

APPENDIX D - Detailed Cost Estimates

PV with 7 percent discount rate

Present Value	3079894		4451237		10092300		16768260		8174299		4741300		5797385		7,118,839
	1,944,160	4,215,627	3,113,821	5,788,653	7,858,238	12,326,363	11,827,303	21,709,217	6,187,271	10,161,328	3,631,062	5,851,537	4,475,931		
	Alt 1	Alt 1	Alt 25	Alt 25	Alt 41	Alt 41	Alt 41b	Alt 41b	Alt 43	Alt 43	Alt 79	Alt 79	Alt 81	Alt 81	
Year	Low	High	Low	High	Low	High	Low	High	Low	High	Low	High	Low	High	
2010	414,883	1,048,126	1,314,525	2,451,306	3,471,919	5,240,632	4,048,389	7,140,362	2,755,699	4,416,543	1,729,409	2,778,845	2,166,128	3,433,924	
2011	387,741	979,557	1,228,528	2,290,940	3,244,784	4,897,787	3,783,541	6,673,235	2,575,420	4,127,610	1,616,270	2,597,052	2,024,419	3,209,275	
2012	91,547	175,466	45,774	83,918	91,547	175,466	320,416	633,203	68,661	129,692	22,887	38,145	22,887	38,145	
2013	85,558	163,987	42,779	78,428	85,558	163,987	299,454	591,779	64,169	121,208	21,390	35,649	21,390	35,649	
2014	79,961	153,259	39,981	73,298	79,961	153,259	279,864	553,064	59,971	113,278	19,990	33,317	19,990	33,317	
2015	74,730	143,232	37,365	68,502	74,730	143,232	261,555	516,882	56,047	105,867	18,682	31,137	18,682	31,137	
2016	69,841	133,862	34,921	64,021	69,841	133,862	244,444	483,068	52,381	98,942	17,460	29,100	17,460	29,100	
2017	65,272	125,105	32,636	59,833	65,272	125,105	228,452	451,465	48,954	92,469	16,318	27,197	16,318	27,197	
2018	61,002	116,920	30,501	55,918	61,002	116,920	213,507	421,930	45,751	86,419	15,250	25,417	15,250	25,417	
2019	57,011	109,271	28,506	52,260	57,011	109,271	199,539	394,327	42,758	80,766	14,253	23,755	14,253	23,755	
2020	53,281	102,123	26,641	48,841	53,281	102,123	186,485	368,530	39,961	75,482	13,320	22,201	13,320	22,201	
2021	49,796	95,442	24,898	45,646	49,796	95,442	174,285	344,420	37,347	70,544	12,449	20,748	12,449	20,748	
2022	46,538	89,198	23,269	42,660	46,538	89,198	162,883	321,888	34,904	65,929	11,635	19,391	11,635	19,391	
2023	43,494	83,363	21,747	39,869	43,494	83,363	152,227	300,830	32,620	61,616	10,873	18,122	10,873	18,122	
2024	40,648	77,909	20,324	37,261	40,648	77,909	142,269	281,150	30,486	57,585	10,162	16,937	10,162	16,937	
2025	37,989	72,812	18,994	34,823	37,989	72,812	132,961	262,757	28,492	53,818	9,497	15,829	9,497	15,829	
2026	35,504	68,049	17,752	32,545	35,504	68,049	124,263	245,567	26,628	50,297	8,876	14,793	8,876	14,793	
2027	33,181	63,597	16,590	30,416	33,181	63,597	116,133	229,502	24,886	47,006	8,295	13,825	8,295	13,825	
2028	31,010	59,436	15,505	28,426	31,010	59,436	108,536	214,488	23,258	43,931	7,753	12,921	7,753	12,921	
2029	28,982	55,548	14,491	26,566	28,982	55,548	101,435	200,456	21,736	41,057	7,245	12,076	7,245	12,076	
2030	27,086	51,914	13,543	24,828	27,086	51,914	94,800	187,342	20,314	38,371	6,771	11,286	6,771	11,286	
2031	25,314	48,518	12,657	23,204	25,314	48,518	88,598	175,086	18,985	35,861	6,328	10,547	6,328	10,547	
2032	23,658	45,344	11,829	21,686	23,658	45,344	82,802	163,632	17,743	33,515	5,914	9,857	5,914	9,857	
2033	22,110	42,377	11,055	20,267	22,110	42,377	77,385	152,927	16,582	31,322	5,527	9,212	5,527	9,212	
2034	20,663	39,605	10,332	18,942	20,663	39,605	72,322	142,922	15,498	29,273	5,166	8,610	5,166	8,610	
2035	19,312	37,014	9,656	17,702	19,312	37,014	67,591	133,572	14,484	27,358	4,828	8,047	4,828	8,047	
2036	18,048	34,593	9,024	16,544	18,048	34,593	63,169	124,834	13,536	25,568	4,512	7,520	4,512	7,520	

COST ANALYSIS

Category	Union St.	Union St.	Sabin	Sabin	Boardman Pond	Boardman Pond	Brown Bridge Pond	Brown Bridge Pond	TOTAL
	Low	High	Low	High	Low	High	Low	High	Low
Annual maintenance(per year)	30,000	50,000	30,000	60,000	30,000	60,000	30,000	60,000	120,000
Repairs	400,000	600,000	100,000	200,000	100,000	300,000	350,000	1,300,000	950,000
Modify for fish passage	1,000,000	1,500,000	1,500,000	2,000,000	2,000,000	2,500,000	2,000,000	2,500,000	6,500,000
Modify for flood control	0	0	0	0	100,000	200,000	200,000	500,000	300,000
Modify for bottom draw	0	0	0	0	0	0	800,000	1,200,000	800,000
Modification Total	1,000,000	1,500,000	1,500,000	2,000,000	2,100,000	2,700,000	3,000,000	4,200,000	7,600,000
Breach and remove impoundments	0	0	300,000	900,000	1,500,000	1,900,000	1,000,000	1,500,000	2,800,000
Manage sediment (breach only)	0	0	10,000	13,000	300,000	600,000	200,000	350,000	510,000
Manage stream banks (breach only)	0	0	50,000	100,000	100,000	200,000	100,000	200,000	250,000
Partial Removal Total	0	0	360,000	1,013,000	1,900,000	2,700,000	1,300,000	2,050,000	3,560,000
Breach dam (from above)	0	0	300,000	900,000	1,500,000	1,900,000	1,000,000	1,500,000	2,800,000
Manage sediment			10,000	13,000	300,000	600,000	200,000	350,000	510,000
Manage stream banks			50,000	100,000	100,000	200,000	100,000	200,000	250,000
Disconnect utilities	0	0	10,000	20,000	10,000	30,000	10,000	20,000	30,000
Asbestos abatement allowance	0	0	50,000	100,000	50,000	100,000	50,000	100,000	150,000
Environmental remediation allowance	0	0	50,000	100,000	50,000	100,000	50,000	100,000	150,000
Demolish powerhouse, spillway, etc.	0	0	100,000	150,000	250,000	300,000	200,000	300,000	550,000
Excavate and remove earthen embankment	0	0	1,300,000	2,300,000	2,600,000	4,800,000	6,900,000	12,900,000	10,800,000
Rebuild infratructure	0	0	0	0	500,000	800,000			500,000
Total Removal Total			1,870,000	3,683,000	5,360,000	8,830,000	8,510,000	15,470,000	15,740,000
Modify dams for hydroelectric power									
FERC process	0	0	200,000	250,000	200,000	250,000	200,000	250,000	600,000
Modify dams for flood control	0	0			1,000,000	1,800,000	20,000	2,500,000	1,020,000
Modify dams for fish passage	0	0	1,500,000	2,000,000	2,000,000	2,500,000	2,000,000	2,500,000	5,500,000
Modify dam for bottom draw	0	0					200,000	400,000	200,000
Annual maintenance			100000	200000	100000	200000	100,000	200,000	300,000
Modify for Hydroelectric Total	0	0	1,800,000	2,450,000	3,300,000	4,750,000	2,520,000	5,850,000	7,620,000

SUMMARY

GRAND TOTAL	Low Estimate	High Estimate	Average
Alternative 1 Retain/repair all dams	1,070,000	2,630,000	\$1,850,000
Alternative 25 Remove (Partial) Sabin/Boardman;Repair Union St and Brown Bridge	3,070,000	5,723,000	\$4,396,500
Alternative 41 Modify all dams	8,070,000	12,230,000	\$10,150,000
Alternative 41Modify all dams w/ hydroelectric	9,690,000	17,180,000	\$13,435,000
Alternative 43 Repair Union St., remove (partial) Sabin, Modify Boardman and Broen Bridge	6,400,000	10,283,000	\$8,341,500
Alternative 79 Repair Union St., remove (partial) all others	3,990,000	6,413,000	\$5,201,500
Alternative 81 Modify Union St., remove (partial) all others	4,990,000	7,913,000	\$6,451,500

COST ANALYSIS**Alternative 1 - Retain and repair all dams**

Category	Union St.	Union St.	Sabin	Sabin	Boardman	Boardman	Brown	Brown	TOTAL	TOTAL
	Low	High	Low	High	Pond	Pond	Bridge	Bridge		
					Low	High	Low	High	Low	High
Annual maintenance(per year)	30,000	50,000	30,000	60,000	30,000	60,000	30,000	60,000	120,000	230,000
Repairs	400,000	600,000	100,000	200,000	100,000	300,000	350,000	1,300,000	950,000	2,400,000
Grand Total	430,000	650,000	130,000	260,000	130,000	360,000	380,000	1,360,000	1,070,000	2,630,000

COST ANALYSIS

Alternative 25 - Remove Sabin and Boardman, retain/repair Union St.and Brown Bridge

Category	Union St.	Union St.	Sabin	Sabin	Boardman	Boardman	Brown	Brown	TOTAL	TOTAL
	Low	High	Low	High	Low	High	Pond	Pond	Low	High
Annual maintenance(per year)	30,000	50,000					30,000	60,000	60,000	110,000
Repairs	400,000	600,000					350,000	1,300,000	750,000	1,900,000
Modify for fish passage										
Modify for flood control										
Modify for bottom draw										
Modification Total										
Breach and remove impoundments			300,000	900,000	1,500,000	1,900,000			1,800,000	2,800,000
Manage sediment (breach only)			10,000	13,000	300,000	600,000			310,000	613,000
Manage stream banks (breach only)			50,000	100,000	100,000	200,000			150,000	300,000
Partial Removal Total			360,000	1,013,000	1,900,000	2,700,000			2,260,000	3,713,000
Breach dam (from above)			300,000	900,000	1,500,000	1,900,000			2,800,000	4,300,000
Manage sediment			10,000	13,000	300,000	600,000			510,000	963,000
Manage stream banks			50,000	100,000	100,000	200,000			250,000	500,000
Disconnect utilities			10,000	20,000	10,000	30,000			30,000	70,000
Asbestos abatement allowance			50,000	100,000	50,000	100,000			150,000	300,000
Environmental remediation allowance			50,000	100,000	50,000	100,000			150,000	300,000
Demolish powerhouse, spillway, etc.			100,000	150,000	250,000	300,000			550,000	750,000
Excavate and remove earthen embankment			1,300,000	2,300,000	2,600,000	4,800,000			10,800,000	20,000,000
Rebuild infratructure			0	0	500,000	800,000			500,000	800,000
			0	0	0	0			0	0
Total Removal Total	430,000	650,000	1,870,000	3,683,000	5,360,000	8,830,000	380,000	1,360,000	15,740,000	27,983,000
Modify dams for hydroelectric power										
FERC process										
Modify dams for flood control										
Modify dams for fish passage										
Modify dam for bottom draw										
Modify for Hydroelectric Total										
GRAND TOTAL	430,000	650,000	360,000	1,013,000	1,900,000	2,700,000	380,000	1,360,000	3,070,000	5,723,000
GRAND TOTAL with TOTAL REMOVAL	430,000	650,000	1,870,000	3,683,000	5,360,000	8,830,000	380,000	1,360,000	8,040,000	14,523,000

