



# On inter-organizational trust, control and risk in transboundary fisheries governance

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## ABSTRACT

Inter-organizational collaboration is often considered essential to transboundary fishery governance, due, in part, to the high levels of task interdependence, the remote and often treacherous conditions, and the limited levels of information available to any policy actor on resource status. In the high seas, Regional Fisheries Management Organizations (RFMOs) are responsible for sustainably managing highly migratory and straddling fish stocks through the implementation of ecosystem-based approaches and ensuring adequate inter-jurisdictional cooperation. A central question facing RFMO governance is therefore how to structure and sustain inter-organizational transboundary collaboration under high uncertainty? This paper presents the case of the North Atlantic Salmon Conservation Organization (NASCO), conceptualized as a strategic alliance between the bureaucratic organizations responsible for north Atlantic salmon fishery management in the member countries. We identify and explain how dimensions of trust, control, and perceived risk have structured the collaborative performance of the alliance. The application of an integrated trust-control-risk framework increases conceptual clarity for how, when and why alliance managers might seek to develop different forms of trust through different management control systems in ways that further multi-actor collaborative network performance. Future research needs are identified, including better understanding how managerial strategies and control mechanisms facilitate inter-organizational trust in transboundary governance settings and mitigate the perceived risks of working together.

## 1. Introduction

*“States shall cooperate with each other in the conservation and management of living resources in the areas of the high seas. States whose nationals exploit identical living resources, or different living resources in the same area, shall enter into negotiations with a view to taking the measures necessary for the conservation of the living resources concerned. They shall, as appropriate, cooperate to establish subregional or regional fisheries organizations to this end.”*

Article 118, United Nations Convention on Law of the Seas.

Environmental change resulting from natural resource extraction

and global climate change presents a significant transboundary governance challenge, not least for fisheries [63,13,71]. In the high seas,<sup>1</sup> where 34.2% of all fished species are considered overfished [24], Regional Fisheries Management Organizations (RFMOs)<sup>2</sup> are responsible for sustainably managing marine living resources through the implementation of ecosystem-based approaches and ensuring adequate inter-jurisdictional cooperation [30,26,23]. RFMOs are international organizations (IOs) established by member states to coordinate their bureaucracies in an effort to realize collective outcomes, generally with the administrative support of an international treaty secretariat [31,73]. They are known to face many organizational challenges, with their effectiveness being regularly questioned [16,31]. Considerable research

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<sup>1</sup> Areas beyond the 200-nautical mile Exclusive Economic Zones (EEZs) granted to coastal states under the United Nations Convention on the Law of the Sea (UNCLOS) [62].

<sup>2</sup> Building from the UNCLOS and the subsequent UN Fish Stocks Agreement (UNFSA), highly migratory and straddling fish stocks require international cooperation through sub-regional or regional fisheries management organizations, which can adopt legally binding conservation and management measures [18].

attention has subsequently been placed on evaluating the performance of RFMOs (see, for example, [14,23,32,62,65,26]) with issues related to transparency, participation, monitoring and data, management measures, compliance and decision-making being common themes [14,18,31,34,53]. Inter-organizational collaboration is often considered essential to transboundary fishery management, due, in part, to the high levels of task interdependence, the remote and often treacherous conditions, and the limited levels of information available to any policy actor on the resource status. A central question facing RFMO governance is therefore how to structure and sustain inter-organizational transboundary collaboration under high uncertainty?

According to Pintassilgo et al. [66], highly migratory and straddling fish stocks (i.e., species that migrate between the high seas and the areas of national jurisdiction) can be regarded as common pool resources shared between RFMO members (and non-members), making the level of cooperation, participation and the stability of these organizations key to effectiveness (see also [18,62]). Managing common pool resources requires regular and ongoing inter-organizational communication in order for the actors involved to be able to understand, plan, coordinate and implement the work that requires collaboration [3,76]. Stern [76], considers collaboration to be “the most fruitful form of interaction leading to the greatest potential for long-lasting and resilient solutions to environmental problems”, enabling a broader array of ideas and strategies to be considered, the reduction of unproductive conflict, and the leveraging of resources (including social networks and capacity) to achieve goals, and enhance efficiency in the long term. We consider inter-organizational collaboration to involve varying degrees of networking (communication and information exchange for mutual benefit), coordination (aligning or altering activities to enhance efficiency), and cooperation (sharing resources for achieving compatible goals) in a dynamic process through which entities “share information, resources and responsibilities to jointly plan, implement, and evaluate a program of activities to achieve a common goal” [11]. While it has been identified that management strategies, risk perceptions, and trust are all important to the inter-organizational collaborative performance of environmental IOs [46,72,80], there has been little-to-no research integrating these concepts in the study of transboundary marine fisheries generally, and RFMOs specifically.

This paper presents the case of the North Atlantic Salmon Conservation Organization (NASCO), an established IO that we conceptualize as a strategic alliance between the organizations responsible for salmon fisheries management in the member countries. Using an integrated trust-control-risk framework, we argue that NASCO’s historical development as a treaty organization, and subsequent management as an alliance network, can be used to identify key attributes that affect the collaborative performance of the organizations involved in transboundary fisheries management.

## 2. International organizations as inter-organizational networks

Studies on international political cooperation have previously highlighted the functional characteristic of international treaties, showing that they often develop in response to evolving scientific knowledge of environmental problems or changing problem definitions [20,33,47]. The resulting IOs have been shown to facilitate cooperation by: lowering transaction costs and providing monitoring when mutual gains are available through collaboration [41]; enabling the development of coordinated focal points for negotiation when actors are concerned about the distributional implications of cooperating [42,50]; and changing the ways that alliance members in the network understand problems [35]. While there has already been considerable scholarship on the political processes involved with the creation and function of IOs in different policy contexts [43], there has been less focus on the bureaucrats and agencies involved in administering IOs, including secretariats. This is surprising, given that recent research suggests they can have considerable influence in treaty implementation, shaping power

relations between states through distributing and building capacity, framing problems and disseminating information used in decision-making [40,73].

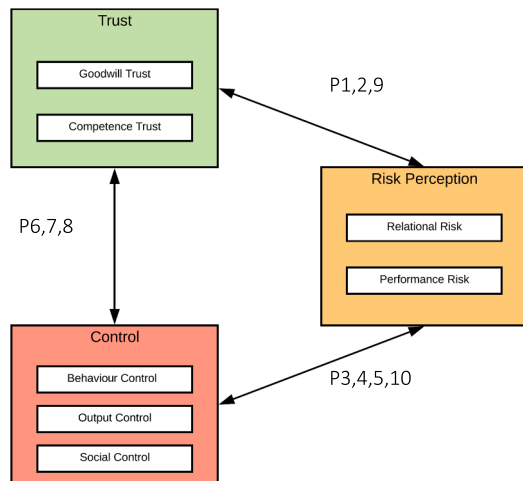
At the bureaucratic level of decision-making, IOs operate as inter-organizational networks [43]. According to Imperial [38], these networks involve a group of “organizations that form temporary or permanent alliances for a limited purpose or common area of involvement [1,2]”, where the “action set is oriented toward the collective activity of a group of organizations [2,49]”. Importantly, inter-organizational networks arise from individual participants being directed to represent their organizations and therefore only communicate in so far as individual representatives communicate, share information and actively participate in the alliance [9]. Previous research has identified a special role for the organizations composed of other organizations that take a leadership role in coordinating collaborative activities, such as pooling resources, distributing tasks, and collectively making decisions [38], referring to them variably as network brokers [48], coalitions, alliances or strategic alliances [27–29], network administrative organizations [69] and/or collaborative organizations [38].

