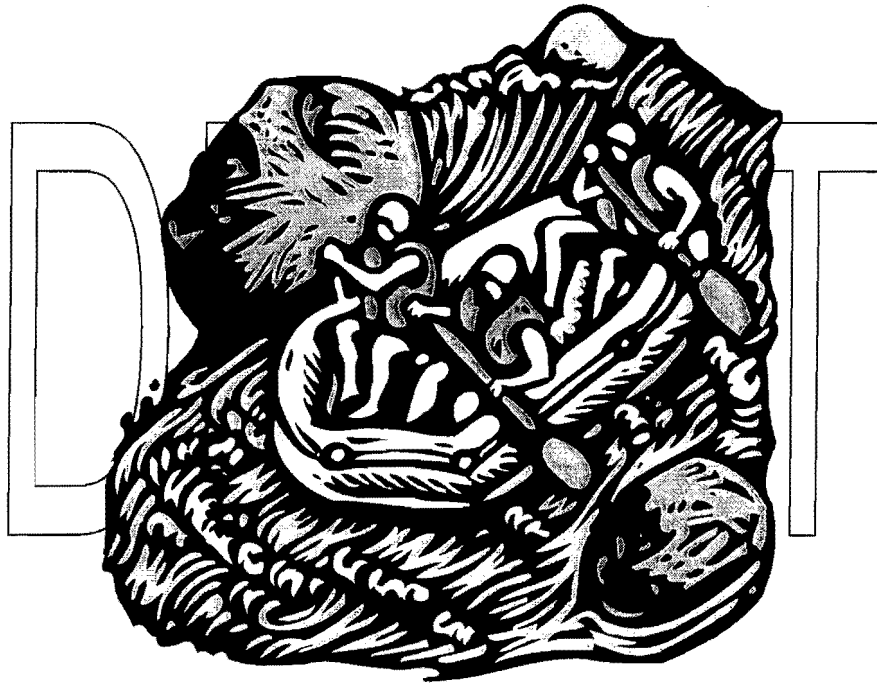


Injuries in Commercial Whitewater Rafting

□ **2003 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

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January 2006

Introduction

In this report, an overview and analysis is presented of injuries reported by the commercial rafting industry during the 2003 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 nearly 77% of reported injuries, while accounting for only about 45% of commercial river use. The remaining 23% 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	25	30.86%	14.79%
Alpine Bible Camp	0	0.00%	1.08%
Appalachian Wildwaters	7	8.64%	4.52%
Blackwater Outdoor Center	0	0.00%	0.66%
Blue Ridge Outfitters	5	6.17%	2.52%
Boy Scouts of America	1	1.23%	0.77%
Calleva Outdoors	0	0.00%	0.07%
Canrel Canoes and Rafts	1	1.23%	1.35%
Cheat River Outfitters	0	0.00%	1.01%
Class VI River Runners & Ltd	3	3.70%	10.86%
Drift-A-Bit Inc.	1	1.23%	1.37%
Extreme Expeditions	3	3.70%	3.37%
Garrett Community College	0	0.00%	0.08%
Gauley Whitewater LLC	0	0.00%	0.00%
Historical River Tours	0	0.00%	0.26%
Laurel Highlands River Tours	0	0.00%	0.40%
Mountain River Tours	0	0.00%	5.73%
Mountain Streams and Trails	0	0.00%	0.42%
New and Gauley River Adventures	0	0.00%	1.94%
New River Scenic Whitewater	0	0.00%	1.68%
North American River Runners	4	4.94%	6.94%
Passages to Adventure	0	0.00%	0.89%
Precision Rafting	0	0.00%	0.00%
River and Trails Outfitters	0	0.00%	3.99%
River Riders Inc.	7	8.64%	4.38%
Rivers/Rivers II	13	16.05%	8.42%
Songer Whitewater	1	1.23%	6.00%
The Rivermen	5	6.17%	9.78%
USA Raft	2	2.47%	3.37%
West Virginia Whitewater	0	0.00%	0.00%
Whitewater Adv. of the Cheat Canyon	0	0.00%	0.27%
Whitewater Information	1	1.23%	1.00%
Wildwater Expeditions	1	1.23%	2.06%
WVa Rafting	0	0.00%	0.00%
Not Reported	1	1.23%	Na
Total	81	100.0%	100.0%

outfitters may be under-reporting or not reporting at all. In total, 18 outfitters submitted no injury reports, and one report was submitted for which no outfitter was identified. 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 strong positive correlation ($r = 0.96$) 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 81 injuries sustained by rafting guests were reported in 2003. The frequency of injuries reported on each river segment roughly corresponded with commercial river use. Twenty-nine injuries (35.8%) were reported on the Lower New River, which in 2003 accounted for 48% of commercial river use (Table 2). This was followed by the Upper Gauley River with 24 (29.6%) injuries and 48% of river use; Lower Gauley with 13 (16.1%) injuries and 11% of river use; Shenandoah River with 12 (14.8%) injuries and 11% of river use; and Upper New with 2 (2.5%) injuries and 12.8% of river use. No injury reports were submitted from either of the Cheat or Tygart Rivers.

