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*Research*

# A network perspective on multi-scale water governance in the Lake Champlain Basin, Vermont

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ABSTRACT. The prevalence and persistence of harmful cyanobacterial blooms demonstrate the importance of governance systems that effectively engage with many actors to address nonpoint pollution from a variety of sources across multiple spatial domains. Although the importance of social-ecological alignment on effective governance is increasingly clear, governance systems often evolve incrementally and in a manner that fails to adequately align resources and governance networks with biophysical structures, processes, and legacies. Through a survey of water governance actors in the Lake Champlain Basin, we map the structure of the water governance network and identify the key information brokers, flows of resources, and ongoing collaborative partnerships. We measure cross-scale and within-scale linkages to characterize the degree of coordination across space and scale using exponential random graph models, finding distinct differences in governance activities by mode of coordination. We also show that coordination in the system is largely a function of geographic proximity and shared issues of concern, demonstrating the importance of multidimensional, social-ecological perspectives in the collaborative governance of freshwater systems. Specific to the Lake Champlain Basin, our findings suggest that as the transformation of the governance system proceeds, cross-scale and inter-watershed coordination must be regularized to maintain learning and innovation across the system as it pursues its clean water goals.

Key Words: *exponential random graph models; harmful algal blooms; network analysis; water governance*

## INTRODUCTION

Cyanobacterial blooms (cyanoHABs) are a common late summer feature along the beaches and in the shallow bays of Lake Champlain. The blooms threaten public health, degrade the aquatic environment, depress property values, close beaches, and negatively affect local economies (USEPA 2018, Gourevitch et al. 2021). Lake Champlain cyanoHABs result from complex interactions among climatic conditions, lake morphology and bathymetry, and nutrient pollution (Zia et al. 2022). However, the primary driver of cyanoHABs across the Lake Champlain Basin (LCB) is phosphorus. Phosphorus enters the lake as runoff from multiple sources, including agriculture, forestry, and urban stormwater (Zia et al. 2016, Isles et al. 2017, Lake Champlain Basin Program 2018). To reduce nutrient pollution to Lake Champlain, the state of Vermont has mounted several policies to address water quality issues in the lake and across the LCB, including multiple pieces of legislation, partnerships with the United States Environmental Protection Agency (USEPA), collaboration with local and regional organizations, and the allocation of over $250 million since 2016 (Vermont Agency of Administration 2021). However, integrated assessment models predict that even with substantial reductions to phosphorus surface runoff, legacy phosphorus in lake bed sediment will continue to affect water quality, posing substantial management problems (Zia et al. 2016, 2022).

Despite the efforts of many concerned actors operating at multiple scales, nutrient reductions required under the jurisdiction of federal and state laws will be insufficient to meet water quality objectives. These policy disconnects (Webster 2015) or functional mismatches (Cumming et al. 2006) in the social-ecological system (SES) reflect the inability of policy tools to adequately manage the complex social-ecological processes in the LCB, including multiple sources of nonpoint nutrient pollution on the surface, climate change–benthic phosphorus interactions, and the inability to effectively regulate agricultural land use on private lands (Koliba et al. 2016, Zia et al. 2016, 2022, Isles et al. 2017). To help close this gap, the Vermont Agency of Natural Resources (VTANR) has increased its use of incentive-based, voluntary projects dependent on coordination among actors (Vermont General Assembly 2019).

Coordination among actors relative to their management of environmental processes can be structured as social and social-ecological networks (Janssen et al. 2006). A network approach obviates the cross-scale and within-scale interactions among social and environmental SES components (Cash et al. 2006). Where mismatches in social networks and ecological functions occur, resource management may suffer (Fischer 2018, Hamilton et al. 2019). However, resource governance networks have multiple functions, and actors are connected via multiple possible pathways. Thus, a multiplex network can be thought of as having multiple "layers" of edges in the network, each layer corresponding to a different mode of interaction or purpose (Koliba et al. 2018). Multiplex network analysis can tell us not only if a tie exists between actors, but also what functional role that tie embodies. For example, previous model-based research in the LCB showed that a collaborative, regionalized, polycentric governance model can reduce functional and spatial mismatches (and increase programmatic efficiency) if information sharing and task coordination activities co-occur among actors at the watershed scale (Bitterman and Koliba 2020).

Meeting Vermont's clean water goals through both the legally-mandated and voluntary work of public and private actors will require a system of effective collaborative governance (Ansell and Gash 2008, Emerson and Gerlak 2014, Emerson and Nabatchi 2015). Hundreds of individuals, institutions, and organizations

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are engaged in issues of water quality and quantity across the state (Koliba et al. 2014, Scheinert et al. 2015), and many of these actors work together directly or through mediated forums and structured action situations (Bitterman and Koliba 2023). Thus, to assess the SES's ability to leverage collaborative governance principles within a polycentric framework in pursuit of a new trophic regime from Lake Champlain, it is useful to understand where, how much, and what type of coordination is currently taking place.

Polycentricity, or the presence of multiple centers of decision making in a governance system (Carlisle and Gruby 2019), can occur across multiple functions in the multiplex network. Polycentricity is often seen as a principle for enhancing resilience (Biggs et al. 2012), as well as a necessary condition for the promotion of collective action (Baldwin et al. 2018). Although many studies have looked at polycentricity through the lens of the Ecology of Games (Berardo and Lubell 2016, 2019) or through connected institutions (McGinnis 2011, Oberlack et al. 2018, Kimmich et al. 2023), network studies of water governance have not fully unpacked the multi-functionality of water resource management. Although much of social network analysis assumes some homogeneity in ties connecting actors, not all types of coordination are equal with respect to their influence on effective water governance (Koliba et al. 2018). By investigating heterogeneous types of coordination within the LCB governance network, we can identify where gaps in coordination among actors exist and where targeted rulemaking can reduce spatial and functional mismatch.

Our analysis utilizes a survey of governance actors across the LCB with social network analysis to map the structure of the water quality governance system in the LCB. We first characterize the general structure of the multiplex governance network, identify which actors are most central to governance activities, and plot the relative frequency of cross-scale and within-scale linkages. We expect to find a network characterized by highly connected actors at the state scale, although the centrality of various actors will differ by function within the multiplex framework. Second, we measure the degree to which scale, geographic proximity, and shared issues of concern influence actor collaboration in the network. We expect that actors will be more likely to coordinate their actions with others at similar spatial scales and with similar concerns and, following the first law of geography (Tobler 1970), will be more likely to coordinate with actors in nearby locations. The LCB demonstrates many of the common features of social-ecological resilience thinking, including spatial and temporal lags (Zia et al. 2016, 2022) and heterogeneity among actors and actor functions (Koliba et al. 2016); in addition, achieving LCB clean water objectives would entail the use of incremental adaptations of the governance system to shift the system from its current mesotrophic state to a more desirable basin of attraction (Carpenter et al. 2001, Walker et al. 2004). In that context, our analysis is an initial step in understanding whether more tightly connecting governance network structures with phosphorus sources and solutions can facilitate water quality improvements in the region. Further, these findings may help identify potential points of leverage that can aid in the development of the collaborative relationships vital to achieving Vermont's clean water objectives.

## METHODS

### The Lake Champlain Social-Ecological System

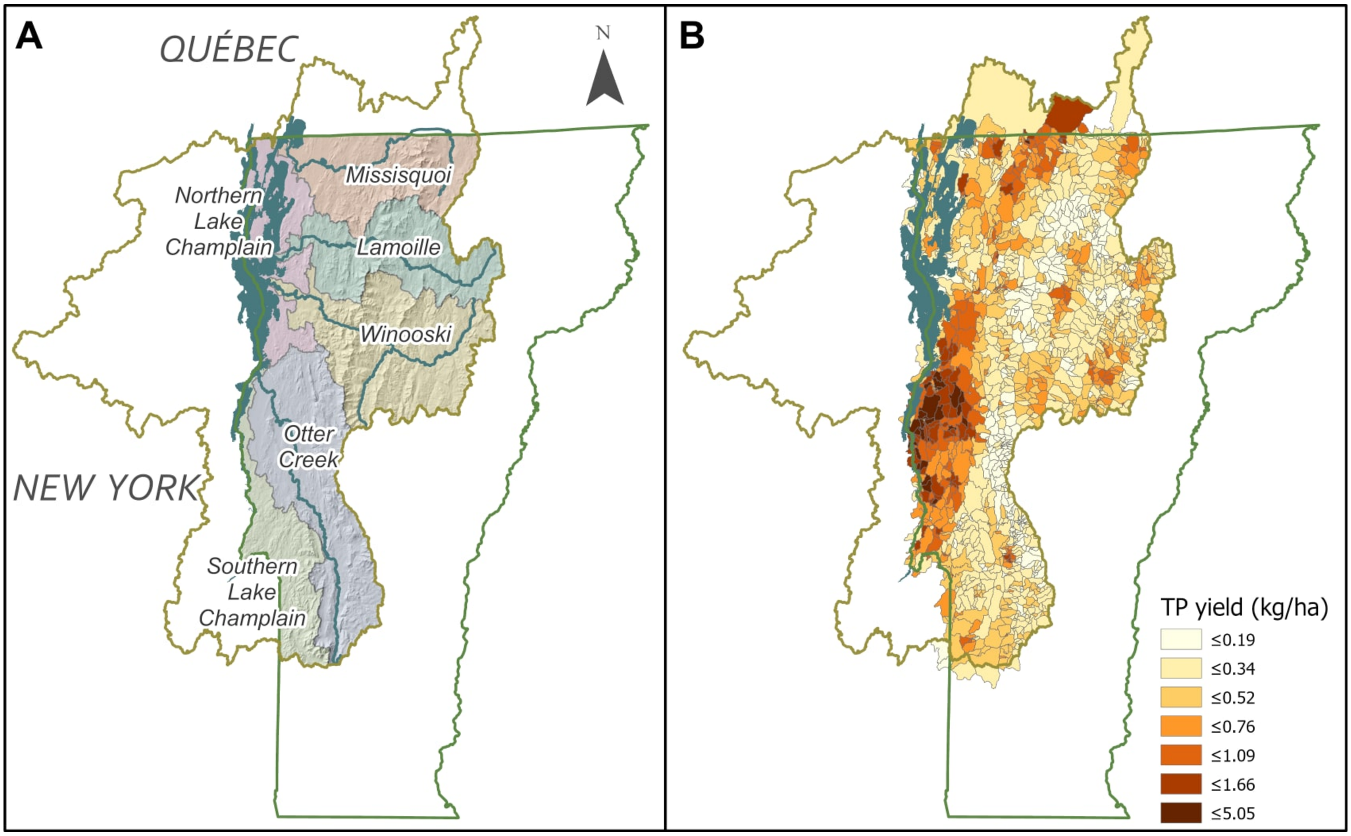
The LCB includes portions of Vermont, New York, and southern Québec, necessitating interstate and international coordination on water-related issues. Within Vermont, there are many overlapping jurisdictions responsible for managing facets of water quality and quantity. VTANR coordinates water quality management at the state scale, but allocates activities in LCB at a spatial unit formally termed "tactical basins." Tactical basins approximate the six 8-digit hydrologic unit (HUC-8) watersheds (including direct drainage to Lake Champlain) that comprise the Vermont portion of the LCB (Fig. 1).

