

in forestry and livestock activities. Functional connectivity models match the observed distribution pattern, suggesting that colonization events were influenced by landscape spatial structure and the performance of long-distance dispersing individuals (Gil-Tena et al., 2013, *European Journal of Forest Research*, 132, 181–194).

In this expansion, the species has begun to occupy commercial plantations of *Pinus radiata*, an introduced North American conifer. This pine was extensively planted during the 20th century in the Spanish Basque region, and comprises 30% of the forest in this area. *Pinus radiata* plantations are intensively managed, and timber is harvested in 20–30 year cycles. It is unclear whether this habitat provides good quality resources for the black woodpecker, or is a sink, with woodpecker numbers sustained by immigration. Demographic parameters support the latter hypothesis, but the evidence is inconclusive. Research on how species tolerance can buffer pressures in human-made habitats has practical implications for adaptive conservation and for the compliance of commercial forestry practices with biodiversity requirements.

JOSÉ M. FERNÁNDEZ-GARCÍA (✉ orcid.org/0000-0001-6235-7986, jofernandez@hazi.eus) Hazi Foundation, Arkaute, Spain

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The impact of avian influenza 2022 on Dalmatian pelicans was the worst ever wildlife disaster in Greece

The avian influenza wave of 2022 affected the Near Threatened Dalmatian pelican *Pelecanus crispus* in most of its European range, but the effect on the Lesser (Mikri) Prespa Lake colony, in north-west Greece, the largest colony of the species, was devastating. The first deaths were recorded in mid February, a week after the first Dalmatian pelicans arrived at Prespa. In the following weeks, the mortality rate peaked, then slowed down after mid March and ceased by the end of April. All dead pelicans were adults in breeding plumage. Laboratory results indicated the highly pathogenic H5N1 strain, clade 2.3.4.4b. By the end of April, 1,734 Dalmatian pelicans had died, c. 60% of the colony.

In addition, three other colonies at the eastern part of the country were affected: Chimaditis Lake with 181 deaths, Karla Reservoir with 103 and Kerkini Lake with 90. The two colonies on the west coast remained untouched by the virus. Overall, 2,286 Dalmatian pelican deaths were recorded in 13 wetlands. The H5N1 strain was also confirmed in the two Albanian and Montenegrin colonies, Karavasta Lagoon and Skadar Lake, and in three of the Romanian colonies in the Danube Delta, with a total of 128 deaths. No deaths were recorded in Bulgaria or Turkey. In total, > 40% of the south-east European population was lost, c. 10% of the global Dalmatian pelican population.

Other species were affected, but in small numbers, which implies that Dalmatian pelicans are particularly susceptible to H5N1. Prior to 2015 this species had not been infected by the avian influenza virus, and all previous events had resulted in minor losses.

Several factors may have contributed to high infection rates and the high vulnerability of Dalmatian pelicans, especially in the Prespa colony: early start of breeding combined with low temperatures (around 0 °C in February and March), high pelican densities and contamination of colony substrates by droppings of migratory ducks and resident greylag geese, which roost on pelican islets in winter.

Documentation of mortality, removal of carcasses and mobilization of authorities was challenging because of the large number of carcasses, difficult access, risks of personnel exposure, and the need to minimize disturbance to nesting pelicans. It took 7 days to remove 82% of the carcasses, almost 15 t, from the Prespa Lake colony.

Approximately 100 pairs managed to nest and raise c. 90 young. It will take decades for the population to recover, provided no other incidents occur. Considering that the highly pathogenic avian influenza virus is a serious global threat to wildlife, vigilance, increased protection measures at colonies and focused research are essential throughout the Dalmatian pelican range.

OLGA ALEXANDROU, MYRSINI MALAKOU and
GIORGOS CATSADORAKIS (✉ orcid.org/0000-0002-8590-5858, catsadorakis@spp.gr) Society for the Protection of Prespa, Lemos, Greece

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