives the Province authority to take action on ZQM. The Controlled Alien Species (CAS) Regulation under the *Wildlife Act* is the principle legislation that defines, lists, and affords provisions to regulate invasive mussels in BC Under the CAS Regulation, prohibitions apply in relation to any mussel listed in Schedule 4 (Zebra, Quagga, and Conrad's False Mussel). Specifically, it is illegal for a person to:

- possess, breed, ship, or transport prohibited mussels;
- release prohibited mussels into BC waters; or
- allow a prohibited mussel to be released or escape into BC waters.

Inspectors are trained to deliver the watercraft inspection program and have been designated as Auxiliary Conservation Officers under the *Wildlife Act.* This designation provides powers to intercept/stop, inspect, question, obtain information, and issue decontamination orders. See the *Zebra and Quagga Mussel Early Detection and Rapid Response (ZQM EDRR) Plan* for more information on the CAS Regulation as it pertains to ZQM (available at www.gov.bc.ca/invasive-species).

In February 2017, following the detection of invasive mussel veligers in Tiber Reservoir, MT in fall 2016, Schedule 5 of the CAS was amended to include Montana as a contaminated U.S. state. This enabled inspectors to issue decontamination orders and quarantine periods for watercraft coming from Montana for the 2017 season. Saskatchewan was also added to Schedule 5 of the CAS as a contaminated province. While there are no confirmed detections of ZQM in Saskatchewan, invasive mussels were detected in Cedar Lake, MB which flows directly into Saskatchewan waters. Due to the direct connectivity with infested waters in Manitoba, all watercraft coming from Saskatchewan were treated as high-risk during the 2017 season.

In June 2015, the Aquatic Invasive Species Regulation, under the Federal *Fisheries Act,* was brought into force. This regulation prohibits the import and transportation of ZQM in the western provinces, and

empowers Canada Border Services Agency (CBSA) staff to detain high risk boats at the Canada/U.S. border.

1.3 CONSERVATION OFFICER SERVICE

The partnership with the Conservation Officer Service (COS) since the Program started in 2015 has been critical to the successful delivery of the Program. The COS has been a foundational partner, helping with many of the major program delivery pieces including hiring, training, and working alongside full-time Conservation Officers.

Through the three years of Program operations, procedures have quickly evolved to streamline delivery of decontamination and quarantine orders by inspectors, as well as violation and warning tickets by full time Conservation Officers.

1.4 JURISDICTIONAL COORDINATION

Ongoing coordination with other jurisdictions in Canada and the U.S. has been critical for the overall success of the Program. Outside of BC, the Program shares research, procedures, and notifications of high-risk boats with Idaho, Montana, Washington, Oregon, Wyoming, Nevada, Arizona, California, Alaska, Yukon, Saskatchewan, Manitoba, and Alberta. This is part of BC's ongoing commitment as a signatory to the trans-boundary *Columbia River Basin Inter-agency Invasive Species Response Plan: Zebra Mussels and Other Dreissenid Species* (available for download here). As a signatory, BC receives notifications of high-risk watercraft from neighbouring states, and is provided access to professional advice on risk management and training opportunities.

BC is also a member of the Western Regional AIS Panel and an active participant in the Pacific Northwest Economic Region (PNWER) invasive species working group. In late 2015, the *Inter-Provincial-Territorial Agreement for Coordinated Regional Defense Against Invasive Species* was signed by British Columbia, Yukon, Alberta, Saskatchewan, and Manitoba. One of the primary objectives under this agreement is to develop and address shared priorities for invasive mussel prevention and rapid response.

2. PROGRAM LOGISTICS

2.1 OPERATIONS

In 2017, Program operations were administered by the BC Ministry of Environment and Climate Change Strategy (ENV). The Program supervisor, Program coordinator, and auxiliary inspectors were staffed through the Ecosystems Branch of ENV. A sergeant with the COS served as COS Coordinator for the program and AIS K9 handler, and also assisted with hiring, training, communications, and Program implementation.

Hours of Operation

A total of eight inspection crews comprising 32 inspectors were operational in late March 2017. Following the announcement of the Program's expansion, two additional inspection stations and 35 additional inspectors became operational on June 12 2017. All of the watercraft inspection stations were staffed with trained auxiliary Conservation Officers (CO) equipped with mobile mussel decontamination units. Eight of the inspection stations (Lower Mainland, Penticton, Midway, Nelson, Creston, Invermere, Cranbrook, and Dawson Creek) consisted of six inspectors for dawn to dusk operations seven days a week. The dawn to dusk stations were operational until mid-November. Due to challenges with fully staffing the Valemount inspection station, it was staffed with four inspectors for 10 hrs per day, and was open until mid-September. The Golden inspection station consisted of twelve inspectors for 24-hr coverage seven days a week from June to mid-November.

During the 2016 season the Program encountered a large number of high-risk watercraft that required decontamination upon arrival in the lower Mainland. The watercraft were frequently either commercially hauled or large/complex watercraft that could not be properly addressed at the inspection station during transportation. To address this in the 2017 season, two inspectors operated as a roving decontamination crew in the Lower Mainland. If there were no decontaminations scheduled the crew was stationed at the weigh scale at the Pacific Border crossing.

Inspection Station Locations

Data from the 2016 boating season and inspection locations were used to identify optimal locations for inspection stations for the 2017 season (Figure 1). The locations were assessed for suitability as 2017 inspection stations based on encounter frequency (watercraft encounters/effort), safety/communication, direction of traffic targeted, the source location of boaters (percent coming from outside BC) and the number of high-risk and mussel infested watercraft intercepted.

Over the course of the 2017 season the Program worked closely with Ministry of Transportation and Infrastructure (MOTI) to address health and safety concerns that came forward at several inspection station locations in the East Kootenays. At the start of the 2017 season the Golden inspection station was moved from the Donald weigh scale to the Kicking Horse Rest Area on Hwy 1. This adjustment was made based on recommendations by MOTI to address safety concerns and maximized program operations by capturing traffic entering the province before the highway splits in Golden.

In addition, inspection station operations in the East Kootenays rotated between the Jaffray, Elko, Caithness, and Sparwood locations over the season to ensure that health and safety concerns were being addressed while also meeting the operational requirements of the Program. These locations were trialed on a temporary basis until suitable long-term locations could be identified by MOTI and senior Program staff.

Minor adjustments to several other inspection station locations were also made over the course of the season to address safety concerns that arose and improve operational requirements. This included rotating the Midway inspection station to the Cascade border crossing based on feedback received by CBSA officers. Inspectors based out Nelson also rotated between the Salmo and Paulson Summit inspection stations. See Figure 1 and Appendix A for a detailed list of the 2017 inspection station locations.

In addition to conducting watercraft inspections at established stations, the inspection crews responded to high-risk watercraft notifications received from within the province and from other jurisdictions. The Program worked very closely with neighboring jurisdictions to send and receive notifications of high-risk boats either destined for BC or traveling to other jurisdictions.

The Report All Poachers and Polluters (RAPP) Hotline operated by COS was used for reporting watercraft suspected of transporting invasive mussels, and any notifications received were sent to the watercraft inspectors. High-risk watercraft notifications from other jurisdictions were sent through an email distribution list to all inspectors, the COS Program liaison, the Program coordinator and the Program supervisor. A response was then coordinated based on the availability of inspectors.

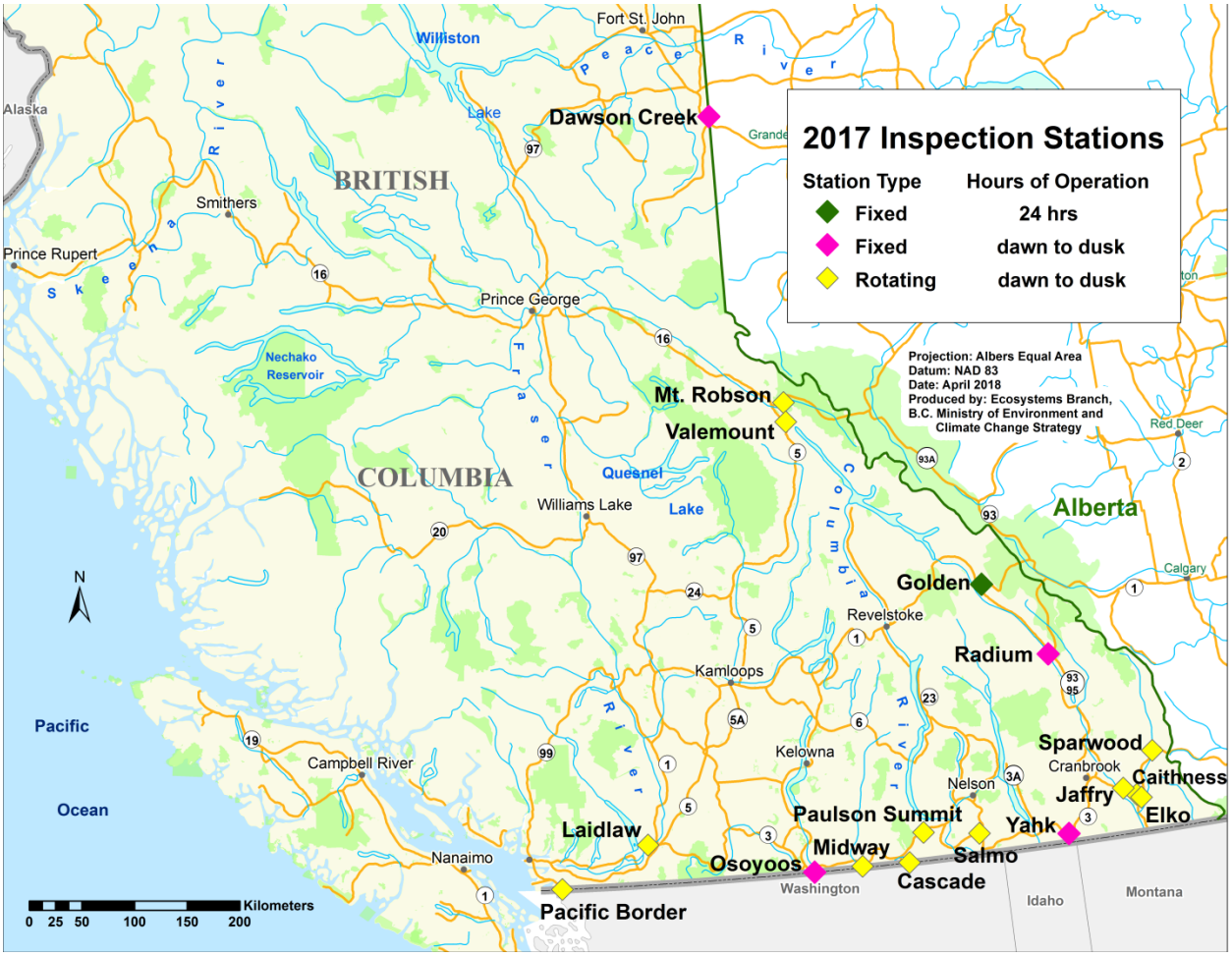


Figure 1. Watercraft inspection station locations for the 2017 season.

2.2 INSPECTION CREW TRAINING (AUXILIARY COS)

Inspector positions are selected based on an education and background from a recognised compliance and enforcement or natural resource management program. These positions provide an opportunity for recent graduates of enforcement programs to gain hands-on experience and training towards a potential career in enforcement or environmental management.

Inspectors were trained in watercraft inspection and decontamination following the Uniform Minimum Protocols and Standards for Watercraft Interception Programs for Dreissenid Mussels in the Western United States (updated 2016). This is the standard protocol used for inspection and decontamination across the Pacific Northwest.

2.3 WATERCRAFT RISK ASSESSMENT

All motorists coming through watercraft inspection stations were asked a series of questions to determine if the watercraft was of high or low risk. Data were recorded electronically.

Two key questions asked by inspectors to determine watercraft risk were:

1. Where was the watercraft in the last 30 days?
2. How long has the watercraft been out of the water?

In accordance with ENV's watercraft risk assessment, any watercraft or piece of equipment that was in any province or U.S. state in the past 30 days that is known or suspected of having ZQM was considered high-risk. Any watercraft or equipment coming from a state or province that has quagga or zebra mussel infestations and was not clean to the extent determined as practical by inspectors, and had not been drained and dried was also considered high-risk, even if it had been out of the water for over 30 days. Low-risk watercraft are those that have been used solely within BC or other non-contaminated provinces or states within the previous 30 days.

The inspectors used investigative skills to verify information provided by watercraft owners. This was done through detailed watercraft inspections, and in some situations if required, through follow-up with third parties to confirm information obtained during interviews.

2.4 PROGRAM FUNDING AND BUDGET

The 2017 season of Provincial Invasive Mussel Defence Program was funded by BC Hydro, Columbia Basin Trust, Columbia Power Cooperation, Fortis BC, and provincial funding that was announced in March 2017 to support the enhanced program operations.

A summary of total expenditures for the 2017 season is provided in (Table 1). The total operational cost was $3,813,391. This includes salary, travel, vehicles, outreach/education, non-capital equipment and maintenance, research, lake monitoring and capital equipment costs.

Salary costs included auxiliary inspectors staffed from March to September/November (28), May to November (25), and May to September (10). Salary costs for Program staff included one full time Program coordinator, two field coordinators (April/June to November 2017), a project assistant (April 2017 to September 2017) and a part time Program administrative support (Sep 2017 to March 2018). The salary cost did not include any salary contributions from the Province for the Program manager or supervisor. The funding delivered to the COS provided support for a dedicated sergeant as Program liaison and AIS K9 handler, who also helped with the hiring, training and coordination of crews implementing the Program.

Salary costs were lower than budgeted due to the timelines of implementing the expanded program operations following the announcement on March 31 2017. The additional auxiliary inspectors were not operational until late May. For the 2017 season, the expanded program was focused on the hiring, training and implementation of the additional auxiliary inspectors. The very short timelines for the implementation of the program expansion did not allow for the necessary increase in senior Program staff to provide the program support associated with over 60 field staff.

Travel costs primarily consisted of meals and accommodation for inspectors' travel to conduct scheduled inspections & decontaminations, as well as partial relocation costs for crew members, and travel required for training. Travel also included training costs for the additional inspectors in May 2017 and the Program start-up in March 2018.

Vehicle costs included gas, repairs and monthly lease fees for 22 trucks from March/May to September or November.

Outreach costs included the development and production of outreach materials (i.e., rack cards, wallet cards, stickers, and resin blocks containing adult ZQM) that were distributed by the crews at the watercraft inspection stations. The Program partnered with the Invasive Species Council of BC to develop specific education materials to target the boating industry in BC as well as youth outreach materials for distribution at watercraft inspection stations. The Program also supported the Invasive Species Council of BC to update the 2016 PNWER Western Canada Invasive Mussel Framework. Outreach/education also included costs for exhibitor booths at sportsman and boating shows, and the outreach events listed in Table 2 (see Section 4.4). Outreach/education costs were lower than budgeted due to the extended interregnum period during the 2017 election that lasted for a significant portion of the 2017 season.

Research costs included the lake monitoring program to test for the presence of invasive ZQM larvae in lakes throughout BC (as part of early detection) and funding to support seven regional invasive species committees to collect samples. Also included were costs for analysis of all samples collected during the 2017 lake monitoring program for early detection (see Section 5 and Appendix B for more details). In March 2017, the Province announced $450,000 in funding to the Habitat Conservation Trust Foundation (HCTF) to provide three years of support to expand government's ongoing invasive mussel lake monitoring to detect potential invasive mussel larvae. For the 2017 season lake monitoring costs were covered under the existing program operating budget. In the fall and winter of 2017 Program staff worked closely with HCTF to establish a grant application process for allocation of the expanded funding for the 2018 and 2019 lake monitoring seasons.

Research costs also supported ongoing collaboration with Fisheries and Oceans Canada to assess whether environmental DNA (eDNA) testing is a reliable means of detecting the presence of ZQM in BC's freshwater environment. See Section 6 for more information on this research.

Non-capital equipment and maintenance costs included uniforms, electronic devices (iPhones, iPads, satellite messengers, and software licenses), highway signs, and safety equipment. Also included were costs for the necessary maintenance, repairs, and storage of the pressure washers. This also included ongoing operational costs for the K9 detection dog (food, veterinary bills, vehicle repairs/outfitting).

Equipment loan agreements were established with the Eastern Kootenay Invasive Species Society and the Columbia-Shuswap Regional District for the use of their pressure washers for the Cranbrook and the Golden inspection stations.

Table 1. Total expenditures for the 2017 season of the Invasive Mussel Defence Program.

2017-2018	2017-2018 Complete Budget	Actuals March 31 2018	Variance
Salary	**$2,847,047**	**$2,618,283**	$228,764
Travel & Training	**$175,000**	**$167,236**	$7,764
Vehicle	**$389,765**	**$301,502**	$88,263
Education/ Awareness/ Research	**$281,000**	**$156,061**	$124,939
COS support	**$150,000**	**$150,000**	$0
Non-capital equipment/ maintenance	**$491,205**	**$285,208**	$205,997
Lake monitoring	**$150,000**	**$120,058**	$29,942
Equipment Amortization	**$15,000**	**$15,043**	-$43
Total	**$4,499,017**	**$3,813,391**	**$685,626**

3. WATERCRAFT INSPECTION SUMMARY FOR 2017

3.1 ALL WATERCRAFT ENCOUNTERS

During the 2017 expanded season, just over 35,500 watercraft were inspected, and the crews interacted with approximately 73,300 people to promote Clean, Drain, Dry. Of the total watercraft inspected, 2,071 were identified as coming from a high-risk province or state, 286 were issued Decontamination Orders, and 200 were issued quarantine periods to meet the required 30-day drying time. Of the total watercraft inspected, 25 were confirmed to have adult invasive mussels (see Section 3.2 for further detail on high-risk watercraft).

The remainder of this section presents and discusses the watercraft inspection data collected by the crews at each station across the entire season. Data were summarized in a number of ways, including an assessment of total watercraft encounters (total number of watercraft inspected), and total effort (total operational hours). To quantify the frequency at which watercraft came through the inspection stations, the ratio of watercraft encounters to effort was calculated as the measure of the encounter frequency. The encounter frequency was assessed across several different temporal scales (by month, day, and hour) as illustrated in the Figures 2 through 9.

3.1.1 Watercraft Inspection Summary by Station

Watercraft encounters (Figure 2) were highest at the Golden station (7,470 boats), followed by the Laidlaw station (5,615 boats), the Radium station (5,500 boats), and the Yahk station (4,244 boats).

The encounter frequency (watercraft encounters/effort) across each inspection station showed that the busiest inspection stations were Elko, Laidlaw, Midway, Jaffray, and Mt. Robson (Figure 3). The stations with the lowest frequency of boater traffic were Pacific Border, Osoyoos, and Cascade. Interestingly, the stations with a low frequency of boater traffic had the highest percentage of high-risk boats (Dawson Creek, Osoyoos, Pacific Border) (Figure 3). It is important to note that the encounter frequency only represents boater traffic during operational hours.

Watercraft inspection data were also used to determine the number of different jurisdictions boats were traveling from (Figure 4). The Dawson Creek station inspected boats coming from 52 different provinces and states, which is more than any other inspection station, while the Cascade, Sparwood and Paulson stations inspected boats from eight different provinces and states. It is important to note that several of the inspection station locations were only operational for a portion of the season (Cascade, Elko, Midway, Pacific, Jaffray, Valemount and Sparwood) so these numbers do not reflect a full season of data.

These data illustrate the importance of looking at both the total number of boats inspected as well as the proportion of high-risk boats going through each inspection station. These data also provide important information on the different routes that boaters are traveling.

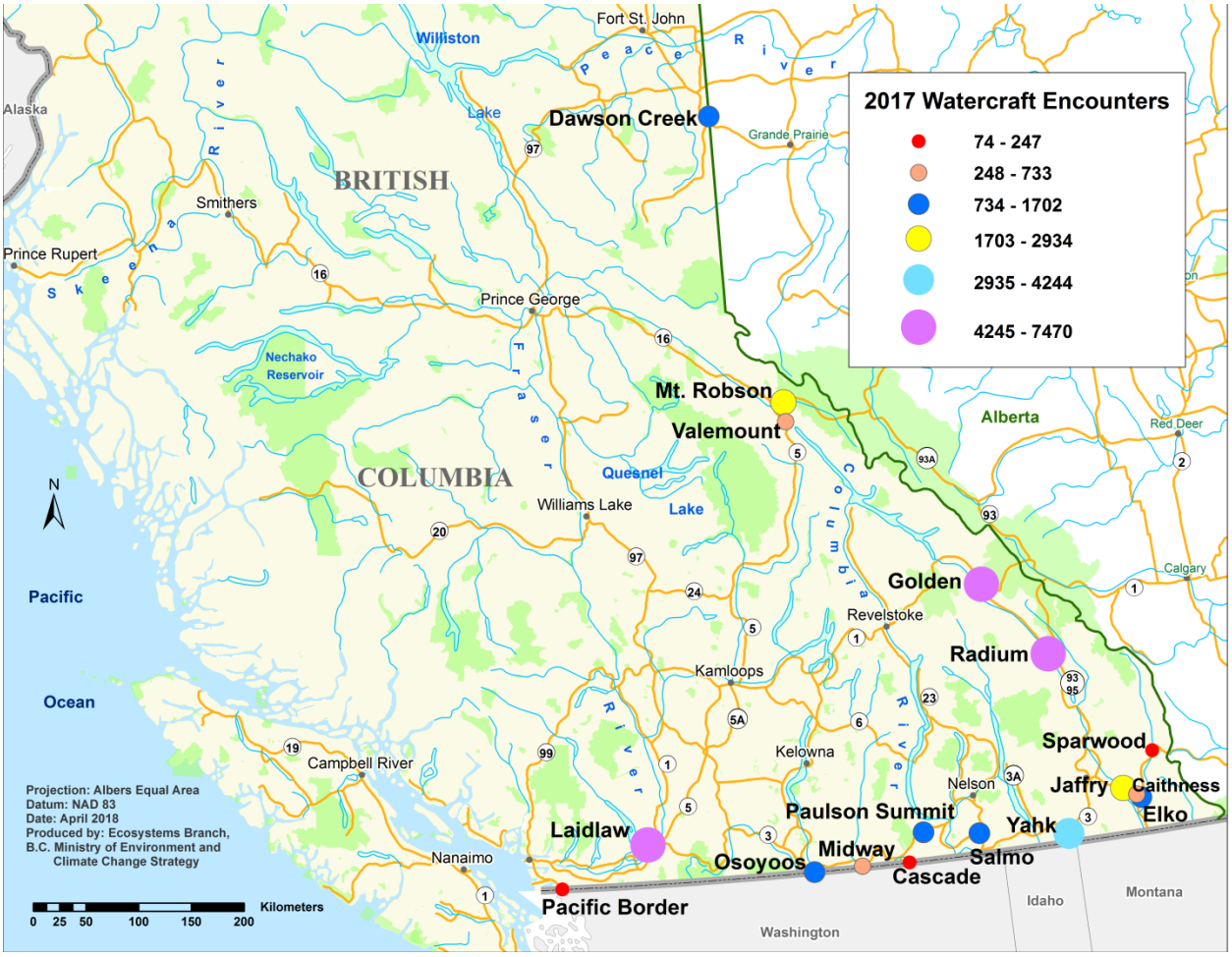


Figure 2. Total watercraft encounters for inspection stations during the 2017 season.

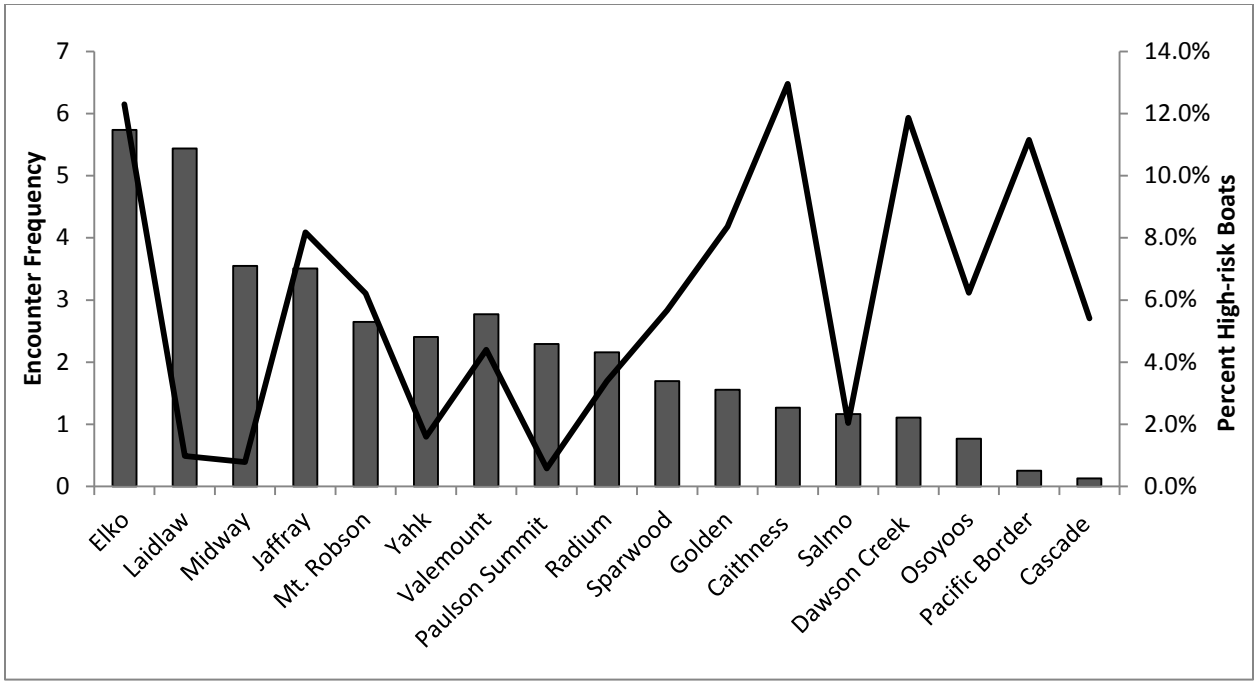


Figure 3. Encounter frequency by inspection station in comparison to percent of high-risk boats per inspection station, from April to November 2017.