In this paper, we conceptualize RFMOs as a form of strategic alliance network [29], where an agreement is reached between at least two partner organizations that (a) they remain legally independent, (b) share benefits and managerial control over the performance of assigned tasks, and (c) make contributions in strategic areas [44,86]. In this “network” form of governance, action is deeply embedded in social networks<sup>3</sup> of relationships, which in turn shape and define the precursors, processes, and outcomes associated with alliances [28,67]. Child and Faulkner [12] note that inter-organizational alliances “are often ‘strategic’ in the sense that they have been formed as a direct response to major governance challenges or opportunities which the partner firms face.” According to Delrue [19], an “alliance” is a relationship where the parties maintain autonomy but are inter-dependent to a non-trivial degree. As a result, partners in alliance relationships can be both cooperative and non-cooperative, which presents certain risks to collaborating and raises the importance of trust and control mechanisms when trying to understand collaborative performance [17,19].

## 3. Trust, control and risk in inter-organizational alliance networks

Previous research suggests that different dimensions of trust, control and risk interact in complex ways to affect the formation, governance structure and performance (i.e., knowledge sharing and collaboration) of inter-organizational alliance networks [17], with implications for how organizations with strategic interdependencies work together [28]. Das and Teng [17] present an integrated framework of how trust and control are inextricably linked with risk in strategic alliances and how managing the different inter-relationships between these constructs enables organizations to effectively collaborate. They consider both control and trust to be primary antecedents of perceived risk, with all three constructs comprised of multiple dimensions (see Fig. 1). This conceptualization of the factors affecting inter-organizational collaboration within alliance networks offers a useful starting point for further exploring some of the social dynamics likely affecting transboundary fisheries governance networks. According to Das and Teng [17], if the perceived risks of collaborating are too great, actors within an alliance will refuse to collaborate on certain tasks, causing the alliance network to change shape or to fragment. Partners within alliance networks therefore employ different forms of control and willingness to trust, either jointly or separately, to manage and reduce their perceived total risk of cooperating [17].

<sup>3</sup> “a set of nodes (e.g., persons, organizations) linked by a set of social relationships (e.g., friendship, transfer of funds, overlapping membership) of a specified type” [45]: 458.



### Propositions

- P1) An organization's goodwill trust in its partner organization will reduce its perceived relational risk in an alliance, but not its perceived performance risk.
- P2) An organization's competence trust in its partner organization will reduce its perceived performance risk in an alliance, but not its perceived relational risk.
- P3) Perceived relational risk in an alliance will be reduced more effectively by behaviour control than by output control.
- P4) Perceived performance risk in an alliance will be reduced more effectively by output control than by behaviour control.
- P5) Social control in an alliance will reduce both perceived relational risk and perceived performance risk.
- P6) Both output control and behaviour control will undermine goodwill trust and competence trust in an alliance.
- P7) Social control will enhance both goodwill trust and competence trust in an alliance.
- P8) Goodwill trust and competence trust will enhance the effectiveness of all control modes (behaviour, output, and social) in an alliance.
- P9a) Control levels remaining the same, the lower the acceptable relational risk level, the higher the needed goodwill trust level in an alliance.
- P9b) Control levels remaining the same, the lower the acceptable performance risk level, the higher the needed competence trust level in an alliance.
- P10a) Goodwill trust remaining the same, the lower the acceptable relational risk level, the more will be the use of behaviour control and social control in an alliance.
- P10b) Competence trust remaining the same, the lower the acceptable performance risk level, the more will be the use of output control and social control in an alliance.

Fig. 1. Integrated framework of trust, control and risk in strategic alliance networks (adapted from [17]).

Perceived Risk: (or subjective risk) relates to the estimated probabilities of several outcomes [17]. It concerns 'risk taking in relationship' in order to differentiate it from more general risk-taking behaviours because it can only occur in the context of a specific, identifiable relationship with another party [51]. It is particularly relevant to managing strategic alliances because of the uncertainty associated with cooperation among partners [17]. Distinguishing between the different dimensions of perceived risk presented in Fig. 1 is essential because depending on which risk is perceived as being more of a threat, actors within an alliance will decide on strategies that can best acquire the resources they require from others while protecting their own - often reflected in the alliance structure [17]. Different forms of *trust* and *control* will be used by alliance partners to reduce the perceived probability and impact of undesirable outcomes, and, according to Das and Teng [17], there is no third determinant of comparable importance.

Trust: is defined as the "psychological state in which one actor (the trustor) accepts some form of vulnerability based upon positive expectations of the intentions or behaviour of another (the trustee), despite

### Dimensions

#### RISK

*Relational Risk*: probability and consequence of not having satisfactory cooperation.

*Performance Risk*: probability and consequence that alliance objectives are not achieved, despite satisfactory cooperation

#### TRUST

*Goodwill Trust*: one's good faith, good intentions, and integrity often assessed based on reputation for dealing fairly and caring about partner's welfare in alliances.

*Competence Trust*: based on the various resources (capital, human, physical, technology, etc.) and capabilities (expertise) of another entity

#### CONTROL

*Behaviour Control*: focused on process that turns appropriate behaviour into desirable output.

*Output Control*: focused on monitoring performance.

*Social Control*: focused on establishing a common culture and values.

inherent uncertainties in that expectation" [78] citing [54,70]. Within strategic alliance networks, trust is considered a key element in cooperative relationships, lessening concerns about opportunistic behaviour and reducing the need for formal control mechanisms [17,21,76]. Because trust is specific—in relation to the context, subject, and object of trust—the different dimensions presented in Fig. 1 are often inter-dependent, potentially existing along two non-exclusive spectra (a positive trust spectrum and a distrust spectrum) with different trust types fitting different niches and serving different functions at various stages in a collaborative management process [59,77].

Control: According to Das and Teng [17], control is about influencing the behaviour of alliance partners, in contrast to trust, which moderates risk perception without doing anything about the behaviour of the partner. Control mechanisms that are designed to moderate perceived risk can be formal or informal, relying on a level of trust to facilitate relationships [19]. Formal control (including behavioural and output controls) can undermine trust within collaborative networks because they reduce autonomy and create doubt about the goodwill of partners,

while informal control (social control) is thought to increase trust [17]. Control is both an antecedent to, and output from, trust in interorganizational networks [67], and can have both positive and negative impacts on collaboration.

We apply these concepts to the case of NASCO, an inter-organizational fishery management alliance (i.e. RFMO) that has operated for over 35 years. We focus on the formation of the alliance, its governance structure, aspects of its dynamic evolution and explain some of the benefits of entering the alliance (as recommended by [28]). Our objective is to illustrate how different dimensions of Das and Teng's [17] framework of trust, control, and perceived risk are relevant to transboundary fishery management collaboration and change through time.

#### 4. Analytical approach

We adopted an exploratory case study approach [85] utilizing documents (newspaper articles, publicly available reports, policy agreements, academic research papers, websites) and archival records (memos, annual reports, meeting minutes, press releases) as sources of evidence. Exploratory case study research "investigates a contemporary phenomenon within its real-life context, especially when the boundaries between phenomenon and context are not clearly evident" [85], generating outputs that aim to provide a sharpened understanding of the situation, and what might be important for interest groups to look at in future research [74]. An exploratory approach was appropriate due to the lack of previous empirical research integrating different dimensions of trust, control and risk in transboundary fishery management [85]. Descriptive qualitative analysis consisted of "three concurrent flows of activity: data reduction, data display, and conclusion drawing / verification" [52]. Data analysis was conducted using content analysis [5] and pattern-matching [52], guided by the integrated trust-control-risk framework presented in Fig. 1 [17]. The analytic strategy therefore relied on the theoretical propositions of the study and analyzing the evidence based on them, helping to focus attention on certain data and to ignore other data [85]. This required a restricted approach to content analysis, focussing on the propositions to be investigated and, in turn, the texts to be included as data [8].

There are limitations associated with the analysis, including reliance on secondary data sources and our desire to explore the potential of Das and Teng's [17] conceptual framework to inform transboundary fisheries scholarship, which may have led to researcher bias when it comes to selecting relevant data. As noted by Strang and Wittrock [79], our results should be considered as offering only partial insight into an always more complex reality. We also acknowledge that our analytical method is limited to recorded communications that, when used alone, raises questions about validity and reliability [8] that will require future empirical research involving primary data to address. Nevertheless, as noted by Berg and Madsen [6] relying solely on secondary data is "arguably a pragmatic choice when given the multitude of challenges that researchers encounter when attempting to map the diffusion and evolution of management (accounting) concepts and ideas" (see also [79]).

