



JANUARY 2022 FLOOD COMPARISONS

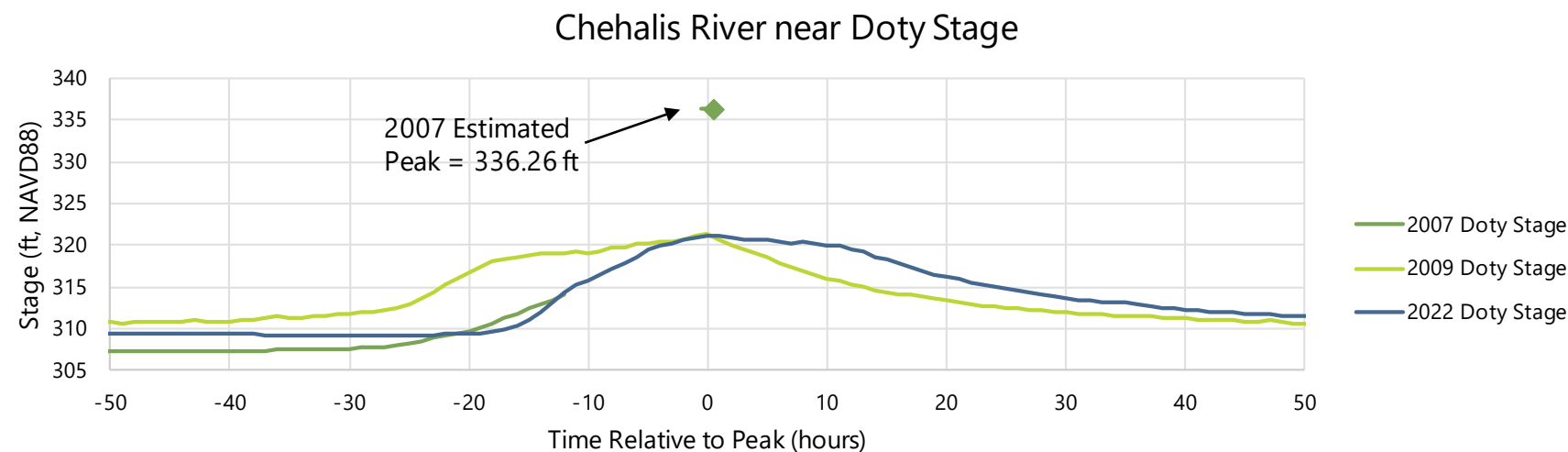
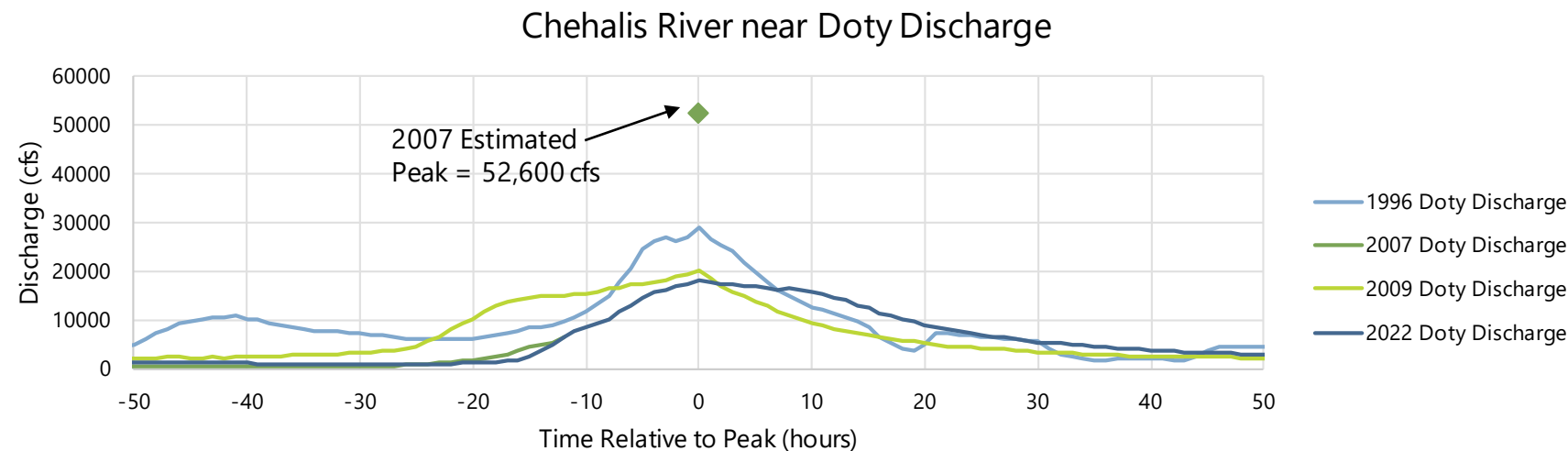
LARRY KARPACK, WSE

