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Research Article

Qualitative interviews of practitioners of Buddhist life release rituals residing in the United States: implications for reducing invasion riskTim Campbell^{1,2,*}, Bret Shaw^{2,3}, Evelyn Hammond², Luye Bao³, Shiyu Yang³, Peter Jurich³ and Sara Fox²¹University of Wisconsin Sea Grant Institute, 1975 Willow Drive, Madison, WI 53706, USA²University of Wisconsin Division of Extension Natural Resources Institute, 445 Henry Mall, Madison, WI 53706, USA³University of Wisconsin Department of Life Sciences Communications, 1545 Observatory Drive, Madison, WI 53706, USAAuthor e-mails: tim.campbell@wisc.edu (TC), Brshaw@wisc.edu (BS), Evelyn.hammond@wisc.edu (EH), Lbao6@wisc.edu (LB), Syang364@wisc.edu (SY), peterjurich@gmail.com (PJ), sfox23@wisc.edu (SF)

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Abstract

The release of live organisms into the environment by Buddhists for religious reasons, known as “life release”, is a less understood pathway of biological invasions. To better understand the activity as it is practiced in the United States, we contacted more than 400 Buddhist groups and interviewed 11 individuals during late 2018 and early 2019 to discuss the practice. The information obtained from this small sample included the nature of the ritual, their awareness of impacts and legality, potential low-risk alternatives to the practice, and how to best engage with this community moving forward. Practitioners’ motivation and understanding of the practice are similar to previously published work, though with perhaps a stronger emphasis on saving lives. Practitioners use release animals that they believe are likely to survive, not harmful to the local environment, and are easy to obtain, including earthworms, crickets, and minnows. Release events are often held in places that give the animals the best probability of surviving and group release events are held in public spaces that may allow for fellowship afterwards. Practitioners were generally aware of potential negative impacts of the practice and the legality of the practice. With this in mind, it was often mentioned that effort was put into limiting these impacts. Promisingly, the interviewed practitioners thought more environmentally friendly methods of release were possible and would welcome further engagement with natural resource professionals and Buddhist opinion leaders to practice life release in an environmentally sustainable manner.

Key words: aquatic invasive species, mercy release, prayer release, invasion pathways, risk assessment, religious release, ceremonial release

Introduction

The intentional introduction of plants and animals into the environment as a result of religious ceremonies is a known vector of nonnative species (Magellan 2019), and Buddhism is the religion most closely associated with this practice (Shiu and Stokes 2008). The Buddhist practice of life release consists of freeing an animal from captivity into the environment to live out the rest of its natural life (Zangpo 2005). The practice is believed to generate positive karma, and good outcomes for a person or cause may

also be associated with the practice (Shiu and Stokes 2008). However, the release of nonnative species into the environment without a permit is illegal throughout the United States and could lead to the establishment of new invasive species and associated undesirable impacts.

Most of our understanding of this invasion pathway comes from efforts that have been completed outside of the United States. In those areas, religious release is known to be a significant pathway for nonnative animals into the environment (Agoramoorthy and Hsu 2007; Corlett 2010; Liu et al. 2012). Addressing the pathway can be difficult due to the complex market for buying and selling organisms that may be released (Gilbert et al. 2012; Romagosa 2015; Su et al. 2016), and the motivations for the practice are intertwined with both religion and culture (Severinghaus and Chi 1999; Chan 2006; Shiu and Stokes 2008). Research has determined that increased ecological knowledge of invasive species (Liu et al. 2013), designated native species for release, and hydrologically isolated designated release sites could reduce the risk of this practice (Wasserman et al. 2019).

Our understanding of the practice within the United States comes from a handful of peer-reviewed articles. A table of occurrences of life release in the United States is available in Liu et al. 2012, while Nico et al. 2011 and Nico et al. 2019 discuss how Asian swamp eels (*Amphipnous cuchia*) have been introduced to five sites in the United States through live-food markets and potentially life release ceremonies. Expanding into Toronto, Ontario, Canada, there is a suspected instance of a bighead carp likely being purchased from a food market and released into local waterways (Crossman and Cudmore 1999).

