HUMAN USE AND BOATING TRAFFIC ON THE UPPER COLUMBIA RIVER, CANADA, 2019

By Joan M. Gallaway and Suzanne E. Bayley

Columbia Wetlands Stewardship Partners 2020

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Executive Summary

Recreational use in the upper Columbia River valley and on the Columbia Wetlands has increased in recent years, but there has been no data on how many people use the river. The increasing human use is a concern to biologists and local citizens groups because the area is spectacular habitat for thousands of waterfowl and other birds which use and migrate through the valley. The area is also home to abundant elk, deer, bears and cougars and many rare and threatened species. The region's importance to wildlife is recognized by its designation as a RAMSAR wetland of international importance and a provincial wildlife management area, The Columbia Wetlands Wildlife Management Area. Several threat assessments have indicated that recreational use may displace or harm wildlife but there has been no data on how much use occurs or where it is. To begin to fill that gap, the Columbia Wetlands Stewardship Partners monitored several reaches of the Columbia River in the summer season of 2019.

The total monitored recreational use of the river in the summer 2019 was 35,222 people using 25,956 boats. This occurred in 5 reaches of the river monitored by the Columbia Wetlands Stewardship Partners. Only a small portion of the 180 km headwaters of the Columbia River were monitored, but these reaches were the areas closest to urban centers and have the greatest recreational use. The 5 reaches of the river that were monitored include the Fairmont golf course reach, the Athalmer Slough reach, the Athalmer to Radium Hot Springs reach, the Radium to Edgewater reach, and then in the northern end of the valley, the Nicholson to Golden reach.

The greatest use is close to the urban centers of Fairmont and Invermere, with thousands of people using kayaks, canoes, and other types of water craft. There is little use of motor boats on the river in the reaches monitored. The Fairmont reach has become a party/family area with 13,819 people using 10,796 water craft, primarily inflatable rafts and kayaks. Much of this reach is located between a golf course and a gated river side community; the extensive use, especially on July and August weekends, has raised concerns about safety, garbage, sanitation and parking at the input and takeout sites.

Private individuals and a commercial boat rental company near the town of Invermere use a segment of the main river (called Athalmer Slough) for short 2 hour trips. These recreational

users typically go downstream, explore the slough area, and then return back upstream, thereby disturbing the wildlife twice as they pass. On this reach, we monitored 15,280 people passing our cameras, using 10,982 boats. Most boats were kayaks and stand up paddle boards.

Fairmont and Athalmer Slough reaches had the greatest use by far, and the activity probably eliminated most wildlife, especially during the short summer season. Moving further downstream away from urban action, wildlife use of the river increases and concerns are raised about disturbance and habitat alienation.

Going downstream, the reach from Athalmer to Radium Hot Springs had 4,077 people using 2,776 boats, primarily kayaks and canoes. This reach is known for its abundant wildlife but it is not known if this recreational traffic disturbs the wildlife. Most of the use is in July and August and between 12-5pm during the day. There are also some guided trips provided by the commercial company near Invermere.

The river reach from Radium to Edgewater had the lowest monitored use on the river, with 780 people in 534 boats, primarily kayaks and canoes. The river north of Edgewater and before Nicholson, a distance of approximately 86 km, was not monitored although some boaters do traverse the entire river.

At Nicholson, boating use again increased as 1,259 people in 865 boats (with a mix of stand up paddle boards, canoes and kayaks) used this stretch of the river.

Recreational use can definitely compete with use by wildlife although there is little data as yet on how wildlife is affected in the Columbia Valley. Other concerns include sanitation (lack of facilities), garbage, and safety. Only two communities, Radium and Golden, have good access and sanitary facilities along the river.

CWSP will again have a human use monitoring program on the river/wetlands in 2020.

Acknowledgements

The Columbia Wetlands Stewardship Partners and authors of this paper would like to thank all the many volunteers who assisted with the monitoring, collection of the data and assisted with the hundreds of hours required to view the data from the cameras. We thank Ian and Carmel Robbins for allowing installation of the camera on their property at Fairmont, and the Columbia Lake Stewardship Society who provided summer student help. We thank Brian Gustafson of Wildsight who monitored the Nicholson to Golden reach, and downloaded and reviewed all the data. We appreciate the Lake Windermere District Rod and Gun Club for assistance and the provision of cameras. We are very appreciative of LUSH Charity Pot, the foundation of LUSH Fresh Made Cosmetics who funded this project.

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Introduction

The Upper Columbia River has long been a recreation destination for water enthusiasts, with activities including canoeing, kayaking, tubing, stand-up-paddle boarding, fishing, birdwatching, hunting, and picnicking. The length of the season varies, but most usage will occur between May 1 and September 30. Users are local residents, recreation property owners, and tourists, with the highest influx of tourism occurring in July and August.

Many river users are independent and self-supported but there are commercial operations that provide guided river adventures. There are also multiple businesses providing rental of water craft: canoes, kayaks, stand-up-paddle boards (SUPs), and various types of inflatables. Some businesses also offer shuttle services to/from the start and end points of various reaches.

In recent years, there have been initiatives and studies investigating various aspects of the Upper Columbia River and adjacent wetlands. There are tourism initiatives that want to increase recreational usage and benefit from the exceptional beauty of the river and wetlands. There are conservation groups and initiatives that want to protect the environment and its flora and fauna. Key information missing from the growing knowledge base is detailed data on the number and type of water craft, and the number of people that are on the river. The Columbia Wetlands Stewardship Partners (CWSP), a group of local organizations, was founded in 2006 to help protect the ecological integrity of the wetlands and to assist local residents better manage and conserve the wetlands. The CWSP has provided maps of the river for recreational users to promote the enjoyment of the river and wetlands, but our organization also wants to ensure that recreational use does not displace wildlife and alienate their habitats. This project will provide actual counts for some of the more popular reaches on the river between Canal Flats and Golden to assist all parties involved in managing this resource.

Why Monitor

The provincial draft **Columbia Wetlands Wildlife Area Management Plan** (CWWMA), which provides regulations and guidance for the provincial management area in most of the Columbia Wetlands, identifies recreational and human use of the river and wetlands as a major threat to the ecological integrity of the river (draft Columbia Wetlands Wildlife Area Management Plan BC FLNRORD, 2019). Management actions considered by BC's Ministry of Forests, Lands, Natural Resource Operations and Rural Development (FLNRORD) include determining the levels of boating use in the WMA, monitoring boating use in the WMA, determining the carrying capacity for boating use in the WMA, and developing and implementing controls on use based on assessments of human use. The types of management options and controls have not been investigated because we do not know how many people use the river and wetlands, or where human activity is the greatest. There has been no monitoring of human use, either in the WMA or outside of it, nor has there been any assessment of the ecological impacts of recreational use

on the river or wetlands. This report from CWSP is part of our effort to assist FLNRORD in achieving their management objectives.

Other government agencies have different objectives for the river and wetlands. Destination BC is looking to increase tourism and increase the use of natural resources for tourists (Destination BC Corp, 2019). Water based activities and experiences are explicitly listed as a priority sector for development. While their report does suggest consideration of carrying capacity, it is in the context of experiential carrying capacity and understanding when over-tourism undermines the tourist experience, rather than the impact on environment.

The Regional District of East Kootenay (RDEK) commissioned a study in 2018 to determine the access points and services on the upper Columbia River (Cordillera Technical Services, 2018). No data were available for actual usage, and anecdotal estimates used by the study may well be understated. This could result in inadequate capacity of newly developed access points and/or services.

The five year Columbia Wetlands Water Bird Survey that concluded in 2019 has identified key habitat required for water bird migration. Another study has identified areas of important marsh bird nesting habitat in the wetlands (Darvill & Westphal, Columbia Wetlands Marsh Bird Monitoring Project (CWMBMP) Final Report, 2019). Similarly, the CWSP and Kootenay Conservation Program are now identifying biodiversity hotspots and important habitat areas for federally and provincially listed species at risk and concern. There is a need to understand where, when and how much human use on the river occurs in order to understand if recreational use of the river impacts important wildlife areas.

The Columbia Valley Priority Conservation Actions Summary Report (Mahr, 2017) documents workshop findings whereby wildlife experts (biologists and ecologists) assessed the threats to wildlife in the Columbia Valley and wetlands and recommended 8 priority actions for conservation. This included developing a Statutory Recreational Access Plan for the Columbia valley with a plan for recreational access in the river and wetlands.

These many factors led CWSP to initiate monitoring of recreational use on the river and wetlands and this report.

Methods

Pilot program 2018

In the summer of 2018, a pilot project was undertaken to investigate the feasibility of a river traffic monitoring program.

Objectives of the 2018 season:

- investigate camera technologies and assess suitability for monitoring boat traffic and human use on the river
- investigate locations suitable for camera installation and successful monitoring
- understand time requirements for collecting and reviewing data
- any other learnings that would influence the design of a monitoring program

Camera types investigated:

- motion sensitive cameras: a motion event triggers the camera to take one or more photos as defined by parameters (Moultrie A-35)
- time lapse cameras: photos are taken continuously at a defined time interval and stitched into a video for fast viewing with accompanying software (PlotWatcher Pro)

2018 Findings and Recommendations

The motion sensitive cameras were deemed not suitable in a river environment for the following reasons:

- Too many pictures are taken; camera is triggered by waves, sunlight glinting on water, reflection of clouds moving, floating debris, branches moving in wind, a spider building a web, etc.
- Because of the above issue, it is impossible to predict when SD card will fill
- The river is usually wider than the detection distance of the camera (max 70-100ft), limiting installation locations
- Installation requires a clear view with no branches and leaves, making the camera more visible and more at risk for tampering or theft.

The time lapse camera was successful with reasonable review time requirements, and was recommended for the 2019 monitoring program. The 2018 experience will allow optimization of camera installation sites and parameter settings to reduce time requirements for reviewing.

Monitoring Program 2019

Five reaches were chosen for the 2019 monitoring program, each close to urban centers but each with differing traffic volume expectations. The first two listed below require little to no paddling experience, while the other three are best with modest experience. The perception is that traffic on each of these reaches has increased noticeably over the last several years.

The term “boat” is used throughout this paper as a generic term that includes all types of watercraft. Boats were placed into 5 categories: Canoes, Kayaks (includes inflatable kayaks), Stand Up Paddleboards (SUPs), Inflatables, and Motorboats.

The hours of monitoring were adjusted through the season to reduce the amount of video footage requiring review. These changes were influenced by seasonal changes in daylight hours and temperatures, and/or because no boats passed by in some hours in the first 3 months of monitoring.

On each of these reaches, there are few locations in high water where boaters can stop for picnics or camping. High water also makes CPR bridges an issue on the Athalmer to Radium, and the Radium to Edgewater reaches. When water is lower, there are some beaches and stopping points available, but most are on private land.

The results presented below only include those river users who passed by the cameras. Undoubtedly, there were people who put in and took out at other locations along the river reaches. In addition, the 5 reaches differed slightly in terms of the period of observation.

Fairmont:	May 17 – Sept 30
Athalmer Slough:	May 14 – Sept 30
Athalmer to Radium:	May 10 – Sept 30
Radium to Edgewater:	May 10 – Sept 30
Nicholson to Golden:	June 21 – Oct 21

Thus the results presented in this paper are our best estimates and a minimum number of river users in 2019. By no means were we able to capture all the river users on these reaches.