COST ANALYSIS

Alternative 41- Modify all dams

Category	Union St.	Union St.	Sabin	Sabin	Boardman	Boardman	Brown	Brown	TOTAL	TOTAL
	Low	High	Low	High	Pond	Pond	Pond	Pond		
Annual maintenance(per year)	30,000	50,000	30,000	60,000	30,000	60,000	30,000	60,000	120,000	230,000
Repairs	400,000	600,000	100,000	200,000	100,000	300,000	350,000	1,300,000	950,000	2,400,000
Modify for fish passage	1,000,000	1,500,000	1,500,000	2,000,000	2,000,000	2,500,000	2,000,000	2,500,000	6,500,000	8,500,000
Modify for flood control	0	0	0	0	100,000	200,000	200,000	500,000	300,000	700,000
Modify for bottom draw	0	0	0	0	0	0	200,000	400,000	200,000	400,000
Modification Total	1,000,000	1,500,000	1,500,000	2,000,000	2,100,000	2,700,000	2,400,000	3,400,000	7,000,000	9,600,000
Breach and remove impoundments										
Manage sediment (breach only)										
Manage stream banks (breach only)										
Partial Removal Total										
Modify dams for hydroelectric power										
FERC process	0	0	200,000	250,000	200,000	250,000	200,000	250,000	600,000	750,000
Modify dams for flood control	0	0	0	0	1,000,000	1,800,000	20,000	2,500,000	1,020,000	4,300,000
Modify dams for fish passage	0	0	1,500,000	2,000,000	2,000,000	2,500,000	2,000,000	2,500,000	5,500,000	7,000,000
Modify dam for bottom draw	0	0	0	0	0	0	200,000	400,000	200,000	400,000
Annual Miantenance			100,000	200,000	100,000	200,000	100,000	200,000	300,000	600,000
Modify for Hydroelectric Total	0	0	1,800,000	2,450,000	3,300,000	4,750,000	2,520,000	5,850,000	7,620,000	13,050,000
GRAND TOTAL	1,430,000	2,150,000	1,630,000	2,260,000	2,230,000	3,060,000	2,780,000	4,760,000	8,070,000	12,230,000
GRAND TOTAL WITH HYDROELECTRIC	1,430,000	2,150,000	1,930,000	2,710,000	3,430,000	5,110,000	2,900,000	7,210,000	9,690,000	17,180,000

COST ANALYSIS

Alternative 43 - Remove Sabin, retain Union St. modify Boardman and Brown Bridge

Category	Union St.		Sabin		Boardman Pond		Brown Bridge Pond		TOTAL	
	Low	High	Low	High	Low	High	Low	High	Low	High
Annual maintenance(per year)	30,000	50,000	0	0	30,000	60,000	30,000	60,000	90,000	170,000
Repairs	400,000	600,000	0	0	100,000	300,000	350,000	1,300,000	850,000	2,200,000
Modify for fish passage	0	0	0	0	2,000,000	2,500,000	2,000,000	2,500,000	4,000,000	5,000,000
Modify for flood control	0	0	0	0	100,000	200,000	200,000	500,000		
Modify for bottom draw	0	0	0	0	0	0	800,000	1,200,000		
Modification Total	0	0	0	0	2,100,000	2,700,000	3,000,000	4,200,000	5,100,000	6,900,000
Breach and remove impoundments			300,000	900,000			0		300,000	900,000
Manage sediment (breach only)			10,000	13,000			0		10,000	13,000
Manage stream banks (breach only)			50,000	100,000			0		50,000	100,000
Partial Removal Total			360,000	1,013,000			0		360,000	1,013,000
Breach dam (from above)			300,000	900,000					300,000	900,000
Manage sediment			10,000	13,000					10,000	13,000
Manage stream banks			50,000	100,000					50,000	100,000
Disconnect utilities			10,000	20,000					10,000	20,000
Asbestos abatement allowance			50,000	100,000					50,000	100,000
Environmental remediation allowance			50,000	100,000					50,000	100,000
Demolish powerhouse, spillway, etc.			100,000	150,000					100,000	150,000
Excavate and remove earthen embankment			1,300,000	2,300,000					1,300,000	2,300,000
Rebuild infratructure			0	0					0	0
			0	0					0	0
Total Removal Total			1,870,000	3,683,000					1,870,000	3,683,000
Modify dams for hydroelectric power FERC process										
Modify dams for flood control										
Modify dams for fish passage										
Modify dam for bottom draw										
Modify for Hydroelectric Total										
GRAND TOTAL	430,000	650,000	360,000	1,013,000	2,230,000	3,060,000	3,380,000	5,560,000	6,400,000	10,283,000
GRAND TOTAL with TOTAL REMOVAL	430,000	650,000	1,870,000	3,683,000	2,230,000	3,060,000	3,380,000	5,560,000	7,910,000	12,953,000

COST ANALYSIS

Alternative 79 - Retain /repair Union St., remove all others

Category	Union St.	Union St.	Sabin	Sabin	Boardman Pond	Boardman Pond	Brown Bridge Pond	Brown Bridge Pond	TOTAL	TOTAL
	Low	High	Low	High	Low	High	Low	High	Low	High
Annual maintenance(per year)	30,000	50,000							30,000	50,000
Repairs	400,000	600,000							400,000	600,000
Modify for fish passage										
Modify for flood control										
Modify for bottom draw										
Modification Total										
Breach and remove impoundments			300,000	900,000	1,500,000	1,900,000	1,000,000	1,500,000	2,800,000	4,300,000
Manage sediment (breach only)			10,000	13,000	300,000	600,000	200,000	350,000	510,000	963,000
Manage stream banks (breach only)			50,000	100,000	100,000	200,000	100,000	200,000	250,000	500,000
Partial Removal Total			360,000	1,013,000	1,900,000	2,700,000	1,300,000	2,050,000	3,560,000	5,763,000
<i>Total Removal Total</i>			<i>1,870,000</i>	<i>3,683,000</i>	<i>5,360,000</i>	<i>8,830,000</i>	<i>8,510,000</i>	<i>15,470,000</i>	<i>15,740,000</i>	<i>27,983,000</i>
Modify dams for hydroelectric power FERC process										
Modify dams for flood control										
Modify dams for fish passage										
Modify dam for bottom draw										
Modify for Hydroelectric Total										
GRAND TOTAL	430,000	650,000	360,000	1,013,000	1,900,000	2,700,000	1,300,000	2,050,000	3,990,000	6,413,000
GRAND TOTAL with TOTAL REMOVAL	430,000	650,000	1,870,000	3,683,000	5,360,000	8,830,000	8,510,000	15,470,000	16,170,000	28,633,000

COST ANALYSIS

Alternative 81 - Modify Union St., remove all others

Category	Union St.	Union St.	Sabin	Sabin	Boardman Pond	Boardman Pond	Brown Bridge Pond	Brown Bridge Pond	TOTAL	TOTAL
	Low	High	Low	High	Low	High	Low	High	Low	High
Annual maintenance(per year)	30,000	50,000							30,000	50,000
Repairs	400,000	600,000							400,000	600,000
Modify for fish passage	1,000,000	1,500,000							1,000,000	1,500,000
Modify for flood control	0	0							0	
Modify for bottom draw	0	0							0	
Modification Total	1,000,000	1,500,000							1,000,000	1,500,000
Breach and remove impoundments			300,000	900,000	1,500,000	1,900,000	1,000,000	1,500,000	2,800,000	4,300,000
Manage sediment (breach only)			10,000	13,000	300,000	600,000	200,000	350,000	510,000	963,000
Manage stream banks (breach only)			50,000	100,000	100,000	200,000	100,000	200,000	250,000	500,000
Partial Removal Total			360,000	1,013,000	1,900,000	2,700,000	1,300,000	2,050,000	3,560,000	5,763,000
Total Removal Total			1,870,000	3,683,000	5,360,000	8,830,000	8,510,000	15,470,000	15,740,000	27,983,000
Modify dams for hydroelectric power FERC process										
Modify dams for flood control										
Modify dams for fish passage										
Modify dam for bottom draw										
Modify for Hydroelectric Total										
GRAND TOTAL	1,430,000	2,150,000	360,000	1,013,000	1,900,000	2,700,000	1,300,000	2,050,000	4,990,000	7,913,000
GRAND TOTAL with TOTAL REMOVAL	1,430,000	2,150,000	1,870,000	3,683,000	5,360,000	8,830,000	8,510,000	15,470,000	17,170,000	30,133,000

PV with 7 percent discount rate

Present Value	1,944,160	4,215,627	7,312,817	13,223,494	7,858,238	12,326,363	11,827,303	21,709,217	7,463,022	12,417,127	13,921,558	24,624,510	14,766,427	25,891,813
Year	Alt 1 Low	Alt 1 High	Alt 25 Low	Alt 25 High	Alt 41 Low	Alt 41 High	Alt 41b Low	Alt 41b High	Alt 43 Low	Alt 43 High	Alt 79 Low	Alt 79 High	Alt 81 Low	Alt 81 High
2010	414,883	1,048,126	3,485,021	6,294,436	3,471,919	5,240,632	4,048,389	7,140,362	3,415,145	5,582,584	7,048,651	12,482,750	7,485,370	13,137,829
2011	387,741	979,557	3,257,029	5,882,651	3,244,784	4,897,787	3,783,541	6,673,235	3,191,725	5,217,368	6,587,524	11,666,121	6,995,673	12,278,345
2012	91,547	175,466	45,774	83,918	91,547	175,466	320,416	633,203	68,661	129,692	22,887	38,145	22,887	38,145
2013	85,558	163,987	42,779	78,428	85,558	163,987	299,454	591,779	64,169	121,208	21,390	35,649	21,390	35,649
2014	79,961	153,259	39,981	73,298	79,961	153,259	279,864	553,064	59,971	113,278	19,990	33,317	19,990	33,317
2015	74,730	143,232	37,365	68,502	74,730	143,232	261,555	516,882	56,047	105,867	18,682	31,137	18,682	31,137
2016	69,841	133,862	34,921	64,021	69,841	133,862	244,444	483,068	52,381	98,942	17,460	29,100	17,460	29,100
2017	65,272	125,105	32,636	59,833	65,272	125,105	228,452	451,465	48,954	92,469	16,318	27,197	16,318	27,197
2018	61,002	116,920	30,501	55,918	61,002	116,920	213,507	421,930	45,751	86,419	15,250	25,417	15,250	25,417
2019	57,011	109,271	28,506	52,260	57,011	109,271	199,539	394,327	42,758	80,766	14,253	23,755	14,253	23,755
2020	53,281	102,123	26,641	48,841	53,281	102,123	186,485	368,530	39,961	75,482	13,320	22,201	13,320	22,201
2021	49,796	95,442	24,898	45,646	49,796	95,442	174,285	344,420	37,347	70,544	12,449	20,748	12,449	20,748
2022	46,538	89,198	23,269	42,660	46,538	89,198	162,883	321,888	34,904	65,929	11,635	19,391	11,635	19,391
2023	43,494	83,363	21,747	39,869	43,494	83,363	152,227	300,830	32,620	61,616	10,873	18,122	10,873	18,122
2024	40,648	77,909	20,324	37,261	40,648	77,909	142,269	281,150	30,486	57,585	10,162	16,937	10,162	16,937
2025	37,989	72,812	18,994	34,823	37,989	72,812	132,961	262,757	28,492	53,818	9,497	15,829	9,497	15,829
2026	35,504	68,049	17,752	32,545	35,504	68,049	124,263	245,567	26,628	50,297	8,876	14,793	8,876	14,793
2027	33,181	63,597	16,590	30,416	33,181	63,597	116,133	229,502	24,886	47,006	8,295	13,825	8,295	13,825
2028	31,010	59,436	15,505	28,426	31,010	59,436	108,536	214,488	23,258	43,931	7,753	12,921	7,753	12,921
2029	28,982	55,548	14,491	26,566	28,982	55,548	101,435	200,456	21,736	41,057	7,245	12,076	7,245	12,076
2030	27,086	51,914	13,543	24,828	27,086	51,914	94,800	187,342	20,314	38,371	6,771	11,286	6,771	11,286
2031	25,314	48,518	12,657	23,204	25,314	48,518	88,598	175,086	18,985	35,861	6,328	10,547	6,328	10,547
2032	23,658	45,344	11,829	21,686	23,658	45,344	82,802	163,632	17,743	33,515	5,914	9,857	5,914	9,857
2033	22,110	42,377	11,055	20,267	22,110	42,377	77,385	152,927	16,582	31,322	5,527	9,212	5,527	9,212
2034	20,663	39,605	10,332	18,942	20,663	39,605	72,322	142,922	15,498	29,273	5,166	8,610	5,166	8,610
2035	19,312	37,014	9,656	17,702	19,312	37,014	67,591	133,572	14,484	27,358	4,828	8,047	4,828	8,047
2036	18,048	34,593	9,024	16,544	18,048	34,593	63,169	124,834	13,536	25,568	4,512	7,520	4,512	7,520

