



# A DNA ageing test to improve fish population management

The Environomics Future Science Platform (FSP) merges genomics and environmental science to transform environmental monitoring and management.

## The challenge

Estimating the ages of fish within a population is a central part of fisheries management. This data supports many activities, including setting sustainable harvests, determining whether a species is at risk of extinction and providing demographic profiles of populations at risk.

The most common method for fish age estimation uses 'growth rings' in otoliths (the inner ear structure). This lethal method is particularly undesirable for species that are protected or endangered. It is time-consuming and costly and can be unreliable due to biological and environmental factors and inconsistencies between labs.

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**Significant benefits are expected to be realised by the Australian wild-caught fisheries industry**

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## The response

Our FSP researchers developed a DNA-based method of fish ageing that is a harmless and cost-efficient alternative to examining otoliths.

The DNA-based method, using a multiplex polymerase chain reaction (PCR) assay, increases the precision and cost-effectiveness of fish ageing and will incentivise commercial fisheries and natural resource management groups to switch ageing methods.

DNA-based fish age estimation will likely serve as a disruptive technology with broad adoption anticipated throughout the globe.

## The impact

The technology is expected to deliver efficiency gains to commercial fisheries thanks to improved fish age data. This data helps each fishery set fishing limitations and regulations to maintain maximum sustainable yield. It is also expected to provide revenue benefits to Australia through royalties or licensing fees of the technology to the global market.

Likely environmental impacts include improved monitoring and risk assessment for endangered fish species, along with adapting the method to other species like sea turtles, which are also difficult to age. DNA ageing can also be used to improve the management of invasive fish populations, further preserving native species and ecosystems.

A recent independent evaluation found that the vast potential of the technology, coupled with the relatively low cost of the supporting research, is projected to result in strong positive returns to the Australian economy and public.

The anticipated benefits attributable to CSIRO are projected to outweigh our investment costs within the first year of the technology's deployment. The benefit-cost ratio is projected to be approximately 25.3 within 5 years (net present value of \$26.1 million) and about 81.3 within 10 years (net present value of \$86.4 million).

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