Fairmont Reach

This portion of the river is a popular float for locals, recreation property owners, and tourists. Near-by campgrounds, RV resorts, timeshares and the Fairmont Hotsprings Resort bring many visitors to the immediate area. There are no official launch sites but several locations are known to be used between the north end of Columbia Lake and the Highway 93 Bridge over the river. A single unofficial and undeveloped take-out location is used by most of the boat traffic. Much of the river downstream from the Highway 93 Bridge is bordered by residential homes and a golf course. There are 2 near-by options for renting boats and inflatables, and a shuttle service can also be arranged with these businesses.

Dates/Hours of Monitoring

May 16 – Aug 14:	7:00 – 22:00
Aug 15 – Sept 5:	8:00 – 20:30
Sept 6 – Sept 30:	9:00 – 20:00

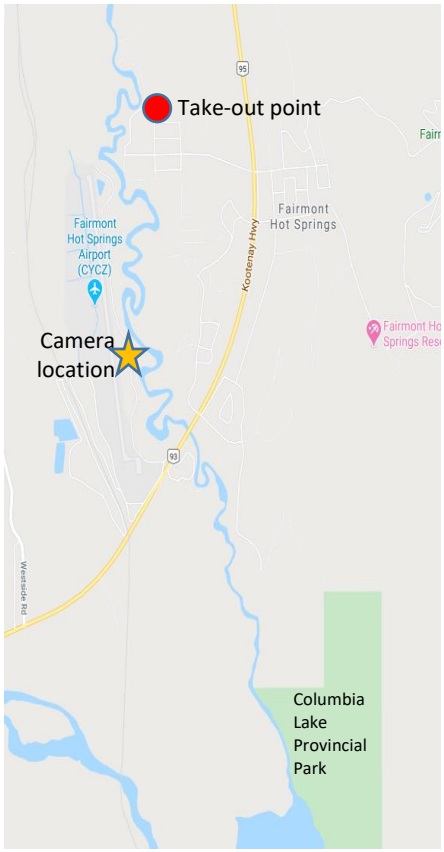


FIGURE 1 FAIRMONT REACH MAP

Athalmer Slough

This reach begins at the Athalmer Bridge and extends to the confluence with Toby Creek. It becomes a difficult paddle back upstream after the confluence, so this is the common decision point about going back up to Athalmer or continuing to Radium. The boat rental company in Athalmer (Columbia River Paddle) recommend to their 2 hour rentals that they not go below this point. This reach provides a leisurely paddle through the slough and wetlands with opportunities for bird watching, and perhaps spotting other wildlife.

FIGURE 2 ATHALMER SLOUGH REACH MAP

Dates / Hours of Monitoring

May 14 – Aug 16:	6:00 – 22:00
Aug 17 – Sept 5:	7:00 – 21:15
Sept 6 – Sept 30:	9:00 – 20:00

Athalmer to Radium Reach

This reach includes the Athalmer Slough described above but extends downstream to the boat launch on the east bank of the river by the Village of Radium Hot Springs at Forsters Road Bridge, adjacent to the mill ponds. There is a shuttle service provided by Columbia River Paddle in Invermere for return back to Athalmer. Time to complete this reach is about 3 hours. There are some locations along the reach where boaters may exit the river into adjacent wetlands (e.g. near Wilmer Wetlands). Much of the adjacent land along this reach is privately owned, and some portions are within the Columbia Wetlands WMA.

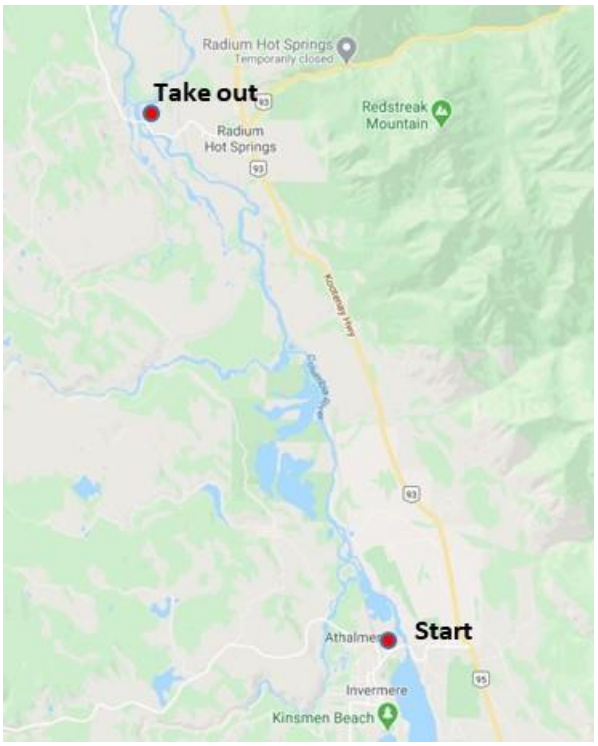


FIGURE 3 ATHALMER TO RADIUM REACH MAP

Dates / Hours of Monitoring

May 10 – Aug 13:	6:00 – 22:00
Aug 14 – Sept 5:	6:30 – 21:40
Sept 5 – Sept 30:	9:00 – 21:00

Radium to Edgewater Reach

This reach starts at the boat launch at Forsters Road Bridge near Radium and finishes at the village of Edgewater at the end of Edgewater Station Road. It is the longest reach of this study, and has less development than the previous reaches. The take-out area is undeveloped and the railway is between the river and the parking area and all are on the CPR right of way. The camera mounted across from the Radium launch area monitored boats taking out, boats entering the river, and those who passed through without stopping. The river channel splits shortly after the starting point below Forsters Road Bridge, and both options can be used to get to Edgewater. For those going downstream, the channel taken was not recorded as the channel decision could be made (or changed) downstream of the camera view. Time for this reach is typically around 4 hours. There are no services, and adjacent lands are largely privately owned.

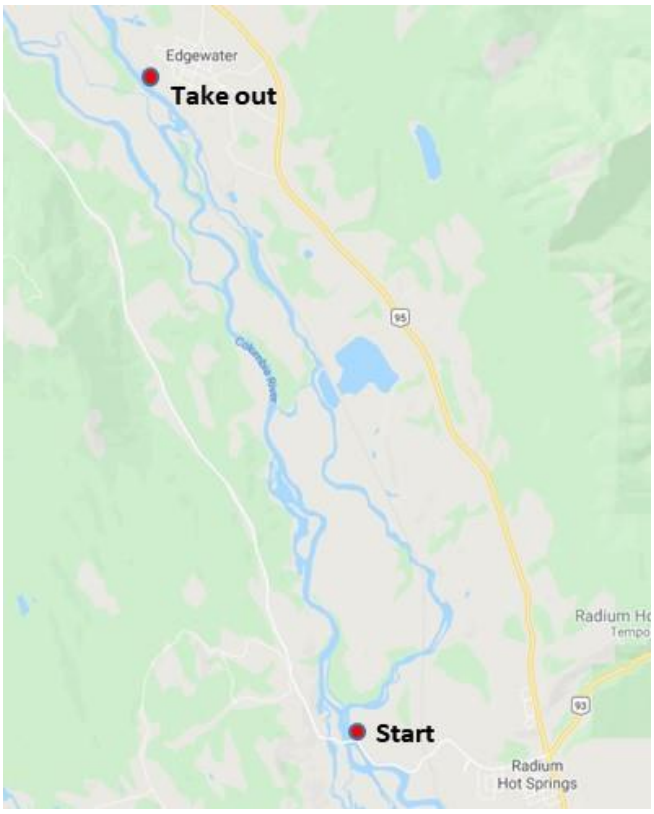


FIGURE 4 RADIUM TO EDGEWATER REACH MAP

Dates / Hours of Monitoring

May 10 – Aug 13:	6:00 – 22:00
Aug 14 – Sept 5:	6:30 – 21:40
Sept 5 – Sept 30:	9:00 – 21:00

Nicholson to Golden Reach

Moving further north, this reach is from the bridge by the village of Nicholson to Golden, with boaters taking out most commonly by the Golden Airport along Fisher Road. This reach was chosen to review activity further downstream, in a differing population and tourism environment. It is a short reach that is usually completed in less than 2 hours. The launch site by the Nicholson Bridge is not developed, but the take-out location by the airport in Golden has a developed boat launch. Adjacent lands are privately owned through the reach.

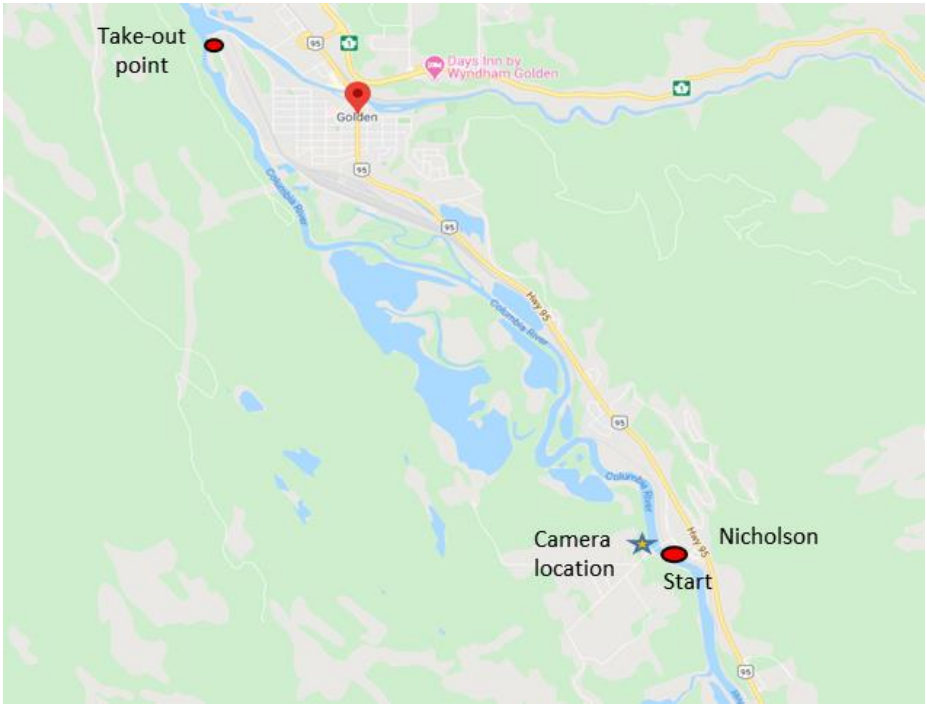


FIGURE 5 NICHOLSON TO GOLDEN REACH MAP

Dates / Hours of Monitoring

June 21 10 – Oct 21: 6:30 – 21:00

Problems during data collection

Despite best efforts, and trouble shooting from the 2018 pilot program, there were still a few glitches in the data collection as described below:

- The Athalmer camera missed pictures on August 16. The batteries were low but despite replacement batteries being installed late morning, the camera did not resume taking pictures until the next day.
- The Radium camera had 10 days in late June where the view of the camera was altered by the river undermining the bank. The tree holding the camera tilted enough that the camera only recorded about 10 feet out into the river. Despite that we were able to obtain data from the Athalmer camera which was used for these 10 days, i.e. the number of boats and people that did not return upstream from the Athalmer Slough. This provided numbers, but not time of arrival at Radium.
- The Nicholson camera missed recording from mid-day Aug 20 to mid-day Sept 3; reason for the failure could not be determined.

