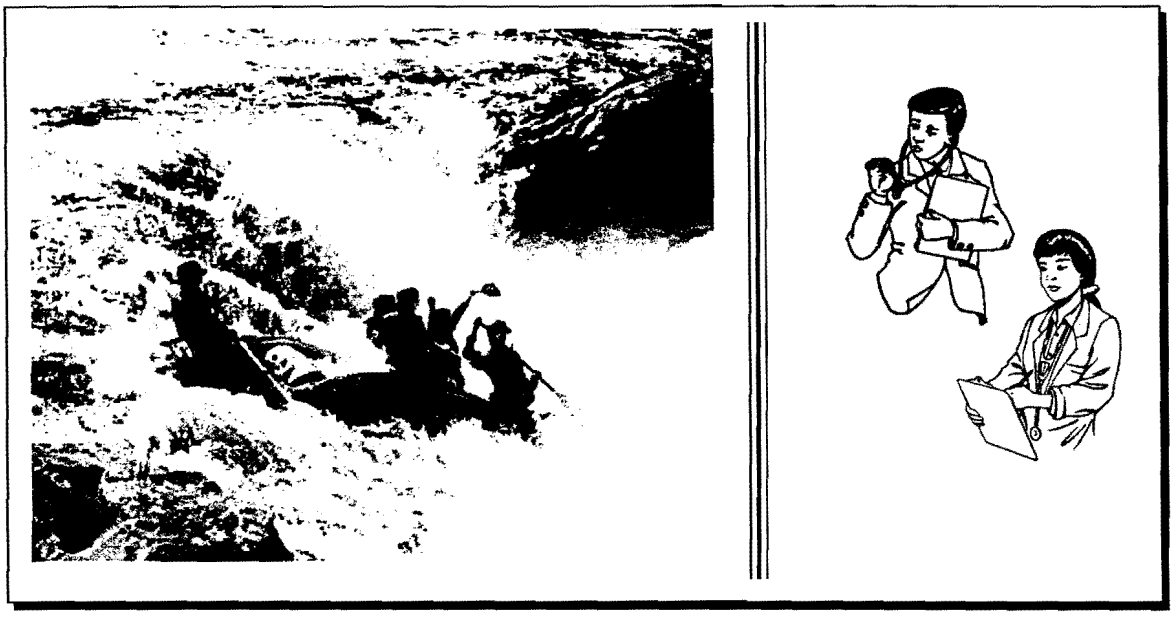
Injuries in Commercial Whitewater Rafting

1999 Annual Report

A Summary of Injuries Reported by
Licensed Commercial Whitewater Outfitters
on West Virginia Rivers



Prepared for:

The West Virginia Division of Natural Resources on behalf of the Whitewater Commission

By:

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Introduction

Since 1994, commercial rafting outfitters in West Virginia have been required to report injuries sustained by their guests that "occur during the performance of a licensee's [outfitter's] services while underway [on the river]" that "require medical treatment by a licensed health care provider, excluding diagnostic analysis" (West Virginia Legislative Rule §47-27-11 [*Accident Reports*]). This generally has been interpreted by the West Virginia Division of Natural Resources (DNR) to mean that injuries requiring a treatment procedure (e. g., setting a fracture, sutures, etc.) performed by a medical doctor, osteopath, registered nurse, or physician's assistant must be reported. In this report, an overview and analysis is presented of injuries reported by the commercial rafting industry during the 1999 season under the requirement set forth in §47-27-11. No judgment was made in this analysis as to whether reported injuries conform to reporting requirement, thus, all injury reports submitted by licensed outfitters are included. However, evidence will be presented suggesting that many injuries that were reported fail to meet the reporting requirement.