Given the high frequency of release events and the number of animals being released documented by other studies (Magellan 2019) and the lack of understanding of the practice in the United States, we set out to interview Buddhist practitioners of life release in the United States to learn more about how the practice occurs. Specifically, we wanted to know if the motivations and requirements of the practice were similar as described elsewhere, how the practice was occurring in the United States, and if there are ways to meet the intent of the practice while reducing or eliminating invasion risk.

Materials and methods

Although life release can occur across a number of religions and cultures (Severinghaus and Chi 1999), it has a known connection to Buddhism, making it easier to identify practitioners to interview; therefore we focused on only the Buddhist practice of life release.

We generated a list of approximately 440 contacts from Buddhist temples (289 temples), Buddhist studies programs and campus clubs (83 programs and clubs), and other suggested related groups in the U.S. (7 groups). These contacts were generated in the following ways: by referral

from natural resource managers and other contacts in the area, by association with a university or college, or by doing a Google search for Buddhist temples and Buddhist studies programs in each state. Recruitment through these methods occurred from November 2018 to May 2019. We would first email groups using a template recruitment email. We used a standard recruitment email first (Supplementary material Appendix 1) as we believed it would be easier to navigate language issues and emails that could be forwarded to help with recruitment. If we did not receive a response within one week, we followed up with two phone calls on the same day during business hours and left a message if no one answered the phone. Again, if we did not receive a response within one week, we followed up with one final email. When we found someone familiar with the practice and willing to participate, we scheduled a phone interview at their convenience.

The interviews were conducted throughout the same November 2018 to May 2019 time period as recruitment. We used convenience sampling because these practitioners were willing and available to be interviewed (Anderson 2010).

Our list of interview questions (Appendix 2) were based on our research questions and acted as a guide for the interviews (Clissett 2008). The interview questions contained an oral consent followed by 19 open-ended questions, which are ideal for learning about the beliefs and behaviors of the respondents (White et al. 2005). The interview questions covered the interviewees' experience with the practice, their understanding of the theology of the practice, the requirements of the practice and how the practice could be done in an environmentally sustainable way. When necessary, the interviewer asked follow-up questions to clarify points interviewees made (Clissett 2008). We opted for this approach because little is known about how the practice is done in the United States and these conversations allowed us to explore topics for broad understanding and depth based on practitioners' experiences, observations, opinions and perceptions of the life release practice (Donaldson and Franck 2016; Patton 2014).

The interviews were audio-recorded to obtain a verbatim record and also allow the interviewer to focus more on the interview process (Patton 2014). The interviews were transcribed using Rev (<https://www.rev.com/>).

We did an initial analysis and developed categories by comparing the interview data with the research questions. This step was important because it enabled us to identify disparities and similarities in all the interviews (Clissett 2008). Using the grounded theory approach, we developed analytic codes based on information from interviewees (Anderson 2010; Clissett 2008; Patton 2014) (Appendix 3). Next, five team members coded the two longest interviews guided by the research questions. After comparing the results of the first two coded interviews, we

settled on specific codes with which the remaining interviews were coded. This procedure ensured that data analysis was reliable and rigorous (Anderson 2010; Patton 2014).

We organized the interview data into matrices in Excel (Miles and Huberman 1994). This made comparing interviewees' opinions and perceptions as well as identifying themes and emerging themes less cumbersome (Miles and Huberman 1994). A summary of themes and codes are available as supplemental material to this paper (Appendix 3).

This research was completed under approved protocol IRB 2018-1030-CP001 from the University of Wisconsin-Madison Social and Behavioral Sciences Institutional Review Board.

Results

Of the 440 contacts made, we received responses from 43 people. We were unable to have further conversations with three contacts due to language barriers. Twenty-one were not familiar with the practice and eight were familiar with the practice but had never practiced it. Two practitioners indicated they engaged in the practice but were unwilling to provide an interview. Eleven respondents had indicated that they had practiced life release and agreed to provide an interview and share their experiences. Interviews averaged approximately 35 minutes in length. While participants were contacted through organizations, the conversations were more on their personal experiences with the practice. Most of the interviewees spoke on their own behalf, with some also explaining experiences that described group behavior.

