

Continuity of Society in the North

Multi-Modal Resiliency in Arctic Defense

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EXECUTIVE SUMMARY

This report examines the human-systems dimension of Arctic homeland defense and concludes that continuity of military operations in the North depends as much on the stability of surrounding civilian communities as it does on physical infrastructure. Through analysis of a dual-theater disruption scenario involving West Coast port degradation and concurrent Arctic escalation, the research demonstrates that household stability, civilian workforce continuity, tribal and Alaska Native resilience systems, and cross-sector governance coordination are all operational variables that directly affect mission assurance. The findings show that Arctic sustainment systems operate with limited redundancy and narrow margins, where disruptions to food, fuel, communications, healthcare, and transportation can cascade rapidly into degraded installation readiness, workforce availability, and force retention within the first 14 days of a crisis.

The central finding of this phase is both clear and consequential: Arctic homeland defense depends not only on physical infrastructure but on the stability of the families, communities, and tribal nations that surround and sustain it. Those systems operate with thin margins, limited buffers, and no predefined coordination architecture for the conditions that matter most. When they fail, when food access erodes, when heating fuel runs short, when the civilian workforce that operates critical services becomes unavailable, the effects propagate directly into installation readiness, mission capability, and force retention. Household instability is not a quality-of-life problem. It is an operational problem. Existing research consistently demonstrates that family stability directly influences readiness, retention, and operational focus [5; 58]; Arctic disruption conditions compress and intensify these stressors within the first 14 days.

This final report presents the completed findings of *Continuity of Society in the North: Multi-Modal Resiliency in Arctic Defense*, a research effort commissioned by the Homeland Defense Institute in support of NORAD and USNORTHCOM's Arctic mission assurance mission. The research examines the human-systems dimension of Arctic homeland defense, military families, the civilian and contractor workforce, tribal and Alaska Native communities, and the governance architecture that connects them, as operational variables in mission assurance rather than as welfare considerations downstream of infrastructure analysis.

The research is analytically distinct from its companion study, *Private-Sector Lifelines in the Arctic: Predicting and Assessing Risk to Critical Infrastructure*, which examines privately operated physical lifeline systems and their failure cascades. The two projects share a common dual-theater scenario, West Coast port degradation across Days 0–14 concurrent with Arctic escalation across Days 10–45, but maintain distinct analytical lenses. Where the companion study traces what happens to systems, this research traces what happens to people because of those system failures, and what those human and societal effects mean for the installations that depend on them.

This report identifies significant vulnerabilities in governance coordination, supply-chain resilience, communications continuity, and family readiness, while emphasizing that existing preparedness frameworks frequently overestimate recovery speed and underestimate the importance of pre-established trust, coordination mechanisms, and community resilience. Tribal governments, Alaska Native organizations, private-sector lifeline operators, and local communities function as essential resilience partners whose relationships and coordination structures must be developed before disruption occurs, not improvised under crisis conditions. Arctic mission assurance requires sustained investment in pre-positioned resources, communications redundancy, exercised civil–military coordination frameworks, and whole-of-society preparedness approaches capable of strengthening the societal systems that underpin national defense operations in the Arctic.

Seven completed deliverables form the analytical backbone of this final report: Scenario Framing and Societal Stressors; Civil–Military and Governance Mapping; Tribal and Alaska Native Resilience Assessment; Family Readiness and Human Factors Review; Infrastructure and Multi-Modal Sustainment Snapshot; Preliminary Multi-Modal Resilience Framework; and Stakeholder Engagement. Together with the Interim Report submitted in March 2026, these deliverables establish the operating environment, map the governance architecture, and document both the protective capacity and the critical vulnerabilities that determine whether Arctic continuity of society holds under stress.

Throughout, the analytical posture is consistent. Arguments lead; research corroborates. Vulnerabilities are framed in operational terms, what fails first, how fast, with what cascading effect, and at what point intervention is no longer feasible. The objective is not to catalogue Arctic problems. It is to give NORAD, USNORTHCOM, the Homeland Defense Institute, and their interagency and private-sector partners an evidence-based foundation for the investment, coordination, and policy decisions that close the gap between paper redundancy and operational redundancy in Arctic mission assurance.

KEY FINDINGS

The following findings represent the most operationally significant conclusions from the research. They are stated at executive level for decision-makers and reviewers engaging with this material in abbreviated form, and they are sequenced to lead with the conditions decision-makers are already operating in, followed by the systems whose failure has the most immediate operational consequence under dual-theater disruption. Each finding is developed in full within the body of the report, with supporting evidence, source attribution, and the analytical reasoning that connects each conclusion to the Arctic mission assurance context.

Cluster 1: The Strategic Context Decision-Makers Are Already Operating In

The simultaneity problem is current federal doctrine, not a speculative scenario construct.

The 2025 National Defense Strategy identifies homeland defense and the Western Hemisphere as the stated first regional priority and explicitly names the "simultaneity problem," coordinated or opportunistic adversary activity across multiple theaters concurrently, as a primary planning challenge. The NDS references Arctic approaches as part of the contested homeland perimeter and notes that adversary influence has grown from Greenland in the Arctic to the Gulf of Mexico and farther south. The dual-theater disruption scenario this research models is the type of simultaneity event the NDS explicitly identifies as requiring planning, not a speculative edge case. Allied capacity that might otherwise contribute to northern approaches is policy-directed to be concentrated in the Indo-Pacific, reinforcing that private-sector lifeline systems and community resilience must bear a larger share of the early-phase sustainment burden than prior doctrine presumed. [14; 56]

The Arctic has transitioned from managed cooperation to active great-power competition, and adversarial gray-zone activity is documented practice rather than a hypothetical threat profile.

Russia has reactivated and modernized Arctic military bases, expanded exercises, and assigned upgraded forces to Arctic installations. China has increased its presence through dual-use scientific activities, infrastructure investment, and growing cooperation with Russia. Russian GPS jamming, undersea telecommunications cable interference, and simulated attacks on NATO targets are documented ongoing tactics. The 2022 Russian cyberattack on Viasat, which degraded civilian services across Europe as collateral to its military targeting, is the documented precedent for adversarial exploitation of the commercial space infrastructure on which Arctic communications depend. Military security dialogue between Russia and other Arctic states has been suspended since 2014, compressing the time available to de-escalate misperceptions or accidental incidents before military and civilian systems must adapt to a degraded or contested environment. [18; 26; 43; 50]

Environmental change is the primary driver of infrastructure risk and societal disruption in the Arctic, not a background condition; the pre-disruption baseline is itself a state of accelerating fragility.

The Arctic is warming at approximately three times the global average, and the pre-disruption baseline that the dual-theater scenario operates within is not stable. Rapid sea ice loss, permafrost thaw, and extreme events create cascading infrastructure vulnerabilities; fisheries and wildlife shifts disrupt both subsistence and commercial food systems; coastal erosion and flooding directly threaten housing, transportation, food systems, and economic livelihoods; and 73 percent of Arctic U.S. waters remain unmapped, limiting situational awareness and infrastructure planning. The Arctic Council documents that 144 Alaska Native communities face infrastructure damage from erosion, flooding, and permafrost degradation. [36] Adaptation has hard limits in some communities, requiring relocation rather than resilience investment. [18; 61] For Arctic mission assurance, the implication is that the framework cannot treat infrastructure resilience as a static investment target. It must treat it as a moving envelope that narrows as climate pressure compounds, and the Days 0–14 window operates against a baseline that is itself in motion. This finding is a cross-layer condition that affects infrastructure resilience, tribal and community systems, and multi-modal sustainment pathways simultaneously.

Cluster 2: The Operational Core: What Fails First, What Determines the Cascade

Household instability is a leading indicator of mission degradation, not a lagging consequence.

Community and family-level disruption from supply chain degradation emerges before installation-level impacts become visible. Decision-makers who wait for operational indicators before responding to household-level stress will be acting after the window for effective intervention has closed. The research identifies the Day 3 to Day 7 interval as the governance inflection point: governance decisions made in that interval either contain the cascade or accelerate it.

The civilian and contractor workforce is the single most consequential point of failure in Arctic installation sustainment.

Installations are not self-sustaining beyond approximately fourteen days without external logistics and civilian workforce support. That workforce lives in communities experiencing the same supply disruptions as the installation, and household stability directly determines work availability. Workforce is both a dependency of the system and a driver of family stability, creating a feedback loop that planning frameworks built around single-variable analysis cannot capture.

Continuity of society is a prerequisite for continuity of operations, not a downstream consequence.

The communities surrounding Arctic installations are not the beneficiaries of defense operations. They are the operational substrate on which defense operations depend. Their workforce operates installation support services. Their stability determines military family readiness. Their governance systems shape the resource allocation decisions that

determine whether disruption stays manageable. Arctic mission assurance planning that treats community continuity as a secondary concern is planning that accepts the degradation of its own operational foundation.

Planning assumptions about recovery timelines are systematically too optimistic.

External assistance and resupply in the Arctic context arrives in days to weeks, not hours. Supply chain disruptions are not resolved quickly. Rerouting alternatives are constrained by mode capacity, Canadian sovereignty, weather, and airfield throughput limits. Planning that assumes a multi-week adjustment period before community-level shortages become visible is working from an incorrect baseline. The Days 0–14 window must be planned for as a period of near-complete self-reliance.

Cluster 3: Governance and Decision Architecture in the Days 0–14 Window

Governance friction emerges in Days 3–7 and determines cascade trajectory.

The absence of predefined protocols for adjudicating competing civilian and military claims on scarce fuel, food, transportation, and medical capacity is the most consequential planning gap this research has identified. These conflicts are structurally inevitable, driven by limited supply and competing survival priorities, not coordination failures. Designing resolution mechanisms before the crisis is a low-cost, high-return investment. The absence of those mechanisms under time pressure produces decisions that accelerate cascading failure rather than containing it.