#### 5. Case: The North Atlantic Salmon Conservation Organization (NASCO)

NASCO is a prominent RFMO dedicated to the restoration, conservation, and management of wild Atlantic salmon (*Salmo salar*) in the North Atlantic region. The analysis focuses on the following questions: What characteristics of the relations between bureaucratic actors influence risk perception? How has trust (goodwill and competence) been developed within the alliance? What activities have increased or

decreased actor perceptions of risk? What has influenced the choice of governance structure and what are the features of the control package(s) employed in the alliance? To explore these questions, we trace and explain the development of and interactions between members of the alliance over time using key events as examples.

##### 5.1. Background

According to Bubier [10] managing and conserving Atlantic salmon is one of the most difficult tasks facing the political jurisdictions that the highly migratory fish encounters. Salmonids are a family of finfishes that spawn in freshwater and occupy the marine environment at later stages of their life history. Atlantic salmon deposit eggs, which are fertilized in select freshwater streams. Eggs develop into fry, then live in freshwater for up to four years before leaving their rivers of origin for the marine environment, where they experience drastic growth due to the abundance of food in the marine system. Adults spend at least two years at sea, then return to their rivers of origin to spawn, with a small percentage not dying and returning to the marine environment to repeat the cycle [10]. The migration and distribution of Atlantic salmon covers thousands of kilometres, which sets them apart from other North Atlantic finfishes. Atlantic salmon from rivers in the Gulf of Maine and northward into Northern Quebec swim to feeding grounds in the waters around Greenland [4], as do salmon originating from the Barents Sea (see Fig. 2). As a result, Atlantic salmon are subject to a wide range of differing, and at times conflicting, management regimes over their five-to-six-year lifespan [10,83].

Salmon experience natural as well as fishing-based mortality, which in turn limits the number of individuals that may return to their rivers of origin [25]. More recently, the rapid expansion of aquaculture production is further threatening wild salmon stocks through the genetic effects of farmed Atlantic salmon escaping and mortality from sea lice and diseases [57]. Beyond the need for appropriate siting of aquaculture facilities and associated sea lice control, reducing fishing pressure is considered one of the best ways to improve stock viability [36,39]. Overall population estimates of Atlantic salmon show that stocks have experienced declines since the 1970's [61], with some individual stocks exhibiting stock sizes that are below, as well as above, spawning escapement reserves [36,39]. At the same time, catches of Atlantic salmon have steadily declined over the last fifty years.

Recognizing the transboundary governance challenge, policy actors including recreational anglers, Indigenous resource users, fishery managers, fisheries scientists, fisheries policymakers, conservationists, and industry representatives from the different jurisdictions impacting wild Atlantic salmon survival created working groups to coordinate information collection and collective action, culminating in the signing of the Convention for the Conservation of Salmon in the North Atlantic Ocean in 1982, and subsequent establishment of the North Atlantic Salmon Conservation Organization (NASCO) in 1984 [81,83]. The Convention created a large, protected zone beyond the fisheries jurisdiction of the coastal states where Atlantic salmon fisheries were no longer allowed. It also prohibited salmon fishing in most areas within coastal state jurisdiction beyond 12 nautical miles from the coast [56]. Furthermore, it requires the Contracting Parties (the "Parties") to provide regular reports on salmon catches, to collect scientific data on stock status, and to provide to NASCO information on domestic management initiatives and regulatory measure implemented [81].

##### 5.2. Structure and function of NASCO

NASCO is an RFMO formed to contribute to the conservation, restoration, enhancement, and rational management of salmon stocks





Fig. 2. Migration routes of the North Atlantic salmon. Credit: Atlantic Salmon Federation, 2018.

throughout their migratory range while considering the best scientific evidence available through consultation and cooperation among actors [10,56]. It has six Contracting Parties: Canada, USA, Denmark (for Greenland and Faroe Islands), the EU, Norway and Russia.

The primary forum for the exchange of information in support of coordination and cooperation among Parties is its Council, which supervises the administrative and financial affairs of the organization, as well as managing external relations, communication among members and between members and non-members [56,81]. The criteria for participation in NASCO Council are set forth in the NASCO Handbook.<sup>4</sup> Each party is authorized to appoint no more than three representatives, who accompany experts and advisers, to NASCO Council. Given large interest among non-governmental organizations (NGOs) and the recognized value that NGOs can offer to NASCO's mandate, in 1985, specific criteria were established to allow for NGO inclusion in meetings. Following a strategic review termed the "Next Steps" process in 2004, the relationship between the organization, the Parties and its stakeholders became a greater focus, with the procedures for NGO participation expanded [56,81].

In addition to having a Council, a Secretariat, and a Research Board, NASCO also has four Commissions, which divide all organizational activities into regions (Fig. 3). Each Commission consists of relevant Party member representatives, with each member having one vote. All decisions taken by the Commissions must be unanimous, with the option for any Party to abstain in order for the proposal to go forward [10]. According to Bubier [10], this need for unanimous consent likely reflects the reality that NASCO, like other international treaties, lacks enforcement power. Therefore, member states who object to measures are not bound by the decision-making outcome.

Key to NASCO is the regular development of fisheries science and biological advice through the International Council for the Exploration of the Sea, or ICES. ICES, also an international organization, includes the Working Group on North Atlantic Salmon, or WGNAS. NASCO affiliates and their member states contribute to, and are informed by, the annual reports produced by members of the WGNAS. ICES and NASCO provide a high-level, intergovernmental structure to improve the understanding of wild salmon stocks and governance of salmon resources in the North Atlantic. While both organizations are responsible for disseminating scientific information or biological advice, NASCO provides the venue for transboundary fishery governance [81]. Since its establishment, NASCO has introduced significant changes to Atlantic salmon fisheries,

including reductions in quotas, fishing effort and even closures [56,83, 84], with most efforts to design and implement regulatory measures largely directed toward Greenland. NASCO and in particular the West Greenland Commission have identified the status and origin of salmon stocks at Greenland and affiliates have worked together to establish quotas to limit the catches of salmon [84]. In the inaugural year of NASCO, a catch quota of 870 tonnes was established, which has since been steadily reducing to just 30 tonnes in 2020. While NASCO's initial focus was on regulating salmon fisheries in West Greenland and the Faroe Islands, it has broadened its purview over time to include habitat protection and restoration, fishery management in States of origin and aquaculture [56,81].

### 5.3. Motivations for establishing NASCO

The life history and distribution of Atlantic salmon stocks causes high levels of task interdependence between different agencies and necessitates international communication and cooperation to ensure that salmon industries exist into the future [83]. As noted by Bubier [10], the salmon conservation measures in one country are only as effective as the corresponding measures in another. However the United States, Canada and European nations have no management control once the salmon have left their waters, resulting in a situation where so-called 'states of origin' are unable to unilaterally conserve their domestic salmon populations [10].

The impetus of this emerging alliance network was to respond to the offshore salmon fishery developing along the coast of West Greenland in the 1960's. A bilateral agreement in the 1970's between the United States and Denmark, in recognition of its territorial jurisdiction over Greenland, represented the first step towards setting quotas and served to phase out high seas fishing by 1976. However, the agreement did not last and was terminated in 1980 due to the introduction of 200 nautical mile limits by most countries of the North Atlantic [83]. Realizing that bilateral agreements were insufficient for managing a species that travels through several coastal state waters, and in recognition of the lack of an organized response following the termination of the 1970's agreement, the US State Department worked with interest groups and countries to draft a multilateral treaty (see [81]). While there was disagreement over the structure and authority of any proposed international organization designed to implement the treaty, a decentralized approach where authority rested in several sub-commissions was decided [10].

