FREE-ROAMING CAT MANAGEMENT

A FUNDERS' GUIDE TO BETTER IMPACT

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Report Commissioned by the Summerlee Foundation

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Executive Summary

Trap-neuter-return (TNR) has prevented countless births, helped free-roaming cats (FRCs) live healthier, longer lives, and reduced the number of cats entering shelters.

But are we making real headway in trying to solve the problem of cat homelessness? Are there, in fact, fewer homeless cats living in our communities than there were decades ago? Or has the remarkable fecundity and adaptability of cats forestalled – so far – our best efforts to reduce the number of cats that live in a world of limited resources and environmental dangers? What will it take to finally solve this proverbial "wicked problem," create discernible momentum, and ultimately break the cycle of cat homelessness?

This report was commissioned by the Summerlee Foundation, a well-established funder of TNR programs, to answer these questions. It summarizes the current status of FRC populations and presents a detailed roadmap for the next generation of impact-focused FRC management. The components of this roadmap have been developed and trialed over many years and decades by TNR operators, animal welfare organizations, and researchers, but they are assembled here for the first time to assist funders and animal welfare strategists who have an interest in pursuing fundamental, systemic, and beneficial change for FRCs.

This roadmap has four key elements:

1. **Integration**, which is combining multiple initiatives to "attack" the problem of cat homelessness from several different directions, rather than relying solely on TNR.
2. **Targeting**, which is concentrating effort and resources in space and time to produce positive change as efficiently as possible.
3. **Multi-year duration**, to ensure that initial investments come to their full fruition and allow sustainability measures to be put in place.
4. **Use of information**, to document what works and what does not, optimize strategy and tactics, and document successes.

Major examples of the successful application of this approach to FRC management have recently been reported from Israel and Spain. Developing comparable success stories in the U.S. will require funders to look beyond their current granting models and support more ambitious pilot projects that provide proof of concept and case studies for the broader animal welfare community. This does not require a wholesale abandonment of current funding models that distribute support to many small projects, but rather recognizing the limitations of that model and investing in next-generation approaches that can create real change at larger scales.

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Although most of these comments and suggestions were incorporated into report revisions, it should not be assumed that every reviewer is in full agreement with every element of this report. The views, perspectives, and conclusions presented herein are solely the responsibility of the authors, along with any errors or critical omissions.

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Section 1: Introduction

Background and Purpose

Several decades ago, most of the owned cats and dogs in the United States roamed and bred freely and stray and abandoned animals were euthanized by the millions in animal control facilities and animal shelters (Rowan, 2018). Since that time, the companion animal welfare (AW) field has created profound, positive changes that are most often expressed in terms of substantial reductions in shelter-based euthanasia and substantial increases in shelter-based adoptions (Rodriguez et al., 2022).[1] The reality, however, is that these celebrated achievements are only reflections of more fundamental underlying shifts that include:

1. A significant reduction in average per-animal reproductive output – a result of decades of promoting and subsidizing spaying and neutering.
2. Changes in public perceptions about shelter animals and shelter adoptions – a result of decades of good "PR" for shelter pets and efforts to make shelters friendlier and more welcoming places.
3. Significant changes in acceptable standards for pet keeping and care – a result of decades of humane education and the creation of various support services.

These fundamental shifts occurred because the "problem" of pet homelessness and shelter overpopulation was attacked consistently, persistently, and simultaneously on multiple fronts for a sufficiently long period to create widespread, systemic change that addressed the root causes of the problem rather than just alleviating its symptoms.[2]

[1] Recent "backslides" in euthanasia and shelter adoption remind us of how easily progress can be reversed, either through lack of attention or due to events that are difficult to control and mitigate. Though concerning, these retrenchments are still relatively modest compared to the preceding decades of progress.

[2] The concepts of "systems" and "system-level change" are central to this report and are defined below.

Free-roaming cats (FRCs)[3], however, have been an exception to this more general pattern.

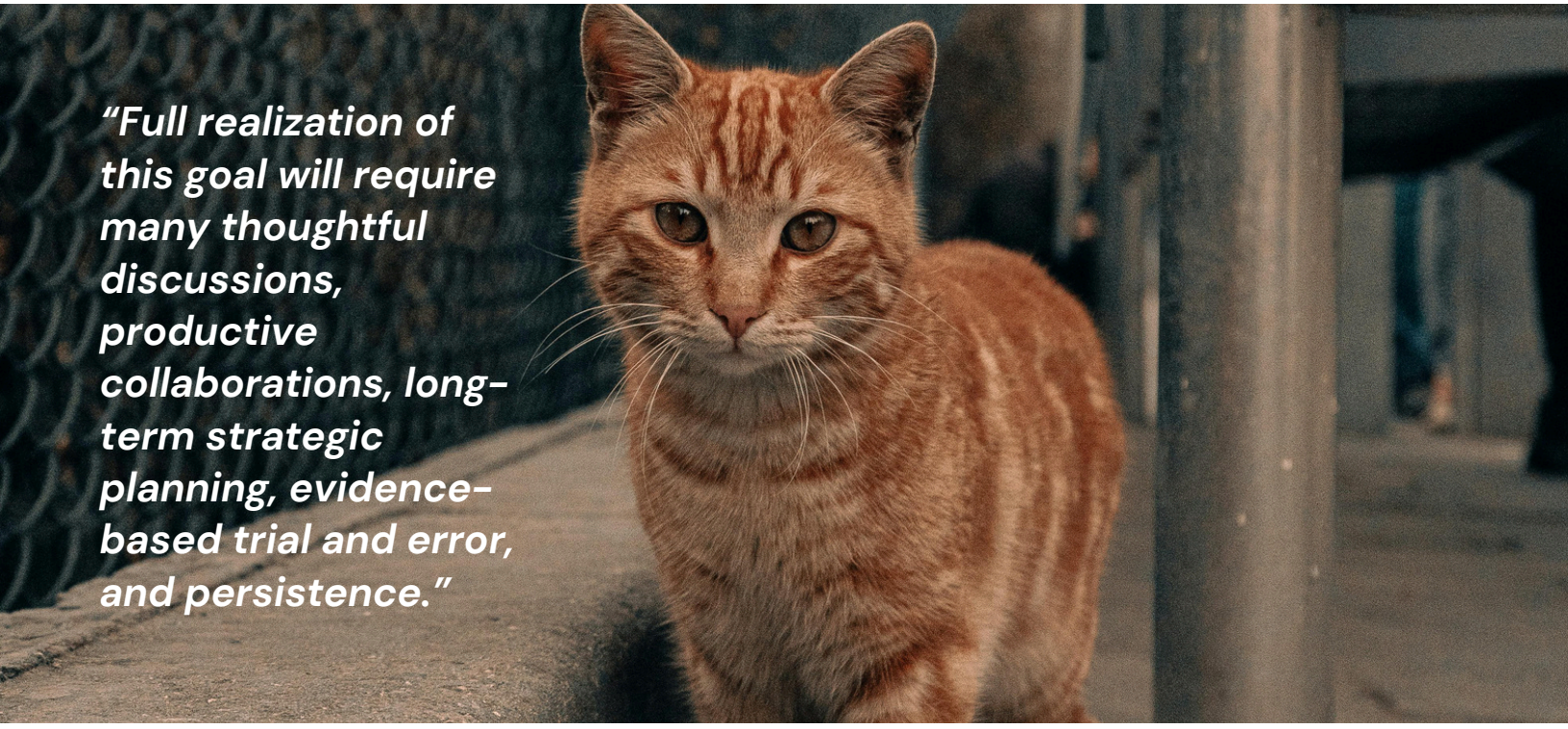
Trap-Neuter-Return (TNR) programs have been promoted and pursued for decades by AW organizations as the method of choice for humane management of FRCs, sometimes (but not always) with the explicit goal of reducing their numbers over time. However, TNR implementation has not mirrored other AW priorities in terms of funding, scale, intensity, or consistency. Instead, it is often a volunteer-based activity that is conducted without the full benefits of institutional support or synergies with other programmatic initiatives. Without question, TNR as currently practiced reduces the number of births in FRC populations, eliminates the suffering and premature death associated with those births (Boone et al., 2019), and improves the health and lifespan of sterilized cats (Hughs and Slater, 2002; Scott et al., 2002; Wallace and Levy, 2006; Gunther et al., 2018). In localized areas, TNR has also been shown to reduce FRC numbers if conducted with sufficient intensity and duration (Hughes and Slater, 2002; Levy et al., 2003a; Spehar and Wolf, 2017, 2018b, 2019b; Kreisler et al., 2019). TNR also provides sheltering organizations with an alternative to intake and thereby reduces shelter euthanasia rates and shelter crowding (Spehar and Wolf, 2018a, 2018c, 2019a, 2020a, 2020b). In all these senses, TNR can viably be said to "work". However, the extent to which TNR performed to date has changed the fundamental characteristics of the FRC system at scale or mitigated the root causes of FRC persistence is far less certain (Robertson, 2008). Indeed, most local FRC populations – including many that are the subject of at least some TNR intervention – seem to maintain themselves at or near their current densities, with TNR functioning more as a form of palliative care than as a change agent.

The Summerlee Foundation, as a long-time funder of TNR programs, is interested in strategies that have the potential to create widespread, beneficial changes for FRC populations over time and that provide funders and funding recipients with opportunities to maximize their impact and better ensure sustainable outcomes. The Foundation supported the preparation of this report to present relevant issues and recommendations and to encourage collaborative visioning among organizations funding FRC programs and AW thought leaders. **The premise of this report is that accomplishing systemic, positive change for FRC populations – however difficult and challenging that may be – is ultimately a more efficient and productive use of resources than an open-ended effort to alleviate the symptoms that are inherent to FRC persistence**.

[3] FRCs can be defined various ways, but the most inclusive definition, which is adopted for this report, includes any cat that is free to roam outdoors. These can include unsocialized feral cats, stray former pets that have been lost or abandoned, community cats that are cared for by caretakers or neighbor networks, and owned pet cats with full-time or part-time outdoor access.

Accomplishing this beneficial change for FRCs requires evaluating current paradigms, practices, and funding models; building on the expertise and creativity of TNR leaders and practitioners; incorporating new tools and concepts into FRC management where appropriate; considering how to address the root causes of FRC persistence rather than just its symptoms; and developing a clear understanding of resource needs and realistic timelines. In this report, we present and discuss these elements, summarize relevant current knowledge, and provide recommendations for an approach to FRC management that can be supported by funders and AW thought leaders who have an interest in pursuing this type of systemic change. Core tenets of these recommendations include better programmatic integration and resource targeting, explicitly planned sustainability, standardized monitoring of outcomes, and peer-to-peer knowledge transfer and mentoring. It is worth emphasizing that all of these recommendations have been discussed and promoted in one form or another for many years, perhaps most comprehensively by Marsh (2010; 2012). However, with limited (but notable) exceptions, they have yet to be implemented consistently across larger geographies, widely embraced throughout AW practice, or prioritized within existing funding models.

