

WHALE SEEKER: EMPOWERING SUSTAINABLE DECISION-MAKING THROUGH AUTOMATED MARINE MAMMAL DETECTION



Good practice



Description

/ Introduction

Scaling marine mammal detection is a first step towards assessing overall ocean health, as the health of populations is a strong indicator of ecosystem resilience and vulnerability to anthropogenic stressors. Without easily accessible marine mammal presence data, marine protected area managers cannot reasonably make decisions to lower negative impacts and incentivize sustainability. Möbius, Whale Seeker's solution, is an AI-assisted software system that complements human expertise in order to detect, localize, and classify marine mammals using imagery.

Marine
mammals
management toolkit



Möbius has detected 108,000 marine mammals to date and has proven to be 97% faster than manual annotations performed by biologists.

By integrating Möbius into the framework, marine protected areas' managers gain access to a wealth of demographic data that is scalable, standardized, and delivered with speed and accuracy. This technology not only ensures the provision of baseline data and long-term monitoring capabilities but also offers a dynamic and flexible approach to MPA management.

The benefits extend further as Möbius is designed to be focused solely on detection, allowing managers to retain complete control over data interpretation. This process works such that once the analysis is complete, Whale Seeker returns clients' imagery with annotations performed by Möbius, enabling managers to make well-informed decisions promptly. Whale Seeker's democratization of marine mammal abundance and population data significantly lowers the data analysis bottleneck encountered today. Whale Seeker's goal is to provide the tools necessary for taking proactive measures to protect marine mammals and for measuring progress toward conservation and sustainability goals.



/ Involved stakeholders

Beneficiaries:

- Decision-makers in maritime industries
- Those needing to quantify environmental impacts within their practices
- Firms and Individuals needing to quantify their SDGs and ESGs
- Researchers in need of a better understanding of species population abundance and ecology

Users:

- Government agencies
- Researchers
- Companies in maritime industries
- Environmental consultants
- Policymakers
- Conservationists

Implementing agency:

- Whale Seeker

Other:

- Whale Seeker's partners – Whale Seeker's collaborative partnerships are forged with a range of organizations and stakeholders, prioritizing local knowledge and local communities.

/ Impact

Whale Seeker's AI-assisted system for detecting, localizing, and classifying marine mammals has had a significant positive impact on marine conservation efforts. By providing the right tools, Whale Seeker is helping to protect and grow populations, enforce marine protected areas and ocean conservation policy, and incentivize proactive action to reduce the impact on ocean systems.

Whale Seeker has already achieved numerous milestones, including launching their commercial product Möbius, and securing a contract with the Department of Fisheries and Oceans Canada.

Moreover, in 2022, Möbius gained recognition from UNESCO's International Research Centre on Artificial Intelligence (IRCAI) as one of the top 10 AI solutions globally for achieving the Sustainable Development Goals. Lastly, Whale Seeker has had two papers published in peer-reviewed journals, and been recognized for their work by numerous media channels and organizations.

/ Innovation

Whale Seeker is among the first to apply a human-in-the-loop approach to machine vision, combining the consistency and efficiency of computer algorithms with the judgement and knowledge of human experts – to achieve what neither a human nor a machine could achieve on their own. This hybrid model ensures not only that our algorithm is constantly improving, but also the adaptability of our solution to a wide variety of use cases and environments. Whale Seeker, therefore, has a significant competitive advantage over traditional approaches, which tend to be fully automated for highly specific contexts and conditions.

Whale Seeker is currently working on: Möbius Observer: a real-time marine mammal detection tool that Marine Mammal Observers can use in the field.

Cetus: An integration of satellite imagery analysis into Whale Seeker's AI platform, significantly increasing the monitoring scale. Arc: A front-facing infrared marine mammal monitoring system that can be installed on ships.

Analysis

/ Sustainability & Replication

Whale Seeker, as a certified B Corporation, is committed to setting technical and ethical standards in AI for the benefit of oceans and wildlife. The human-in-the-loop functionality of Möbius ensures the replicability and scalability of Whale Seeker's solution in other regions. By actively involving experts in fine-tuning annotated data and reviewing edge cases, the algorithm's performance is enhanced, allowing for effective adaptation to new contexts. This iterative process of re-training the model with expert decisions ensures continuous improvement and applicability.