Twelve segments of Lake Champlain are under a "total maximum daily load" (TMDL) regulation that limits the level of phosphorus that may legally enter waterways draining to the lake, and requires the state to take steps to reduce phosphorus runoff. The TMDL was initially conceived in 2002, then revised in 2011 and 2016 following litigation (Koliba et al. 2016, USEPA 2016, Lake Champlain Basin Program 2018). The TMDL estimates that 41% of total phosphorus (TP) comes from agricultural lands, 21% from riverbank instability, 16% from forested lands, 13% from developed lands, 5% from unpaved roads, and 4% from sewage treatment (see Fig. 1B for the spatial distribution of TP estimates from the TMDL; USEPA 2016).

In response to the TMDL and concerns of its residents, the Vermont government has enacted multiple pieces of legislation aimed at improving water quality. Act 64, commonly called Vermont's Clean Water Act [of 2015], adopted revised required agricultural practices, established permitting processes for development, and created the Clean Water Fund to fund "clean water projects" to reduce nutrient runoff to Lake Champlain (Vermont General Assembly 2015). Within VTANR, responsibility for prioritizing clean water projects was consolidated in the Department of Environmental Conservation (DEC), which makes prioritization decisions under the law. However, private land rights, capacity constraints, external financial perturbations, and imperfect information have constrained the search for optimal outcomes. Even without these constraints, the phosphorus reduction targets set by the TMDL cannot be strictly met by Act 64 and other existing regulatory frameworks (e.g., the U.S. Clean Water Act), necessitating new legislation titled the Clean Water Service Delivery Act of 2019, or Vermont Act 76. This law prioritizes non-regulatory projects in pursuit of EPA-mandated targets and establishes a new paradigm for water quality management by creating new regional organizations termed Clean Water Service Providers (CWSPs). CWSPs are intended to manage, implement, and maintain non-regulatory projects within jurisdictions on the basis of HUC-8 watersheds, thus shifting some of the responsibility and centrality of VTANR for managing water quality to novel watershed-based social-ecological action situations (Ostrom 2005, Schlüter et al. 2019) across the state, and theoretically reducing spatial mismatch between hydrology and management.

To assess the LCB water governance network, we collected survey data via an online platform from July to December 2019. The sample frame included private, non-profit, and public entities (e.g., organizations, institutions, and agencies), collectively termed "actors," engaged in water quality or quantity issues in the Vermont

**Fig. 1.** The Lake Champlain Basin (gold outline) spans parts of Vermont, New York, and southern Québec. Lake Champlain drains north in Canada, presenting multiple international water management issues. On the left, tactical basins (labeled) in the Vermont portion of the Lake Champlain Basin are management units roughly corresponding to HUC-8 watersheds. Water governance occurs across multiple boundaries and scales. On the right, TMDL estimates of the annual total phosphorus yield (area-normalized TP load in units of kg/ha/year) represent spatially heterogenous mitigation targets across the basin.




or Québec portions of the LCB. An initial set of possible actors was seeded from the authors' previous surveys in the region (Koliba et al. 2014, Scheinert et al. 2015). Additional actors were identified via expert knowledge, state government databases (e.g., funding recipients), document analysis (e.g., meeting minutes), internet searches, and collaboration with local government agencies. The lists were validated by watershed management staff at VTANR. Because many Vermont towns and villages are small, with few full-time staff, we excluded municipalities from the sample frame. Respondents were contacted via email at their place of employment and were asked to answer on behalf of the entity they represented. Although entities varied in size, care was taken to ensure individual respondents were in leadership roles within the organizations, thereby likely possessing knowledge regarding coordination efforts. Further, we surveyed sub-units of large organizations to assess coordination among functional units. For example, VTANR is not an actor in our network, but the Watershed Management Division of VTANR is included, among many others. Subjects were sent an invitation email, followed by up to two follow-up reminder emails. A PDF of the web survey can be found in Appendix 2.

We received responses from 88 of 203 (43.3%) surveyed actors (some had multiple responses). Our contact list purposefully included many small organizations and private firms. That these potential actors did not reply is unsurprising, given the private nature of firms and contracts as well as the limited resources of small entities. If we omitted actors that did not respond and were identified as partners by five or fewer respondents (corresponding to one edge per mode of coordination), our response rate would improve to 51.3%. To increase our confidence in our sample, expert staff at VTANR verified that we captured nearly all major actors in the system.

The survey asked about actor activities (e.g., "Does your organization provide or offer any of the following [services]..."), participation in water resource management issues (e.g., stormwater, agricultural land management), and measures of accountability. We also asked respondents to identify other actors they partner with to manage water-related issues along five possible dimensions. Possible modes of coordination included: (1) information sharing, (2) technical assistance, (3) reporting, (4) financial resource sharing or exchange, and (5) project coordination or collaboration. We selected these modes to

**Table 1.** Coding rules used to assign a final hybrid scale to each actor based on jurisdictional and hydrological scale. DEC, Department of Environmental Conservation; US EPA, United States Environmental Protection Agency; VTANR, Vermont Agency of Natural Resources.

| Jurisdictional scale | Hydrological scale | Final assigned scale | Example actor(s) |
|---|---|---|---|
| International | Basins spanning international boundaries | Basin | International Joint Commission (IJC) |
| National | Basins spanning state boundaries | Basin | US EPA |
| State | No corresponding hydrological scale | Basin | VTANR DEC Watershed Program |
| Lake Champlain Basin | Lake Champlain Basin | Basin | Lake Champlain Basin Program |
| Tactical basin | HUC-8 watershed | Watershed | Addison County Regional Planning Commission |
| Municipality | No corresponding hydrological scale | Watershed | Morrisville Conservation Commission |

correspond with policy incentives, priorities in Acts 64 and 76, and to align with previous studies in the LCB (Koliba et al. 2014, Scheinert et al. 2015). Each respondent is termed an "ego" in the network and each stated partner is an "alter." The data were transformed into ego-alter pairs where each pairwise connection represents an edge in the network, yielding a five-layer (one for each model of interaction) multiplex social network of water governance actors in the LCB.

In post-survey coding, we assigned each actor a functional type (e.g., planning commission, firm, education) and a jurisdictional scale. Assigning a single geographic scale is an imperfect process dependent on purpose of analysis and complicated by spatial mismatch between hydrology and administrative boundaries. Given the pending shift of many water management functions from the state scale to the HUC-8 scale, we simplified our coding of spatial scale to two levels. We used "watershed scale" to encompass actors that operate across just two or fewer HUC-8 watersheds and "basin scale" to encompass all others. Our final assigned scale was a hybrid of hydrological and jurisdictional scales and more closely aligned with the new policy regime (Table 1).

Our analysis is divided into two parts. First, we characterized the structure of the water governance network in the LCB. To do so, we created five egocentric networks (one for each mode of interaction) of the self-reported relationships from survey respondents to other actors. We created network data structures using the igraph and tidygraph packages in R (Csardi and Nepusz 2006, Pedersen 2019). Nodes were assigned properties for their scale and actor type. In cases where multiple respondents identified as working for the same actor, the network was simplified so that multiple edges between two actors were only counted once, loops were eliminated, and isolated nodes were removed. By definition, egocentric networks include relationships between egos that may not be validated or reciprocated, potentially underestimating network density and limiting analyses. Accordingly, we used the egocentric network as a first approximation of actor centrality and characterized network function by calculating descriptive statistics of each layer of the multiplex network.

Our second analysis investigated the geographic components of the multiplex network to investigate the degree to which actors in the network were coordinating across space and our assigned scale. To do so, we created a subset of the network that only included survey respondents such that we could control for additional actor properties (e.g., homophily in issue domains). The smaller network was a "square" network containing only validated reciprocal edges between nodes, eliminating the concerns of egocentric analysis. Using this network, we first measured the relative frequency of within-scale and cross-scale relationships for each of the five models of coordination in the network. We then used exponential random graph models (ERGMs) to measure the influence of various factors on two modes of actor-actor coordination. ERGMs assume the observed network is one possible realization of many possible networks and estimate parameters (e.g., the influence of scale on the likelihood of an edge) to generate simulated networks with similar statistics to the network we observed (Robins et al. 2007).

Using the statnet set of packages (Handcock et al. 2008), we fit two ERGMs to estimate the determinants of within-scale coordination among watershed-scale actors with respect to project coordination and information sharing. These two activities will be central to watershed-scale actions under the new regionalized governance regime, and exploratory data analysis suggested that actors in adjacent watersheds are more likely to collaborate. Accordingly, we modeled geographic dependence of ties between adjacent watersheds using the *edgecov* model term. We also tested for homophily in the various issues (e.g., wastewater, agriculture, stormwater) in which actors were involved, as well as the number of municipalities with whom each actor worked. Finally, we introduced a series of control parameters to account for geometrically weighted degree distribution (gwdegree) and geometrically weighted edgewise shared partners (gwesp), which controled for structural characteristics of the network. All model parameters are described in Appendix 1.

## RESULTS

### Whole network characterization

We first identified the most connected actors using a simple measure of degree centrality, which measures a node's number of incoming or outgoing (or both) edges. The governance network carries out its management functions via multiplex ties representing the five modes of coordination. Figure 2A plots each mode separately, whereas Table 2 reports network metrics for each mode. Actors in the network are plotted as nodes and shaded according to assigned spatial scale. We found that the network functions largely as an information sharing and project coordination network. Edge density is formally defined as the number of edges in the network divided by the number of possible edges. The whole network has an edge density of 0.28, suggesting a moderately connected governance network.

**Fig. 2.** Panel A: the multiplex governance network by the five surveyed dimensions. Panel B: the distributions of actors by degree centrality and mode of coordination. The most central actors are state agencies and large non-governmental organizations (i.e., the Lake Champlain Committee [LCC], Lake Champlain Basin Program [LCBP]). Within Vermont Agency of Natural Resources (VTANR), the Watershed Management Division (WMD), Rivers Program (Rivers), and Clean Water Improvement Program (CWIP) are most central. DEC, Department of Environmental Conservation; NRC, Vermont Natural Resources Council; Stone Env., Stone Environmental, Inc.