Table 2. Reported Injuries and Injury Incidence Rates in 2002 by Designated Whitewater Zones.

River	Injuries	Percent	Incidence per 1,000 User Days
Cheat Canyon	0	0.0%	0.000
Cheat Narrows	0	0.0%	0.000
Upper New	2	2.5%	0.070
Lower New	29	35.8%	0.270
Upper Gauley	24	29.6%	0.752
Lower Gauley	13	16.1%	0.540
Shenandoah	12	14.8%	0.478
Tygart	0	0.00%	na
Not reported	1	1.2%	na
Total	81	100%	0.362

Injury incidence rates in 2003 ranged from 0 per 1,000 user days on the Cheat and Tygart to 0.752 per 1,000 on the Upper Gauley. The overall incidence rate was 0.362 per 1,000 across all rivers (Table 2) was very similar to 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 82.7% of injury reports submitted in 2003, a vast improvement compared to previous years. Among these persons, ages ranged from 12 to 79, with an average of 33.1 years. A majority was between the ages of 20 to 40 years (49%) or forty to 65 years (17%). Forty-one percent of injured persons were female. Most individuals (68%) sustaining injuries during 2003 had previous rafting experience, meaning they had taken at least one commercial rafting trip prior to the trip on which they were injured. The number of times some injured individuals had taken rafting trips exceeded 100, suggesting that these reports represent injuries to guides, not customers. Of those with less than 100 trips, the average was 5 trips, and visual inspection of injury reports indicated that at least 5 (6%) of them were for guides not customers as specified in §58-12-11, suggesting that some outfitters need assistance complying with statutory reporting requirements with regard to definition of reportable injuries.

Types of injuries reported in 2003 included sprains/strains (25%), dislocations (15%), contusions/bruises (10%), lacerations (9%), and fractures (7%) as shown in Figure 1. The remaining injuries included other unspecified injuries (20%), or were not reported at all (8%). These proportions are roughly similar to injury types reported in previous years (Whisman 2002, Whisman 2000, Whisman 1999, Whisman and Hollenhorst 1999).

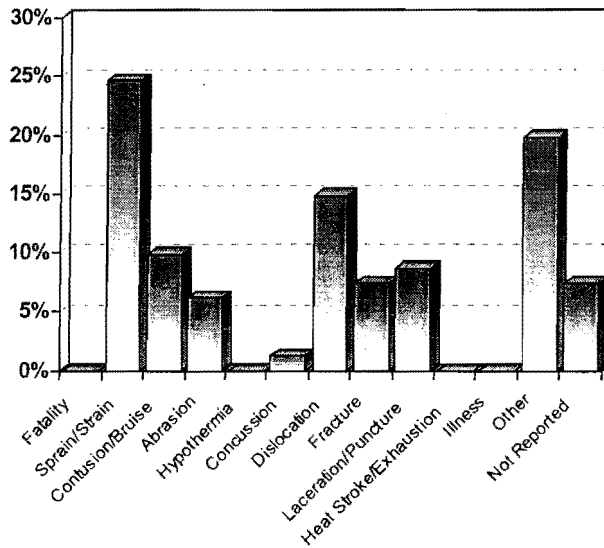


Figure 1. Percent of injuries by type of injury.

The most frequently injured parts of the body involved some part of the face (22%), including the nose (3%), teeth (6%), mouth (4%), eye (6%), or unspecified facial parts (4%). Knee injuries (15%) were prominent, as were injuries to the hip/leg/foot (15%) and injuries to the arm/wrist/hand (15%) and the ankle (6%). Hip/leg/foot injuries included the and lower leg (10%), hip (2.5%), and foot (2.5%), while arm/wrist/hand injuries included the arm (4%), hand (10%) and wrists (1%). The remaining injuries consisted of injuries to the shoulder (12%), head/neck (2.8%), abdomen/chest/back (1.2%), or other unspecified body parts (2.5%). The part of the body injured was not specified on 9% of reports (Figure 2)

Forty-six 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 1999 when evacuation rates between 40% and 52% were reported. Whether the injured person was evacuated was not reported on less than 1% of forms.