The responses revealed a number of themes that allowed us to better understand the practice of life release in the United States. These themes include the following: practitioner backgrounds, nature of the ritual (this includes origins of the practice, organization, animals released in a ceremony and locations of release ceremonies), awareness of impacts and legality of the practice, alternatives to the practice and outreach to the Buddhist community. These themes are discussed in more detail below, and with a summary available in Table 1.

Practitioner backgrounds

Eleven people were interviewed from 10 states: California, Maine, Michigan, Minnesota, New Jersey, Ohio, Oregon, Tennessee, Vermont and Virginia. All interviewees indicated they had practiced life release. Out of these, nine currently practice the ceremony, and two formerly practiced it. Interviewees have practiced life release for varying lengths of time. Five had been practicing life release for between 21–30 years, two have been practicing for between 11–20 years, and two for less than 10 years. Two interviewees did not say how long they practiced life release. Four interviewees were

Table 1. A summary of key findings from the 11 interviews with Buddhist life release practitioners.

Theme	Key Findings
Nature of ritual	Theology behind practice is similar to previously published work. Strong emphasis on saving lives of animals versus simply releasing animals.
Awareness of impacts and legality	Most practitioners did research how to limit the environmental risk and animal welfare issues of the practice. Half indicated that the practice could be illegal.
Alternatives	Interviewee suggested alternatives that involve supporting organizations that save animals, like sanctuaries and rehabilitation centers, and changing personal behavior, like becoming vegetarian. The provided examples of alternative practices, like working with fish stocking operations and wildlife rehabilitation centers, were supported.
Outreach	Using religious figures as trusted spokespeople and working with local Buddhist organizations were common responses. All respondents were interested in speaking to natural resource professionals that could help them practice life release in a low-risk way.

Tibetan Buddhists, and one was a Soto Zen Buddhist. The remaining seven did not indicate belonging to a particular sect of Buddhism.

Origins of practice

For the practitioners, the origin of life release varies, and the practice may be influenced by their culture. While four interviewees mentioned that their practice was based on the Mahayana tradition/scriptures, two suggested they used the Tibetan Sutra. Other texts mentioned were the Golden Light Sutra, Brahmajala Sutra (Japanese), Chinese Bodhisattva precept Sutra, and a text by Chatral Rinpoche. One interview suggested that the kind of text used is culture dependent:

There are dedicated rituals that have been developed for life release, yes. There actually are. But they are not required to be used. The reason for this is because not everyone has the texts. The prayer texts. Not everybody has them, not everybody knows them. ... many Tibetans will mere (sic) recite the compassion mantra, which everybody knows, om mani padme hum. And then release the animal... I am unaware of specific requirements because it depends on the culture and the people.

Another interviewee indicated differences due to culture:

These texts are all the same, like Sutra, for example, and the Karma Sutra, they are the same throughout the Theravada Buddhism, Mahayana. But it might vary through different styles, according to the culture.

Timing of practice

The life release ritual can be performed any day or time; however, practitioners usually schedule releases on Buddhist holy days, which include Buddha's birthday, Buddha's enlightenment day, Buddha's day of death, Buddha's first teaching, Buddha's descent from the god realm, new

moon or full moon days, and first and last quarter moon days. Some days carry greater importance because more karma is associated with them, making life release on certain days preferable. This point was elucidated by an interviewee:

The day of the Buddha's enlightenment, which is usually in the spring, they say that the karma on that day is much, much higher because it's, I don't know, I guess it's like in sync with some really important event that happened. So, there's four days like that. And because the karma is multiplied so much that we, we use, we try to do things that create a lot of positive karma.

In other instances, life release is performed after a visiting teacher leads a lesson.

We also do it when a teacher comes to [visit]. We drive out there with him the day after his teaching program and we do a release. That's usually our biggest one.

Release days vary in countries where the practice occurs. In explaining when the practice is conducted in the U.S., one interviewee described the ceremony as practiced in Tibet:

In Tibet, it's pretty much the four major Buddhist holy days, plus the moon days are the more likely times. Although, it can be done any time, any day. It also may be done on specific days as chosen by monasteries or teachers... And this is really how life release has been done, to my knowledge in the United States.

