EVALUATION REPORT

Evaluating the Social Network Characteristics of the ACE for Wildlife Network

APRIL 2024

GROUNDSWELL SERVICES INC.

Groundswell Services, Inc.

ADVANCING CONSERVATION THROUGH **EMPATHY FOR WILDLIFE**

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Introduction

Woodland Park Zoo and its Advancing Empathy Team (AE Team) contracted Groundswell Services Inc. to conduct an evaluation of the Advancing Conservation through Empathy for Wildlife (ACE for Wildlife) Network, which focuses on fostering empathy for wildlife. Specifically, Groundswell investigated the information-sharing and collaboration patterns of the ACE for Wildlife Network. The evaluation focused on four key questions, below. To answer the questions, Groundswell Services used an explanatory sequential mixed methods case study design that integrated quantitative data from a survey that included social network analysis (SNA) questions, data from Network archival records, and data from open-ended survey questions and interviews. The evaluation was designed to offer valuable insights into the dynamics of collaboration, information-sharing, and engagement within the context of promoting empathy for wildlife. Several key findings emerged, guiding actionable recommendations for consideration.

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Key Evaluation Questions

1. What is the breadth and extent of empathy-focused collaboration among Network participants and organizations?
2. How does empathy-related information and learning spread through the Network?
3. What are the opportunities for and challenges to greater participation, collaboration, and cohesion among the Network, as well as to expanding to a multi-hub structure?
4. How does empathy-related information and learning spread beyond the Network to organizations accredited by the Association of Zoos and Aquariums (AZA)? What is the breadth of this reach across the North American AZA field currently?

Navigating This Document

We have organized this document to promote use by the AE Team. To that end, we maintain a conversational tone, start with the big picture, and provide detailed tables and the methods section as appendices. In the heart of the document, we provide what you came here to do: **Learn about the results of the evaluation.** After the initial context-setting, we dig in, sharing insights and what we learned about overall satisfaction with the Network. Then, we proceed to unpack the results for each evaluation question, one by one. For each question, we start by sharing our "big picture" insights before describing the data that painted that picture for us. If you just want the big picture, go to the first page of each new evaluation question, and look for the "big picture" heading.

We do provide the details some of you may appreciate. You can find the methods, tables, and tools all in the appendices. In short, navigating this document is almost like navigating a typical academic paper in reverse.

Also, please note that for the graphs in this document, we have used color combinations that are designed to be distinctive for people with different types of color blindness. To create the color scheme for the network graphs, we used guidance from the federal government (www.section508.gov) and an Accessible Color Palette Generator from Venngage (venngage.com), an infographic design company. The color scheme used for regions is the same throughout the report, as is the color scheme used for organizations.

Context Setting

Network Context

The ACE for Wildlife Network was created in 2019 as a learning network to create and share practices to foster empathy for wildlife. At the point of this evaluation in late 2023, 380 people from around the US and internationally were participants. Three types of participants comprise the Network: Partners, Members, and Affiliates. Partners are organizations accredited by the AZA that are committed to fostering empathy as a strategy for conservation; many of these have been involved in the Network since 2019. Members are staff or volunteers at Partner organizations. People who work or volunteer for organizations that are not Partners can be Affiliates, a relatively new category of membership that is growing.

Evaluation Context

The evaluation of the ACE for Wildlife Network is focused on examining Network relationship characteristics, patterns, and dynamics, in addition to facilitators and challenges related to

involvement in the Network. Through systematic examination and analysis, Groundswell Services investigated the various aspects of participation, collaboration, and information-sharing within the Network, with particular emphasis on the role of Woodland Park Zoo's AE Team in facilitating connections and knowledge exchange.

Employing SNA as our primary methodological approach, we delved into the complex network of relationships, identifying patterns, trends, and opportunities that influence the ACE for Wildlife Network's structure and functioning. We enhanced our understanding of SNA results with qualitative data from surveys and key informant interviews, in addition to two sense-making conversations with AE Team members.

Our evaluation aims to achieve two objectives: (1) provide insights into the current state of the Network, and (2) propose strategies for its future development. Through the integration of quantitative metrics, qualitative insights, and stakeholder perspectives, we aim to offer a comprehensive understanding of the Network's characteristics, strengths, challenges, and potential areas for improvement.

Context for Social Network Analysis

In our endeavor to understand the dynamics and patterns within the ACE for Wildlife Network, we employed SNA as an essential tool. The primary purpose of SNA in our evaluation was to systematically graph and analyze the intricate web of relationships among Network participants. This method was instrumental in revealing not just the visible threads of collaboration and information exchange, but also in uncovering hidden influencers and pivotal connections that might otherwise go unnoticed.


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What Is a Network?

A "network" in the context of SNA is a set of connected nodes. These nodes, or network participants, are typically individuals, organizations, or other entities that are connected by various types of relationships. The relationships represent interactions or ties between the nodes, such as friendships, communication patterns, or business transactions. These connections typically are the unit of analysis in SNA. However, SNA involves analyzing the patterns and implications of these connections to reveal insights about a network as a whole.

The "network" is defined by the boundaries you put around it. For example, if you ask me who I know, that will result in one network, my "acquaintance" network. If you ask me who I would call to take me to the ER at 2 a.m., that will result in a different group of people and, therefore, a different network, my "emergency" network.

In all, Groundswell Services studied 14 ACE for Wildlife Network sub-networks, each of which we will explore in this document:

1. An individual collaboration network generated by ACE for Wildlife Network participants
2. An organizational collaboration network generated by ACE for Wildlife Network participants
3. An individual information-sharing network generated by ACE for Wildlife Network participants
4. An organizational information-sharing network generated by ACE for Wildlife Network participants
5. A committee network generated by the AE Team that generates collaboration
6. A discussion board network generated by the AE Team that generates information-sharing
7. A discussion board sub-network that includes only discussion board participants
8. A discussion board sub-network that includes only discussion board participants minus WPZ staff members
9. An events network generated by the AE Team that generates information-sharing
10. An events sub-network without WPZ staff members
11. A consolidated network that integrates participant-generated collaboration and information-sharing networks
12. A consolidated network that integrates WPZ-generated collaboration and information-sharing networks
13. An organizational connections network between AZA (and non–ACE for Wildlife Network) survey respondents and organizations they named
14. An organizational connections network between ACE for Wildlife Network survey respondents and organizations they named

How Can We Use SNA Statistics?

When discussing the interpretation of statistics in SNA, a common query we have encountered revolves around the idea of what constitutes a "good" or "bad" statistic. We emphasize that there is not a universal standard for better or worse SNA statistics; their significance is heavily contingent upon the specific context of a network and, importantly, the objectives set for that network. How, then, do we derive meaning from these SNA statistics?

- One approach is to juxtapose the statistics against other visual data representations we explored, such as collaboration patterns and information-sharing dynamics within the ACE for Wildlife Network. By comparing across these sub-networks, we began to understand the unique characteristics of the larger Network.
- Another method is to observe changes over time. For instance, conducting another SNA in five years would allow the AE Team to compare the evolving relationship patterns and characteristics, providing insight into whether the Network is moving in the desired direction. This longitudinal perspective can reveal trends and shifts that might otherwise go unnoticed.
- Perhaps the most profound way to utilize this information is to align it with a network's aspirations and directional goals. For instance, some networks might aim for a highly diffuse structure, fostering a free flow of ideas and innovation, with participants contributing sporadically yet significantly. On the other hand, a network might envision a close-knit community or family, where participants can rely on each other for support and collaboration in times of need.

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In essence, the utility of SNA statistics lies not in striving for arbitrary numerical targets but in how they can guide you toward the envisioned landscape of the Network. The statistics should serve as indicators, pointing in the direction you wish to steer the Network, be it fostering innovation, nurturing close relationships, or a mix of various interactive dynamics. Finally, though we narratively describe the meaning of these terms the first time we use them, we also have included a Glossary as an appendix for reference.

Essential Insights

Our evaluation journey provided valuable insights into the dynamics of the Network, highlighting both its strengths and areas for potential growth. Through the lens of participation, collaboration, and information-sharing, we observed the diverse ways in which Network participants engage with each other, facilitated by the AE Team's central role in catalyzing connections and fostering dialogue. We summarize the essential insights below, as key findings and suggestions.

Key Findings

1. **Active Information-Sharing Culture:** The Network exhibited a culture of information-sharing around the topic of empathy, with connections forged within and across organizations. Notably, for both collaboration and information-sharing dynamics, the presence of people who acted as bridges, or connectors, between organizations underscored the Network's capacity for facilitating meaningful connections.
2. **Role of the AE Team:** The AE Team proactively involved Network participants through committees, discussion boards, and events. These have been instrumental in catalyzing cross-organizational collaboration and information exchange.
3. **Challenges for Independent Information-Sharing and Collaboration:** Network participants reported difficulty in finding people to directly connect with for information-sharing or collaboration outside of Network-facilitated pathways. Feelings of intimidation and unclear rules of engagement were additional barriers. Participants believed that small groups, a Network directory, directory platform improvements, and additional engagement guidance could help to address these challenges.

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4. **Interest in Small Group Structures:** Survey results revealed a strong interest (84%) in instituting smaller group structures based on professional roles or empathy-related topics. This feedback presents an opportunity to deepen engagement and foster specialized discussions within the Network. It is worth noting that interviewees qualified that while they were interested in smaller group structures, they did not want those structures to replace the supporting role of the AE Team or the large group activities such as events.
5. **Different Levels of Engagement:** While the AE Team may seek a high level of engagement, Network participants reported that they seek a network that provides opportunities for high and low engagement so they can create the experience they want, depending on their interests, their other responsibilities, their comfort, and the relevance to them.
6. **Challenges in Sustaining Engagement:** Despite enthusiasm for small group structures, challenges persist in ensuring sustained participation and engagement. Concerns regarding potential disengagement in the absence of continued AE Team support highlight the need for ongoing facilitation and coordination.
7. **Member Reports of Comfort in Network but May Need More Data:** Overall, almost all interviewees (26) reported feelings of comfort while participating in the Network, though some mentioned moments of discomfort that may be addressed with additional engagement guidance. Given the small sample of interviewees (27), it may be worth gathering more information across the entire Network about comfort and belonging for greater representation of the membership, particularly in terms of race and gender.

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8. **Collaboration Is Fostered in Different Ways:** According to the interview data, collaborations that were internal and regional tended to be guided by independent pathways, while collaborations that were cross-institutional beyond region tended to be facilitated by the AE Team and formal Network activities.
9. **Engagement in Empathy Work Is Dispersed Nationwide:** From the survey data of AZA members (except for ACE for Wildlife Network participants, who were purposely excluded), organizations across the US (and beyond) were named as resources, information-sharers, and collaborators in work fostering empathy for wildlife. Without dominance by any group, we observed widely dispersed, nationwide interest.

Suggestions

1. **Set Intentions:** Using the baseline results from this evaluation, establish clear intentions for collaboration, information-sharing, and learning within the Network. Utilize study findings as a baseline to track progress over time and set benchmarks for success. Looking ahead, establishing clear goals and benchmarks for collaboration, information-sharing, and learning will provide a roadmap for future growth and evaluation.
2. **Sustain Bridges and Those Exhibiting "Betweenness":** Recognize and support bridges (people who act as connectors between others) within the Network to facilitate connections between organizations. Also, engage those individuals adjacent to the highly connected individuals (also known as "betweenness") to further integrate them into collaborative efforts and strengthen network connectivity. Nurturing them is essential for maintaining connectivity and facilitating knowledge exchange. By supporting these key actors and engaging those on the cusp of deeper involvement, the Network can maximize its potential and drive meaningful impact.
3. **Support Small Group Structures:** Facilitate the establishment of smaller group structures aligned with roles or specific empathy-related topics to accommodate diverse engagement preferences. For example, the AE Team can establish and nurture communities of practice (short-term or long-term) within networks so participants can focus on building skills or tools. When a network is large, these smaller communities of practice are less intimidating and more relational, and they are where engagement happens more intentionally. The concept of a multi-hub structure (briefly, a network structure in which multiple small groups, or hubs, centered around some type of commonality such as role or geography provide an organizing structure) emerged as a promising approach to further enhance collaboration and information-sharing across organizations. By expanding the Network's reach and facilitating connections between organizations, the AE Team can amplify its impact and foster a culture of collaboration beyond its immediate sphere. The idea of the multi-hub structure was largely supported

by the Network if the AE Team (as the Network backbone support team) continues to provide ongoing support and resources to sustain participation and foster meaningful interactions.

4. **Enhance Engagement Strategies:** Develop tailored strategies to promote participation and engagement in small group activities. Leverage successful approaches from existing committees as a model for effective engagement. Provide necessary resources for these initiatives. Support is crucial to continue the popular large group interactions while exploring the potential of smaller, focused groups. Avoiding the pitfalls of low turnout requires careful consideration of Network participants' varying needs and preferences. For example, consider directing special grant funds to collaborative projects including cross-site visits or technical assistance, regional networking, trainings or workshops, or development of projects or tools.
5. **Scaffold Engagement Opportunities:** Continue to create varied spaces within the Network, each tailored to achieve different outcomes. Some areas can be designed for open, innovative engagements, attracting temporary participation for fresh ideas and inspiration. Others can focus on fostering deep, collaborative relationships, where participants work closely to develop new programs or products. Also, there could be spaces dedicated to discussing challenges and sharing experiences related to empathy-focused projects. These multiple avenues for engagement accommodate varying preferences among participants. While some gravitate toward active participation in committees and events, others find value in more passive forms of engagement, such as following discussions on the board. Balancing these preferences while maintaining a cohesive network presents both challenges and opportunities for future development.
6. **Engage Organizations Named by Others:** Organizations not currently involved in the Network but named as being involved in fostering empathy for wildlife are good candidates for Network inclusion. (See results from a question asked in both the ACE for Wildlife Network survey and the AZA survey in the section reviewing the fourth evaluation question.) Strategically reach out to organizations that are connected to the Network in some way, especially if it seems likely that they will contribute to or benefit from the Network. Exploring opportunities to expand the Network's reach to these organizations opens new avenues for impact and knowledge dissemination beyond its current boundaries.

By implementing these suggestions, the AE Team can foster greater engagement in the ACE for Wildlife Network as it moves into a more mature phase of development over the next five years. Through continued strategic initiatives, regular monitoring, and intermittent evaluation, the Network can achieve its objectives while adapting to evolving needs and challenges.

Evaluation Results

This section first provides the big picture, then the results related to each evaluation question. If you are looking for the information about methods, evaluation participants, margin of error, and the like, please see the appendices. In short, with guidance and input from AE Team members, Groundswell Services (1) utilized participation and other Network archival records, (2) surveyed ACE for Wildlife Network Members and Affiliates, (3) interviewed a subset of ACE for Wildlife Network survey respondents, and (4) surveyed members of AZA who are not currently part of the Network.

Respondents

ACE for Wildlife Network Surveys

The ACE for Wildlife Network survey was completed by 141 people, representing 47 organizations, including all 27 Partner organizations. Based on the number of Members and Affiliates at the time the survey was written, the individual response rate was 37.2%, while the organizational response rate was 42.7%. The demographics of these survey respondents are presented in the appendices.

ACE for Wildlife Network Interviews

Individual interviews were conducted with 27 Network participants who completed the survey. Interviewees were part of 21 organizations, with 21 Partners and 6 from Affiliate organizations. The demographics of interviewees are presented in the appendices. To understand the experience of Network participants across varying levels of engagement, the evaluation team used purposive sampling to select interviewees. First, we calculated survey respondents' total

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number of connections reported (i.e., how many individuals they indicated sharing information or collaborating with). Then, using quadrats, we sorted respondents into three categories: High connectivity, medium connectivity, low connectivity. We invited a selection of participants from each category for interviews. We conducted interviews between February 13 and March 8, 2024, between one and two months after participants completed surveys.

Table 1. Composition of Interviewee Pool

Connectivity Level of Interviewees	Number	Percent of Total Interviewed
Low (< 8 connections)	8	30%
Medium (8-20 connections)	10	37%
High (21 or more connections)	9	33%
Total	27	100%

AZA Surveys

The AZA survey was shared with AZA members via several AZA list servs. ACE for Wildlife Network participants were excluded from this survey because they had already been invited to complete the Network survey. The AZA survey was completed by 106 people, representing 57 organizations. At the time we deployed the survey, the AZA website listed 237 accredited zoos and aquariums. Of those, 27 were part of the ACE for Wildlife Network. Therefore, AZA members from 210 organizations were eligible to complete the survey, resulting in a response rate of 27.1%, based on organizations represented.

Overall Satisfaction with Network Engagement

Overall, most interviewees (22) reported feeling satisfied about their current level of engagement, from feeling "very satisfied" to "fine." Of those, a few indicated that their engagement in the Network was sufficient given their responsibilities at their institutions or their participation in other networks that they wanted to be a part of. Five people mentioned expecting to be more engaged in the future as they grow into their roles or as projects, they are working on become more relevant to empathy.

An interviewee with a medium level of Network connectivity noted, "I feel like it's pretty easy to get involved if you want to be involved…There's opportunities to share in the newsletter…They have grant opportunities…You can be on networks [committees], you can present for the

summit. So I feel like there's a lot of ways to get involved. So you can kind of be as involved as you want to be."

An interviewee with a low level of Network connectivity said, "I think it's striking the right balance for me right now…I don't feel like I'm missing out on a ton of stuff that's going on that I can't get to because of other obligations, and I'm able to make time for the big stuff."

Most participants that were not satisfied (four with low to medium connectivity) reported that time and capacity were barriers to getting more involved. They related that these challenges were directly generated by their employers rather than the Network. Alternatively, one person with a high level of connectivity mentioned that their participation in the Network had been time-consuming and may have superseded what made sense for them in their current role.

All eight low-connectivity participants reported getting what they were hoping for from the Network, including access to resources, learning and sharing of ideas and research, and opportunities to network. However, two individuals—both with low levels of Network connectivity—mentioned that they were not finding the resources provided by the Network to be directly relevant to projects they were working on in their current roles (both were in volunteer engagement).

"I feel like it's pretty easy to get involved if you want to be involved."

–Interviewee

Results from Information-Sharing and Collaboration

Being a part of the ACE for Wildlife Network has led to outcomes for participants. According to the survey data, participation has led to new collaboration among some Network members, including 51.8% of survey respondents. Participation also has led some to try new things; this is true for 70% of survey respondents. We asked interviewees to provide deeper understanding through sharing any results they have observed from engaging in information-sharing or collaboration. They offered the following outcomes.

Outcome 1: Personal development

Interviewees (17) described an increase in knowledge and confidence around empathy for wildlife. One person said, "It's also helped me…express to…leaders and team members at the zoo the reasons why we do certain signage. …[and] sometimes there's conversations like…should we still keep doing these? And so being able to say, 'yes, we want to keep them because they support empathy. And this is a best practice. And we know this because…of our shared understanding of empathy…across organizations.'… that has been really useful."

Eight participants also mentioned the professional development benefits from being involved in the Network including participation in conference panels and committees, sharing of projects and generally understanding and connecting with various roles within the zoo and aquarium field. One interviewee noted, "I think personally, I've gained, like a lot of leadership...on the steering committee...and it's been kind of my first committee that I've been on that's not within our zoo...so that's been really professionally developing for me."

Outcome 2: Relationships

Nine interviewees, most with medium to high connections, reported feeling in community with other Network participants, connecting through their shared interest and sometimes challenges with implementing empathy for wildlife. One person mentioned appreciating the support of Network members outside of their institution since "it can sometimes feel a little isolating, especially when I'm the only person on my team focusing on interpretation." They noted that "it's really nice to be able to have...people to ask questions to, and know that they are in the same boat as I am." Another participant said, "I think there is an overall sense of inclusion...[and] that it's nice to know that all these other people that you can network with, knowing that they're there and everyone that I've met through it...they are always so kind."

> "It's really nice to be able to have...people to ask questions to, and know that they are in the same boat as I am."
>
> –Interviewee

Outcome 3: Products

Interviewees (21) mentioned that their information-sharing or collaborations had resulted in tangible products including signage, reports, trainings and training manuals, guides, plans, and programs. One person described, "I was able to push to get...position-specific guest engagement training, rather than having all staff do the same one. Because of reports from...different ACE Network members regarding their effective...[separate] training[s]." They proposed using tangible ways of engagement for specific roles and "I was like, 'If I want to make this change...here's some evidence from the Network.' They were like, 'Oh, okay, let's try it.'"

Outcome 4: Validation and prioritization of empathy work

Nine interviewees described that with their involvement in the Network, they have received validation for their empathy work through research, evidence, and examples of other institutions successfully implementing practices. For some, this has led to buy-in from managers and leadership. One person said, "we [have] leaned really heavily on, like, we're part of the network. This is coming out of... [what] a bunch of zoos are doing. It's not just like us randomly saying that we should start using the animals' names and discussing their personalities...[it's] almost like

being a part of an academic institution…like a little bit of a stamp of approval…[and] that is meaningful." Another person noted that their head of department was able to talk to their director to show "why this is important that we are able to schedule time to have everyone involved."

Several (13) participants observed the integration of empathy not only in the direct projects they were working on but across roles, departments, or programs at their facilities. One participant said, "we really have embraced empathy…at our zoo. It's something that's been a priority as we plan pretty much anything." Another person stated that their institution, "really kind of dove in with ACE and we're fully invested now…and with that, we've really moved putting like building empathy to the main goal of our team…whereas before, like we were doing it. We just weren't calling it empathy. And now we're recognizing that's what we're doing and we're being very, very intentional."

Outcome 5: Empathy outcomes

A few interviewees mentioned that they had observed changes in empathy from staff and guests. One person indicated that, "I think we are getting a lot of good feedback from people. Even the educators say they feel better about what they're doing. They're not forcing animals to do anything. They're not having to hold animals that don't want to be held. Um, kids are even reacting with more empathy to seeing animals not being held."

Evaluation Question 1: What is the breadth and extent of empathy-focused **collaboration** among Network participants and organizations?

To answer this question, Groundswell Services reviewed Network participation data, utilized the ACE for Wildlife Network survey, and conducted 27 key informant interviews. We studied three types of networks, with the following boundaries:

- An individual collaboration network generated by ACE for Wildlife Network participants
- An organizational collaboration network generated by ACE for Wildlife Network participants
- A committee network generated by the AE Team that generates collaboration

The Bottom Line

Woodland Park Zoo is central to both the individual and organizational collaboration networks identified through this SNA evaluation.

- Collaboration is occurring mostly **within** organizations.
- To a lesser extent, collaboration is occurring **between** organizations, especially at a regional level.

