

***Early-nesting birds in the Grand Canyon:  
Effects of global climate change?***

Robert Schell and Sarah Thrasher

Several studies have shown a correlation between global warming and advancing bird migration and nesting dates (Cotton 2003, Jenni 2003). Cotton (2003) showed that arrival dates of 20 bird species in Europe have advanced about eight days over the past 30 years. This is due to interaction between bird behavior and climate warming. Many migratory species use warm spring temperatures as a migration or breeding cue (Marra et al. 2005). Global coupled climate models predict increases in average yearly temperature from 2 to 6 degrees C in the next 100 years, meaning that “spring” as defined by temperature will come earlier (Thrasher 2005). We should also, therefore expect that birds will continue to breed and migrate earlier.

Wilson (2003) showed that some birds do not respond directly to increases in average temperature, but to El Nino events. El Nino and La Nina events will become more intense and more frequent (because all anomalous weather is predicted to increase in frequency and vigor), which would probably have the overall effect of advancing average breeding and migration dates.

Floods are controlled by Glen Canyon Dam and water is let out in very controlled releases, usually ramping from 5,000 to 20,000 cfs daily, with almost no seasonal variation. This is a far cry from the historic fluctuations from a few hundred cfs in summer to over 100,000 cfs in June floods. Some controlled floods have been allowed for habitat building, such as the November 2004 42,000 cfs event. This would not have disturbed nesting birds along the Grand Canyon because November is not a month when nesting occurs. However, researchers recommend controlled floods during the spring, which was the historic flooding season. The 1996 flood which occurred in March could have disturbed early nesting birds.

Some bird species are well known to breed early in the Grand Canyon. Lesser Goldfinches in the canyon are known to begin breeding behavior in February with fledglings appearing as early as late March (Brown et al. 1987). We witnessed no

evidence of nesting goldfinches; perhaps breeding had already occurred or had not yet begun.

Say's Phoebe was the most commonly seen bird along the river corridor during our trip from March 20<sup>th</sup> to the 28<sup>th</sup>. This species of flycatcher, which generally does not begin to breed until May, was observed on two separate occasions partaking in activities associated with breeding.

On March 23<sup>rd</sup>, at RM129 a Say's Phoebe was observed constructing a nest in a crack in the amphibolite rock cliff. This particular nest site was roughly eight feet above the water line at low water (10,000 cfs). This nest would easily be inundated during an experimental flow, such as the 42,000 cfs flow released in March 1996, during which the water line would be easily 12 – 15 feet higher than at 10,000 cfs. The second example was a Say's Phoebe observed capturing a butterfly in flight and then perching on a mesquite tree for some time without consuming the insect. It then flew to the other side of the river where it gave the insect to another Say's phoebe. This was a nuptial gift given to a female prior to copulation to demonstrate the male's ability as a provider.

The bittersweet prediction under climate change, however, is that research floods from Glen Canyon Dam will not be possible in as little as 40 or 50 years because water will be completely allocated for human uses (Thrasher 2005). Early nesting birds will be safe from inundation but other components of the Grand Canyon ecosystem that benefit from controlled floods will suffer. This does, however, illustrate possible direct mortality of birds if experimental floods are ill-timed. Such floods should be limited to winter months between November and January.

The more obvious example of the onset of earlier breeding behavior are the Lucy's Warblers. According to Grand Canyon Birds, Lucy's Warblers are prevalent by mid-April or later (Brown et al. 1987). However, in late March, we were inundated with these little wood-warblers. They were literally at every site we visited, and everywhere in between.

Together these three accounts represent real-world examples of the onset of early breeding caused by changing climate patterns, whether related to El Niño events or increasing temperature trends. These species appear to be shifting to earlier breeding

seasons in the Grand Canyon, and this shift should be addressed when conducting future management actions.

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