During the years leading up to NASCO's formation, coastal states and their policy actors recognized their high levels of interdependence, causing them to seek collaboration on Atlantic salmon conservation and

<sup>4</sup> NASCO Handbook, NASCO, [http://www.nasco.int/pdf/reports\\_other/NASCO\\_Handbook.pdf](http://www.nasco.int/pdf/reports_other/NASCO_Handbook.pdf) (accessed July 28, 2020).

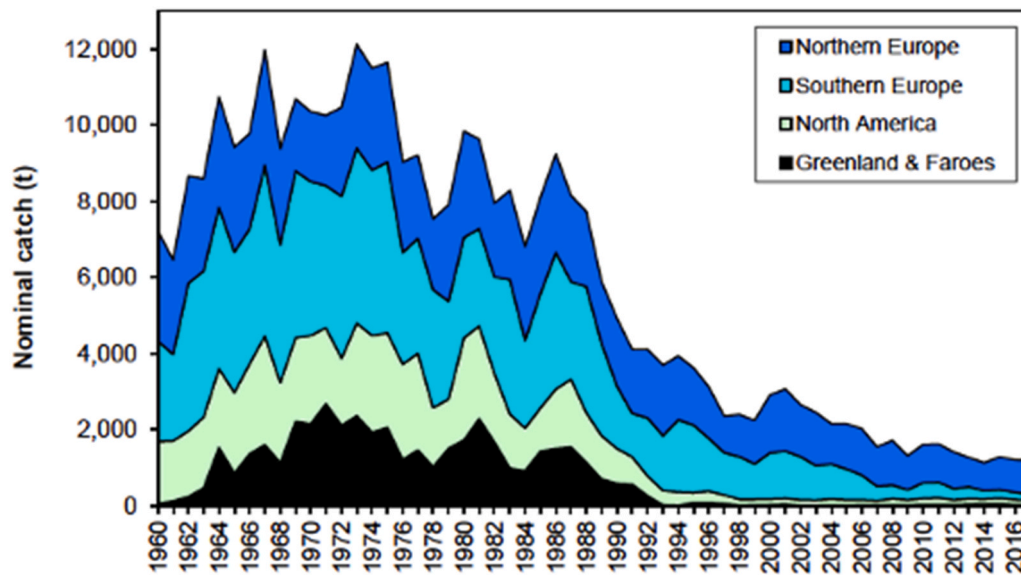


Fig. 3. Total reported nominal catch of Atlantic salmon (tonnes of round fresh weight in four North Atlantic regions 1960–2017). Credit: ICES WGNAS.

management [83,84]. Applying Das and Teng's [17] framework, there are perceived risks associated with inter-organizational alliance formation, including relational and performance risks. An example of *relational risk* would be the likelihood and consequence of not having satisfactory cooperation among organizations in member states, in this case potentially resulting in goal conflict, high transaction costs, loss of autonomy or sovereignty and deviance from agreements. *Performance risks* are the likelihood and consequence that alliance objectives are not achieved despite satisfactory cooperation. In this case, performance risk is manifest as the potential to waste time and resources and associated opportunity costs. We expect the actual perceived risks of collaborating differ among the organizations involved, given that individual governments and NGOs have voiced concern about the risk of losing their local investments to manage, conserve, and improve salmon stocks when other coastal states enjoy the largest return on their investment [22]. Historic controversy on this point was leveled at Greenland and the Faroe Islands, whose coastal state economies derived revenue from salmon fisheries [75]. Coastal nations with large recreational or traditional fishery economies are known to have perceived their risks differently, with at least one NGO arguing that an objective approach that failed to account for varying stakeholder perceptions was why early NASCO agreements were unsuccessful [64].

Recognizing their high levels of interdependence, a situation amplified by the declining salmon stocks, ultimately led the Parties to ratify the Convention for the Conservation of Salmon in the North Atlantic Ocean [83], signaling a desire to cooperate and collaborate on management despite the perceived risks. Potential *relational risks* were initially addressed through the requirement to establish an international organization, NASCO, with a management mandate to facilitate "consultation and cooperation" among the organizations involved (*behaviour controls*). NASCO also has a mandate to ensure "the best scientific evidence available" is used in decision-making which is pursued through *output controls* such as assessment reports and action plans (see [81]) in order to help mitigate *performance risk* (i.e., Proposition 4, Fig. 1). Preceding the signing of the treaty and subsequent establishment of NASCO was a necessary degree of trust among the member Parties to act in good faith, assessed based on their reputations for dealing fairly in previous transboundary resource management alliances (*goodwill trust*) and ability to contribute the necessary resources and expertise to ensure the alliance performs (*competence trust*), in this case potentially involving scientific evidence, funding, infrastructure, monitoring and enforcement capacity (i.e., Propositions 1 and 2, Fig. 1).

#### 5.4. Managing the relationship

The Convention is the underlying instrument facilitating the bureaucratic alliance and subsequent participation in NASCO activities. The Convention sets the mandate, budget as well as the limits of the international organization (*output controls*). It addresses who is represented and in what capacity (*behaviour control*), how decisions are taken and conflicts resolved (*social control*), how business is conducted, the transparency of proceedings, and who is allowed to observe (*behaviour controls*). Relationships among NASCO officers and representatives are maintained through regular correspondence with respective members of each Commission (e.g., North American Commission, West Greenland Commission) and through annual meetings (*behaviour controls*). Annual meetings also serve the purpose of *social control*, facilitating inter-organizational cultural blending [87] by creating a venue for sharing, discussing, and revising shared values and norms, including which kinds of scientific and regulatory activities should be prioritized [81]. Meetings also serve as a venue for *output control*, facilitating goal convergence and the setting of shared objectives as the annual check-ins ensure that Parties' agreed progress on activities is being satisfactorily met, and if not, that Parties have an opportunity to develop resolutions to any setbacks encountered. NASCO's careful documentation and archive of activities ensures accountability and transparency. Examples include adjusting catch quotas to account for overharvest in a previous year [56], or revising a sampling program to account for new techniques or stocks [58].

The collaborative performance of an inter-organizational alliance depends heavily on the positive and negative feedback relationships existing between control and trust over time. For example, within the NASCO alliance, *behaviour controls* have been supplanted by *competence trust*, as individual representatives or organizations demonstrate the capacity to meet the given management objectives (in line with Propositions 2 and 9b). Varying forms of trust and control not only serve to substitute for each other in certain contexts; they also complement and reinforce each other in other contexts. For example, both *goodwill* and *competence trust* deepens with shared *social controls* (e.g., joint decision-making and dispute resolution processes, attendance at annual meetings, scientific presentations and professional discussions, field excursions, receptions, dinners and events) (see Proposition 7, Fig. 1), which then serves to enhance the effectiveness of all controls (Proposition 8, Fig. 1). Conversely, when agreed objectives are not meeting the expectations of the alliance members, *goodwill trust* can become diminished

and perceived *relational risk* can increase (Proposition 1, Fig. 1), which then needs to be supplanted by behaviour controls, issued and/or upheld by representatives of a given party (Propositions 3 and 5, Fig. 1), helping to repair *goodwill trust* with time (Proposition 8, Fig. 1).

A good example of the dynamic interactions between varying forms of trust and control in reducing the perceived risks of participating to enhance the performance of the alliance is offered by recent discussions surrounding the desire to further reduce Greenland's catch quota due to the risk of Atlantic salmon extirpation in the USA and Canada [36,39]

(see Table 1). With mounting scientific evidence that the Atlantic salmon stocks were in decline, members of the West Greenland Commission produced the *Multi-Annual Regulatory Measure for Fishing for Salmon at West Greenland for 2015, 2016 and 2017 (WGC 15(21))*, which set out 11 points of agreement, including but not limited to protocols for reporting salmon catches, protocols for sampling salmon, a defined salmon fishing season, and a salmon catch quota of no more than 45 metric tonnes (*behaviour controls*). In reaching this agreement, NASCO members were not able to convince Greenland to further restrict its

**Table 1**

Trust, control and perceived risk framework applied to the example of Greenland's Atlantic salmon quota reductions in 2018.

