

# Gastroenteritis Associated with Rafting the Middle Fork of the Salmon River

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Lemhi County Emergency Services personnel notifies EIPHD that 5 out of 9 United States Forest Service (USFS) workers on river patrol / weed control taken off river at confluence of the Middle Fork of the Salmon and main Salmon Rivers by ambulance due to nausea / vomiting / diarrhea / cramping / dehydration.



# Further reports of illness

- \* USFS worker stationed near halfway point hears reports of illness among rafters and guides on Middle Fork (1 sick in group, 1 guide sick, lots of sick folks, etc).



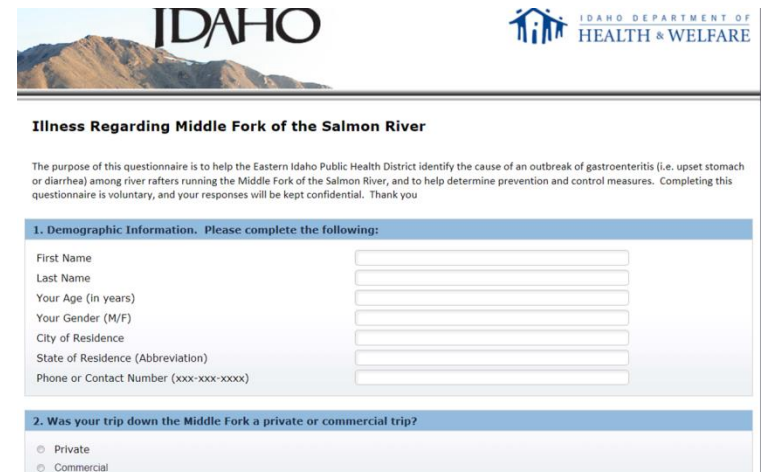
# Methods

## \* Case-Control Study

- \* Questionnaire URL sent to permit holders
- \* Case defined as nausea, vomiting, or diarrhea within 25 days of rafting, in a person who rafted between July – September
- \* Controls were well rafters during same time frame
- \* Stratification of symptom duration

## \* Laboratory Testing

- \* Stool / Vomit samples
- \* Environmental samples along river



**IDAHO** IDAHO DEPARTMENT OF HEALTH & WELFARE

**Illness Regarding Middle Fork of the Salmon River**

The purpose of this questionnaire is to help the Eastern Idaho Public Health District identify the cause of an outbreak of gastroenteritis (i.e. upset stomach or diarrhea) among river rafters running the Middle Fork of the Salmon River, and to help determine prevention and control measures. Completing this questionnaire is voluntary, and your responses will be kept confidential. Thank you