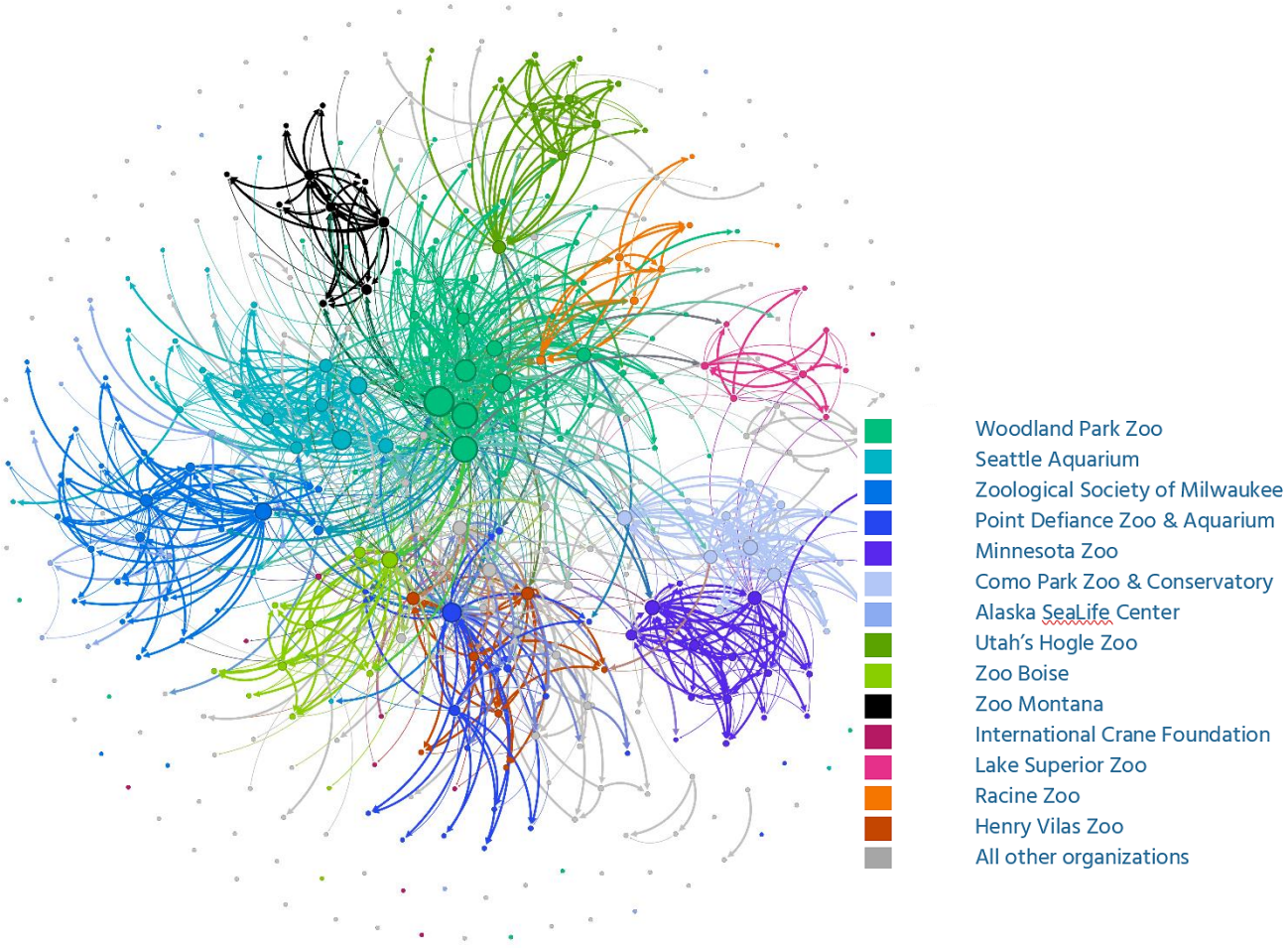
- Interviewees said pathways to collaboration were facilitated by **both** the AE Team **and** via self-generated connecting outside of Network activities.
- Specific people play an important role as bridges between organizations.
- Both committees and bridges (connectors between multiple people) help to foster collaboration between people from different organizations.
- Committees provide a positive model of small group connection-building that could inform development of a multi-hub structure or other small group approach.

Individual Collaboration Network

NOTE: For this first exploration of a social network graph together, we will provide more detailed explanation. We will limit the explanation for subsequent graph descriptions.

Figure 1 depicts the visualization of the individual collaboration network. In the survey, we asked whether Network participants "occasionally" or "regularly" collaborated with other Network participants on fostering empathy for wildlife. Every individual in the Network is represented by a circle or dot, and the collaborative connections between these circles are illustrated by lines.

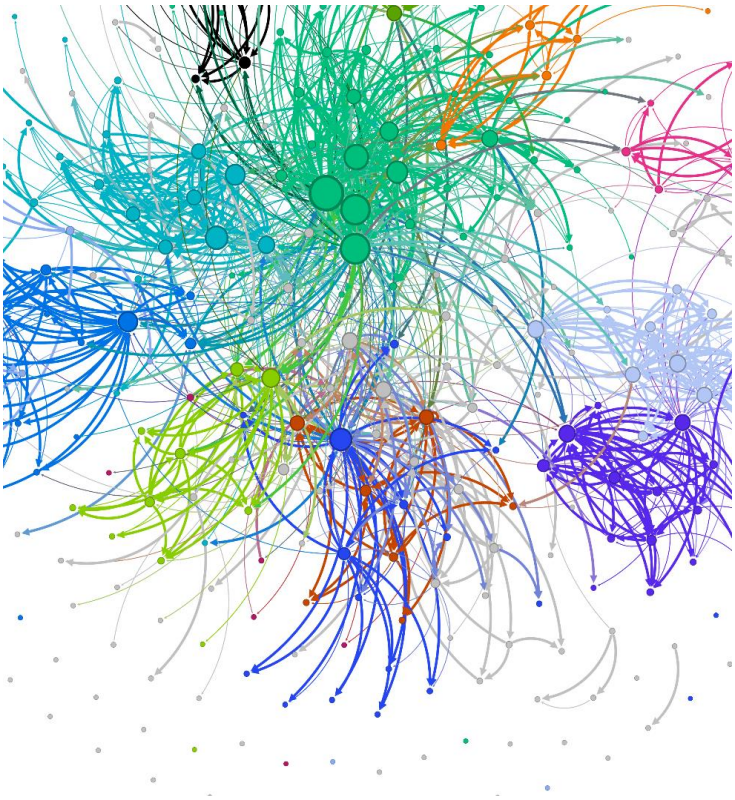
Figure 1. Individual Collaboration Network



Occasional collaboration is depicted by a thinner line, while regular collaboration is depicted by a thicker line. The colors in this image are segregated by organization. As described in the introduction section, the color scheme was designed to accommodate various types of color blindness. Also, the color scheme used for regions is the same throughout the report, as is the color scheme used for organizations.

In addition, circles that are closer to the center are more strongly connected. The varying size of the circles also has meaning. The size corresponds to the number of Network participants that individual named as collaborators (known as "out-degree") together with the number of respondents that named that individual as a collaborator (known as "in-degree"). The larger the circle, the more that individual named others as collaborators and was named by others as a collaborator.

Figure 2. Close-Up of Individual Collaboration



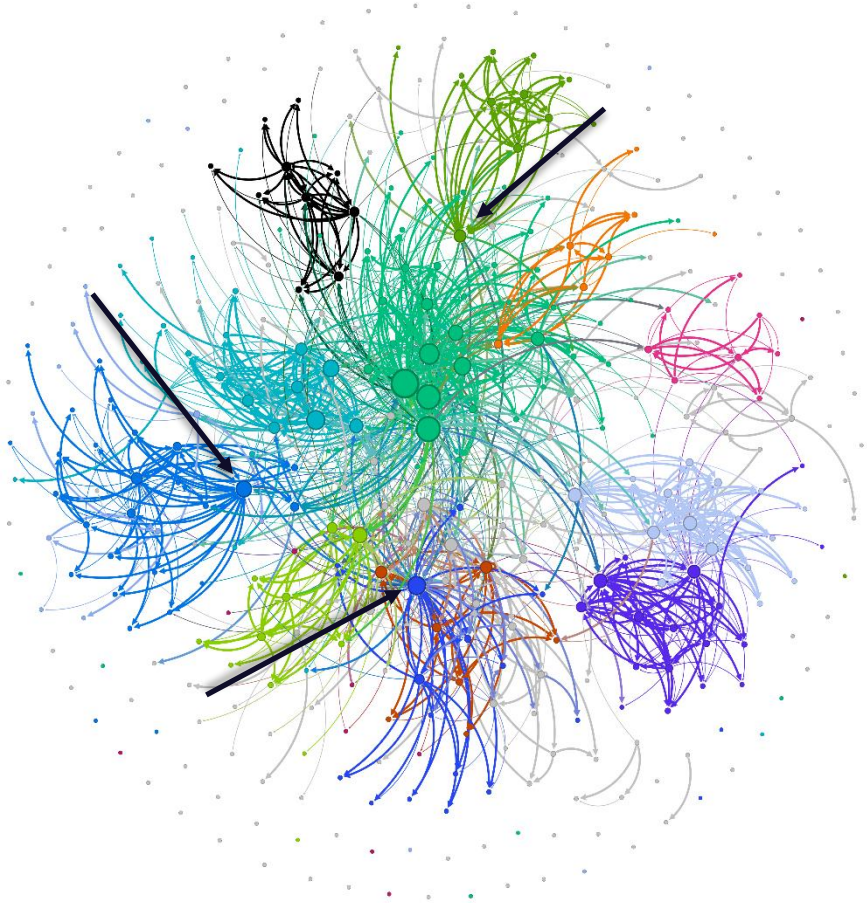
A notable pattern emerged: Most collaboration around fostering empathy for wildlife is occurring within organizations. This is logical, as individuals within the same organization often work closely together. However, we also observe evidence of inter-organizational collaboration. For instance, if we focus on the lower central area of the graph (Figure 2), characterized by red and blue, it is intriguing to see numerous lines—representing collaborative connections—extending from these organizations to various other colors like green and teal. These connections signify interactions stretching beyond the confines of a single organization.

Thus, while most collaborations are found within individual organizations, as indicated by their specific color groupings in the Network graph, the presence of inter-organizational collaborations, demonstrated by the crossing lines of different colors, paints a picture of a Network that is not just inward-looking but also reaching out.

Another intriguing pattern emerged in the way certain individuals within organizations functioned as bridges to others. The concept of a bridge in SNA is vital; it refers to a person who serves as a connector, not only embedded in their own organization but also extending their reach to other entities in the network.

Consider the **blue** cluster to the left of the graph (Figure 3). Here, one can observe a larger, more prominent circle—a clear indication of an individual with numerous collaborative ties. This individual's position towards the center of the graph, suggests their pivotal role in the Network. What makes them a bridge is not just their prominence within their own organization, as shown by their connections to the smaller circles (or other Network participants) within the **blue** zone, but also their links extending outward, reaching into other color zones on the graph. These connections illustrate their role in facilitating cross-organizational collaboration. It's probable that many of these bridges have been fostered deliberately by the AE Team as organizational points of contacts. Every organization that is a Partner in the Network has at least one point of contact. Points of contact are responsible for disseminating information through the organizations they represent.

Figure 3. Bridges



This bridging role is crucial in SNA, as bridges often represent the main contact points or key representatives of their organizations within the broader Network. They are the conduits through which ideas, resources, and support flow—not only within, but also between different organizations. Their strategic position and numerous connections make them vital for the health and cohesion of the entire Network. In essence, these bridges are at the heart of collaboration dynamics within the Network. They not only reinforce internal connections within organizations, but also play a critical role in fostering and sustaining external collaborations, thereby knitting the entire Network more closely together.

Next, we delve into the network statistics for the individual collaboration network. Again, we will provide a higher level of detail for this first review of SNA statistics to help you understand what they mean. These are the network statistics we will explore:

- 1,304 connections.
- Diameter: 9
- Ave path length: 3.4
- Density: 0.01
- Ave weighted degree: 5.2
- Clustering Coefficient: .25

Diameter

The **diameter** of a network is, essentially, the longest of all the shortest possible paths between any two individuals in the network. Imagine needing to collaborate with someone you do not personally know within this Network. How many intermediary connections would it take before you could reach this person? It is like a chain of introductions: I might ask someone I know, who then asks another acquaintance, and so on, until the chain reaches the person I need to connect with.

Using the Network visualization above in Figure 3, consider the circle shape. The diameter is about finding the longest path you would need to traverse from one end of this circle to the other, passing through the fewest possible intermediaries. For each Network participant, we calculate the shortest path needed to reach every other participant, and then identify the longest of these shortest paths. This longest path is what we refer to as a network's diameter.

In this case, the diameter is nine. This metric gives us a sense of the Network's connectivity—how closely or distantly related the participants are. In a tightly knit network, where everyone knows each other directly, the diameter would be small—say, one. Conversely, in a sprawling, widespread network like those on social media platforms, where connections are far-flung and people are linked through a shared interest or influencer but do not personally know each other, the diameter would be considerably larger than nine. Diameter is a measure that captures the extent of connectedness within a network, indicating the ease or complexity of reaching out across this web of relationships. As we will see when we examine the various ACE for Wildlife sub-networks, nine is a larger diameter for this Network, meaning that the individual collaboration sub-network is less tightly connected than other sub-networks.

Average Path Length

Next, let us consider **average path length**. This statistic, akin to the diameter, serves as another indicator of a network's interconnectedness, but it approaches the concept from a slightly different angle. Average path length is calculated by the shortest distance between all pairs of

individuals who responded to the survey. These distances are then averaged to give us a more comprehensive view of the Network's connectivity.

Imagine you are at a big party where you know a few people, and you are curious about how many handshakes it would take to be introduced to everyone else. "Average path length" is kind of like finding out the average number of handshakes needed to connect you with any person in that party. It is a way of figuring out how many steps, or connections, it typically takes for one person in a network to reach another. So, if your network's average path length is, say, three, it is like saying, "On average, I'm just three handshakes away from everyone at this party!" It is a way to see how close or connected everyone is in a group or network.

In our analysis, the average path length for this individual collaboration network was 3.4. This means that, on average, a person in the Network is only about three to four steps away from any other participant. To put it another way, if I wanted to reach out to any given individual within the Network, I would need to go through three or four other people to make that connection.

Density

Next, we turn to the network statistic **density**. Density compares the actual connections that exist within a network against all possible connections. Think of density in SNA like how packed a room is at a party. If the room is filled to the brim, with everyone chatting and mingling, that is high density—a lot of connections happening. But if the room is less crowded, with people mainly sticking to their own little groups, that is low density—not as many connections.

Photo by Michael Payne on Unsplash

In this Network, we found the density to be 0.01, which translates to about 10%. Imagine that as if only 10% of the possible conversations that could be happening at a party are happening. This suggests there are many potential chats or collaborations that are not taking place yet. Depending on

the goals for the Network, density can tell you a lot: If your aim is to increase collaboration, to get more people interacting and working together, then you will want to see an increase in this number. A higher density will mean the Network is like a bustling party, with a lot of connections and a strong sense of community. That is the kind of vibrant, closely-knit network scenario indicated by a higher density—a real buzz of collaboration.

Average Weighted Degree

The concept of **average weighted degree** in social network analysis can be thought of as measuring how involved each person is in a network, taking into account not just how many connections they have, but also how strong or important each of those connections is.

For example, imagine you are at a party with friends and acquaintances. In a regular SNA, we might count the number of connections each person has. For example, if Alice talks to five people at the party, she has five connections. But not all interactions are equal. Suppose some conversations are just quick greetings, while others are deep, engaging discussions. In weighted SNA, these interactions have different weights. A quick hello might be a "light" connection (low weight), while a long conversation about shared interests might be a "heavy" connection (high weight). The average weighted degree of a person at the party would be the average strength, or weight, of their interactions.

So, if Alice has three deep conversations (with a weight of 3 each) and two brief greetings (with a weight of 1 each), her total interaction weight would be $(3\times3)+(2\times1)=11$. If she interacted with five people, her average weighted degree would be $11/5=2.2$. This average tells you not just how many people Alice interacted with, but it also gives a sense of how meaningful or significant those interactions were. A higher average weighted degree implies that a person was not just mingling with a lot of people, but also had more significant interactions on average.

From our analysis, it turns out that, on average, considering both the number and closeness of these connections, each person in the Network has about five significant connections. This gives us a sense of how tightly or loosely connected Network participants are.

Clustering Coefficient

The **clustering coefficient** in SNA is a measure that tells how closely knit certain groups, communities, or even cliques are within a network. Picture this as observing different circles of friends at a social gathering. How interconnected are these circles? If the circles do not connect, then you have isolated cliques at the gathering, and they do not intermix.

Calculating the clustering coefficient involves looking at each person and counting the existing connections between their immediate contacts. We then compare this to the total possible connections these contacts could have with each other. This calculation is averaged across the entire network. A higher clustering coefficient indicates that if you know two people, it is likely

they also know each other, forming a triangle of connections. On the network graph, you might see these clusters represented by groups of circles (organizations) closely interlinked.

This individual collaboration network has a clustering coefficient of about 25%, meaning that on average, there is a 25% chance that two of the connections of a person are also connections with each other. The implications of a higher or lower clustering coefficient vary based on the Network's goals. For a network focused on innovation and spreading new ideas, a very high clustering coefficient might not be ideal. This is because, in tightly knit groups, information tends to circulate within the group and may not reach other parts of a network as efficiently. For fostering innovation, networks want a balance, ensuring ideas can travel and inspire across an entire network.

In this case, a 25% clustering coefficient suggests a moderate level of interconnectedness. It is not highly clustered (where almost everyone knows each other), but it is also not completely dispersed (where hardly anyone knows each other outside their direct connections). This again highlights the important role that bridges play, as they help to span groups and support connection between them. Without bridges, groups can become isolated.

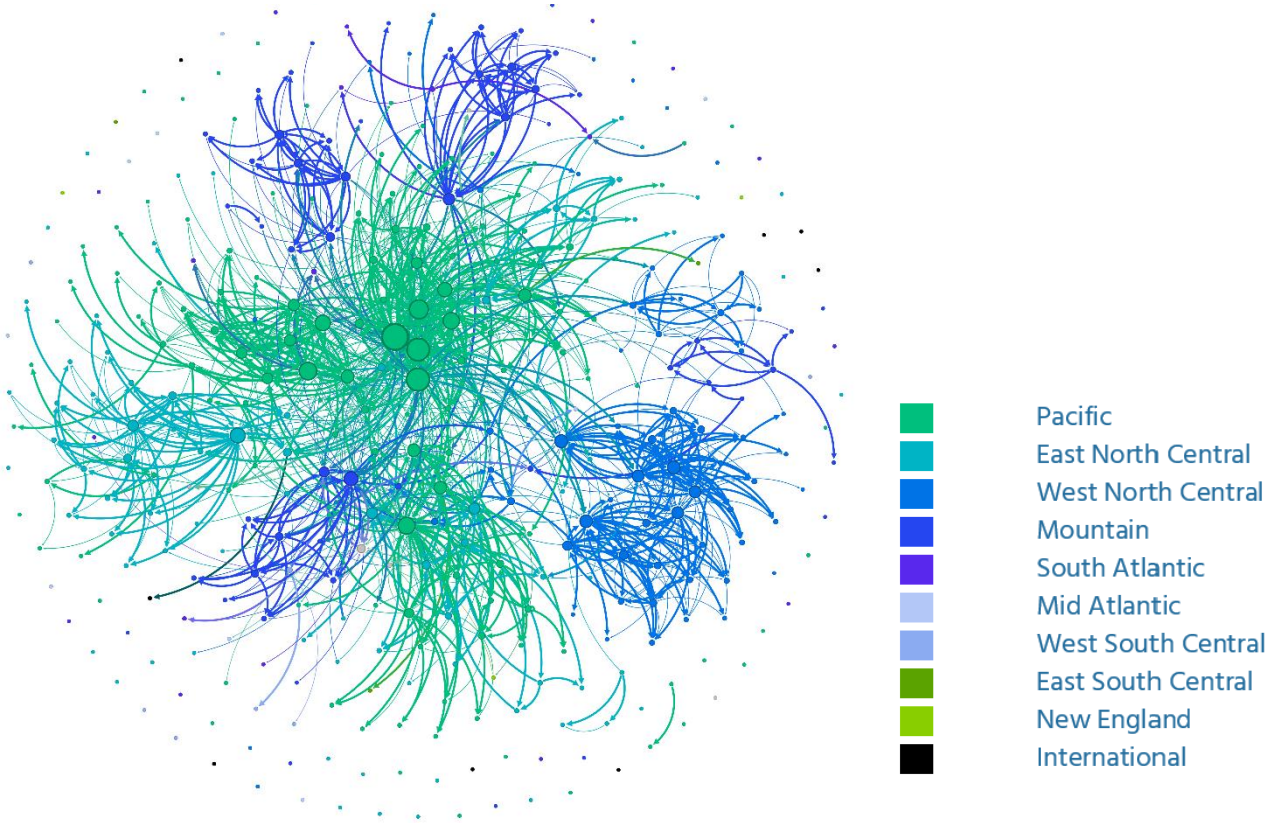
Individual Collaboration Network by Region

We also explored the regional dimensions of collaboration, using the same regional classification system as the U.S. Census. In Figure 4, colors signify the different regions (see the appendices for a list of organizations by region):

- **Pacific: Alaska, Hawaii, Washington, Oregon, California**
- **Mountain: Montana, Idaho, Wyoming, Nevada, Utah, Colorado, Arizona, New Mexico**
- **West North Central: North Dakota, South Dakota, Nebraska, Kansas, Minnesota, Iowa, Missouri**
- **West South Central: Oklahoma, Texas, Arkansas, Louisiana**
- **East North Central: Wisconsin, Illinois, Indiana, Michigan, Ohio**
- **East South Central: Kentucky, Tennessee, Mississippi, Alabama**
- **Middle Atlantic: New York, Pennsylvania, New Jersey**
- **South Atlantic: Maryland, Delaware, Washington D.C., West Virginia, Virginia, North Carolina, South Carolina, Georgia, Florida**
- **New England: Maine, New Hampshire, Vermont, Massachusetts, Connecticut, Rhode Island**

This visual approach helps us understand if there is a tendency for organizations within the same geographical area to collaborate more closely. As we look at the graph, distinct patterns emerge. First, in the **Pacific** region, there is a noticeable cluster, indicated by **sea green**. This suggests a strong regional collaboration and predominance. Moving our focus to the **East North Central**

Figure 4. Individual Collaboration Network, by Region



group, indicated by teal, we observe a pattern with a degree of diffusion, indicating that these organizations are more spread out within the Network, engaging with organizations in multiple regions. The same can be said for the **Mountain** group (**blue**), which shows collaboration with organizations and across regions. This highlights a level of cross-regional collaboration that breaks down geographical boundaries within the Network.

Finally, from this analysis, one clear takeaway is the prominent role of regional collaboration, particularly in the Pacific. Larger organizations exhibit greater centrality and connectivity within the collaboration network, primarily because they involve multiple individuals compared to the one or two representatives typical of smaller organizations. While collaboration with smaller organizations exists, larger organizations are prominent in the collaboration network. Two of the larger organizations involved in fostering empathy for wildlife are in the Pacific region. Thus, it is not surprising that the Pacific region is strongly represented in the organizational collaboration network. While large organizations are prominent in the Network, the regional collaboration dynamic does not only exist for the Pacific. Across the Network, collaboration is strong within individual organizations, followed by collaboration that is strong within regions. Yet, the presence of cross-regional collaboration is also evident, showcasing a Network that is both locally grounded and interconnected across regions.