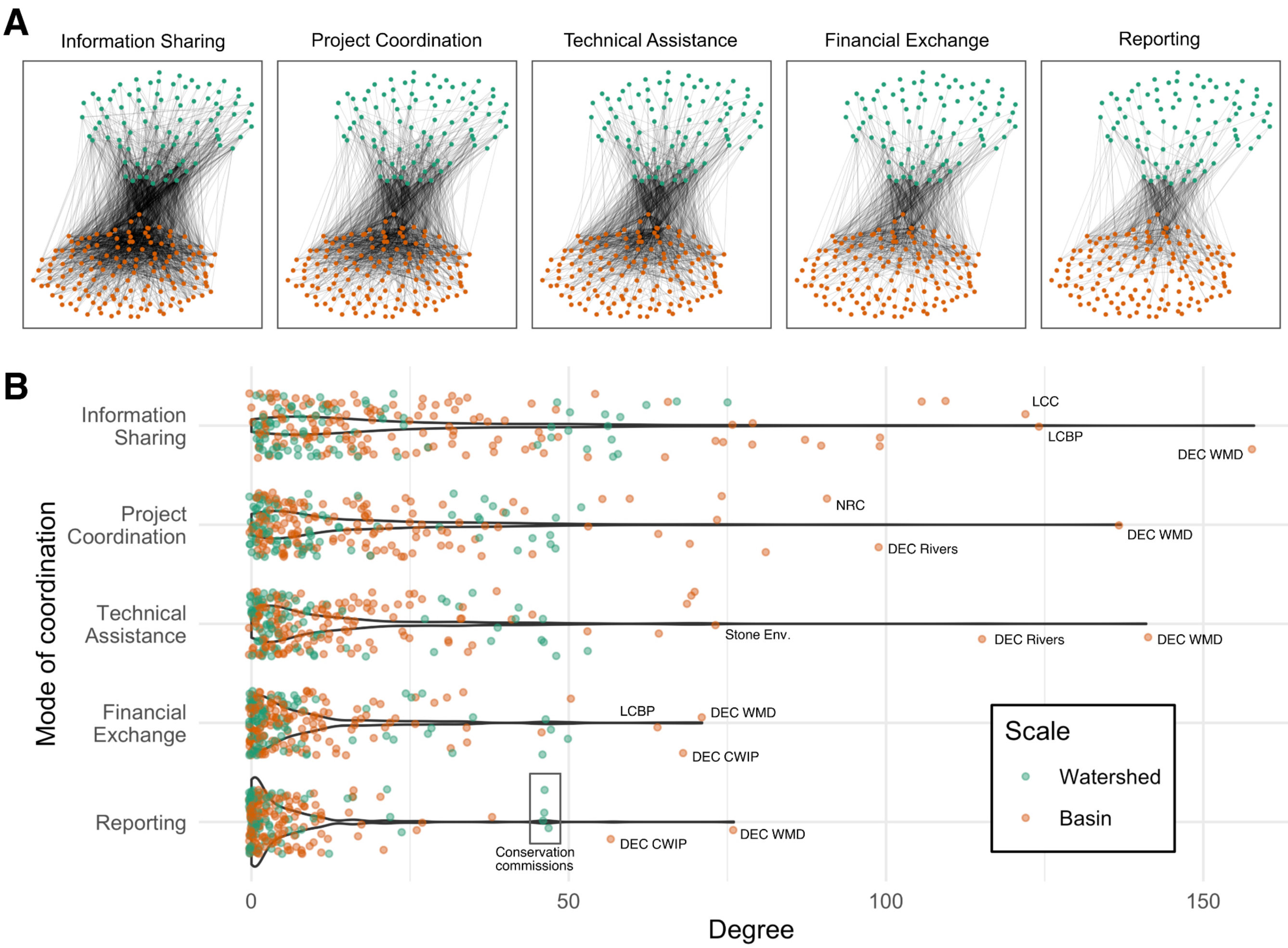



Figure 2B plots the degree distributions by different modes of coordination and scale. Because of the large number of actors, we labeled only the most central actors along each dimension, and include a table of the 30 most central actors in Appendix 1. The degree distribution of respondents and nominated non-respondents is exponential, with most actors having low degree centrality. The most central actors are generally state agencies, and across all modes of interaction, programs and divisions within VTANR are the most central. Their rankings also benefit from strong internal coordination because the various programs within VTANR commonly work together to address water quality issues. Despite the importance of VTANR actors, some non-governmental organizations (NGOs) serve important roles in distributing information, including the Lake Champlain Committee (LCC) and the Lake Champlain Basin Program (LCBP). A few private organizations also have substantial influence in the system. For example, Stone Environmental, Inc., an environmental consulting firm, provides technical assistance across Vermont. Finally, a group of municipal conservation commissions are highly central in the reporting network. In general, the most central actors operate at the basin scale and have substantial capacity. Overall, these network statistics point to a water governance network dominated by highly connected state actors that largely perform information distribution and project coordination functions.

### Cross-scale and within-scale linkages

The relative frequency of cross-scale and within-scale linkages in the governance network are presented in Table 3. Across all modes of coordination, there is a slightly greater proportion of cross-scale linkages than within-scale. The same is true for technical assistance, whereas the opposite is the case for information sharing and project coordination activities. The greatest

**Table 2.** Metrics describing the structure of the full multiplex network and by individual modes of interaction. Metrics include: number of nodes, number of edges, edge density. See text for descriptions of metrics.

| Network | Nodes (n) | Edges (m) | Density |
|---|---|---|---|
| All modes | 232 | 7446 | 0.28 |
| Information sharing | 229 | 2627 (35.3%) | 0.10 |
| Project coordination | 220 | 1779 (23.9%) | 0.07 |
| Technical assistance | 216 | 1485 (20.0%) | 0.06 |
| Financial exchange | 187 | 961 (12.9%) | 0.06 |
| Reporting | 153 | 594 (8.0%) | 0.05 |

**Table 3.** Relative frequency of cross-scale and within-scale coordination in the LCB water governance network by mode of coordination. Frequencies are presented as percentages with counts in parentheses. Higher percentages italicized.

| Mode of coordination | Percentage of cross-scale edges (count) | Percentage of within-scale edges (count) |
|---|---|---|
| All modes | *53.3% (2225)* | 46.7% (1951) |
| Information sharing | 48.1% (681) | *51.9% (736)* |
| Project coordination | 47.2% (470) | *52.8% (525)* |
| Technical assistance | *53.8% (448)* | 46.2% (385) |
| Financial exchange | *63.7% (359)* | 36.3% (205) |
| Reporting | *72.8% (267)* | 27.2% (100) |

differences are found in financial exchange and reporting, which are substantially more cross-scale than within-scale activities. The large majority of within-scale edges are between basin-scale actors.

Information sharing and project coordination are the two primary functions of the LCB water governance network, and both activities will be vital to the success of the regional collaborative governance regime targeted by Act 76. Accordingly, we focus our analysis on the determinants of those activities among watershed-scale actors only. These edges represent a validated reciprocal network among 36 actors spread across six HUC-8 watersheds. Figure 3 plots these two networks, shading each node by its membership in each of the six tactical basins in the LCB.

The ERGM results explain the factors that influence the likelihood of an edge connecting actors (nodes) in the network. The "watershed adjacency" parameter (Table 4) indicates actors are more likely to coordinate their information sharing and project coordination activities with nearby actors in adjacent watersheds. This confirms our supposition that geographic space (here, proximity) partially explains coordination efforts across the LCB. The "count of connected municipalities" parameter suggests a weak but positive relationship between municipal engagement and coordination with other actors. The set of homophily parameters measures the influence that co-engagement with the same water quality issues has on the likelihood of an edge between two actors. Surprisingly, the project coordination model does not find any relationship between actors engaged in similar activities and the likelihood of coordination. However, the information sharing model finds that co-engagement in forestry issues predicts greater information sharing, whereas co-engagement in wastewater issues predicts lower coordination. Last, the "shared partners" control parameter indicates that in both models, actors are more likely to coordinate with partners-of-partners, signifying clustering in the network. The control parameters and model fit diagnostics are included in Appendix 1.

## DISCUSSION

The policy goals of water quality governance across the LCB include a transformation of the SES from a mesotrophic state characterized by intermittent cyanoHABs to a stable clean water state. The ongoing transformation is marked by multiple iterative learning and adaptive management and legal processes, including the Lake Champlain TMDL, Act 64, and Act 76. None of these policies are singularly sufficient to achieve the goals, and future interventions will likely be required as well. Further, the policy suite attempts to manage the actions of many heterogeneous actors and institutions playing multiple roles across multiple geographies and scales to improve the hydrology, ecology, human health and well-being, and regional economic productivity of a complex system. From an SES resilience theoretic perspective, this evokes a canonical example of resilience in SES, the freshwater lake system (Janssen and Carpenter 1999, Gunderson et al. 2006), and the policy goals entail altering the system's stability landscape (Walker et al. 2004) to guide the system into a new basin of attraction. To reach these goals, management and analysis must map the connections among actors and the environment in network space, but also integrate these graph-based data structures with multi-scale representations of discrete spaces (e.g., legal jurisdictions, watershed boundaries) and continuous spaces (e.g., precipitation, depth gradients) as well. Only through a holistic approach to understanding space can governance and management capture sufficient system complexity, develop new solutions, and successfully guide the system toward more desirable states.

There is substantial evidence for homophily in governance and management networks across multiple contexts (McPherson et al. 2001), including actor beliefs (Howe et al. 2021) and politics (e.g., voting behavior, general partisanship; Gerber et al. 2013). With respect to policy issues in the LCB, we find evidence that for some issues homophily affects the likelihood (both positively and negatively) of collaborative information sharing between actors. However, we also find the strength of the homophilic effects varies by mode of coordination. Although ERGMs can help explicate the influence of multiple effects on collaboration across multiple geographies (Bodin et al. 2016), collaborative relationships are multidimensional, as are the issues with which actors engage. Further, the issues are themselves intertwined, complicating our understanding of fit between collaborative arrangements and the issues or environmental problems at hand (Hedlund et al. 2021).

The water governance system in the LCB is a moderately dense network linking many actors across multiple scales. However, the connections among actors are heavily weighted toward state-scale government actors, with activity by a small number of NGOs. This is unsurprising, because following the creation of the Lake Champlain TMDL and the implementation of Act 64, the state agencies responsible for managing water quality (primarily

**Fig. 3.** Networks of within-scale coordination at the watershed scale. Nodes are shaded by actors' location within each of the six tactical basins in the LCB.

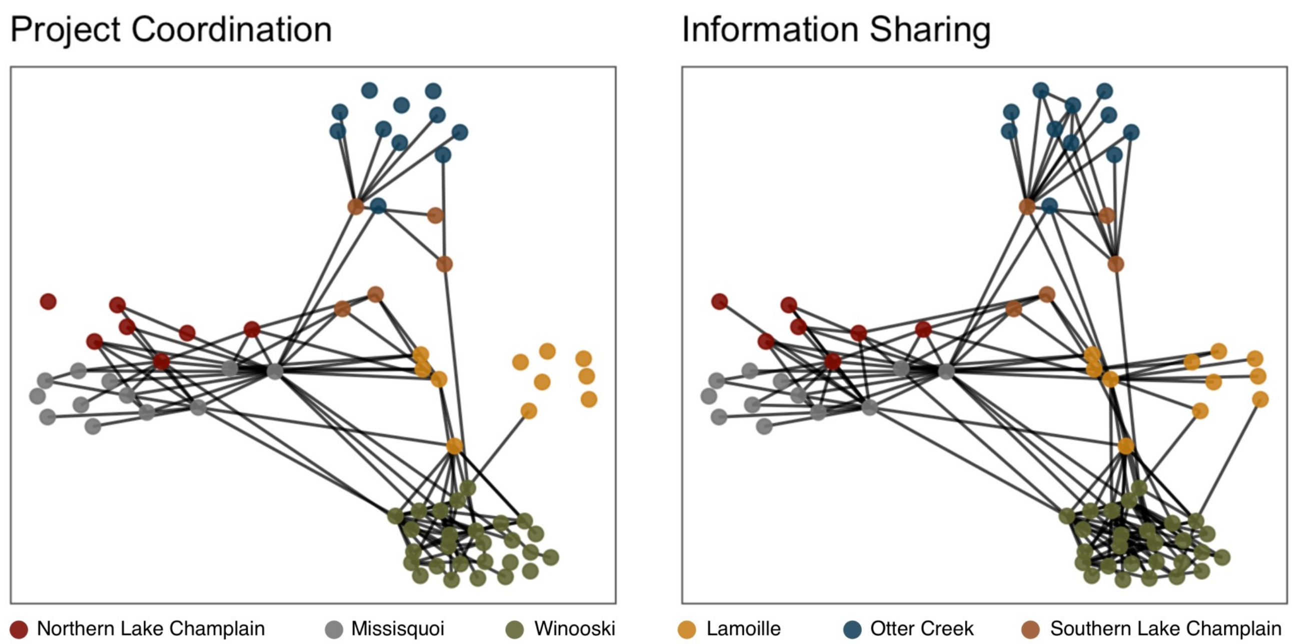



**Table 4.** Exponential random graph model (ERGM) results. AIC, Akaike information criterion; BIC, Bayesian information criterion; GW, geometrically-weighted.

