CURRENT SCIENTIFIC KNOWLEDGE ON CETACEANS UNDER HUMAN CARE

Evidence-based considerations for public policy and animal welfare assessment

Scientific review | October 2026

Purpose

To distinguish claims that can be tested scientifically from ethical or political preferences, and to summarise peer-reviewed evidence relevant to cetacean health, welfare, behaviour, movement, reproduction, research and conservation.

Prepared as a scientific briefing. Not a legal opinion.

European Association for Aquatic Mammals
Devoted to Marine mammal conservation since 1972

Executive summary

- Cetacean welfare cannot be inferred from a single characteristic such as intelligence, habitat dimensions, wild travel distances or maximum dive depth. Welfare is a multidimensional biological state that must be assessed at the level of the individual using convergent animal-based and resource-based indicators.
- Species-specific welfare assessment tools are now available. C-Well incorporates 36 welfare measures and Dolphin-WET incorporates 49 indicators (37 animal-based and 12 resource-based), structured within the Five Domains framework and designed specifically for bottlenose dolphins under professional care.
- Current scientific evidence does not support the assertion that cetaceans are inherently unable to experience positive welfare under professional human care. Welfare outcomes depend on health, social environment, behavioural opportunities, agency, enrichment, management practices and individual circumstances rather than on any single environmental variable.
- Wild movement patterns are highly variable among populations and ecotypes. Travel distances and dive depths reflect prey distribution, habitat characteristics, seasonality, predation risk and ecological opportunity. These measurements document behavioural capability and habitat use, but do not define minimum welfare requirements. Direct measurements of bottlenose dolphins under professional care demonstrate that activity levels and distance travel are more strongly associated with management and enrichment programmes than with habitat characteristics alone. This highlights the importance of evaluating actual behavioural outcomes rather than relying exclusively on habitat dimensions.
- Contemporary survival analyses show major improvements in cetacean care over recent decades. For bottlenose dolphins in modern zoological populations, annual survival rates and life expectancy are at least comparable to, and in several cases exceed those reported for comparable wild populations.
- Reproduction within the European bottlenose dolphin population is overwhelmingly natural. With the exception of a very limited number of research-related cases, calves are produced through normal social reproduction. Approximately 81% of dolphins currently held within the managed European population were themselves born under human care, demonstrating the existence of a self-sustaining, multi-generational population.
- Population management programs are designed to maintain genetically healthy, demographically sustainable and socially appropriate populations rather than to maximise births. Reproductive management contributes to stable social groups and natural behavioural opportunities. Conversely, permanent breeding bans are not welfare-neutral because they require active interventions such as contraception, segregation or transfers.
- Modern conservation science increasingly recognises that ex situ and in situ conservation should be viewed as complementary rather than opposing approaches. Under the One Plan Approach, professionally managed populations, research programs, rescue capacity, veterinary expertise and conservation action are integrated components of a broader conservation strategy.
- Accredited cetacean institutions contribute substantially to welfare science, veterinary medicine, reproductive biology, acoustics research, rescue and rehabilitation, conservation programs and public education. The loss of this infrastructure would reduce scientific and conservation capacity available for future marine mammal challenges.
- The French experience demonstrates that prohibition policies do not automatically create viable alternatives. The continued search for solutions for existing animals, the absence of fully operational sanctuary options and the ongoing reliance on zoological expertise illustrate that the need for professional cetacean-care capacity persists even after political decisions to phase out cetacean populations.

1. Scientific framing: from assumptions to measurable welfare

Ethical and political preferences may legitimately differ regarding the keeping of cetaceans under human care. However, such preferences should not be presented as scientific conclusions. Science can determine whether particular claims are supported, identify risk factors, measure outcomes and compare management approaches. The relevant question is not whether a zoological habitat reproduces the ocean. It is whether the animals can experience good physical health, behavioural competence, positive social relationships, choice, control and positive affective states. Current scientific evidence does not demonstrate that the keeping of cetaceans under professional human care is inherently incompatible with positive welfare.
Consequently, scientific evidence does not support blanket prohibitions or phase-out policies as necessary welfare measures.
Where deficiencies are identified, they should be addressed through evidence-based standards, accreditation, welfare assessment, professional oversight and continuous improvement rather than through assumptions that all institutions are unable to meet cetacean needs.