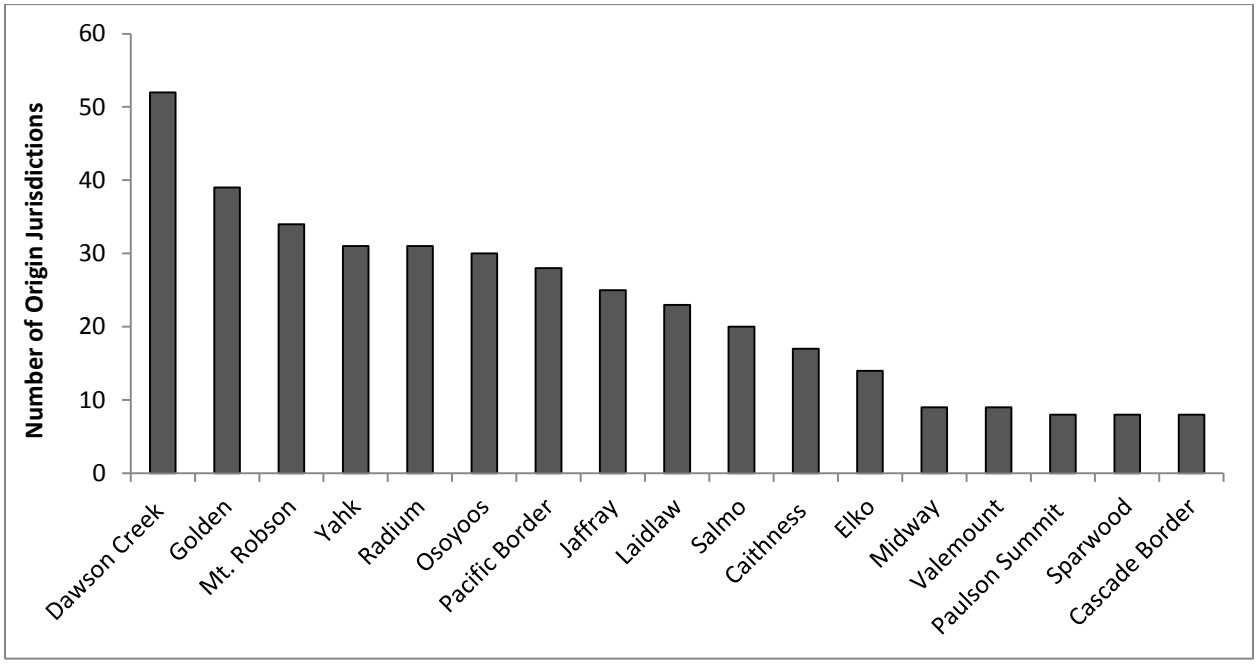


Figure 4. Total number of origin jurisdictions from which boats were traveling that were intercepted between April and November 2017, by inspection station.

3.1.2 Watercraft Inspection Summary by Month and by Day of the Week

Highway inspection stations were operational from April 01 to November 09. The inspection station total effort (operational hours) increased over the spring months (April-June), peaking in July and August (Figure 5). Total effort was lowest in November since the two northern inspection stations (Dawson Creek and Valemount) closed at the beginning of September, and the southern inspection stations were only operational until November 09. In addition, winter road conditions prevented some inspection stations from operating at the end of the season. Watercraft encounters and encounter frequency (Figure 6) showed a similar trend, increasing over the spring months (April to June) and peaking in July and August.

Figure 7 shows the total watercraft encounters and total effort by days of the week across the 2017 season. Watercraft encounters and encounter frequency peaked on Fridays and Saturdays, and were lowest on Tuesdays and Wednesdays. Total effort was similar across all days of the week since the inspection stations were operational seven days a week (Figure 7).

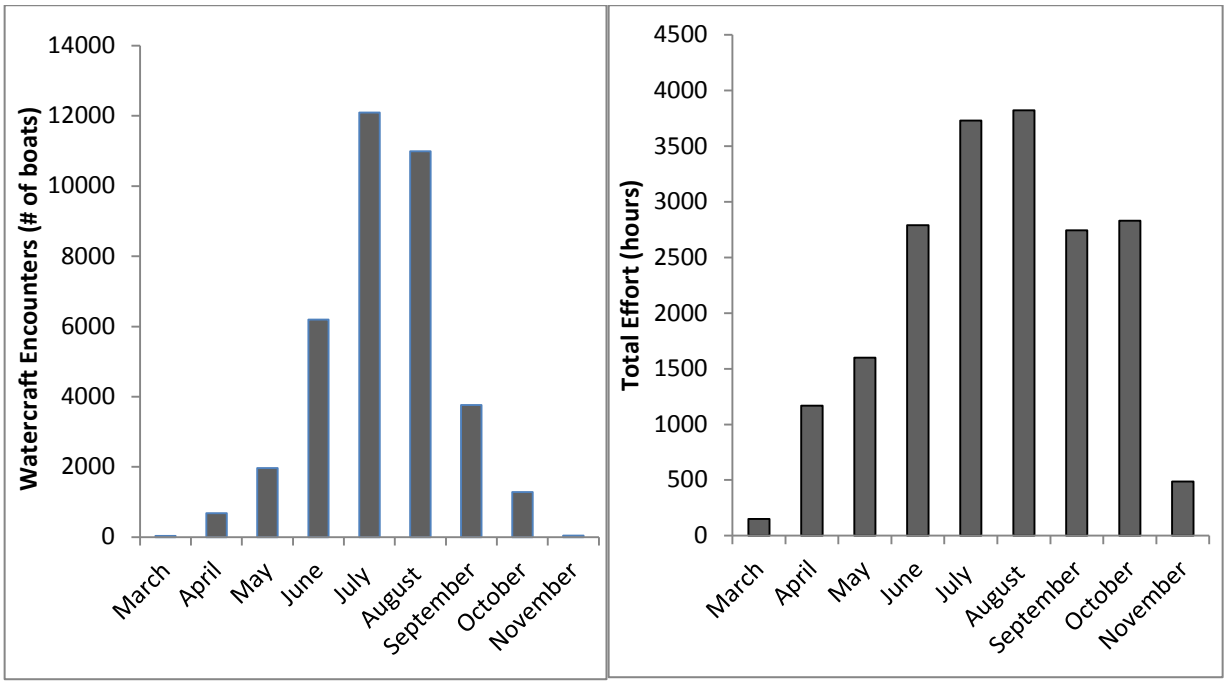


Figure 5. Watercraft encounters (left) and total effort (right) by month across inspection stations.

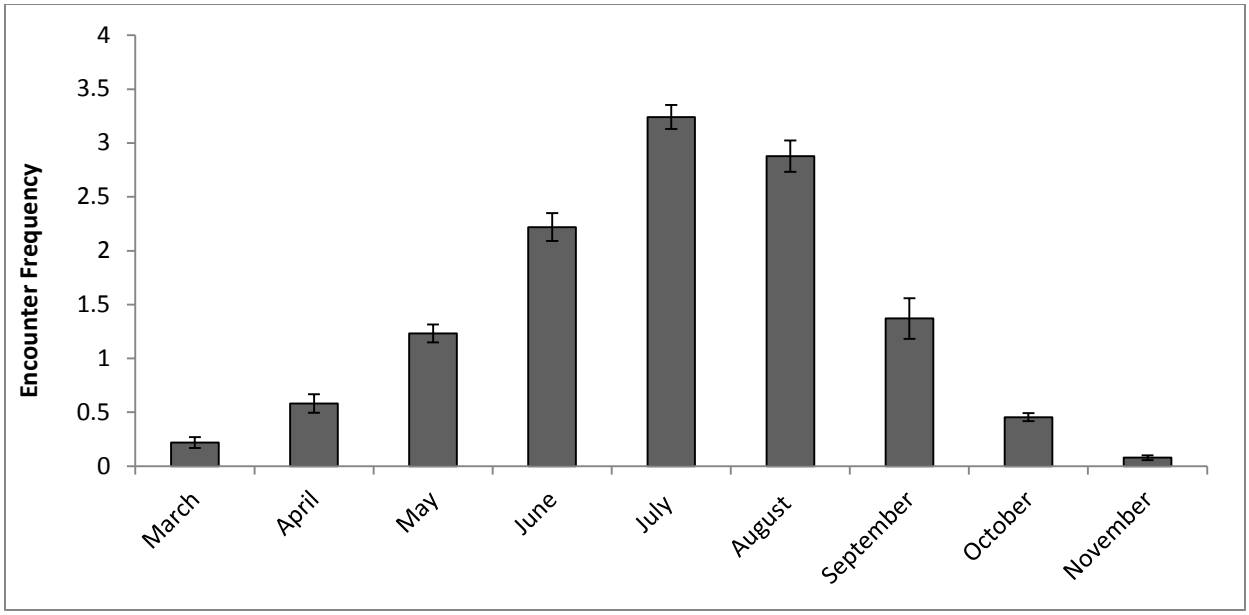


Figure 6. Encounter frequency by month across all inspection stations (error bars illustrate the standard error).

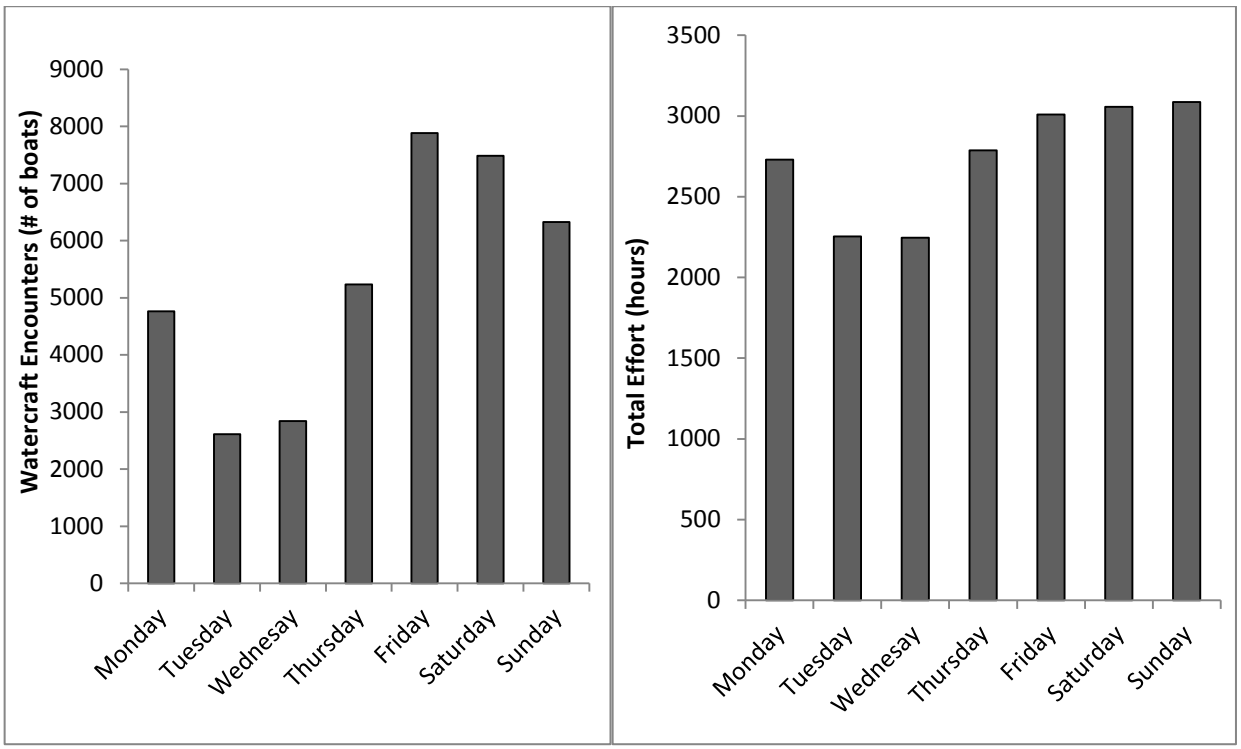


Figure 7. Watercraft encounters (left) and total effort (right) by day of the week across inspection stations. Statutory holidays were included in the data analyses.

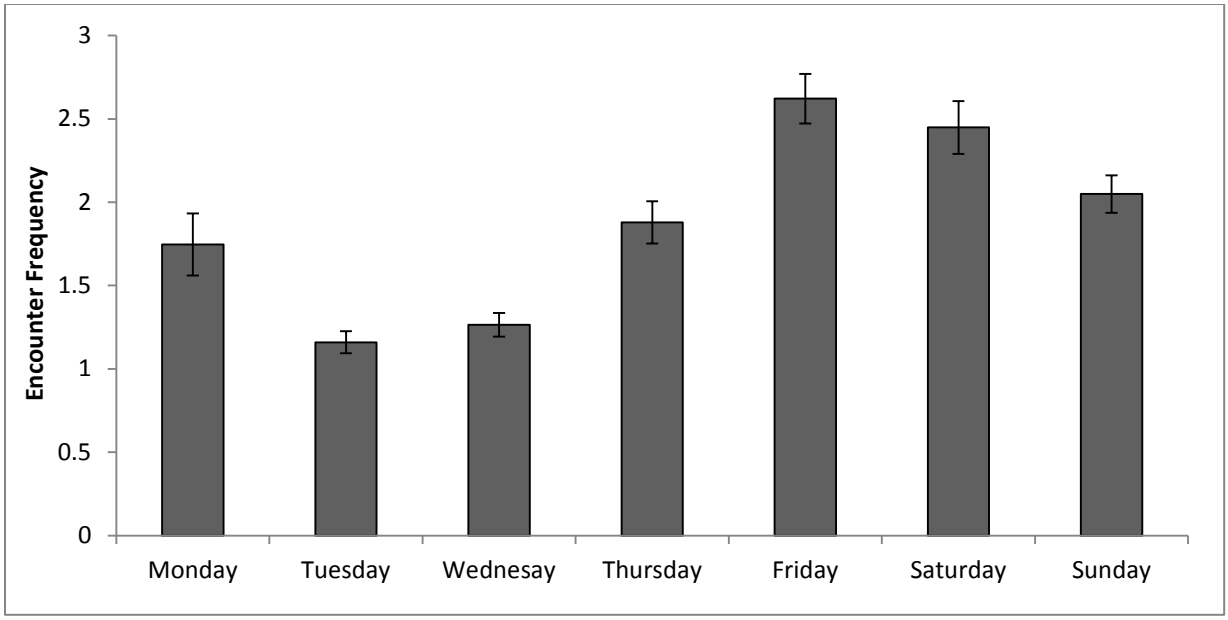


Figure 8. Encounter frequency by day of the week from April to November 2017 across inspection stations. Error bars illustrate the standard error. Statutory holidays were included in the data analyses.

3.1.3 Watercraft Inspection Summary by Hour of the Day

The time of the inspection was recorded by inspectors for every watercraft and adjustments were made in early July to improve the accuracy of recording this in the field electronically. Therefore, the data illustrated in Figure 9 do not represent all the watercraft inspected over the full 2017 season as time of inspection was not captured for all watercraft prior to early July. Figure 9 illustrates that the volume of boater traffic was normally distributed across all inspection stations, peaked in the middle of the day, and was lowest at the start and the end of the daily operational period. The data do show that boater traffic more than doubled between 7 AM and 9 AM, indicating that boater traffic started to increase around 8 AM. The data also show that boaters were traveling in the early evening (between 7 PM and 9 PM) but at much lower numbers.

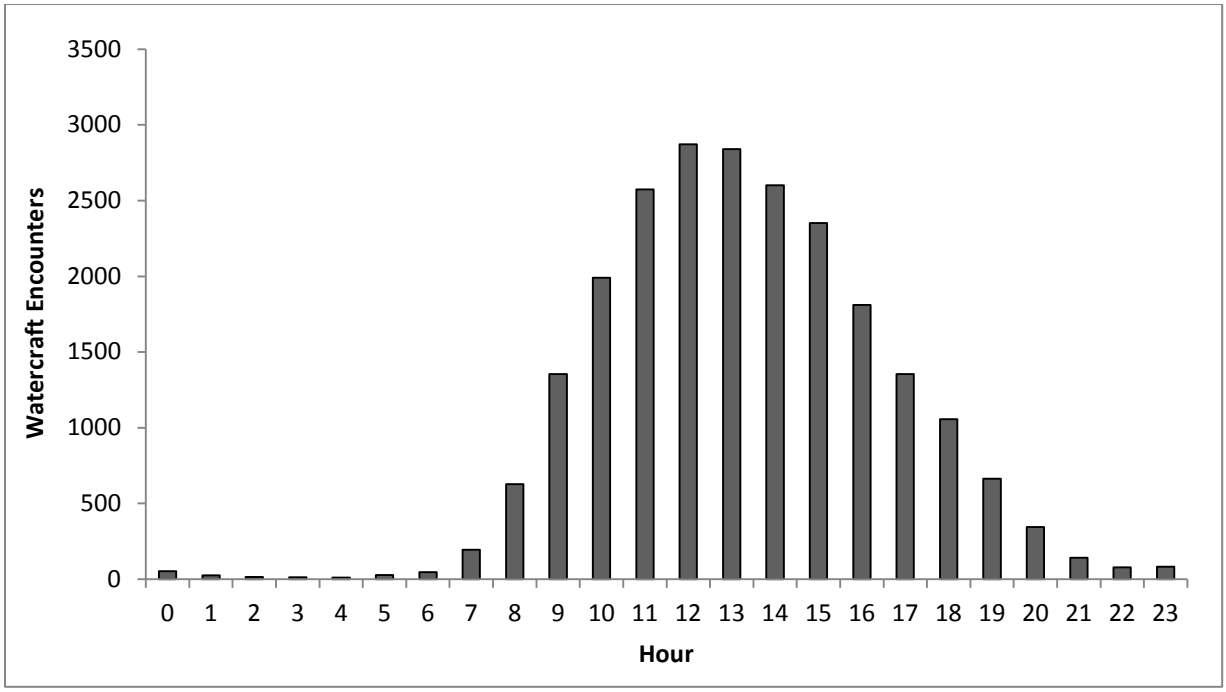


Figure 9. Watercraft encounters by time of day across all inspection stations for the 2017 season.

3.1.4 Source and Destination Locations

Inspected watercraft traveled into BC from 64 different provinces, territories, and states (Figure 10 and Figure 11). Of the watercraft inspected, 53% were traveling from a waterbody within BC This represents a slight increase from the 2016 season during which 50% of inspected watercraft travelled from within the province. The inspected watercraft coming from out of province traveled primarily from neighbouring jurisdictions: Alberta (32.8%), Washington (3.4%), Idaho (2.5%), Montana (1.9%), and Saskatchewan (1.7%). The remaining 4.0% came from 59 different provinces, states, and territories (Figure 10).

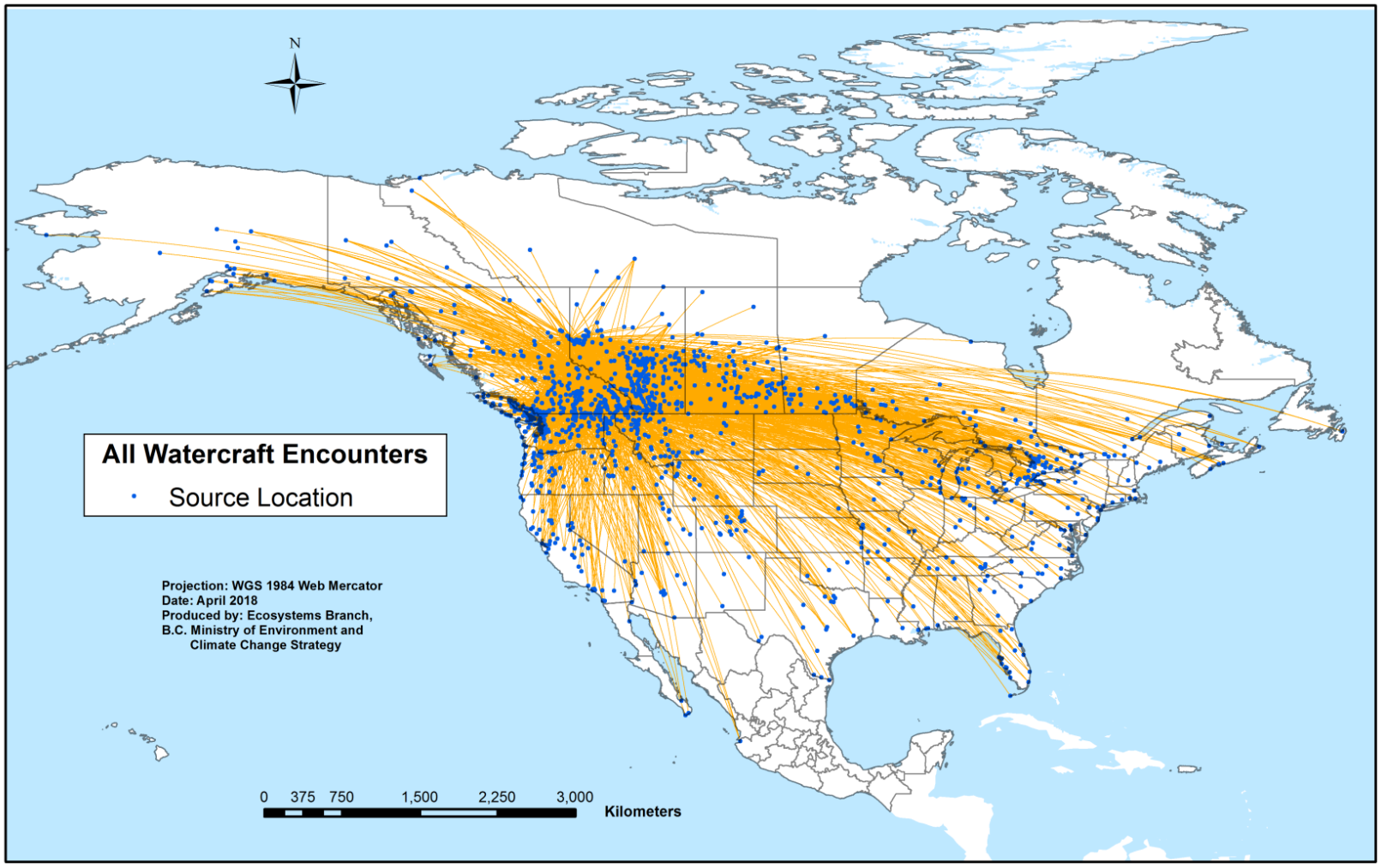


Figure 10. Previous location for all watercraft inspected in BC from April to November 2017.

