

Injuries in Commercial Whitewater Rafting

~ 2002 Annual Report ~

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



Photo courtesy of Carnifex Ferry Cottages

Prepared for:

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

By:

Steven A. Whisman, Ph.D.
West Virginia Prevention Resource Center
Marshall University Graduate College

June 2003

Introduction

In this report, an overview and analysis is presented of injuries reported by the commercial rafting industry during the 2002 season under the requirement set forth in West Virginia Legislative Rule §58-12-11. 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.

From 1994 through June 30, 2002, 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. On July 1, 2002 midway through the 2002 rafting season, new regulations became effective whereby a reportable injury was defined as follows:

If a customer reports an injury to a licensee or the licensee is aware of an injury or accident that requires medical services at an established medical facility and the injury or accident occurs during the performance of a licensee’s services from the put-in to the take-out, the licensee shall file an accident report with the director [of DNR] (West Virginia Legislative Rule §58-12-11 [Accident Reports]).

Injuries were unevenly distributed among outfitters (Table 1). Six outfitters accounted for 68% of reported injuries, while accounting for only 51% of commercial river use. The remaining 32% of injuries were unevenly distributed suggesting that some outfitters are over-reporting for documentation, liability, or other undetermined reasons, while other

Outfitter	Number of Injuries	Percent of Injuries	Percent of River Use
Ace Whitewater, New R. Rafting	14	15.9%	15.8%
Alpine Bible Camp	0	0.0%	1.3%
Appalachian Wildwaters	5	5.7%	4.6%
Blackwater Outdoor Center	0	0.0%	0.8%
Blue Ridge Outfitters	0	0.0%	0.8%
Boy Scouts of America	0	0.0%	0.8%
Calleva Outdoors	0	0.0%	0.0%
Cantrel Canoes and Rafts	0	0.0%	1.9%
Cheat River Outfitters	0	0.0%	0.2%
Class VI River Runners & Ltd	12	13.6%	11.0%
Drift-A-Bit Inc.	5	5.7%	1.9%
Extreme Expeditions	3	3.4%	3.9%
Garrett Community College	0	0.0%	0.0%
Gauley Whitewater LLC	0	0.0%	0.0%
Historical River Tours	0	0.0%	0.1%
Laurel Highlands River Tours	0	0.0%	0.3%
Mountain River Tours	0	0.0%	7.3%
Mountain Streams and Trails	0	0.0%	0.2%
New and Gauley River Adventures	3	3.4%	2.7%
New River Scenic Whitewater	2	2.3%	2.3%
North American River Runners,	11	12.5%	7.2%
Passages to Adventure	3	3.4%	1.0%
Precision Rafting	0	0.0%	0.0%
River and Trails Outfitters	1	1.1%	0.5%
River Riders Inc.	2	2.3%	1.2%
Rivers	3	3.4%	4.5%
Rivers II	2	2.3%	4.6%
Songer Whitewater	3	3.4%	7.0%
The Rivermen	13	14.8%	10.6%
USA Raft	3	3.4%	3.8%
West Virginia Whitewater	0	0.0%	0.0%
Whitewater Adv the Cheat Canyon	0	0.0%	0.2%
Whitewater Information	2	2.3%	1.2%
Wildwater Expeditions	1	1.1%	2.2%
WVa Rafting	0	0.0%	0.0%
Total	88	100.0%	100.0%

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). However, a fairly strong positive correlation ($r = 0.87$) was observed between injuries and river use, suggesting that to some extent outfitters reported injuries in proportion to the amount of total river use they accounted for.

Incidence Rates

A total of 88 injuries sustained by rafting guests were reported in 2002. The frequency of injuries reported on each river segment roughly corresponded with commercial river use. Thirty-seven injuries (42.05%) were reported on the Upper Gauley River, which in 2002 accounted for 16% of reported commercial river use (Table 2). This was followed by the Lower New River with 33 (27%) injuries but with 58% of river use; Lower Gauley with 9 (10%) injuries and 10% of river use; Upper New with 6 (7%) injuries and 11% of river use; and Shenandoah River with 3 (3.4%) injuries and 3% of river use. No injury reports were submitted from either section of the Cheat River.