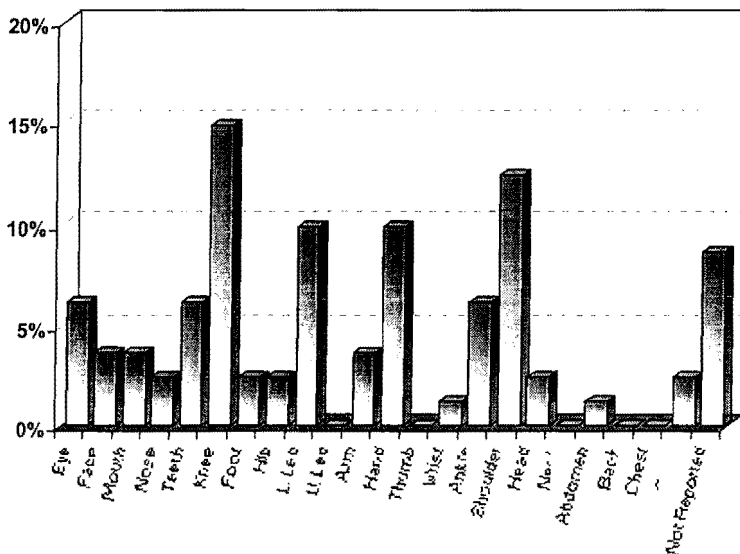


Figure 2. Percent of injuries by injured body part.

A large proportion of injuries sustained by commercial boaters occurred in the raft (48%). 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 (31%). 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 (11%), at other unspecified locations (6%) or were unreported (4%).

On-site administration of first aid for injuries included bandages (33%), splinting or immobilization (22%), application of ice (11%), direct pressure (4%), treatment for shock (2.5%), elevation of the injured body part, CPR, or antiseptic (1%, respectively), or other unspecified first aid (5%). No first aid was administered for 12 % of reported injuries. Whether first aid was administered was not reported on 1% of reports.

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 2003, 37% indicated that injured individuals were evaluated by a medical or osteopathic doctor (MD or DO), 7% by an EMT or paramedic, 1% each by physicians assistant (PA) and registered nurse (RN) (Figure 3).

Nineteen 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 thirty-five (35%) of injury reports, no response was given as to by whom or if the injured individuals were evaluated. Also, only 50% of reports indicated that injured individuals received treatment in the form of a splint or cast (16%), stitches (9%), medication (6%), or other unspecified treatment (19%). Seventeen percent of reports indicated "diagnosis only", while no response was given as to the type of treatment administered on 33% of reports.

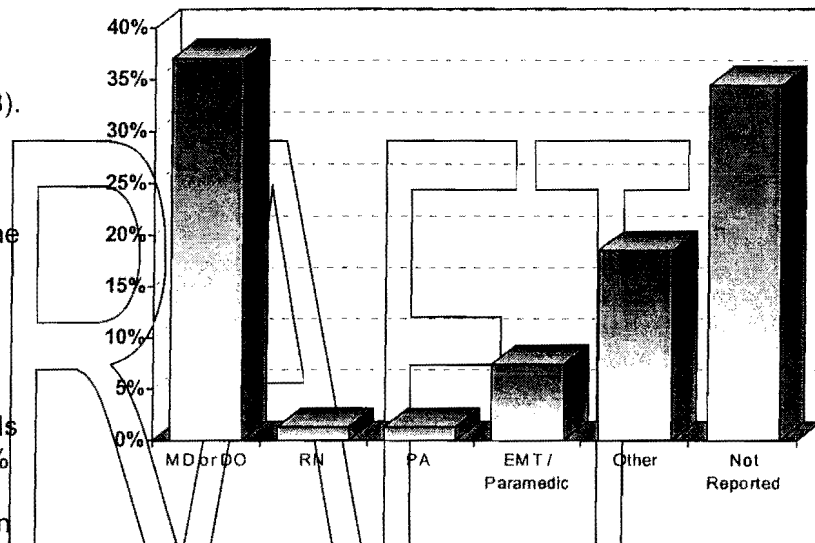


Figure 3. Percent of injuries by type of health care professional treated by.

The large number of body part categories was collapsed to facilitate cross-tabulation for the purpose of identifying injury associations. Injuries to the face, knee, and ankle appeared to occur more frequently in the raft (Figure 4). Arm/wrist/hand, hip/leg/foot, and head/neck injuries appeared to occur more frequently during a swim. However, because of small cell sizes no statistical tests were conducted to determine if these associations were significant.