January 31, 2022

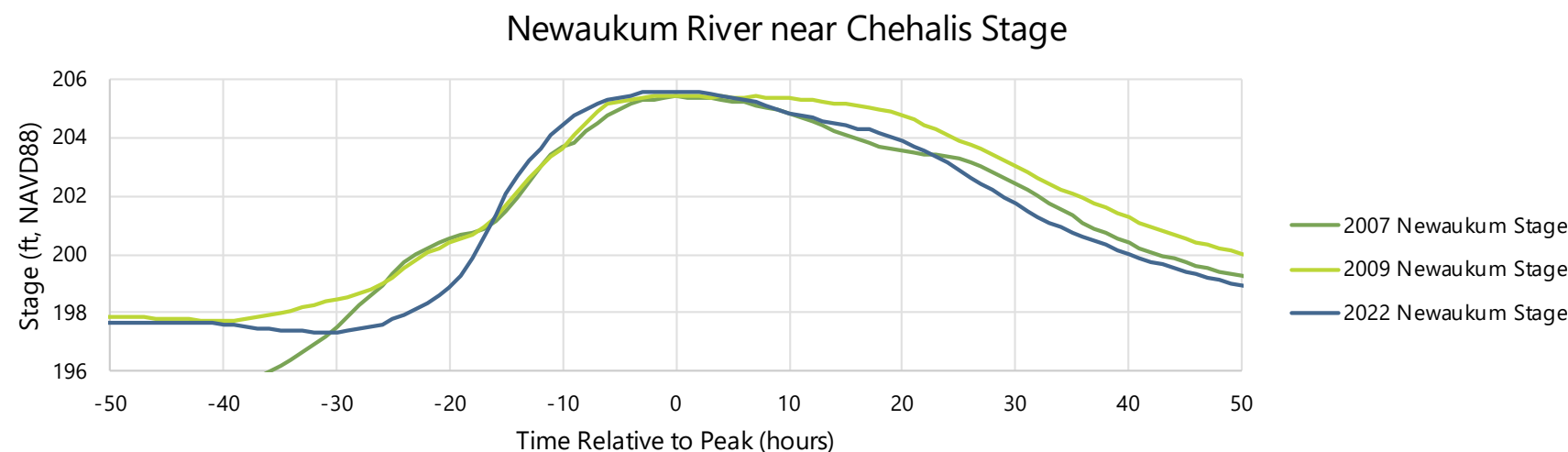
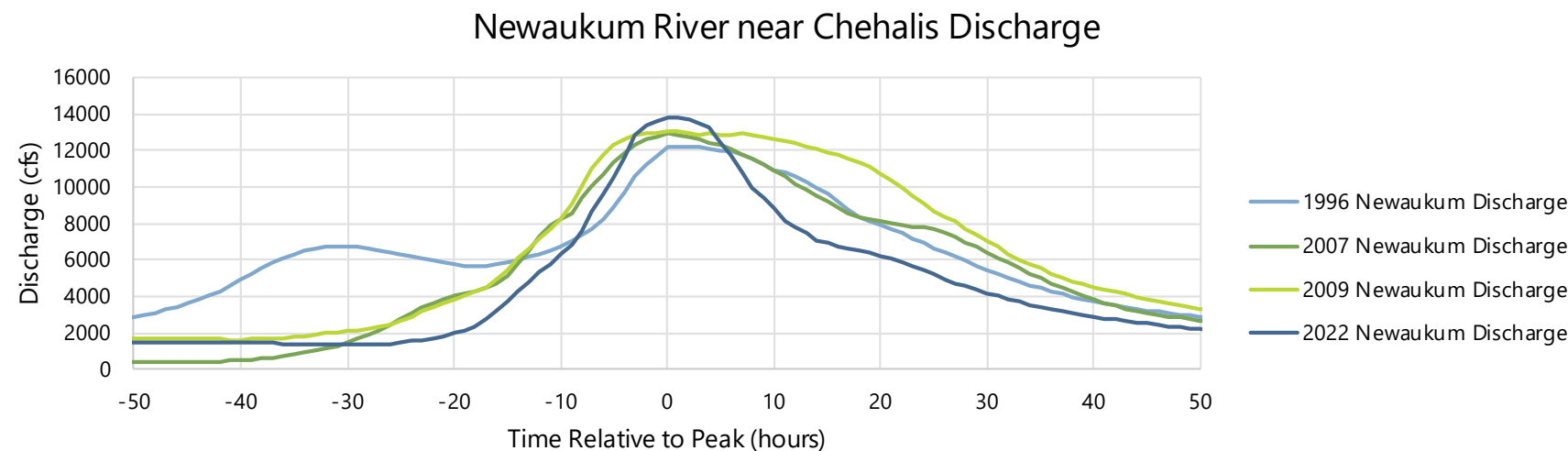
OBJECTIVE