Possible errors in data

- Fairmont camera: Large groups of boats and inflatables rafted together were common in this reach. When this occurred, it was difficult to discern exact number of boats and people in the group. Reviewers erred on the low side in this situation.
- Athalmer and Radium cameras:
    - Groups rafted together were not common as on the Fairmont reach, but when it occurred, reviewers erred on the low side if it was difficult to determine exact numbers of people in the boats.
    - These two cameras were installed at close to the maximum distance for being able to count people and correctly identify boat types. The total number of boats counted is accurate (other than perhaps in the rafting situations) but there may be some errors in boat type identification when lighting was poor (e.g. a person sitting on an SUP may be mistakenly identified as a kayak).
    - Additionally, when many people are in a single boat (e.g. a voyageur canoe), it was sometimes difficult to determine the exact number of people. As in the rafting situations, reviewers erred on the low side.
- Sunlight glare: at certain times of the season, each camera had days where sunlight reflection off the water was significant for a short portion of the day and covered much of the field of view. Boats possibly were missed, and/or misidentified due to poor view.
- Reviewer fatigue: The review of the video footage is a somewhat monotonous task and fatigue may result in errors. Some such errors were found and resolved in the data verification actions described below.

Data verification and correction activities:

A number of tasks were undertaken to uncover inconsistencies and errors in the data:

- Identification of daily boat totals greater than daily people totals; footage for these days was reviewed again and corrections made.
- Identification of daily people totals significantly larger than daily boat totals; if unexplained by large boats such as voyageur canoes, then footage was reviewed again.
- Athalmer camera counts for boats/people that did not return upstream from the sloughs was used to compare with Radium camera data for the Athalmer to Radium reach. In some instances, this allowed correction of boat type identification, or numbers of people in the boats, as the view and lighting could be better in one location vs the other. This comparison also indicated if boaters were using other launch and take-out points.
- Summarizing data in various ways using Excel pivot tables highlighted errors and/or inaccuracies in data entry.

Results

Total Season Usage

The total number of people measured on the 5 reaches of the upper Columbia River in summer 2019 was 35,222, using 25,956 boats. This is an underestimate of the total recreational users since only 5 reaches of the river were monitored and not all people used the access and egress points covered by our monitoring. Figure 6 shows the number of boats and people for the different reaches of the river. The Fairmont Reach and Athalmer Slough reach are the sites closest to towns and experienced the greatest numbers of users. Fairmont reach had 13,819 people using 10,796. Athalmer Slough was used by 15,287 users in 10,985 boats, many provided by Columbia River Paddle. Detailed numbers for the graph are found in Appendix 1.

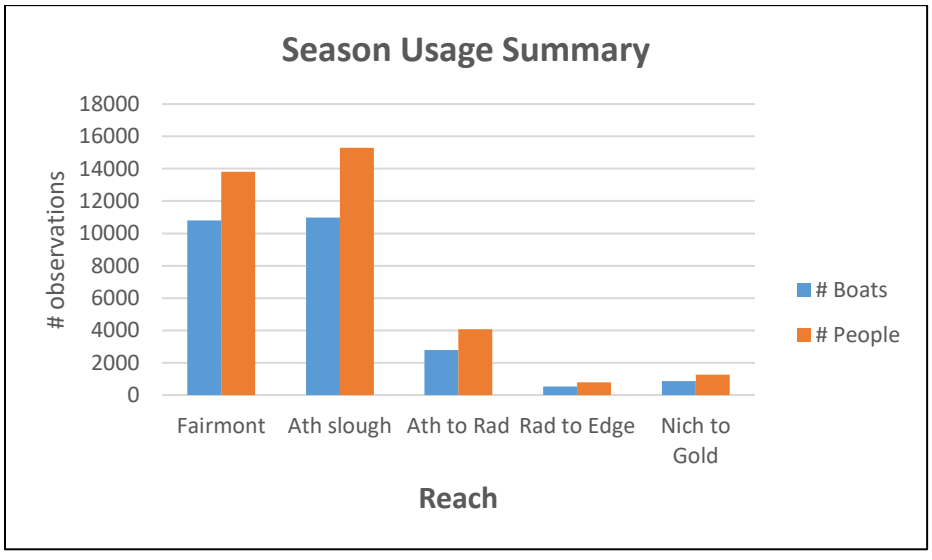


FIGURE 6 SEASON USAGE SUMMARY BY REACH

The Athalmer Slough reach differs from the others in that its boat traffic travels the reach twice, once downstream to the sloughs (or beyond), and again back upstream by those who return to the launch. The numbers in Figure 6 above include both the downstream and upstream observations as each journey has the potential to impact wildlife and the environment.

While the numbers may seem high to many, it must be noted that the 2019 summer was cooler and wetter than prior years. In particular, July and September each had a number of cool wet days with little or no boat traffic on the river. The monthly temperature and rain data from Environment Canada weather stations at Golden and Kootenay National Park West Gate (shown in Appendix 2) both show that the 2019 summer was less amenable for paddling than the prior two years, particularly in July. For example the average daily maximum temperature in July was 5 C ^{o} lower than the previous 2 years in the Fairmont through Radium areas, and rainfall was ~20 to 60mm greater than in previous years. Locals estimate that there were fewer recreational users than in previous years due to the weather.

Overall, the types of boats used in the Columbia River is dominated by inflatable boats (42%) and kayaks (37%), with far fewer stand up paddleboards (11%) and canoes (9%) being used. There are very few motor boats detected in any of the 5 reaches during the May-Sept season. Only 153 motor boats (.8%) were detected in all the reaches in the entire season. There is a change of distribution in the types of boats across the 5 reaches, as well as a generally declining number of paddlers as we go north. In the south, most of the recreational users were in inflatable rafts, with some kayaks and few canoes. In Athalmer north to Edgewater, kayaks predominated with an increasing number of canoes, but almost no inflatables. Farthest north from the towns of Nicholson to Golden, there were an even number of canoes, kayaks and stand up paddle boards.

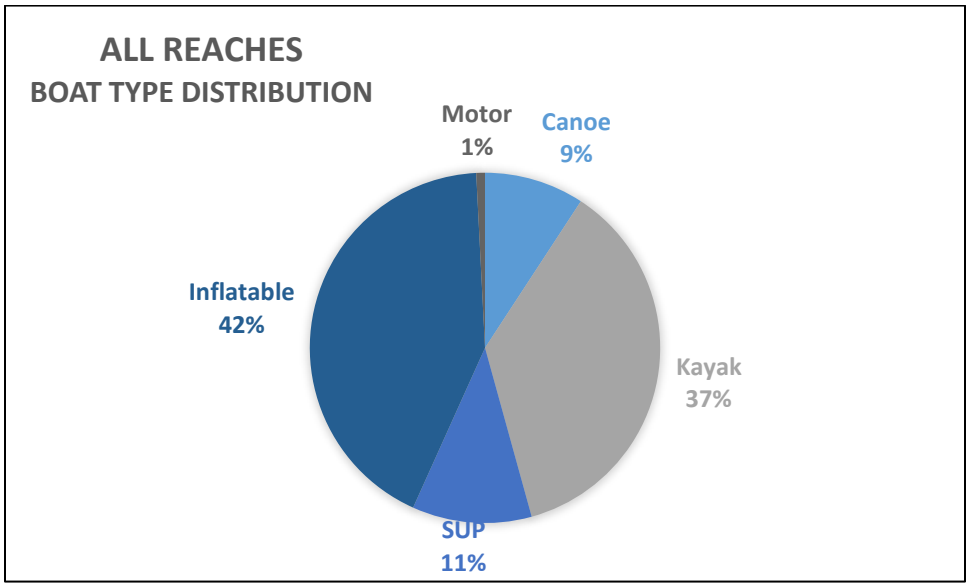


FIGURE 7 BOAT TYPE SUMMARY FOR ALL REACHES

Reach Data

This section provides summary data for each reach individually. Charts include monthly and weekly summations through the season, an hourly profile of usage through the day, and a distribution of boat types. Again, detailed numbers for the graphs can be found in Appendix 1.

Fairmont Reach Data

The Fairmont Reach with 13,819 people using 10,796 boats, was primarily a family and/or party experience with most people in inflatables (73%), many with drinks in hand and dogs along for the fun day on the river. Most river users started in the afternoon and were off the river well before dark. Cool weather likely reduced the number of users in July, but August had 7209 people using the river, mostly on the weekends. The narrow, shallow river had almost no use from motor boats or even canoes. In the pictures, people were seen enjoying their float down the river with family and friends, often in groups of inflatables rafted together. Since the Fairmont Reach is located between a subdivision and a golf course, the primary concerns related to safety, sanitation and facilities are at the access points.

