Supplemental Materials for: Agricultural Insurance Loss Relationships to Climatic Damage Cause Across the Inland Pacific Northwest Region of the United States

The material contained herein is supplementary to the article named in the title and submitted to the journal, Environmental Research Letters.

September 2023

This supplemental appendix provides exploratory data and factor analyses of agricultural insurance loss for the Pacific Northwest (PNW) and the inland Pacific Northwest (iPNW), to better understand the combined impacts by differing damage causes, commodities, counties, and years.

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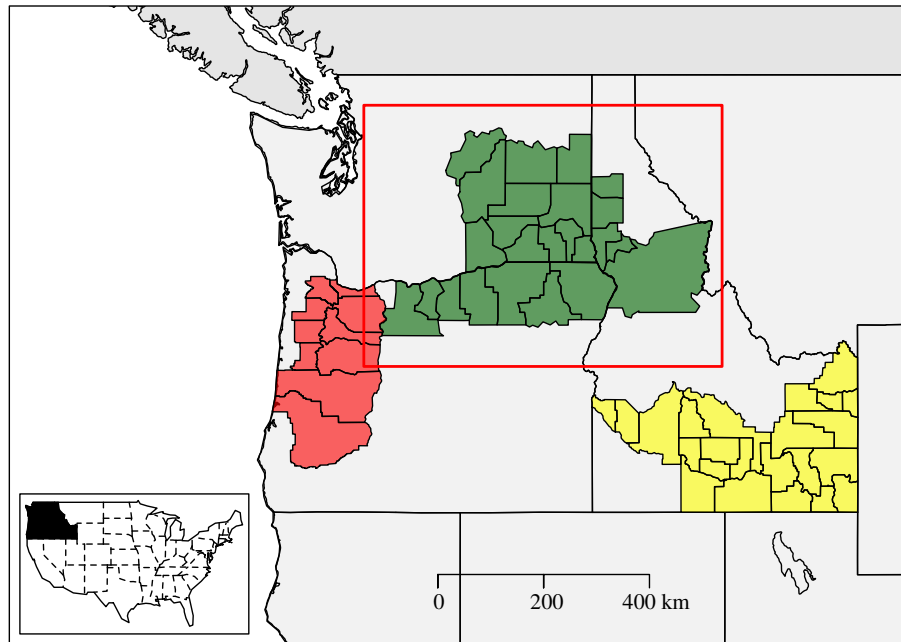
Figure S 1: Pacific Northwest study area, which includes agricultural regions for the inland Pacific Northwest, the southern Idaho valley, and the Willamette valley.

Table S 1: Example of insurance loss records that were acquired from the USDA Risk Management Agency (RMA). Each record represents an individual insurance claim. Full datasets are available at <REDACTED for review> as well as via the following DOI: <REDACTED for review>

year	state	county	commodity	damagecause	month	acres	loss	lossperacre	cropyear
2001	ID	Ada	All Other Crops	Drought	SEP	17.000	153.00	9.000000	2001
2001	ID	Ada	All Other Crops	Heat	AUG	105.200	5249.00	49.895437	2001
2001	ID	Ada	All Other Crops	Freeze	APR	125.000	4500.00	36.000000	2001
2001	ID	Ada	All Other Crops	Wind/Excess Wind	MAY	50.000	1800.00	36.000000	2001
2001	ID	Ada	All Other Crops	Wind/Excess Wind	APR	92.500	3330.00	36.000000	2001
2001	ID	Bannock	WHEAT	Drought	AUG	133.000	1212.00	9.112782	2001
2001	ID	Bannock	WHEAT	Drought	SEP	777.520	24807.00	31.905289	2001
2001	ID	Bannock	WHEAT	Drought	JUL	3529.754	54726.46	15.504327	2001
2001	ID	Bannock	WHEAT	Heat	JUL	19.796	2371.60	119.801980	2001