The most common multi-jurisdictional coordination failure mode under disruption is confusion about authority, not disagreement about it.

Multi-jurisdictional coordination research from the Pacific Northwest documents a consistent pattern under simulated and actual disruption conditions that applies directly to Arctic governance. Formal coordination frameworks that specify information sharing, resource allocation protocols, and decision authority in pre-disaster planning documents consistently fail to activate as designed, not because the frameworks were poorly written but because the interpersonal and organizational relationships required to make them function had not been built during normal operations. The most common failure mode is not disagreement about authority but confusion about it: actors believing their counterparts have situational awareness they do not have, or assuming decision commitments have been made that have not been made, producing coordination gaps at precisely the moments when coordination is most urgently required. This finding sharpens the interim Key Finding on governance friction by identifying the specific failure mechanism the absence of pre-established adjudication produces and reinforces the design requirement for exercised protocols and pre-staged decision rules rather than for new authority allocations.

Institutional trust is a pre-event resilience variable, not a communications-quality variable that can be improved during disruption.

A finding consistent across the post-interim literature integration is that institutional trust is not generated in the moment of crisis by competent communication. It is accumulated over time through demonstrated responsiveness, equitable treatment, and consistent delivery on commitments. Populations whose trust in military, government, and emergency-management institutions has been eroded by prior experiences of inequitable treatment, broken commitments, or consultation without action will not generate the cooperative behavioral responses that plans assume under stress. The implication for Arctic mission assurance is direct: the quality of a community's response to official guidance during disruption is largely determined by relational and institutional investments made before the disruption, not by message design or communication-channel optimization during it. This finding unifies the Family Readiness Group (FRG) erosion analysis, the tribal-coordination-as-pre-crisis-investment analysis, and the Day 3 to Day 7 governance inflection analysis under a single analytical claim.

Cross-sector mental-model misalignment is the structural condition that produces the paper-vs-real redundancy gap, and the stakeholder engagement validates it sector-by-sector.

Operators within a single lifeline sector tend to hold accurate mental models of their own system's vulnerabilities while holding incomplete or inaccurate models of the dependencies that link their system to adjacent ones. This is not a knowledge deficit in the ordinary sense; it is a structural feature of sector-specific expertise. The post-interim stakeholder engagement documents the pattern sector-by-sector: downstream operators overestimated the resilience of upstream supply chains; healthcare operators assumed pharmaceutical distribution networks would prioritize Alaska medical supply over other regions, an assumption the distributors did not confirm absent specific pre-incident agreement; installation logistics personnel assumed commercial cargo prioritization would account for defense sustainment requirements, an assumption carriers confirmed is not built into routine cargo allocation logic; communications continuity assumptions diverged significantly across sectors, with downstream operators continuing to operate under invalidated continuity assumptions while the systems they depend on had already begun degrading service. The mental-models framework provides the analytical explanation for why these assumption misalignments emerge and the methodological grounding for the question architecture this research applied.

The federal architecture lacks a permanent cross-sector supply-chain coordination capability, and the absence of that capability is a structural condition the Days 0–14 window cannot accommodate.

A specific institutional gap surfaced in the post-interim literature integration is the absence at the federal level of a permanent entity capable of aggregating supply chain intelligence across the civilian sectors that Arctic defense operations depend on, analyzing it for cross-sector cascade implications, and translating it into actionable policy recommendations before a crisis reaches the threshold requiring political decision-making. Responses to supply chain disruption have historically been organized through temporary, ad hoc task forces assembled after the crisis is underway and disbanded when the acute phase passes, leaving no persistent institutional capability for the next

disruption. For Arctic continuity-of-society planning, this gap means the federal architecture available at Day 0 of an Arctic disruption is not the architecture that would be most operationally useful during Days 0–14, it is the architecture that has been activated through prior crisis cycles and disbanded between them. The implication is that the absence of a permanent federal cross-sector supply-chain coordination capability is itself a Days 0–14 vulnerability, not only a procedural limitation that recovery-phase coordination addresses.

Cluster 4: Physical Lifelines and Supply-Chain Geography

Maritime dependency is a strategic vulnerability with no rapid substitute.

Alaska's supply architecture is organized around a single intermodal chokepoint. Disruption at West Coast maritime gateways does not produce distributed statewide effects; it produces immediate, concentrated failure at the one node through which the vast majority of Alaskan household sustenance flows. Aviation cannot replace maritime cargo volumes at scale. The Alaska–Canada Highway is subject to Canadian sovereignty, weather, seasonal, and support-infrastructure constraints that limit functional surge capacity to a small fraction of theoretical road-class capacity. Community-level food shortages begin within five to seven days of sustained maritime disruption.

Alaska's food-buffer architecture operates on three coexisting day-counts that planning frameworks consistently misread, and household-visible empty-shelf conditions emerge at the earliest of the three figures under winter conditions.

Community-level food shortages begin within five to seven days of sustained maritime disruption, a finding that holds, but one that requires reconciling three coexisting day-counts in Alaska's food-buffer architecture that planning frameworks consistently misread.

The research identifies three distinct figures circulating in the project record, each measuring a different point in the supply chain rather than contradicting one another. The 7–10 day figure documented in *The Alaska Supply Chain Analysis: Baseline Report* [23] and reinforced in the *Alaska Food Security and Independence Task Force Report* [4] measures commercial pipeline inventory under normal flow conditions, the aggregate food moving through ports, distribution centers, and wholesale networks before reaching retail. The 3–7 day figure captured in *The Messy Reality of Feeding Alaska* (Feed-Alaska-2024) measures retail warehousing capacity tied to the Port of Alaska, representing the inventory visible to households on store shelves during the first week of disruption. The 2–3 day figure documented in the *State of Alaska Mass Care Group Feeding Support Operations Guide* [48] measures effective availability under disruption conditions, when normal replenishment cadence is interrupted and household demand surge produces accelerated drawdown.

These figures are not in conflict; they describe the same system at different layers. Household-visible empty-shelf conditions emerge at the earlier end of the 3–7 day retail-warehousing range under winter conditions and collapse toward the 2–3 day figure once demand surge takes hold. Planning frameworks that anchor on the 7–10 day pipeline

figure systematically underestimate the speed at which household-level food insecurity emerges, with direct implications for the Day 3 to Day 7 governance inflection window when civil–military resource tensions first materialize.

Pharmaceutical disruption operates on a time-sensitivity gradient qualitatively different from other lifelines, with cold-chain failures emerging through cumulative small degradations rather than single catastrophic events.

The population-health framework documented in the post-interim literature integration establishes that pharmaceutical supply chains are among the most time-sensitive lifeline dependencies in any disruption scenario, with failure thresholds qualitatively different from those of other lifeline systems. A food disruption becomes acute over days to weeks; a fuel disruption forces operational changes within hours to days; but a pharmaceutical disruption affecting insulin-dependent, dialysis-dependent, oxygen-dependent, or time-sensitive-mental-health patients produces irreversible harm within hours to days of resupply failure. Cold-chain failures in pharmaceutical supply chains spanning multiple transfer points and weather-dependent access windows are typically not single catastrophic temperature excursions; they are a sequence of small degradations, brief power interruptions, transport delays, transfer handling failures, that individually fall below failure thresholds but cumulatively compromise product integrity in ways that may not be immediately detectable. Under Arctic dual-theater conditions, simultaneous power, fuel, communications, and transportation degradation produces precisely the conditions in which cumulative cold-chain compromise emerges without a single triggering event. The acceleration effect operates as a workforce-degradation mechanism through the families and contractor households whose stability depends on uninterrupted pharmaceutical access, a pathway that linear infrastructure-only models do not capture.

Communications failure is a force degrader for every other failure mode.

Communications degradation eliminates the information environment that households, communities, installations, and governance systems depend on to make decisions. It amplifies misinformation. It prevents compliance with emergency directives that reach populations only through digital channels. It destroys the informal coordination networks that substitute for formal systems in the early phase of disruption. And it is adversarial-exploitable: documented gray-zone tactics including satellite jamming and undersea cable interference are part of the active threat environment, not a hypothetical risk.

Cluster 5: The Human Systems Layer: Family Readiness, Workforce Exposure, Generational Capacity

Family readiness is a system variable, not a support function.

Military family well-being is an operational variable, not a support-service concern. The research consistently links household stability to retention, readiness, and mission focus, and that relationship does not pause during a crisis. Under Arctic disruption conditions, the household-level stressors that already strain military families in peacetime, employment, healthcare, childcare, financial stability, communications, do not emerge sequentially. They activate simultaneously, within the first fourteen days, before any external support mechanism can reach the household. The Military Family Readiness

System was built around a deployment model in which stressors are largely sequential, and support timelines are predictable. Arctic supply disruption does not fit that model.

Family stability translates into force readiness through specifically quantified pathways with documented retention magnitudes.

The Key Finding that family readiness is a system variable is directionally correct and is preserved. The post-interim literature integration permits the finding to be stated with specifically quantified magnitudes. Penn State Military Families Research Institute documents that family-related stressors reduce deployability, focus, morale, and mental health, with divorce or separation linked to approximately 15 percent of military suicides and family relationship problems appearing in more than 25 percent of military suicides. The same research records retention increases of up to 1.98 times for senior officers when spousal support is strong, with marital satisfaction functioning as a key predictor of retention. [39] The Office of People Analytics confirms that spousal support for staying on active duty is associated with actual retention behavior. [54] RAND's My Career Advancement Account analysis documents that targeted spouse-employment support produces 10 percentage-point employment-rate increases during use and 6–8 percentage-point sustained advantage years later. [42] These are not directional claims. They establish that the family-stability investment pathway is operationally productive and measurable, and that family-readiness investment belongs in the Tier 1 resilience-investment category alongside fuel storage and communications redundancy.