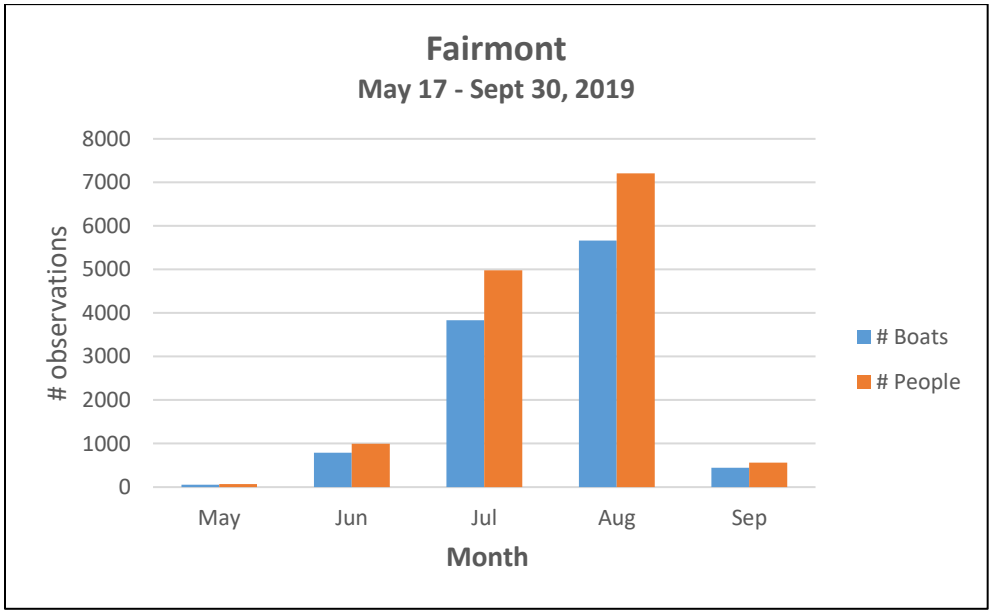


FIGURE 8 FAIRMONT REACH MONTHLY SUMMARY

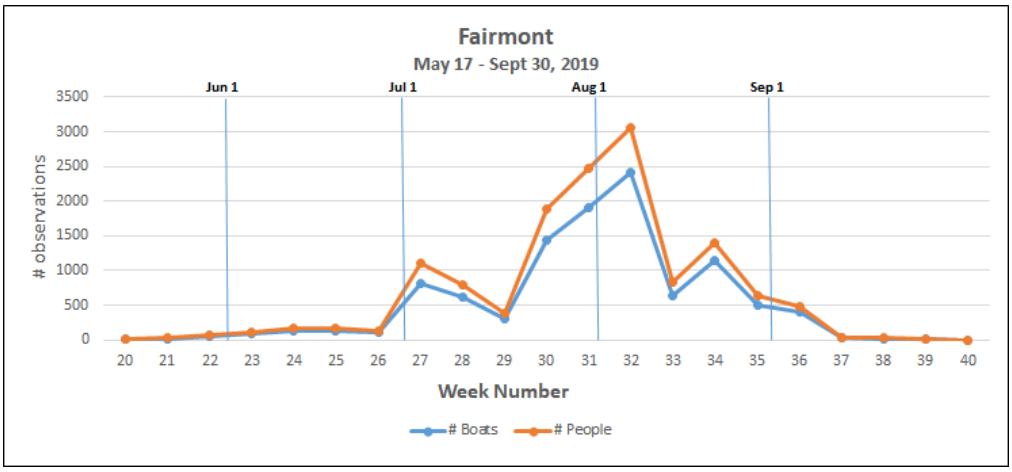


FIGURE 9 FAIRMONT REACH WEEKLY SUMMARY

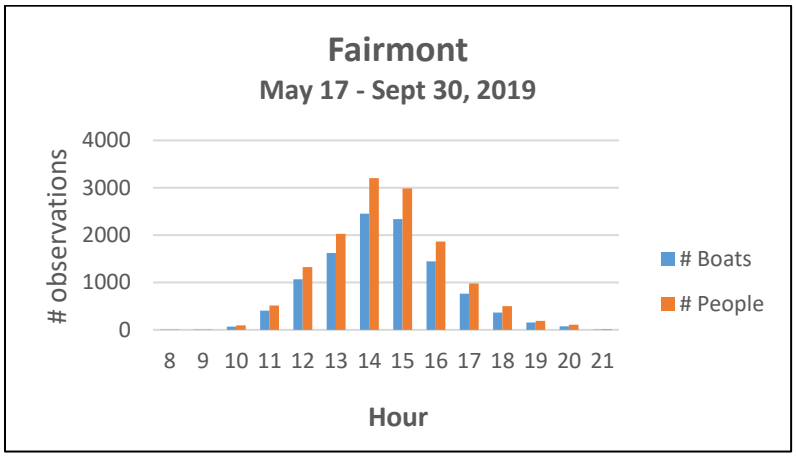


FIGURE 10 FAIRMONT REACH HOURLY SUMMARY

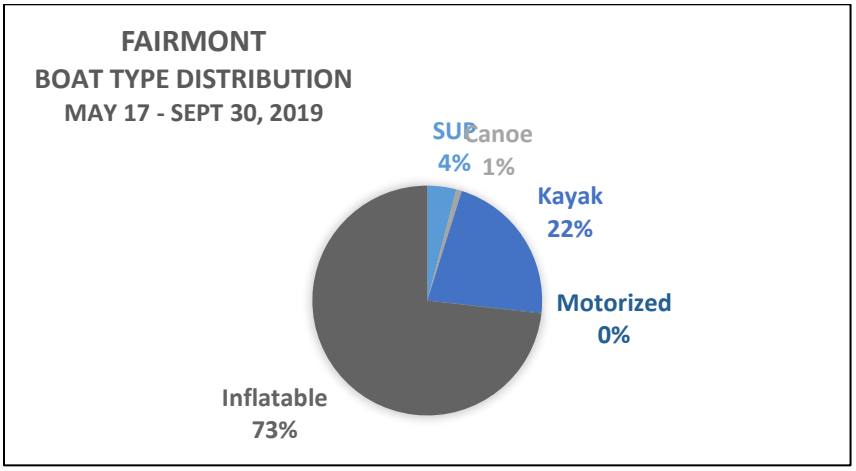


FIGURE 11 FAIRMONT REACH BOAT TYPE SUMMARY

Note that motorized boats were 0.14%, a number that shows as 0% on the pie chart.

Athalmer Slough Reach Data

The Athalmer Slough reach received the highest number of recreational users in the upper Columbia Valley with 15,287 users in 10,985 boats. This counts the boats as they pass downstream and then again as they pass back upstream because our interest is the number of times wildlife may be disturbed by people or boats. These users often were interested in a shorter paddle, mostly in kayaks and presumably were interested in wildlife as most users were on the river between 11:00 to 3:00. Based on the camera pictures, these people were interested in a different kind of recreational experience than users in the Fairmont Reach. Inflatables were not common, and rafting of boats in groups was also uncommon. Again, most of the use was in late July and early August.

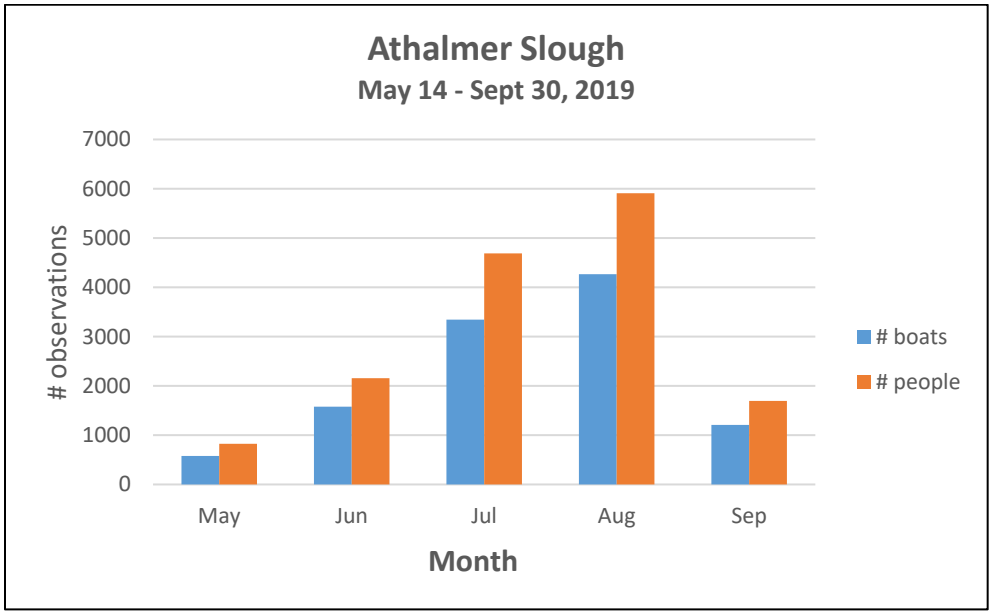


FIGURE 12 ATHALMER SLOUGH MONTHLY SUMMARY

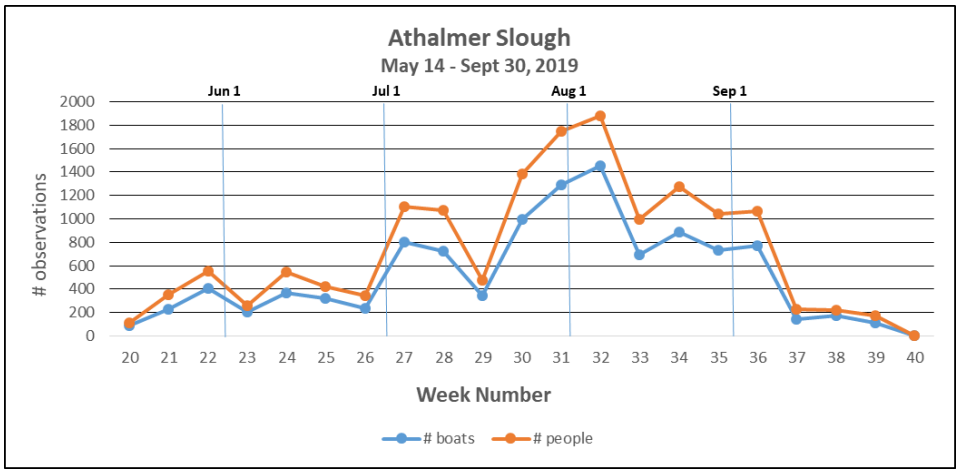


FIGURE 13 ATHALMER SLOUGH WEEKLY SUMMARY

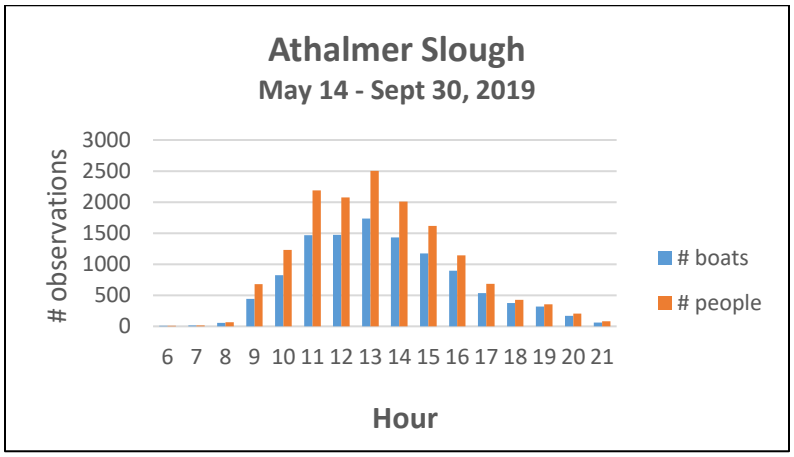


FIGURE 14 ATHALMER SLOUGH HOURLY SUMMARY

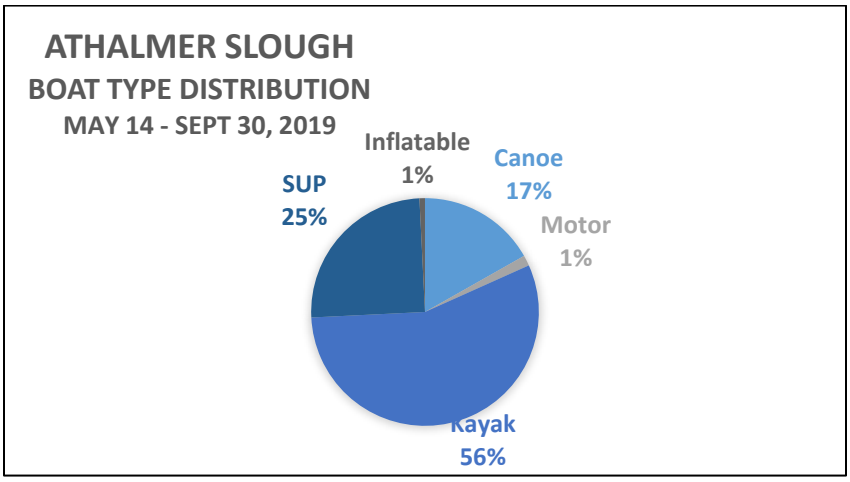


FIGURE 15 ATHALMER SLOUGH BOAT TYPE SUMMARY

Athalmer to Radium Reach Data

The reach from Athalmer to Radium Hot Springs had 4,077 people using 2,776 boats. The peak time where most people were observed at the camera (at the end of the reach) was between 2:00-4:00pm. Since it takes approximately 3 hours to paddle this reach, this means that that boaters were on the river in the middle of the day as seen on the previous two reaches. The shuttle service provided by Columbia River Paddle created noticeable peaks in boat arrivals as people finished in time to catch the shuttle back to Athalmer. Most people used kayaks (66%), while a smaller number used canoes (20%). Only 16 motor boats were detected during the entire summer. Late July and early August was the period of greatest use.

