



# Middle Methow Reach Recreational Use Assessment

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Wave Trek Rescue

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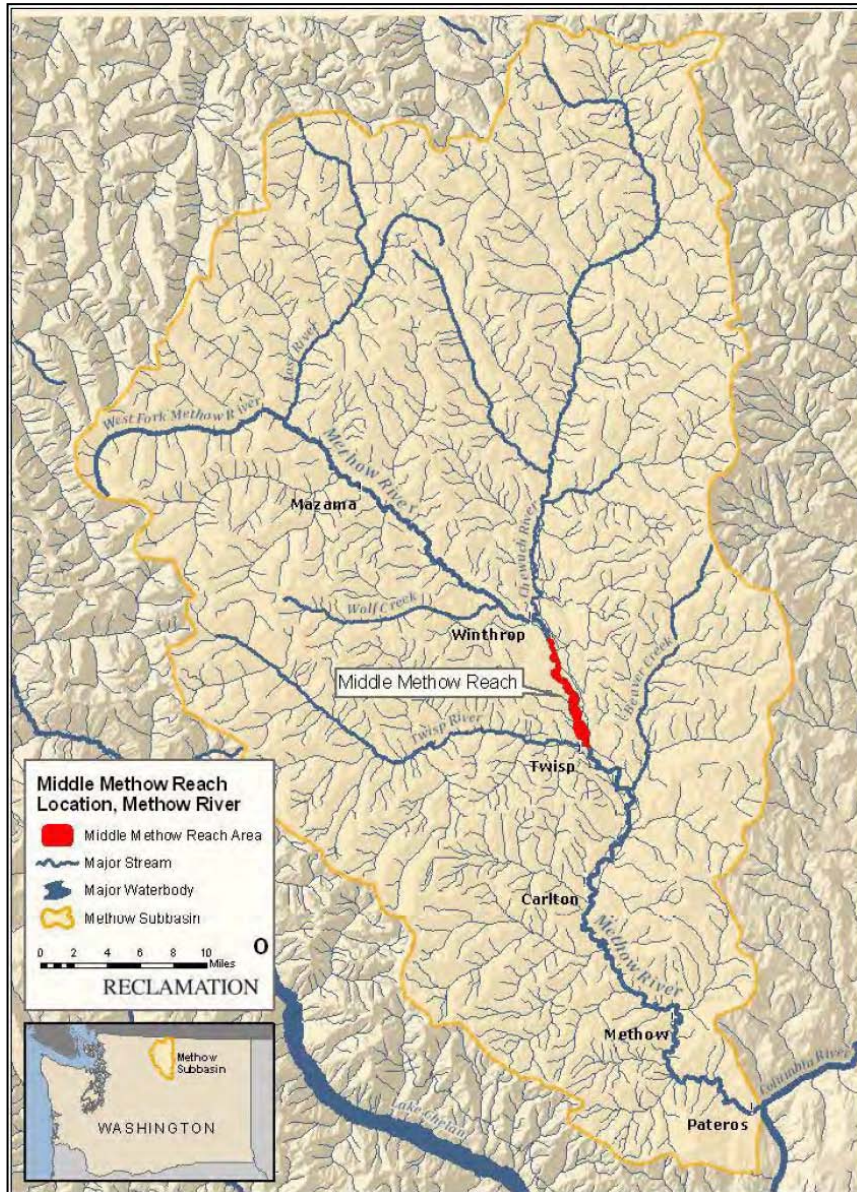
# **1 OVERVIEW AND OBJECTIVES**

## **1.1 Overview**

Reducing the potential for conflicts between river users and salmon habitat restoration projects is a high priority for salmon recovery implementers in the Upper Columbia Region. In the spring of 2011, the Yakama Nation contracted Wave Trek Rescue, a Washington state-based river rescue training and swift water safety consulting company, to assess recreational river use trends in areas targeted for salmon habitat restoration actions. The intent of this report is to provide information about river recreation use within the Middle Methow Reach of the Methow River. This information will be incorporated into the design and implementation of salmon habitat restoration projects associated with the Middle Methow Habitat Project.

Currently, a reach-based restoration effort, known as the Middle Methow Habitat Project, is underway between the Yakama Nation, the United States Bureau of Reclamation (Reclamation), and the Methow Salmon Recovery Foundation to improve habitat conditions for endangered salmonids in the Methow sub-basin. This effort has been in the planning phases since 2009, and restoration actions are planned to be implemented over a two-year work-window starting in the summer of 2012. Activities and installations, such as engineered log jams and the removal of dikes, levees and riprap, could have an impact on the hydraulic conditions the recreating public encounters while interacting with the river. Habitat restoration activities could include, among other things: installing engineered log jams, increasing groundwater and/or surface flows in side channels, removing dikes/levees/riprap, and/or modifying riprap with large woody debris. By understanding recreational use trends on the Middle Methow Reach, habitat project implementers can better reduce conflicts between river users and salmon habitat restoration projects.

## 1.2 Study Area



**Figure 1. Location of the Middle Methow Reach of the Methow River.**

This recreational use assessment focuses on the Methow River between the towns of Winthrop and Twisp, Wash., in Okanogan County (see Figure 1). This area extends from approximately River Mile 41 to River Mile 50 and is known as the Middle Methow Reach of the Methow River.

### **1.3 General Information About River Use and Conditions in the Middle Methow Reach**

The Middle Methow Reach is known to be a popular destination for recreational river use. Over the past decade, the Middle Methow Reach has grown in popularity for inner tubers. Its topography, accessibility from State Route 20, and its location between the two most populous towns in the area—Winthrop and Twisp—contribute to its overall popularity as a river recreation destination in the Methow Subbasin.

