

Analysis of loadings

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First, we'll read the data files and divide the events into a few classes: one class for events that occurred with snowmelt, one class for events that occurred after the spring's last snowmelt but before mid-May (defined here as Julian date 135), and one class for events that occurred after Julian 135 and before the first snowmelt of the next winter.

We also will look at dividing the data into just two groups: one that is snow-influenced and one that is not. "Not snow-influenced" just combines event classes two and three.

The next block of code produces a set of bar charts that show the relative contributions of the snow-driven events, post-snow-pre-vegetation events, and the post-vegetation events.

The next block prints a table of the proportion of total phosphorus loading due to each class of event at each site

	snowmelt-driven	early post-snow	late post-snow
eagle	32.8%	22.9%	44.2%
joosvalley	36.4%	16.9%	46.7%
otter	45.9%	17.1%	37.0%

Table 1: Proportion of total phosphorus loading contributed by each type of event

Produce plots of the proportion of the suspended solids and phosphorus (both total loading and stormflow loading) that is contributed by each class of event at each stream site:

	snowmelt-driven	early post-snow	late post-snow
eagle	27.0%	29.1%	43.9%
joosvalley	26.9%	20.5%	52.6%
otter	34.8%	21.0%	44.2%

Table 2: Proportion of total suspended solids loading contributed by each type of event

Now let's do the same between the snow and no-snow events:

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Figure out what proportion of total sediment loading is contributed by the top 10% of storms:

The top 10% of events contributed 89.1% of the sediment loading at Eagle Creek, 73.1% of the sediment loading at Otter Creek, and 93.4% of the sediment loading at Joos Valley Creek.

Now we want to know how these major events are distributed within the event classes; that is, whether snowmelt tends to produce major loading events, or whether it is the post-snow events. Note that the `_tot` column measures the total loading during an event. The snowmelt-driven events are different in kind than the rainfall-driven ones because they don't require continuous rain during the event. If the snowmelt-driven events are caused by warm weather, it seems reasonable that a single event might last for many days and cause more loading than a more-intense rainfall event that only lasts a day or two. To account for this, we will look both at total loading (`_tot`) and average daily loading during an event (`_avg`).

Creek	Snowmelt		Early post-snow		Late post-snow	
	All	Major	All	Major	All	Major
Eagle	42%	30%	13%	19%	45%	51%
Otter	39%	42%	12%	19%	49%	40%
Joos	46%	31%	11%	17%	43%	52%

The table shows that the major loading events that produce the majority of the

loading can be occur during each of the three annual periods. However, the events caused by snowmelt produced a smaller proportion of major events than their proportion of all events, and their relative contribution to the total sediment load was smaller than their proportion of loading events. Taken together, these insights tell us that, while snowmelt can cause a major loading event, a snowmelt-driven event is less likely to be a major contributor to sediment load than is a rainfall-driven event.

We can also see that the 43% of the events were driven by snowmelt; these events contributed only 27% of the total sediment load but 36% of the total phosphorus load.

Meanwhile, the 12% of events that were caused by early-season rainfall produced 27% of the total sediment load and 20% of the total phosphorus load.

Meanwhile, the 46% of events that were caused by late-season rainfall produced 46% of the total sediment load and 44% of the total phosphorus load.

Overall, 34% of the largest events at each site were produced by snowmelt; 18% were produced by early-season rainfall, and 48% were produced by late-season rainfall.

1

48.34

GUIDE piecewise constant least-squares regression tree model. At each intermediate node, a case goes to the left branch if and only if the condition is satisfied. Number in italics beneath leaf node is sample mean of stottot.

1

175.48

GUIDE piecewise constant least-squares regression tree model. At each intermediate node, a case goes to the left branch if and only if the condition is satisfied. Number in italics beneath leaf node is sample mean of stottot.

theisen

≤ 2.20

1

totalwater

≤ 1.98

2

tmean

≤ 68.50

3

4

5

6

7

18.05

272.43

482.94

685.43

GUIDE piecewise constant least-squares regression tree model. At each intermediate node, a case goes to the left branch if and only if the condition is satisfied. Number in *italics* beneath leaf node is sample mean of stottot.