A Note About the Influence of Large and Small Organizations in Social Network Analysis

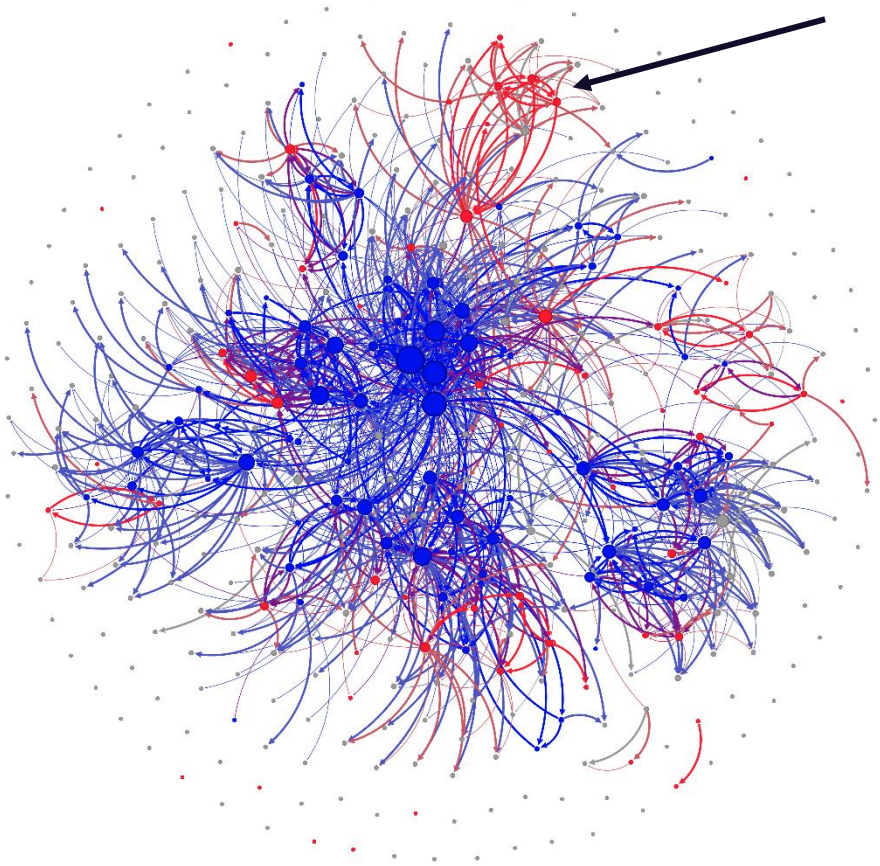
SNA inherently reflects the actual structure and dynamics of relationships within the Network. Larger organizations, by virtue of having more representatives, naturally have more connections and greater influence within this structure. These connections and their centrality metrics are direct measurements of their actual engagement and roles within the Network.

One might wonder if SNA data could be or should be adjusted to equalize larger organizations and smaller organizations. In fact, adjusting the data to artificially balance the influence between large and small organizations would misrepresent these real-world interactions and could obscure key insights into how information and collaboration flow through the Network. Such an adjustment would not only alter the factual accuracy of the data, but also undermine the purpose of the analysis, which is to understand and visualize the genuine patterns and power dynamics within the Network. (See additional information about bias due to survey responses in the appendices.)

Individual Collaboration Network by New Collaboration

Next, we explored whether being part of the ACE for Wildlife Network led to new collaborations aimed at fostering empathy for wildlife (Figure 5). The responses were revealing: 51.8% (n=73) of survey respondents affirmed that their participation had resulted in new collaborations, represented by **blue** on the visualization. Conversely, 42.6% (n=60) did not report new collaborations, indicated by **red**. 5.7% (n=8) of the respondents chose not to answer this question.

Figure 5. Individual Collaboration Network by New Collaboration



When we look at the distribution of responses across the Network's graph, a pattern emerges. Generally, those with a higher number of connections, or the more highly connected respondents, were more likely to respond positively, suggesting that increased connectivity within the Network might be linked to a higher likelihood of engaging in new collaborative efforts. This is evident from the positioning of the blue dots, primarily located among the more interconnected areas of the Network.

This dynamic is not universal, however. Note the organization in the top middle area of the graph that is colored **red** (see the arrow in Figure 5), indicating that most respondents from that organization said participating did not result in new collaboration. While SNA is not able to tell us why these individuals are not experiencing new collaboration, the AE Team was able to explain: The individuals connected with this organization were new to the Network and had not yet had ample opportunities to develop new collaboration.

Also, the periphery, which symbolizes unconnected and less connected individuals is comprised of **red** and **gray** dots. The **red** indicates a negative response, while the **gray** signifies non-respondents or those who did not take the survey.

So, what can we infer from this? Altogether, it appears that having stronger and more numerous connections within the Network relates to an increased likelihood of engaging in new collaborations related to empathy for wildlife. Thus, fostering more and stronger connections within the Network could potentially lead to more collaborative projects and initiatives.

A Note About the Periphery

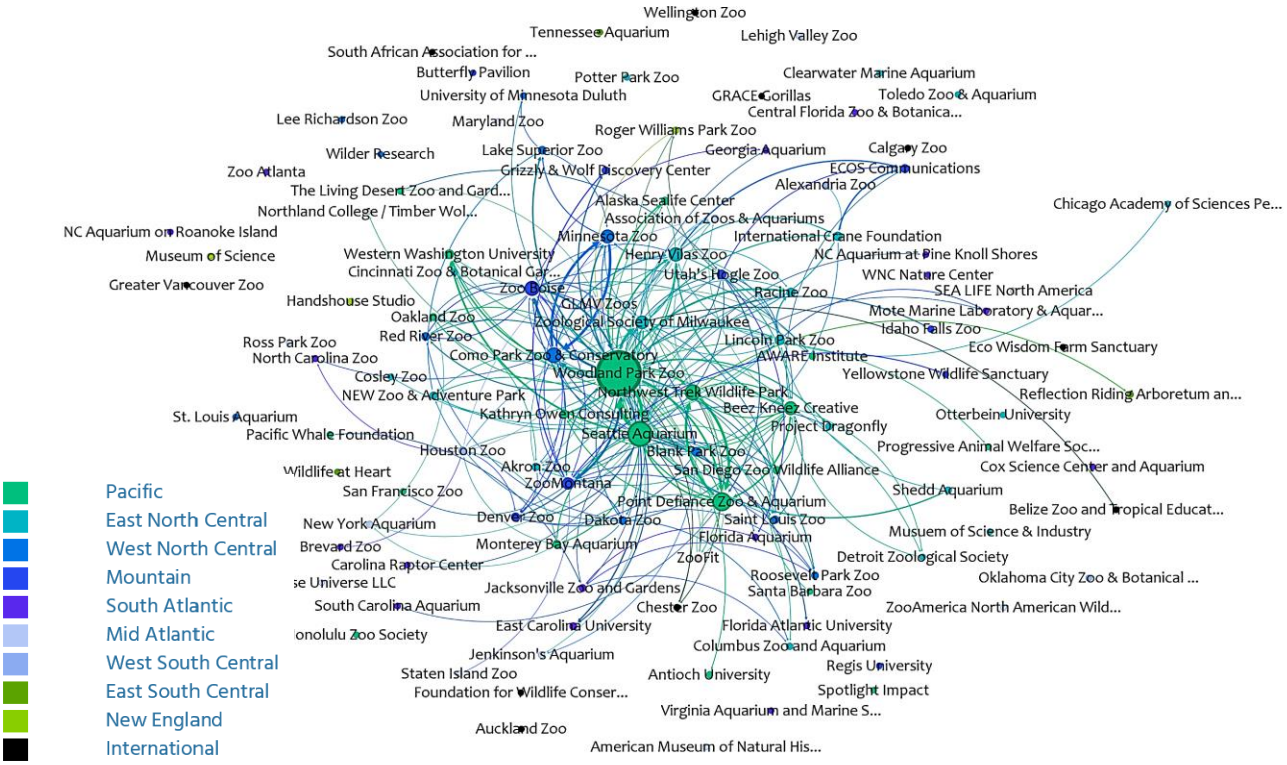
All these graphs reveal some intriguing outliers. Around the periphery, we have what look like rings or orbits, representing individuals who did not name any connections in the survey *and* were not named by others as connections. It is important to note that this does not necessarily mean they lack connections. There are two possible scenarios that led to someone appearing as a gray dot: (1) Not taking the survey and not being named as a connection by survey respondents, or (2) completing the survey, naming no connections, and not being named as a connection by other survey respondents.

Photo by Luca Ambrosi on Unsplash

Organizational Collaboration Network

Next, we shifted focus to examine responses to collaboration network questions at the organizational level. In Figure 6, instead of circles representing individuals, circles represent organizations. The lines still signify self-reported collaborative connections—this time between organizations. The colors represent regions, enabling identification and understanding of cross-regional collaborations. As we saw in the individual collaboration network graph, Figure 6 highlights a notable presence of Pacific organizations and reveals cross-organizational collaboration.

Figure 6. Organizational Collaboration Network



Our understanding of regional collaboration is affected by survey participation. Table 2 compares the percentage of survey respondents to Network participants by region. No Network participants from **New England** or **international** organizations completed the SNA portion of the survey, and **international**, **Middle Atlantic**, and **South Atlantic** organizations are underrepresented in the survey data. **West North Central** organizations and, less so, **Pacific** organizations, are overrepresented. Still, the survey data and graph represent regions fairly well. While the **West North Central** region is overrepresented in the SNA data by almost 6%, most regions are overrepresented or underrepresented by insubstantial margins. Also, each Network participant had an equal opportunity to be named as a collaborator by each survey respondent, regardless of whether they themselves completed the survey. So, even an organization that

produced no survey participants could have been named as a collaborator by survey respondents.

Table 2. Survey Respondents Versus Network Participants by Region

	% Survey Respondents	% Network Participants	Over- or Under-Representation in SNA
West North Central	22.4%	16.5%	+5.9%
Pacific	35.7%	33.0%	+2.7%
International	0.0%	2.7%	-2.7%
East North Central	20.3%	22.1%	-1.8%
South Atlantic	3.5%	5.3%	-1.8%
Middle Atlantic	0.7%	2.4%	-1.7%
New England	0.0%	0.8%	-0.8%
West South Central	2.1%	1.9%	+0.2%
Mountain	14.7%	14.6%	+0.1%
East South Central	0.7%	0.8%	-0.1%

Network Statistics

- **Diameter**: 6 (Compared with the individual collaboration network's diameter of 9, in this Network, fewer connections are needed to connect across the entire Network.)
- **Average Path Length**: Similarly, the average path length for organizations is shorter, at 2.8, compared to 3.4 for individuals. It means that, on average, an organization needs to connect through about three other organizations to reach any other participant in the Network.
- **Density**: The density of this organizational network is 0.02, slightly higher than the 0.01 of the individual network. This indicates a greater proportion of actual connections among organizations compared to possible connections.
- **Average Weighted Degree**: The average weighted degree for organizations is 11.7, up from 5.2 for individuals. This implies that, on average, organizations report being collaboratively connected to almost 12 other organizations, considering both regular and occasional interactions.
- **Clustering Coefficient**: Lastly, the clustering coefficient sees a marginal increase from 0.25 to 0.26. This slight increase is too small to be meaningful.

Findings about Collaboration

During the 27 interviews, participants that were involved in collaborations (20) reported that pathways to organizational engagement were both independent and facilitated by the ACE for Wildlife Network.

- Independent pathways to collaboration
    - Direct contact with individuals previously connected through the ACE for Wildlife Network or other professional networks
    - Direct contact with participants of their own institutions
- Pathways to collaboration facilitated by the ACE for Wildlife Network
    - Through ACE for Wildlife Network events (e.g., Empathy Summits, learning groups)
    - Through the Building Organizational Capacity to Foster Empathy for Wildlife Granting Program (hereafter, Capacity Building Granting Program)
    - Through ACE for Wildlife Network committees

Collaborations that were internal and regional tended to be guided by independent pathways, while collaborations that were cross-institutional beyond region tended to be facilitated by the ACE for Wildlife Network.

Participants engaging in internal collaborations (10) reported working with co-workers in their departments, while one person mentioned cross-departmental interactions. Types of collaborations included conference panel proposals, evaluation, training and guide development, workshop delivery, programming, and signage development. Three people mentioned being supported by the Capacity Building Grant Program for these internal projects.

Participants engaging in regional collaborations (5) reported reaching out to specific people with similar roles or projects/programs in their area. Types of collaborations included regional projects, training development, grant and report writing, brainstorming and exchanging of resources, and site visits. One person was appreciative that a Capacity Building Grant was going to support a site visit with a neighboring zoo.

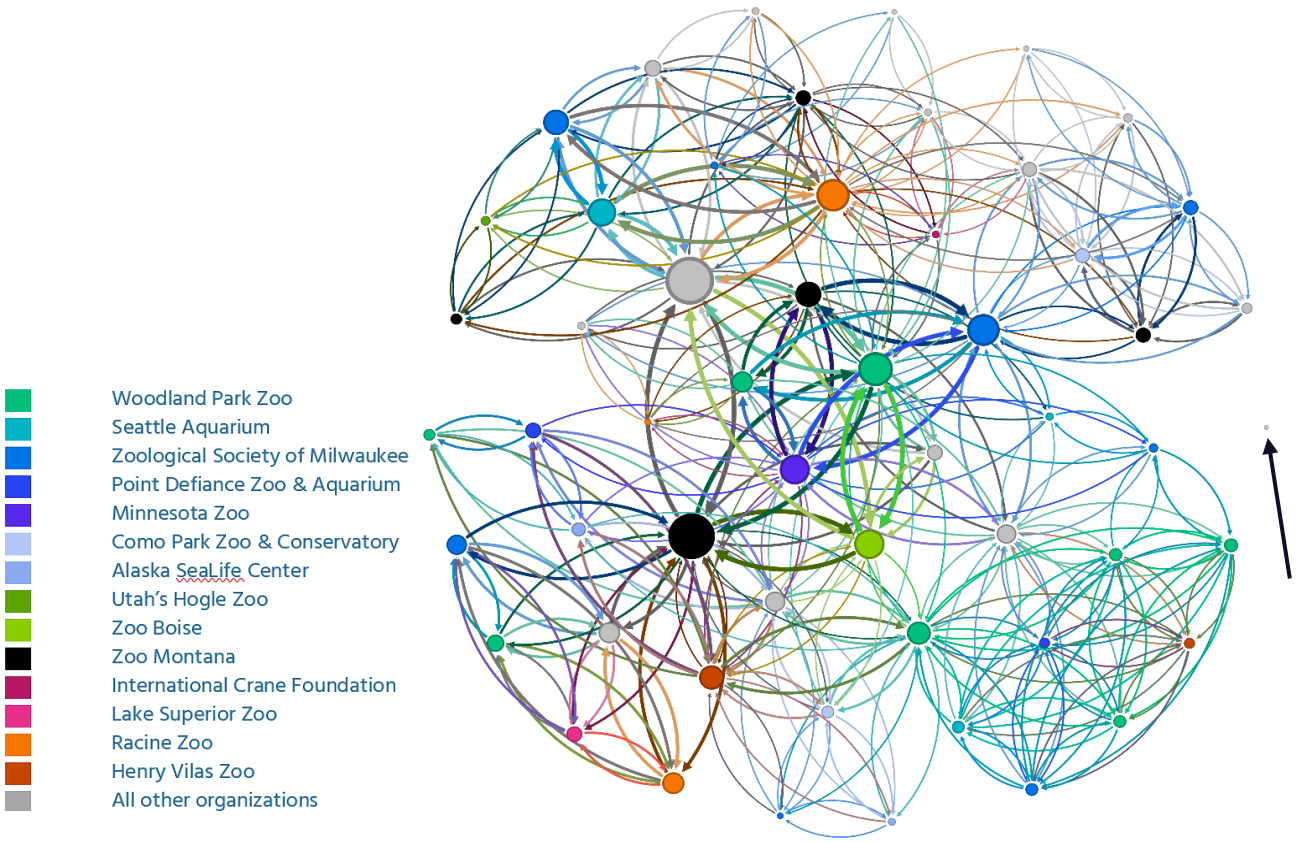
Participants engaging in cross-institutional collaborations (13) beyond their regions primarily connected with others through the ACE for Wildlife Network and other professional networks. Types of collaborations included brainstorming and exchanging of resources, ACE for Wildlife Network committee tasks, and conference panel proposals. Two people supported by Capacity Building Grants worked with Network participants outside of their institution and region on evaluation, an interpretive master plan, a program development roadmap, and training.

Equally noteworthy are the organizations lingering on the periphery of the network graph. These are organizations that either did not participate in the survey or were not mentioned by other respondents. While some of these may be relatively new participants without ample time to engage, this situation presents an opportunity for the AE Team, which can consider whether these peripheral organizations wish to be more actively involved or identify potential bridging roles within them. Could there be untapped synergies or common interests that the AE Team could use to help foster connections?

Committee Network

In exploring another aspect of the Network, Groundswell Services focused on the collaborative connections fostered through Woodland Park Zoo's coordination of Network committees. This brings us to a graph that visualizes the committee-based interactions within the Network (Figure 7).

Figure 7. Committee Network



In this graph, each circle represents an individual, and the lines connect those who attended the same committee meetings. The colors denote different organizations (which are the same as the colors used in the prior network maps). The larger the circle, the more committee interactions an individual has had. The thicker the line between circles, the more frequent their joint committee attendance.

As we step back for a broader view, the graph resembles a wreath with different "flowers" of activity, each representing a committee. These "flowers" are not totally isolated; they interweave, showing some cross-committee interactions, which prevents a perfect, distinct pattern. This indicates that while committee representatives primarily connect within their own groups, there is connection between committee participants.

On the periphery of the "wreath," we see an isolated dot (see straight arrow pointing at the dot). This dot represents an individual who became a committee representative just a month before data collection for the SNA concluded and thus had not yet attended meetings.

A striking observation is the significant number of cross-organizational connections. While committees are essentially internal collaborative units, they seem to serve as a nexus for inter-organizational connection, potentially fostering broader connections that extend beyond the confines of individual committees. This is particularly evident when contrasted with the individual collaboration network, which is so intra-organizationally focused. In this committee-based graph, there is not a single dominant organizational color, suggesting a rich tapestry of intermixing and collaborative diversity.

Network Statistics

- Diameter: 4
- Average Path Length: 2.5
- Density: .002
- Average Weighted Degree: 3.8
- Clustering Coefficient: .59

Ten interviewees reported being on committees at the time the survey was deployed, including four with high levels of connection, four with medium levels of connection, and two with low levels of connection. (Note that the two with low levels did not name committee representatives as collaborators.) Interviewees indicated that committees promote cross-institutional collaborations among Network participants. One person noted about participating on a committee, "That's where I've built a lot of the long-term friendships that go past just professional relationships…where I feel comfortable enough to…reach out to them very informally." Another person appreciated that AE Team coordinates the monthly committee meetings, facilitates conversations, and takes notes, emphasizing that this makes it feasible for

"That's where I've built a lot of the long-term friendships that go past just professional relationships."

–Interviewee

them to participate alongside their full-time job responsibilities. This person said that with the AE Team's support, "I'm able to focus more on the work that the committee is doing, as opposed to also doing the logistics of the committee."

In summary, committees are not just internal working groups; they are catalysts for cross-organizational collaboration. The AE Team plays a critical coordinating role.

Evaluation Question 2: How does empathy-related **information and learning** spread through the Network?

To answer this question, Groundswell Services reviewed Network participation data, utilized the ACE for Wildlife Network survey, and conducted key informant interviews. We studied four networks, with the following boundaries:

1. An individual information-sharing network generated by ACE for Wildlife Network participants
2. An organizational information-sharing network generated by ACE for Wildlife Network participants
3. A discussion board network generated by the AE Team that generates information-sharing
4. The events network generated by the AE Team

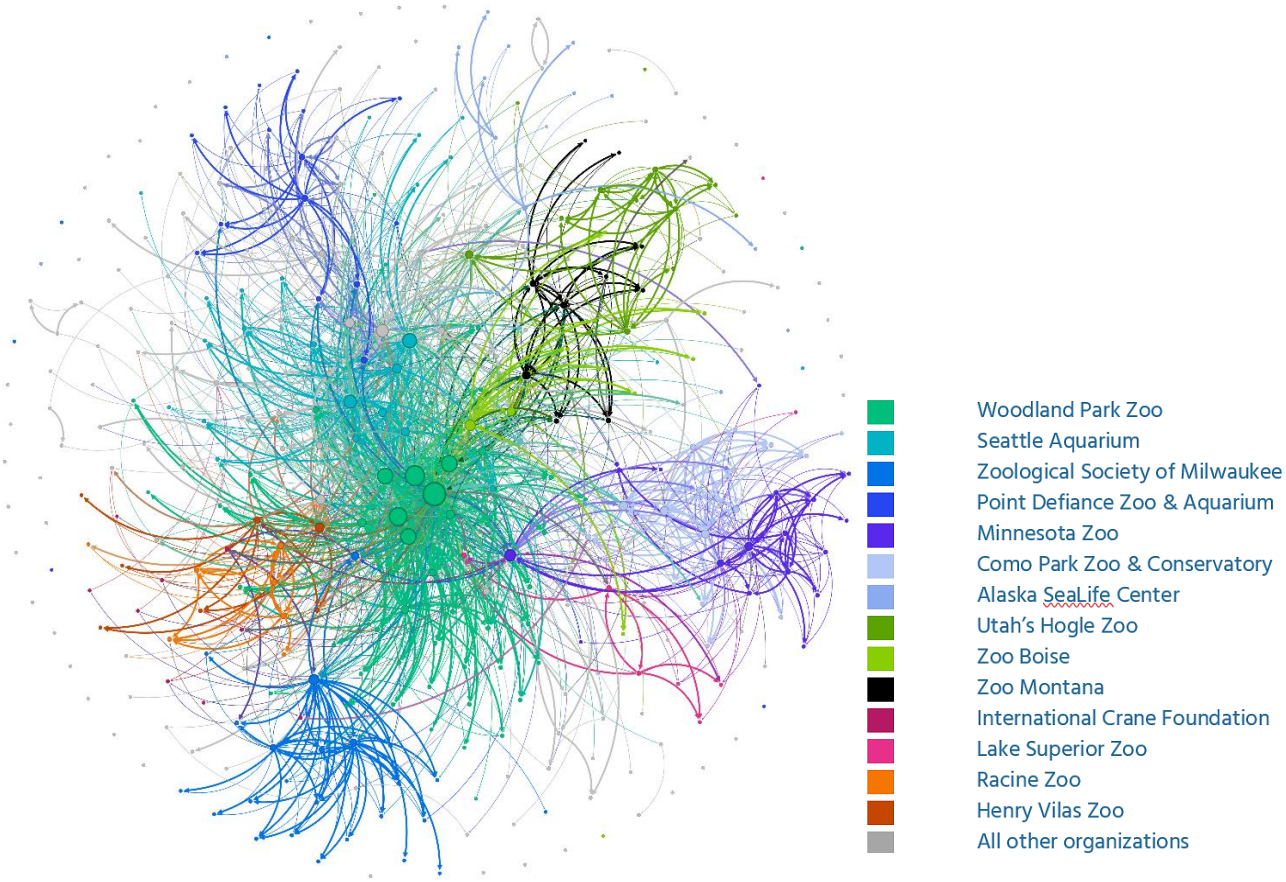
The Bottom Line

- More information-sharing than collaboration is occurring across organizations.
- More information-sharing bridges are active in this information-sharing network.
- Survey respondents reported they are trying new things because of what they have learned from others in the Network.
- Discussion board participation is relatively low, though people report valuing it for different reasons. Interviewees encouraged the AE Team to continue playing a catalyzing role with the discussion board. In fact, interviews with low-connection participants revealed that people may be satisfied with simply accessing resources through the Network without the need for connection with individual people.
- People are exposed to information, learning, and possible collaborative and information-sharing with others through events, and this is a key way information is shared.

Individual Information-Sharing Network

Figure 8 portrays the regular or occasional information-sharing connections reported by Network participants who completed the ACE for Wildlife Network survey. The density of this network, when compared to the individual collaboration-sharing network discussed earlier, is immediately noticeable. This is evident in the sheer number of connections, thicker lines, and less white space on the graph. There is also less isolation, as we see fewer people on the periphery and more people connected within the network's core.

Figure 8. Individual Information-Sharing Network



Each circle on the graph represents an individual, with size reflecting their weighted degree—essentially, how many people each respondent said they shared information with, and how many named them as a source of information, accounting for whether the sharing was occasional or regular.

