Injuries in West Virginia Commercial Whitewater Rafting

2004 Annual Report

Introduction

This report is an analysis of the injuries reported to the West Virginia Whitewater Commission by the commercial rafting industry for year (FY) 2004. 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

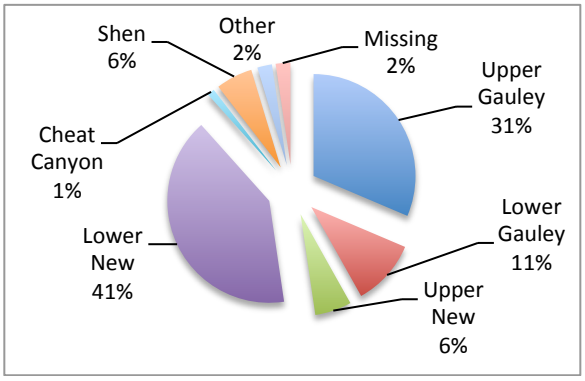
A total of 86 persons were injured while commercial rafting for year (FY) 2004. The age of persons for whom injury reports were submitted in 2004 ranged from 14 to 61 years, with a mean of 33 years. The majority (43%) was between the ages of 20 to 39 years or was over age forty (30%). Sixteen percent of injured individuals were less than 20 years of age. Almost half (43%) of injured persons were male. Well over half (64%) of those injured had taken at least one commercial rafting trip prior to the trip on which they were injured.

River Where Injury Occurred

Almost half (47%) of reported injuries occurred on the New River, followed by the Gauley with forty two percent. Thirty-one injuries (41%) were reported on the Lower New River followed by the Upper Gauley with 23 (31%). The Lower Gauley accounted for 8 (11%) injured guests. The least number of injuries (1) occurred in the Cheat River Canyon (Figure 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.

Figure 1. Reported Injury Rates by River



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.). A *rafter day* is defined as a paying guest on a whitewater zone for any part of a day. The total number of rafting participants FY 2004 = 214,550 (WVDNR, 2011). *IPTRD* rates FY 2004 ranged from 0.120 on Cheat Canyon to .945 on the Upper Gauley. The overall *IPRPD* for all rivers was 0.195.

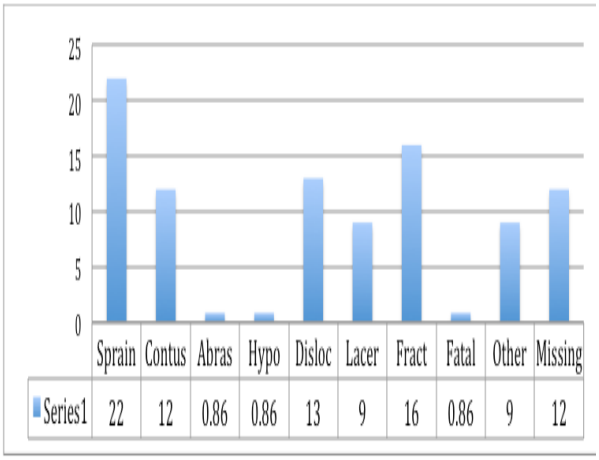
Table 1. *Reported Injuries and Injury Incidence Rates by River*

River	Number Injured	Percent	*IPTRD*
Upper Gauley	27	31	0.945
Lower Gauley	9	10	0.486
Upper New	5	6	0.199
Lower New	35	41	0.303
Cheat Canyon	1	1	0.120
Shenandoah	5	5	0.231
Missing	2	2	
Total	42	100	0.195

Injuries

Types of injuries reported in 2004 included sprains/strains (22%), fractures (16%), dislocations (14%), and contusions (12.9%). Hypothermia (.86%) and abrasions (.86%) accounted for less than two percent of injuries. The remaining injuries included other unspecified injuries (9%), or were not specified (missing) (13%) (Table 1). These proportions are similar to the previous types of injury reported in previous years. A single fatality was reported FY 2004.

Figure 2. Type of Injury by Percent



The most frequently injured anatomical region of the body was to the upper extremities, including injuries to the hand (11%), arm (2%), and wrist (2%). Nineteen percent of injuries involved some part of the face, including the eye (3%), nose (4%), mouth (6%), and teeth (6%). Knee injuries (19%) were noticeable, as were injuries to the shoulder (10%), lower leg (6%), ankle (5%), foot (5%) and head (4%). Injuries to all other body parts accounted for 3% or fewer injuries. The anatomical region of the injury was not specified on 4% of reports (Table 2).