Another compares the difference in frequency of timing of ceremonies between the U.S. and China:

Often in the United States, we have the event quite often during the summer. But in China, there is an event going on every week... Some of those, they are related to the Buddhist festival. Like, actually yesterday, there is the festival of the birth of Buddha. So, in this festival, many people back in China, they do the life release in order to celebrate for that.

Interviewees suggested that in the United States planned events happen more often in the summer because they are more convenient for the congregation, and that the planned nature provides good opportunity for fellowship around the event.

Organization of ceremony

The life release ceremony can be performed by one person, a family, a few people or in a large group of 25–30 people. It can be spontaneous or planned. When the ceremony is spontaneous, it is likely to involve a small number of people and be part of another event. An interviewee described

purchasing crickets on their birthday, performing the ceremony and releasing them in a “hospitable looking place”. Another interviewee similarly released “a bunch of crickets” he had bought from a pet store. An interviewee recounted the story of a visiting old lama who bought some fish from a Chinese restaurant (intended for human consumption) and had them released into a river as part of an unplanned ceremony.

A planned release ceremony is more elaborate and the details depend on the country of origin of the practice. An interviewee explained that the ritual used in the Tibetan tradition began in the 19th century with a teacher called Jiang Un Khandro. In this tradition, if the life release is planned, the ceremony is announced in advance.

During the ceremony, the animal to be released is first sprinkled with plain water to purify it of defects, consecrated with a blessing substance (such as blessed water), prayed over, blessed and released into the habitat with chanting. Participants recite mantras and dedicate merit or intentions during the ceremony, which lasts between 15–45 minutes.

Prayers recited during dedication of merit varied slightly among interviewees, though they are similar in dedicating merit to a person, including oneself, and given for the well-being of the animal. One interview mentioned the Samantabhadra Wishing Prayer, while another described a different recitation:

We might chant the mantra of Avalokitesvara, om mani padme hum.... a four-line dedication of merit ... By this merit, may all attain omniscience. May it defeat the enemy, wrongdoing. From the story waves of birth, old age, sickness, and death. From the ocean of Samsara, may I free all beings.

Since the practice is culture dependent, practitioners can adapt parts of the ceremony to suit a particular culture. As an example, one interview shortened the life release ceremony and adapted language for “modern America.” Another interviewee explained that although some Buddhist groups use a formal liturgy related to life release, it is not a common practice and not all groups have one. The interviewee clarified:

But they [some Buddhist groups] have formal practice for the beings that are to be released, and it is something that can be done as a practice. We don’t do many of those formal liturgies.... usually we just generate compassion, and they may or may not do the Mani Mantra. But often, we just gather together and work more on creating a nice environment to be placed in to live.

Animals released in a ceremony

Practitioners release a wide variety of animals, although the most common are earthworms and crickets. An interviewee pointed out it was more convenient to release smaller creatures like crickets since such ceremonies

could be done anywhere and without much planning. Other animals mentioned include pigeons, fish, minnows, lobsters, hawks, eagles, bobwhite quail, turtles, chukar partridge, pheasants, insects and birds. The kind of animal released depends on what is immediately available. An interviewee compared animal selection in Asia to California:

If you're in Asian countries and others, they have the opportunities of buying chickens and cows and goats and sheep and birds and various fish... And I know that in the Bay Area of California, they do release fish.

Release animals are often bought from pet stores and bait shops since both store types are common. Other sources include markets, commercial anglers, and wildlife rehabilitation centers. Smaller animals such as earthworms and crickets are preferred to larger ones due to cost and the logistics involved in releasing larger animals.

Location of release ceremonies

Release locations are not specific to any of the practicing Buddhist traditions. Locations are chosen based on the practitioner's belief that the animal would survive and thrive in the environment into which it has been released.

