

Flathead Wild and Scenic River: 2017 River Use Report



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Executive Summary:

This report describes the use of watercraft on the North and Middle Forks of the Flathead River for 2017. This season was the first time that researchers from the University of Montana have collected information on river use patterns for designated stretches of the Flathead River. This project will continue for future years, which will allow researchers to compare data across years.

The data was collected using Plotwatcher Pro game Cameras and GameFinder Software. The cameras collected data from 7:00 to 21:00 at five locations (three on the North Fork, two on the Middle Fork). The three locations on the North Fork were: above Wurtz Airstrip launch site (measuring the Border to Wurtz stretch of the river), Ford downstream from the Ford cabin launch site, and Polebridge below the Polebridge launch site (measuring downstream from Polebridge). The two sites on the Middle Fork were: Quarter Circle Bridge/ West Glacier (downstream from the bridge and the McDonald creek confluence), and Moccasin Creek (downstream from the Moccasin Creek launch site). The cameras were installed between 5/24/2017 and 6/04/2017. Cameras were taken down between 9/07/2017 and 9/14/2017.

The site with the highest monthly average water craft was Moccasin Creek in July with 136.5 craft per day. Wurtz monitoring site had the lowest average monthly craft in July at 20.4. Overall July experienced the highest use at each site, followed by August and September. High water, cold water and cool temperatures may have discouraged use in May and June.

On the North Fork the Wurtz and Ford monitoring locations experienced spikes in use during the weekend before the 4th of July. Polebridge likely would have experienced similar spikes in use, however the camera at this location experienced technical difficulties during the 2nd and 3rd of July.

Introduction:

The North Fork, Middle Fork, and South Fork all make-up the Flathead River. The Flathead River flows between Glacier National Park and the Flathead National Forest and is dually managed by the two agencies (Flathead Wild and Scenic River Management Plan, 1980). In addition, the Flathead River is a Wild and Scenic River (WSR), under the Wild and Scenic River Act, “including the North Fork from the Canadian border to its confluence with the Middle Fork, the entire Middle Fork, and the South Fork from its headwaters to the Hungry Horse Reservoir (Flathead Wild and Scenic River Management Plan, 1980).”

The Wild and Scenic Rivers Act of 1968 declared the policy to preserve certain free-flowing rivers with “outstandingly remarkable scenic, recreational, geologic, fish and wildlife, historic, cultural, or other similar values... for the benefit and enjoyment of present and future generations... by prescribing the methods by which and standards according to which additional components may be added to the system from time to time (Wild and Scenic Rivers Act, 1968).” The free-flowing character, diverse and intact ecosystems, and remarkable values are what make the Flathead River unique and vital to protect and conserve for the viability of natural systems and the enjoyment of present and future generations. Managers from the Flathead National Forest and Glacier National Park are currently preparing to embark on a process to revise the current plan for the management of the river.

The river exists in the context of rapid social and environmental change. There has been a large increase in the number of visitors to Glacier National Park over the last few years, reaching 3 million visitors annually (Annual Park Recreation Visitation, 2017). The population of the region surrounding the river is also increasing at a rapid rate. More people could mean more river corridor users and increased use. Additionally, there are new types of users in the corridor. Watercrafts are becoming more affordable and lighter-weight and many recreationists do not need a guide to help them down the river. As a result, the Flathead River is experiencing more shore parties, dispersed camping, and extended seasons. This could affect peoples’ perceptions of crowding and may explain increased impacts along shores.

The purpose of this project is to empirically document the existing use levels within the river corridor. This documentation will assist managers in identifying appropriate indicators of change upon which a monitoring system can be developed.

The camera footage that was collected from these five monitoring sites was reviewed by a Researcher from the University of Montana. Using the GameFinder Software she played the footage of all of the camera locations, stopping and recording each craft, the approximate number of people, and whether the craft appeared to be a commercial or private group. The process of watching through this video footage was time consuming but allowed for the collection of complete census of watercraft that passed by these cameras in the 2017 season. Image 1.1 provides an example of the image collected from the Quarter Circle monitoring location.

Image 1.1 Gamefinder Screenshot:



North and Middle Fork of the Flathead River Use Overview:

Table 1 provides an overview of the total number of craft and average craft per day that passed by each monitoring location during the 2017 season.

Table 1 Total Craft Use in 2017 by Location:

Location	Total Days Monitored	Total Craft	Average Craft Per Day
Quarter Circle	98	6307	64.4
Moccasin	60	5411	90.2
Ford	107	1643	15.4
Wurtz	97	898	9.3
Polebridge	85	826	9.7

Table 2 provides an overview of the average craft per day broken down by location and month. Due to weather and technical difficulties, cameras were installed at some locations for longer periods of time. Ford and Quarter Circle were installed in May and had few technical issues throughout the summer. The cameras on the North Fork were taken down one week earlier than the Middle Fork due to fire closures. Wurtz had the third largest number of monitoring days though the camera was not installed until 06/01/2017 due to a tree blocking the road. Moccasin Creek had the lowest number of monitoring days throughout the summer but had the highest craft counts during the time that the camera was in place and working properly.

Table 2 Average Craft Use in 2017 by Month:

	Number of Days Monitored				
Location	May	June	July	August	September
Quarter Circle	6	24	28	28	12
Moccasin Creek	0	0	16	31	13
Ford	8	30	31	31	7
Wurtz	0	29	30	31	7
Polebridge	0	20	27	31	7
	Average Craft Per Day				
Location	May	June	July	August	September
Quarter Circle	9.8	18.3	114.0	81.5	27.9
Moccasin Creek	NA	NA	136.5	93.3	25.7
Ford	2.5	6.1	30.9	14.0	6.7
Wurtz	NA	5.0	20.4	4.4	0.4
Polebridge	NA	1.4	22.0	5.6	4.1

Table 3 shows the count of people per day by month for both of the Middle Fork monitoring sites. The daily average is shown as well as the minimum and maximum daily count of individuals. Table 4 provides the count of people per day by month for the North Fork locations.

Table 3 Counts of Individuals on the Middle Fork:

Location	Month	Daily Average	Minimum	Maximum	Observation Days
Quarter Circle	May	31.0	12	43	6
	June	74.8	7	261	24
	July	306.2	189	448	28
	August	245.9	94	558	28
	September	71.1	11	226	12
Moccasin	May	-	-	-	0
	June	-	-	-	0
	July	867.3	720	1029	16
	August	573.7	226	1195	31
	September	120.8	7	344	13

Note: Missing observations: Quarter Circle 6/13-6/18, 7/4-7/5, 8/3-9/6, Moccasin Creek 7/26-7/29.

Table 4 Counts of Individuals on the North Fork:

Location	Month	Daily Average	Minimum	Maximum	Observation Days
Ford	May	6.3	0	39	8
	June	14.7	0	64	30
	July	74.5	17	243	31
	August	30.7	0	139	31
	September	14.3	0	48	7
Wurtz	May	-	-	-	0
	June	12.1	0	63	29
	July	48.1	3	198	30
	August	9.4	0	41	31
	September	0.9	0	6	7
Polebridge	May	-	-	-	0
	June	2.9	0	18	20
	July	49.7	5	105	27
	August	12.6	0	48	31
	September	9.1	0	27	7

Note: Missing observations: Ford none, Wurtz 6/15, 7/4, Polebridge 6/24-7/3.

Figure 1.1 provides an overview of the daily watercraft counts for the 2017 season. Average daily watercraft counts for the five locations by month are displayed in Figure 1.2. Figure 1.3 shows an overview of individual people counts for the 2017 season. Figure 1.4 provides the average daily counts of people by month for each location. In the month of May the only available counts were from Quarter Circle and Ford. Due to weather the Wurtz camera was not installed until June 1st. Moccasin Creek and Polebridge Cameras faced technical difficulties leading to limited observations until July. Figures 1.1- 1.4 show that the Middle Fork use was much higher than North Fork use.

Figure 1.1 Daily Watercraft Counts:

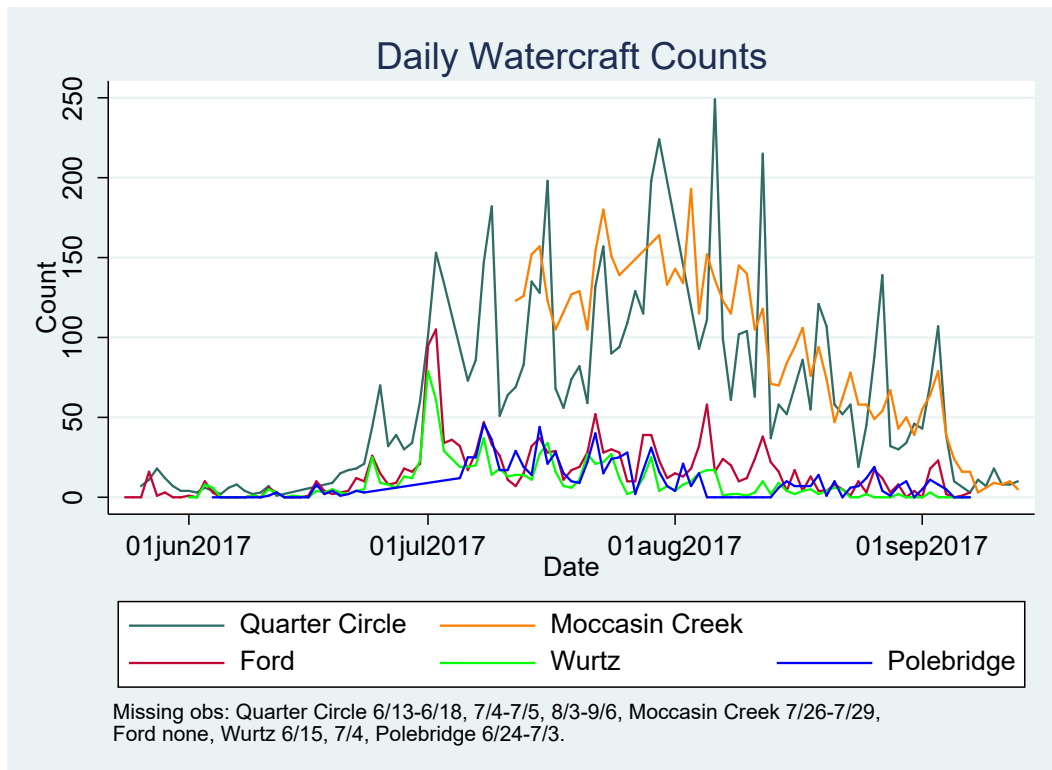


Figure 1.2 Average Daily Watercraft Count by Location:

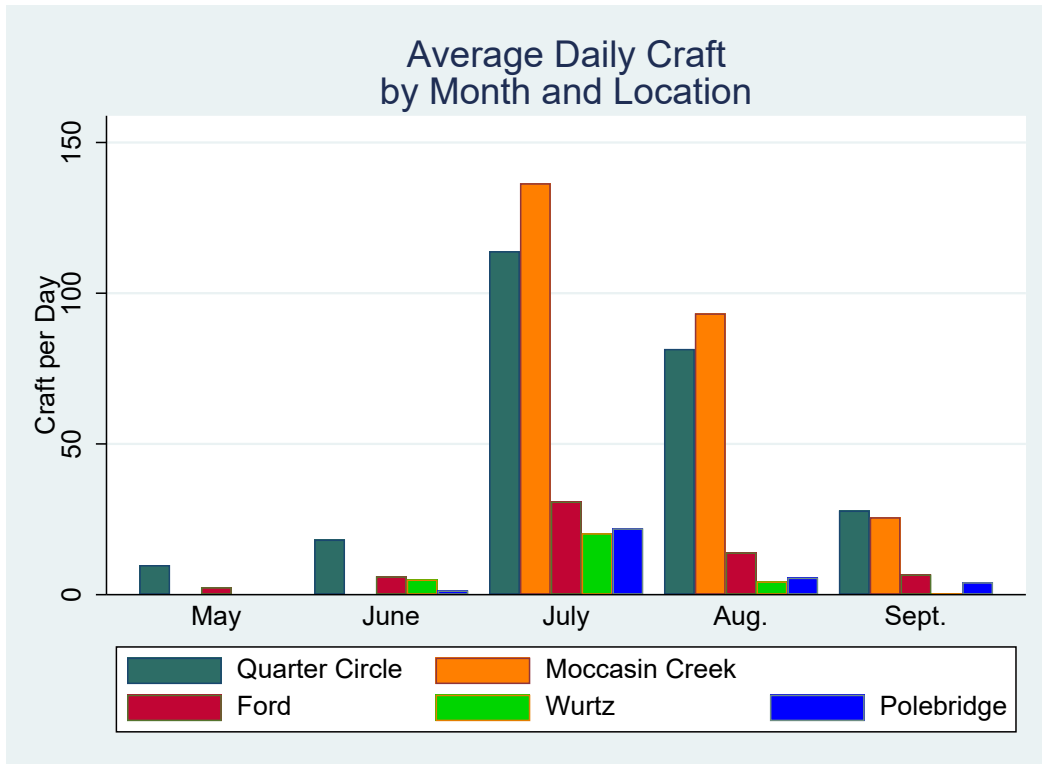


Figure 1.3 Daily Count of People:

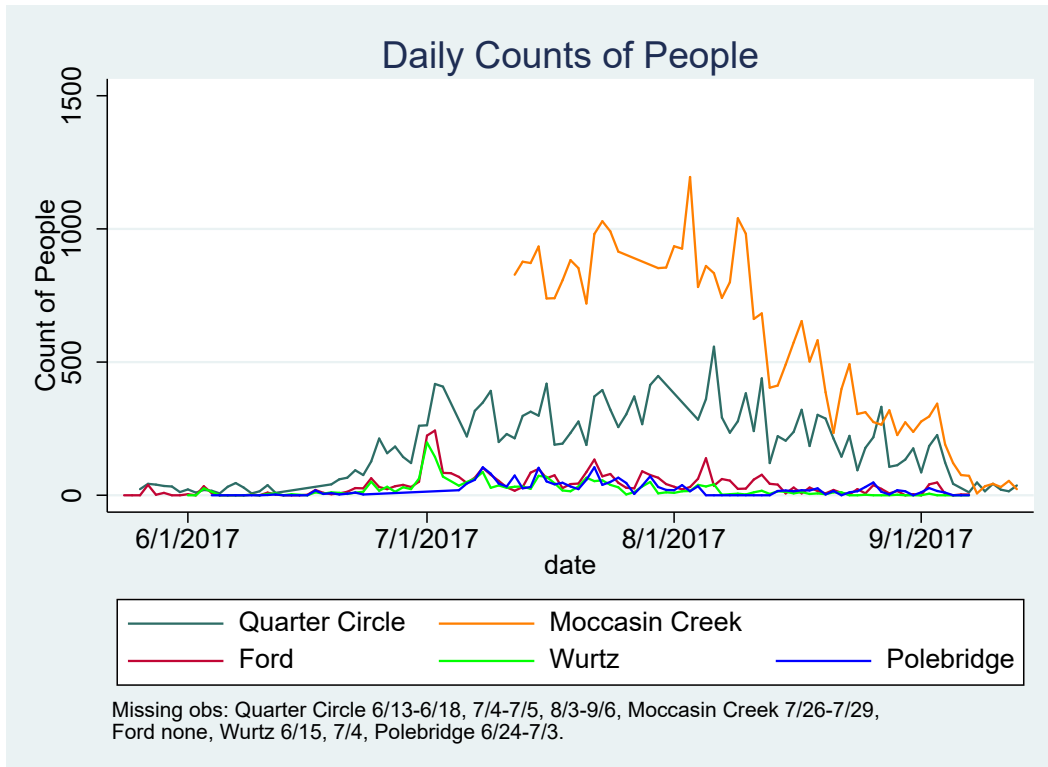
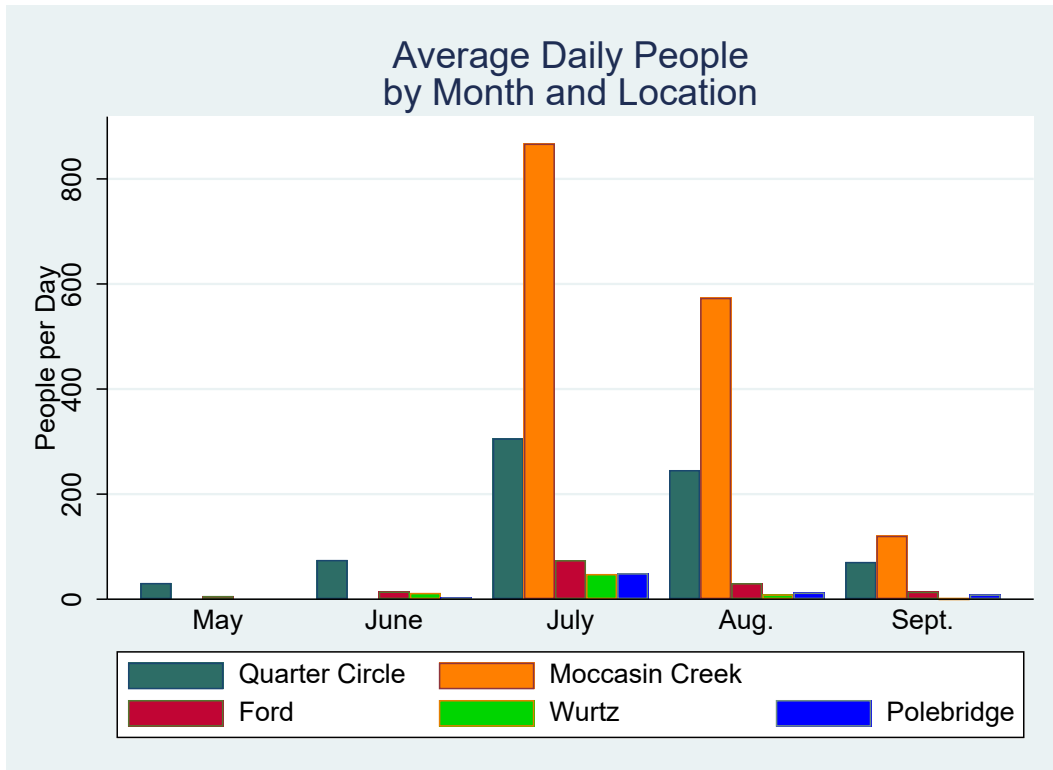
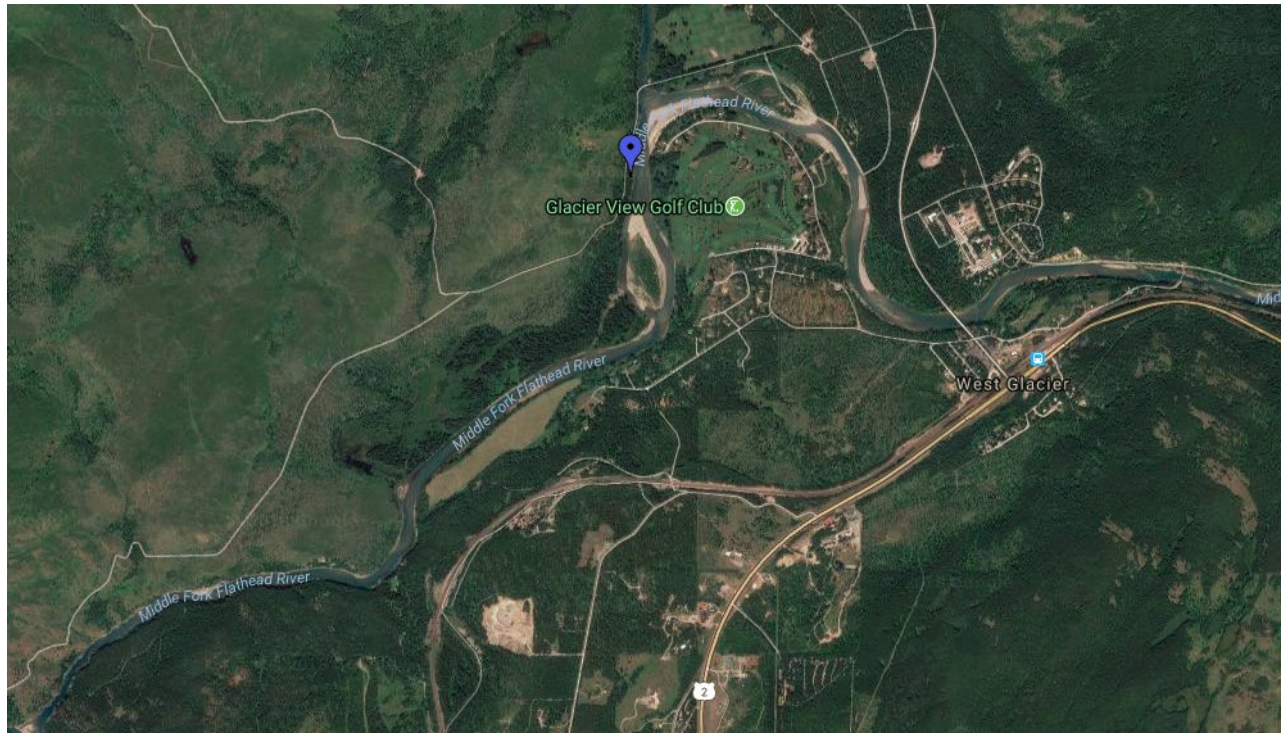


Figure 1.4 Average Daily Count of People By Location:



Quarter Circle/West Glacier:

Figure 2.1 Quarter Circle/West Glacier Camera Location:



The Quarter Circle camera was located near West Glacier on the Middle Fork from 05/26/17-09/13/17 (Figure 2.1). The following graphs describe distribution of watercraft by hour of the day at the Quarter Circle monitoring site. Figure 2.2 shows an overview of passing watercraft by hour of the day. This graph shows that over 3,000 craft passed this location between the hours of 12:00 and 15:00. Figure 2.3 shows the distribution of watercraft by hour of the day in the 6 days of May that were observed. The highest use time was between 14:00 and 16:00 with 24 watercraft passing during that time. Figure 2.4 shows the distribution of watercraft by hour of the day in June with the highest use time being between 14:00 and 15:00 with approximately 170 watercraft passing. Figure 2.5 shows the distribution of watercraft by hour for July. This month both the window of use and the volume of watercraft increased with approximately 1,400 watercraft passing between the hours of 13:00 and 15:00. Figure 2.6 shows the distribution of watercraft for August with approximately 1,100 passing between the hours of 13:00 and 15:00. Figure 2.7 shows the distribution of watercraft for the 12 days of September that were monitored. The volume of passing craft and high use window decreased in September with approximately 140 craft passing between the hours of 14:00 and 15:00. Figure 2.8 shows the average as well as minimum and maximum count of people by month for the Quarter Circle monitoring location.