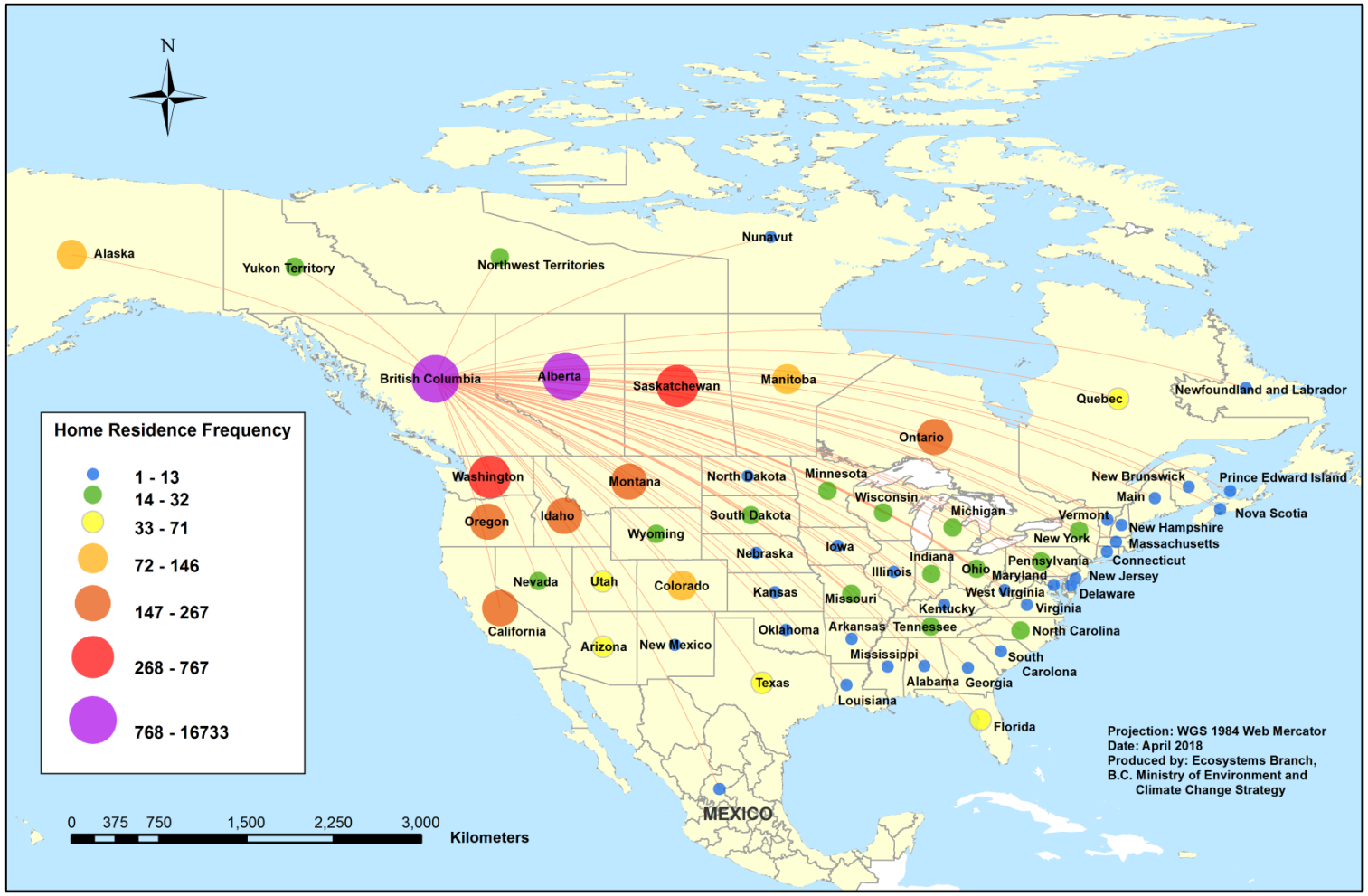


Figure 11. Home residence by province/state of all watercraft inspected during the 2017 season.

The majority of watercraft were destined for waterbodies within BC (87%), followed by waterbodies in neighbouring jurisdictions: Alberta (7.2%), Idaho (1.6%), Alaska (1.1%), Washington (0.8%), and Montana (0.7%) (Figure 12). The remaining 1.5% of watercraft were destined for waterbodies in 38 different jurisdictions (Figure 13). The most common destination waterbodies within BC were Shuswap Lake (7.5%), Okanagan Lake (6%), Windermere Lake (4.4%), Pacific Ocean (4.0%), Christina Lake (3.5%), Kootenay Lake (3.2%), and Osoyoos Lake (2.5%) (Figure 12).

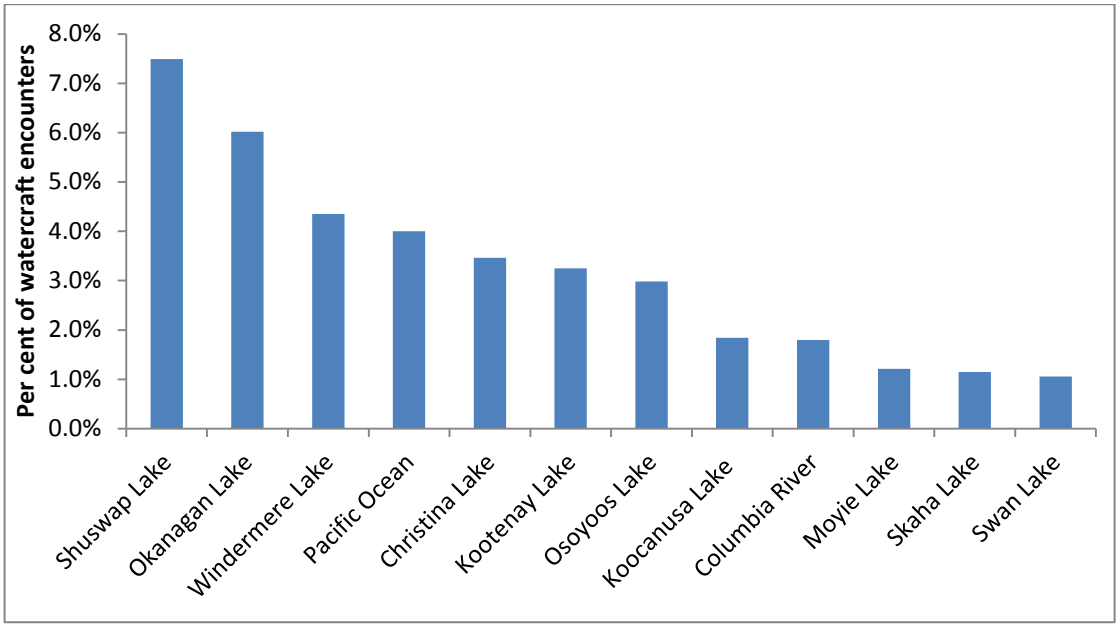


Figure 12. Destination waterbodies by per cent of all watercraft encounters during the 2017 season.

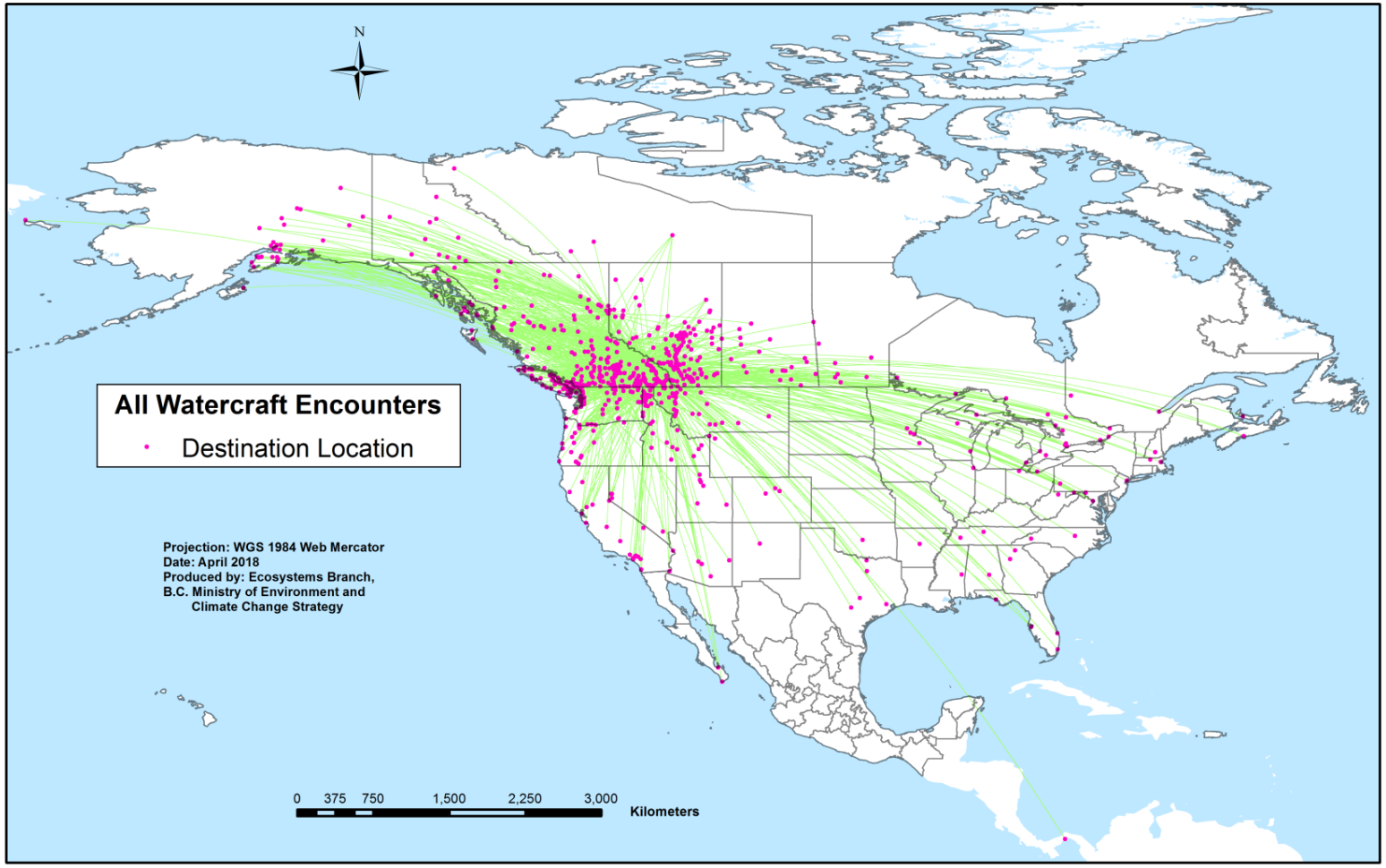


Figure 13. Destination location for all watercraft inspected from April to November 2017.

3.1.5 Compliance

During each shift at an inspection station, inspectors recorded watercraft that failed to stop at the station and used this number as a measure of compliance. The compliance rate for a shift was calculated as the number of watercraft that stopped over the total number of boats that went by an inspection station. Figure 14 illustrates that compliance at inspection stations was similar across all the months. It is important to note that the accuracy of recording compliance was affected by the inspectors' ability to see traffic from the inspection area. For example at the Golden inspection station it was difficult for inspectors to monitor traffic on the road while conducting inspections and performing decontaminations. In addition, poor weather and road conditions may have affected motorists' ability to see signs and safely pull over and may explain the lower compliance rate during the month of November. On average, 76% of watercraft stopped at the inspection stations. This represents a slight decrease from the 2016 compliance rate of 81%.

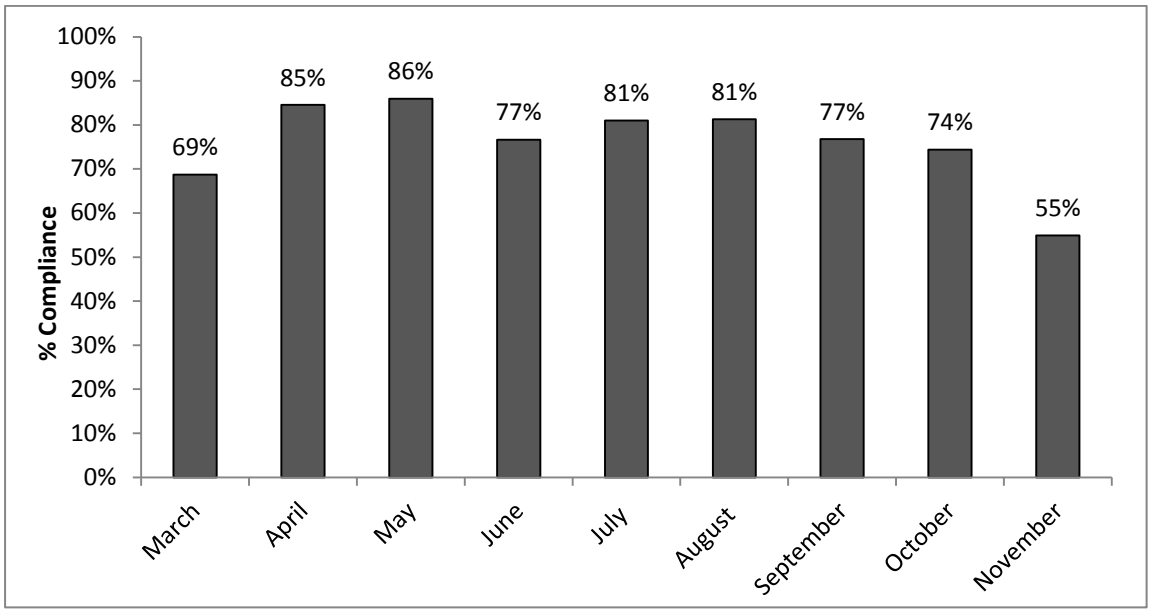


Figure 14. Percent compliance by month across inspection stations for 2017.

During the 2017 season the inspectors also recorded whether the watercraft that failed to stop were motorized or non-motorized. Figure 15 shows that, on average across all the months, 76% of the watercraft that failed to stop were non-motorized. Figure 16 shows the compliance rates for each inspection station across the 2017 season. Compliance rates ranged from 100% at the Cascade border crossing to 50% at the Pacific station situated on Highway 15 in the Lower Mainland.

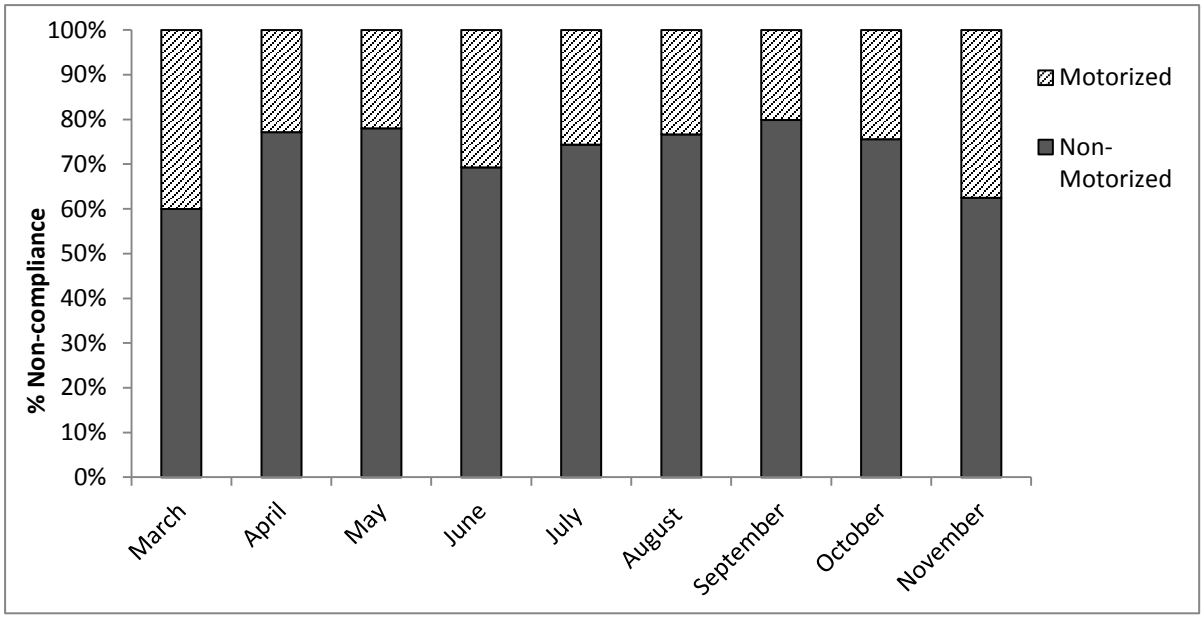


Figure 15. Percent of non-compliant watercraft that were motorized vs. non-motorized.

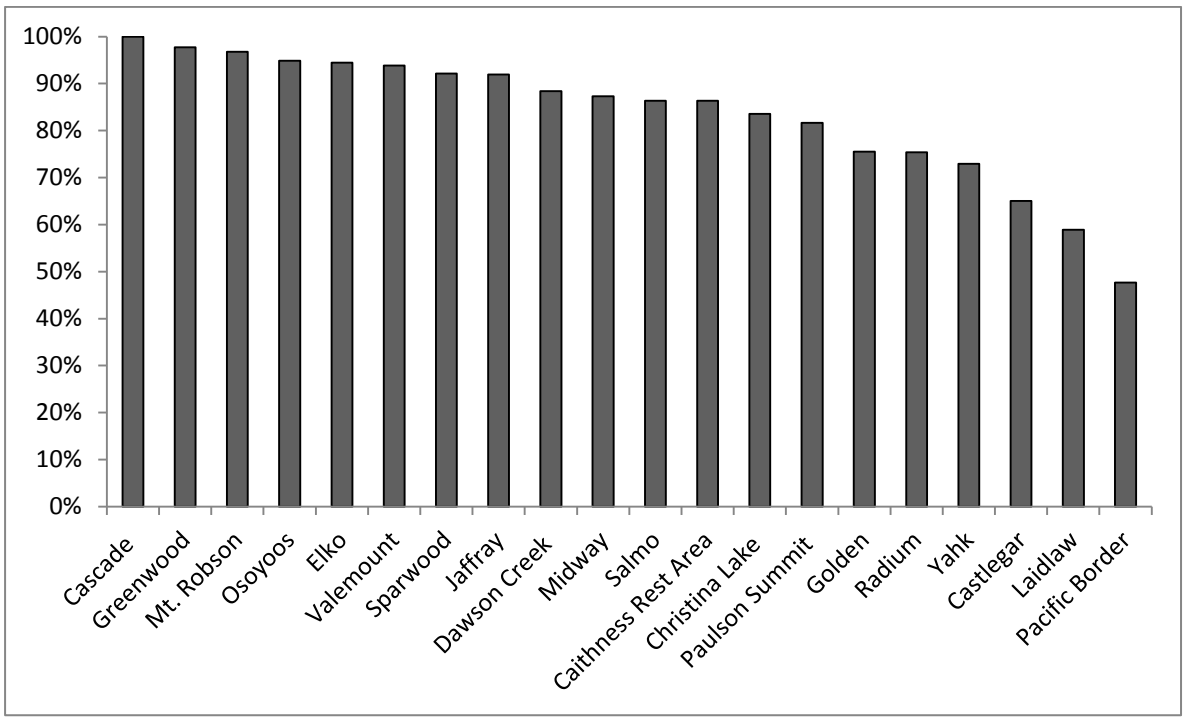


Figure 16. Percent compliance by inspection station for the 2017 season.

The inspectors also recorded whether each watercraft coming through a station had been through a previous inspection in B.C or elsewhere and when they had been through a previous inspection. Figure 17 shows the percent of boats that stopped at an inspection station and which had already been through an inspection station. The highest percentages of previously inspected watercraft occurred at Yahk, Salmo, Radium, Sparwood and Paulson Summit stations.

Of the previously inspected watercraft, 15% had been through over one year ago, 30% had been through within the last year, and 61% had been through within 30 days. Collectively, these results highlight the efficacy of the perimeter defence approach of having multiple inspection stations across jurisdictions, in particular for addressing high-risk boats coming from the east and for educating the boating public.

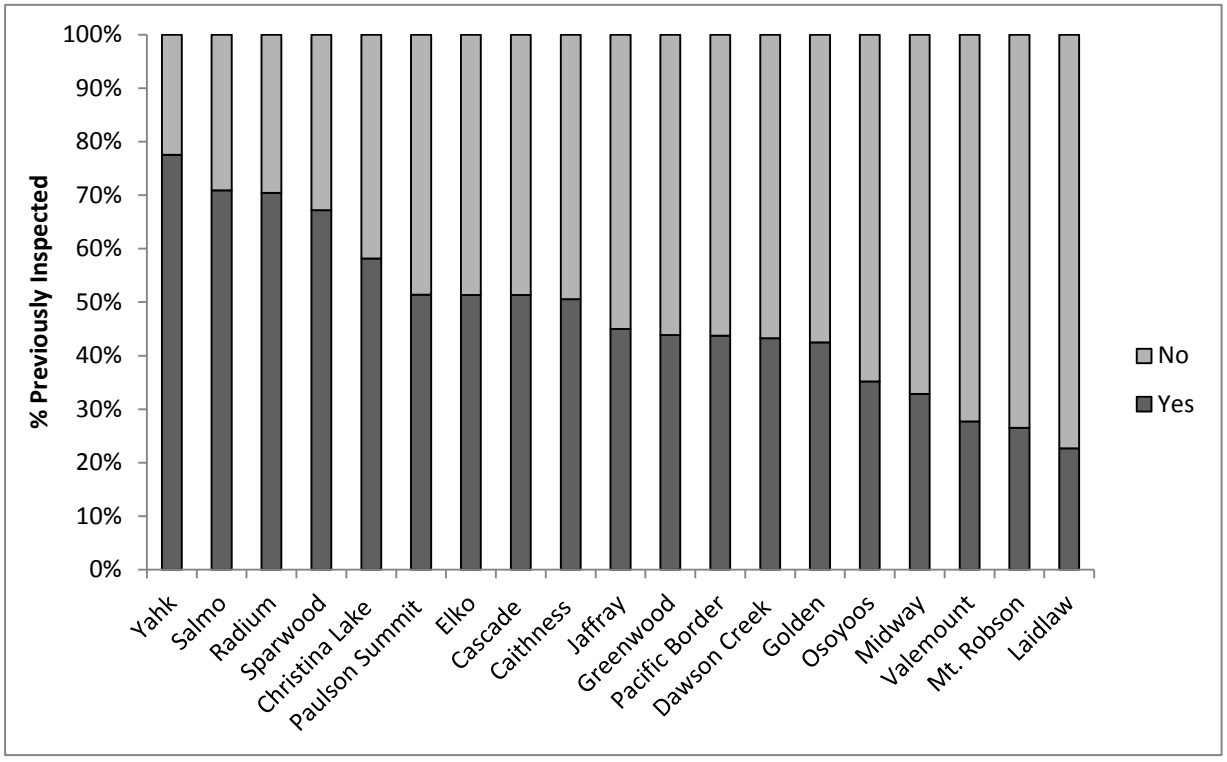


Figure 17. Per cent of watercraft intercepted per inspection station that had been previously inspected.

3.2 HIGH-RISK WATERCRAFT ENCOUNTERS

3.2.1 By Station and Month

A total of 2,071 high-risk watercraft were encountered during the 2017 season, 181 of which were inspected during April and May, which indicates the importance of opening the inspection stations on April 01. Across all three years since the Program has been operational, the total number of high-risk

boats inspected has peaked in July. In 2017, the total numbers of high-risk boats showed a sharp decline between August and September, which was not observed in 2016. This is likely a reflection of the overall boater traffic decreasing at the end of summer and tourists bringing more boats from outside BC during the busy summer months. Although there was a large decrease in the number of high-risk boats intercepted during October to November—from 80 boats to 4 (Figure 18) —it is important to note that inspection stations were only operational until November 10 so there was not a full month of data. This illustrates the importance of keeping inspection stations operational until late October, but not into November.

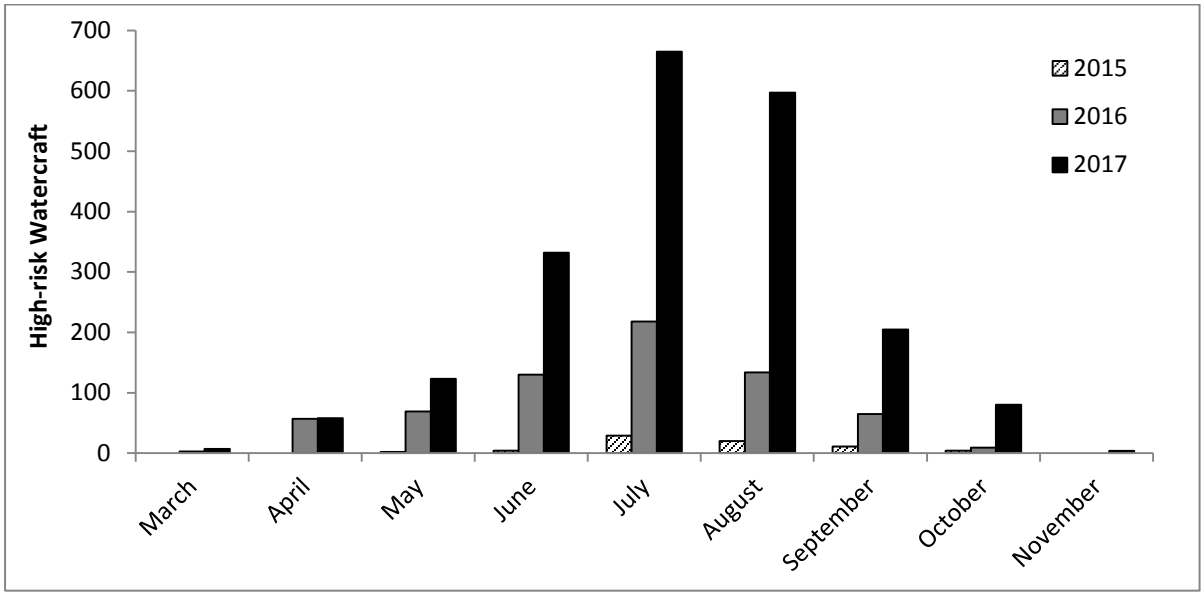


Figure 18. Total high-risk watercraft encounters by month across the 2017 season.