Five population categories within the military and contractor community are systematically underweighted in existing family-readiness literature and particularly exposed under Arctic disruption conditions.

The Key Finding that family readiness is a system variable assumed a household with spouse and dependents as its analytical center. The post-interim deliverable integration surfaces five population categories whose exposure runs through pathways the spouse-and-dependent baseline does not capture. Single service members face the absence of a household partner to absorb impact. Military caregivers, the cornerstones of support for wounded, ill, and injured veterans, a large, stressed, and often hidden population, face the simultaneous degradation of the formal care systems they substitute for, and the household supports they themselves require.[45] Non-traditional family structures fall outside the formal family-readiness architecture in ways that intensify under disruption. Dual-career households face joint-employment-disruption rather than single-spouse stress, compounding the spouse-employment-disruption pathway documented in the Penn State and Blue Star Families literature. Families with exceptional family needs face the disproportionate impact of any single specialized service interruption. Each category is exposed to a distinct pathway of household-stability degradation under Arctic disruption, and the family-readiness architecture proposed in the Recommendations section must be designed to absorb them rather than only the baseline that the deployment-era FRG model assumed.

The seafood processing workforce is a policy-sensitive lifeline dependency whose exposure runs through immigration and travel policy rather than through traditional logistics chains.

A specific workforce category surfaced in the post-interim deliverable integration warrants identification because its exposure does not appear in conventional civil–military resource-tension analysis. Alaska's seafood sector employs approximately 27,000 shoreside processing workers, many of whom are seasonal, migrant, or international labor, including H-2B visa holders. [1;19] Changes to immigration policy, travel restrictions, or transportation disruption during the Days 0–14 window would severely degrade processing capacity, with cascading effects on fishing fleets, local food supply, community economies, and the civilian workforce population on which installation sustainment indirectly depends. The implication for governance mapping is that workforce continuity is a lifeline dependency with policy-sensitive exposure: governance decisions about immigration, border access, or travel during simultaneous disruption can propagate through sectors not usually modeled in civil–military resource tension analysis, with consequences that reach installation operations through second-order pathways. This finding extends the interim Key Finding on civilian and contractor workforce as the most consequential point of failure by identifying a specific workforce category whose exposure is policy-decision-mediated rather than infrastructure-mediated.

The generational preparedness gap converts potential surge capacity into additional demand.

Teenagers and young adults fill the entry-level and gig-economy roles that are most immediately needed under disruption conditions. Their near-total digital dependency, and the absence of preparedness frameworks designed for their living conditions and communication channels, means they become focused on meeting immediate personal needs rather than contributing to community response precisely when their physical capacity and mobility are most needed. This is a latent vulnerability with tangible community and installation consequences.

Cluster 6: Tribal and Alaska Native Community Dimensions

Tribal systems are resilience amplifiers, but only when engaged before the crisis.

Alaska Native and tribal communities operate subsistence systems, resource-sharing networks, and community governance structures that function as the primary early-phase stabilizers in regions where formal systems fail first and recover last. Those systems depend on pre-existing trust and relationships that cannot be improvised under time pressure. External decisions, particularly fuel diversion and transportation prioritization, can unintentionally collapse local resilience systems that planning frameworks do not even know exist. Tribal governments are sovereign entities, not subordinate actors in the state or federal response chain, and engagement that does not proceed from sovereignty, consent, and reciprocity will not produce coordination capacity available under crisis conditions.

The Alaska Native governance ecosystem operates as a constellation rather than a hierarchy, and civil–military planning frameworks that identify a single tribal point of coordination miss the architecture through which tribal resilience actually functions.

The Alaska Native governance ecosystem includes 12 regional corporations, more than 200 village corporations, federally recognized tribal governments, regional nonprofits, and statewide Native organizations, collectively serving more than 160,000 Alaska Native shareholders, with complementary but non-interchangeable roles. Approximately 75 percent of Alaska Native communities are not road-accessible. [6] Resilience under disruption depends on coordination across the ecosystem rather than on the authority of any single entity. The civil–military planning implication is operationally direct: planning frameworks that identify a single tribal point of coordination as the interface for Arctic disruption miss the architecture through which tribal resilience actually functions. Effective coordination requires sustained engagement across the constellation under sovereignty, consent, and reciprocity, and across the institutional timeline that constellation coordination requires to mature.

Arctic community preparedness is non-uniformly distributed; approximately one-quarter of surveyed Arctic communities are structurally under-equipped for the risk profile they face.

The interim treatment of tribal and Alaska Native communities as risk amplifiers is preserved. The post-interim integration of the Arctic Council EPPR oil-spill preparedness assessment permits the underlying constraint distribution to be stated with specific quantification. Approximately 25 percent of surveyed Arctic communities are adequately prepared relative to their risk exposure, approximately 50 percent are moderately prepared, and approximately 25 percent are inadequately prepared. Communities are located on average 120 or more miles from formal response centers and function as de facto first responders despite limited equipment, training, and integration with national response systems. [7] The operational implication is that constraints are not uniformly distributed across Arctic communities. A meaningful fraction is structurally under-equipped for the risk profile they face, which is a planning condition civil–military coordination architectures must design around rather than treat as a deficiency to be remediated during disruption.

Federal-program access barriers are a structural governance-layer condition, twenty federal programs have at least one design feature that obstructs access for small remote communities, and tribal-coordination recommendations that rely on federal-assistance pathways are operating on availability assumptions the access record contradicts.

The GAO analysis of Alaska Native village threats documents that the problem tribal governments face is not only exposure to risk but structural access to the federal assistance system. Over one-third of highly threatened villages received no relevant federal assistance during the five-year period reviewed. Twenty federal programs were identified with at least one design feature that obstructs tribal access, including competitive grants, cost-share requirements, cost-benefit analysis rules that disadvantage small populations, hazard mitigation plan prerequisites, ineligible-applicant restrictions, and national competition that small remote communities cannot win against urban

applicants with larger administrative capacity. [61] For civil–military coordination, this means external decisions to rely on federal-assistance pathways as a backstop for tribal and community resilience during Days 0–14 may operate on an availability assumption that the access record contradicts. The recommendation implication is direct: tribal-system preservation recommendations must address federal-system reform, including waivers or alternatives for cost-share requirements, modifications to cost-benefit rules, tribal set-asides, simplified applications, and a formal interagency coordinating mechanism for Alaska Native village resilience, as a governance-layer concern, not only a community-level concern.

Cluster 7: National Will and Whole-of-Society Preparedness

Whole-of-society preparedness culture is a national-will variable that responds to a specific HDAS research question, and the United States has moved decisively in the opposite direction of the documented exemplars.

The Homeland Defense Awareness Symposium Research Focus Areas explicitly ask which countries are exemplars of whole-of-society preparedness culture applicable to an Arctic focus, and how national will can be stress-tested in wargames and exercises. The comparative record is direct: Finland, Sweden, Estonia, and Latvia have built measurable whole-of-society preparedness cultures by embedding shared risk awareness in civic education, maintaining conscription or universal service systems that give broad populations direct experience with military and emergency response functions, sustaining community-level civil defense organizations with genuine resources and recognized authority, and building institutional trust between governments and populations through demonstrated competence over decades of consistent investment. [24] U.S. preparedness policy has moved decisively in the opposite direction since the post-civil-defense era, toward an individualized, consumer-oriented model that produces measurable input activity but not the social cohesion, practiced cooperation, and institutional trust that genuine national will requires. The cooperative behaviors emergency plans assume cannot be created in the moment of crisis by communication alone; they must be in place before disruption arrives.

Cluster 8: Long-Horizon Cascades and the Limits of Recovery-Phase Planning

Post-event population displacement is a long-horizon cascade dimension that converts acute incidents into permanent demographic loss, with operational implications that recovery-phase planning frameworks do not capture.

A long-horizon cascade dimension surfaced from the engineering and hazard-mitigation sector in the post-interim stakeholder engagement: post-event population displacement is a cascading consequence that does not reverse. Communities depopulated under prolonged disruption may not return, converting an acute incident into permanent demographic loss. This dimension is consistent with the analytical posture the research carries throughout, cascading failure compresses timelines and changes the character of recovery but extends it across a longer horizon than the Days 0–14 frame. For Arctic mission assurance, the implication is operationally direct: the civilian and contractor

workforce that operates installation services, the family stability that determines retention, and the tribal and Alaska Native community continuity that stabilizes regions in which Arctic installations operate are all subject to a demographic-loss pathway that prolonged disruption can activate. Recovery-phase frameworks that assume populations return after the acute phase are working from an incorrect baseline; in some documented Arctic cases, they do not.

Cluster 9: Methodological Convergence: Why These Findings Carry Weight

Practitioner reality, analytical framing, and the recommendation set converge on the same operational priorities, which is itself the strongest evidence the research can offer that the identified actions are operationally consequential.

A consistent observation across the post-interim stakeholder engagement is that practitioners, across military, civilian, tribal, and nonprofit roles, already know what coordination architecture would be operationally useful. The recommendations that emerged from engagement are not novel discoveries; they are operational asks that have been articulated repeatedly across prior crises and that have not been resourced or sustained between them. Pre-staging civil–military coordination protocols, hardening family communications, exercising paper governance architectures, and building hybrid family readiness models were each identified by multiple stakeholder populations as actions that have been recommended before and remain incomplete. The convergence between practitioner reality, analytical framing, and the recommendation set is itself the strongest evidence the research can offer that the actions identified here are operationally consequential. The implication for the final report is that the recommendations are not asking the planning system to discover new actions; they are asking it to resource, sustain, and exercise actions that practitioners and the literature have repeatedly identified, and to do so before the next disruption rather than after it.

