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CMS

2nd CMS Workshop on Conservation Implications of Animal Culture and Social Complexity – Part II

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Reports of the Cross-Cutting Sub-Groups: Reintroductions/Translocations

Background

This document reflects work done by the translocation sub-group in preparation for the 2nd CMS Workshop on Conservation Implications of Animal Culture and Social Complexity - Part II (to be held in Parma, Italy, 3-4 April 2023).

In addition to completing a brief survey gathering ideas, the subgroup has met to discuss applications of non-human culture to translocations. This document compiles and summarizes insight from that discussion.

Purpose

"The purpose of the workshop, as outlined in the related CMS Decisions, is to identify priority species and populations on the CMS Appendices, and to provide advice to Parties on rapid assessment techniques and how to augment existing conservation efforts using insights on aspects of sociality"

The efforts of this sub group center on augmenting existing conservation efforts in the context of conservation translocations.

***Deadline** final version of this document is due 7th March 2023*

Draft resolution for Translocation sub-group

Very few of the many translocations that occur each year explicitly identify problems with non-human culture. Despite this lack of evidence, there are many mechanistic reasons why culture should play an important role in determining translocation outcomes (Brakes et al. 2019, 2021; Goldenberg et al. 2019; Greggor & Goldenberg 2023), and there are a number of cases where social learned behavior—or a lack thereof—has likely been influential (e.g. lesser spotted eagles (Meyburg et al. 2017), whooping cranes (Mueller et al. 2013), ungulates (Jesmer et al. 2018)). For instance, in animals that learn socially, a lack of species- appropriate or local-appropriate behavior can lead to the loss of adaptive migratory behavior, and to issues in finding resources, especially seasonal ones, and during period of environmental stress (i.e. drought). Also when translocated animals lose cultural foraging patterns, they may become more reliant on easy-to-find, "cheap" food sources, which can tilt animals towards human-wildlife conflict (e.g. elephants) and the dangerous outcomes these scenarios create. The capacity of animal populations to absorb translocated individuals may also vary based on not only the basis of habitat saturation (others may term this carrying capacity) but also willingness of conspecifics to

interact and engage with these individuals (e.g. social groups). A mismatch in other socially learned behaviors that can contribute to culture, such as vocal patterns or modes of communication, may also inhibit integration of translocated animals into existing populations. This willingness to integrate may depend on age, sex and other attributes in different ways depending on species' life history (e.g. age at dispersal, social organization and mating system) (Goldenberg et al. 2019).

Therefore there are a number of ways in which translocations may be impacted by cultural rupture or deficiencies. However, given that there can be long time lags between cultural disturbances and their fitness consequences (e.g. sperm whale cultural groups or elephant group knowledge (Shannon et al. 2013), issues relating to cultural incompetence may take a long time to detect in translocated populations. Moreover, since culture can be challenging to identify empirically, these issues are likely under-reported in the peer reviewed literature (Brown 2023) and under-appreciated in wider translocation discourse.

Conservation translocation is an umbrella term that covers the human mediated movement of animals for a conservation purpose (IUCN 2013). Conservation translocations cover wild to wild transfers of animals and the release of animals bred in captivity. In both cases releases can occur in habitat where conspecifics are already occurring (i.e. reinforcement or supplementation), where the species has been extirpated (i.e. reintroduction), where habitat may be suitable even if not historically occupied (i.e. assisted colonization), or where habitat has lost a comparable species that previously fulfilled an important ecological niche (i.e. ecological replacement). Depending on the species, the type of translocation may influence the importance of considering culture in planning efforts. In theory, better outcomes would be predicted in supplementation/reinforcement contexts, since local culture already acts as a repository of knowledge in the release area (e.g. reintroduced marine reef fish can learn locations of new feeding grounds when local fish are present (Helfman & Schultz 1984)), whereas animals undergoing a reintroduction or assisted colonization may need to learn and establish their culture anew. On the other hand, differences among introduced individuals and residents has the potential to create cultural conflict, or even inadvertently propagate behavioral tactics that are ultimately detrimental, such as those that underlie human-wildlife conflict.