Figure 19 illustrates the number of high-risk watercraft encounters across inspection stations. The Golden inspection station intercepted the most high-risk watercraft (625), followed by Jaffray (240), Dawson Creek (202), Radium (184), and Mt. Robson (155). The Dawson Creek and Pacific inspection stations had very low overall encounter frequencies (see Figure 3) but higher numbers of high-risk boats relative to other inspection stations.

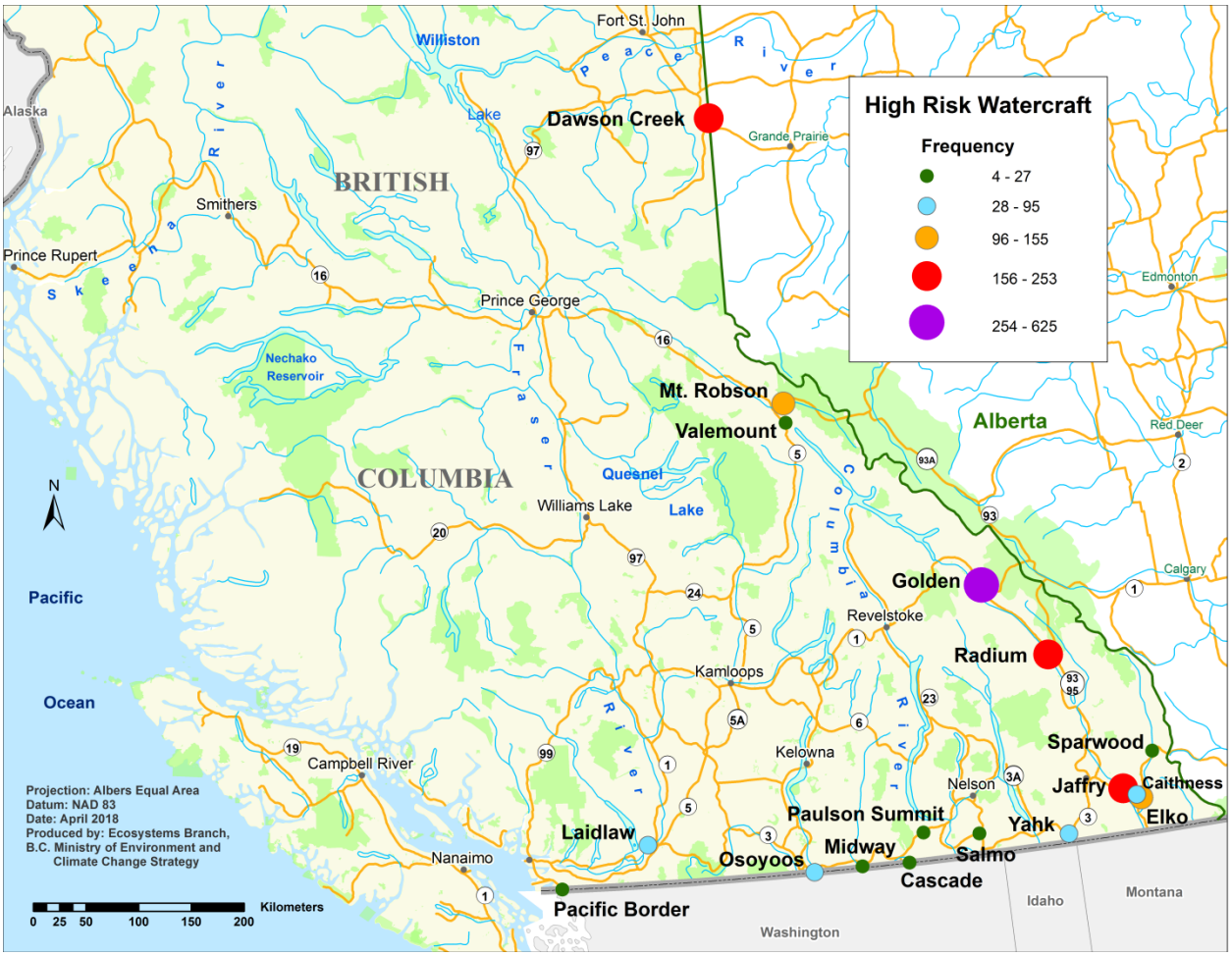


Figure 19. The number of high-risk watercraft by inspection station for the 2017 season.

3.2.2 By Time of Day

Figure 20 shows the number of high-risk watercraft encounters by time of day and illustrates that the volume of high-risk boats was normally distributed, peaked in the middle of the day, and was lowest at the start and the end of the daily operational period. Between 8 PM and 10 PM at total of 65 high-risk watercraft were intercepted, while 27 high-risk watercraft were intercepted between 10 PM and 7 AM at the Golden inspection station.

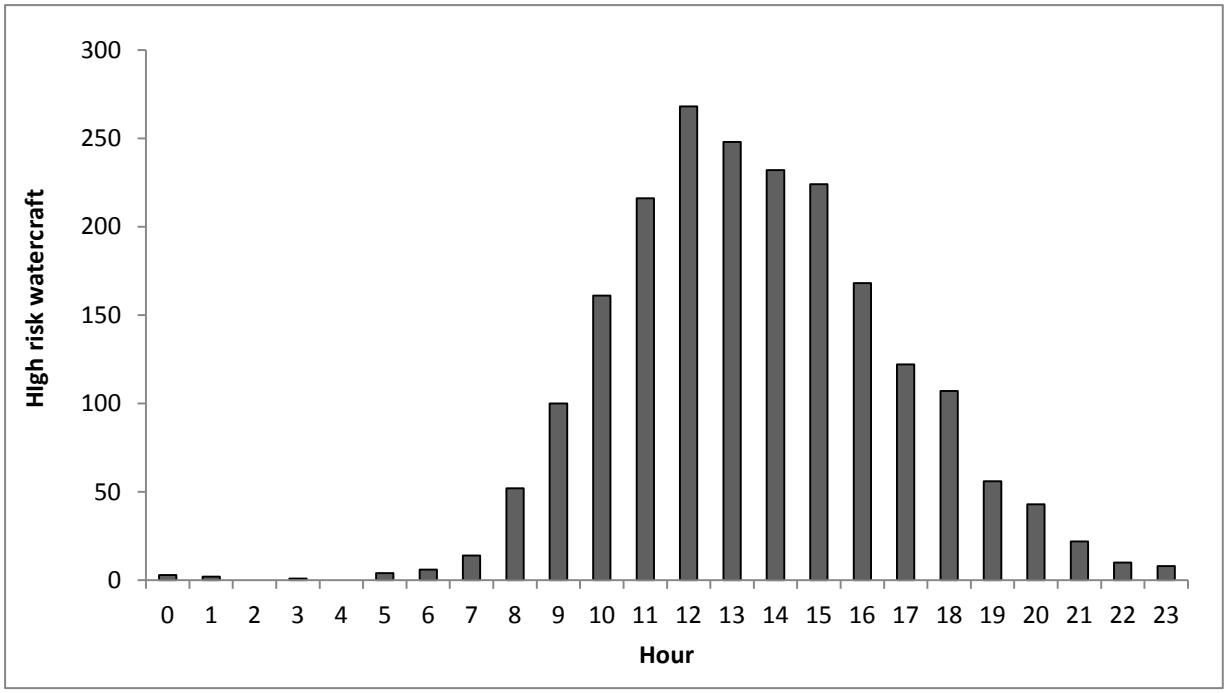


Figure 20. Total high risk watercraft encounters by time of day across all inspection stations during the 2017 inspection season.

3.2.3 Source and Destination Locations

Of the 2,071 high-risk watercraft identified by inspection crews, 449 came from Montana (22%), 393 from Saskatchewan (19%), 249 from Ontario (12%), 197 from Alberta (10%), 111 from Manitoba (5%), 59 from California (3%), 51 from Arizona (2%), and 32 from Quebec (2%). Note that watercraft from Alberta were identified as high risk for whirling disease, not for invasive mussels. The remaining 26% came from 48 different provinces and states (Figure 21 and Figure 23). Of note is that the number of high-risk boats from California and Arizona dropped slightly from 2016, at 75 and 52 respectively. It is important to note that high-risk watercraft with a source location from a non-mussel-infested jurisdiction (i.e. Washington, Oregon, Idaho, Wyoming, and Alberta) in Figure 23 may have visited waterbodies from more than one jurisdiction within the last 30 days or may have been flagged as high risk for other reasons (whirling disease, not CDD).

Of the high-risk watercraft inspected, 26% were destined for waterbodies in the Kootenay region, 16% for waterbodies in the Okanagan region, 8% for the Lower Mainland, 8% for Vancouver Island, 4% for the Thompson-Nicola, and 3% for the Skeena (Figure 22 and Figure 24). The remaining 31% of the high-risk watercraft were destined for waterbodies outside of BC If a watercraft was still considered high-risk following inspection/decontamination, the destination jurisdiction was notified.

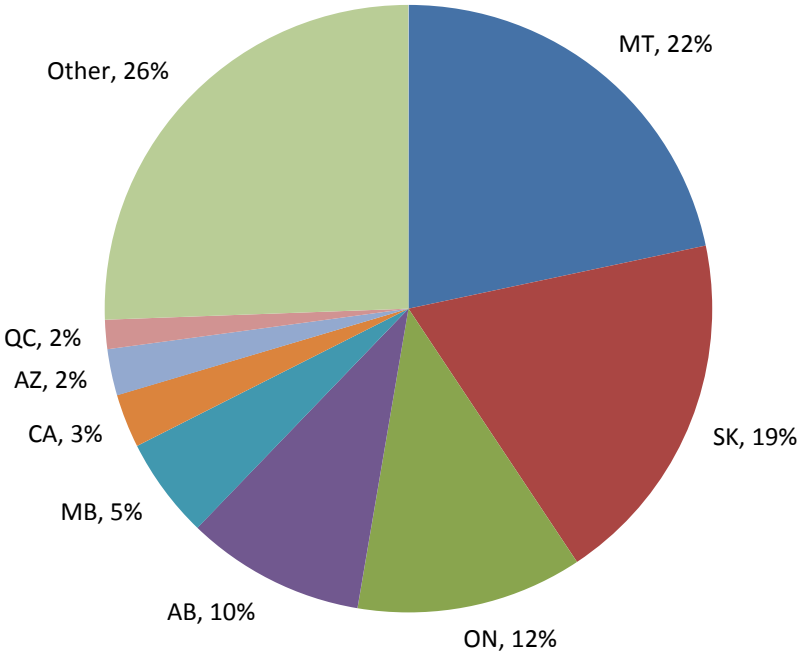


Figure 21. Source locations of the high-risk watercraft identified during the 2017 season. Other jurisdictions consisted of 48 different provinces and states. High-risk watercraft from Alberta were identified as high risk for whirling disease not invasive mussels.

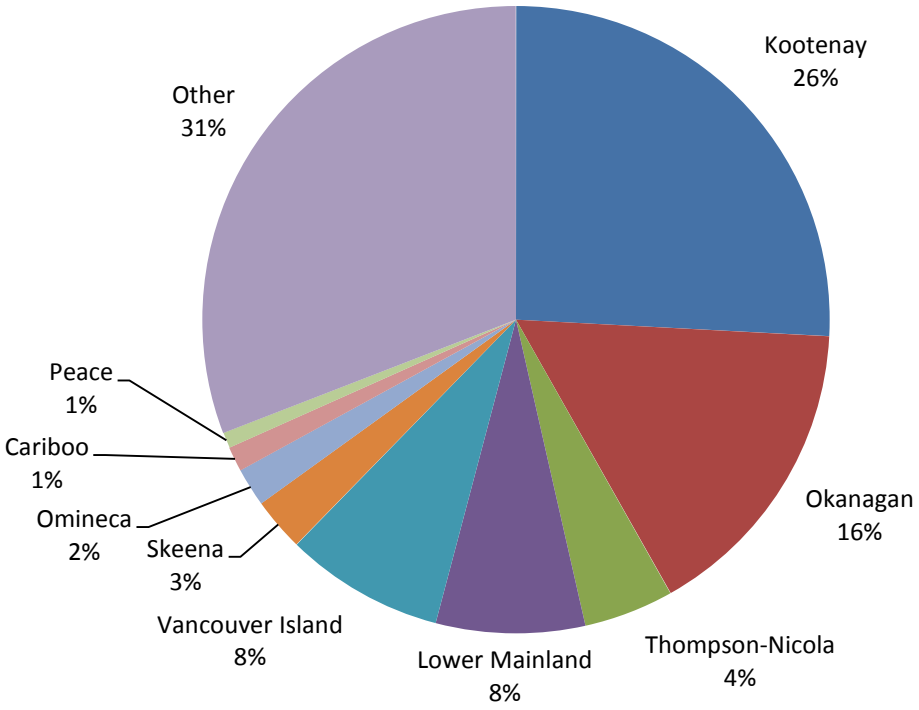


Figure 22. Destination regions of all high-risk watercraft identified during the 2017 season. Other jurisdictions consist of but not limited to: AB, AK, MT, ID, YK, CA, WA, SK, OR, UT, ON, CO, and TX.

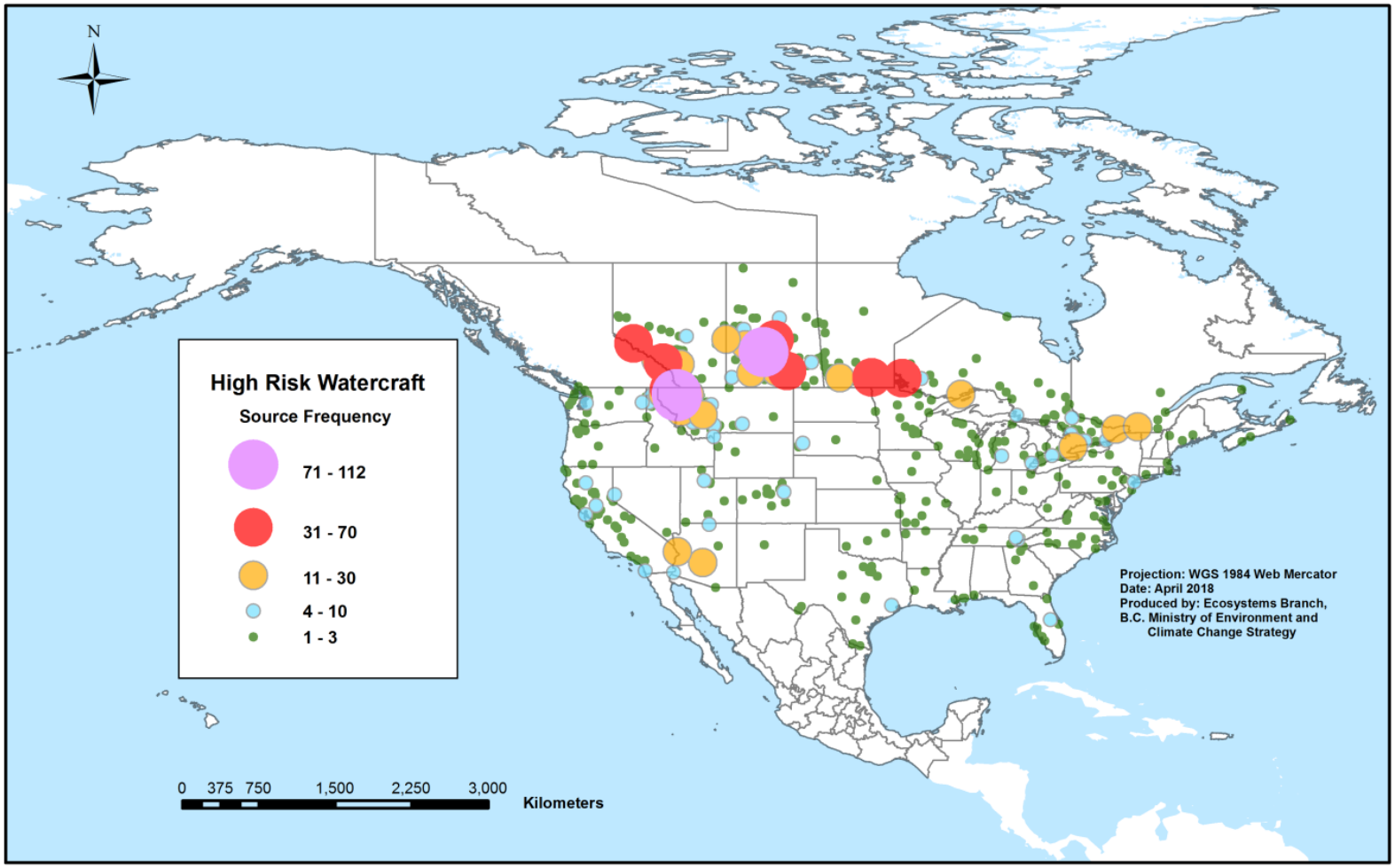


Figure 23. Source locations of the high-risk watercraft inspected during the 2017 season.

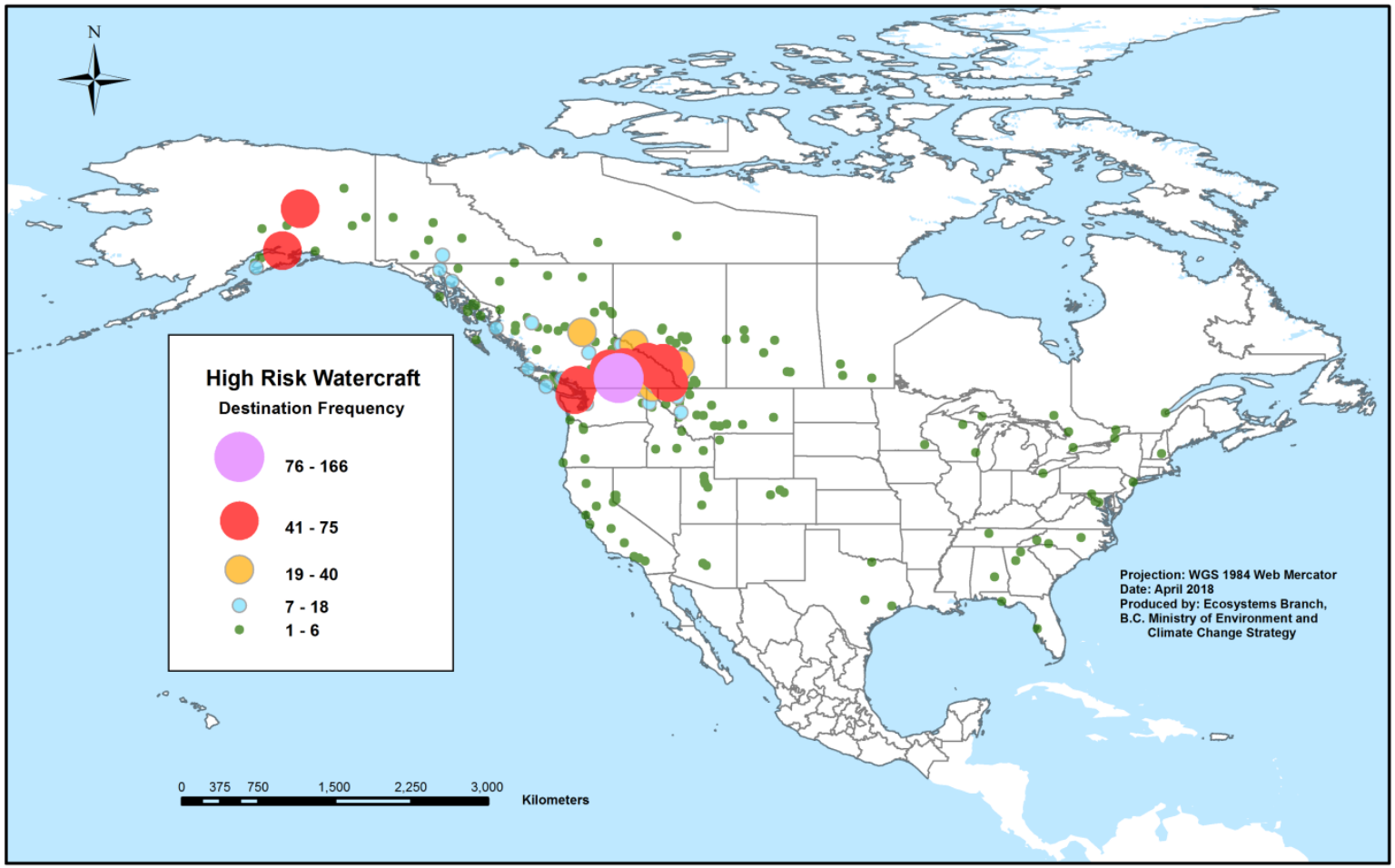
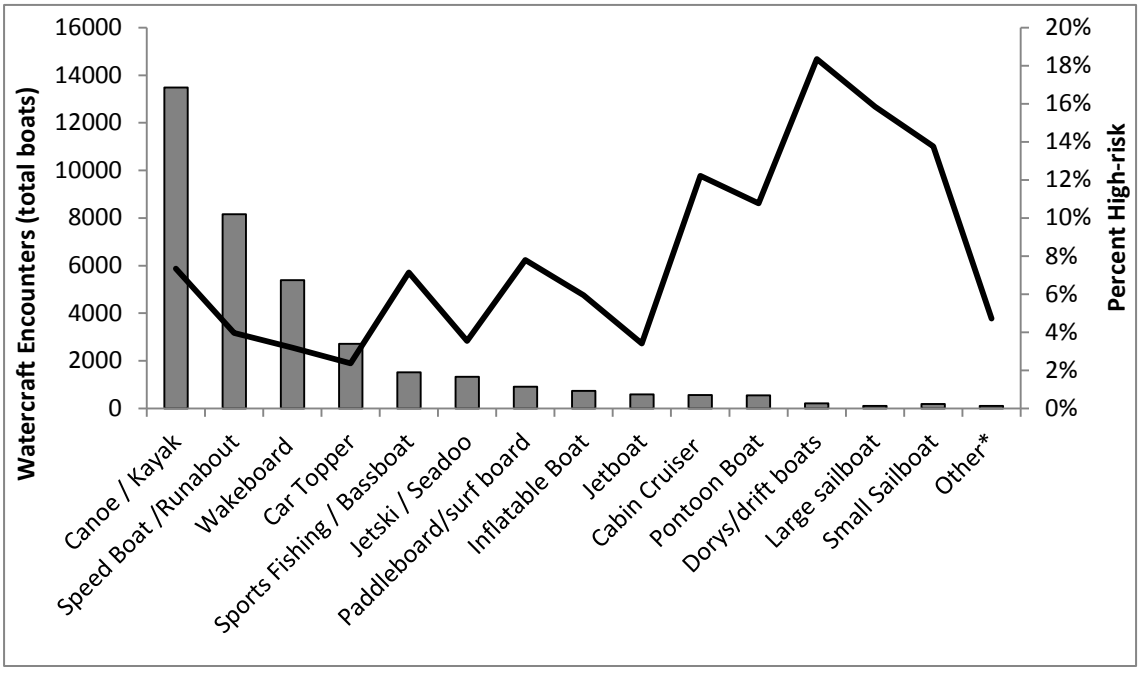


Figure 24. Destination locations of the high-risk watercraft identified during the 2017 season.

3.2.4 Watercraft Types

The type of watercraft was recorded for every inspection. Despite the fact that canoes and kayaks comprised the highest percentage of the total number of watercraft inspected (37%), they represented a much lower risk with only 7% registering as high-risk. Conversely, small and large sailboats represented the smallest percentage of the total watercraft inspected (1%), but posed a disproportionately higher risk, at 14% and 16%, respectively. Other watercraft types that posed high risk included dories/drift boats (18%), cabin cruisers (12%), and pontoon boats (11%) (Figure 25).

These results are consistent with larger boats such as sailboats, cabin cruisers, and pontoon boats typically being moored in infested waterbodies for longer periods of time than smaller watercraft. Because dories and drift boats frequently traveled from Montana and to the Elk River, a greater per cent of them were deemed high risk. However, canoes, kayaks, and small sailboats can still pose a risk of transporting standing water with potentially viable invasive mussel larvae as they are more commonly moved between waterbodies from multiple jurisdictions in short periods of time. During the 2017 season, Alberta inspectors intercepted a mussel fouled kayak being transported from Ontario. For this reason, all non-motorized watercraft types are required to stop at inspection stations and are treated the same as motorized watercraft during inspections.