According to interviewees, Network participants have shared information including research articles, empathy guides and toolkits, evaluation reports and tools, factsheets, interpretive plans, lesson plans, program information, grant and Network opportunities, signage, training information, and general ideas about these topics.

Looking at Figure 8, you will notice several key individuals acting as bridges within their organizations and across the Network. Their connections extend in various directions, indicating their role in spreading information further. Unlike the collaboration network, where bridges were more defined, this network shows a greater number of individuals facilitating information flow. It is these connections that keep the Network vibrant, ensuring that information does not just stay within one group but permeates throughout.

Network Statistics

- Connections: 1,869
- Diameter: 6
- Average Path Length: 2.9
- Density: .013
- Average Weighted Degree: 6.6
- Clustering Coefficient: .22

The network's diameter suggests a more closely connected web of information-sharing. The density also indicates a more connected network, with potential for more information-sharing. The clustering coefficient of 22% suggests some organization-based clustering but also points to considerable cross-organizational sharing. Visually, this network might seem a bit chaotic, but the numbers and image together show a rich tapestry of information exchange, with multiple bridges and pathways through which information flows.

Interviewees shared information with individuals within their own institutions, with external Network participants, and with people outside of their organizations or the Network. The main pathway to information-sharing was through direct contact. Six interviewees mentioned utilizing their organization's Network point of contact or a more active participant as a bridge. Also, seven interviewees reported sharing information with individuals during Network events.

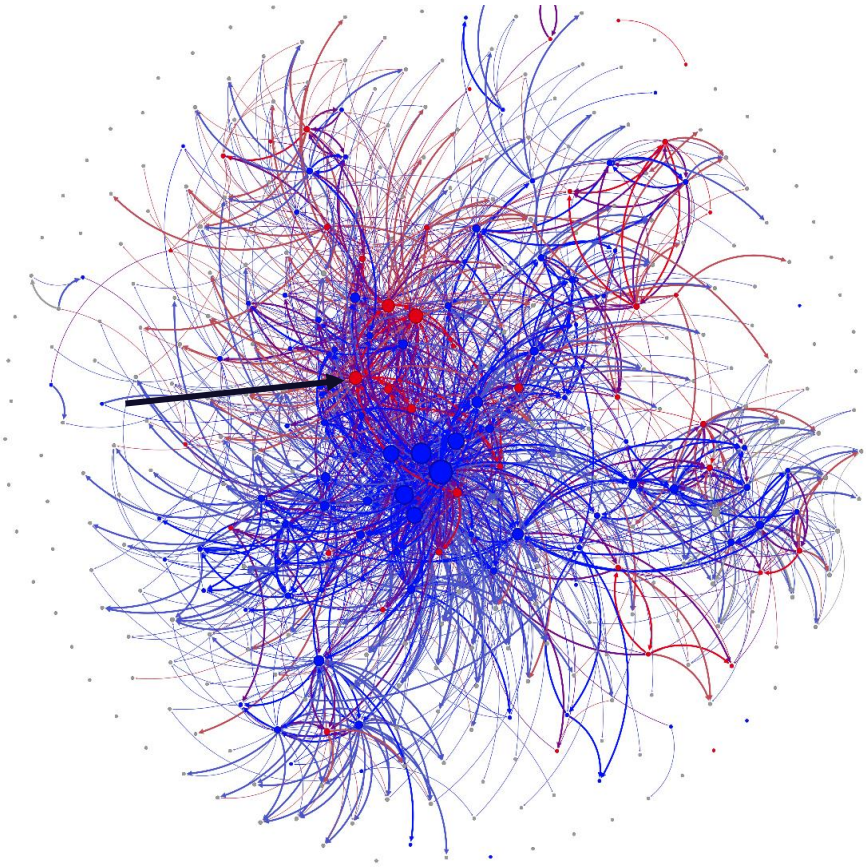
Members indicated that they are encouraged to share information with others to exchange knowledge on effective practices and not reinvent the wheel or hoard resources. Some participants believe that this information-sharing helps to advance the field of conservation through empathy for wildlife and its professionals. Additionally, a few participants mentioned that information-sharing also allowed them to get feedback on their work.

In summary, this network demonstrates that through multiple bridges and a multitude of pathways, empathy-related information reaches most of the Network's participants.

Individual Information-Sharing Network by Instituting Something New

Next, we explored whether being part of the ACE for Wildlife Network led to new information-sharing connections. In the survey, we inquired whether participants had implemented any changes or introduced new practices related to fostering empathy for wildlife because of their involvement in the Network. 70% answered affirmatively. In the visual representation of these responses (Figure 9), those who said "yes" are marked in **blue**, while the "no" responses are in **red**.

Figure 9. Individual Information-Sharing Network by Instituting Something New



This visualization surfaces a relationship between network connectivity and changes in practices. A closer examination reveals that individuals who were more connected within the Network—those with numerous and stronger connections—were more likely to have responded with a "yes." Thus, being well-connected in the Network seems to positively influence the adoption of new practices or changes in approach toward fostering empathy for wildlife.

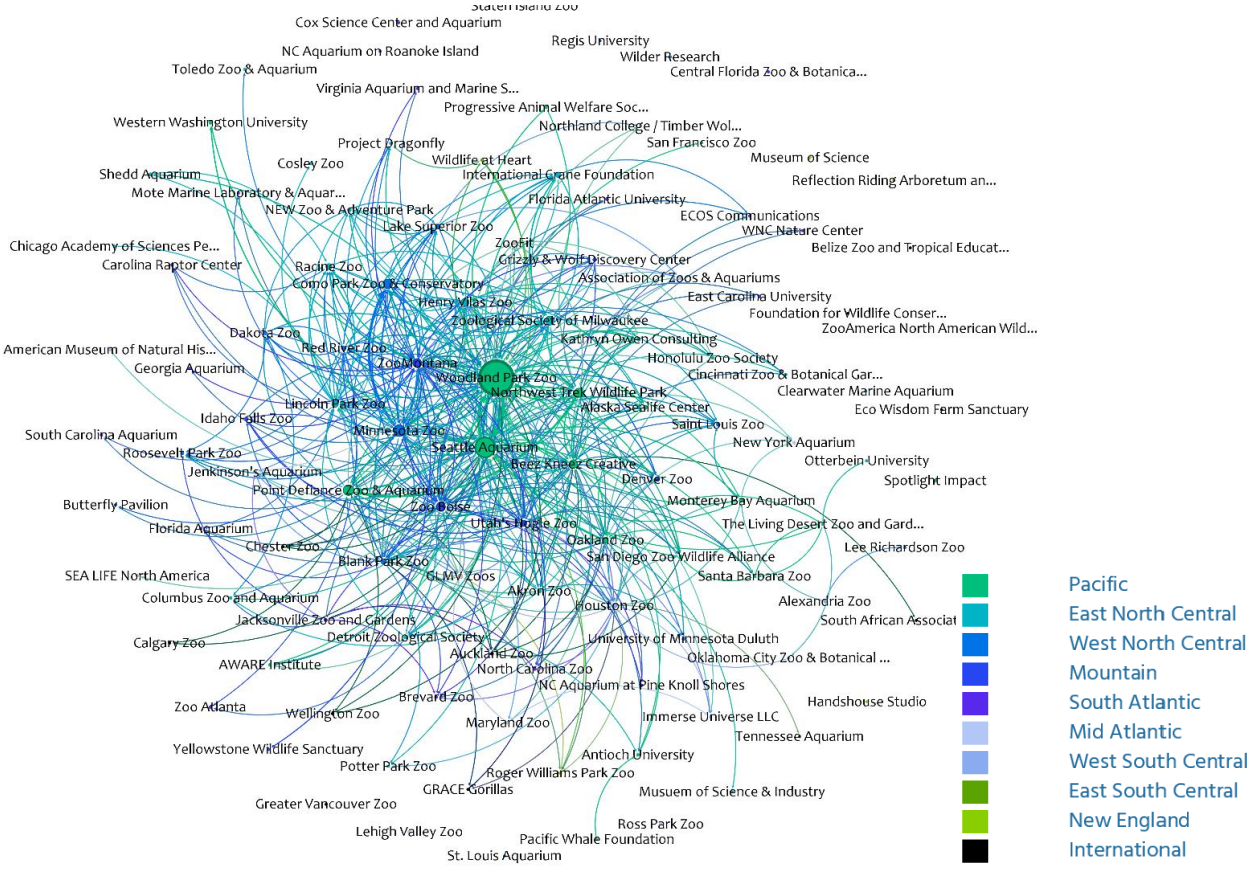
The other relationship that the graph reveals is one between organization and adoption of new practices, though this relationship does not appear to be as consistent as the relationship between connectivity and new practice adoption. The relationship can be seen most prominently in the **blue** grouping at the center of the graph and in the **red** grouping just above and to the left of the graph's center where the arrow indicates. Most—though not all—of the people from that organization said "no" to the question. A comparison to the graph in Figure 8 confirms most (not all) of the red in that area comes from one organization that is known for being an experienced leader and teacher of empathy for wildlife practices.

Organizational Information-Sharing Network

Next, we looked at information-sharing from an organizational perspective (Figure 10). In this view, circles on the graph represent organizations instead of individuals, with lines indicating self-reported information-sharing connections between these entities. The colors now signify different regions.

Notable in this graph is the evidence of extensive cross-regional information-sharing. The overall picture is one of diverse connections across various regions. Notably, the **Pacific** region comprises the largest portion of the Network, but the **East** and **West North Central** regions, along with the **Mountain** and **East South Central** regions, are all well-represented in this information-sharing graph.

Figure 10. Organizational Information-Sharing Network



Also interesting is that despite this diversity, certain organizations within each region emerge as primary hubs of empathy-related information-sharing. This is particularly evident in the **Pacific** region, where a few central circles are highly connected, their lines reaching out across the Network. An AE Team member pointed out that this may be partially explained by the fact that the Seattle Aquarium offers empathy training that many Network participants have used.

Despite this, other regions display prominence as well, with multiple organizations acting as major nodes in the information-sharing Network.

Network Statistics

- 1,869 connections
- Diameter: 6
- Average path length: 2.9
- Density: 0.012
- Average weighted degree: 6.4
- Clustering coefficient: .22

Our initial hypothesis was that information-sharing would be more region-centric, similar to how collaboration tends to be organization-centric. But this graph paints a different picture: Information is flowing across regions, not just within them. This indicates a healthy level of exchange beyond geographical confines, which is a positive sign for the Network's reach and impact in fostering empathy for wildlife. While individual key players bridge connections at a personal level, on an organizational scale, we see certain organizations taking up the role of information brokers, not just within their regions but across the entire Network. This dynamic interplay of regional and cross-regional sharing challenges assumptions and showcases the Network's reach.

Individual Information-Sharing Network via Discussion Board

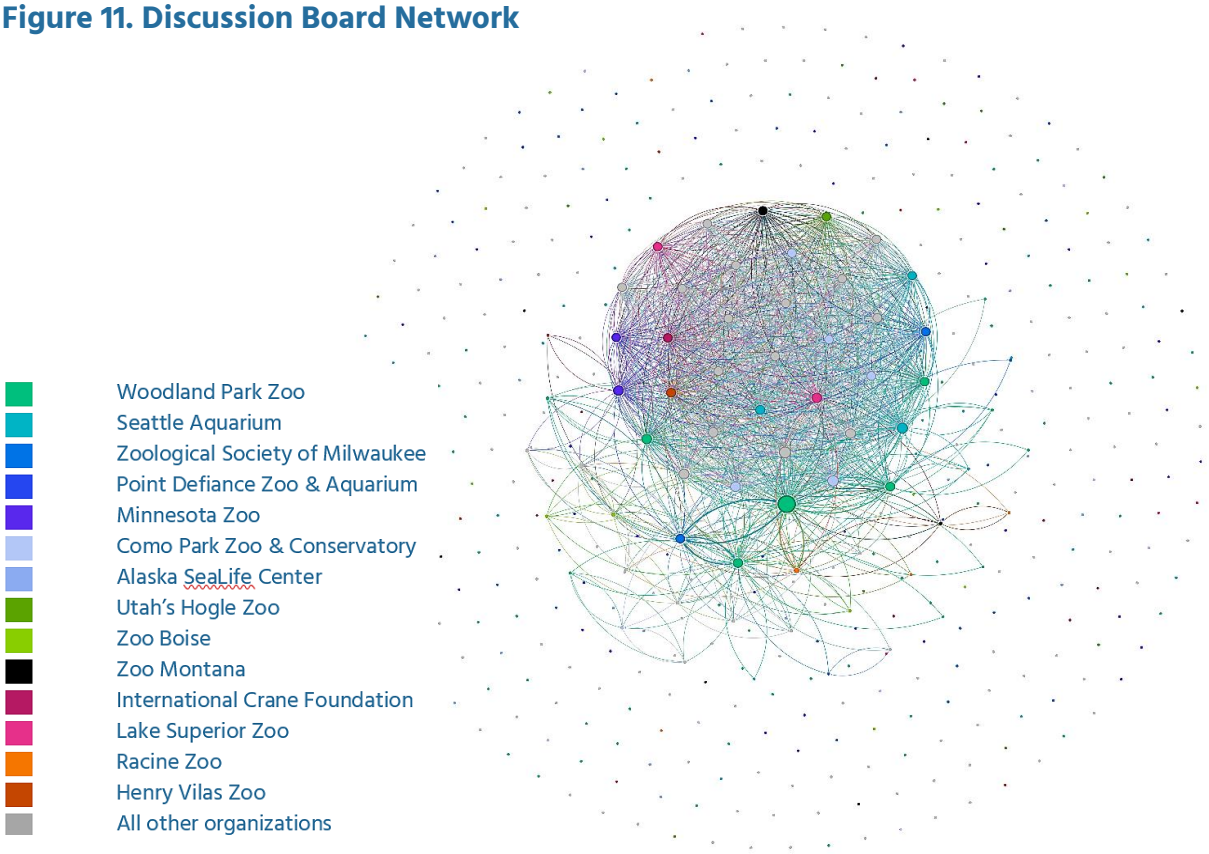
The discussion board is one element encouraging information flows through the ACE for Wildlife Network. In Figure 11, circles represent individual participants, and lines denote connections made via discussion board posts. A connection is established when someone initiates a post and another responds, or when someone engages by responding to an existing post.

These connections show how participants interact on the discussion board. Those who are more centrally located in the image are more actively engaged. Each individual's circle size reflects the extent of their participation in discussions. For instance, if I post something and "Katie" responds, that forms a connection. The more we interact on the board, the thicker the line between our circles becomes. In essence, the thicker the line, the more robust our engagement in discussion.

A quick glance at the network reveals a somewhat "jellyfish" structure. At the top of the image, resembling the "head" of the jellyfish, is a dense cluster of connections. From discussions with the AE Team, this represents the initial surge of activity when participants were encouraged to introduce themselves on the board. The size and density of this cluster suggest that most participants engaged equally in this initial phase, hence the balanced spread of connections with circles the same size. It is a cross-organizational, dense cluster reflecting that first burst of engagement.

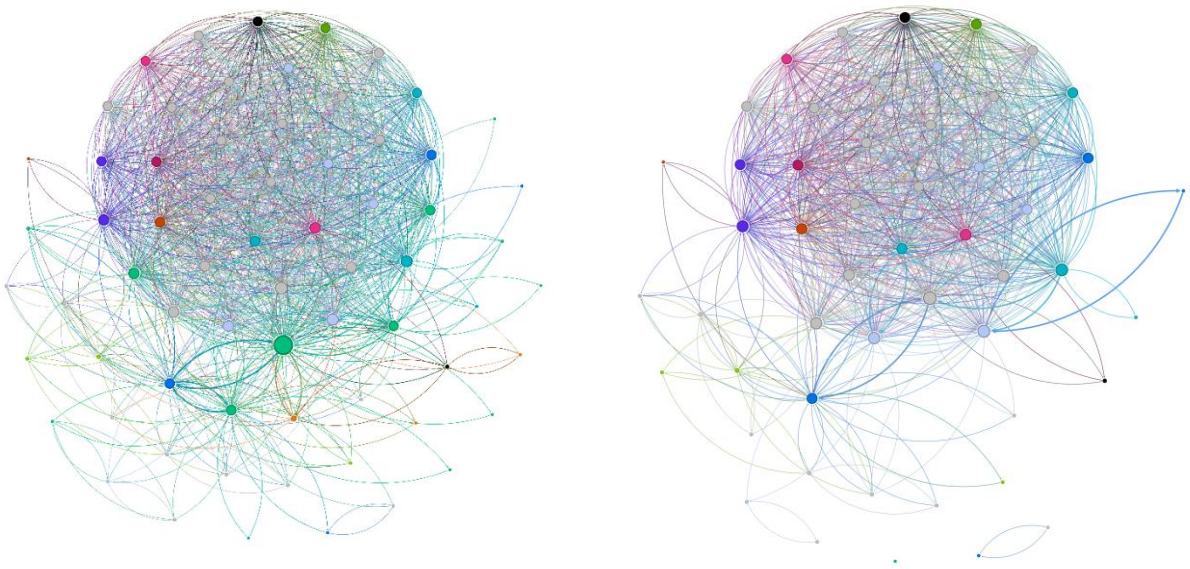
The "tentacles" emanating from this head represent other, subsequent discussions on the board. The many unconnected dots around this structure indicate Network participants who have not posted or commented on the discussion board.

Figure 11. Discussion Board Network



Because most people in the Network did not participate in the discussion board conversations after the initial introductions, Figure 12 portrays only discussion board participants (having removed non-participants). The graph on the right shows the discussion board when all Woodland Park Zoo participation is removed. While not all Woodland Park Zoo participants are members of the AE Team, all participants from Woodland Park Zoo were removed because of the influence the AE Team has on all Woodland Park Zoo staff.

Figure 12. Discussion Board Participants (Left) and Without Woodland Park Zoo Staff (Right)



Network Statistics (Discussion Board Participants Only)

- 1,451 connections (When we remove WPZ staff, connections drop to 1,076.)
- Diameter: 4
- Average path length: 1.8
- Density: 0.33
- Average weighted degree: 23
- Clustering coefficient: .81

These statistics indicate that users of the discussion board became quite closely connected despite the geographical distances separating them. A diameter of four means it would only take about four steps to connect with anyone else involved in the board. The average path length and density also suggest close connections among active participants. Average weighted degree is also quite high, indicative of a high degree of interaction among the proportionately high number of Network participants. A high clustering coefficient of 0.89 is observed, mainly due to the concentrated activity around the initial introductions, which makes sense visually given the prominent central cluster.

This analysis shows that while there was an initial burst of activity and connectivity on the discussion board, sustaining this level of engagement appears to be a challenge. It underscores the need for continuous efforts to keep the Network participants engaged and connected through the discussion board.

It also raises a vital question for the Network's strategy on the discussion board: What role should the AE Team play? Their active participation clearly drives much of the discussion and engagement, but there is a balance to be struck to ensure a self-sustaining and organically

interactive community. This finding underlines the importance of Woodland Park Zoo's involvement in fostering a dynamic and connected Network, while also encouraging independent interactions among other Network participants.

Some interviewees suggested using the discussion board to directly share information or to find people to collaborate with. They found Network emails summarizing discussion board activity helpful to stay updated on what people are working on. However, other participants noted that the discussion board did not seem very active and believed it to be more useful for resource sharing rather than as a tool for conversation. Some participants reported not feeling comfortable sharing information to the entire Network or not understanding the "rules of engagement," including what was appropriate to post, when to post, and how often to post. A couple of interviewees discouraged the use of the discussion board entirely. The AE Team mentioned the existence of a Code of Conduct and are considering adding it to the discussion board to make it more accessible. See the "Challenges and Recommendations" section for information on possible discussion board improvements.

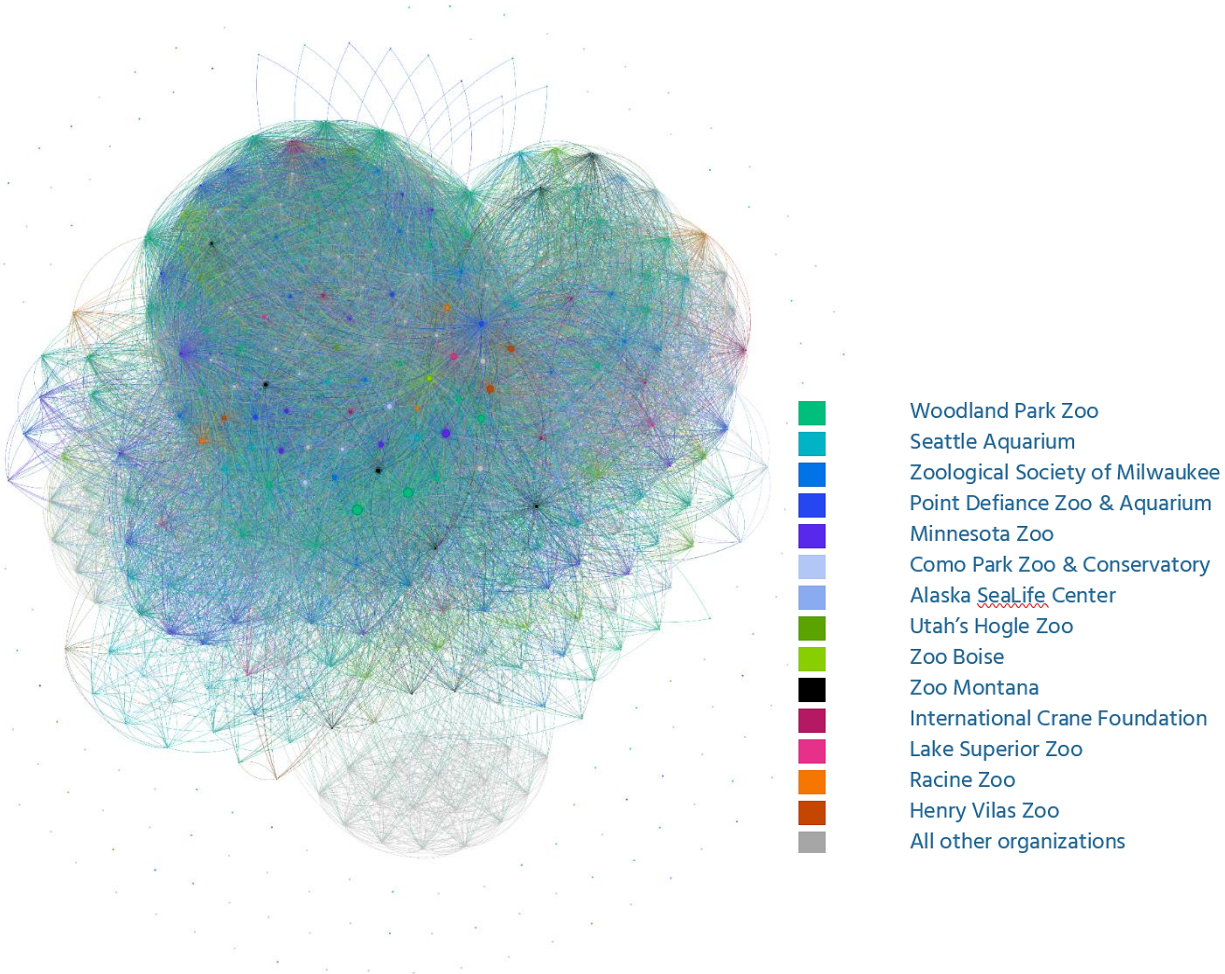
Individual Information-Sharing via Events

Next, we examined the information-sharing network created through events, which have been pivotal in disseminating information across large segments of the Network. Figure 13 portrays this network, and it is striking in its density and distinctive structure. The center is particularly dense, radiating outward to more sparse connections. There is even a noticeable crown-like feature at the top.