What science has to say about it

- The Five Domains Model explicitly evaluates nutrition, physical environment, health, and behavioural interactions for their combined effects on mental state. It is not limited to the absence of suffering.
- C-Well was developed as a dolphin-specific, systematic assessment with 36 measures, most of them animal-based, allowing comparison among individuals, demographic groups and facilities.
- Dolphin-WET was developed by a European multidisciplinary expert group (EAAM welfare committee). Its 49 indicators provide a holistic, individual-based assessment rather than assuming welfare from enclosure dimensions alone.
- Tools and apps such as SAWA are nowadays in use to monitor dolphin welfare at the individual level and continuously.
- A decade of welfare assessment across five cetacean species shows that standardised repeated assessment is operationally feasible and can be refined as evidence develops.

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2. Intelligence, cognition, agency and enrichment

Cognitive complexity is found in a broad range of species living in zoological settings. It increases the responsibility to provide meaningful challenge, control and behavioural opportunities to the animals. It does not demonstrate that positive welfare is impossible. The scientific task is to evaluate whether animals can explore, solve problems, learn, make choices, interact socially and influence their environment.

What science has to say about it

- Positive-reinforcement training can facilitate voluntary veterinary procedures, reduce the need for restraint and provide predictable cognitive and social engagement.
- Cognitive foraging enrichment produced improvements in several longer-term welfare indicators in bottlenose dolphins, supporting the value of controllable, problem-solving opportunities.

- Enrichment quality, diversity and scheduling are more informative than the simplistic presence or absence of objects. Choice and control are core design principles.
- The largest multi-institutional cetacean welfare research programme found meaningful relationships between management practices and behavioural or physiological indicators, contradicting claims that welfare is determined by habitat size alone.

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3. Swimming distance, activity and habitat functionality

Wild travel distances reflect ecological constraints including prey distribution, habitat configuration, predator avoidance and social dynamics. Consequently, movement distance is not synonymous with welfare requirement. Studies of dolphins under professional care have demonstrated that actual movement can be measured directly and is strongly influenced by enrichment and management factors.

Essential distinction

Capability describes what an animal can do. Opportunity describes what the environment permits. Motivation describes what the animal wants to do in a given context. Welfare need describes what must be available to avoid negative states and enable positive ones. These concepts should not be treated as synonyms.

What science has to say about it

- Lauderdale et al. (2021) used high-resolution, non-invasive Movement Tags on 60 bottlenose dolphins in 31 habitats, one day per week during two five-week periods. They analysed average distance travelled per hour and overall dynamic body acceleration as a proxy for activity and energy expenditure.
- Environmental enrichment programmes were strongly related to both average distance travelled and activity. Predictable training-session timing was also positively associated with distance travelled.
- Habitat characteristics showed comparatively weak relationships with activity and were not related to average distance travelled. The authors concluded that management practices were more strongly related to activity levels than physical habitat characteristics.
- This does not mean dimensions are irrelevant. Adequate depth, volume, complexity, multiple spaces and opportunities for choice remain necessary. It means that size alone is not a validated proxy for how much an individual moves or for its overall welfare.
- Wild bottlenose-dolphin populations range from highly resident coastal communities to wide-ranging offshore ecotypes. Exceptional long-distance movements demonstrate connectivity and behavioural flexibility, but do not establish a daily minimum distance applicable to every population or individual.

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4. Diving depth: ecological adaptation rather than a universal minimum

Bottlenose dolphins occupy strongly contrasting environments. Offshore animals may forage at great depths, whereas resident coastal animals may spend their lives in shallow bays. Selecting the deepest recorded dive as the minimum needed by the species would erase this ecological diversity and would imply that naturally shallow habitats are intrinsically inadequate.