COST ANALYSIS

Category	Union St.		Sabin		Boardman Pond		Brown Bridge Pond	Brown Bridge Pond	TOTAL	
	Low	High	Low	High	Low	High	Low	High	Low	High
Annual maintenance(per year)	30,000	50,000	30,000	60,000	30,000	60,000	30,000	60,000	120,000	210,000
Repairs	400,000	600,000	100,000	200,000	100,000	300,000	350,000	1,300,000	950,000	2,400,000
Modify for fish passage	1,000,000	1,500,000	1,500,000	2,000,000	2,000,000	2,500,000	2,000,000	2,500,000	6,500,000	8,500,000
Modify for flood control	0	0	0	0	100,000	200,000	200,000	500,000	300,000	700,000
Modify for bottom draw	0	0	0	0	0	0	800,000	1,200,000	800,000	1,200,000
Modification Total	1,000,000	1,500,000	1,500,000	2,000,000	2,100,000	2,700,000	3,000,000	4,200,000	7,600,000	10,400,000
Breach and remove impoundments	0	0	300,000	900,000	1,500,000	1,900,000	1,000,000	1,500,000	2,800,000	4,300,000
Manage sediment (breach only)	0	0	10,000	13,000	300,000	600,000	200,000	350,000	510,000	963,000
Manage stream banks (breach only)	0	0	50,000	100,000	100,000	200,000	100,000	200,000	250,000	500,000
Partial Removal Total	0	0	360,000	1,013,000	1,900,000	2,700,000	1,300,000	2,050,000	3,560,000	5,763,000
Breach dam (from above)	0	0	300,000	900,000	1,500,000	1,900,000	1,000,000	1,500,000	2,800,000	4,300,000
Manage sediment			10,000	13,000	300,000	600,000	200,000	350,000	510,000	963,000
Manage stream banks			50,000	100,000	100,000	200,000	100,000	200,000	250,000	500,000
Disconnect utilities	0	0	10,000	20,000	10,000	30,000	10,000	20,000	30,000	70,000
Asbestos abatement allowance	0	0	50,000	100,000	50,000	100,000	50,000	100,000	150,000	300,000
Environmental remediation allowance	0	0	50,000	100,000	50,000	100,000	50,000	100,000	150,000	300,000
Demolish powerhouse, spillway, etc.	0	0	100,000	150,000	250,000	300,000	200,000	300,000	550,000	750,000
Excavate and remove earthen embankment	0	0	1,300,000	2,300,000	2,600,000	4,800,000	6,900,000	12,900,000	10,800,000	20,000,000
Rebuild infrastructure	0	0	0	0	500,000	800,000			500,000	800,000
Total Removal Total			1,870,000	3,683,000	5,360,000	8,830,000	8,510,000	15,470,000	15,740,000	27,983,000
Modify dams for hydroelectric power										
FERC process	0	0	200,000	250,000	200,000	250,000	200,000	250,000	600,000	750,000
Modify dams for flood control	0	0			1,000,000	1,800,000	20,000	2,500,000	1,020,000	4,300,000
Modify dams for fish passage	0	0	1,500,000	2,000,000	2,000,000	2,500,000	2,000,000	2,500,000	5,500,000	7,000,000
Modify dam for bottom draw	0	0					200,000	400,000	200,000	400,000
Annual maintenance			100,000	200,000	100,000	200,000	100,000	200,000	300,000	600,000
Modify for Hydroelectric Total	0	0	1,800,000	2,450,000	3,300,000	4,750,000	2,520,000	5,850,000	7,620,000	13,050,000

SUMMARY

GRAND TOTAL	Low Estimate	High Estimate
Alternative 1 Retain/repair all dams	1,070,000	2,630,000
Alternative 25 Remove (total) Sabin/Boardman;Repair Union St and Brown Bridge	8,040,000	14,523,000
Alternative 41 Modify all dams	8,070,000	12,230,000
Alternative 41Modify all dams w/ hydroelectric	9,690,000	17,180,000
Alternative 43 Repair Union St., remove (total) Sabin, Modify Boardman and Broen Bridge	7,910,000	12,953,000
Alternative 79 Repair Union St., remove (total) all others	16,170,000	28,633,000
Alternative 81 Modify Union St., remove (total) all others	17,170,000	30,133,000

COST ANALYSIS

Alternative 1 - Retain and repair all dams

Category	Union St.	Union St.	Sabin	Sabin	Boardman	Boardman	Brown	Brown	TOTAL	TOTAL
	Low	High	Low	High	Low	High	Low	High	Low	High
Annual maintenance(per year)	30,000	50,000	30,000	60,000	30,000	60,000	30,000	60,000	120,000	230,000
Repairs	400,000	600,000	100,000	200,000	100,000	300,000	350,000	1,300,000	950,000	2,400,000
Grand Total	430,000	650,000	130,000	260,000	130,000	360,000	380,000	1,360,000	1,070,000	2,630,000

COST ANALYSIS

Alternative 25 - Remove Sabin and Boardman, retain/repair Union St.and Brown Bridge

Category	Union St.	Union St.	Sabin	Sabin	Boardman	Boardman	Brown	Brown	TOTAL	TOTAL
	Low	High	Low	High	Low	High	Pond	Pond	Low	High
Annual maintenance(per year)	30,000	50,000							60,000	110,000
Repairs	400,000	600,000					350,000	1,300,000	750,000	1,900,000
Modify for fish passage										
Modify for flood control										
Modify for bottom draw										
Modification Total										
Breach and remove impoundments			300,000	900,000	1,500,000	1,900,000			1,800,000	2,800,000
Manage sediment (breach only)			10,000	13,000	300,000	600,000			310,000	613,000
Manage stream banks (breach only)			50,000	100,000	100,000	200,000			150,000	300,000
Partial Removal Total			360,000	1,013,000	1,900,000	2,700,000			2,260,000	3,713,000
Breach dam (from above)			300,000	900,000	1,500,000	1,900,000			2,800,000	4,300,000
Manage sediment			10,000	13,000	300,000	600,000			510,000	963,000
Manage stream banks			50,000	100,000	100,000	200,000			250,000	500,000
Disconnect utilities			10,000	20,000	10,000	30,000			30,000	70,000
Asbestos abatement allowance			50,000	100,000	50,000	100,000			150,000	300,000
Environmental remediation allowance			50,000	100,000	50,000	100,000			150,000	300,000
Demolish powerhouse, spillway, etc.			100,000	150,000	250,000	300,000			550,000	750,000
Excavate and remove earthen embankment			1,300,000	2,300,000	2,600,000	4,800,000			10,800,000	20,000,000
Rebuild infratructure			0	0	500,000	800,000			500,000	800,000
			0	0	0	0			0	0
Total Removal Total	430,000	650,000	1,870,000	3,683,000	5,360,000	8,830,000	380,000	1,360,000	15,740,000	27,983,000
Modify dams for hydroelectric power										
FERC process										
Modify dams for flood control										
Modify dams for fish passage										
Modify dam for bottom draw										
Modify for Hydroelectric Total										
GRAND TOTAL	430,000	650,000	360,000	1,013,000	1,900,000	2,700,000	380,000	1,360,000	3,070,000	5,723,000
GRAND TOTAL with TOTAL REMOVAL	430,000	650,000	1,870,000	3,683,000	5,360,000	8,830,000	380,000	1,360,000	8,040,000	14,523,000

COST ANALYSIS

Alternative 41- Modify all dams

Category	Union St.	Union St.	Sabin	Sabin	Boardman Pond	Boardman Pond	Brown Bridge Pond	Brown Bridge Pond	TOTAL	TOTAL
	Low	High	Low	High	Low	High	Low	High	Low	High
Annual maintenance(per year)	30,000	50,000	30,000	60,000	30,000	60,000	30,000	60,000	120,000	230,000
Repairs	400,000	600,000	100,000	200,000	100,000	300,000	350,000	1,300,000	950,000	2,400,000
Modify for fish passage	1,000,000	1,500,000	1,500,000	2,000,000	2,000,000	2,500,000	2,000,000	2,500,000	6,500,000	8,500,000
Modify for flood control	0	0	0	0	100,000	200,000	200,000	500,000	300,000	700,000
Modify for bottom draw	0	0	0	0	0	0	200,000	400,000	200,000	400,000
Modification Total	1,000,000	1,500,000	1,500,000	2,000,000	2,100,000	2,700,000	2,400,000	3,400,000	7,000,000	9,600,000
Breach and remove impoundments										
Manage sediment (breach only)										
Manage stream banks (breach only)										
Partial Removal Total										
Modify dams for hydroelectric power										
FERC process	0	0	200,000	250,000	200,000	250,000	200,000	250,000	600,000	750,000
Modify dams for flood control	0	0	0	0	1,000,000	1,800,000	20,000	2,500,000	1,020,000	4,300,000
Modify dams for fish passage	0	0	1,500,000	2,000,000	2,000,000	2,500,000	2,000,000	2,500,000	5,500,000	7,000,000
Modify dam for bottom draw	0	0	0	0	0	0	200,000	400,000	200,000	400,000
Annual Miantenance			100,000	200,000	100,000	200,000	100,000	200,000	300,000	600,000
Modify for Hydroelectric Total	0	0	1,800,000	2,450,000	3,300,000	4,750,000	2,520,000	5,850,000	7,620,000	13,050,000
GRAND TOTAL	1,430,000	2,150,000	1,630,000	2,260,000	2,230,000	3,060,000	2,780,000	4,760,000	8,070,000	12,230,000
GRAND TOTAL WITH HYDROELECTRIC	1,430,000	2,150,000	1,930,000	2,710,000	3,430,000	5,110,000	2,900,000	7,210,000	9,690,000	17,180,000

COST ANALYSIS

Alternative 43 - Remove Sabin, retain Union St. modify Boardman and Brown Bridge

Category	Union St.		Sabin		Boardman Pond		Brown Bridge Pond		TOTAL	
	Low	High	Low	High	Low	High	Low	High	Low	High
Annual maintenance(per year)	30,000	50,000	0	0	30,000	60,000	30,000	60,000	90,000	170,000
Repairs	400,000	600,000	0	0	100,000	300,000	350,000	1,300,000	850,000	2,200,000
Modify for fish passage	0	0	0	0	2,000,000	2,500,000	2,000,000	2,500,000	4,000,000	5,000,000
Modify for flood control	0	0	0	0	100,000	200,000	200,000	500,000	300,000	700,000
Modify for bottom draw	0	0	0	0	0	0	800,000	1,200,000	800,000	1,200,000
Modification Total	0	0	0	0	2,100,000	2,700,000	3,000,000	4,200,000	5,100,000	6,900,000
Breach and remove impoundments			300,000	900,000			0		300,000	900,000
Manage sediment (breach only)			10,000	13,000			0		10,000	13,000
Manage stream banks (breach only)			50,000	100,000			0		50,000	100,000
Partial Removal Total			360,000	1,013,000			0		360,000	1,013,000
Breach dam (from above)			300,000	900,000					300,000	900,000
Manage sediment			10,000	13,000					10,000	13,000
Manage stream banks			50,000	100,000					50,000	100,000
Disconnect utilities			10,000	20,000					10,000	20,000
Asbestos abatement allowance			50,000	100,000					50,000	100,000
Environmental remediation allowance			50,000	100,000					50,000	100,000
Demolish powerhouse, spillway, etc.			100,000	150,000					100,000	150,000
Excavate and remove earthen embankment			1,300,000	2,300,000					1,300,000	2,300,000
Rebuild infratructure			0	0					0	0
			0	0					0	0
Total Removal Total			1,870,000	3,683,000					1,870,000	3,683,000
Modify dams for hydroelectric power FERC process Modify dams for flood control Modify dams for fish passage Modify dam for bottom draw										
Modify for Hydroelectric Total										
GRAND TOTAL	430,000	650,000	360,000	1,013,000	2,230,000	3,060,000	3,380,000	5,560,000	6,400,000	10,283,000
GRAND TOTAL with TOTAL REMOVAL	430,000	650,000	1,870,000	3,683,000	2,230,000	3,060,000	3,380,000	5,560,000	7,910,000	12,953,000