PNW total insurance loss by year: 1989 to 2022
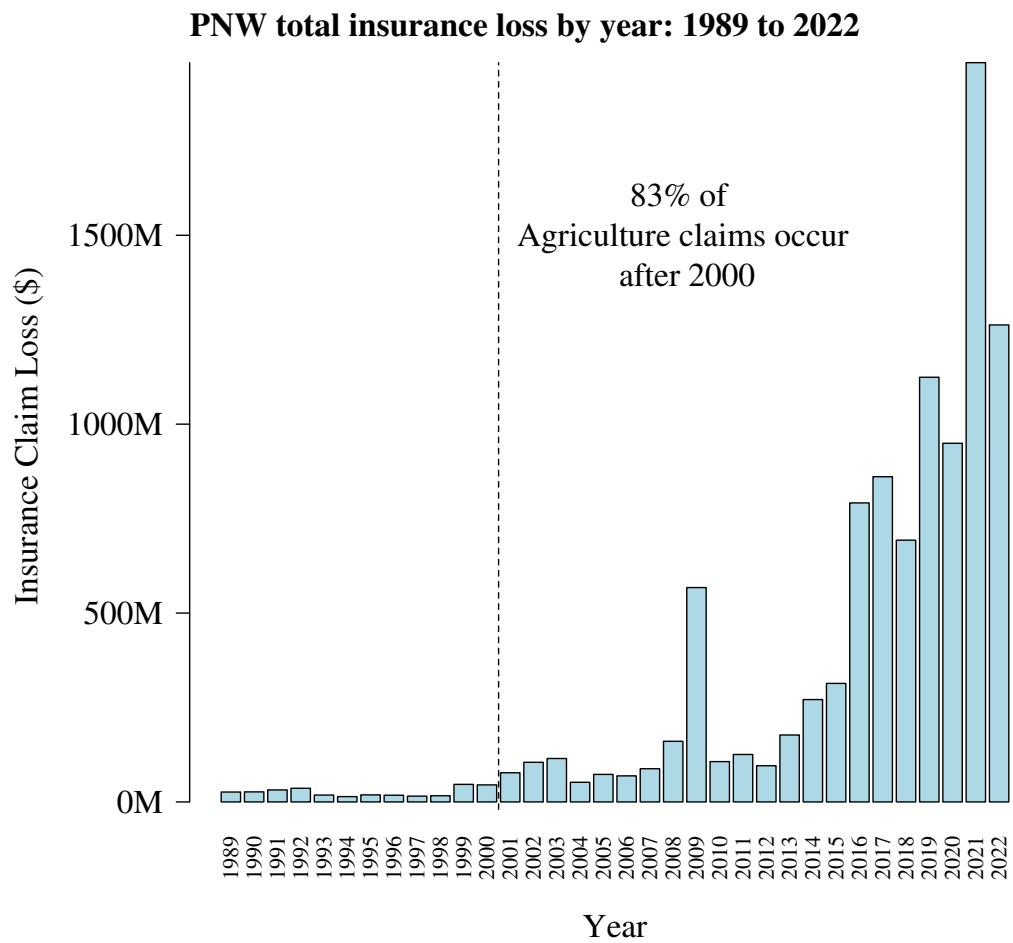
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PNW total insurance loss by year: 2001 to 2022
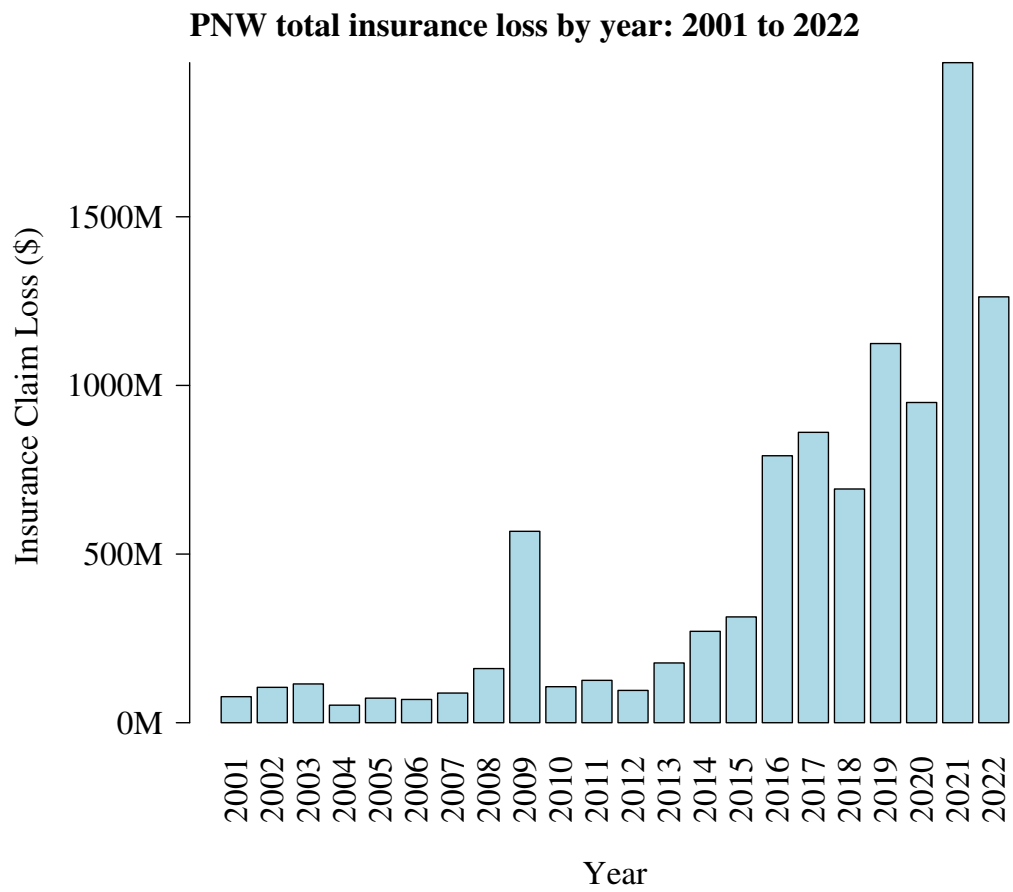
