

COMPOUND INTEREST AND ANNUITY TABLES

**SNAKE RIVER DAM COSTS**  
Beginning in 2001  
All costs in Thousands of Dollars  
Discount Rate: 6.880%

Total Annual Costs	Present Value	Cap. Recovery Factor	Annual Average
\$ 84,422,437	\$ 3,296,857	0.06889	\$ 227,117
Decommission (breach)			\$20,000
Total Annual Average			\$247,117

Year	Total Annual Costs**	Present Value \$1	Total Annual Cost: Present Value	Annual Cost Categories						Year	Total Annual Cos
				1. System Improvements	2. O&M	3. Turbine Rehab	4. Comp Plan	5. Power Services	6. Dredging		
2001	\$ 92,263	\$ 9,93563	\$ 86,324	\$11,660	\$35,200		\$14,450	\$22,681	\$8,272.00	2001	\$ -
2002	\$ 133,893	\$ 8,75400	\$ 117,209	\$42,325	\$43,700		\$16,000	\$23,382	\$8,484.00	2002	\$ -
2003	\$ 137,245	\$ 8,19055	\$ 112,110	\$46,137	\$42,900		\$15,400	\$24,106	\$8,702.00	2003	\$ -
2004	\$ 133,737	\$ 7,66633	\$ 102,486	\$53,861	\$30,600		\$15,500	\$24,851	\$8,925.00	2004	\$ -
2005	\$ 163,189	\$ 7,17005	\$ 117,005	\$64,221	\$32,700	\$12,800	\$18,700	\$25,620	\$9,148.13	2005	\$ -
2006	\$ 157,742	\$ 6,70884	\$ 105,820	\$55,953	\$34,700	\$12,800	\$18,500	\$26,412	\$9,376.83	2006	\$ -
2007	\$ 153,991	\$ 6,27666	\$ 96,654	\$47,451	\$38,200	\$12,800	\$18,700	\$27,229	\$9,611.25	2007	\$ -
2008	\$ 157,652	\$ 5,87226	\$ 92,582	\$49,129	\$38,000	\$12,800	\$19,800	\$28,071	\$9,851.53	2008	\$ -
2009	\$ 158,347	\$ 5,49445	\$ 87,005	\$48,942	\$37,968	\$12,800	\$19,600	\$28,939	\$10,097.82	2009	\$ -
2010	\$ 180,238	\$ 5,14009	\$ 92,658	\$36,202	\$52,551	\$27,700	\$23,600	\$29,834	\$10,350.26	2010	\$ -
2011	\$ 214,418	\$ 4,80999	\$ 103,134	\$53,652	\$14,900	\$24,500	\$30,757	\$30,575	\$10,609.02	2011	\$ -
2012	\$ 199,551	\$ 4,50003	\$ 89,804	\$37,586	\$14,900	\$24,500	\$31,708	\$31,708	\$10,874.25	2012	\$ -
2013	\$ 220,925	\$ 4,21066	\$ 93,023	\$37,190	\$31,200	\$28,700	\$32,689	\$32,689	\$11,146.10	2013	\$ -
2014	\$ 210,401	\$ 3,93996	\$ 82,889	\$38,306	\$16,300	\$30,670	\$33,700	\$33,700	\$11,424.75	2014	\$ -
2015	\$ 213,791	\$ 3,68860	\$ 78,803	\$39,400	\$16,300	\$31,670	\$34,711	\$34,711	\$11,710.37	2015	\$ -
2016	\$ 234,758	\$ 3,44887	\$ 80,961	\$40,600	\$34,100	\$32,303	\$35,752	\$35,752	\$12,003.13	2016	\$ -
2017	\$ 221,777	\$ 3,22677	\$ 71,564	\$41,900	\$35,200	\$32,949	\$36,825	\$36,825	\$12,303.21	2017	\$ -
2018	\$ 226,037	\$ 3,01907	\$ 68,241	\$43,100	\$37,100	\$37,900	\$37,900	\$37,900	\$12,610.79	2018	\$ 35,854.00
2019	\$ 249,920	\$ 2,82447	\$ 70,594	\$44,400	\$37,200	\$36,326	\$39,068	\$39,068	\$12,926.06	2019	\$ 44,924.32
2020	\$ 201,731	\$ 2,62428	\$ 53,314	\$45,700	\$19,400	\$38,143	\$40,240	\$40,240	\$13,249.21	2020	\$ 96,088.01
2021	\$ 207,577	\$ 2,47277	\$ 51,328	\$47,100	\$19,400	\$40,050	\$41,447	\$41,447	\$13,580.44	2021	\$ 110,548.69
2022	\$ 234,762	\$ 2,23135	\$ 54,313	\$48,500	\$40,600	\$42,052	\$42,690	\$42,690	\$13,919.95	2022	\$ 173,161.57
2023	\$ 221,594	\$ 2,16466	\$ 47,967	\$50,000	\$21,200	\$44,155	\$43,971	\$43,971	\$14,267.95	2023	\$ 139,886.29
2024	\$ 227,977	\$ 2,02523	\$ 46,172	\$51,500	\$21,200	\$46,363	\$45,290	\$45,290	\$14,624.65	2024	\$ 42,712.21
2025	\$ 258,720	\$ 1,89499	\$ 49,025	\$53,000	\$44,400	\$48,681	\$46,649	\$46,649	\$14,990.27	2025	\$ 39,029.51
2026	\$ 292,071	\$ 1,77229	\$ 51,782	\$47,743	\$54,600	\$23,200	\$51,115	\$48,048	\$15,365.02	2026	\$ 31,715.09
2027	\$ 300,584	\$ 1,65888	\$ 49,861	\$49,175	\$56,300	\$23,200	\$53,670	\$49,490	\$15,749.15	2027	\$ 27,973.12
2028	\$ 334,621	\$ 1,55220	\$ 51,934	\$50,650	\$57,900	\$25,300	\$56,354	\$50,974	\$16,142.88	2028	\$ 24,238.04
2029	\$ 320,392	\$ 1,45221	\$ 46,525	\$52,170	\$59,700	\$25,300	\$59,172	\$52,504	\$16,546.45	2029	\$ 23,269.13
2030	\$ 329,704	\$ 1,35886	\$ 44,795	\$53,795	\$61,500	\$25,300	\$62,130	\$54,079	\$16,960.11	2030	\$ 20,932.98
2031	\$ 339,269	\$ 1,27212	\$ 43,127	\$55,347	\$63,300	\$25,300	\$65,237	\$55,701	\$17,384.12	2031	\$ 21,358.86
2032	\$ 322,897	\$ 1,18894	\$ 39,523	\$57,008	\$65,200	\$25,300	\$68,498	\$57,737	\$17,817.72	2032	\$ 21,797.15
2033	\$ 334,099	\$ 1,11128	\$ 37,190	\$58,718	\$67,200	\$27,190	\$71,924	\$59,093	\$18,264.19	2033	\$ 22,343.71
2034	\$ 344,785	\$ 1,04112	\$ 35,898	\$60,479	\$69,200	\$27,520	\$75,250	\$60,866	\$18,720.79	2034	\$ 22,702.67
2035	\$ 356,669	\$ 0,97411	\$ 34,647	\$62,293	\$71,200	\$29,296	\$79,296	\$62,692	\$19,188.81	2035	\$ 21,791.64
2036	\$ 302,902	\$ 0,91114	\$ 27,608	\$73,400	\$73,400	\$28,260	\$64,573	\$19,688.53	2036	\$ 22,268.51	
2037	\$ 312,694	\$ 0,85228	\$ 26,666	\$75,600	\$75,600	\$28,424	\$66,510	\$20,160.24	2037	\$ 22,757.80	
2038	\$ 320,864	\$ 0,79799	\$ 25,601	\$75,900	\$80,200	\$29,795	\$68,505	\$20,664.25	2038	\$ 23,258.10	
2039	\$ 333,326	\$ 0,74655	\$ 24,883	\$80,200	\$82,600	\$29,984	\$70,560	\$21,180.86	2039	\$ 23,769.44	
2040	\$ 344,191	\$ 0,69885	\$ 24,040	\$82,600	\$85,100	\$30,204	\$72,677	\$21,710.38	2040	\$ 24,290.42	
