

Introduction

This report is an overview and analysis of the injuries reported to the West Virginia Whitewater Commission by the commercial rafting industry for year (FY) 2010. The information contained in this report is based on the requirement described in West Virginia Legislative Rule §58-12-11. No judgment was made in this analysis whether reported injuries follow the criteria for reporting established by West Virginia Legislative Rule §58-12-11. Therefore, all injury reports submitted by licensed outfitters are included.

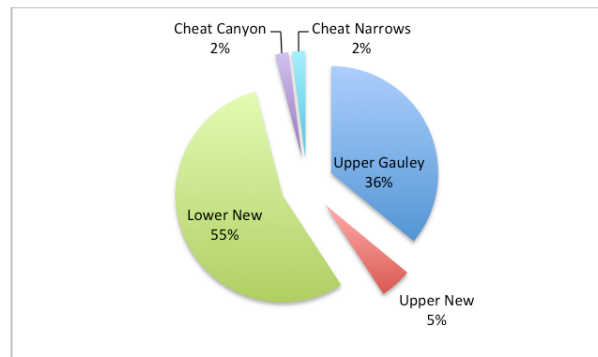
Demographics

A total of 42 individuals were injured while participating in a commercial rafting trip during 2010. The age of injured persons ranged from 8 to 68 years with a mean of 37 years. A majority (55%) of those injured were between 20 to 50 years of age. For the first time, three guests (7%) were under the age of 10 years. Over one-half (52%) of injured guests were male. Fifty-seven percent of the injured indicated that they had taken at least one commercial rafting trip prior to the trip on which they were injured.

River Where Injury Occurred

Six out of ten injuries (60%) occurred on the New River, followed by the Gauley with thirty-six percent. Twenty-three injuries (55%) were reported on the Lower New River followed by the Upper Gauley with 15 (36%). For the first time since 2008 injuries were reported on the Cheat River (4%) (Figure 1).

Figure 1. Reported Injury Rates by River



The number of injuries reported for each river corresponded with the amount of commercial use the river receives, with two exceptions. The Upper Gauley River, which accounted for 13% of commercial river use, recorded fifteen injuries (36%). And two injuries (4%) were reported for the Cheat River which accounts for 4% of river use. The Lower New with twenty-three injuries (55%) and 61% of river use (Table 1).

Injury rates in commercial whitewater rafting is questionable because of suspected discrepancies in the reporting of minor injuries that may not meet the criteria established by the WV Whitewater Commission, reportable injuries that go unreported, and the variability of monthly user numbers.

Injury rates are presented in Table 1 by *Injuries Per 1000 Rafter Days* (IPTRD). Dividing the number of reported injuries by the total number of rafting participants and multiplying by 1000 calculate this rate. The total number of rafting participants FY 2010 = 155,712 (West Virginia Department of Natural Resources, 2010). IPTRD rates FY 2010 ranged from 0.135 on the Upper New to 0.592 on the Cheat

Canyon. The overall *IPTRD* was 0.269 per 1,000 rafters FY 2010.

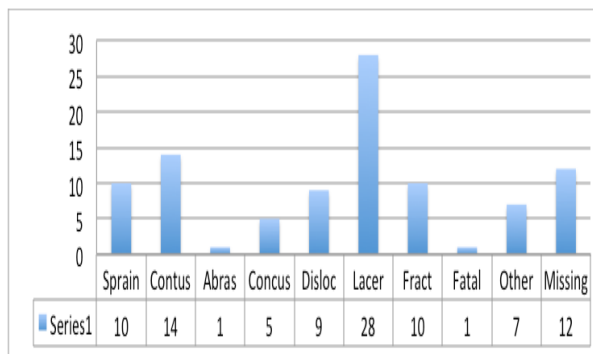
Table 1. *Reported Injuries and Injury Incidence Rates by River*

River	Number of Injured	Percent	IPTRD
Upper Gauley	15	36	0.727
Upper New	2	5	0.135
Lower New	23	55	0.242
Cheat Canyon	1	2	0.592
Cheat Narrows	1	2	0.589
Total	42	100	0.269

Injuries

Types of injuries reported in 2010 included lacerations/punctures (28%) contusions (14%), sprains/strains (10%), fractures (10%), and dislocations (9%). The remaining injuries included other unspecified injuries (7%), or were not specified (missing) at all (12%) (Figure 2). Injuries are similar to those reported in previous years.