Figure S 3: Pacific Northwest agricultural insurance loss by year: 2001 to 2022
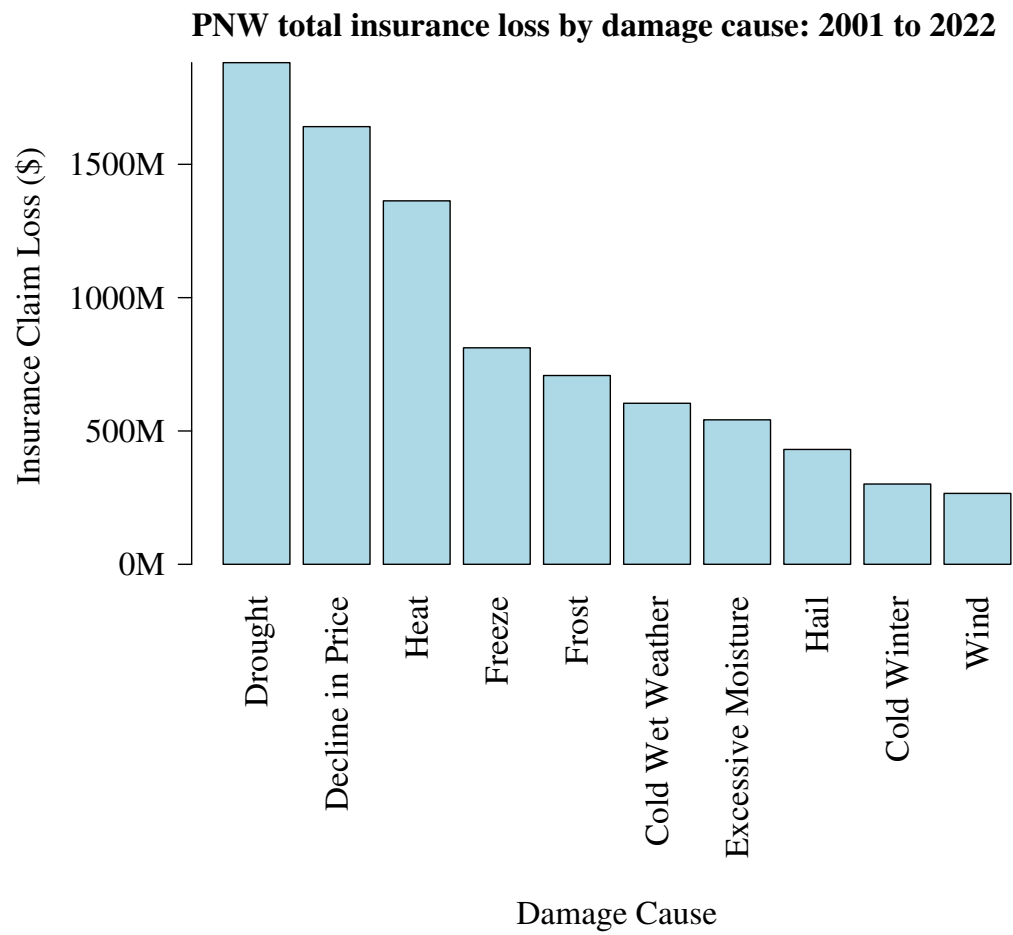
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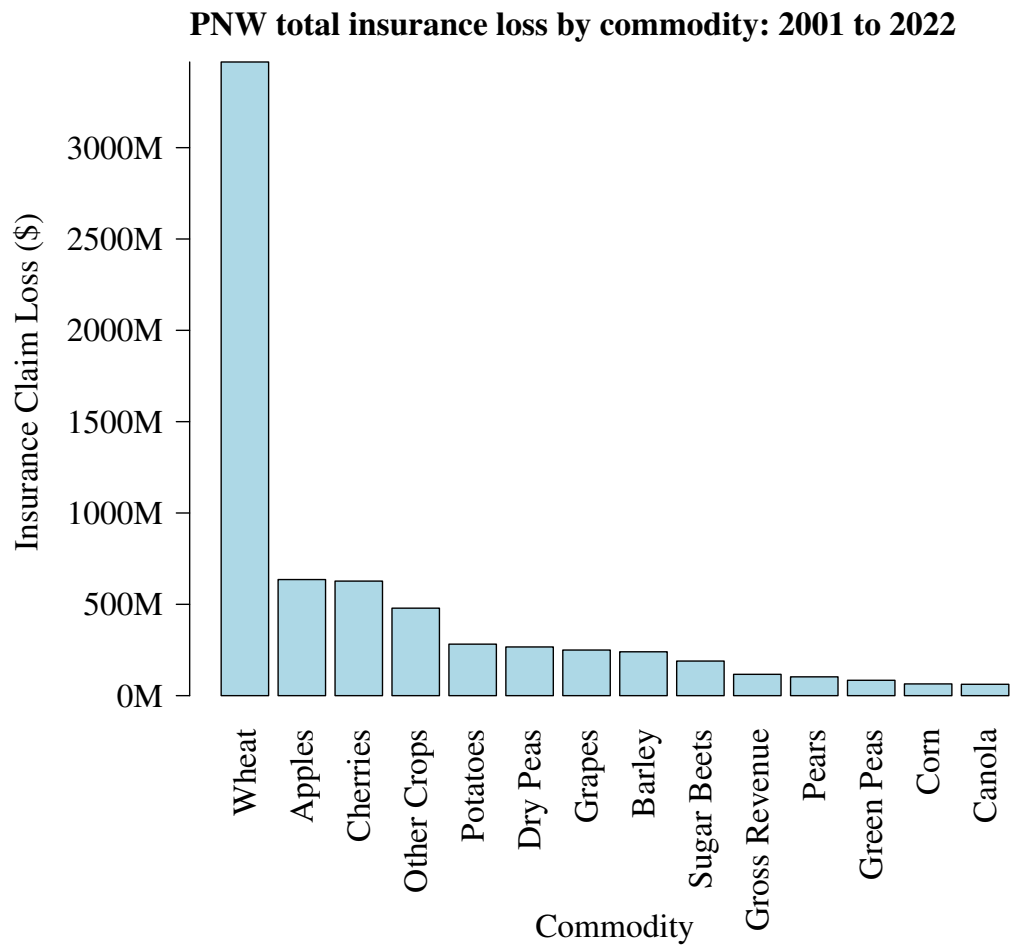
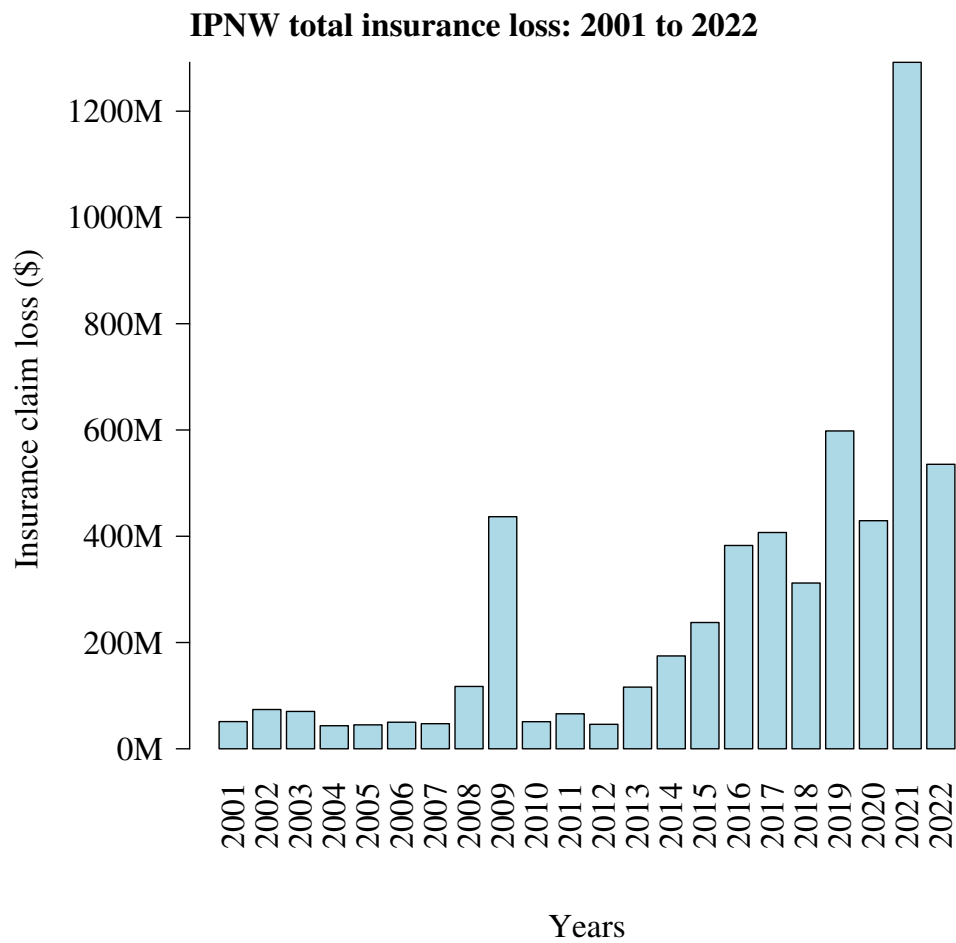