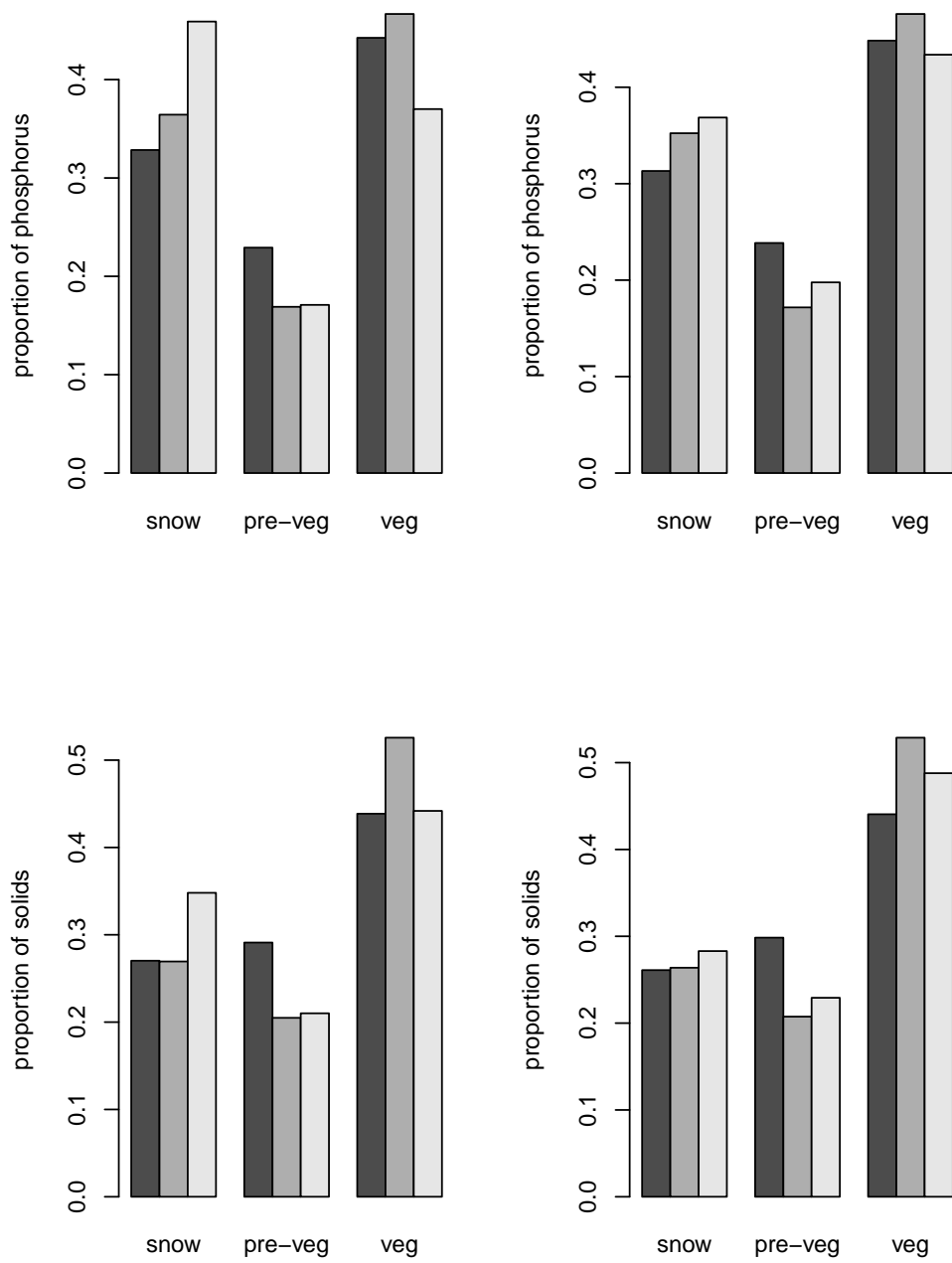


Figure 1: Cumulative storm loadings at the three creeks.