- Compare flows and stages at key locations in the Chehalis basin for the January 2022 flood event against previous flood events
- Comparisons to January 2009, December 2007, and February 1996 events
- All available data were used in these comparisons; some gages were not in place or some data are not available for certain events

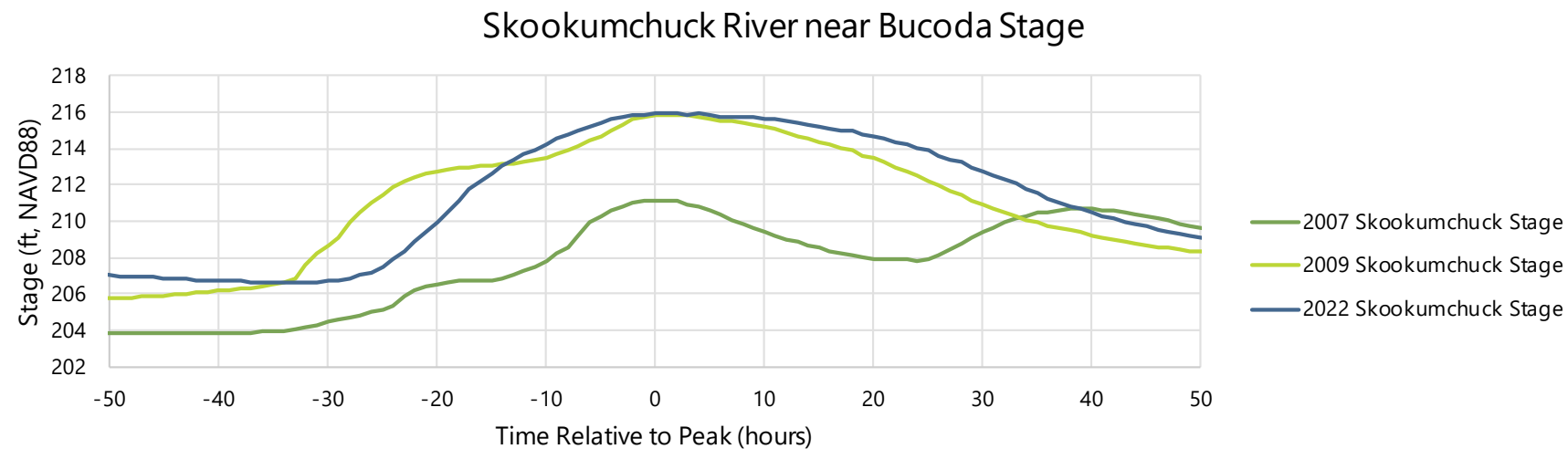
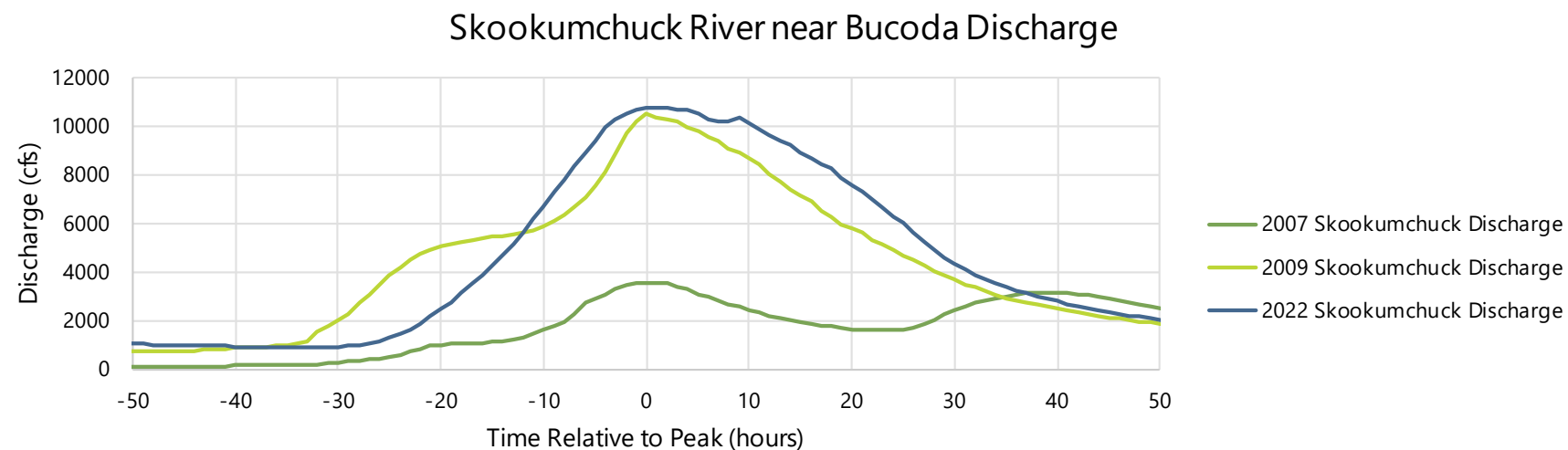
USGS GAGE CHEHALIS RIVER NEAR DOTY