We stress that the recommendations outlined in this report can only approximate the pathway towards real change. Full realization of this goal will require many thoughtful discussions, productive collaborations, long-term strategic planning, evidence-based trial and error, and persistence. Our hope is that this report provides an impetus and a useful starting point for this journey.



Audience, Goals, and Limitations

This report was commissioned for the specific purpose described above. **It is not intended to be a comprehensive treatment of all matters relevant to FRC management and well-being. For this reason, we strongly encourage readers and users of this report to carefully review the following stipulations:**

Target audience: This report is directed primarily towards AW funding organizations, strategists, and thought leaders that have a capacity to shape and influence how FRCs are managed. It is not primarily directed towards TNR practitioners, although they may find many topics of interest.

Goals: Specific goals of this report are to:

1

Provide an overview of what is known about FRC populations and current management approaches.

2

Present management concepts and tools that can produce systemic change most effectively and efficiently.

3

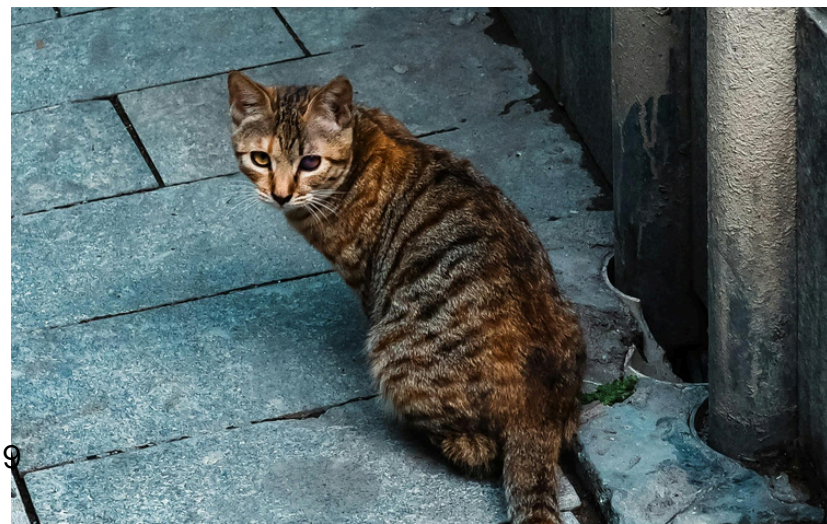
Argue for an integrated and strategic approach to FRC management that combines both existing and novel elements.

4

Offer recommendations for "next steps".

5

Encourage further discussion and exploration.



Exclusions and limitations: This report has several important limitations, exclusions, and caveats:

1. **It focuses on the management goal of reducing FRC population size**, for several reasons:
   a. Population size reduction is a fundamental goal that – if achieved – leads almost inevitably to concomitant improvements in animal welfare, reductions in shelter intake, reductions in wildlife predation and nuisance complaints, improvements in public health and sanitation, and reductions in nuisance complaints (Zito et al., 2018; Kreisler et al., 2019).
   b. Population size reduction can be directly measured and linked causally with FRC management efforts.[4]
   c. The management approaches that most efficiently create FRC population decline can be successfully applied to other management goals.

   Despite our focus on population size reduction, we recognize and acknowledge that TNR and FRC management is undertaken in pursuit of many other worthwhile and appropriate goals. These include reduction in shelter intake and shelter euthanasia, fewer kitten births, and improvements in FRC welfare and quality of life. Our focus on population size reduction is not intended to suggest that other goals are not valid in and of themselves.
2. **It focuses on non-lethal FRC management in the United States**. FRC management as conducted outside the AW and animal control sphere, where humane considerations are not paramount, in the developing world, or in countries with different baseline circumstances than the U.S. are not considered.
3. **It focuses on larger-scale and longer-term programs because they have the most potential to create positive systemic change.** However, we recognize and acknowledge that smaller-scale and shorter-term efforts—often volunteer based—have value either alone or as contributors to larger, collaborative initiatives.
4. **It is primarily conceptual**. Fully operationalizing the concepts presented herein will require additional steps by funding and implementing organizations to ensure their practicality and effectiveness.
5. **It is not intended to define "best practices" for TNR in the field**. These are already covered by other resources.

[4] The logic of this causal linkage is described later.

Definitions and Concepts

Several important terms and concepts used in this document are defined as follows:

Free-roaming cats (FRCs): Any cats that spend all or part of their time outdoors and are free to roam. These include owned cats with full-time or part-time outdoor access.

Integrated management: Management that involves multiple, coordinated components working together – either concurrently or consecutively – to achieve specific goals.

Targeting: Concentrating management efforts in a well-defined area and well-defined time period to create change as quickly as possible.

Phasing: Targeting a sequence of different areas, usually abutting one another, in a logical pattern over time to grow the zone of impact.

Front-loading: A form of targeting that involves concentrating resources and management effort at the earliest possible time, rather than spreading them out more evenly over a longer time frame.

Monitoring: Standardized and objective measurement of management outcomes at regular intervals to assess progress and refine approaches.

Population: A set of individuals of a given species that can be geographically defined and that interact with one another.

Population-level impacts: Changes in the fundamental characteristics of a defined population – like population size, birth rate, death rate, or demographic profile – that are widespread and sustained over time.

System: A system is a set of entities and processes that interact with one another to generate outcomes. For instance, an FRC population is a system comprised of:

- Entities such as individual cats, distinct subpopulations of cats, the entire defined population, the environment (food resources, shelter, etc.) within which the population exists, and the human individuals and organizations that interact with cats.

- Processes such as breeding, death, dispersal, human interventions, human attitudes, and economics.
- Outcomes like the density of FRCs or frequency of premature death that result from the system's processes interacting with the system's entities.

In short, a system is an emergent phenomenon that is "more than the sum of its parts" and that must be considered and managed from a system-level perspective for maximum effectiveness.

Systemic / system-level change: Systemic or system-level (the terms are interchangeable) change is a significant realignment of the system's entities and processes in a way that produces consistently different outcomes.

Trap-Neuter-Return (TNR): An FRC management approach that involves capturing and sterilizing FRCs and either returning them to their original location (the most common result), adopting them to new homes, or relocating them to an alternative outdoor location if other options are not possible. There are many variants and models of TNR that may incorporate feeding, vaccination, additional health care, and other components.

Section 2: Development of TNR and Current Status of FRC Management

Brief History of TNR[5]

Best available information suggests that small-scale, grassroots TNR began in the United Kingdom in the 1950s to improve the welfare of homeless cats, whose numbers had grown dramatically with physical destruction, displacement, and austerity imposed by the Second World War. Eventually, through the efforts of Ruth Plant and Celia Hammond of National Cat Rescue in the 1970s, TNR became a more organized, structured, and public undertaking in the U.K. This process accelerated in the 1980s after Dr. Jenny Remfry of Universities Federation for Animal Welfare (UFAW) presented a detailed argument for TNR in a seminal symposium and subsequent publications.

By the early 1990s, TNR had arrived in the U.S., promoted by organizations such as Alley Cat Allies. In contrast to its general acceptance in the U.K., TNR in the U.S. initially faced substantial opposition from traditional animal control agencies, some mainstream AW organizations, and public health departments. As a result, the American version of TNR in its early years was typified by local, colony-based efforts untaken by volunteer caretakers and trappers without formal institutional affiliations. In those early years, the goals of individual TNR practitioners varied, but in general they were motivated by a desire to alleviate suffering and reduce the number of births within their respective cat colonies.

Several important initiatives were created in the mid-to-later 1990s to encourage more sustained and focused TNR efforts in the U.S., including Operation Catnip (Levy et al., 2014) and Fix Nation.[6] In the early 2000s, Neighborhood Cats, motivated by a belief that broader acceptance of TNR was a critical pre-requisite for expanding its impact, spearheaded an outreach effort to mainstream AW partners. This met with substantial success, and over time many national AW organizations assimilated TNR into their portfolios of programs and tools. This led to a growing number of positive TNR articles, position statements, presentations, and instructional materials. The number of TNR-focused groups expanded through the early 2000s, and a

[5] Additional sources describing the development of TNR are listed in Appendix 1.
[6] https://fixnation.org/mission-history-programs/

series of new elements were added to the TNR formula, such as vaccination, health care, regular feeding, and relocation of colonies. More and more shelters began to support TNR programs through the provision of clinic space or the hiring of community cat coordinators. To increase surgical capacity, partnerships were established with local veterinary hospitals; spay-neuter clinics were established based on the Humane Alliance model for high-quality / high-volume spay-neuter (HQHVSN) surgery; and "MASH" style clinics and voucher programs were developed, often by local sheltering organizations. During the late 2000s, many shelters adopted a formal "Return to Field" policy for unowned FRCs that was sometimes – but not always – accompanied by a focused TNR effort.[7] Around this time, Neighborhood Cats and other organizations also began to broadly promote the concept of "targeting" – that is, concentrating TNR effort as a means of achieving better outcomes more efficiently. Over the course of all these developmental steps, the motivations for TNR programs grew to encompass institutional goals, particularly reducing the number of shelter intakes and euthanasias that were attributable to FRCs. TNR programs of sufficient duration indeed saw substantial progress towards these shelter-based goals in many areas (Hughes and Slater, 2002; Levy et al., 2003a; Spehar and Wolf, 2017, 2018a, 2018c, 2019a, 2020a, 2020b; Wolf and Weedon, 2023).

For all its progress and progressive institutionalization, the early ethos of TNR in the U.S. as an underground, grassroots, and highly localized activity has persisted and remains easily discernible to this day. In recent years, progress towards shelter-based goals has slowed or leveled and funding for TNR has decreased substantially in favor of other AW priorities. For all these reasons, TNR appears to be at a natural inflection point, awaiting its next iteration, one that can perhaps reach beyond shelter walls and more effectively address FRC populations in communities.

