

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) 2007. 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

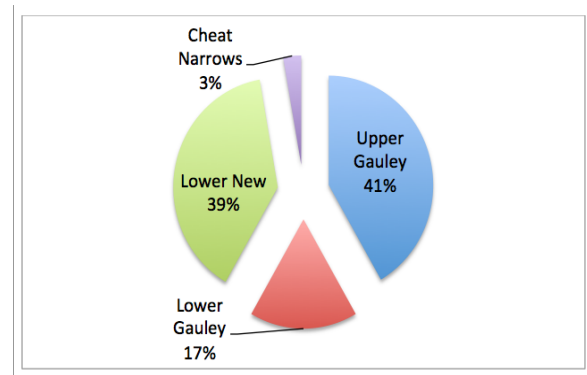
A total of 36 individuals were injured while on a commercial raft trip during 2007. This number is almost two times greater than the previous year when 19 injury reports were submitted. The age of injured persons continues to remain consistent with previous years. Persons for whom injury reports were submitted in 2007 ranged from 12 to 64 years, with an average of 39.5 years. Almost one third (30%) of the injured were between the ages of 37 to 48 years or were over age forty (47%). One-fourth were less than 30 years of age. Over half (53%) of injured persons were male. Over three-fourths (81%) of those injured had previous rafting experience, meaning they had taken at least one commercial rafting trip prior to the trip on which they were injured.

River Where Injury Occurred

Like 2006, the majority (58%) of reported injuries occurred on the Gauley River, followed by the New with

thirty nine percent. Fifteen injuries (42%) were reported on the Upper Gauley followed by the Lower New River with 14 (39%). The Lower Gauley accounted for 6 (17%) injured guests. The least number of injuries (1) occurred on the Cheat Narrows (Figure 1).

Figure 1. Reported Injury Rates by River



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.

The total number of rafting participants FY 2007 was 171,931, however no complete data for designated whitewater sections were available for analysis. Therefore, *Injuries Per 1000 Rafter Days (IPTRD)* rates FY 2007 were not calculated.

Injury rates are presented in Table 1 by *IPTRD*. Dividing the number of reported injuries by the total number of rafting participants and multiplying by 1000 calculate this rate.

The overall IPTRD for all designated whitewater sections was 0.209.

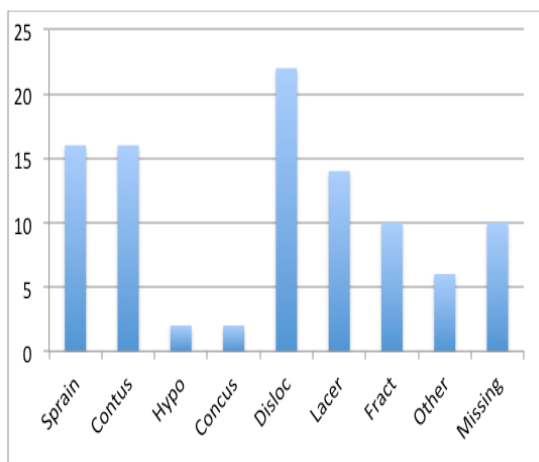
Table 1. *Reported Injuries and Injury Incidence Rates by River*

River	Number Injured	Percent	IPTRD
Upper Gauley	15	41	N/A
Lower Gauley	6	17	N/A
Lower New	14	39	N/A
Cheat Narrows	1	3	N/A
Total	36	100	0.209

Injuries

Types of injuries reported in 2007 included dislocations (22%) sprains/strains (16%), fractures (16.3%), contusions (16%), lacerations (14%), and fractures (10%). The remaining injuries included other unspecified injuries (6%), or were not specified (missing) at all (10%) (Figure 2). These types of injuries continue to remain consistent since injury reports were initiated in the 1990s.

Figure 2. Type of Injury by Percent



Anatomically, injuries were to the shoulder (12%), arm/wrist/hand (A/W/H) (12%), including injuries to the hand (6%), arm (4%), and wrist (2%) and twelve percent to the back. Knee (8%) and ankle injuries (6%) were noticeable, as were injuries to the face (4%), nose (4%), and mouth (2%). The anatomical location of the injury was not specified on 20% of reports (Table. 2).