Bottom Line

Arctic homeland defense cannot be sustained against the dual-theater disruption scenario this research models without three things that do not currently exist at adequate scale: pre-positioned reserves of fuel, food, pharmaceuticals, and critical materiel sufficient to bridge the Days 0–14 window; multi-layer communications redundancy that does not depend on any single commercial provider or terrestrial pathway; and a pre-defined civil–military coordination architecture, exercised against realistic Arctic disruption conditions, with private-sector cargo prioritization agreements in place before the crisis. Each of these is a preparatory investment whose return is realized before disruption occurs. None can be substituted for during the window when the failures they are designed to prevent are already underway.

The recommendations developed in this report are organized to support exactly that preparatory posture, across near-term, mid-term, and long-term horizons, with explicit identification of which external partners, carry which lines of effort. The closing PSEMA Network section articulates the connective infrastructure that this research identifies as essential to making any of these recommendations operationally executable.

STRATEGIC IMPLICATIONS

Arctic mission assurance is constrained by lifeline fragility, not force capability. The lifeline systems on which Arctic homeland defense depends were not designed for the disruption scenario this research models; they were designed for normal operating conditions, and they are thin at every margin, in storage capacity, redundancy, workforce, coordination architecture, and the time available before failures cascade across sectors. Under dual-theater disruption, those margins compress from weeks to days, and in some cases to hours.

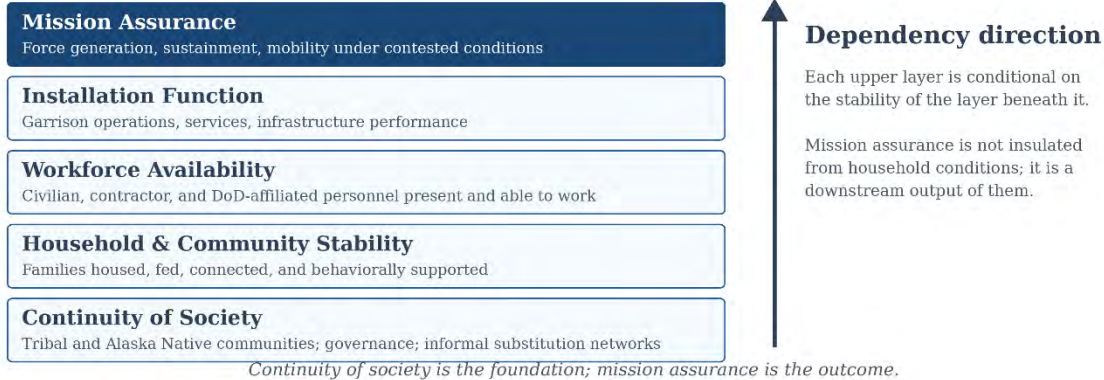
Closing the gap requires investments that are pre-positioned, pre-coordinated, and pre-authorized to take effect inside the Days 0–14 window. It requires throughput preservation, not infrastructure protection alone. It requires upstream cascade prevention rather than downstream symptom mitigation. And it requires engaging commercial operators as mission partners, not as regulated entities or contracted vendors.

It also requires sustained engagement with tribal governments, Alaska Native corporations, regional nonprofits, and community-level organizations and leadership, conducted on the basis of sovereignty, consent, and reciprocity, and built well before disruption arrives. Tribal and community organizations are constrained by limited funding and limited personnel, and the relationships, coordination structures, and pre-event agreements that allow them to function as resilience amplifiers under crisis conditions cannot be improvised under time pressure. Waiting until the situation occurs to initiate that engagement produces the predictable outcome the research has documented elsewhere: the absence of established trust, the absence of pre-negotiated coordination structures, and the absence of standing agreements together convert what could have been distributed regional resilience into an additional coordination burden at precisely the moment governance capacity is most constrained.

The institutional scaffolding exists, the doctrinal rationale is established, and the analytic foundation has been built. What remains is the deliberate alignment of investment, policy, and coordination commitment to the conditions, geographic, climatic, and operational, that make the Arctic both the most demanding and the most consequential environment for homeland defense mission assurance.

Continuity of Society as Prerequisite for Continuity of Operations

Household and community stability is the substrate on which workforce availability, installation function, and mission assurance depend.



Conceptual diagram showing the dependency relationship from continuity of society through household and community stability, workforce availability, installation function, to mission assurance.

Introduction and Strategic Context

The question at the center of this research is one that defense planning has not adequately answered: when Arctic logistics are disrupted and operational demand simultaneously increases, what happens to the people and communities that make sustained military operations possible?

Military installations in Alaska depend on a civilian and contractor workforce to operate base support services, logistics, food service, transportation, and maintenance. That workforce lives in communities that depend on the same fragile supply chains the installation does. Military families live both on and off post, connected to local schools, healthcare systems, food distribution networks, behavioral health infrastructure, and communication systems that are commercially operated and not designed for disruption. Tribal communities across Alaska operate essential functions, fuel distribution, airstrip maintenance, local emergency response, subsistence provisioning, community health aide systems, that underpin regional stability whether or not defense planning frameworks account for them. [2; 32]

The baseline condition for military family readiness in Alaska is not strong. A recent survey conducted nationally, not specific to the Alaska/Arctic region, data shows that fewer than one-third of active-duty families would recommend military service to a young family member, a figure that reflects pre-crisis pressure on spouse employment, housing affordability, healthcare access, and financial stability. [8] Those are not disruption-induced stressors. They are the starting point. Research on military family well-being confirms that household stability is directly linked to mission focus, warfighting capability, and retention, and that when family support systems erode, service members cannot sustain the same level of operational attention. [39; 33] Under an Arctic

sustainment crisis, each of those baseline pressures would compound simultaneously and without the gradual onset that allows managed intervention. The implication is direct: household instability in an Arctic disruption scenario is not a welfare concern. It is a readiness variable, and it belongs in the operational planning model.

Doctrinal and Strategic Grounding

This research is anchored to three institutional authorities. *DoD Directive 3020.40*, Mission Assurance establishes that DoD continuity of operations requires understanding of the interdependencies and capability gaps in critical infrastructure assets, systems, and networks, including civilian systems on which military facilities and missions depend [55]. *National Security Memorandum 22*, Critical Infrastructure Security and Resilience (April 30, 2024) defines Defense Critical Infrastructure to include non-DoD-owned networked assets and facilities essential to project, support, and sustain military forces and operations worldwide, and directs federal departments to strengthen the security and resilience of that infrastructure. [64] The January 23, 2026, National Defense Strategy identifies homeland defense and the Western Hemisphere as the first regional priority and explicitly names the simultaneity problem, coordinated or opportunistic adversary activity across multiple theaters concurrently, as a primary planning challenge. [56; 14]

Each of these authorities establishes that mission assurance depends on civilian infrastructure and community stability. None of them provides the operational framework for translating that dependency into pre-crisis investment in the human-systems architecture, families, workforce, tribal communities, governance, through which civilian infrastructure dependencies actually reach installation readiness. This research is built to close that gap.

Human Systems as Operational Variables

The framing this research carries forward through every section is that human systems are operational variables in mission assurance, not adjacent welfare concerns. That framing has three direct implications. First, military families and the civilian and contractor workforce are treated as operational variables rather than passive dependents, their stability determines workforce availability, and workforce availability determines whether installations function. Second, tribal sovereignty, consent, and reciprocity are governing principles for engagement, not procedural courtesies, the trust-based relationships that allow tribal coordination to function under crisis are pre-disruption investments comparable in priority to fuel storage and communications redundancy. Third, governance authority gaps that prevent coordinated early-phase human-systems response are first-order resilience constraints, not policy refinements to be addressed during recovery.

Scope and Boundaries

This research is bounded in three deliberate ways that should be transparent to the reader. First, the analytical focus is on the Days 0–14 disruption window. Longer-horizon analysis, recovery dynamics, structural reconstitution, and multi-month sustainment modeling, is out of scope for this engagement and identified as a follow-on research priority. Second, the geographic frame is Alaska, the ALCAN corridor, and the West Coast maritime gateways serving Alaska. Greenland and Canadian Arctic interests are referenced where they directly affect Alaska sustainment, but a full North American Arctic treatment is outside this scope. Third, the analysis is unclassified and operates from publicly available sources, supplemented by structured stakeholder engagement conducted under non-attribution protocols. Where classified context would refine specific findings, the report identifies the boundary and recommends the appropriate follow-on framework.

Within those bounds, the research is intended to be operationally usable. The dependency mapping identifies specific nodes. The risk assessment identifies specific failure thresholds. The mitigation prioritization identifies specific investment categories ranked against five operational criteria. The recommendations identify specific actions, specific external partners, and specific time horizons. The intent is not to characterize Arctic vulnerability in general terms; it is to provide the foundation for command-level decisions about where preparatory investment is most consequential, and which coordination architectures must be built before the next disruption requires them to exist.

Analytical Framework

Three analytical commitments established at scenario stage are carried forward into all subsequent work and into this final report.

The Days 0–14 early phase remains the primary analytical window. This is the period in which household and community stress accumulates fastest, in which governance coordination mechanisms are least prepared, and in which the absence of pre-established relationships, trust, and authority clarity is most operationally consequential. Later-phase conditions are analyzed, but early-phase human-systems vulnerability is the organizing priority throughout.

Human systems are treated as operational variables, not support functions. The stability of military families, the availability of the civilian and contractor workforce, the standing of tribal and Alaska Native communities as sovereign partners with their own governance and subsistence systems, and the functionality of civil–military governance architecture are not secondary concerns to be addressed after infrastructure and logistics are resolved. They are operational determinants of whether Arctic mission assurance is achievable, and tribal and Alaska Native engagement is conducted on the basis of sovereignty, consent, and reciprocity rather than as a capacity to be drawn on.