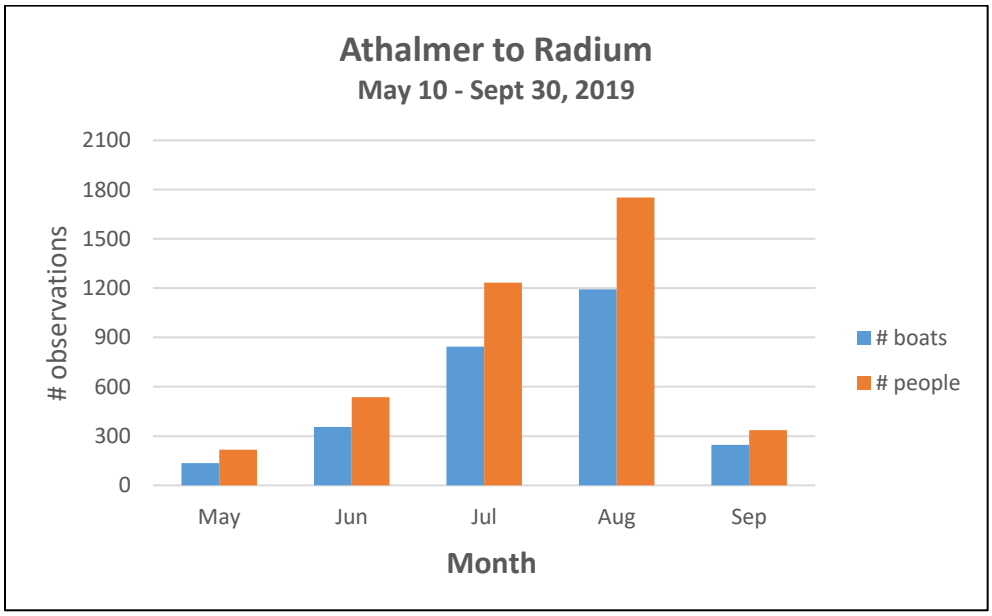


FIGURE 16 ATHALMER TO RADIUM REACH MONTHLY SUMMARY

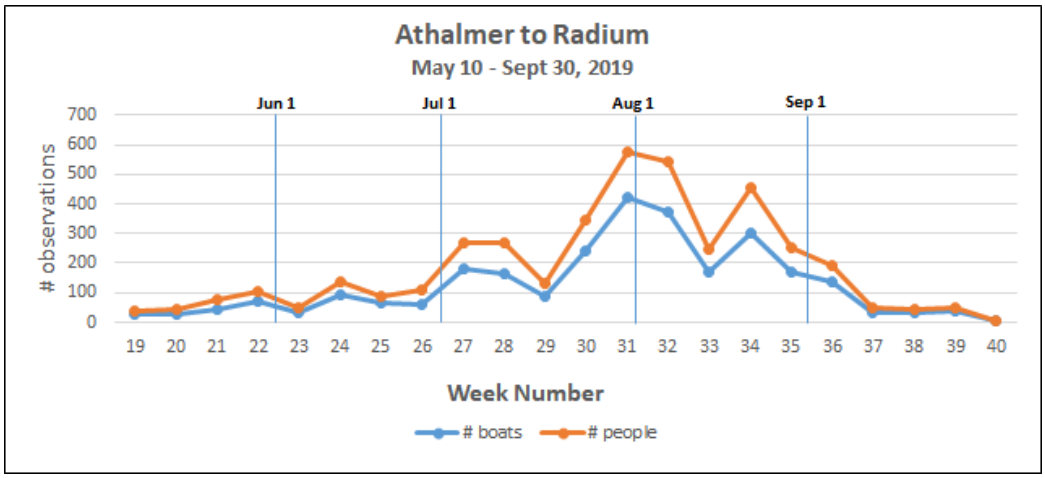


FIGURE 17 ATHALMER TO RADIUM REACH WEEKLY SUMMARY

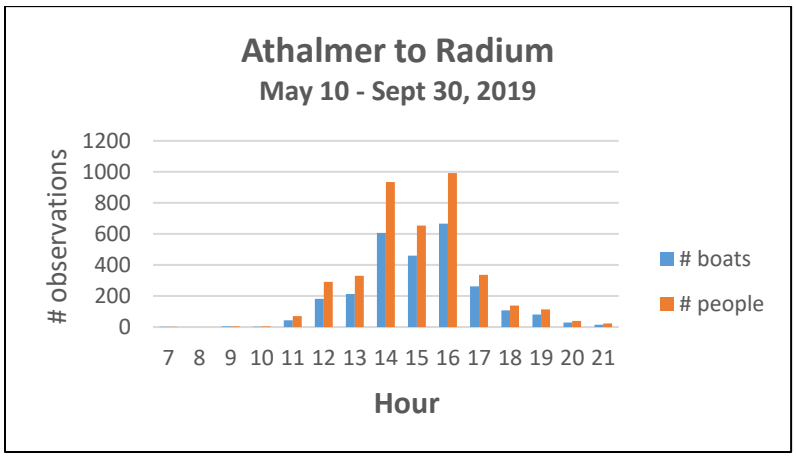


FIGURE 18 ATHALMER TO RADIUM REACH HOURLY SUMMARY

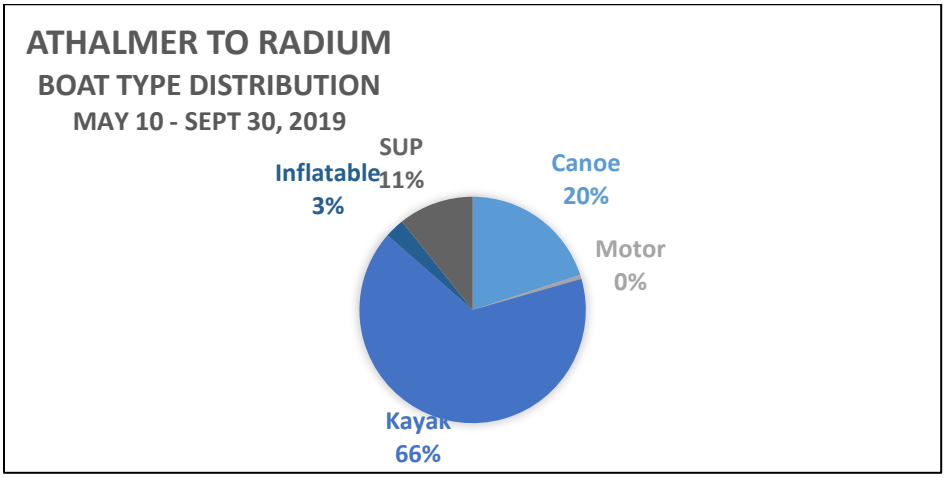


FIGURE 19 ATHALMER TO RADIUM REACH BOAT TYPE SUMMARY

Note that motorized boats were 0.5%, and shows as 0% on the pie chart.

Radium to Edgewater Reach

It is noteworthy that the reach farthest from urban centers had the least use in 2019. The Radium to Edgewater reach had 780 people in 534 boats observed. Again most use was in late July and early August with the period from 11:00 - 4:00 have the highest use. The camera was located at the start of the reach so those users launching between 3:00 and 4:00 would not arrive in Edgewater until early evening, potentially in conflict with wildlife use of the river and levees. In this reach, the numbers of canoes increased slightly compared to the Athalmer to Radium reach (29% compared to 20%) while the number of kayaks decreased compared to Athalmer to Radium (51% compared to 66%). There were more motor boats using this reach than in previous reaches, but still only 21 boats had motors (4%). Hunters often use motor boats, so apparently there is little hunting done in this reach, even in September.

