Injuries in West Virginia Commercial Whitewater Rafting

2008 Annual Report

Introduction

This report is an overview and analysis of the injuries reported to the West Virginia Whitewater Commission by the commercial rafting industry for the year (2008. 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.

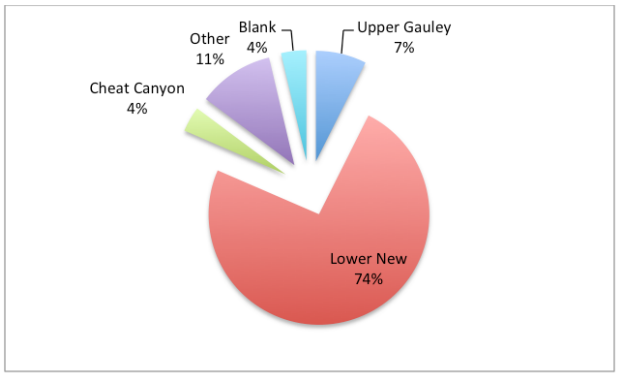
Demographics

A total of 27 persons were injured while participating in a commercial raft trip rafting during 2008. Ages of the injured ranged from 14 to 70 years, with a mean of 38 years. Age was not recorded for fourteen of the injured (51%). The majority (57%) was between the ages of 14 to 38 years or over age forty (43%). Twenty eight percent of those injured were less than 20 years of age. Just over half (51%) of injured persons were female. Like previous years, the majority (60%) of those injured reported taking at least one commercial rafting trip prior to the trip on which they were injured.

River Where Injury Occurred

Approximately three-fourths (74%) of reported injuries occurred on the New River, followed by the Gauley with seven percent. The least number of injuries (4%) occurred in the Cheat River Canyon (Figure 1). Injury reports also indicated that 11% of those injured received their injuries on "other" rivers, while 4% of reports did not indicate on what river the injury occurred.

Figure 1. Reported Injury Rates by River



The Upper Gauley River, which accounted for 17% of commercial river use, recorded two injuries (7%), whereas the Lower New River received sixty-one percent of use and accounted for seventy-four percent of the reported injuries. No data were available for the Cheat Canyon. Three injury reports (11%) were submitted for "other" rivers (Table 1). Reporting "other" rivers suggests that some guides reporting injuries do not understand the reporting requirement outlined in West Virginia Legislative Rule §58-12-11.

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 2008 was 155,843 (West Virginia Department of Natural Resources, 2008). IPTRD rates FY 2008 ranged from 0.074 on the Upper Gauley to 0.211 on the Lower New River. The overall IPTRD for all rivers was 0.166.

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

River	Number Injured	Percent	*IPTRD*
Upper Gauley	2	7	0.074
Lower New	20	74	0.211
Cheat Canyon	1	4	0.000
Other	3	11	0.000
Total	26	100	0.166

Injuries

Types of injuries reported in 2008 include contusions, which for the first time (22%) made up almost one-fourth of reported injuries, followed by lacerations and punctures (17%), sprains/strains (9%), fractures (9%), and dislocations (9%). The remaining injuries included other unspecified injuries (9%), or were not specified (missing) at all (12%) (Figure 2). Anatomically the most frequently injured parts of the body were the ankle (12%), lower leg (7%), shoulder (7%), face (7%) and arm (4%). Injuries to all other anatomical locations accounted for 2% or fewer injuries. The anatomical location of the injury was not specified on 26% of reports (Table. 2).

Figure 2. Type of Injury by Percent

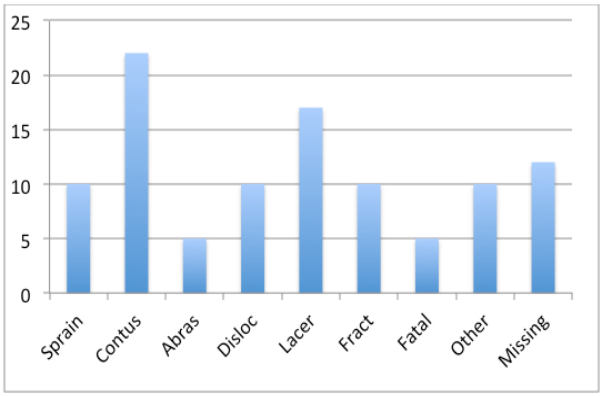


Table 2. *Percent Injury by Anatomical Location*

Anatomical Location	%
Upper Leg	4.8
Lower Leg	7.3
Knee	4.8
Ankle	12.2
Foot	2.4
Shoulder	7.3
Arm	4.8
Head	2.4
Face	7.3
Eye	4.8
Nose	4.8
Mouth	2.4
Teeth	4.8
Other	2.4
Missing	26.8