Table 2. *Percent Injuries by Anatomical Location*

Anatomical Location	%
Upper Leg	2.0
Knee	8.1
Ankle	6.1
Hip	2.0
Abdomen	2.0
Chest	2.0
Back	12.2
Neck	4.0
Shoulder	12.2
Arm	4.0
Wrist	2.0
Hand	6.1
Head	6.1
Face	4.0
Nose	4.0
Mouth	2.0
Missing	20.4

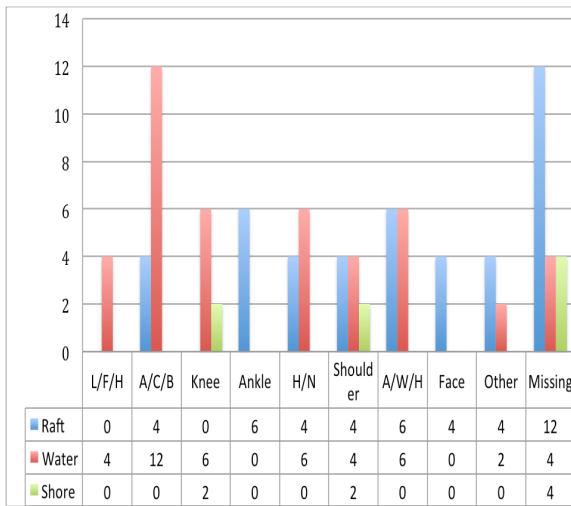
Injury Setting

Forty five percent of injuries to commercial rafters occurred in the raft and 45% in the water. This is a different scenario from the previous year when over one-half (54%) of injuries were received in the water.

Injuries in the raft usually occur when passengers collide with one another in the raft, are struck by a paddle or other piece equipment, or arms and legs are entangled in parts of the raft.

Injuries occur in the water when passengers ejected from the raft are subjected to the forces of high volume, turbulent water in which they may encounter hydraulics, undercut rocks, foot entrapments, impacts with rocks, floating debris, or other hazards. The remaining injuries occurred while guests were on shore (8%), or were identified as other or unknown (2%) (Figure 3).

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

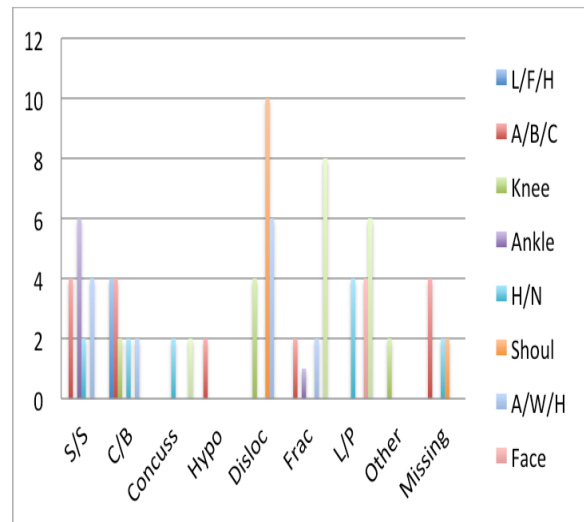


Cross tabulation was conducted to identify injury associations. This was calculated by collapsing the large number of anatomical locations into smaller categories to facilitate analysis. Injury associations were observed occurring in the raft more commonly were to the ankle and face. Injuries occurring in the water involved the legs/foot/hip (L/F/H) abdomen/chest/back, knee, and head/neck. A limited number of injuries occurred while on shore (Figure 3).

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 and lacerations and punctures involved the head, neck, and face (Figure 4).

Injuries also appeared to vary by sex, with females more frequently sustaining legs/foot/hip (L/F/H) abdomen/chest/back (A/C/B), ankle, and face injuries. Males sustained injuries to the head/neck (H/N) and arm/wrist/hand (A/W/H) (Figure 5).

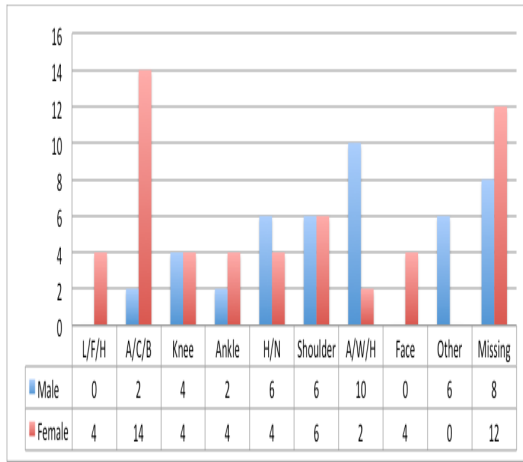
Figure 4. Percent of Anatomical Location and Type of Injury



First Aid Rendered

As in past years, first aid was administered on-site for injuries and included the use of bandages (38%), splinting or immobilization (38%), application of ice (44%), direct pressure (11%), elevation of the extremity (11%), application of antiseptic (11%), and eight percent treated for shock.