River	Injuries	Percent	Incidence per 1,000 User Days
Cheat Canyon	0	0.0%	0.000
Cheat Narrows	0	0.0%	0.000
Lower New	33	37.5%	0.255
Upper New	6	6.8%	0.243
Upper Gauley	37	42.0%	1.020
Lower Gauley	9	10.2%	0.405
Shenandoah	3	3.4%	0.514
Tygart	0	0.0%	0.000
Total	88		0.396

The currently effective definition is believed to be less confusing and less restrictive. Consequently the rate at which outfitters submit injury reports was expected to increase. This was borne out in that prior to July 1 the overall injury rate was 0.243 per 1,000 user days. After July 1, the rate nearly doubled to 0.466 per 1,000 user days. Surprisingly, however, the overall number of injury reports submitted in 2002 seemed relatively unchanged from previous years—88 compared to an average of about 90 per season over the past decade.

Injury incidence rates in 2002 ranged from 0 per 1,000 user days on the Cheat to 1.020 per 1,000 on the Upper Gauley. Like the total number of injuries reported, the overall incidence rate was 0.396 per 1,000 across all

river segments (Table 2) was essentially unchanged from previous years. 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 injured persons was reported on 45.5% of injury reports submitted in 2002. Among these persons, age ranged from 12 to 70, with an average of 32.7 years. A majority was between the ages of 20 to 40 years (45%) or forty to 65 years (32.5%). Twenty percent of injured individuals were less than 20 years old, but the age or birth date of 48 (54.5%) injured boaters was not reported. Thirty-one percent of injured persons were female. Most individuals (78%) sustaining injuries during 2002 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 18 or more previous rafting trips, suggesting that a substantial proportion of the injury reports submitted in 2002 were for guides, not customers. Visual inspection of injury reports indicated that at least 8 (9%) were for guides not customers as specified in §58-12-11, and some occurred at locations other than *from the put-in to the*

take-out, further indicating the inability of outfitters to comply with statutory reporting requirements and the definition of reportable injuries.

Types of injuries reported in 2002 included sprains/strains (31%), lacerations (17%), contusions/bruises (13%), dislocations (11%), and fractures (11%) as shown in Figure 1. The remaining injuries included other unspecified injuries (11%), or were not reported at all (8%). With exception to a decrease in reported lacerations, made up for by an increase in sprains/strains, these proportions are roughly similar to injury types reported in previous years (Whisman 2002, Whisman 2000, Whisman 1999, Whisman and Hollenhorst 1999).

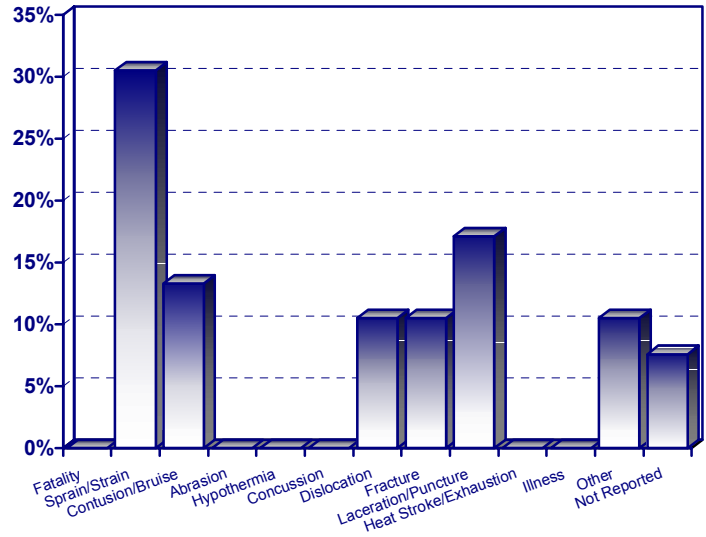


Figure 1. Percent of injuries by type of injury.