Current Status of FRC Populations

Many fundamental characteristics of FRC populations in the U. S. are poorly understood. Most notably, there are no rigorously developed estimates of overall FRC numbers except in a few relatively small areas (for example, see Flockhart et al., 2016; Cove et al., 2023). National FRC estimates that do exist, created from indirect proxy variables or by extrapolating local datasets, range from 30 to 80 million (Hurley and Levy, 2022). None of these estimates adequately account for variations in FRC density that occur across the gradients of urbanization, land use, and climate. None attempt to account for variations in FRC population makeup (i.e., proportions of true ferals, stray former pets,

[7] For the purposes of this report, we consider Return to Field (RTF) as an adjunct to TNR, and do not attempt to describe or address any of the nuances that distinguish them from one another.

etc.) that occur in different kinds of locations (Rowan et al., 2019). The degree to which owned, roaming cats – whatever their proportion – contribute to reproduction within the overall FRC population also remains uncertain.

There are comparatively more (but not entirely sufficient) data describing critical rates in FRC populations (e.g., survival and death rates, birth rate, litter size and frequency) (McDonald et al., 2023; Ng et al., 2023). These have facilitated the development of numerous computer simulation models that compare the effectiveness of different management approaches (Budke and Slater, 2009; Lohr et al., 2013; Miller et al., 2014; Benka, 2021; Thompson et al., 2022; among many others). Collectively, these models suggest the importance of reaching and maintaining critical threshold sterilization percentages as a pre-requisite for population decline, identify the substantial challenges posed by cat immigration and abandonment, and emphasize the importance of targeting TNR effort to create change as efficiently as possible. Many of these findings are summarized in a document produced by the Alliance for Contraception in Cats & Dogs (ACC&D, 2022).

Information about FRC population trends across larger geographies is generally inadequate. FRC population declines in response to management have been documented or inferred in some localized areas (see previous citations), but information about broader FRC trends across larger areas is largely absent (Luzardo et al., 2025).[8] To the best of our knowledge, there is no clear data suggesting that FRC density at the national level has declined appreciably over recent decades in a manner that parallels overall declines in shelter intake or euthanasia.

Current FRC Management

Scope, status, and guidance: Although the number of FRC spay-neuter surgeries that are performed annually is unknown,[9] TNR has become an accepted practice within the AW field (see Appendix 1) and within many, perhaps most, communities. This normalization may stem from promotion of TNR and FRC welfare to the public, multiple efforts to secure formal support from municipal governments, and associated efforts to repeal or soften ordinances against TNR and FRC feeding – at least some of which have been successful. Many professional associations have also developed official statements offering either full or conditional support for TNR, including the National

[8] One exception may be in New England, where anecdotal observation and internal records suggest possible regional declines in the overall FRC numbers.

[9] Unlike shelter intakes and outcomes, FRC management and TNR are not systematically tracked. Shelter Animals Count (www.shelteranimalscount.org) gathers information about whether participating shelters provide FRC services, but not the number of surgeries performed.

Animal Care and Control Association, the American Veterinary Medical Association, and the Feline Veterinary Medical Association, among others (see Appendix 1). TNR field practice is not formally governed in any respect, but well-known and respected guidance resources are widely consulted, most notably those from Neighborhood Cats, Alley Cat Allies, and the Association of Shelter Veterinarians (see Appendix 1). These organizations and others also offer training resources to assist practitioners in adhering to these voluntary guidelines (Appendix 1).

Assessment of current practice and effectiveness: Our review suggests to us the following generalizations about current FRC management, TNR practice, and their outcomes:

1. **FRC Management and Integration**: At present, FRC management consists mainly of TNR and its ancillary RTF which focuses on keeping cats out of shelters. Relatively few programs explicitly and consistently layer multiple programmatic initiatives – either concurrently or consecutively – to accomplish specific FRC management goals. Probably the most commonly practiced form of integration involves diverting some kittens and younger cats into an adoption track rather than returning them to the field (Hughs and Slater, 2002; Levy et al., 2003a, 2014), which has the immediate and beneficial effect of reducing FRC population size. Integration of TNR with programs to provide sterilization support for owned cats, encourage cat containment, or provide owner support to reduce abandonment appears to be far less common.
2. **Organization**: A large proportion of TNR effort is a diffuse activity conducted by volunteers and small TNR-focused groups. These initiatives often operate with some level of assistance and cooperation from local sheltering organizations and clinics but are typically not fully integrated into their operations. Notable exceptions occur, however, where TNR is pursued at the organizational level, in some cases with the active support of national organizations (Appendix 2).
3. **Coordination and Collaboration**: In general, strategic and tactical coordination of FRC management among practitioners and organizations within a given operational area is either limited or absent. Exceptions occur most often in the form of clinics that offer a fixed number of "feral surgeries" for cats trapped and transported by other organizations, caretakers, or volunteers. Although formalized relationships between more experienced "mentor" organizations and smaller "mentee" organizations do exist, they appear to be relatively uncommon. In some communities, local ordinances prohibiting the feeding or care of FRCs have driven TNR efforts underground, posing additional challenges to coordination and collaboration.
4. **Goals and Motivations:** The founding goals of TNR were to reduce the births, suffering, and premature death associated with FRC breeding (see Boone et al.,

2019) and lack of regular veterinary care. In contrast, the goals of current TNR initiatives, when stated, usually involve accomplishing a targeted number of surgeries, often with the explicit or implicit intent of reducing shelter intakes, euthanasias, or nuisance complaints. Rarely are goals quantified in population terms, such as a desired percent reduction in FRC numbers over a specified period.

5. **Targeting, Phasing, and Timelines**: The substantial benefits of focusing TNR effort in a concentrated area have been long recognized and actively promoted (as "targeting") by organizations including Neighborhood Cats, Alley Cat Allies, Humane World for Animals, and ASPCA (see Appendix 1). Multiple studies have confirmed the value of targeting in producing better outcomes with greater efficiency (Stoskopf and Nutter, 2004; Miller et al., 2014; Spehar and Wolf, 2018a; Zito et al., 2018; Boone et al., 2019; Cho et al., 2020; Spehar and Wolf, 2020a), a finding that has also been confirmed in the field (Wolf and Weedon, 2023). In practice, however, targeting appears to be more of an exception than the rule, and phasing (proceeding through a planned sequence of targeted areas) is even less common. This may in part result from a real or perceived obligation of TNR providers to service their entire operational area, or from basic resource limitations.
6. **Resources**: TNR programs usually rely heavily on volunteer labor for trapping and transporting cats. Surgery costs are typically borne by grants with relatively short duration, or by limited and irregularly available institutional funds. Even with sufficient funding, the number of available surgery slots is typically low in comparison to need.
7. **Monitoring and Evaluation**: Monitoring of TNR programs usually consists of tracking the number of surgeries performed, and, in some cases, tracking shelter intake data during and after a TNR effort. In past years, some funders have required grant recipients to provide standardized metrics of impact at the population level, but at present, field measurements – such as sterilization percentage or FRC density – are rarely obtained, making it difficult to demonstrate whether a project is having a meaningful population impact. However, a small but growing number of programs are conducting more formalized cat surveys in the field using methodologies such as those recommended by the D.C. Cat Count Project (Flockhart et al., 2022; also see Appendix 1 & 2).
8. **Effectiveness**: Lower-intensity or opportunistic TNR does not appear to have significant population level impacts, either locally or in aggregate over large areas, though it does prevent births and improve the welfare of individual cats. In contrast, in areas where TNR has been practiced intensively and consistently over time, evidence for population impacts is stronger, usually taking the form of substantial reductions in shelter intake (Johnson and Cicirelli, 2014; Levy et al., 2014; Edinboro et al., 2016; Spehar and Wolf 2018a, 2018c, 2019a, 2020a, 2020b; Hamilton, 2019; Kreisler et al., 2019; Wolf and Weedon, 2023). An underlying decline in FRC

population size due to TNR is of course a logical and plausible contributor to declines in shelter intake. However, the extent of this contribution is difficult to demonstrate definitively, and it cannot simply be assumed that declining shelter intake equates to a declining FRC population because shelter intake can change for other reasons, including changes in intake policy, changes in budget, economic cycles, incentives for increasing live release rates, and growth in the number of rescue and fostering organizations.[10] Perhaps the best evidence for an FRC population decline following intensive TNR as a driving force in reducing localized shelter intake was provided by Levy et al. (2014) in Alachua County, Florida, using a controlled study design, but similarly rigorous demonstrations are unusual. A smaller body of literature reports more direct (and less ambiguous) evidence of FRC population declines in localized areas following sustained TNR (Hughes and Slater, 2002; Levy et al., 2003a, 2003b; Spehar and Wolf, 2017, 2018b, 2019b) in the U.S. Outside the U.S., declines in FRC populations in the wake of targeted, intensive TNR have been well demonstrated at larger scales (Natoli et al., 2019; Gunther et al., 2022; Luzardo et al., 2025).

To summarize and highlight key elements of this assessment, current FRC management is overwhelmingly reliant on TNR. TNR implementations cover a wide range of scales, time frames, and operational models, but tend to be opportunistic and of lower intensity. In some cases, TNR implementations have been sufficient in scope, intensity, and duration to create fundamental population impacts, usually within relatively limited focal areas. In aggregate, however, TNR to date does not appear to have substantially changed the larger FRC system or reduced FRC numbers at a national level. Rather, it serves mostly to mitigate the symptoms of this larger reality using the limited resources that are available. Although we believe that this is a justifiable overall assessment of TNR impact, it should be stressed that a number of innovative TNR initiatives have occurred or are currently being piloted that utilize more strategic approaches to achieve better outcomes (Bissonnette et al., 2018; Swarbrick and Rand, 2018; Gunther et al., 2022; Luzardo et al., 2025; also see Appendix 2). These undertakings provide a model for a more general advancement in FRC management, especially if they can be supported with sufficient resources.

Challenges: Managing FRCs to reduce population size is an intrinsically difficult task for a series of both system-level and operational reasons. At the system level, the first and foremost of these is the sheer scale of the "problem," which spans nearly every community in every corner of the country – a testament to cats' remarkable adaptability and reproductive potential. Another challenge is that FRC population reduction by reproductive suppression necessarily involves substantial time lags. It can only begin after achieving and maintaining critical sterilization thresholds that

[10] In fact, shelter intake reductions over the last ~ 20 years seems to be a common pattern in many regions, including localities without an intensive TNR effort.

decrease reproduction below population replacement rates over time (Miller et al., 2014; Kreisler et al., 2019). Population reduction then occurs over multiple years as adults die and fail to be replaced.[11] Additionally, every owned cat is partnered with a potential "agent of change" – the pet guardian. These guardians can, with proper motivation, education, and support, prevent their pet from reproducing and control its behavior and activity in many other ways (Robertson, 2008).[12] For FRCs, in contrast, agents of change are fewer and farther between, and the workload of a consequential intervention falls on a smaller number of figurative shoulders. Finally, those involved in TNR work have an understandable tendency to conceptualize cats as individuals. However, to effectively manage FRC populations, particularly at larger scales, this perspective must be combined with a population-level and system-level awareness and appreciation (Figure 1). Without this additional perspective and an appreciation for its complexities, it is difficult or impossible to anticipate (or effectively measure) how a population responds to management (Figure 2).