The distinction between paper redundancy and real redundancy is maintained throughout the analysis. The Arctic operating environment contains nominal resilience

structures, family readiness programs, emergency coordination protocols, tribal consultation mechanisms, mutual aid agreements, that are underfunded, understaffed, or untested under the conditions this research examines. The research does not treat the existence of these structures as evidence of resilience. It evaluates whether those structures are accessible, sufficient, and actionable under the specific stress conditions documented.

Research Sponsor and Institutional Context

The Private Sector Emergency Management Association (PSEMA) conducted this research under commission from the Homeland Defense Institute in support of NORAD and USNORTHCOM Arctic mission assurance priorities, following PSEMA's proposal submission to the HDAS 2026 open call. under federal commission from the Homeland Defense Institute. Reviewers of this report and stakeholders engaging with its findings may not be familiar with PSEMA. The institutional architecture, membership composition, and operational posture that produced this research are summarized here to ground the analysis that follows in the organizational context that generated it.

PSEMA is a 501(c)(6) professional association, with an affiliated 501(c)(3) PSEMA Foundation, founded to close a structural gap in the national emergency management architecture: the absence of a sustained, sector-neutral, non-attribution venue through which private-sector lifeline operators, federal and state emergency management authorities, tribal governments and Alaska Native organizations, military commands, and academic institutions could engage one another on the operational realities that determine whether disaster response, continuity of operations, and homeland defense missions succeed or fail. PSEMA was established to fill that gap, and its institutional architecture is built around the engagement model the gap requires.

Mission and Vision. PSEMA's mission is to advance the integration of private-sector capability into emergency management and homeland defense by convening cross-sector practitioners, producing operationally grounded analytical products, and sustaining the trust-based relationships that crisis coordination depends on. PSEMA's vision is a national resilience architecture in which the privately operated systems that sustain American communities and defense operations, energy, fuel, food, transportation, communications, medical supply, warehousing, and the workforce that operates them, are integrated into preparedness, response, and recovery as full partners rather than as transactional vendors engaged at the point of disruption.

Membership Composition. PSEMA's membership and affiliated partner network span the lifeline sectors examined in this research and the partner categories that surround them. Member and partner organizations include energy and fuel providers; transportation, logistics, and supply chain operators across maritime, rail, trucking, and aviation modes; telecommunications and technology firms; food distribution, retail, and humanitarian feeding organizations; medical and pharmaceutical providers; engineering and infrastructure resilience consultancies; insurance and reinsurance partners; tribal and Alaska Native organizations; humanitarian and disaster-relief nonprofits; and emergency management consultancies and continuity practitioners. Federal, state, and

academic partners participate alongside private-sector members through structured engagement protocols. The cross-sector composition is not incidental; it is the structural condition that makes the cross-sector translation function operationally feasible.

Operational Posture. Three features define PSEMA's operational posture and distinguish it from sector-specific trade associations, single-domain consultancies, and federal advisory committees. First, PSEMA operates under non-attribution protocols that enable candid practitioner engagement on system vulnerabilities, operational limits, and decision realities that attributed forums constrain. Second, PSEMA is sector-neutral, not anchored in any single lifeline category, which positions it to facilitate the cross-sector coordination that cascading disruption requires. Third, PSEMA's engagement is sustained across pre-incident, incident, and post-incident periods rather than activated transactionally during a disruption, producing the institutional memory and relationship continuity that operational coordination under stress depends on. These three features, non-attribution, sector neutrality, and sustained engagement, together constitute the operational posture under which PSEMA conducts every engagement described in this report and the partnership case developed in From Recommendations to Implementation.

Relationship to This Research. PSEMA's research engagement with the Homeland Defense Institute on this project and its companion study draws directly on the cross-sector membership and engagement architecture described above. The dependency mapping, cascading risk pathways, and mitigation analysis presented in this report reflect practitioner insight gathered through PSEMA's standing engagement protocols, supplemented by literature review, federal policy analysis, and structured stakeholder validation. The non-attribution methodology applied throughout this research is the same methodology under which PSEMA's broader practitioner engagement operates, and it is the methodology that makes the operational realities documented in this report accessible to the analytical record at all. The recommendations developed in this report identify multiple external partners across every line of effort, and the connective infrastructure under which those recommendations become operationally executable is the subject of the From Recommendations to Implementation section. The institutional, methodological, and relational foundations developed here are the foundations that section builds on.

Whole-of-Society Preparedness Culture as a Resilience Variable

The Homeland Defense Awareness Symposium Research Focus Areas explicitly identify the question of national will among military-affiliated personnel and the comparative question of which national preparedness cultures are exemplars applicable to an Arctic focus. The comparative analysis is unambiguous: Finland, Sweden, Estonia, and Latvia have built measurable whole-of-society preparedness cultures by embedding shared risk awareness in civic education from an early age, maintaining conscription or universal service systems that give broad swaths of the population direct experience with military and emergency response functions, sustaining community-level civil defense organizations with genuine resources and recognized authority, and building institutional trust between governments and populations through demonstrated competence over

decades of consistent investment. [24] The cooperative, adaptive behaviors that effective crisis response requires, mutual aid, information sharing, collective resource management, and deference to coordinated authority, are practiced behaviors that those populations have rehearsed rather than aspirational behaviors that governments hope will emerge under stress.

U.S. preparedness policy has moved decisively in the opposite direction since the post-civil-defense era, toward an individualized, consumer-oriented model in which preparedness is framed as a personal responsibility and marketed through kit lists, awareness campaigns, and digital tools. The result is measurable input activity, kits sold, websites visited, plans acknowledged, but not the social cohesion, practiced cooperation, and institutional trust that genuine national will requires. The shift has not distributed preparedness burden equally; it has concentrated it in households with fewer resources, less institutional connectivity, and more exposure to the hazards preparedness is supposed to address.

For Arctic mission assurance, this distinction is operationally significant. When military families trust that the institutional support structures they depend on will function under stress, they demonstrate the tolerance for disruption and the operational focus that Arctic operations require. When that trust has not been built through demonstrated competence and meaningful investment, the first significant disruption to the systems families depend on produces the behavioral responses that populations with thin preparedness cultures consistently exhibit: anxiety, self-protective hoarding, absenteeism, and self-evacuation. The connection between whole-of-society preparedness culture and Arctic mission assurance is direct: the cooperative behaviors emergency plans assume cannot be created in the moment by communication alone. They must be in place before the disruption.

RESEARCH FOUNDATION

The deliverables in this report were developed through three lines of work that together give the analysis its operational and evidentiary grounding. Literature review was the primary source of information for this research, providing the analytical depth that the compressed performance window did not permit through stakeholder engagement alone. Literature review was supplemented by strategic conversations with current and former NORAD and USNORTHCOM leadership, a limited set of structured stakeholder calls, and a SurveyMonkey-distributed Stakeholder Input Survey. The methodological objective was not comprehensive coverage of every human-systems question in Arctic mission assurance; it was the construction of a coherent analytical foundation capable of supporting specific, decision-grade recommendations on the societal, governance, and workforce variables that shape mission outcomes within the time and resource constraints of the engagement.

Methodology

The research was conducted along three coordinated lines of work, each documented separately and integrated by analytical synthesis. The full methodological foundation, source inventory, mental-models foundation, strategic conversations protocol, and stakeholder engagement instrument detail, is documented in Appendix D. The Stakeholder Input Survey instrument is documented in Appendix E.

The first and primary line of work was an extensive literature review spanning military family readiness and household stability under prolonged disruption, civilian and contractor workforce dynamics in austere environments, tribal governance and Alaska Native sovereignty frameworks, civil–military coordination under contested conditions, and the governance architecture of tribal, municipal, state, federal, and military authorities in Alaska. Given the three-month performance window, literature review carried the analytical weight of the research, providing the specificity of human-systems failure thresholds, the precision of the governance friction mapping, and the identification of cascading societal risk pathways that are consistent across multiple independent sources. The full inventory of sources with citation IDs is documented in Appendix B.

The literature record converges on four conditions that ground the human-systems analysis and shape every deliverable that follows. First, pre-crisis military family strain is empirically documented at levels that establish a fragile baseline well before any Arctic disruption begins, with declining recommendations to serve, financial precarity, and spouse employment friction recorded year-over-year. Second, the civilian and contractor workforce that sustains Alaska installations is geographically constrained, demographically thin, and dependent on commercial systems that the workforce itself has no authority to protect. Third, governance authority across tribal, municipal, state, federal, and military entities is fragmented in ways that produce friction under disruption rather than under blue-sky conditions, and the friction points are predictable. Fourth, the United States has no current equivalent of the Civil Defense–era preparedness culture

that historically functioned as a societal force in absorbing disruption, and that absence is a variable in how disruption propagates through the population.

The second line of work was a series of strategic conversations with current and former NORAD and USNORTHCOM leadership. These conversations informed the analytical scope of the research by validating the dual-theater scenario as operationally relevant, confirming that the human-systems gaps under examination are recognized at the command level, and identifying military family readiness, civilian and contractor workforce sustainment, and civil–military governance friction as research areas consequential for mission-assurance planning. Input from these conversations is reflected in the analytical framing of the deliverables that follow.

The third line of work was structured stakeholder engagement conducted primarily through a SurveyMonkey-distributed Stakeholder Input Survey, supplemented by limited informal conversations with select members of the PSEMA network. The Stakeholder Input Survey served as the principal instrument and consisted of fifteen items combining closed-ended ranking, multi-select, and open-ended response formats. The survey used a core question architecture calibrated to the dual-theater disruption scenario and oriented toward surfacing governance friction, family and workforce sustainment thresholds, civil–military coordination gaps, and the early-phase decision points where authority structures are most likely to strain.