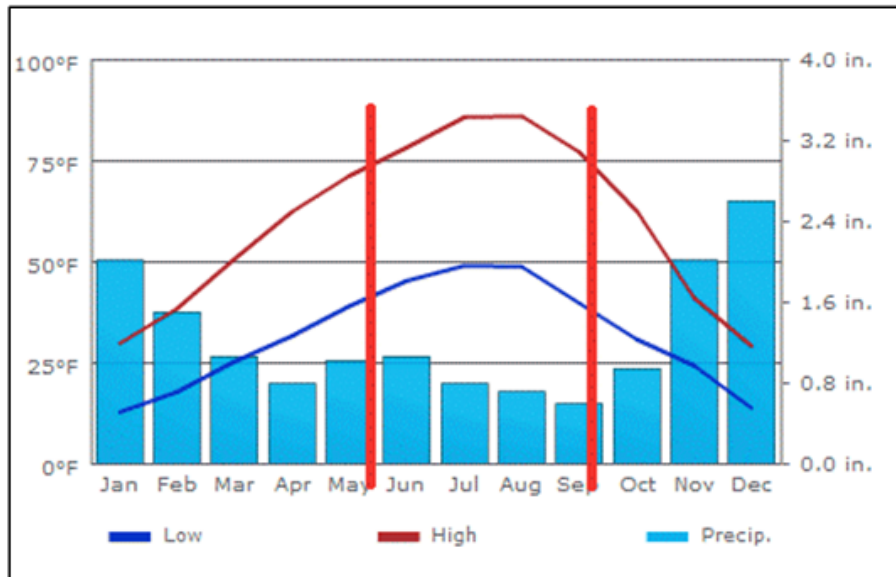
Although popular, for much of the year the Methow Valley's cold climate discourages recreational use of the Middle Methow Reach, aside from streamside angling. From June through September, however, hot daytime temperatures encourage local residents and tourists alike to seek a cool down in the Methow River. Fishing while wading, swimming, snorkeling, inner-tubing, canoeing, kayaking, rafting, and paddle boarding are some of the most common river recreation activities identified on the Middle Methow Reach.

Several public land and open to the public put-ins accommodate a variety of river users throughout this reach. Despite the level of activity, the Middle Methow Reach has few, if any, signs that warn potential users about the inherent hazards of the river system and interacting with hydraulics.

During the months of peak recreation use—June through September—the Middle Methow Reach can flow as low as 200 cubic feet per second up to over 10,000 cubic feet per second. The highest flows are most common in mid to late May and the lower flows are more common in September. The two-year flood discharge for the Middle Methow Reach at Winthrop is just over 9,000 cubic feet per.

River temperatures in this reach fluctuate radically through June and September. In 2002, the Methow River at Winthrop had a daily mean temperature as low as 43 degrees in June, and as high as 59 degrees in mid-August.

Air temperature and the average monthly precipitation in Winthrop, Washington, can be seen in the following graph. During the peak of river recreation use, the monthly maximum temperature stays above 75 degrees, and the monthly precipitation rate is less than 0.9 inches (see Figure 2).



**Figure 2. Graph depicting average monthly precipitation and ambient air temperatures in the study area. The area between the two vertical red lines denotes the period of more intensive recreational use of the river corridor in the Middle Methow Reach.**

Generally, the number of daily recreational users interacting with the river in the Middle Methow Reach increases with the ambient air temperature and with the decrease in the river's flow. For this reason, the highest amounts and highest variety of river recreation use in the Middle Methow Reach occur in July and August.

## 2 METHODS

### 2.1 Methods of Collecting Data on Current River Use

Gaining empirical data about recreational river use within the Middle Methow Reach was a major focus of this assessment. To this end, we conducted a survey of river users accessing the Middle Methow Reach at known high volume public access points during the weekends of the peak season of river activity (July and August)

during the summer of 2011. To gather river user data, a surveyor was posted from 9 AM to 6 PM on Saturdays and Sundays at the Winthrop Red Barn. The surveyor observed people accessing the river and completed a survey form for each identifiable "party" (a group of people of any size planning to recreate together on the river) he or she witnessed. Within each survey form the following data was collected:

- Places of primary residence
- Type of crafts(s) used
- Number of people in the party
- Number of party members younger than 18 years of age
- Frequency of river use and past experience on the Middle Methow Reach
- personal flotation devices use
- Visible alcohol consumption

Additionally, interviews were conducted with recreationists, commercial river companies, river rescue entities, and other parties familiar with the trends and risks associated with recreational river usage in the Middle Methow Reach in order to qualify use trends and issues for the benefit of habitat restoration decision makers.

Special Note – This year has been an unusually cold and high water year on the Methow River. This delayed the general public's use of the river until towards the end of the typical busy season. Typically commercial and public use of the river would pick up in mid-June and continue through Labor Day, peaking in July and August. However, due to the unusually cold water temperatures and high water levels this year, river usage did not pick up much until the month of August. At the beginning of the river-user survey in 2011, the river was running at 2650 cubic feet per second at Winthrop, and by the end of the survey it was running at 565 cubic feet per second.



### **3 ASSESSMENT OF EXISTING REACH CONDITIONS, ACCESSIBILITY, AND SAFETY CONSIDERATIONS**

#### **3.1 Whitewater Classification of the Middle Methow Reach (International Scale of River Difficulty)**

American Whitewater regards the section of the Methow River between Winthrop and Twisp to be a Class I and Class II run. According to American Whitewater's classification system:

*Class I (Easy)* is characterized as having fast moving water with riffles and small waves. Few obstructions, all obvious and easily missed with little training. Risk to swimmers is slight; self-rescue is easy.

*Class II (Novice)* is characterized as having straightforward rapids with wide, clear channels which are evident without scouting. Occasional maneuvering may be required, but rocks and medium-sized waves are easily missed by trained paddlers. Swimmers are seldom injured and group assistance, while helpful, is seldom needed.