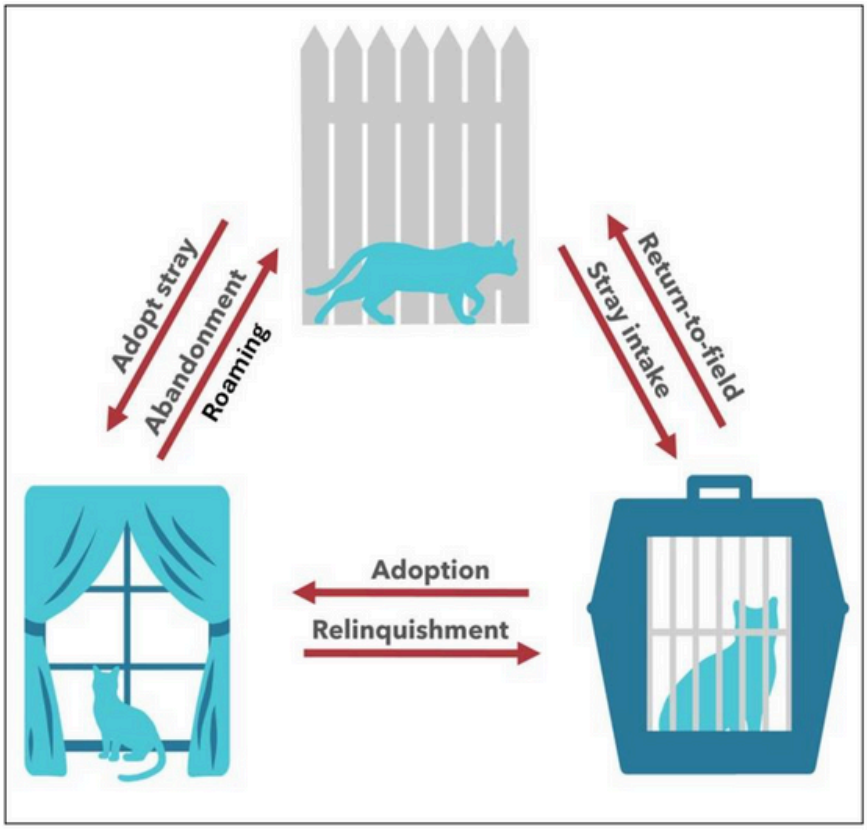


Figure 1. Diagram illustrating the cat "system," which is comprised of unowned cats (by the fence, in this diagram), owned cats (by the window), and shelter cats (in the carrier kennel), and the various processes by which individuals may move from one of these sub-populations to another (arrows with descriptive labels). All of these processes operate simultaneously and are subject to feedback loops and interdependencies, creating a complex dynamic that is hard to understand, track, or manage effectively without a system-level perspective.

[11] If there is also a substantial level of abandonment or immigration into the population, it further slows (or even reverses) this process.

[12] Encouraging more responsible cat care and stewardship may well be the key element for finally solving the problem of cat homelessness; see Robertson (2008).

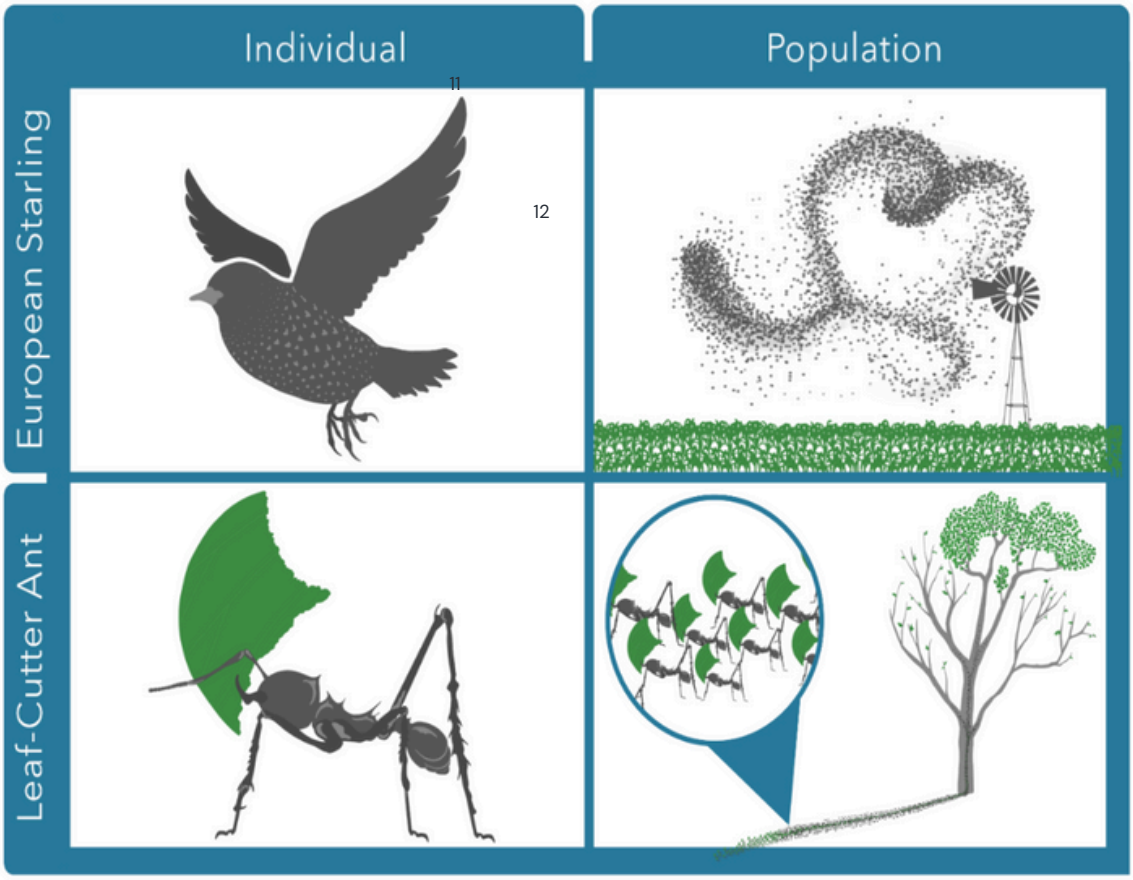


Figure 2. Diagram showing two examples of emergent, population-level phenomena in the right column – a murmuration of European starlings and the coordinated defoliation of a tree by leafcutter ants. Neither of these emergent phenomena could have been predicted or well understood based only on knowledge of individual starlings or ants (left column). For that reason, they must be studied and described at the system level. FRC populations also exhibit emergent properties and behaviors that require a system-level perspective to understand and effectively manage.

System-level challenges are amplified by a series of operational and logistical challenges, including:

1. **Surgical capacity and cost**: Surgical capacity and cost have always been limiting factors in TNR programs, and communities with the most reliable access to adequate surgery slots have tended to have the best outcomes. In recent years, veterinary capacity for TNR has constricted appreciably, with about half of all HQHVSN clinics closing or reducing their spay-neuter operations, as well as a decrease in funding available to pay for surgeries in general. At the same time, veterinary shortages have affected private practice and shelter veterinary staffing (Cushing, 2023; Powell et al., 2023). Reductions in program operations during the program operations during the COVID epidemic created a backlog of surgical need

that has been difficult to overcome given the reduced veterinary resources currently available.[13]

2. **Reliance on volunteers**: Like limited veterinary capacity, a reliance on volunteers to trap and transport cats may impose a functional cap on TNR activity that is well below the level required for effective FRC population management.
3. **Lack of supporting and synergistic programs**: Most TNR programs do not benefit from focused, synergistic efforts to sterilize owned cats with outdoor access, reduce abandonment, and promote better cat stewardship. This often means TNR – by itself – is attempting to address the symptoms of a problem without any complementary efforts to reduce that problem's root causes.
4. **Difficulties in targeting**: Concentrating TNR effort to reach a high sterilization percentage quickly maximizes the impact of whatever surgical and trapping capacity is available (Miller et al., 2014). However, many organizations find it difficult to target their efforts to good effect because of unpredictable resource availability or because of a real or perceived obligation to provide support and services throughout their entire operational area.
5. **Lack of critical information**: In TNR-based management, sterilization percentage must reach a high level before FRC population decline begins and it must be maintained at a high level for population decline to continue over time. Without information about the current sterilization percentage, TNR projects are at some level "flying blind." Sterilization percentage cannot be determined by counting surgeries unless the size of the target population is known in advance with a high level of confidence, which is rarely the case. Instead, it requires some basic form of direct "cat counting," which at present is uncommon. Barriers to wider use of cat counting are a real or perceived lack of technical expertise, lack of technical support, and the small number of instructive and inspirational case studies. These barriers, however, are beginning to decline as the number of collaborations between AW professionals and data scientists increases (Flockhart et al., 2022).
6. **Competing activities**: Many AW organizations operate multiple programs serving their community and their community's animals. When resources are not adequate to meet all needs, TNR is often de-prioritized in favor of adoption programs or anti-cruelty operations.
7. **Funding**: See below.

Controversies: Criticism of TNR has developed along with its public profile and operational footprint. In more recent times, this pushback has come mostly from conservation organizations and biologists concerned about the impacts of FRCs on birds and other wildlife (Lepczyk et al., 2023; Menon et al., 2024; Neave et al., 2024), and to a lesser degree from the public health sector and animal control "traditionalists." In

[13] See https://sheltermedicine.vetmed.ufl.edu/2022/09/13/impact-on-spay-neuter-surgeries-due-to-covid-19-pandemic-threatens-pet-overpopulation/.

general, critiques of TNR emphasize that it is unlikely to reduce FRC numbers appreciably except at small scale and over very long time periods. They also express concern about returning sterilized cats to potentially sensitive areas, or to the outdoors more generally (Crawford et al., 2019; Lepczyk et al., 2022). Many critics of TNR support active removal of cats, especially from areas with vulnerable wildlife species, along with educational or regulatory steps to keep owned cats confined (Calver et al., 2022; Luzardo et al., 2023; Rand et al., 2024; Wayne et al., 2024). The debate about the impact of FRCs on wildlife and the extent to which various management approaches either "work" or "do not work" to reduce this impact continues, with both sides sometimes overlooking real-world complexities and realities.[14] For example, there has been surprisingly little acknowledgement and discussion of the variability of threat levels posed to wildlife by FRCs. Logically, these should range from little or no threat in many urban areas where sensitive species and habitats are essentially absent to very high threat levels where FRCs co-occur with vulnerable species. This variability, which could be the basis for constructive compromise and reasonable location-specific prioritizations, is typically ignored in overarching and polarizing debates about TNR and FRCs.