The current internationally recognized guidelines for conducting animal translocations (IUCN 2013) do not directly address issues of culture, but do contain some relevant information about behavior that may be socially learned. For instance, they recommend considering the behavioral ecology of the translocated species, the behavior of individuals when selecting a release cohort, and of monitoring behavior post-release. The guidelines raise the potential for newly released animals to learn survival skills from wild conspecifics, and to face issues with social integration. In terms of relevant interventions, the guidelines also suggest the potential for cross fostering within a species to encourage behaviors and traditions, and for using pre-release behavioral training where needed. While many of these considerations and techniques are increasingly used, their roll-out has been uneven between species and translocation programs, as behavior is still reported as a major issue in translocation failures (Brown & Day 2002; Berger-Tal et al. 2020). However, when applied well, behavioral tools, such as pre-release training in translocation preparations, can successfully address deficiencies in socially learned behaviors and boost survival (Brown & Laland 2001; Tetzlaff et al. 2019). For instance it is well known that in salmonoids, species have templates for imprinting upon their environment when they are at the egg and fry stage which are critically important. While less is known about how important social learning is in the context of migration, it is critical in foraging and predator avoidance.

Despite the growing use of behavioral tools in translocations, there has yet to be such an explicit consideration of non-human culture. Just because a behavior is socially transmitted does not mean it is relevant to fitness or translocation outcomes. Some cultural traits may be 'neutral' with respect to fitness, but others could be key to finding mates, successful reproduction, avoiding predators, efficient migration, etc. Meanwhile, there is a potential risk that by intervening in culture, practitioners could inadvertently seed non-natural or maladaptive behavior, corrupting existing culture if released populations interact with wild ones. While such consequences may be hypothesized or suspected, there is still a paucity of empirical documentation, thus these risks likely exist for translocation programs, but do not yet have widespread recognition. Issues with culture can also contribute to some of the more unpredictable translocation outcomes. For instance, if social learning occurs, then managers should be prepared for increased flexibility and behavioral surprises. So where should practitioners tap into the field of social learning and non-human culture for their interventions?

Steps for application

Identifying the potential for social learning and culture that is tied to fitness outcomes touches on many of the topics within this wider document (i.e. rapid assessment methods and applying a precautionary principle (Brakes et al. 2021)). In cases where the potential for culture or social learning to influence outcomes of a translocation has been established, there are a series of questions a practitioner can ask which will help shape the type of training or exposure they may be able to use. For instance, what are the main perceptual modalities the organisms learn most effectively from conspecifics (e.g. visual, chemosensory, auditory)? Are suitable peers both present and accessible in the release site? If wild-wild translocation is the goal, are the individuals being moved "problem animals"? If so, are they likely to seed that problem behavior in the new site, and how experienced are human neighbors in coping with those issues? How can translocated individuals acquire knowledge of where seasonal resources are and which areas are to be avoided? Are there any ecological traps that may undermine the success of naive translocated individuals? What behaviors must be learned and tailored with the prospective release site in mind, which may differ from the rearing/original location (e.g. food plants, water sources)?

More research is needed for understanding how information flows in the context of translocations (Greggor & Goldenberg 2023). There exist bigger gaps in knowledge about some species than others. For instance, tactics and methods for controlling social learning in salmonids or song learning in birds are much better articulated than in some other species. There is the potential for social learning to either be explicitly staged, controlled or considered when engaging in the majority of documented tactics that can be deployed in a conservation translocation (Batson et al. 2015); Table 1.

Strategy	Tactic	Meaning	Cultural or Social Learning Relevance
Animal Selection	Behavioral Selection	selection of individuals or groups from multiple candidates based on a behavioral trait	Could use culturally acquired traits, or potential for acting as tutors
	Demographic Selection	selection of individuals or groups from multiple candidates based on a demographic trait	Set demographic goals to facilitate social information flow based on learning biases
	Genetic Selection	selection of individuals or groups from multiple candidates based on the prevalence for a genetic trait	Cultural traits likely have genetic underpinnings (such as selection for temperature tolerance) which play important roles in movement, migration and breeding decisions (gene/culture coevolution)
	Physiological Selection	selection of individuals or groups from multiple candidates based on the prevalence for a physiological trait	As above, classic examples include animals/populations operating at the fringe of the distribution (eg trout and Atlantic salmon in Spain) or those in habitats with larger predicted climate change effects
	Health Selection	selection of individuals or groups from multiple candidates based on the prevalence for a health trait, such as disease immunity	Currently no clear application.
	Experiential Selection	selection of individuals or groups from multiple candidates based on pre-release experiences	Experiences can include prior opportunities for social learning. Likely older animals are a store of cultural knowledge and are more likely to be copied
Animal Preconditioning	Behavioral Preconditioning	alteration of a behavioral trait within individuals or group prior to release	Stage social learning opportunities, considering learning biases of the species in question (i.e. sensitive periods, propensity to