Table 1. Reported Injuries in 1999 by Licensed Outfitters

Outfitter	Frequency	Percent of Injuries	Percent of River Use
ACE Whitewater (ACE)	6	10%	11%
Rivers/River II (RIV)	1	2%	10%
Extreme Expeditions (EEI)	5	8%	5%
Alpine Bible Camp (ABC)	0	0%	1%
Blackwater Outdoor Center (BOC)	0	0%	<1%
Blueridge Outfitters (BRO)	0	0%	1%
Cantrell Canoes (CCR)	0	0%	1%
Cheat River Outfitters (CRO)	2	3%	<1%
Class VI (CVI)	10	17%	11%
Drift-a-Bit (DAB)	3	5%	3%
Historical River Tours (HRT)	0	0%	<1%
Laurel Highlands (LHR)	0	0%	1%
Mountain River Tours (MRT)	13	22%	8%
Mountain Streams and Trails (MST)	0	0%	<1%
New River Scenic NRSW)	3	5%	3%
New and Gauley River Tours (NGRA)	1	2%	3%
North American (NARR)	0	0%	8%
Passages to Adventures (PTA)	1	2%	1%
Precision Rafting (PRE)	0	0%	<1%
River Riders (RRI)	1	2%	1%
River & Trails (RTO)	0	0%	1%
Songer Whitewater (SW)	7	12%	5%
The Rivermen (TR)	3	5%	8%
USA Raft (USA)	0	0%	5%
Appalachian Wildwater (AW)	1	2%	5%
Whitewater Adventurers (WWA)	0	0%	<1%
Calleva Outdoors (CAV)	0	0%	<1%
WV Whitewater (WVW)	1	2%	1%
Whitewater Information (WWI)	0	0%	2%
Wildwater Expeditions (WWE)	2	3%	2%

Injuries were unevenly distributed among outfitters (Table 1). Five outfitters accounted for 69% of reported injuries, while accounting for only 40% of commercial river use. Only one (ACE) reported injuries in proportion with their share of river use. The remaining 31% of injuries were unevenly distributed among the other 25 outfitters. This suggests that some outfitters are over-reporting for documentation, liability, or other undetermined reasons, while other outfitters may be under-reporting or not reporting at all. Determining how many injuries go unreported is made difficult by verification complexities and self-reporting methodologies used by most regulatory agencies (Whisman and Hollenhorst, 1999).

Incidence Rates

A total of 60 injuries sustained by rafting guests were reported in 1999. Fourteen reports describing injuries of river

Table 2. Reported Injuries and Injury Incidence Rates in 1999 by Designated Whitewater Zones.

River Segment	Frequency	Percent	Incidence per 1,000 User Days
Cheat Canyon	2	3%	0.625
Lower New	31	52%	0.233
Upper New	3	5%	0.132
Upper Gauley	15	25%	0.395
Lower Gauley	8	13%	0.379
Shenandoah	1	2%	0.112
Total	60	100%	0.263

guides were submitted but are excluded from this analysis. The frequency of injuries reported on each river segment roughly corresponded with commercial river use. Thirty-one injuries (52%) were reported on the Lower New River, which in 1999 accounted for 58% of reported commercial river use (Table 2). This was followed by the Upper Gauley River with 15 (25%) injuries and 17% of river use; Lower Gauley with 8 (8%) injuries and 9% or river use; Upper New with 3 (5%) injuries and 10% of river use, Cheat Canyon with 2 (3%) injuries and 1% of river use, and Shenandoah with 1 (2%) injuries and 4% of river use.

Injury incidence rates ranged from 0.112 per 1,000 user days on the Shenandoah to 0.625 per 1,000 on the Cheat Canyon. The overall incidence rate was 0.263 per 1,000 across all rivers (Table 2). These rates are lower than the somewhat elevated rate of 0.441 per 1,000 reported in 1998, but consistent with the overall rates derived for the previous years. For example, Whisman and Hollenhorst (1999) reported overall injury incidence rates 0.263 per 1,000 for the 1995-97 seasons. The accuracy of injury incidence rates in commercial rafting is questionable because of suspected over-reporting of minor injuries that may not meet the reporting criteria, and by verification complexities that preclude the determination of how many possibly reportable injuries that go unreported.

Injuries

The age of persons for whom injury reports were submitted in 1999 ranged from 7 to 53, with an average of 30 years. A majority were between the ages of 20 to 39 years (40%) or were over forty (17%). Fifteen percent of injured individuals were less than 20 years old, but the age or birth date of 17 (28%) of injured boaters was not reported. Forty percent of injured persons were female. Most individuals (55%) sustaining injuries during 1999 had previous rafting experience, meaning they had taken at least one commercial rafting trip prior to the trip on which they were injured. These individuals had taken an average of 3.1 previous rafting trips.