FRC Funding Approaches

Several funding models for TNR and FRC management have been developed over the years. These have included:

1. **Smaller-scale grants** from national or regional foundations and organizations that are parsed out among many TNR projects. These grants are usually structured to pay for a certain number of surgeries during a relatively short time frame. Performance is typically assessed based on the number of surgeries accomplished rather than by changes in the FRC population. This appears to be the most common funding approach at the present time.
2. **Public funding** for TNR, which was initially promoted by the work of Peter Marsh. Delaware, Maryland, and Miami-Dade County are examples of this approach, which has the advantage of creating a reliable, sustained resource base. It is not widely implemented, however.
3. **Strategic funding** for TNR program development and implementation at larger and

[14] Most notably, the idea of "working" or "not working" is misplaced in the absence of additional context. Any management method can fail to work if implemented with insufficient intensity or sustainability. Similarly, either sterilization or removal methods can, if employed at sufficient scale, duration, and intensity, reduce FRC population density. Finally, any reductions in FRC density achieved by any method can also be easily reversed if management efforts are suspended after an initial "success," as evidenced by decades of ineffective culling efforts around the world.

longer scales. This concept stems largely from the work of Bryan Kortis at PetSmart Charities beginning in 2009, where it also incorporated targeting and impact assessment. At roughly the same time, a network of HQHVSN clinics based on the Humane Alliance Clinic model was established and synergies emerged between these two approaches. Strategic funding for TNR has declined to very low levels over recent years, however, as the focus of AW funders has shifted towards other community-based goals such as providing access to affordable veterinary care (Koch, 2023).

4. **Community funding** for TNR. In some locations, a portion of the overall financial support for TNR comes from community organizations and donors. Typically, this funding occurs at a relatively small scale, but where present it can provide a more consistent resource over time than grant-based funding.

At present, it appears that most TNR funding is of the first type, and even that has declined to the point where local TNR programs have had to increasingly rely on local fundraising to sustain their efforts (Aeluro et al., 2021). This reality makes it difficult for practitioners to concentrate enough effort in a focal area for a long enough period to create real change.

Section 3: FRC Management for Better Impact

Vision

The developmental arc of TNR coupled with current circumstances in AW have led us to an inflection point. On the one hand, we have a greatly improved understanding of how to best manage FRCs for maximum impact, but on the other hand, this knowledge is not well incorporated into actual practice. Additionally, after years of declines, shelter intake and euthanasia rates have leveled or even showed small upticks in some locales. TNR funding, after many years of growth, has declined precipitously over the last decade. Given these considerations, a new paradigm for FRC management that better operationalizes and leverages our existing knowledge base is critical for reinvigorating funder interest and for launching a new period of progress and achievement. This paradigm shift could involve, among other things, smaller TNR-based groups becoming more collaborative; larger organizations providing more mentoring and partnering opportunities; a transition from a shelter-based focus to a focus on FRC populations themselves; improved use of population monitoring data to track progress and optimize tactics; and a willingness by funders to make appropriate investments. Fortunately, we have compelling precedents for this new approach that deserve to be broadly discussed and disseminated. In Israel, a seminal 12-year study confirmed that an intensive, large-scale sterilization program could overcome the effects of cat immigration and create FRC population declines over time (Gunther et al., 2022). This study emphasized the importance of regular monitoring to track progress and adjust operations for maximum impact. A more recent four-year project of intensive, well-monitored TNR in Córdoba, Spain, showed similarly promising results (Luzardo et al., 2025). Smaller but equally strategic projects are underway in Australia (Rand et al., 2024) and Los Angeles (see Appendix 2).

Funders can and should play a foundational role in a transition towards better FRC management in the U.S., most importantly through a renewed investment in strategic, layered, and sustained programs led by proven organizations with stable leadership. This approach can initially be explored though smaller-scale pilot projects that allow for

learning, familiarization, and optimization, but it is critical that they have sufficient duration to create population change and that they are monitored sufficiently to evaluate their performance. Once pilot efforts establish a precedent, effort can turn to propagating these approaches to additional locations and larger scales. This "scaling-up" will require funder support but can also be accelerated by encouraging peer-to-peer knowledge transfer and mentoring.

Building Blocks

Decades of practical field experience, innovation, and research provide us with most of the building blocks needed to conduct better FRC management that produces population-level impacts over time. From TNR practitioners and the AW field, we have well-developed methods to efficiently capture cats and provide them with appropriate care; innovations like targeting and mass trapping; infrastructure and expertise for adopting cats to the public; precedents for working with the stakeholders and municipalities; and the ability to educate the public about responsible pet stewardship. Many online resources are freely available that provide information about best practices, available veterinary resources, and lessons from successful programs (Appendix 1). From researchers, we have a good understanding of critical sterilization percentage thresholds; likely FRC population responses to different management approaches, including targeting; the quantitative advantages of integrated management; refinements to the targeting concept, such as "front loading" and phasing; and detailed guidance on collecting and utilizing data about FRC populations. The challenge at hand is to assemble these building blocks into functional projects that are adequately supported and sustained.

"The challenge at hand is to assemble these building blocks into functional projects that are adequately supported and sustained."

Principles

The building blocks of next-generation FRC management should be deployed with full awareness of several core principles to produce the best outcomes. Many of these principles have already been introduced, but they are consolidated below and explained in greater detail.

Integration: Many factors conspire to make reducing FRC populations a difficult task, as illustrated in Figure 3. Relying solely on TNR as an agent of change is – at best – a highly resource-intensive and time-intensive approach because it addresses only one of these factors. At worst, it may be unrealistic to expect TNR to reduce FRC populations except at relatively small scales. This reality is not a reflection on the value of TNR, or the effort expended upon it, but rather of the remarkable adaptability and reproductive capacity of cats and the fundamental (though largely unintentional) role that humans play in subsidizing FRC populations. Even after most cats in an FRC population are sterilized, reproduction of the remaining intact individuals coupled with immigration and abandonment can rapidly "undo" a great deal of hard-won progress. In fact, attempting to reduce an FRC population solely by reproductive suppression is much like trying to "climb up the down escalator." While it is possible to do so, it requires intensive, unrelenting effort. This effort far exceeds that required to climb a stationary staircase or the "up escalator," and any relaxing of effort results in substantial reversals. The most viable way to reduce these challenges to more manageable levels is through integrated management (Luzardo et al., 2023).

Integrated management for FRCs involves combining TNR with other initiatives that complement and supplement it. Examples could include adopting a substantial proportion of trapped FRCs into homes (Hughs and Slater, 2002), adjusting supplemental feeding to more closely match population density, or subsidizing sterilization and promoting better confinement of pet cats to reduce their contributions to the FRC population (Kass et al., 2013; Rand et al., 2024). Especially important contributors to integrated management over the long-term may be education and support initiatives to reduce abandonment and improve cat stewardship and care practices (Robertson, 2008). These have the potential to propagate within communities and become "new norms," creating cascading benefits that are a key to larger-scale change.

When several elements of integrated management are layered – either concurrently or consecutively – their benefits are not only additive but may become multiplicative (Warburton and Norton, 2009; Doherty and Ritchie, 2017). For example, by preventing 50 cats from immigrating into a management area, we not only prevent those 50 cats from joining our focal FRC population but also prevent all their potential descendants from joining the population and requiring additional management actions. Stated figuratively, integrated management can slow down, turn off, or even reverse the figurative "down" escalator, making it much easier to climb. This kind of synergy is the key to making larger-scale management a feasible undertaking. Within an integrated framework, TNR becomes an important – but not exclusive – management action that is applied in areas where it can provide the most benefit.

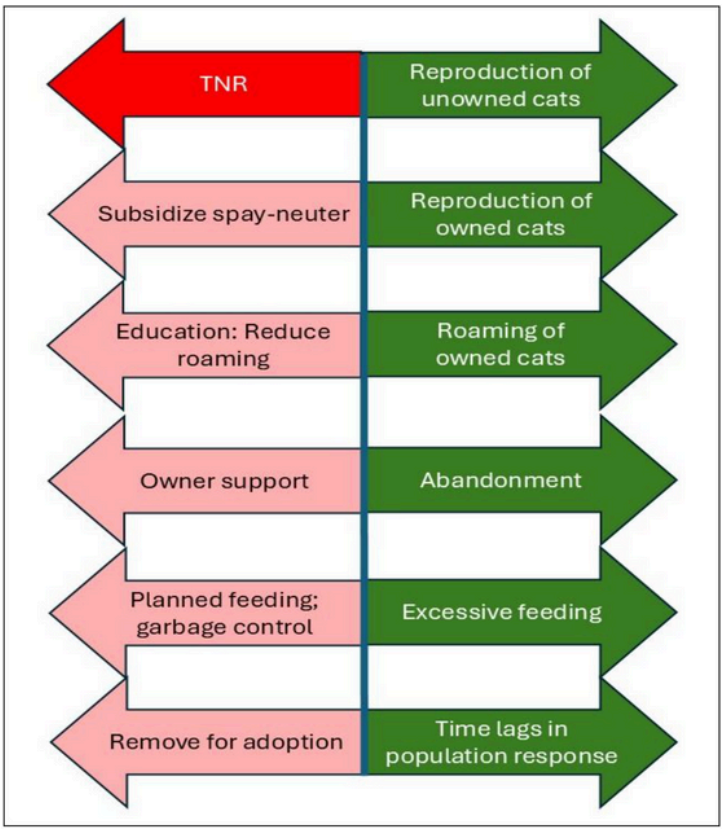


Figure 3. Factors that tend to work against FRC population reduction are shown as green arrows. Their relative contributions vary from place to place, but in most situations at least several of these factors combine to make population size reduction challenging, especially if TNR (red arrow) is the only management tool used to counteract them. If TNR is combined with complementary and supplementary approaches (pale pink arrows that target multiple factors) that operate either concurrently or consecutively, population reduction becomes more achievable.