Figure 5. Percent of Injuries by Sex



Evacuations

Fifty percent of injured guests required evacuation to an outfitter base camp or medical facility, or otherwise prevented the injured person from completing the raft trip. This evacuation rate was thirty one percent lower than year 2006, and twenty-four percent less than the rate reported FY 2005.

Treatment by Health Care Provider

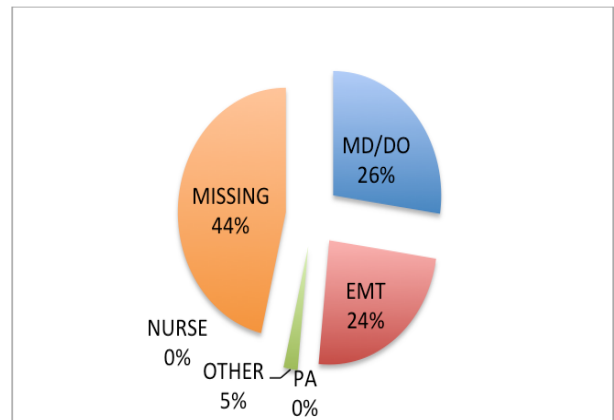
Legislative rule governing injury reporting (§47-27-11 [Accident Reports]) specifies that injuries that “require medical treatment by a licensed health care provider, excluding diagnostic analysis” must be reported to the West Virginia DNR.

Only 26% of the injury reports submitted during 2007 indicated that the injured were evaluated by a medical or osteopathic doctor (MD or DO) and 23% by an EMT or paramedic. None were evaluated by a registered nurse (RN) or a physician’s assistant (Figure 5). Five 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 17 (44%) of injury reports (Figure 6).

Over one-third (36%) of the injured received some form of treatment including stitches (15%), medication (7%), or other unspecified treatment (61%). Twenty three percent of reports indicated “diagnosis only.”

Figure 6. Professional Health Care Provider



Summary

During 2007, commercial rafting outfitters submitted a total of 36 injury reports. The average age of injured persons was 39.5 years, 53% were male, and 81% had previous rafting experience. Over half (58%) of the injuries reported occurred on the Gauley River. The overall injury incidence rate was 0.209 per 1,000 rafters for the year, which was higher than the previous year, most likely because of better reporting.

The most frequently injured parts of the body were the shoulder, back, arm/wrist/hand, and parts of the face. Predominant injuries included dislocations, sprains/strains, contusions and bruises, lacerations and punctures, and fractures. On-site administration of first aid included application of bandages, splinting/ immobilization, application of ice, direct pressure, elevation, and antiseptic. Injuries occurred both in the raft (45%) and in the water (45%) as a result of collisions among passengers, being struck by a paddle or other equipment, or entanglement of extremities in parts of the raft. Injury associations were observed occurring in the raft more commonly were to the ankle and face. Injuries occurring in the water involved the legs/foot/hip (L/F/H) abdomen/chest/back, knee, and head/neck. Female rafters more frequently sustained injuries to the back or shoulder, while males more frequently sustained injuries to the head/neck and arm/wrist/hand. Sprains and strains occurred more often to the ankle, dislocations involved the shoulder; lacerations/punctures involved the head, neck, and face.

Conclusions and Recommendations

More injuries were reported in 2007 compared to the number reported FY 2006 (n=19). This difference may be attributed to better reporting or more injured rafters. It is difficult to determine how many injuries go unreported because of the self-reporting process currently in place and the difficulties associated with

authenticating submitted injury reports. Collected information should reflect reported injuries, and are accurate only to the extent that outfitters are conscientious about reporting.

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 may be solutions to lessen potential injuries to rafters. While these remedies may take a common sense approach to injury prevention, they might not be cost effective or without undesirable consequences. Guides should be encouraged to educate or make aware customers 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. Additional injury reporting categories should be included in a newly designed Injury Report Form to capture "other" injuries. This would provide for a more comprehensive overview injuries. As guide awareness about accidents, injuries, illnesses, and hazards improves, guides are more likely to report injuries. Accurate record keeping can allow the commercial whitewater rafting industry in West Virginia to better administer safety.

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. 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 injuries associated with commercial whitewater rafting in West Virginia.

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