2041	\$ 288,474	\$ 0,65335	\$ 18,852	\$85,100	\$87,600	\$30,264	\$74,857	\$22,253.14	2041	\$ 15,196.67	
2042	\$ 299,090	\$ 0,61114	\$ 18,287	\$87,600	\$90,200	\$31,577	\$77,103	\$22,809.47	2042	\$ 15,548.13	
2043	\$ 310,152	\$ 0,57211	\$ 17,743	\$90,200	\$93,000	\$31,577	\$79,416	\$23,379.70	2043	\$ 10,221.16	
2044	\$ 321,777	\$ 0,53522	\$ 17,223	\$93,000	\$95,800	\$32,014	\$81,799	\$23,964.19	2044	\$ 10,477.52	
2045	\$ 333,780	\$ 0,50008	\$ 16,716	\$95,800	\$98,600	\$32,164	\$84,253	\$24,563.30	2045	\$ 10,739.39	
2046	\$ 442,080	\$ 0,46886	\$ 20,714	\$98,600	\$99,900	\$33,623	\$86,780	\$25,177.38	2046	\$ 11,008.15	
2047	\$ 455,094	\$ 0,44384	\$ 19,951	\$101,600	\$101,600	\$34,404	\$89,384	\$25,806.82	2047	\$ 11,282.42	
2048	\$ 465,441	\$ 0,41928	\$ 19,218	\$104,600	\$99,900	\$34,524	\$92,065	\$26,451.99	2048	\$ 11,564.96	
2049	\$ 587,441	\$ 0,38838	\$ 22,544	\$107,800	\$200,700	\$35,000	\$94,827	\$27,113.29	2049	\$ 11,854.40	
2050	\$ 506,113	\$ 0,35951	\$ 18,173	\$99,952	\$111,000	\$35,850	\$97,672	\$27,791.12	2050	\$ 12,150.72	
2051	\$ 621,333	\$ 0,33360	\$ 20,874	\$102,955	\$114,400	\$36,093	\$100,602	\$28,485.90	2051	\$ 12,453.94	
2052	\$ 754,620	\$ 0,31343	\$ 23,720	\$106,039	\$117,800	\$36,279	\$103,620	\$29,198.04	2052	\$ 12,765.43	
2053	\$ 669,330	\$ 0,29241	\$ 19,685	\$109,220	\$121,500	\$36,835	\$106,729	\$29,928.00	2053	\$ 13,083.80	
2054	\$ 689,703	\$ 0,27522	\$ 18,978	\$112,496	\$128,700	\$37,376	\$109,931	\$30,676.20	2054	\$ 13,411.83	
2055	\$ 835,863	\$ 0,25755	\$ 21,519	\$115,872	\$132,600	\$37,915	\$113,229	\$31,443.10	2055	\$ 13,746.74	
2056	\$ 743,341	\$ 0,24209	\$ 17,906	\$119,348	\$136,500	\$38,454	\$116,625	\$32,229.18	2056	\$ 14,089.93	
2057	\$ 766,068	\$ 0,22554	\$ 17,265	\$122,958	\$140,600	\$38,993	\$120,124	\$33,034.91	2057	\$ 14,442.77	
2058	\$ 926,405	\$ 0,21099	\$ 19,535	\$126,616	\$144,900	\$39,532	\$123,728	\$33,860.78	2058	\$ 14,803.87	
2059	\$ 826,000	\$ 0,19733	\$ 16,296	\$130,415	\$149,200	\$40,071	\$127,440	\$34,707.30	2059	\$ 15,173.24	
2060	\$ 851,576	\$ 0,18486	\$ 15,719	\$134,327	\$153,700	\$40,610	\$131,263	\$35,574.98	2060	\$ 15,553.64	
2061	\$ 1,028,142	\$ 0,17277	\$ 17,757	\$138,240	\$158,300	\$41,149	\$135,201	\$36,464.36	2061	\$ 15,942.31	
2062	\$ 789,880	\$ 0,16156	\$ 12,618	\$142,153	\$163,000	\$41,688	\$139,257	\$37,375.97	2062	\$ 16,340.63	
2063	\$ 805,494	\$ 0,15122	\$ 12,178	\$146,066	\$167,700	\$42,227	\$143,435	\$38,310.36	2063	\$ 16,748.59	
2064	\$ 994,998	\$ 0,14115	\$ 14,075	\$150,000	\$172,400	\$42,766	\$147,738	\$39,268.12	2064	\$ 17,167.58	
2065	\$ 871,831	\$ 0,13234	\$ 11,539	\$153,913	\$177,100	\$43,305	\$152,170	\$40,249.83	2065	\$ 16,340.63	
2066	\$ 899,738	\$ 0,12388	\$ 11,142	\$157,826	\$181,800	\$43,844	\$156,735	\$41,256.07	2066	\$ 16,748.59	
2067	\$ 1,107,864	\$ 0,11559	\$ 12,836	\$161,739	\$186,500	\$44,383	\$161,437	\$42,287.47	2067	\$ 17,167.58	
2068	\$ 974,356	\$ 0,10804	\$ 10,562	\$165,652	\$191,200	\$44,922	\$166,280	\$43,344.66	2068	\$ 17,596.22	
2069	\$ 1,005,865	\$ 0,10104	\$ 10,202	\$169,565	\$195,900	\$45,461	\$171,268	\$44,428.28	2069	\$ 18,037.26	
2070	\$ 1,038,842	\$ 0,09499	\$ 9,858	\$173,478	\$200,600	\$46,000	\$176,406	\$45,538.98	2070	\$ 18,487.95	
2071	\$ 894,142	\$ 0,08888	\$ 7,939	\$177,391	\$205,300	\$46,539	\$181,699	\$46,677.46	2071	\$ 18,949.67	
2072	\$ 929,923	\$ 0,08311	\$ 7,725	\$181,304	\$210,000	\$47,078	\$187,150	\$47,844.40	2072	\$ 19,423.79	
2073	\$ 967,245	\$ 0,07777	\$ 7,518	\$185,217	\$214,700	\$47,617	\$192,764	\$49,040.51	2073	\$ 19,908.94	
2074	\$ 1,006,071	\$ 0,07277	\$ 7,316	\$189,130	\$219,400	\$48,156	\$198,547	\$50,266.52	2074	\$ 20,406.49	
2075	\$ 1,255,948	\$ 0,06680	\$ 8,546	\$209,281	\$234,400	\$48,695	\$204,503	\$51,523.18	2075	\$ 20,916.44	
2076	\$ 1,304,562	\$ 0,06037	\$ 8,305	\$215,559	\$239,400	\$49,234	\$210,639	\$52,811.26	2076	\$ 21,440.18	
2077	\$ 1,351,176	\$ 0,05596	\$ 8,072	\$222,036	\$244,400	\$49,773	\$216,958	\$54,131.54	2077	\$ 21,976.32	
2078	\$ 1,407,252	\$ 0,05157	\$ 7,842	\$228,687	\$249,400	\$50,312	\$223,466	\$55,484.83	2078	\$ 22,534.87	
2079	\$ 1,462,136	\$ 0,04721	\$ 7,624	\$235,548	\$254,400	\$50,851	\$230,170	\$56,871.95	2079	\$ 23,088.58	
2080	\$ 1,519,256	\$ 0,04288	\$ 7,412	\$242,614	\$259,400	\$51,390	\$237,076	\$58,293.75	2080	\$ 23,597.15	
2081	\$ 1,578,827	\$ 0,03866	\$ 7,206	\$249,892	\$264,400	\$51,929	\$244,188	\$59,751.09	2081	\$ 24,127.34	
2082	\$ 1,640,848	\$ 0,03455	\$ 7,007	\$257,389	\$269,400	\$52,468	\$251,513	\$61,244.87	2082	\$ 24,663.77	
2083	\$ 1,705,422	\$ 0,03054	\$ 6,814	\$265,111	\$274,400	\$53,007	\$259,059	\$62,775.99	2083	\$ 25,213.37	
2084	\$ 1,772,755	\$ 0,02663	\$ 6,627	\$273,064	\$279,400	\$53,546	\$266,831	\$64,345.39	2084	\$ 25,779.42	
2085	\$ 1,841,105	\$ 0,02282	\$ 6,445	\$281,236	\$284,400	\$54,085	\$274,913	\$65,949.03	2085	\$ 26,351.42	
2086	\$ 1,910,500	\$ 0,01911	\$ 6,272	\$289,627	\$289,400	\$54,624	\$283,331	\$67,602.88			