Strategy	Tactic	Meaning	Cultural or Social Learning Relevance
			learn from certain types of tutors)
	Genetic Preconditioning	alteration of genetic traits within an individual or group prior to release	Currently no clear application
	Physiological Preconditioning	alteration of physiological traits within individuals prior to release	Ensuring that the animals have had sufficient time to adjust to local conditions at the release site. This is likely an issue if there are differences between the captive and wild environments (which may be addressed with soft-release protocols)
	Social Preconditioning	alteration of social relationships between individuals prior to release	Socialize individuals to maximize stability and potential for social learning, based on routes for information flow
	Experiential Preconditioning	alteration of environmental characteristics of the source environment prior to release	Include wild environmental features that align with local culture (eg common predators and prey)
	Health Preconditioning	alteration of health characteristics of individuals prior to release, e.g. vaccination	Currently no clear application
	Reproductive Preconditioning	alteration or control of the reproductive status of individuals prior to release	Currently no clear application
Animal Release Design	Population Size	selection of the number of individuals included in a translocated cohort	Consider cultural allee effects
	Genetic Composition	control of the genetic makeup of a translocated cohort	Likely to be important when there is evidence of local adaptation
	Demographic Composition	control of the demographic make-up of a translocated population or cohort	Target social information flow

Strategy	Tactic	Meaning	Cultural or Social Learning Relevance
	Social composition	control of the social make-up of a translocated population or cohort	Target social information flow
Post-release Animal Management	Intervention	Actions undertaken in order to mitigate issues based on post-release observations	Use social learning markers or targets to identify early problems
	Manipulated Reproduction	Actions undertaken to influence the reproductive cycles or offspring of translocated individuals	Currently no clear application
	Managed Dispersal	Action undertaken to establish and maintain meta-population dynamic	Use social cues to influence movement, by either encouraging dispersal or settlement (efficacy likely depends on species)
Environmental Selection	Suitability Selection	selection of an environment from multiple candidates based on the level of suitability to the translocated wildlife	Consider suitability based on propensity to avoid human-wildlife conflict culture
	Similarity Selection	selection of an environment from multiple candidates based on the level of similarity between the source and recipient environments	Consider habitat factors which are used in locally adapted culture.
Environmental Preconditioning	Pre-release Resource Augmentation	augmentation of resources within the recipient environment pre-release	Select resources animals will readily be able to use or socially learn about
	Pre-release Threat Control	control of threats within the recipient environment pre-release	Consider removal of threats that could be associated with socially learned ecological traps
Environmental Release Design	Spatial Configuration	control of the number and configuration of release sites	Separate sites beyond social contact if wanting to avoid social learning, put them within social contact range if wanting to encourage social learning

Strategy	Tactic	Meaning	Cultural or Social Learning Relevance
	Temporal Configuration	control of the number and configuration of release events	Consider how release frequency influences information flow and stability of recipient population
	Release Timing	control of the timing of a release event(s)	Consider social learning biases in times of year
	Delayed or Immediate Release	inclusion, exclusion and design of a holding period immediately preceding release	Consider potential opportunities for social learning during holding period or soft release period
Post-release Environmental Management	Post-release Resource Augmentation	augmentation of resources within the recipient environment post-release	Use socially learned foraging behavior or cues to encourage use of provisioned resources
	Post-release Threat Control	control of threats within the recipient environment post-release	Use socially learned behavior or cues to discourage interaction with threats

Table 1. Areas of potential intervention where social learning or culture could be used as a tool to influence translocation outcomes. List of wider translocation strategies adapted from (Batson et al. 2015)

Ongoing challenges

Despite the wide variety of strategies that could consider, influence or track cultural or socially learned behaviors (Table 1), many practitioners likely face barriers to doing so.

Practitioners need to contend with the logistics and feasibility of culturally relevant interventions. For instance, it is useful to identify where using social learning is more cost effective overall than not. In salmonids, for instance, the time, effort and cost involved with the use of social learning to train anti-predator and foraging behavior pays off since it sufficiently enhances post-release survival (Brown & Laland 2001). Additionally, there can sometimes be really small changes to translocation protocols which may enhance the potential for the socially learned transfer of behavior. For instance, timing releases to coincide with natural dispersal, or other social learning opportunities. In other cases, the scale of intervention necessary to enact cultural change may be too wide ranging. Animals with large home ranges may need to be trained at the release site, especially for long range behaviors. (e.g. whooping crane migration), and other behaviors may be infeasible to replicate in human care (e.g. seasonal movements or responses to weather) and may have to be nudged or seeded via a series of smaller scale manipulations. Additionally, there may only be narrow windows of time or very precise locations where individuals have opportunities to learn certain behaviors (e.g. nest selection or mate choice), which may occur outside of the release timeframe. Therefore, practitioners may have little ability to influence learning outcomes in those scenarios.