The prominent, larger central ball likely represents the annual meetings that attract a wide attendance. Another distinct cluster, the gray ball at the bottom, caught our attention due to its unique characteristics. Upon further investigation, it turned out this cluster represented an event to facilitate feedback on a specific toolkit. Intriguingly, the participants represented by the gray ball at the bottom of the graph seem to have attended this event exclusively, with limited overlap with other Network events. Similarly, at the top of the network, the "crown" part of the image, we observe a pattern of individuals who attended one event.

In this graph, circles represent individuals, and lines indicate connections formed through shared attendance at events. For example, if both "Katie" and I attended the same event, a line connects our circles. The closer a circle is to the center, the more strongly connected it is within this network. The size of each circle grows with the number of events attended in common with others. So, the thicker the line between any two circles, the more events those two individuals have attended together. Similarly, the larger a person's circle, the more they have attended events with others.

Figure 13. Events Network



Network Statistics

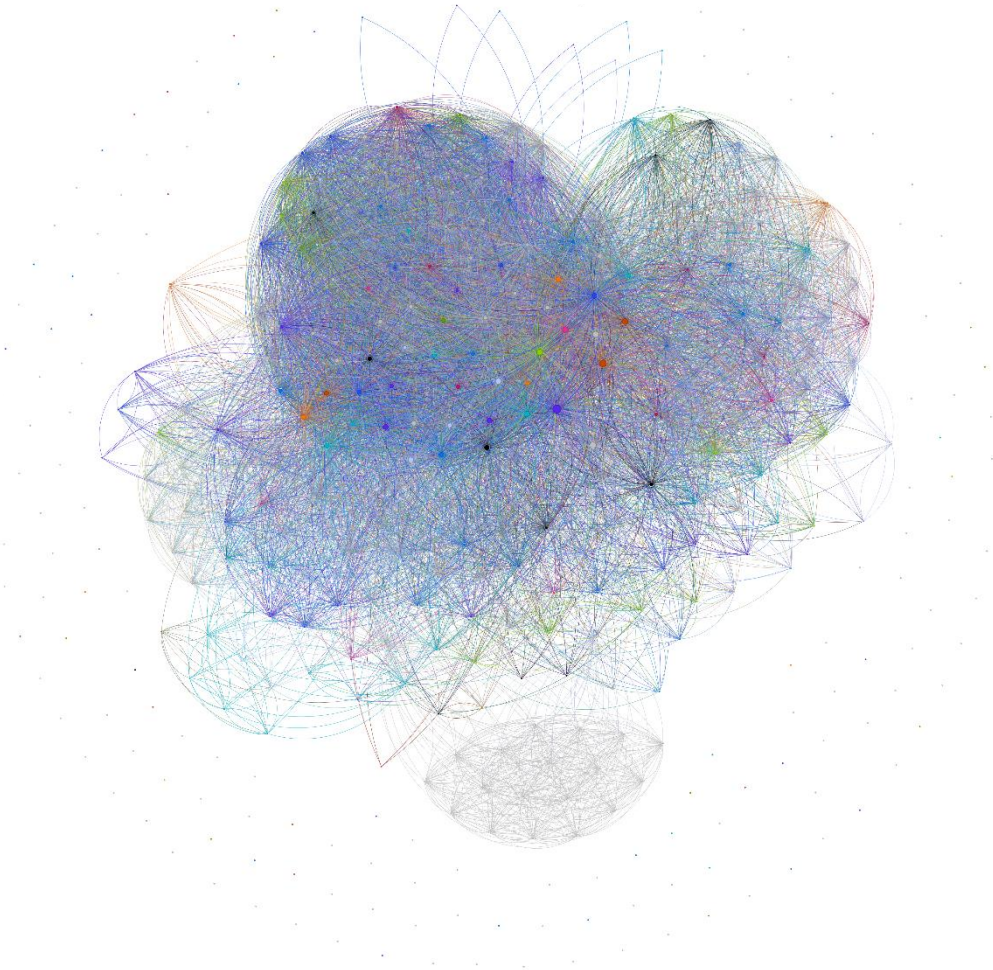
- 19,701 connections
- Diameter: 3
- Average path length: 1.8
- Density: 0.1
- Average weighted degree: 57.6
- Clustering coefficient: .71

Through these events, the Network has facilitated 19,701 connections. The density is higher at 0.1, which is more than what we have seen in other parts of the Network. This suggests that 10% of possible connections have been realized through events. The average weighted degree is a substantial 57.6, pointing to frequent and repeated interactions among attendees over the past five years. Lastly, the clustering coefficient is 0.71, aligning with our understanding of how individuals attended specific events.

We also analyzed the specific impact of WPZ participants on the Network, particularly regarding event participation. The difference is noticeable (Figure 14): With WPZ included, the Network

shows 19,701 connections. However, when we exclude WPZ's participation, the number drops to 12,413 connections. The effect can be seen in the change in the events graph (Figure 14) without WPZ, which highlights the active and regular involvement of their staff in various Network events.

Figure 14. Events Network without Woodland Park Zoo Participation



The events provide space for considerable exposure to different organizations as well, seen in the vibrant mix of colors. This not only enhances connectivity but also reinforces the strength and reach of the shared learning experiences. Overall, the network visualization of event participation paints a picture of a dynamic and diverse landscape. Network events draw many participants and foster engagement and repeated interactions among participants. Different events also attract different subsets of the Network, creating varied patterns of connection and engagement. These insights offer a deeper understanding of how events serve as crucial opportunities for cross-organizational interaction and information dissemination within the Network.

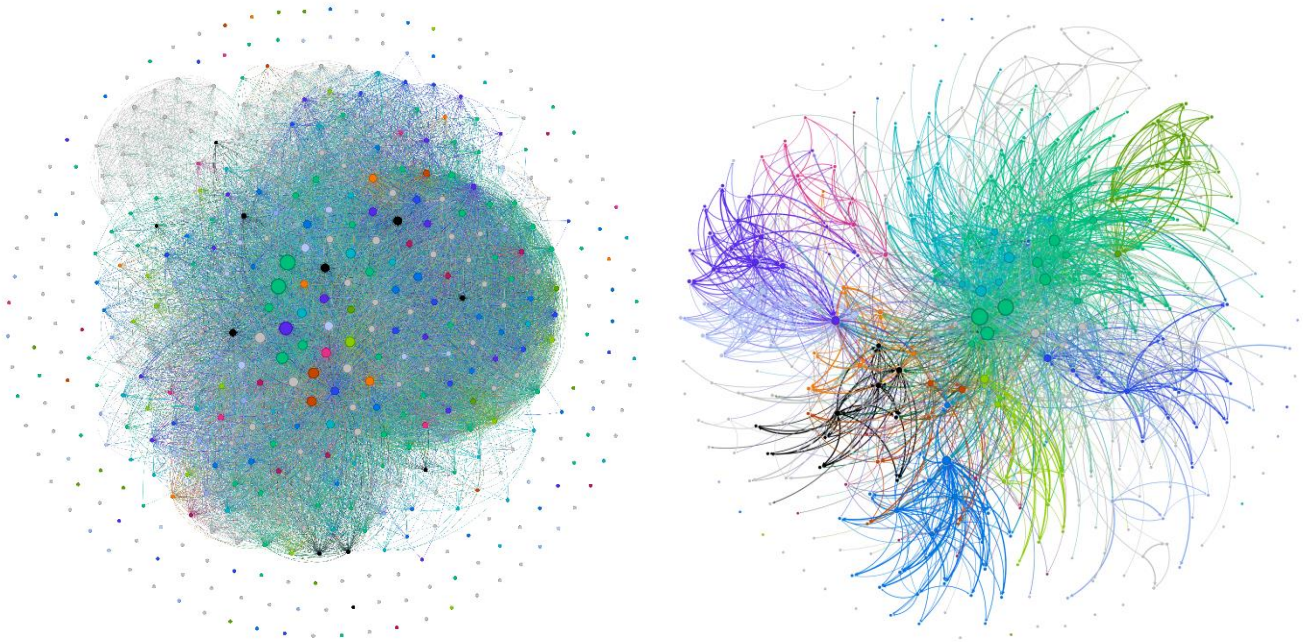
Coordinated Activities versus Self-Generating Activities

Though not an evaluation question we asked from the beginning, we added a question about the distinct networks developed by activities coordinated by the AE Team versus activities that Network participants generated themselves. Woodland Park Zoo records shed light on formal Network activities, but the AE Team was interested to know about information-sharing and collaboration that participants have pursued on their own. We retrieved this information from the Network survey, in which we asked participants to share their collaboration and information-sharing connections outside of activities organized by the AE Team. We studied two networks, with the following boundaries:

- First, we compiled all AE Team coordinated activities: committees, the discussion board, and events.
- Next, we compiled participant-generated activities: the information-sharing network and collaboration network from the ACE for Wildlife Network connections survey.

The resulting patterns (Figure 15) were similar to what we have already observed. From coordinated activities, cross-organizational collaboration and information-sharing continue to be evident, especially through bridge connections. Many potential connections are unrealized, as shown by a density of 10%, meaning that only 10% of potential collaboration and information-sharing connections have occurred across all AE Team coordinated activities.

Figure 15. Combined AE Team – Coordinated Activities (Left) and Network Participants' Self-Generated Activities (Right)



Considering the transitory nature of Network participants' roles, there is a regular flux of people coming and going. This movement impacts participation and connection within the Network. It may be helpful, or at least informative, for the AE Team to track these changes—both to follow individuals as their roles evolve and to invite new participants who assume their previous positions. Maintaining and supporting those critical bridging roles is also crucial, as they significantly enhance information-sharing and collaboration within the Network.

Looking at coordinated activities, we see these play a significant role in facilitating wide-ranging, cross-organizational sharing and collaboration. These events are particularly successful in bringing people together, encouraging repeated and engaged participation. Coordinated events act as a crucial catalyst, promoting not just connectivity but also fostering collaborative efforts.

Regarding participant-driven activities, we observe a substantial level of self-generated collaboration and information-sharing relatively early in the Network's life. Such autonomous engagement is a sign of a dynamic network. The AE Team, along with Network participants, can consider whether generative collaboration and information-sharing aligns with the Network's goals. How can they build upon the existing momentum? For example, if the AE Team shared case studies describing productive collaborations between different Network organizations or provided direct support for intra-organizational collaborations, this may encourage further collaboration.

As facilitators, it is vital to consider diverse needs within the Network—from those who prefer observing to those who engage actively in smaller groups or large-scale events. Finding ways to support participants at different engagement levels and ensuring inclusivity for smaller organizations is crucial. In essence, how do we nurture this ecosystem where both coordinated activities and participant-driven activities facilitate an environment that continues to grow in collaboration, connectivity, and shared learning?

Evaluation Question 3: What are the opportunities for and challenges to greater participation, collaboration, and cohesion among the Network, as well as to expanding to a multi-hub structure?

To answer this question, Groundswell Services utilized open-ended questions in the ACE for Wildlife Network survey and conducted key informant interviews. (See information about how interviewees were selected in the appendices.)

The Bottom Line

- 84% of Network survey respondents expressed interest in utilizing a smaller group structure, while only 10% said no, and 6% did not respond. Most respondents were interested in organized small groups or communities of practice around their role or topic of interest.
- By facilitating smaller, role- or topic-specific groups, the AE Team can cater to the specific interests and professional focuses of the Network. Such a structure can foster deeper, more relevant engagement. It also has the potential to strengthen the Network's overall cohesion and collaborative spirit.
- However, this approach also presents certain challenges. Organizing and managing these smaller groups requires careful planning, coordination, and resources to ensure they are effective and aligned with the Network's broader goals. Additionally, it is crucial to maintain a balance between these smaller, specialized groups and the larger Network activities to ensure inclusivity and comprehensive engagement.

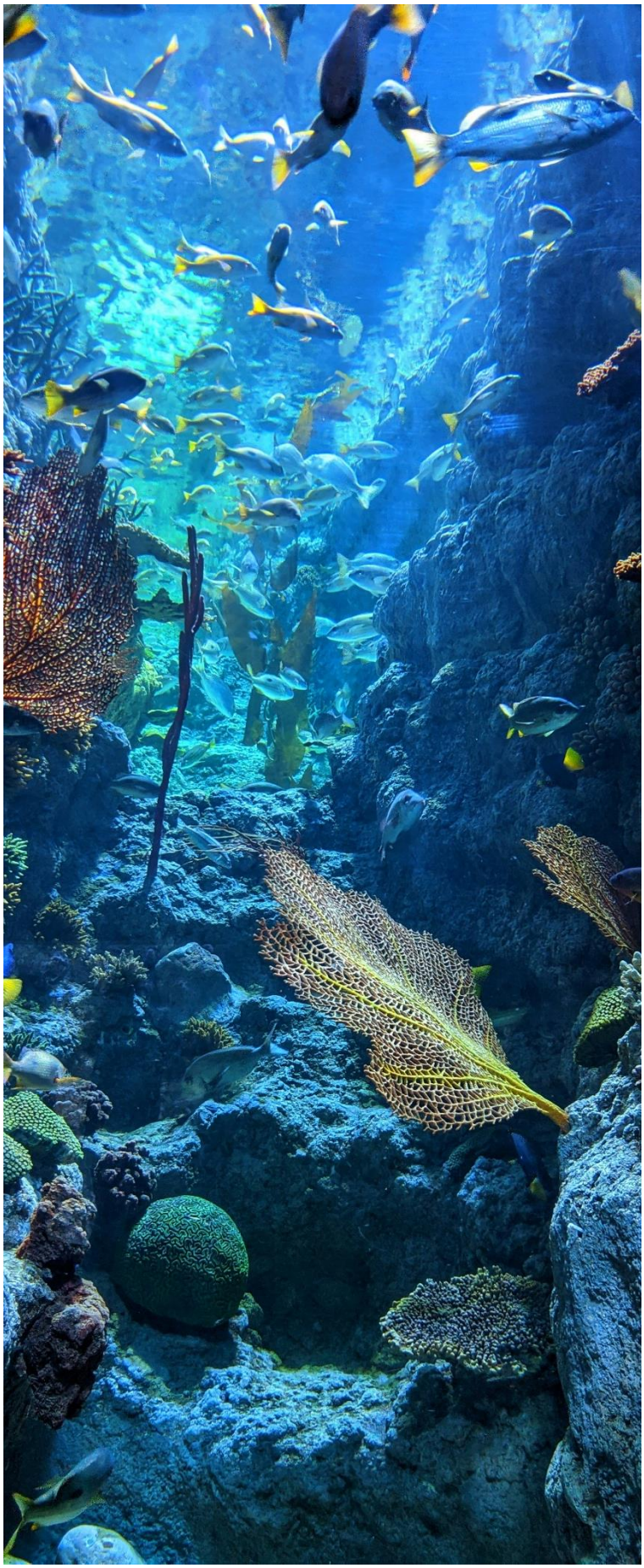


Photo by Shifaz Abdul Hakkim on Unsplash

Enablers for Information-Sharing and Collaboration

During interviews, participants shared advice for engaging in information-sharing and collaboration.

Comfort as Participant in Network toward Cohesion

Overall, almost all interviewees (26) reported feelings of comfort while participating in the Network, though 12 people (of 27 interviewees) mentioned moments of discomfort.

At a Network level, participants indicated that they felt comfortable because of its welcoming nature and the expressed culture of respect, learning, and collaboration. Several participants specified that the AE Team has contributed to this environment through direct support to Network participants, facilitating conversations, organizing events to accommodate participants across time zones, and offering opportunities to share regardless of experience level or size of organization. Interviewees highlighted how welcoming and kind the AE Team has been and recognized their efforts. In-person meetings and working in smaller groups, like committees or Members within the same organization, were referenced as platforms that helped participants feel more comfortable.

One person said that with other networks, "You never want to show that you're struggling with anything. And I feel like ACE has kind of built this world where it's okay to fail and it's okay to be struggling, and we kind of help each other. And because we've...built that kind of relationship with each other and within the Network, it makes me more likely to share stuff out."

At an individual level, interviewees said they felt comfortable because of personal factors including an outgoing nature, seniority or greater level of experience, time in the Network, and personally knowing other participants and Network leaders. One person noted that identifying with the majority racial and gender demographics of the group also contributed to her comfort; she noticed the Network's efforts to help people that identify differently to feel welcome as well but could only speak to her personal experience.

Feelings of discomfort primarily related to not understanding the Network's "rules of engagement" and not connecting to topics or the majority role in the Network (e.g., zoo educators). Interviewees' main uncertainties in terms of how to engage with the Network included not knowing the process for reaching out to individual people and, specifically, the boundaries of how and what Affiliates and Members can participate in (3 of 6 Affiliate interviewees had experienced this). One Affiliate said, "I definitely feel comfortable talking with

> "I feel like ACE has kind of built this world where it's okay to fail and it's okay to be struggling, and we kind of help each other."
>
> –Interviewee

people and networking with people, but I don't know if I would actually say that I feel like I'm part of the community. And I think…[it] gets back to the idea of, like, Members versus Affiliates. What are the differences? And Affiliates can feel a little bit out of the loop sometimes about things."

A few participants also mentioned discomfort interacting with individuals with a "strong" character. One person mentioned witnessing discussions in which some people were strongly opinionated and even aggressive. This person said the AE Team tried to intervene in these conversations to bring calm and refocus the discussion. The person concluded, "You're never going to make everyone comfortable in uncomfortable situations, but [the AE Team] definitely try their best." Another person noted that when they first joined the Network they were a little nervous because there were "a lot of very strong characters in the Network." Recommendations to address some of these issues can be found in the "Challenges and Recommendations" section.

Given the small sample of interviewees (27), it may be worth gathering more information across the entire Network about comfort and belonging for greater representation of the membership, particularly in terms of race and gender.

Supports for Information-Sharing and Collaboration

Interviewees pointed to Network and institutional support as well as individual-level actions as enablers for information-sharing and collaboration.

Network

- **Network events:** Most interviewees recommended going to Network events to support information-sharing and collaboration, noting that in-person Summits and smaller groups like the learning groups helped them feel more comfortable meeting people through breakout session discussions and informal conversations. Empathy Cafes, hosted by Partner Organization Seattle Aquarium, were also mentioned as another small group to connect with Network participants.

  In line with these data, when survey respondents were asked what most helped them connect with others in the Network, attending Network events was mentioned the most. No event format surfaced as more helpful than the others, which suggests that having a wide variety of events allows Network participants to engage in the ways that work for them.

- **Committees:** A few interviewees also recommended participating in committees, particularly since collaboration is already a part of engaging in these groups. Serving on a committee was also mentioned several times by survey respondents as being helpful in fostering connections.

- **Discussion board:** Some participants suggested using the discussion board to directly share information or to find people to collaborate with. They found Network emails summarizing discussion board activity helpful to stay updated on what people were

working on. The discussion board was also mentioned several times by survey respondents as being helpful in fostering connections.

- **Support from the AE Team:** A few interviewees mentioned reaching out directly to AE Team staff for support in connecting to other individuals given their extensive knowledge of the Network's participants and ongoing empathy projects. One person appreciated being tagged on a discussion post by an AE Team member regarding a topic that they were involved with.
- **Support at work:** Having support from co-workers and direct supervisors as well as buy-in from organizational leadership has been key to several participants' involvement in the Network, particularly in regard to collaboration since this activity can take time away from job duties. One person noted that being funded through a Capacity Building Grant was helpful for leadership to support their taking the time to focus on an empathy project.

Individual

- **Support from Network participants:** The most common advice for information-sharing and collaboration was for participants to not be afraid to share their work, ask questions, and reach out to people directly. These participants noted that in their experiences doing this, they had been received with kindness and openness and that "Everyone's really excited to share stuff they are working on." Some participants suggested reaching out early to give others enough time to respond to questions or requests. Recommendations for the Network to be less intimidating for participants to engage in this way are listed in the next section.

"Everyone's really excited to share stuff they are working on."

–Interviewee

Challenges and Recommendations for Information-Sharing and Collaboration

Interviewees shared their main challenges for information-sharing and collaborations and provided recommendations to address them. These are summarized in Table 3, followed by more detailed information.

Table 3. Summary of Challenges and Recommendations for Information-Sharing and Collaboration

Challenges	Recommendations
Challenge 1: Difficulty finding people to connect with.	• Network directory improvements • Creation of sub-groups • Use of bridge individuals • Opportunities for connection at Network events

Challenges	Recommendations
Challenge 2: Feeling intimidated to reach out to individuals.	• Network directory improvements • Creation of sub-groups • Use of bridge individuals • Alternative platforms for connection • Discussion board changes
Challenge 3: Unclear rules of engagement.	• Network directory improvements • Creation of sub-groups • Discussion board changes • More Network engagement guidance • Affiliate-specific guidance
Challenge 4: Time and capacity as barriers.	*Network level* • Continue to plan Network events during off-season *Institutional level* • Have one person (i.e., Network point of contact) go to Network events and bring back information to others. • The AE Team responded that if a Partner organization wanted to do this, they could arrange it internally. • The potential drawbacks of this strategy are less connectivity among all participants and the increasing importance of the bridge role. People playing the bridge role are important connectors, which typically supports good network health unless they leave without transitioning that role to a different Network participant within their organization. • Connect eligible organizations to empathy for wildlife Capacity Building grants, which several interviewees mentioned as being helpful. Eligible organizations are those in the seven-state region targeted by the grant program's funder). *Individual level* • Get supervisor support and leadership buy-in for participation in Network • Prioritize and schedule specific empathy activities on personal calendar

Challenge 1: Difficulty finding people to connect with.

Participants reported difficulty in finding people with overlapping interests or roles for information-sharing or collaboration particularly for non-educators and Affiliates. Similarly, some participants expressed not relating to content presented at Network events due to differences in institutional size or experience level with empathy practices.

Some interviewees mentioned that the website was easy to navigate, to find information, and to share information. The AE Team pointed out that they have recently completed a website redesign, in part to increase the ease of finding information. However, interviewees specifically named that finding information on the website or discussion board about individuals with whom

to connect was cumbersome and required sifting through past materials. A few people noted that the discussion board did not seem very active and believed it to be more useful for resource sharing rather than a tool for connecting. An AE Team member agreed with that assessment.

Challenge 2: Feeling intimidated to reach out to individuals.

When asked to describe challenges to connecting with others in the Network, many survey respondents described the general social anxiety or awkwardness of reaching out to strangers. The fear of being a "bother" or "annoying" was echoed several times, which suggests that respondents are unclear about the willingness of other Network participants to connect or collaborate. Respondents noted that reaching out would feel less awkward if it was in relation to a specific project.

During interviews, a couple of participants mentioned feeling intimidated to share information or collaborate because of their limited experience or being in an early stage in their careers. In regard to the discussion board, some participants reported not feeling comfortable sharing information out to the entire Network.

Challenge 3: Unclear rules of engagement.

Some interviewees reported not knowing the process for reaching out to individual people and uncertainty around what level of participation is allowed for Members and Affiliates. In terms of posting on the discussion board, one person indicated that it is not clear whether a post is appropriate or may be redundant since posting history is not easily seen. Another mentioned being unsure of how often to respond to posts so as to keep opportunities open for others to engage.

Challenge 4: Time and capacity as barriers.

Several participants repeated that time and capacity continue to be barriers to participation, specifically in relation to collaboration.

Recommendation 1: Network directory improvements.