**Category 1:  
System Improvement Construction and Rehab Costs, Base Year 2001**

*All costs in Thousands of Dollars*

*Discount Rate: 6.880%*

*CRF: 6.889%*

Year	Present Value \$1	Annual Cost	Annual Cost: Present Value
2002	0.93563	\$11,660	\$10,909
2003	0.87540	\$42,325	\$37,051
2004	0.81905	\$46,137	\$37,789
2005	0.76633	\$53,861	\$41,275
2006	0.71700	\$64,221	\$46,046
2007	0.67084	\$55,953	\$37,536
2008	0.62766	\$47,451	\$29,783
2009	0.58726	\$49,129	\$28,851
2010	0.54945	\$48,942	\$26,891
2011	0.51409	\$36,202	\$18,611
2012	0.48099		
2013	0.45003		
2014	0.42106		
2015	0.39396		
2016	0.36860		
2017	0.34487		
2018	0.32267		
2019	0.30190		
2020	0.28247		
2021	0.26428		
2022	0.24727		
2023	0.23135		
2024	0.21646		
2025	0.20253		
2026	0.18949		
2027	0.17729	\$47,743	\$8,465
2028	0.16588	\$49,175	\$8,157
2029	0.15520	\$50,650	\$7,861
2030	0.14521	\$52,170	\$7,576
2031	0.13586	\$53,735	\$7,301
2032	0.12712	\$55,347	\$7,036
2033	0.11894	\$57,008	\$6,780
2034	0.11128	\$58,718	\$6,534
2035	0.10412	\$60,479	\$6,297
2036	0.09741	\$62,293	\$6,068
2037	0.09114		
2038	0.08528		
2039	0.07979		
2040	0.07465		
2041	0.06985		

These costs have been corrected in consideration of the comments made by a NWW review team ie., "the out-years cost for rehab and replacement of fish improvements are not considered" (in part). They were derived by comparing LSRF Appendix E estimates with the actual costs shown in NWW Corps Works activity reports from 2000-20012 for the Columbia River Fish Mitigation Projects. To create similar comparisons, the AFEP costs given in Appendix E were calculated backwards using the CRFM numbers as well as an adjustment for work at McNary Dam. See notes for details.