| Parameter | Project coordination model: estimate (SE) | Information sharing model: estimate (SE) |
|---|---|---|
| Watershed adjacency | 3.64 (0.5)*** | 5.22 (0.8)*** |
| Count of connected municipalities | 0.003 (0.002)* | 0.003 (0.001)* |
| Issue homophily: wastewater | -0.61 (0.38) | -0.68 (0.36)† |
| Issue homophily: forestry | 0.44 (0.38) | 0.93 (0.34)*** |
| Issue homophily: river corridors | 0.09 (0.27) | 0.1 (0.29) |
| Issue homophily: agriculture | 0.2 (0.39) | -0.39 (0.36) |
| Issue homophily: development | 0.12 (0.35) | 0.45 (0.33) |
| Issue homophily: stormwater | 0.35 (0.28) | 0.35 (0.29) |
| Edges | -3.57 (0.74)*** | -5.38 (0.64)*** |
| GW Degree<br>Coordination model: ($\theta_S$= 0.9)<br>Information model: ($\theta_S$= 0.6) | -1.06 (0.68) | 1.57 (0.85)† |
| GW edgewise shared partners ($\theta_T$= 0.55) | 0.69 (0.27)* | 1.31 (0.26)*** |
| AIC | 293.2 | 340.6 |
| BIC | 342.1 | 389.5 |

Significance code: *** p-value < 0.001; ** p-value < 0.01; * p-value < 0.05; † p-value < 0.1.

VTANR and the Vermont Agency of Agriculture, Farms, and Markets [AAFM]) significantly increased their water quality management activities. Further, information sharing and project coordination are the most prevalent modes of coordination in the network. Information sharing is relatively lower in cost and easier to accomplish than other forms of coordination, and is thus a common activity in governance networks (Koliba et al. 2018). The importance of state-scale expert organizations in the LCB (see Fig. 2B) supports the notion that actors seek out other popular actors, some of which may act as important bridging organizations (Berardo and Scholz 2010). Although our experience in the LCB reinforces the importance of state-scale actors, we also note the prevalence of heterogeneous actors operating across the basin. Many of these actors are small, possessing limited capacity and commonly focusing on highly localized issues. However, these actors also have highly specialized expertise that may be unlocked locally by partnering with CWSPs at the watershed scale to address problems across the entire LCB. Accordingly, assisting these small actors with capacity building and connecting them to bridging organizations (e.g., VTANR, CWSPs) will be increasingly important, as networking skills and experience have been shown to be important in effectively navigating polycentric governance systems (Hileman and Bodin 2018).

Our analysis found multiple centers of information at the state scale; however, most of those actors are housed within VTANR. Across different modes of interaction, we find some evidence for polycentricity. For example, private firms have an increased role in technical assistance and formal commissions serve wider reporting functions. However, we see clear partitioning of cross-scale and within-scale activities by mode of coordination. Over half of information sharing and project coordination activities are within-scale, with most activity occurring at the basin scale. This focus on broader scale activities is likely an artifact of the 2002 TMDL, which defined the cyanoHAB problem as a basin-wide issue. At the watershed scale, our ERGM results indicate that although watershed-to-watershed coordination is occurring, it is largely limited to adjacent tactical basins. This focus on localized concern aligns with studies that have found similar geographic signals (Fischer and Jasny 2017, Hamilton et al. 2019). It is possible that the strength of these geographic signals varies by the various water quality–related issues as well. The increased prevalence of geographically bound collaboration in the LCB is unsurprising, as it is reasonable that nearby actors have existing professional or personal relationships. Despite the large number of actors engaged in water-related activities, Vermont is a small state where specialists tend to know one another. How the LCB water governance system might bridge spatial and issue boundaries to leverage social capital and strengthen governance networks in the region will likely require additional qualitative research (Fischer et al. 2016).

We can extend quantitative network analysis to direct more in-depth and qualitative research within the basin. For example, in an analysis of watershed partnerships in Arizona, Muñoz-Erickson et al. (2010) showed how information sharing spans boundaries (e.g., geographic, scalar, belief) and promotes coordination. However, it can be more difficult to determine the exact causal influences that promote coordination. In other geographic contexts, water governance studies have found that collaboration depends on trust, transparency, and leadership style (Snorek et al. 2022); that establishing common ground can break down barriers to collaboration (Dimadama and Zikos 2010); and that engagement by key groups (e.g., tribal members) can activate transformation in the water governance system (Diver et al. 2022). Future research in the LCB might focus on how regional water governance is organized across HUC-8 watersheds in the LCB, and how various organizational rules promote trust, legitimacy, and collaborative culture.

Collectively, our findings suggest that as VTANR implements Act 76 and delegates authority to regional service providers, cross-scale and inter-watershed coordination among actors will need to be actively managed. In other SES, actors facing common problems have been shown to form collaborative arrangements, even with direct competitors (Barnes et al. 2019). However, our analysis shows that the likelihood of project coordination among actors is not a function of common interests, suggesting actors do not coordinate to co-manage mutually beneficial projects. Further research is required to determine the cause of this lack of coordination, but it may be rooted in resource constraints, lack of information, lack of trust, or legal and policy frameworks that restrict cooperation. Whether the responsibility for improving coordination falls on CWSPs or is facilitated by VTANR and other state organizations, these functions will likely be important to Vermont's clean water goals. Without these connections, innovations developed in one tactical basin may not transfer across the network to other basins, reducing system-level learning and possibly threatening the resilience of the new state. If VTANR and other state entities maintain the role of facilitating information transfer while regionalizing project coordination, polycentricity can be realized while simultaneously ensuring a communication backbone in the system. Information distribution or the coordination of projects could also be distributed at the watershed scale, as opposed to relying on the state or CWSPs to serve those functions. Our findings also point to potential bridging organizations that connect sub-components of the network and possibly serve as local facilitators. Thus, the process of learning can be regularized while innovation can be distributed across tactical basins.

Analyses of this type can aid policymakers and water managers in the intentional design of policy tools to effectively manage common pool resources in complex social-ecological contexts. In particular, scalar and functional mismatches commonly cited as sources of management problems differ by mode of interaction among actors. Further, although information sharing is often the underlying function of many of these social networks, it is not synonymous with coordination. Just because organizations are sharing information about the state of the SES does not mean they are coordinating their activities. Many network analysis approaches do not parse these distinctions, and our analysis demonstrates the importance of understanding these interactions from a multidimensional perspective.

## CONCLUSION

The pursuit of effective water quality policy in Vermont is an ongoing process marked by legislation, litigation, and activism over decades. The network structure we measured is an emergent outcome of countless social-ecological interactions within this governance context. The alignment between environmental processes and the social processes (and structures) that manage them is increasingly recognized as important in generating successful outcomes (Bodin et al. 2014, Sayles and Baggio 2017). Although we do not measure alignment directly, our findings suggest that network structure can be responsive to how the scale and scope of the environmental problem are defined. The predominately basin-scale network we measured reflects the basin-scale focus of the 2002 TMDL and the state-level funding apparatus created to address TMDL objectives that followed. The new priority to transition from a centralized, top-down regulatory network to a more bottom-up, democratically anchored governance design reflects the need to better align governance activities to watershed-scale hydrology.

Within these watershed-scale activities, we found evidence that localized relationships and existing partnerships matter significantly in coordinating clean water activities, whereas shared interests matter little. Accordingly, as CWSPs begin to develop new partnerships within their tactical basin jurisdictions, they may want to look at multiple modes of interaction to build on existing relationships. Because our analysis captured multiple connections among governance actors and integrated geographic topology, such an approach would be appropriate for identifying candidate actors to collaborate with CWSPs or sit on advisory basin water quality councils.

This study provides the groundwork for future work in integrating multiple conceptualizations of geographic space, scale, and relationships in social and social-ecological network analysis. Further, the ongoing transformation of the LCB SES provides a rare opportunity to observe a natural experiment in polycentric governance. Although we investigated the role of scale and space in actor-actor coordination, future research investigating the fit between social networks in a particular HUC-8 watershed and surface and groundwater hydrology would significantly improve our understanding of how to design policies to engage multiple actors across multiple management domains (e.g., by land use/

land cover type). In addition, further work focusing on the role of formal institutions in facilitating coordination across multiple scales could provide insight into how novel action situations might integrate with the existing institutional landscape to better address water quality problems across the Lake Champlain Basin.

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**Data Availability:**

*All code related to data processing and visualization will be made publicly available via the University of Nebraska-Lincoln Data Repository (https://dataregistry.unl.edu). Raw survey data are unavailable due to confidentiality concerns.*

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APPENDIX 1

Table A1.1: Degree centrality of 30 most-central actors in the network

| Actor name | Financial Exchange | Information sharing | Project Coordination | Reporting | Technical Assistance | All Modes |
|---|---|---|---|---|---|---|
| DEC Watershed Management Division | 71 | 158 | 137 | 76 | 141 | 583 |
| DEC Rivers Program | 26 | 106 | 99 | 20 | 115 | 366 |
| DEC Clean Water Improvement Program | 68 | 79 | 73 | 57 | 69 | 346 |
| Stone Environmental | 50 | 90 | 74 | 38 | 69 | 321 |
| Lake Champlain Commission | 31 | 124 | 64 | 7 | 70 | 296 |
| AAFM Water Quality Division | 46 | 87 | 69 | 27 | 64 | 293 |
| LCBP Steering Committee | 64 | 122 | 81 | 11 | 11 | 289 |
| Cambridge Conservation Commission | 50 | 58 | 52 | 47 | 53 | 260 |
| Lake Champlain Fish and Wildlife Resources Office | 34 | 73 | 55 | 11 | 73 | 246 |
| DEC Wetlands Program | 22 | 99 | 53 | 17 | 53 | 244 |
| Georgia Conservation Commission | 47 | 50 | 48 | 46 | 48 | 239 |
| Charlotte Conservation Commission | 46 | 47 | 47 | 46 | 46 | 232 |
| Morrisville Conservation Commission | 46 | 47 | 47 | 46 | 46 | 232 |
| Vermont Natural Resources Council | 13 | 99 | 91 | 6 | 19 | 228 |
| The Nature Conservancy | 33 | 76 | 60 | 6 | 33 | 208 |
| Lake Champlain NRCD | 35 | 53 | 48 | 24 | 46 | 206 |
| Lamoille County Planning Commission | 32 | 67 | 40 | 22 | 39 | 200 |
| Northwest Regional Planning Commission | 28 | 62 | 44 | 12 | 42 | 188 |
| Poultney Mettowee Natural Resources Conservation District | 24 | 75 | 36 | 15 | 35 | 185 |
| UVM Extension | 26 | 66 | 43 | 17 | 31 | 183 |
| Central Vermont Regional Planning Commission | 28 | 56 | 38 | 16 | 42 | 180 |
| Chittenden County Regional Planning Commission | 27 | 57 | 36 | 21 | 30 | 171 |
| Lintilhac Foundation | 34 | 74 | 44 | 6 | 12 | 170 |
| DEC Green Infrastructure Collaborative | 10 | 109 | 18 | 7 | 19 | 163 |
| Lewis Creek Association | 17 | 54 | 25 | 26 | 41 | 163 |
| Addison County Regional Planning Commission | 16 | 56 | 42 | 9 | 38 | 161 |
| EPA Region 1 office | 31 | 44 | 33 | 16 | 34 | 158 |
| DEC Compliance and Enforcement Program | 7 | 53 | 41 | 10 | 44 | 155 |
| Friends of Northern Lake Champlain | 21 | 57 | 32 | 7 | 33 | 150 |
| Vermont Emergency Management: Recovery and Mitigation Section | 16 | 48 | 36 | 15 | 35 | 150 |

**Description of Exponential Random Graph parameters and interpretation**

For dyad$_{i,j}$, "watershed adjacency" measures whether *i* and *j* are located in adjacent HUC-8 scale watersheds. The parameter is assigned as an edge property, and modeled using the *edgecov* term. In both the project coordination and information sharing models, the parameter is positive and significant, indicating that actors in adjacent watersheds are more likely to coordinate their respective activities.

