

**PROCEDURES FOR
BEAR LAKE/MUD LAKE
ELEVATION EQUIVALENCY CALCULATIONS**

April 18, 1995

HISTORY OF REVISIONS

April 18, 1995 - Adopted



BEAR RIVER COMMISSION

PROCEDURES FOR BEAR LAKE/MUD LAKE ELEVATION EQUIVALENCY CALCULATIONS

April 18, 1995

I. INTRODUCTION

The Amended Bear River Compact indicates that "'Bear Lake' means Bear Lake and Mud Lake." The current operation of Mud Lake by PacifiCorp is to generally hold waters in Mud Lake at an elevation higher than Bear Lake. This mode of operation reduces the amount of energy expended to pump waters via the Lifton pumps. However, this mode of operation also prevents the two water bodies from equalizing in elevation, which reduces the elevation to which Bear Lake would otherwise reach if the waters were not held back by PacifiCorp.

The Amended Bear River Compact in Article VI prevents storage under additional storage allocations in upstream reservoirs when the elevation of Bear Lake is below 5911 (UP&L Datum). It is important to upstream storage, in critical water years when the elevation of Bear Lake is below but approaching an elevation of 5911, to precisely determine the elevation of Bear Lake. Depending on a number of factors during the storage season, a determination of when Bear Lake exceeds the 5911 threshold could make a very dramatic difference in the allowable storage during that season. The Bear River Commission has determined that the waters held back in Mud Lake do make a meaningful impact to this determination.

II. DETERMINATION

The Commission has determined that because "'Bear Lake' means Bear Lake and Mud Lake," that in order to calculate the true elevation of Bear Lake, mathematically the contents of Bear Lake and Mud Lake should be allowed to equalize in elevation. Therefore, a procedure has been adopted by the Commission in the past and is formalized herein whereby the contents within Mud Lake are mathematically added to the contents of Bear Lake (as if they were allowed to flow into Bear Lake), and a determination is made as to what the new "equivalent" Bear Lake elevation would be (this simple method of adding Mud Lake to Bear Lake only applies when the equivalent elevation is below the bottom of Mud Lake, otherwise consideration needs to be given to waters which would naturally remain in Mud Lake should the two water bodies be allowed to equalize in elevation).

With the failure of the Mud Lake dike in May of 1993 (which allowed Mud Lake to flow into Bear Lake) and the subsequent refilling of Mud Lake in February of 1994, PacifiCorp was able to generate a new area capacity table for Mud Lake (attachment A). Using the existing area capacity table for Bear Lake (attachment B), it is a rather simple process to, for any

combinations of elevations of the two lakes, add their respective contents together and determine the equivalent Bear Lake elevation. For ease of determination of the Bear Lake equivalent elevation, a table has been generated (attachment C) for the normal operating range of Mud Lake during the spring storage season. The rows represent the elevation and contents in Mud Lake in increments of 0.10'. The columns indicate the elevation of Bear Lake as it approaches an elevation of 5911 in increments of 0.02'. A determination of the equivalent elevation is made by viewing the intersection of any given combination of Bear Lake and Mud Lake elevations. Combinations which make a Bear Lake equivalent elevation of 5911' or greater are shown below and to the right of the line which traverses the page. This table is adopted herein. It is recognized that at times the Bear Lake and/or Mud Lake elevations may fall outside of the limits shown on this table. In these instances, the same mathematical procedures will be applied. It is further recognized that greater precision could be obtain by reducing the size of the increments; but such is probably not warranted.