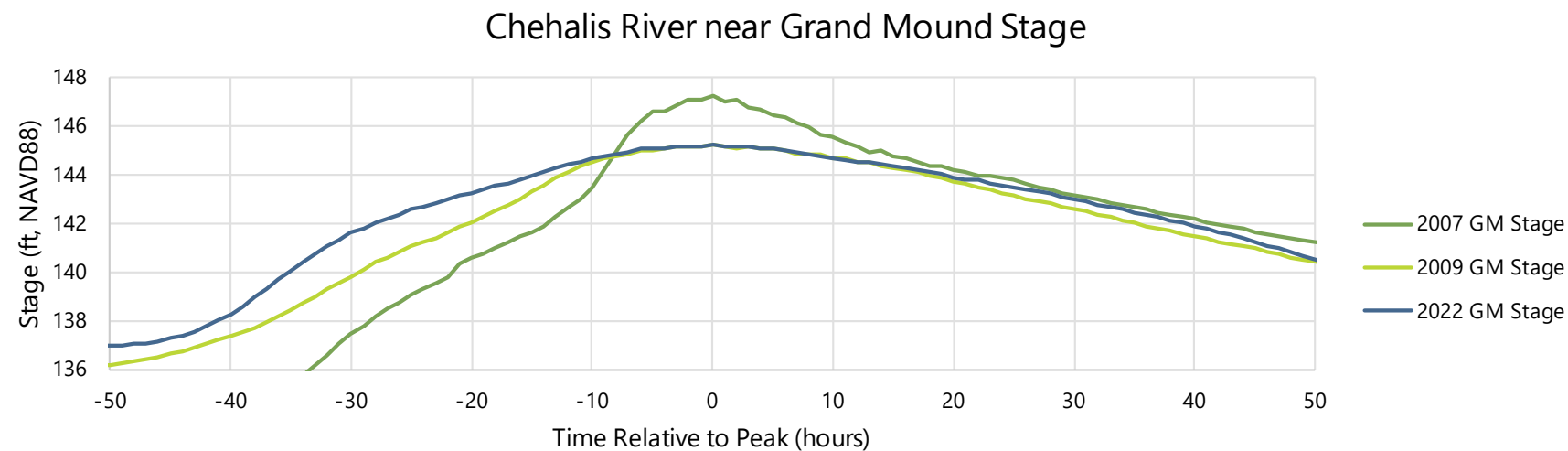
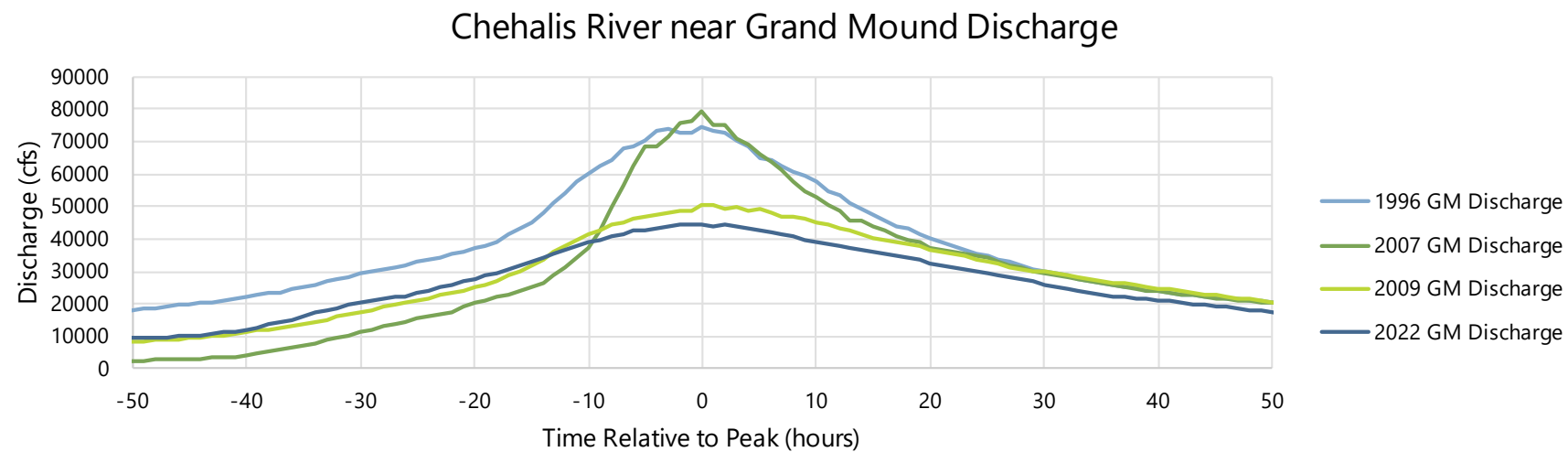
USGS GAGE NEWAUKUM RIVER NEAR CHEHALIS



