

2020 NMFS CRS BIOP, SECTION 1.3.1.3.3
 2020 USFWS CRS BIOP, SECTION 5.1.4.3

“Between October 15 and February 28, when power market conditions warrant and when river conditions make it feasible, power generation at Snake River projects may cease, and water stored, during nighttime hours, most commonly implemented between 2300 and 0500 hours when demand for power is lowest or other renewable resources are generating surplus power (or both). This operation will end no later than 2 hours before dawn between October 15 and November 30. During the operation between December 15 and February 28, daytime hours will no longer be excluded from this operation, and up to 3 hours of daytime cessation will be part of the proposed action.”

Summary of BiOp Criteria:

Oct 15 – Nov 30: Nighttime hours, end no later than 2 hours before dawn

Dec 1-14: Nighttime hours

Dec 15 – Feb 28: Nighttime hours + up to 3 daytime hours

The timing of “*nighttime*” and “*dawn*” changes throughout the year. Based on the hours of actual Civil Twilight at Lower Granite Dam (see next page for details), the following hour ranges were defined to be consistent with BiOp criteria:

| DATES | “NIGHTTIME” HOURS FOR ZERO GEN |
|---------------|-----------------------------------|
| OCT 15-31 | 1900-0400 (ending 2 hours < dawn) |
| NOV 1-30 | 1800-0400 (ending 2 hours < dawn) |
| DEC 1-14 | 1800-0600 |
| DEC 15-JAN 31 | 1800-0600 + up to 3 daytime hours |
| FEB 1-28 | 1900-0600 + up to 3 daytime hours |

See the next page for definition of Civil Twilight and weekly solar data for Lower Granite Dam.

For the location of LWG dam (N46.6591001, W117.4277969), the hours of “nighttime” are between evening Civil Twilight and morning Civil Twilight. Civil Twilight is defined as when the sun azimuth angle is at -6 degrees below the horizon. Sunrise and sunset occur when the sun crosses the horizon.

Sources:

<https://www.esrl.noaa.gov/gmd/grad/solcalc/glossary.html>

<https://www.esrl.noaa.gov/gmd/grad/solcalc/calcdetails.html>

| Date | Sunset | Civil Twilight (<-6 degrees) | | Sunrise | GMT Differential |
|--------------|--------|---------------------------------|------------------------------|---------|---------------------|
| | | End of Evening Twilight | Start of Morning Twilight | | |
| Sat 10/17/20 | 17:59 | 18:30 | 6:36 | 7:10 | -7 |
| Sat 10/24/20 | 17:47 | 18:18 | 6:48 | 7:20 | -7 |
| Sat 10/31/20 | 17:35 | 18:12 | 6:54 | 7:30 | -7 |
| Sat 11/07/20 | 16:25 | 17:00 | 6:06 | 6:40 | -8 |
| Sat 11/14/20 | 16:17 | 16:54 | 6:18 | 6:51 | -8 |
| Sat 11/21/20 | 16:10 | 16:48 | 6:24 | 7:01 | -8 |
| Sat 11/28/20 | 16:05 | 16:42 | 6:36 | 7:10 | -8 |
| Sat 12/05/20 | 16:02 | 16:42 | 6:42 | 7:18 | -8 |
| Sat 12/12/20 | 16:01 | 16:42 | 6:48 | 7:25 | -8 |
| Sat 12/19/20 | 16:03 | 16:42 | 6:54 | 7:30 | -8 |
| Sat 12/26/20 | 16:07 | 16:48 | 6:54 | 7:33 | -8 |
| Sat 1/02/21 | 16:13 | 16:54 | 6:54 | 7:34 | -8 |
| Sat 1/09/21 | 16:20 | 17:00 | 6:54 | 7:32 | -8 |
| Sat 1/16/21 | 16:29 | 17:06 | 6:54 | 7:29 | -8 |
| Sat 1/23/21 | 16:39 | 17:18 | 6:48 | 7:23 | -8 |
| Sat 1/30/21 | 16:50 | 17:24 | 6:42 | 7:16 | -8 |
| Sat 2/06/21 | 17:00 | 17:36 | 6:30 | 7:06 | -8 |
| Sat 2/13/21 | 17:11 | 17:48 | 6:24 | 6:56 | -8 |
| Sat 2/20/21 | 17:21 | 17:54 | 6:12 | 6:45 | -8 |
| Sat 2/27/21 | 17:32 | 18:06 | 6:00 | 6:32 | -8 |