Many interviewees were unaware that a Network directory exists. They offered three suggestions for making the directory more useful: 1) including a list of current empathy-related projects that each person is working on, 2) including a list of empathy-related topics of interest or expertise for each person, and 3) indicating the level of engagement each person is interested in (i.e., whether they are willing for people to reach out to them, whether they want to collaborate, etc.). Interestingly, an AE Team member responded to the second suggestion by saying they had offered a list in the past and received very few responses, though the request from the AE Team to participants for this information may have gone out after data collection for this evaluation was mostly complete. To increase responses, the AE Team member suggested placing the request for information in the newsletter and at summits or other larger events.

Additionally, one respondent offered that it would be helpful if Network participants were automatically notified whenever a new person joined the Network or new information was added to the directory. A few interviewees also recommended a database of this kind. The AE

Team is considering using the monthly newsletter and Network events to announce updates to the directory and call for participants to add their information to it.

Recommendation 2: Creation of subgroups.

Many survey respondents expressed interest in meeting with smaller subgroups, either by role, topic, or region. Interviewees also were interested in smaller groups by size and empathy experience level and one person recommended a group by institution outside of zoos and aquariums, specifically for Affiliates. Although participants agreed that sub-groups would allow for greater engagement, there were concerns of siloing and losing diversity from interacting with participants across the entire Network. See the "Multi-Hub Structure" section below for more information on alternative ideas to this structure.

Recommendation 3: Use of bridge individuals.

A few interviewees noted that it would be helpful to have certain individuals who are responsible for connecting individuals or institutions with similar interests, primarily through formal email introductions. According to the SNA graphs, this is happening naturally at some locations. Similarly, AE Team staff indicated that each organization had a Network point of contact. Since not everyone is aware of this, more focused attention or a deliberate attempt to highlight these individuals could be made to support this structure.

Recommendation 4: Opportunities for connection at Network events.

One interviewee suggested that during Network events, presenters be explicit about whether they are willing to be contacted and, if so, to take a few moments during the session to provide contact information. The AE Team is considering these changes for the 2025 summit. Also, one Member with higher empathy experience suggested bringing experts from the field and more sessions that could cater to a range of experiences so that everyone could gain professional development.

Recommendation 5: Alternative platforms for connection.

Several survey respondents mentioned that they would be interested in using platforms other than the discussion board to connect, such as Discord, Slack, and Facebook. Respondents noted that they tend to check these platforms frequently, and they foster fewer formal connections and are less intimidating.

Recommendation 6: Discussion board changes.

Create discussion boards by sub-group or topic that only goes to members of the group. One interviewee suggested that AE Team staff post questions on discussion boards and invite people to respond to get the conversation going.

Recommendation 7: More Network engagement guidance.

A couple of interviewees asked for more guidance on how to connect with others and engage on different platforms. One person suggested adding more of this information to the existing Network Welcome Guide. Another person suggested that organizations lead a coffee chat on

brainstorming how to connect with other people in the Network so that people can learn from each other and have a space to connect. The AE Team is considering discussing rules of engagement during onboarding sessions with new Network participants.

Recommendation 8: Affiliate-specific guidance.

A few Affiliates requested more detailed information about the differences between Members and Affiliates and to specify what Network activities, platforms, or groups they can engage in. One person believed that Affiliates could not join committees, while another did not know whether they had access to the discussion board or resource library. One person noted that having Network staff reach out to welcome Affiliates would make them feel more comfortable. Although the AE Team already has specific guidance for Affiliates, they recognize that confusion still may exist because of recent changes. To address this, the AE Team is considering using Network events to remind Affiliates about guides and directly following up with new participants a couple months after their initial orientation.

Multi-Hub Structure

Overall, 84.4% of survey respondents said that they would be interested in connecting with others in a small group structure, while 9.9% said no and 5.7% did not respond.

Similarly, during interviews, most participants expressed interest in a smaller group structure and agreed that it could help promote further engagement as it would be less intimidating, and participants could more easily find people to connect with. However, there were concerns of siloing and losing the diversity from interacting with others across the entire Network. Also, splitting participants by role or type of organization would create uneven groups since most of the Network is composed of educators and zoos. Others expressed concern with the possibility of losing logistical backbone support from Woodland Park Zoo; one person mentioned that this would make participating in committees more challenging for them. Several of these participants offered suggestions for alternative structures:

- Keep Woodland Park Zoo as the coordinator and have regional subsets (e.g., Empathy Midwest, Empathy Southwest) with a coordinator that then reports to the AE Team.
- Split participants into small hubs while maintaining opportunities to engage across the entire Network.

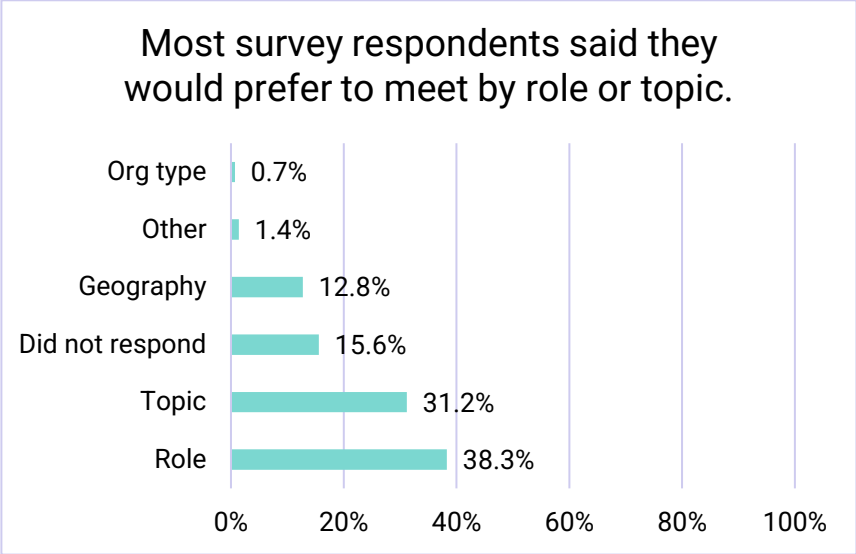
Photo by Alina Grubnyak on Unsplash

- Split members into hubs by multiple criteria and allow people the choice to join as many hubs as they are interested in—for example, by having hubs by region and other hubs by role.
    - Generate a list of participants that fall into the specific categories of each hub so that everyone knows how they relate and who they can reach out to.
    - Have discussion boards by hub.
- Split participants into smaller hubs where each one has an assortment of institution type, size, and region.
- Have multiple flagship organizations, and then build hubs from there.

Hub Categorization

While most survey respondents said they would be interested in meeting in subgroups by role, followed by topic (see Figure 16), most interviewees mentioned being interested in hubs by geography (13), followed by role (10) and size (8).

Figure 16. Network Survey Respondents' Opinions about Subgroups



Note that interviewees named more than one type of hub they might want to participate in, while survey respondents only selected their top choice. Two people mentioned a group by empathy experience level, and one by institution outside of zoos and aquariums, specifically for Affiliates. See Table 4 for the reasons interviewees gave for hub categorization.

Table 4. Reasons for Hub Categorization

Geography	Similar physical and political environments, easier for in-person site visits and neighboring institutions tend to be those that participants are already collaborating with. Participants interested in hubs by geography represented all locations of interviewees (e.g. Pacific, Mountain, West North Central, East North Central, West South Central).
Role	Makes empathy more applicable to day-to-day job duties and can justify time spent in the Network to institutional departments.

	Participants interested in hubs by role represented almost all roles of interviewees (e.g., animal care and husbandry, conservation, education and guest engagement, evaluation and research, marketing and PR, volunteer engagement).
Size	Makes empathy work more realistic and relevant based on budget and staff capacity. The majority of participants that were interested in hubs by size came from small institutions who noted that the experiences of larger zoos were often not applicable to them.

Evaluation Question 4: How does empathy-related information and learning spread beyond the Network to AZA organizations? What is the breadth of this reach across the North American AZA field currently?

To answer this question, Groundswell Services utilized the ACE for Wildlife Network survey and the AZA member survey (which purposefully excluded AZA members who are also Network participants). We studied two networks:

1. An organizational connections network between AZA survey respondents and organizations they named
2. An organizational connections network between ACE for Wildlife Network survey respondents and organizations they named

The Bottom Line

- AZA is an important partner for the ACE for Wildlife Network, to help increase awareness of empathy for wildlife and disperse information.
- ACE for Wildlife Network participants–especially WPZ and Seattle Aquarium–are also recognized by some AZA members as sources of information in empathy for wildlife.
- Empathy for wildlife information also is dispersed through…
    - Local connections (for example, the connection around empathy for wildlife between a state's natural resources department and a zoo within that state)
    - Thematic connections (for example, the connection around empathy for wildlife between a zoo that hosts polar bears and an organization focused on polar bears)
- If we observed only a handful of organizations named in the responses, we would think that interest in and engagement in empathy for wildlife was centralized. What we see instead is a widely dispersed, nationwide interest in empathy for wildlife.

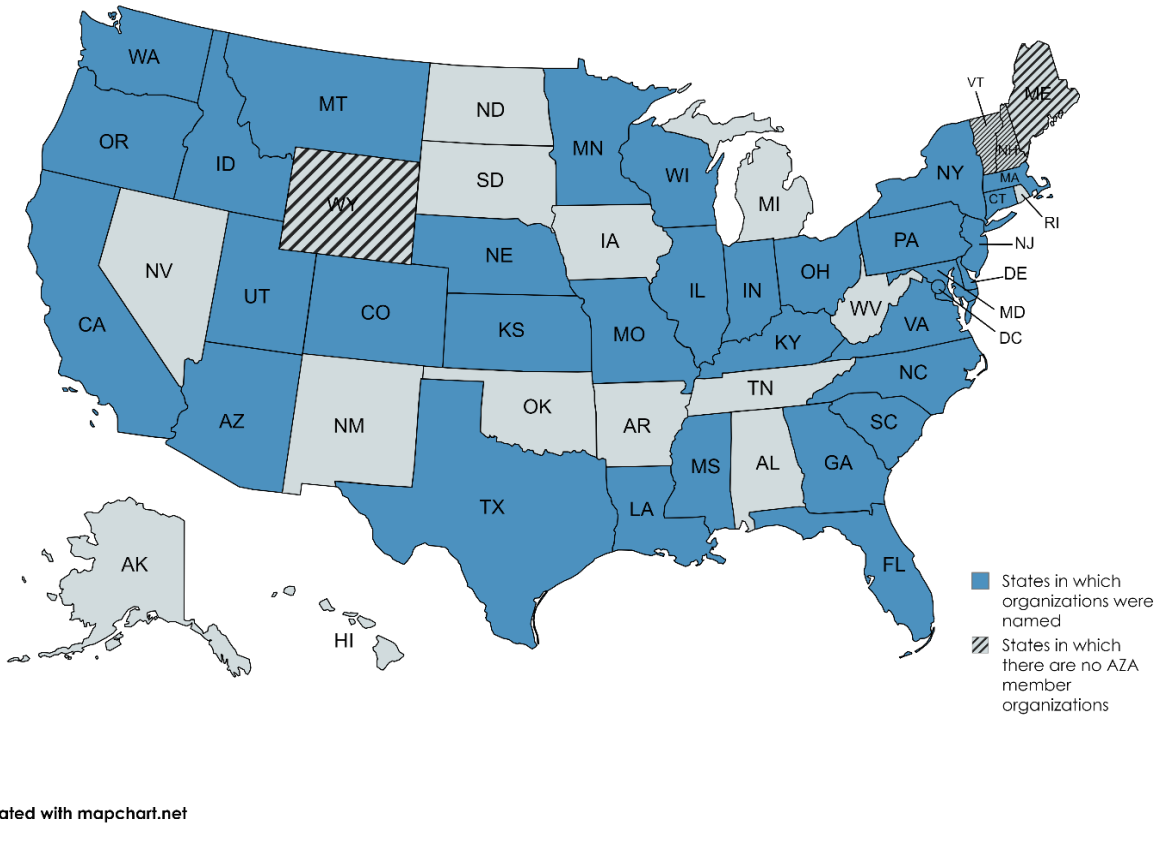
- The organizations listed by Network participants and AZA members that are not currently part of the ACE for Wildlife Network but are working on fostering empathy for wildlife could be worth engaging in some way. Given the fact that a large majority of AZA survey respondents had not heard of the Network, it is likely that many of the organizations named in these surveys also do not know about the Network.

To address the fourth evaluation question about how empathy-related information and learning spreads beyond the ACE for Wildlife Network to AZA organizations, and its reach across the North American AZA field, we turned to a dual approach. We analyzed self-reported connections in both the ACE for Wildlife Network survey and a separate survey distributed among AZA members. In both surveys, we asked respondents to identify the top four organizations with which they most regularly exchanged information, ideas, resources, or collaborated on fostering empathy for wildlife.

AZA Survey

Focusing on the AZA survey, 107 respondents began the survey, and 68 completed all questions. These participants represented a diverse array of 69 organizations across 34 US states and 4 Canadian provinces. The geographical spread of these organizations is highlighted in blue on a US map (without the Canadian provinces; Figure 17). There are no AZA member organizations in Maine, New Hampshire, Vermont, and Wyoming.

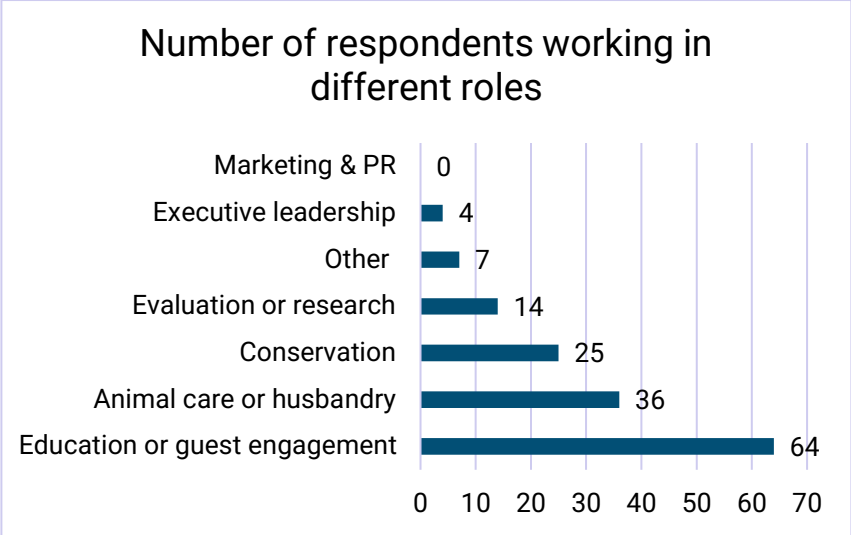
Figure 17. States in Which Organizations Participated in the AZA Member Survey



Created with mapchart.net

Most respondents, mirroring the trend in the ACE for Wildlife Network survey, were involved in education or guest management (Figure 18). The next highest category of participation came from the field of animal care or husbandry.

Figure 18. AZA Member Survey Respondent Roles



A deeper look at their engagement level with empathy for wildlife revealed that most believed their organizations were somewhat involved to actively involved in this area. However, when probed about whether they had created, used, or evaluated resources or tools specific to fostering empathy for wildlife, a majority (71%) indicated they had not, pointing to a level of involvement that may be more superficial than that of participants in the ACE for Wildlife Network. In terms of awareness and interaction with the ACE for Wildlife Network, about 60.7% of the AZA survey respondents were **not** familiar with the Network. Among those who were aware (39%, or 42 individuals), their primary source of information about the Network was through AZA channels such as communications, conferences, and the listserv. A smaller number mentioned becoming aware of the Network through colleagues. This suggests that while there is a level of awareness within the AZA community, it primarily stems from formal AZA communications rather than organic, colleague-to-colleague interactions.

For those who had interacted with the ACE for Wildlife Network, the majority had engaged through passive activities such as visiting the website or attending an AZA conference. Only a small number had actively utilized the Network's resources or participated in online events. Currently, only Members and Affiliates are able to officially access resources and participate in online events, suggesting that AZA members who completed the survey were either recipients of informally shared resources, were former members, or were mistaken. Nonetheless, all of these methods of interaction present opportunities to bring interested people into the Network, if that is a goal of the AE Team. If it is, the Team can consider how to leverage resources and events as a potential area for growth in actively engaging AZA members.

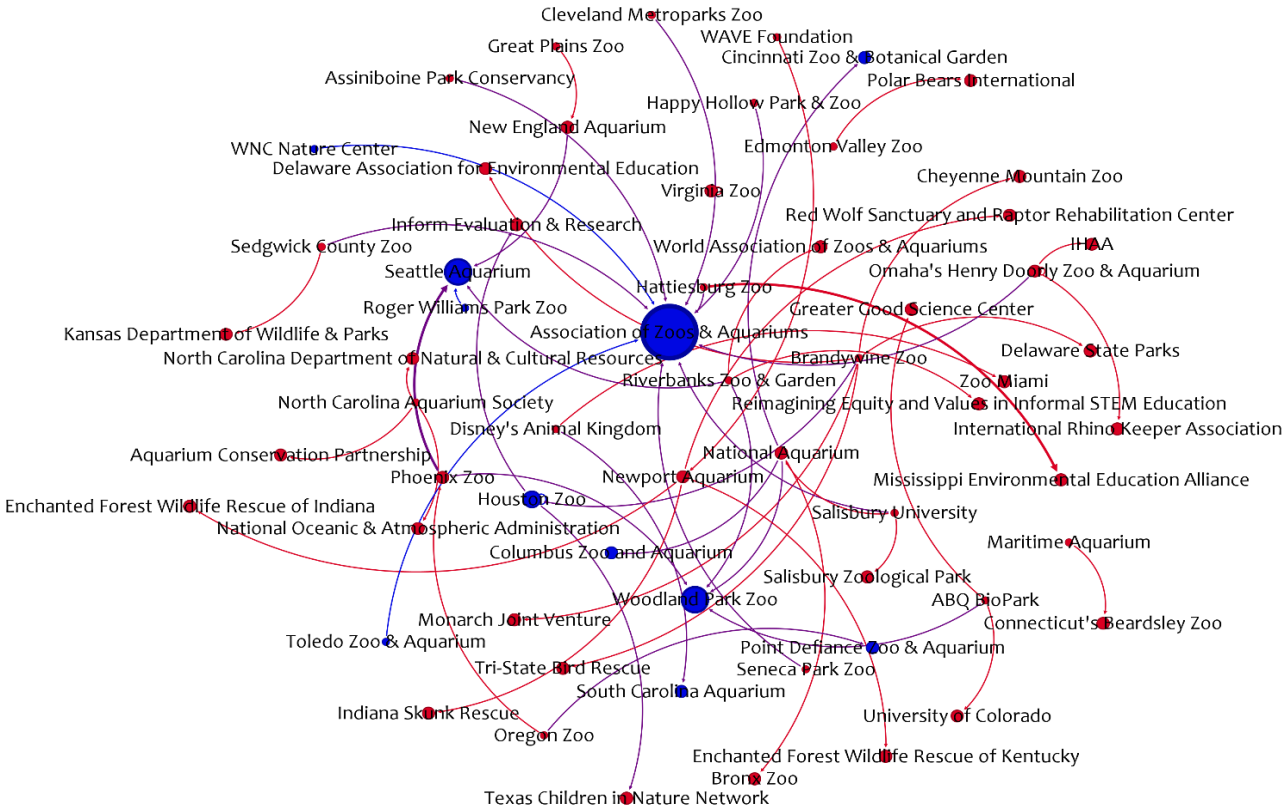
Non-ACE for Wildlife Network of Organizations Working in Empathy

In the AZA survey, we asked members, "Which top four organizations do you most regularly exchange information, ideas, resources, or collaborate with on fostering empathy for wildlife?" The answers to this question form the basis of the SNA graph we are about to delve into.

Looking at Figure 19, the circles on the graph indicate the organizations mentioned by the respondents. The size of each circle corresponds to how often they were named, reflecting their involvement in empathy for wildlife activities. The colors on the graph serve as indicators of network participation: **blue** signifies organizations that are part of the ACE for Wildlife Network, while **red** represents those outside it. Additionally, directional arrows on the graph show the flow of information, highlighting which organizations are considered sources of expertise and collaboration in the field of wildlife empathy.

One immediate observation is the relatively low density of connections on this graph. Only a few organizations have been named repeatedly, suggesting a concentration of recognized collaboration in certain areas. Predominantly, it is the AZA that stands out, along with notable mentions of the Seattle Aquarium and Woodland Park Zoo. Meaningfully, these most frequently named entities are already part of the Network. As an AE Team member pointed out, two of these organizations catalyzed the fostering-empathy movement, and the Seattle Aquarium hosts empathy workshops across the county, including at many AZA member organizations. While AZA, Woodland Park Zoo, and the Seattle Aquarium were named by multiple AZA members, the low density overall indicates that respondents are looking to other entities as well to exchange information, ideas, and resources, or collaborate on activities related to fostering empathy for wildlife.

Figure 19. Organizations Working in Empathy, Named by AZA Members, Color by Network Participant (Blue) or Not (Red)

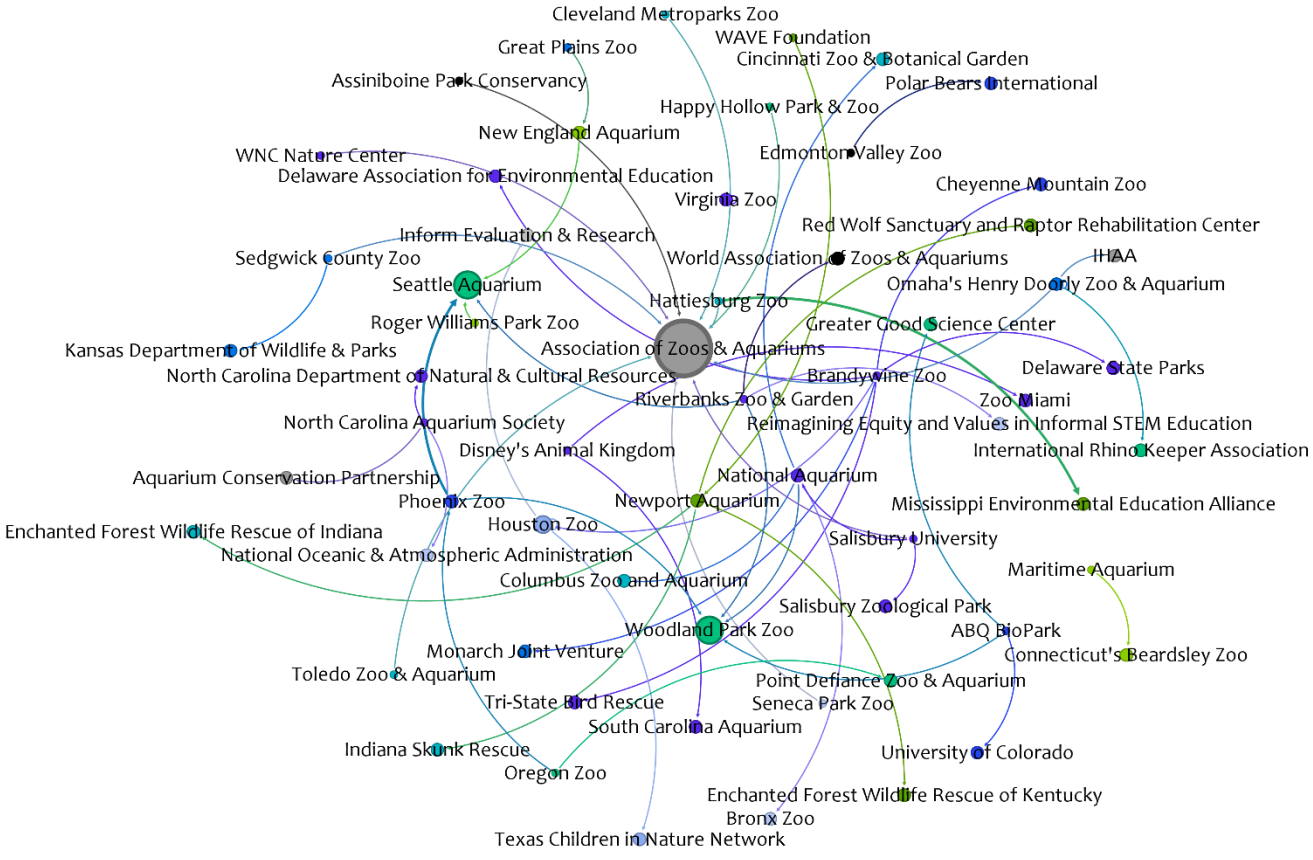


This pattern leads us to consider the outreach potential for the Network. Recognizing that several other organizations, not currently part of Network but active in the field, were mentioned, it opens avenues for engagement. The AE Team might explore opportunities to invite these organizations to join the Network, attend events, or participate in collaborative projects, broadening its reach and impact.