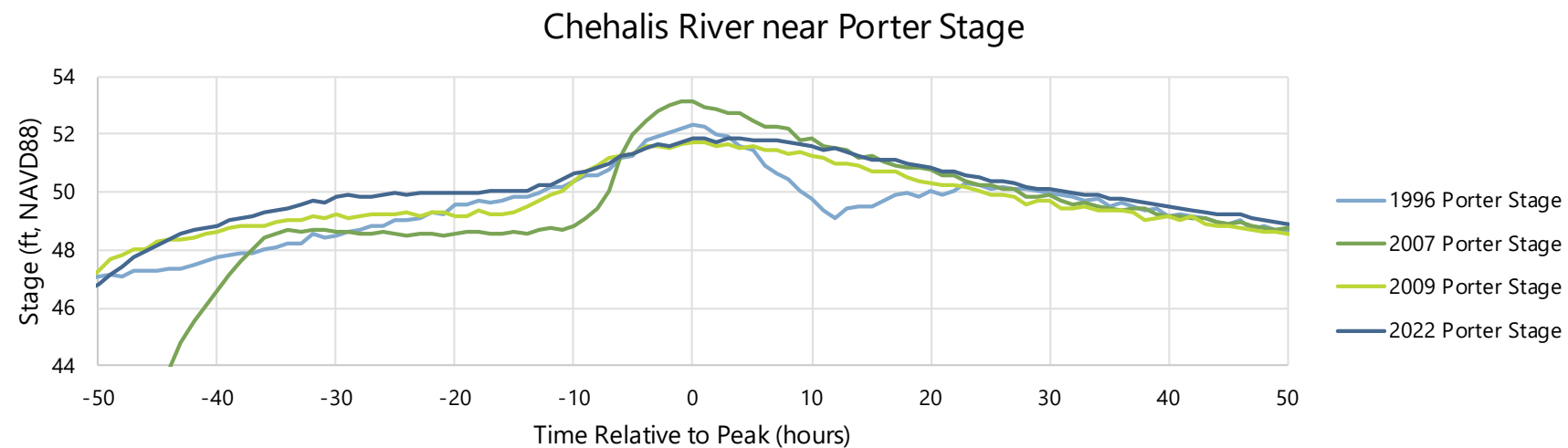
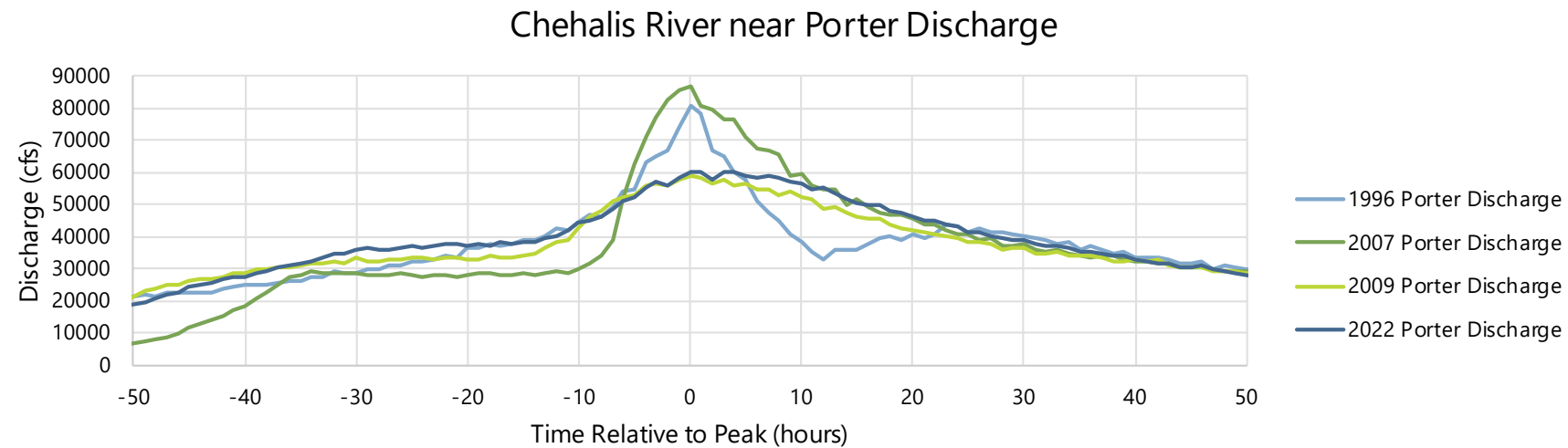
USGS GAGE SKOOKUMCHUCK RIVER NEAR BUCODA