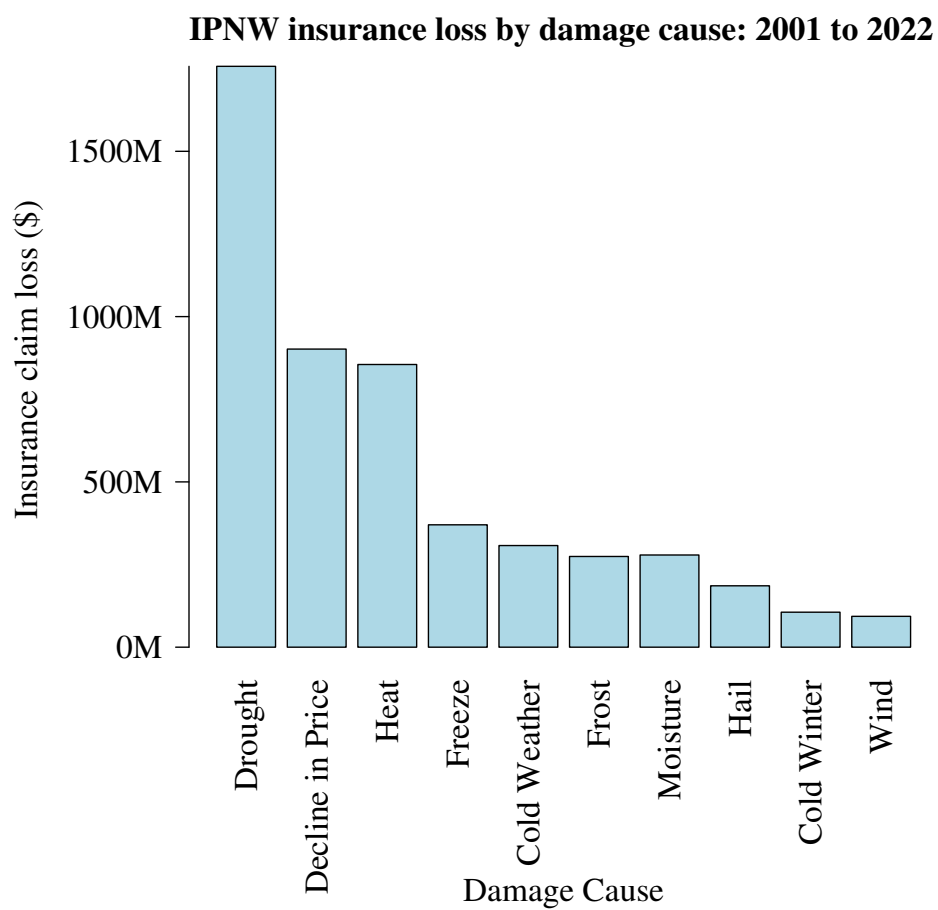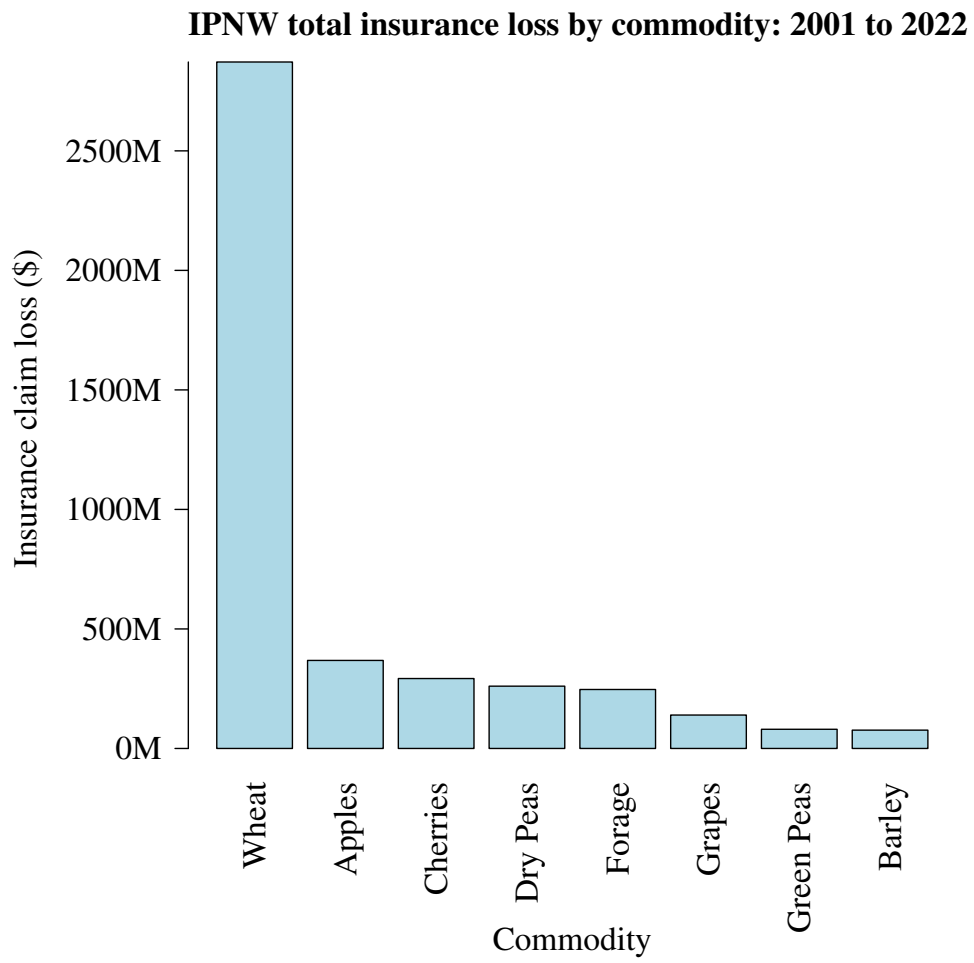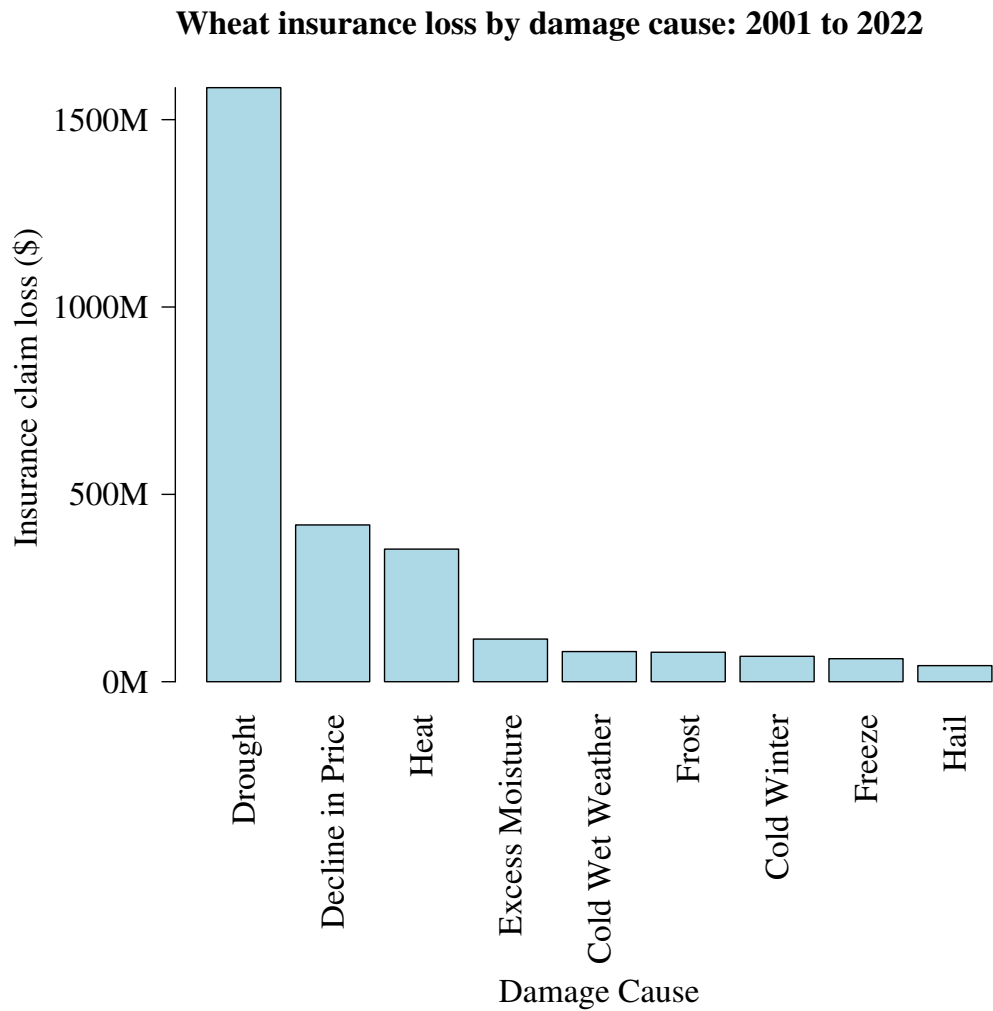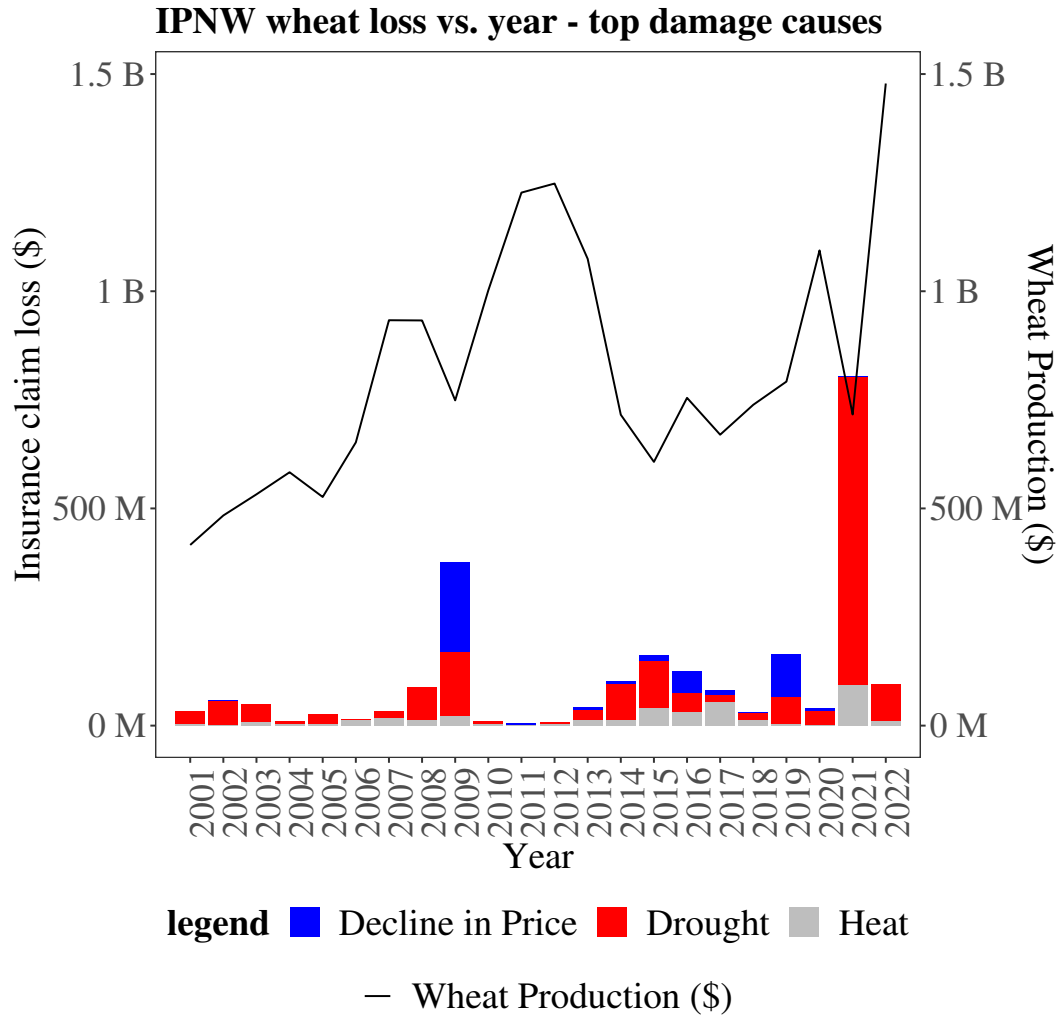Figure S 5: Pacific Northwest agricultural insurance loss by commodity: 2001 to 2022.