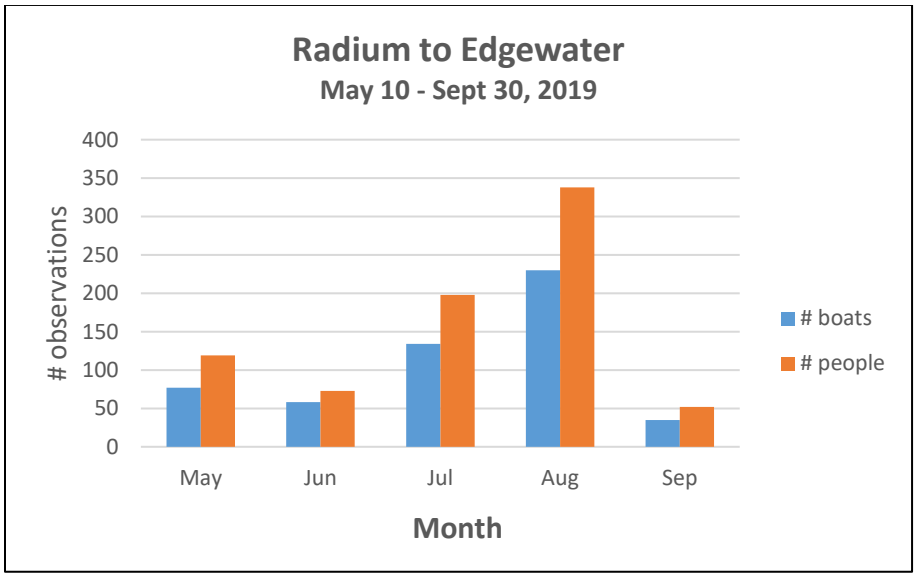


FIGURE 20 RADIUM TO EDGEWATER REACH MONTHLY SUMMARY

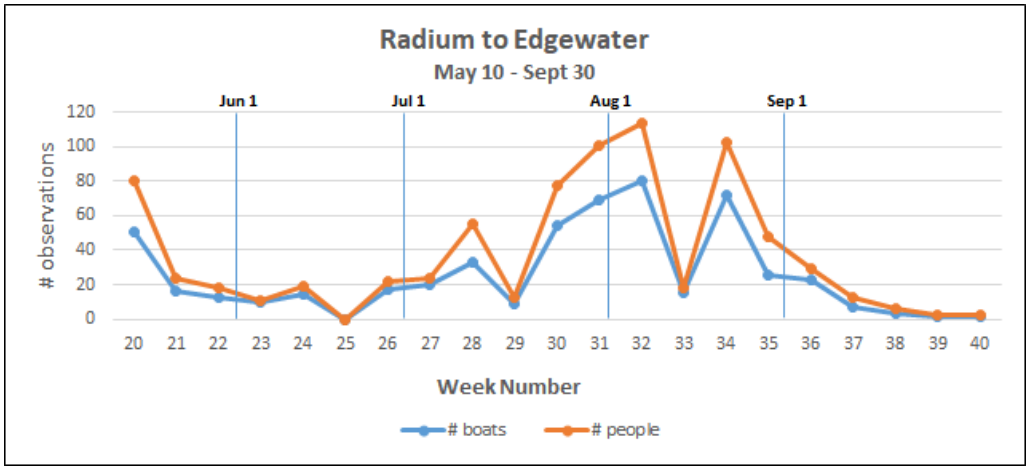


FIGURE 21 RADIUM TO EDGEWATER REACH WEEKLY SUMMARY

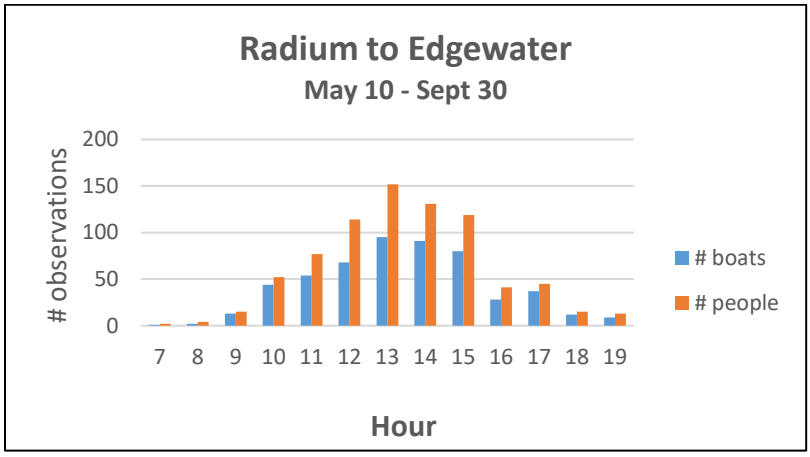


FIGURE 22 RADIUM TO EDGEWATER REACH HOURLY SUMMARY

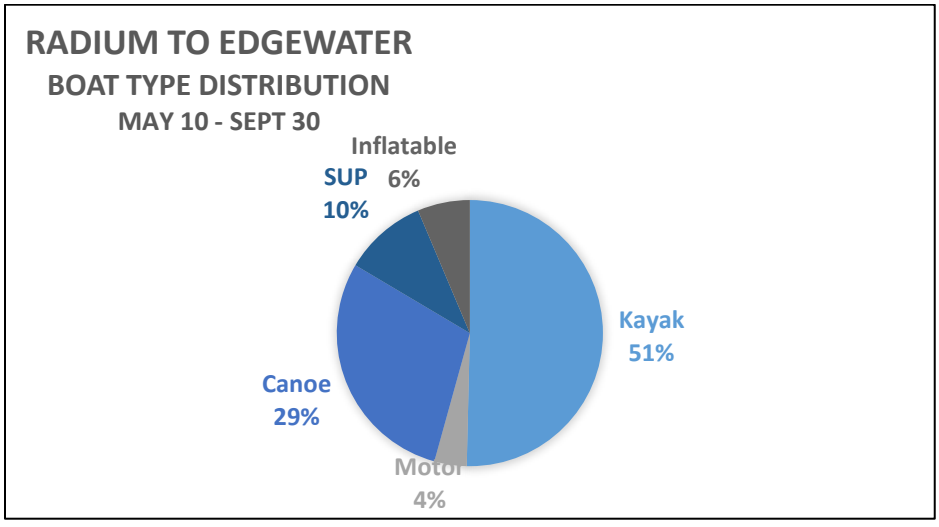


FIGURE 23 RADIUM TO EDGEWATER REACH BOAT TYPE SUMMARY

Nicholson to Golden Reach

The reach from Nicholson to Golden had 1259 boaters in 865 boats. Most boating occurred in late July and early August, similar to the other reaches. Most use of the river was between 12:00 - 3:00 pm, with another peak at 5:00 pm, perhaps by people enjoying the river after work. The types of boats were fairly evenly distributed between inflatables (33%) and canoes (32%) and slightly fewer kayaks (25%). There were 39 motor boats (5%) detected on the river during the period of monitoring.

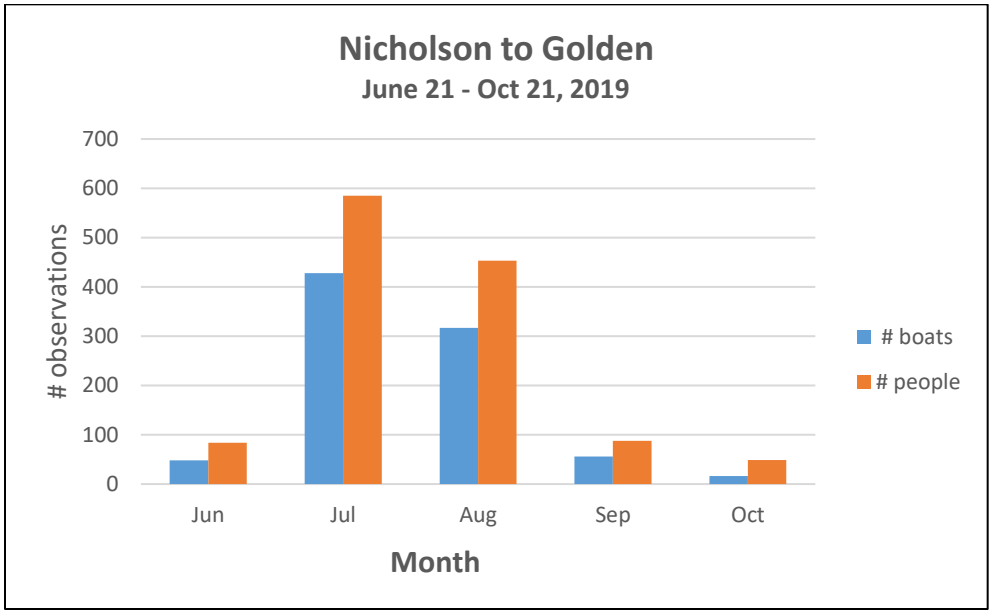


FIGURE 24 NICHOLSON TO GOLDEN REACH MONTHLY SUMMARY

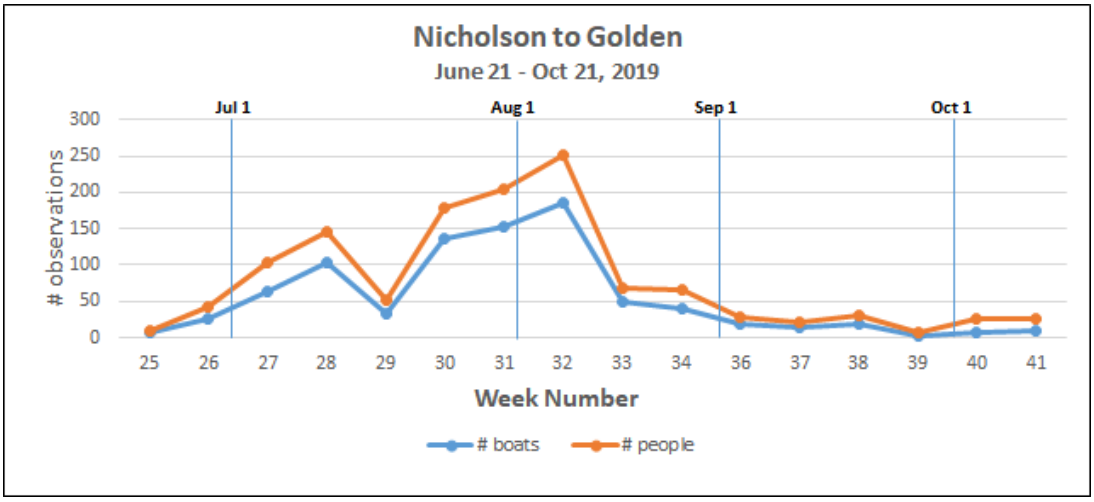


FIGURE 25 NICHOLSON TO GOLDEN REACH WEEKLY SUMMARY

Note that Week 35 is missing; this was in the period when the camera was not functioning.

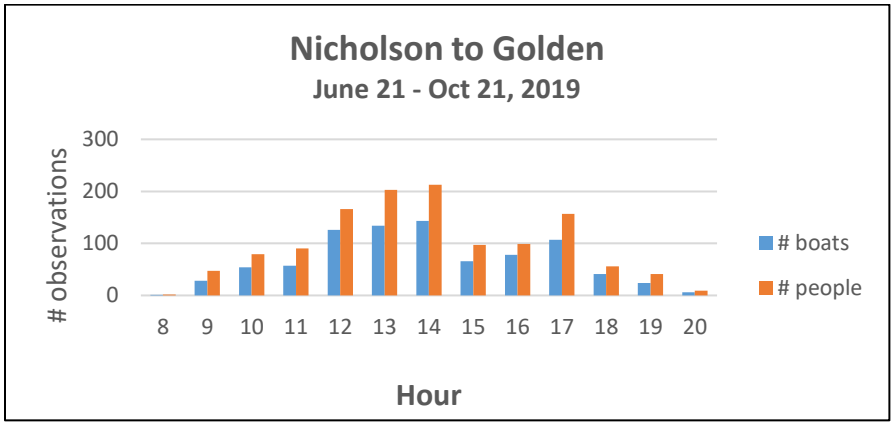


FIGURE 26 NICHOLSON TO GOLDEN REACH HOURLY SUMMARY

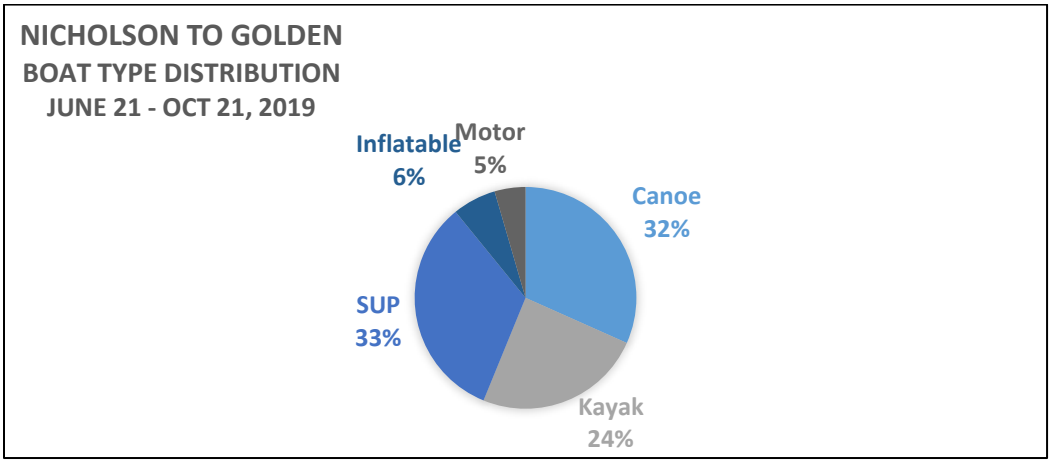


FIGURE 27 NICHOLSON TO GOLDEN REACH BOAT TYPE SUMMARY

Discussion

The river monitoring program has provided quantitative data of human use of the river on five popular reaches for 2019. The usage patterns can be examined for similarities and differences that may be influential in future management policies and service/facility developments. These data may also be useful in evaluating impact to wildlife by comparing spatial and temporal human use patterns with seasonal and temporal periods that are critical for birds and other wildlife during migration, resting, feeding, nesting, etc.

On a seasonal basis, the Fairmont and the Athalmer Slough Reaches are clearly the most popular with 13,819 and 15,287 users respectively. As noted previously, the Athalmer Slough Reach users were counted twice (downstream and upstream) because that is the number of people that would affect wildlife on the river. The actual number of people on that reach was 9,649, if they were counted in only one direction. The reasons for the popularity of these two reaches include proximity to towns, accessibility, shorter time requirements, easier logistics for start/finish, simpler paddling requirements, near-by boat rental opportunities, and public awareness (business signage for rentals, visibility of river and its traffic from roads and for Fairmont, from an adjacent golf course). These reaches are the least "wild" in their locations relative to residential and recreation land development. Thus there may be less conflict with wildlife in these reaches, although it may also be that wildlife has abandoned the habitat during periods with high human use. Fewer people use those reaches in early morning and evening periods which are typically popular with wildlife.

The Athalmer to Radium Reach is the third most popular reach, and traffic here has probably increased with the availability of a shuttle service in recent years. Additionally, public awareness of how to do this reach has increased with relatively new businesses providing guided paddle trips, with the River Guide directions on the Columbia Wetlands Stewardship Partners website, and an increase in the number of guided paddle events in the Wings Over the Rockies Nature Festival. There are far more concerns about wildlife disturbance in this reach than in the Fairmont and Athalmer Slough reaches. The river is increasingly wild after leaving Toby Creek near Athalmer and presumably there are increasing concerns about wildlife disturbance and habitat alienation.

The months of July and August were clearly the busiest on all reaches. These months are the peak summer tourist season as well as peak usage months for recreation property and timeshare owners. It was expected that July would be very similar to August, but cooler wetter weather in July was probably a deterrent, keeping numbers lower than expected. Interestingly, the Nicholson to Golden reach was busier in July compared to August, despite the weather being less amenable. The reasons for this difference in usage patterns in Golden is unknown.