**1st Major Rehab/Repair, year 25**

Assumed to be 50% of original construction cost, \$456,000 using 3% escalation for 30 years is  $(\$954,864)(50\%) = \$479,432$ ; or \$47,743 per year for 10 years (midpoint to midpoint) and then escalated at 3% per year.

Note: since O&M incorporates around 1% escalation for aging infrastructure, the 50% Rehab/Repair cost should be adequate. This is also low because it is assumed that much of the original study, modeling, and design will be used again.

2042	0.06535		
2043	0.06114		
2044	0.05721		
2045	0.05352		
2046	0.05008		
2047	0.04686		
2048	0.04384		
2049	0.04102		
2050	0.03838		
2051	0.03591		
2052	0.03360	\$99,952	\$3,358
2053	0.03143	\$102,955	\$3,236
2054	0.02941	\$106,039	\$3,119
2055	0.02752	\$109,220	\$3,005
2056	0.02575	\$112,496	\$2,896
2057	0.02409	\$115,872	\$2,791
2058	0.02254	\$119,348	\$2,690
2059	0.02109	\$122,958	\$2,593
2060	0.01973	\$126,616	\$2,498
2061	0.01846	\$130,415	\$2,407
2062	0.01727	\$134,327	\$2,320
2063	0.01616		
2064	0.01512		
2065	0.01415		
2066	0.01324		
2067	0.01238		
2068	0.01159		
2069	0.01084		
2070	0.01014		
2071	0.00949		
2072	0.00888		
2073	0.00831		
2074	0.00777		
2075	0.00727		
2076	0.00680	\$209,281	\$1,424
2077	0.00637	\$215,559	\$1,372
2078	0.00596	\$222,026	\$1,322
2079	0.00557	\$228,687	\$1,274
2080	0.00521	\$235,548	\$1,228
2081	0.00488	\$242,614	\$1,184
2082	0.00456	\$249,892	\$1,141
2083	0.00427	\$257,389	\$1,099
2084	0.00400	\$265,111	\$1,059
2085	0.00374	\$273,064	\$1,021
2086	0.00350		
2087	0.00327		
2088	0.00306		
2089	0.00286		
2090	0.00268		

### 2nd Major Rehab/Repair, year 50

Assumed to be 50% of original construction cost, \$456,000 @3% escalation for 50 years is (\$1,999,104) (50%)=\$999,552 or \$99,953 per year for 10 years (mid point to mid point)and then escalated at 3% per year.

### 3rd Major Rehab/Repair, year 75

Assumed to be 50% of original construction cost, \$456,000 using 3% escalation for 50 years is \$4,185,624\*50%=\$2,092,812, or \$209,281 per year for 10 years (midpoint to midpoint), and then escalated at 3% per year.

2091	0.00251		
2092	0.00235		
2093	0.00220		
2094	0.00205		
2095	0.00192		
2096	0.00180		
2097	0.00168		
2098	0.00157		
2099	0.00147		
2100	0.00138		
2101	0.00129		
<b>Totals:</b>		\$4,682,568	\$429,856
<b>Average Annual:</b>			\$29,613

Revised by Chandra Johnson 8 Dec 2014

COMPOUND INTEREST AND ANNUITY TABLES -

**Category 2:  
Dam O&M and Repair (Includes AFEP)  
Base Year 2001**

*All costs in Thousands of Dollars*

*Discount Rate: 6.880%*

*CRF: 6.889%*

Year	Present Value \$1	Annual Cost	Annual Cost: Present Value
2002	0.93563	\$35,200	\$32,934
2003	0.87540	\$43,700	\$38,255
2004	0.81905	\$42,900	\$35,137
2005	0.76633	\$30,600	\$23,450
2006	0.71700	\$32,700	\$23,446
2007	0.67084	\$34,700	\$23,278
2008	0.62766	\$38,200	\$23,977
2009	0.58726	\$38,000	\$22,316
2010	0.54945	\$37,968	\$20,862
2011	0.51409	\$52,551	\$27,016
2012	0.48099	\$53,652	\$25,806
2013	0.45003	\$37,568	\$16,907
2014	0.42106	\$37,190	\$15,659
2015	0.39396	\$38,306	\$15,091
2016	0.36860	\$39,400	\$14,523
2017	0.34487	\$40,600	\$14,002
2018	0.32267	\$41,900	\$13,520
2019	0.30190	\$43,100	\$13,012
2020	0.28247	\$44,400	\$12,542
2021	0.26428	\$45,700	\$12,078
2022	0.24727	\$47,100	\$11,647
2023	0.23135	\$48,500	\$11,221
2024	0.21646	\$50,000	\$10,823
2025	0.20253	\$51,500	\$10,430
2026	0.18949	\$53,000	\$10,043
2027	0.17729	\$54,600	\$9,680
2028	0.16588	\$56,300	\$9,339
2029	0.15520	\$57,900	\$8,986
2030	0.14521	\$59,700	\$8,669
2031	0.13586	\$61,500	\$8,356
2032	0.12712	\$63,300	\$8,047
2033	0.11894	\$65,200	\$7,755
2034	0.11128	\$67,200	\$7,478
2035	0.10412	\$69,200	\$7,205
2036	0.09741	\$71,200	\$6,936
2037	0.09114	\$73,400	\$6,690
2038	0.08528	\$75,600	\$6,447

Years 1-12 are actual costs from the NWW Civil Works Activity reports. From then on the annual costs are calculated by applying a 3% escalation rate to \$37,190 which was the annual O&M cost shown in LSFR Appendix E, Table E-E-35. This table warns that costs are not escalated nor do they include inflation costs, hence the 3% correction for escalation to determine the annual O &M, R costs in the following years.