#### **3.2 Notable Existing Hydraulic Hazards and Safety Considerations**

The level of danger to river recreationists on the Middle Methow Reach is directly associated with air temperatures and water levels at the time of use. In the spring and early summer snowmelt season, when the air is cooler, the water is cold, and the river level is high, the Middle Methow can be quite dangerous to the under-prepared. In these conditions, flush-drowning and hypothermia are predictable hazards for the unskilled. The temperature of the water during the beginning of our surveys in July was 43 degrees F, and the river was running at 2,560 cubic feet per second at the top end of the Reach.

Though the higher air temperatures, lower water levels, and mildly warmer water temperatures of late summer do somewhat mitigate the dangers of flush drowning and hypothermia, they also encourage more intensive and reckless use of the river

by unskilled river-runners. The temperature of the water at the end of our surveys in August was only 59 degrees F, and the river was running at 565 cubic feet per second at the top end of the Reach. Any safety gained by the more favorable flow and temperature conditions is partially offset by the increased potential for foot entrapment and floater entanglement with log jams. In these scenarios, lack of awareness and preparedness is the most significant contributor to river user danger.

The Middle Methow Reach has small wave trains and occasionally small hydraulics, with few obstacles. Woody debris hazards such as "strainers" are locally abundant in some places. Much of the woody debris that interacts with river hydraulics during summer flows is located on river bends and tops of floodplain islands.

Despite there being hazards, most of the river is easily navigated by novice users. Some of the strainers, however, could create a problem if floaters do not avoid them. Man-made hazards, such as fencing, automobiles and farming equipment, are also present and may be less intuitive and/or visible hazards to an inexperienced recreationist. Maneuvering inner-tubes, and maintaining stability in them, for example, is difficult. Inner tubes do not protect river users from impact with rocks. And their instability can dump floaters in uneven water, exposing the floater to an array of other dangers, such as foot entrapment. Rafts are more appropriate crafts for this river and they offer better protection to the passengers.

### **3.3 Public and Private River Access**

This section of river is accessed through six primary locations (see Figure 3 on page 10):

- 1.) **The River Run Inn:** Located one-half of a mile west of Winthrop, the River Run Inn allows guests to put in and take out at its property. The general public, however, is not allowed to access the Methow through this property. Few floaters are observed above this put-in point.
- 2.) **Red Barn:** Located in Winthrop off Highway 20, the Red Barn can accommodate roughly 50 parking spots. Access is free and does not require a permit. The Red Barn is the most popular access point. Additionally, this

site for river access is located along Highway 20, which is a very popular and busy scenic driving route.

3.) **Winthrop KOA:** Located in Winthrop, this Highway 20-based campground provides access to 20,000 river-users from June through September. The KOA is most commonly used as a take-out for floaters coming from the Red Barn put-in.

4.) **Rising Eagle Road Turn-Out:** Located about 4 River Miles south of Winthrop (and 6 River Miles north of Twisp), a large Washington Department of Transportation turnout along Highway 20 provides a "halfway" point take-out and put-in for floaters coming from Winthrop, and/or heading to Twisp.

5.) **River Bend RV Park:** Just north of Twisp, the River Bend RV Park provides access to 18,000 river users every season. The RV park gives access only to its guests.

6.) **Highway turnout:** A mile and-a-half upstream of Twisp, the general public can park in a wide turnout and access the river. This is a very popular take-out point on the river.

7.) **Twisp Park:** Located on the north end of Lincoln Street in Twisp, Twisp Park gives river-users an alternate public lands access and take-out.

At each of these locations no signs currently exist warning prospective users about the inherent hazards of interacting with the river.