USGS GAGE CHEHALIS RIVER NEAR GRAND MOUND



USGS GAGE CHEHALIS RIVER NEAR PORTER



STAGE AND DISCHARGE COMPARISONS AT ALL GAGES

| | Jan 7-8, 2022 Flood | | | Jan 9, 2009 Flood | | | 2009 minus 2022 | |
|--|---------------------|---------------|--|-------------------|---------------|--|-----------------|--------------|
| | Peak Stage | Peak Flow | | Peak Stage | Peak Flow | | Peak Stage | Peak Flow |
| Gage Description | (feet) | (cfs) | | (feet) | (cfs) | | (feet) | (cfs) |
| Chehalis River near Doty | 321.11 | 18,100 | | 321.28 | 20,100 | | 0.17 | 2,000 |
| Elk Creek below Deer Creek near Doty | 311.10 | 8,810 | | | | | | |
| SF Chehalis River near Wildwood | 365.35 | 7,660 | | 365.01 | 6,870 | | -0.34 | -790 |
| <i>Chehalis River D/S of SF Chehalis (estimated)</i> | | <i>34,600</i> | | | <i>36,800</i> | | | <i>2,200</i> |
| Chehalis River near Adna | 213.21 | 34,800 | | | | | | |
| Newaukum River near Chehalis | 205.59 | 13,900 | | 205.43 | 13,000 | | -0.16 | -900 |
| Chehalis River at Chehalis WWTP | 182.45 | NA | | | | | | |
| Chehalis River at Centralia (Mellen) | 174.93 | NA | | 175.72 | | | 0.79 | |
| Skookumchuck River near Bucoda | 215.99 | 11,000 | | 215.87 | 10,500 | | -0.12 | -500 |
| Skookumchuck River at Centralia | 190.18 | NA | | 190.34 | | | 0.16 | |
| Chehalis River near Grand Mound | 145.21 | 44,600 | | 145.21 | 50,700 | | 0.00 | 6,100 |
| Chehalis River near Porter | 52.01 | 61,900 | | 51.76 | 58,700 | | -0.25 | -3,200 |
| Satsop River near Satsop | 41.23 | 51,700 | | 42.01 | 45,500 | | 0.78 | -6,200 |
| Wynoochee River near Montesano | 40.40 | 15,500 | | 44.59 | 22,700 | | 4.19 | 7,200 |