Goals: At present, most TNR projects state their goals in terms of accomplishing a certain number of surgeries. Less often, reducing shelter intake and/or euthanasia is a stated goal. These are important metrics to track, but they are not adequate for understanding whether the project is accomplishing population-level change, assuming that population-level change is a desired outcome. Surgeries themselves, while a necessary TNR activity, will have little or no effect on FRC density until a critical sterilization percentage is achieved within the target FRC population (Budke et al., 2008; Miller et al., 2014),[15] and simply counting surgeries provides no insight about whether this threshold condition has been met. Similarly, shelter intake and euthanasia can either increase or decrease for many reasons other than changes in FRC density, including policy shifts and economic cycles (Winkleback, 2011). Figure 4 illustrates a more comprehensive approach for categorizing and conceptualizing goals that may be helpful.[16] Any FRC management project that aims to create a population-level impact should define one or more clear, quantitative, and measurable goals that are "direct" population outcomes, as depicted in this figure. Figure 5 illustrates a simple example of how these goals might be arrayed along a realistic timeline. Defining goals in a biologically logical sequence along an appropriate time frame avoids creating unrealistic expectations and sets up a project for a series of successes rather than failures.

[15] We note and acknowledge, however, that each surgery has a likely benefit to the cat that is sterilized.
[16] The DC Cat Count project tool kit provides more details about this approach to goal setting; see Appendix 1.

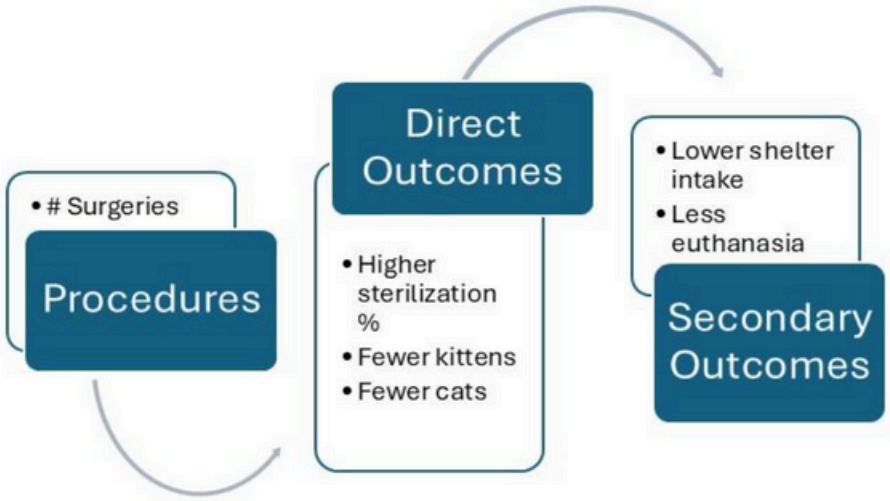


Figure 4. Different types of goals and examples of each. Procedures are the actions taken in hopes of achieving specific outcomes, quantified here as the number of surgeries performed. Direct outcomes describe how performing these procedures may affect the target FRC population, quantified here as changes in sterilization percentage, number of kittens, and number of cats. Secondary outcomes such as lower shelter intake and euthanasia may then occur after the direct outcomes are achieved, but they could also occur for other, unrelated reasons.

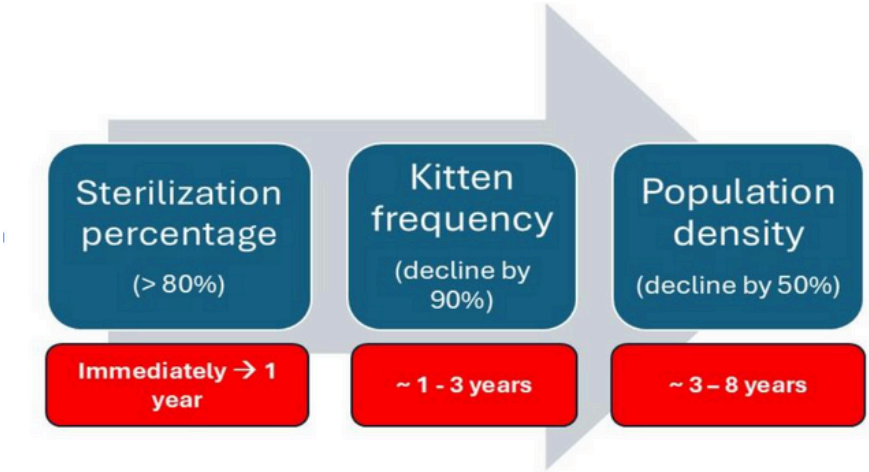


Figure 5. A sequence of direct outcome (Figure 4) goals (blue boxes), arrayed along a realistic timeline (red boxes). Each of these outcomes is measurable by a basic monitoring effort, and each listed outcome is a prerequisite for the next outcome. Estimated time ranges shown in each red box begin when changes first become detectable until the stated goal is reached. Specific percentages and time frames shown here are illustrative only and may not be appropriate for all projects.

Targeting, phasing, and design: Concentration of TNR effort in space and time allows critical sterilization thresholds to be reached as quickly and efficiently as possible (Miller et al., 2014; Wolf and Weedon, 2023).[17] Phasing defines a logical sequence of targeting zones to produce optimal impacts across larger project areas. All projects with population reduction goals should incorporate targeting to the greatest practical extent.[18] This is done most effectively within the conceptual framework of an initial project design that defines the overall project area, identifies the components of integrated management that will be used, and specifies how efforts will be targeted both initially and (where applicable) in later phases. Designs should be based on current knowledge of the project area and the surrounding communities and ideally informed by a baseline assessment of the resident FRC population (see below). Designs can, and should, be fine-tuned over time to best accomplish project goals. Figure 6 illustrates a simple targeting and phasing design for a hypothetical project.

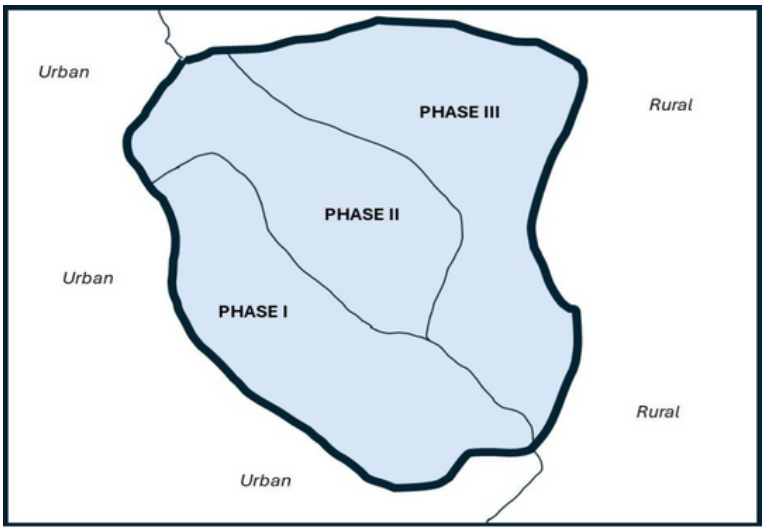


Figure 6. Schematic of a simple targeting and phasing plan for an imaginary program area. Intensive, targeted TNR occurs first in the "Phase I" area, which represents the lower-income zip code where cat intakes have traditionally been high. The Phase I area is bounded on the lower left side by a major freeway that is a suspected barrier to easy FRC movements. Once the targeted sterilization percentage is achieved in the Phase I area, intensive targeted TNR shifts to the Phase II area, which is an adjacent zip code with intermediate levels of cat intake, while still maintaining a reduced level of effort in the Phase I area to maintain a high sterilization percentage. After target sterilization percentage is achieved in the Phase II area, targeted intensive TNR effort shifts to the Phase III area, which is a suburb lying outside the city boundary, while the previous areas continue to be monitored and treated as needed.

[17] Although targeting is most often considered in relation to TNR, it can also apply to other components of integrated management.

[18] Often, "idealized" targeting may not be possible due to programmatic obligations or other considerations. However, even partial targeting can be helpful. In the case of TNR, this could take the form of a proportionally greater TNR effort in the targeted area in comparison to other parts of an organization's overall service area.

Geographical scale: The "edge effect" is a well-known phenomenon in ecology that has significant (if underappreciated) relevance to FRC management. Edge effects occur when a population is affected, either negatively or positively, by environmental gradients.[19] This concept is relevant to FRC management because an active FRC management zone can either be, or become, very different from the unmanaged areas that surround it, creating an "edge." As an example, imagine a managed area that was initially selected because of its high density of FRCs. After a 90% sterilization percentage is reached in this area, FRC density begins to decline. As the decline progresses, the differences between the managed area and the surrounding area, where comparatively few cats are sterilized and FRC density remains unchanged, become increasingly pronounced. Some of the unsterilized cats from this surrounding area will move into the managed area seeking mates or resources, driving its sterilization percentage downward and population density upward. In this scenario, exchanges across the edge between the managed and unmanaged area dilutes progress within the managed area. As illustrated in Figure 7, smaller management areas inherently have more "edge" – relative to their size – than larger management areas and are therefore more vulnerable to this dilution effect. The best way to minimize problematic edge effects is to define relatively large management areas within which effort is strategically targeted and phased. This is not meant to suggest that an entire, large area should or can be managed all at once, but rather that it should be identified within a phased project design and managed to limit problematic edge effects to the extent possible.

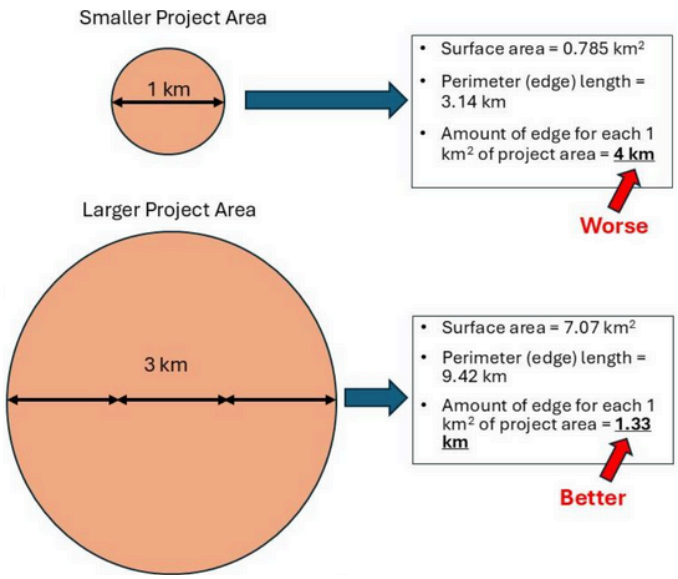


Figure 7. Schematic illustrating the comparative influence of edge effects in smaller versus larger management areas.

[19] A familiar example is urban deer, which prefer areas where the woodland patches that provide them with cover adjoin more open lawns and parklands where they can feed on desirable plants.