EQUIVALENT BEAR LAKE ELEVATION

(As per PacifiCorp's new Mud Lake rating)

Elevation	Contents	10.64	10.66	10.68	10.70	10.72	10.74	10.76	10.78	10.80	10.82	10.84	10.86	10.88	10.90	10.92	10.94	10.96	10.98	11.00	
		533,510	534,801	536,092	537,384	538,675	539,967	541,259	542,551	543,844	545,136	546,429	547,722	549,016	550,309	551,603	552,897	554,191	555,485	556,780	
		Bear Lake Elevation (+5900' (UPAL Datum))																			
18.70	536	5910.64	5910.66	5910.68	5910.70	5910.72	5910.74	5910.76	5910.78	5910.80	5910.82	5910.84	5910.86	5910.88	5910.90	5910.92	5910.94	5910.96	5910.98	5911.00	
18.80	930	5910.65	5910.67	5910.69	5910.71	5910.73	5910.75	5910.77	5910.79	5910.81	5910.83	5910.85	5910.87	5910.89	5910.91	5910.93	5910.95	5910.97	5910.99	5911.01	5911.03
18.90	1,368	5910.66	5910.68	5910.70	5910.72	5910.74	5910.76	5910.78	5910.80	5910.82	5910.84	5910.86	5910.88	5910.90	5910.92	5910.94	5910.96	5910.98	5911.00	5911.02	5911.04
19.00	1,850	5910.66	5910.68	5910.70	5910.72	5910.74	5910.76	5910.78	5910.80	5910.82	5910.84	5910.86	5910.88	5910.90	5910.92	5910.94	5910.96	5910.98	5911.00	5911.02	5911.04
19.10	2,268	5910.67	5910.69	5910.71	5910.73	5910.75	5910.77	5910.79	5910.81	5910.83	5910.85	5910.87	5910.89	5910.91	5910.93	5910.95	5910.97	5910.99	5911.01	5911.03	5911.05
19.20	3,374	5910.69	5910.71	5910.73	5910.75	5910.77	5910.79	5910.81	5910.83	5910.85	5910.87	5910.89	5910.91	5910.93	5910.95	5910.97	5910.99	5911.01	5911.03	5911.05	5911.07
19.30	4,252	5910.70	5910.72	5910.74	5910.76	5910.78	5910.80	5910.82	5910.84	5910.86	5910.88	5910.90	5910.92	5910.94	5910.96	5910.98	5911.00	5911.02	5911.04	5911.06	5911.08
19.40	5,131	5910.71	5910.73	5910.75	5910.77	5910.79	5910.81	5910.83	5910.85	5910.87	5910.89	5910.91	5910.93	5910.95	5910.97	5910.99	5911.01	5911.03	5911.05	5911.07	5911.09
19.50	5,887	5910.74	5910.76	5910.78	5910.80	5910.82	5910.84	5910.86	5910.88	5910.90	5910.92	5910.94	5910.96	5910.98	5911.00	5911.02	5911.04	5911.06	5911.08	5911.10	5911.12
19.60	6,451	5910.74	5910.76	5910.78	5910.80	5910.82	5910.84	5910.86	5910.88	5910.90	5910.92	5910.94	5910.96	5910.98	5911.00	5911.02	5911.04	5911.06	5911.08	5911.10	5911.12
19.70	7,014	5910.74	5910.76	5910.78	5910.80	5910.82	5910.84	5910.86	5910.88	5910.90	5910.92	5910.94	5910.96	5910.98	5911.00	5911.02	5911.04	5911.06	5911.08	5911.10	5911.12
19.80	7,578	5910.75	5910.77	5910.79	5910.81	5910.83	5910.85	5910.87	5910.89	5910.91	5910.93	5910.95	5910.97	5910.99	5911.01	5911.03	5911.05	5911.07	5911.09	5911.11	5911.13
19.90	8,142	5910.76	5910.78	5910.80	5910.82	5910.84	5910.86	5910.88	5910.90	5910.92	5910.94	5910.96	5910.98	5911.00	5911.02	5911.04	5911.06	5911.08	5911.10	5911.12	5911.14