"Count of connected municipalities" measures the number of municipalities each actor reported coordinating with. While the parameter is positive and significant for both models, the effect is very small. We do not infer any substantial impact of this parameter on the likelihood of edges in either network.

For dyad$_{i,j}$, the "issue homophily" parameters measure whether *i* and *j's* co-engagement in water quality issues affects the likelihood of coordination. In the project coordination model, wastewater is negative and all other parameters are positive. However, none are significant. In the information sharing model, only the wastewater and forestry parameters are significant. Wastewater homophily is negative, indicating relatively lower information sharing. The forestry parameter is positive, indicating greater information sharing among actors co-engaged in forestry issues.

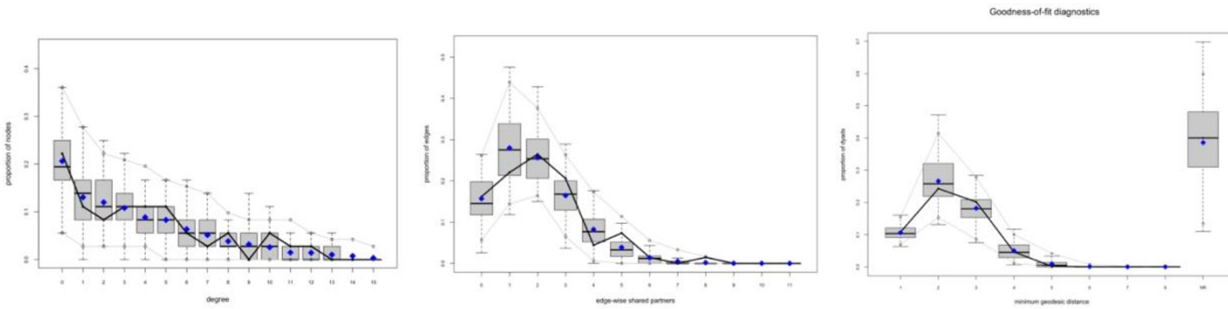
The "edges" parameter measures the number of edges in the network. It is equivalent to an intercept term in a logistic regression.

"GW Degree" is a control parameter equal to the weighted degree distribution, subject to a decay parameter. To fit the models (see diagnostic graphs below), we used a decay of 0.9 in the project coordination model and 0.6 in the information sharing model. In the former, the parameter was negative but not significant. In the latter, the parameter is positive, though only significant at $p = 0.1$. This provides limited support that actors tend to share information with others that share information more broadly, which is intuitive.

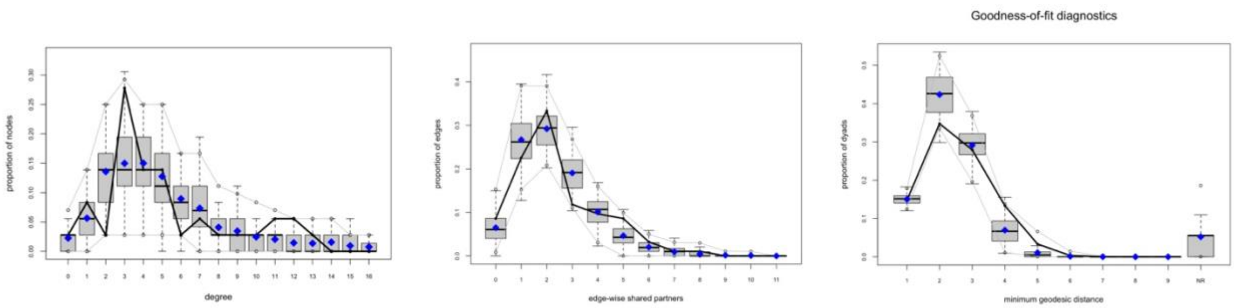
"GW edgewise shared partners" is a control parameter that measures if actors tend to coordinate with those their partners also coordinate with, subject to a decay parameter. This statistic essentially measures clustering within the network. For both models, we used the decay value of 0.55, which fit the model best. For both models, the parameter is positive and significant, indicating that an actor is more likely to coordinate an actor if they already work with their partner.

## Goodness of model fit

### Project coordination model




### Information sharing model



APPENDIX 2

The following is a PDF copy of the web survey used to collect data for this article. Some formatting appears differently in this file due to the HTML to PDF conversion process. Unfortunately, an HTML version is no longer available, as the use of the platform has been discontinued by the University of Vermont, where the data collection took place.

# BREE Water Quality Implementation Networks Survey (2019) - Winooski River Watershed

BREE
Basin Resilience to Extreme Events
in the Lake Champlain Basin

Greetings,

You or your organization have been identified as participating in actions that positively impact water quality in the Lake Champlain Basin (LCB). This study is being conducted by Chris Koliba at the University of Vermont.

Water quality in Lake Champlain and in the LCB relies on unique levels of partnership between private, non-profit, and public entities. We are conducting research regarding water quality governance and these partnerships in the LCB. We invite you and your organization to participate in a study that examines how the different entities are connected through the sharing of knowledge, resources, and technical assistance. It is our objective to understand and map these connections as part of ongoing efforts to examine policy-making and project implementation to protect water quality in the LCB and across all of Vermont.

This survey is being conducted by scientists at the University of Vermont, Vermont EPSCoR, and the Basin Resilience to Extreme Events (BREE) project. Following the objectives of BREE, we seek to use this information to better understand and support our region's capacity to pursue and sustain surface and ground waters. This research is funded by the National Science Foundation (Grant # OIA1556770).

**Study Procedures**
If you take part in this study, you will be asked to answer questions about your organization's role in improving or addressing water quality in the Lake Champlain Basin. This study is in the form of an online survey. You will be asked to identify other organizations with whom your organization partners and the nature of those partnerships.

**Benefits**
As a participant in this research study, there may not be any direct benefits for you. However, information from this study may benefit other people now or in the future.

**Risks**
We will do our best to protect the information we collect from you during this study. Your responses and identifying information will remain confidential. The identifiable information that will be collected are your name, email address, place of work, and job title.

**Costs**
There will be no costs to you for participation in this research study.

**Compensation**
You will not be paid for taking part in this study.

**Confidentiality**
All information collected about you during the course of this study will be stored with a code name or number so that we are able to match you to your answers. Your responses will be kept secure and protected in a password-protected system. Only the members of the research team will have access to your information. As part of a long-term study, your data will be kept for 10 years.

**Voluntary Participation/Withdrawal**
Taking part in this study is voluntary. You are free to not answer any questions or withdraw at any time. You may choose not to take part in this study, or if you decide to take part, you can change your mind later and withdraw from the study. If you choose to withdraw your participation from the study, your partial responses will not be saved or used. The survey should take 30-45 minutes to complete.

**Questions**
If you have any questions about this study now or in the future, you may contact:

Dr. Christopher Koliba
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University of Vermont
ckoliba@uvm.edu (mailto:ckoliba@uvm.edu) or 802-498-8172

or

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If you have questions or concerns about your rights as a research participant, then you may contact the Director of the Research Protections Office at (802) 656-5040.

**Participation**
Your participation is voluntary, and you may refuse to participate without penalty or discrimination at any time.

You may wish to print this information sheet for your records before continuing.

Thank you for taking the time in helping us better understand these issues!

The BREE Social Systems Team

There are 35 questions in this survey

# Contact information

## []Your first name: *

Please write your answer here:

## []Your last name: *

Please write your answer here:

## []Organization Name: *

Please write your answer here:

## []Program, Division, or Unit (If applicable)

Please write your answer here:

## []Your job title:

Please write your answer here:

## []Your email address:

Please write your answer here:

# Organization functions

## []Does your organization *provide or offer* any of the following?

Check all that apply

Please choose **all** that apply:

- ☐ Make loans and/or guarantees
- ☐ Communicate public information
- ☐ Administer permits
- ☐ Commit to cost sharing
- ☐ Administer tax incentives
- ☐ Pursue litigation

- [ ] Make grants
- [ ] Organize community action
- [ ] Provide technical assistance
- [ ] Enforce regulation compliance
- [ ] Provide contracted services
- [ ] Establish conservation easements
- [ ] Other: ____________

## []Does your organization *respond to or utilize* any of the following?

Check all that apply

Please choose **all** that apply:

- [ ] Receive technical assistance
- [ ] Receive cost sharing
- [ ] Benefit from tax incentives
- [ ] Benefit from organized actions by the local community
- [ ] Receive loans and/or guarantees
- [ ] Receive public information
- [ ] Receive grants
- [ ] Respond to litigation
- [ ] Obtain permits
- [ ] Complete contracted services
- [ ] Establish conservation easements
- [ ] Comply with regulation
- [ ] Other: ____________

## []Please check all of the planning, technical assistance, and policy response efforts in the Lake Champlain Basin where your organization is engaged.

Check all that apply

Please choose **all** that apply:

- [ ] Municipal stormwater management and technical assistance provision
- [ ] Vermont Clean Water Network
- [ ] Agricultural technical assistance program

- [ ] Vermont Technical Basin Planning (TBP) committees, meetings, and hearings
- [ ] Legislative committees in the Vermont State House and Senate covering natural resources, water resources, and energy
- [ ] Watershed Alliance (UVM Extension)
- [ ] The Vermont Green Infrastructure Collaborative
- [ ] EPA-Initiated TMDL Agricultural Work Group (AG Workgroup)
- [ ] Clean Water Advisory Committees (CWACs)
- [ ] Vermont Sustainable Jobs Fund
- [ ] Legislative Committees in the Vermont State House and Senate covering agriculture
- [ ] Legislative Committees in the Vermont State House and Senate covering transportation
- [ ] Legislative Committees in the Vermont State House and Senate covering economic development
- [ ] Your local Clean Water Advisory Committee (CWAC)
- [ ] Vermont Farm to Plate network

## []Participation in water and land resource management for water quality can focus on many different issues. In which of the following issues does your organization work?

