Demographic Precision and Causal Narrowness

A Critical Review of Bennington et al. 2026 on Hector's Dolphin Fecundity and Bycatch Management

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The unresolved causal problem

The study improves estimates of reproductive output.

It does not identify the processes causing low fecundity.

Bycatch management remains the dominant interpretive frame.

Technical precision can leave the causal problem untouched.

Demographic estimation and causal attribution

Demographic estimation	How frequently mature females reproduce.
Precautionary management	How much additional mortality the population can tolerate.
Causal attribution	Which processes produce the observed population problem.

METHOD

The model and its evidentiary boundary

Banks Peninsula photo-identification records, 1986–2024.

Bayesian multi-event capture–recapture model.

Hidden breeding states and imperfect field observations.

Demographic transitions without environmental causal covariates.

The numerical correction

Published estimate	Previous analysis	Bennington et al. 2026
Fecundity per mature female per year	0.409	0.291
Reported 95% credible interval	0.267–0.635	0.215–0.393
Average inter-calf interval	2.4 years	3.4 years

A revised estimate does not demonstrate a 30% decline through time.

The limits of the inference

Conclusion	Evidentiary status
Updated reproductive rate	Estimated by the demographic model
Less tolerance of additional mortality	Conditional management implication
Bycatch is the principal cause of the crisis	No causal ranking from this model

Our critique targets the authority assigned to an unperformed causal test.

Causal drivers outside the fitted model

Chemical exposure and reproductive toxicity.

Disease, toxoplasmosis and immune dysfunction.

Prey conditions, maternal condition and habitat pressures.

Interactions among stressors and early calf survival.

An average can conceal a changing process

The fitted demographic probabilities remain constant across years.

The authors report a slight decline in the observed calving index.

Sparse observations constrained their attempt at time-varying estimation.

The temporal mechanisms remain an investigation to conduct.

Bycatch management and explanatory closure

Management implication

Lower fecundity reduces tolerance for additional mortality.

Unsupported causal extension

Bycatch therefore explains the population crisis.

The right-hand claim illustrates the inference our review rejects.

Structural falsification through framing

Our diagnosis: a systematically incomplete scientific picture.

Demographic precision lends authority to a selected management frame.

Alternative causal mechanisms remain outside the fitted analysis.

Repeated framing can turn untested exclusions into accepted explanation.

University authority and scientific accountability

Academic prestige cannot replace a causal test.

Funding and citation networks require empirical scrutiny.

Expert consensus must remain open to competing evidence.

A university’s standing increases its responsibility for scientific openness.

A programme capable of testing the causes

Link reproductive histories to exposure, pathology and prey conditions.

Reconstruct sources and transport for each population separately.

Compare competing and interacting causes in time-varying models.

Publish evidence, model assumptions and explicit rejection criteria.

Key takeaways

The fecundity estimate is useful. Its causal reach is limited.

A management implication cannot establish the principal cause.

Structural falsification can coexist with accurate calculations.

Conservation requires an open test of what prevents recovery.

Selected references

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Discussion

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Which evidence would change the research framework?

Full review and references

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