20.00	8,706	5910.77	5910.79	5910.81	5910.83	5910.85	5910.87	5910.89	5910.91	5910.93	5910.95	5910.97	5910.99	5911.01	5911.03	5911.05	5911.07	5911.09	5911.11	5911.13	5911.15
20.10	9,269	5910.78	5910.80	5910.82	5910.84	5910.86	5910.88	5910.90	5910.92	5910.94	5910.96	5910.98	5911.00	5911.02	5911.04	5911.06	5911.08	5911.10	5911.12	5911.14	5911.16
20.20	9,833	5910.79	5910.81	5910.83	5910.85	5910.87	5910.89	5910.91	5910.93	5910.95	5910.97	5910.99	5911.01	5911.03	5911.05	5911.07	5911.09	5911.11	5911.13	5911.15	5911.17
20.30	10,397	5910.80	5910.82	5910.84	5910.86	5910.88	5910.90	5910.92	5910.94	5910.96	5910.98	5911.00	5911.02	5911.04	5911.06	5911.08	5911.10	5911.12	5911.14	5911.16	5911.18
20.40	11,520	5910.81	5910.83	5910.85	5910.87	5910.89	5910.91	5910.93	5910.95	5910.97	5910.99	5911.01	5911.03	5911.05	5911.07	5911.09	5911.11	5911.13	5911.15	5911.17	5911.19
20.50	12,568	5910.83	5910.85	5910.87	5910.89	5910.91	5910.93	5910.95	5910.97	5910.99	5911.01	5911.03	5911.05	5911.07	5911.09	5911.11	5911.13	5911.15	5911.17	5911.19	5911.21
20.60	13,678	5910.85	5910.87	5910.89	5910.91	5910.93	5910.95	5910.97	5910.99	5911.01	5911.03	5911.05	5911.07	5911.09	5911.11	5911.13	5911.15	5911.17	5911.19	5911.21	5911.23
20.70	14,754	5910.86	5910.88	5910.90	5910.92	5910.94	5910.96	5910.98	5911.00	5911.02	5911.04	5911.06	5911.08	5911.10	5911.12	5911.14	5911.16	5911.18	5911.20	5911.22	5911.24
20.80	15,832	5910.88	5910.90	5910.92	5910.94	5910.96	5910.98	5911.00	5911.02	5911.04	5911.06	5911.08	5911.10	5911.12	5911.14	5911.16	5911.18	5911.20	5911.22	5911.24	5911.26
21.00	18,496	5910.92	5910.94	5910.96	5910.98	5911.00	5911.02	5911.04	5911.06	5911.08	5911.10	5911.12	5911.14	5911.16	5911.18	5911.20	5911.22	5911.24	5911.26	5911.28	5911.30
21.10	19,515	5910.94	5910.96	5910.98	5911.00	5911.02	5911.04	5911.06	5911.08	5911.10	5911.12	5911.14	5911.16	5911.18	5911.20	5911.22	5911.24	5911.26	5911.28	5911.30	5911.32
21.20	20,535	5910.95	5910.97	5910.99	5911.01	5911.03	5911.05	5911.07	5911.09	5911.11	5911.13	5911.15	5911.17	5911.19	5911.21	5911.23	5911.25	5911.27	5911.29	5911.31	5911.33
21.30	21,554	5910.97	5910.99	5911.01	5911.03	5911.05	5911.07	5911.09	5911.11	5911.13	5911.15	5911.17	5911.19	5911.21	5911.23	5911.25	5911.27	5911.29	5911.31	5911.33	5911.35
21.40	22,574	5910.98	5911.00	5911.02	5911.04	5911.06	5911.08	5911.10	5911.12	5911.14	5911.16	5911.18	5911.20	5911.22	5911.24	5911.26	5911.28	5911.30	5911.32	5911.34	5911.36
21.50	23,594	5911.00	5911.02	5911.04	5911.06	5911.08	5911.10	5911.12	5911.14	5911.16	5911.18	5911.20	5911.22	5911.24	5911.26	5911.28	5911.30	5911.32	5911.34	5911.36	5911.38