The most frequently injured parts of the body involved some part of the face (17%), including the nose (6%), teeth (5%), mouth (3%), eye (2%), or unspecified facial parts (1%). Knee injuries (15%) were prominent, as were injuries to the hip/leg/foot (15%) and injuries to the ankle (13%) and arm/wrist/hand (10%). Hip/leg/foot injuries included the and lower leg (13%) and foot (2%), while arm/wrist/hand injuries included the arm (6%), and hand (4%). The remaining injuries consisted of injuries to the shoulder (6%), head/neck (7%), abdomen/chest/back (7%), or other unspecified body parts (5%). The part of the body injured was not specified on 7% of reports (Figure 2).

Forty-two percent of injuries involved evacuation of 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 with that in since 1995 1999 when evacuation rates between 40% and 52% were reported. Whether the injured person was evacuated was not reported on 9% of forms.

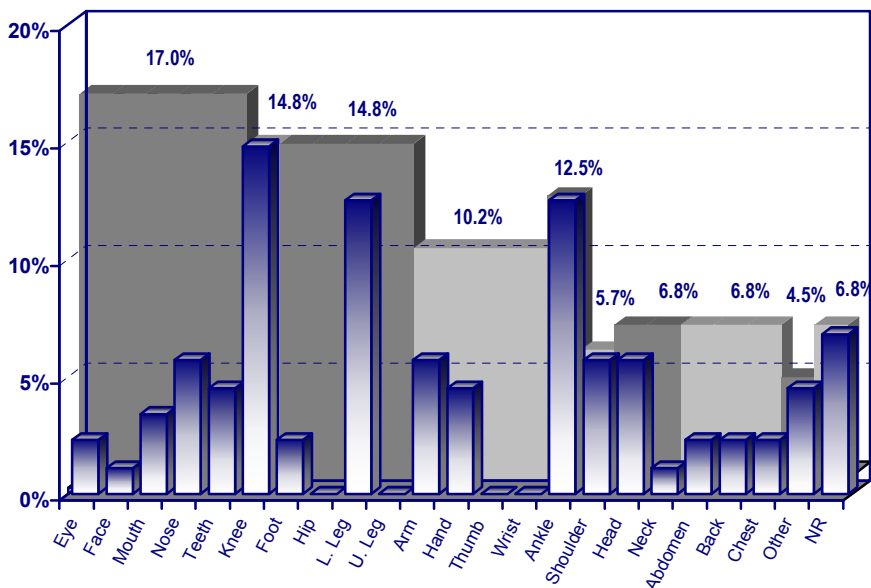


Figure 2. Percent of injuries by injured body part.

A large proportion of injuries sustained by commercial boaters occurred in the raft (42%). 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 (9%), at other unspecified locations (7%) or were unreported (9%).

On-site administration of first aid for injuries included application of ice (24.3%), bandages (19.1%), splinting or immobilization (13.2%), elevation of the injured body part (9.2%), direct pressure (8.6%), antiseptic (5.3%), treatment for shock (0.7%), or other unspecified first aid (6.6%). No first aid was administered for 7.9% of reported injuries. No first aid was reported on 5.3% of reports.

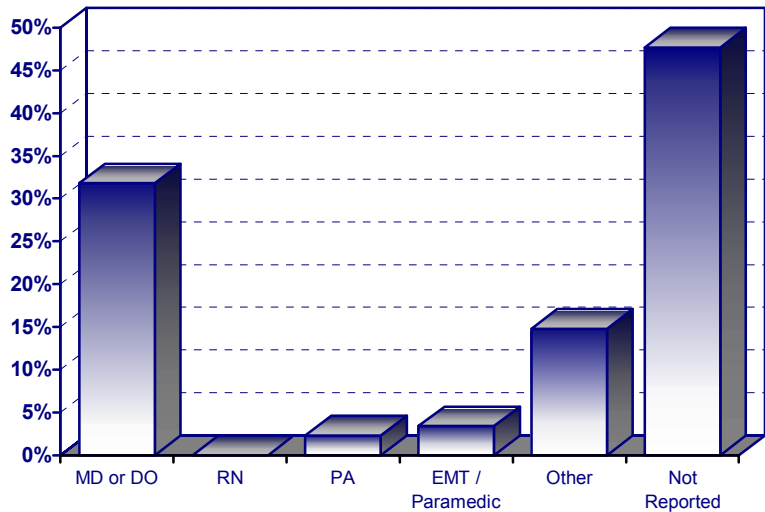


Figure 3. Percent of injuries by type of health care professional treated by.