Figure 2.2 Quarter Circle Craft by Hour of the Day Overview:

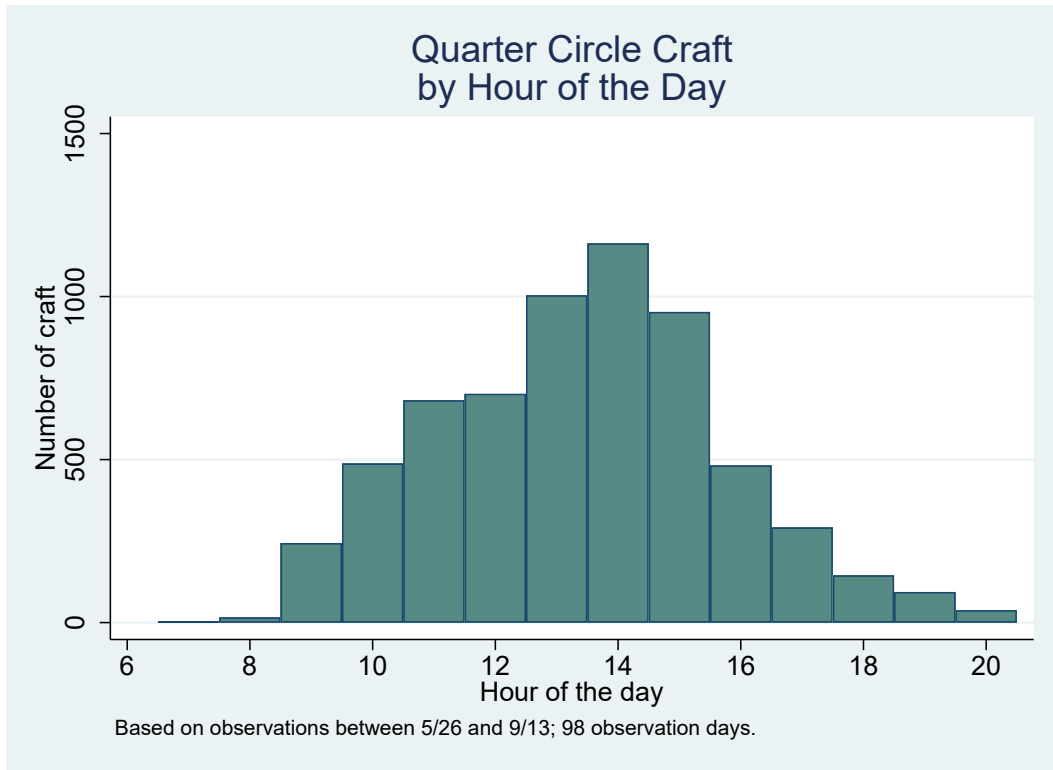


Figure 2.3 Quarter Circle Craft by Hour of the Day in May:

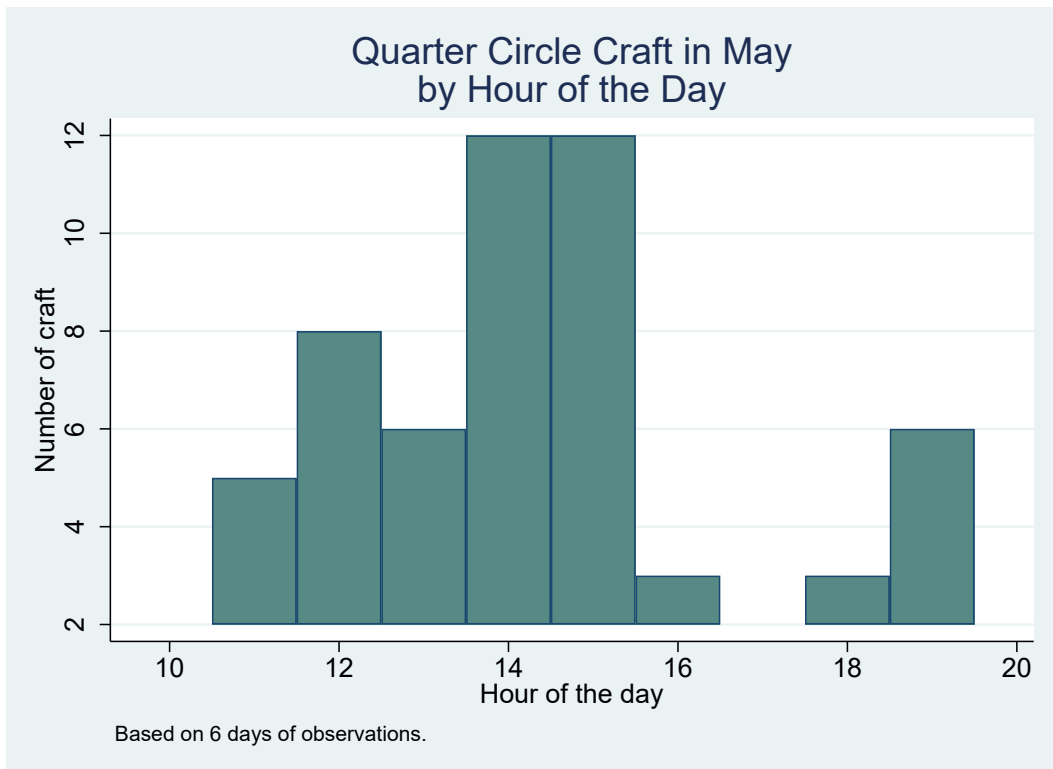


Figure 2.4 Quarter Circle Craft by Hour of the Day in June:

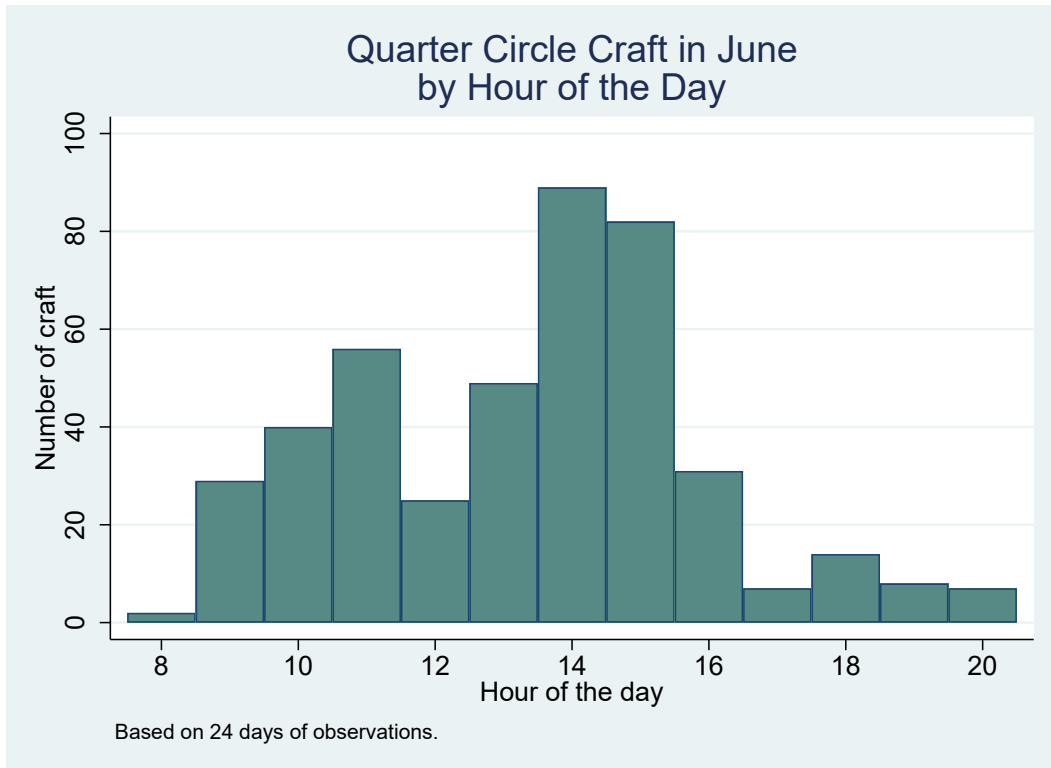


Figure 2.5 Quarter Circle Craft by Hour of the Day in July:

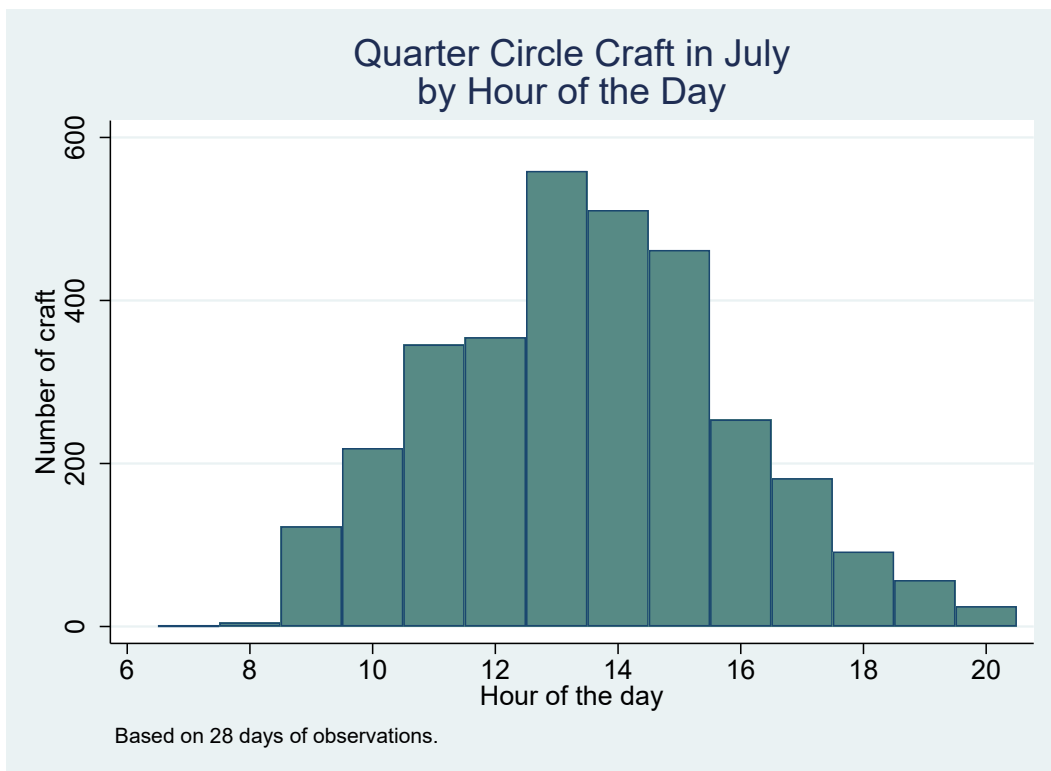


Figure 2.6 Quarter Circle Craft by Hour of the Day in August:

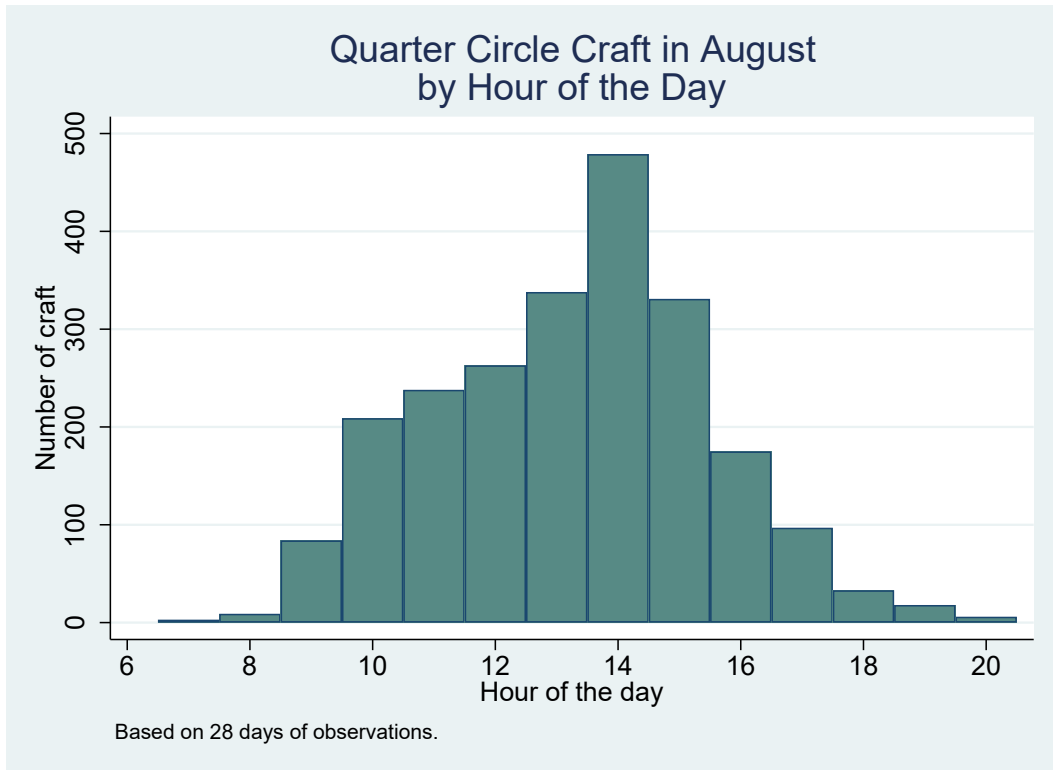


Figure 2.7 Quarter Circle Craft by Hour of the Day in September:

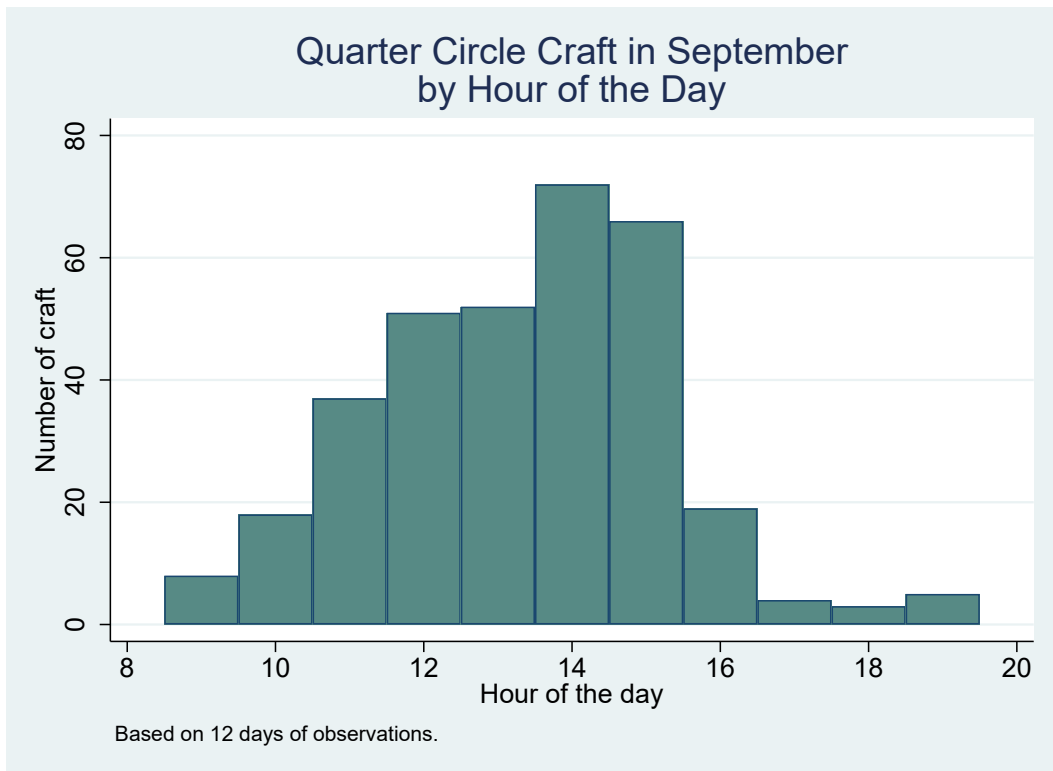


Figure 2.8 Quarter Circle Counts of People Overview:

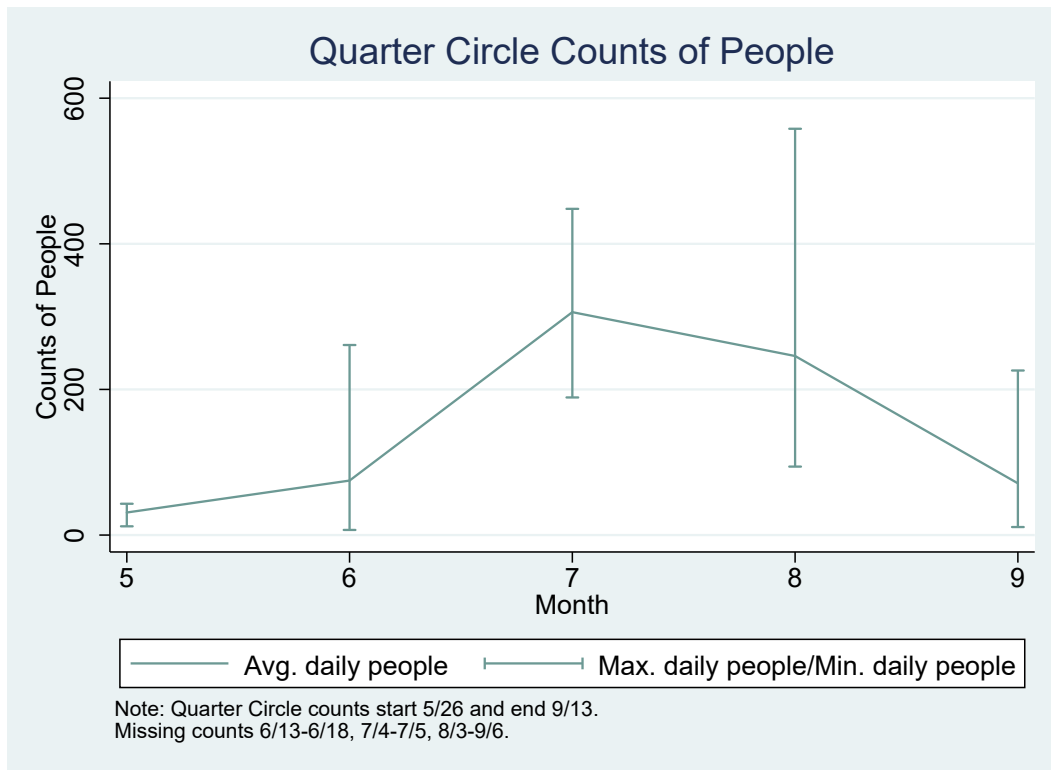


Figure 2.9 describes the number of craft in relation to air quality. Though the amount of daily watercraft does decrease as the air quality reaches more unhealthy levels, this may be due to other factors. The spikes in poor air quality do not correspond directly with decreases in craft on the river which suggests there is not a strong correlation between air quality and watercraft. Figure 2.10 shows the relationship between daily craft and temperature. There does not appear to be a strong correlation between high temperatures and increased watercraft on the river. This was the first year of monitoring and temperatures were high throughout much of the 2017 season. Future years of monitoring may show if there is a stronger relationship between temperature and crafts on the river. Figure 2.11 shows the relationship between precipitation and daily watercraft. There were few days of precipitation throughout the 2017 monitoring season. Early season precipitation correlates to low use days, however this may be due to other factors such as high water levels. There were several days in August with some precipitation, but the precipitation was very light and did not seem to impact daily use. Figure 2.12 shows the relationship between watercraft and water flow. In May and June when water flow was above 5000 cfs use was low. After the beginning of July when water flow dropped into the range just below 2000 cfs use increased before decreasing again in September when water flow was very low. Though there appears to be some relationship between water flow and watercraft this pattern of use could also be due to other factors.

