

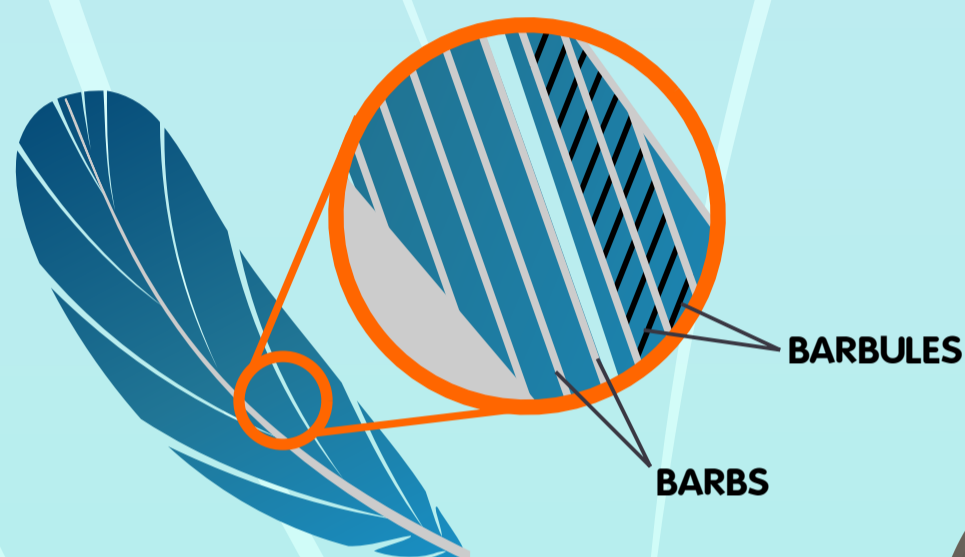
# Pollutants & plumage

The state of a bird's feathers signals its general condition. Ornamental coloration is **costly** for individuals to maintain, so birds might be **less vibrantly hued** in poor quality habitats. This property makes feather brightness a potentially **noninvasive** means to evaluate exposure to pollutants. Human activity increases environmental concentrations of heavy metals, but whether a bird's plumage reflects heavy metal pollution in its habitat is unclear.

Natalia Lifshitz and Colleen Cassady St. Clair investigated how heavy metals affect **iridescence** in tree swallows.

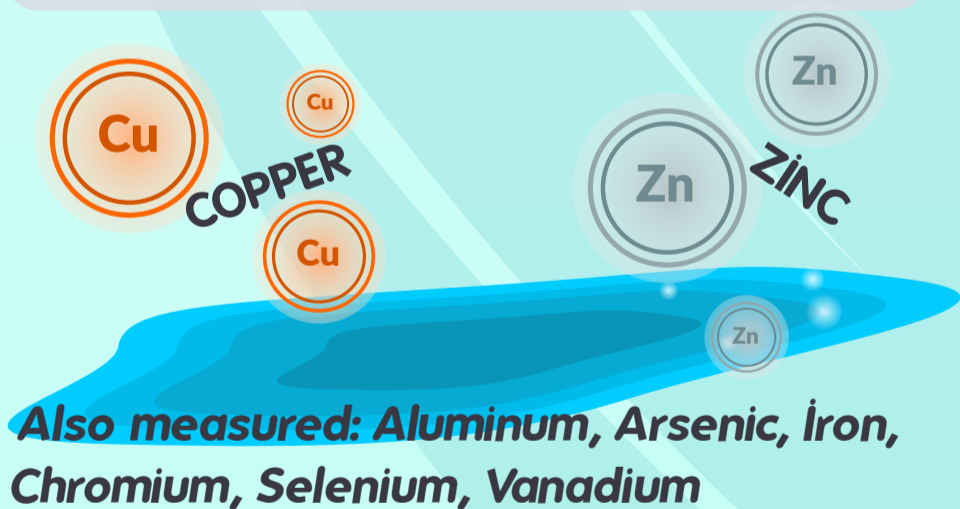


**TREE SWALLOW**  
*Tachycineta bicolor*



Iridescence is a kind of **structural coloration**: it's not produced by pigments, but by the structure of the feather and how it bends light.

The team sampled birds living near bodies of water with different levels of heavy metal pollution.



**HEAVY METALS: NOT ALL BAD**  
Some, like copper & zinc, are essential. But high levels are harmful.

Swallows were **brighter** and **greener** at sites with high copper and zinc concentrations. Interestingly, **females**, but not males, were also in **better health** at these sites.

There were slightly **fewer fledglings** at more polluted sites, but this didn't depend on the parents' coloration.

3 measurements were taken:

**PLUMAGE COLORATION**

**HEALTH**  
(oxidative stress)

When stressed, cells are less able to neutralize reactive oxygen species produced during respiration, causing oxidative damage.

**REPRODUCTIVE SUCCESS**  
(number of fledglings)

Overall, iridescence in tree swallows was **not strongly linked** to heavy metal concentrations.

Currently it wouldn't be a good noninvasive indicator of heavy metal exposure.

**REFERENCE**

Lifshitz, N., and St. Clair, C.C. 2019. Iridescent coloration of Tree Swallows relates to environmental metal pollution. Avian Conserv. Ecol. 14(2): art7. doi:10.5751/ACE-01411-140207.