As stated above, the previous and current legislative rules governing injury reporting specifies that injuries that “require medical treatment by a licensed health care provider, excluding diagnostic analysis” (§47-27-11) or “requires medical services at an established medical facility” (§58-12-11) must be reported to the DNR. Of the injury reports submitted during 2002, 32% indicated that injured individuals were evaluated by a medical or osteopathic doctor (MD or DO), 3% by an EMT or paramedic, 2% by physicians assistant (PA) and none by a registered nurse (RN) (Figure 3). Fifteen percent of reports indicated that evaluation of injured individuals was performed by persons with some other training (e.g., First Responder), most likely a trip leader or guide. On forty six (51%) of injury reports, no response was given as to by whom or if the injured individuals were evaluated. Also, only 35% of reports indicated that injured individuals received treatment in the form of a splint or cast (10%), stitches (9%), medication (3%), or other unspecified treatment (14%). Eleven percent of reports indicated “diagnosis only”, while no response was given as to the type of treatment administered on 51% of reports.

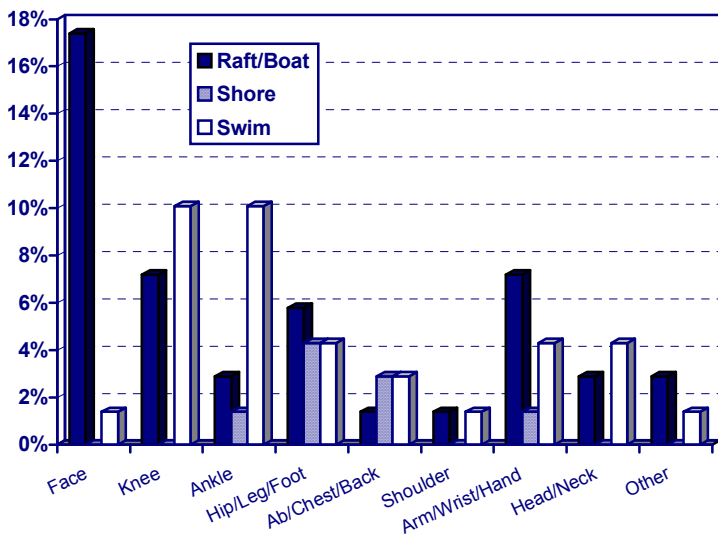


Figure 4. Percent of injuries by injured body part and location of occurrence.

The large number of body part categories was collapsed to facilitate cross-tabulation for the purpose of identifying injury associations. Injuries to the face, hip/leg/foot, and arm/wrist/hand appeared to occur more frequently in the raft (Figure 4). Knee, ankle, and head/neck injuries appeared to occur more frequently during a swim. However, no statistically significant associations were found between injured body parts and location of occurrence, most likely because of small cell sizes.

From 1995 through 1998, injured body part varied by gender. Female boaters more frequently sustained arm/wrist/hand and facial injuries while males slightly more frequently sustained injuries to the knee and shoulder. While variations were observed in 2002, no