Since the goal of the practice is to preserve life, interviewees stressed the importance of choosing a release location suitable for the organism being released. Interviewees suggested suitable locations included shady areas, humid places, local parks, rivers, irrigation ponds, animal sanctuaries, temple grounds and generally any place away from homes and businesses. An interviewee emphasized the importance of identifying a suitable release location for worms:

Not too dry and where there's shelter where they could escape other predators because, of course, part of life release is you don't want them to get eaten right away. That's the effective part of the liturgy in the Zen ceremony is "may you live out your natural life span and not be eaten by other creatures".

Motivation for practice

The desire to save lives was common across all interviewees and seemed to be a primary motivator for the practice. Every interviewee mentioned saving lives as a motivation for this practice.

Then next most common motivation for engaging in life release is to accumulate good karma. An interviewee explained that life release was an effective way of accumulating a virtuous state of mind, which is synonymous with accumulating good karma:

It is considered to be more effective in terms of accumulating a virtuous state of mind. Some of your Asian Buddhists will call this merit. As an American, I prefer to call it accumulating a virtuous mind state, which produces happiness. But they'll say accumulating merit or good karma. The words merit and good karma are pretty much synonymous.

Others explained that by saving lives one became kinder, happier and more virtuous. Some interviewees cited gratification, attainment of enlightenment, positive energy, a more positive mind, a beautiful intention, good health and longevity as their motivation for practicing life release. Additionally, the practice is recommended for those dealing with sickness or facing challenges.

Some practitioners engage in life release out of compassion for animals. For example, one interviewee said:

In the Buddhist tradition, protecting life, especially animals or creatures that would otherwise be killed and keeping them from being killed is considered very important. So just any practices that protect living creatures is considered to be very important, so that's sort of the main emphasis.

Furthermore, practitioners perform life release on behalf of loved ones or family members who are sick, dying or dead to pray for healing or to make their passage into the next life easier. When life release is done on behalf of Buddhist teachers, practitioners pray for longevity. An interviewee explained:

If you got like maybe a specific teacher who you want to have live longer, you might do that practice and dedicate the merit to them.

Awareness of impacts and legality of practice

Most (8) interviewees researched the kind of animals they could release to avoid negative environmental impacts. Two interviewees specifically stated they researched what types of animals would “not be harmful to the local ecosystem” and would be appropriate for release.

Two interviewees had some awareness of the impacts of the practice on the environment specifically through their interactions with natural resource professionals. After releasing shellfish obtained from a commercial angler, one had been told “it wasn't appropriate from a biologist's point of view.” Similarly, another interviewee had released turtles and was told it was not ecologically appropriate.

An interviewee had collaborated with natural resource professionals to determine what species of animals to release and the appropriate time to do so to ensure the animals survived. Some interviewees had done their own research to limit animal welfare issues and release animals in a way

and at a time that increased the animals' chance of survival. One interviewee had wondered about the animal welfare implications of a spontaneous release event they had been a part of since it was possible that they did not release a fish purchased from a restaurant into an appropriate body of water. Another admonished another life release practitioner for releasing crickets in the middle of a cold winter, which she believed certainly killed them.

While not specifically asked in the interviews, six interviewees responded that they knew releasing animals was illegal. One of them affirmed that their group had checked with wildlife professionals and obtained a permit before performing life release in a river. Another posited:

I think it's even illegal and not appropriate from a biologist's point of view because when they're kept in these tanks in captivity, they spread disease very quickly. So that then you're putting these diseased lobsters or creatures back into the water, that's going to affect the population.

Another interviewee was unsure of the legality of the practice:

We are sensitive to this invasive species issue, although I don't, I can't say we thoroughly look into it, but this one it seems like it's clearly not invasive species because it's put back in the same water that it's taken from.

The other four interviewees did not explicitly state their opinion on the issue.

Alternatives to life release practice

All interviewees were open to discussing alternatives to the practice of life release. They reasoned that if the practice would do more environmental harm than the good intended, it was crucial to consider other options. A few (3) suggested that promoting veganism or vegetarianism would reduce the consumption of meat and save animal lives; some (3) mentioned financial support for animal sanctuaries and no-kill shelters to save animals from being killed. One interviewee suggested a portable worm farm that could provide a safe place for worms and compost in the process.