COST ANALYSIS

Alternative 79 - Retain /repair Union St., remove all others

Category	Union St.		Sabin		Boardman Pond		Brown Bridge Pond	Brown Bridge Pond	TOTAL	
	Low	High	Low	High	Low	High	Low	High	Low	High
Annual maintenance(per year)	30,000	50,000							30,000	50,000
Repairs	400,000	600,000							400,000	600,000
Modify for fish passage										
Modify for flood control										
Modify for bottom draw										
Modification Total										
Breach and remove impoundments			300,000	900,000	1,500,000	1,900,000	1,000,000	1,500,000	2,800,000	4,300,000
Manage sediment (breach only)			10,000	13,000	300,000	600,000	200,000	350,000	510,000	963,000
Manage stream banks (breach only)			50,000	100,000	100,000	200,000	100,000	200,000	250,000	500,000
Partial Removal Total			360,000	1,013,000	1,900,000	2,700,000	1,300,000	2,050,000	3,560,000	5,763,000
Breach dam (from above)			300,000	900,000	1,500,000	1,900,000	1,000,000	1,500,000	2,800,000	4,300,000
Manage sediment			10,000	13,000	300,000	600,000	200,000	350,000	510,000	963,000
Manage stream banks			50,000	100,000	100,000	200,000	100,000	200,000	250,000	500,000
Disconnect utilities			10,000	20,000	10,000	30,000	10,000	20,000	30,000	70,000
Asbestos abatement allowance			50,000	100,000	50,000	100,000	50,000	100,000	150,000	300,000
Environmental remediation allowance			50,000	100,000	50,000	100,000	50,000	100,000	150,000	300,000
Demolish powerhouse, spillway, etc.			100,000	150,000	250,000	300,000	200,000	300,000	550,000	750,000
Excavate and remove earthen embankment			1,300,000	2,300,000	2,600,000	4,800,000	6,900,000	12,900,000	10,800,000	20,000,000
Rebuild infratructure			0	0	500,000	800,000			500,000	800,000
Total Removal Total			1,870,000	3,683,000	5,360,000	8,830,000	8,510,000	15,470,000	15,740,000	27,983,000
Modify dams for hydroelectric power FERC process										
Modify dams for flood control										
Modify dams for fish passage										
Modify dam for bottom draw										
Modify for Hydroelectric Total										
GRAND TOTAL	430,000	650,000	360,000	1,013,000	1,900,000	2,700,000	1,300,000	2,050,000	3,990,000	6,413,000
GRAND TOTAL with TOTAL REMOVAL	430,000	650,000	1,870,000	3,683,000	5,360,000	8,830,000	8,510,000	15,470,000	16,170,000	28,633,000

COST ANALYSIS

Alternative 81 - Modify Union St., remove all others

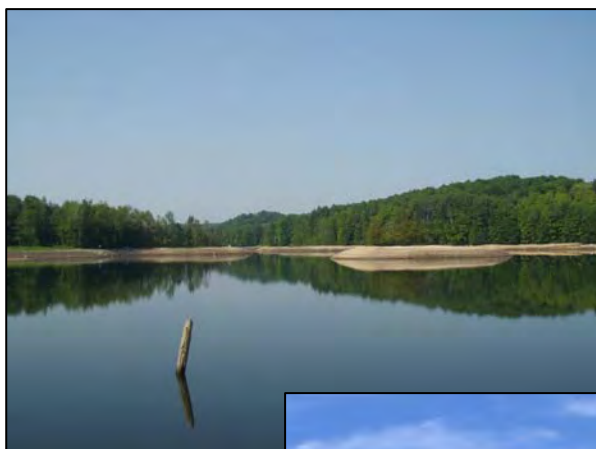
Category	Union St.		Sabin		Boardman Pond		Brown Bridge Pond		TOTAL	
	Low	High	Low	High	Low	High	Low	High	Low	High
Annual maintenance(per year)	30,000	50,000							30,000	50,000
Repairs	400,000	600,000							400,000	600,000
Modify for fish passage	1,000,000	1,500,000							1,000,000	1,500,000
Modify for flood control	0	0							0	
Modify for bottom draw	0	0							0	
Modification Total	1,000,000	1,500,000							1,000,000	1,500,000
Breach and remove impoundments			300,000	900,000	1,500,000	1,900,000	1,000,000	1,500,000	2,800,000	4,300,000
Manage sediment (breach only)			10,000	13,000	300,000	600,000	200,000	350,000	510,000	963,000
Manage stream banks (breach only)			50,000	100,000	100,000	200,000	100,000	200,000	250,000	500,000
Partial Removal Total			360,000	1,013,000	1,900,000	2,700,000	1,300,000	2,050,000	3,560,000	5,763,000
Breach dam (from above)			300,000	900,000	1,500,000	1,900,000	1,000,000	1,500,000	2,800,000	4,300,000
Manage sediment			10,000	13,000	300,000	600,000	200,000	350,000	510,000	963,000
Manage stream banks			50,000	100,000	100,000	200,000	100,000	200,000	250,000	500,000
Disconnect utilities			10,000	20,000	10,000	30,000	10,000	20,000	30,000	70,000
Asbestos abatement allowance			50,000	100,000	50,000	100,000	50,000	100,000	150,000	300,000
Environmental remediation allowance			50,000	100,000	50,000	100,000	50,000	100,000	150,000	300,000
Demolish powerhouse, spillway, etc.			100,000	150,000	250,000	300,000	200,000	300,000	550,000	750,000
Excavate and remove earthen embankment			1,300,000	2,300,000	2,600,000	4,800,000	6,900,000	12,900,000	10,800,000	20,000,000
Rebuild infrastructure			0	0	500,000	800,000			500,000	800,000
Total Removal Total			1,870,000	3,683,000	5,360,000	8,830,000	8,510,000	15,470,000	15,740,000	27,983,000
Modify dams for hydroelectric power FERC process Modify dams for flood control Modify dams for fish passage Modify dam for bottom draw										
Modify for Hydroelectric Total										
GRAND TOTAL	1,430,000	2,150,000	360,000	1,013,000	1,900,000	2,700,000	1,300,000	2,050,000	4,990,000	7,913,000
GRAND TOTAL with TOTAL REMOVAL	1,430,000	2,150,000	1,870,000	3,683,000	5,360,000	8,830,000	8,510,000	15,470,000	17,170,000	30,133,000

APPENDIX E - Public Opinion Survey

Boardman River Dams Project

*Report on the General Public Opinion Survey
Concerning the future of the Boardman River Dams*

October 2008



Submitted by:



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Executive Summary

The *Public Opinion Survey* developed and administered through this project was not designed as a referendum or a statistically valid sample of public opinion. Rather, the *Survey* and associated *Informational Booklet* were intended to inform and engage the general population while offering another opportunity for public participation. The *Surveys* were distributed as broadly as feasible given time and funding limitations between September 23 and October 10, 2008.

Copies of the *Information Booklet* with the *Public Opinion Survey* inside were distributed to people throughout Grand Traverse County and other parts of the Boardman River Watershed using four general methods. First, the *Booklet* and *Survey* were inserted into the *Traverse City Record Eagle* and distributed to 15,000 subscribers, most in Grand Traverse County. Second, copies of the *Booklet* and *Survey* were mailed with stamped, self-addressed return envelopes to 391 owners of riverfront property and 2,609 people randomly selected from the Voter Registration List of Grand Traverse County. These materials were also distributed to about 180 people at three public information meetings. Last, the survey and related information was provided to everyone through the project website (www.theboardman.org).

In total, we collected 749 completed surveys, including: 323 from the web, 233 from Record Eagle inserts and handouts, 124 from the mailings, and 69 from people at public meetings. We witnessed no obvious attempts to unduly influence the survey results in any systematic way (e.g., large quantities of duplicate surveys). Therefore, we believe that the survey results provide a reasonable reflection of the opinions held by people (mostly middle age or older) with an active interest in the future of the Boardman River and the Boardman River Dams.

About 82% of all survey respondents (612) were year round residents of Grand Traverse County. Approximately 15% of those who responded (109) said that they own property on the Boardman River. The vast majority of survey respondents were 45 years of age or older (78% or 588 respondents); though on-line respondents tended to be younger than those people responding using printed forms. Of the categories provided, respondents most often identified themselves as *nature enthusiast* (198 respondent) or *fisherman* (150 respondents).

Over 90% of the respondents believe that the Boardman River is an important resource for *recreation* and the *community*. Over 95% of those responding (703) said they had visited the Boardman River within the last year. Large majorities of respondents also reported having visited each dam. When asked what water-based recreation they engage in, about 92% said they *walk or hike* in nature areas. About 76% of all respondents *canoe or kayak*; and a little more than half of the respondents say they *fish*.

When asked which concerns or considerations are most important in deciding the future of the Boardman River Dams, 83% of all respondents identified *preserving habitat for wildlife*. The next most frequently cited criteria were *increase habitat for cold water fish*, *limit costs to taxpayers*, and *keep impoundments for waterfowl*; identified as important by 60% to 64% of all respondents. However, responses to this question also indicate a significant amount of disagreement over several criteria. For example, respondents were nearly split on the importance of *protecting the buildings and dam structures*, with large numbers taking each of the extreme positions (e.g., *Not at all Important* vs. *Very Important*). Similar splits in opinion occur over the criteria identified as *generate electric power* and *returning river to more natural state*.

The last section of the survey was designed to gather public opinions and suggestions concerning the alternatives for managing each of the Boardman River Dams. Response patterns suggest that the people who answered this survey are not in agreement on any single course of action for any single dam, with one notable exception. The vast majority of respondents appear to support the *Retain & Repair* alternative for the Union Street Dam. About 72% of respondents ranked this option as important or *very important*. No other alternative for any of the dams received such broad support.

The option of *Retain & Repair* of the Brown Bridge Dam received the second greatest amount of support, with about 57% identifying this option as important or very important. About 51% to 54% of respondents said that *modification of dams for electric power generation* was important or very important for each of the upstream dams (Sabin, Boardman, and Brown Bridge Dams). An even smaller majority said that the *Retain & Repair* alternatives for the Sabin (~51%) and Boardman (~52%) Dams were important or very important.

The lack of agreement on particular alternatives for each dam is emphasized by the distribution of respondent opinions. The data suggest that most respondents held extreme views of many alternatives. For example, over 83% of the respondents selected one of two extremes (*Not at All Important* or *Very Important*) concerning the option of *Retain & Repair* for the Sabin Dam. This pattern of strong disagreement is repeated over the *Modify for Electric Power Generation* and *Remove the Entire Dam* alternatives with the Sabin Dam. In fact, the same pattern of strong disagreement over these three alternatives is also apparent with the Boardman and Brown Bridge Dams.

Introduction

The Boardman River Dams Committee (BRDC) has been considering management options for the future of four dams since 2005. All of the dams – Union Street, Sabin Dam, Boardman Dam and the Brown Bridge Dam – currently impound water on the main stem of the Boardman River. As part of this effort, the BRDC is overseeing an effort by Environmental Consulting and Testing, Inc. (ECT) to complete an *Engineering and Feasibility Study* (EFS) concerning the future of the Boardman River Dams. The EFS was designed to evaluate all reasonable and feasible options for the future of the dams.

Throughout the process, the BRDC has worked to inform and engage all stakeholders and all interested citizens. There has been a great deal of effort to encourage public participation. All BRDC meetings have been open to the public and well publicized. People have been encouraged to express their views and request information through these meetings, regular press releases, and information published through the project website (www.theboardman.org).