Figure S 6: Inland Pacific Northwest agricultural insurance loss by year, 2001 to 2022.

IPNW insurance loss by damage cause: 2001 to 2022

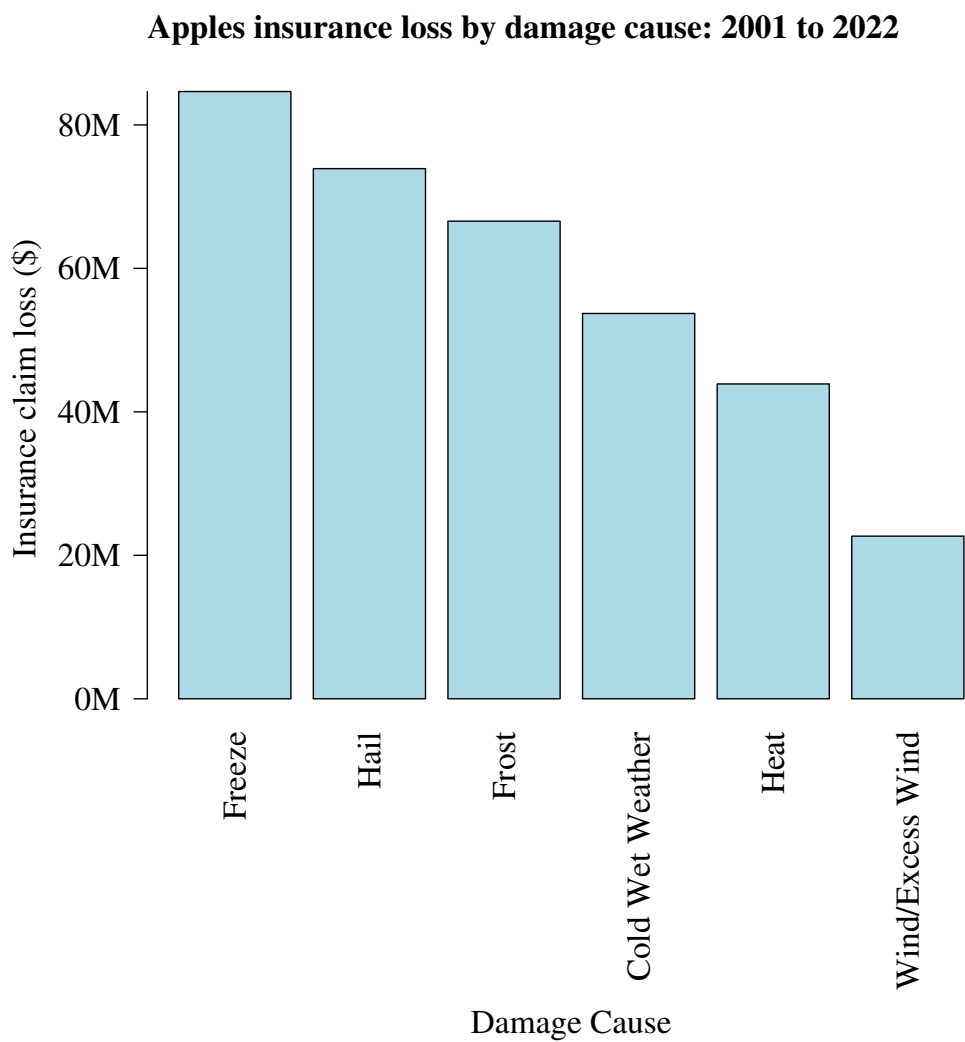Figure S 7: Inland Pacific Northwest agricultural insurance loss by damage cause, 2001 to 2022.

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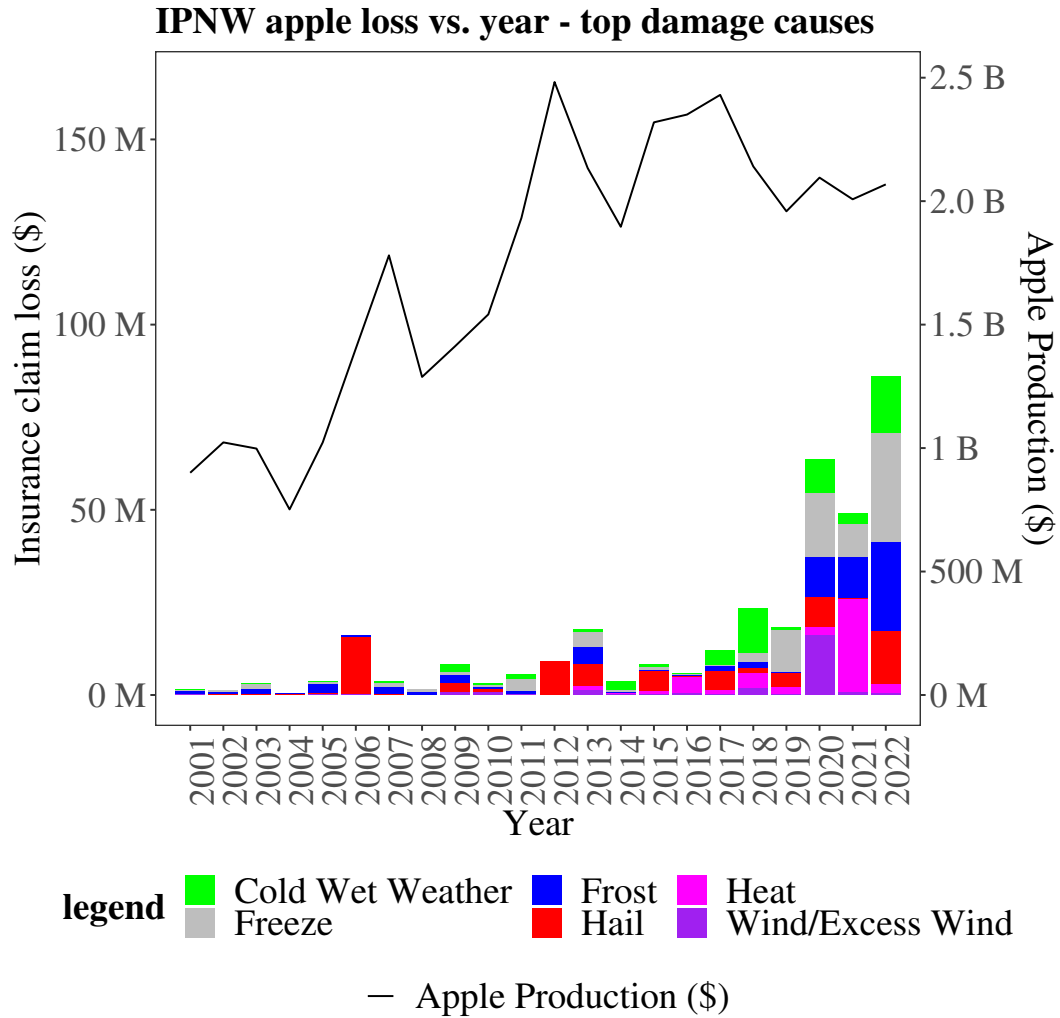Figure S 9: Inland Pacific Northwest agricultural insurance loss for wheat, by damage cause, 2001 to 2022.