Event	Network Feature	Network Function	Outcome
2018 salmon fishing quota in Greenland exceeded due to clerical error receiving late catch reports from remote settlements in Greenland	Goodwill Trust	Moderating conflict	Despite quota exceeded, ASF/NASF do not terminate agreement because (1) they understand that the government of Greenland could not anticipate the error and (2) they have a continued interest in the success of the agreement.
ASF/NASF propose 2018 agreement with monetary component	Competence Trust	Establishing normative expectations	ASF/NASF expect fishery to be regulated because KNAPK and government of Greenland have competent and effective staff and administration.
Government of Greenland implement Zero Catch Reporting Requirement in 2018 fishing season	Behavioural Control	Incentivizing desired behaviour	Government of Greenland expect salmon fishing license holders will improve their catch reporting for fear of losing access to fishery in the following year.
Stakeholders hold quarterly meetings to evaluate fishery performance	Output Control	Monitoring partners, facilitating goal convergence and the setting of shared objectives	Stakeholders maintain regular progress toward stated goals and revise goals given progress.
Stakeholders gather in rotating locations in Iceland, Greenland, and USA.	Social Control	Facilitating policy-oriented learning and the development of goodwill and competence trust	Cultural blending. Stakeholders exposed to their own societies and knowledge communities.
Stakeholders develop effective cross-cultural communication	Perceived Relational Risk	Enhanced communication and goodwill trust development; conflict reduction	Stakeholders appreciate each other's reasons for fishing and conserving salmon.
Increasing NGO engagement in capacity building and reporting processes.	Perceived Performance Risk	Enhanced transparency and competence trust development; conflict reduction	Stakeholders understand administrative challenges and limitations affecting implementation.



harvest of Atlantic salmon below 45 tonnes, despite the advice of scientists, resulting in a loss of *goodwill trust* among the Parties being reported in the media [15]. NGO's subsequently played a leading role in expressing their frustration publicly, with the president of the Atlantic Salmon Federation stating:

*"A compromise would have been a subsistence fishery of no more than 20 tonnes, but more than twice this amount is unacceptable... Greenland's intent to harvest 45 tonnes each year from 2015 to 2017 will put our salmon at further risk" [15].*

Questions then emerged about the efficacy of the management control mechanisms supporting the alliance objectives of NASCO. As noted by a biologist from the US National Marine Fisheries Service in 2016 [82]:

*"We've tried everything possible to negotiate with Greenland to find alternatives to find out how they can lessen impacts on U.S. fish... This is part of their culture, this is part of who they are, this is something they've always done. We are trying to work with them to realize the fish they are fishing for originate in Canada, in U.S. waters, in Europe, and these populations are in decline".*

For their part, the Government of Greenland disagreed that a halt to Inuit fishing would save the salmon population, with a spokesperson from the Ministry of Fisheries noting that Greenland has been continuously reducing its salmon fishery for over twenty years with no improvement in the population's status. This view suggests that *performance risk* was becoming a major concern for the various Contracting Parties with decreasing *competence trust* challenging the performance of the alliance (Proposition 2, Fig. 1). For Greenland, the main domestic policy concern related to the importance of salmon fishing to the Inuit community, which comprise 90% of the total population, and who fish close to shore and solely for local use [82]:

*"Surviving off the resources that nature can offer has been the way that the tough Inuit of Greenland has survived for thousands of years, and it is still the way that a large part of the people survive today—and here the salmon plays a vital part of the history and culture".*

This position is in line with the International Labour Organization Convention No. 169, also known as the Indigenous and Tribal Peoples Convention (1989), a legally-binding international agreement protecting the rights of Indigenous peoples, which was ratified by Denmark in 1996, (and Norway in 1990), but has not been ratified by the other NASCO Parties (2021). In response to the inability of the Contracting Parties to negotiate a significant further reduction in Greenland's salmon quota through the *behaviour and social controls* outlined in the Convention and the *competence and goodwill trust* developed over the 30 + years since the Convention was ratified, NASCO-observing salmon conservation organizations became more active in the design, implementation, and revision of agreements among Party members, including the *ASF NASF International Conservation Agreement*; and, the *Multi-annual Regulatory Measure for fishing for Salmon in West Greenland (WGC(18) 11)*.

The *Multi-annual Regulatory Measure for fishing for Salmon in West Greenland (WGC(18)11)*, herein referred to as the 2018 Regulatory Agreement set out 13 points of agreement, including but not limited to:

- A continued ban on exports of salmon catches
- A catch quota of 30 metric tons
- A defined salmon fishing season
- Protocols for collecting and verifying fishery catch data
- Reporting standards for salmon catches
- Licensing requirements
- Protocols for sampling salmon for stock assessment purposes

This Agreement was subsequently implemented into the *Executive*

*Order for Fishery after salmon* in 2018, and demonstrates how NASCO as a strategic alliance helped to facilitate multilateral action on the management of salmon. *Goodwill trust* was further restored when the Atlantic Salmon Federation and the North Atlantic Salmon Fund in Iceland (both NGOs with NASCO observer status) reached a 12-year agreement with the Greenland association of hunters and fishers, Kalaallit Nunaanni Aalisartut Piniartullu Kattuffiat (KNAPK), to stop commercial fishing of wild salmon. The president of the Atlantic Salmon Federation described the agreement as a win for transboundary resource management: *"It's a huge win for wild Atlantic salmon, particularly in Canada... In a given year 75 or 80 per cent of salmon caught in Greenland are of Canadian origin" [37].*

The deal was structured around using funds from private donors and conservation bodies, with no money provided by government agencies. These funds were provided to KNAPK through the ASF NASF Agreement, with the goal of augmenting the effectiveness of the 2018 Regulatory Agreement. Funds were used to incentivize fishers to invest in gear to participate in other fisheries, thus taking pressure off salmon. That KNAPK would agree to such a deal is a change of course, given that the organization has in recent years supported commercial fishing as a means of Greenland utilizing its own resources [55].

However, in 2019 Greenland's Ministry of Fisheries, Hunting and Agriculture reported that the 2018 Atlantic salmon harvest off the country's west coast was 40.3 tonnes, more than double the 20-tonne subsistence quota agreed to by KNAPK [7] damaging *goodwill and competence trust* between the organizational actors, and pointing to the need for further control mechanisms to be explored. In response to this conservation set-back, an Atlantic Salmon Federation spokesperson responded that: *"It came as a great disappointment... We certainly have a duty to the people who support us and donate generously to make this possible... Everyone is keen to come back in year two of this agreement and do better" [7].*

The current (2020) Agreement includes private and confidential compensation schemes for satisfactory performance, essentially forming a voluntary environmental program (VEP) designed to induce positive environmental externalities beyond the requirements of government legislation [68]. Funds provided to KNAPK are earmarked for distribution among Greenlandic fishers to invest in equipment or gear for targeting species other than salmon. Granted funds are also earmarked for conservation education, as well as for actions that improve the monitoring and reporting of the agreed upon catch quota (*performance controls*). The ASF NASF Agreement also signals the support of the Government of Greenland (*output control*) and establishes that satisfactory progress toward upholding the terms of the Agreement will be made known through NASCO meetings and the information produced by the West Greenland Commission each year, *social controls* designed to mitigate *performance risk* and enhance *competence trust*.