The graph also indicates that collaborative efforts seem to be spread among a variety of entities, from larger zoos to more specialized or regional organizations like the Delaware Association for Environmental Education or the Kansas Department of Wildlife and Parks. This diversity of collaborators suggests a rich tapestry of knowledge and resources being shared across different players, each contributing uniquely to the collective goal of fostering empathy for wildlife. It is a testament to the wide-ranging and varied nature of collaboration in this field, emphasizing the importance of both regional and broader partnerships.

We also examined the spread of collaboration and information exchange from a regional perspective (Figure 20). This time, the color-coding on the graph represents different regions, as opposed to indicating whether or not an organization is part of the ACE for Wildlife Network. This approach allows us to observe both cross-regional and within-region collaborations.

Figure 20. Organizations Working in Empathy, Named by AZA Members, Regional Focus



The predominant narrative revealed through this regional lens underscores the significant role of the AZA as a conduit for information. Many organizations are receiving vital information primarily through their AZA connections. Interestingly, alongside this cross-regional exchange, there is a noticeable trend of organizations collaborating with those geographically closer to them—indicating strong local or regional ties.

This regional analysis highlights that while there is a degree of nationwide connectivity, most collaborations and information exchanges tend to occur within closer geographical confines. The emphasis appears to be on local and regional partnerships, with less involvement in broader, national-level discussions. This pattern suggests that while the AZA plays a crucial role in fostering nationwide connections, local, and regional collaborations remain a key component of the Network's structure.

ACE for Wildlife Network Named Organizations Working in Empathy

In the survey for the ACE for Wildlife Network, we posed the same question about the key organizations outside of the Network with which participants regularly exchanged empathy for wildlife-related information, ideas, resources, or collaboration. The responses from these Network participants are represented in Figure 21, where we have again used color coding to distinguish different regions.

What we observe in this graph is a spread of information-sharing that again shows some regional patterns. The AE Team may use these findings to discover potential new organizations to engage with. These organizations are already being tapped into for information and collaboration by current Network participants, making them prime candidates for integration into broader conversations within the Network.

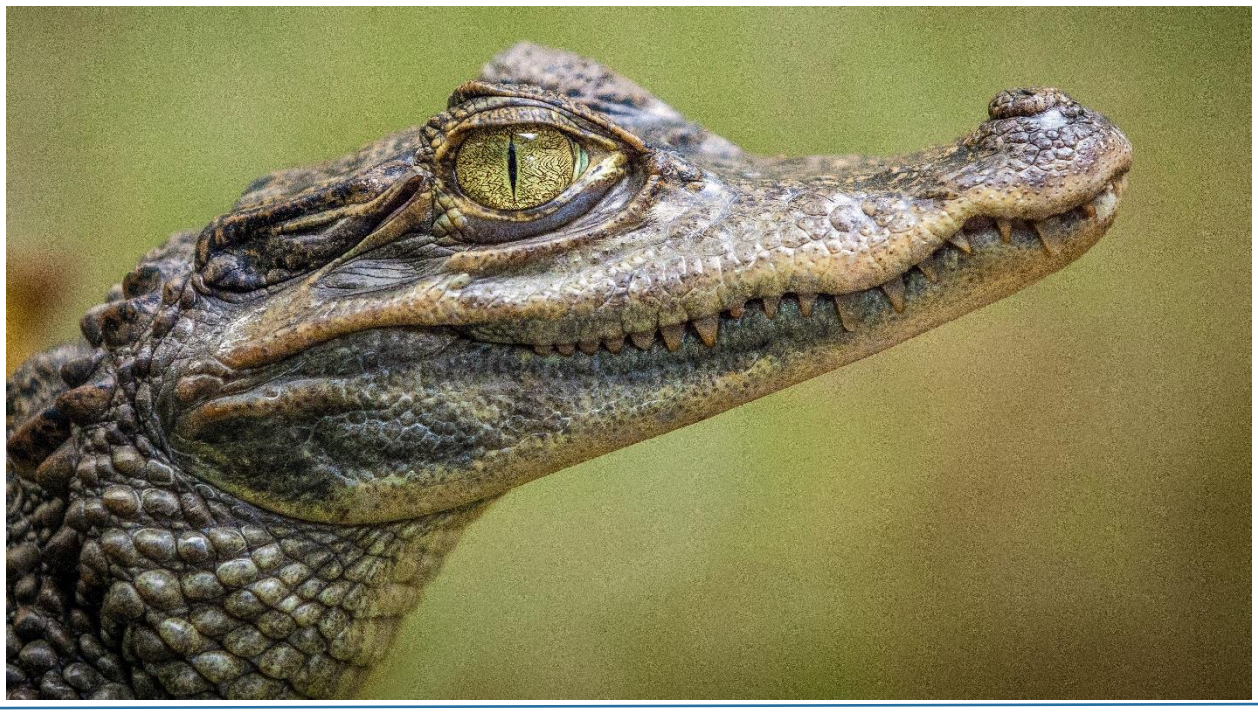
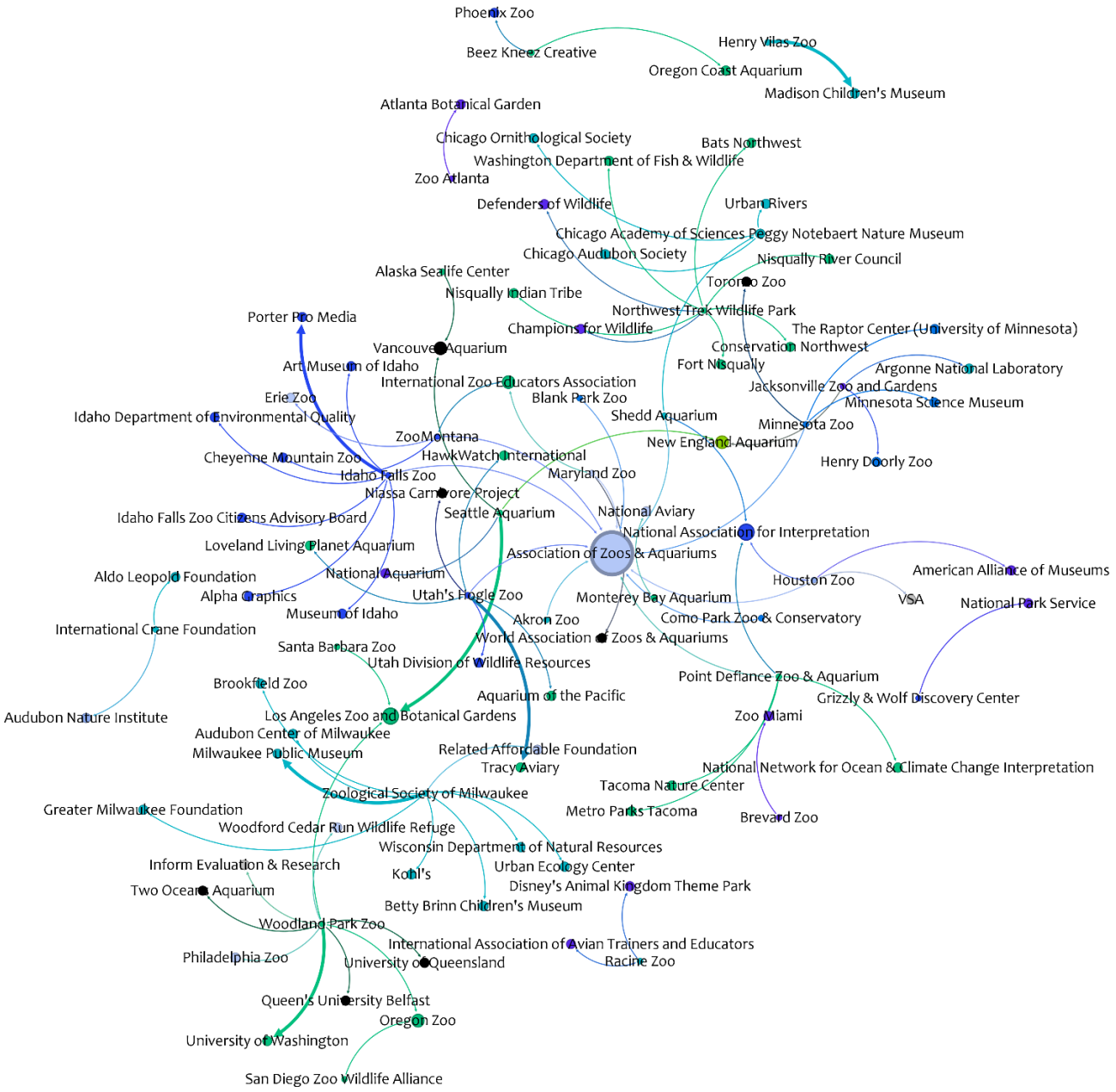


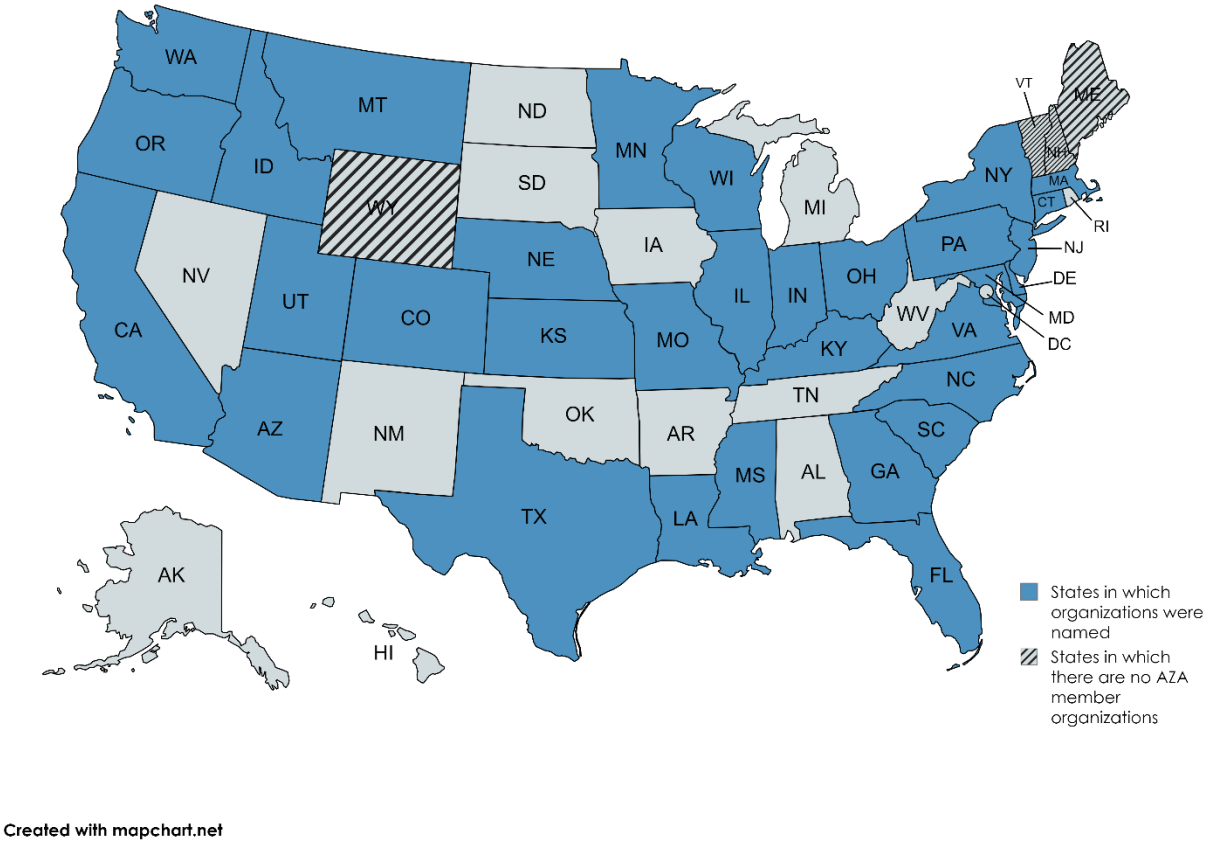
Photo by Gaetano Cessati on Unsplash

Figure 21. Non-Network Organizations Working in Empathy, Named by ACE Members, Regional Focus



Interestingly, apart from AZA, there was no overlap in the organizations named by different respondents from the Network, nor between Network survey respondents and AZA survey respondents. In fact, only two organizations were named by more than one survey respondent. This speaks to the wide variety of connections within the Network. Another way to look at this is via the US map (Figure 22), which highlights the home states of the organizations listed by both ACE for Wildlife Network survey respondents and AZA survey respondents. Attention to fostering empathy for wildlife is occurring throughout the US (and internationally).

Figure 22. Home States of the Organizations Listed by Network and AZA Survey Respondents



Created with mapchart.net

Conclusion

Over the course of this evaluation of the ACE for Wildlife Network, we learned about patterns of collaboration and information-sharing, how participants are affected by their connections within the Network, and what next steps could strengthen and support Network engagement. A picture emerged of an active culture of information-sharing and intra-organizational collaboration, with a growing culture of inter-organizational collaboration. Woodland Park Zoo's coordinative role has been critical to connecting Network participants through strategic initiatives, which have facilitated cross-organizational interactions and collaborations. These efforts have established a system within which Network participants can effectively share knowledge and collaborate on projects. It is important to note that some participants have reported challenges in initiating connections independently of the facilitated activities. Furthermore, there is a strong interest among members in forming smaller, more focused groups that align with their specific roles or interests related to empathy for wildlife, suggesting a pathway for deeper engagement and more specialized collaboration within the Network.

Based on these findings, several recommendations were made to enhance the Network's effectiveness in connecting and engaging participants. Briefly, it will be important to continue supporting and developing the infrastructure that allows for both high and low levels of engagement. This approach will cater to the diverse needs and preferences of the Network's participants, ensuring that all can find value in their involvement. Also, the potential of small group structures could be harnessed to foster more intimate and focused discussions and collaborations, which in turn could lead to more innovative and effective practices in empathy for wildlife. Finally, it will be important to maintain robust support for the Network's bridging figures and to cultivate new connections that can sustain the Network's dynamism and adaptability.

In conclusion, the ACE for Wildlife Network stands as a dynamic and evolving platform that has already catalyzed connections it creates to expand the ecosystem for advancing conservation efforts through empathy for wildlife. By addressing the challenges identified and leveraging the strengths highlighted by this evaluation, the Network can enhance its impact and continue to grow as a leading force in conservation education and practice.

Appendices

Appendix 1. Regions and Organizations

The following are the regions used in reporting the results of this evaluation. Under each region are the states included in the region and the ACE for Wildlife Network participant organizations located in that region.

- Pacific: Alaska, Hawaii, Washington, Oregon, California
  - Alaska SeaLife Center
  - Antioch University
  - AWARE Institute
  - Beez Kneez Creative
  - Honolulu Zoo Society
  - Kathryn Owen Consulting
  - Monterey Bay Aquarium
  - Northwest Trek Wildlife Park
  - Oakland Zoo
  - Pacific Whale Foundation
  - Point Defiance Zoo & Aquarium
  - San Diego Zoo Wildlife Alliance
  - San Francisco Zoo
  - Santa Barbara Zoo
  - Seattle Aquarium
  - Spotlight Impact
  - The Living Desert Zoo and Gardens
  - Western Washington University
  - Woodland Park Zoo
- Mountain: Montana, Idaho, Wyoming, Nevada, Utah, Colorado, Arizona, New Mexico
  - Butterfly Pavilion
  - Denver Zoo
  - ECOS Communications
  - Grizzly & Wolf Discovery Center
  - Idaho Falls Zoo
  - Regis University
  - Utah's Hogle Zoo
  - Yellowstone Wildlife Sanctuary
  - Zoo Boise
  - ZooMontana

- West North Central: North Dakota, South Dakota, Nebraska, Kansas, Minnesota, Iowa, Missouri
  - Blank Park Zoo
  - Chahinkapa Zoo
  - Como Park Zoo & Conservatory
  - Dakota Zoo
  - Lake Superior Zoo
  - Lee Richardson Zoo
  - Minnesota Zoo
  - Red River Zoo
  - Roosevelt Park Zoo
  - Saint Louis Zoo
  - St. Louis Aquarium
  - University of Minnesota Duluth
  - Wilder Research
  - Northland College / Timber Wolf Alliance
  - GLMV Zoos
- West South Central: Oklahoma, Texas, Arkansas, Louisiana
  - Alexandria Zoo
  - Houston Zoo
  - Oklahoma City Zoo & Botanical Garden
- East North Central: Wisconsin, Illinois, Indiana, Michigan, Ohio
  - Akron Zoo
  - Chicago Academy of Sciences Peggy Notebaert Nature Museum
  - Cincinnati Zoo & Botanical Garden
  - Clearwater Marine Aquarium
  - Columbus Zoo and Aquarium
  - Cosley Zoo
  - Detroit Zoological Society
  - Henry Vilas Zoo
  - International Crane Foundation
  - Lincoln Park Zoo
  - Museum of Science & Industry
  - NEW Zoo & Adventure Park
  - Otterbein University
  - Potawatomi Zoo
  - Potter Park Zoo

    - Project Dragonfly
    - Racine Zoo
    - Shedd Aquarium
    - Toledo Zoo & Aquarium
    - Zoological Society of Milwaukee
- East South Central: Kentucky, Tennessee, Mississippi, Alabama
    - Reflection Riding Arboretum and Nature Center
    - Tennessee Aquarium
    - Wildlife at Heart
- Middle Atlantic: New York, Pennsylvania, New Jersey
    - American Museum of Natural History
    - Association of Zoos & Aquariums
    - Immerse Universe LLC
    - Jenkinson's Aquarium
    - Lehigh Valley Zoo
    - Maryland Zoo
    - New York Aquarium
    - Ross Park Zoo
    - Staten Island Zoo
    - ZooAmerica North American Wildlife Park
- South Atlantic: Maryland, Delaware, Washington D.C., West Virginia, Virginia, North Carolina, South Carolina, Georgia, Florida
    - Brevard Zoo
    - Carolina Raptor Center
    - Central Florida Zoo & Botanical Gardens
    - Cox Science Center and Aquarium
    - East Carolina University
    - Florida Aquarium
    - Florida Atlantic University
    - Georgia Aquarium
    - Jacksonville Zoo and Gardens
    - Mote Marine Laboratory & Aquarium
    - NC Aquarium at Pine Knoll Shores
    - NC Aquarium on Roanoke Island
    - North Carolina Zoo
    - South Carolina Aquarium
    - Virginia Aquarium and Marine Science Center

    - WNC Nature Center
    - Zoo Atlanta
    - SEA LIFE North America
- New England: Maine, New Hampshire, Vermont, Massachusetts, Connecticut, Rhode Island
    - Handshouse Studio
    - Museum of Science
    - Roger Williams Park Zoo
- International
    - Auckland Zoo
    - Belize Zoo and Tropical Education Center
    - Calgary Zoo
    - Chester Zoo
    - Eco Wisdom Farm Sanctuary
    - Foundation for Wildlife Conservation
    - GRACE Gorillas
    - Greater Vancouver Zoo
    - South African Association for Marine Biological Research
    - Wellington Zoo
- Unspecified
    - ZooFit

Appendix 2. Participant Demographics

This table provides information, where available, about the number of participants for each data source used in this evaluation.

	ACE for Wildlife Network Survey	ACE for Wildlife Network Interviews	ACE for Wildlife SNA Events	ACE for Wildlife SNA Committees	ACE for Wildlife SNA Discussion Board	AZA Survey
Total Respondents	141	27	405	52	67	107
Organizations represented	47	21	99	22	29	61
Founding Partner Organizations represented	20	14	20	16	20	0
Roles of Respondents[1][2]						
Education or guest management	92 (65%)	20 (74%)				64 (60%)
Other	33 (23%)	3 (11%)				7 (7%)
Conservation	27 (19%)	3 (11%)				25 (23%)
Executive leadership	18 (13%)	1 (4%)				4 (4%)
Evaluation or research	16 (11%)	5 (19%)				14 (13%)
Animal care of husbandry	16 (11%)	3 (11%)				36 (34%)
Marketing and PR	8 (6%)	1 (4%)				2 (2%)

[1] This was only asked of ACE for Wildlife Network survey respondents

[2] Respondents could choose multiple options

	ACE for Wildlife Network Survey	ACE for Wildlife Network Interviews	ACE for Wildlife SNA Events	ACE for Wildlife SNA Committees	ACE for Wildlife SNA Discussion Board	AZA Survey
Engagement Level[3]						
Low	51 (36%)	8 (22%)				
Medium	47 (33%)	10 (37%)				
High	43 (30%)	9 (33%)				
Network Membership Type						
Member	99 (70%)	21 (78%)	297 (73%)	47 (90%)	51 (76%)	N/A
Affiliate	42 (30%)	6 (22%)	108 (27%)	5 (10%)	12 (18%)	N/A
Region						
Pacific	51 (36%)	10 (37%)	153 (38%)	18 (35%)	23 (34%)	8 (8%)
West North Central	32 (22%)	6 (22%)	73 (18%)	10 (19%)	14 (21%)	5 (5%)
East North Central	29 (20%)	4 (15%)	79 (20%)	14 (27%)	13 (19%)	7 (7%)
Mountain	21 (15%)	6 (22%)	55 (14%)	10 (19%)	8 (12%)	5 (5%)
South Atlantic	5 (4%)		16 (4%)		3 (5%)	15 (14%)
West South Central	3 (2%)	1 (4%)	5 (1%)			2 (2%)
Middle Atlantic	1 (1%)		10 (2%)			4 (4%)
Unspecified	1 (1%)		2 (.5%)		4 (6%)	3 (3%)
East South Central	1 (1%)		2 (.5%)			5 (5%)
New England	0 (0%)		2 (.5%)			5 (5%)

[3] This was only calculated for ACE for Wildlife Network survey respondents

	ACE for Wildlife Network Survey	ACE for Wildlife Network Interviews	ACE for Wildlife SNA Events	ACE for Wildlife SNA Committees	ACE for Wildlife SNA Discussion Board	AZA Survey
International	0 (0%)		8 (2%)		1 (1%)	3 (3%)
Organization Size						
Small	46 (33%)	12 (44%)	118 (29%)	24 (46%)	23 (34%)	
Medium	38 (27%)	7 (26%)	101 (25%)	10 (19%)	14 (21%)	
Large	40 (28%)	5 (19%)	122 (30%)	11 (21%)	19 (28%)	
N/A	17 (12%)	3 (11%)	64 (16%)	7 (13%)	11 (16%)	

Appendix 3. ACE for Wildlife Network Sub-Network Statistics

We studied multiple sub-networks of the ACE for Wildlife Network to better understand the collaboration and information-sharing characteristics and patterns of the Network. The table below summarizes the major network statistics we considered for each sub-network.