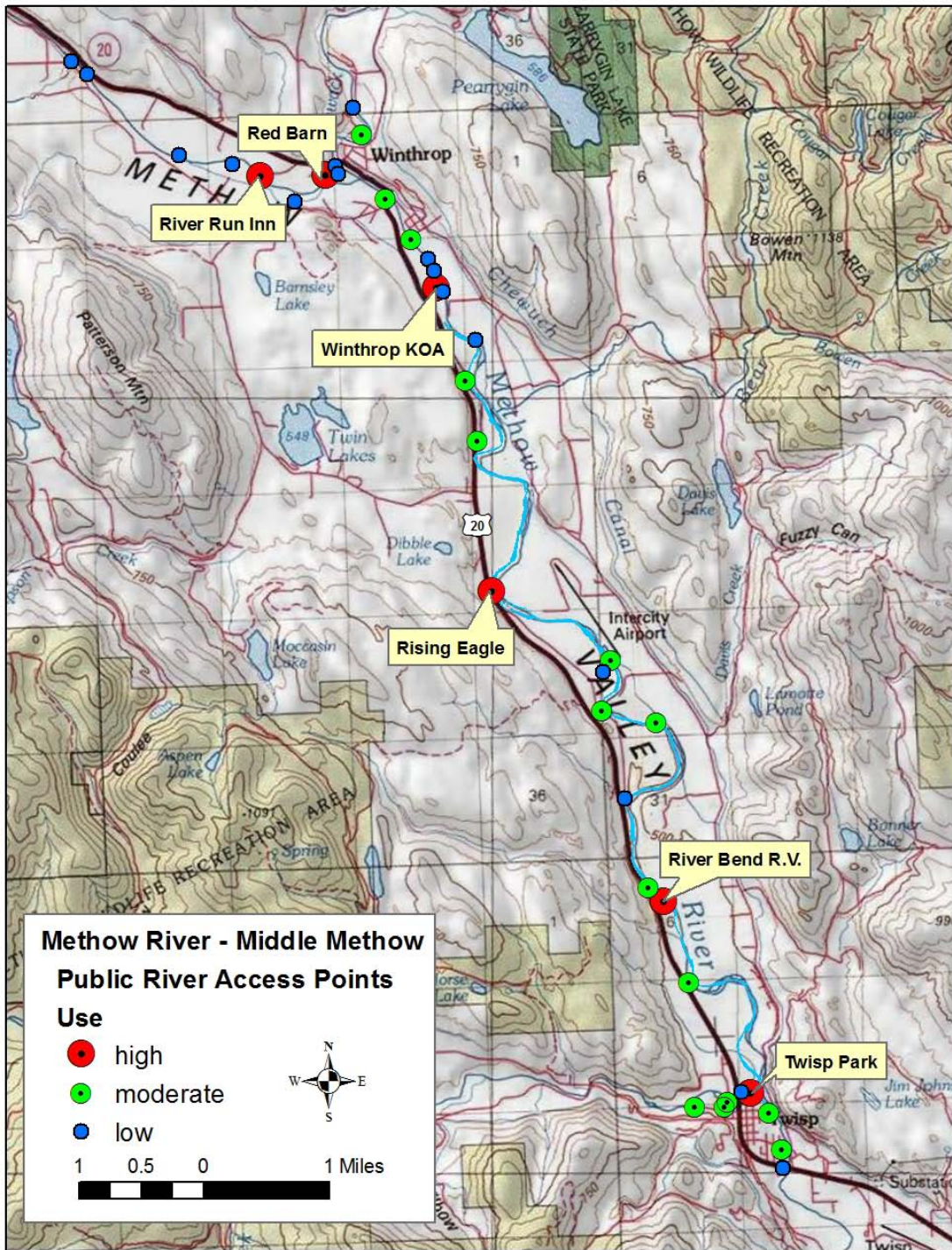


Figure 3. Public and/or commonly used access points for river recreation in the Middle Methow Reach.

### 3.4 River Rescue Accessibility and Swiftwater Response

<b>Emergency Response Entities:</b>	<b>Aero Methow</b> <b>1005 Hwy. 20</b> <b>Twisp, WA 98856</b> <b>1-(509)-997-4013</b> <a href="http://www.aeromethow.net">www.aeromethow.net</a>
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Aero Methow is the local medical and rescue service that would respond to river rescue situations on the Middle Methow Reach of the Methow River. Aero Methow is located in the Town of Twisp and is the only swiftwater response team in the area. The 10-member team also responds to low-angle and high-angle rescues.

Aero Methow possesses all of the necessary equipment and training to execute most river responses. In addition to quarterly water training, the Aero Methow team undergoes on-going training and is re-certified in swiftwater response and rescue every three years.

Aero Methow has requested that a detailed map of the M2 site locations be provided. The information to be included will be the address, river right or left location, road mile markers and a complete description of each site.

Aero Methow's proximity to the project area likely lends itself to fairly quick emergency response times under ideal conditions (Figure 4).