##### 5.5. Strategic benefits of the alliance

Increased levels of inter-organizational interaction, coordination, cooperation and ultimately collaboration are a significant benefit of NASCO [83,84], helping to navigate the complexity of Atlantic salmon conservation and facilitating task division, thereby enhancing both *goodwill and competence trust* among network members. Examples of tasks include organizing transboundary scientific research, engaging with traditional knowledge systems, conducting impact and stocking assessments, and the monitoring, management and enforcement of agreed fishery resource management plans, sometimes in remote and treacherous conditions (see [13]). Another benefit of the alliance has been the opportunity to engage national and international NGOs in the management discussions (*behavioural and social control*) and also in support of the shared ecosystem-based management objectives (*output control*). While NGOs are not formally voting members of NASCO, their role in facilitating *competence trust* among the Parties and expanding the control mechanisms available to the alliance beyond the institutions of



government at key junctures appear to have mitigated *performance risk* and enhanced collaboration (Proposition 2, Fig. 1). As noted by the Chairman of NASCO's NGOs 1997–2012, "*The NGOs have worked successfully together with NASCO Parties to facilitate much greater transparency in its work, notably the requirement for each jurisdiction to produce an implementation plan which now creates public accountability for wild salmon management around the North Atlantic. Close co-operation and constructive criticism are essential to help implement both vital research and practical salmon management measures aimed at conserving and restoring this iconic species.*"

Key, but less well understood, is the extent to which the bureaucratic alliance has enabled the development of informal management social control mechanisms. These controls can serve to enhance the goodwill and competence trust among member organizations (Proposition 7, Fig. 1), and include annual meetings with associated receptions, dinner events, field tours, and opportunities for cultural exchange through reciprocated travel opportunities and joint research expeditions. A recent example includes the 2018 Salmon summit in Portland, Maine at the Gulf of Maine Research Institute, where the latest research on salmon stocks was shared amidst discussions about the 2018 regulatory agreements. While the interactions between perceived risk, trust and control within the inter-organizational alliance appear to be supporting collaborative transboundary fishery governance, it is worth noting that the north Atlantic salmon populations have continued to decline since the establishment of NASCO, suggesting a need to expand the policy boundaries of ecosystem-based fishery management (see also [81]). Indeed, the External Review of NASCO [56] identified a need for NASCO to "*consider other activities with a significant impact on the environmental status of these habitats of concern. In the rivers of the Parties, one of the main concerns has been dam building and the barring of access for salmon to spawning grounds. Other impacts of concern include aquaculture, introductions and transfers and transgenics*" in order to meet the objectives of the Convention. This is another example where the formal engagement of NGOs and local communities is likely to be beneficial to furthering the shared objectives (*output control*) of the alliance.

## 6. Discussion and Conclusion

To better understand the inter-organizational factors affecting collaborative fishery management network performance and offer policy insights of relevance to transboundary resource management, we explored how the different organizations involved in NASCO draw on trust and control to mitigate perceived risk of collaboration.

Using Das and Teng's [17] integrated framework, our analysis highlights how different dimensions of control and trust can serve different purposes while also interacting in complex ways to support the collaborative relationship among inter-organizational alliance members at different points in time. Table 2 summarizes the results of the analysis, showing the roles played by different forms of trust and control in reducing the perceived risks of engaging in inter-organizational alliance relationships. We recognize that these results are coarse and would benefit from further empirical work to expand on the various mechanisms being used by network managers to support inter-organizational collaboration on transboundary resource management, however, we believe that the potential value of the framework to decision-makers is visible. In particular, our analysis shows that the application of an integrated trust-control-risk framework can increase conceptual clarity for how, when and why network managers might seek to develop different forms of trust through diverse management control systems in ways that further multi-actor collaborative network performance. While a large and growing number of studies have already identified different dimensions of trust as being key to developing inter-organizational goal convergence and collaboration in natural resource management (see for example [46,72,76,78,80]), none have empirically examined the dynamic relationships between different dimensions of trust and control, and their roles in mitigating perceived risks of inter-organizational

**Table 2**

Risk reduction through trust building and control mechanisms in a transboundary fishery alliance (adapted from [17]).

Trust Building and Control Mechanisms	Applicability to Perceived Risk of Collaborating	
	Reducing Relational Risk	Reducing Performance Risk
<i>Goodwill trust-building</i>		
Establishing mutual interests	X	
Individual and team-level trust	X	
Joint dispute resolution	X	
<i>Competence trust-building</i>		
Proactive information collection		X
Joint scientific research		X
<i>Behaviour control mechanisms</i>		
Policies and procedures	X	
Transparency and inclusivity	X	X
Reporting structures	X	
Staffing and training	X	X
Quotas and catch reporting		X
Annual meetings	X	
<i>Output control mechanisms</i>		
Setting goals and objectives		X
Setting system boundaries		X
Monitoring and assessment		X
Reporting and meeting presentations	X	X
Planning and budgeting		X
<i>Social control mechanisms</i>		
Decision-making process	X	X
Joint dispute resolution	X	X
Meetings, events, field excursions	X	
Ritual, ceremonies and networking	X	

collaboration in RFMOs. Our exploratory case of NASCO offers a first step towards an expanded conceptualization of the role that trust plays in collaborative network governance in transboundary fishery settings and suggests that further research is warranted. In particular, there is a need to better understand how the managerial strategies and control mechanisms presented in Table 2 facilitate inter-organizational trust in RFMOs and mitigate the perceived risks of working together [46]. The effects of the control mechanisms commonly used in transboundary fishery networks (e.g., stocking assessments, interagency strategic vision statements, action plans, decision structures, incentives for informal interaction, etc.) are generally under-researched in the context of understanding trust and collaboration dynamics through time. Moreover, as noted by Nielsen [59], it is also important to understand the recursive nature of trust development over time, for example as organizations make changes to their aspirations and realign their goals the roles of trust may change, with different dimensions acting as both a determinant and a feature of the relationship. The framework presented in Fig. 1 provides a useful starting point from which we can begin to tackle the multi-level and multi-directional roles that different types of trust and control play in different phases of an inter-organizational collaborative relationship [60].

Our analysis also shows how NGO involvement in the alliance has grown through time as new relational and performance risks emerged and goodwill and competence trust were needed. The example of the ASF NASF Agreement in 2018 nicely demonstrates the ways that NGOs were able to act in a pragmatic and entrepreneurial manner to implement supplementary performance and behavioural controls, while also building competence and goodwill trust within the alliance (see Table 1). As such, although NGOs are not formal member Parties to the Convention, meaning their actions were officially considered beyond the activities of NASCO, their involvement has greatly supported the collaborative performance of the alliance (see also [65]). This is an area that warrants further policy consideration in the context of transboundary fisheries governance, where the creation of formal mechanisms to include communities and NGOs may serve to enhance the performance of the bureaucratic alliance (see also [18]). While one

could imagine that the perceived relational and performance risks among the different organizations involved may initially be higher, the potential for effective control mechanisms and different forms of trust to co-develop through time appears likely to counteract these concerns when task interdependence is high. In the case of NASCO, NGOs have increasingly been recognized as facilitating transparency and accountability in the performance and output controls being used within the alliance, such as offering input on fish sampling programs, offering monetary incentives to the in-country fishers association KNAPK, enhancing competence trust and reducing performance risk. This recognition is relevant to other RFMOs [18], suggesting that identifying and including potentially interested NGOs and local rightsholders early in the process of alliance formation, and engaging them fully in the transboundary policy discussions, scientific assessment reporting processes and (in)formal meeting events can accelerate collaborative performance of the alliance and, ultimately, increase the likelihood of ecosystem-based fishery management objectives being realized over time.

### CRedit authorship contribution statement

**Gordon M. Hickey:** Conceptualization, Formal analysis, Investigation, Methodology, Project administration, Funding acquisition, Writing – original draft. **Hunter T. Snyder:** Conceptualization, Investigation, Methodology, Funding acquisition, Writing – original draft. **Jasper R. deVries.** Conceptualization, Funding acquisition, Writing – review & editing. **Owen F. Temby:** Conceptualization, Funding acquisition, Writing – review & editing.