Check all that apply

Please choose **all** that apply:

- [ ] Wastewater
- [ ] Forestry
- [ ] River corridors
- [ ] Agricultural land management
- [ ] Development
- [ ] Stormwater runoff
- [ ] Flood hazard mitigation

## []
## There are many ways that organizations typically assess their effectiveness.  How does your organization assess the effectiveness of its actions?

Check all that apply

Please choose **all** that apply:

- [ ] Professional codes of conduct, principles of best practice
- [ ] Direct oversight from an administratively_superior organization or unit
- [ ] Feedback garnered from public hearings, citizen input, or other forms of citizen participation
- [ ] Feedback from shareholders or owners of your organization
- [ ] Feedback from peer or partnering organizations or units
- [ ] Feedback from federal, state, or local elected officials
- [ ] Feedback from consumers of your services
- [ ] Outcomes of court cases or quasi-judicial rulings
- [ ] Other: ______

## Class nodes

Next, we are going to ask about partnerships you may have with different types of actors (individuals, organizations, institutions, or agencies) that have an impact on water quality in the Lake Champlain Basin.

You will be presented with lists of actors operating in the region. Please identify if you partner with each actor, and if you do partner with them, the nature of that partnership.

***Only consider partnerships that have occurred in the last 5 years, and ONLY those related to water quality or water quantity issues.***

**Only check those boxes for actors and partnership types your organization engages in.**

There are five types of partnerships we are interested in:

- Information sharing, either to or from another organization
- Technical assistance, provided either to or from another organization
- Reporting to another organization
- Financial resourshe sharing or exchange, either to or from another organization
- Project coordination or collaboration, either to or from another organization

## []Does your organization partner with Vermont farms or farmers? *

Please choose **only one** of the following:

- ( ) Yes
- ( ) No

## []Please identify the types of farms that you partner with and the nature of those partnerships.

**Only answer this question if the following conditions are met:**
Answer was 'Yes' at question '12 [farmersBoolean]' (Does your organization partner with Vermont farms or farmers?)

| | Information sharing | Technical assistance, either to or from | Report to | Financial resource sharing or exchange | Project coordination or collaboration |
|---|---|---|---|---|---|
| Small farm operations (SFOs) | ☐ | ☐ | ☐ | ☐ | ☐ |
| Medium farm operations (MFOs) | ☐ | ☐ | ☐ | ☐ | ☐ |
| Large farm operations (LFOs) | ☐ | ☐ | ☐ | ☐ | ☐ |

If you are unfamiliar with these designations, you can view their definitions at the following link:

https://agriculture.vermont.gov/water-quality/regulations (https://agriculture.vermont.gov/water-quality/regulations)

## []Please identify the types of actors that you partner with and the nature of those partnerships.

| | Information sharing | Technical assistance, either to or from | Report to | Financial resource sharing or exchange | Project coordination or collaboration |
|---|---|---|---|---|---|
| Foresters | ☐ | ☐ | ☐ | ☐ | ☐ |
| Property developers | ☐ | ☐ | ☐ | ☐ | ☐ |
| Households | ☐ | ☐ | ☐ | ☐ | ☐ |

# Watershed organizations

This section of the survey asks if and how your organization partners with other groups in the Winooski River Watershed.

There are five types of partnerships we are interested in:

- Information sharing, either to or from another organization
- Technical assistance, provided either to or from another organization
- Reporting to another organization

- Financial resourshe sharing or exchange, either to or from another organization
- Project coordination or collaboration, either to or from another organization

# []Does your organization partner with non-profit or non-governmental groups or organizations? For example, Natural Resource Conservation Districts (NRCDs), Regional Planning Commissions (RPCs), universities and colleges, or other interest groups or organizations? *

Please choose **only one** of the following:

- Yes
- No

# []Does your organization partner with programs, projects, or offices within the University of Vermont (UVM)? *

**Only answer this question if the following conditions are met:**
Answer was 'Yes' at question '15 [ngosBoolean]' (Does your organization partner with non-profit or non-governmental groups or organizations? For example, Natural Resource Conservation Districts (NRCDs), Regional Planning Commissions (RPCs), universities and colleges, or other interest groups or organizations?)

Please choose **only one** of the following:

- Yes
- No

# []Please identify the UVM programs, projects, or offices you partner with and the nature of those partnerships.

**Only answer this question if the following conditions are met:**
Answer was 'Yes' at question '15 [ngosBoolean]' (Does your organization partner with non-profit or non-governmental groups or organizations? For example, Natural Resource Conservation Districts (NRCDs), Regional Planning Commissions (RPCs), universities and colleges, or other interest groups or organizations?) *and* Answer was 'Yes' at question '16 [uvmBoolean]' (Does your organization partner with programs, projects, or offices within the University of Vermont (UVM)?)

| | Information sharing | Technical assistance, either to or from | Report to | Financial resource sharing or exchange | Project coordination or collaboration |
|---|---|---|---|---|---|
| UVM Extension Office | ☐ | ☐ | ☐ | ☐ | ☐ |
| Basin Resilience to Extreme Events | ☐ | ☐ | ☐ | ☐ | ☐ |

| | | | | | |
|---|---|---|---|---|---|
| (BREE) Project | | | | | |
| Lake Champlain Sea Grant | ☐ | ☐ | ☐ | ☐ | ☐ |
| Gund Institute for Environment | ☐ | ☐ | ☐ | ☐ | ☐ |
| Other UVM projects, programs, or offices | ☐ | ☐ | ☐ | ☐ | ☐ |

# []Does your organization partner with projects or programs within the Lake Champlain Basin Program (LCBP)? *

**Only answer this question if the following conditions are met:**
Answer was 'Yes' at question '15 [ngosBoolean]' (Does your organization partner with non-profit or non-governmental groups or organizations? For example, Natural Resource Conservation Districts (NRCDs), Regional Planning Commissions (RPCs), universities and colleges, or other interest groups or organizations?)

Please choose **only one** of the following:

- ◯ Yes
- ◯ No

# []Please identify the LCBP projects or programs you partner with and the nature of those partnerships.

**Only answer this question if the following conditions are met:**
Answer was 'Yes' at question '15 [ngosBoolean]' (Does your organization partner with non-profit or non-governmental groups or organizations? For example, Natural Resource Conservation Districts (NRCDs), Regional Planning Commissions (RPCs), universities and colleges, or other interest groups or organizations?) *and* Answer was 'Yes' at question '18 [lcbpBoolean]' (Does your organization partner with projects or programs within the Lake Champlain Basin Program (LCBP)?)

| | Information sharing | Technical assistance, either to or from | Report to | Financial resource sharing or exchange | Project coordination or collaboration |
|---|---|---|---|---|---|
| Technical Advisory Committee (TAC) | ☐ | ☐ | ☐ | ☐ | ☐ |
| Vermont Citizen Advisory Committee (CAC) | ☐ | ☐ | ☐ | ☐ | ☐ |
| Education and Outreach Committee (E&O) | ☐ | ☐ | ☐ | ☐ | ☐ |
| Steering Committee | ☐ | ☐ | ☐ | ☐ | ☐ |

| | | | | | |
|---|---|---|---|---|---|
| Lake Champlain Watershed Environmental Assistance Program | ☐ | ☐ | ☐ | ☐ | ☐ |
| Other LCBP projects, program, or commitees | ☐ | ☐ | ☐ | ☐ | ☐ |

## []Does your organization partner with land trusts or conservation organizations *in your region*? *

**Only answer this question if the following conditions are met:**
**((ngosBoolean.NAOK (/index.php/admin/questions/sa/view/surveyid/169225/gid/61803/qid/597556) == "Y"))**

Please choose **only one** of the following:

- Yes
- No

## []Please identify the land trusts or conservation organizations you partner with and the nature of those partnerships.

**Only answer this question if the following conditions are met:**
Answer was 'Yes' at question '15 [ngosBoolean]' (Does your organization partner with non-profit or non-governmental groups or organizations? For example, Natural Resource Conservation Districts (NRCDs), Regional Planning Commissions (RPCs), universities and colleges, or other interest groups or organizations?) *and* Answer was 'Yes' at question '20 [landtrustsBoolean]' (Does your organization partner with land trusts or conservation organizations in your region?)

| | Information sharing | Technical assistance, either to or from | Report to | Financial resource sharing or exchange | Project coordination or collaboration |
|---|---|---|---|---|---|
| Stowe Land Trust | ☐ | ☐ | ☐ | ☐ | ☐ |
| Duxbury Land Trust | ☐ | ☐ | ☐ | ☐ | ☐ |
| Jericho Underhill Land Trust | ☐ | ☐ | ☐ | ☐ | ☐ |
| Richmond Land Trust | ☐ | ☐ | ☐ | ☐ | ☐ |
| Green Mountain Club | ☐ | ☐ | ☐ | ☐ | ☐ |

# []Please identify the non-governmental organizations that your organization partners with and the nature of those partnerships.

**Only answer this question if the following conditions are met:**
Answer was 'Yes' at question '15 [ngosBoolean]' (Does your organization partner with non-profit or non-governmental groups or organizations? For example, Natural Resource Conservation Districts (NRCDs), Regional Planning Commissions (RPCs), universities and colleges, or other interest groups or organizations?)

| | Information sharing | Technical assistance, either to or from | Report to | Financial resource sharing or exchange | Project coordination or collaboration |
|---|---|---|---|---|---|
| Central Vermont Regional Planning Commission | ☐ | ☐ | ☐ | ☐ | ☐ |
| Chittenden County Regional Planning Commission | ☐ | ☐ | ☐ | ☐ | ☐ |
| Winooski Natural Resource Conservation District | ☐ | ☐ | ☐ | ☐ | ☐ |
| Friends of the Winooski River | ☐ | ☐ | ☐ | ☐ | ☐ |
| Friends of the Mad River | ☐ | ☐ | ☐ | ☐ | ☐ |
| Trout Unlimited (Mad Dog Chapter) | ☐ | ☐ | ☐ | ☐ | ☐ |
| Trout Unlimited (Central Vermont Chapter) | ☐ | ☐ | ☐ | ☐ | ☐ |
| Huntington River Conservation Partnership | ☐ | ☐ | ☐ | ☐ | ☐ |
| Regional Stormwater Education Program (South Burlington) | ☐ | ☐ | ☐ | ☐ | ☐ |
| Chittenden County Stream Team | ☐ | ☐ | ☐ | ☐ | ☐ |
| Greater Burlington Industrial Corporation | ☐ | ☐ | ☐ | ☐ | ☐ |
| Lamoille County Natural Resource Conservation District | ☐ | ☐ | ☐ | ☐ | ☐ |

| | | | | | |
|---|---|---|---|---|---|
| Mad River Valley Chamber of Commerce | ☐ | ☐ | ☐ | ☐ | ☐ |
| Intervale Foundation | ☐ | ☐ | ☐ | ☐ | ☐ |
| Central Vermont Chamber of Commerce | ☐ | ☐ | ☐ | ☐ | ☐ |
| United Way of Chitteden County | ☐ | ☐ | ☐ | ☐ | ☐ |
| Mad River Planning District | ☐ | ☐ | ☐ | ☐ | ☐ |
| Stowe Area Association Inc. | ☐ | ☐ | ☐ | ☐ | ☐ |
| Lake Champlain Regional Chamber of Commerce | ☐ | ☐ | ☐ | ☐ | ☐ |
| Friends of the Waterbury Resevoir | ☐ | ☐ | ☐ | ☐ | ☐ |
| Lake Iroquois Association | ☐ | ☐ | ☐ | ☐ | ☐ |
| South Chittenden Riverwatch | ☐ | ☐ | ☐ | ☐ | ☐ |
| Voice for the Potash Brook Watershed | ☐ | ☐ | ☐ | ☐ | ☐ |
| ECHO | ☐ | ☐ | ☐ | ☐ | ☐ |

# []Please identify the non-governmental organizations that your organization partners with and the nature of those partnerships.