Figure 2.9 Quarter Circle Craft and Air Quality:

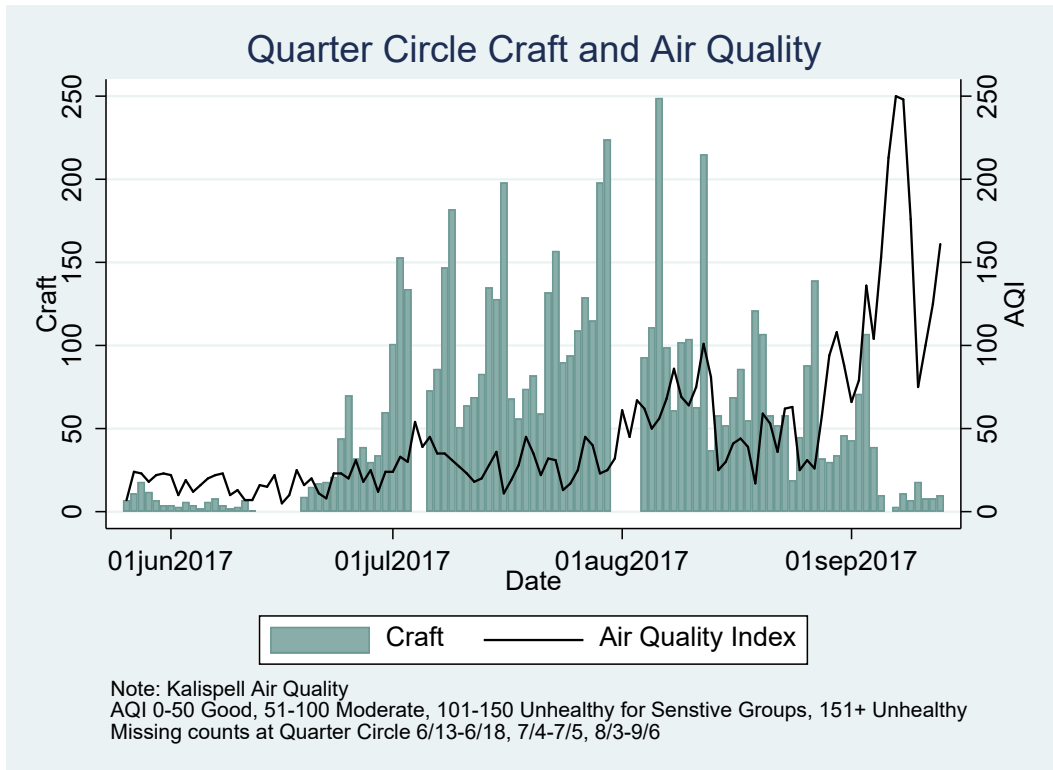


Figure 2.10 Quarter Circle Craft and Temperature:

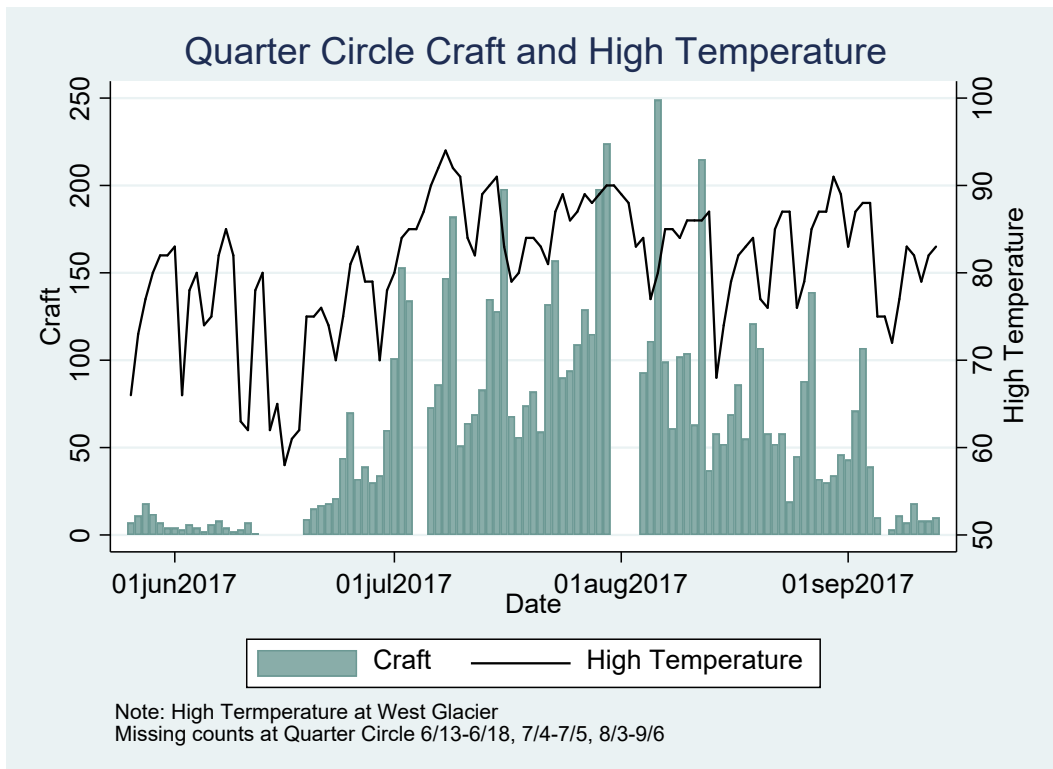


Figure 2.11 Quarter Circle Craft and Precipitation:

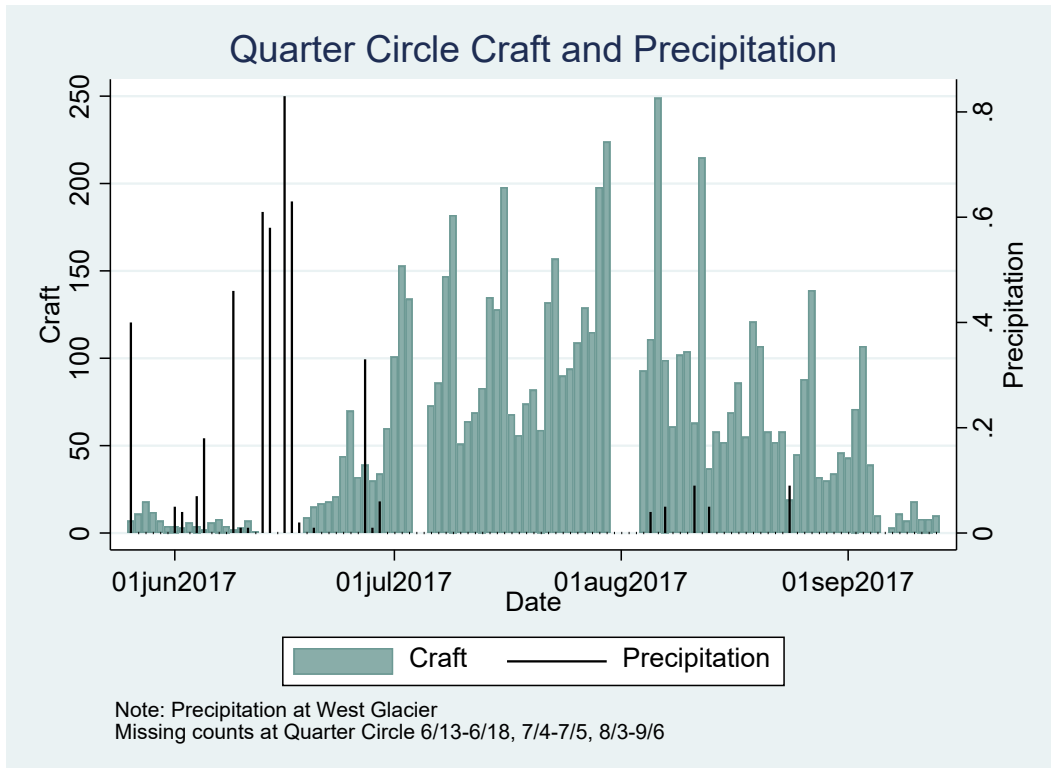
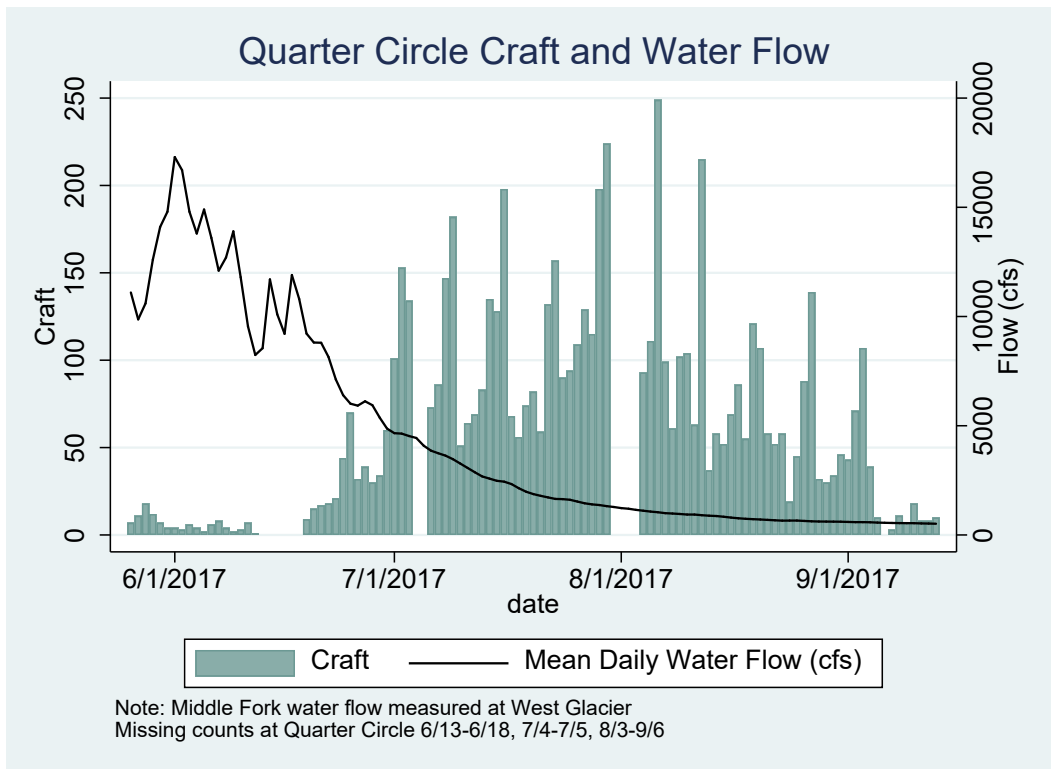
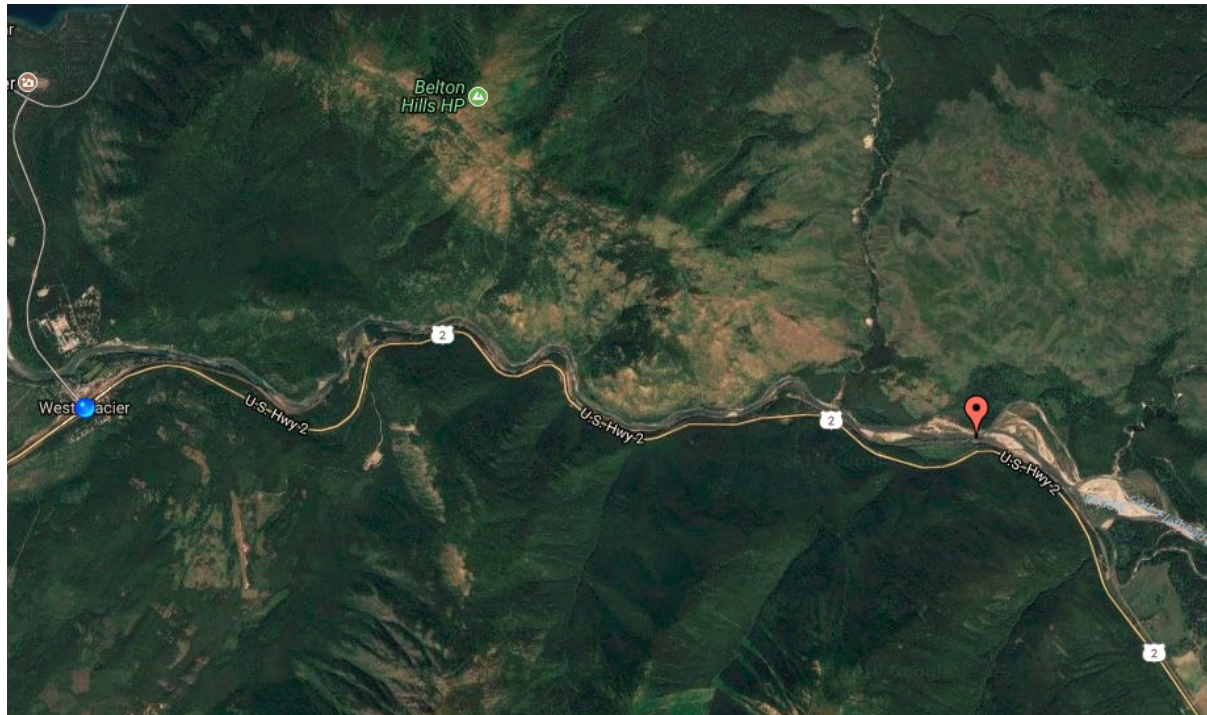


Figure 2.12 Quarter Circle Craft and Water Flow:



Moccasin Creek:

Figure 3.1 Moccasin Creek Camera Location:



The Moccasin Creek camera was located on the Middle Fork east of West Glacier along U.S. Highway 2 from 07/11/17-09/13/17 (Figure 3.1). The following graphs describe the hourly distribution of watercraft throughout the 2017 monitoring season at Moccasin Creek. Figure 3.2 provides an overview of hourly craft throughout the season. This figure shows sharp increases in watercraft at 11:00 and 15:00, with over 1,000 watercraft passing at 11:00 and again at 15:00. In the time between 11:00 and 15:00 use remained high with approximately 2,225 passing. This makes the total use between 11:00 and 15:00 4,500 of the 5,411 total watercraft. Figure 3.3 shows watercraft use for the 16 days of July when monitoring was conducted. Use remained high between 11:00 and 15:00 with 1,710 watercraft passing in that time. Figure 3.4 shows the distribution of use in the month of August. There were again spikes at 11:00 and 15:00 though use was consistently high with 2,200 watercraft passing between 11:00 and 15:00. Figure 3.5 shows use for the 13 observation days of September. There was a similar spike at 11:00 and 15:00 though the volume of craft diminished with approximately 240 craft passing between these times. Figure 3.6 shows the average as well as minimum and maximum count of people by month for the Moccasin Creek monitoring location.

Figure 3.2 Moccasin Creek Craft by Hour of the Day Overview:

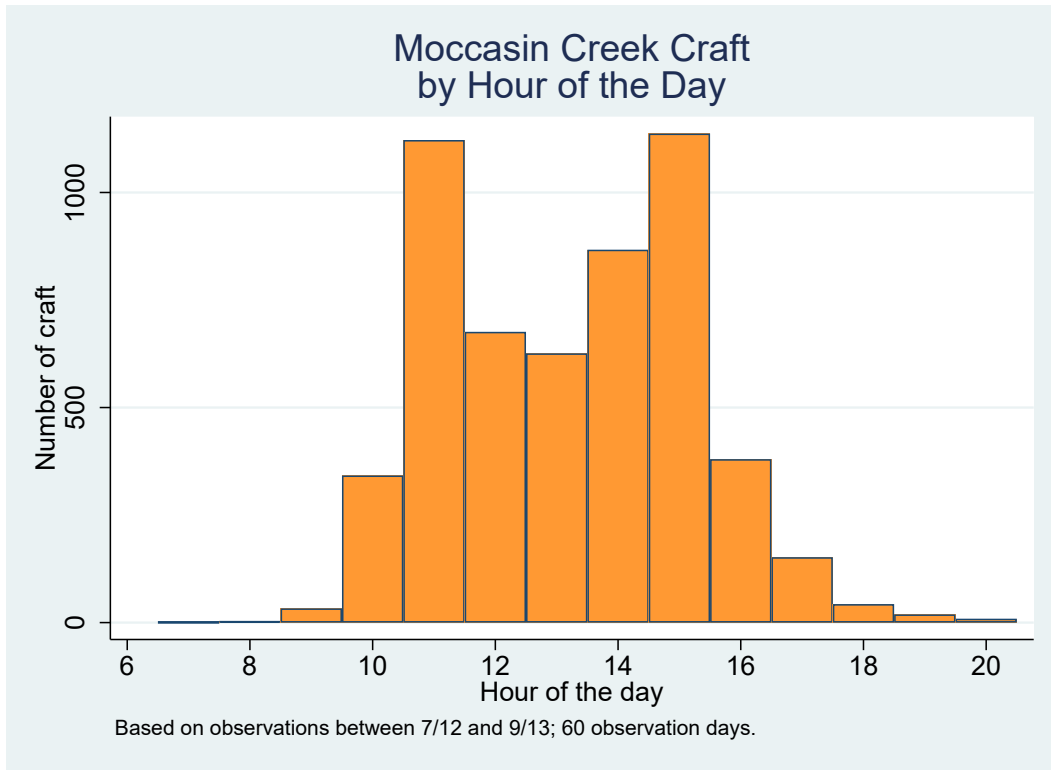


Figure 3.3 Moccasin Creek Craft by Hour of the Day in July:

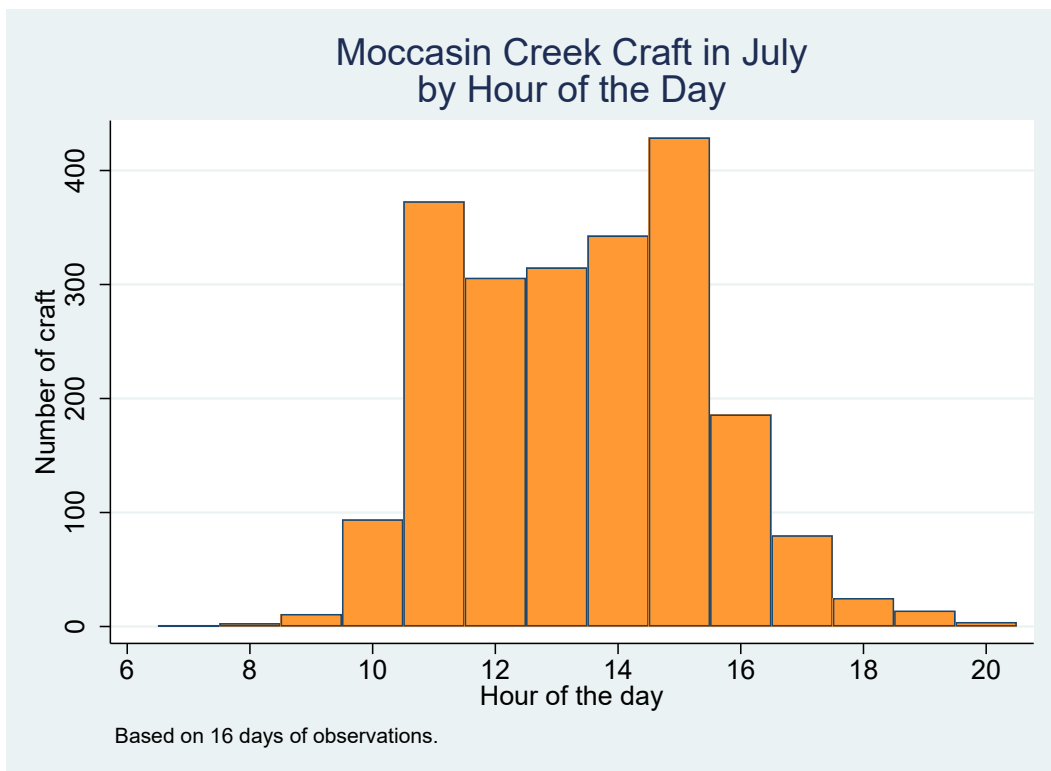


Figure 3.4 Moccasin Creek Craft by Hour of the Day in August:

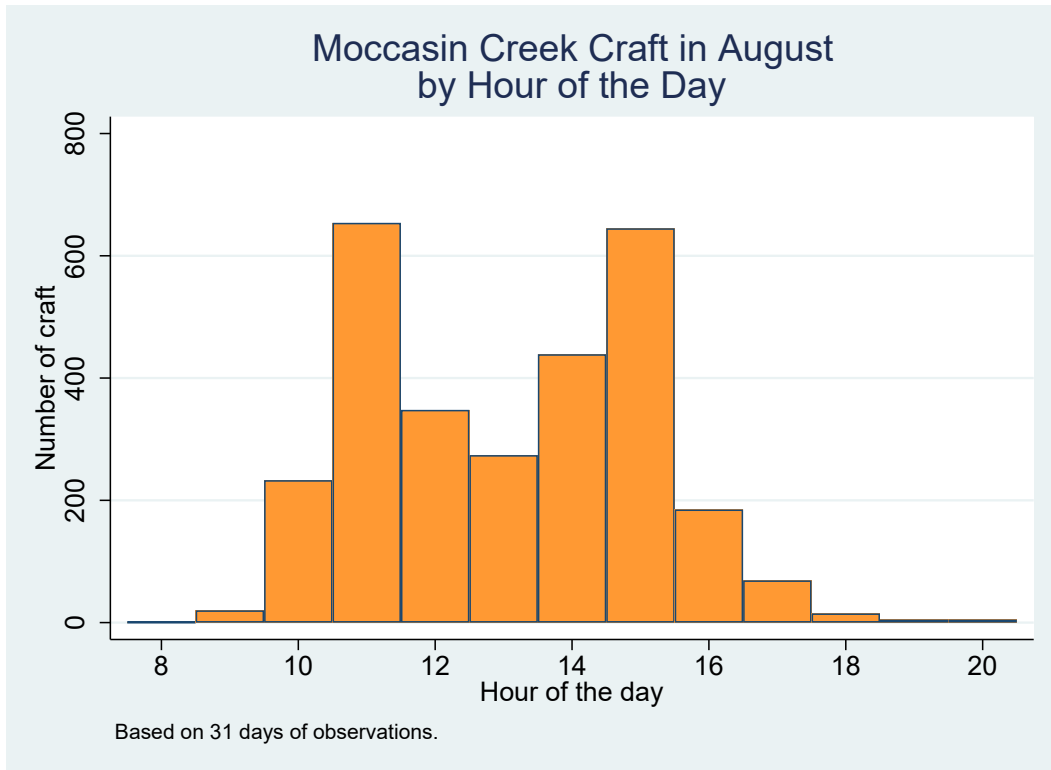


Figure 3.5 Moccasin Creek Craft by Hour of the Day in September:

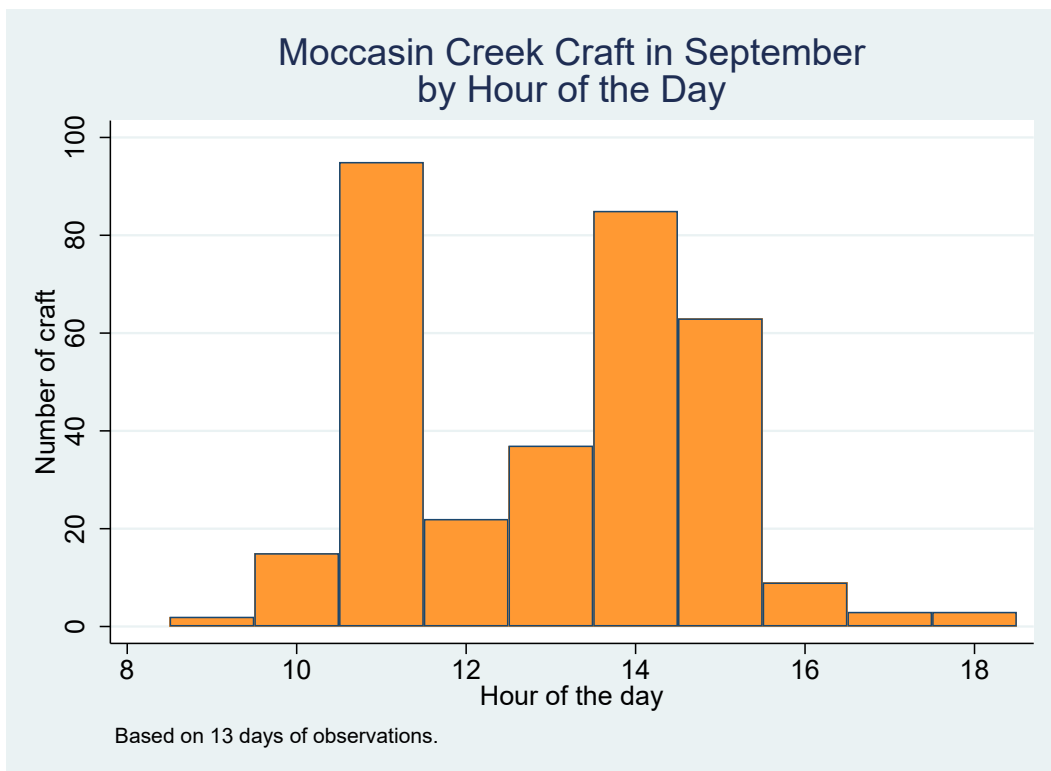


Figure 3.6 Moccasin Creek Counts of People Overview:

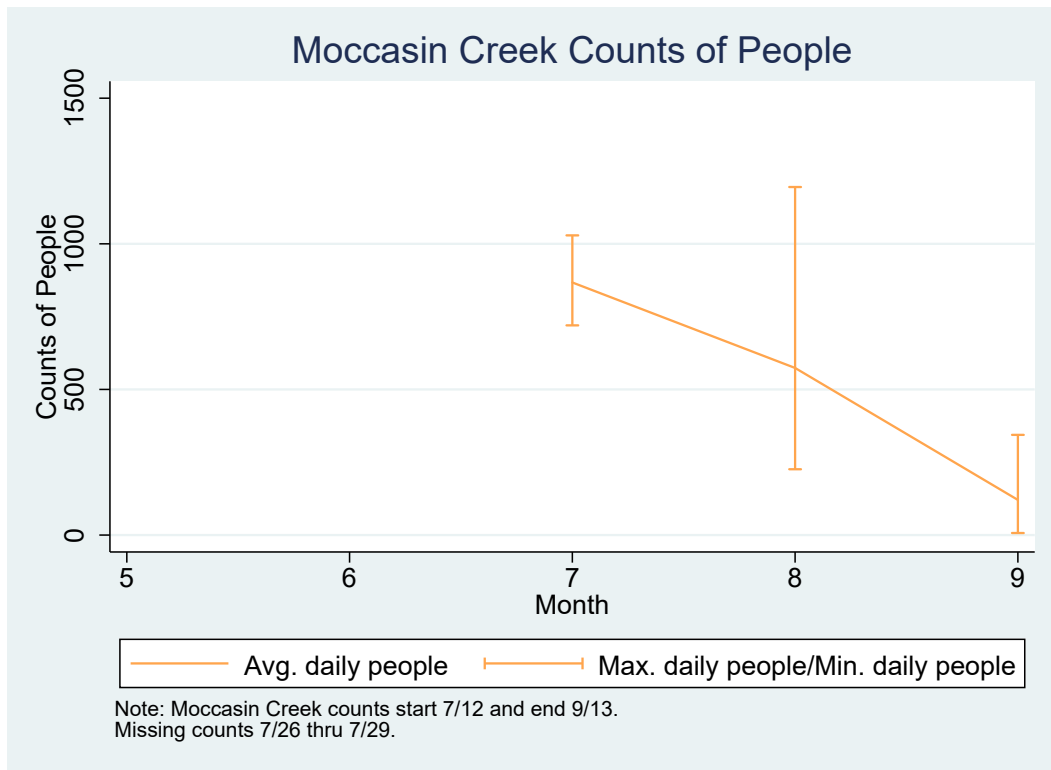


Figure 3.7 describes the number of watercraft in relation to air quality. Though the daily craft do decrease as the air quality reaches more unhealthy levels, this may be due to other factors. There is no correlation between spikes in poor air quality and decreased use which suggests there is not a strong relationship between air quality and watercraft. Figure 3.8 shows the relationship between daily craft and temperature. There does not appear to be a strong correlation between high temperatures and increased watercraft on the river. This was the first year of monitoring and temperatures were high throughout much of the 2017 season. Future years of monitoring may show if there is a stronger relationship between temperature and crafts on the river. Figure 3.9 shows the relationship between precipitation and daily watercraft. The monitoring of this site began in July when the hot dry weather had begun. This makes determining a relationship between precipitation and craft on the river difficult. There were a couple of days in August with light precipitation which had no impact on watercraft. Figure 3.10 shows the relationship between craft and water flow. Though the decrease in watercraft as water flow dropped below 1000 cfs suggests some relationship between water flow and watercraft this pattern of use could also be due to other factors.

Figure 3.7 Moccasin Creek Craft and Air Quality:

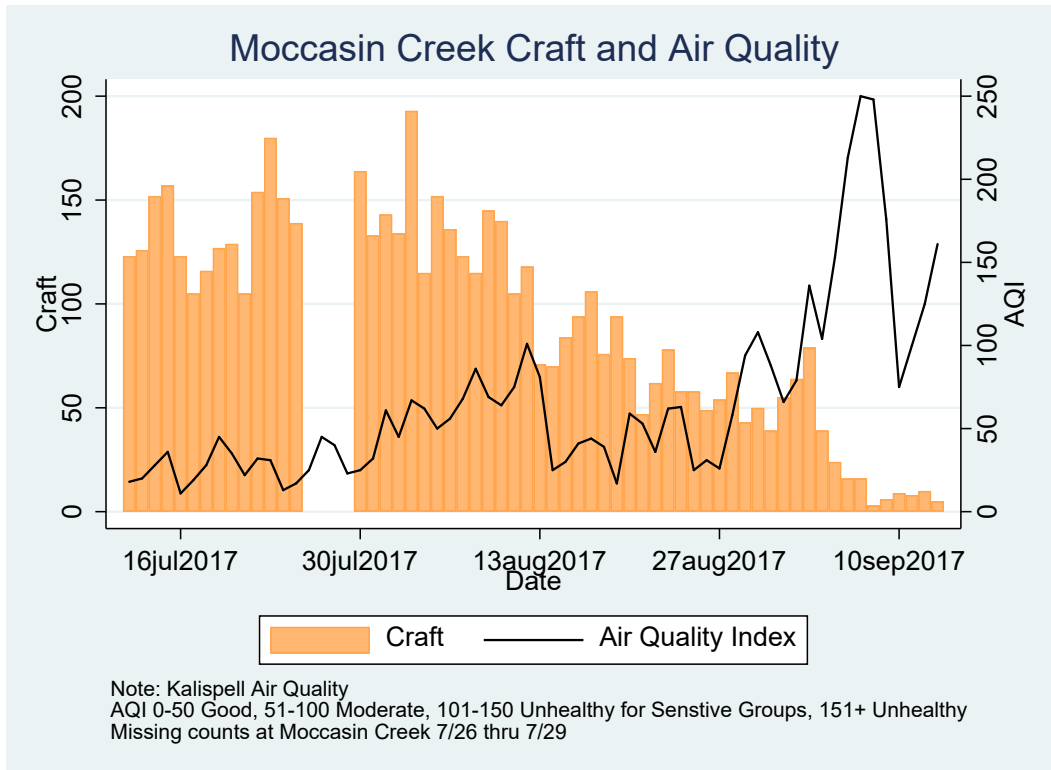


Figure 3.8 Moccasin Creek Craft and Temperature:

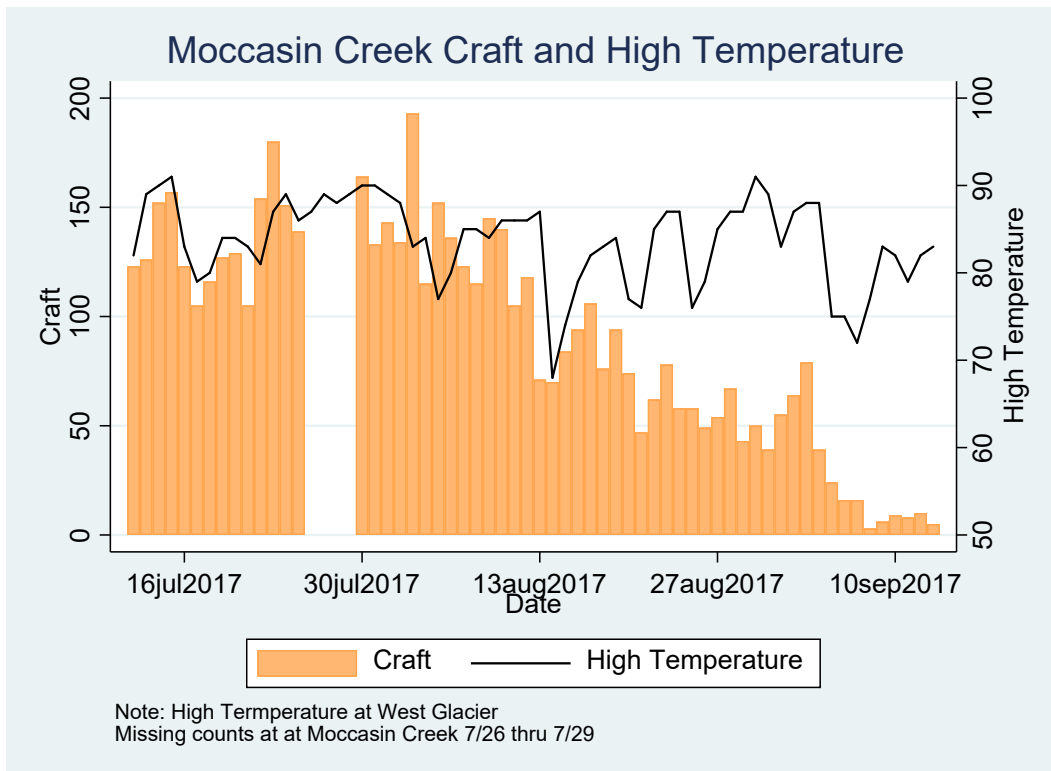


Figure 3.9 Moccasin Creek Craft and Precipitation:

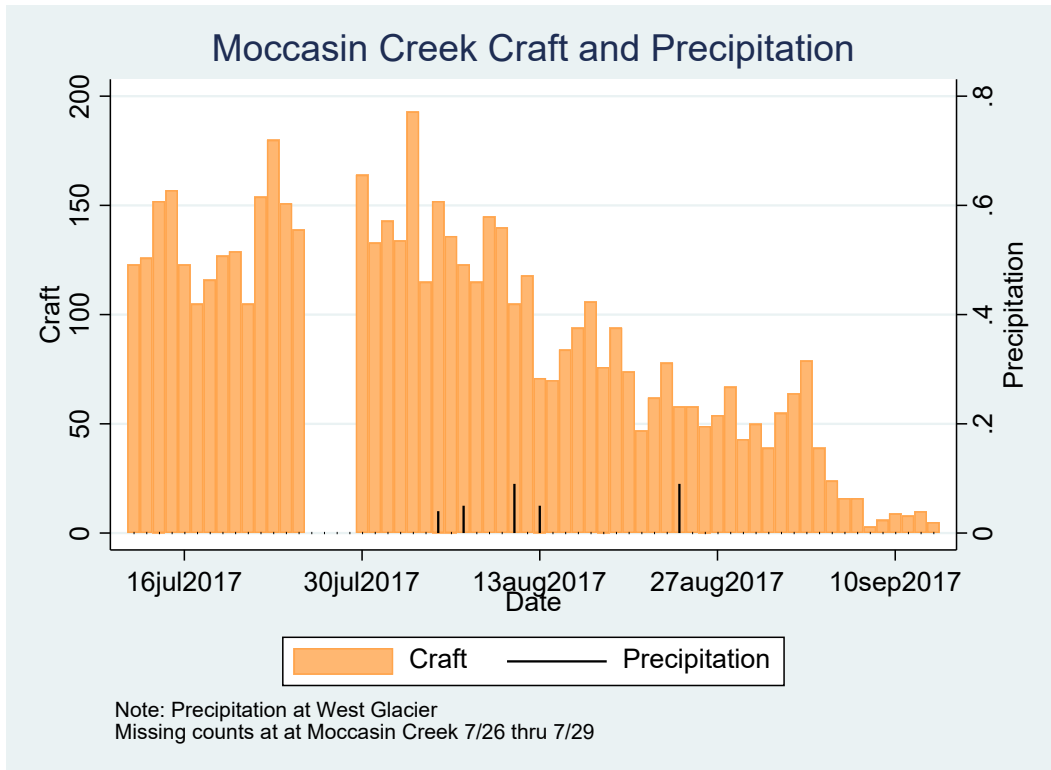
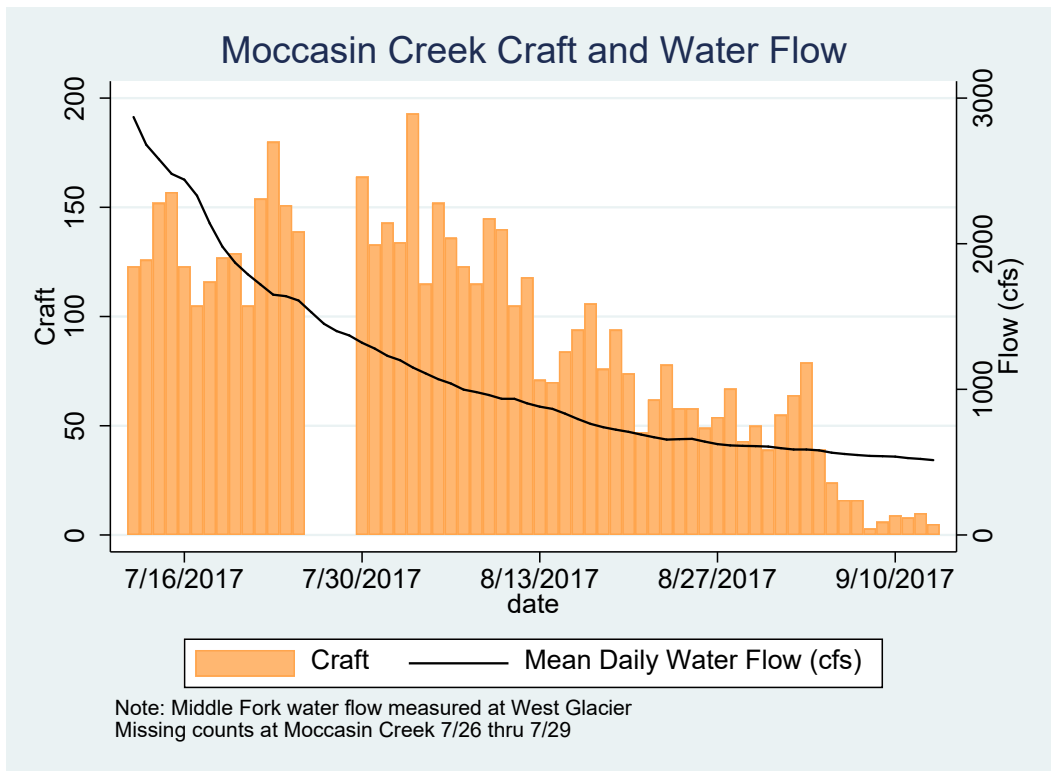
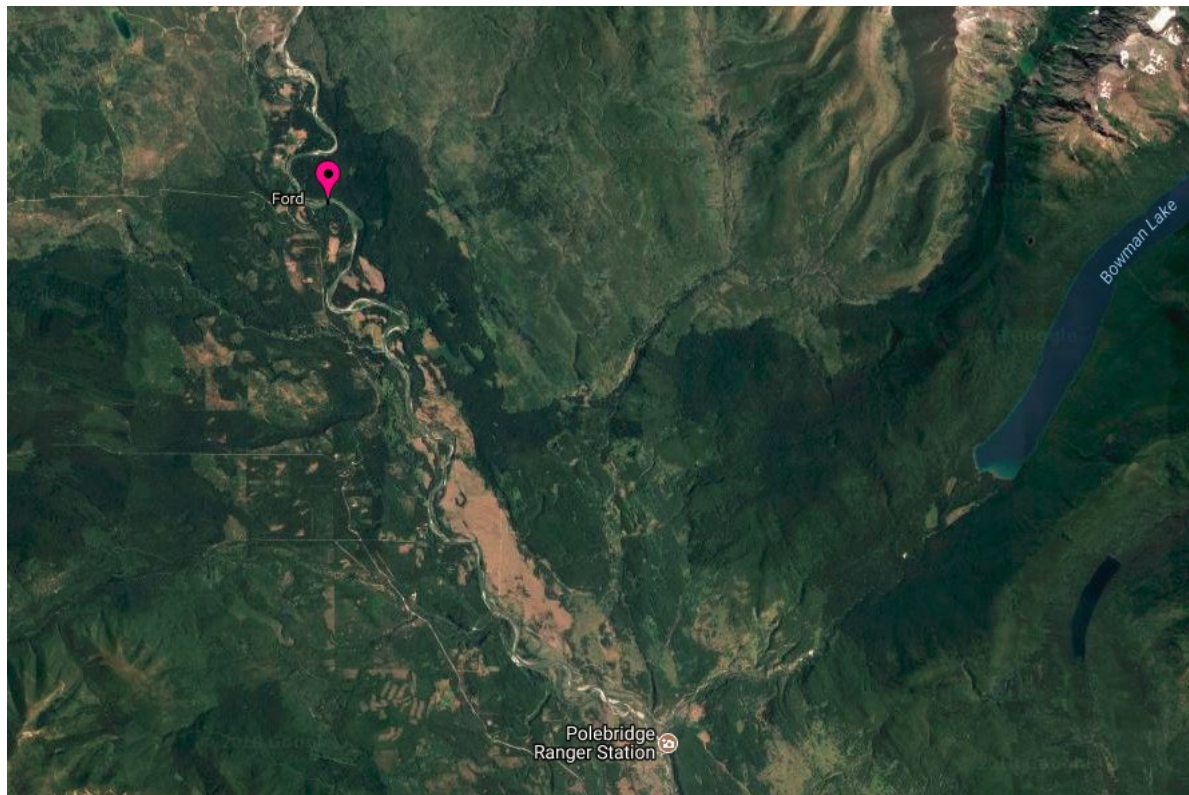


Figure 3.10 Moccasin Creek Craft and Water Flow:



Ford:

Figure 4.1 Ford River Camera Location:



The Ford camera site is on the North Fork north of the Polebridge Ranger Station and is the middle of the three camera locations on the North Fork (Figure 4.1). This camera was in place from 05/24/17 – 09/07/17. The following graphs describe the hourly distribution of watercraft throughout the 2017 season at the Ford river monitoring site. Figure 4.2 provides an overview of hourly watercraft traffic for the full season. The highest use at this location was between 11:00 and 14:00 with 1,050 of the 1,643 total watercraft passing during this time. Figure 4.3 shows distribution for May at the Ford location. During the 8 days that were monitored in May only 19 watercraft passed. These craft were distributed between 13:00 and 16:00. Figure 4.4 shows distribution for the month of June with the majority of watercraft passing between 12:00 and 15:00 this was approximately 99 watercraft. Figure 4.5 shows use for July at the Ford location. Between 11:00 and 14:00 use was highest with 575 watercraft passing at this time. Figure 4.6 provides a distribution of use for August, the high use times for August were the same as July, with most watercraft passing between 11:00 and 14:00. However use decreased with 320 watercraft passing during this high use time. Figure 4.7 shows watercraft traffic for the 13 days of September when use was monitored. Passing of watercraft decreased, the peak time was between 12:00 and 1:00 with 35 craft. Figure 4.8 shows the average as well as minimum and maximum count of people by month for the Ford monitoring location.