**1. Demographic Information. Please complete the following:**

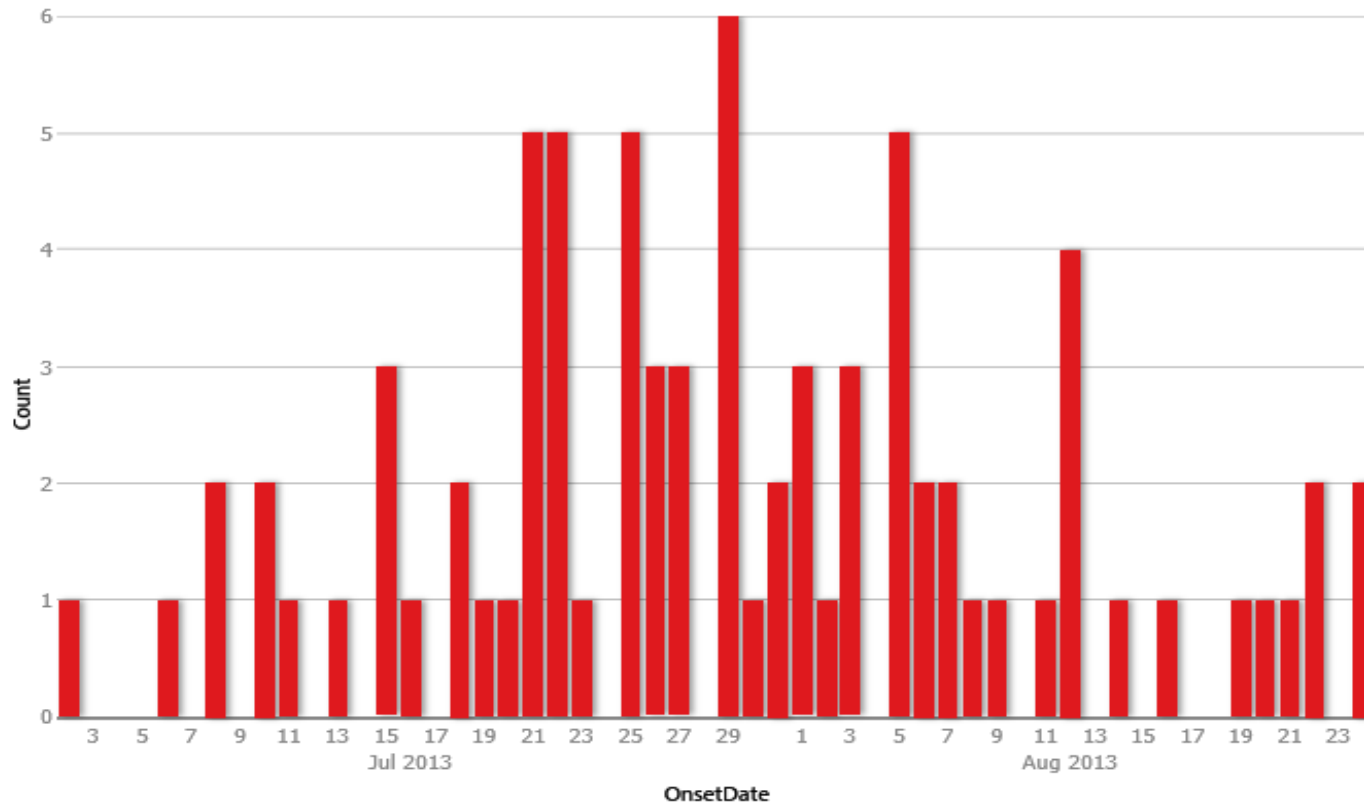
First Name	<input type="text"/>
Last Name	<input type="text"/>
Your Age (in years)	<input type="text"/>
Your Gender (M/F)	<input type="text"/>
City of Residence	<input type="text"/>
State of Residence (Abbreviation)	<input type="text"/>
Phone or Contact Number (xxx-xxx-xxxx)	<input type="text"/>

**2. Was your trip down the Middle Fork a private or commercial trip?**

Private

Commercial

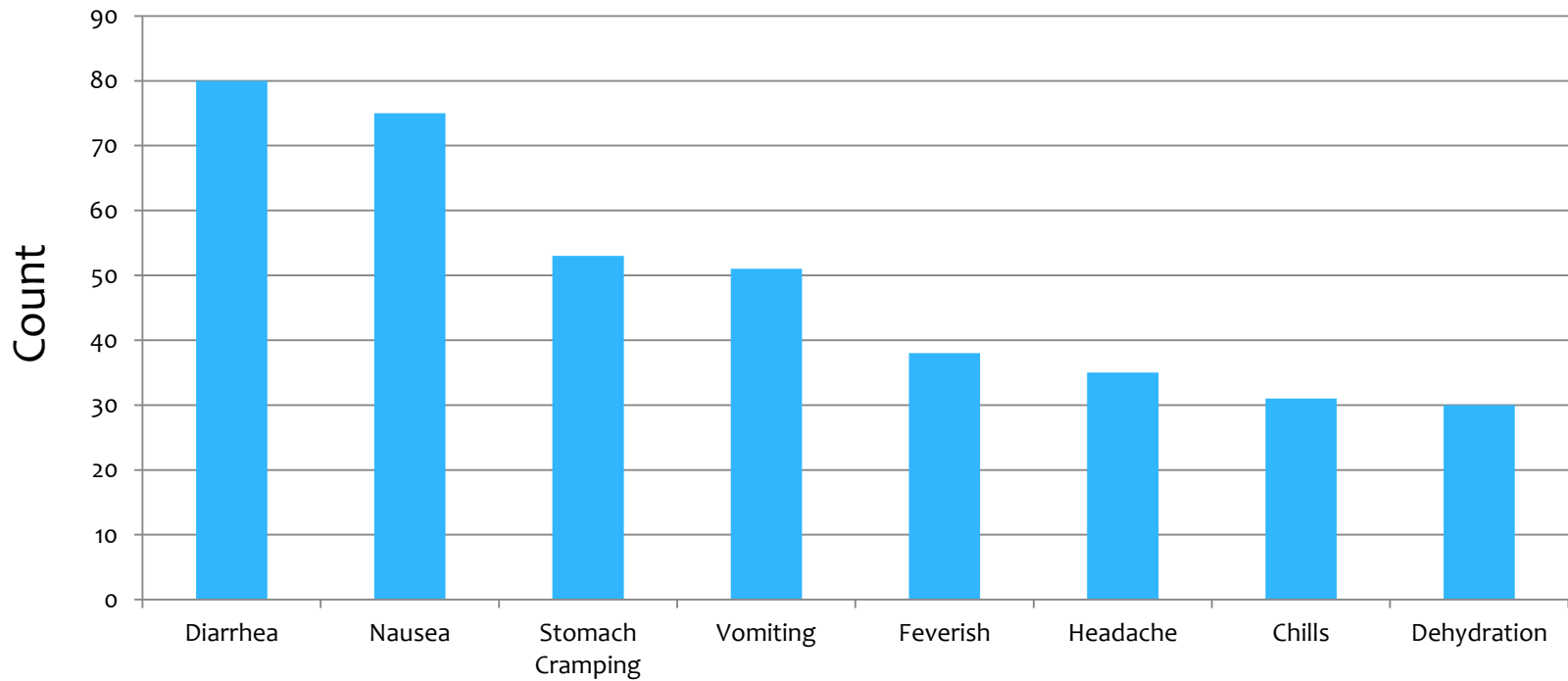
# Epi Curve – All Cases (102 cases)