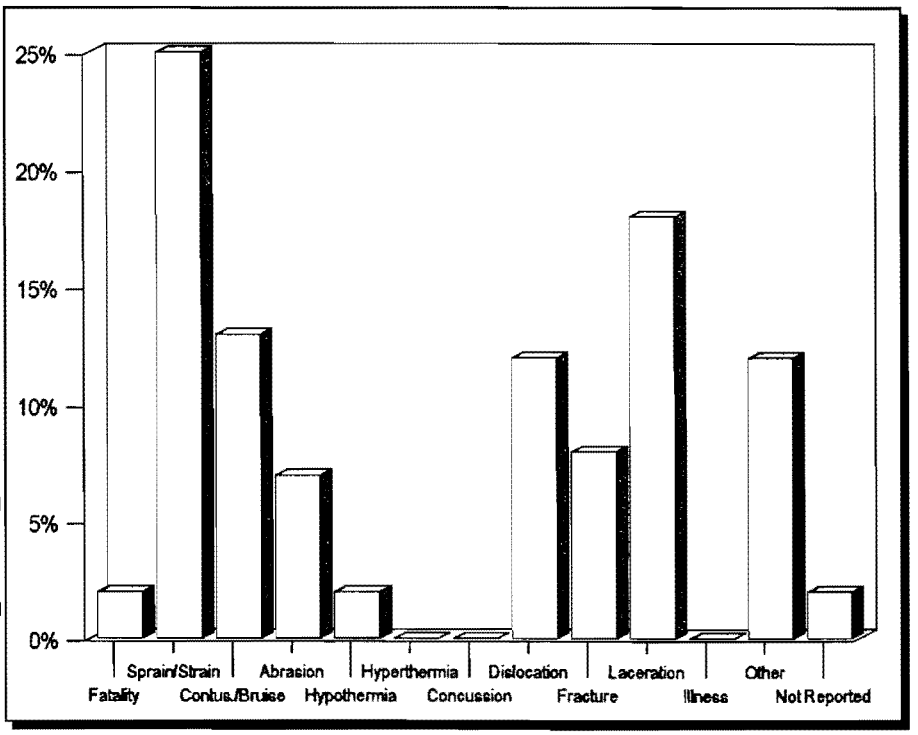


Figure 1. Percent of injuries by type of injury.

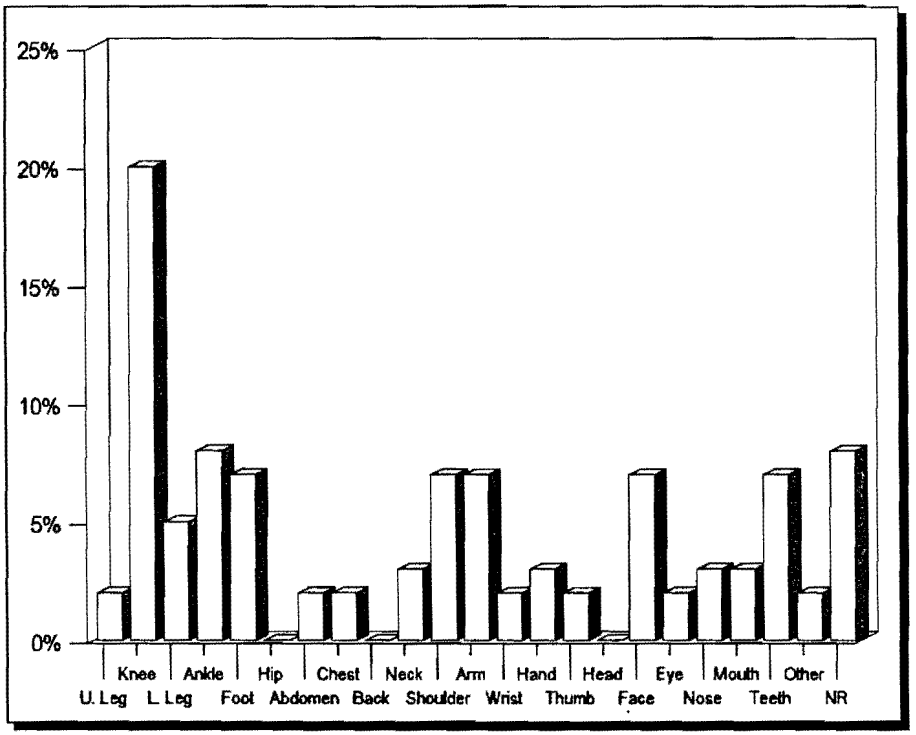


Figure 2. Percent of injuries by injured body part.

Types of injuries reported in 1999 included sprains/strains (25%), lacerations (18%), contusions/bruises (13%), dislocations (12%), fractures (8%), abrasions (7%), and hypothermia (2%). One fatality was reported. The remaining injuries included other unspecified injuries (12%), or were not specified at all (2%) (Figure 1). With exception to a decrease in reported lacerations, these proportions are similar to injury types reported in 1998 (Whisman 1999) and in 1995 through 1997 (Whisman and Hollenhorst 1999).