Figure 4.2 Ford Craft by Hour of the Day Overview:

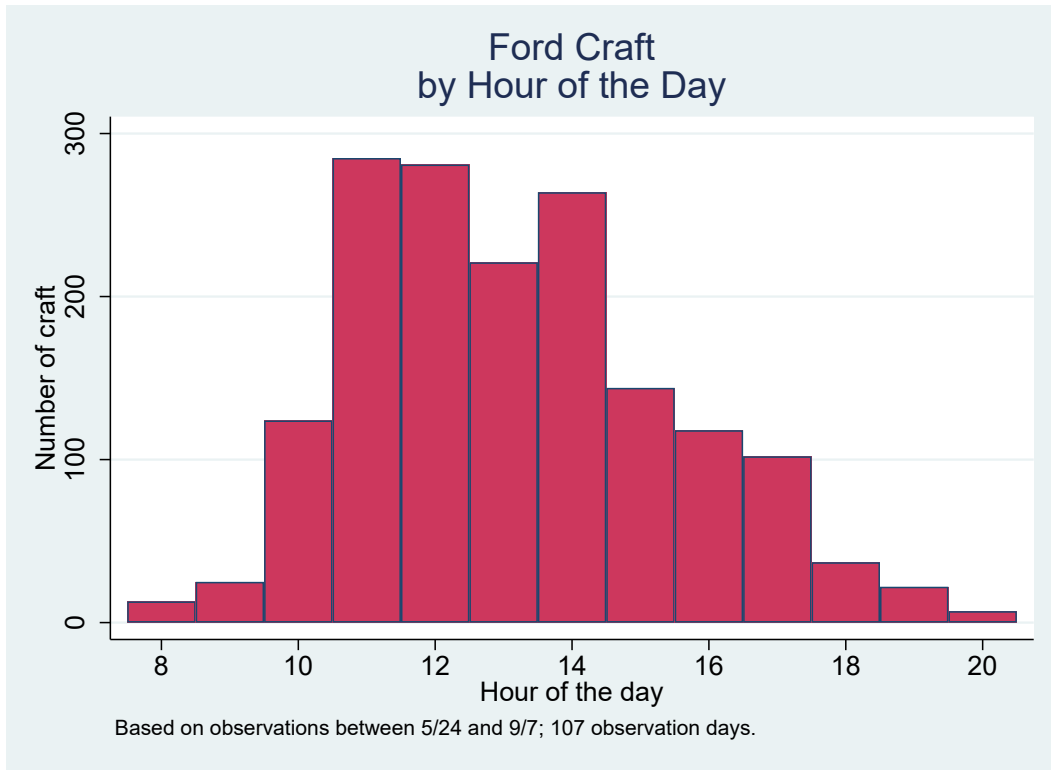


Figure 4.3 Ford Craft by Hour of the Day in May:

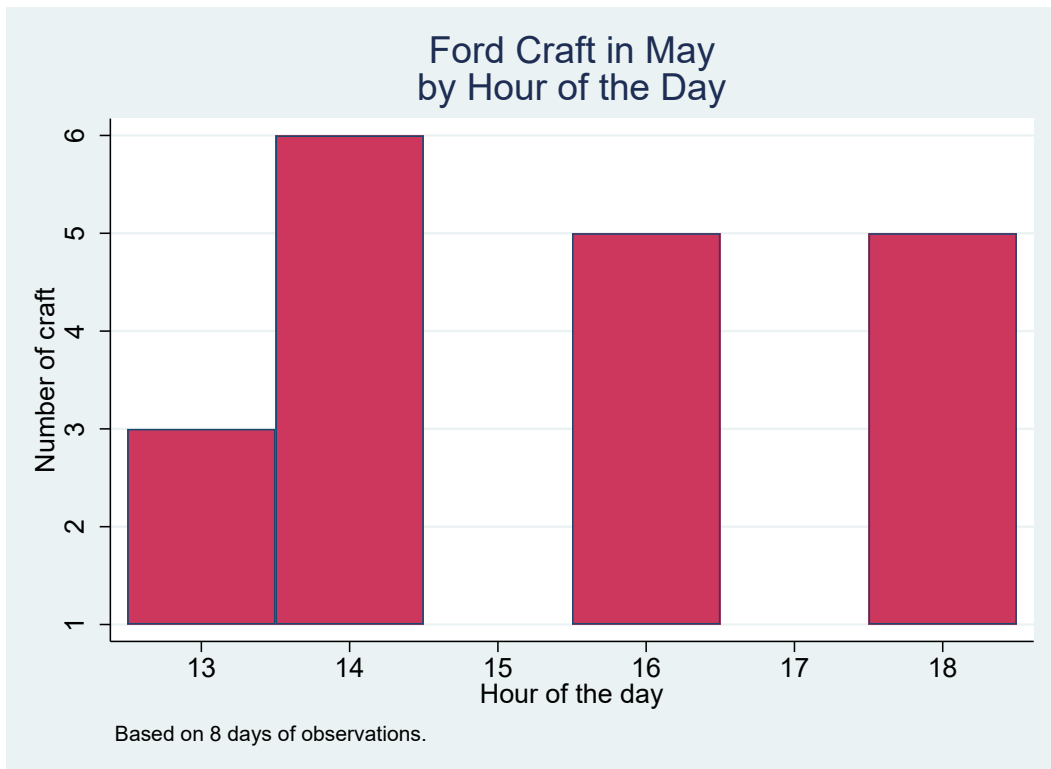
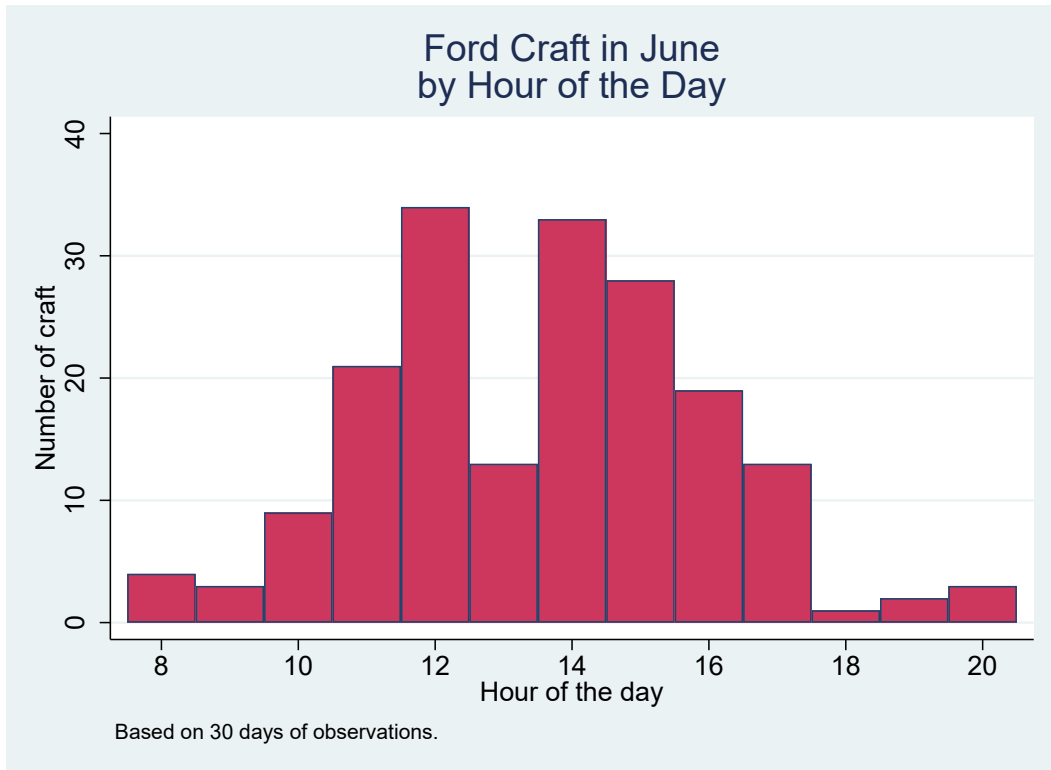
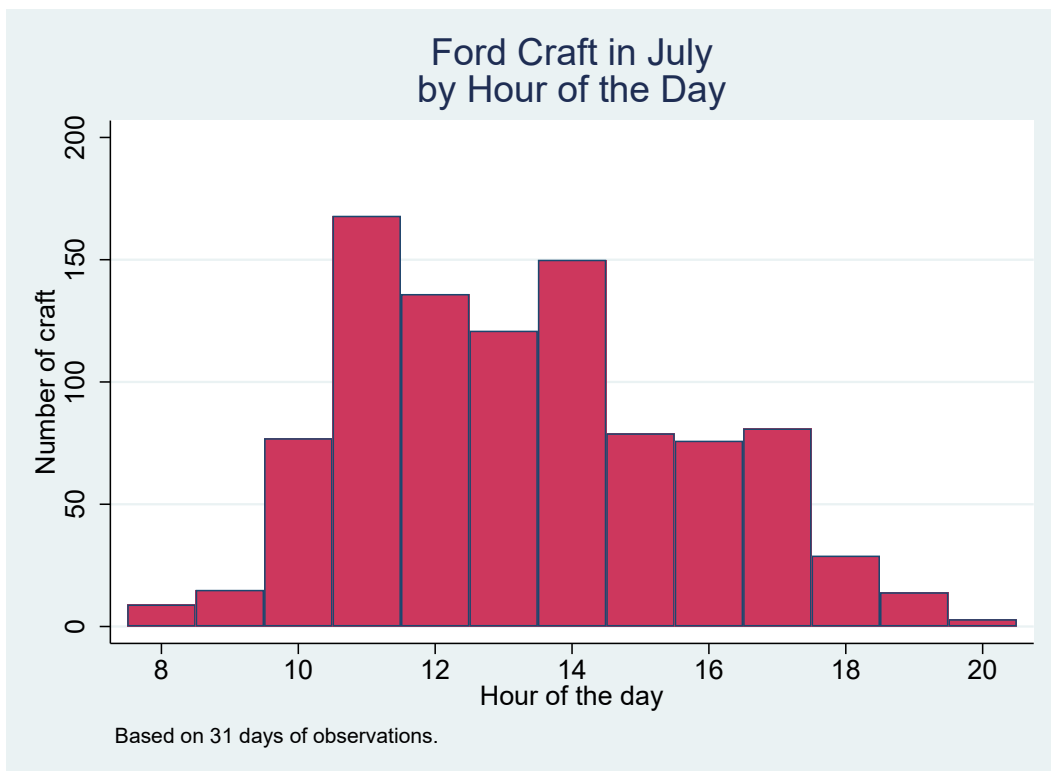


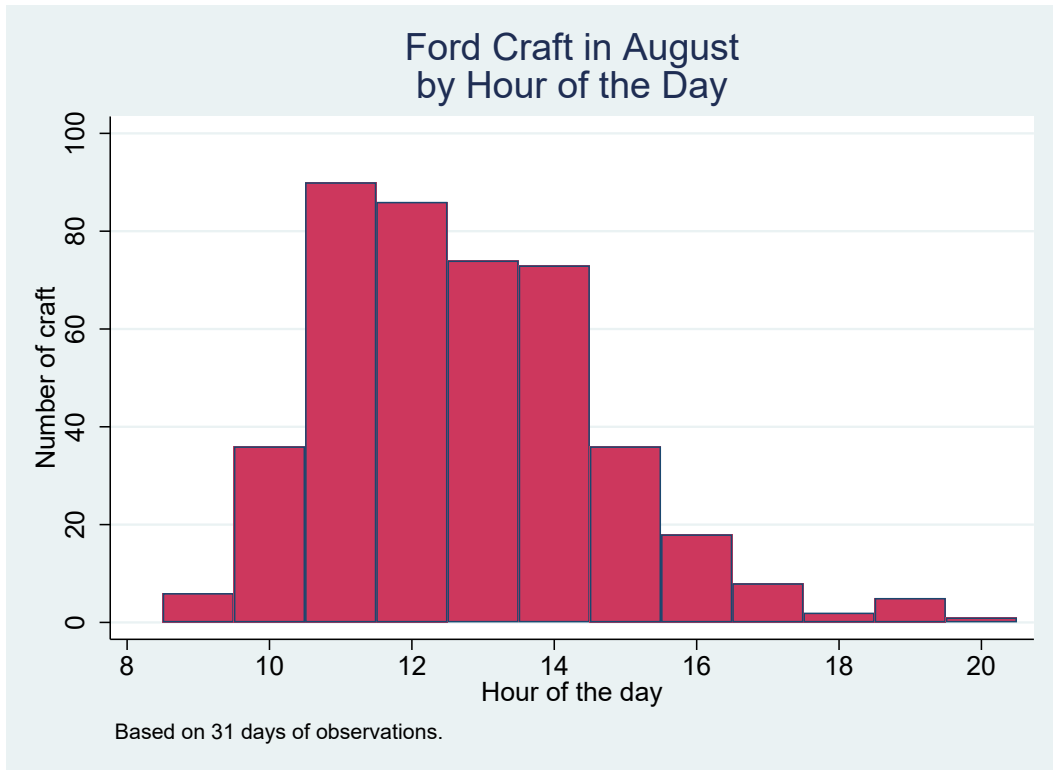
Figure 4.4 Ford Craft by Hour of the Day in June:



4.5 Ford Craft by Hour of the Day in July:



4.6 Ford Craft by Hour of the Day in August:



4.7 Ford Craft by Hour of the Day in September:

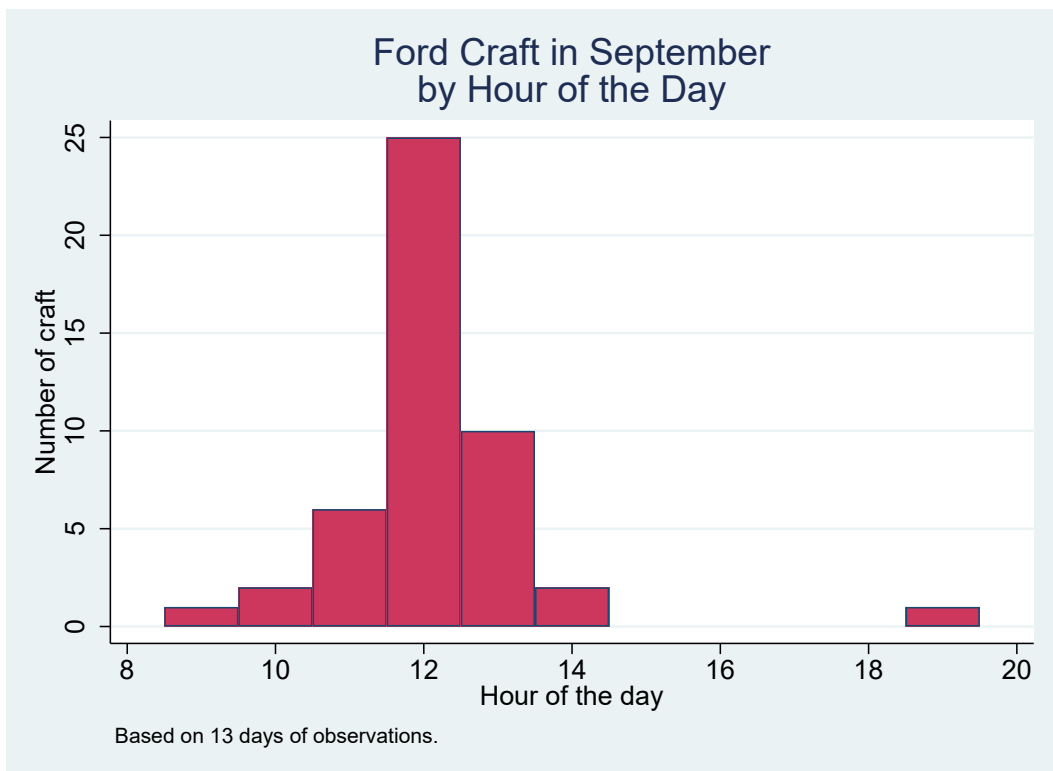


Figure 4.8 Ford Counts of People Overview:

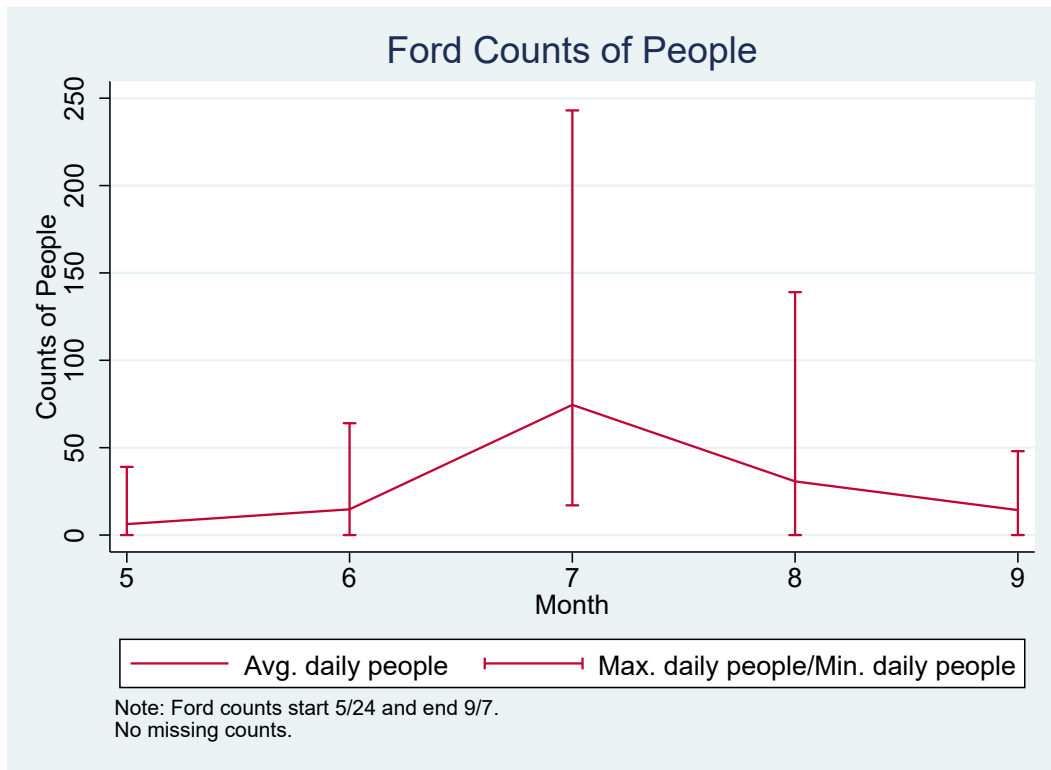


Figure 4.9 describes the number of craft in relation to air quality. Watercraft use fluctuates throughout the 2017 season. There appears to be no correlation between a decrease in air quality and watercraft use. Figure 4.10 shows the relationship between daily craft and temperature. There does not appear to be a strong correlation between high temperatures and increased watercraft on the river. This was the first year of monitoring and temperatures were high throughout much of the 2017 season. Future years of monitoring may show if there is a stronger relationship between temperature and crafts on the river. Figure 4.11 shows the relationship between precipitation and daily watercraft. There appears to be no relationship between precipitation and craft. The precipitation in May and June corresponds with low use, however this is likely due to factors other than precipitation. Figure 4.12 shows the relationship between craft and water flow throughout the monitoring season. In May and June when water flow was above 2000 cfs use was low. After the beginning of July when water flow dropped into the range just below 2000 cfs use increased before decreasing again in September when water flow was very low. Though there appears to be some relationship between water flow and watercraft this pattern of use could also be due to other factors. The relationship between these four figures do show that there was a substantial spike in watercraft traffic during the first weekend in July at this location.

Figure 4.9 Ford Craft and Air Quality:

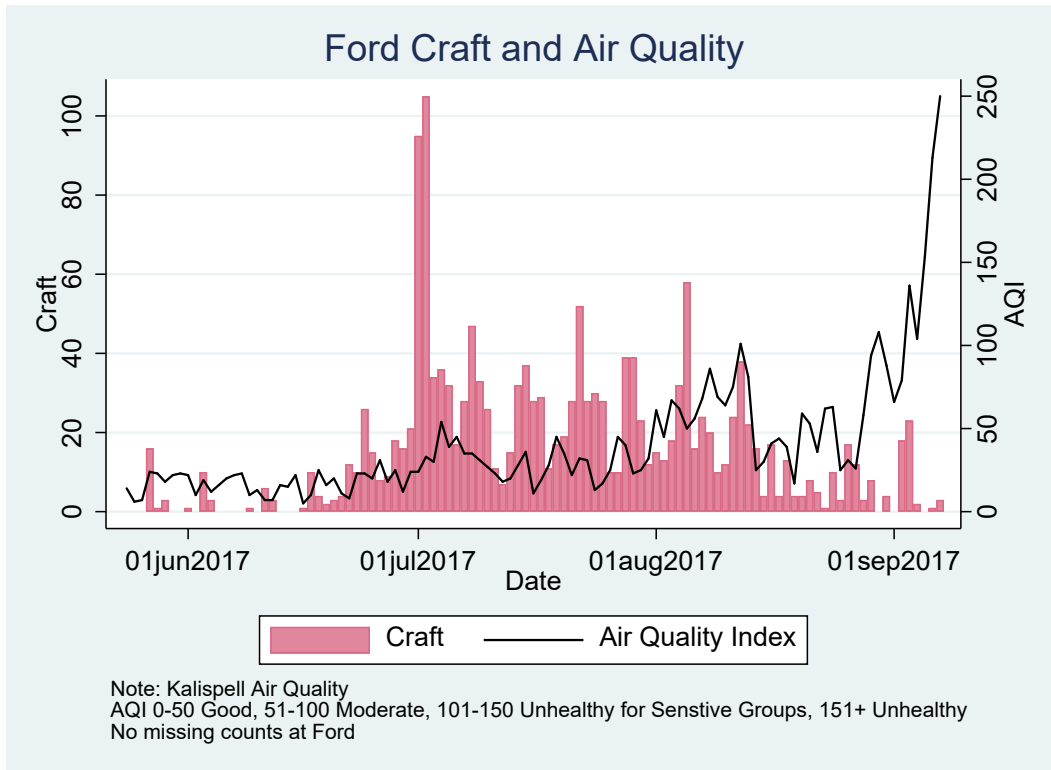


Figure 4.10 Ford Craft and Temperature:

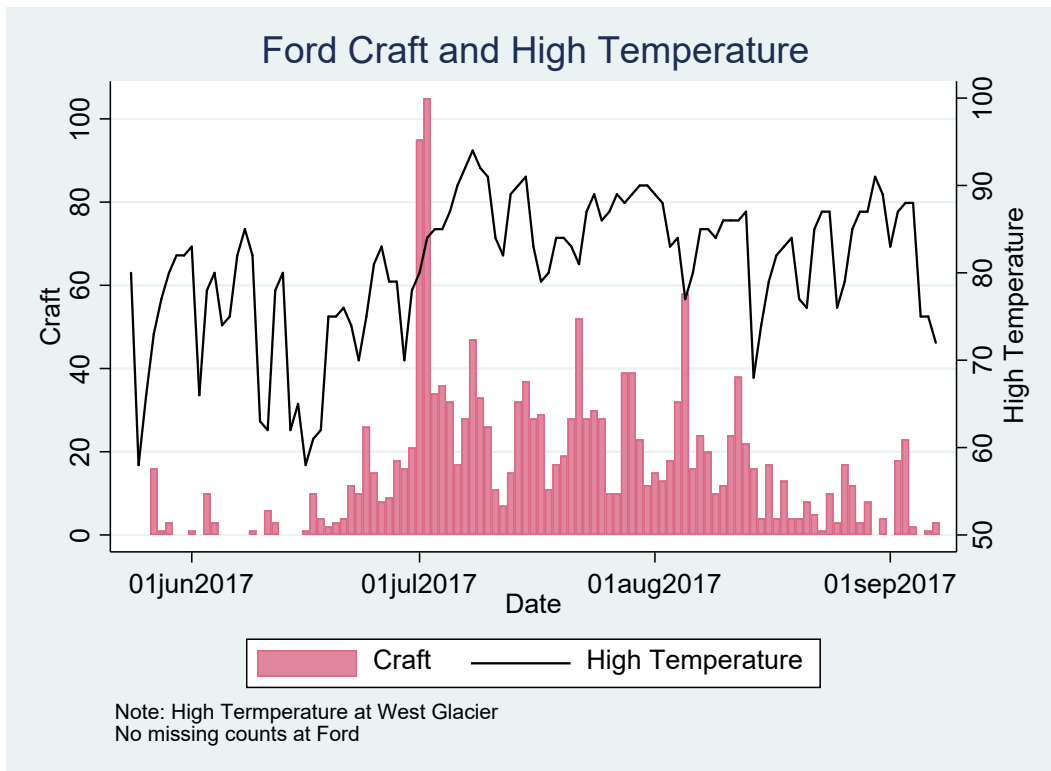


Figure 4.11 Ford Craft and Precipitation:

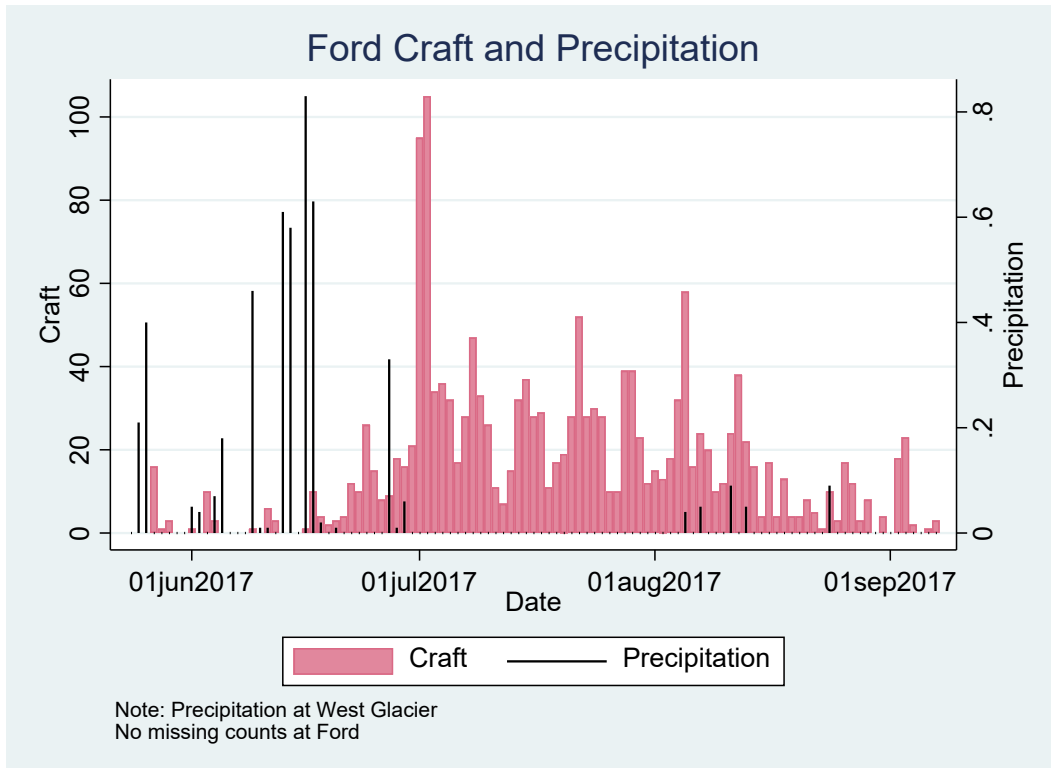
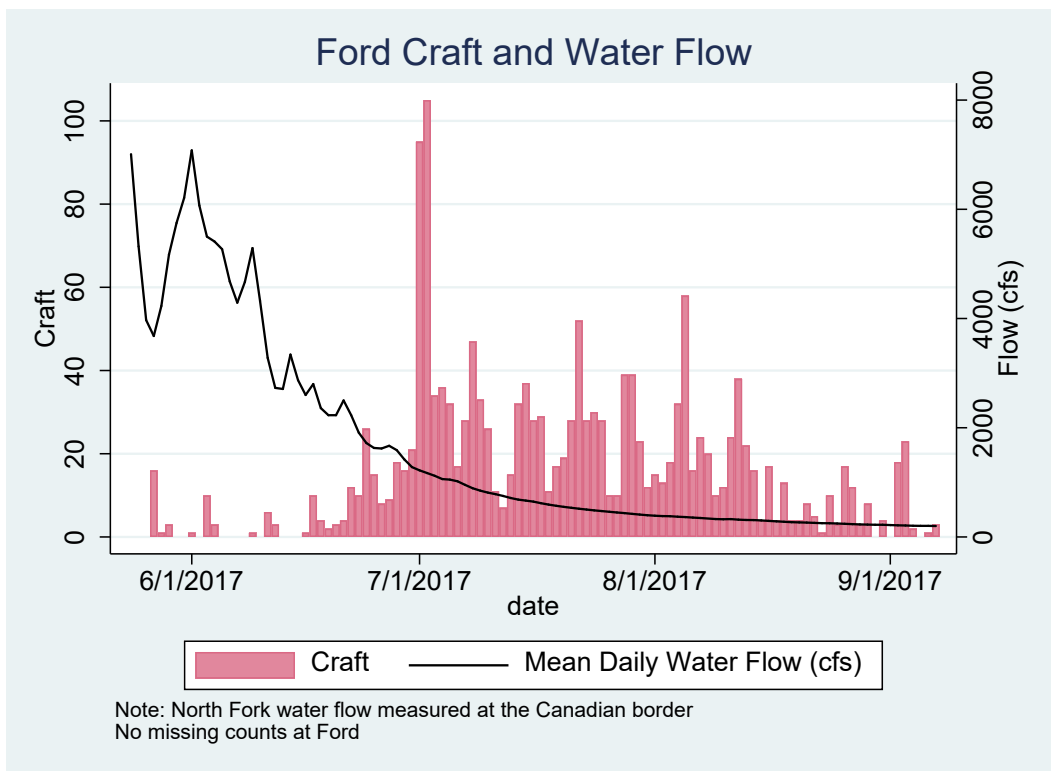
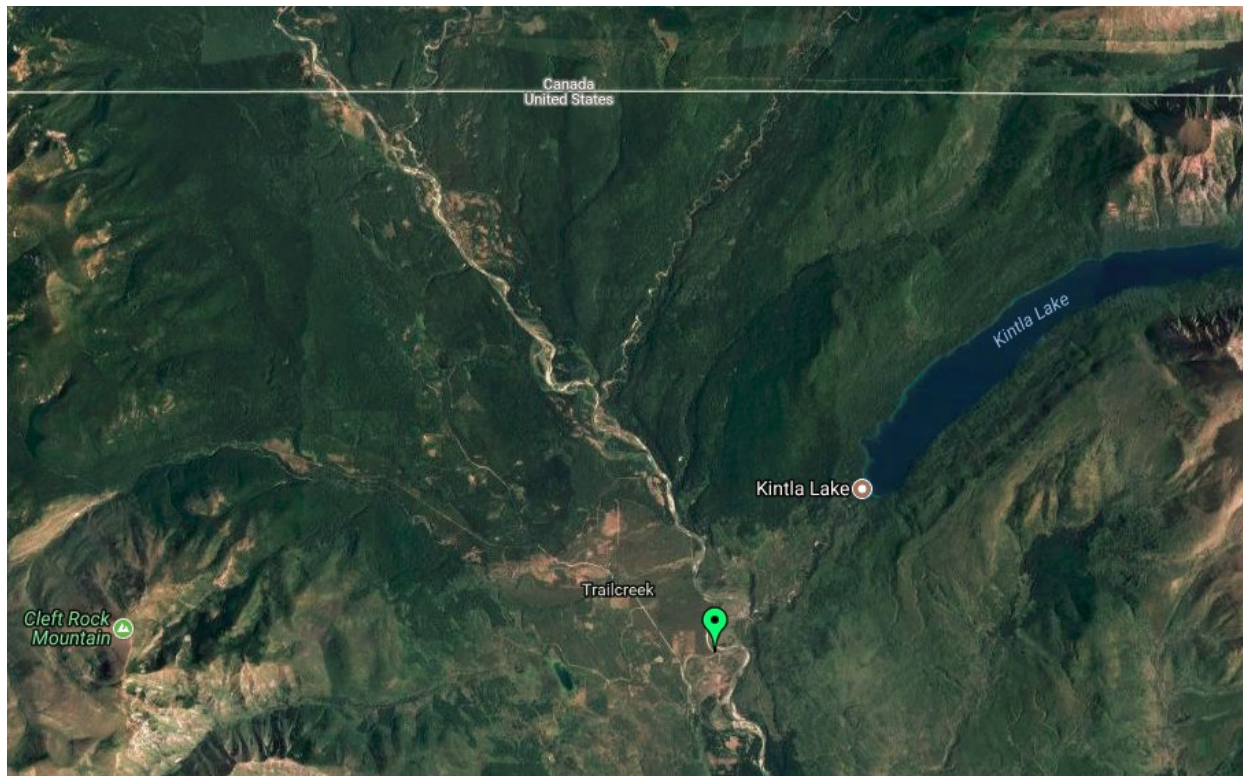


Figure 4.12 Ford Craft and Water Flow:



Wurtz:

Figure 5.1 Wurtz River Camera Location:



The Wurtz camera is the northernmost camera on the North Fork in 2017 and is located between the Canadian border and the Ford camera location. This camera site is on the Wurtz airstrip near the Wurtz Forest Service rental cabin (Figure 5.1). The monitoring season for this location was 06/01/17-09/07/17. The following graphs provide descriptions of the distribution of watercraft by hour of the day during the 2017 season at the Wurtz river monitoring site. Figure 5.2 provides an overview of use by hour of the day for the full season. This figure shows that the peak time at this site was between 13:00 and 17:00. Approximately 600 of the 898 total watercraft passed during this time window. Figure 5.3 shows that in the month of June the highest use was between 13:00 and 16:00 with 100 watercraft passing during this time. Figure 5.4 shows craft traffic for July. The highest use was between 15:00 and 17:00 with 325 watercraft passing. Figure 5.5 shows watercraft in August with the majority of use between 15:00 and 16:00 being 70 watercraft. There was no figure made for September because only one craft passed by in the 7 days of observation. Figure 5.6 shows the average as well as minimum and maximum count of people by month for the Wurtz monitoring location.

Figure 5.2 Wurtz Craft by Hour of the Day Overview:

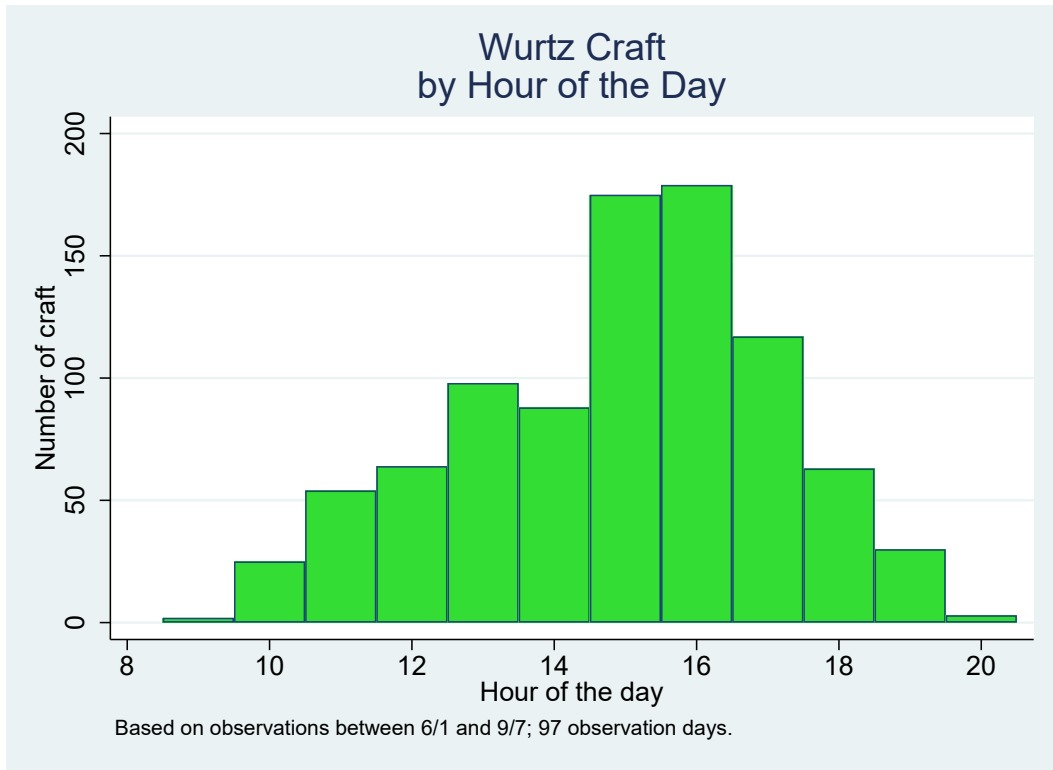


Figure 5.3 Wurtz Craft by Hour of the Day in June:

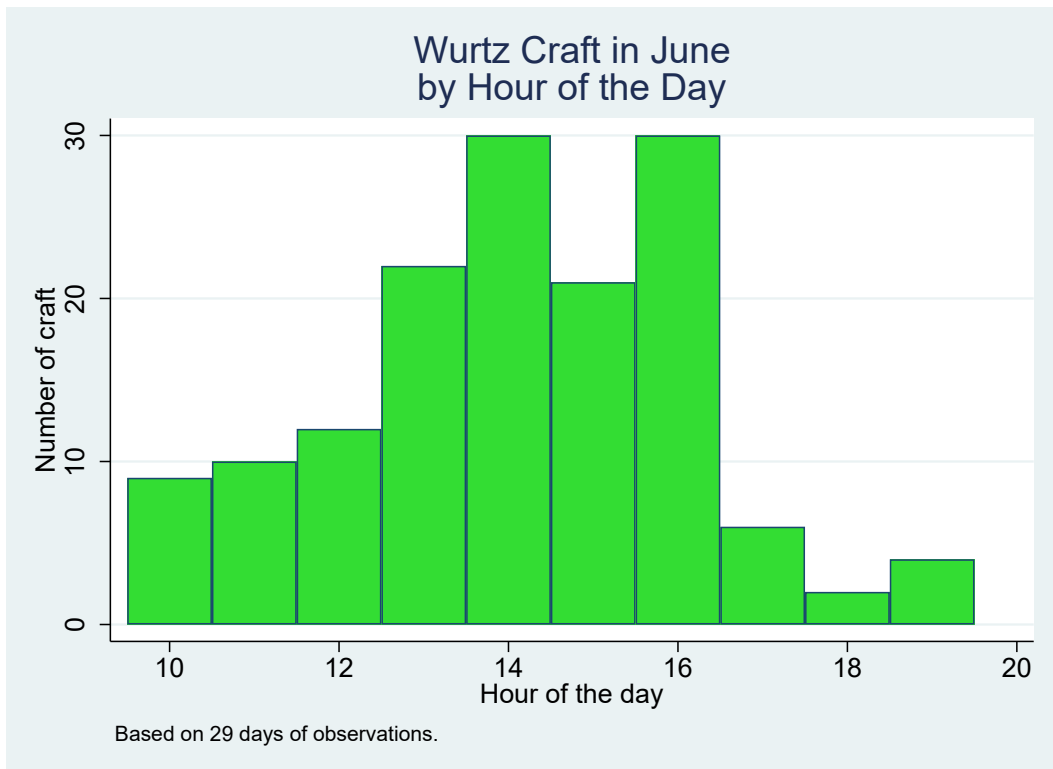


Figure 5.4 Wurtz Craft by Hour of the Day in July:

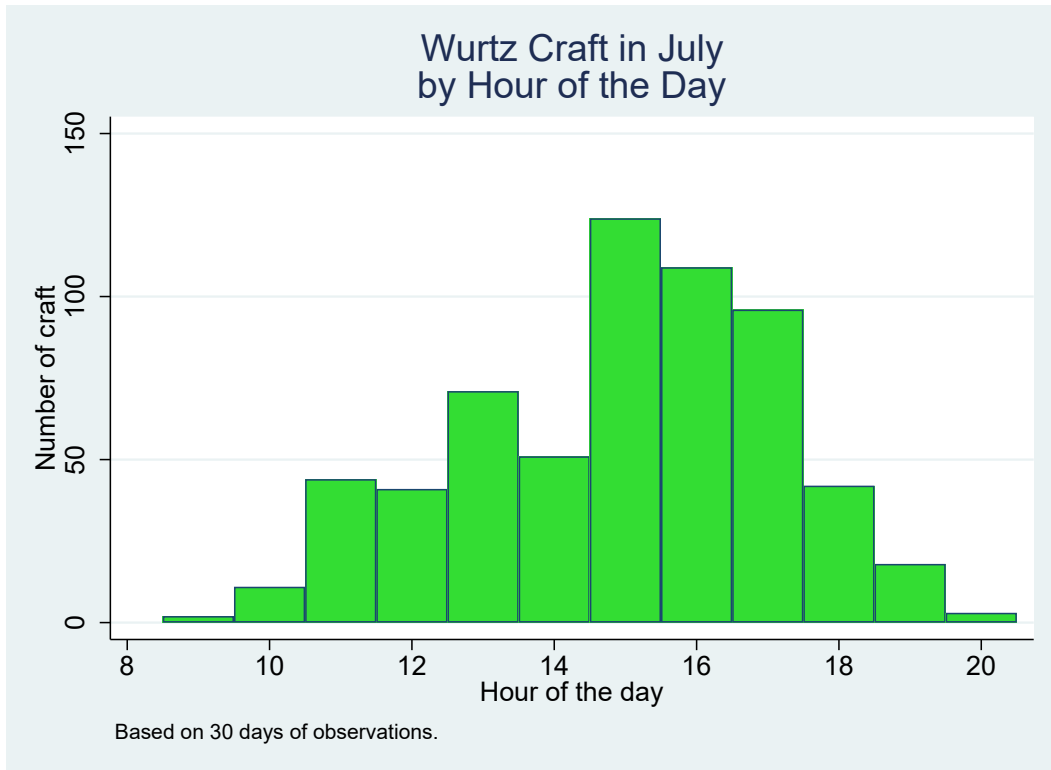


Figure 5.5 Wurtz Craft by Hour of the Day in August:

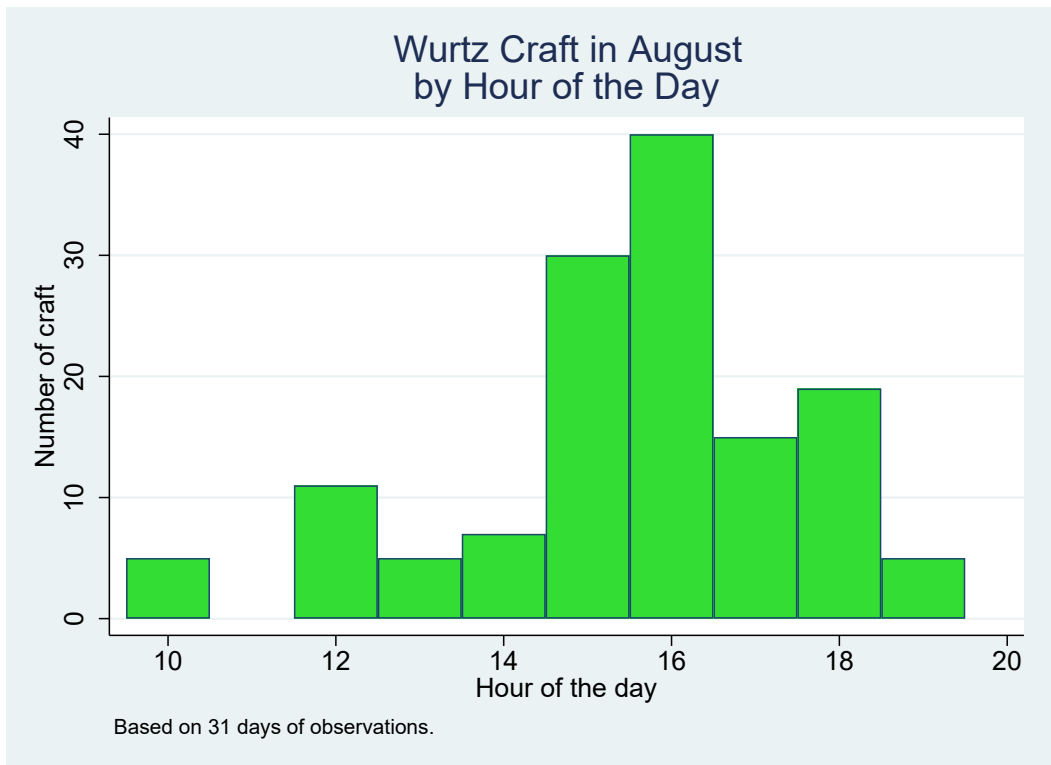


Figure 5.6 Wurtz Counts of People Overview:

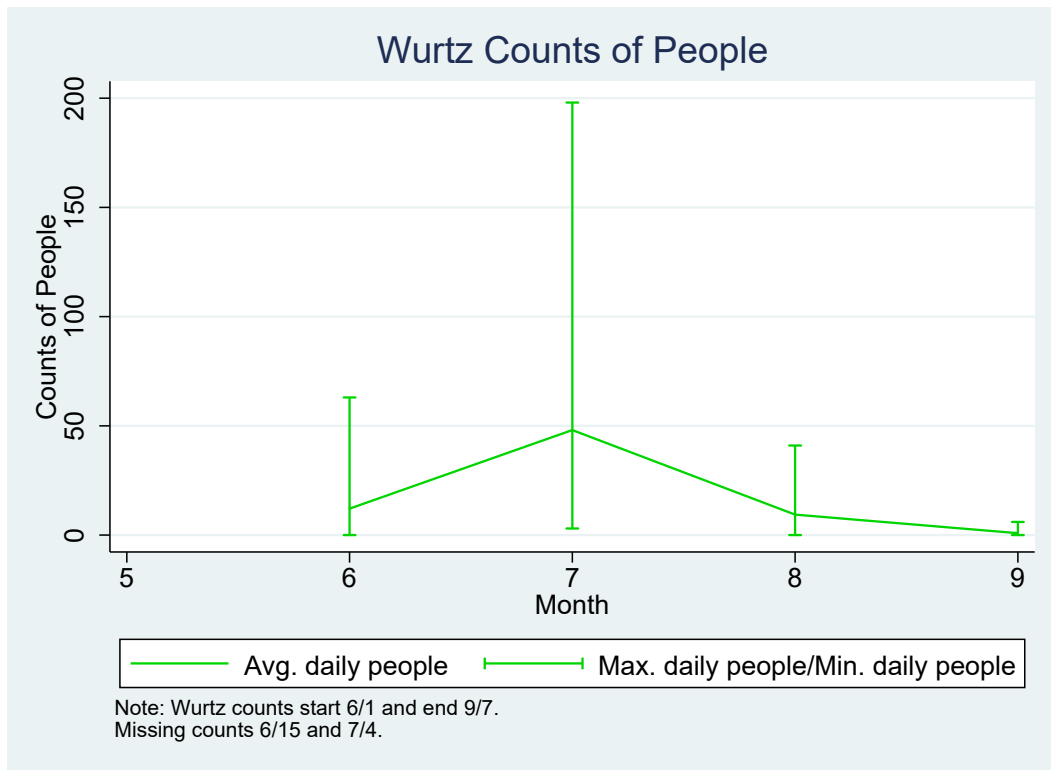


Figure 5.7 describes the number of craft in relation to air quality. Watercraft use fluctuates throughout the 2017 season. There appears to be no correlation between a decrease in air quality and watercraft use. Figure 5.8 shows the relationship between daily craft and temperature. There does not appear to be a strong correlation between high temperatures and increased watercraft on the river. Figure 5.9 shows the relationship between precipitation and daily watercraft. There appears to be no relationship between precipitation and craft. The precipitation in May and June corresponds with low use however this is likely due to factors other than precipitation such as high river flow and cooler water and air temperatures. Figure 5.10 shows the relationship between watercraft and stream flow. In May and June when water flow was above 2000 cfs use was low. After the beginning of July when water flow dropped into the range just below 2000 cfs use increased before decreasing again in September when water flow was very low. Though there appears to be some relationship between water flow and watercraft use this pattern of use could also be due to other factors. These four figures do show that similar to the Ford location there was a substantial spike in watercraft during the first weekend in July.