Supplemental input was gathered through a small number of informal, non-attributed conversations with select PSEMA network members; these exchanges were not conducted as formal structured interviews but provided contextual validation of assumptions and dependencies surfaced through the survey and literature reviews. The engagement window was reopened with an extended response deadline to encourage adequate representation; survey response was nonetheless limited by the three-month performance window, and the analysis presented in this report reflects responses received through the extended deadline.

Three engagement principles govern the stakeholder methodology and apply throughout. First, the engagement is system-of-systems by design: the question architecture surfaces cross-domain interdependencies, the relationships between governance structures, family readiness, workforce sustainment, and tribal community resilience, rather than domain-specific perspectives. Second, the engagement is structured rather than open-ended: a standardized question framework asked across all participants enables comparative analysis across domains and surfaces practitioner-vs-analytical divergences in operationally consequential terms. Third, all input is aggregated and non-attributed by default, with no proprietary or sensitive data required and qualitative thresholds and operational insights treated as sufficient. Participation does not imply endorsement of findings. Tribal engagement was conducted under explicit sovereignty, consent, and reciprocity protocols, and tribal input is governed by those protocols rather than by the default aggregation framework.

Limits, Boundaries, and What This Methodology Cannot Deliver

The methodology is bounded by time constraints, the data accessible under non-attribution protocols, and the unclassified frame of the work. Three categories of limits warrant explicit acknowledgement and shape the recommendations developed in the final phase of the report.

First, the research does not produce decision-grade quantification of failure thresholds at the precision that command-level investment and pre-positioning decisions ultimately require. The Days 0–14 analytical frame is established with rigor, and the directional findings, that inventory buffers are measured in days, that cascading failure initiates within the first seventy-two hours, that governance friction compounds degradation, are sound. Translating those directional findings into time-to-failure parameters expressed in hours and days, by commodity, location, and disruption condition, is identified as a follow-on research priority.

Second, the research operates from publicly available sources supplemented by limited structured stakeholder engagement under non-attribution protocols. Where classified context, proprietary commercial data, or installation-specific operational information would refine specific findings, the report identifies the boundary and recommends the appropriate follow-on framework. The intent is not to claim more than the methodology supports; it is to be transparent about what the methodology does and does not deliver.

Third, the research is engagement-window-bounded, and the stakeholder engagement component is bounded further by response rate, sector coverage, and self-selection within that window. The three-month performance period was sufficient to construct the analytical foundation, validate it against literature and stakeholder input, and identify the most consequential mitigation and recommendation priorities. It was not sufficient to fully operationalize the recommendations, conduct exercise-based validation of paper coordination architectures, or pilot the integrated Arctic logistics testbed concept that the long-term recommendations identify. Within the engagement component specifically, structured stakeholder calls were limited to a small select group, and survey response was concentrated in the operations, continuity, and emergency management end of the lifeline architecture rather than in upstream lifeline operators. Direct fuel and energy operator participation, direct maritime and port operator participation, and direct communications and telecommunications provider participation are below the levels that sector-specific quantitative claims would require.

Tribal and Alaska Native organizational engagement did not occur within the engagement window and is identified as a priority for future research, with the sovereignty, consent, and reciprocity framing that institutional participation on terms tribal governments determine requires. Survey participation was self-selected; respondents who chose to engage are systematically more disposed toward cross-sector coordination than the sector population as a whole, which is a relevant consideration when interpreting the strength of the joint government-industry coordination consensus. The non-attributed aggregation approach protects respondent confidentiality and was a precondition for candid engagement, but it limits the specificity with which individual findings can be

sourced. Engagement findings are therefore treated throughout this report as directional validation of the analytical record and as identification of practitioner-vs-analytical divergences worth carrying forward, not as the basis for sector-specific quantitative claims in under-represented categories.

Key Insight: These limits are not deficiencies in the research; they are boundaries of what can be accomplished within the engagement frame. The recommendations and the PSEMA Network section of this report are constructed to identify what should happen next, by whom, on what timeline, and with what coordination architecture, so that the foundation laid here can be extended into the operationally executable architecture that Arctic mission assurance requires.

The seven deliverables that follow build on this methodological foundation in sequence; the dual-theater disruption scenario that grounds all subsequent analysis is developed in the Scenario Framework section that opens the analytical body of this report.

SCENARIO DEVELOPMENT

The Scenario Development deliverable establishes the operating environment against which all subsequent analysis is conducted. It is designed for a broader audience than most defense research, not only DoD planners and logistics analysts, but installation and garrison leadership, private-sector lifeline operators, state and local emergency management partners, tribal governments and Alaska Native organizations, elected officials and civilian policymakers, and the nonprofit and community organizations that support both installations and the populations surrounding them. Understanding the scenario, and why it was constructed as it was, is essential context for everything that follows.

Framework Overview

This research employs a dual-theater disruption scenario to evaluate the limits of U.S. Arctic sustainment capacity under sustained stress. The scenario reflects the central research question: how do interdependencies between defense installations and privately operated lifeline networks influence mission assurance when both are disrupted at scale, particularly during the first Days 0–14 of disruption?

The dual-theater disruption scenario that grounds all subsequent analysis, West Coast port degradation across Days 0–14 concurrent with Arctic escalation across Days 10–45, is developed in full in the Scenario Framework section that opens the analytical body of this report.

The research focuses on how interdependencies between defense installations and privately operated lifeline networks influence mission assurance and sustainment capacity during the first zero to fourteen days of disruption, when formal mitigation options are limited and the decisions made under incomplete information set the trajectory of everything that follows.

These constraints compress decision timelines and magnify early impacts on households and communities in ways that planning frameworks built around installation self-sufficiency assumptions do not capture. The Blue Star Families 2024 survey documents that military families' baseline stressors, financial strain, healthcare access, childcare, spouse employment, are already significant under normal conditions. [8] The Penn State Military Families Research Institute documents that family stress translates directly into reduced deployability, lower morale, and reenlistment challenges. [39] Under dual-theater disruption, each of those stressors intensifies simultaneously.

This Scenario Framework is the canonical home for the dual-theater scenario architecture. Subsequent sections, Dependency Mapping, Risk Assessment, Cascading Impact Narratives, and the Mitigation Options framework, reference the operative phase or window only, and rely on this section for the full scenario specification. The two-phase architecture is summarized as: Days 0–14 West Coast port degradation as the early-phase

analytical focus, and Days 10–45 concurrent Arctic escalation as the extension window during which mitigation timelines must be evaluated.



*Concurrent West Coast port degradation and Arctic escalation
Scenario framework establishes a planning stress test, not a prediction.*

The scenario simultaneously stresses two interdependent systems. The first is the CONUS-to-Alaska supply chain supporting food, fuel, pharmaceuticals, mail, consumer goods, and critical services relied upon by families and communities, systems whose fragility is documented across the research base and whose failure produces household-level consequences long before installation-level impacts become visible. The second is the in-theater Arctic lifeline system that sustains garrisons, military families, contractors, tribal communities, and the civilian workforce that enables installation operations.

The scenario explicitly incorporates the Arctic-specific realities that make disruptions here qualitatively different from their lower-latitude analogs. Sparse infrastructure and long resupply distances [22; 23]. Severe and prolonged weather conditions. Limited redundancy across fuel, food, power, and communications. [22; 23] Reliance on shared civilian–military systems with no dedicated military alternatives at scale. Jurisdictional complexity involving tribal, municipal, state, federal, and military authorities with different legal bases, different priorities, and no predefined coordination architecture for simultaneous stress. [16; 20] Concentrated dependence on Pacific Northwest maritime gateways with no equivalent substitute. [1]

These constraints compress decision timelines and magnify early impacts on supply chains and workforce availability in ways that planning frameworks built around installation self-sufficiency assumptions do not capture. Just-in-time architecture (Glossary; developed in Dependency Mapping) is the structural condition under which the Days 0-14 timeline operates.

Primary Disruption: West Coast Port Degradation (Days 0-14)

The scenario begins with a coordinated, non-kinetic disruption of major West Coast maritime hubs, the Seattle/Tacoma port complex, which serves as the primary gateway for Alaska-bound containerized cargo, and the Port of Los Angeles/Long Beach. The disruption is compound in character: cyber intrusions targeting terminal operating systems, interference with navigation and cargo-handling systems, and labor safety stand-downs triggered by operational instability. No single failure shuts ports down completely. Throughput degrades. Predictability erodes. Confidence collapses. For Alaska-bound supply chains, the effect is immediate.

The Port of Alaska is the single node through which the majority of Alaska's commercial and defense sustainment flows, handling approximately half of all inbound freight and fuel for nearly the entire state's population. When the Seattle/Tacoma gateway degrades, that concentration means disruption is not distributed gradually across the state. It arrives statewide, immediately, at a single point with no equivalent substitute.

That vulnerability is not uniform across the calendar year. Alaska's downstream distribution network serving western and northern communities is seasonal and ice-constrained. A West Coast port disruption occurring between October and April operates against already-depleted community reserve margins, with no barge resupply option available to offset shortages. For households dependent on bulk seasonal delivery, that compression means the interval between port degradation and critical food or fuel shortage is measured in days, not weeks. The scenario examined in this research must be assessed against both dimensions: a national chokepoint failure and a seasonal logistics closure occurring simultaneously, and landing on communities with the least buffer to absorb either.

The scenario's analytical premise does not require this specific disruption mechanism to hold. Open-source seismic-science analysis of the Cascadia Subduction Zone documents a parallel disruption pathway in which a magnitude 8.0–9.2 full-margin rupture would simultaneously degrade the Ports of Seattle, Tacoma, and Portland; sever Pacific Northwest overland transportation corridors; damage fuel storage and distribution infrastructure including the Puget Sound refineries that process the majority of jet fuel and diesel consumed in Alaska; and generate tsunami inundation across critical intermodal nodes. [37] The non-kinetic disruption modeled here, and the seismic disruption documented in the geological record produce structurally analogous downstream effects on the Alaska supply system; the analytical conclusions of this scenario hold under either pathway.