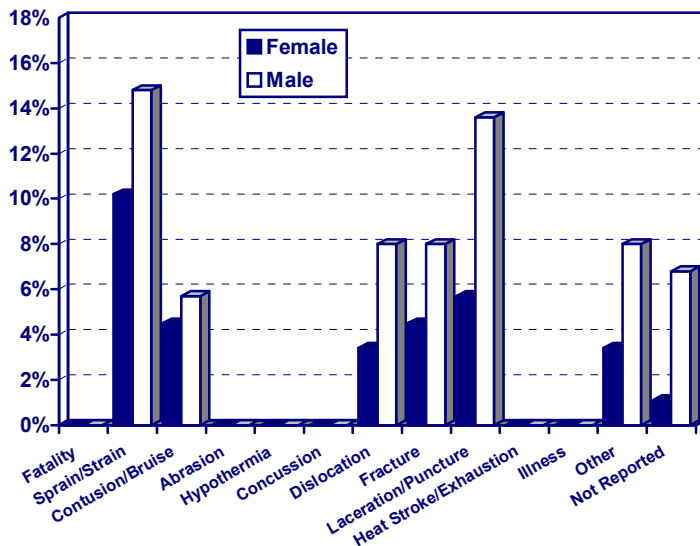


Figure 5. Percent of injury types by gender.

statistically significant gender association was found in the body part injured. A gender association appeared to exist in reported injury type. Male boaters appeared to be more likely to sustain all injury types represented in the 2002 reports (Figure 5). However, none of these associations were statistically significant.

Finally, a statistically significant association was observed between injury type and injured body part. Lacerations more commonly involved injuries to the face and hip/leg/foot, sprains/strains occurred more often to the knee and ankle, and fractures to the arm/wrist/hand. All dislocations involved the shoulder (Figure 6).

Summary

During the 2002 rafting season, a total of 88 injury reports were submitted on behalf of guests and guides of commercial rafting outfitters who sustained injuries. The average age of injured persons was 32.7 years, 31% were female, and 78% had previous rafting experience. Nine percent of reports were submitted for guides, not customers. The overall injury incidence rate was 0.396 per 1,000 user days, which was unchanged from the previous year.

Only six outfitters accounted for most of the injuries reported in the year, and only 38% of injury reports indicated that injured persons were evaluated by one of the four recognized categories of licensed health care providers. Furthermore, only 35% of reports indicated that injured individuals received treatment in the form of a splint or cast, stitches, medication, or surgery, and 11% percent of reports indicated “diagnosis only.”

The most frequently injured parts of the body were the parts of the face and the extremities (arm/wrist/hand, hip/leg/foot, knee, and ankle). Predominant injury types included lacerations and sprains/strains, followed by contusions/bruises, fractures, and dislocations. On-site administration of first aid included bandages, splinting/immobilization, elevation, direct pressure, and antiseptic. No first aid was administered for 4% of injuries.

Finally, most injuries 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 involved all major body part categories, but injuries to the face, hip/leg/foot, and arm/wrist/hand occurred more frequently in the raft. Knee, ankle, and head/neck injuries appeared to occur more frequently during a swim. No gender association was found in the body part injured or injury type. Lacerations more commonly involved injuries to the face and hip/leg/foot, sprains/strains occurred more often to the knee and ankle, and fractures to the arm/wrist/hand. Dislocations more often involved the shoulder

It was expected that the number of injuries reported would increase when the new reporting requirements became effective July 1 2002. However, the number of reports submitted decreased when those for guides are eliminated. As well, a few outfitters accounted for most of the reported injuries, reinforcing the suspicion that a small number of outfitters may be over-reporting while others