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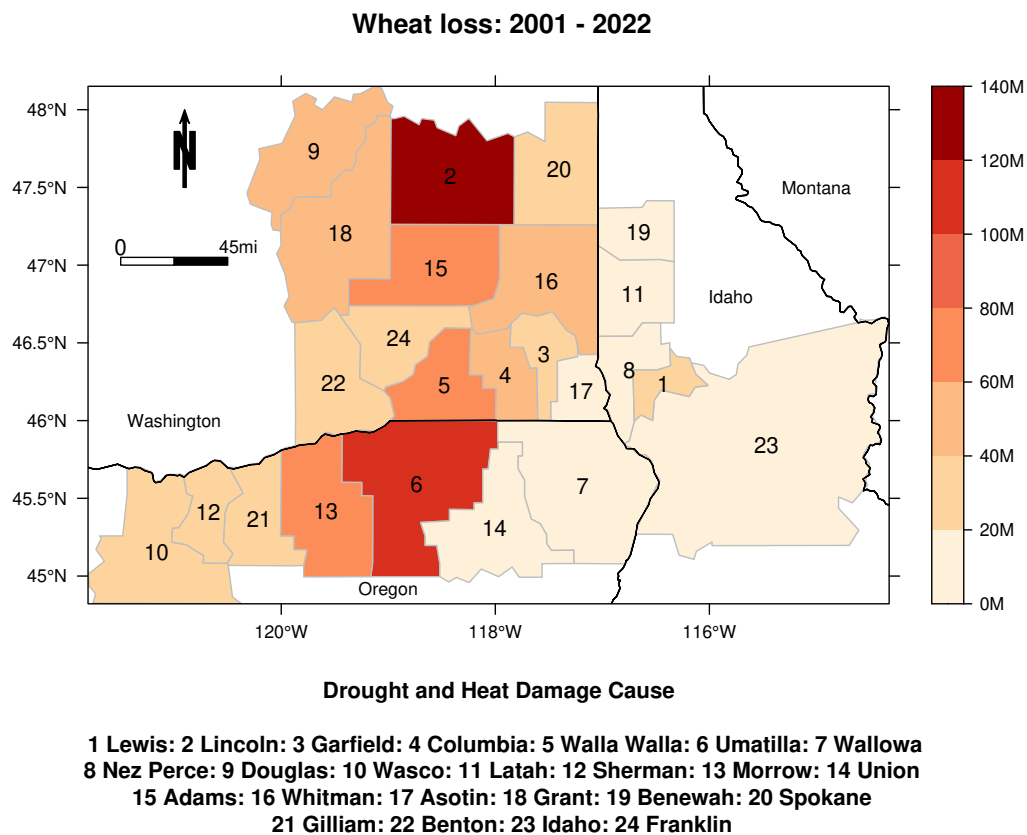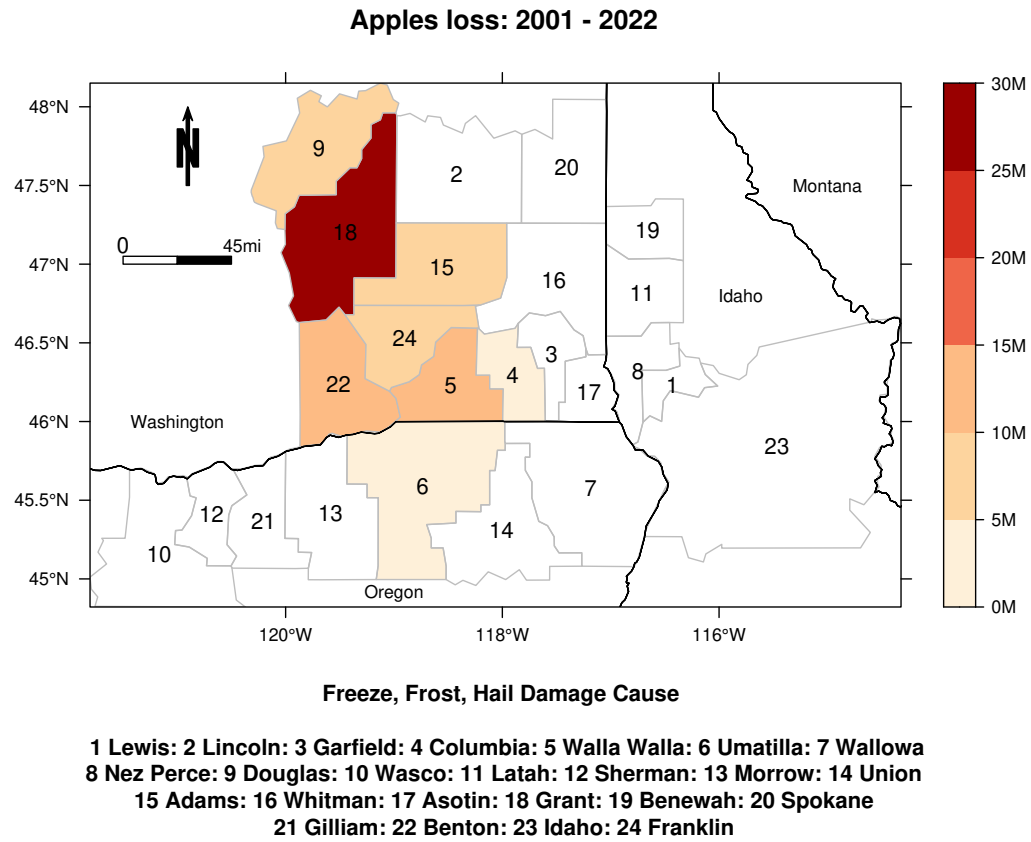
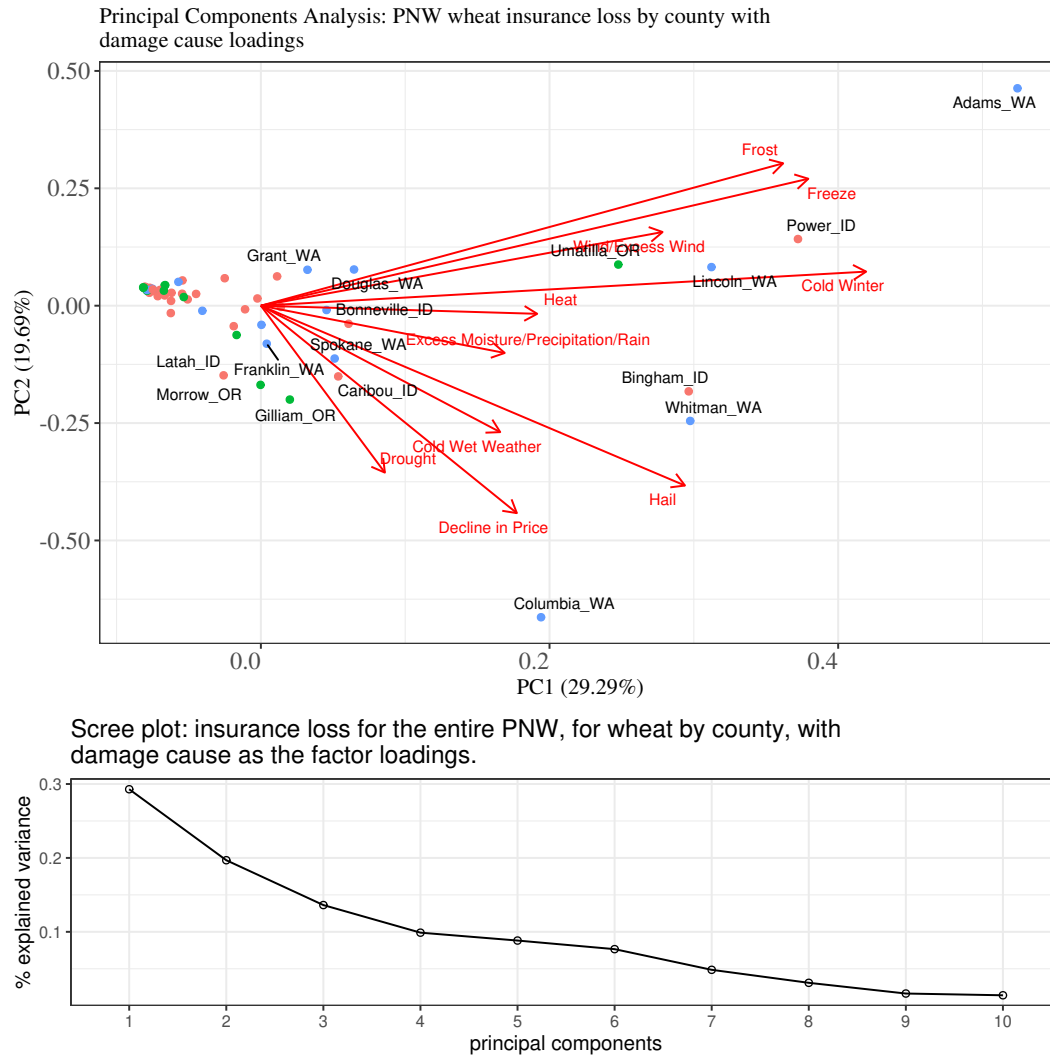Figure S 11: Inland Pacific Northwest map of wheat losses, 2001 to 2022.

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Apples loss: 2001 - 2022

Freeze, Frost, Hail Damage Cause

**1 Lewis: 2 Lincoln: 3 Garfield: 4 Columbia: 5 Walla Walla: 6 Umatilla: 7 Wallowa
8 Nez Perce: 9 Douglas: 10 Wasco: 11 Latah: 12 Sherman: 13 Morrow: 14 Union
15 Adams: 16 Whitman: 17 Asotin: 18 Grant: 19 Benewah: 20 Spokane
21 Gilliam: 22 Benton: 23 Idaho: 24 Franklin**

Figure S 14: Inland Pacific Northwest map of apple losses, 2001 to 2022.