Network	Connections	Diameter	Avg. path length	Density	Avg. weighted degree	Clustering coefficient
Committees	414	4	2.5	.002	3.8	.59
Individual Collaborations	1,304	9	3.4	.01	5.2	.25
Individual Information-Sharing	1,869	6	2.9	.013	6.6	.22
Organizational Collaboration	1,304	6	2.8	.02	11.7	.26
Organizational Information-Sharing	1,869	6	2.9	.012	6.4	.22
Discussion Board	1,451	4	1.8	.33	23	.81
Events	19,701	3	1.8	.1	57.6	.71

Appendix 4. Evaluation Methods

To understand the baseline connectivity of the ACE for Wildlife Network, an evaluation was designed around four key evaluation questions:

1. What is the breadth and extent of empathy-focused collaboration among Network participants and organizations?
2. How does empathy-related information and learning spread through the Network, including potential events or factors that influence the diffusion?
3. What are the opportunities for and challenges to greater participation, collaboration, and cohesion among the Network, as well as to expanding to a multi-hub structure?
4. How does empathy-related information and learning spread beyond the Network to non-participating AZA organizations? What is the breadth of this reach across the North American AZA field currently?

We employed an explanatory sequential mixed methods case study design to answer these key questions. This means we first collected and analyzed quantitative data, then collected and analyzed qualitative data with the purpose of better explaining the quantitative findings. Quantitative data primarily consisted of social network data from five sources:

- A social network survey for current Network participants (henceforth called the ACE for Wildlife Network survey)
- A social network survey for AZA members not currently affiliated with the ACE for Wildlife Network (henceforth called AZA survey),
- Network discussion board data,
- Network event attendance records, and
- Network committee meetings attendance records.

Qualitative data consisted of individual interviews with Network participants.

Data Sources

Surveys

The ACE for Wildlife Network survey was developed in collaboration with designated AE Team members. Groundswell Services conducted three cognitive interviews, revised the survey in response, and then deployed the survey with five Network participants who agreed to pilot it. Following an additional round of revisions, the ACE for Wildlife Network survey was sent to 378 current Network Members and Affiliates (i.e., participants, based on membership records from November 2023) representing 110 organizations. The survey consisted of demographic questions, questions (closed and open-ended) related to Network processes and outcomes, and social network questions. For the latter, respondents were given the name of every current Network Member and Affiliate and were asked to indicate (1) whether they shared information and ideas

with that person, whether they collaborated with that person, or both, and (2) the frequency with which they shared information or collaborated (i.e., occasionally or regularly). Individuals were listed by organization. For each organization, respondents were also asked to consider their relationship with "someone unnamed" from the organization. In addition to these questions, respondents were also asked to name any organizations that they shared information or collaborated with about fostering empathy for wildlife that were not part of the Network. The survey invitation and instructions qualified that each survey respondent who completed the survey and provided their email address to Groundswell Services would receive an Amazon gift card for $25.

The AZA survey, a much shorter survey, was shared with three AZA Member listservs: Animal Programs, Education, and Research & Technology. The survey consisted of demographic questions, questions (closed and open-ended) related to empathy and networking, and social network questions. For the latter, respondents were asked to share the top four organizations with which they regularly exchange information and ideas or collaborate with on the topic of fostering empathy. The survey invitation and instructions qualified that each survey respondent who completed the survey and provided an email address to Groundswell Services would be entered into a drawing to receive one of eight $50 Amazon gift cards. Several weeks after the close of the survey, eight names were drawn using a random number generator, and those survey respondents were awarded the $50 gift cards via email.

Both surveys were created in Alchemer, an online survey platform. AE Team members deployed the survey and sent three reminders with the deadline to complete the survey. At the end of the open period, AE Team members downloaded responses from Alchemer to Excel and sent Groundswell Services a copy.

Interviews

To provide additional context and meaning to the quantitative data, as well as to understand the perspective of Network participants in regard to enablers of and challenges to Network engagement, along with suggestions for improvement, the evaluation team conducted 27 one-on-one interviews with a purposive sampling of participants who completed the Network survey. As a first step for the selection of interviewees, the AE Team indicated to those respondents that they would recommend participating in individual interviews, prioritizing those without previous involvement in evaluation activities. Keeping this in mind, the evaluation team sorted respondents by their total number of connections reported (i.e., how many individuals they indicated sharing information or collaborating with) into three categories: low connectivity (fewer than 8 connections), medium connectivity (8 to 20 connections), and high connectivity (21 or more connections). Respondents were further sorted by their membership status (i.e., Member or Affiliate) and geographic location. Final interviewees reflected a variety of

experiences based on engagement level, geography, institution, role, membership status, and time in the Network. All interviews were between 30 minutes to an hour on Zoom and were recorded using Zoom. Each participant received a $50 gift card in appreciation.

Other

The following data sources were provided by the AE Team:

Source	# of Data Points	Dates	Criteria
Discussion Board	63 posts	2021-2023	Posts had to have at least one response
Event Attendance	48 events	2019-2023	Events had to be hosted by the Network
Committee Meeting Attendance	130 meetings	2020-2023	N/A

Analysis

All SNA was conducted using Gephi version 0.10, an open-source software for network analysis. Close-ended survey questions were analyzed using Microsoft Excel, and all open-ended survey questions were thematically analyzed by hand. Interviews were conducted and recorded using Zoom. The recordings produced by Zoom were used to create transcripts using Sonix.ai. Then by hand, transcripts were cleaned and thematically analyzed.

Respondents

ACE for Wildlife Network Survey

The ACE for Wildlife Network survey was completed by 141 people, representing 47 organizations (individual response rate: 37.2%; organizational response rate: 42.7%). The AZA survey was completed by 128 people representing 61 organizations. According to the AZA website, there are currently 237 members. Of those, 27 are Network Partner Organizations and therefore were ineligible to complete the AZA survey. Thus, using 210 as the possible number of respondent organizations, the AZA organizational survey response rate was 29%.

The ACE for Wildlife Network survey attracted a diverse range of respondents, predominantly from specific sectors within the Network. A significant portion of those who completed the survey were actively involved in education or guest engagement roles. This trend is not only indicative of the roles these individuals play, but also reflective of the broader focus of the Network on educational outreach and visitor interaction.

Delving into the specifics, we observed that the category with the next highest representation was labeled “other.” To better understand this segment, we analyzed the self-reported roles within this group. We found that it encompassed a variety of functions, including volunteer

coordination, development, grants management, philanthropy, and community outreach and engagement.

Notably, there were fewer respondents from departments or roles such as human resources, interpretation, and biofact coordination. Additionally, there were representatives from administrative sectors and other miscellaneous roles. It is important to note that the survey design allowed participants to identify more than one role, which explains why the total count of responses exceeds the actual number of respondents.

This distribution of roles among survey participants aligns well with our understanding of the Network's composition. It underscores the fact that a substantial number of Network participants are engaged in activities related to education and guest interaction. Such a finding is crucial as it highlights the predominant areas of focus within the Network and guides AE Team efforts in fostering effective collaboration and communication among these key areas.

Additional demographics are reported in Appendix 2.

Interviews

Individual interviews were conducted with 27 people representing 21 organizations. The individuals were purposely selected based on their level of connectivity (per the survey data they contributed), their membership type, and the region in which they work. The connectivity levels of the interviewees were as follows:

Connectivity Level of Interviewees	Number	Percent of Total Interviewed
Low (< 8 connections)	8	30%
Medium (8-20 connections)	10	37%
High (21 or more connections)	9	33%
Total	27	100%

Additional demographics are reported in Appendix 2.

Limitations

The evaluation faced several limitations that affect the quality and results of the study: A lengthy survey, possible misunderstanding of survey terms, responses from less than a census of Network participants, organizational influence discrepancies in the survey, and manipulation of data by hand.

Lengthy Survey

Because the ACE for Wildlife Network survey asked respondents to review a list of all Network participants and select those with whom they collaborate or share information, the survey was lengthy. We purposefully limited the number of additional questions, but the survey still included almost 350 names for respondents to read through.

To improve the presentation of those names and accurately predict how long the survey would take, Groundswell Services worked with AE Team representatives, completed three cognitive interviews, and piloted the survey with five Network participants. We updated the survey multiple times in response to feedback and removed all non-essential questions. Even so, 145 people consented to take the survey, and 138 completed the questions following the SNA portion. While we cannot know why the seven individuals did not complete the survey, it is likely that survey fatigue contributed.

Possible Misunderstanding of Survey Terms

One of the limitations of this work was participants' varying interpretation of survey questions. For example, during interviews, we discovered that some participants had interpreted information-sharing as collaboration; in one case, a participant stated that they had mistakenly reported collaboration with others in their survey. On the other hand, two interviewees that were categorized as low-level connectivity (0 to 7 connections) had not interpreted their involvement in committees as collaboration. Given this, there may have been some miscategorization of participants in terms of their involvement in information-sharing or collaboration activities as well as their level of engagement. Another limitation was that while interviews were done one to two months after surveys, interviewees sometimes described experiences outside the survey period. The interviewer tried to mitigate this by asking participants to focus on what they had reported on their surveys.

Responses from Less than a Census of Network Participants

The ability of SNA to visually represent relationships allows us to identify key players within the Network—those individuals who serve as bridges or conduits for information flow. These individuals often play a disproportionately significant role in the dissemination of ideas and practices within the Network. By highlighting these critical connections, SNA gives us a clearer picture of the Network's structure and functioning, enhancing our understanding of how collaboration and knowledge sharing occur organically within the group.

However, SNA comes with limitations, particularly when it comes to the completeness of data. Our analysis is predicated on the assumption that the more comprehensive our data from Network participants, the more accurate our understanding of the Network. In cases like ours, where we aim for a complete census of the Network but achieve only partial participation—around half in our study—the results must be interpreted with understanding of these

limitations. The absence of responses from highly engaged individuals, who often have extensive connections, can lead to significant gaps in our analysis. These individuals, acting as bridges or central nodes, are critical for a full understanding of the Network's structure and dynamics. Their non-participation can lead to a misleading representation of the Network, understating its actual interconnectedness and the influence of these key individuals.

Conversely, the non-participation of less engaged Network participants, though still a concern, does not impact our analysis to the same extent. If these individuals are indeed less connected within the Network, their absence in the survey data might inadvertently offer a somewhat accurate portrayal of their limited engagement in the Network. This scenario presents a less severe issue compared to the absence of highly connected individuals.

The impact of non-participation in the survey becomes particularly evident when we consider the visualization of the Network. Imagine this scenario: If a person in the Network chose not to participate in the survey, but they are known to collaborate with me, their absence has a tangible effect on the representation of the Network's connections. In the visual graph we create, each person is a circle, and their relationships with others are lines connecting these circles.

Let us delve a bit deeper. If that non-participating individual had completed the survey and acknowledged their collaborative connection with me, both our circles would potentially appear larger, representing the strength of our mutual connection. Additionally, there would be a line connecting us, symbolizing our collaborative relationship. However, due to their absence, this line is missing from the visual representation. Essentially, their non-participation leads to a one-sided portrayal of the relationship – if I mentioned them, a line from my circle to an unrepresented space exists, but it lacks the reciprocal connection that would have been there if they had also participated.

This situation results in an incomplete but still telling picture of the Network. It highlights the importance of participation in accurately graphing the Network's full extent of collaborations. When key individuals abstain from the survey, it diminishes our ability to fully grasp the depth and scope of the Network's interconnections. The resulting visual graph, while valuable, should thus be viewed as a representation that, while insightful, may not fully capture all the nuances and connections of the Network.

Therefore, while SNA offers valuable insights into the Network's structure and dynamics, the partial response rate in our study underscores a crucial limitation. It highlights the need for careful interpretation of our findings, acknowledging that our analysis might not fully capture the complexities and nuances of the entire Network due to the underrepresentation of certain key participants.

Organizational Influence Discrepancies in the Survey

In the survey, the representation of various organizations within the Network revealed notable discrepancies in terms of response rates. The structure of the Network is such that some organizations are represented by a single individual, while others have multiple representatives. Consequently, when the survey was disseminated to Network participants, response patterns emerged that varied significantly across organizations. This variation led to a situation in which some organizations are overrepresented in the survey responses, while others are underrepresented.

To illustrate, consider the Alaska SeaLife Center, which constitutes 3.96% of the Network's total membership. However, only 2.84% of all survey respondents came from this organization, despite 26.67% of its Network-affiliated individuals responding. This scenario indicates a slight underrepresentation of the Alaska SeaLife Center in the survey. Similarly, take the case of Woodland Park Zoo, representing 12.93% of total membership. From this organization, 11.4% of the survey responses were received, despite only 33% of their Network-affiliated individuals participating. This again reflects underrepresentation, albeit to a different degree.

In contrast, consider the Living Desert, where the lone staff member who is part of the Network responded to the survey. This organization makes up 0.26% of total membership, but since their sole representative participated, they accounted for 0.71% of survey responses, leading to overrepresentation in the data.

These examples highlight the challenges faced in achieving balanced representation in SNA surveys. While the size and diversity of the Network mean that these variations do not pose insurmountable challenges, they do underscore the need for careful interpretation of the data. The differences in response rates, albeit small, can impact the overall understanding of Network engagement and dynamics. Currently, there is no established methodology within our framework to adjust or weigh these discrepancies, presenting an area for future development in survey approaches.

The table below helps us consider whether an organization is overrepresented or underrepresented in the ACE for Wildlife Network survey. Each organization that has participants in the Network is listed in the left-hand column. Next, we show the percentage of the entire Network participant pool that organization holds. Then, we show the percentage of the entire survey respondent pool that organization holds. In the final column, we show the percentage of participants from that organization that completed the survey.

Organization	% of current membership	% of survey respondents (shaded = greater representation in survey than in membership)	% of members from organization that completed the survey
Akron Zoo	1.06%	2.13%	75%
Alaska Sealife Center	3.96%	2.84%	26.67%
Alexandria Zoo	0.26%	0.71%	100%
American Museum of Natural History	0.26%	0%	0%
Antioch University	0.26%	0%	0%
Auckland Zoo	0.26%	0%	0%
AWARE Institute	0.26%	0%	0%
Association of Zoos and Aquariums	0.26%	0.71%	100%
Beez Kneez Creative	0.26%	0.71%	100%
Belize Zoo and Tropical Education Center	0.26%	0%	0%
Blank Park Zoo	0.79%	2.13%	100%
Brevard Zoo	0.26%	0.71%	100%
Butterfly Pavilion	0.26%	0%	0%
Calgary Zoo	0.26%	0%	0%
Carolina Raptor Center	0.26%	0%	0%
Central Florida Zoo & Botanical Gardens	0.26%	0%	0%
Chester Zoo	0.26%	0%	0%
Chicago Academy of Sciences Peggy Notebaert Nature Museum	0.26%	0.71%	100%
Cincinnati Zoo	0.79%	0%	0%
Clearwater Marine Aquarium	0.53%	0%	0%
Columbus Zoo	0.26%	0%	0%
Como Park Zoo & Conservatory	4.22%	5.67%	50%
Cosley Zoo	0.26%	0%	0%
Cox Science Center and Aquarium	0.26%	0%	0%
Dakota Zoo	1.06%	0.71%	25.00%
Denver Zoo	1.32%	0.71%	20%
Detroit Zoological Society	0.26%	0.71%	100%
East Carolina University	0.26%	0%	0%
Eco Wisdom Farm Sanctuary	0.26%	0%	0%
ECOS Communications	0.26%	0%	0%
Florida Aquarium	0.26%	0%	0%
Florida Atlantic University	0.26%	0%	0%
Foundation for Wildlife Conservation	0.26%	0%	0%
Georgia Aquarium	0.26%	0%	0%

Organization	% of current membership	% of survey respondents (shaded = greater representation in survey than in membership)	% of members from organization that completed the survey
GLMV Zoos	0.26%	0.71%	100%
GRACE Gorillas	0.26%	0%	0%
Greater Vancouver Zoo	0.26%	0%	0%
Grizzly & Wolf Discovery Center	1.32%	0.71%	20%
Handshouse Studio	0.26%	0%	0%
Henry Vilas Zoo	1.85%	2.84%	57.14%
Honolulu Zoo Society	0.26%	0%	0%
Houston Zoo	1.06%	0.71%	25%
Idaho Falls Zoo	1.58%	2.13%	50%
Immense Universe LLC	0.26%	0%	0%
International Crane Foundation	2.37%	2.13%	33.33%
Jacksonville Zoo & Gardens	0.53%	0.71%	50%
Jenkinson's Aquarium	0.26%	0%	0%
Kathryn Owen Consulting	0.26%	0%	0%
Lake Superior Zoo	1.85%	3.55%	71.43%
Lee Richardson Zoo	0.26%	0.71%	100%
Lehigh Valley Zoo	0.26%	0%	0%
Lincoln Park Zoo	0.79%	0.71%	33.33%
Maryland Zoo	0.26%	0.71%	100%
Minnesota Zoo	4.49%	6.38%	52.94%
Monterey Bay Aquarium	0.26%	0.71%	100%
Mote Marine Laboratory & Aquarium	0.26%	0%	0%
Museum of Science	0.26%	0%	0%
Museum of Science & Industry	0.26%	0%	0%
NC Aquarium at Pine Knoll Shores	0.26%	0.71%	100%
NC Aquarium on Roanoke Island	0.26%	0%	0%
New York Aquarium	0.26%	0%	0%
NEW Zoo & Adventure Park	1.32%	0.71%	20%
North Carolina Zoo	0.26%	0%	0%
Northland College / Timber Wolf Alliance	0.26%	0%	0%
Northwest Trek Wildlife Park	1.32%	2.84%	80%
Oakland Zoo	0.53%	1.42%	100%
Oklahoma City Zoo & Botanical Garden	0.26%	0.71%	100%
Otterbein University	0.26%	0%	0%
Pacific Whale Foundation	0.26%	0.71%	100%
Point Defiance Zoo & Aquarium	4.49%	2.84%	23.53%

Organization	% of current membership	% of survey respondents (shaded = greater representation in survey than in membership)	% of members from organization that completed the survey
Potter Park Zoological Society	0.53%	0%	0%
Progressive Animal Welfare Society (PAWS)	0.26%	0.71%	100%
Project Dragonfly	0.26%	0%	0%
Racine Zoo	1.85%	2.84%	57.14%
Red River Zoo	1.06%	1.42%	50%
Reflection Riding Arboretum and Nature Center	0.26%	0%	0%
Regis University	0.26%	0%	0%
Roger Williams Park Zoo	0.26%	0%	0%
Roosevelt Park Zoo	1.32%	1.42%	40%
Ross Park Zoo	0.26%	0%	0%
Saint Louis Zoo	0.26%	0%	0%
San Diego Zoo Wildlife Alliance	0.79%	0.71%	33.33%
San Francisco Zoo	0.26%	0%	0%
Santa Barbara Zoo	0.53%	1.42%	100%
SEA LIFE North America	0.26%	0%	0%
Seattle Aquarium	6.33%	7.09%	41.67%
Shedd Aquarium	0.79%	2.13%	100%
South African Association for Marine Biological Research	0.26%	0%	0%
South Carolina Aquarium	0.26%	0%	0%
St Louis Aquarium	0.26%	0%	0%
Staten Island Zoo	0.26%	0%	0%
Tennessee Aquarium	0.26%	0%	0%
The Living Desert	0.26%	0.71%	100%
Toledo Zoo	0.26%	0%	0%
University of MN - Duluth	0.26%	0%	0%
Utah's Hogle Zoo	3.43%	4.26%	46.15%
Virginia Aquarium and Marine Science Center	0.26%	0%	0%
Wellington Zoo	0.26%	0%	0%
Western Washington University	0.26%	0%	0%
Wilder Research	0.26%	0%	0%
Wildlife at Heart	0.26%	0.71%	100%
WNC Nature Center	0.26%	0%	0%
Woodland Park Zoo	12.93%	11.35%	32.65%
Yellowstone Wildlife Sanctuary	0.26%	0%	0%

Organization	% of current membership	% of survey respondents (shaded = greater representation in survey than in membership)	% of members from organization that completed the survey
Zoo Atlanta	0.26%	0%	0%
Zoo Boise	2.90%	2.84%	36.36%
ZooAmerica North American Wildlife Park	0.26%	0%	0%
ZooFit	0.26%	0.71%	100%
Zoological Society of Milwaukee	7.12%	5.67%	29.63%
ZooMontana	2.64%	4.26%	60%
Unaffiliated	0.26%	0%	0%
Unaffiliated	0.26%	0%	0%
TOTALS	100%	100%	

Manipulation of Data by Hand

Gephi requires that social network data be entered using two separate spreadsheets formatted in a particular way; the program is not able to support data analysis without strict adherence to the formatting requirements. Groundswell Services received raw survey and administrative data in Excel from Woodland Park Zoo. Thus, we had to manipulate data within these spreadsheets into the required format. Any time manual manipulation of data is required, we create the risk of introducing error. To help guard against error, one team member created the sheets, and a second team member cross-checked the first person's work.

Appendix 5. SNA Glossary

Using SNA, we can look at network-level statistics—i.e., statistics that tell us about the collaboration network and the information-sharing network. Also, we can look at individual-level statistics—i.e., statistics that tell us about the individuals who comprise a network. For individual-level statistics, we typically average those across all survey participants to continue to build a picture of a network as a whole.

General

- **Bridge:** An individual or node that connects two or more distinct groups or clusters within a network.
- **Edge** (aka Tie): The connection between nodes in a network.
- **Node:** The individuals, organizations, or other entities that are connected by various types of relationships in a network.
- **Network:** A set of connected nodes, bounded by contextually relevant, traditionally social criteria
- **Unit of measurement:** Typically, the unit of measurement for a "network" is "connection."

Network-Level Statistics

- **Average path length:** Shortest possible path between all individuals; smaller number = greater communication efficiency
- **Average weighted degree:** Average number of connections per person, given multiple connections between people; higher number = greater connectivity
- **Clusters:** A measure of cliques, number of closed triangles; higher numbers = more closed triangles—i.e., more clusters
- **Clustering coefficient:** A measure of cliques, degree to which individuals are clustered versus being equally or randomly distributed; proportion of actual closed triangles to potential closed triangles; higher numbers = fewer closed triangles—i.e., fewer clusters
- **Density:** Proportion of actual connections to possible connections; higher number = greater connectivity
- **Diameter:** Maximum number of connections required to cross the entire network; larger number = greater complexity
- **Size of network:** Number of individuals, number of connections between them

Node-Level Statistics

- **Betweenness centrality:** The number of times a node acts as a bridge along the shortest path between two other nodes. The frequency with which a node appears on these paths; higher number = stronger role in facilitating communication or connection between different parts of the network. (High betweenness centrality indicates that

although you might not be the most connected, you are connected to the people who are the most connected.)

- **Closeness centrality:** Proximity to well-connected neighbors; higher number = better placed to influence the entire network most quickly
- **Eccentricity:** Maximal distance to other individuals in the network; higher number indicates greater influence in the network, from a maximum equal to network diameter
- **Harmonic closeness centrality:** The average distance of an individual to all other individuals in the network; higher numbers = quicker communication with other individuals
- **Weighted degree:** Number of connections given multiple connections between individuals; higher number = more connections