Figure 2. *Type of Injury by Percent*



The most frequently injured anatomical locations of the body were injuries that involved some part of the face (1%), the

eye (8%), nose (3%), and mouth (3%). Fourteen percent of injuries involved the arm/wrist/hand (A/W/H), including injuries to the hand (8%), arm (5%), and wrist (1%). Injuries to the shoulder (7%) were noticeable, as were injuries to the lower leg (7%), head (7%) and ankle (5%). The anatomical location of the injury was not specified on 14% of reports (Table 2).

Table 2. *Percent of Injuries by Anatomical Location*

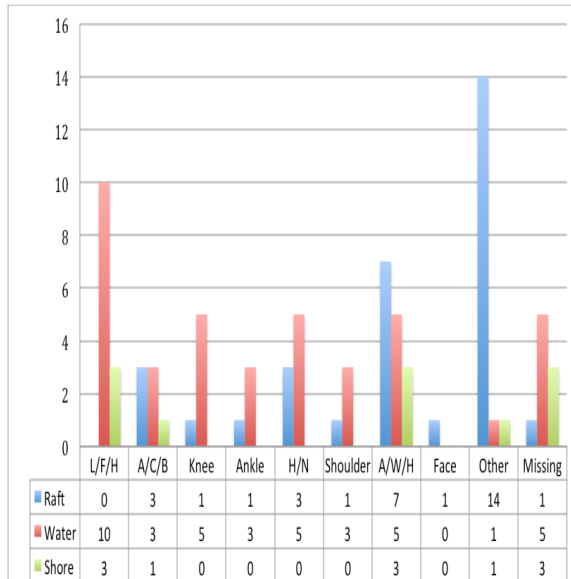
Anatomical Location	%
Upper Leg	1.7
Lower Leg	7.0
Knee	7.0
Ankle	5.2
Foot	1.7
Hip	3.5
Chest	1.7
Back	7.0
Neck	1.7
Shoulder	7.0
Arm	5.2
Wrist	1.7
Hand	8.7
Head	7.0
Face	1.7
Eye	8.7
Nose	3.5
Mouth	3.5
Other	1.7
Missing	14.0

Injury Setting

Unlike past years, this year almost one-half the injuries sustained by commercial rafters occurred in the water (45%). Injuries occur in the water when passengers ejected from the raft are subjected to a variety of river hazards. Some of these include the forces of high volume, turbulent water, hydraulics, undercut rocks, strainers, foot entrapments, impacts with rocks, floating debris, or other hazards. Thirty-eight

percent of injuries occurred in the raft. These injuries are usually a result of collisions between passengers in the raft, being struck by a paddle or other piece equipment, or entanglement of arms and legs in parts of the raft. The remaining injuries occurred while guests were on shore (10%), were recorded as other (5%) or went unreported (2%) (Figure 3).

Figure 3. Percent of Injured Anatomical Location and Setting of Occurrence

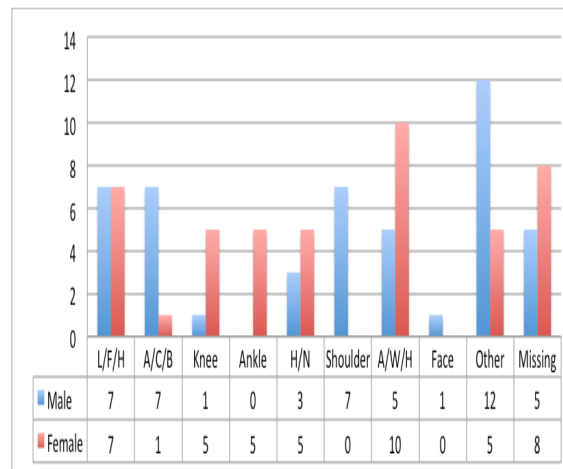


Anatomical location categories were collapsed to facilitate cross tabulation in order to identify injury associations. Injuries occurring in the raft included those to the arm/wrist/hand (A/W/H) and face. Injuries occurring in the water involved the leg/foot/hip (L/F/H), knee, the head/neck (H/N), and shoulder. A limited number of injuries occurred while on shore (Figure 4).