2039	0.07979	\$75,900	\$6,056
2040	0.07465	\$80,200	\$5,987
2041	0.06985	\$82,600	\$5,769
2042	0.06535	\$85,100	\$5,561
2043	0.06114	\$87,600	\$5,356
2044	0.05721	\$90,200	\$5,160
2045	0.05352	\$93,000	\$4,978
2046	0.05008	\$95,800	\$4,798
2047	0.04686	\$98,600	\$4,620
2048	0.04384	\$101,600	\$4,454
2049	0.04102	\$104,600	\$4,290
2050	0.03838	\$107,800	\$4,137
2051	0.03591	\$111,000	\$3,986
2052	0.03360	\$114,400	\$3,843
2053	0.03143	\$117,800	\$3,703
2054	0.02941	\$121,300	\$3,567
2055	0.02752	\$125,000	\$3,440
2056	0.02575	\$128,700	\$3,313
2057	0.02409	\$132,600	\$3,194
2058	0.02254	\$136,500	\$3,076
2059	0.02109	\$140,600	\$2,965
2060	0.01973	\$144,900	\$2,859
2061	0.01846	\$149,200	\$2,754
2062	0.01727	\$153,700	\$2,655
2063	0.01616	\$158,300	\$2,558
2064	0.01512	\$163,000	\$2,464
2065	0.01415	\$167,900	\$2,375
2066	0.01324	\$172,900	\$2,288
2067	0.01238	\$178,100	\$2,205
2068	0.01159	\$183,500	\$2,126
2069	0.01084	\$189,000	\$2,049
2070	0.01014	\$194,600	\$1,974
2071	0.00949	\$200,500	\$1,903
2072	0.00888	\$206,500	\$1,833
2073	0.00831	\$212,700	\$1,767
2074	0.00777	\$219,100	\$1,703
2075	0.00727	\$225,600	\$1,641
2076	0.00680	\$232,400	\$1,581
2077	0.00637	\$239,400	\$1,524
2078	0.00596	\$246,600	\$1,469
2079	0.00557	\$253,380	\$1,412
2080	0.00521	\$261,000	\$1,361
2081	0.00488	\$268,800	\$1,311
2082	0.00456	\$276,900	\$1,264
2083	0.00427	\$285,200	\$1,218
2084	0.00400	\$293,700	\$1,174
2085	0.00374	\$302,500	\$1,131

2086	0.00350	\$311,600	\$1,090
2087	0.00327	\$321,000	\$1,051
2088	0.00306	\$330,600	\$1,012
2089	0.00286	\$340,500	\$976
2090	0.00268	\$350,700	\$940
2091	0.00251	\$361,200	\$906
2092	0.00235	\$372,100	\$873
2093	0.00220	\$383,300	\$842
2094	0.00205	\$406,600	\$835
2095	0.00192	\$418,800	\$805
2096	0.00180	\$431,400	\$776
2097	0.00168	\$444,300	\$748
2098	0.00157	\$457,600	\$720
2099	0.00147	\$471,328	\$694
2100	0.00138	\$485,468	\$669
2101	0.00129	\$500,032	\$645
<b>Totals:</b>		\$16,030,343	\$727,993
<b>Average Annual:</b>			\$50,151

Revised by Chandra Johnson 8 Dec 2014

COMPOUND INTEREST AND ANNUITY TABLES -

**Category 3:  
Turbine Rehabs and Upgrades, Base Year 2001**

*All costs in Thousands of Dollars*

*Discount Rate: 6.880%*

*CRF: 6.889%*

Year	Present Value \$1	Annual Cost	Annual Cost: Present	
2002	0.93563			
2003	0.87540			
2004	0.81905			
2005	0.76633	\$12,800	\$9,809	Ice Harbor Units 1,2,3 See Notes
2006	0.71700	\$12,800	\$9,178	
2007	0.67084	\$12,800	\$8,587	Low Mo Units 1,2,3. Life span 45 yrs
2008	0.62766	\$12,800	\$8,034	
2009	0.58726	\$12,800	\$7,517	Lower Granite Units 4,5,6. LS 35 yrs
2010	0.54945	\$27,700	\$15,220	
2011	0.51409	\$14,900	\$7,660	Little Goose Units 1,2,3 Lifespan 45 years
2012	0.48099	\$14,900	\$7,167	
2013	0.45003	\$31,200	\$14,041	Low Mo Units 4,5,6 Lifespan 35 years
2014	0.42106	\$16,300	\$6,863	
2015	0.39396	\$16,300	\$6,422	Ice Harbor Units 4,5,6
2016	0.36860	\$34,100	\$12,569	
2017	0.34487	\$17,800	\$6,139	Little Goose Units 4,5,6 Lifespan 35 years
2018	0.32267	\$17,800	\$5,744	
2019	0.30190	\$37,200	\$11,231	Lower Granite Units 1,2,3 Lifespan 45 years
2020	0.28247	\$19,400	\$5,480	
2021	0.26428	\$19,400	\$5,127	
2022	0.24727	\$40,600	\$10,039	
2023	0.23135	\$21,200	\$4,905	<p>Note: These rehabs are funded through BPA's Capital Investment Program with an estimate of \$97 million for Ice Harbor Units 1,2,3 is found in the 2013 CIP report. This estimate works out to be 3 times the one shown in the LSFR Appendix I page I3-213 for \$380 million for all 4 dams (24 turbines) rehabed twice. Costs are also shown in Appendix E table E-E-43. No escalation is used in the estimates. NWW internal review indicated that the estimates where low but they where not corrected in the final FS/EIS.</p> <p>Corrections have been made to reflect underestimating and escalation at 3% per year.</p>
2024	0.21646	\$21,200	\$4,589	
2025	0.20253	\$44,400	\$8,992	
2026	0.18949	\$23,200	\$4,396	
2027	0.17729	\$23,200	\$4,113	
2028	0.16588	\$48,600	\$8,062	
2029	0.15520	\$25,300	\$3,927	
2030	0.14521	\$25,300	\$3,674	
2031	0.13586	\$25,300	\$3,437	
2032	0.12712			
2033	0.11894			
2034	0.11128			
2035	0.10412			
2036	0.09741			
2037	0.09114			
2038	0.08528			



