**3.8.2 Diel Distribution (Colotelo et al. 2014. Pg 50/153)**

The hourly distributions of kelt passage at LGR, LGS, LMN, MCN, JDA, TDA, and BON were fairly consistent during the study period (Appendix I). There was a trend of a higher proportion of kelts first detected on the cabled dam-face array at LGR during daylight hours, but this difference was slight. Nearly 13.1% of kelts that passed LMN were first detected during the period of 2300 hours and 0000 hours, which is contrasted to the less-than 8% of kelts being first detected during each of the other hourly bins. The hourly distributions of first detections on the cabled arrays in the Columbia River (MCN, JDA, TDA, and BON) were more variable than those in the Snake River (LGR, LGS, and LMN). Generally, there were greater differences in the proportion of fish that were first detected during sequential hours of the day.

**3.8.2 Diel Distribution** **(Colotelo et al. 2014. Pg 52/129)**

The hourly distributions of kelt passage at LGR, LGS, and LMN were fairly consistent throughout the season in 2013 (Appendix I). At all dams studied in 2013, approximately 75% of kelts passed through the dam during daylight hours, whereas 25% of kelts passed during hours of darkness based on their last detection on the cabled receiver arrays.

**Bonneville Dam**

**2001 - Time of passage (diel); (Kelt 2001 p. 14)**

Most kelts 79% (112/142), passed through Bonneville Dam during daytime hours (05:00-20:59). At the PH I sluiceway, spillway, PH II JBS, and PH II turbine units daytime passage proportions were 76% (13/17), 80% (28/35), 81% (38/47), and 73% (33/45), respectively.

**2002 - Time of passage (diel); Kelt 2002 p.13**

At PH I, 88% of sluiceway passage occurred during daytime hours. Of the kelts passing via the spillway, over half (63%; 79/126) passed during daytime hours. At PH II, daytime passage rates through the JBS and turbine units were 74% (23/31) and 74% (14/19), respectively (Figure 11).

**Figure 11. Hourly passage history at Bonneville dam for radio-tagged kelts in 2002.**

**2004 - Time of passage (diel)**

At B2, roughly two-thirds (67%) of kelts passed during daylight hours; the same proportion passed the B2CC during this period (i.e., 67%). Similarly, 73% of kelts passed the B1 sluiceway during daylight hours. Spillway passage was almost equally divided between daytime (49%) and nighttime periods (recall, daytime spill was ~ 51 kcfs, whereas nighttime spill was ~ 95 kcfs).

**The Dalles Dam**

**2001 - Time of passage** **(diel) (Kelt 2001 p.11)**

Much (75%; 80/106) of kelt passage occurred during daytime hours (05:00-20:59). Most kelts (82%; 54/66) passed the spillway during the daytime. Similarly, many kelts passed the sluiceway (71%; 20/28) during daylight hours. Turbine passage was equally divided (50%; 6/12) between day and night periods.

**2002- Time of passage** **(diel) Kelt 2002 p. 12)**

Kelt passage was skewed toward daytime hours (Figure 9). Spillway passage was daylight biased (81%), whereas turbine (67%) and sluiceway passage (62%) were roughly proportional with daylight hours.

**Figure 9. Hourly passage history at The Dalles Dam for radio-tagged kelts in 2002.**

**2004 – Time of passage (diel)**

Most kelts (72%; 320 of 443) passed the spillway during the daylight hours; however sluiceway passage was higher during the nighttime period (67%; 20 of 30).

**John Day Dam**

**2002 - Time of passage** **(diel) Kelt 2002 p.11)**

Kelt passage timing was variable. Daytime hours (05:00 – 20:59) accounted for 66.7% of total available hours. During 24-hour spill, passage routes were mainly via the spillway, and much 72% (64/89) of kelt passage occurred during daytime hours (Figure 6). During the 54% night spill (16:59-07:00 hours) kelt passage was predominately via the spillway (Figure 7).

**2004 - Time of Passage (diel)**

Data suggests the forebay residence times of kelts were increased in 2004 due to the lack of an alternative daytime passage route to turbine intakes. For example, nearly 80% (81/103) of kelt first contacts in forebay areas occurred during daylight hours. Patterns of contacts from telemetry arrays suggest kelts were moving across the face of the dam during daylight hours, presumably, searching for a passage route. During the first hour after the onset of spill almost 25% (21 of 89) of kelts that had accumulated during daytime hours passed via the spillway. On the final hour of night-only spill (between 0600 and 0659 hours) an average of one kelt exited via spill, a passage pattern that was unlikely to have occurred through chance alone (chi-square test; P < 0.01). Evidently, kelts that had accumulated in forebay areas during daylight hours were reluctant to enter turbine intakes (or did not discover turbine flows), and readily discovered river discharge passing via the spillway, once, river-flow was allocated via this route.