**Only answer this question if the following conditions are met:**
Answer was 'Yes' at question '15 [ngosBoolean]' (Does your organization partner with non-profit or non-governmental groups or organizations? For example, Natural Resource Conservation Districts (NRCDs), Regional Planning Commissions (RPCs), universities and colleges, or other interest groups or organizations?)

| | Information sharing | Technical assistance, either to or from | Report to | Financial resource sharing or exchange | Project coordination or collaboration |
|---|---|---|---|---|---|
| American Society of Landscape Architects (ASLA) Vermont Chapter | ☐ | ☐ | ☐ | ☐ | ☐ |
| Association of Vermont Convservation | ☐ | ☐ | ☐ | ☐ | ☐ |

| | | | | | |
|---|---|---|---|---|---|
| Commissions | | | | | |
| Beck Pond LLC | ☐ | ☐ | ☐ | ☐ | ☐ |
| Center for Global Resilience and Security at Norwich University | ☐ | ☐ | ☐ | ☐ | ☐ |
| Champlain Valley Farmer Coalition | ☐ | ☐ | ☐ | ☐ | ☐ |
| Cold Hollow to Canada | ☐ | ☐ | ☐ | ☐ | ☐ |
| Community Resilience Organizations | ☐ | ☐ | ☐ | ☐ | ☐ |
| Conservation Law Foundation (CLF) | ☐ | ☐ | ☐ | ☐ | ☐ |
| Ducks Unlimited | ☐ | ☐ | ☐ | ☐ | ☐ |
| Green Mountain Dairy Farmers Cooperative Federation | ☐ | ☐ | ☐ | ☐ | ☐ |
| Green Works Vermont Nursery and Landscape Association | ☐ | ☐ | ☐ | ☐ | ☐ |
| High Meadows Fund | ☐ | ☐ | ☐ | ☐ | ☐ |
| Housing Vermont | ☐ | ☐ | ☐ | ☐ | ☐ |
| Institute for Sustainable Communities | ☐ | ☐ | ☐ | ☐ | ☐ |
| Lake Champlain Committee | ☐ | ☐ | ☐ | ☐ | ☐ |
| Lake Champlain International | ☐ | ☐ | ☐ | ☐ | ☐ |
| Lake Champlain Lakekeeper | ☐ | ☐ | ☐ | ☐ | ☐ |
| Lake Champlain Land Trust | ☐ | ☐ | ☐ | ☐ | ☐ |
| Lake Champlain Maritime Museum | ☐ | ☐ | ☐ | ☐ | ☐ |
| Lintilhac Foundation | ☐ | ☐ | ☐ | ☐ | ☐ |
| National Woodland Owners Association | ☐ | ☐ | ☐ | ☐ | ☐ |
| New England Interstate Water Pollution Control Commission | ☐ | ☐ | ☐ | ☐ | ☐ |

| | | | | | |
|---|---|---|---|---|---|
| The Nature Conservancy | ☐ | ☐ | ☐ | ☐ | ☐ |
| Trust for Public Land | ☐ | ☐ | ☐ | ☐ | ☐ |
| Vermont Association of Conservation Districts | ☐ | ☐ | ☐ | ☐ | ☐ |
| Vermont Chamber of Commerce | ☐ | ☐ | ☐ | ☐ | ☐ |
| Vermont Council on Rural Development | ☐ | ☐ | ☐ | ☐ | ☐ |
| Vermont Environmental Consortium | ☐ | ☐ | ☐ | ☐ | ☐ |
| Vermont Federation of Lakes and Ponds | ☐ | ☐ | ☐ | ☐ | ☐ |
| Vermont Grass Growers Association | ☐ | ☐ | ☐ | ☐ | ☐ |
| Vermont Land Trust | ☐ | ☐ | ☐ | ☐ | ☐ |
| Vermont Leauge of Cities and Towns | ☐ | ☐ | ☐ | ☐ | ☐ |
| Vermont Natural Resources Council | ☐ | ☐ | ☐ | ☐ | ☐ |
| Vermont Paddlers Club | ☐ | ☐ | ☐ | ☐ | ☐ |
| Vermont Rivers Conservancy | ☐ | ☐ | ☐ | ☐ | ☐ |
| Vermont Rural Water Association | ☐ | ☐ | ☐ | ☐ | ☐ |
| Vermont Sustainable Jobs Fund | ☐ | ☐ | ☐ | ☐ | ☐ |
| Vermont Woodlands Association | ☐ | ☐ | ☐ | ☐ | ☐ |
| Watersheds United Vermont | ☐ | ☐ | ☐ | ☐ | ☐ |
| Vermont Youth Conservation Corps Watershed Program | ☐ | ☐ | ☐ | ☐ | ☐ |

## []Does your organization partner with private firms (planning, consulting, engineering)? *

Please choose **only one** of the following:

- ◯ Yes
- ◯ No

# []Please identify the firms that your organization partners with and the nature of those partnerships.

**Only answer this question if the following conditions are met:**
Answer was 'Yes' at question '24 [firmsBoolean]' (Does your organization partner with private firms (planning, consulting, engineering)?)

| | Information sharing | Technical assistance, either to or from | Report to | Financial resource sharing or exchange | Project coordination or collaboration |
|---|---|---|---|---|---|
| Ann Ruzow Holland | ☐ | ☐ | ☐ | ☐ | ☐ |
| Arrowwood Environmental | ☐ | ☐ | ☐ | ☐ | ☐ |
| ATC | ☐ | ☐ | ☐ | ☐ | ☐ |
| Bannon Engineering | ☐ | ☐ | ☐ | ☐ | ☐ |
| Ben and Jerry's | ☐ | ☐ | ☐ | ☐ | ☐ |
| Community Workshop LLC | ☐ | ☐ | ☐ | ☐ | ☐ |
| Dubois & King, Inc. | ☐ | ☐ | ☐ | ☐ | ☐ |
| Dunkiel, Saunders, Elliott, Raubvogel, and Hand | ☐ | ☐ | ☐ | ☐ | ☐ |
| Fitzgerald Environmental Associates, LLC | ☐ | ☐ | ☐ | ☐ | ☐ |
| GeoTech Environmental Equipment, Inc. | ☐ | ☐ | ☐ | ☐ | ☐ |
| Green Mountain Engineering | ☐ | ☐ | ☐ | ☐ | ☐ |
| Green Mountain Water Environment Association | ☐ | ☐ | ☐ | ☐ | ☐ |
| Marble Valley Engineering | ☐ | ☐ | ☐ | ☐ | ☐ |
| Milone & MacBroom | ☐ | ☐ | ☐ | ☐ | ☐ |
| Native Geographic | ☐ | ☐ | ☐ | ☐ | ☐ |
| PlaceSense | ☐ | ☐ | ☐ | ☐ | ☐ |
| SE Group | ☐ | ☐ | ☐ | ☐ | ☐ |
| South Mountain Research & Consulting | ☐ | ☐ | ☐ | ☐ | ☐ |
| Stantec | ☐ | ☐ | ☐ | ☐ | ☐ |
| Stone | | | | | |

| | | | | | |
|---|---|---|---|---|---|
| Environmental | ☐ | ☐ | ☐ | ☐ | ☐ |
| Tetra Tech | ☐ | ☐ | ☐ | ☐ | ☐ |
| Transmission Developers, Inc | ☐ | ☐ | ☐ | ☐ | ☐ |
| Waite-Heindel Environmental | ☐ | ☐ | ☐ | ☐ | ☐ |
| Watershed Consulting Associates, LLC | ☐ | ☐ | ☐ | ☐ | ☐ |
| White + Burke | ☐ | ☐ | ☐ | ☐ | ☐ |

# Watershed municipalities

This section of the survey asks if and how your organization partners with towns, cities, or villages in the Winooski River Watershed.

There are five types of partnerships we are interested in:

- Information sharing, either to or from another organization
- Technical assistance, provided either to or from another organization
- Reporting to another organization
- Financial resourshe sharing or exchange, either to or from another organization
- Project coordination or collaboration, either to or from another organization

## []Does your organization partner with any municipalities in the Winooski River watershed on water quality related issues? *

Please choose **only one** of the following:

- ◯ Yes
- ◯ No

## []Please identify the municipalities that your organization partners with and the nature of those partnerships.

**Only answer this question if the following conditions are met:**
Answer was 'Yes' at question '26 [localmunisboolean]' (Does your organization partner with any municipalities in the Winooski River watershed on water quality related issues?)

| | Information sharing | Technical assistance, either to or from | Report to | Financial resource sharing or exchange | Project coordination or collaboration |
|---|---|---|---|---|---|
| All Municipalities | ☐ | ☐ | ☐ | ☐ | ☐ |

| | | | | | |
|---|---|---|---|---|---|
| Barre City | ☐ | ☐ | ☐ | ☐ | ☐ |
| Barre | ☐ | ☐ | ☐ | ☐ | ☐ |
| Berlin | ☐ | ☐ | ☐ | ☐ | ☐ |
| Bolton | ☐ | ☐ | ☐ | ☐ | ☐ |
| Brookfield | ☐ | ☐ | ☐ | ☐ | ☐ |
| Buels Gore | ☐ | ☐ | ☐ | ☐ | ☐ |
| Burlington | ☐ | ☐ | ☐ | ☐ | ☐ |
| Cabot | ☐ | ☐ | ☐ | ☐ | ☐ |
| Calais | ☐ | ☐ | ☐ | ☐ | ☐ |
| Cambridge | ☐ | ☐ | ☐ | ☐ | ☐ |
| Colchester | ☐ | ☐ | ☐ | ☐ | ☐ |
| Duxbury | ☐ | ☐ | ☐ | ☐ | ☐ |
| East Montpelier | ☐ | ☐ | ☐ | ☐ | ☐ |
| Elmore | ☐ | ☐ | ☐ | ☐ | ☐ |
| Essex | ☐ | ☐ | ☐ | ☐ | ☐ |
| Fayston | ☐ | ☐ | ☐ | ☐ | ☐ |
| Granville | ☐ | ☐ | ☐ | ☐ | ☐ |
| Groton | ☐ | ☐ | ☐ | ☐ | ☐ |
| Hinesburg | ☐ | ☐ | ☐ | ☐ | ☐ |
| Huntington | ☐ | ☐ | ☐ | ☐ | ☐ |
| Jericho | ☐ | ☐ | ☐ | ☐ | ☐ |
| Lincoln | ☐ | ☐ | ☐ | ☐ | ☐ |
| Marshfield | ☐ | ☐ | ☐ | ☐ | ☐ |
| Middlesex | ☐ | ☐ | ☐ | ☐ | ☐ |
| Montpelier | ☐ | ☐ | ☐ | ☐ | ☐ |
| Moretown | ☐ | ☐ | ☐ | ☐ | ☐ |
| Morristown | ☐ | ☐ | ☐ | ☐ | ☐ |
| Northfield | ☐ | ☐ | ☐ | ☐ | ☐ |
| Orange | ☐ | ☐ | ☐ | ☐ | ☐ |
| Peacham | ☐ | ☐ | ☐ | ☐ | ☐ |
| Plainfield | ☐ | ☐ | ☐ | ☐ | ☐ |
| Richmond | ☐ | ☐ | ☐ | ☐ | ☐ |
| Roxbury | ☐ | ☐ | ☐ | ☐ | ☐ |
| Shelburne | ☐ | ☐ | ☐ | ☐ | ☐ |
| South Burlington | ☐ | ☐ | ☐ | ☐ | ☐ |
| St.George | ☐ | ☐ | ☐ | ☐ | ☐ |
| Starksboro | ☐ | ☐ | ☐ | ☐ | ☐ |
| Stowe | ☐ | ☐ | ☐ | ☐ | ☐ |
| Underhill | ☐ | ☐ | ☐ | ☐ | ☐ |
| Waitsfield | ☐ | ☐ | ☐ | ☐ | ☐ |
| Walden | ☐ | ☐ | ☐ | ☐ | ☐ |
| Warren | ☐ | ☐ | ☐ | ☐ | ☐ |
| Washington | ☐ | ☐ | ☐ | ☐ | ☐ |