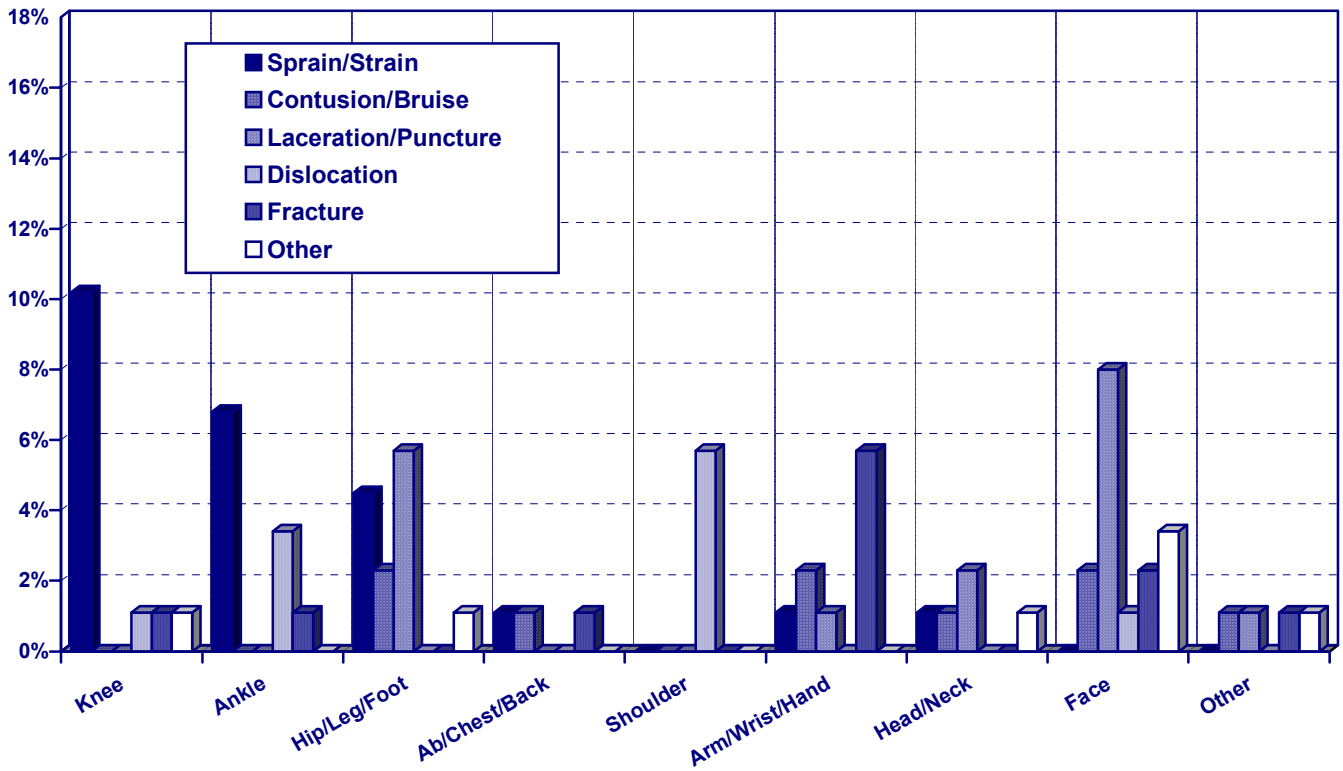


Figure 6. Percent of injured body parts by injury types.

are under-reporting or not reporting at all.

Similarly, verification limitations make it difficult to determine if or how many injuries go unreported. Combined, these factors are cause for concern in that they almost certainly affect the determination of actual incidence rates or the true characteristics of rafting injuries. More effort is needed to verify injury rates and severity. As in the previous Whitewater Commission meetings, it is recommended that the Commission emphasize the importance of and need for accurate injury reporting, and reiterate the definition of a reportable injury as specified in the current reporting requirements.

References

- Whisman, S. A. 2002. Injuries in Commercial Whitewater Rafting: 2001 Annual Report. Report to the West Virginia Whitewater Commission. Available at http://www.state.wv.us/dnr/law/white/rivermgt/Injury/2001_Inj_rpt.pdf
- Whisman, S. A. and S. J. Hollenhorst. 1999. Injuries in Commercial Whitewater Rafting. *Clinical Journal of Sports Medicine*. 9:18-23.
- Whisman, S. A. 1999. Injuries in Commercial Whitewater Rafting: 1998 Annual Report. Report to the West Virginia Whitewater Commission. Available at http://www.state.wv.us/dnr/law/white/rivermgt/Injury/98_inj_rpt.pdf.
- Whisman, S. A. 1999. Injuries in Commercial Whitewater Rafting: 1999 Annual Report. Report to the West Virginia Whitewater Commission. Available at http://www.state.wv.us/dnr/law/white/rivermgt/Injury/99_inj_rpt.pdf.