2039	0.07979			
2040	0.07465			
2041	0.06985			
2042	0.06535			
2043	0.06114			
2044	0.05721			
2045	0.05352			
2046	0.05008	\$95,900	\$4,803	Second rehabs
2047	0.04686	\$95,900	\$4,493	Same estimates as above
2048	0.04384	\$95,900	\$4,204	escalated at 3% per year.
2049	0.04102	\$200,700	\$8,232	Gaps in timing match
2050	0.03838	\$104,800	\$4,022	life spans from first rehaab
2051	0.03591	\$104,800	\$3,763	
2052	0.03360	\$219,300	\$7,367	
2053	0.03143	\$114,500	\$3,599	
2054	0.02941	\$114,500	\$3,367	
2055	0.02752	\$239,600	\$6,593	
2056	0.02575	\$125,100	\$3,221	
2057	0.02409	\$125,100	\$3,013	
2058	0.02254	\$261,700	\$5,898	
2059	0.02109	\$136,600	\$2,880	
2060	0.01973	\$136,600	\$2,695	
2061	0.01846	\$286,500	\$5,289	
2062	0.01727	\$149,900	\$2,589	
2063	0.01616	\$149,900	\$2,422	
2064	0.01512	\$313,700	\$4,743	
2065	0.01415	\$163,800	\$2,317	
2066	0.01324	\$163,800	\$2,168	
2067	0.01238	\$342,800	\$4,245	
2068	0.01159	\$179,000	\$2,074	
2069	0.01084	\$179,000	\$1,940	
2070	0.01014	\$179,000	\$1,816	
2071	0.00949			No further rehabs as the dams
2072	0.00888			are now over 110 years old and
2073	0.00831			should be decommissioned and
2074	0.00777			breached.
2075	0.00727			
2076	0.00680			
2077	0.00637			
2078	0.00596			
2079	0.00557			
2080	0.00521			
2081	0.00488			
2082	0.00456			
2083	0.00427			
2084	0.00400			
2085	0.00374			

2086	0.00350		
2087	0.00327		
2088	0.00306		
2089	0.00286		
2090	0.00268		
2091	0.00251		
2092	0.00235		
2093	0.00220		
2094	0.00205		
2095	0.00192		
2096	0.00180		
2097	0.00168		
2098	0.00157		
2099	0.00147		
2100	0.00138		
2101	0.00129		
<b>Totals:</b>		\$4,907,700	\$300,675
<b>Average Annual:</b>			\$20,713

Prepared By Jim Waddell, Revised 8 April 2014  
Revised by Chandra Johnson 8 Dec 2014

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**Category 4:**  
**Lower Snake Comp Plan: Hatchery O&M, R,R,**  
**(BPA Funded) Base Year 2001**

*All costs in Thousands of Dollars*

*Discount Rate: 6.880%*

*CRF: 6.889%*

Year	Present Value \$1	Annual Cost	Annual Cost: Present Value		5.25% escalation comparison
2002	0.93563	\$14,450	\$13,520	Actuals 2001*	\$14,450
2003	0.87540	\$16,000	\$14,006	actuals	\$15,209
2004	0.81905	\$15,400	\$12,613	actuals	\$16,007
2005	0.76633	\$15,500	\$11,878	actuals	\$16,847
2006	0.71700	\$18,700	\$13,408	actuals	\$17,732
2007	0.67084	\$18,500	\$12,411	actuals	\$18,663
2008	0.62766	\$18,700	\$11,737	actuals	\$19,643
2009	0.58726	\$19,800	\$11,628	actuals	\$20,674
2010	0.54945	\$19,600	\$10,769	actuals	\$21,759
2011	0.51409	\$23,600	\$12,132	actuals	\$22,902
2012	0.48099	\$24,500	\$11,784	actuals	\$24,104
2013	0.45003	\$24,500	\$11,026	actuals	\$25,369
2014	0.42106	\$28,700	\$12,084	actuals	\$26,701
2015	0.39396	\$30,670	\$12,083	actuals	\$28,103
2016	0.36860	\$31,670	\$11,674	proposed	\$29,579
2017	0.34487	\$32,303	\$11,140	proposed	\$31,131
2018	0.32267	\$32,949	\$10,632	proposed	\$32,766
2019	0.30190	\$34,596	\$10,445	escalated @5%	
2020	0.28247	\$36,326	\$10,261	Annual costs are actual costs and proposed cost taken from BPA budget documents. Beginning in 2017, the costs are escalated at 5% per year to generate the annual cost. An escalation rate of 5.25% is shown for comparison since this rate is close to the actual escalation between 2001 and 2017.	
2021	0.26428	\$38,143	\$10,080		
2022	0.24727	\$40,050	\$9,903		
2023	0.23135	\$42,052	\$9,729		
2024	0.21646	\$44,155	\$9,558		
2025	0.20253	\$46,363	\$9,390		
2026	0.18949	\$48,681	\$9,225		
2027	0.17729	\$51,115	\$9,062		
2028	0.16588	\$53,670	\$8,903		
2029	0.15520	\$56,354	\$8,746		
2030	0.14521	\$59,172	\$8,592		
2031	0.13586	\$62,130	\$8,441		
2032	0.12712	\$65,237	\$8,293		
2033	0.11894	\$68,499	\$8,147		
2034	0.11128	\$71,924	\$8,004		
2035	0.10412	\$75,520	\$7,863		
2036	0.09741	\$79,296	\$7,725		
2037	0.09114	\$83,260	\$7,589		
2038	0.08528	\$87,424	\$7,455		

2039	0.07979	\$91,795	\$7,324
2040	0.07465	\$96,384	\$7,195
2041	0.06985	\$101,204	\$7,069
2042	0.06535	\$106,264	\$6,944
2043	0.06114	\$111,577	\$6,822
2044	0.05721	\$117,156	\$6,702
2045	0.05352	\$123,014	\$6,584
2046	0.05008	\$129,164	\$6,468
2047	0.04686	\$135,623	\$6,355
2048	0.04384	\$142,404	\$6,243
2049	0.04102	\$149,524	\$6,133
2050	0.03838	\$157,000	\$6,025
2051	0.03591	\$164,850	\$5,919
2052	0.03360	\$173,093	\$5,815
2053	0.03143	\$181,747	\$5,713
2054	0.02941	\$190,835	\$5,612
2055	0.02752	\$200,376	\$5,514
2056	0.02575	\$210,395	\$5,417
2057	0.02409	\$220,915	\$5,321
2058	0.02254	\$231,961	\$5,228
2059	0.02109	\$243,559	\$5,136
2060	0.01973	\$255,737	\$5,045
2061	0.01846	\$268,523	\$4,957
2062	0.01727	\$281,950	\$4,870
2063	0.01616	\$296,047	\$4,784
2064	0.01512	\$310,849	\$4,700
2065	0.01415	\$326,392	\$4,617
2066	0.01324	\$342,711	\$4,536
2067	0.01238	\$359,847	\$4,456
2068	0.01159	\$377,839	\$4,378
2069	0.01084	\$396,731	\$4,301
2070	0.01014	\$416,568	\$4,225
2071	0.00949	\$437,396	\$4,151
2072	0.00888	\$459,266	\$4,078
2073	0.00831	\$482,229	\$4,006
2074	0.00777	\$506,341	\$3,936
2075	0.00727	\$531,658	\$3,866
2076	0.00680	\$558,241	\$3,798
2077	0.00637	\$586,153	\$3,731
2078	0.00596	\$615,460	\$3,666
2079	0.00557	\$646,234	\$3,601
2080	0.00521	\$678,545	\$3,538
2081	0.00488	\$712,472	\$3,476
2082	0.00456	\$748,096	\$3,415
2083	0.00427	\$785,501	\$3,355
2084	0.00400	\$824,776	\$3,296
2085	0.00374	\$866,015	\$3,238