Whale Seeker's sustainable practices and proven solution make it readily adaptable and transferable to address similar challenges in different regions.



/ Success factors

While specific legislation can support and reinforce Whale Seeker's efforts, it is not a requirement for success. However, a regulatory framework that promotes environmental protection and sustainable practices certainly provides a conducive environment for the adoption of Whale Seeker's marine mammal detection tools.

Developed mechanisms are essential to ensure the effective utilization of Whale Seeker technology. This includes streamlined data processing and management systems, access to high-quality imagery, and the availability of trained personnel who can effectively interpret and act upon the generated data. High levels of capacity and resources are necessary for the successful implementation of Whale Seeker's good practice. This encompasses technological infrastructure, expertise in AI and marine mammal monitoring, and sufficient financial resources to support ongoing research, development, and operational activities.

By considering these factors and fostering strong partnerships with stakeholders, including governments, organizations, and industries, Whale Seeker maximizes the success of the good practice and drives meaningful change in maritime industries' sustainability and conservation efforts.

/ Constraints

Reliance on aerial imagery for marine mammal detection: Obtaining high-quality, up-to-date imagery is crucial for accurate AI-based solutions. Factors like weather, availability of aircraft/drones, and restricted data collection areas can impact image consistency. However, Whale Seeker has invested in diverse data sources, partnerships, and advanced image analysis algorithms to mitigate these challenges, ensuring reliable whale detection even in adverse conditions.

Regulatory compliance: Evolving marine mammal protection regulations require monitoring integration.

The pace of regulatory frameworks, enforcement, and industry adoption impacts demand. Delays or resistance in compliance may impede growth. Whale Seeker has strong relationships with regulators, engages in compliance advocacy, and educates industries about solution benefits. This positions Whale Seeker to navigate regulatory changes effectively and drive adoption, mitigating the risk.

/ Lessons learnt

Through the implementation of Whale Seeker's good practice, several valuable lessons have been learned that can assist others in implementing similar practices.

These include:

- **Collaborative partnerships:** Working with diverse ocean stakeholders, including environmental organizations and research institutions, has proven to be instrumental in developing effective solutions and driving positive change.
- **Human-in-the-loop approach:** Incorporating human expertise alongside AI algorithms has enhanced the accuracy and adaptability of the practice. This combination allows for continuous improvement and customization to different contexts and use cases.
- **Ethical considerations:** Placing ethics at the forefront of data collection, labeling, and usage ensures responsible and sustainable application of AI technology.
- **Scalability and replication:** Designing the practice to be scalable and easily replicable in different regions enables wider adoption and impact.

By considering these lessons, organizations can enhance the implementation of similar practices, fostering sustainability, conservation, and innovation in their respective fields.

Conclusion

Whale Seeker's solution is driven by the goal of protecting and growing populations while promoting sustainable business practices.

Whale Seeker has developed fast, automated, and accurate detection tools that empower decision-makers in maritime industries.

By working with diverse ocean stakeholders, Whale Seeker addresses environmental impact assessments, evidence-based policy, regulatory compliance, and conservation efforts.

Their long-term aspiration is to prevent 16,000 whale deaths caused by human activity annually. Whale Seeker strives to democratize marine mammal abundance and population data, lower barriers for ocean stakeholders, and contribute to overall marine mammal wellbeing and ocean health.



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Whale Seeker: Empowering Sustainable Decision-Making through Automated Marine Mammal Detection

Author:
Emily, Charry Tissier

Representation:
Whale Seeker

Marine protected areas:
The Last Ice Area In the Arctic, one of the world's largest MPAs.

Location/geographical coverage:
Whale Seeker is a company based in Quebec, Canada, but our software can be used to analyse imagery collected anywhere in the world.

Contact details:
emily@whaleseeker.com

URL: www.whaleseeker.com

Documents:
Peer Reviewed Article - Scaling whale monitoring using deep learning: A human-in-the-loop solution for analyzing aerial datasets
Peer Reviewed Article - Mapping Arctic cetaceans from space: A case study for beluga and narwhal

Keywords:
Marine Mammal Detection, Artificial Intelligence, Sustainable Business Practices.



Ocean
Governance



This project is funded
by the European Union