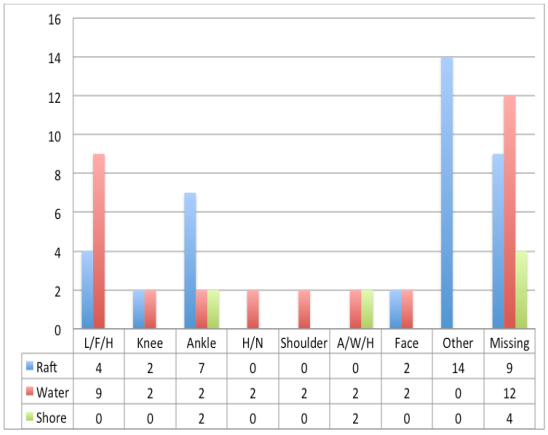
Injury Setting

The majority (42%) of injuries occurred in in the raft usually a result of passengers colliding with one another in the raft, being struck by a paddle or other piece equipment, or entanglement of arms and legs in parts of the raft. Thirty eight percent of injuries occurred in the water after a passenger was ejected from the raft while running whitewater. Passengers ejected from a raft are subject to the forces of high volume; turbulent water in

which they may encounter hydraulics, foot entrapments, and impacts with rocks, floating debris, or other hazards. The remaining seventeen percent of injuries occurred while guests were on shore (7%), or were identified as other (7%) or went unreported (3%).

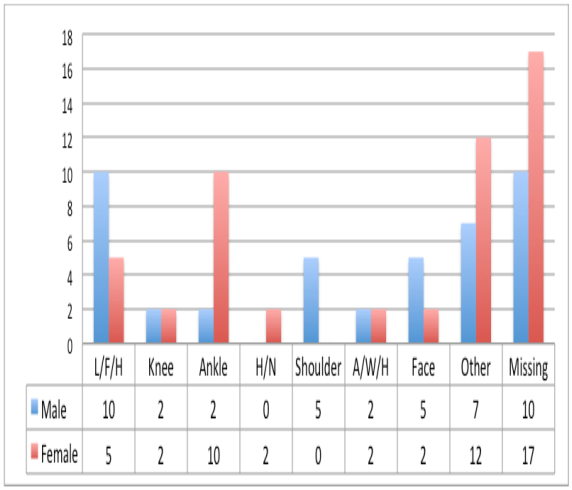
Anatomical location categories were collapsed to facilitate cross tabulation in order to identify injury associations. Injury associations were observed occurring in the raft more commonly were to the ankle, leg/foot/hip (L/F/H), and knee. Injuries occurring in the water involved the leg/foot/hip arm/wrist/hand (A/W/H), and shoulder. A limited number of ankle injuries occurred while on shore (Figure 3).

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



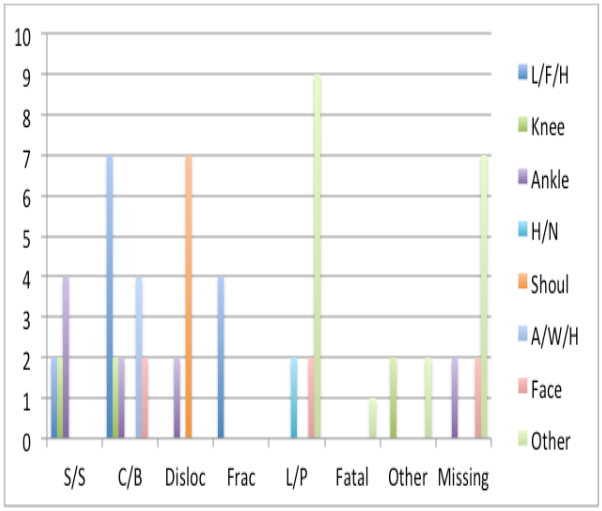
Injuries also appeared to vary by sex, with females more frequently sustaining ankle injuries, injuries to the eye and other injuries. Males sustained injuries to the shoulder, upper leg, and face (Figure 4).