2086	0.00350	\$909,315	\$3,181
2087	0.00327	\$954,781	\$3,125
2088	0.00306	\$1,002,520	\$3,070
2089	0.00286	\$1,052,646	\$3,016
2090	0.00268	\$1,105,279	\$2,963
2091	0.00251	\$1,160,543	\$2,911
2092	0.00235	\$1,218,570	\$2,859
2093	0.00220	\$1,279,498	\$2,809
2094	0.00205	\$1,343,473	\$2,760
2095	0.00192	\$1,410,647	\$2,711
2096	0.00180	\$1,481,179	\$2,663
2097	0.00168	\$1,555,238	\$2,617
2098	0.00157	\$1,633,000	\$2,571
2099	0.00147	\$1,714,650	\$2,525
2100	0.00138	\$1,800,382	\$2,481
2101	0.00129	\$1,890,402	\$2,437
<b>Totals:</b>		\$39,392,045	\$662,191
<b>Average Annual:</b>			\$45,618

Revised by Chandra Johnson 8 Dec 2014

**Category 5:  
Power Services (Including System Improvements and BPA's Dam O,M&R  
Costs). Base Year 2001**

*All costs in Thousands of Dollars*

*Discount Rate: 6.880%*

*CRF: 6.889%*

Year	Present Value \$1	Annual Cost	Annual Cost: Present Value
2002	0.93563	\$22,681	\$21,221
2003	0.87540	\$23,382	\$20,469
2004	0.81905	\$24,106	\$19,744
2005	0.76633	\$24,851	\$19,044
2006	0.71700	\$25,620	\$18,369
2007	0.67084	\$26,412	\$17,718
2008	0.62766	\$27,229	\$17,091
2009	0.58726	\$28,071	\$16,485
2010	0.54945	\$28,939	\$15,901
2011	0.51409	\$29,834	\$15,337
2012	0.48099	\$30,757	\$14,794
2013	0.45003	\$31,708	\$14,270
2014	0.42106	\$32,689	\$13,764
2015	0.39396	\$33,700	\$13,276
2016	0.36860	\$34,711	\$12,794
2017	0.34487	\$35,752	\$12,330
2018	0.32267	\$36,825	\$11,882
2019	0.30190	\$37,930	\$11,451
2020	0.28247	\$39,068	\$11,035
2021	0.26428	\$40,240	\$10,635
2022	0.24727	\$41,447	\$10,249
2023	0.23135	\$42,690	\$9,877
2024	0.21646	\$43,971	\$9,518
2025	0.20253	\$45,290	\$9,172
2026	0.18949	\$46,649	\$8,840
2027	0.17729	\$48,048	\$8,519
2028	0.16588	\$49,490	\$8,209
2029	0.15520	\$50,974	\$7,911
2030	0.14521	\$52,504	\$7,624
2031	0.13586	\$54,079	\$7,347
2032	0.12712	\$55,701	\$7,081
2033	0.11894	\$57,372	\$6,824
2034	0.11128	\$59,093	\$6,576
2035	0.10412	\$60,866	\$6,337
2036	0.09741	\$62,692	\$6,107
2037	0.09114	\$64,573	\$5,885
2038	0.08528	\$66,510	\$5,672
2039	0.07979	\$68,505	\$5,466

\$33.7 million was the estimated cost in 2014 for BPA O,M&R on the Four Lower Snake Dams. 3% escalation and deescalation used.

2040	0.07465	\$70,560	\$5,267
2041	0.06985	\$72,677	\$5,076
2042	0.06535	\$74,857	\$4,892
2043	0.06114	\$77,103	\$4,714
2044	0.05721	\$79,416	\$4,543
2045	0.05352	\$81,799	\$4,378
2046	0.05008	\$84,253	\$4,219
2047	0.04686	\$86,780	\$4,066
2048	0.04384	\$89,384	\$3,919
2049	0.04102	\$92,065	\$3,776
2050	0.03838	\$94,827	\$3,639
2051	0.03591	\$97,672	\$3,507
2052	0.03360	\$100,602	\$3,380
2053	0.03143	\$103,620	\$3,257
2054	0.02941	\$106,729	\$3,139
2055	0.02752	\$109,931	\$3,025
2056	0.02575	\$113,229	\$2,915
2057	0.02409	\$116,625	\$2,809
2058	0.02254	\$120,124	\$2,707
2059	0.02109	\$123,728	\$2,609
2060	0.01973	\$127,440	\$2,514
2061	0.01846	\$131,263	\$2,423
2062	0.01727	\$135,201	\$2,335
2063	0.01616	\$139,257	\$2,250
2064	0.01512	\$143,435	\$2,169
2065	0.01415	\$147,738	\$2,090
2066	0.01324	\$152,170	\$2,014
2067	0.01238	\$156,735	\$1,941
2068	0.01159	\$161,437	\$1,870
2069	0.01084	\$166,280	\$1,803
2070	0.01014	\$171,268	\$1,737
2071	0.00949	\$176,406	\$1,674
2072	0.00888	\$181,699	\$1,613
2073	0.00831	\$187,150	\$1,555
2074	0.00777	\$192,764	\$1,498
2075	0.00727	\$198,547	\$1,444
2076	0.00680	\$204,503	\$1,391
2077	0.00637	\$210,639	\$1,341
2078	0.00596	\$216,958	\$1,292
2079	0.00557	\$223,466	\$1,245
2080	0.00521	\$230,170	\$1,200
2081	0.00488	\$237,076	\$1,157
2082	0.00456	\$244,188	\$1,115
2083	0.00427	\$251,513	\$1,074
2084	0.00400	\$259,059	\$1,035
2085	0.00374	\$266,831	\$998
2086	0.00350	\$274,836	\$961