# Results – All Cases

- \* 102 (25.56%) rafters met our case definition of having nausea, vomiting, or diarrhea.
- \* 69 (68.32%) of the cases were male
- \* 45.51 years - mean age of cases.

# Symptoms – All Cases (N=102)



# Case Lab Results

- \* 23 (22.55%) cases sought medical attention
- \* 13 stated in questionnaire they had submitted a lab sample.
  - \* 7 Idaho residents were reported with confirmed lab results (Not all of the 7 Idaho residents completed a questionnaire).
    - \* 4 were positive for giardia
    - \* 3 were positive for norovirus.
      - \* Two of the three norovirus positive test results, one a vomitus sample and the other a stool sample, had norovirus sequencing and RT-PCR performed and both samples were Genogroup 1 and G1\_8; respectively.
  - \* 3 rafters from other states (UT, CO, CA) indicated in the questionnaire they had seen a doctor, submitted a lab sample, and listed a test result.
    - \* All three listed giardia as their test result (test results were not confirmed with written laboratory results).



# Results – Questionnaire

## All Cases (N=102)

**Potential Risk Factors for Gastrointestinal Illness Among Rafters, Middle Fork of the Salmon River, N=399 (102 cases and 297 controls).**

Risk Factor	n	Number of ill rafters exposed	Number of healthy rafters exposed	Total exposed	A%	Number of ill rafters not exposed	Number of healthy rafters not exposed	Total not exposed	A%	OR	95% CI (Lower Limit)	95% CI (Upper Limit)
Restaurant Before	395	52	141	193	26.9	50	152	202	24.8	1.12	0.71	1.76
Commercial Trip	399	24	65	89	27.0	78	232	310	25.2	1.1	0.64	1.87
Prepared Own Meals	395	77	233	310	24.8	25	60	85	29.4	0.08	0.47	1.35
Outfitter Prepped Meals	395	29	65	94	30.9	73	228	301	24.3	1.4	0.84	2.32
Boundary Creek (mile 0, put in)												
Spigot	386	50	152	202	24.8	47	137	184	25.5	0.96	0.61	1.52
Toilet	393	59	187	246	24.0	42	105	147	28.6	0.79	0.5	1.25
Indian Creek (mile 25, airstrip)												
Spigot	385	35	120	155	22.6	62	168	230	27.0	0.79	0.49	1.27
Toilet	393	36	105	141	25.5	65	187	252	25.8	0.99	0.62	1.58
Flying B (mile 67, store, airstrip)												
Spigot	384	31	90	121	25.6	66	197	263	25.1	1.03	0.63	1.69
Toilet	393	24	77	101	23.8	77	215	292	26.4	0.87	0.51	1.47
Eat at Flying B	386	11	26	37	29.7	89	260	349	25.5	1.24	0.59	2.6
Cache Bar (mile 100, take out)												
Spigot	383	4	14	18	22.2	93	272	365	25.5	0.84	0.27	2.6
Toilet	393	23	85	108	21.3	78	207	285	27.4	0.72	0.42	1.22
Filtered Creek	367	31	75	106	29.2	62	199	261	23.8	1.33	0.8	2.2
<b>Filtered River</b>	<b>382</b>	<b>69</b>	<b>109</b>	<b>178</b>	<b>38.8</b>	<b>29</b>	<b>175</b>	<b>204</b>	<b>14.2</b>	<b>3.82</b>	<b>2.33</b>	<b>6.27</b>
Unfiltered Creek	389	17	66	83	20.5	82	224	306	26.8	0.7	0.39	1.27
Unfiltered River	394	5	6	11	45.5	97	286	383	25.3	2.46	0.73	8.23
Hot Springs	399	79	255	334	23.7	23	42	65	35.4	0.57	0.32	1
Trail Flat (mile 7)	326	13	68	81	16.0	59	186	245	24.1	0.6	0.31	1.17