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### Conflicts of Interest

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### References

- [1] H. Aldrich, D.A. Whetten, Organization-sets, action sets, and networks: making the most of simplicity, in: P.C. Nystrom, W. Starbuck (Eds.), *Adapting Organizations to their Environments*, Vol. 1, Oxford University Press, New York, 1981, pp. 385–408.
- [2] E.R. Alexander, *How Organizations Act Together: Interorganizational Coordination in Theory and Practice*, Gordon & Breach, Amsterdam, 1995.
- [3] D.R. Armitage, R. Plummer, F. Berkes, R.I. Arthur, A.T. Charles, I.J. Davidson-Hunt, E.K. Wollenberg, Adaptive co-management for social-ecological complexity, *Front. Ecol. Environ.* 7 (2) (2009) 95–102.
- [4] Atlantic Salmon Federation (2017). ASF-NASF INTERNATIONAL CONSERVATION AGREEMENTS, Atlantic Salmon Federation. (<https://0104.nccdn.net/1.5/2df/145/2bd/03-asf-greenland-background.pdf>) (Accessed April 24, 2019).
- [5] E. Babbie, *The Practice of Social Research*, Wadsworth/Thomson Learning, Belmont, CA, 2001.
- [6] T. Berg, D.Ø. Madsen, The historical evolution and popularity of activity-based thinking in management accounting, *J. Account. Organ. Change* 16 (3) (2020) 401–425.
- [7] A. Beswick, (2019). Greenland Doubles Atlantic Salmon Tonnage Allowed under Conservation Deal. (<https://www.thechronicleherald.ca/news/provincial/greenland-doubles-atlantic-salmon-tonnage-allowed-under-conservation-deal-297248/>) (Accessed January 15, 2021).
- [8] P.K. Bose, *Research Methodology: A Trend Report*, Indian Council of Social Science Research, New Delhi, India, 1995, p. 52.
- [9] R.F. Brummel, K.C. Nelson, P.J. Jakes, Burning through organizational boundaries? Examining inter-organizational communication networks in policy-mandated collaborative bushfire planning groups, *Glob. Environ. Change* 22 (2) (2012) 516–528.
- [10] J.L. Bubier, International management of atlantic salmon: equitable sharing and building consensus, *Ocean Dev. Int. Law* 19 (1) (1988) 35–57.
- [11] L.M. Camarinha-Matos, H. Afsarmanesh. Collaborative networks (June) International conference on programming languages for manufacturing 2006 Springer, Boston, MA 26 40.(June).
- [12] J. Child, D. Faulkner, *Strategies of Cooperation: Managing Alliances, Networks, and Joint Ventures*, Oxford University, 1998.
- [13] J.S. Christiansen, C.W. Mecklenburg, O.V. Karamushko, Arctic marine fishes and their fisheries in light of global change, *Glob. Change Biol.* 20 (2) (2014) 352–359.
- [14] N.A. Clark, J.A. Ardron, L.H. Pendleton, Evaluating the basic elements of transparency of regional fisheries management organizations, *Mar. Policy* 57 (2015) 158–166.
- [15] N. Crabbe, (2015). Greenland 'Devastating' Atlantic Salmon says Conservation Group. (<https://www.cbc.ca/news/canada/new-brunswick/greenland-devastating-atlantic-salmon-says-conservation-group-1.3106018>) (Accessed January 15, 2021).
- [16] S. Cullis-Suzuki, D. Pauly, Failing the high seas: a global evaluation of regional fisheries management organizations, *Mar. Policy* 34 (5) (2010) 1036–1042.
- [17] T.K. Das, B.S. Teng, Trust, control, and risk in strategic alliances: an integrated framework, *Organ. Stud.* 22 (2) (2001) 251–283.
- [18] L.M. Dellmuth, M.T. Petersson, D.C. Dunn, A. Boustany, P.N. Halpin, Dataset on non-state actor participation in regional fisheries management organizations, *Data Brief* 34 (2021), 106682.
- [19] H. Delerue, Relational risk perception and alliance management in French biotechnology SMEs, *Eur. Bus. Rev.* 17 (6) (2005) 532–546.
- [20] R. Dimitrov, *Science and International Environmental Policy: Regimes and Nonregimes in Global Governance*, Rowman & Littlefield, 2006.
- [21] J. Edelenbos, E.H. Klijn, B. Steijn, Managers in governance networks: how to reach good outcomes? *Int. Public Manag. J.* 14 (4) (2011) 420–444.
- [22] Editorial, Boycott not the answer, *The Atlantic Salmon Journal*. (1981).
- [23] C. Ewell, J. Hovevar, E. Mitchell, S. Snowden, J. Jacquet, An evaluation of regional fisheries management organization at-sea compliance monitoring and observer programs, *Mar. Policy* 115 (2020), 103842.
- [24] Food and Agriculture organization of the United Nations (FAO) (2020). *The State of the World Fisheries and Aquaculture 2020. Sustainability in Action*. (<https://www.fao.org/3/ca9229en/CA9229EN.pdf>). (Accessed July 7, 2021).
- [25] I.A. Fleming, Reproductive strategies of Atlantic salmon: ecology and evolution, *Rev. Fish Biol. Fish.* 6 (4) (1996) 379–416.
- [26] E. Gilman, K. Passfield, K. Nakamura, Performance of regional fisheries management organizations: ecosystem-based governance of bycatch and discards, *Fish Fish.* 15 (2) (2014) 327–351.
- [27] R. Gulati, Social structure and alliance formation patterns: a longitudinal study, *Adm. Sci. Q.* 40 (1995) 619–652.
- [28] R. Gulati, Alliances and networks, *Strateg. Manag. J.* 19 (4) (1998) 293–317.
- [29] R. Gulati, H. Singh, The architecture of cooperation: managing coordination costs and appropriation concerns in strategic alliances, *Adm. Sci. Q.* 43 (1998) 781–814.
- [30] B. Haas, M. Haward, J. McGee, A. Fleming, Explicit targets and cooperation: regional fisheries management organizations and the sustainable development goals, *Int. Environ. Agreem.: Polit. Law Econ.* 21 (1) (2021) 133–145.
- [31] B. Haas, J. McGee, A. Fleming, M. Haward, Factors influencing the performance of regional fisheries management organizations, *Mar. Policy* 113 (2020), 103787.
- [32] B. Haas, M. Haward, J. McGee, A. Fleming, The influence of performance reviews on regional fisheries management organizations, *ICES J. Mar. Sci.* 76 (7) (2019) 2082–2089.
- [33] P.M. Haas, *Saving the Mediterranean: The Politics of International Environmental Cooperation*, Columbia University Press, 1990.
- [34] R. Hilborn, Measuring fisheries management performance, *ICES J. Mar. Sci.* 77 (7–8) (2020) 2432–2438.
- [35] M.J. Hoffmann, *Ozone Depletion and Climate Change: Constructing a Global Response*, Suny Press, 2005.
- [36] ICES, Atlantic salmon at West Greenland – Summary of the advice for 2020, ICES, 2020a. (<http://www.ices.dk/sites/pub/PublicationReports/Forms/DispForm.aspx?ID=36568>) (accessed January 5, 2021).
- [37] H. Ibrahim, (2018). Atlantic salmon group strikes deal to stop Greenland fishing for 12 years. (<https://www.cbc.ca/news/canada/new-brunswick/salmon-fishing-prohibition-greenland-faroe-island-1.4680875>) (Accessed January 5, 2021).
- [38] M.T. Imperial, Using collaboration as a governance strategy: lessons from six watershed management programs, *Adm. Soc.* 37 (3) (2005) 281–320.
- [39] ICES 2020b Atlantic salmon at West Greenland Online: (<http://www.ices.dk/sites/pub/PublicationReports/Forms/DispForm.aspx?ID=36568>).
- [40] S. Jinnah, *Post-treaty Politics: Secretariat Influence in Global Environmental Governance*, MIT Press, 2014.
- [41] R.O. Keohane, *After Hegemony: Cooperation and Discord in the World Political Economy*, Princeton University Press, 1984.
- [42] R.O. Keohane, L.L. Martin, The promise of institutionalist theory, *Int. Secur.* 20 (1) (1995) 39–51.
- [43] R.O. Keohane, J.S. Nye, Transgovernmental relations and international organizations, *World Pol.* 27 (1974) 39–62.
- [44] D. Knoke, Playing well together: creating corporate social capital in strategic alliance networks, *Am. Behav. Sci.* 52 (12) (2009) 1690–1708.
- [45] E.O. Laumann, J. Galaskiewicz, P.V. Marsden, Community structure as interorganizational linkages, *Annu. Rev. Sociol.* 4 (1978) 455–484.