Figure 4. Percent of Injuries by Sex



An association was observed between types of injuries and anatomical location: sprains and strains (S/S) occurred more often to the ankle, dislocations involved the shoulder, fractures more often involved the leg/foot/hip (L/F/H), and contusions and bruises (C/B) involved the leg/foot/hip (L/F/H) (Figure 5).

Figure 5. Percent of Anatomical Location and Type of Injury



First Aid Rendered

First aid continues to be administered on-site for injuries. First aid included the use of bandages (31%), ice (31%), splinting or immobilization (19%), application of direct pressure (11%), elevation of the extremity (11%), and application of antiseptic (8%). CPR was performed on a single individual (4%).

Evacuations

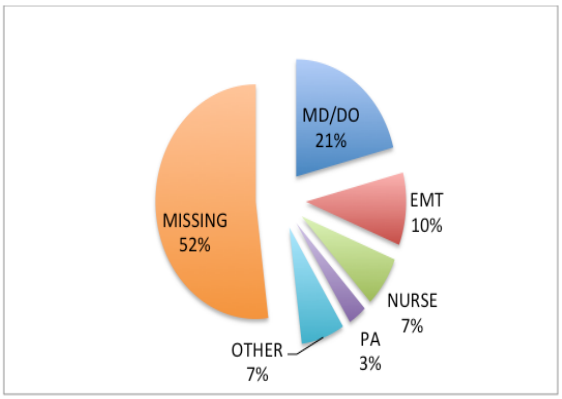
Forty two percent of the injured required evacuation to an outfitter base camp or medical facility, or were prevented from completing the raft trip. This finding was similar to the rate reported for 2007 (50% evacuation rate) and almost half (39%) the rate reported for 2006 (81%).

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 21% of the injury reports submitted during 2008 indicated that injured individuals were evaluated by a medical or osteopathic doctor (MD or DO), 7% by a registered nurse (RN), 10% by an EMT or paramedic, and 3% by a physicians assistant (Table 3). Seven 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 over one-half (52%) of injury reports, again suggesting that guides are not taking the time to thoroughly compile the Injury Report Form.

Figure 6. Professional Health Care Provider



Over one-third of injury reports (38%) indicated that injured individuals received some form of treatment including stitches (8%), medication (3%), surgery (3%), or other unspecified treatment (8%). Fifteen percent of reports indicated "diagnosis only."

Summary

During 2008 commercial outfitters submitted a total of 27 injury reports. The mean age of injured persons was 38 years, 51% were female, and 60% had previous rafting experience. Three-fourths of the injuries reported occurred on the New River. The overall injury incidence rate was 0.142 per 1,000 rafters for the year.

The most frequently injured parts of the body were the extremities (arm/wrist/hand, hip/leg/foot, knee, ankle) and parts of the face. Principal types of injuries included contusions,

lacerations and punctures, sprains/strains, fractures, and dislocations,

On-site administration of first aid included application of bandages, ice, direct pressure splinting/ immobilization, elevation, and antiseptic.

Most injuries (42%) occurred in the raft as a result of collisions among passengers, being struck by a paddle or other equipment, or entanglement of extremities in parts of the raft. Injuries occurring in the raft more commonly were to the knee, leg/foot/hip, and to the face. Injuries occurring in the water involved the upper extremities, including the shoulder.

Female rafters more frequently sustained knee, hand or shoulder injuries, while males more frequently sustained injuries to the knee, shoulder, face and mouth. Sprains and strains occurred more often to the knee, dislocations involved the shoulder, and fractures more often involved the arm/wrist/hand.

Conclusions and Recommendations

The majority of injuries continue to occur in the raft. Preventive measures such as attaching face protection to helmets, wearing mouth guards to protect teeth, or carrying fewer passengers per raft should be considered. These remedies might not be cost effective or without undesirable consequences. Instead, encouraging 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". 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.

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. Accurate record keeping can allow the commercial whitewater rafting industry in West Virginia to better administer safety. 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 oversight (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. (2008*). West Virginia Department of Natural Resources 2008 Commercial river usage report.* Unpublished report.

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