Time scales: It is not possible to quickly reduce FRC populations solely by curtailing reproduction. Instead, substantial time lags between the initiation of sterilization efforts and measurable change in population density are an intrinsic reality unless a subset of trapped cats are removed for adoption. Using intensive sterilization alone, it can easily take five or more years for population decline to become statistically definitive (Budke and Slater, 2009; Miller et al., 2014). Sustaining programmatic momentum over this period while waiting for confirmation of a positive impact can be difficult for both funders and program operators, but fortunately the precursors of population reduction (as shown above in Figure 5) can be monitored for evidence of progress while waiting for population declines to manifest. Specific indicators of interest in this regard are the sterilization percentage for the focal population, which should reach and be maintained minimally at a 70% level (preferably greater) over a sustained period (Miller et al., 2014), and the frequency of kitten detections during standardized surveys, which should begin to decline after an effective threshold sterilization percentage has been reached (Boone, 2015).

Collaboration and mentoring: Larger project areas, despite their potential efficiencies (see above), have their own challenges. Among these, larger projects are more likely to encompass the operational zones of multiple organizations involved in FRC work and thereby require active collaboration. The effort involved in creating functional collaborations should not be underestimated, but they represent real opportunities for progress and synergy (Ramírez Riveros and González-Lagos, 2024). Within collaborations, for example, small-scale TNR operators can contribute to larger undertakings while still maintaining a high degree of operational independence. Collaborations also lend themselves to formal mentor-mentee relationships between larger and smaller organizations that help to broaden the reach of new operational models and disseminate knowledge and expertise.

Pilot projects: Funders cannot support large-scale, integrated FRC management everywhere. A realistic and constructive approach in the near term is to establish some well-supported, longer-term pilot projects to explore, illustrate, and document the potential of integrated management to the broader AW and stakeholder communities. Doing so would provide "proof of concept" that could encourage additional funding and collaborations over time. Although pilot programs will likely be most successful at larger scales (Robertson, 2008; Gunther et al. 2022), they can also create useful precedents at smaller, more tractable scales as long as they are of a multi-year duration (allowing time for population changes to occur) and well-monitored (so that they can be assessed and objectively evaluated). Pilot programs can also help recipient organizations become regional experts in FRC management that are capable of mentoring peer organizations, developing sustainable funding models, and providing

regional leadership and vision. In essence, pilot programs can serve as laboratories to test and refine new approaches, evaluate them objectively, institutionalize the expertise required to grow their footprint, and create strategies and models for sustainability. It is worth noting that the most promising homes for these pilot projects are within communities or regions that have already established and maintained elements of integrated FRC management, healthy collaborations within their area of operation, and stable organizational leadership. This contrasts to the more typical "need-based" approach to distributing grant funding.

Information: Although shelter data are routinely tracked, data collection to support and inform FRC management is comparatively underdeveloped and underutilized (Boone, 2015; Aeluro et al., 2021; Benka et al., 2022; Flockhart et al., 2022). In its stead, TNR practitioners often treat shelter intake trends or animal control data as a proxy indicator of FRC population size and status. This approach is at best limited, and at worst potentially misleading in some cases for the reasons described above. A better approach is to monitor the target cat population with standardized "cat counts" at regular intervals. Monitoring data of this type facilitates a valid assessment of trends and impacts and is also a critical component of adaptive management, as illustrated in Figure 8.

Figure 8. The adaptive management loop starts with "planning," to define goals, strategies, timelines, and procedures. This is followed by "doing," which involves performing the planned management and monitoring actions. The next step is "learning," where monitoring results are used to evaluate what is working and what is not working as intended, and adjustments are made to the original plan if needed to produce better results. This loop continues over many cycles until goals are achieved. Without the data collected by periodic monitoring, the loop cannot operate, and we are forced to perform actions with little or no feedback about their effectiveness. Gunther et al. (2022) provides an excellent example of adaptive management for FRCs.

Monitoring data can also function as an "early warning system," alerting managers to the need for additional interventions to maintain a high sterilization percentage in a previously targeted TNR area. Finally, aggregated monitoring data shared by multiple project operators would present a unique opportunity to better understand larger scale patterns of FRC density and trends, which are currently not well understood (see above). Monitoring need not be especially difficult or time consuming to be useful, but it does require a small commitment of time and resources and adherence to a standardized cat counting protocol. These requirements have been barriers to wider use of cat counting in the past, but an increasing number of resources are available to help FRC managers collect appropriate data and draw valid conclusions.[20]

Setting the stage for a non-surgical future: Finally, it is worth emphasizing that the principles described above and our recommendations in the following section are based on what we consider to be a necessary "long-haul" approach. The timeline we envision for fully developing an improved model of FRC management and accomplishing fundamental change in FRC populations will likely extend into a future era when effective nonsurgical sterilants become widely available (Robertson, 2008; also see Appendix 1). If this transpires, it could greatly expand the number of cats that can be sterilized for a given amount of effort and funding and thereby make large scale FRC management far more feasible. Most of our recommendations, and all of the principles on which they are based, will remain relevant in a nonsurgical future.

[20] Appendix 1 lists some of these resources.

Section 4: Recommendations for Funders

Funding Models

The principles presented above collectively define what we consider an optimal framework for impact-focused FRC management. We recognize, however, that funders will be understandably and appropriately be reluctant to go "all-in" on this suggested approach. **Instead, we suggest that funders take a more stepwise approach towards integrated FRC management**. This would not require abandoning current funding models but rather recognizing their limitations and actively exploring alternatives that are more likely to produce real change. With this in mind, we organize our recommendations as follows:

1. **Recommendations for Integrated Projects**: These projects are intended to maximize population level impacts for a given investment. They can be configured as either pilot projects at smaller scales, or as larger scale projects intended to create impacts across zip codes, towns, cities, or counties.
2. **Recommendations for traditional TNR projects**: There are meaningful opportunities to increase the impact and long-term value of traditional (smaller-scale, shorter-duration) TNR projects without adding substantially to the grant recipient's overhead. These enhancements could also help to build broader awareness of the potential value of integrated management and provide incentives for increased collaboration and partnership among organizations involved in TNR work.
3. **Other recommendations**: These describe opportunities to further develop, promote, and support the integrated management model through research and information sharing.

We recommend as a first step that funders consider the extent to which they are able and willing to invest in new approaches to FRC management versus maintaining investments in their current form. If resources are inadequate to support integrated pilot projects, we recommend that they consider opportunities for co-funding such projects with peer foundations or organizations.

Recommendations for Integrated Project Funding

Integrated management of FRCs over long time periods is the only realistic way to humanely reduce FRC populations and improve the lives of FRCs at large scale. It does, however, represent a significant investment, which is why we recommend an initial pilot phase to test and refine the integrated model before highly ambitious and expensive projects are undertaken. To be viable, these pilots must operate over a time span that is sufficient to create population change (at least 3-4 years, but ideally 5 + years), and mechanisms must be in place to detect this change, evaluate program performance, and determine the intervals at which "maintenance" management is required to prevent reversion of the FRC population to its former state over time.

Integrated management at any scale has multiple "moving parts" and it would be difficult – and in fact counterproductive – to specify a single, universal approach for all areas and organizations. Therefore, we suggest that funders consider an application process that makes grant recipients for these pilot projects meaningful contributors to project development and strategy.[21] Currently, many grant applications for TNR projects rely on forms that leave the applicant with limited opportunity for creativity. While this approach lowers barriers to entry and is practical for smaller, traditional grants, it is unlikely to provide an adequate basis for selecting the most appropriate recipients for larger grants, especially those that are intended to explore new precedents and paradigms. A better alternative might be a "request for proposals" (RFP) approach that describes the funder's general goals and expectations, specifies award caps and durations, notes the expected number of awards, outlines proposal format and maximum length, defines hard requirements for reporting or cost sharing, and other similar information. Applicants would be encouraged to submit proposals that are responsive to the RFP and that thoughtfully address a series of fundamental topics in whatever manner the applicant feels is most workable for their operational area. These topics could include:

1. **Goals, timelines, and metrics of success** – What do you want to achieve? When do you expect to achieve it? What measurements will you use to evaluate success?
2. **Project area** – Where will you work, and why?
3. **Integration** – What kinds of programmatic activities – potentially including but not limited to TNR – will you perform and how will they complement one another? Will

[21] This type of active participation may be especially valuable for identifying workable approaches to sustainability, which are difficult to prescribe far in advance of actually achieving the conditions we wish to sustain.

be concurrent or sequential?

4. **TNR** – How will TNR factor into the project? Will you have specific goals for TNR, such as targeted sterilization rates or planned number of surgeries?
5. **Targeting and phasing** – How will you target your efforts to create the greatest impact? How will you phase your efforts to address the entire project area over time in the most effective way?
6. **Monitoring** – What information will you collect, how will you collect it, for how long will you collect it, and how will you use it?
7. **Collaboration and coordination** – Who are you collaborating with? Why? How is the collaboration structured? Will you be providing avenues for citizen involvement and contributions?
8. **Education** – How will you encourage your community to help address FRC issues and to be better pet guardians?
9. **Knowledge transfer** – How will you share what you learn to inform and mentor other organizations?
10. **Sustainability** – How do you propose to sustain your progress over time? How will you develop a funding stream that will facilitate this sustainability? Are you pursuing funding partnerships with non-traditional sources?
11. **Budget** – What funds are you requesting? How will they be spent (including an itemized budget)?
12. **Qualifications** – Why do you think you are qualified to do this work?

Applicants will (and should) prioritize and address these topics differently based on local factors and their own institutional strengths and weaknesses. In doing so, some may propose novel and ultimately productive approaches. We recognize that this is a challenging application process for both funder and applicant that will favor more sophisticated organizations with more resources and experience, but these are the organizations that are best positioned to establish new FRC management paradigms and mentor peer organizations. This application process requires applicants to do some homework and carefully think through their approach; provides funders with the benefits of creative crowd-sourced problem solving; and eventually makes successful applicants real partners in developing better FRC management.

Finally, we recommend that funders of integrated projects actively engage with grantees for periodic project reviews rather than simply waiting for final reports. These reviews not only represent stewardship of significant investments, but they provide opportunities for co-learning the course corrections that are a vital element of adaptive management.