Injuries also varied by sex, with males sustaining injuries to the

abdomen/chest/back (A/C/B), shoulder, and face. Females sustained injuries to the knee, ankle, head/neck (H/N), and arm/wrist/hand (A/W/H) (Figure 4).

Figure 4. Percent of Injuries by Sex



An association was also observed between types of injuries and anatomical location: sprains and strains (S/S) occurred more often to the knee, dislocations involved the shoulder, and contusions/bruises to the face, L/F/H and knee, and lacerations to the H/N and A/W/H.

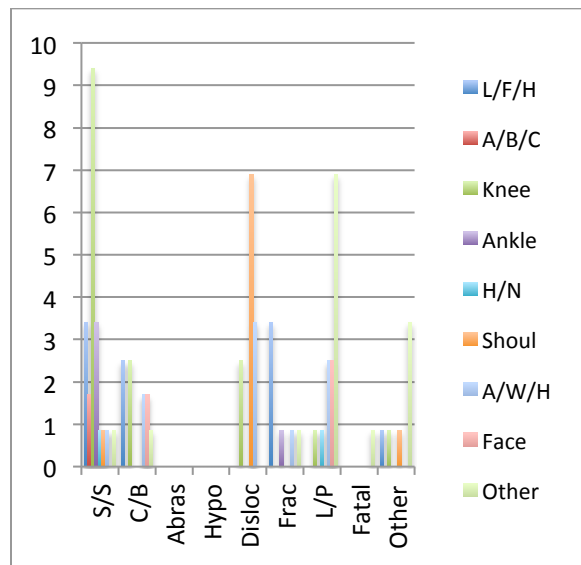
First Aid Rendered

First aid was administered on-site for injuries and included the use of ice (61%), bandages (42%), splinting or immobilization (11%), use of direct pressure (42%), elevation of the extremity (27%), and the use of an antiseptic (7%). The injured also received other first aid (19%).

Evacuations

Fifty-six percent of those receiving injuries required evacuation to an outfitter base, medical facility, or were otherwise prevented from completing their raft trip. This finding was similar to the rate reported FY 2007 and was 24% higher than the 32% reported FY 2009.

Figure 5. Percent of Anatomical Location and Type of Injury



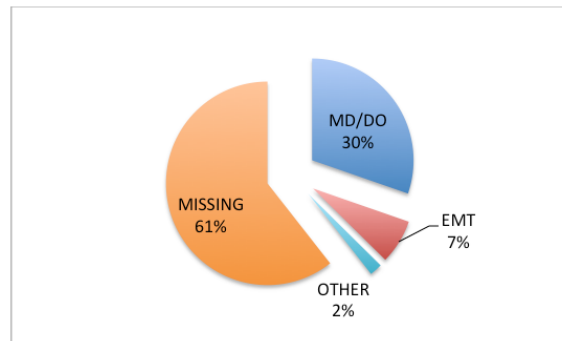
Treatment by Health Care Provider

Legislative rule governing injury reporting (§47-27-11 [Accident Reports]) specifies that injuries that “require medical treatment by a licensed health care provider, excluding diagnostic analysis” must be reported to the West Virginia DNR.

Only 30% of the injury reports submitted during 2010 indicated that the injured were evaluated by a medical or osteopathic doctor (MD or DO), and 7% by an EMT or paramedic. None were evaluated by a registered nurse (RN) or

physician’s assistant (PA). Two percent of reports indicated that evaluation of the injured was performed by persons with some other training (e.g., First Responder, Wilderness First Responder) who most likely were trip leaders or guides. No response was given as to by whom or if the injured individuals were evaluated on 61% of injury reports did not identify a health care provider (Figure 6). This finding is similar to year 2008 when over half (52%) of the injury reports did not identify a professional health care provider.

Figure 6. Professional Health Care Provider



Forty-two percent of injury reports noted that injured persons received some form of treatment. Medical care received included stitches (33%), medication (27%), a splint or cast (16%), oxygen (5%), or other unspecified treatment (22%). Twenty-seven percent of reports indicated “diagnosis only.”