Last summer, the BRDC determined that additional efforts were needed to gain public participation and gauge public opinion about the possible fate of the Boardman River Dams. The BRDC asked ECT and LIAA to develop a general public opinion survey to help stimulate greater participation and obtain additional public input. This report describes the methodology employed to encourage public participation and sample public opinion.

Project Design & Survey Limitations

To guide this project, the BRDC identified a number of interrelated concerns and interests. For example, BRDC members wanted to assure that interested people received basic information about the Boardman River Dams and their impacts on the river. They reasoned that this would give people the ability to provide more informed opinions. Additionally, the BRDC wanted to assure that everyone with an interest in the fate of the Boardman River Dams could participate in the discussion and offer their opinions. The administration of the *Public Opinion Survey*, as described below, reflected this open process.

Following some discussion with BRDC members, including *Scoping Team* members and *Communications and Outreach Team* members, ECT and LIAA concluded that a multi-part effort was necessary to provide information and obtain public opinion from as many people as

possible. With direct oversight and editorial control exercised by the BRDC, we developed an attractive and informative booklet to help explain some of the characteristics of the Boardman River Dams and the alternatives for their future as well as a short, public opinion survey.

As described by the various draft EFS reports, the Boardman River Dams play a very significant role in determining the aesthetic, hydrologic, and ecological conditions along an extended section of the river. Therefore, changes in any one or a combination of these dams would have significant impacts on the Boardman River and opportunities for its use. The *Information Booklet* prepared by ECT and LIAA summarized the available information in a very brief, heavily illustrated 10-page booklet. The 4-page *Public Opinion Survey* was developed to accompany the *Information Booklet* as a “pull-out” insert.

The questions contained in the *Public Opinion Survey* were developed with direct input from and editing by members of the BRDC’s *Scoping Team* and *Communications and Outreach Team*. The questions were organized into four sections titled: *Demographic Information*, *About Your Use of the Boardman River*, *About Your Interest in the Boardman River Dams*, and *What Would You Recommend for the Boardman River Dams*.

The *Public Opinion Survey* developed and administered through this project was not designed to be a referendum or a statistically valid sample of public opinion. Rather, the *Survey* and associated *Informational Booklet* were intended to inform and engage the general population while offering another opportunity for public participation. The *Surveys* were distributed as broadly as feasible given time and funding limitations, without the application of scientific sampling techniques, between September 23 and October 10, 2008.

Survey Distribution

Copies of the *Information Booklet* with the *Public Opinion Survey* inside were distributed to people throughout Grand Traverse County and other parts of the Boardman River Watershed using four general methods. First, the *Booklet* and *Survey* were inserted into the *Traverse City Record Eagle* on Tuesday, September 23, 2008 and distributed to 15,000 subscribers, including almost all subscribers in Grand Traverse County. Approximately 100 copies of the *Booklet* and *Survey* were distributed by members of the BRDC and placed in public locations including the library and Traverse City Government Center. A total of 233 of these *Surveys* were completed and returned to LIAA by Friday, October 10th. Very roughly calculated, this represents a response rate of about 1.5%.

The second approach to distributing the *Booklet* and *Survey* was through direct mail. Copies of the *Booklet* and *Survey* (with stamped, self-addressed return envelopes) were mailed to 3,000 people in Grand Traverse County on Friday, September 26th. A reminder post card requesting

completion and return of the *Survey* was mailed to all recipients about one week later. The mailing was divided into two groups. The first group included all people identified as owners of land adjacent to the Boardman River and impoundments by Grand Traverse County's Equalization Department, a total of 391 properties. Fifty two (52) of these surveys were completed and mailed back to LIAA for a response rate of about 13.3%. The second group of *Surveys* (including stamped, self-addressed return envelopes) was sent to 2,609 people randomly selected from the list of *Registered Voters* in Grand Traverse County. Seventy two (72) of these *Surveys* were completed and returned to LIAA for a response rate of about 2.8%.

We also organized and sponsored three public information meetings as a method for distributing the *Information Booklet* and *Public Opinion Survey*. These meetings were widely publicized through the local media, notices on the project website, e-mail notifications, and publicly posted notices. The meetings times and locations were:

- 6:00 – 7:00 p.m., Tuesday, September 23rd at the Grand Traverse Civic Center
- 7:00 – 8:00 p.m., Tuesday, September 30th at the Traverse Area District Library
- 7:00 – 8:00 p.m., Wednesday, October 1st at the Grand Traverse Nature Center

Based on a simple head count, approximately 80 people attended the first meeting and about 40 people attended each of the next two meetings (i.e., about 160 people in total). Participants were provided a ½ hour illustrated presentation delivered by ECT's project manager, Don Tilton. The presentation was based on the contents of the *Information Booklet*. At the end of the presentation, questions were answered and everyone present was asked to fill out the *Survey* on-site before leaving. Project staff members were on hand to help encourage participants to complete and return the *Survey*. We collected a total of 69 completed surveys at these events (a response rate of roughly 43%).

The fourth opportunity for public participation was provided through the project website (www.theboardman.org). In addition to presenting a complete copy of the *Information Booklet*, the website provided much more detailed information, including fact sheets about possible alternatives and complete reports from the *EFS* concerning the Boardman River Dams. All visitors to the website were invited to complete the *Public Opinion Survey* online, resulting in the delivery of 323 completed surveys through this method.

Survey Response Data

As noted above, the *Public Opinion Survey* was developed as a method for obtaining additional public participation in the BRDC's process which focused on developing recommendations for the fate of the Boardman River Dams. There was no attempt to conduct a scientific sample of a particular population (i.e., this is not a random sample survey). Although we did engage a large

number of people and mailed surveys to people randomly selected from a voter registration list, we cannot say that the respondents fairly represent any specific population. Indeed, most mailed surveys result in a very low response rate (usually less than 30%) and suffer from a self-selection bias. That is, people with particular interests, opinions or personal characteristics are over represented and others are under-represented. Further, we could not prevent people from completing more than one survey. Therefore, the Survey and its results should not be treated as a referendum or pole with a specific level of confidence.

On the other hand, a large number of people expressed interest in the fate of the Boardman River Dams by completing this survey (749 respondents). By seeking survey responses from different groups of people in different settings, we were able to gain some diversity in participation. For example, the people who completed surveys that were distributed with the *Traverse City Record Eagle* were generally older than the people who filled out the survey *on-line* (a predictable difference). The people who filled out surveys at *public meetings* and *on-line* were more likely to have children of school age than the other respondents. Further, by comparing responses from different participant groups, we were able to check for any suspiciously large systematic weighting of survey responses. We witnessed no obvious attempts to unduly influence the survey results in any systematic way. There appear to be very few duplicate surveys (none specifically identified). Therefore, we believe that the survey results provide a reasonable reflection of the opinions held by people (mostly middle age or older) with an active interest in the future of the Boardman River and the Boardman River Dams.

Compilations of all the data obtained from the completed surveys are provided in the Appendices to this report. *Appendix A* includes the numeric data compiled from the closed questions. The data are aggregated into total responses for all surveys and percentages for each answer category for each question. Additionally, the response totals and percentages for each survey group are provided, including: 1. *On-line*; 2. Record Eagle (*R-E*) inserts and hand outs; 3. Mailed to *owners* of Boardman River waterfront property; 4. Mailed to those randomly selected from the *voter* registration list; and 5. Provided to participants at public *meetings*. For many of the questions, we also provide the average (i.e., mean) response and its variance. Finally, we have included all the text answers verbatim to the three open-ended questions asked in the survey.

Section 1. Demographic Information

The *Survey* asked six questions that we termed *demographic* in nature. In total, about 82% of survey respondents (612) were year round residents of Grand Traverse County; 5.9% (44) were seasonal residents; and 11.9% (89) were not residents of Grand Traverse County. We note that a large number of respondents who were not County residents filled the survey out on line (73 of the 89 respondents).

Approximately 15% of those who responded (109) said that they own property on the Boardman River; a total of 632 of the respondents (~85%) do not own property on the river. When asked if they own property on an impoundment, 52 of the respondents (7%) answered “yes” and 691 of the respondents (93%) answered “no.”

Question 4 of the *Survey* asked respondents to identify which of four age categories they belonged to. As indicated in the summary table below, the vast majority of survey respondents were 45 years of age or older (78% or 588 respondents). In general, on-line respondents tended to be younger than those people responding using printed forms. However, this age distribution suggests that respondents, as a group, are older than the overall population of Grand Traverse County where 63% of the population is 44 years old or younger and 24% of the population is 45-64 years old.

Table 1. Survey Response: What is your age group?

What is your age group?	All	%	On-line	%	R-E	%	Owners	%	Voter	%	Meetings	%
< 25:	14	1.9%	8	2.5%	0	0.0%	0	0.0%	1	1.4%	5	7.2%
25-44:	142	19.1%	108	33.5%	9	3.9%	2	3.9%	13	18.1%	10	14.5%
45-64:	352	47.3%	168	52.2%	97	42.2%	24	47.1%	34	47.2%	29	42.0%
65+:	236	31.7%	38	11.8%	124	53.9%	25	49.0%	24	33.3%	25	36.2%
Total Responses:	744	99.3%	322	99.7%	230	98.7%	51	98.1%	72	100%	69	100%

Approximately 24% of all survey respondents (159) reported having school age children at home. Again, greater percentage of on-line respondents reported having school age children at home (~29%) than respondents who returned a printed survey form.

Question 6 asked respondents to identify how they had heard about the Boardman River Dams Project, offering four categories with the option to choose more than one. The most frequently selected category was “radio, television or newspaper stories,” chosen by 525 respondents (over 70% of all possible). The next most frequently selected category was “neighbors, friends, or family,” selected by 320 respondents (about 43% of all possible).

Through the next question, we hoped to obtain a better understanding of what group of people the respondents most strongly associated with. The question asked respondents to identify which grouping or category best describes their interest in the Boardman River. A total of 541 respondents selected only one of the categories, as instructed; 194 respondents selected more than one category. Table 2 provides a compilation of specific responses.

Table 2. Survey Response: Which grouping or category describes your interest best?

Group or Category	Selection Frequency	% of Total
Owner:	81	15.0
Fisherman:	150	27.7
Canoeist or Kayaker:	85	15.7
Nature Enthusiast:	198	36.6
Public Official:	27	5.0
Total:	541	100.0

Section 2. Use of the Boardman River

In this section of the *Public Opinion Survey*, we asked respondents to help us better understand their interaction with the Boardman River by answering a few short questions. The first question in this section (Question 8 in *Appendix A*) asked, “Have you visited the Boardman River in the past year?” Over 95%, or 703 of the 738 respondents, answered *yes* to this question.

In the next question, we asked if the respondents had visited each of the four dams within the last year. The vast majority of respondents indicated that they had visited all of the dams in the last year, with some variations.

Table 3. Survey Response: *Have you visited the following dams in the past year?*

Union St. Dam &/or Boardman Lake	Responses	%
Yes:	605	86.7%
No:	93	13.3%
Total Responses:	698	100.0%
Sabin Dam &/or Pond		
Yes:	449	67.4%
No:	217	32.6%
Total Responses:	666	100.0%
Boardman Dam &/or Pond		
Yes:	479	71.3%
No:	193	28.7%
Total Responses:	672	100.0%
Brown Bridge Dam &/or Pond		
Yes:	466	68.8%
No:	211	31.2%
Total Responses:	677	100.0%

The next survey question asked how often people participate in each of seven different water-based recreational activities. Four categories were provided for each activity, ranging from “not at all” to “six or more times” each year, as shown in the table below.

Table 4. Survey Response: How often do you participate in the following recreational activities?