The weekly graphs show two sharp drops across all reaches in Week 29 (July 14-20) and Week 33 (Aug 11-17). These drops can be partially attributed to cooler weather but other weeks with

higher numbers had similar or worse weather. A further contributing factor may be numbers of tourists and recreation property owners in the valley mid-way between holiday weekends.

In reviewing the hourly data, one must consider the location of the camera relative to the reach to understand the actual times when people are on the river. For Fairmont, the camera location is approximately one third to half way along the reach, depending on the launch point. The Athalmer Slough camera is 5-10 minutes from the start and end point. The camera located at Radium monitors the finish of the Athalmer-Radium Reach, and the start of the Radium-Edgewater reach. The Nicholson-Golden camera is also at the beginning of the reach. For all cameras, the boats are counted as they pass. Thus the numbers in the charts do not reflect the total number of people on the reach at that point in time, only the count of those who passed the camera in the hour interval.

All reaches have the bulk of their traffic in the middle of the day. The pattern for the Nicholson-Golden reach differs slightly with increasing values of people starting their boat trip between 16:00 and 18:00. All reaches have some evening traffic and very little early morning traffic.

Boat type distribution varies across the reaches. On the Fairmont Reach, the most popular boat by far is some type of inflatable, and unquantified reviewer observation is that the most popular inflatable was the “floating armchair”. Inflatables of all shapes and sizes were seen, often rafted together in groups of between 2 and 10 boats, and frequently with floating coolers and dogs as part of the entourage. Anecdotally, it is known that many punctured inflatables are found in the river through the season.

For Athalmer Slough, the boat of choice is the kayak, followed by Stand Up Paddleboards (SUP). Inflatables were not common, probably because they are difficult to paddle back upstream to the launch point. Frequently, inflatables were towed back upstream by canoes or kayaks, and there were a few observations where someone was walking upstream pulling their inflatable.

Athalmer to Radium, and Radium to Edgewater both see primarily kayaks, followed by canoes. These two boat types comprise over 80% of the traffic on these reaches, suggesting the users of these longer reaches are more experienced or serious paddlers.

Nicholson to Golden differs in having canoes and SUP’s as the most common boats, followed by kayaks. More inflatables show up here than in the longer reaches, but still not a large percentage.

Overall, motorized traffic is not high on any of the reaches, and for the most part, motor boats appeared to be going at low speed.

Concerns raised by increasing river traffic

There has been no previous monitoring of recreational use on the upper Columbia River, however locals have noticed a substantial increase in the numbers of boaters on the river. In previous decades, motor boats and hunters contributed to a substantial number of the users, but no longer. As the urban centers of Fairmont, Invermere, Windermere, Radium and Golden have developed and commercial operations started, canoes, kayaks, stand up paddleboards and inflatables have become very popular. The increased traffic raises concerns about the ecological impacts, especially on viability of wildlife habitat, the lack of sanitary facilities, lack of developed river access points, garbage, and human safety.

Potential for ecological impacts

There are number of potential ecological impacts from boat traffic on the river that should be investigated now that usage data are available.

Human activity including boaters are known to have substantial impact on wildlife. In our region, that is mostly birds, elk and deer. Alert distances and flight initiation distances for species using habitat on or near the river should be evaluated. Noise levels from groups may initiate stress in adjacent areas even if boaters are not visible to the birds and/or wildlife. Such disturbance may cause fauna to discontinue feeding or even flee optimal feeding locations as they err on the side of caution in assessing the possible threat. Similar concerns exist for migrating bird species resting on or near the river and wetlands. In addition, a number of boats have dogs, and these have been seen to be in and out of the water even in the brief view of the cameras. It is feasible that dogs may bark at or chase waterfowl or animals.

The Columbia Wetlands Wildlife Management Area (CWWMA) status is important for conservation but the CWWMA management plan does permit recreational activities, hunting & fishing. The draft CWWMA management plan raises concern about the increased use and encourages government to develop a recreation use plan and management options if use is considered damaging to wildlife. Data from this report will assist them in that endeavor.

There is no recent monitoring of breeding or moulting water birds, nor of habitat use by elk, deer or other wildlife. The on-going CWSP-Kootenay Connect project has summarized all the past data available (both spatial and temporal data) and created maps of high biodiversity areas and important linkage areas in the Columbia Wetlands which may assist in determining the need for management of boating traffic.

There has been recent monitoring of population abundance and species of spring and fall migrating water birds by Rachel Darvill (Darvill, Columbia Wetlands Waterbird Survey, 2020). The Columbia Wetlands Water Bird Survey (CWWS) was a 5 year monitoring effort using volunteer citizen scientists and was completed in 2019. Although the CWWS study was for migrating water birds, the final report lists a wide range of potentially negative behavioural patterns for water birds during the breeding and moulting season in response to recreation activities. Darvill references studies by several authors [see Darvill (2020) for references by

Korschgen & Dahlgren, 1992; Hockin et al., 1992; Korschgen, George & Green, 1985; Liddle & Scorgie, 1980; York, 1994] that document effects of recreational activity on waterfowl behavior. Some of the detrimental impacts Darvill notes in her report include: multiple flushing and extended flight times resulting in increased energy expenditure by birds, reduction of energy intake activities including lost foraging opportunities and fewer resting periods, lowered productivity during nesting, increased incidences of nest abandonment and egg loss, disruption of pair bonding and parent-offspring bonds and reduced use of feeding, resting and breeding sites. Essentially this is habitat alienation whereby repetitive disturbances eventually cause ducks and other nesting species to nest elsewhere or not at all.

A further concern arising from human use on the river is the lack of facilities for garbage and sanitation, both at most launch/take-out locations as well as along the river. This increases the risk of garbage and human pollution along the shores, and/or in the water.

Safety

The increasing number of people on the river brings with it increased concerns for safety. Reviewers of the camera images noted that many people do not wear Personal Floatation Devices (PFD's), particularly in the Fairmont and Athalmer Slough reaches. In fact, our general observation is that inflatable and SUP users rarely wear PFD's, kayak users wear them about half the time, and canoeists usually wear them.

Additionally, the multi-boat rafting so common on the Fairmont reach can cause problems when passing bridge structures, as experienced in recent years in Penticton. A man there drowned when a group of boats tied together got caught and flipped at a bridge abutment (Penticton Western News, 2017).

In the reaches between Athalmer and Edgewater, the railroad bridge crossings of the Columbia River can present safety issues, especially during peak flows when there is no or limited access under the bridges.

In the event of a serious problem, accessibility for rescue services is reasonable in Fairmont and Athalmer Slough, but considerably more difficult in the other three reaches.

Alignment of tourism and economic plans with environmental protection plans

As mentioned in the Introduction, there is a direction in Destination BC and the Kootenay Rockies Destination Development Strategy to further exploit water experiences as a tourism draw and economic benefit. There is a need to balance these economic directions with protection of the natural resource that is the very attraction for tourism.

The concept of carrying capacity has often been discussed as a tool for managing natural resources and tourism. Carrying capacity is typically defined with respect to tourism as the number of tourists that can be accommodated in an area without compromising specific considerations, be it social, cultural, environmental. However, in recent decades, the concept of "Limits of Acceptable Change" has found to be more relevant to ecotourism (Noga Collines-

Kreiner, 2013). This approach identifies specific indicators of environmental quality and tourism impacts, and then determines thresholds that allow balance between tourism, economic, and conservation goals. Given the desire to exploit the water resources in tourism development plans, this latter approach may be the most appropriate for this region, although the current lack of information on the environmental impacts precludes this tactic.

CWSP and like organizations should be included in the development of tourism and marketing strategies and plans in the Upper Columbia Valley. In addition, development of management policies by the Columbia Wetlands Wildlife Management Area should consider the existing number of river users identified by this project, in conjunction with the tourism development efforts. Human use numbers acquired by this study should be considered by all organizations as they move forward with management policies and plans, and with expanded tourism development.

In conclusion

This study provided one season of boating traffic numbers for 5 main stem reaches on the river. It may be important to understand if some reaches are increasing in volume year over year. The new (2020-2023) CWSP-Kootenay Connect project should provide additional information to see what locations at what times are most important for wildlife activities. Monitoring of these areas should be undertaken to understand if human usage patterns of the river are a threat to these important habitat areas. A monitoring program for 2020 will be developed based on these concerns.

References

Cordillera Technical Services. (2018). *Columbia River Public Access Feasability Study.* Cranbrook, BC: Cordillera Technical Services.

Darvill, R. (2020). *Columbia Wetlands Waterbird Survey.* Golden, BC: Goldeneye Ecological Services.

Darvill, R., & Westphal, A. (2019). *Columbia Wetlands Marsh Bird Monitoring Project (CWMBMP) Final Report.* Golden, BC: Golden Ecological Services.

Destination BC Corp. (2019). *Kootenay Rockies Destination Development Strategy 2019-2029.* Victoria: Destination BC Corp.

Draft Columbia Wetlands Wildlife Management Area Management Plan 2019 BC FLNRORD

Mahr, M. (2017). Columbia Valley Priority Conservation Actions Summary Report. *Columbia Valley Priority Conservation Actions Summary Report.* Invermere, BC: Kootenay Conservation Program.

Noga Collines-Kreiner, D. M. (2013). Are birders good for birds? Bird conservation through tourism management in the Hula Valley, Israel. *Tourism Management*, 31-42.

Penticton Western News. (2017, June 28). *Emergency Services Called to Possible Drowning.* Retrieved from Penticton Western News: https://www.pentictonwesternnews.com/news/emergency-services-called-to-possible-drowning/

Appendix 1 Summary Data for the Graphs

SEASONAL SUMMARY

	# Boats	# People
Fairmont	10796	13819
Athalmer Slough	10985	15287
Athalmer to Radium	2776	4077
Radium to Edgewater	534	780
Nicholson to Golden	865	1259
TOTAL	**25,956**	**35,222**

Note that the Athalmer Slough number contains both downstream and upstream observations, as the stretch between the bridge and the slough area gets traffic in both directions. Both traverses have the potential to disturb birds and other wildlife.