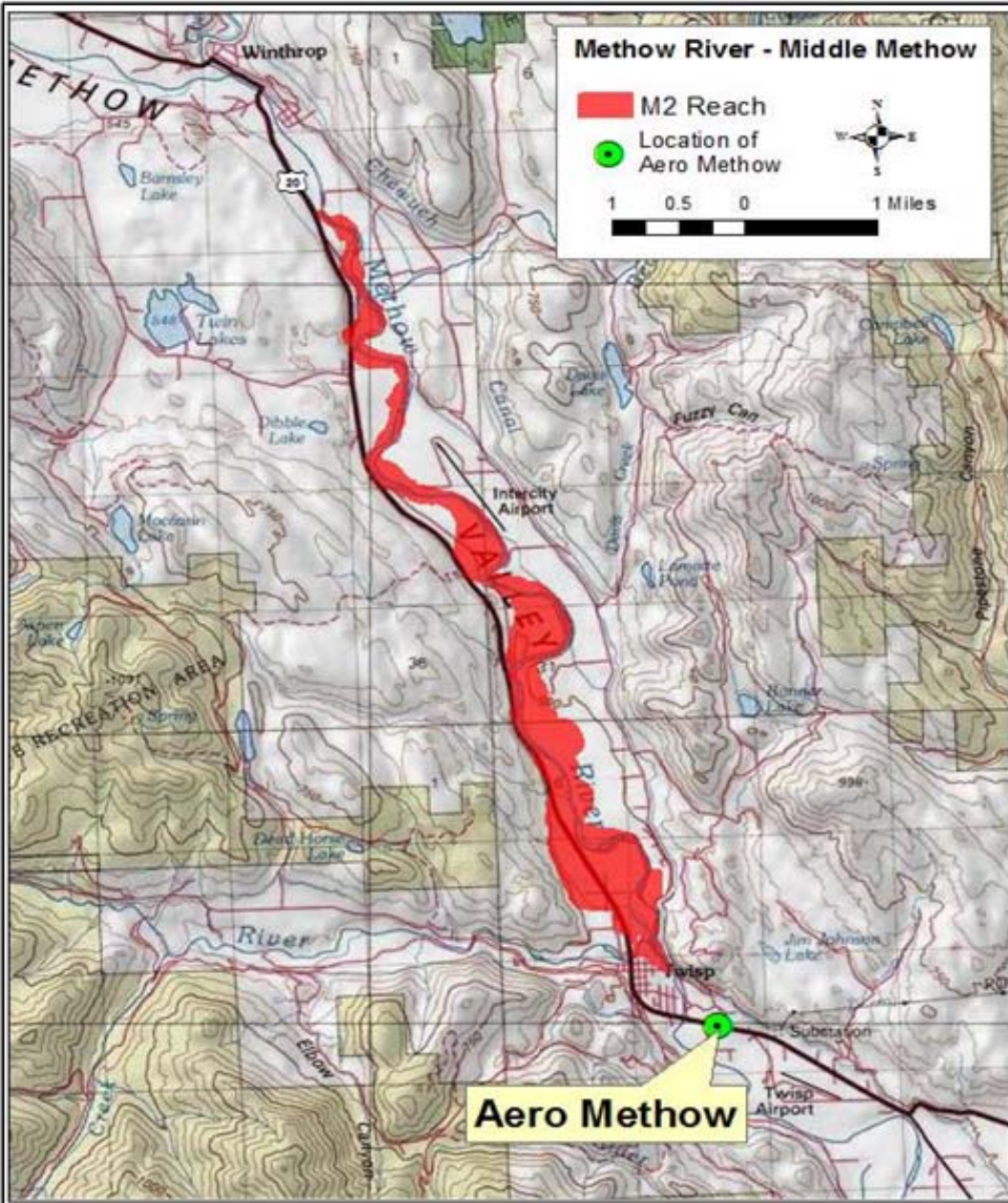


Figure 4. Location of nearest Swiftwater Response Team (Aero Methow) to the study area.

Aero Methow uses detailed maps to access various river locations. Most of these maps correspond with highway miles next to the river. They also own an Oceanid Raft, which can be used to travel downstream to access river points.

## **4 ASSESSMENT OF OVERALL RIVER ACTIVITY**

### **4.1 Commercial River Activity**

This stretch of the Methow River has little commercial activity. Even on the busiest days during peak river use, only one to two commercially guided trips were observed. For the most part, commercial activity is restricted to guided inflatable kayak trips. These groups consist of adults and teenagers and are always outfitted in helmets and personal flotation devices. Children are present on commercial rafting trips; but not on kayak trips. All observed commercial rafting trips had one to two river guides. All groups observed were fully outfitted in Type 5 personal flotation devices.

Methow Raft and Kayak is the only commercial river rafting company offering guided river trips on this reach of the Methow River. Observations and interviews indicate Methow Raft and Kayak offers safe, fully outfitted and professionally guided inflatable kayak trips. They also offer some river rafting trips that begin at the Red Barn in Winthrop, Washington.

Several local fishing ventures were also seen putting rafts in at the Red Barn in Winthrop. Each of these outfitters appeared to be operating in a safe and professional manner. An interview with one fishing guide indicated the observed company is a new company with few clients. The guide said his company would guide less than 300 clients throughout the entire season over the entire Methow Subbasin.

### **4.2 Non-Commercial General Public River Activity**

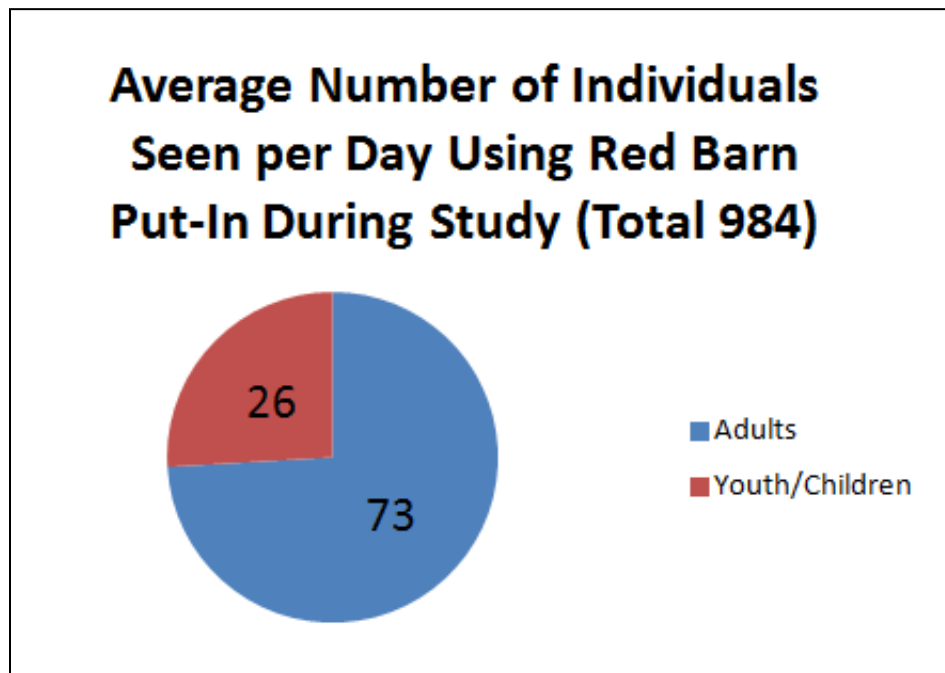
This portion of the Methow River sees a very high volume of traffic and usage by the general public. We tallied almost 1,000 users accessing the river from the Red Barn during our study. That amounts to roughly 100 users putting in at the Red Barn per day on weekends.

The majority of people on this stretch of the Methow are floaters not using personal flotation devices. Many families—including some with toddlers—use this section of river. We observed some families suiting their children in personal flotation devices, however some did not, and it was rare to see parents and children from the same family wearing adequate personal flotation devices.

River activity and usage by the general public was largely related to weather conditions and the day of the week (weekends and sunnier days were busier). About 80 percent of the people we interviewed on the river were from other parts of the state. Roughly 20 percent of river-users were local. Most floaters were exploring the river for the first time and a majority were ignorant of the Methow River specifically and inexperienced with river safety in general.

#### **4.2.1 River Usage With Regards To Age**

Adults (over 18 years of age) generated 75.5 percent of the activity on this stretch. Youth and children were more frequently observed on warmer weather days.





#### **4.2.2 River Usage With Regards To Personal Flotation Devices Usage**

The use of personal flotation devices was minimal, especially considering how many children were on the river. We observed only sixty-five percent of children/youths wearing personal flotation devices. On average, 42 percent of group leaders, such as parents, were wearing personal flotation devices. Although some parents who were not wearing them had their young children wearing lifejackets, the majority of kids who appeared older than 10 were not wearing them.