Canoe or Kayak	Responses	%
Not at all	157	23.5%
1-2	193	28.9%
3-5	121	18.1%
6+	196	29.4%
Responses:	667	89.1%
Fish in Lakes or Impoundments		
Not at all (1):	255	40.9%
1-2 (2):	95	15.2%
3-5 (3):	88	14.1%
6+ (4):	186	29.8%
Responses:	624	83.3%
Walk or Hike		
Not at all (1):	53	7.5%
1-2 (2):	139	19.8%
3-5 (3):	175	24.9%
6+ (4):	335	47.7%
Responses:	702	93.7%
Swim or Boat		
Not at all (1):	151	23.3%
1-2 (2):	111	17.1%
3-5 (3):	111	17.1%
6+ (4):	275	42.4%
Responses:	648	86.5%
Fish in Rivers or Stream		
Not at all (1):	257	39.6%
1-2 (2):	93	14.3%
3-5 (3):	95	14.6%
6+ (4):	204	31.4%
Responses:	649	86.6%
Use a Motor Boat		
Not at all (1):	278	43.1%
1-2 (2):	68	10.5%
3-5 (3):	61	9.5%
6+ (4):	238	36.9%
Responses:	645	86.1%

The aggregated responses show that more respondents listed *walking or hiking* than any other activity and they participated in this activity at a greater frequency than the other activities listed. Approximately 92% of respondents (649) say they *walk or hike* in nature areas as a water-related recreational activity at least once a year. About 76% of the respondents (510) say they canoe or kayak at least once a year. Similarly, about 77% of the respondents (497) say they swim or boat in the Grand Traverse Bay at least once a year. Among all respondents, about 56% or 369 *fish in lakes and/or impoundments*; 60% or 392 *fish in rivers or streams*, and 57 % or 367 *use a motor boat for recreation*.

The Survey asked respondents to list any other water-based recreational activities they participate in at least once a year. There were 179 responses to this question (all are transcribed and presented in *Appendix B*). The most frequent responses included: sailing, bird-watching and wildlife watching, scuba diving, tubing, swimming in lakes and rivers, and hunting.

Section 3. Interest in the Boardman River Dams

In the next survey section, we asked respondents about their familiarity with the Boardman River Dams and the on-going discussion concerning their future management. The first question asked respondents to rank the importance of the Boardman River for personal or family recreation, using a range of 1 for *not at all important* to 4 for *very important* (Question 11 in *Appendix A*) The respondent could also answer *no opinion*. Of the 745 responses to this question, 678 scored the importance as a 3 or 4 (91% of respondents). About 72% of the respondents (537) said the river was *very important* for recreation. An even larger number of respondents, 719 or 96.5% of all respondents, said that the river was *important* or *very important* to their community (Question 12 in *Appendix A*).

The next survey question (Question 13 in *Appendix A*) asked how important the Boardman River Dams are to the region on scale ranging from *not at all important* (1) to *very important* (4). About 70% of respondents (507) ranked the dams as *important* (12.8%) or *very important* (56.8%) to the region. Just over 28% (207) ranked the dams as *not very important* (12.9%) or *not at all important* (15.5%).

In the survey, we stated that each of the Boardman River Dams will require some improvements or modifications or could be removed. We asked the respondents to provide their opinions about what criteria are most important in deciding what to do (Question 14 in *Appendix A*). Respondents were asked to rank the importance of each of 12 different concerns or considerations in deciding whether to repair, modify or remove each dam. The aggregated data is provided below in Table 5.

Table 5. Survey Response: *How important are each of the following concerns or considerations in deciding whether to repair, modify, or remove each dam?*

Concern or Consideration	Levels of Importance				Total Responses	No Response	Average Response	Response Variance
	Not at all Important			Very Important				
	1	2	3	4				
Preserve Habitat for Wildlife	21 2.9%	53 7.4%	171 23.7%	476 66.0%	721 96.3%	28 3.7%	3.53	0.57
Keep size of impoundments	212 29.5%	144 20.1%	96 13.4%	266 37%	718 95.9%	31 4.1%	2.58	1.58
Open river to fish passage	232 32.5%	143 20.1%	138 19.4%	200 28.1%	713 95.2%	36 4.8%	2.43	1.46
Protect the buildings & dam structures	259 35.9%	118 16.4%	112 15.5%	232 32.2%	721 96.3%	28 3.7%	2.44	1.61
Keep impoundments for Waterfowl	117 16.1%	169 23.3%	161 22.2%	278 38.3%	725 96.8%	24 3.2%	2.83	1.23
Increase habitat for cold water fish	125 17.4%	133 18.5%	153 21.3%	308 42.8%	719 96.0%	30 4.0%	2.90	1.30
Prevent Great Lake fish from moving upstream	177 25.1%	169 24.0%	116 16.5%	243 34.5%	705 94.1%	44 5.9%	2.60	1.43
Return river to more natural state	205 28.8%	101 14.2%	114 16.0%	292 41%	712 95.1%	37 4.9%	2.69	1.61
Generate electric power	216 29.8%	101 13.9%	108 14.9%	300 41.4%	725 96.8%	24 3.2%	2.68	1.64
Improve conditions for canoeing & kayaking	135 19.0%	187 26.4%	221 31.2%	166 23.4%	709 94.7%	40 5.3%	2.59	1.09
Preserve warm water fisheries	243 34.7%	210 30.0%	140 20.0%	107 15.3%	700 93.5%	49 6.5%	2.16	1.14
Limit costs to taxpayers	80 11.1%	180 24.9%	214 29.6%	249 34.4%	723 96.5%	25 3.3%	2.87	1.02

The compiled data in Table 5 indicate that respondents identify *preserving habitat for wildlife* as the most important of the 12 criteria listed, over 83% of respondents gave it a ranking of important or very important (an average of 3.53 on a four-point scale). Overall, the other criteria listed were ranked as considerably less important. A little more than 64% of the respondents identified *increasing habitat for cold water fish* as the second most important criteria to consider (an average of 2.90 for all responses). Almost exactly 64% of respondents identified *limit costs to taxpayers* as an important or very important criterion (an average of 2.87 for all responses). The criterion, *keep impoundments for waterfowl*, was also identified as important or very important by about 60% of the respondents (an average of 2.83 for all responses). The criterion that was identified as least important was *preserve warm water fisheries*, with about 35% of the respondents identifying it as important or very important (an average of 2.16 for all responses).

The responses also indicate a significant amount of disagreement over several criteria. For example, respondents were nearly split on the importance of *protecting the buildings and dam structures*, with large numbers taking each of the extreme positions (e.g., *not important at all* vs. *very important*). Similarly splits in opinion occur over the criteria identified as *generate electric*

power and returning river to more natural state, with large numbers of respondents saying these are either not at all important or very important criteria.

There were some relatively small differences in responses between respondent groups. For example, the group of people who completed surveys on-line assigned slightly higher levels of importance to the criteria of increasing habitat for cold water fish and returning the river to a more natural state than the other survey respondent groups. On the other hand, the survey respondents identified as riparian owners and the randomly selected voters assigned slightly higher importance to generating electric power than the other groups.

In a follow-up, open-ended question, we asked survey respondents to list any other considerations that they thought important or very important. Two hundred (200) completed surveys included text responses to this question (about 27% of all respondents). Many of the respondents emphasized one or more of the criteria listed in the survey question. However, many more respondents raised very good points in suggesting additional things to consider in making the decisions concerning the future of the Boardman River Dams. All of the comments provided by the respondents were transcribed and are presented in *Appendix C*. However, a number of the additional considerations offered by respondents were repeated many times, including:

- Safety and structural integrity of the dams.
- Preservation of property values & impact on property owners.
- Balancing costs against benefits for hydroelectric power.
- Control of non-native fish species.
- Historic preservation and education.
- Traffic management.

Section 4. Recommendations for the Boardman River Dams

The last section of the survey was designed to gather public opinions and suggestions concerning the alternatives for managing each of the Boardman River Dams. The alternatives were listed as:

- a. retain & repair existing dam structure.
- b. modify dam to provide fish passageway.
- c. modify dam to provide for electric power generation.
- d. partially remove dam to allow free-flow of river.
- e. remove the entire dam structure.

The survey asked people to rank the importance of the alternatives for each dam, individually, on a four-point scale, ranging from *Not At All Important* (1) to *Very Important* (4). Respondents

were free to rank all alternatives high or low for each dam. The following tables provide compilations of responses for each of the dams, as well as an average (i.e., mean) and variance for each alternative, for each dam.

Table 6. Importance of Alternatives for Union Street Dam & Boardman Lake

Boardman Lake & Union Street Dam	Levels of Importance				Total Responses	No Response	Average Response	Response Variance
	Not at all Important			Very Important				
	1	2	3	4				
Retain & Repair existing dam structure	134 19.0%	60 8.5%	81 11.5%	430 61%	705 94.1%	44 5.9%	3.14	1.44
Modify dam to provide a fish passageway	220 33.5%	145 22.1%	143 21.8%	148 22.6%	656 87.6%	93 12.4%	2.33	1.35
Partially remove dam to allow free-flow of river.	355 56.0%	106 16.7%	114 18.0%	59 9.3%	634 84.6%	115 15.4%	1.81	1.08
Remove the entire dam structure.	436 68.8%	49 7.7%	34 5.4%	115 18.1%	634 84.6%	115 15.4%	1.73	1.40

Table 7. Importance of Alternatives for Sabin Dam & Sabin Pond

Sabin Dam & Sabin Pond	Levels of Importance				Total Responses	No Response	Average Response	Response Variance
	Not at all Important			Very Important				
	1	2	3	4				
Retain & Repair existing dam structure	279 41.6%	51 7.6%	61 9.1%	280 41.7%	671 89.6%	78 10.4%	2.51	1.92
Modify dam to provide a fish passageway	280 43.7%	150 23.4%	123 19.2%	88 13.7%	641 85.6%	108 14.4%	2.03	1.18
Modify dam for electric power generation.	245 36.8%	78 11.7%	84 12.7%	257 38.7%	664 88.7%	85 11.3%	2.53	1.76
Partially remove dam to allow free-flow of river.	322 49.7%	93 14.4%	134 20.7%	99 15.3%	648 86.5%	100 13.4%	2.02	1.32
Remove the entire dam structure.	317 48.7%	47 7.2%	45 6.9%	242 37.2%	651 86.9%	98 13.1%	2.33	1.94

Table 8. Importance of Alternatives for Boardman Dam & Boardman Pond

Boardman Dam & Boardman Pond	Levels of Importance				Total Responses	No Response	Average Response	Response Variance
	Not at all Important			Very Important				
	1	2	3	4				
Retain & Repair existing dam structure	270 40.1%	56 8.3%	58 8.6%	290 43.0%	674 90.0%	75 10.0%	2.55	1.91
Modify dam to provide a fish passageway	280 45%	143 22.2%	119 18.5%	92 14.3%	644 86.0%	105 14%	2.02	1.21
Modify dam for electric power generation.	249 36.9%	75 11.1%	82 12.1%	269 39.9%	675 90.1%	74 9.9%	2.55	1.78
Partially remove dam to allow free-flow of river.	325 50.5%	97 15.1%	131 20.3%	91 14.1%	644 86%	105 14.0%	1.98	1.27
Remove the entire dam structure.	318 48.7%	46 7.0%	40 6.1%	249 38.1%	653 87.2%	96 12.8%	2.34	1.96

Table 6. Importance of Alternatives for Brown Bridge Dam & Brown Bridge Pond

Brown Bridge Dam & Brown Bridge Pond	Levels of Importance				Total Responses	No Response	Average Response	Response Variance
	Not at all Important 1	2	3	Very Important 4				
Retain & Repair existing dam structure	251 37%	41 6.0%	58 8.6%	328 48.4%	678 90.5%	71 9.5%	2.68	1.93
Modify dam to provide a fish passageway	300 46.4%	137 21.2%	129 20.0%	80 12.4%	646 86.2%	103 13.8%	1.98	1.16
Modify dam for electric power generation.	243 36.3%	66 9.9%	86 12.9%	274 41.0%	669 89.3%	80 10.7%	2.58	1.79
Partially remove dam to allow free-flow of river.	349 53.9%	89 13.8%	123 19.0%	86 13.3%	647 86.4%	102 13.6%	1.92	1.26
Remove the entire dam structure.	344 52.9%	36 5.5%	37 5.7%	233 35.8%	650 86.8%	99 13.2%	2.24	1.96

Response patterns suggest that the people who answered this survey are not in agreement on any single course of action for any single dam, with one notable exception. The vast majority of respondents appear to support the *Retain & Repair* of the Union Street Dam. About 72% of respondents ranked the retention and repair of the Union Street Dam as important or *very important*. No other alternative for any of the dams received such broad support.