Table 2. *Injuries by Anatomical Region*

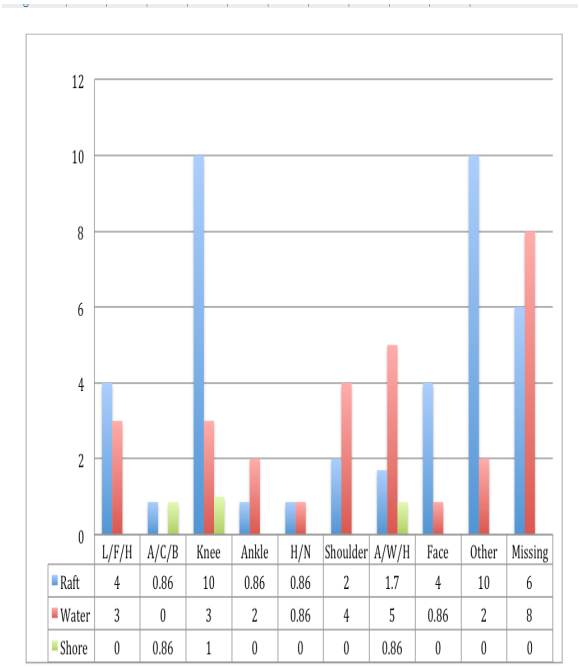
Anatomical Location	%
Upper Leg	2.0
Lower Leg	6.0
Knee	19.0
Ankle	5.0
Foot	5.0
Hip	1.0
Abdomen	1.0
Chest	2.0
Back	1.0
Neck	1.0
Shoulder	10.0
Arm	2.0
Wrist	2.0
Hand	11.0
Head	2.0
Face	6.0
Eye	3.0
Nose	4.0
Mouth	6.0
Teeth	6.0
Other	1.0
Missing	4.0

Injury Setting

Almost half the injuries sustained by commercial rafters occurred in the raft (42%). 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 extremities in parts of the raft. Injuries sustained in the raft were followed by those occurring in the

river (31%). Passengers ejected from a raft are subject to the forces of high volume, turbulent water in which they may encounter foot entrapments, impacts with rocks, strainers, floating debris, or other hazards. The remaining injuries occurred while on shore (3.5%), or were identified as other (6.9%) unknown (2.5%) or went unreported (13%) (Figure 3).

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

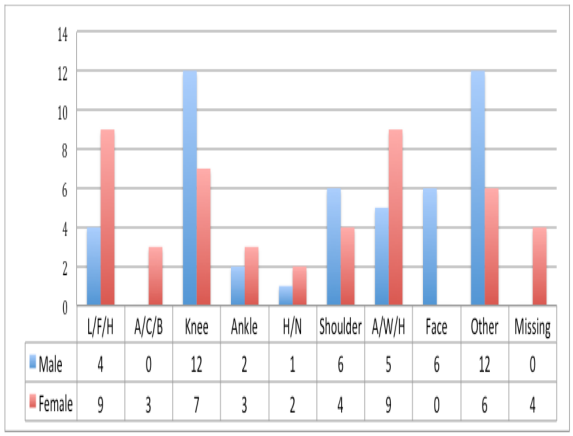


	L/F/H	A/C/B	Knee	Ankle	H/N	Shoulder	A/W/H	Face	Other	Missing
Raft	4	0.86	10	0.86	0.86	2	1.7	4	10	6
Water	3	0	3	2	0.86	4	5	0.86	2	8
Shore	0	0.86	1	0	0	0	0.86	0	0	0

The anatomical region categories were collapsed to facilitate cross tabulation to identify injury associations. Injury associations were observed occurring in the raft were to the knee, leg/foot/hip (L/F/H), and face, while injuries in the water included the arm/wrist/hand (A/W/H), and shoulder. A limited number of injuries occurred while on shore.
(Figure 3).

Injuries also appeared to vary by sex, with females more frequently sustaining knee hand and shoulder injuries, while males received injuries to the knee, shoulder, face, and mouth (Figure 4).

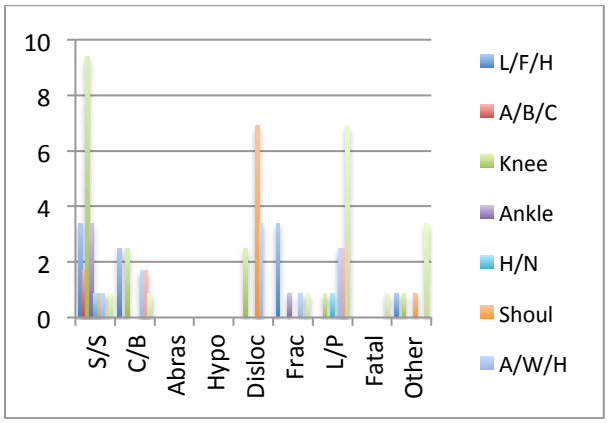
Figure 4. Percent of Injuries by Sex



	L/F/H	A/C/B	Knee	Ankle	H/N	Shoulder	A/W/H	Face	Other	Missing
Male	4	0	12	2	1	6	5	6	12	0
Female	9	3	7	3	2	4	9	0	6	4

An association was observed between types of injuries and anatomical region: sprains and strains (S/S) occurred more often to the knee, dislocations involved the shoulder, and fractures more often involved the arm/wrist/hand (A/W/H).