2087	0.00327	\$283,081	\$926
2088	0.00306	\$291,573	\$893
2089	0.00286	\$300,320	\$860
2090	0.00268	\$309,330	\$829
2091	0.00251	\$318,610	\$799
2092	0.00235	\$328,168	\$770
2093	0.00220	\$338,013	\$742
2094	0.00205	\$348,153	\$715
2095	0.00192	\$358,598	\$689
2096	0.00180	\$369,356	\$664
2097	0.00168	\$380,437	\$640
2098	0.00157	\$391,850	\$617
2099	0.00147	\$403,605	\$594
2100	0.00138	\$415,713	\$573
2101	0.00129	\$428,185	\$552
<b>Totals:</b>		<b>\$13,933,958</b>	<b>\$575,269</b>
<b>verage Annual:</b>			<b>\$39,630</b>

Revised by Chandra Johnson 8 Dec 2014



COMPOUND INTEREST AND ANNUITY TABLES -

**Category 6:  
Dredging, Base Year 2001**

*All costs in Thousands of Dollars*

*Discount Rate: 6.880%*

*CRF: 6.889%*

Year	Present Value \$1	Annual Cost	Annual Cost: Present Value
2002	0.93563	\$8,272	\$7,740
2003	0.87540	\$8,484	\$7,427
2004	0.81905	\$8,702	\$7,127
2005	0.76633	\$8,925	\$6,839
2006	0.71700	\$9,148	\$6,559
2007	0.67084	\$9,377	\$6,290
2008	0.62766	\$9,611	\$6,033
2009	0.58726	\$9,852	\$5,785
2010	0.54945	\$10,098	\$5,548
2011	0.51409	\$10,350	\$5,321
2012	0.48099	\$10,609	\$5,103
2013	0.45003	\$10,874	\$4,894
2014	0.42106	\$11,146	\$4,693
2015	0.39396	\$11,425	\$4,501
2016	0.36860	\$11,710	\$4,316
2017	0.34487	\$12,003	\$4,140
2018	0.32267	\$12,303	\$3,970
2019	0.30190	\$12,611	\$3,807
2020	0.28247	\$12,926	\$3,651
2021	0.26428	\$13,249	\$3,502
2022	0.24727	\$13,580	\$3,358
2023	0.23135	\$13,920	\$3,220
2024	0.21646	\$14,268	\$3,088
2025	0.20253	\$14,625	\$2,962
2026	0.18949	\$14,990	\$2,841
2027	0.17729	\$15,365	\$2,724
2028	0.16588	\$15,749	\$2,612
2029	0.15520	\$16,143	\$2,505
2030	0.14521	\$16,546	\$2,403
2031	0.13586	\$16,960	\$2,304
2032	0.12712	\$17,384	\$2,210
2033	0.11894	\$17,819	\$2,119
2034	0.11128	\$18,264	\$2,032
2035	0.10412	\$18,721	\$1,949
2036	0.09741	\$19,189	\$1,869
2037	0.09114	\$19,669	\$1,793
2038	0.08528	\$20,160	\$1,719
2039	0.07979	\$20,664	\$1,649

Dredging costs are based on the \$12.75 per cubic yards used in 2004/5 navigation dredging, multiplied times the 700,000 cubic yards/year stated in the 2014 PSMP. Costs are deescalated at 2.5% for 3 years to base year 2001 and escalated at 2.5% for 97 years.

2040	0.07465	\$21,181	\$1,581
2041	0.06985	\$21,710	\$1,516
2042	0.06535	\$22,253	\$1,454
2043	0.06114	\$22,809	\$1,395
2044	0.05721	\$23,380	\$1,337
2045	0.05352	\$23,964	\$1,283
2046	0.05008	\$24,563	\$1,230
2047	0.04686	\$25,177	\$1,180
2048	0.04384	\$25,807	\$1,131
2049	0.04102	\$26,452	\$1,085
2050	0.03838	\$27,113	\$1,041
2051	0.03591	\$27,791	\$998
2052	0.03360	\$28,486	\$957
2053	0.03143	\$29,198	\$918
2054	0.02941	\$29,928	\$880
2055	0.02752	\$30,676	\$844
2056	0.02575	\$31,443	\$810
2057	0.02409	\$32,229	\$776
2058	0.02254	\$33,035	\$745
2059	0.02109	\$33,861	\$714
2060	0.01973	\$34,707	\$685
2061	0.01846	\$35,575	\$657
2062	0.01727	\$36,464	\$630
2063	0.01616	\$37,376	\$604
2064	0.01512	\$38,310	\$579
2065	0.01415	\$39,268	\$555
2066	0.01324	\$40,250	\$533
2067	0.01238	\$41,256	\$511
2068	0.01159	\$42,287	\$490
2069	0.01084	\$43,345	\$470
2070	0.01014	\$44,428	\$451
2071	0.00949	\$45,539	\$432
2072	0.00888	\$46,677	\$414
2073	0.00831	\$47,844	\$397
2074	0.00777	\$49,041	\$381
2075	0.00727	\$50,267	\$366
2076	0.00680	\$51,523	\$351
2077	0.00637	\$52,811	\$336
2078	0.00596	\$54,132	\$322
2079	0.00557	\$55,485	\$309
2080	0.00521	\$56,872	\$297
2081	0.00488	\$58,294	\$284
2082	0.00456	\$59,751	\$273
2083	0.00427	\$61,245	\$262
2084	0.00400	\$62,776	\$251
2085	0.00374	\$64,345	\$241
2086	0.00350	\$65,954	\$231

2087	0.00327	\$67,603	\$221
2088	0.00306	\$69,293	\$212
2089	0.00286	\$71,025	\$203
2090	0.00268	\$72,801	\$195
2091	0.00251	\$74,621	\$187
2092	0.00235	\$76,486	\$179
2093	0.00220	\$78,399	\$172
2094	0.00205	\$80,359	\$165
2095	0.00192	\$82,368	\$158
2096	0.00180	\$84,427	\$152
2097	0.00168	\$86,537	\$146
2098	0.00157	\$88,701	\$140
2099	0.00147	\$90,918	\$134
2100	0.00138	\$93,191	\$128
2101	0.00129	\$95,521	\$123
<b>Totals:</b>		<b>\$3,584,823</b>	<b>\$186,307</b>
<b>Average Annual:</b>			<b>\$12,835</b>

Revised by Chandra Johnson 8 Dec 2014