* Other includes but not limited to equipment/docks, tugboats, submarine, hovercraft, ocean fishing boat, and fanboat.

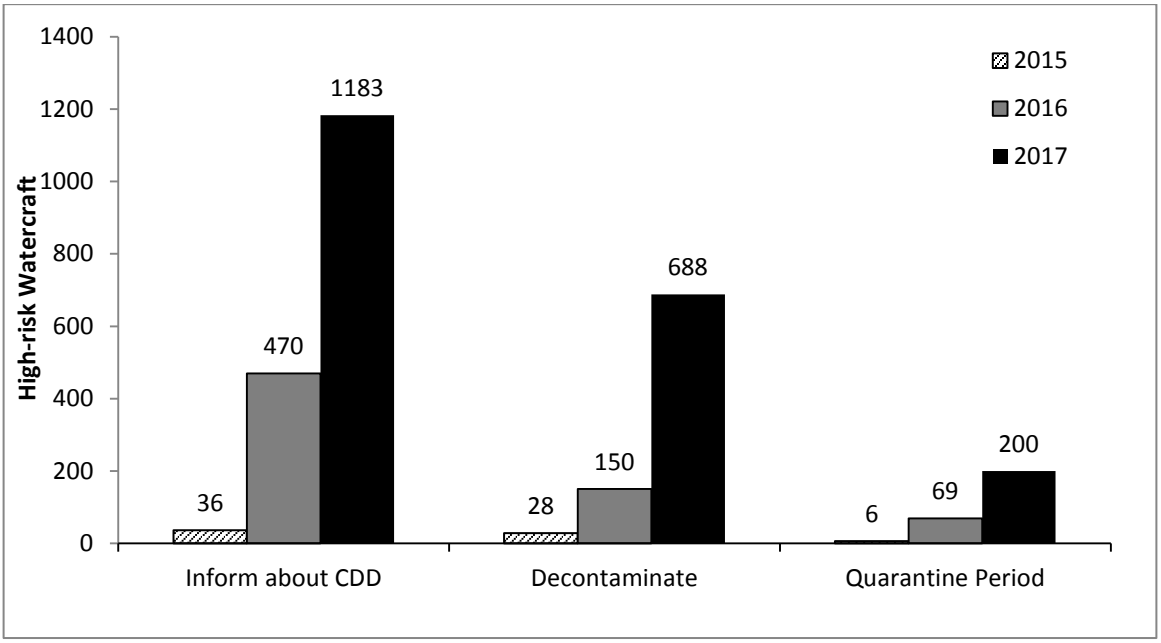
Figure 25. Total watercraft encounters by watercraft type (primary axis) and the percent that registered as high-risk (secondary axis).

3.2.1 Inspection Findings

Of the 2,071 high-risk watercraft, 688 were decontaminated. Of those, 200 were issued quarantine orders to allow for sufficient drying time of 30 days out of water (Figure 26). Quarantine orders are issued in situations when standing water or mussels are found and the boat has been out of the water less than 30 days, or if inspectors cannot confirm the history of the boat at the time of inspection, or a full decontamination cannot be completed at the time of inspection.

Of the 688 watercraft that were decontaminated, 25 were confirmed to have adult invasive mussels. The remaining 1,183 high-risk watercraft received full inspections with no signs of standing water or invasive mussels and had been cleaned, drained, and dried. These watercraft did not undergo decontamination, based on clean inspections and having been out of the water for over 30 days, or having arrived from a previous successful inspection/decontamination.

Quarantine orders were enforced by applying wire seals to the boats and inspectors followed up at the end of the quarantine period to ensure the seals were still intact prior to the boat being launched. A total of 1,303 of the 2,071 high-risk watercraft (63%) had been through a previous inspection station within either BC or another jurisdiction.



CDD = Clean, Drain, Dry

Figure 26. Actions taken following inspection of high-risk watercraft.

3.3 MUSSEL INFESTED WATERCRAFT

A total of 25 mussel infested watercraft were encountered, of which 20 had been through a previous inspection station in another jurisdiction and about which BC had received advanced notification. This highlights the importance of having several jurisdictional layers of inspection stations to increase the likelihood of detection. Of the total mussel fouled boats, eight were initially intercepted and inspected at the Golden inspection station on Highway 1. Two mussel-fouled boats were intercepted after dark at the Golden inspection station at 10 PM on September 11 and 10:45 PM on October 11. The Program had already received advanced notification about these boats from Alberta, demonstrating the effectiveness of the established notification system between jurisdictions.

The highest number of mussel infested watercraft encounters took place in May and June with five each, followed by four each in July, September, and October. The eight mussel fouled boats encountered in September and October demonstrate the importance of having inspection stations operational until late October. Figure 27 compares these results to the 2015 and 2016 field season, by month. Particular differences are the increased numbers of mussel fouled boats intercepted in May and October of 2017 relative to previous years.

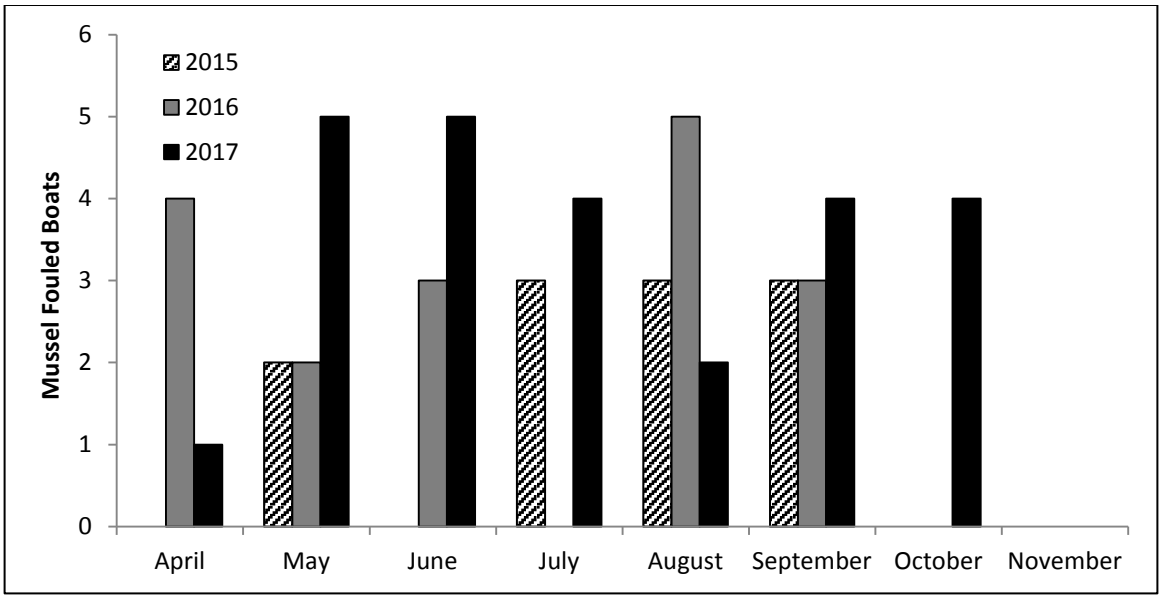


Figure 27. The number of mussel infested watercraft for the 2015, 2016, and 2017 seasons, by month.

Of the total number of mussel fouled boats, 14 had come from Ontario, 2 from Quebec, 2 from Michigan, 2 from Texas, 2 from New York, and 1 each from Arizona, Ohio, and Illinois (Figure 28 and Figure 29). The proportion of mussel fouled boats that came from eastern/Great Lakes jurisdictions in the 2017 season was 84%. Figure 28 shows that only 4 of 25 mussel fouled boats came from a southern U.S. state (Texas, Ohio, and Arizona), which illustrates the continued greater threat from waters in the eastern mussel infested provinces and states.

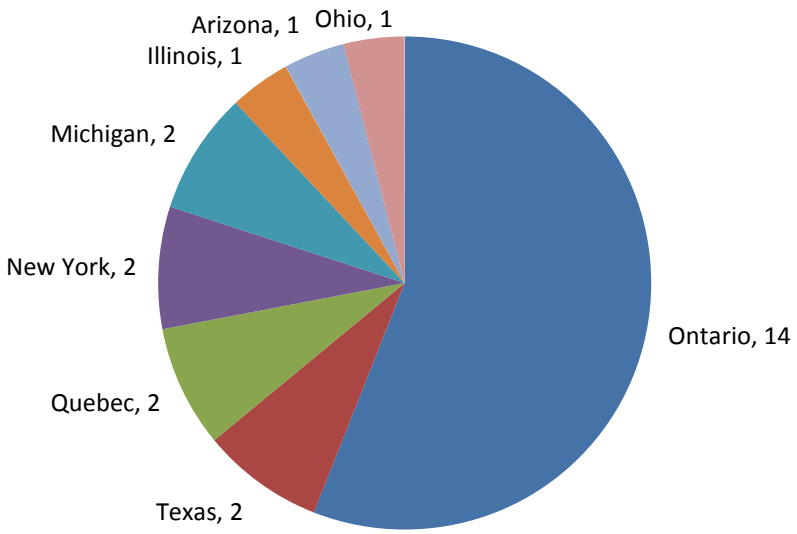


Figure 28. Source provinces and states of the 25 mussel fouled watercraft intercepted during the 2017 season.

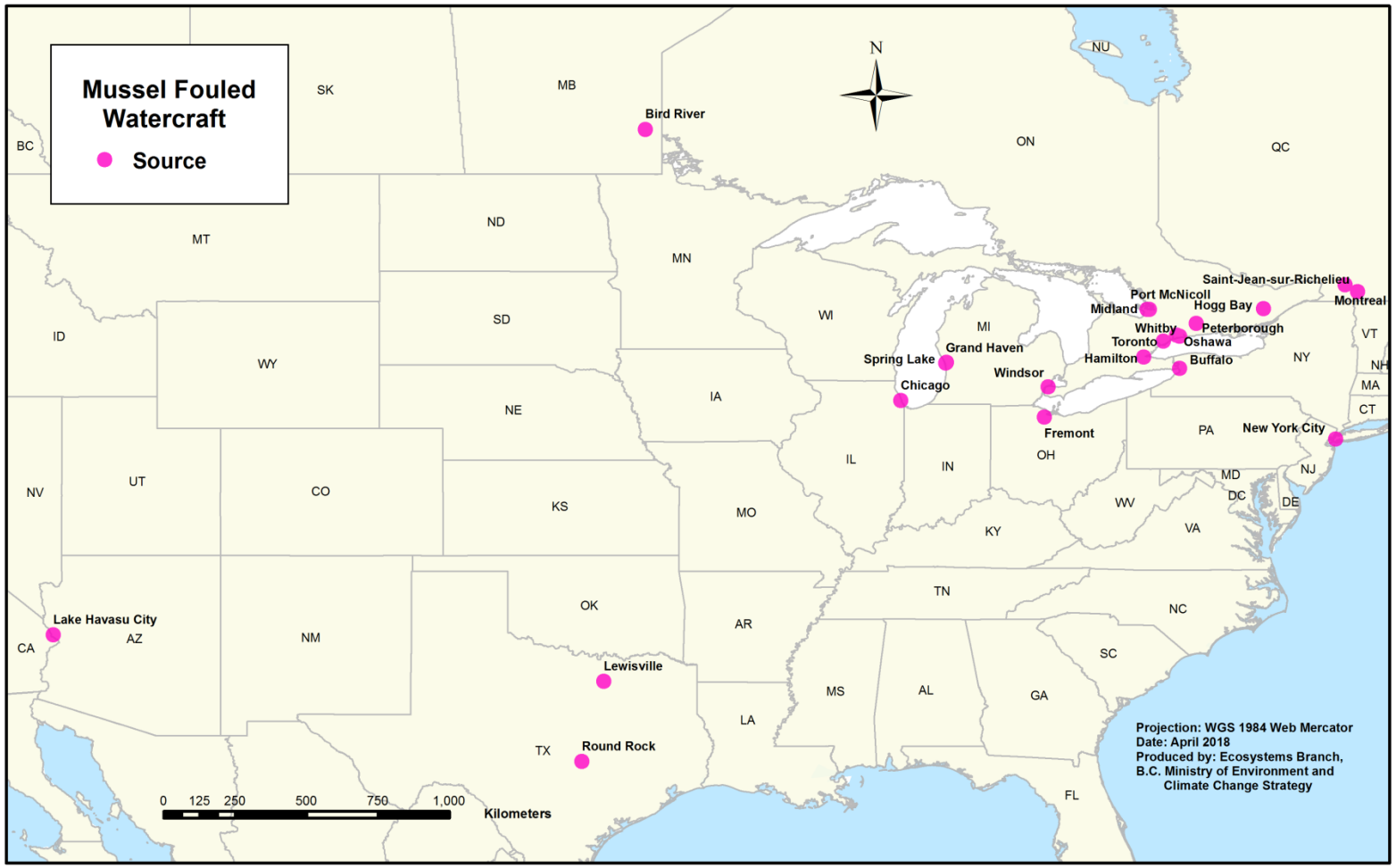


Figure 29. Source location of mussel fouled boats.

The most common destination of the mussel fouled boats by region was the Lower Mainland/South Coast with 11 (44%), followed by the Okanagan with 7 (28%), Vancouver Island with 4 (16%), and one (4%) for each of the Kootenays, Thompson-Nicola, and Alaska (Figure 30).

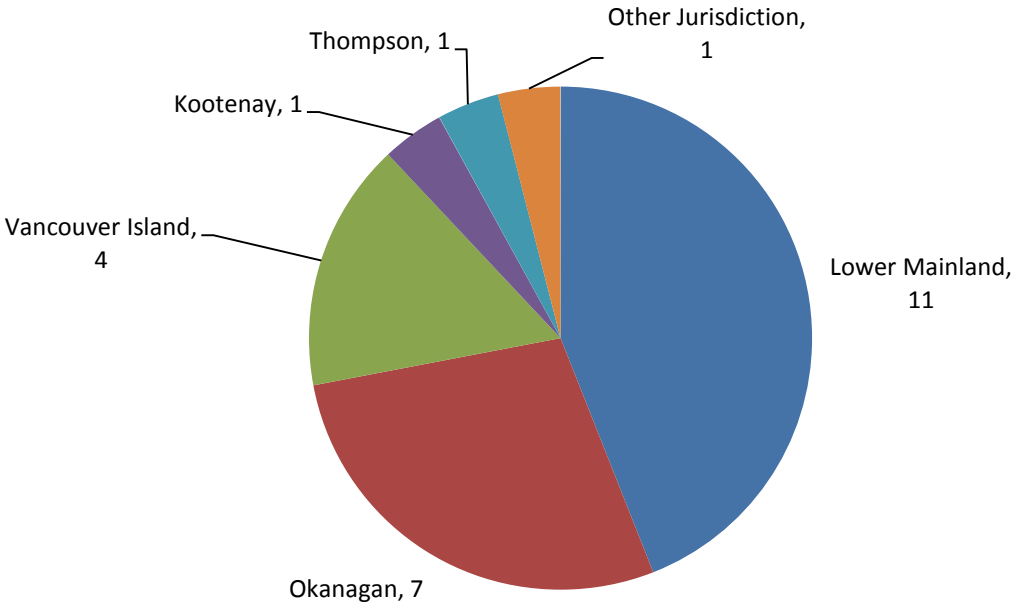


Figure 30. Destination regions of the 25 mussel fouled watercraft intercepted during the 2017 season.

3.4 COMMERCIALLY HAULED WATERCRAFT

Of the total watercraft inspected (just over 35,500), 349 were commercially hauled, representing less than 1% of the total boats inspected. Commercially hauled watercraft represent a very low percentage of total watercraft inspected; however, they demonstrate a disproportionately higher risk of carrying invasive mussels. While only 5.6% of high-risk watercraft were commercially hauled, 48% of mussel infested watercraft (12 of the 25 boats) were commercially hauled.

The Golden inspection station intercepted the highest number of commercially hauled watercraft (126), followed by the Pacific border crossing (49), and the Osoyoos border crossing (41) (Figure 32). This is consistent with results from the 2016 season and is expected since the Trans-Canada Highway, where the Golden station is located, is a primary travel route for commercially-hauled watercraft. Interestingly, despite the east Kootenay inspection stations (Jaffray, Elko, and Caithness) having high watercraft encounter frequency, they only saw a total of 13 commercially hauled watercraft, indicating Highway 3 is not a major route for commercial haulers.

Figure 33 illustrates the source location for all 349 commercially hauled watercraft inspected. This includes both new and used commercially hauled boats. The most common source location for commercially hauled boats was Alberta as new boats are frequently transported to Alberta and then shipped to BC (typically the Okanagan). Common locations of boat manufacturers include Tennessee, Florida, Washington, and Ontario. Used boats being commercially hauled from mussel infested jurisdictions pose the highest risk for transporting invasive mussels and common source locations are Ontario and Quebec (Figure 33).

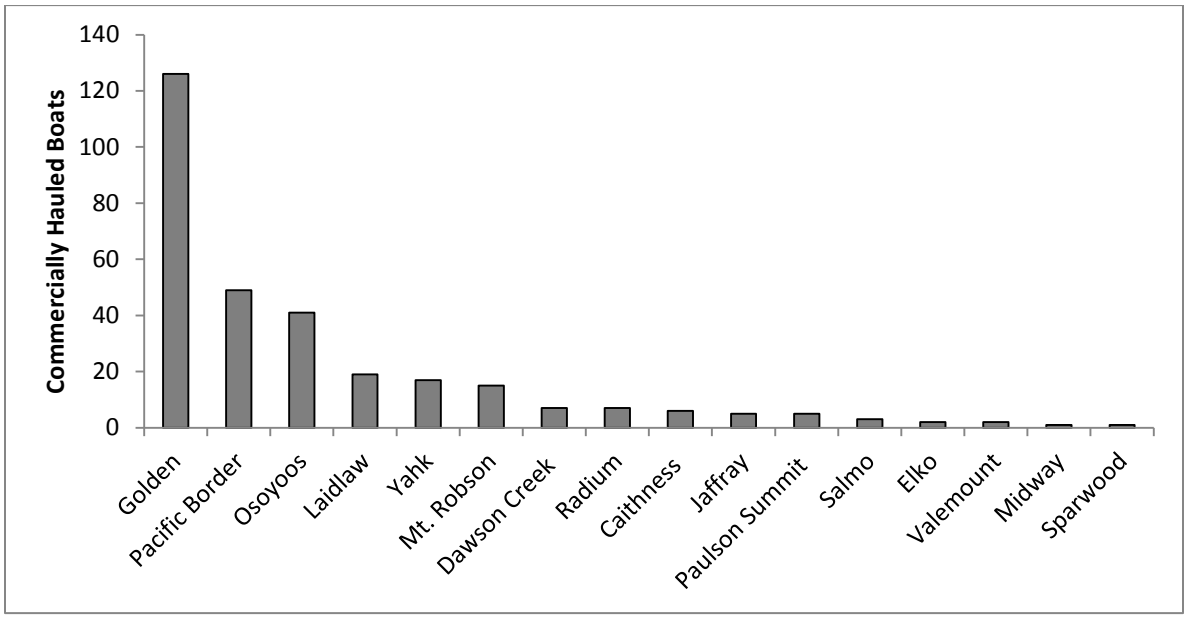


Figure 31. Number of commercially hauled boats intercepted at the watercraft inspection stations during the 2017 season.

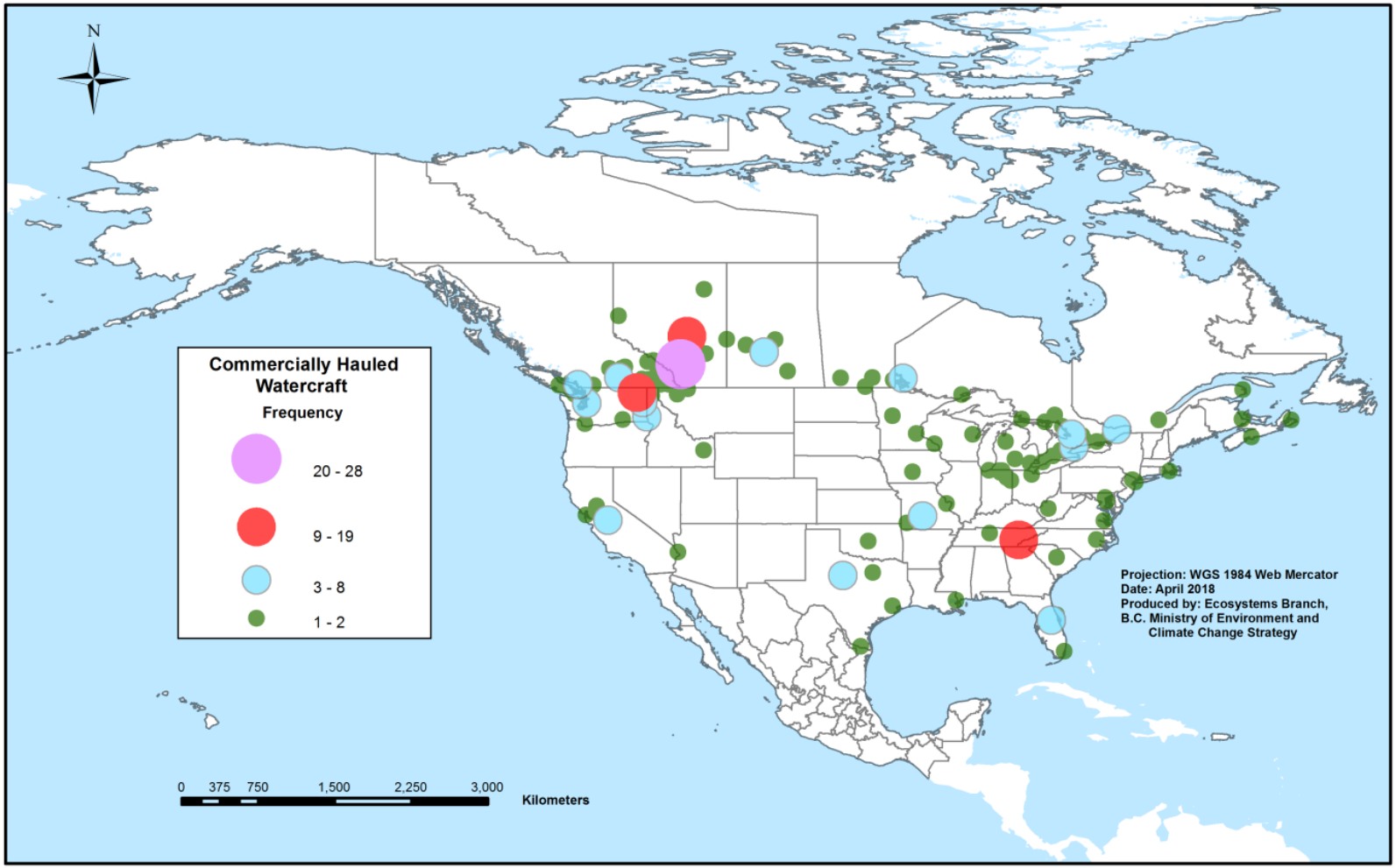


Figure 32. Source location of commercially hauled watercraft.

3.5 PILOT PASSPORT PROGRAM

In July 2017 BC and Alberta launched a joint watercraft passport pilot program. The passport is intended for watercraft that travel frequently through BC and Alberta. When passports are issued, boaters sign a commitment to practice Clean, Drain, Dry and stop at all inspection stations. It is still mandatory for all passport holders to stop at inspection stations, but the inspection process is quicker. The passport is stamped each time a boater goes through an inspection station. The passport serves as a record of past watercraft inspections.

Over the course of the season 1,390 passports were issued across the BC inspection stations (Figure 34). An additional 400 passports were issued by Alberta inspection stations. When passport holders stopped at an inspection station they were surveyed on their overall experience. Survey results showed that 99% of passport holders found it to be a positive/neutral experience.