Fifty-one out of 161 observed groups—less than 32 percent—were fully outfitted in lifejackets. The rest of the groups either completely lacked personal flotation devices or only had some members of the group wearing them.

#### **4.2.3 River Usage With Regards To Alcohol Consumption**

Alcohol consumption was fairly common. About 24 percent of the groups we observed were consuming alcohol. Some users demonstrated visible signs of intoxication. The number of individuals and groups consuming alcohol increased with good weather and river use. Most alcohol consumers appeared to be of age. None of the alcohol consumers were wearing a personal flotation device, nor did the alcohol consumers have lifejackets with them in their vessels.

We observed several groups with parents consuming alcohol while floating downstream with their children. Researchers also observed a handful of teenagers—mostly in groups—consuming alcohol.

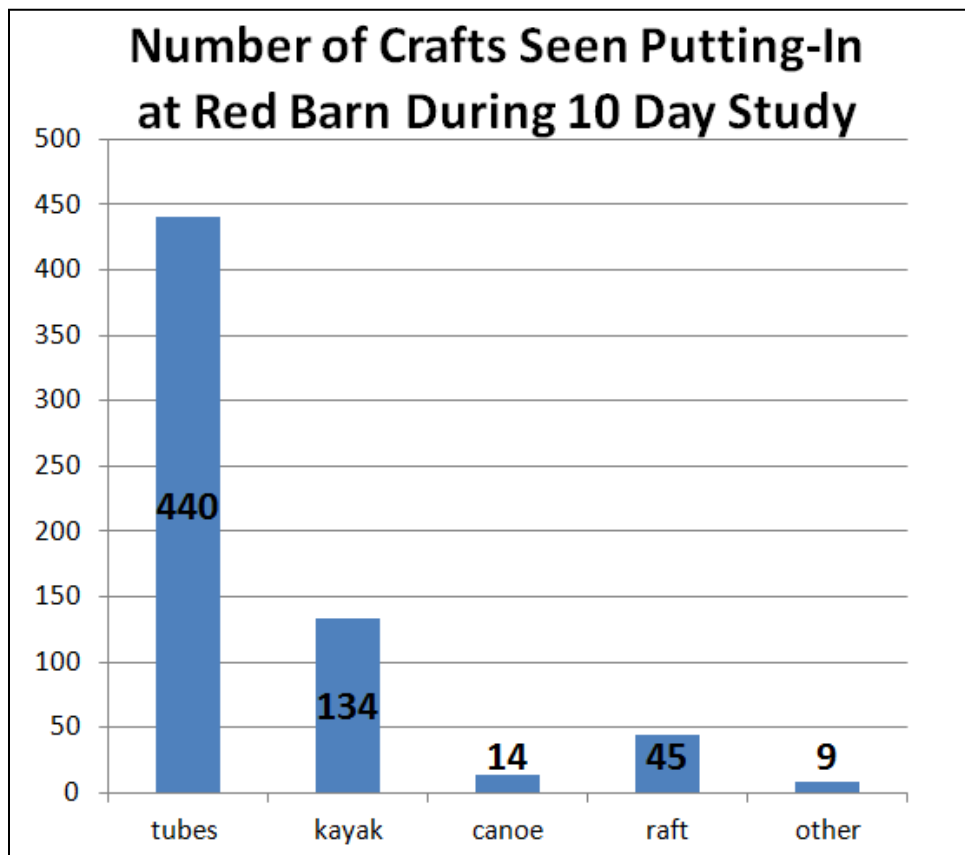
#### **4.2.4 River Usage With Regards To Craft Type**

Inner-tubes were the most common craft, comprising 70 percent (440 actual inner-tubes) of the total crafts on the river. Inner-tubes were commonly used by families with youths/children.

Commercial outfitters' reliance on kayaks and inflatable kayaks made them the second-most common craft. Rafts were moderately common. Most of the rafts observed were single-chambered, vinyl rafts, most likely purchased at department

stores. (Professional river runners derisively refer to these crafts as "K-Mart Coffins"). Many of these low quality rafts were occupied by groups of people and/or families. Few of their passengers were all wearing personal flotation devices.

Commercial raft companies represented the only group using high-quality rafts. Canoes and other crafts such as catarafts and drift boats were seen infrequently on this portion of the Methow River.



## **5 SUMMARY AND CONCLUSIONS**

The Middle Methow Reach of the Methow River currently receives heavy recreational river use during the peak summer months. This use includes a large amount of inexperienced users, including children, that lack river training and appropriate equipment. The majority of river users were from out of town, with little to no firsthand experience with the river conditions in the Middle Methow Reach.

The most popular river craft of choice was inner-tubes, which are unstable, easily popped or deflated, and very hard to maneuver in moving water making it difficult to avoid obstacles. Alcohol consumption, which impairs both judgment and the ability to self-rescue, is fairly frequent by recreationists on the Middle Methow Reach.











Even though this reach is only Class I and II, the amount of dangers present can be deceptive due to the varying speeds of the current by location and by season, cool and rapidly changing water and air temperatures, and the amount of debris that exists. Many anecdotal stories about observing or hearing about "close calls" were provided by locals and officials concerned with river recreationist safety during the interview phases of this project. Most folks with knowledge of river safety principles are quite surprised that drowning and river recreation related injuries and deaths aren't more common under current conditions in this stretch of the river, given the lack of preparedness and skill levels of the general user, and the quantity of users.

The current lack of signage describing river conditions and safety principles at all commonly used put in or take out points is surprising, given the current volume of potentially life threatening recreational use types. Signs and kiosks located at put in and take out points can effectively educate the public regarding the inherent risks of river running, and provide information on how recreationists can be better prepared to ensure their own safety through training and having the proper equipment. At a local level, programs such as River Sense and a life-jacket program could be

implemented through the school system to help educate youth and underage floaters of risks associated with rivers.