Figure S 15: Top panel: biplot of insurance loss for the entire PNW, for wheat by county, with damage cause as the factor loadings. Bottom panel: Scree plot. Data from 2001 is 2022 is used.
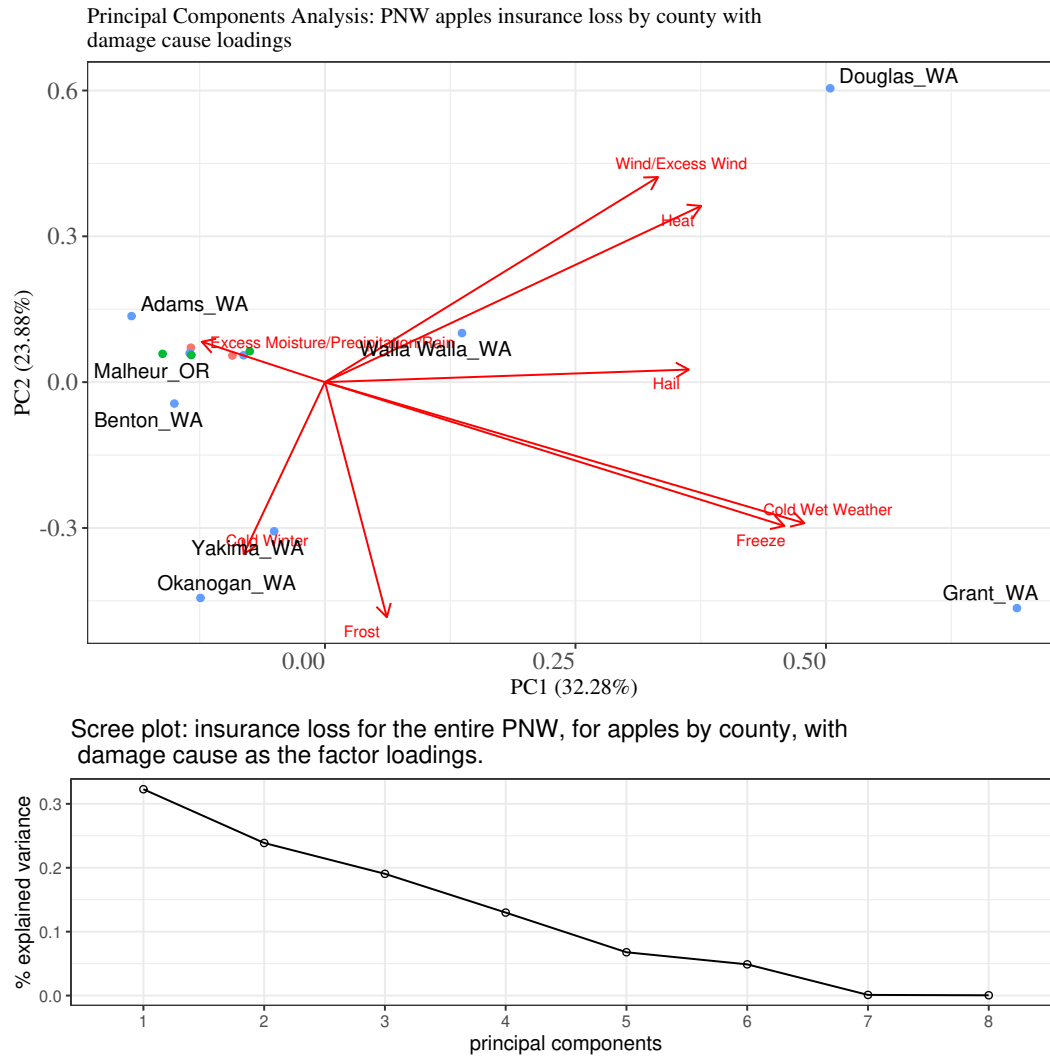
Figure S 16: Top panel: biplot of insurance loss for the entire PNW, for apples by county, with damage cause as the factor loadings. Bottom panel: Scree plot. Data from 2001 is 2022 is used.
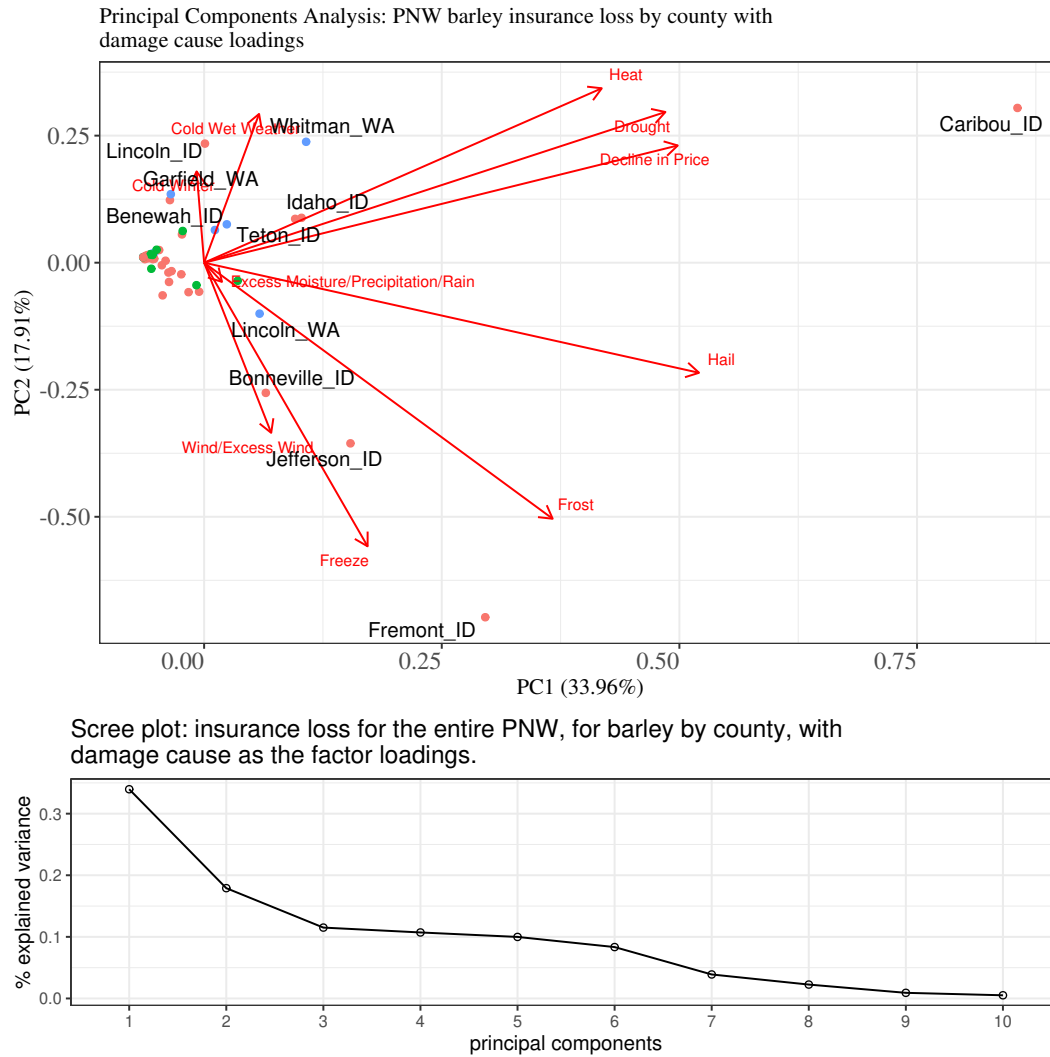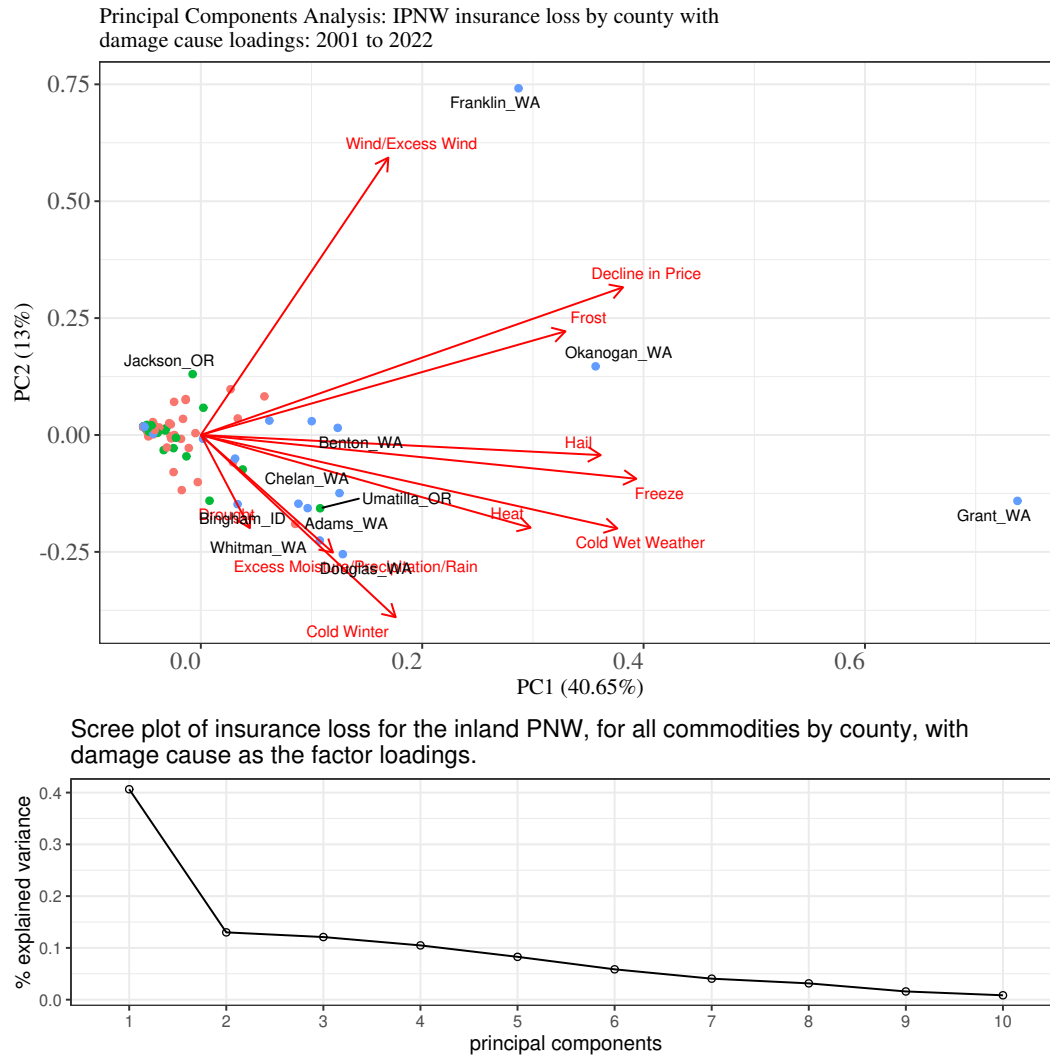
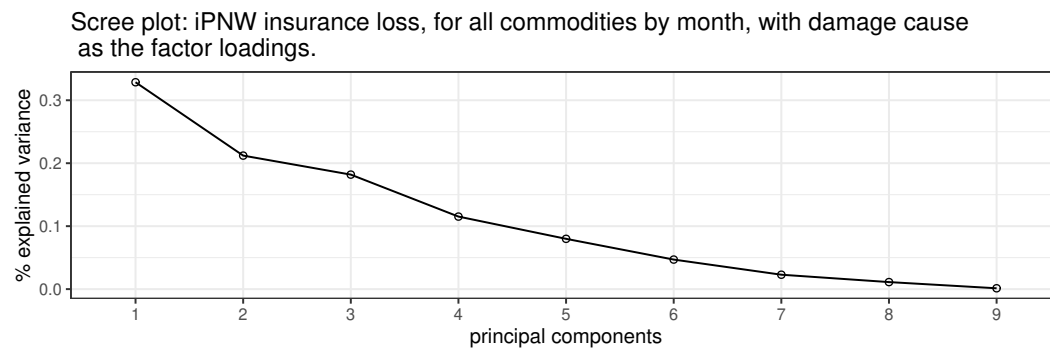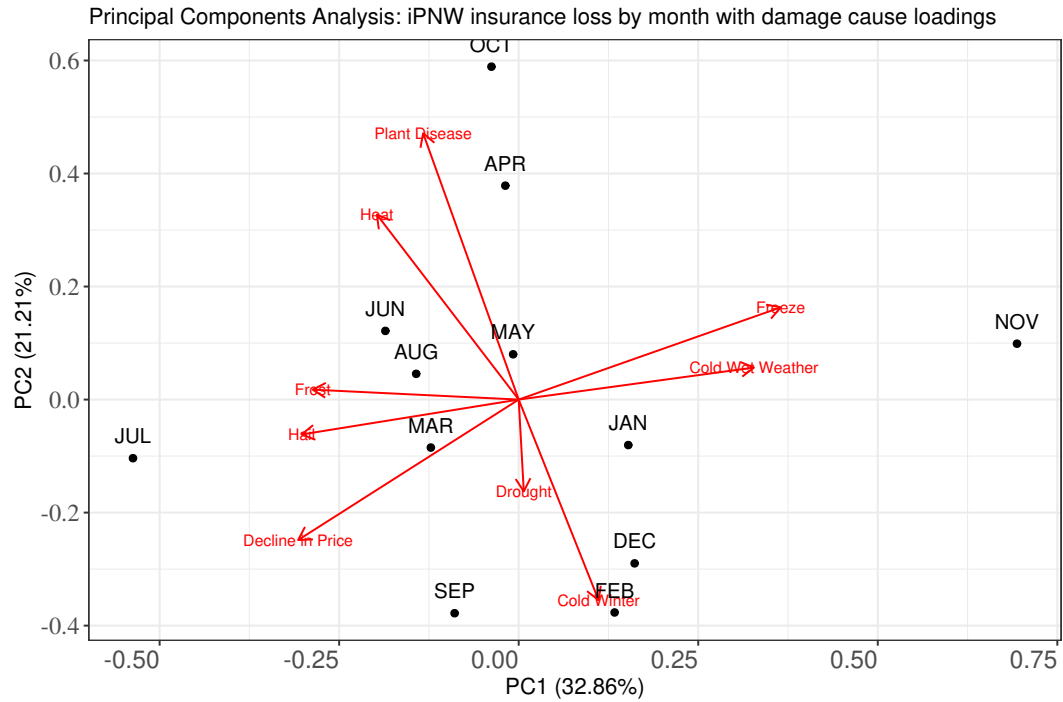Figure S 17: Top panel: biplot of insurance loss for the entire PNW, for barley by county, with damage cause as the factor loadings. Bottom panel: Scree plot. Data from 2001 is 2022 is used.