**Illness associated with drinking filtered river water – OR = 3.82 (2.33 – 6.27)**

Hospital Bar (mile 02)	233	20	77	97	28.8	47	133	180	23.3	0.66	0.47	1.00
Restaurant After	399	64	188	252	25.4	38	109	147	25.9	0.98	0.61	1.56

# Results - Lab

- \* Human Stool / Vomit Samples
  - \* 3 Norovirus (2 stool, 1 vomit)
  - \* 8 Giardia (All stool)
- \* Environmental Samples
  - \* Norovirus detected on water spigots and outhouses
  - \* E. coli detected in unregulated water source



The results in the table below are the environmental samples collected by the USFS. The “-“ notes testing was not performed for that particular disease.

<u>Sample Location</u>	<u>Collection Date</u>	<u>Sample Matrix</u>	<u>Giardia Cysts</u>	<u>Crypto Oocysts</u>	<u>Norovirus (Genogroup)</u>
Boundary Creek Spigot #1	9/24/13	Swab	-	-	Positive (II)
Boundary Creek Spigot #2	9/24/13	Swab	-	-	Positive (II)
Boundary Creek North Outhouse	9/24/13	Swab	-	-	Positive (II)
Boundary Creek South Outhouse	9/24/13	Swab	-	-	No Virus Detected
Boundary Creek Spigot #1	9/24/13	Water	Negative	Negative	No Virus Detected
Cold Springs #1 & #2	9/30/13	Water	Negative	Negative	No Virus Detected
Waterfall Springs #1 & #2	10/1/163	Water	Negative	Negative	No Virus Detected
Flying B Downstream #1 & #2	10/1/13	Water	Negative	Negative	No Virus Detected

# Conclusions

- \* No point source identified.
- \* Transmission of illness most likely from:
  - \* Person-to-person
  - \* Environmental contamination
    - \* River water (lack of chemical treatment)
    - \* Spigots and Outhouses



# Recommendations

## KEEP YOUR PARTNERS PADDLING: SPARING OTHERS IF SOMEONE GETS SICK

- If people should consider postponing going on a river trip for 72 hours to 2 weeks after symptoms go away, depending on the cause of diarrhea. *Norovirus*, *Salmonella*, and *Cryptosporidium* are examples of organisms that you can shed in your stool and expose others, even after diarrhea stops.
- Make a fresh bleach solution (5–23 tablespoons regular strength bleach, not "ultra-strength", per gallons of water) daily to clean contaminated non-food surfaces, such as toilet seats, sleeping pads, and rafts. Do not use this for food surfaces or hand-washing – it is too strong for that.
- Make every effort to have only people who have not been sick in the previous 2 weeks prepare food or filter water.
- Make sure no one touches the nozzle of water dispensers. Wipe the nozzle with bleach solution twice a day.

### Separate sick people:

- Select one only responsible adult to assist sick children and sick elderly persons until 24 hours after their symptoms stop.
- Set up separate toilets away from others for those who are sick and take extra disposable toilet bags or cans in case of emergencies.
- Serve food to sick people last and away from people who are not sick.
- Keep sick people on the same boat if possible and have them stay in the same area of camp.
- For the rest of the trip, keep the same equipment (e.g., sleeping pads, tents) with the people who were sick.
- Put vomit and feces from accidents in a sealed plastic bag in the trash; if possible, sick people should vomit directly into plastic bags and seal them immediately.