What science has to say about it

- Fahlman et al. tagged offshore bottlenose dolphins near Bermuda. Long dives exceeding 272 seconds and deep dives exceeding 199 metres were common in the analysed deep-dive sample; the maximum recorded dive was 1,000 metres and 826 seconds.
- Most dives deeper than 50 metres occurred at night, indicating an ecological and foraging context rather than a constant need to remain at depth.
- The authors expressly distinguished the Bermuda offshore deep-diving ecotype from shallow-diving nearshore dolphins.
- Comparative work on Sarasota Bay and Bermuda dolphins shows that nearshore and offshore ecotypes use very different dive profiles. Such flexibility is evidence against a single species-wide minimum-depth inference.
- Depth remains an important habitat feature because it enables vertical movement, choice and behavioural diversity. The scientifically unsupported leap is from “some dolphins can dive extremely deeply” to “all dolphins must reach that depth to experience good welfare”.

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5. Health, veterinary care, survival and longevity

Longevity is not a complete welfare measure, but poor survival would be incompatible with claims of consistently good health. Contemporary comparisons must use recent cohorts because husbandry, nutrition, preventive medicine and neonatal care have changed substantially over time.

What science has to say about it

- Jaakkola and Willis analysed US bottlenose-dolphin records from 1974-2012 and found significant historical improvement. For the modern period, annual survival was 0.972; Kaplan-Meier mean and median life expectancies were 28.2 and 29.2 years in a zoological setting.
- The study concluded that current survival and life expectancy in US zoological facilities were at least as high as those of the wild populations when the most restrictive level of statistical criteria was taken but longer for other statistical methods for which comparable estimates existed.
- Sweeney et al. documented improved neonatal survivability between the 1990s and 2000s across three US institutions, illustrating the effect of accumulated reproductive and veterinary expertise.
- Tidière et al. found that survival improvements in zoo-held marine mammals mirrored historical advances in human longevity, consistent with progressive improvements in care rather than a static historical condition.
- Health and longevity data do not prove that every facility or animal has good welfare. They refute the categorical proposition that human care necessarily causes shortened life or unavoidable systemic ill health.

- In conclusion, scientific studies show that dolphin life expectancy in zoos (DeMaster, 1988; Small, 1995) mirrored the wild population (Wells, 1990) in the early 90s and is now superior, exceeding 30 years in modern institutions (Venn-Watson, 2011; Tidière, 2023). There is no scientific evidence showing a reduction of life expectancy in dolphins for living in a zoological setting at the population level.

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6. Social behavior and social group management

Bottlenose-dolphin societies are dynamic rather than organised as one permanent, undifferentiated group. Individual affiliations, age, sex, reproductive state and context influence association patterns. Good management therefore requires compatible partners, opportunities to associate or separate, multiple interconnected spaces and ongoing behavioural monitoring.

What science has to say about it

- Long-term field studies describe fission-fusion social systems with stable preferred relationships embedded within flexible group membership.
- The welfare relevance of social management is individual: both unwanted isolation and forced proximity to incompatible individuals can be harmful.
- Multi-institutional welfare research found social and management variables associated with welfare-relevant outcomes, reinforcing that social design cannot be reduced to group size alone.
- Access to several spaces can enable animals to exercise social choice and control, a key component of positive welfare.
- Participation in population-level management programs - such as EEP - allows for respect of the social challenge associated with a fusion-fission social dynamic.

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Connor, R. C., Wells, R. S., Mann, J., & Read, A. J. (2000). The bottlenose dolphin: social relationships in a fission-fusion society. In J. Mann et al. (Eds.), Cetacean Societies. University of Chicago Press.

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7. Reproduction, social welfare and European population management

Current European population

Approximately 81% of dolphins currently living in the European managed population were born in zoological institutions. Reproduction is natural in Europe apart from three exceptional research-related cases. This is a multi-generational, largely self-sustaining population without any import from the wild for more than three decades. The percentage and exception count are current EEP inventory figures supplied for this briefing and should be updated when the studbook is refreshed.

The purpose of coordinated breeding is not unrestricted growth. It is to maintain an appropriate age structure, sex ratio, genetic representation and range of compatible social placements across Europe. Decisions are made at population level but must remain appropriate for each animal.