Principal Components Analysis: IPNW insurance loss by county with
damage cause loadings: 2001 to 2022

Scree plot of insurance loss for the inland PNW, for all commodities by county, with
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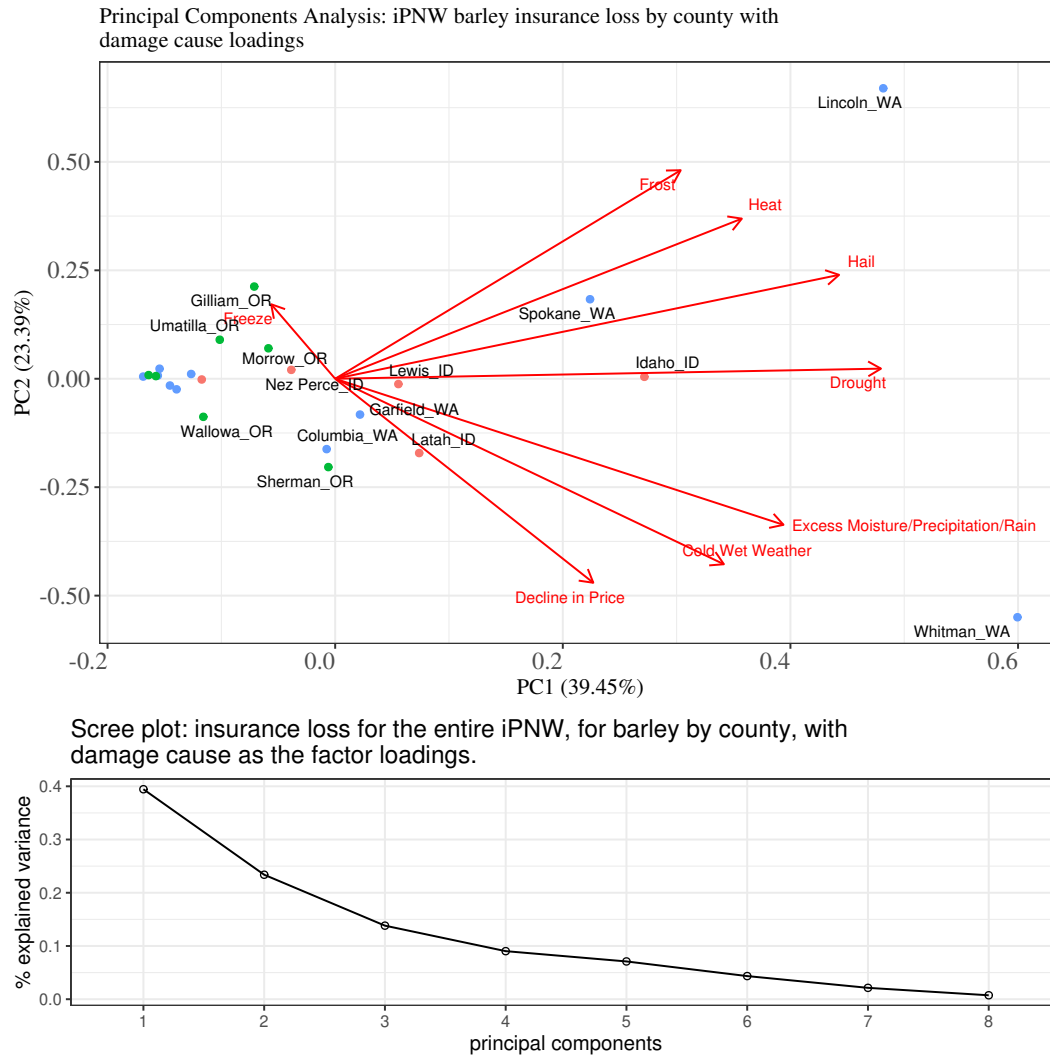
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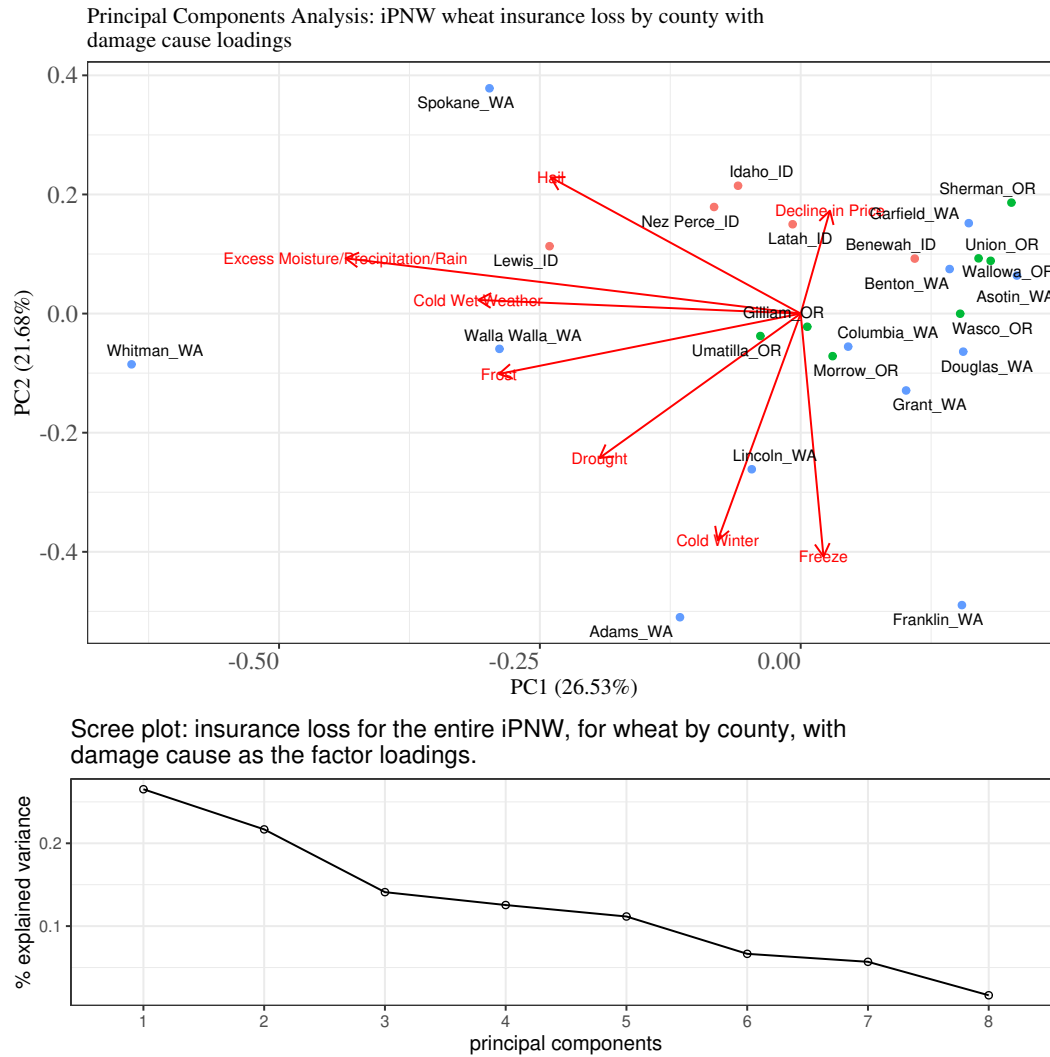
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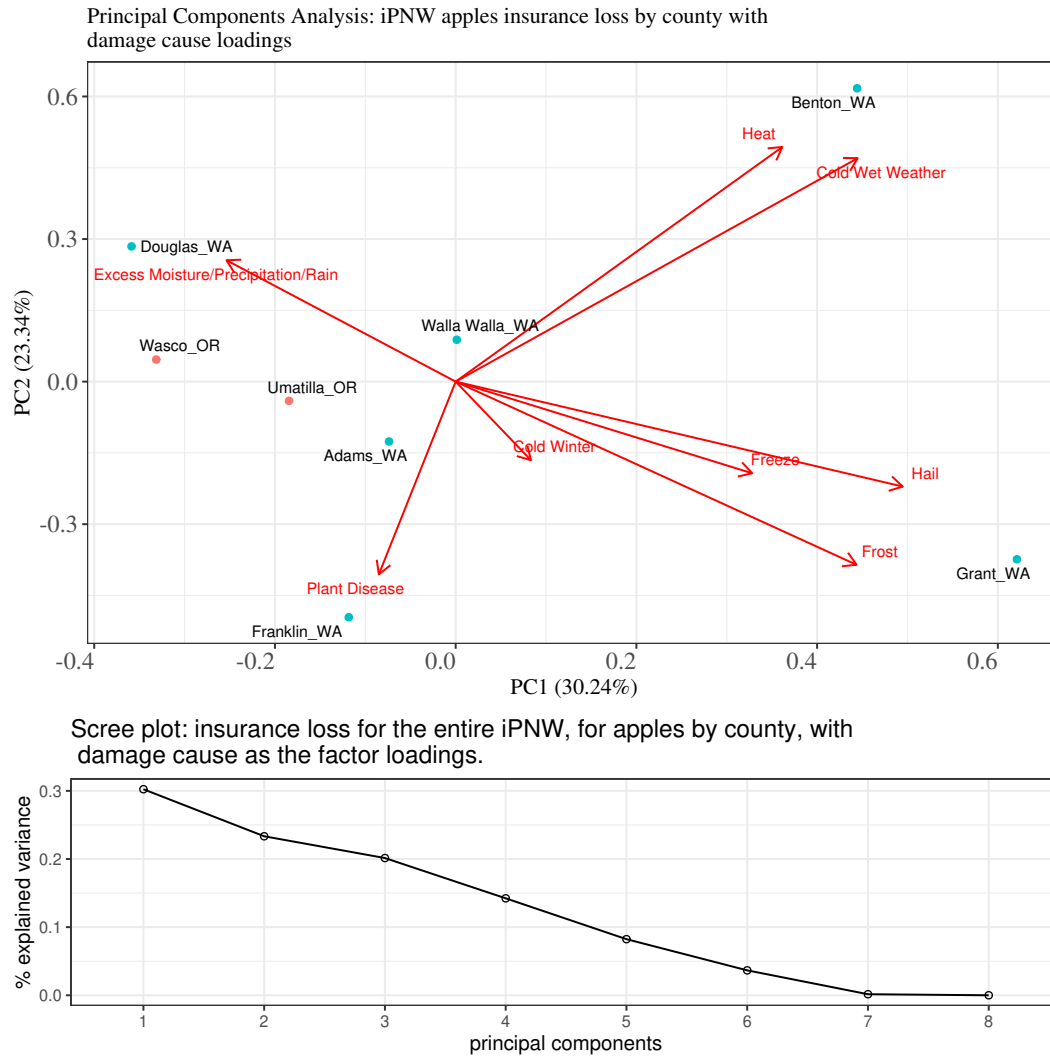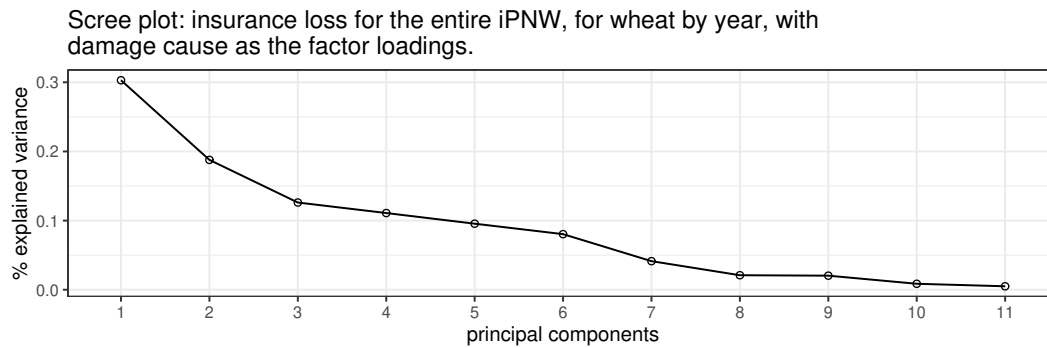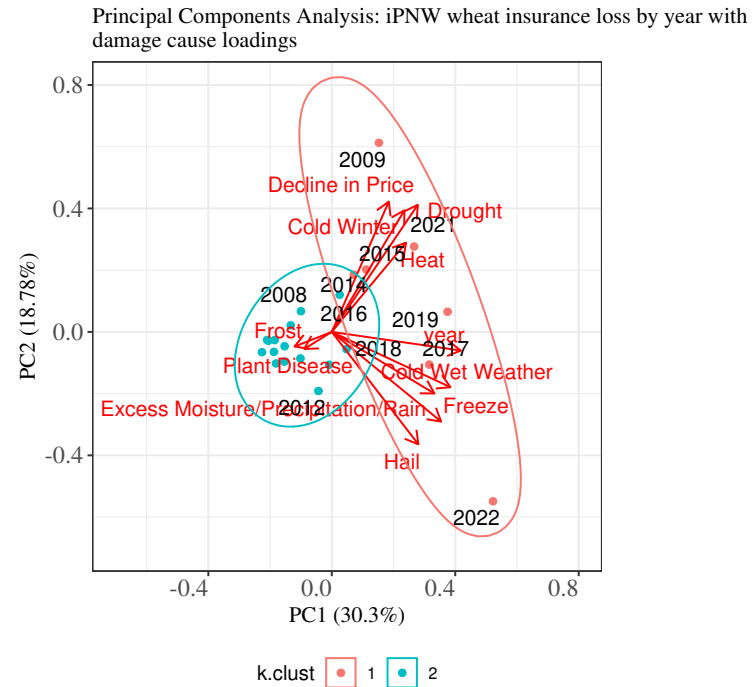
Principal Components Analysis: iPNW apples insurance loss by county with
damage cause loadings

Scree plot: insurance loss for the entire iPNW, for apples by county, with
damage cause as the factor loadings.

Figure S 22: Top panel: biplot of insurance loss for the entire iPNW, for apples by county, with damage cause as the factor loadings. Bottom panel: Scree plot. Data from 2001 is 2022 is used.
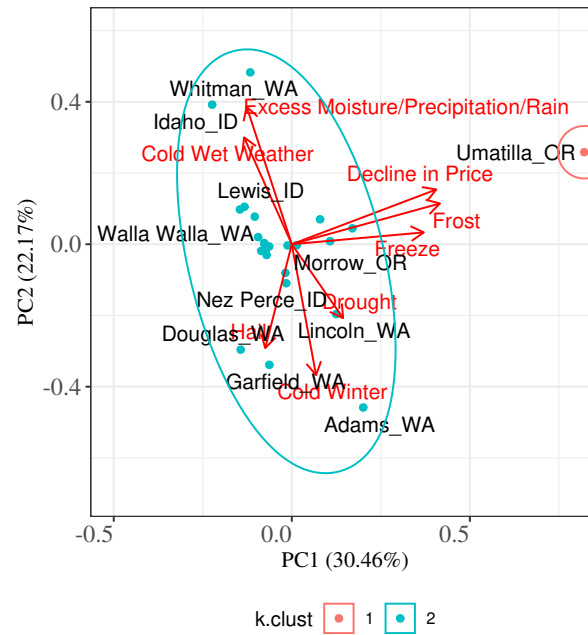
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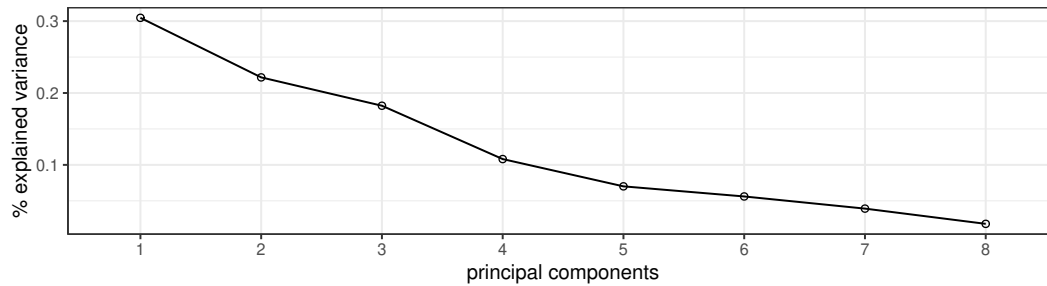
Figure S 24: Top panel: biplot of insurance loss for the iPNW, for wheat by county, with damage cause as the factor loadings. Uses a Kmeans technique for grouping. Bottom panel: Scree plot. Data from 2001 is 2022 is used.