STAGE AND DISCHARGE COMPARISONS AT ALL GAGES

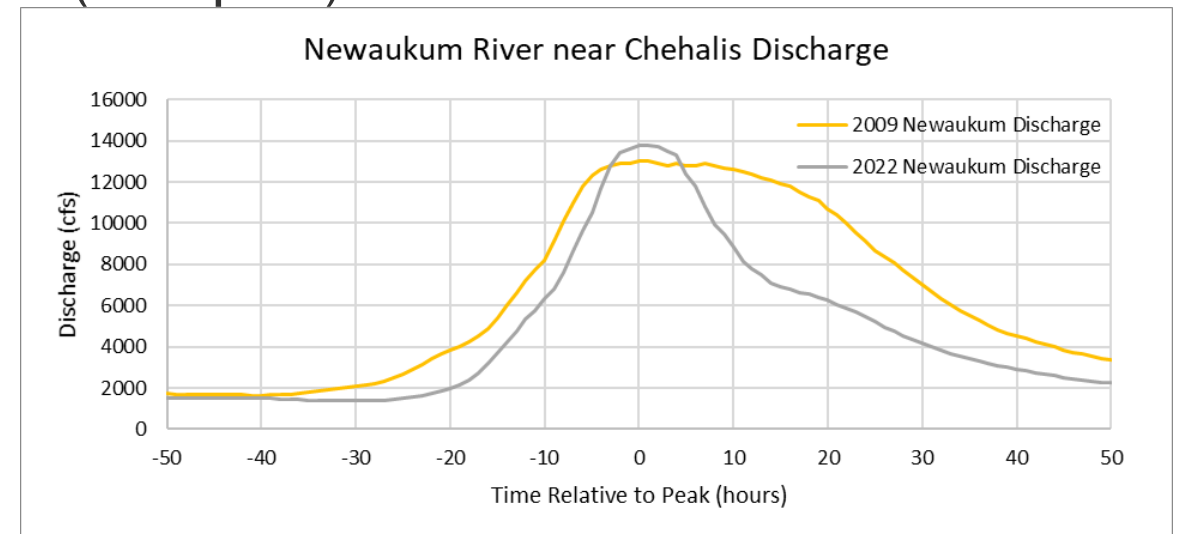
| | Jan 7-8, 2022 Flood | | | Dec 3, 2007 Flood | | | 2007 minus 2022 | |
|--|---------------------|---------------|--|-------------------|---------------|--|-----------------|---------------|
| | Peak Stage | Peak Flow | | Peak Stage | Peak Flow | | Peak Stage | Peak Flow |
| Gage Description | (feet) | (cfs) | | (feet) | (cfs) | | (feet) | (cfs) |
| Chehalis River near Doty | 321.11 | 18,100 | | 336.26 | 52,600 | | 15.15 | 34,500 |
| Elk Creek below Deer Creek near Doty | 311.10 | 8,810 | | | | | | |
| SF Chehalis River near Wildwood | 365.35 | 7,660 | | 367.25 | 12,200 | | 1.90 | 4,540 |
| <i>Chehalis River D/S of SF Chehalis (estimated)</i> | | <i>34,600</i> | | | <i>90,400</i> | | | <i>55,800</i> |
| Chehalis River near Adna | 213.21 | 34,800 | | | | | | |
| Newaukum River near Chehalis | 205.59 | 13,900 | | 205.39 | 12,900 | | -0.20 | -1,000 |
| Chehalis River at Chehalis WWTP | 182.45 | | | | | | | |
| Chehalis River at Centralia (Mellen) | 174.93 | | | 178.10 | | | | |
| Skookumchuck River near Bucoda | 215.99 | 11,000 | | 211.18 | 3,600 | | -4.81 | -7,400 |
| Skookumchuck River at Centralia | 190.18 | | | | | | | |
| Chehalis River near Grand Mound | 145.21 | 44,600 | | 147.26 | 79,100 | | 2.05 | 34,500 |
| Chehalis River near Porter | 52.01 | 61,900 | | 53.17 | 86,500 | | 1.16 | 24,600 |
| Satsop River near Satsop | 41.23 | 51,700 | | 40.52 | 36,400 | | -0.71 | -15,300 |
| Wynoochee River near Montesano | 40.40 | 15,500 | | 38.21 | 12,000 | | -2.19 | -3,500 |