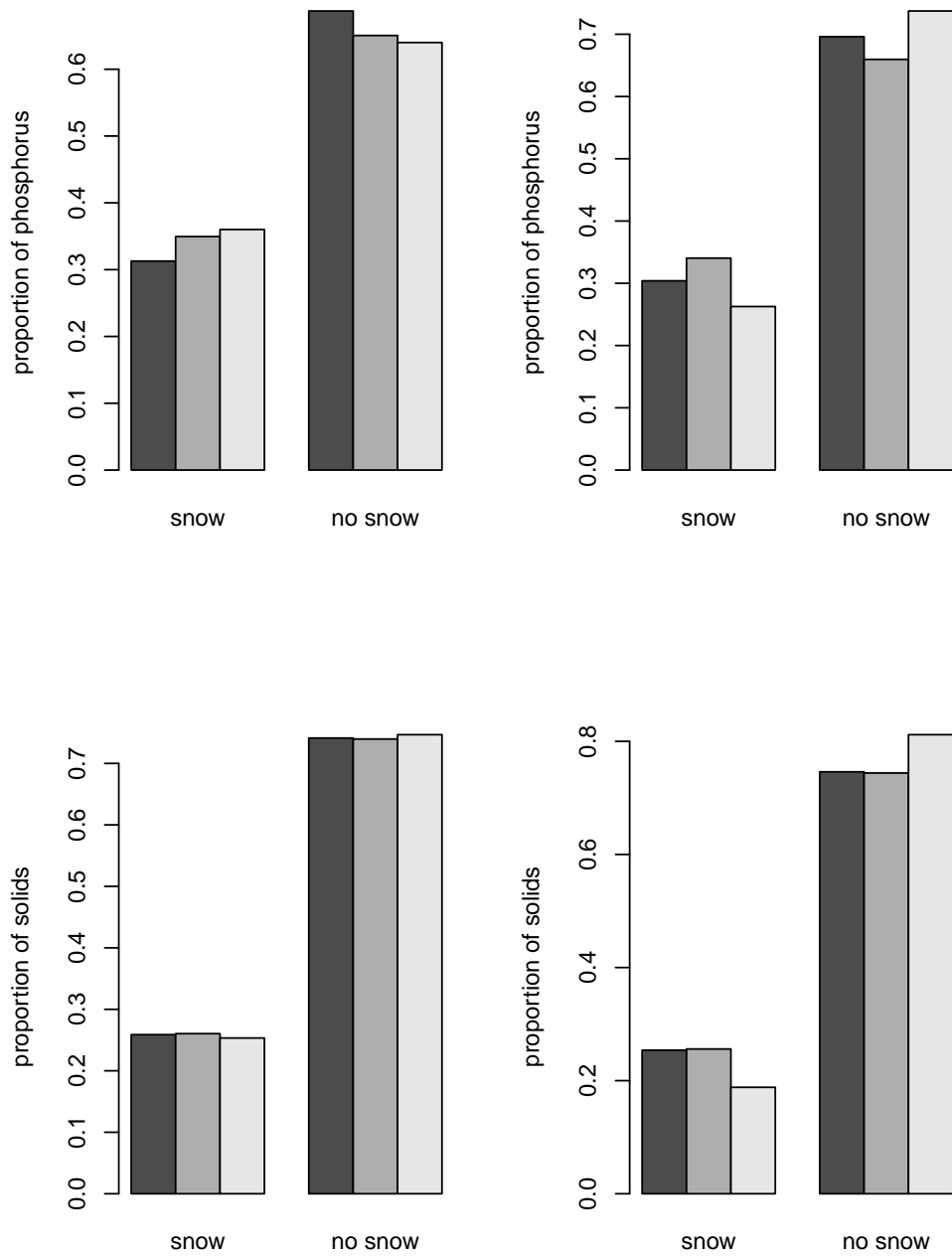
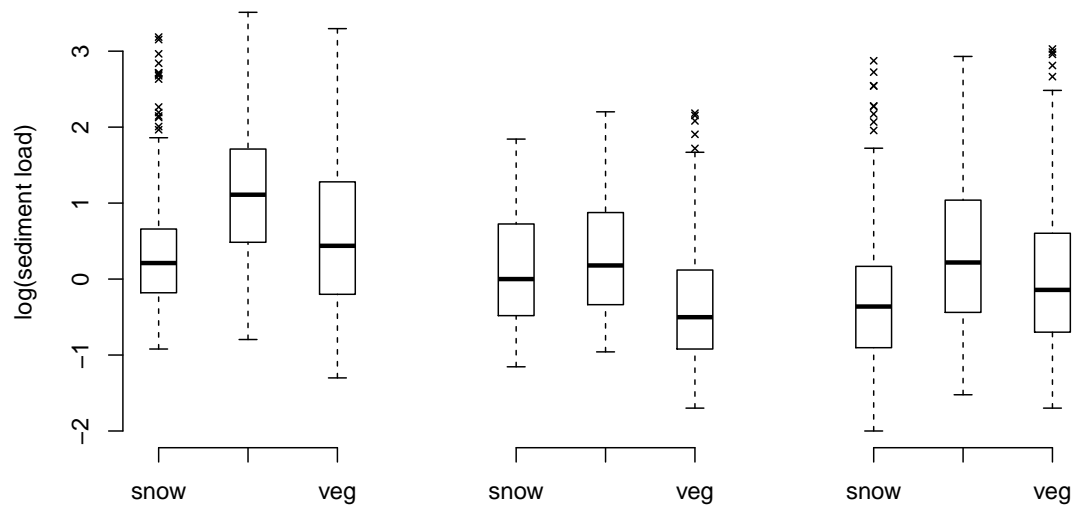
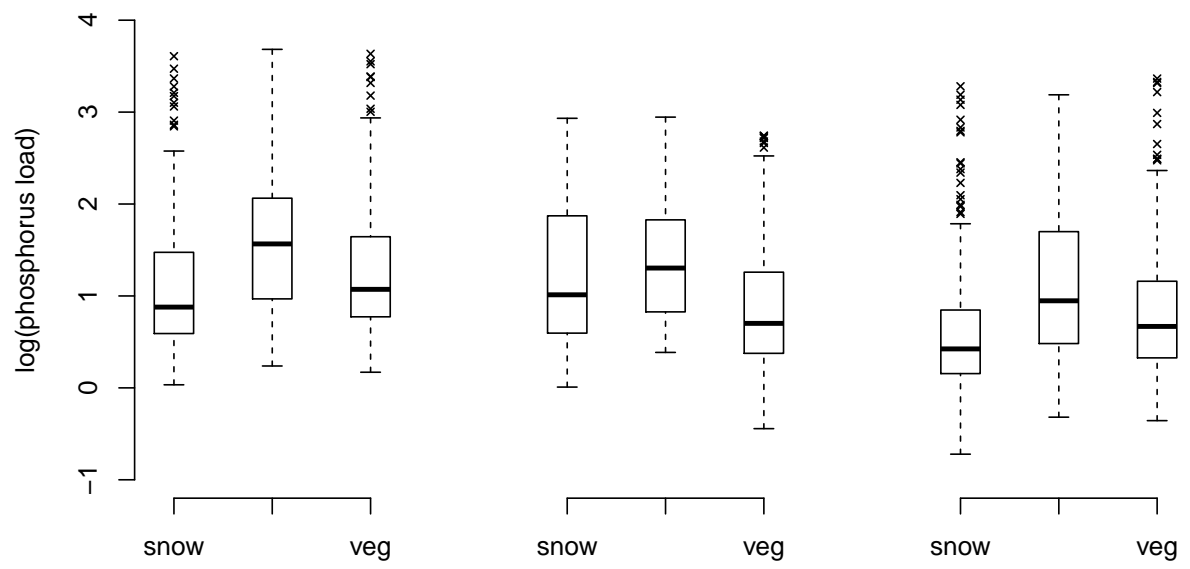