## GOING HOME

- If you rented gear, tell the owner that you had illness on the trip so that the owner can take extra care in cleaning your returned gear.
- If you used private gear, sanitize all equipment using bleach (5–23 tablespoons per gallon of water) or hot water >140 °F. Launder sleeping bags and other soft goods in hot water and dry on hot or in sunlight. Don't forget to clean all items that have hard surfaces, such as the ammo cans that hold your library.
- Contact your local public health department to report outbreaks of illness.

## OTHER RESOURCES

Idaho Food Protection Program website:  
[www.foodsafety.idaho.gov](http://www.foodsafety.idaho.gov)

Cooking for Groups:  
[www.fhs.usda.gov/wps/wcm/connect/92770ad0-c540759b004e24bb24a0/Cooking\\_for\\_Groups.ppt?MOD=AJPERES&CACHEID=02630093-b77e-465b-b730-b9b007be90d](http://www.fhs.usda.gov/wps/wcm/connect/92770ad0-c540759b004e24bb24a0/Cooking_for_Groups.ppt?MOD=AJPERES&CACHEID=02630093-b77e-465b-b730-b9b007be90d)

Bad Bag Book:  
[www.fda.gov/Food/FoodborneIllnessContaminants/CaseStudies/BadBagBook/](http://www.fda.gov/Food/FoodborneIllnessContaminants/CaseStudies/BadBagBook/)

Food Safety While Hiking, Camping, and Boating:  
[www.fhs.usda.gov/wps/wcm/connect/922199a7-9c00-47ac-9015-7476c402910/Food\\_Safety\\_While\\_Hiking\\_Camping\\_Boating.pdf?MOD=AJPERES](http://www.fhs.usda.gov/wps/wcm/connect/922199a7-9c00-47ac-9015-7476c402910/Food_Safety_While_Hiking_Camping_Boating.pdf?MOD=AJPERES)

Prevent Foodborne and Waterborne Illness Recommendations for Idaho River Outfitters:  
<http://healthandwelfare.idaho.gov/Portals/0/Health/FoodProtection/PreventFoodborne.pdf>

A Quick Reference for River Outfitters: Cleaning and Sanitizing Dishes Using the Three-Container Method:  
<http://healthandwelfare.idaho.gov/Portals/0/Health/FoodProtection/CleaningDishes.pdf>

CDC - Wash Your Hands:  
[www.cdc.gov/Features/HandWashing/](http://www.cdc.gov/Features/HandWashing/)

CDC - Backcountry Water Treatment:  
[www.cdc.gov/healthywater/drinking/travel/backcountry\\_water\\_treatment.html](http://www.cdc.gov/healthywater/drinking/travel/backcountry_water_treatment.html)

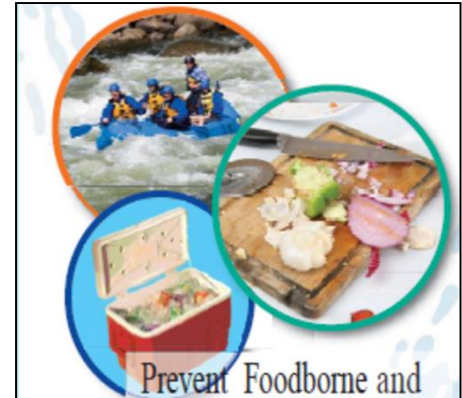


## Running the River (without getting the runs):

How to Prevent and Control  
Vomiting and Diarrheal Illness  
on River Rafting Trips



Vomiting and diarrhea on a river rafting trip? How bad could that be? Depending on the cause, vomiting can be violent and occur many times a day; diarrhea can be explosive and continue for days to weeks, turning your adventure into a nightmare. Dehydration caused by vomiting and diarrhea can be made worse by hours of exertion in the hot sun. Dehydration can be especially dangerous in the backcountry, where medical evacuation may not be available or can only be done at great expense. Although diarrheal illness in most healthy adults generally resolves without medical intervention, symptoms can be more severe for young children, elderly persons, and those with compromised immune systems.



Prevent Foodborne and  
Waterborne Illness:  
Recommendations for  
Idaho River Outfitters



WASH HANDS