FAIRMONT REACH Chart Data

Month	# Boats	# People
May	58	70
Jun	793	999
Jul	3833	4979
Aug	5664	7209
Sep	448	562
TOTAL	**10796**	**13819**

Hour	# Boats	# People
8	4	7
9	9	9
10	68	97
11	409	512
12	1070	1325
13	1623	2025
14	2456	3202
15	2339	2987
16	1449	1864
17	764	980
18	365	498
19	154	192
20	78	108
21	8	13
TOTAL	**10796**	**13819**

Week Number	# Boats	# People
20	6	10
21	18	24
22	58	65
23	95	114
24	136	159
25	129	167
26	117	139
27	818	1105
28	616	786
29	310	387
30	1437	1897
31	1900	2481
32	2417	3065
33	640	824
34	1144	1402
35	507	632
36	394	487
37	23	34
38	15	23
39	14	16
40	2	2
TOTAL	**10796**	**13819**

Boat Type		
SUP	4.1%	441
Canoe	0.8%	84
Kayak	21.8%	2355
Motor	0.1%	16
Inflatable	73.2%	7900
TOTAL		**10796**

ATHALMER SLOUGH Chart Data

Month	# boats	# people
May	580	825
Jun	1576	2159
Jul	3347	4689
Aug	4268	5911
Sep	1211	1696
TOTAL	**10982**	**15280**

Hour	# boats	# people
6	10	10
7	13	13
8	56	67
9	441	680
10	823	1230
11	1469	2189
12	1475	2074
13	1737	2502
14	1433	2006
15	1173	1619
16	894	1142
17	535	683
18	373	427
19	318	355
20	171	203
21	61	80
TOTAL	**10982**	**15280**

Week Number	# boats	# people
20	87	112
21	225	354
22	410	555
23	204	259
24	366	546
25	324	421
26	234	347
27	802	1107
28	721	1073
29	345	479
30	998	1384
31	1291	1751
32	1455	1881
33	690	996
34	886	1276
35	733	1043
36	772	1063
37	143	229
38	175	223
39	115	174
40	6	7
TOTAL	**10982**	**15280**

Boat Type	%	
Canoe	16.8%	689
Motor	1.5%	61
Kayak	55.9%	2294
SUP	25.0%	1025
Inflatable	0.8%	32
TOTAL		**4101**

ATHALMER to RADIUM REACH Chart Data

Month	# boats	# people
May	136	217
Jun	356	537
Jul	844	1233
Aug	1193	1753
Sep	247	337
TOTAL	**2776**	**4077**

Hour	# boats	# people
7	1	2
8	0	0
9	5	5
10	3	5
11	44	70
12	183	292
13	213	330
14	607	934
15	460	655
16	666	993
17	262	336
18	107	139
19	81	115
20	29	39
21	14	24
TOTAL	**2675**	**3939**

Week Number	# boats	# people
19	26	38
20	26	42
21	44	78
22	70	103
23	33	49
24	92	138
25	65	90
26	62	110
27	180	270
28	164	268
29	89	133
30	241	345
31	420	573
32	375	545
33	169	247
34	302	457
35	171	254
36	139	190
37	34	47
38	34	44
39	36	51
40	4	5
TOTAL	**2776**	**4077**

Boat Type		
Canoe	20.0%	555
Motor	0.6%	16
Kayak	65.9%	1829
Inflatable	2.8%	78
SUP	10.7%	298
TOTAL		**2776**

RADIUM to EDGEWATER REACH Chart Data

Month	# boats	# people
May	77	119
Jun	58	73
Jul	134	198
Aug	230	338
Sep	35	52
TOTAL	**534**	**780**

Hour	# boats	# people
7	1	2
8	2	4
9	13	15
10	44	52
11	54	77
12	68	114
13	95	152
14	91	131
15	80	119
16	28	41
17	37	45
18	12	15
19	9	13
TOTAL	**534**	**780**

Week Number	# boats	# people
20	51	80
21	16	24
22	13	18
23	10	11
24	14	19
25	0	0
26	17	22
27	20	24
28	33	55
29	9	13
30	54	78
31	69	101
32	80	114
33	15	18
34	72	103
35	26	48
36	23	29
37	7	13
38	3	6
39	1	2
40	1	2
TOTAL	**534**	**780**

Boat Type		
Kayak	50.4%	269
Motor	3.9%	21
Canoe	29.2%	156
SUP	10.1%	54
Inflatable	6.4%	34
TOTAL		**534**

NICHOLSON to GOLDEN REACH Chart Data

Month	# boats	# people
Jun	48	84
Jul	428	585
Aug	317	453
Sep	56	88
Oct	16	49
TOTAL	**865**	**1259**

Hour	# boats	# people
8	1	2
9	28	47
10	54	79
11	57	90
12	126	166
13	134	203
14	143	213
15	66	97
16	78	99
17	107	157
18	41	56
19	24	41
20	6	9
TOTAL	**865**	**1259**

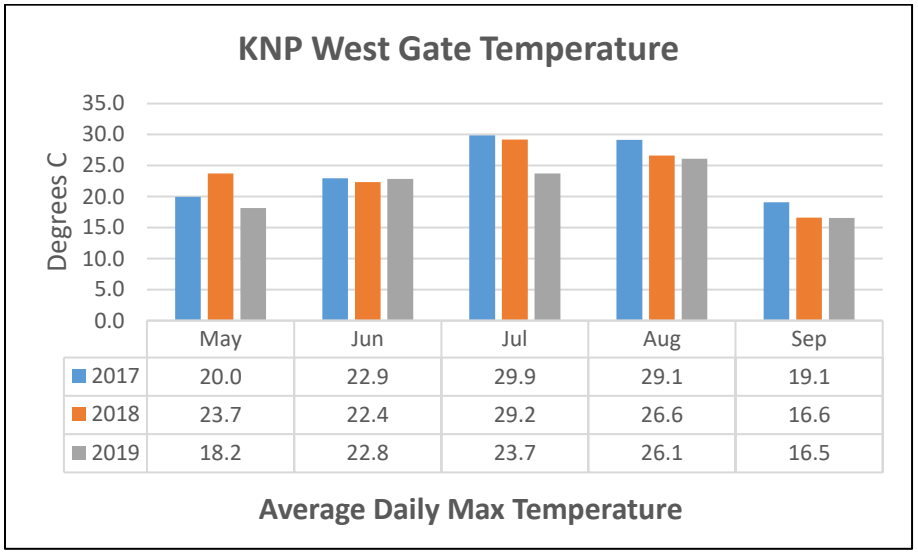
Week Number	# boats	# people
25	6	10
26	25	42
27	64	103
28	103	146
29	33	52
30	137	178
31	152	205
32	185	252
33	49	69
34	39	65
36	20	28
37	13	22
38	19	30
39	3	6
40	8	25
41	9	26
TOTAL	**865**	**1259**

Note: week 35 is missing; this was during the period when camera was not functioning.

Boat Type		
Canoe	31.7%	274
Kayak	24.5%	212
SUP	32.9%	285
Inflatable	6.4%	55
Motor	4.5%	39
TOTAL		**865**

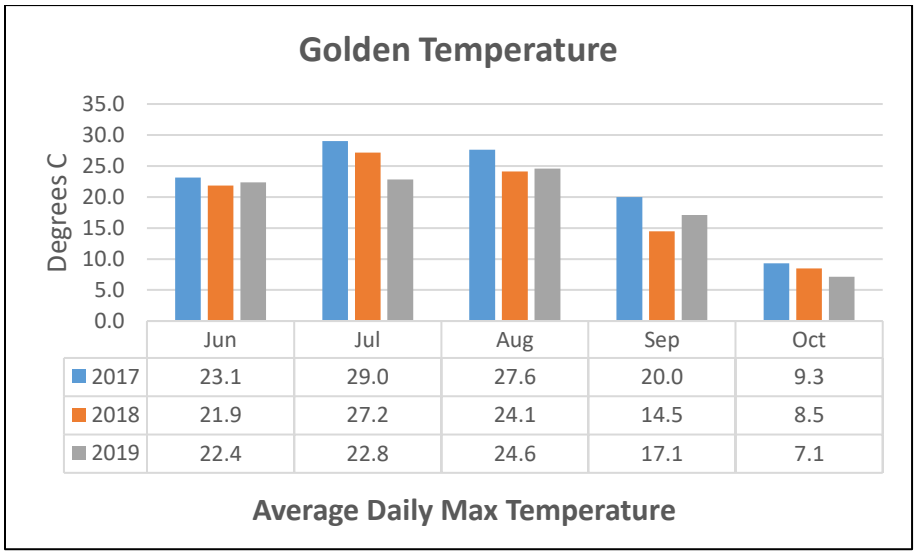
Appendix 2 Summary Weather Data

Weather data downloaded from Environment Canada (www.weather.gc.ca) weather stations at Kootenay National Park West Gate, and at Golden show that 2019 was a cooler and wetter summer than the previous 2 years.



	May	Jun	Jul	Aug	Sep
2017	20.0	22.9	29.9	29.1	19.1
2018	23.7	22.4	29.2	26.6	16.6
2019	18.2	22.8	23.7	26.1	16.5

FIGURE 28 KOOTENAY NATIONAL PARK WEST GATE AVERAGE DAILY MAXIMUM TEMPERATURE



	Jun	Jul	Aug	Sep	Oct
2017	23.1	29.0	27.6	20.0	9.3
2018	21.9	27.2	24.1	14.5	8.5
2019	22.4	22.8	24.6	17.1	7.1

FIGURE 29 GOLDEN AVERAGE DAILY MAXIMUM TEMPERATURE

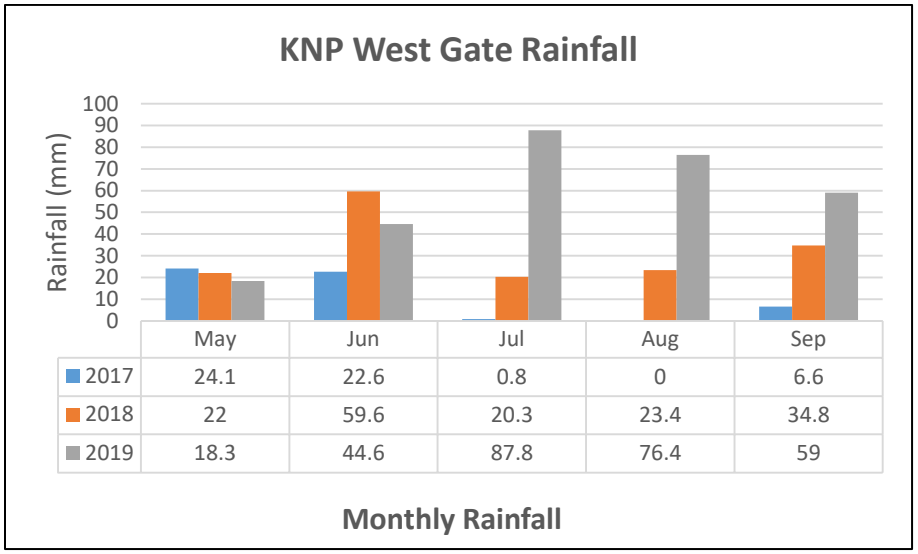


FIGURE 30 KOOTENAY NATIONAL PARK WEST GATE RAINFALL

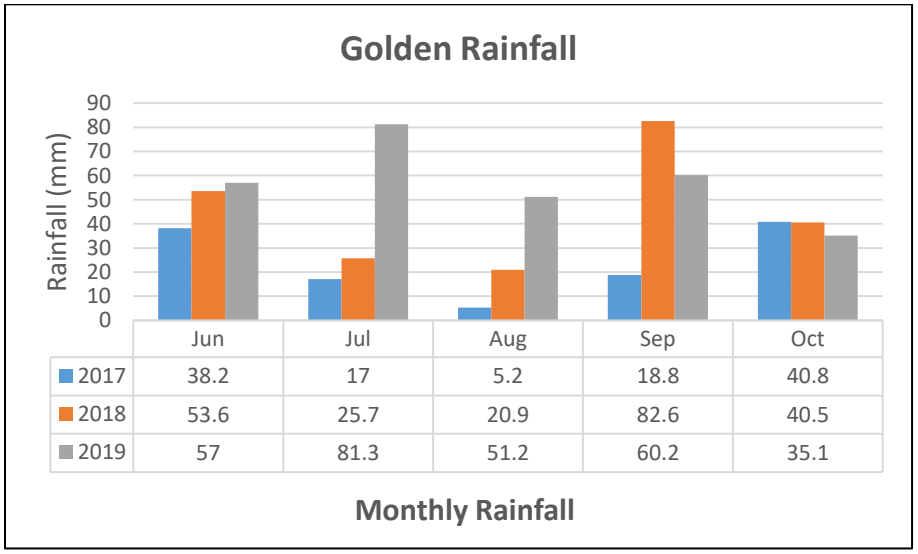


FIGURE 31 GOLDEN RAINFALL