Immediate Impacts: First 72 Hours

Within the first 72 hours, the effects arrive at the household level before they arrive at the installation level. Delays in Alaska-bound shipments of food, heating fuel, medical supplies, household goods, and building materials begin immediately as maritime scheduling reliability erodes. Disruption to mail and parcel flows, a dimension of household stability that planning frameworks rarely model, affects families dependent on prescription medications, infant supplies, specialized goods not available locally,

and the regular cadence of parcel delivery that sustains household routines under remote conditions.

Early backlogs form across container terminals, rail yards, and intermodal transfer points. Rerouting toward Gulf and East Coast ports stresses rail and trucking capacity in ways that compound the original disruption and extend restoration timelines. State, tribal, and local leaders have limited visibility into commercial recovery sequencing, alternative routing feasibility, or which sectors and communities will be prioritized first in commercial cargo allocation decisions. The National Association of Manufacturing West Coast port stoppage analysis quantifies the national scale: a full West Coast port shutdown produces one to two billion dollars per day in economic losses, with food and agricultural supply chains among those most immediately affected and no short-term rerouting alternative available at sufficient scale. [34]

Early-Phase Stressors: Days 0-14 Primary Analytical Focus

State emergency management planning in Alaska explicitly recognizes that outside assistance to affected communities may require 24 hours or more to arrive, establishing an early-phase response gap that local and tribal resources alone must absorb. This is not a planning estimate produced by the present research; it is an assumption embedded in Alaska's own operational doctrine, confirming that the Days 0–14 analytical window reflects an operational reality already recognized by state practitioners rather than an externally imposed construct.

Three integrated conditions shape what happens inside that early-phase window, and together they account for why disruption that would degrade gradually in a CONUS context degrades acutely in an Arctic context.

Just-in-Time Fragility Expresses Itself at the Household Level. The 2023 *Alaska Supply Chain Baseline Assessment*, prepared by Dewberry under the FEMA SCAN Pacific Partnership Project, identifies that commercial inventory buffers for essential goods in Alaska are limited, with food distribution systems commonly estimated at 6–10 days of available supply under normal operating conditions. Alaska imports upwards of 95 percent of its food, with approximately 95 percent arriving by sea, 4 percent by refrigerated truck up the ALCAN, and 1 percent by air cargo. Food departing the Port of Tacoma arrives at the Port of Alaska in three days and reaches retail shelves on the fourth day; ships arrive on Sundays and Thursdays; the state has no major warehousing capacity. Alaska is, by design, a just-in-time food retail state. What matters for this research is that the 6–10 day inventory window is not an abstract supply chain metric. It is the actual decision horizon within which families, workforce members, and community caregivers must decide about feeding, heating, medical access, and whether to remain in place. In the Arctic, that dependence is not a planning edge case; it is the defining operational condition. [23; 4; 41]

External Dependency with Limited Local Substitution. Fuel, food, medical supplies, and consumer goods are overwhelmingly imported, and the population's capacity to substitute local production for disrupted external supply is bounded. Subsistence systems are resilient and operationally significant, as the Alaska Federation of Natives' community resilience documentation confirms [2], and they extend survival timelines and reduce immediate dependence on external supply flows for the communities that practice them. But subsistence systems are not scalable to offset prolonged commercial disruption at the statewide population level, and the populations most dependent on external commercial supply, the military, the civilian and contractor workforce, and urban populations, have the least access to subsistence substitution. This differential is the analytical basis for the differential vulnerability assessment this research applies across the three populations examined.

Annual petroleum throughput at the Port of Alaska is at a volume for which no alternative routing or delivery mechanism exists within the Days 0–14 window; the infrastructure substitution analysis is examined in the companion study. When that flow is interrupted, the downstream effect is not a gradual reduction in availability; it is an immediate drawdown against fixed reserves with no replacement mechanism on the timescale of the disruption. The dual-theater disruption scenario used in this research is structurally consistent with the simultaneity problem the 2025 National Defense Strategy identifies as a primary planning challenge across the Arctic and Western Hemisphere. The doctrinal frame within which this scenario is analytically significant is developed in the Institutional Coordination section.

Workforce Attrition as Early-Phase Condition. The workforce that sustains transport, processing, logistics, healthcare, and community services in Alaska is heavily dependent on seasonal, imported, and transient labor whose availability is directly affected by the same disruption conditions the scenario produces. Workforce absenteeism driven by childcare, eldercare, household sustainment needs, and subsistence requirements begins within the first week, with simultaneous stress on healthcare, public safety, social services, schools, and emergency response organizations. Workforce attrition under these conditions is therefore not a downstream consequence of the scenario; it is an early-phase condition that propagates into installation support functions, community services, and the civilian sustainment capacity that both populations and installations depend on. The generational digital-dependency vulnerability documented in the Scenario Conditions section compounds this dynamic in the population segment most needed for surge capacity. The contractor workforce that installations rely on for maintenance, logistics, food service, transportation, and support operations is drawn from the same communities experiencing these stressors, which is why installation-level workforce disruption and community-level workforce disruption cannot be analytically separated.

Across households and families, the first fourteen days produce reduced availability of food, heating fuel, medications, and essential household goods. Price volatility, panic purchasing, and rationing behavior emerge in local markets as supply predictability erodes. Families with limited local storage, limited transportation options, or limited income flexibility face these conditions with the least capacity to absorb them. Delays in

childcare supplies, medical items, and household necessities destabilize the daily routines that support both family wellbeing and workforce participation. Family-related stressors including food access constraints, healthcare disruption, childcare breakdown, and loss of communications reduce readiness directly through reduced deployability, lower focus, lower morale, and reenlistment challenges. [9; 39]

U.S. Department of Defense and Office of People Analytics research has found that spousal support is a significant predictor of retention behavior, and broader military family research links family stability to readiness and mission focus. [54; 39] Under Arctic disruption conditions, these findings suggest that household instability creates a workforce stability risk not yet adequately integrated into most installation resilience planning.

Across installations and garrisons, civilian workforce disruptions affecting base operations and support services begin within the first week. Increased demand on installation support services from families and dependents intensifies simultaneously. Garrison leaders face growing pressure to balance mission requirements with household and community support concerns, a tension that early-phase uncertainty and limited information make harder to resolve, not easier. Early decisions made under that uncertainty set conditions for prolonged strain even if logistics flows partially recover later.

Key Insight: Household and community instability emerges before installation-level impacts are fully visible, making early civilian stress a leading indicator of broader operational degradation.

Concurrent Arctic Escalation (Days 10-45)

As West Coast logistics remain impaired, Arctic operational requirements increase. Elevated air and maritime activity, expanded surveillance and domain-awareness missions, sustained operations at Arctic and sub-Arctic installations, and increased demand for logistics support, fuel, mobility, and installation services all impose greater demands on systems already stressed by the primary disruption.

Under these conditions, readiness depends directly on the resilience of commercial systems that sustain operations: fuel delivery and distribution, food supply continuity, pharmaceutical and medical resupply, telecommunications infrastructure, and the civilian and contractor workforce sustaining installation operations. RAND Plan Blue 21 is directly applicable: logistics capacity falls below operational demand, coordination speed falls below disruption speed, and civilian system resilience falls below military dependency, creating conditions where the cumulative failure arrives faster and cuts deeper than any individual system failure would predict. [44]

The scenario assumes no open kinetic conflict but sustained pressure on systems with limited surge capacity, limited redundancy, and high dependence on commercial infrastructure that was not designed for these conditions. The critical analytical insight is that increased operational demand does not merely add to existing civilian system strain;

it amplifies it, accelerating competition for limited resources across military and community systems in ways that governance frameworks are not currently designed to manage.

The Arctic escalation pathway is further shaped by the absence of functional security dialogue mechanisms. Open-source analysis documents that military security dialogue between Russia and other Arctic states has been suspended since 2014, and that no pan-Arctic mechanism exists for managing submarine telecommunications cable security. The absence of deconfliction mechanisms means that misperceptions or accidental incidents are harder to de-escalate, compressing the time available before military and civilian systems must adapt to a degraded or contested environment. The Northern Sea Route represents a potential maritime rerouting option that could be closed or degraded by adversarial action under UNCLOS Article 234 claims at the moment of greatest need, eliminating a pathway that otherwise appears as an alternative in benign planning models. [13; 43]

Key Insight: Increased operational demand amplifies existing commercial system strain, accelerating competition for scarce fuel, cargo capacity, and workforce availability across military and civilian systems simultaneously.

Arctic Sustainment Modes and Lifeline Constraints

The Arctic sustainment hierarchy that governs the flow of fuel, food, medical supply, and other lifeline goods into Alaska's communities and installations operates across four modes: maritime sustainment from the Pacific Northwest to the Port of Alaska, maritime barge resupply to Western and Northern Alaska, fixed-wing aviation, and the overland ALCAN Highway corridor. In this research, these modes are treated as upstream constraints rather than as logistics variables; the infrastructure hierarchy itself is examined in detail in the companion study, *Private-Sector Lifelines in the Arctic*. What matters for the human-systems analysis is how the modes behave relative to one another and what their degradation propagates into.