Figure 2: Cumulative storm loadings at the three creeks.





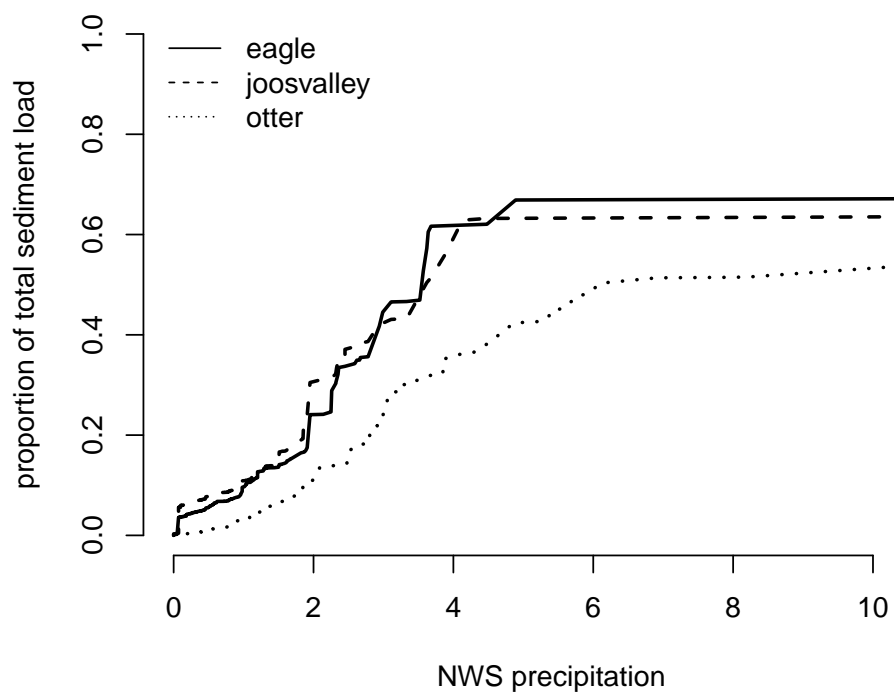


Figure 3: Cumulative storm loadings at the three creeks.

