

Unanswered questions from Project Exploration 2.0 answered by Dr Annette Fayet, Seabird Biologist

- **How do puffins survive?**

The parents build a nest underground in a burrow, but they leave the nest regularly to go at sea and catch some fish to eat. The birds lay a single egg in their nest. While one parent sits on the egg, the other feeds at sea, then they swap, usually about once a day for puffins, or once a week for shearwaters. Once the chick hatches, it stays in the nest for several weeks while it grows. During that time the parents bring food to the chick to the nest (as you could see on one of the video, showing a puffin taking some fish inside its burrow - that was to feed its chick!).

- **How can you tell the difference between white-tailed and red-tailed tropicbirds?**

The white-tailed tropicbird has a long white tail, while the red-tailed tropicbird has a long red tail. So the colour of the tail is a good indication of which species it is. Also, the red-tailed tropicbirds are a bit larger than the white-tailed tropicbirds.

- **How do sea birds hatch their eggs?**

They incubate their egg for a long time (for example ~42 days in puffins). The two parents take turn to sit on the egg and keep it warm, while the other goes to feed at sea. Then they switch, over and over again. However, some seabird eggs have this amazing adaptation to cooling - that means if the parents leave the egg alone for a bit (a few hours to several days) the egg cools down but the chick inside does not die, it simply halts its development, and then starts again when the parents warm it up again. Amazing!

- **Can they survive in a different habitat?**

Not really, seabirds cannot survive if they're not at sea for most of the time (for example it's extremely difficult to keep them in zoos, because they need a lot of space and water to fly, dive, catch fish etc).

- **How do you catch the birds for tagging for tracking?**

Good question! It depends on the species. With tropicbirds, I walk slowly to their nest and then grab the bird gently, as they don't fly away easily. For species nesting underground like puffins, I stick my arm down the burrow and grab them. Sometimes, the burrow is too deep for me to reach the bird, so I use a small net placed on the entrance of the nest, in which the bird gets caught when it leaves or enters the burrow.

- **What other birds live on the island?**

On Aldabra Atoll there are many, many species of birds. Some are seabirds (tropicbirds, frigatebirds, terns, noddys, red-footed boobies, and more) while others are land birds that stay on the island all the time, for example the Aldabra rail, the Aldabra fody, the Madagascar nightjar, and many more.

On Skomer Island there are Atlantic puffins, Manx shearwaters, razorbills, common guillemots, black-legged kittiwakes, three species of gulls, and more!

- **How can the birds protect their eggs from the rats?**

That's the problem: they can't. That's because seabirds have evolved on rat-free remote islands and so they don't have defences against them once rats invade these islands (often the rats invaded after shipwrecks in the 19th century), and many millions of seabirds (and other species) have disappeared because of rats. That's why the only way to help them quickly is to conduct rat eradications, but these are very costly and difficult to do. However there are success stories where rats have been removed and seabirds are recovering, so it is possible!

- **How do you define male and female birds?**

Good question! Generally, and unlike land birds, seabird males and females look approximately the same. Sometimes females are a bit smaller but this isn't always clear. There are two ways I use to determine the sex of seabirds I study: if I am here on the day the egg is laid, I check the cloaca of the bird (where the egg comes out of): it's its small and looks normal it's a male, if it's all bruised and swollen it's a female (because she's just had to lay an enormous egg). Otherwise, I take a feather from the birds and I send it to the lab for DNA analysis, which will identify if the bird has male or female chromosomes. Note that in birds it's the female that has two different sex chromosomes (Z and W) while the male has only one type (two Z chromosomes). That's the opposite of us humans, where females only have one type (two X chromosomes) while males have X and Y.

- **Why are their beaks different shapes?**

Good question! The beak shape in birds is usually related to the type of food the bird eats, and the method to catch the food/prey. In some seabirds like puffins the beak is also what we call a sexual ornament, that means it is used to attract a mate, and that's why they have this brightly colour beak.

- **How long until they disappear completely?**

Re tropicbirds: We don't know. For this we would need to understand better how many there are exactly and how their reproduction is affected, and then model their declines. My research is only just the beginning, but hopefully as it continues we will have a better idea. For some species it's already almost too late, for example the Balearic shearwater in the Mediterranean Sea is predicted to disappear in 60 years if we don't make major conservation efforts now, and the only population of Amsterdam Albatross, which nests on Amsterdam Island in the southern Indian Ocean, only has ~130 individuals left.

- **Which sea birds live the longest?**

Albatrosses are some of the longest lived bird species on the planet, with the oldest known bird being 70 (you may have heard of her, she is a Laysian albatross called Wisdom nesting on Midway Atoll, and she is currently raising a chick!)

- **How does a penguin don't fly even though if it's a bird?**

Most birds fly but some, through evolution, have lost the ability to fly, most likely because they didn't need it (e.g. several bird species in New Zealand like the kiwi or the takahe, because they were no terrestrial predators) or because it was too energetically demanding, which is the case of penguins. Their wings have

become really tiny and couldn't lift them up any more (we say their wings have become atrophied). Close relatives of penguins, the auks, still fly but it's very energetically demanding for them.

- **What type of fish do they catch?**

Different species specialise on different type of prey. For example, the puffin's favourite is sandeel, the tropicbirds like flying fish. Other feed on squid, or even on zooplankton. It also depend how deep they can dive, those who can dive can catch fish living deep underwater, those who only pick up fish from the water surface eat species which will come close to the surface.

- **How are the tracking devices collected so that there is no pollution?**

Most birds that I tag with devices I catch again to remove the device and download the data. Sometimes, if I fail to recapture a bird the tag will fall off naturally when it's on the nest, so I can collect the device from the nest. In the remaining cases, the device probably falls off when the bird is a sea. This causes a little bit of pollution but the devices are very small and given the large amount of marine pollution it will not make a big difference, especially as this doesn't happen very often. This isn't perfect, but because the data collected with these devices are incredibly useful to help protect the birds, we think it is an acceptable trade-off.

- **How many eggs do puffins lay every year?**

A single one! They lay one egg and so can only raise a single chick per year.