## Appendix A. RIVER USE STATISTICS

### Red Barn River User Tally

Dates of Observations		Conditions			Group Counts			Individual Counts			Craft Counts				
Month	Day	High Ambient Air Temp (Degrees Farenheit)	Weather	Flow (cfs)	Number of Groups Seen	Groups with Leader using a PFD	Groups with Everyone in Group Using a PFD	Number of Individuals	Adults	Children	tubes	kayak	canoe	raft	other
July	7/23/2011	78		2560	5	5	5	22	16	6	14	2		2	2
	7/24/2011	80		2360	3	2	2	17	17		14		2		1
	7/31/2011	81		1910	37	12	12	146	118	28	56	53		10	1
August	8/6/2011	89		1410	26	11	9	150	115	35	78	23	8	2	4
	8/7/2011	92		1330	23	8	8	81	44	37	50	14	2	5	
	8/13/2011	92		1000	53	18	13	242	139	103	172	21	2	21	1
	8/14/2011	91		943	14	4	2	80	59	21	50	19		2	
	8/19/2011	87		721	not collected	not collected	not collected	161	151	10	not collected	not collected	not collected	not collected	not collected
	8/20/2011	93		693	not collected	not collected	not collected	69	59	10	not collected	not collected	not collected	not collected	not collected
	8/28/2011	96		565	2	2	2	16	11	5	not collected	not collected	not collected	not collected	not collected

## **Appendix B. GLOSSARY OF RIVER SAFETY TERMINOLOGY**

### **Features Found in White Water**

Any given rapid can host a variety of features that result from the relationship between the character of the riverbed and the velocity of the water. Water levels alter and affect the river's difficulty and character, as well. The dynamic nature of rivers requires a thorough understanding of river features and the ways they change in response to changing conditions and changing use. The following terminology and river classification and craft information is intended to help inform readers understand the impact these factors play with regards to river construction and safety.

### **Terminology**

***Constriction*** – Constrictions can create a rapid when the flow of the river is forced into a narrower channel. This increases water-speed that, in turn, can interact with river features to form a variety of hydraulics.

***C.F.S. (cubic feet per second)*** – C.F.S. Is figured by taking a river's depth and multiplying it by the river's height and speed in order to calculate a river's volume.

***Eddies*** – Eddies can form on the downstream water of an obstruction within the river. They arise as swirling areas on the horizontal surface of the water, and are typically calmer spots within the river where the water is moving slowly upstream. Eddies are often utilized as places for river goers to rest or make their way upstream against the current. However, in very powerful water, eddies can have be very powerful and form strong swirling currents which can capsize boats and be extremely difficult to escape from.

***E.L.J. (Engineered Log Jam)*** – An intentional created and placed mass of logs that are crowded and forced together making them immovable.

***Floaters*** – Any individual floating on any kind of craft downstream. Crafts can be anything from small rafts, inner-tubes, to pool floats and air mattresses.

***Gradient*** – The gradient of a river is measured as the rate at which the river loses elevation along its course, which determines the slope of the river, which has a strong influence on its rate of flow. Shallow gradients tend to produce calm, slow rivers whereas steep gradients tend to produce much stronger, raging rivers.

***Holes (also known as "hydraulics", "stoppers", or "souse-holes")*** – Holes are formed when water falls over a boulder, waterfall or ledge, creating a depression at the base. Downstream water rushes upstream to fill the depression. This creates a recirculation that can trap swimmers and floaters. The most dangerous holes on rivers are formed by low-head dams, underwater ledges, and other symmetrical, man-made obstructions.

***Naturally Occurring Log Jam*** – An immovable mass of logs that have been forced and crowded into a portion of the riverbed by the river's current.

***Obstruction*** – An obstruction is a boulder or ledge in the middle or near the edge of the river which can obstruct the river's flow and create a "cushion," a "drop," or a "hole," where the river flows back on itself.

***Pillows*** – Pillows are formed when a large flow of water runs into a large obstruction, usually a boulder, which causes water to "pile up" against the face of the obstruction. Pillows are especially dangerous when the object that forms the pillow is undercut. Undercut boulders and obstructions can cause paddlers to be swept underwater and possibly be entrapped.

***Put-in*** – River access where trips begin.

**Rapids** - Rapids are characterized as a fast, turbulent stretch of river, which often have obstructions. Rapids are created by four factors: gradient, constriction, obstruction and flow rate. Gradient, constriction and obstruction are streambed topography factors and are relatively consistent. Flow rate is dependent on both seasonal variation in precipitation and snowmelt and the release rates of upstream dams. Any one or any combination of these four factors can cause a rapid.

**Sieves** – A sieve is a narrow empty space—usually a combination of boulders and/or logs—through which water flows. The constriction of the sieve increases water-speed. The most dangerous sieves are wider at their entrances than their exits.

**Strainers** – A strainer is formed when an object, usually a log jam, blocks the passage of larger objects, but allows the flow of water to continue. Strainers can pin any object or body against the strainer, drag it under water and snag it with its branches or debris. Getting to safety from this position can be difficult and impossible, leading to fatal outcomes.

**Streambed topography**- Streambed topography is defined as the arrangement of the natural and artificial physical features that define the streambed. Streambed topography is the primary factor in the creation and characterization of rapids. Increased flow rate, as during a flood or high rainfall season can permanently change the streambed by displacing rocks and boulders or by creating new channels for flowing water.

**Stream Flow Rate** – Stream flow rate is the measure of the speed at which water is flowing within the riverbed. A marked increase or decrease in flow can create a rapid, eliminate a rapid or make safe passage through previously-navigable rapids more difficult or impossible. The U.S. Measures flow rate in cubic feet per



second (cfs). Canada and other countries using the metric system measure it in cubic feet per second (cumens).