- [46] A. Lima, D. Kim, A.M. Song, G.M. Hickey, O. Temby, Trust and influence in the Gulf of Mexico's fishery public management network, *Sustainability* 11 (21) (2019) 6090.
- [47] K. Litfin, *Ozone Discourses: Science and Politics in Global Environmental Cooperation*, Columbia University Press, 1994.
- [48] M.P. Mandell, Application of network analysis to the implementation of a complex project, *Hum. Relat.* 37 (1984) 659–679.
- [49] M.P. Mandell, Organizational networking: collective organizational strategies, in: J. Rabin, G.J. Miller, W.B. Hildreth (Eds.), *Handbook of Strategic Management*, eds., Marcel Dekker, New York, 1989, pp. 141–165.
- [50] L.L. Martin, B.A. Simmons, Theories and empirical studies of international institutions, *Int. Organ.* 52 (1998) 729–757.
- [51] R.C. Mayer, J.H. Davis, F.D. Schoorman, An integrative model of organizational trust, *Acad. Manag. Rev.* 20 (3) (1995) 709–734.
- [52] M.B. Miles, A.M. Huberman, *Qualitative Data Analysis: A Sourcebook of New Methods*, Sage Publications, 1984, p. 263.
- [53] E.J. Molenaar, *Regional Fisheries Management Organizations. Global Challenges and the Law of the Sea*, Springer, Cham, 2020, pp. 81–109.
- [54] G. Mollering, *Trust: Reason, Routine, Reflexivity*, Emerald Group Publishing, 2006.
- [55] N. Moller, P. Hansen, KNAPK, (2015). Vi accepterer ikke stop af indhandling af laks, KNR. (<https://knr.gl/da/nyheder/knapk-vi-accepterer-ikke-stop-af-indhandling-af-laks>) (Accessed January 15, 2021).
- [56] NASCO, (2012). WGC(12)12 Regulatory Measure for Fishing for Salmon at West Greenland for 2012, 2013, and 2014.
- [57] NASCO, (2019). State of North Atlantic Salmon. (<https://nasco.int/wp-content/uploads/2020/05/SoS-final-online.pdf>) (Accessed July 12, 2021).
- [58] NASCO, (2020). WGC(20)08 Statement of Co-operation on the West Greenland Fishery Sampling Program for 2020.
- [59] B.B. Nielsen, The role of trust in collaborative relationships: a multi-dimensional approach M@ N.@ gement, 7, 3, 2004, pp. 239–256.
- [60] B.B. Nielsen, Trust in strategic alliances: toward a co-evolutionary research model, *J. Trust Res.* 1 (2) (2011) 159–176.
- [61] D.L. Parrish, R.J. Behnke, S.R. Gephard, S.D. McCormick, G.H. Reeves, Why aren't there more Atlantic salmon (*Salmo salar*)? *Can. J. Fish. Aquat. Sci.* 55 (S1) (1998) 281–287.
- [62] B. Pentz, N. Klenk, S. Ogle, J.A. Fisher, Can regional fisheries management organizations (RFMOs) manage resources effectively during climate change? *Mar. Policy* 92 (2018) 13–20.
- [63] C. Perry, B. Andersen, New strategic dynamics in the Arctic region, *Atlantis Perspect.* 36 (6) (2012) 4–9.
- [64] A.E. Peterson Jr., A matter of perspective, *Atl. Salmon J.* (1985).
- [65] M.T. Petersson, L.M. Dellmuth, A. Merrie, H. Österblom, Patterns and trends in non-state actor participation in regional fisheries management organizations, *Mar. Policy* 104 (2019) 146–156.
- [66] P. Pintassilgo, M. Finus, M. Lindroos, G. Munro, Stability and success of regional fisheries management organizations, *Environ. Resour. Econ.* 46 (3) (2010) 377–402.
- [67] W.W. Powell, (1990). *Neither Market Nor Hierarchy: Network Forms of Organization*.
- [68] A. Prakash, M. Potoski, Voluntary environmental programs: a comparative perspective, *J. Policy Anal. Manag.* 31 (1) (2012) 123–138.
- [69] K.G. Provan, H.B. Milward, Do networks really work? A framework for evaluating public-sector organizational networks, *Public Adm. Rev.* 61 (2001) 414–423.
- [70] D.M. Rousseau, S.B. Sitkin, R.S. Burt, C. Camerer, Not so different after all: a cross-discipline view of trust, *Acad. Manag. Rev.* 23 (3) (1998) 393–404.
- [71] G.E. Shephard, K. Dalen, R. Peldszus, S. Aparício, L. Beumer, R. Birkeland, F. Marazzi, Assessing the added value of the recent declaration on unregulated fishing for sustainable governance of the central Arctic Ocean, *Mar. Policy* 66 (2016) 50–57.
- [72] A.M. Song, O. Temby, D. Kim, A.S. Cisneros, G.M. Hickey, Measuring, mapping and quantifying the effects of trust and informal communication on transboundary collaboration in the Great Lakes fisheries policy network, *Glob. Environ. Change* 54 (2019) 6–18.
- [73] A.M. Song, O. Temby, D. Kim, G.M. Hickey, Assessing the influence of international environmental treaty secretariats using a relational network approach, *Earth Syst. Gov.* 5 (2020), 100076.
- [74] S.K. Soy, The case study as a research method: Uses and users of information, *Sch. Inf.* (1997).
- [75] R. Stein, The politics of sharing, *Atl. Salmon J.* (1984).
- [76] M.J. Stern, *Social Science Theory for Environmental Sustainability: A Practical Guide*, Oxford University Press, 2018.
- [77] M.J. Stern, T.D. Baird, Trust ecology and the resilience of natural resource management institutions, *Ecol. Soc.* 20 (2015) art14.
- [78] M.J. Stern, K.J. Coleman, The multidimensionality of trust: applications in collaborative natural resource management, *Soc. Nat. Resour.* 28 (2) (2015) 17–132.
- [79] D. Strang, C. Wittrock, *Methods for the study of management ideas*. Oxford Handbook of Management Ideas, Oxford University Press, Oxford, 2019, pp. 86–103.
- [80] O. Temby, A. Rastogi, J. Sandall, R. Cooksey, G.M. Hickey, Interagency trust and communication in the transboundary governance of pacific salmon fisheries, *Rev. Policy Res.* 32 (1) (2015) 79–99.
- [81] D.L. VanderZwaag, E.J. Pudden, The north atlantic salmon conservation organization (NASCO): surpassing a 25 year voyage in transboundary cooperation but still confronting a sea of challenges Recasting Transbound. *Fish. Manag. Arrange. Light Sustain. Princ.*, 2011, pp. 307–346. (Brill Nijhoff).
- [82] P. Whittle, (2016). In Atlantic salmon fight, Greenland Proves a Sticking Point. (<https://phys.org/news/2016-03-atlantic-salmon-greenland.html>) (Accessed January 15, 2021).
- [83] M.L. Windsor, P. Hutchinson, International management of Atlantic salmon—The role of NASCO, *Fish. Res.* 10 (1–2) (1990) 5–14.
- [84] M.L. Windsor, P. Hutchinson, International management of Atlantic salmon, *Salmo salar* L., by the North Atlantic salmon conservation organization, 1984–1994, *Fish. Manag. Ecol.* 1 (1) (1994) 31–44.
- [85] R.K. Yin, *Case Study Research: Design and Methods*, Sage, 1994.
- [86] M.Y. Yoshino, U.S. Rangan, *Strategic Alliances: An Entrepreneurial Approach to Globalization*, Harvard University Press, Cambridge, MA, 1995.
- [87] T.K. Das, B.S. Teng, Between trust and control: Developing confidence in partner cooperation in alliances, *Academy of management review* 23 (3) (1998) 491–512.