Interviewees welcomed the idea of collaborations between natural resource professionals and Buddhists to prevent the introduction of invasive species in the wild while finding ways for Buddhists to honor their religious obligations. One interview question suggested options that included connecting people to wildlife rehabilitation centers, releasing fish intended for stocking, supporting animal shelters, and introducing a permit program that manages and monitors what animals are being released. All of the respondents indicated at least some support for the alternatives that were mentioned.

It should also be noted that interviewees indicated that they would rather not practice life release than cause environmental harm. While that did cause one interviewee to stop their practice, most continued to research options until they found an animal or way to practice that they believed had little impact on the environment.

Outreach to Buddhist Community

Interviewees were asked to identify Buddhist spiritual leaders who could disseminate information about the environmental risks of life release. Trusted and influential leaders include His Holiness the Dalai Lama, religious figures in various monasteries, the Hai Tao Master, the 17th Karmapa, heads and professors of Buddhists centers, and temple instructors or teachers. An interviewee explained that some leaders, such as the 17th Karmapa of Kagyu, have already identified the environmental risks associated with the life release practice and have spoken about it to raise awareness of the issue. An additional suggested resource that could be used for outreach include Buddhist media outlets like *Tricycle* and *Mandala*, which would have a broad reach and be non-denominational.

Additionally, interviewees were asked about how welcoming they would be to engagement by natural resource professionals on this topic. Every respondent indicated that they would welcome some sort of engagement by a natural resource professional, including representatives from local natural resource departments, fish and game commissions, and university programs that could help them practice life release in an environmentally sustainable manner. Print resources outlining how to practice life release in an environmentally sustainable way were often suggested as a way to initiate a conversation with a local group on the topic. Many suggested that the best way to distribute information was to reach out to a local Buddhist organization that you might be interested in working with.

Discussion

These interviews provided insights on how a small group of Buddhist life release practitioners practice in the United States, including the theology behind the practice, how the practice is performed, and some potential ways to reduce the risk of the practice. This increased understanding of the practice can help aquatic invasive species managers begin work with practitioners of life release to recommend options that meet the intent of the practice that may coincide with already existing permitted activities.

Most interviewees stressed the importance of saving lives as part of this practice. It is not just the act of releasing the animal that is important, but the act of saving its life and providing it an opportunity to live out its natural life. Promoting partnerships with existing organizations that already save the lives of animals and release them, including wildlife rehabilitators, would be a natural fit. A few of the interviewees we spoke to

already partner with groups like this. Additionally, there are already existing release events that are performed or permitted by natural resource agencies that with small modifications would meet the intent of the practice without increasing invasive species introduction risk. Specific examples of this could include releasing fish into a primarily put-and-take fishery before a scheduled stocking time which give them a better chance of living their natural life. Allowing groups to use oyster aquaculture stock in restoration efforts would save those lives by taking them out of food supply chain and introducing them into the environment as part of an already permitted activity. Local natural resource managers would have the most knowledge of events like this that could be best modified for life release. Providing means of practicing life release that are low-risk while meeting the needs of the practice builds off suggested best practices (Everard et al. 2019; Wasserman et al. 2019) and operationalizes them into possible practices through communication and cooperation (Magellan 2019). “Operation No Release” as described by Yeo and Chia (2010) is an existing example of a potential intervention that features alternative practices.

It was clear from our interviews that the practitioners we spoke to would welcome engagement from invasive species professionals in order to eliminate any harm done by the practice since there was an understanding that any ecological damage generated from the practice, or any animal welfare concerns, could outweigh the good generated by it. While it is possible that practitioners who chose not to speak with us would not welcome engagement, we believe that entities that want to engage communities on this invasion pathway should feel optimistic about the willingness of some in the community to engage with them. Most of our interviewees suggested that simply making contact with local groups would be an effective way for distributing information and partnering on efforts. Utilizing existing Buddhist media outlets and opinion leaders were also suggested by the interviewees, although many of the suggested opinion leaders might be difficult to reach or engage with due to their high status within the Buddhist community.