Figure 5.7 Wurtz Craft and Air Quality:

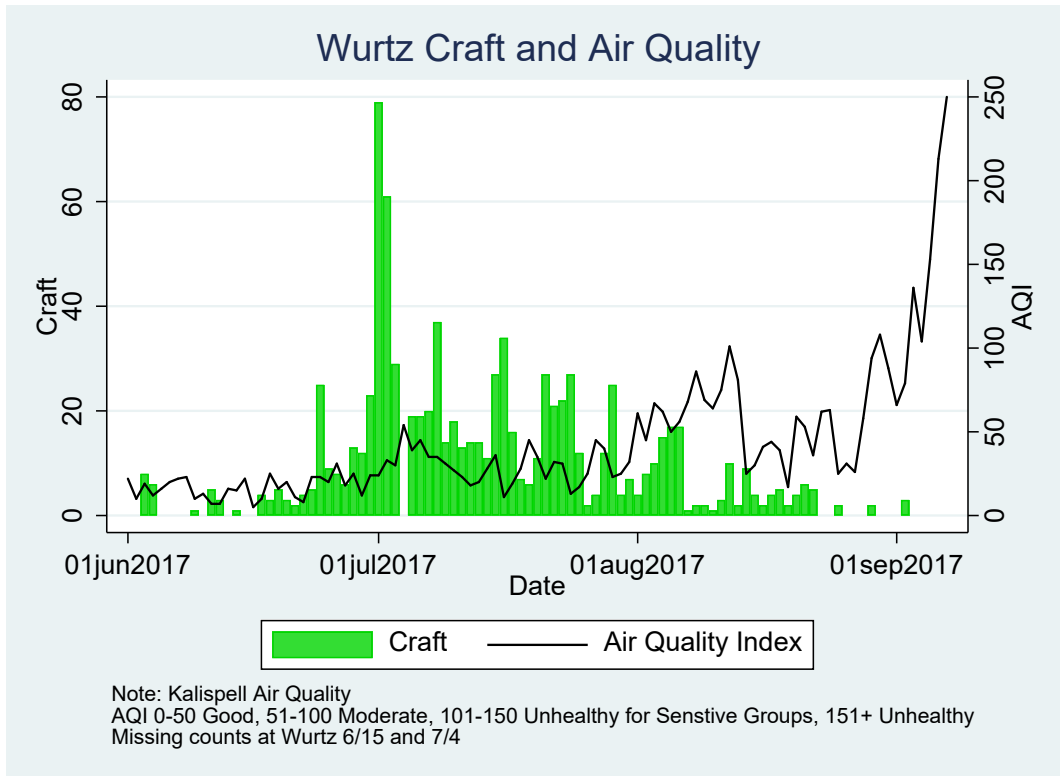


Figure 5.8 Wurtz Craft and Temperature:

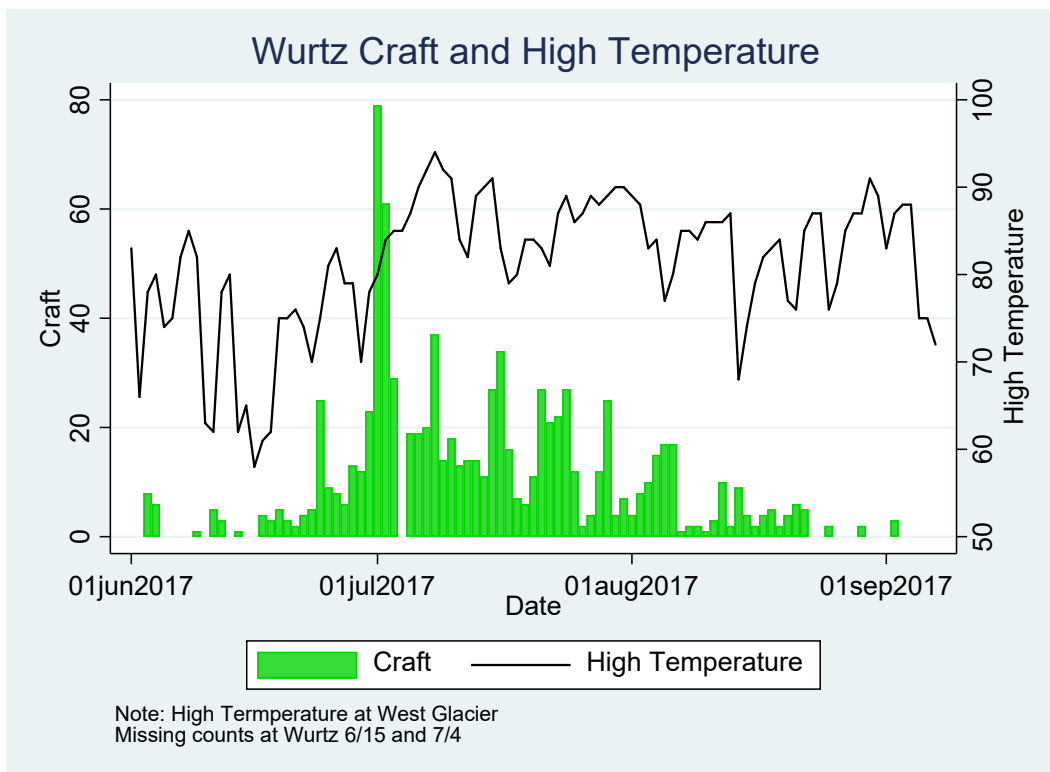


Figure 5.9 Wurtz Craft and Precipitation:

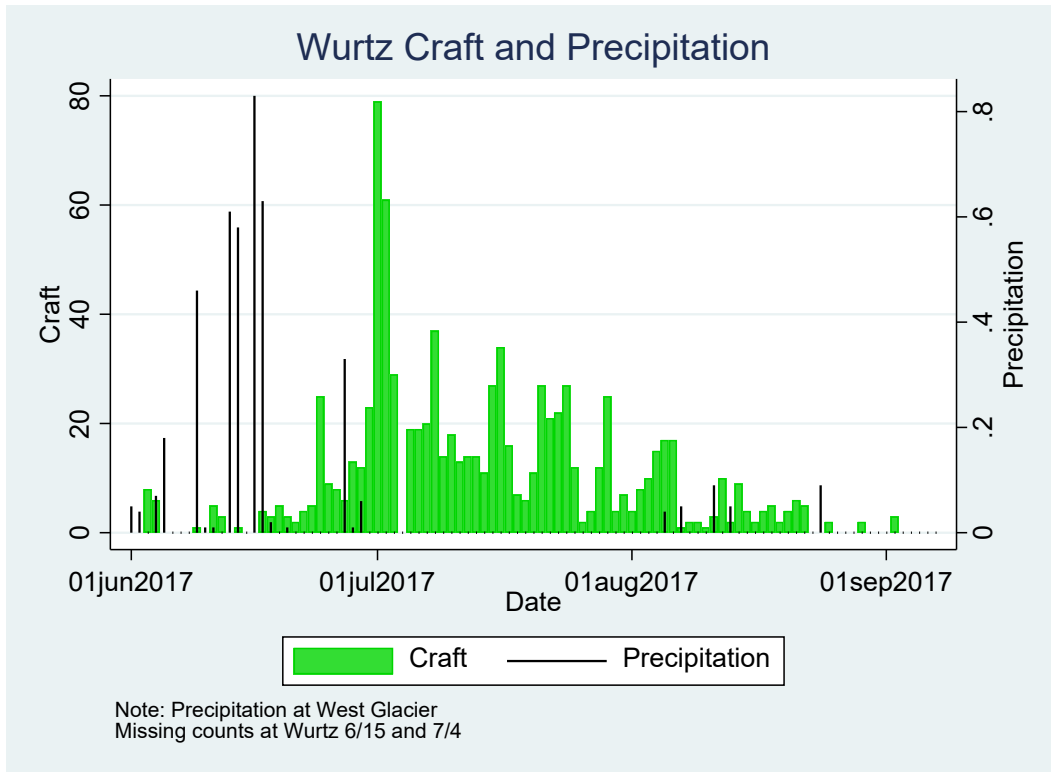
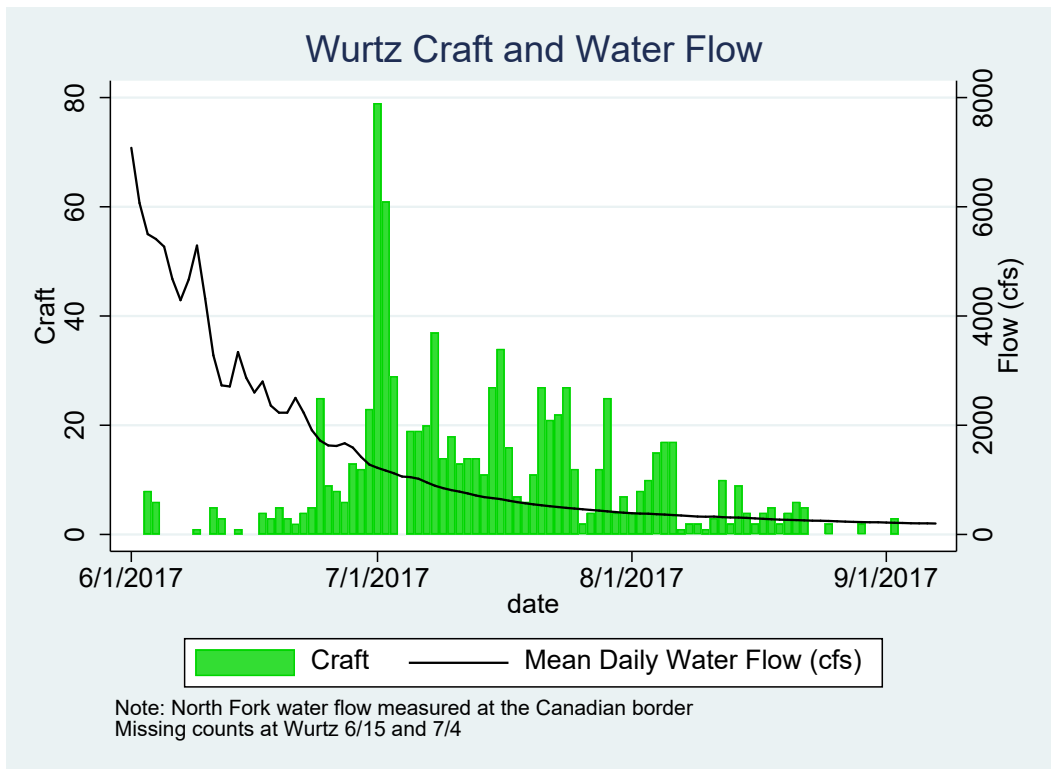


Figure 5.10 Wurtz Craft and Water Flow:



Polebridge:

Figure 6.1 Polebridge River Camera Location:



The Polebridge camera was the southernmost camera site on the North Fork and was located just south of the Glacier National Park Polebridge Ranger Station (Figure 6.1). The following graphs provide information on the distribution of watercraft by hour of the day for the Polebridge river monitoring site. Figure 6.2 provides an overview of use by hour of the day for the 2017 season. This figure shows that the highest use at this site was between 10:00 and 13:00 with approximately 500 watercraft of the 826 total craft passing during this time. Figure 6.3 shows the distribution of watercraft by hour of the day for the month of June. Watercraft counts were low for this month with the highest use time being 5 watercraft at 14:00. Figure 6.4 shows watercraft by hour for the month of July. The highest use was between 10:00 and 12:00 with 280 watercraft passing in this time period. It is important to note that counts are missing for this monitoring site for the first weekend in July which was an unusually high use time for the two other North Fork monitoring sites. This may make counts for the Polebridge site appear lower than they were. Figure 6.5 provides watercraft distribution information for August. This figure shows that the highest use time was between 10:00 and 12:00 with approximately 60 watercraft passing at this time. Figure 6.6 shows watercraft traffic for the 7 days of September that were monitored. The highest use time remained early with 14 watercraft passing between 10:00 and 11:00. Figure 6.7 shows the average as well as minimum and maximum count of people by month for the Polebridge monitoring location.

Figure 6.2 Polebridge Craft by Hour of the Day Overview:

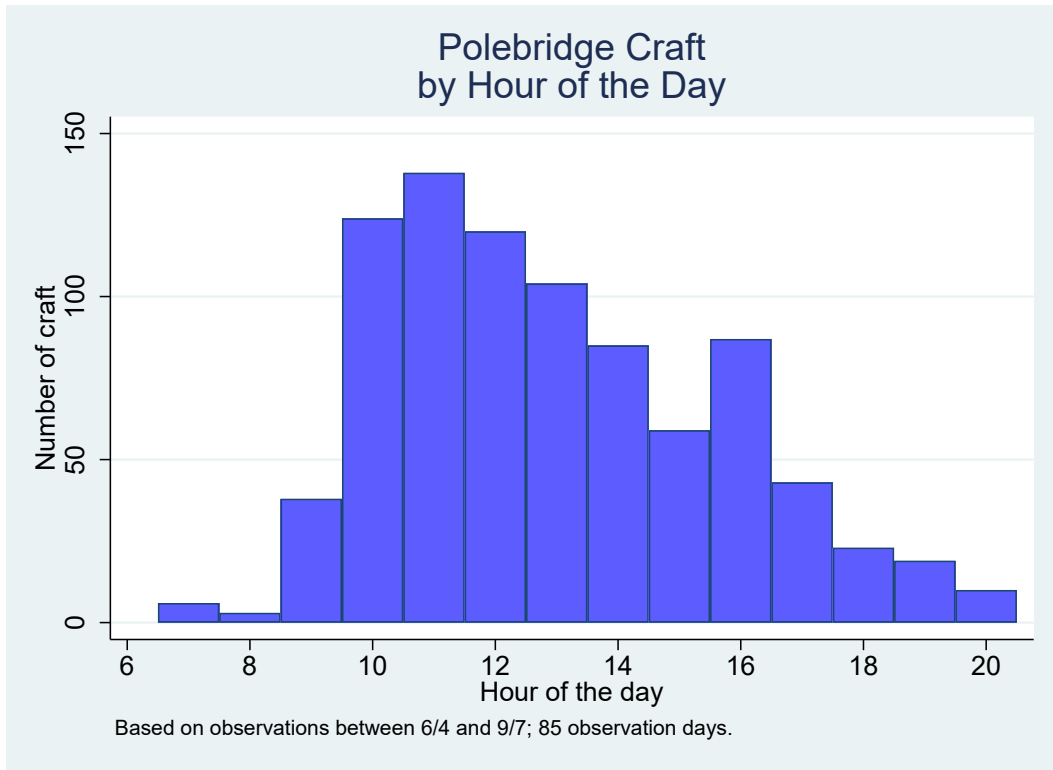


Figure 6.3 Polebridge Craft by Hour of the Day in June:

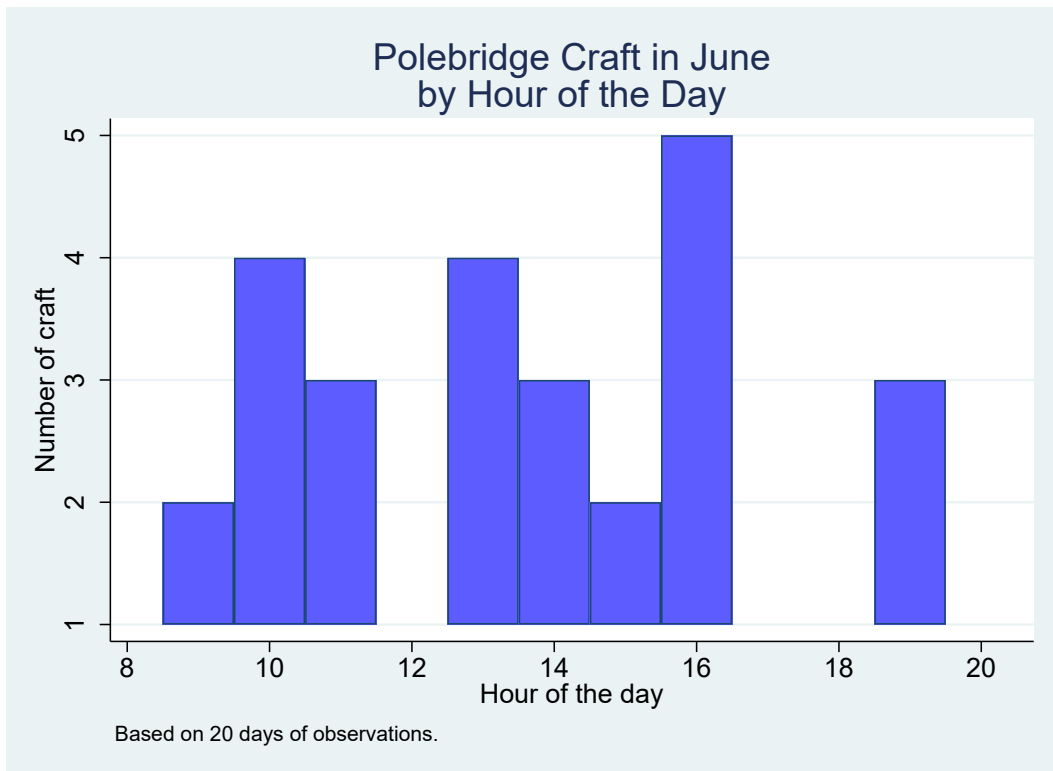


Figure 6.4 Polebridge Craft by Hour of the Day in July:

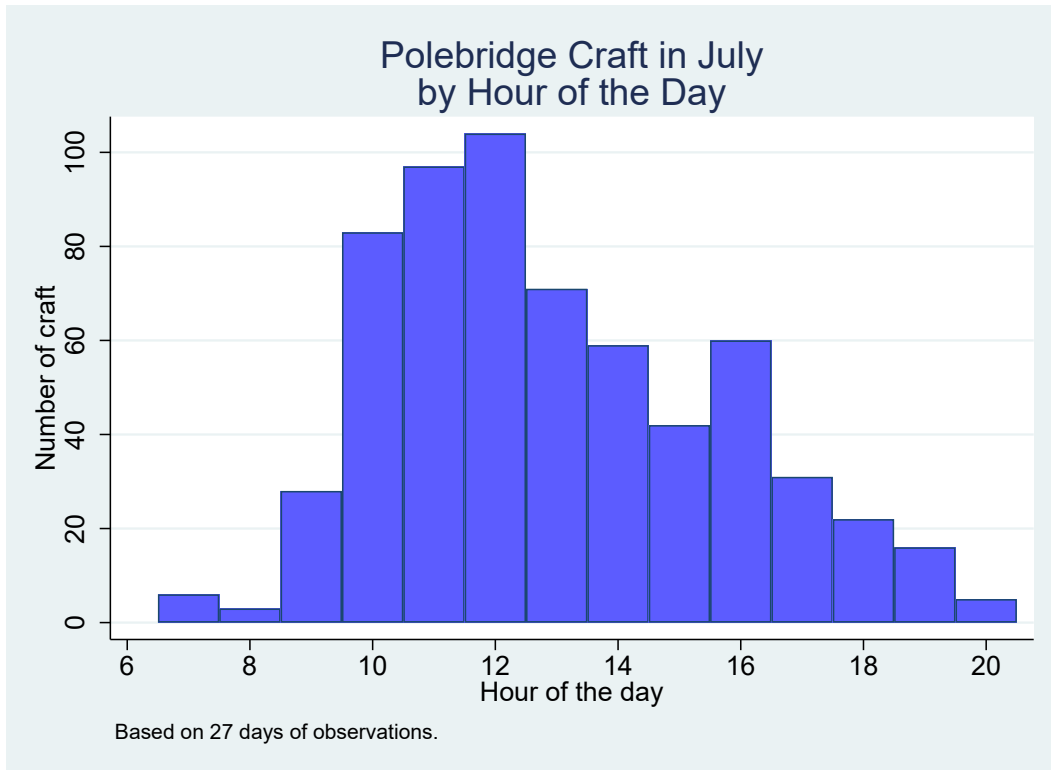


Figure 6.5 Polebridge Craft by Hour of the Day in August:

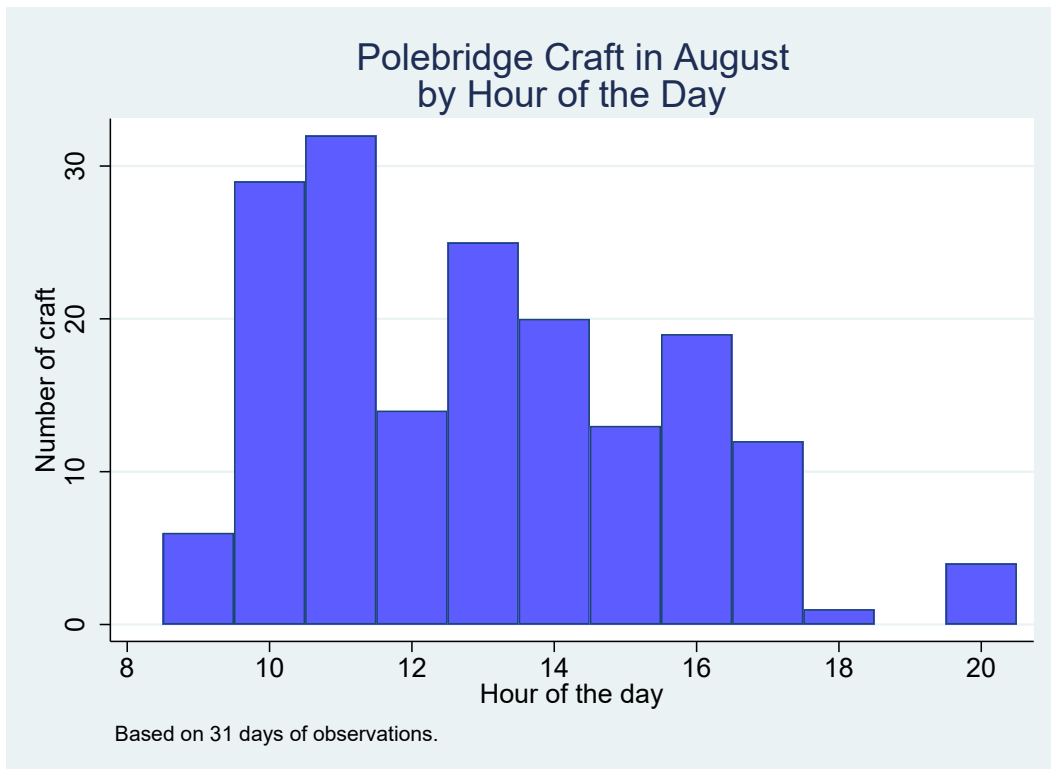


Figure 6.6 Polebridge Craft by Hour of the Day in September:

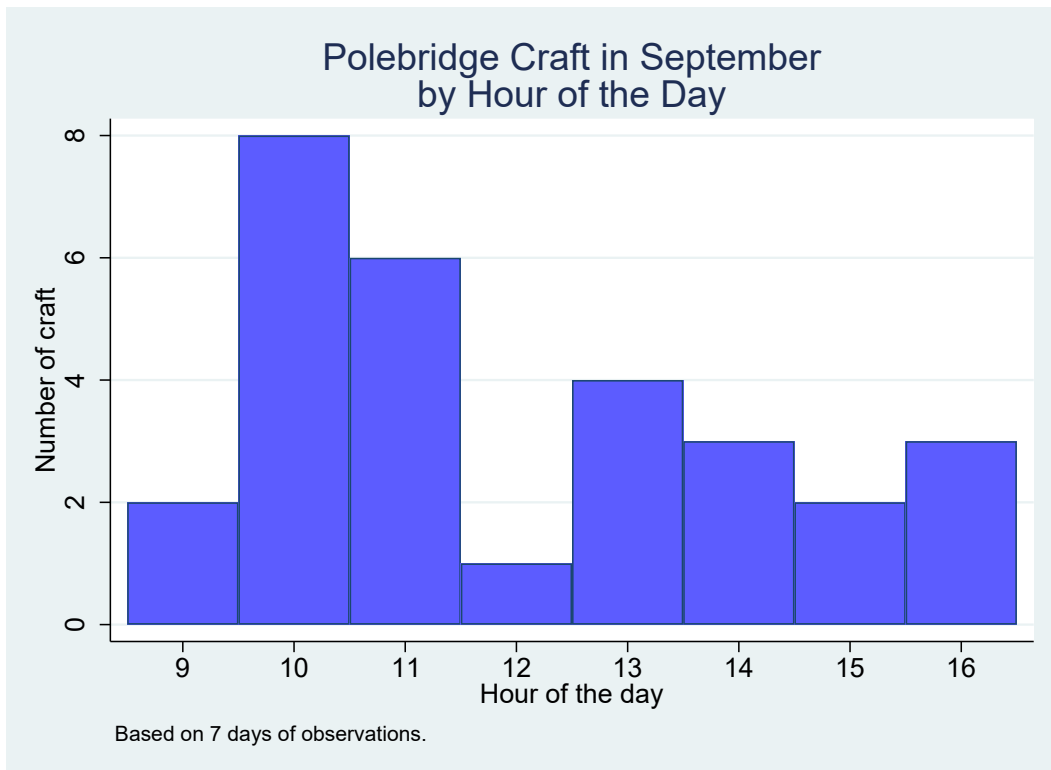


Figure 6.7 Polebridge Counts of People Overview:

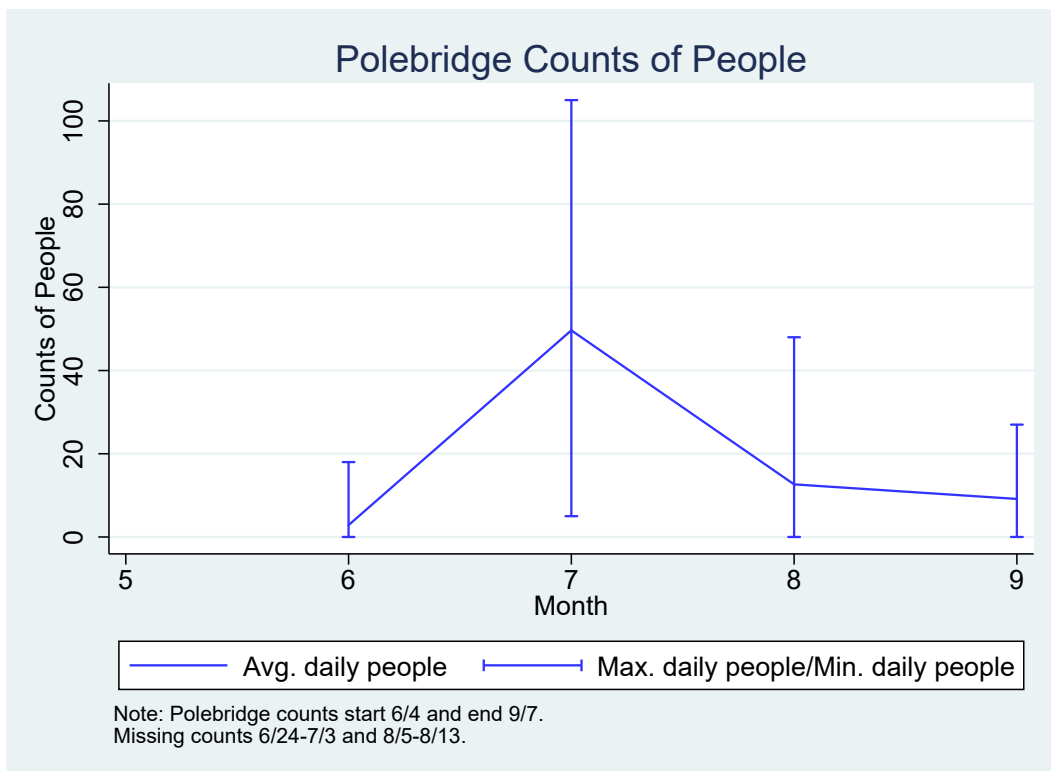


Figure 6.8 describes the number of craft in relation to air quality. Watercraft use at the Polebridge location fluctuates throughout the 2017 season. There appears to be no correlation between a decrease in air quality and watercraft use. Figure 6.9 shows the relationship between daily craft and temperature. There does not appear to be a strong correlation between high temperatures and increased watercraft on the river. This was the first year of monitoring and temperatures were high throughout much of the 2017 season. Future years of monitoring may show if there is a stronger relationship between temperature and crafts on the river. Figure 6.10 shows the relationship between precipitation and daily watercraft. There appears to be no relationship between precipitation and craft. The high precipitation in June does correspond with low use. However this low use be due to high water levels or other factors. Counts are missing from this site for 08/05-08/13 which was the other period with precipitation throughout the summer. Figure 6.11 shows the relationship between craft and water flows for this monitoring location. In May and June when water flow was above 2000 cfs use was low. After the beginning of July when water flow dropped into the range just below 2000 cfs use increased before decreasing again in September when water flow was very low. Though there appears to be some relationship between water flow and watercraft this pattern of use could also be due to other factors.

Figure 6.8 Polebridge Craft and Air Quality:

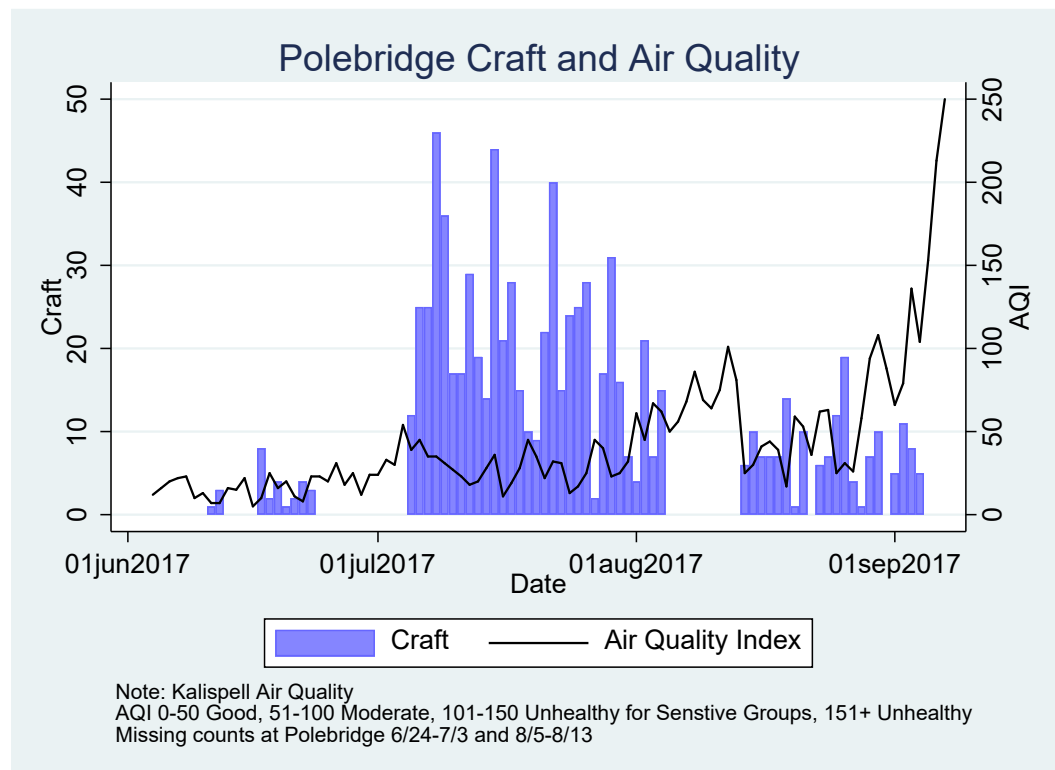


Figure 6.9 Polebridge Craft and Temperature:

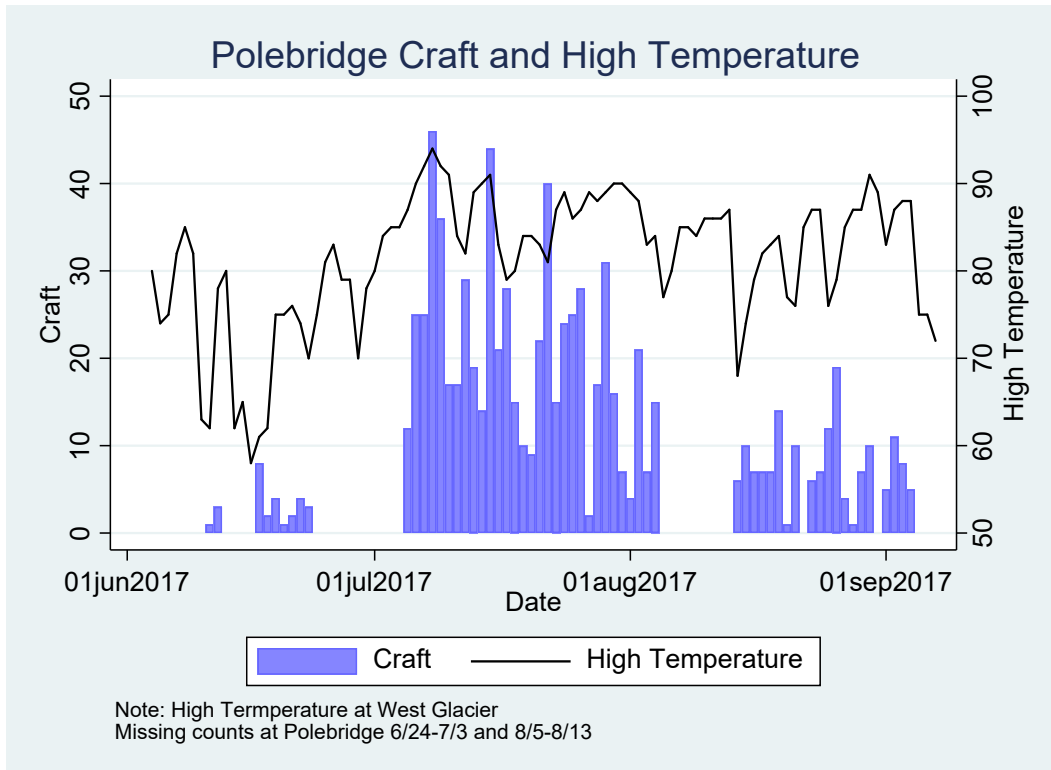


Figure 6.10 Polebridge Craft and Precipitation:

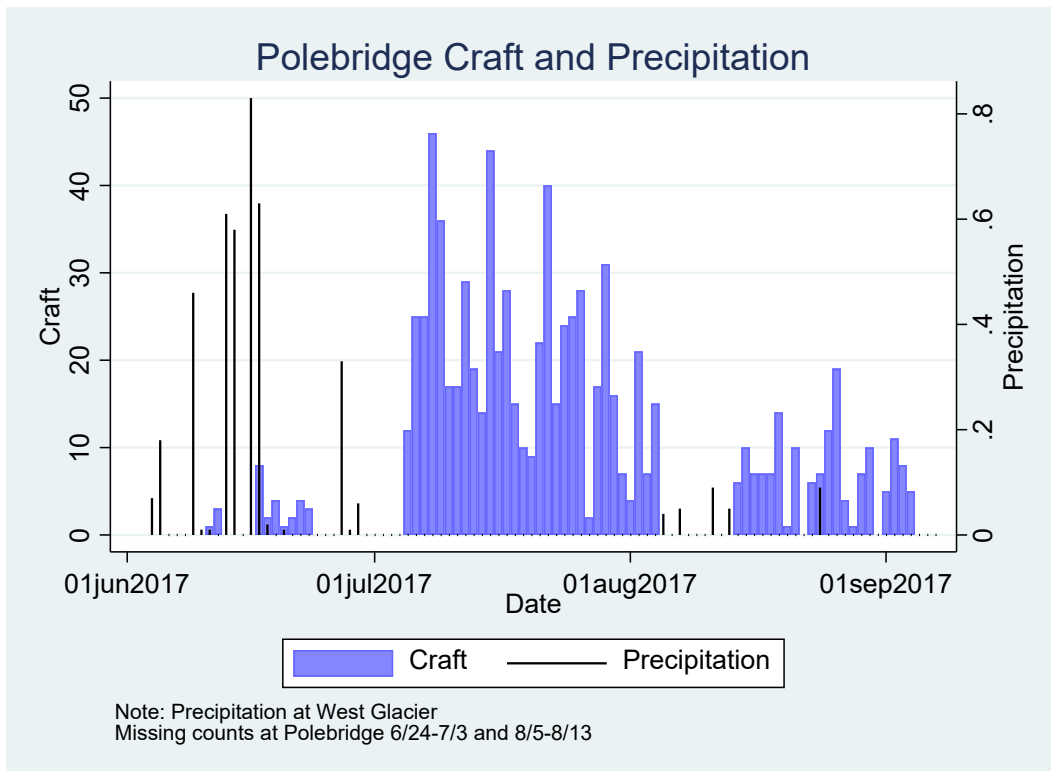
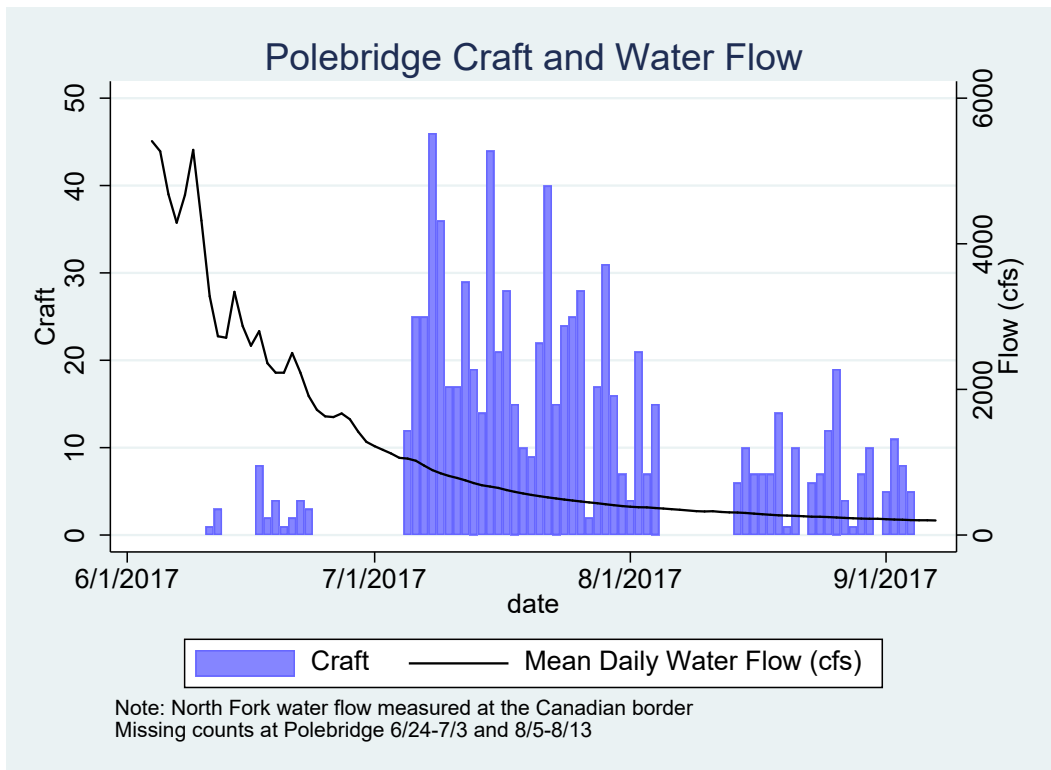


Figure 6.11 Polebridge Craft and Water Flow:



Research Reflections:

Data Collection Reflections:

This year of data collection was the pilot project of river use monitoring for the Flathead River. The exploratory nature of this year of data collection has led to some lessons and ideas for next time to be developed.

First, Plotwatcher game cameras do not fill up at a predictable rate, though safe time frames to remove data and ensure no loss would be:

- When recording 14 hours per day (7:00-21:00) @ 3 Second intervals: Every 2 weeks (15 days Max)
- When recording 14 hours per day (7:00-21:00) @ 5 Second intervals: 21-25 Days (can make it 30 days but not recommended)

The season should begin with cameras taking images at 3 second intervals due to speed of water flow. As water levels drop throughout the summer, this speed can be dropped to 5 second intervals (this year that switch was made in mid-July).

Second, locks are necessary. Despite efforts to camouflage equipment and place in inconspicuous locations, one camera was stolen during the 2017 season.

Third, camera should be positioned at an angle pointing downstream rather than straight across river. This allows for more shots of an individual watercraft to pass, allowing researchers to gain several angles of the number of passengers on the craft.

Fourth, at the North Fork River locations, camera locations were always near occupied campsites or heavily used day recreation sites. The addition of road counters would provide additional depth to this project.

Data Analysis Reflections:

The process of watching the video recordings of the river data for each day was extremely time consuming. The time needed to filter through all of the collected data took one researcher 5 months (September- January) working between 20-35 hours a week. Some sections of the river went more quickly than others, however the Middle Fork sections in particular took up to 2 hours per day. The researchers recommend adopting a sampling method or machine learning software to avoid manually watching and collecting complete census data for each location.