Male boaters appeared to be more likely to sustain sprains/strains, contusions/bruises, dislocations, and lacerations/punctures, while female boaters appeared to more frequently sustain abrasions and fractures and facial injuries (Figure 5). Also, males appeared to sustain more injuries to the shoulder and lower leg and females to the hand. However, none of these associations were tested for statistical significance due to small cell sizes.

Finally, an apparent association was observed between injury type and injured body part. Sprains/strains more commonly involved injuries to the ankle and knee. All shoulder injuries involved

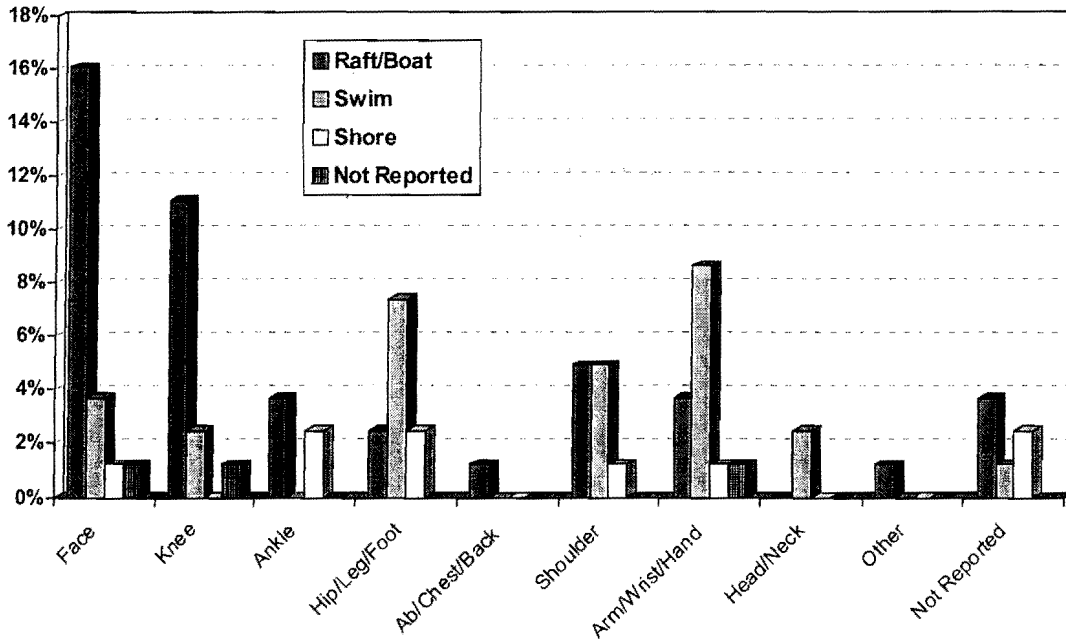


Figure 4. Percent of injuries by injured body part and location of occurrence.

dislocations or sprains/strains (Figure 6).

Summary

During the 2003 rafting season, a total of 81 injury reports were submitted on behalf of guests and guides of commercial rafting outfitters who sustained injuries. The average age of injured persons was 33.1 years, 41% were female, and 68% had previous rafting experience. Six percent of reports were submitted for guides, not customers. The overall injury incidence rate was 0.362 per 1,000 user days, which was comparable to previous years. Also, only six outfitters accounted for most of the injuries reported in the year, suggesting over-reporting by some and perhaps under-reporting by other

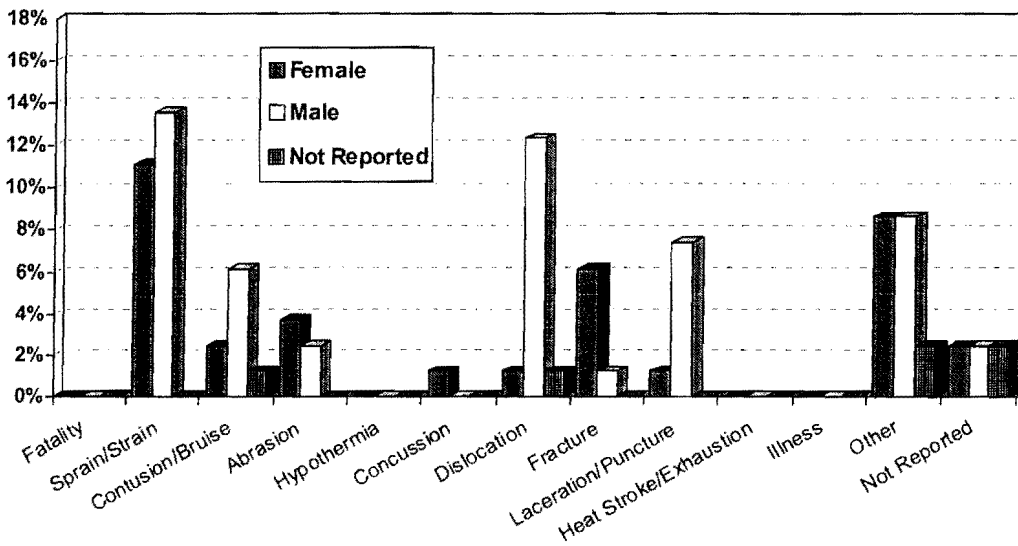


Figure 4. Percent of injury types by gender.