STAGE AND DISCHARGE COMPARISONS AT ALL GAGES

| | Jan 7-8, 2022 Flood | | | Feb 8, 1996 Flood | | | 1996 minus 2022 | |
|--|---------------------|---------------|--|-------------------|---------------|--|-----------------|---------------|
| | Peak Stage | Peak Flow | | Peak Stage | Peak Flow | | Peak Stage | Peak Flow |
| Gage Description | (feet) | (cfs) | | (feet) | (cfs) | | (feet) | (cfs) |
| Chehalis River near Doty | 321.11 | 18,100 | | 325.27 | 28,900 | | 4.16 | 10,800 |
| Elk Creek below Deer Creek near Doty | 311.10 | 8,810 | | | | | | |
| SF Chehalis River near Wildwood | 365.35 | 7,660 | | 364.84 | 5,620 | | -0.51 | -2,040 |
| <i>Chehalis River D/S of SF Chehalis (estimated)</i> | | <i>34,600</i> | | | <i>48,600</i> | | | <i>14,000</i> |
| Chehalis River near Adna | 213.21 | 34,800 | | | | | | |
| Newaukum River near Chehalis | 205.59 | 13,900 | | 205.48 | 13,300 | | -0.11 | -600 |
| Chehalis River at Chehalis WWTP | 182.45 | | | | | | | |
| Chehalis River at Centralia (Mellen) | 174.93 | | | 177.63 | | | 2.70 | |
| Skookumchuck River near Bucoda | 215.99 | 11,000 | | 216.02 | 11,300 | | 0.03 | 300 |
| Skookumchuck River at Centralia | 190.18 | | | 191.03 | | | 0.85 | |
| Chehalis River near Grand Mound | 145.21 | 44,600 | | 147.01 | 74,800 | | 1.80 | 30,200 |
| Chehalis River near Porter | 52.01 | 61,900 | | 53.17 | 80,700 | | 1.16 | 18,800 |
| Satsop River near Satsop | 41.23 | 51,700 | | NA | 26,800 | | | -24,900 |
| Wynoochee River near Montesano | 40.40 | 15,500 | | NA | 13,600 | | | -1,900 |

OBSERVATIONS FROM FLOOD COMPARISONS

- January 2022 flood very similar to January 2009 event:
 - Doty, SF Chehalis, Newaukum, Skookumchuck all within 10% of 2009
 - Grand Mound about 12% lower in 2022 than in 2009
 - Grand Mound in 2022 was 44% lower than 2007 and 40% lower than 1996
- Newaukum Peak flows in 2022 and 2009 were 13,900 and 13,000 cfs, but the duration of high flows were different (see plot)
- Highway flooding worse in 2009
- Not sure about other flood impacts?



OBSERVATIONS FROM FLOOD COMPARISONS

- Newaukum peak flows very similar for all four floods (2022, 2009, 2007, 1996)
- Skookumchuck peaks very similar for all four events except 2007
- 2009 and 2022 floods were 5 to 10-year events at Grand Mound
- 2007 had high flows in most locations and extremely high flows at Doty
 - Low flows in 2007 at Bucoda caused by Skookumchuck Dam
- 1996 had high flows on all tribs and approximately 100-year flood at Grand Mound

QUESTIONS OR DISCUSSION