The option of *Retain & Repair* of the Brown Bridge Dam received the second greatest amount of support, with about 57% identifying this option as important or very important. About 51% to 54% of respondents said that *modification of dams for electric power generation* was important or *very important* for each of the upstream dams (Sabin, Boardman, and Brown Bridge Dams). And even smaller majorities said that the *Retain & Repair* alternatives for the Sabin (~51%) and Boardman (~52%) Dams were important or *very important*.

The lack of agreement on particular alternatives for each dam is emphasized by the distribution of respondent opinions. As with the question concerning the importance of various decision criteria, answers provided by respondents suggest that most respondents held extreme views of many alternatives. For example, over 83% of the respondents selected one of two extremes (*Not at All Important* or *Very Important*) concerning the option of *Retain & Repair* for the Sabin Dam, as illustrated in *Figure 1*. This pattern of strong disagreement is repeated over the *Modify for Electric Power Generation* and *Remove the Entire Dam* alternatives with the Sabin Dam (*Figures 3 and 5*). In general, the two other alternatives listed – *Modify for Fish Passage* and *Partially Remove Dam* – appear less important to most respondents (*Figures 2 and 4*).

As illustrated in *Figures 6 - 15* below, the same pattern of strong disagreement over the three alternatives is also apparent with the Boardman and Brown Bridge Dams.

Figure 1.

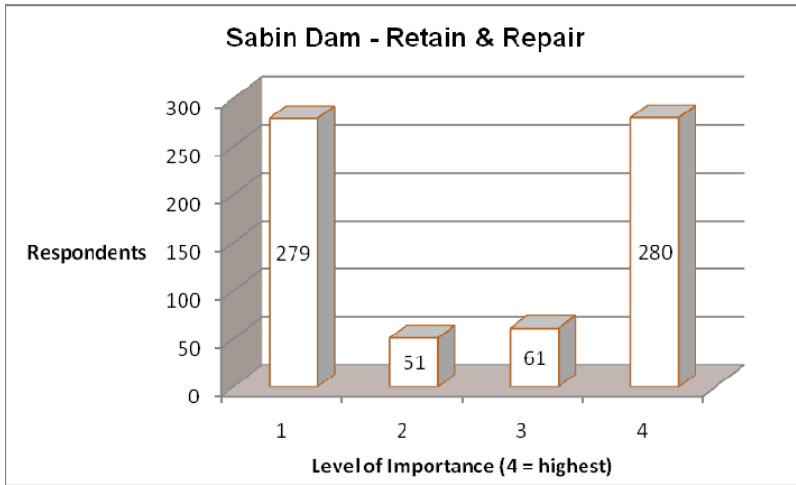


Figure 2.

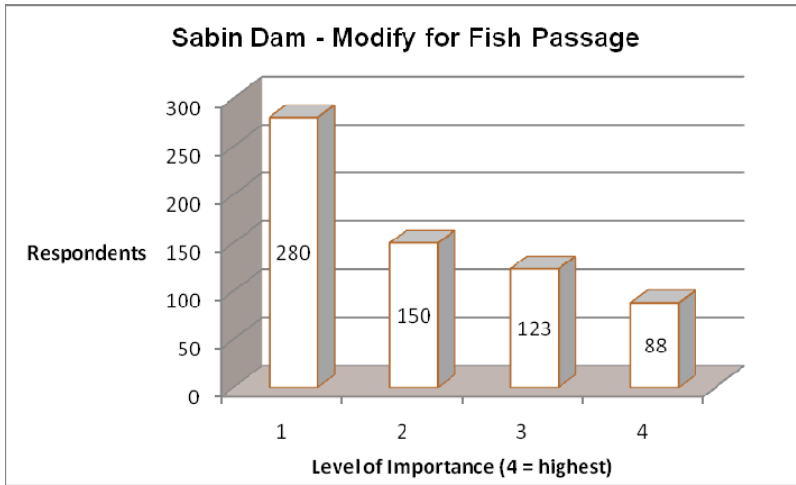


Figure 3.

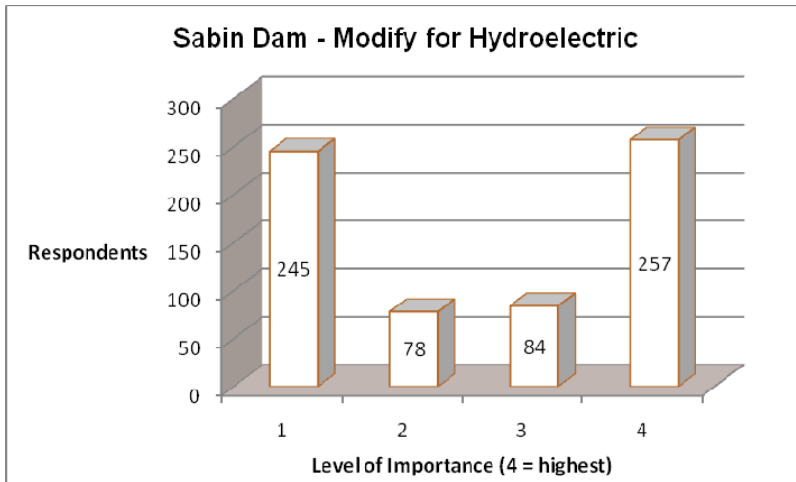


Figure 4.

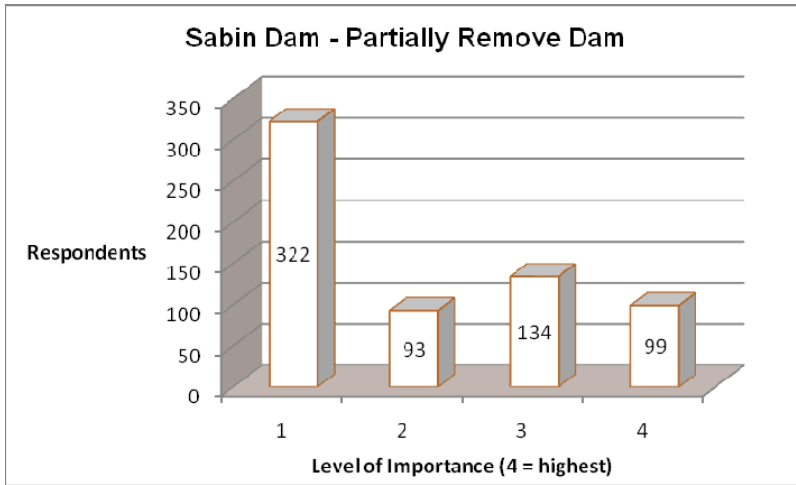


Figure 5.

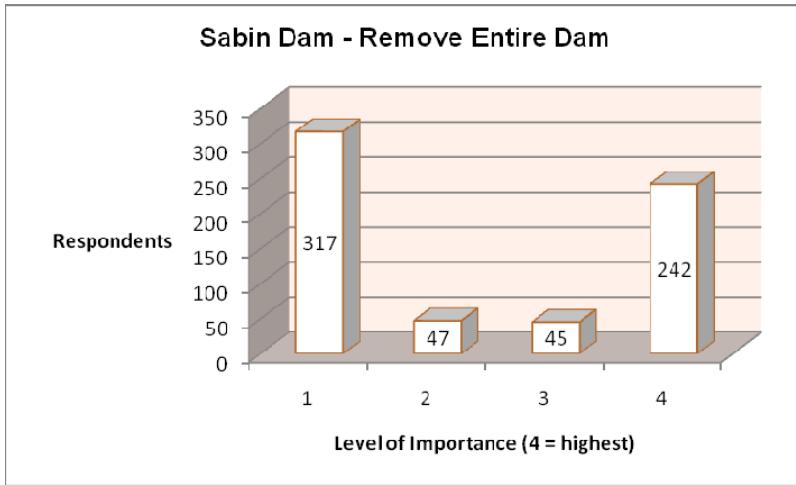


Figure 6.

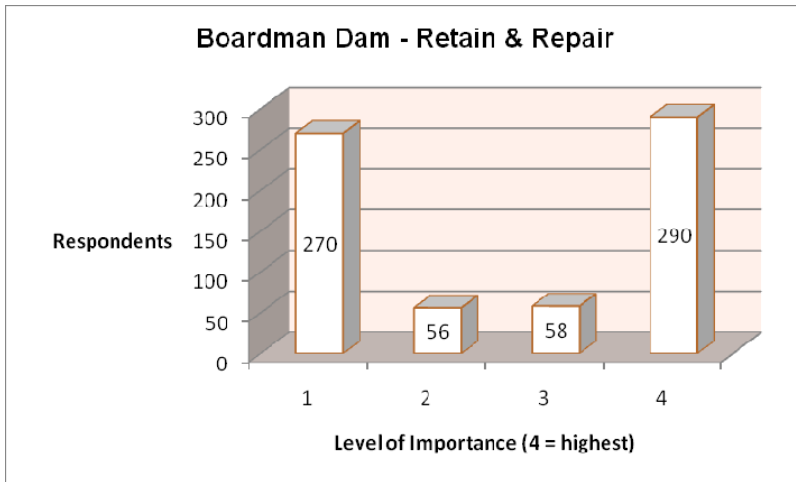


Figure 7.

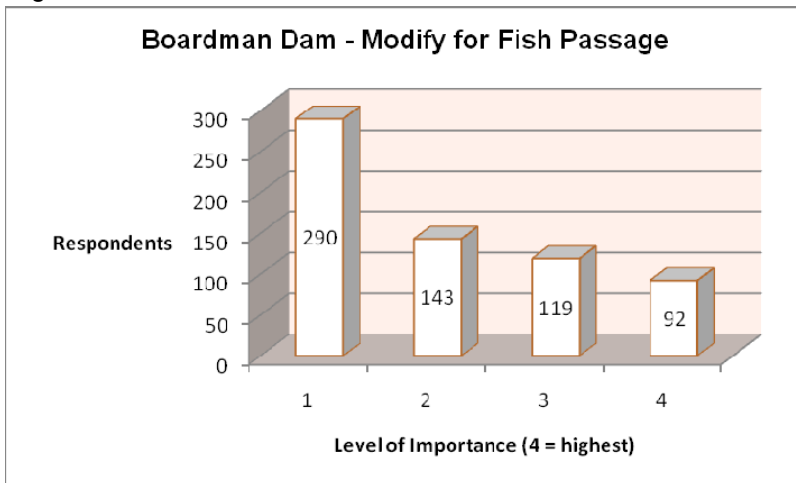


Figure 8.

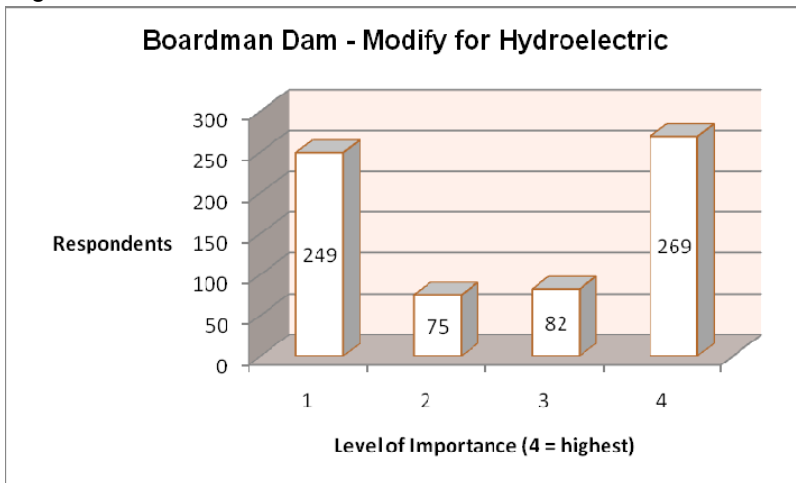


Figure 9.