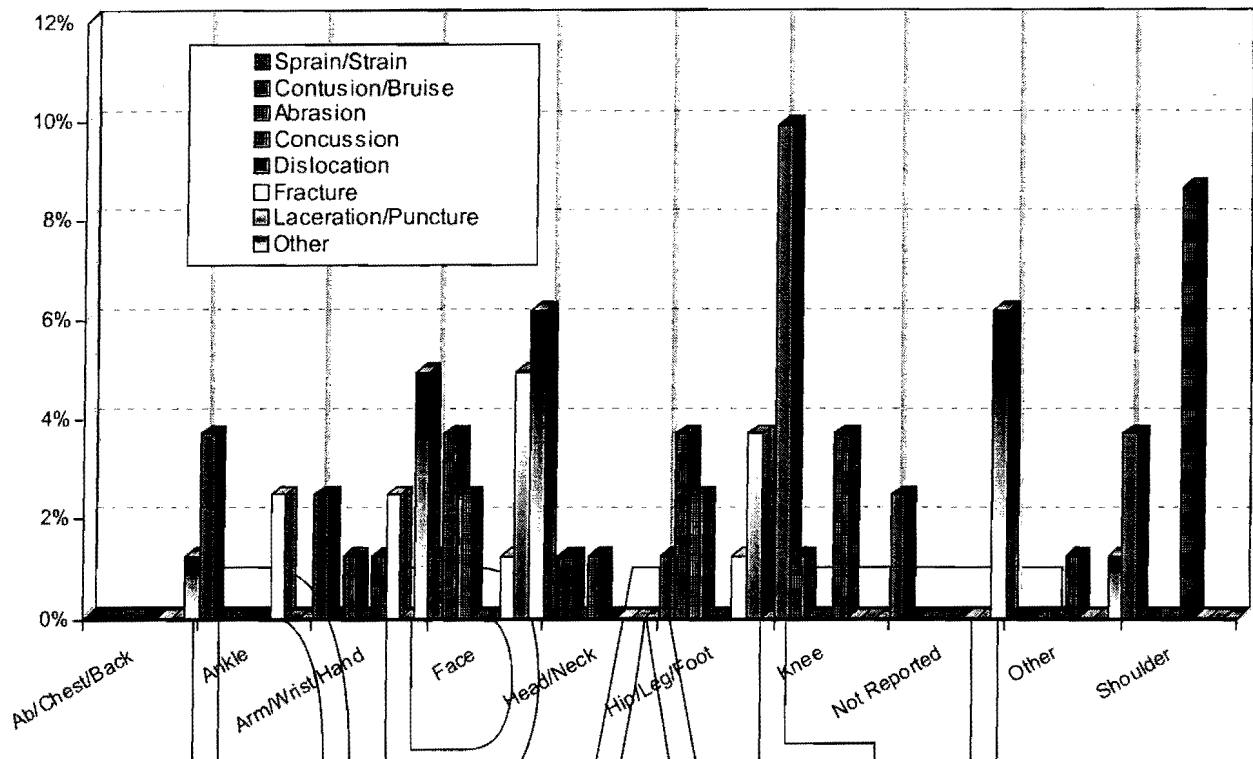


Figure 5. Percent of injured body parts by injury types.

outfitters.

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.

Only about 47% of injury reports indicated that injured persons were evaluated by one of the four recognized categories of licensed health care providers. Furthermore, only 50% of reports indicated that injured individuals received treatment in the form of a splint or cast, stitches, medication, or surgery, and 17% 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 sprains/strains dislocations, contusions/ bruises, lacerations, and fractures. On-site administration of first aid included bandages, splinting or immobilization, application of ice, direct pressure, treatment for shock, elevation of the injured body part, CPR, or antiseptic.

Finally, most injuries sustained by commercial boaters occurred in the raft (48%). This was followed by injuries occurring in the water after falling from the raft while running rapids (31%). The remaining injuries occurred on shore (11%), at other unspecified locations (6%) or were unreported (4%).

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