

## Long-Term Reproduction (1984-2023), Nestling Diet, and Eggshell Thickness of Peregrine Falcons in Yellowstone National Park

David B. Haines<sup>1</sup>, Douglas W. Smith (retired)<sup>1</sup>, Katharine E. Duffy (retired)<sup>1</sup>, Lisa M. Baril<sup>2</sup>, Lauren E. Walker<sup>1</sup>

<sup>1</sup> Yellowstone Center for Resources, Yellowstone National Park, WY 92190

<sup>2</sup> Northern Great Plains Joint Venture

**Background:** Nineteen species of hawk, eagle, falcon, and owl have been confirmed to breed in Yellowstone National Park (YNP). However, few have long-term data regarding their population status within YNP. Peregrine Falcons (*Falco peregrinus*) are one of only three raptor species in YNP with nearly 40 years of monitoring. Peregrine falcons were extirpated from YNP by 1970 as a result of widespread use of DDT (dichloro-diphenyl-trichloroethane) throughout North America from the late 1940s to the early 1970s. DDT, and its primary metabolite DDE (dichloro-diphenyldichloroethylene), caused eggshell thinning and impaired reproduction in Peregrine Falcons and other raptors. Restoration of Yellowstone's Peregrine Falcon population began with nationwide restrictions placed on the use of DDT in 1972, coupled with the release of 36 captive-raised juveniles in YNP and the dispersal of 644 captive-raised juvenile Peregrine Falcons released within 260 km of YNP.

**Methods:** We monitored Peregrine Falcon reestablishment and reproductive success in YNP (nesting success, productivity, and brood size) from 1984–2023. Productivity was defined as the number of young reaching  $\geq 28$  days per territorial pair. Nest success was defined as the percent territorial pairs with at least one young reaching  $\geq 28$  days. Brood size referred to the number of young reaching  $\geq 28$  d per successful pair. From 2010–2013, we collected and analyzed prey remains and eggshell fragments from nine Peregrine Falcon territories across YNP.

**Results:** We documented a substantial increase in the number of occupied territories from one in 1984 to 32 by 2007, as well as high nesting success (74%), productivity (1.66 young/territorial pair), and brood size (2.21 young/successful pair) during 1984–2023. Nesting success, productivity, and brood size were at or above the target values identified by U.S.F.W.S. and those found for the Rocky Mountain/Great Plains region during the 2003 national survey. Peregrine Falcon eggshells collected at the nine eyries were 4% thinner than pre-1947 measurements (pre-DDT) and presumably indicate low DDE concentrations. Prey remains were dominated by birds (97% of individuals), mostly terrestrial species (63%) including American Robins (*Turdus migratorius*), Franklin's Gulls (*Leucophaeus pipixcan*), and Mountain Bluebirds (*Sialia currucoides*).