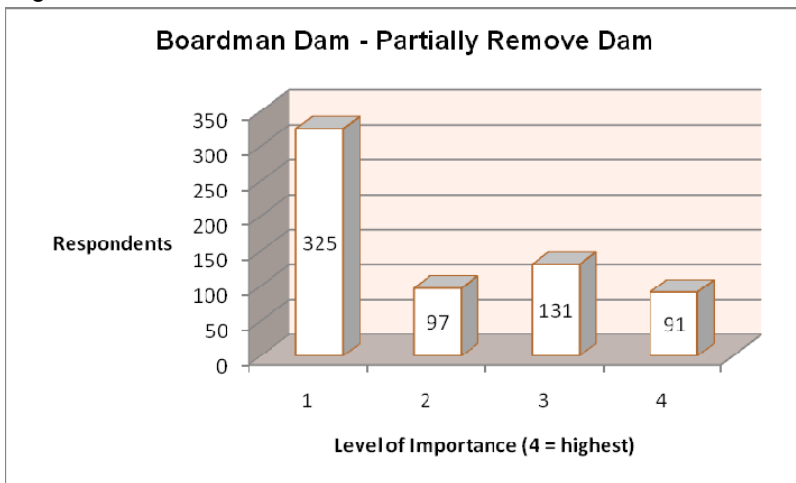


Figure 10.

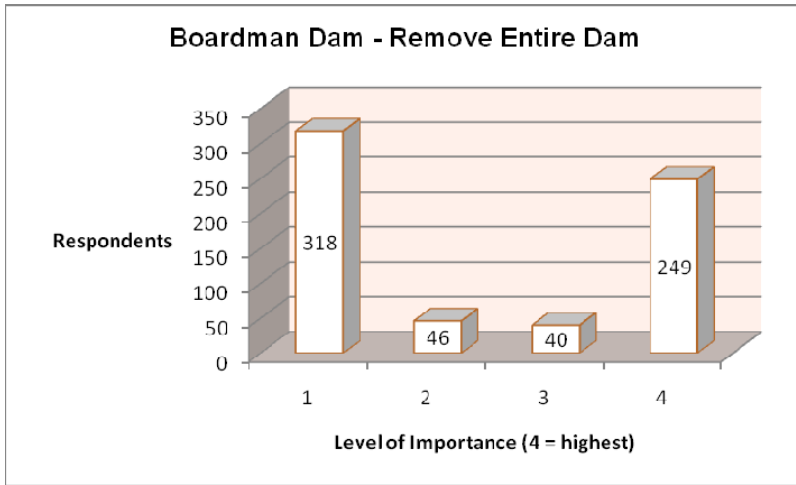


Figure 11.

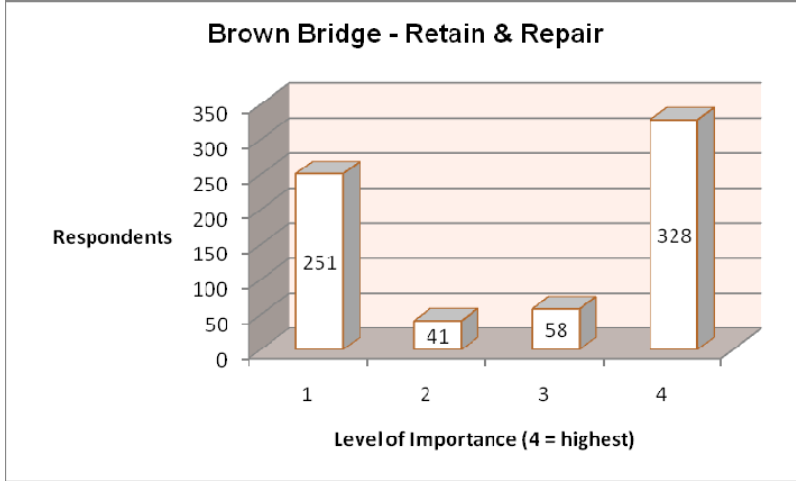


Figure 12.

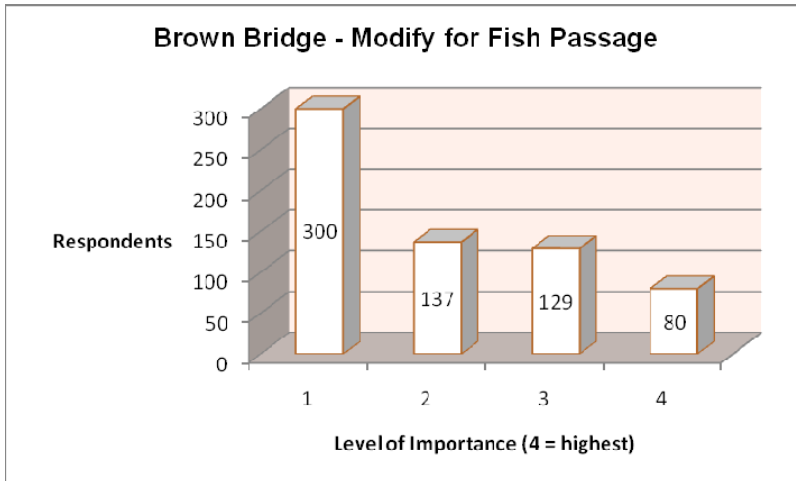


Figure 13.

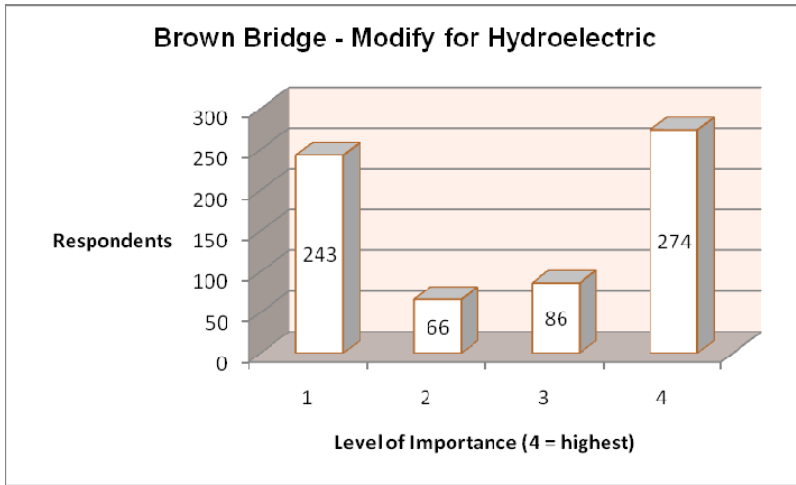


Figure 14.

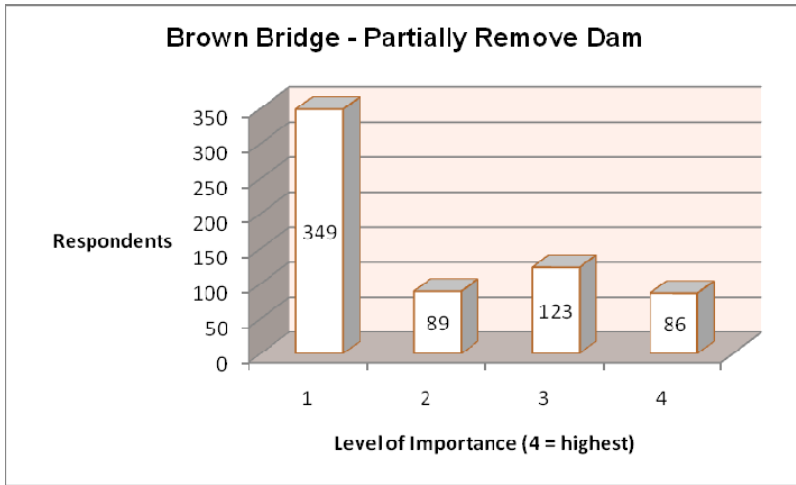
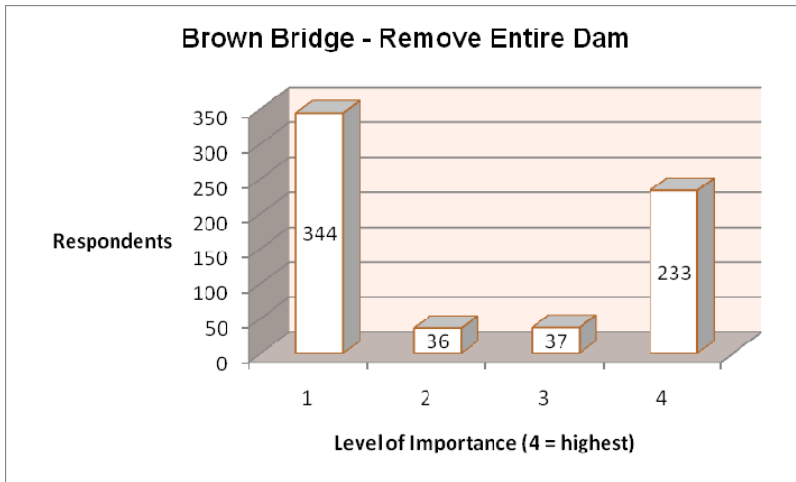


Figure 15.



At the end of the Survey, we asked respondents, *Do you have a vision for the future of the Boardman River?* We asked if they would share their perspective or recommendations with the decision makers. About half of all respondents, 374 or 49.9%, provided written responses to this request, including a large number of carefully considered, lengthy and impassioned statements. All of these responses have been transcribed verbatim and are included as *Appendix D* to this report.

Reviewing these statements, it is clear that many respondents recognize the complexity and difficulty of the decisions to be made concerning the Boardman River Dams. Many people stated that they did not want to cause losses to riparian property owners, including the property owners themselves. On the other hand, many of the same respondents said that choices made should focus on providing the greatest good to the greatest number of people. The cost to tax payers is of real concern, but *not* to the exclusion of other concerns.

Many of these text responses can be categorized into three major preference categories, with some overlap. At least 52 of these open-ended responses (about 14%) said that the dams should not be changed – *keep things the way they are*. At least 121 of these open-ended responses (about 32%) said that the dams should be used for electric power generation, *if feasible*. At least 117 of these open ended responses said that the Boardman River should be allowed to flow freely – *return the river to a more natural state*. We noted that a large number of the respondents who called for a free-flowing river and dam removal believe that the dams should remain if hydroelectric power generation made economic sense (e.g., providing a reasonable return on investment).

Clearly, large numbers of the respondents are interested in seeing the dams used for hydroelectric power. However, many of these respondents are also conflicted. These people would like to know what the actual costs and benefits would be before making a decision. They ask, *What is the return on investment (ROI)?* Given the global emphasis on “green energy,” they reason, we should not remove dams that might provide an efficient, non-polluting source of energy. But these respondents want to see the economic information before making that choice.

Several people noted that the dams are already there and have already caused the damage and disruption to the environment. If the dams are removed, it would be considerably more expensive to re-build them should we ever need them. On the other hand, many of the same respondents state that if the dams cannot produce power efficiently, it would be better to remove them and return the river to a free-flow and “more natural” state.

Another large group of the respondents wrote with great emotion about the potential for the river as a *nationally recognized, high-quality trout stream*. If the dams were removed, these respondents said, the Boardman River would support a much improved fishery and excellent

recreational resource for kayakers and canoeists. However, there were some differences in what kind of fishery this should be. For a few respondents, the passage of Great Lakes fish such as steelhead could help sustain the fisheries and increase tourism. But most of these respondents said that allowing Great Lakes fish to pass beyond Boardman Lake would be a mistake, potentially increasing the spread of disease and contamination while encouraging undesirable fishing activities. These respondents were particularly adamant that salmon should not be allowed up river.

Conclusions

The *Public Opinion Survey* described in this report offered people a substantial opportunity to participate in the Boardman River Dams Project. By distributing approximately 19,000 printed copies of the *Information Booklet* and *Public Opinion Survey* to people throughout Grand Traverse County and offering the same materials to everyone on-line, we were able to assure that most people were given the opportunity to contribute their opinions to this process.

The information gathered through this survey effort and the data provided in the *Appendices* are both substantial and meaningful. A very large number of people took the time and made the effort to complete the survey, with little prompting. Almost all of these people are directly interested in and concerned about the future of the Boardman River and the Boardman River Dams. However, the very low overall response rate raises some question about the larger population's level of interest in this topic.

As described in this report, the survey data shows that this group of respondents is divided in their opinions about the future of most Boardman River Dams. While there is reasonably strong agreement that the Union Street Dam should be repaired and retained, there is no dominant opinion on what to do with the others. Indeed, most of the alternatives result in widely divergent views with roughly similar numbers of respondents on each side.