The most frequently injured parts of the body involved some part of the face (22%), including the unspecified facial parts (7%), teeth (7%), nose (3%), mouth (3%), or eye (2%). Knee injuries (20%) were prominent, as were injuries to the arm/wrist/hand (14%) and injuries to the hip/leg/foot (13%). Arm/wrist/hand injuries included the arm (7%), hand (3%), wrist (2%) and thumb (2%), while hip/leg/foot injuries included the foot (7%), lower leg (5%), and upper leg (2%). The remaining injuries consisted of injuries to the ankle (8%), shoulder (7%), neck (3%), and chest (2%), other unspecified body parts (2%), or was not specified (8%) (Figure. 2).

Forty-seven percent of injuries involved evacuation on the injured person either to an outfitter base camp or medical facility, or otherwise prevented the injured person from completing the raft trip. This was significantly higher than the 27% evacuation rate in 1998, but consistent to that in the three years from 1995 to 1997 when an evacuation rate of 40% occurred.

Most injuries sustained by commercial boaters occurred in the raft (43%). Injuries sustained on board the raft typically result from collisions between passengers in the raft, being struck by a paddle or other rafting equipment, or entanglement of extremities in parts of the raft. This was followed by injuries occurring in the water after falling from the raft while running rapids (33%). Passengers thrown from a raft are subject to the forces of high volume, turbulent water in which they may encounter boulder entrapments, floating debris, or other hazards. The remaining injuries occurred on shore (18%), at other unspecified (2%) or at unreported (3%) locations.

On-site administration of first aid for injuries included splinting/immobilization (18%), application of ice (17%), bandages (17%), elevation (16%), direct pressure (13%), antiseptic (8%), CPR (1%), treatment for shock (1%) and other unspecified first aid (5%). No first aid was administered for 2% of injuries.

As stated above, the 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. Of the injury reports submitted during 1999, 30 % indicated that injured individuals were evaluated by a medical or osteopathic doctor (MD or DO), 5% by an EMT or paramedic, and none by a registered

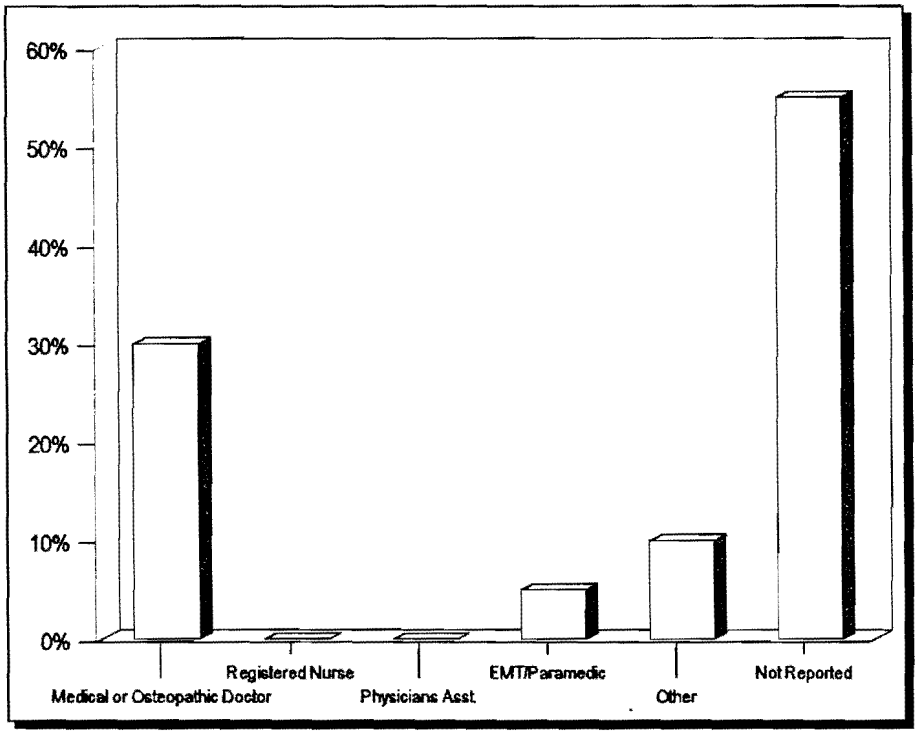


Figure 3. Percent of injuries by type of health care professional treated by.

nurse (RN) or physicians assistant (PA) (Figure 3). Ten percent of reports indicated that evaluation of injured individuals was performed by persons with some other training (e.g., First Responder) who most likely were trip leaders or guides. On thirty-three (55%) of injury reports, no response was given as to by whom or if the injured individuals were evaluated. Also, only 27% of reports indicated that injured individuals received treatment in the form of a splint or cast (12%), stitches (3%), medication (2%), surgery (2%), or other unspecified treatment (13%). Eight percent of reports indicated "diagnosis only," while on 60% of reports no response was given as to the type of treatment administered.