Engagement with this community will be important to ensure life release is practiced in a low-risk way. Most of our interviewees at least had an idea that the practice may not be ecologically appropriate, and may be illegal, but still practiced it after trying to find low-risk ways to perform life release. Through our interviews, we confirmed prior findings that life release could happen either in an organized fashion through a temple or as part of a solo practice without planning or input from a temple. The organized events are likely to be easier to reach before life release ceremonies occur simply because they are easier to identify than individuals, and the increased visibility of group events may motivate these groups to seek out or partner with people that can help them practice in an environmentally sustainable manner. It will be more challenging to reach practitioners of solo events with information on invasive species and potential low-risk ways to practice life release.

Unfortunately, it was difficult to recruit life release practitioners to participate in the study, as is evident from the 2.5% response rate. Many temples were difficult to contact – some did not have email addresses, and others only answered the phone when the temple was open, which might only be for a few hours each week. Language barriers also existed for some of the contacts. Additionally, people we contacted may have been aware that the practice was illegal and did not want to discuss it. These difficulties illustrate the challenges associated with reaching practitioners to learn more about this practice. Local and in-person components to future work, much like similar work done by Liu et al. (2013), would likely increase response rate and produce results that are more robust.

This low response rate is in contrast to prior unpublished interviews on similar topics with similar findings that were conducted in Wisconsin, where we were able to interview three practitioners of life release with little effort thanks to our local social networks and campus connections. Future efforts will likely benefit from leveraging similar local relationships and networks to boost response rate and to learn more about life release in their area. University programs that specialize in community engagement, including Extension and Sea Grant programs, along with local nongovernmental organizations, would be well-suited to this work.

Prior to the beginning of this project, one concern from aquatic invasive species managers was that this practice could lead to the introduction of invasive silver, bighead, grass or black carp into new areas, including the Great Lakes. Interviewees did not mention these species during the interviews. However, there are two risk assessments for the listed carps (Mandrak and Cudmore 2004; USFWS 2006) that indicate that life release is a possible invasion pathway for these fish and a documented instance of a bighead carp likely being purchased from a food market and released (Crossman and Cudmore 1999). Since species that were easily obtained were often released, ensuring that these species aren't available in live food markets should reduce the risk of new introductions of these fish through this pathway.

Crickets, minnows and earthworms were all mentioned in interviews as common animals to release since they are inexpensive to purchase in large numbers, are widely available, and are believed to survive in many locations. Of course, all of those animals have invasive species concerns associated with them and impacts that need to be managed, with the risks of live bait and earthworms being well documented in the United States (USGS NAS 2020; Killian et al. 2012). Additionally, there was also a wide diversity of animals released by our interviewees that we believe reflects local efforts to find low-risk release options, examples including working with commercial anglers to release their catch into the body of water from which it was harvested or by working with hunting clubs to release pheasants when no one was hunting. Again, local natural resource

professionals can help make connections to these types of efforts, while more clear direction from natural resource managers on acceptable low or no risk species that are widely available for purchase would steer practitioners to these species. More engagement could also address animal welfare issues resulting from this practice.

Future studies should ascertain the prevalence of the practice in the U.S., both in terms of how often it is practiced and what percentage of the Buddhist population practice life release. This could also include other Asian religions and cultures that are known to practice life release. More detailed information on the frequency of events and the animals released would allow managers to better understand the potential propagule pressure of this pathway. Future work should more explicitly consider approaches to minimize non-response bias (White et al. 2005) and social desirability bias (Krumpal 2013) to ensure results are more broadly applicable.

Lastly, additional work should combine what we know from practitioners with what aquatic invasive species managers could determine to have a low likelihood of negative ecological impacts. Only then can the best recommendations, ones that meet the needs of the practice while reducing invasion risk and fitting into existing legal frameworks, be made for the sustainable practice of life release in North America.

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Ethics and Permits

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Supplementary material

The following supplementary material is available for this article:

Appendix 1. The recruitment letter language that was used via email for recruiting life release practitioners to this study.

Appendix 2. The interview questions that were used as a guide for life release practitioner interviews.

Appendix 3. The themes and codes that were used during the analysis of the interview data.