***Sweepers (or Spanners)*** – Sweepers are trees or logs that have fallen into the river or are leaning over into the river in a partially submerged manner while still rooted to the shore. The trunk and branches of the tree may form a strainer-like obstruction. Although these obstructions do not typically create whitewater features in the river, they can create turbulence and significant hazards to boaters, floaters, and paddlers.

***Take-out*** – River access where trips end and boaters take their crafts out of the river.

***Undercut rocks*** – Undercut rocks are rocks that have eroded away at their bases, creating spaces in which debris, boats or bodies can get stuck. Undercut rocks can be mushroom-shaped or angled downward.

***Waves*** – Waves are characterized as the large, smooth face of the water rushing down stream. Because of the ever-changing and rough pattern of a riverbed, waves are not always perpendicular to the river's current. This can make flip or dump truck a raft, kayaks, canoes and other crafts.

***Whitewater*** - Whitewater is formed in a rapid, when a river's gradient increases enough to disturb its laminar flow and create turbulence and form a bubbly or aerated and unstable current that gives the water a white, frothy appearance. The term "whitewater" is also used loosely to refer to less turbulent but still agitated flows.

## **River Classification System**

The following descriptions are what categorize the International Scale of River Difficulty as defined by American Whitewater. This system is used to classify rivers and/or sections of rivers for individuals traveling on them to be able to assess whether or not it is safe for them to be on the river based upon their craft, training, swimming abilities, and overall river experience.

***Class I (Easy)*** – Characterized by moving water with small riffles and waves. On waters of this class risk is considered slight and most individuals can maneuver this level on their own with little instruction and self rescue should be easy.

***Class II (Novice)*** – Characterized by rapids that are straightforward with wide, clear channels. Rocks or obstructions are present in this type of river but they can be easily missed with minimum maneuvering by trained paddlers.

***Class III (Intermediate)*** – Characterized by rapids that are moderate with irregular waves, which are difficult to avoid. Complex maneuvering is required on this type of river to avoid capsizing but experienced paddlers should be able to avoid most danger. Large waves and/or strainers may appear on this type of river and strong currents can make self-rescue difficult. Scouting is advised on this type of river for inexperienced paddlers.

***Class IV (Advanced)*** – Characterized by powerful but predictable rapids. This type of whitewater requires precise handling in turbulent waters due to the potential for large, unavoidable waves or rapids. Additionally this type of whitewater may present constricted passages that may demand very quick maneuvering and rapids large enough to flip a raft. Swims on this type of river may be long and violent and risk to injury is a great possibility. Assistance is usually required if capsized on this type of river.

***Class V (Expert)*** – Characterized by extreme conditions and long, difficult, violent rapids. This type of whitewater contains unavoidable waves and obstructions as well as steep holes and/or drops. This type of river contains demanding maneuvers that come quickly before difficult passageways. Risks of injury and death are high on this type of whitewater.

***Class VI (Extreme and Exploratory)*** – Characterized as a river or route that is one of extreme difficulty. This type of whitewater is mostly exploratory where danger is unpredictable. Consequence of errors on this type of river may result in severe injury, life-threatening situations or even death.

### **Types of River Crafts**

***C1s*** – Similar in appearance and construction of a whitewater kayak, C1s are known as whitewater canoes because they are paddled in a low, kneeling position using a single-bladed paddle that is slightly smaller than a traditional canoe paddle. Individuals operating this type of craft will wear a spray cover like those used in kayaking, and can roll the vessel after capsizing with an Eskimo roll just as a kayaker would.

***Canoes*** – Canoes are most often made of fiberglass, Kevlar, plastic, or a combination of all three for strength and durability but were traditionally made of wood. Canoes can either have a spray cover or be “open” and resemble a more typical canoe. Canoes can be operated by multiple people or by a single individual sitting in a low kneeling position, paddling with a single-bladed paddle. Many river canoes contain large airbags or sections of foam in order to help keep them afloat should they capsize.

***Cataracts*** – Cataracts have two pontoons on either side of the craft, which are bridged by a metal frame that contains one or multiple metal seats. Cataracts can either be paddled or rowed with oars. Typically, cataracts are powered by oars with a single boater operating and steering the craft. Cataracts can accommodate passenger, but they have no direct responsibility in maneuvering

the craft. Cataracts can vary in size, and many of them are smaller and easier to maneuver than a typical river raft.

***Drift Boat ("McKenzie River Dory")*** – A more traditional, hard-sided boat with a wide, flat bottom, flared sides, narrow, flat bow, and a pointed stern. These boats contain an extreme rocker in the bow and stern, which allows it to spin around its center.

***Inner-tube*** – An inflatable donut-shaped river craft often used recreationally by individuals floating downstream for fun. An inner-tube is typically a single-person craft that one lays on or sits in and operates without a paddle using the river's current to maneuver downstream.

***Rafts*** – Inflatable crafts that are made from high-strength fabric coated with PVC, Urethane, Neoprene or Hypalon. Rafts tend to be multiple passenger crafts that can carry large loads. They are often used on guided trips and expeditions. Rafts tend to be more stable than kayaks or canoes on rivers but more difficult to maneuver. Although most rafts are large, multiple passenger crafts, there are also smaller rafts, and even single-person whitewater rafts, known as *Packrafts*. Rafts can vary significantly in quality and stability. Larger, more expensive crafts from specialty companies, such as those used by commercial rafting ventures, tend to be much safer and sturdier than the smaller, cheaper rafts that can be purchased at a large chain store or place that sells outdoor goods.

***River bugs*** – Small, single-person inflatable crafts that are operated without a paddle. An individual's feet point out the front of the craft toward downstream.

***Whitewater Kayaks*** – Most frequently made of plastic that can flex with impact, whitewater kayaks are designed to maneuver quickly around obstacles.