What science has to say about it

- European Ex situ Programmes coordinate demographic, genetic and social management. Breeding and transfers are tools used to maintain healthy and thriving populations, not ends in themselves.
- Natural mating, pregnancy, birth, maternal care, calf development and calf-directed behaviour form part of the species-typical repertoire. Preventing all reproduction removes these opportunities and should not be presumed welfare-neutral.
- Dudzinski, Themelin and Hill found that groups with pre-weaned calves showed more diverse behaviour, more inter-individual contact, greater intensity of exchanges and participation by more group members. Effects extended beyond the mother-calf dyad.
- A reproductive ban requires intervention: temporary or permanent sex separation, transfers, contraception or other reproductive suppression. Each option has individual health and social consequences requiring veterinary and welfare review.
- Because dolphins are long-lived, eliminating recruitment progressively produces an ageing and potentially unbalanced population, reducing future flexibility to compose compatible groups.
- The correct regulatory contrast is responsible, coordinated breeding versus breeding without sufficient planning, not reproduction versus an imaginary intervention-free state.

Key scientific references

Dudzinski, K. M., Themelin, M., & Hill, H. M. (2026). The influence of dolphin offspring to a social group. Animal Behavior and Cognition, 13, 165-183. https://doi.org/10.26451/abc.13.02.04.2026

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8. Scientific and veterinary research contribution

Animals under professional care allow longitudinal, voluntary and repeatable studies that are difficult or impossible to conduct in free-ranging animals. The strongest conservation model is reciprocal: research under human care develops methods and baseline knowledge that can then be applied to wild populations, while field questions improve zoological research priorities.

What science has to say about it

- Voluntary participation permits repeated physiological sampling, hearing tests, metabolic measurements, ultrasound, respiratory assessments and validation of non-invasive tools.
- Controlled or known contexts allow researchers to relate a measured signal to age, health, reproductive status or behaviour, generating reference data for stranded and free-ranging animals.

- Research on hearing and sound exposure has informed impact assessment for anthropogenic underwater noise.
- Reproductive physiology research has supported population management and understanding of cetacean biology.
- The availability of trained animals improves both data quality and welfare during procedures.

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9. Conservation, rescue, rehabilitation and education

Cetacean-holding institutions constitute an important component of the scientific, veterinary, educational and conservation infrastructure available for marine mammal conservation.

Their contributions include: rescue and rehabilitation; veterinary medicine; reproductive biology; acoustics and hearing research; physiology; conservation technology; public education; population management expertise; support for field conservation initiatives.

The removal of this expertise through prohibition policies should therefore itself be considered a conservation risk.

What science has to say about it

- Stranding response requires rapid access to veterinary, husbandry, transport and water-management expertise. Zoological teams often contribute personnel, equipment, diagnostics and post-mortem knowledge.
- Animals that cannot be released require realistic lifetime-care options. Ex situ management may be a necessary conservation or welfare tool in specific cases, provided objectives and standards are explicit.
- Education impact should be evaluated rather than presumed. Effective programmes connect animal observation to clear conservation actions, credible interpretation and measurable learning outcomes.
- Research, rescue, education and conservation roles strengthen the public-interest case for institutions where they are substantive and transparent.

Key scientific references

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10. Cetaceans under Human Care and the One Plan Approach

Core lesson

The scientific question is not whether cetaceans should exist under human care or in nature. The One Plan Approach recognises that ex situ and in situ efforts can be complementary components of species conservation.

Why ex situ populations remain necessary?

The IUCN Species Survival Commission increasingly advocates integrated conservation approaches in which ex situ and in situ populations are considered complementary conservation tools. The concept is consistent with the One

Plan Approach, which encourages evaluation of all available conservation options across the full management spectrum of a species (Byers et al., 2013; IUCN SSC, 2017), while recognising that ex situ management may represent an important component of species conservation under specific circumstances (Brakes et al., 2023).

