

## APPENDIX B

### U.S. Army Corps flood crest data

Flood crest travel times at various discharge rates for stretches of the Russian River were obtained from the Sonoma County Water Agency's Emergency Operation Plan (SCWA, 1987). The SCWA took those figures from the U. S. Army Corps of Engineers' report (USACOE, 1986). Travel times are in hours between locations, and the miles between locations are also given. The USACOE in San Francisco originally prepared this report, though they are no longer responsible for the area, and have not retained records of the actual methodology. Presumably travel times were estimated from a computerized water surface profile computation program based on flood hydrographs. The flood crest travel time was measured from gauge to gauge, then converted to mph, and then the travel time calculated from town to town. The USACOE was interested in travel times for actual flood events where discharge exceeded flood stage, and since the calculations were based on flood crests did not feel that the lower end of this model is reliable (Brick, 1987).

Measurements of river miles between towns from USGS 7.5-minute topographical maps did not agree with the distances reported in the USACOE report. To adjust the USACOE's data to compare with the formalin and velocity-derived data, we obtained the speed in mph by dividing the reported travel time by measured distances between towns. Plots of these data as flood crest speed in mph and fps follow, along with the cumulative travel times as reported in the SCWA report.

The estimated travel times showed a dramatic increase in travel time between Healdsburg and Guerneville, i.e. increase in slope of cumulative time vs. miles downstream as compared to the rest of the river. Likely this is an artifact of the model at less than flood level discharge rates, and dependent on the storm pattern, i.e. the model most likely assumes storage of flood waters in the Mark West Creek and Laguna de Santa Rosa systems at all discharge rates. That storage effect is not an actuality at low discharge rates, although the USACOE travel time estimates suggest such (Brick, 1987; Markham, 1987; SCWA, 1987).

RUSSIAN RIVER FLOOD CREST DATA FROM:

SONOMA COUNTY WATER AGENCY  
AND U.S. ARMY CORPS OF ENGINEERS.

LOCATION	LENGTH Rept.Mi.	DISCHARGE (CFS)	TRAV.TIME (Hours)	Reported miles/hours		19.2/rept mph
				SPEED (MPH)	SPEED (FPS)	Trv.Tm. (Hours)
Forks of	14	400	11	1.273	1.867	15.08
R.R. to		1000	9	1.555	1.061	12.35
Hopland		2000	7.5	1.867	1.273	10.28
		4000	6.5	2.154	1.469	8.91
Meas.Miles = 19.2		6000	6	2.333	1.591	8.23
		8000	6	2.333	1.591	8.23
		10000	5.5	2.545	1.735	7.54
		20000	5	2.8	1.909	6.86
		40000	4.5	3.111	2.111	6.17
						15/rept mph
Hopland	16	400	12.5	1.28	1.877	11.72
to		1000	9	1.778	1.212	8.44
Cloverdale		2000	7	2.286	1.559	6.56
		4000	5.5	2.901	1.978	5.17
Meas.Miles = 15		6000	5	3.2	2.182	4.69
		8000	4.5	3.556	2.424	4.22
		10000	4	4	2.727	3.75
		20000	3	5.333	3.636	2.81
		40000	2.5	6.4	4.364	2.34
						30.5/rept mph
Cloverdale	28	400	18.5	1.513	2.219	20.16
to		1000	13	2.154	1.469	14.16
Hidsburg		2000	10.5	2.667	1.818	11.44
		4000	9.5	2.947	2.009	10.35
Meas.Miles = 30.5		6000	8.5	3.294	2.246	9.26
		8000	8	3.5	2.386	8.71
		10000	7.5	3.733	2.545	8.17
		20000	6.5	4.308	2.937	7.08
		40000	6	4.667	3.182	6.54
						17.4/rept mph
Hidsburg	16	400	43	0.372	0.5456	46.77
to		1000	31	0.516	0.757	33.72
Grnville		2000	26	0.615	0.419	28.29
		4000	21	0.762	0.52	22.83
Meas.Miles = 17.4		6000	19	0.842	0.574	20.67
		8000	18	0.889	0.606	19.57
		10000	16.5	0.97	0.661	17.94
		20000	14	1.143	0.779	15.22
		40000	13	1.231	0.839	14.13

TOWNS MEASURED AT:  
 FORKS = FORKS OF RUSSIAN RIVER  
 HOP = HOPLAND BRIDGE  
 CLOV = CROCKER ROAD BRIDGE

HLD = HWY.101 BRIDGE  
 GRNVL = GUERNEVILLE BRIDGE

NOTE: USACDE REPORTS THESE TO BE FLOOD CRESTS TRAVEL TIMES BETWEEN TOWNS  
 CALCULATED FROM THE FLOOD CREST TRAVEL TIMES BETWEEN GAUGES.

CUMULATIVE FLOOD CREST TRAVEL TIMES CALCULATED  
FROM SONOMA COUNTY WATER AGENCY REPORT  
AND USING REPORTED MILEAGES

Discharge rate (cfs)	Hours from Ukiah to:			
	<u>Hopland</u>	<u>Cloverdale</u>	<u>Healdsburg</u>	<u>Guerneville</u>
400	11	23.5	42	85
1,000	9	18	31	62
2,000	7.5	14.5	25	51
4,000	6.5	12	21.5	42.5
6,000	6	11	19	38.5
8,000	6	10.5	18.5	36.5
10,000	5.5	9.5	17	33.5
20,000	5	8	14.5	28.5
40,000	4.5	7	13	26
Mileage from Ukiah	14	30	58	74

FLOOD CREST TRAVEL TIMES ADJUSTED FOR  
MEASURED MILEAGES BETWEEN TOWNS AND USING  
HOPLAND AS THE STARTING POINT

Discharge rate (cfs)	Hours from Hopland to:			
	<u>Hopland</u>	<u>Cloverdale</u>	<u>Healdsburg</u>	<u>Guerneville</u>
400	0	11.7	31.9	78.6
1,000	0	8.4	22.6	56.3
2,000	0	6.6	18.0	46.3
4,000	0	5.2	15.5	38.4
6,000	0	4.7	14.0	34.6
8,000	0	4.2	12.9	33.5
10,000	0	3.8	11.9	30.9
20,000	0	2.8	9.9	29.9
40,000	0	2.3	8.8	23.0
Mileage from Ukiah	19.2	34.2	64.7	82.1