Summary

During the 2010, commercial rafting outfitters submitted a total of 42 injury reports. The mean age of injured persons was 37 years, 48% were female, and 57% had previous rafting experience. Over

one-half (60%) of the injuries reported occurred on the New River. The overall injury incidence rate was 0.269 per 1,000 rafters for the year, which was slightly higher than the previous year (*IPTRD*=0.269), most likely because of over reporting of relatively minor injuries. The most frequently injured anatomical parts of the body were injuries that involved some part of the face, the arm/wrist/hand, shoulder, lower leg, and head. Common injuries included lacerations, contusions sprains/strains, fractures, and dislocations. On-site administration of first aid included application of bandages, ice, direct pressure splinting/ immobilization, elevation, and antiseptic.

For the first time in many years, most injuries occurred in the river. Injuries occurring in the water involved the lower extremities, including the leg/hip/foot and knee. Injuries occurring in the raft more commonly were to the arm/wrist/hand. Females more frequently received knee, ankle, head/neck, and arm/wrist/hand injuries while males more frequently sustained injuries to the abdomen/chest/back, shoulder, and face. Sprains and strains were more often associated with the knee, dislocations involved the shoulder, contusions and bruises included the face, leg/foot/hip and knee, and lacerations to the head/neck and arm/wrist/hand.

Conclusions and Recommendations

Encourage guides to educate or make customers aware on what, where, and why injuries occur on raft trips to reduce injuries, or at least to improve the

customer's experience and may be a more effective approach to reducing injuries.

Many Injury Report forms had information "missing", or marked "other". No response was given by whom or if the injured were evaluated on 61% of injury reports. This suggests that guides or the outfitter representative accompanying the injured for medical treatment is not recording this information and some sort of over site should be put into practice to prevent this from occurring. This lack of information creates a void in the reporting system and should not be tolerated. As guide awareness about accidents, injuries, illnesses, and hazards improves, guides are more likely to report injuries.

Guides should be encouraged to do a better job of reporting injuries. Report only medically significant injuries or illnesses. Minor injuries such as abrasions or cuts that did not affect the raft experience should not be included. Also, report all injuries for customers and guides. This presents a more realistic view of injuries and how, when and where they occur. This information can help the WW industry in the event of a serious accident by showing diligence in collecting and analyzing injury data to successfully respond to potential lawsuits.

Accurate record keeping can allow the commercial whitewater rafting industry in West Virginia to better administer safety. Tracking accidents, injuries, and illnesses can help prevent them in the future by allowing WV DNR and outfitters to help them properly identify and focus on accidents, injuries and illnesses in a

particular area. By using this information outfitters may be better equipped to identify and handle problem areas. To accomplish this, accurate reporting and record keeping is essential. Currently this is not happening.

More effort is needed to verify injury rates and injury severity, and to document the magnitude of related medical costs. Collected data should reflect reported injuries. This information is accurate only to the extent that companies are conscientious about reporting injuries. Finally, all invested parties must decide if the reporting of injuries is important; the need for monitoring; how monitoring should be carried out and by whom; and how to enforce compliance and penalties for not reporting. Unless these questions are addressed the reporting of injuries should not be continued.

As mentioned in previous reports, the number of injuries being reported under current reporting requirements may be questionable. This combined with the annual numbers of commercial rafters reported to WV-DNR should be considered suspect, since there is no independent system to verify the participant numbers provided by outfitters. These factors can lead to inaccuracies in annual injury rates. Therefore, caution is advised when making annual comparisons of injury rates. Incomplete, illegible, missing, or "other" information on submitted injury report forms along with no over site (e.g. who's responsibility is it to follow-up with the patient?) also creates suspect and questionable information. It is also

suspected that the injury data is of questionable reliability. Inconsistent interpretation of the phrase "reportable injuries," and the thoroughness of outfitters in reporting injuries may affect the accuracy of the data. Combined, these factors are cause for concern since they have the potential to affect the actual incidence rates or the true characteristics of rafting injuries. Because of these concerns, no generalizations can or should be made about the commercial whitewater in West Virginia.

References

West Virginia Department of Natural Resources. (2010). *West Virginia Department of Natural Resources 2010 Commercial river usage report*. Unpublished report.

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