The IUCN Species Survival Commission promotes the **One Plan Approach**, which integrates:

- in situ conservation;
- ex situ population management;
- research;
- veterinary expertise;
- capacity building;
- education;
- rescue and rehabilitation;
- population sustainability.

Under this framework, zoological populations are not considered separate from conservation but are potential components of integrated species management strategies.

What science has to say about it

- Many conservation tools currently used for marine mammals have been developed, tested or refined with animals under professional care.
- Rescue and rehabilitation programmes depend on expertise maintained in zoological institutions.
- Ex situ populations provide research opportunities that cannot ethically or practically be conducted in the wild.
- Long-term demographic and veterinary datasets constitute an important scientific resource.
- Future conservation challenges associated with pollution, emerging diseases, fisheries interactions and climate change may increase the importance of maintaining specialised cetacean expertise.
- Eliminating zoological populations removes infrastructure and expertise that may be needed for future conservation challenges.

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11. Policy case study: lessons from the French experience

Core lesson

A prohibition does not itself create an alternative place of care. It does not build a sanctuary, secure permits, fund lifetime veterinary care, retain specialised teams or guarantee that a proposed destination will survive legal challenge.

The French experience demonstrates that unscientifically grounded policies can create animal welfare uncertainty while failing to deliver the alternative solutions that were presented as replacements.

Rather than demonstrating that zoological institutions are unnecessary, the French experience illustrates how heavily authorities continue to rely on zoological expertise when confronted with the practical management of living animals.

Period	Development
2015	Calls by parliamentarians and campaigning organisations to prohibit cetacean keeping.
2015-2017	Growing political and media pressure.
3 May 2017	Royal-Pompili ministerial order introduced major restrictions, including reproductive prohibition.
29 January 2018	Conseil d'État annulled the order on procedural grounds without resolving the underlying scientific debate.
2018-2020	Legislative work increasingly focused on welfare requirements and prohibition of cetacean shows.
30 November 2021	Animal-protection law established a future prohibition on keeping and breeding, subject to limited exceptions.
2022-2024	No comprehensive operational destination existed for all affected animals.
2024	Further regulatory provisions addressed establishments authorised to keep cetaceans while transfer constraints persisted.
5 January 2025	Marineland Antibes closed to the public based on lack of visibility and continuous pressure from NGOs.
2025-2026	Alternative placements, temporary transfers and proposed facilities were sought amid administrative and legal disputes.
2025-2026	The State sought support from ZooParc de Beauval; that pathway subsequently faced opposition and uncertainty, leaving the animals that have not been transferred to other zoological institutions in jeopardy.

What science and responsible policy have to say about it

- A prospective welfare-impact assessment should cover every animal over its expected lifetime, not only the date on which a ban enters into force.
- Destinations should be technically operational, authorised, funded and independently assessed before closure or transfer deadlines become irreversible.
- Contingency plans must address delay, litigation, failure of a proposed sanctuary, deterioration of an existing site and animals that cannot be transported.
- Campaign promises should not be treated as capacity. A credible solution requires a site, design, licences, financing, staff, veterinary governance and an executable timeline.

12. Conclusions and evidence-based regulatory principles

Current scientific evidence does not support prohibition of cetacean care under professional human management as a necessary animal-welfare measure.

Conversely, the available evidence demonstrates that accredited cetacean institutions contribute significantly to animal welfare science, conservation, rescue capacity, veterinary medicine, research and education.

For these reasons, professionally managed cetacean populations should be regarded not only as compatible with modern welfare science, but also as an important component of the scientific, educational and conservation infrastructure available to society.

Based on the few restrictions, phase-out or banning policies implemented (UK, France and Canada), they never achieved to demonstrate that hosting cetaceans in a zoological setting is incompatible with good welfare and rather created uncertainty and compromised the faith of the animals. So far, relocation of the animals to other zoological institutions has been the only proven effective option.

Final scientific message

The question supported by science is not whether welfare can be "guaranteed" in the abstract. It is whether welfare is being achieved for each animal, how this is demonstrated, and how then, zoological missions – education, research and conservation - are fulfilled.

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