Figure 5. Percent of Anatomical Region and Type of Injury



First Aid Rendered

First aid was administered on-site for injuries and included the use of bandages (37%), ice (20%), application of direct pressure (12%), splinting or immobilization (11%), elevation of the extremity (11%), and antiseptic (8%).

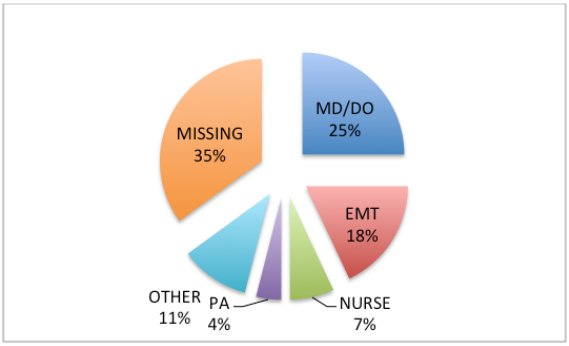
Evacuations

Forty two percent of the injured required evacuation to an outfitter base camp or medical facility, or otherwise prevented the injured person from completing the raft trip. This finding was similar to the rate reported FY 2002 and was 10% lower than the 52% reported in 2001.

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. Thirty five percent of the injury reports submitted during 2004 indicated that the injured were evaluated by a medical or osteopathic doctor (MD or DO), 18% by an EMT or paramedic, 7% by a registered nurse (RN), and 4% by a physicians assistant (Table 3). Eleven percent of reports noted 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. Thirty-five percent of injury reports had information missing regarding health care professional. .

Figure 6. Professional Health Care Provider



Over half of injury reports (52%) noted that the injured received some form of treatment including a splint or cast (42%), stitches (18%), medication (11%), surgery (2%), or other unspecified treatment (33%). Twenty two percent of reports indicated "diagnosis only."

Summary

During 2004 commercial rafting outfitters on guests of who sustained injuries submitted a total of 86 injury reports. The average age of injured persons was 33 years, 43% were female, and 68% had previous rafting experience. Almost half (47%) of the injuries reported occurred on the New River. The overall injury incidence rate was 0.195 per 1,000 rafters for the year, which was one-half the rate reported FY 2001 and 2002 (IPTRD=0.396).

The most frequently injured parts of the body were the extremities (arm/wrist/hand, hip/leg/foot, knee, ankle) and parts of the face. Primary injuries included sprains/strains, followed by fractures, dislocations, contusions/bruises, and lacerations and punctures. On-site administration of first aid included application of bandages, ice, direct pressure

splinting/ immobilization, elevation, and antiseptic.

Conclusions and Recommendations

Most injuries (42%) occurred in the raft while negotiating whitewater and involved the knee as a result from contact among passengers or paddling equipment. Female rafters more frequently sustained leg/foot/hip, arm/wrist/hand and knee, injuries, while males experienced more 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. 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.

The majority of injuries continue to occur in the raft. Injuries in the raft may be prevented by introducing preventive measures such as attaching face protection to helmets, wearing mouth guards to protect teeth, or carrying fewer passengers per raft. While these remedies may take a common sense approach to injury prevention, they might not be very cost effective or without undesirable consequences. Instead, guides should be encouraged to educate or make customers aware on what, where, and why injuries occur on raft trips. This method should be considered, as it may be a more effective way to reduce injuries or at least a way to improve the customer's rafting experience.

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. Guides should be encouraged to do a better job of reporting injuries. As guide awareness about accidents, injuries, illnesses, and hazards improves, guides are more likely to report injuries. Accurate record keeping can also help the commercial whitewater rafting industry in West Virginia to better administer safety.

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 both 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 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 related medical costs. Information collected through injury reporting should reflect reported injuries. This information is accurate only to the extent that outfitters are conscientious about reporting injuries. Finally, all invested parties must decide if reporting injuries is important; the need for monitoring; how monitoring should be conducted 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 injuries in commercial whitewater in West Virginia.

References

West Virginia Department of Natural Resources. (2004*). West Virginia Department of Natural Resources 2004 Commercial river usage report.* Unpublished report.

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