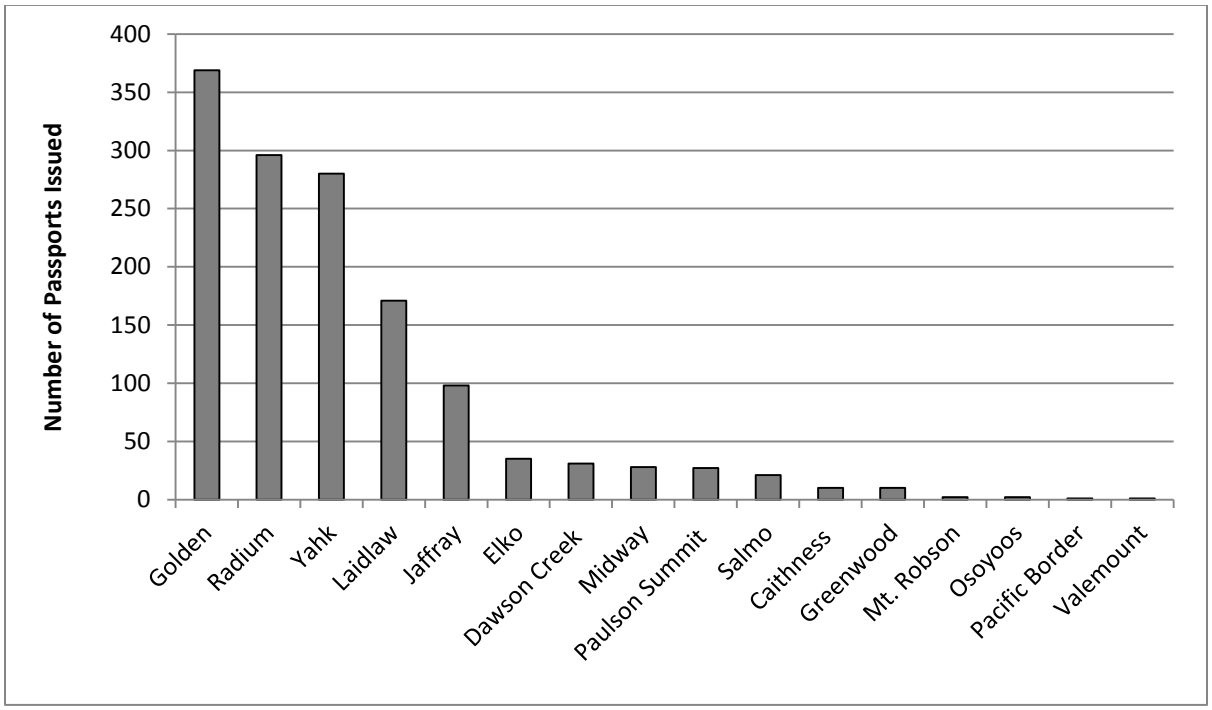


Figure 33. Number of passports issued during the 2017 season, by inspection station.

3.6 CANADA BORDER SERVICES AGENCY NOTIFICATIONS

During the 2017 season the Program worked directly with CBSA to receive notifications of watercraft at the southern border crossings, including 24-hr coverage along several of the southern border crossings. The Program received notification for all types of watercraft including canoes, kayaks, and river rafts.

For the 2017, season the Program received 315 notifications from CBSA at several different border crossings that inspectors responded to and followed-up on (Figure 35). These numbers reflect the notifications that were received through the Program's email inbox. In some instances, CBSA officers notified individual provincial inspectors by phone and those are not reflected here. It is also important to note that Program inspectors were set up at the Osoyoos and Cascade border crossings, during which time boats were directed to the inspectors, so a notification was not required. The Program saw a substantial increase over 2016 in the number of notifications received from CBSA in 2017 and work is underway to further streamline the notification process for the 2018 season.

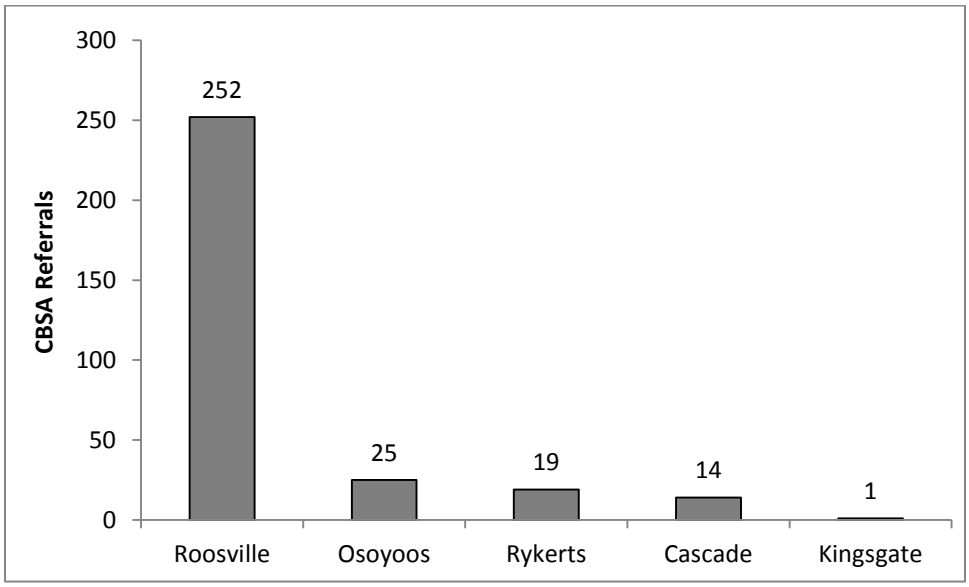


Figure 34. CBSA notifications received across several border crossings during the 2017 season.

3.7 OTHER AQUATIC INVASIVE SPECIES

In addition to assessing watercraft for risk of transporting invasive mussels, inspectors are looking for other aquatic invasive species. A total of 386 watercraft were identified during the 2017 season as transporting aquatic plants. Inspectors routinely offer to clean the watercraft to ensure they are free of aquatic plants and Clean, Drain, Dry before leaving an inspection station.

A total of 1,221 watercraft were identified as coming from an area in Alberta of high risk for whirling disease (*Myxobolus cerebralis*). Inspectors were equipped with outreach and education resources on whirling disease to share with watercraft owners and conveyed the importance of Clean, Drain, Dry for boats and gear to prevent the spread of whirling disease.

3.8 K9 INSPECTIONS

In 2017 the Program launched the start of the AIS K9 Unit and the training of BC's first multipurpose detection dog, Kilo. The primary handler of Kilo is a Sergeant within the COS. Kilo is trained to detect invasive mussels as well as firearms and bear parts, and will also be used in evidence recovery cases within the COS. Kilo and his handler toured the watercraft inspection stations during the 2017 season (Figure 36).

In his first year, Kilo was on shift to assist when needed for over 900 inspections and detected invasive mussels on two contaminated watercraft. One of those was a vehicle towing a trailered watercraft from Quebec that failed to stop at the Golden inspection station. The AIS K9 Unit apprehended the vehicle and escorted it back to the inspection station. During the K9 inspection, Kilo detected mussels in several locations and inspectors visually confirmed the presence of invasive mussels. The watercraft was decontaminated and sealed with a 30-day quarantine period. The owner of the watercraft received a ticket for failing to stop at the inspection station and a ticket for possession of Dreissenid mussels. The watercraft had previously been in infested waters in Quebec one week prior and was destined for Shuswap Lake, BC

Figure 35. Kilo was the newest addition to the Program team in 2017 and is trained as a multipurpose invasive mussel detection dog.

4. OUTREACH/EDUCATION ON CLEAN, DRAIN, DRY

4.1 INSPECTION STATIONS

It is estimated that inspection crews had approximately 73,300 interactions across all the inspection stations during the 2017 season to promote the message of Clean, Drain, Dry (CDD). Inspectors recorded whether the watercraft owner had any previous knowledge of AIS or CDD as a measure of efficacy of the Program to educate the public about AIS and CDD.

For the 2017 season, watercraft owners having previous knowledge of AIS and CDD averaged 63%, similar to the 2016 season results. It appeared that previous knowledge of AIS and CDD was higher at the start and end of the 2017 season, in March and November (Figure 37). This could be linked to the fact that the low risk boats primarily consisted of local boaters (from BC and AB) that may have had increased awareness about AIS and CDD through their watercraft inspection stations.

Information on the source of previous knowledge of AIS / CDD was also collected. Figure 38 shows that the top source was the previous inspection station visited (68%), followed by word of mouth (11%), brochures (4%), TV advertising/news (3%), and highway signs (4%). Of the previous inspection stations visited, 78% were in BC, 14.7% were in AB, and the remaining 6.5% were from other jurisdictions. These data provide important information about how to effectively target the boating community to raise awareness about AIS/CDD in future years of the Program.

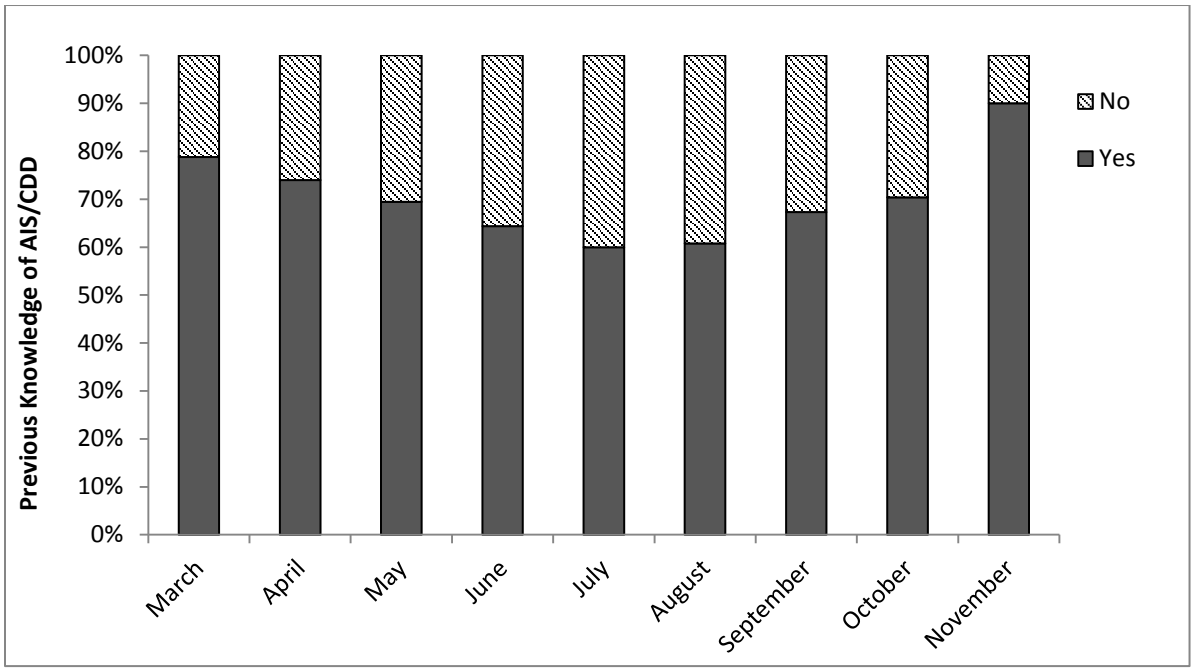
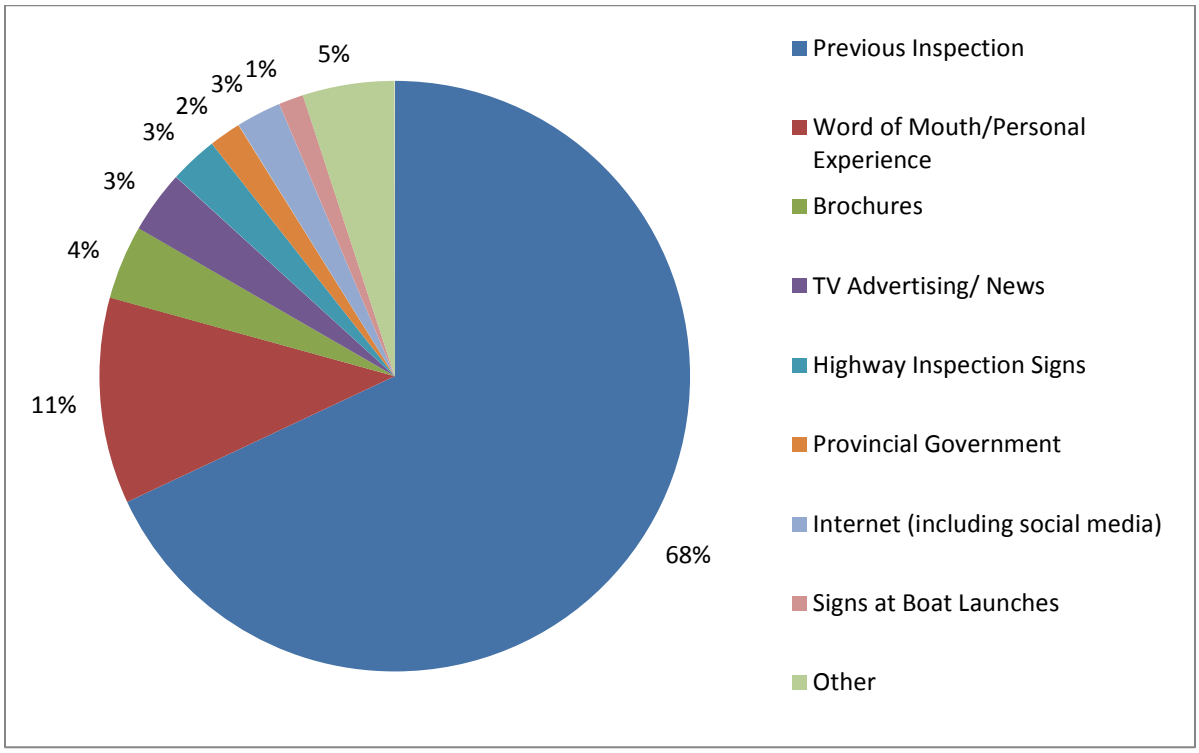


Figure 36. Watercraft owners' previous knowledge of aquatic invasive species and/or Clean, Drain, Dry across each month of Program operations in 2017.



Other sources of knowledge include but are not limited to: work-related training, radio, newspaper, local government outreach, regional invasive species councils, magazines, the Invasive Species Council of BC, and US/Canada border. Data were collected from boaters attending inspection stations.

Figure 37. Sources of previous knowledge of aquatic invasive species or Clean, Drain, Dry.

Over the entire 2017 season, 480 people voluntarily stopped at an inspection station to get more information, representing a 14.6% increase over the 419 who stopped during the 2016 season. This is a very positive sign of the public support and interest in the Program.

4.2 PARTNERSHIPS

At the provincial and international boundary scale, BC works directly with the western provinces and U.S. states to ensure consistent messaging such as CDD is going out to the boating community. The Program also works directly with Transport Canada to integrate the CDD message into boater safety materials.

At the provincial level, the Program works directly the non-governmental community, including the Invasive Species Council of BC and regional invasive species committees on outreach and education messaging. During the winter of 2017/18 the program worked with the Invasive Species Council of BC on a number of different outreach initiatives including outreach materials specifically targeting the non-motorized boating community. In addition, working with Invasive Species Council of BC on a MarinaWise

program to provide marinas with resources about practicing CDD and how to report high-risk watercraft to the provincial Program.

Since 2015, information on the watercraft inspection program and CDD has been included in the BC Freshwater Fishing Regulations Synopsis. Through ongoing partnership with the provincial Ministry of Transportation and Infrastructure, invasive species messages were displayed again in the summer of 2017 on overhead highway reader board signs throughout the province. The message displayed was "Stop Aquatic Invasive Species, Clean, Drain, Dry Your Watercraft" and was intended to educate the traveling public about aquatic invasive species prevention.

4.3 OUTREACH EVENTS

While provincial inspection stations were the first priority of the Program, when time permitted inspection crews also attended local events to provide education about CDD, invasive mussels, and other high-risk AIS. Inspection crews worked with several regional invasive species committees to identify suitable events to attend.

Table 2 provides a detailed list of the events attended during the 2017 season. This includes provincial events and meetings that were attended by senior Program staff but does not include out-of-province cross-border meetings attended by senior Program staff. Kilo and his handler attended a number of events such as the BC Boat & Sportsman/Hunting Show, the Union of BC Municipalities Convention, the Christina Lake Stewardship Society Annual General Meeting, and the Vancouver International Boat Show.

Table 2. Outreach events and meetings attended during the 2017 season.

Event	Date(s)	Location
2017 BC Boat & Sportsman/Hunting Show	March 4 – 6, 2017	Abbotsford
World Water Day	March 22, 2017	Dawson Creek
Castlegar Flying Fishing Symposium	March 25/26, 2017	Castlegar
2017 Gun & Sportsman Show	April 1/2, 2017	Dawson Creek
2017 Cloverdale Rod and Gun Show	April 29/30, 2017	Cloverdale
Fingerling Festival	May 06, 2017	Port Moody
Koocanusa Wakesurf Challenge	July 28/29, 2017	Cranbrook
Lake Windermere Ambassadors Summer Splash	August 6, 2017	Invermere
Wooden Boat Festival	August 24-27, 2017	Grandville Island
RiverFest	September 23′ 2017	New Westminster
Union of BC Municipalities	Sep 27/28, 2017	Vancouver
Boating BC Association Annual Conference	November 21, 2017	Richmond
Christina Lake Stewardship Society AGM	November 29, 2017	Christina Lake
2018 Vancouver International Boat Show	January 17-21, 2018	Vancouver

5. LAKE MONITORING

Monitoring is critical for early detection of new invasive species incursions in BC and is an important first step in the *Provincial Early Detection Rapid Response (EDRR) Plan*. The Province has been conducting early detection lake monitoring for ZQM since 2011. BC is one of the many jurisdictions across North America conducting early detection monitoring and active prevention efforts for invasive mussels.

In 2017, 402 samples were collected from 109 lakes throughout BC and all samples tested negative for the presence of invasive mussels (Figure 39). See Appendix B for complete list of lakes sampled in 2017. The severe wildfire season restricted access to lakes in some parts of the province resulting in slightly fewer samples collected than originally planned. In 2017, samples were collected by ENV and FLNR regional staff, BC Hydro, Boundary Invasive Species Society, Central Kootenay Invasive Species Society, Columbia-Shuswap Invasive Species Society, Christina Lake Stewardship Society, East Kootenay Invasive Species Society, Okanagan and Similkameen Invasive Species Society, Northwest Invasive Plant Council, Sea to Sky Invasive Species Council, and the Lillooet Regional Invasive Species Society.

The *British Columbia Dreissenid Mussel Lake Monitoring Field Protocol* was updated and published in February 2018 and it details the provincial protocols used for early detection lake monitoring for invasive mussels. As a signatory of the *Columbia River Basin Inter-agency Invasive Species Response Plan: Zebra Mussels and Other Dreissenid Species,* BC has committed to following the accepted methods for the collection, preservation, and analysis of invasive mussel veliger samples. As such, BC uses a specified cross-polarized microscopy method which is done through a designated lab to ensure the provincial standards are met.

In February 2018, the Habitat Conservation Trust Foundation announced a new granting program in partnership with the BC Ministry of Environment and Climate Change Strategy. This new granting program is designed to fund community efforts to monitor lakes in BC for the presence of invasive freshwater mussels under the $450,000 of provincial funding that was announced in March 2017. Applications were received in spring 2018 and grants are being allocated to support lake monitoring efforts for the 2018 season.

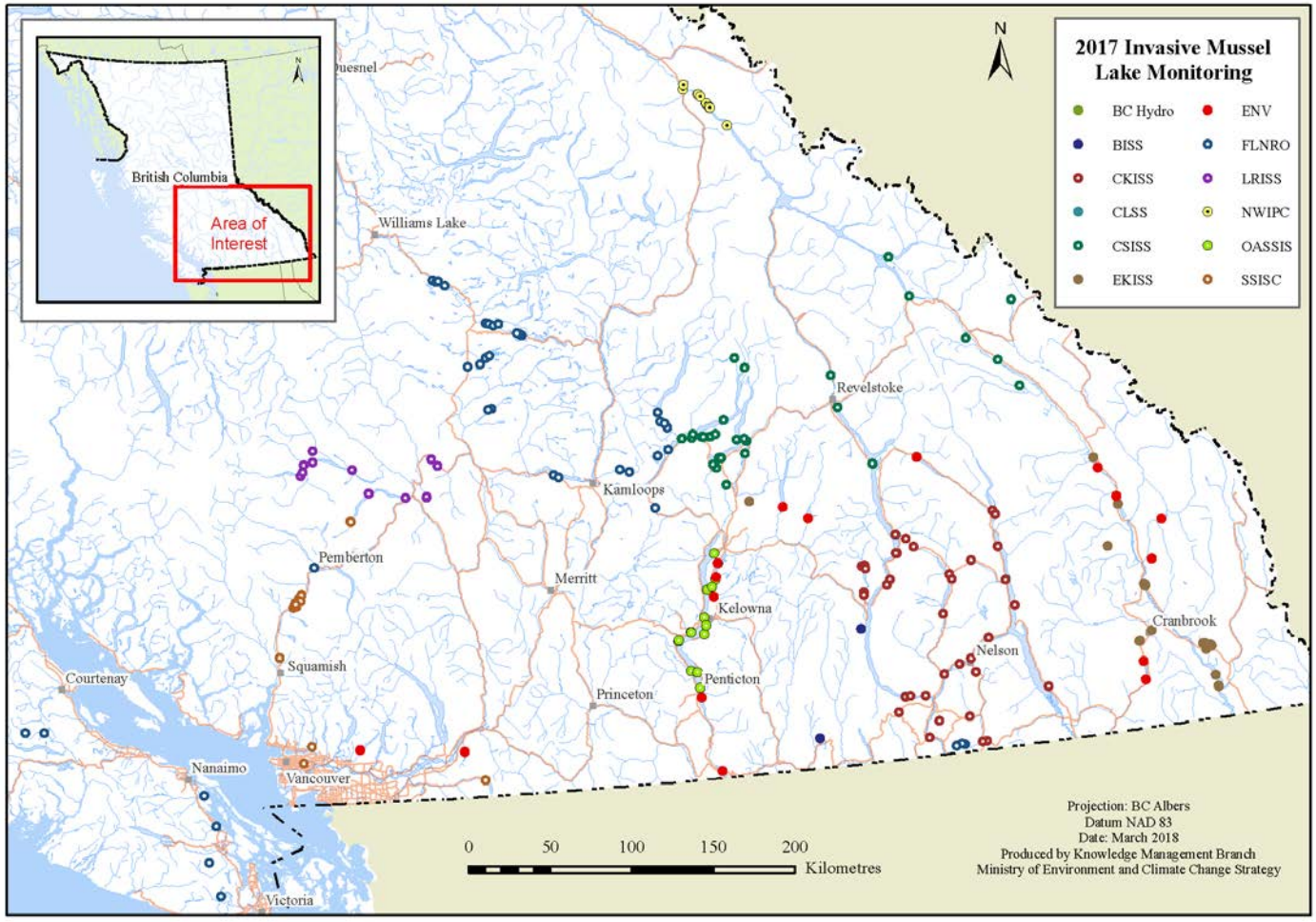


Figure 38. Locations of 2017 invasive mussel veliger samples collected by ENV and FLNR regional staff, and regional invasive species committees.

6. RESEARCH

The Program has just completed its fourth year of operations. For a relatively new program of this nature, it is critical that information on efficacy and compliance be collected, and to constantly identify ways to improve operations. Prior to the start of the Program, no data were available on boater movements in BC and no agency was tracking them. Hence, a standardised, real-time data collection process was established at the beginning of the Program to capture information on boater movements, compliance, awareness, enforcement actions taken, and level of risk associated with each watercraft. This information is used to determine the most effective positioning of inspection stations, and to monitor Program effectiveness.

The boater movement data also form the foundation of a collaboration with the University of Alberta, Mathematical Biology Research Chair, where a boater movement model is being developed to optimize boat inspection locations. The data were used to estimate how many boaters visit BC from each province and U.S. state. Furthermore, lake properties that correspond to high lake attractiveness have been identified, and routes boaters prefer are inferred. This information is used to build a comprehensive boater-traffic model. This model is used, in turn, to determine the BC lakes that attract most boaters from mussel-infested jurisdictions and are therefore at higher risk of invasion. The model is also being used to compute the most strategic locations for watercraft inspection stations. According to the model, the current choice of inspection locations is almost optimal. Nonetheless, the model will help further optimize inspection station operations further and serve as a basis for informed management decisions.

Another research collaboration is underway between the Program and Fisheries and Oceans Canada to assess whether eDNA testing is a reliable means of detecting the presence of ZQM in BC's freshwater environment. A critical part of this assessment is to understand how the eDNA test will behave in the presence of BC's native fauna. This is essential for minimizing the risk of false positives. Testing completed thus far has shown that the assay being used does not detect freshwater mussel species native to BC and that it is compatible with existing laboratory infrastructure. In the second year of the project, a full analytical validation of the eDNA assay's sensitivity will be completed. This will verify whether the assay performs up to sensitivity standards typically expected by this type of test; usually they are successful at detecting down to only a few copies of the target DNA. In addition, this project will survey other parts of the Pacific Northwest and generate a summary of other eDNA assays for ZQM in use in this region.

Finally, the Program is also partnering with the University of British Columbia on the development of an ecosystem model of Shuswap Lake which characterizes the interrelationships between different trophic groups, species, and life stages. The model is then able to project ecosystem response to the addition of ZQM in the system. The model will be conditioned on nutrient concentrations and tuned to existing time series on kokanee and sockeye abundance, rainbow and bull trout catches, zooplankton, and phytoplankton. The model will be used to characterize likely scenarios of invasion and impact and evaluate various mitigation measures.