| | | | | | |
|---|---|---|---|---|---|
| Waterbury | ☐ | ☐ | ☐ | ☐ | ☐ |
| Westford | ☐ | ☐ | ☐ | ☐ | ☐ |
| Williamstown | ☐ | ☐ | ☐ | ☐ | ☐ |
| Williston | ☐ | ☐ | ☐ | ☐ | ☐ |
| Winooski | ☐ | ☐ | ☐ | ☐ | ☐ |
| Woodbury | ☐ | ☐ | ☐ | ☐ | ☐ |
| Worcester | ☐ | ☐ | ☐ | ☐ | ☐ |

# Vermont state government

This section of the survey asks if and how your organization partners with agencies, departments, and programs within the Vermont state goverment.

There are five types of partnerships we are interested in:

- Information sharing, either to or from another organization
- Technical assistance, provided either to or from another organization
- Reporting to another organization
- Financial resourshe sharing or exchange, either to or from another organization
- Project coordination or collaboration, either to or from another organization

## []Does your organization partner with programs or offices within the Vermont Agency of Natural Resources (ANR) or the Department of Environmental Conservation? *

Please choose **only one** of the following:

◯ Yes

◯ No

## []Please identify the programs or offices *within ANR / DEC* that you partner with and the nature of those partnerships.

**Only answer this question if the following conditions are met:**
Answer was 'Yes' at question '28 [decBoolean]' (Does your organization partner with programs or offices within the Vermont Agency of Natural Resources (ANR) or the Department of Environmental Conservation?)

| | Information sharing | Technical assistance, either to or from | Report to | Financial resource sharing or exchange | Project coordination or collaboration |
|---|---|---|---|---|---|
| DEC Clean Water Initiative | ☐ | ☐ | ☐ | ☐ | ☐ |
| DEC Commissioner's | | | | | |

| | | | | | |
|---|---|---|---|---|---|
| Office | ☐ | ☐ | ☐ | ☐ | ☐ |
| DEC Compliance and Enforcement Program | ☐ | ☐ | ☐ | ☐ | ☐ |
| DEC Dam Safety Program | ☐ | ☐ | ☐ | ☐ | ☐ |
| DEC Drinking Water and Groundwater Protection Program | ☐ | ☐ | ☐ | ☐ | ☐ |
| DEC Environmental Assistance Office | ☐ | ☐ | ☐ | ☐ | ☐ |
| DEC Green Infrastructure Collaborative | ☐ | ☐ | ☐ | ☐ | ☐ |
| DEC Indirect Discharge Program | ☐ | ☐ | ☐ | ☐ | ☐ |
| DEC Lakes and Ponds Program | ☐ | ☐ | ☐ | ☐ | ☐ |
| DEC Monitoring, Assessment, and Planning Program | ☐ | ☐ | ☐ | ☐ | ☐ |
| DEC Regional Permits Program | ☐ | ☐ | ☐ | ☐ | ☐ |
| DEC River Program | ☐ | ☐ | ☐ | ☐ | ☐ |
| DEC Solid Waste and Recycling Program | ☐ | ☐ | ☐ | ☐ | ☐ |
| DEC Solid Waste Program: Groundwater | ☐ | ☐ | ☐ | ☐ | ☐ |
| DEC Stormwater Program | ☐ | ☐ | ☐ | ☐ | ☐ |
| DEC Tactical Basin Planning | ☐ | ☐ | ☐ | ☐ | ☐ |
| DEC Underground Injection Control Program | ☐ | ☐ | ☐ | ☐ | ☐ |
| DEC Wastewater Program | ☐ | ☐ | ☐ | ☐ | ☐ |
| DEC Watershed Management Division | ☐ | ☐ | ☐ | ☐ | ☐ |
| DEC Wetlands Program | ☐ | ☐ | ☐ | ☐ | ☐ |
| ANR Secretary's Office | ☐ | ☐ | ☐ | ☐ | ☐ |

| | | | | | |
|---|---|---|---|---|---|
| Other ANR programs or agencies | ☐ | ☐ | ☐ | ☐ | ☐ |

## []Does your organization partner with programs or offices within the Vermont Agency of Agriculture, Food, and Markets (AAFM)? *

Please choose **only one** of the following:

- ◯ Yes
- ◯ No

## []Please identify the programs of offices *within AAFM* that your organiation partners with and the nature of those partnerships.

**Only answer this question if the following conditions are met:**
Answer was 'Yes' at question '30 [aafmBoolean]' (Does your organization partner with programs or offices within the Vermont Agency of Agriculture, Food, and Markets (AAFM)?)

| | Information sharing | Technical assistance, either to or from | Report to | Financial resource sharing or exchange | Project coordination or collaboration |
|---|---|---|---|---|---|
| AAFM Water Quality Division | ☐ | ☐ | ☐ | ☐ | ☐ |
| Agricultural Resource Management Division (ARM) | ☐ | ☐ | ☐ | ☐ | ☐ |
| AAFM Secretary's Office | ☐ | ☐ | ☐ | ☐ | ☐ |
| Other AAFM programs | ☐ | ☐ | ☐ | ☐ | ☐ |

## []Does your organization partner with programs or offices within any other Vermont State agencies (VTrans, Department of Health, etc.)? *

Please choose **only one** of the following:

- ◯ Yes
- ◯ No

## []Please identify the other Vermont state programs or offices that you partner with and the nature of those partnerships.

**Only answer this question if the following conditions are met:**
Answer was 'Yes' at question '32 [otherVtStateBoolean]' (Does your organization partner with programs or offices within any other Vermont State agencies (VTrans, Department of Health, etc.)?)

| | Information sharing | Technical assistance, either to or from | Report to | Financial resource sharing or exchange | Project coordination or collaboration |
|---|---|---|---|---|---|
| Vermont Department of Health: Environmental Public Health Tracking Program | ☐ | ☐ | ☐ | ☐ | ☐ |
| Vermont Department of Health: Other Programs | ☐ | ☐ | ☐ | ☐ | ☐ |
| Vermont Department of Health: Recreational Water Program | ☐ | ☐ | ☐ | ☐ | ☐ |
| VTrans: Municipal Mitigation Grants Program | ☐ | ☐ | ☐ | ☐ | ☐ |
| VTrans: Better Roads Program | ☐ | ☐ | ☐ | ☐ | ☐ |
| VTrans: Policy Planning and Intermodal Development Program (PPAID) | ☐ | ☐ | ☐ | ☐ | ☐ |
| VTrans: Project Delivery Bureau | ☐ | ☐ | ☐ | ☐ | ☐ |
| Vermont Emergency Management: Recovery and Mitigation Section | ☐ | ☐ | ☐ | ☐ | ☐ |
| Department of Forests, Parks and Recreation (FPR): Forest Resource Management Program | ☐ | ☐ | ☐ | ☐ | ☐ |
| Department of Forests, Parks and Recreation (FPR): Urban and | ☐ | ☐ | ☐ | ☐ | ☐ |

| | | | | | |
|---|---|---|---|---|---|
| Community Forestry Program | | | | | |
| Department of Forests, Parks and Recreation (FPR): Forest Resource Protection Program | ☐ | ☐ | ☐ | ☐ | ☐ |
| Department of Forests, Parks and Recreation (FPR): Watershed Forestry Program | ☐ | ☐ | ☐ | ☐ | ☐ |
| Department of Forests, Parks and Recreation (FPR): Commissioner's Office | ☐ | ☐ | ☐ | ☐ | ☐ |
| Natural Resources Board: Executive Director | ☐ | ☐ | ☐ | ☐ | ☐ |
| Agency of Commerce and Community Development: Community Planning and Revitalization Program | ☐ | ☐ | ☐ | ☐ | ☐ |

# Federal and International actors

This section of the survey asks if and how your organization partners with Federal (US Goverment) or International organizations or agencies.

There are five types of partnerships we are interested in:

- Information sharing, either to or from another organization
- Technical assistance, provided either to or from another organization
- Reporting to another organization
- Financial resourshe sharing or exchange, either to or from another organization
- Project coordination or collaboration, either to or from another organization

## []Does your organization partner with Federal (US Goverment) or International organizations or agencies? *

Please choose **only one** of the following:

◯ Yes

○ No

## []Please identify the federal and international organizations or agencies that your organization partners with and the nature of those partnerships.

**Only answer this question if the following conditions are met:**
Answer was 'Yes' at question '34 [fedAndIntlBoolean]' (Does your organization partner with Federal (US Goverment) or International organizations or agencies?)

| | Information sharing | Technical assistance, either to or from | Report to | Financial resource sharing or exchange | Project coordination or collaboration |
|---|---|---|---|---|---|
| EPA Region 1 Office | ☐ | ☐ | ☐ | ☐ | ☐ |
| International Joint Commission (IJC) | ☐ | ☐ | ☐ | ☐ | ☐ |
| Lake Champlain Fish and Wildlife Conservation Office (US Fish and Wildlife) | ☐ | ☐ | ☐ | ☐ | ☐ |
| National Flood Insurance Program (NFIP) | ☐ | ☐ | ☐ | ☐ | ☐ |
| National Pollutant Discharge Elimination System (NPDES) | ☐ | ☐ | ☐ | ☐ | ☐ |
| USDA-FSA Chittenden Service Center | ☐ | ☐ | ☐ | ☐ | ☐ |
| USDA Natural Resource Conservation Service (NRCS) | ☐ | ☐ | ☐ | ☐ | ☐ |

Thank you very much for taking the time to complete this survey. Your responses will help us better understand how the wide array of organizations, individuals, and agencies are working together to improve water quality in the Lake Champlain Basin.

If you have any questions or would be interested in learning about the results of this research, please contact:

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802-498-8172

Thank you!

Submit your survey.

Thank you for completing this survey.