Recommendations for Traditional TNR Projects

Many funders will wish to maintain their current approach to distribution of TNR funding at some level. These smaller-scale, shorter-duration investments would benefit from modest enhancements to improve outcomes and build broader awareness of the value of integrated management, targeting, and basic cat counting. These could include:

1. Asking applicants to identify any non-TNR programmatic initiatives in their area of operations that might provide useful synergies.
2. Encouraging recipients to utilize some degree of targeting in their project area, and "front-loading" TNR effort to the extent reasonably possible (Miller et al., 2014; ACC&D, 2022).
3. Requiring simple cat counts (but not formal data analysis) before and after the funded TNR effort to estimate sterilization percentage.[22] Basic requirements of these counts could be easily specified for grant recipients. Then, in exchange for several hours of cat counting effort, funders and grantees would acquire information about the potential impacts of their investments and actions. This requirement would also help to demystify data collection in a straightforward, "low stakes" environment, and provide an incentive to involve a broader range of volunteers or students – including those with some quantitative background – in the organization's operations.

Other Recommendations

Funders with the ability to support targeted research might also consider the value of helping to resolve critical unknowns. Most notable of these is the extent to which indoor / outdoor cats contribute to the persistence and net reproductive output of FRC populations in various kinds of settings. Previous investigations suggest that this contribution could be substantial (Gunther et al., 2022; Schmidt et al., 2009). If this is confirmed as a more general pattern, any successful FRC management strategy must have provisions to address this issue. Other important research goals include better quantifying the rates of cat abandonment in different community types based on their socio-economic profiles and better understanding the barriers to pet retention and sterilization.

[22] This estimate is calculated as E / (E + NE), where E = the number of observed cats that are ear-tipped and NE = the number of observed cats that are not ear tipped. This formula excludes observed cats where ear tip status cannot be clearly determined. Although there are more rigorous ways to estimate sterilization percentage, routine use of this simple approach would represent a significant step forward. See https://hub.dccatcount.org/pages/toolkit for more details.

Making information about the integrated management model – especially management case studies, results, and resources – more broadly available will help to grow the concept, foster collaborations and mentoring, and improve implementations. Creation of a centralized information "hub" for FRC management and TNR could meet this need, but full development and maintenance of this resource would require initial and sustaining funding.

Finally, data collection and evaluation are a critical component of an integrated management model, but they have presented barriers to entry for many AW users in the past. Efforts have been made to reduce these barriers and provide non-technical end users with the capability to collect basic data and draw valid insight from it (see Appendix 1), but these resources and their intended end users would benefit greatly from additional development and support.

Section 5: Next Steps and Conclusion

One of the stated goals of this report was to encourage and facilitate active discussion about FRC management and foster productive collaborations. Along these lines, a useful next step could be one or a series of organized events (virtual or in-person) in which the ideas presented herein, and others, could be shared, explained, workshopped, and critiqued. Ideally, such a gathering would prominently feature program operators whose previous work serves as a model for others to emulate (e.g., Spehar and Wolf, 2017; Gunther et al., 2022; Luzardo et al., 2025). Ideally, these discussions would lead to collaborative pilot projects focusing on proof of concept and information sharing. This approach could help to revitalize interest in strategic FRC management and effectively kick-start the longer-term developmental processes described above.

Other next steps are more internal. Funders must determine their interest level in integrated management, their willingness and ability to support it, and their openness to co-funded projects and initiatives that (ideally) transcend the limitations of organizational branding. Those opting to fund integrated pilot projects will further need to consider their application requirements and application review processes, as they will likely be much different from those currently established. In other fields, RFP-based applications are sometimes structured as a two-stage process that begins with submission of a short preproposal. The most promising preproposal submitters are then invited to submit a full proposal that is reviewed in greater detail, potentially with assistance from subject matter experts. Additional experimentation and discussion will be required to identify an application and awarding process that best accomplishes the goals presented in this report while remaining practical for funders to administer and manageable for applicants.

Leading AW organizations can also help to advance the approaches discussed in this report by fostering and promoting system-level thinking and technical skill development among key staff members. Growing these capabilities will create better receptivity to strategic management concepts and will pay many dividends beyond their immediate application to TNR and FRC management.

In conclusion, humanely reducing FRC populations at large scale has been described as a proverbial “wicked problem,” and for good reason. Because of their adaptability and reproductive fecundity, FRCs resist all but the most intensive and sustained efforts to reduce their numbers. In the absence of

population reduction, however, the cycle of cat homelessness will continue indefinitely, with all the attendant consequences for animal welfare and well-being. The only way to reduce cat populations at scale is to layer several management approaches so that they reinforce one another (integration) and to apply management effort in ways that maximize its impact (targeting). Even with integration and targeting, sustained effort over years is required before population declines are likely to become apparent, raising concerns about maintaining sufficient interest, effort, and investment. This concern is reasonable given the human propensity to focus on quick fixes and rapid results, but it can be mitigated by defining meaningful intermediate goals, clearly documenting intermediate achievements, and emphasizing both the immediate and longer-term welfare benefits that inevitably occur as the number of FRCs declines. **If the integrated management concept is developed intelligently and diligently through pilot projects, and in a collaborative framework dedicated to mutual learning and achievement, it has a realistic potential to take hold and ultimately succeed.**

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John is a wildlife biologist with the Great Basin Bird Observatory in Reno NV, where he focuses on the conservation and ecology of western birds. His involvement in animal welfare started in 2001 with the SPCA of Northern Nevada, where he has served as board chair for most of the last 24 years. Since 2010, he has also been on the board of the Alliance for Contraception in Cats & Dogs and acted as a consultant for nearly 100 national and international projects focused on the humane management of free-roaming dogs and cats.

Stacy LeBaron
Stacy LeBaron is a longtime leader and strategic thinker in community cat management. With over 30 years in animal welfare, she is on a mission to turn anyone's passion for cats into action. Stacy is the founder of the Community Cats Podcast, an educational platform featuring weekly podcasts, blog posts, and over 30 virtual events and certificate programs each year, focused on sustainable solutions to cat overpopulation and management programs. She also founded the Community Cats Grants program—now administered by United Spay Alliance—to support grassroots spay/neuter efforts nationwide. Stacy co-created and teaches the Community Cats Program Management Certificate course at the University of the Pacific and is co-owner of the Community Cat Clinic in Georgia. She holds leadership roles with several animal welfare organizations, including treasurer and director of strategy for United Spay Alliance, and consults with organizations on effective, data-driven program design.

Appendix 1: Selected Resources and Additional Information

This appendix lists some additional sources of information and guidance that may be of interest to readers of this report, organized topically. This listing represents a very small sample of the wealth of resources that can be easily found online. Websites for Neighborhood Cats, ASPCA, Humane World for Animals, Best Friends Animal Society, and Alley Cat Allies are especially rich sources of information and guidance.

History and Development of TNR

TNR: Past, Present, and Future: A History of the Trap-Neuter-Return Movement. Ellen Perry Berkely. Book available for purchase at amazon.com and other booksellers.

TNR Guidance and Best Practices

"Community Cats." ASPCA. Available at https://www.aspcapro.org/topics/community-cats.

"Community TNR: Tactics and Tools." Bryan Kortis. Available at https://www.neighborhoodcats.org/learn-more/books-guides.

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Appendix 2: Selected Examples of Impact-Focused FRC Management Programs

The approach to impact-focused FRC management recommended in this report has ample precedent. Below are some examples of programs and initiatives that tangibly illustrate at least some components integrated management, many of which feature population size reduction as an explicit goal. More information is available online about most of these efforts. This list is not intended to be comprehensive.

Israel: Gunther et al. (2022) provide us with perhaps the best example of large-scale, effective FRC management. This effort incorporated TNR and made extensive use of monitoring and adaptive management to achieve measurable progress towards population reduction.

Córdoba, Spain: Luzardo et al. (2025) is a newer example of multi-year, integrated management that promises another useful precedent like that of Israel.

Australia: Efforts underway at several small towns in Australia (Rand et al., 2024) combine elements of integrated management (especially TNR for owned roaming cats) and data collection to target FRC population reduction.

Newburyport, Massachusetts: As reported in Spehar and Wolf (2017), this effort led by the Merrimack River Feline Rescue Society represents perhaps the best example in the U.S. of persistent, consistent, long-term FRC management featuring TNR but including some other elements of integration. Over 25 years, FRCs were virtually eliminated from the target management area, as narrated in this video: https://www.youtube.com/watch?v=PA6nCK_UWdU. Broader efforts across the New England region may have produced a concurrent regional decline in FRC numbers over decades based on indirect and anecdotal data.

Central Florida University: As reported in Levy et al. (2003a), this long-term TNR and adoption effort produced a profound decline in the resident FRC population over time.

ASPCA El Monte Cat Spay/Neuter (SN) Project: Starting in 2021, the ASPCA in collaboration with community partners, began a SN/TNR project aimed at reaching and maintaining an 80%+ sterilization rate for all cats within an approximately two square mile focus area in El Monte, CA. They use standardized, cat count transect walking routes, along with project data, to measure sterilization rates and track cat population trends/density along focus area and control area transects. With proactive outreach, overlapping transect walks and reconciling uneartipped but altered cats, the project achieved an 80% sterilization rate.

Community Cat Coalition of Clark County: Although not explicitly focused on population size reduction, this volunteer-based group provides an excellent example of a consistent, long-term approach that incorporates appropriate concentration and tracking of trapping and TNR effort within a relatively large project area.

Portland, Oregon: On Hayden Island in Portland, the Feral Cat Coalition of Oregon and Portland Audubon Society collaborated on several years of cat counts and programs to keep cats "safe at home". Information online at https://birdallianceoregon.org/wp-content/uploads/2019/02/Cats_Hayden_Mews2018-5.1.18.pdf.

Feral Freedom Program, Jacksonville, Florida: This is an innovative public-private coalition involving multiple organizations coordinating their efforts to maximize the impacts of TNR on the city's FRCs. More information is available online at https://fcnmhp.org/wp-content/uploads/2013/11/FeralFreedomGuide.pdf.

Miami-Dade County: In Miami-Dade County, the municipality subsidizes the cost of spaying or neutering FRCs trapped by residents. Information online at https://www.miamidade.gov/global/service.page?Mduid_service=ser1599404922449638.

Maui Cat Count: Using the methodology from the DC Cat Count Project, an island-wide baseline cat count was recently completed on Maui, administered by the Maui Humane Society and with support from the Dave and Cheryl Duffield Family Foundation and Humane World for Animals. This effort can provide a springboard for planning long term strategic FRC management.

South Central LA Cat Count: A major baseline cat count in South Central Los Angeles is currently underway using methods recommended by the DC Cat Count Project. This count is led by the Stray Cat Alliance with support from Humane World for Animals.

To learn more and access the full report, visit
thecatreport.org

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United Spay Alliance is a national nonprofit promoting affordable, accessible, and timely spay/neuter as the key to ending the suffering and homelessness of cats and dogs.

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