7. OTHER PARTNERSHIPS AND COLLABORATIONS

Partnerships and collaboration are at the foundation of the Program. Establishing a new program of this complexity requires working with various levels of government in BC, Canada, and the U.S. Within the provincial government the Program is administered by staff within ENV Ecosystems Branch, and the COS.

The Program has also benefited from the active support of the provincial Inter-Ministry Invasive Species Working Group (IMISWG). Through the IMISWG, Program communications were amplified from MOTI highway billboards to Facebook and Twitter from multiple ministries, all reaching targeted audiences on the importance of the Clean, Drain, Dry message to reduce the risk associated with invasive mussels. The Program also works with BC Parks, Service BC, and FLNR for program delivery, education and outreach, and monitoring.

Outside of BC, the Program shares research, procedures, and notifications of high-risk boats with Idaho, Montana, Washington, Oregon, Wyoming, Nevada, Arizona, California, Alaska, Yukon, Saskatchewan, Manitoba, and Alberta. Specifically the program worked very closely with the Alberta invasive mussel program regarding high-risk watercraft notifications during the 2017 season. On-going and effective communication enabled both provinces to address high-risk watercraft in a timely manner.

Western Provinces Coordination

Through the Western Inter-Provincial-Territorial Agreement for invasive species, a secret boater quality assurance / quality control exercise was conducted during the 2017 season. The exercise was led by Alberta, on behalf of the western provinces and each province (MB, AB, and BC) provided input into the areas to be audited. Saskatchewan was invited, but elected not to participate. The purpose of the secret boater exercise was:

1. To ensure consistent messaging to boaters across the western provinces on Clean, Drain, Dry;
2. For each province to assess their standards and protocols being used across the inspection stations for determining risk, conducting inspections, and taking corrective actions with watercraft individual stations; and
3. Make any necessary adjustments, as a result of the exercise, while still within the 2017 operating season.

The main areas that were evaluated at each inspection station were station setup (highway signs etc.), initial contact, interview, inspection, outreach, and safety. An Alberta Parks staff member travelled from Manitoba to BC in mid-July transporting a trailered motorized watercraft and stopping at 12 inspection stations across Manitoba (2 stations), Alberta (7 stations), and BC (3 stations) (Figure 40). The watercraft was staged with standing water (plug in) and inspectors were told it had been in Ontario waters within the last week.

In BC, the secret boater first stopped at the Golden inspection station on Tuesday July 23 and inspectors were able to perform a complete decontamination and the boat was released. On Wednesday July 24, the secret boater stopped at the Invermere station and a complete decontamination could not be

performed as the boat engine was out of gas. Thus, the boat was sealed and the secret boater was issued a quarantine period. On Thursday July 25 the secret boater cut the seal before moving on to the Jaffray inspection station. The inspectors at Jaffray issued a new seal and quarantine. Immediately following this an email notification was sent out to all other stations with pictures and identifying information about this watercraft, as well as the seal and quarantine that was issued. This alerted the inspectors in Invermere that the owner had removed the seal previously applied at the Invermere station before going through the Jaffray station. Within fifteen minutes the Program had notified the COS and several Conservation Officers were deployed to apprehend the secret boater for failing to comply with a decontamination order. The COS was also in the process of contacting the RCMP to apprehend this person along all possible highway routes. Program staff realized in time that this was in fact the secret boater.

While this exercise was meant to be an inspection only, and not an audit of enforcement action, the Program and COS were very happy with the response and outcome of the exercise. As a result of the response by BC, AB adjusted their procedures to have notifications sent out to every inspection station in the province whenever a boat is issued a quarantine order, as a means to keep track of any potential violations. The overall evaluation of the exercise was that it is highly unlikely for a mussel infested watercraft coming from Ontario to pass through BC's boat inspection stations.

Figure 39. Route traveled by the secret boater exercise in July 2017.

8. SUMMARY OF LESSONS LEARNED

8.1 WATERCRAFT INSPECTION SUMMARY

A significant operational change from the 2016 to 2017 season was the addition of Montana and Saskatchewan as high risk jurisdictions under Schedule 5 of the Controlled Alien Species Regulation (see Section 1.2 for more information). This resulted in increased numbers of high risk boats being intercepted at the inspection stations with 41% (842 boats) of the high risk boats coming from Montana and Saskatchewan. This further resulted in more decontaminations being performed, in particular at the eastern border inspection stations. Of the 639 decontaminations being performed, 497 were at the eastern border inspection stations. Inspection station locations and staffing levels were assessed at the end of the 2017 season to address this (see Section 8.3 below).

Another change that was implemented part way through the 2017 season was the BC/AB pilot passport program. The pilot was a huge success and of the passport holders surveyed 99% had a positive or neutral experience. BC and AB will be continuing the program in the 2018 season, and BC will be looking for ways to further streamline the process in the 2018 season, such as having separate lanes at inspection stations to further expedite the process for passport holders.

Of the 25 mussel fouled boats through the season, 8 were intercepted in late September through early October. This demonstrates the importance of keeping inspection stations operational until late October. With 84% of the mussel fouled watercraft intercepted during the 2017 boating season identified as coming from the east, it is clear that the BC/Alberta border crossings should continue to be a priority in 2018.

During the 2016 and 2017 seasons the Program learned, through close collaboration with neighbouring jurisdictions, that brand new boats can also pose a risk for transporting invasive mussels. A number of boat manufacturers test new boats in local mussel-infested waters, creating the risk of standing water in internal compartments, such as ballast tanks, and potentially transporting invasive mussel larvae. These new boats are then transported to retailers across North America. In response, the Program has developed a manufacturer database to track how and where new boats are being tested by manufacturers. The database was updated regularly over the course of the 2017 season. If new boats were coming from a manufacturer that tests in infested waters, inspectors followed up with an inspection and decontamination, or quarantine if necessary. For the 2018 season the Program aims to work with several manufacturers to find alternative ways for new boats to be tested to minimize or eliminate the risk of invasive mussels being transported on these new boats.

8.2 WATERCRAFT NOTIFICATIONS

In addition to conducting watercraft inspections at established stations, the inspection crews responded to high-risk watercraft notifications received from within the province and from other jurisdictions. During the 2017 the Program worked very closely with CBSA to receive notification of all types of watercraft coming through the border crossings. There was a substantial increase in the number of notifications received by CBSA, in particular from the Rooseville crossing that borders Montana, with

252 notifications received. However, the Program did not receive notifications from all the border crossings in 2017 and will continue to work closely with CBSA for the 2018 season to determine ways to further improve the notification system.

Of the 25 mussel infested watercraft encountered during the 2017 season, 20 had been through a previous inspection station in another jurisdiction, and BC had received advanced notification of these watercraft. This highlights the importance of having several jurisdictional layers of inspection stations to increase the likelihood of detection.

8.3 INSPECTION STATION LOCATIONS

One challenge that the Program faced in 2017 was to ensure that all the watercraft inspection station locations met both the operational requirements of the Program as well as the safety requirements identified by MOTI. Senior Program staff worked with MOTI staff over the fall and winter to identify alternative locations in the east Kootenays. The locations identified and agreed upon by Program and MOTI staff will result in some adjustments to Program operations for the 2018 season. The Cranbrook inspection station (rotated between Jaffray, Caithness, Sparwood and Elko in 2017) will be split into two inspection stations with a fixed location on Hwy 93, just north of the Rooseville border crossings, and Hwy 3 between Fernie and Sparwood. This will maximize capturing traffic coming north from Montana (a high-risk state) and traffic coming from the east on Hwy 3, and will also provide additional staffing resources to address the large number of high-risk boats and subsequent decontaminations required at these locations.

Other adjustments that will be made for the 2018 season include inspectors previously based out of Nelson will be based out of Castlegar to reduce travel time to the inspection stations. The Lower Mainland will be split into two inspection stations/crews with one crew based out of Chilliwack for the Laidlaw inspection station, and one crew based out of Surrey for the Pacific border crossing station. This will increase the hours of operation at the Pacific border crossing station in order to target high-risk boat traffic.

8.4 COMPLIANCE

The average compliance for the 2017 season (76%) is comparable to other jurisdictions' watercraft inspection program compliance rates after several years of operation. A number of factors affected the overall compliance at BC inspection stations. For example, the Cascade and Osoyoos border crossings had very high compliance, where watercraft were directed by CBSA staff to the Program Inspectors. This provided little opportunity for watercraft owners to bypass the inspection station. Conversely, the Laidlaw weigh scale and the Kicking Horse rest area are both situated on highways with high speed limits (100-120 km/h) and large volumes of semi-truck traffic passing the stations. This makes it more difficult for boaters to see the inspection station, and to safely slow down and pull over. Compliance was also affected by the physical location of stations situated on roads (e.g., a corner, cloverleaf, or intersection), any nearby road construction (competing signage), and by targeted traffic direction (one-way versus two-way).

A new initiative for 2017 to help expand Program effectiveness was the use of electronic reader boards to increase the visibility of the high volume inspections stations (Dawson Creek, Mt. Robson, Golden, Jaffray/Caithness, and Yahk) from the highway. In addition, messaging was displayed outside of inspection operating hours that directed motorists to report where they were arriving from and their destination in BC Inspectors then followed up to arrange for watercraft inspection/decontamination if necessary.

A total of 59 tickets and 86 warnings were issued by full time Conservation Officers to motorists for failing to stop at a watercraft inspection station. When full time Conservation Officers were not on site to issue tickets and warnings to motorists, the inspectors reported all high-risk boats that failed to stop to the RAPP line. RAPP line notifications were circulated to all the full time Conservation Officers within the region. An example of the effectiveness of this system occurred in August 2017 when a motor vehicle transporting a watercraft from Ontario failed to stop at the Golden inspection station. Inspectors immediately notified the COS using the RAPP hotline. The watercraft owner was later apprehended by a Conservation Officer near Sicamous and, upon visual inspection, the Conservation Officer observed adult invasive mussels. The boat was sealed to the trailer and the driver was issued a violation ticket for failing to stop at the watercraft inspection station. The driver was ordered to report to invasive mussel inspectors in the Lower Mainland where a complete decontamination of the watercraft was performed.

When full time Conservation Officers apprehend and pull over motorists for failing to stop at an inspection station, they asked motorists their reason for not stopping. Officers observed that motorists were frequently mistaking the inspection station signs for construction signs due to the orange and black colors. In addition, data from inspection stations showed that in both 2016 and 2017 a large proportion of non-compliant vehicles were transporting non-motorized watercraft. Based on this data and feedback from Officers, the Program worked closely with MOTI staff over the winter and spring of 2017/2018 to develop new inspection station signs. The signs were developed through a series of focus groups to identify signs that will maximize both visibility and awareness of the traveling public. The new signs will be implemented for the 2018 season.

8.5 INSPECTION SEASON DURATION/HOURS OF OPERATION

As part of the Program expansion, the inspection season was extended to November 10 to assess the volume of boats being transported later into the season. The data showed that boat traffic significantly decreased at this time of year, with only 44 watercraft inspected in November across the nine inspection stations that were still operational. In addition, many of the inspection stations experienced substantial winter weather conditions, making it an occupational health and safety concern to operate the stations under these conditions (Figure 41).

Some adjustments that will be made for the 2018 season will be to close the northern inspection stations (Dawson Creek and Valemount) at the end of September and the southern inspection stations at the end of October. Approximately 34 auxiliary inspectors will be on staff from March to the end of October, and 30 from May to early September. This will allow for the inspection stations to operate 10

hrs per day and 7 days per week during the slower shoulder season, and run at full scale dawn to dusk and 24 hr (Golden) during the busy boating season (May to early September).

Figure 40. Winter weather conditions experienced in November 2017 at the Golden inspection station on Hwy 1.

APPENDIX A 2017 WATERCRAFT INSPECTION STATION DETAILS

Station Name	Hwy #	Region	Type	Traffic Direction/Comments
Dawson Creek	2	Peace	Pullout	Westbound
Elko	93 and 3	Kootenay	Rest area	West, east and northbound
Golden	1	Kootenay	Rest area (Kicking Horse)	Westbound
Jaffray	3	Kootenay	Pullout	Westbound
Laidlaw	1	Lower Mainland	Weigh scale	Eastbound
Midway	3	Kootenay	Weigh scale (not active)	East and Westbound
Mt. Robson	16	Omineca	Pullout	Westbound
Osoyoos	97	Okanagan	Border crossing	Northbound
Pacific	176 Ave	Lower Mainland	Weigh scale	Northbound
Paulson Summit	3	Kootenay	Pullout	Westbound
Radium	95	Kootenay	Pullout	Southbound
Salmo	3	Kootenay	Pullout	Westbound
Sparwood	3	Kootenay	Pullout	Westbound
Valemount	5	Omineca	Pullout	Westbound
Yahk	95 and 3	Kootenay	Pullout	Westbound

APPENDIX B RESULTS FROM 2017 VELIGER SAMPLE ANALYSIS

Analysis completed by Cordillera Consulting Inc. in Summerland, BC.

Lake / Waterbody	Sampling Agency	Sampling Date	Lat (decimal degrees)	Long (decimal degrees)	ZQM[1] Veligers Detected (Yes/No)
Adams Lake	FLNR	07-Sep-17	50.9872	-119.7255	No
Adams Lake	FLNR	07-Sep-17	50.9494	-119.6687	No
Adams Lake	FLNR	07-Sep-17	50.9741	-119.6890	No
Adams Lake	FLNR	08-Sep-17	51.0373	-119.7404	No
Alouette Lake	ENV	27-Jun-17	49.2936	-122.4882	No
Alouette Lake	ENV	25-Jul-17	49.2936	-122.4882	No
Alouette Lake	ENV	15-Aug-17	49.2935	-122.4882	No
Alouette Lake	ENV	11-Sep-17	49.2936	-122.4882	No
Alpha Lake	SSISC	03-Aug-17	50.0942	-123.0011	No
Alpha Lake	SSISC	03-Aug-17	50.0941	-123.0005	No
Alta Lake	SSISC	12-Sep-17	50.1130	-122.9763	No
Alta Lake	SSISC	01-Aug-17	50.1189	-122.9827	No
Alta Lake	SSISC	01-Aug-17	50.1078	-122.9814	No
Alta Lake	SSISC	03-Aug-17	50.0979	-122.9743	No
Alta Lake	SSISC	12-Oct-17	50.1189	-122.9827	No
Anderson Lake	LRISS	17-Aug-17	50.7011	-122.3031	No
Anderson Lake	LRISS	12-Sep-17	50.7043	-122.3065	No
Anderson Lake	SSISC	16-Aug-17	50.5541	-122.4757	No
Anderson Lake	SSISC	16-Aug-17	50.5507	-122.4717	No
Arrow Lake, Lower	CKISS	17-Sep-17	49.3409	-117.8714	No
Arrow Lake, Lower	CKISS	17-Sep-17	49.3424	-117.8292	No
Arrow Lake, Lower	CKISS	15-Jul-17	49.3409	-117.8714	No
Arrow Lake, Lower	CKISS	15-Jul-17	49.3424	-117.8292	No
Arrow Lake, Lower	CKISS	02-Aug-17	49.3409	-117.8714	No
Arrow Lake, Lower	CKISS	02-Aug-17	49.3424	-117.8292	No
Arrow Lake, Lower	CKISS	25-Aug-17	49.3409	-117.8714	No
Arrow Lake, Lower	CKISS	25-Aug-17	49.3424	-117.8292	No
Arrow Lake, Lower	FLNR	25-Jul-17	49.3414	-117.8700	No
Arrow Lake, Lower	FLNR	23-Aug-17	49.3402	-117.8716	No
Arrow Lake, Upper	CSISS	18-Jul-17	50.6372	-117.9230	No
Arrow Lake, Upper	CSISS	15-Aug-17	50.6372	-117.9235	No
Arrow Lake, Upper	CKISS	23-Sep-17	49.9932	-117.8867	No

Lake / Waterbody	Sampling Agency	Sampling Date	Lat (decimal degrees)	Long (decimal degrees)	ZQM[1] Veligers Detected (Yes/No)
Arrow Lake, Upper	CKISS	23-Sep-17	49.9646	-117.9191	No
Arrow Lake, Upper	FLNR	17-Jul-17	49.9152	-116.9053	No
Arrow Lake, Upper	CKISS	08-Jul-17	50.1319	-117.8109	No
Arrow Lake, Upper	CKISS	26-Jul-17	50.2361	-117.7979	No
Arrow Lake, Upper	CKISS	26-Jul-17	50.1319	-117.8048	No
Arrow Lake, Upper	CKISS	29-Aug-17	50.2361	-117.7979	No
Arrow Lake, Upper	CKISS	29-Aug-17	50.1319	-117.8109	No
Arrow Lake, Upper	FLNR	26-Jul-17	50.2356	-117.7973	No
Arrow Lake, Upper	FLNR	22-Aug-17	50.2353	-117.7974	No
Arrow Lake, Upper	CSISS	11-Oct-17	50.6382	-117.9247	No
Babine Lake	ENV	14-Aug-17	54.8507	-126.1844	No
Beavertail lake	FLNR	21-Jul-17	49.9828	-125.4975	No
Box Lake	CKISS	17-Aug-17	50.2058	-117.7120	No
Brannen Lake	ENV	21-Aug-17	49.2140	-124.0500	No
Brohm Lake	SSISC	11-Sep-17	49.8213	-123.1336	No
Burns Lake	ENV	28-Aug-17	54.1318	-125.4537	No
Buttle Lake #1	FLNR	22-Jul-17	49.6578	-125.5328	No
Buttle Lake #2	FLNR	22-Jul-17	49.5934	-125.5596	No
Buttle Lake #3	FLNR	23-Jul-17	49.6123	-125.5390	No
Buttle Lake #4	FLNR	23-Jul-17	49.8306	-125.6146	No
Buttle Lake #5	FLNR	24-Jul-17	49.8044	-125.6016	No
Buttle Lake #6	FLNR	24-Jul-17	49.8210	-125.6186	No
Campbell Lake #1	FLNR	20-Jul-17	49.9953	-125.4432	No
Campbell Lake #2	FLNR	20-Jul-17	50.0007	-125.3860	No
Campbell Lake #3	FLNR	20-Jul-17	50.0142	-125.3735	No
Campbell Lake #4	FLNR	21-Jul-17	49.9953	-125.4432	No
Carpenter Reservoir	LRISS	14-Aug-17	50.8374	-122.4392	No
Carpenter Reservoir	LRISS	13-Sep-17	50.8896	-122.7776	No
Cedar Lake	CSISS	26-Jul-17	51.2628	-116.9820	No
Champion Lake (3rd)	FLNR	29-Jul-17	50.7579	-120.8627	No
Champion Lake (3rd)	CKISS	05-Jul-17	49.1865	-117.6116	No
Champion Lake (3rd)	CKISS	18-Aug-17	49.1865	-117.6116	No
Chilliwack Lake	SSISC	14-Sep-17	49.0877	-121.4508	No
Christina Lake	CLSS	17-Jun-17	49.1022	-118.2411	No
Christina Lake	CLSS	17-Jun-17	49.1236	-118.2578	No

Lake / Waterbody	Sampling Agency	Sampling Date	Lat (decimal degrees)	Long (decimal degrees)	ZQM[1] Veligers Detected (Yes/No)
Christina Lake	CLSS	03-Jul-17	49.1022	-118.2411	No
Christina Lake	CLSS	03-Jul-17	49.1236	-118.2578	No
Christina Lake	CLSS	22-Jul-17	49.1022	-118.2411	No
Christina Lake	CLSS	22-Jul-17	49.1236	-118.2578	No
Christina Lake	CLSS	12-Aug-17	49.1022	-118.2411	No
Christina Lake	CLSS	12-Aug-17	49.1236	-118.2578	No
Christina Lake	CLSS	04-Sep-17	49.1022	-118.2411	No
Christina Lake	CLSS	04-Sep-17	49.1236	-118.2578	No
Columbia Lake	EKISS	21-Jul-17	50.2440	-115.8674	No
Columbia Lake	EKISS	21-Jul-17	49.4805	-115.8470	No
Columbia Lake	EKISS	21-Jul-17	50.2896	-115.8705	No
Columbia Lake	ENV	29-Aug-17	50.2885	-115.8695	No
Columbia River	CKISS	17-Sep-17	49.3343	-117.6998	No
Columbia River	CKISS	17-Sep-17	49.1021	-117.7079	No
Columbia River	CKISS	15-Jul-17	49.3343	-117.6998	No
Columbia River	CKISS	15-Jul-17	49.1021	-117.7079	No
Columbia River	CKISS	02-Aug-17	49.3343	-117.6998	No
Columbia River	CKISS	25-Aug-17	49.1021	-117.7079	No
Columbia River	CKISS	25-Aug-17	49.3343	-117.6998	No
Columbia Wetlands	CSISS	25-Jul-17	51.1205	-116.7300	No
Cottonwood Lake	CKISS	28-Jul-17	49.4301	-117.2554	No
Cottonwood Lake	CKISS	18-Aug-17	49.4301	-117.2554	No
Cowichan Lake	ENV	21-Aug-17	48.8240	-124.0620	No
Cranberry Marsh	NWIPC	23-Aug-17	52.8198	-119.2430	No
Cranberry Marsh	NWIPC	06-Jun-17	52.8198	-119.2430	No
Cranberry Marsh	NWIPC	12-Jul-17	52.8198	-119.2430	No
Cranberry Marsh	NWIPC	24-Jul-17	52.8198	-119.2430	No
Cranberry Marsh	NWIPC	06-Jun-17	52.8198	-119.2430	No
Crown Lake	LRISS	03-Aug-17	50.8339	-121.6940	No
Crown Lake	LRISS	06-Sep-17	50.8339	-121.6939	No
Deer Lake	SSISC	20-Sep-17	49.2349	-122.9661	No
Downton Reservoir	LRISS	14-Aug-17	50.8174	-122.8903	No
Downton Reservoir	LRISS	13-Sep-17	50.8368	-122.8690	No
Duncan Lake	CKISS	22-Sep-17	50.3024	-116.9442	No
Duncan Lake	CKISS	22-Sep-17	50.2792	-116.9241	No

Lake / Waterbody	Sampling Agency	Sampling Date	Lat (decimal degrees)	Long (decimal degrees)	ZQM[1] Veligers Detected (Yes/No)
Duncan Lake	FLNR	19-Jul-17	50.3100	-122.8067	No
Duncan Lake	CKISS	07-Jul-17	5.0390	-116.9512	No
Duncan Lake	CKISS	24-Jul-17	50.3024	-116.9442	No
Duncan Lake	CKISS	24-Jul-17	50.2792	-116.9241	No
Echo Lake	FLNR	19-Jul-17	49.9862	-125.4138	No
Elk Lake	ENV	23-Aug-17	48.5300	-123.4000	No
Elk/Beaver Lake #1	FLNR	26-Jul-17	48.5255	-123.3881	No
Elk/Beaver Lake #2	FLNR	26-Jul-17	48.5326	123.4086	No
Ellison Lake	ENV	19-Sep-17	49.9981	-119.4021	No
Elsie Lake	FLNR	04-Oct-17	49.4407	-125.1480	No
Emerald Lake	CSISS	06-Sep-17	51.4399	-116.5412	No
Erie Lake	FLNR	29-Jul-17	50.7552	120.8467	No
Erie Lake	CKISS	05-Jul-17	49.1914	-117.3524	No
Erie Lake	CKISS	28-Jul-17	49.1914	-117.3524	No
Erie Lake	CKISS	18-Aug-17	49.1914	-117.3524	No
Fish Lake	CKISS	17-Aug-17	50.0459	-117.1804	No
Fountain Lake	LRISS	01-Aug-17	50.6637	-121.8032	No
Fountain Lake	LRISS	07-Sep-17	50.6688	-121.8035	No
Fuller Lake	FLNR	02-Oct-17	48.9055	-123.7203	No
Gardom Lake	CSISS	10-Jul-17	50.6061	-119.2050	No
Green Lake	SSISC	03-Aug-17	50.1437	-122.9489	No
Green Lake	SSISC	16-Aug-17	50.1618	-122.9258	No
Green Lake	FLNR	29-Sep-17	51.3681	-121.3740	No
Green Lake	FLNR	29-Sep-17	51.3774	-121.2641	No
Green Lake	FLNR	30-Sep-17	51.4096	-121.2100	No
Green Lake	FLNR	30-Sep-17	51.4204	-121.1763	No
Gun Lake	LRISS	08-Aug-17	50.8755	-122.8583	No
Gun Lake	LRISS	05-Sep-17	50.8755	-122.8584	No
Horse Lake	FLNR	03-Sep-17	51.6003	-121.1913	No
Horse Lake	FLNR	04-Sep-17	51.5934	-121.1632	No
Horse Lake	FLNR	04-Sep-17	51.5840	-121.1240	No
Horse Lake	FLNR	04-Sep-17	51.5895	-121.0793	No
Humamilt Lake	CSISS	18-Jul-17	51.2953	-119.0260	No
Jimsmith Lake	EKISS	20-Jul-17	49.5289	-115.7342	No
Jimsmith Lake	EKISS	20-Jul-17	49.4793	-115.8529	No