Practitioners also commonly face constraints surrounding the lack of experimental data or evidence to guide decision making (Walsh et al. 2019). There may also exist a perceived irrelevance of culture in the context of translocations by wildlife authorities and agencies, given that it has largely been an academic topic. Conservation actors face conflicting and often rushed timelines, limited resources and the need to do the best with what is available. Such scenarios occur in other conservation contexts beyond culture or translocations. Just as decision making in the face of uncertainty is part of the skillset for many practitioners, and is in itself a studied discipline (Williams & Johnson 2013), there may be lessons learned in using these frameworks for the application of culture in translocation scenarios. Additionally, there may be instances where defining translocation success may not benefit from using the term culture, so long as animals can acquire the positive fitness-related behaviors they need, and do not acquire new deleterious ones.

References

Batson WG, Gordon IJ, Fletcher DB, Manning AD. 2015. Translocation tactics: a framework to support the IUCN Guidelines for wildlife translocations and improve the quality of applied methods. Journal of Applied Ecology **52**:1598–1607.

Berger-Tal O, Blumstein DT, Swaisgood RR. 2020. Conservation translocations: a review of common difficulties and promising directions. Animal Conservation **23**:121–131. Wiley Online Library.

Brakes P et al. 2019. Animal cultures matter for conservation. Science **363**:1032–1034.

Brakes P et al. 2021. A deepening understanding of animal culture suggests lessons for conservation. Proceedings of the Royal Society B: Biological Sciences **288**:rspb.2020.2718, 20202718.

Brown C. 2023. Fishes: From social learning to culture. Oxford University Press.

Brown C, Day RL. 2002. The future of stock enhancements: lessons for hatchery practice from conservation biology. Fish and Fisheries **3**:79–94.

Brown C, Laland K. 2001. Social learning and life skills training for hatchery reared fish. Journal of Fish Biology **59**:471–493.

Goldenberg SZ, Owen MA, Brown JL, Wittemyer G, Oo ZM, Leimgruber P. 2019. Increasing conservation translocation success by building social functionality in released populations. Global Ecology and Conservation **18**:e00604.

Greggor AL, Goldenberg SZ. 2023. Manipulating animal social interactions to enhance translocation impact. Trends in Ecology & Evolution:S0169534723000150.

Helfman GS, Schultz ET. 1984. Social transmission of behavioural traditions in a coral reef fish. Animal Behaviour **32**:379–384.

International Union for Conservation of Nature and Natural Resources, Species Survival Commission. 2013. Guidelines for reintroductions and other conservation translocations. Available from http://data.iucn.org/dbtw-wpd/edocs/2013-009.pdf (accessed August 12, 2022).

Jesmer BR et al. 2018. Is ungulate migration culturally transmitted? Evidence of social learning from translocated animals. Science **361**:1023–1025.

Meyburg B-U, Bergmanis U, Langgemach T, Graszynski K, Hinz A, Börner I, Meyburg C, Vansteelant WMG. 2017. Orientation of native versus translocated juvenile lesser spotted eagles (*Clanga pomarina*) on the first autumn migration. Journal of Experimental Biology **220**:2765–2776.

Mueller T, O'Hara RB, Converse SJ, Urbanek RP, Fagan WF. 2013. Social Learning of Migratory Performance. Science **341**:999–1002.

Shannon G, Slotow R, Durant SM, Sayialel KN, Poole J, Moss C, McComb K. 2013. Effects of social disruption in elephants persist decades after culling. Frontiers in Zoology **10**:62.

Tetzlaff SJ, Sperry JH, DeGregorio BA. 2019. Effects of antipredator training, environmental enrichment, and soft release on wildlife translocations: A review and meta-analysis. Biological Conservation **236**:324–331.

Walsh JC, Dicks LV, Raymond CM, Sutherland WJ. 2019. A typology of barriers and enablers of scientific evidence use in conservation practice. Journal of Environmental Management **250**:109481.

Williams BK, Johnson FA. 2013. Confronting dynamics and uncertainty in optimal decision making for conservation. Environmental Research Letters **8**:025004.