The large number of body part categories were collapsed to facilitate cross-tabulation for the purpose of identifying injury associations. Apparent associations were observed in injured body parts by location of occurrence (Figure 4). Injuries occurring in the raft more commonly were to the face and to a lesser extent the knee. Injuries occurring in the water or on shore involved the arm/wrist/hand, shoulder, knee and leg. In the years spanning 1995 through 1998, injured body parts appeared to vary by gender, with female boaters more frequently sustaining arm/wrist/hand and facial injuries, while males slightly more frequently sustained injuries to the knee and shoulder. While slight variations were observed in 1999, no statistically significant gender association was found in the body part injured. However, a gender association was observed

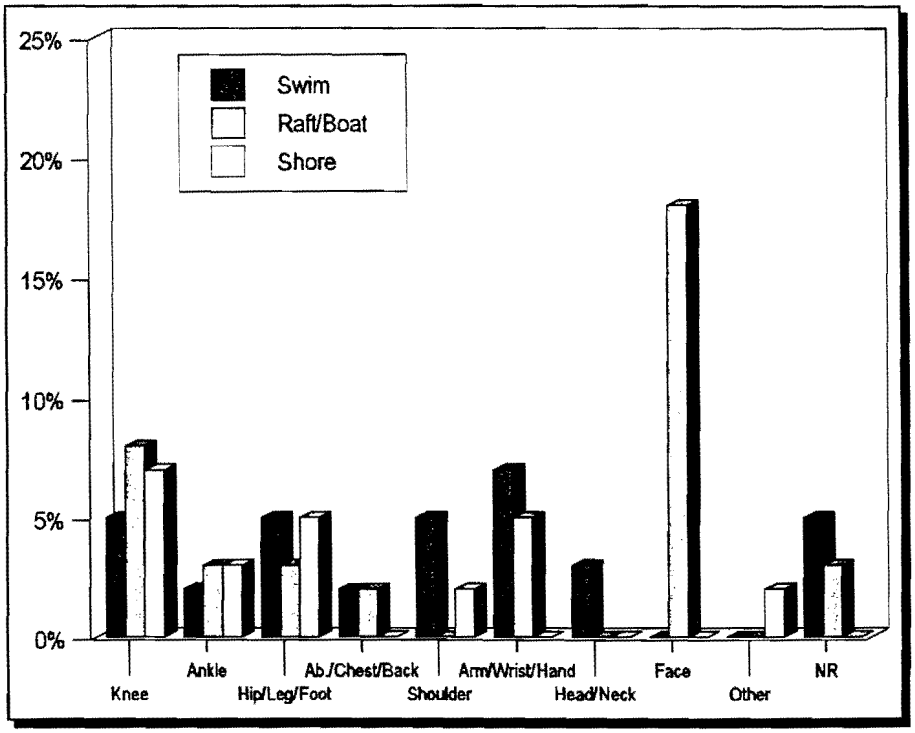
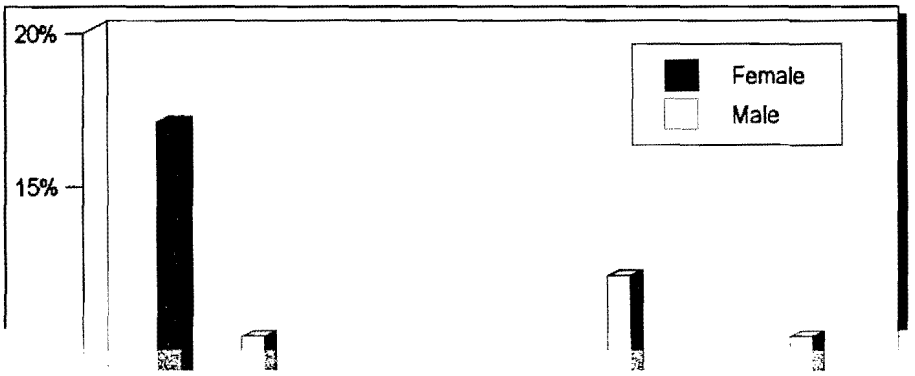


Figure 4. Percent of injuries by body part and location of occurrence.



in 1999 in reported injury type that was not seen in previous years. In 1999, female boaters were more likely to sustain a sprain or strain while males were more likely to sustain a contusion/bruise or fracture (Figure 5).