Lake / Waterbody	Sampling Agency	Sampling Date	Lat (decimal degrees)	Long (decimal degrees)	ZQM[1] Veligers Detected (Yes/No)
Kalamalka Lake	OASSIS	08-Jul-17	49.7990	-119.5134	No
Kalamalka Lake	OASSIS	28-Jul-17	49.7990	-119.5134	No
Kalamalka Lake	OASSIS	20-Aug-17	49.7990	-119.5134	No
Kalamalka Lake	OASSIS	08-Jul-17	50.1804	-119.3405	No
Kalamalka Lake	OASSIS	29-Jul-17	50.1804	-119.3405	No
Kalamalka Lake	OASSIS	18-Aug-17	50.1804	-119.3405	No
Kalamalka Lake	ENV	14-Sep-17	50.1804	-119.3414	No
Kamloops Lake	FLNR	05-Sep-17	50.7409	-120.6906	No
Kamloops Lake	FLNR	05-Sep-17	50.7262	-120.6496	No
Kinbasket Reservoir	NWIPC	10-Aug-17	52.7939	-119.2541	No
Kinbasket Reservoir	NWIPC	10-Aug-17	52.7449	-119.1027	No
Kinbasket Reservoir	NWIPC	10-Aug-17	52.7449	-119.1027	No
Kinbasket Reservoir	NWIPC	21-Aug-17	52.6793	-119.0252	No
Kinbasket Reservoir	NWIPC	28-Aug-17	52.8197	-119.2430	No
Kinbasket Reservoir	NWIPC	28-Aug-17	52.6847	-119.0333	No
Kinbasket Reservoir	NWIPC	18-Sep-17	52.6794	-119.0253	No
Kinbasket Reservoir	CSISS	07-Jul-17	51.7567	-117.5750	No
Kinbasket Reservoir	CSISS	07-Jul-17	51.5275	-117.4330	No
Kinbasket Reservoir	NWIPC	07-Jun-17	52.6798	-119.0258	No
Kinbasket Reservoir	NWIPC	26-Jun-17	52.7595	-119.1210	No
Kinbasket Reservoir	NWIPC	29-Jun-17	52.7054	-119.0569	No
Kinbasket Reservoir	NWIPC	29-Jun-17	52.6793	-119.0250	No
Kinbasket Reservoir	NWIPC	26-Jul-17	52.7589	-119.1195	No
Kinbasket Reservoir	NWIPC	26-Jul-17	52.7450	-119.1027	No
Kinbasket Reservoir	NWIPC	26-Jul-17	52.6794	-119.0253	No
Kinbasket Reservoir	NWIPC	27-Jul-17	52.7055	-119.0552	No
Kinbasket Reservoir	NWIPC	02-Aug-17	52.7055	-119.0552	No
Kinbasket Reservoir	NWIPC	02-Aug-17	52.6843	-119.0293	No
Kinbasket Reservoir	NWIPC	02-Aug-17	52.6791	-119.0254	No
Kinbasket Reservoir	NWIPC	01-Oct-17	52.6794	-119.0254	No
Kinbasket Reservoir	BC Hydro	20-Jul-17	52.1416	-119.3726	No
Kinbasket Reservoir	BC Hydro	20-Jul-17	51.7465	-117.5239	No
Kinbasket Reservoir	BC Hydro	23-Aug-17	52.0599	-118.2930	No
Kinbasket Reservoir	BC Hydro	23-Aug-17	52.0557	-118.3190	No
Kinbasket Reservoir	BC Hydro	23-Aug-17	52.0498	-118.3351	No

Lake / Waterbody	Sampling Agency	Sampling Date	Lat (decimal degrees)	Long (decimal degrees)	ZQM[1] Veligers Detected (Yes/No)
Kinbasket Reservoir	CSISS	05-Sep-17	51.5276	-117.4329	No
Kinbasket Reservoir	CSISS	05-Sep-17	51.7564	-117.5750	No
Koocanusa Lake	EKISS	13-Jul-17	49.1721	-115.2458	No
Koocanusa Lake	EKISS	13-Jul-17	49.2331	-115.2576	No
Koocanusa Lake	EKISS	13-Jul-17	49.0210	115.1809	No
Koocanusa Lake	EKISS	13-Jul-17	49.1685	-115.2441	No
Koocanusa Lake	EKISS	13-Jul-17	49.3820	-115.3040	No
Kootenay Lake	FLNR	05-Oct-17	49.9156	-116.9047	No
Kootenay Lake	CKISS	16-Sep-17	49.7696	-116.8572	No
Kootenay Lake	CKISS	16-Sep-17	49.3001	-116.6629	No
Kootenay Lake	CKISS	22-Sep-17	49.5089	-117.2817	No
Kootenay Lake	CKISS	22-Sep-17	50.1017	-116.9388	No
Kootenay Lake	CKISS	22-Sep-17	49.9135	-116.9079	No
Kootenay Lake	CKISS	22-Sep-17	49.6102	-117.1125	No
Kootenay Lake	FLNR	26-Jul-17	48.5244	123.3957	No
Kootenay Lake	FLNR	28-Jul-17	50.1773	120.5307	No
Kootenay Lake	FLNR	28-Jul-17	49.3394	120.6128	No
Kootenay Lake	BISS	21-Aug-17	49.7402	-118.1796	No
Kootenay Lake	CKISS	02-Jul-17	49.7696	-116.8572	No
Kootenay Lake	CKISS	02-Jul-17	49.3001	-116.6629	No
Kootenay Lake	CKISS	05-Jul-17	49.5089	-117.2817	No
Kootenay Lake	CKISS	07-Jul-17	50.1017	-116.9388	No
Kootenay Lake	CKISS	24-Jul-17	49.6099	-117.1143	No
Kootenay Lake	CKISS	24-Jul-17	49.9135	-116.9079	No
Kootenay Lake	CKISS	28-Jul-17	49.5089	-117.2817	No
Kootenay Lake	CKISS	29-Jul-17	49.7696	-116.8572	No
Kootenay Lake	CKISS	29-Jul-17	49.3001	-116.6629	No
Kootenay Lake	FLNR	14-Aug-17	49.9152	-116.9053	No
Kootenay Lake	CKISS	14-Aug-17	49.7696	-116.8572	No
Kootenay Lake	CKISS	14-Aug-17	49.3001	-116.6629	No
Kootenay Lake	CKISS	15-Aug-17	49.6107	-117.1124	No
Kootenay Lake	CKISS	15-Aug-17	49.9135	-116.9079	No
Kootenay Lake	CKISS	15-Aug-17	50.1017	-116.9388	No
Kootenay Lake	FLNR	05-May-17	49.9155	-116.9051	No
Kootenay River	CKISS	20-Sep-17	49.4859	-117.3852	No

Lake / Waterbody	Sampling Agency	Sampling Date	Lat (decimal degrees)	Long (decimal degrees)	ZQM[1] Veligers Detected (Yes/No)
Kootenay River	CKISS	20-Sep-17	49.4390	-117.5227	No
Kootenay River	CKISS	15-Jul-17	49.4859	-117.3852	No
Kootenay River	CKISS	02-Aug-17	49.4390	-117.5227	No
Kootenay River	CKISS	27-Aug-17	49.4859	-117.3852	No
Kootenay River	CKISS	27-Aug-17	49.4390	-117.5227	No
Lac La Hache	FLNR	02-Sep-17	51.8543	-121.6376	No
Lac La Hache	FLNR	02-Sep-17	51.8449	-121.6056	No
Lac La Hache	FLNR	02-Sep-17	51.8469	-121.5869	No
Lac La Hache	FLNR	03-Sep-17	51.8219	-121.5322	No
Lake Revelstoke	CSISS	27-Jun-17	51.1468	-118.2000	No
Lake Revelstoke	CSISS	27-Sep-17	51.1469	-118.2002	No
Lakelse Lake	ENV	08-Aug-17	54.3909	-128.5340	No
Langford Lake	ENV	23-Aug-17	48.4510	-123.5390	No
Little Cranberry Lake	NWIPC	05-Jun-17	52.7937	-119.2540	No
Little Cranberry Lake	NWIPC	04-Jul-17	52.7937	-119.2540	No
Little Cranberry Lake	NWIPC	09-Aug-17	52.7938	-119.2541	No
Little Cranberry Lake	NWIPC	23-Aug-17	52.7937	-119.2541	No
Little Cranberry Lake	NWIPC	16-Aug-17	52.7937	-119.2540	No
Little Shuswap Lake	FLNR	24-Aug-17	50.8281	-119.6775	No
Little White Lake	CSISS	20-Jul-17	50.8784	-119.3090	No
Lizard Lake	ENV	22-Aug-17	48.6070	-124.2250	No
Lois Lake	FLNR	02-Oct-17	48.7069	-123.7880	No
Loon Lake	FLNR	01-Oct-17	51.1285	-121.1898	No
Loon Lake	FLNR	01-Oct-17	51.1242	-121.2190	No
Lost Lake	SSISC	01-Aug-17	50.1301	-122.9369	No
Lost Lake	SSISC	01-Aug-17	50.1279	-122.9361	No
Lost Lake	SSISC	12-Oct-17	50.1278	-122.9362	No
Lost Lake	SSISC	12-Oct-17	50.1300	-122.9369	No
Mabel Lake	ENV	19-Sep-17	50.4535	-118.7369	No
Maple Lake	FLNR	24-Jul-17	49.6392	-125.0119	No
Mara Lake	CSISS	20-Jul-17	50.7669	-119.0170	No
Mara Lake	CSISS	23-Aug-17	50.7669	-119.0170	No
Mara Lake	CSISS	26-Sep-17	50.7669	-119.0172	No
Mara Lake	CSISS	18-Oct-17	50.7667	-119.0168	No
Mayie North	ENV	23-Aug-17	49.3662	-115.8405	No

Lake / Waterbody	Sampling Agency	Sampling Date	Lat (decimal degrees)	Long (decimal degrees)	ZQM[1] Veligers Detected (Yes/No)
Mayie South	ENV	23-Aug-17	49.2648	-115.8451	No
McGuire Lake	CSISS	22-Aug-17	50.7039	-119.2751	No
Mitten Lake	CSISS	25-Jul-17	50.9641	-116.5700	No
Monte Lake	FLNR	06-Sep-17	50.5147	-119.8344	No
Nancy Greene Lake	CKISS	25-Aug-17	49.2588	-117.9415	No
Naskonlith Lake	FLNR	26-Aug-17	50.7992	-119.7740	No
Nita Lake	SSISC	12-Oct-17	50.0971	-122.9953	No
Nita Lake	SSISC	12-Oct-17	50.0971	-122.9950	No
Okanagan Lake	OASSIS	09-Jul-17	50.1804	-119.3406	No
Okanagan Lake	OASSIS	26-Jul-17	50.1804	-119.3406	No
Okanagan Lake	OASSIS	16-Aug-17	50.1804	-119.3406	No
Okanagan Lake	OASSIS	09-Jul-17	50.2345	-119.3645	No
Okanagan Lake	OASSIS	26-Jul-17	50.2345	-119.3645	No
Okanagan Lake	OASSIS	16-Aug-17	50.2345	-119.3645	No
Okanagan Lake	OASSIS	25-Jun-17	50.0410	-119.4499	No
Okanagan Lake	OASSIS	19-Jul-17	50.0410	-119.4499	No
Okanagan Lake	OASSIS	11-Aug-17	50.0410	-119.4499	No
Okanagan Lake	OASSIS	24-Jun-17	49.8889	-119.4995	No
Okanagan Lake	OASSIS	20-Jul-17	49.8889	-119.4995	No
Okanagan Lake	OASSIS	16-Aug-17	49.8889	-119.4995	No
Okanagan Lake	OASSIS	23-Jul-17	49.8452	-119.4895	No
Okanagan Lake	OASSIS	16-Aug-17	49.8452	-119.4895	No
Okanagan Lake	OASSIS	24-Jun-17	49.8452	-119.4895	No
Okanagan Lake	OASSIS	24-Jun-17	49.8152	-119.6230	No
Okanagan Lake	OASSIS	13-Aug-17	49.8152	-119.6230	No
Okanagan Lake	OASSIS	22-Jul-17	49.8145	-119.6215	No
Okanagan Lake	OASSIS	22-Jul-17	49.7726	-119.7369	No
Okanagan Lake	OASSIS	12-Aug-17	49.7726	-119.7369	No
Okanagan Lake	OASSIS	24-Jul-17	49.7767	-119.7338	No
Okanagan Lake	OASSIS	07-Jul-17	49.6025	-119.6513	No
Okanagan Lake	OASSIS	28-Jul-17	49.6025	-119.6513	No
Okanagan Lake	OASSIS	11-Aug-17	49.6025	-119.6513	No
Okanagan Lake	OASSIS	05-Jul-17	49.5923	-119.5993	No
Okanagan Lake	OASSIS	26-Jul-17	49.5923	-119.5993	No
Okanagan Lake	OASSIS	23-Aug-17	49.5923	-119.5993	No

Lake / Waterbody	Sampling Agency	Sampling Date	Lat (decimal degrees)	Long (decimal degrees)	ZQM[1] Veligers Detected (Yes/No)
Okanagan Lake	OASSIS	24-Jun-17	49.5049	-119.5871	No
Okanagan Lake	OASSIS	20-Jul-17	49.5049	-119.5871	No
Okanagan Lake	OASSIS	17-Aug-17	49.5049	-119.5871	No
Oshinow Lake	FLNR	04-Oct-17	49.4422	-125.3075	No
Osoyoos Lake	OASSIS	15-Jun-17	49.0373	-119.4639	No
Osoyoos Lake	OASSIS	30-Jul-17	49.0373	-119.4639	No
Osoyoos Lake	OASSIS	18-Aug-17	49.0373	-119.4639	No
Osoyoos Lake	ENV	18-Sep-17	49.0375	-119.4639	No
Paul Lake	FLNR	25-Aug-17	50.7438	-120.1129	No
Pavilion Lake	LRISS	03-Aug-17	50.8715	-121.7438	No
Pavillion Lake	LRISS	06-Sep-17	50.8715	-121.7437	No
Pend D'Oreille River	CKISS	25-Aug-17	49.0393	-117.4925	No
Pend D'Oreille River	CKISS	17-Sep-17	49.0393	-117.4925	No
Pend D'Oreille River	FLNR	22-Sep-17	49.0414	-117.4196	No
Pend D'Oreille River	FLNR	22-Sep-17	49.0458	-117.4453	No
Pend D'Oreille River	FLNR	22-Sep-17	49.0385	-117.4903	No
Pinantan Lake	FLNR	25-Aug-17	50.7256	-120.0309	No
Pitt Lake #1	FLNR	27-Jul-17	49.3502	-122.6149	No
Pitt Lake #2	FLNR	27-Jul-17	49.3540	-122.5808	No
Pitt Lake #3	FLNR	27-Jul-17	49.3802	-122.5672	No
Premier Lake	ENV	28-Aug-17	49.9191	-115.6475	No
Quesnell Lake	FLNR	05-Oct-17	49.0759	-123.8132	No
Revelstoke Reservoir	BC Hydro	22-Aug-17	51.0448	-118.1051	No
Revelstoke Reservoir	BC Hydro	22-Aug-17	51.0882	-118.1199	No
Revelstoke Reservoir	BC Hydro	24-Aug-17	51.2843	-118.2725	No
Rosebud Lake	FLNR	28-Jul-17	50.2100	120.4913	No
Rosebud Lake	CKISS	05-Jul-17	49.0449	-117.2339	No
Rosebud Lake	CKISS	28-Jul-17	49.0448	-117.2697	No
Rosen Lake	EKISS	12-Jul-17	49.3961	-115.2534	No
Rosen Lake	EKISS	12-Jul-17	49.4003	-115.2580	No
Rosen Lake	EKISS	12-Jul-17	49.4044	-115.2613	No
Saddle Lake	NWIPC	26-Jul-17	52.5722	-118.8863	No
Sasamat Lake	SSISC	18-Sep-17	49.3222	-122.8938	No
Seton Lake	LRISS	01-Aug-17	50.6690	-121.9885	No
Seton Lake	LRISS	07-Sep-17	50.6689	-121.9884	No

Lake / Waterbody	Sampling Agency	Sampling Date	Lat (decimal degrees)	Long (decimal degrees)	ZQM[1] Veligers Detected (Yes/No)
Sheridan Lake	FLNR	27-Sep-17	51.5191	-120.8794	No
Sheridan Lake	FLNR	27-Sep-17	51.5286	-120.9012	No
Sheridan Lake	FLNR	27-Sep-17	51.5331	-120.9197	No
Shuswap Lake	CSISS	28-Jun-17	50.9632	-119.1740	No
Shuswap Lake	CSISS	28-Jun-17	50.8800	-119.4640	No
Shuswap Lake	CSISS	06-Jul-17	50.8361	-118.9930	No
Shuswap Lake	CSISS	11-Jul-17	50.7564	-119.2440	No
Shuswap Lake	CSISS	11-Jul-17	50.8804	-119.3620	No
Shuswap Lake	CSISS	18-Jul-17	51.2372	-118.9460	No
Shuswap Lake	CSISS	22-Aug-17	50.8819	-119.3626	No
Shuswap Lake	CSISS	22-Aug-17	50.8835	-119.5516	No
Shuswap Lake	CSISS	22-Aug-17	50.9011	-119.4515	No
Shuswap Lake	CSISS	23-Aug-17	50.7257	-119.3024	No
Shuswap Lake	CSISS	23-Aug-17	50.7578	-119.2452	No
Shuswap Lake	CSISS	23-Aug-17	50.8490	-119.0758	No
Shuswap Lake	CSISS	23-Aug-17	50.8361	-118.9934	No
Shuswap Lake	CSISS	25-Sep-17	50.9635	-119.1733	No
Shuswap Lake	CSISS	25-Sep-17	50.9010	-119.4528	No
Shuswap Lake	CSISS	25-Sep-17	50.8828	-119.5520	No
Shuswap Lake	CSISS	25-Sep-17	50.8821	-119.3757	No
Shuswap Lake	CSISS	26-Sep-17	50.7563	-119.2275	No
Shuswap Lake	CSISS	26-Sep-17	50.8360	-118.9936	No
Shuswap Lake	CSISS	16-Oct-17	50.7555	-119.2274	No
Shuswap Lake	CSISS	16-Oct-17	50.8818	-119.3622	No
Shuswap Lake	CSISS	16-Oct-17	50.8829	-119.5512	No
Shuswap Lake	CSISS	18-Oct-17	50.8358	-118.9932	No
Shuswap Lake	CSISS	18-Oct-17	50.8503	-119.0127	No
Skaha Lake	OASSIS	29-Jun-17	49.4512	-119.5819	No
Skaha Lake	OASSIS	24-Jul-17	49.4512	-119.5819	No
Skaha Lake	OASSIS	16-Aug-17	49.4512	-119.5819	No
Skaha Lake	ENV	07-Sep-17	49.4519	-119.5815	No
Slocan Lake	CKISS	20-Sep-17	49.9842	-117.3777	No
Slocan Lake	CKISS	20-Sep-17	49.9544	-117.3625	No
Slocan Lake	CKISS	20-Sep-17	49.7696	-117.4727	No
Slocan Lake	FLNR	29-Jul-17	50.7746	120.7433	No

Lake / Waterbody	Sampling Agency	Sampling Date	Lat (decimal degrees)	Long (decimal degrees)	ZQM[1] Veligers Detected (Yes/No)
Slocan Lake	FLNR	02-Aug-17	49.0262	117.3831	No
Slocan Lake	FLNR	02-Aug-17	49.0101	117.3605	No
Slocan Lake	CKISS	06-Jul-17	49.7696	-117.4727	No
Slocan Lake	CKISS	06-Jul-17	49.9544	-117.3625	No
Slocan Lake	CKISS	06-Jul-17	49.9842	-117.3777	No
Slocan Lake	CKISS	01-Aug-17	49.9842	-117.3777	No
Slocan Lake	CKISS	01-Aug-17	49.9544	-117.3625	No
Slocan Lake	CKISS	01-Aug-17	49.7696	-117.4727	No
Slocan Lake	CKISS	17-Aug-17	49.9842	-117.3777	No
Slocan Lake	CKISS	17-Aug-17	49.9544	-117.3625	No
Slocan Lake	CKISS	17-Aug-17	49.7696	-117.4727	No
Slocan Lake	CKISS	18-Aug-17	49.5089	-117.2817	No
Slocan South Lake	ENV	19-Sep-17	49.9543	-112.3625	No
Sooke Lake	FLNR	03-Oct-17	48.5178	-123.7012	No
Sugar Lake	ENV	30-Aug-17	50.3767	-118.5296	No
Summit Lake	FLNR	02-Aug-17	49.0410	117.4189	No
Summit Lake	CKISS	06-Jul-17	50.1567	-117.6559	No
Tie Lake	EKISS	06-Jul-17	49.4164	-115.3236	No
Tie Lake	EKISS	06-Jul-17	49.4139	-115.3032	No
Tie Lake	EKISS	06-Jul-17	49.4155	-115.3070	No
Trout Lake	CSISS	18-Jul-17	50.6452	-117.5360	No
Trout Lake	CSISS	11-Oct-17	50.6453	-117.5363	No
Trout Lake	ENV	20-Sep-17	50.6444	-117.5356	No
Tyaughton Lake	LRISS	05-Sep-17	50.9510	-122.7729	No
Tyax Lake	LRISS	08-Aug-17	50.9511	-122.7731	No
Tyhee Lake	ENV	31-Jul-17	54.7096	-127.0393	No
Wahleach Lake	ENV	26-Jul-17	49.2525	-121.6103	No
Wahleach Lake	ENV	16-Aug-17	49.2505	-121.6103	No
Wahleach Lake	ENV	13-Sep-17	49.2505	-121.6103	No
Wasa Lake	EKISS	07-Jul-17	49.7761	-115.7354	No
Wasa Lake	EKISS	07-Jul-17	49.7823	-115.7333	No
Wasa Lake	EKISS	07-Jul-17	49.7877	-115.7425	No
Whatshan Lake	CKISS	23-Sep-17	49.9384	-118.1216	No
Whatshan Lake	CKISS	23-Sep-17	49.9249	-118.1235	No
Whatshan Lake	BISS	24-Aug-17	49.1634	-118.6228	No

Lake / Waterbody	Sampling Agency	Sampling Date	Lat (decimal degrees)	Long (decimal degrees)	ZQM[1] Veligers Detected (Yes/No)
Whatshan Lake	CKISS	08-Jul-17	50.0845	-118.1153	No
Whatshan Lake	CKISS	26-Jul-17	50.0847	-118.0900	No
Whatshan Lake	CKISS	29-Aug-17	50.0847	-118.0900	No
Whatshan Lake	CKISS	29-Aug-17	50.0685	-118.0853	No
White Lake	CSISS	20-Jul-17	50.8794	-119.2980	No
White Lake	CSISS	22-Aug-17	50.8881	-119.2570	No
White Lake	CSISS	25-Sep-17	50.8881	-119.2568	No
Whiteswan Lake	ENV	28-Aug-17	50.1290	-115.5160	No
Williamson Lake	CSISS	08-Aug-17	50.9684	-118.1710	No
Windemere Lake	ENV	29-Aug-17	50.4580	-115.9950	No
Windermere Lake	EKISS	21-Sep-17	50.0210	-116.0048	No
Windermere Lake	EKISS	21-Sep-17	50.5035	-119.0208	No
Windermere Lake	EKISS	21-Sep-17	50.5153	-116.0194	No
Wood Lake	OASSIS	20-Jul-17	50.0928	-119.3743	No
Wood Lake	OASSIS	12-Aug-17	50.0928	-119.3743	No
Wood Lake	OASSIS	24-Aug-17	50.0928	-119.3743	No
Wood Lake	OASSIS	25-Jun-17	50.0529	-119.4106	No
Wood Lake	OASSIS	19-Jul-17	50.0529	-119.4106	No
Wood Lake	OASSIS	11-Aug-17	50.0529	-119.4106	No
Wood Lake	ENV	14-Sep-17	50.1046	-119.3670	No

[1] ZQM = Zebra and Quagga Mussels.

[2] Boundary Invasive Species Society (BISS), Central Kootenay Invasive Species Society (CKISS), Columbia-Shuswap Invasive Species Society (CSISS), Christina Lake Stewardship Society (CLSS), East Kootenay Invasive Species Society (EKISS), Ministry of Environment and Climate Change Strategy (ENV), Ministry of Forests, Lands and Natural Resource Operations and Rural Development (FLNRO), Okanagan and Similkameen Invasive Species Society (OASISS), Northwest Invasive Plant Council (NWIPC), Sea to Sky Invasive Species Council (SSISC) and the Lillooet Regional Invasive Species Society (LRISS)