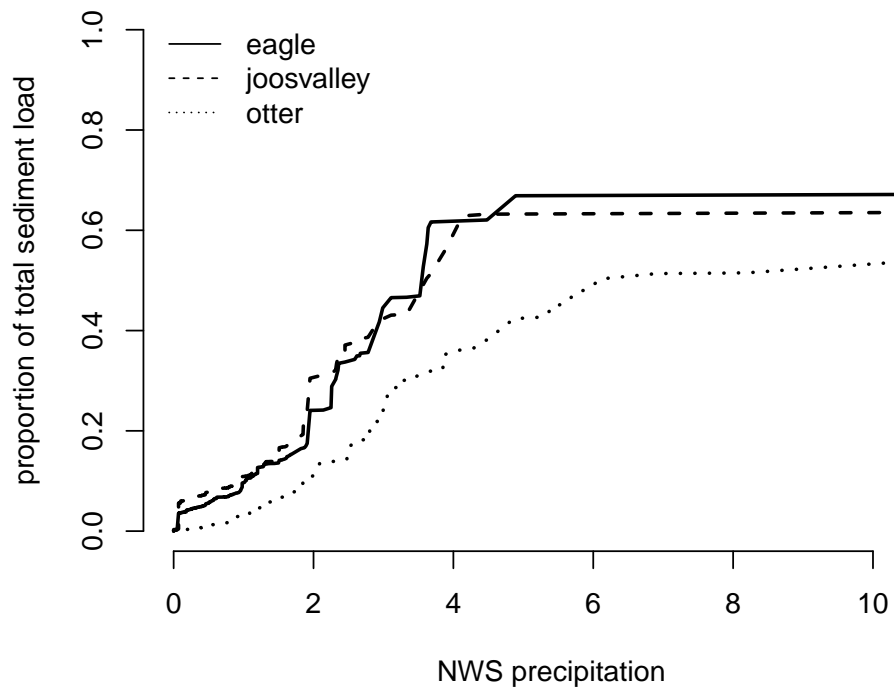


Figure 4: Proportion of the total sediment load contributed by rainfall events up to the size shown. Snowmelt-driven events are excluded.

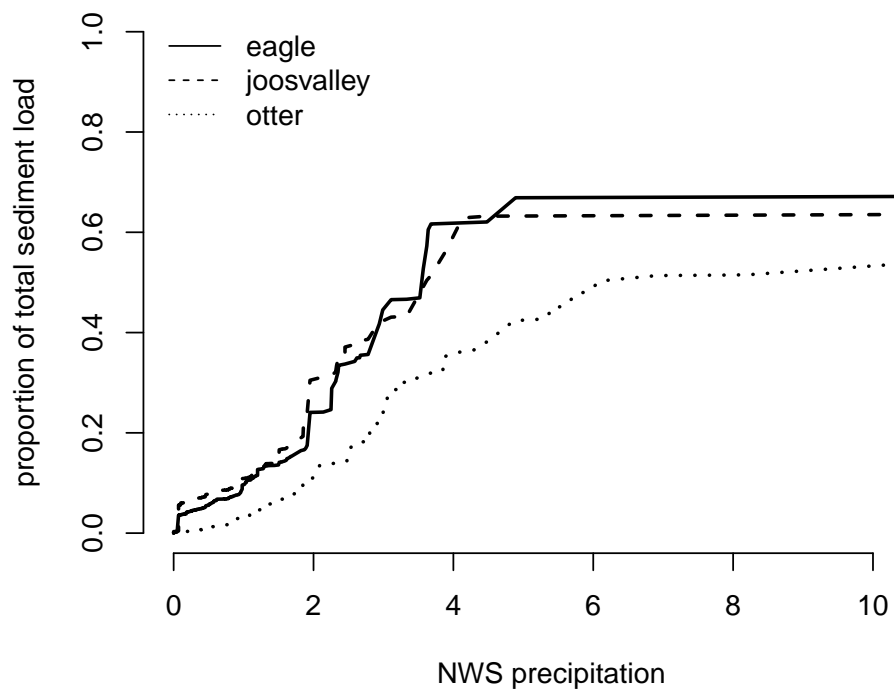


Figure 5: Proportion of the total phosphorus load contributed by rainfall events up to the size shown. Snowmelt-driven events are excluded.