Maritime sustainment through the Port of Alaska is the primary mode, carrying roughly half of inbound freight and fuel for approximately 90 percent of the state's population. Fixed-wing aviation is critical but capacity-limited; replacing one week of Port of Alaska cargo by air would require approximately 700 wide-body sorties, a substitution that is not feasible at scale. [23; 41; 44; 53] The ALCAN Highway provides constrained redundancy at roughly 350 vehicles per day of operating throughput against a theoretical lane capacity an order of magnitude higher, with approximately 1,200 miles of Canadian transit creating sovereign decision points that U.S. planning cannot resolve unilaterally. [52; 29] Western and Northern Alaska barge resupply is seasonally closed from ice-in to spring breakup, after which depleted rural fuel reserves cannot be replenished by any other mode until the next delivery cycle. The modes are not interchangeable substitutes for one another, and the seasonal asymmetry is severe: the modes that carry the greatest peak capacity are also the modes most compressed by winter conditions and gateway congestion, while the modes available year-round carry categorically lower peak capacity.

When any of these modes degrades, the resulting lifeline shortfalls do not remain bounded within infrastructure systems. They propagate directly into the societal stressors documented in the sections that follow: heating and fuel scarcity in rural and tribal communities, food and subsistence disruption, medical evacuation delays, communications fragility, the erosion of family readiness under household-level scarcity, and civil–military friction over the allocation of resources that have become simultaneously insufficient for installations and for the communities surrounding them. This propagation is the operative analytical bridge between the infrastructure hierarchy and continuity of society, and it is what makes Arctic sustainment mode behavior a load-bearing variable in mission assurance rather than a logistics concern adjacent to it.

Scenario Conditions and Constraints

The scenario incorporates conditions and constraints that define the operating environment for all subsequent deliverables. These are not hypothetical additions; they are the documented realities of Arctic community and installation life under disruption.

Infrastructure and Transportation Constraints

Alaska's transportation architecture operates as a centralized and fragile system simultaneously: no continental rail connection, approximately 75 percent of communities inaccessible by road, infrastructure costs two to ten times the Lower 48 baseline, and seasonal logistics cycles with no buffer for sustained disruption. [22] The Port of Alaska consolidates approximately 50 percent of inbound freight and fuel serving approximately 90 percent of the state's population, which establishes the upstream condition under which every societal stressor examined in this research operates: when the Port of Alaska is constrained, lifeline goods are constrained statewide, simultaneously, and across both communities and installations. [41] The infrastructure hierarchy that produces this condition, including icebreaker fleet capacity, deep-draft port absence north of the 800-mile threshold, and the data-environment limitations of unmapped Arctic waters, is examined in detail in the companion study. For the human-systems analysis that follows, the operative point is that no infrastructure substitution is available within the Days 0–14 window, and the disruption that propagates into families, workforce, tribal communities, and governance structures begins from that constraint.

Communications and Information Constraints

The Ted Stevens Center's 2023 Arctic Communications Workshop Report documents fragmented and non-interoperable communications systems across agencies and communities, bandwidth limitations constraining real-time coordination, lack of redundancy creating high vulnerability to single-point failures, and insufficient infrastructure in remote communities. [51] For the populations examined in this research, communications degradation is not merely a coordination problem. It eliminates the information access that households depend on to make decisions, increases anxiety and the spread of misinformation, disrupts the digital channels that family readiness programs rely on, and isolates rural and tribal communities from the state and federal coordination structures responsible for their support. The Ted Stevens Center dual-use space capabilities analysis further documents that commercial satellite operators may alter service availability based on financial or political considerations during crises, a

governance gap with direct implications for both community coordination and installation family support.

Medical and Health System Constraints

Limited healthcare capacity in rural and remote regions, medevac delays driven by weather, distance, and airfield constraints, and vulnerable pharmaceutical and medical supply chains create a healthcare system that is operating near its limits before disruption begins. The CRS Arctic report documents that 144 Alaska Native communities face infrastructure damage from erosion, flooding, and permafrost degradation, with sanitation and water systems already stressed [18], conditions that increase healthcare demand precisely when system capacity is most constrained and that fall most heavily on Alaska Native populations whose pre-disruption baseline is already the most fragile. Behavioral health, crisis counseling, and family support service demand increases simultaneously with physical healthcare demand across all three populations examined in this research, stressing a system that has no meaningful surge capacity.

Governance and Coordination Constraints

Overlapping tribal, municipal, state, federal, and military authorities with differing legal bases, different priorities, and no predefined coordination architecture for simultaneous stress create friction at the moments when speed is most operationally critical. The National Academies' report on Indigenous disaster preparedness documents that confusion about tribal authority worsens outcomes, and that tribes exercise real governmental powers in emergencies that outside agencies frequently misunderstand or ignore. [32] The State of Alaska Emergency Operations Plan (EOP) confirms that no single agency controls all infrastructure or response capabilities, that resource scarcity and competing demands are expected, and that pre-established agreements with private sector and voluntary organizations are critical for effective response, agreements that are rarely in place with the specificity that early-phase conditions require. [47] The governance gap that matters most for the analysis that follows is not the absence of frameworks but the gap between codified authority structures and the operational coordination capacity available under disruption, the paper-vs-real distinction this research applies throughout. Tribal authority within that gap is examined under the sovereignty, consent, and reciprocity framework established in the Research Foundation.

Seasonal Asymmetry and the Berlin Airlift Anchor

Seasonal asymmetry between summer and winter disruption scenarios is one of the scenario's most consequential and most consistently misunderstood conditions, and its consequences fall most directly on the rural and tribal communities examined in this research. Bulk fuel delivery to rural Alaska occurs by barge in late fall, before sea ice and river ice set in; any additional fuel required between ice-in and spring breakup must be delivered by bush plane at substantially higher cost and substantially lower volume. A West Coast port disruption occurring during or after the fall barge season therefore operates against communities that cannot receive bulk fuel resupply by the primary delivery mode until spring. For households in those communities, the consequence is not a delayed delivery; it is depleted heating fuel reserves with no resupply window, and a compression of survival timelines from weeks to days. Aviation-based fuel resupply under those conditions is not a functional substitute; it is a constrained emergency mechanism

operating against depleted reserves. The historical record on aviation-based sustainment under primary-infrastructure denial, including the Berlin Airlift case and the governing throughput constraints it establishes, is examined in the companion study; the analytical conclusion this research adopts from that record is that the rapid-degradation timelines modeled in this scenario are a documented historical pattern, not a projection.

Workforce Digital Dependency

A dimension of workforce disruption that current planning frameworks do not adequately address is the vulnerability concentrated in the youngest segment of the civilian and contractor workforce, teenagers, college students, and young adults roughly ages 13 through 30. This population is disproportionately represented in the entry-level and gig-economy roles that are most immediately stressed under supply disruption: food service, logistics, ride-share and delivery services, retail, childcare, and construction. Their operational reliability under disruption conditions is constrained by a specific and well-documented vulnerability: near-total dependence on mobile devices and digital connectivity as their primary tools for communication, navigation, information access, and coordination.

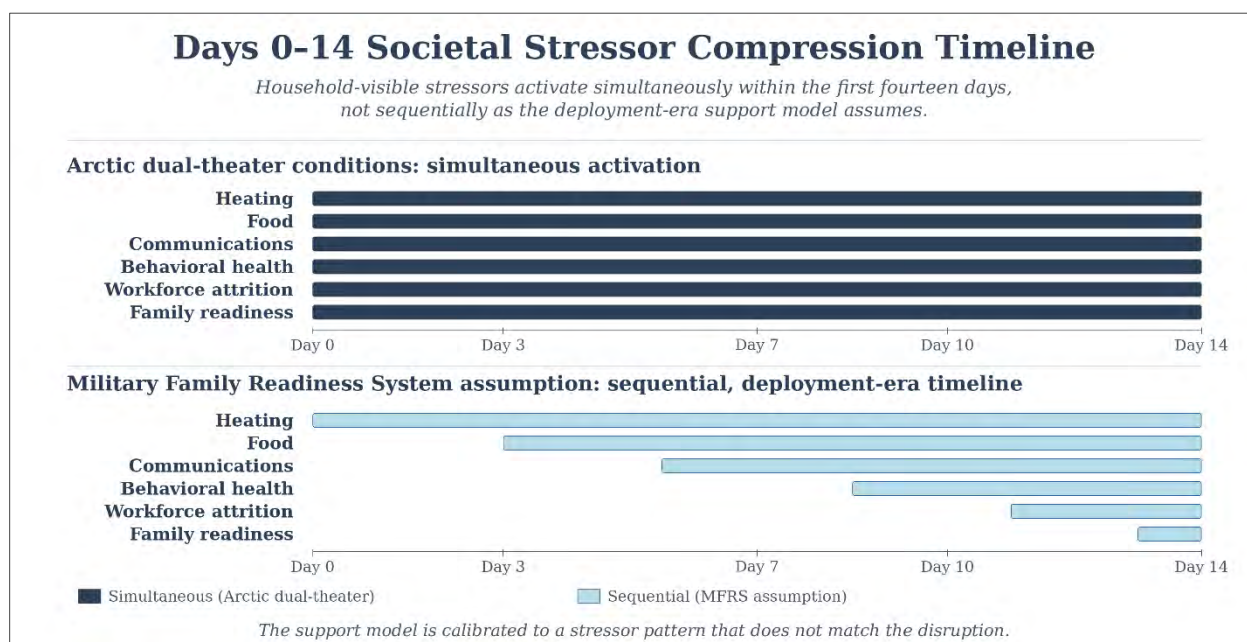
In emergency scenarios characterized by power outages, telecommunications failures, and infrastructure degradation, precisely the conditions the dual-theater scenario produces, this digital dependency becomes a concentrated liability. Without reliable cellular networks or internet access, this population loses situational awareness, cannot navigate without GPS, cannot coordinate with employers or community resources, and cannot comply with emergency directives that reach them only through digital channels.

They are simultaneously the workforce segment most needed for surge capacity and the segment least equipped to function when the infrastructure they depend on fails. In rural and tribal communities where this dynamic is compounded by greater distances between services and more pronounced infrastructure fragility, the gap between their potential contribution and their actual availability under disruption conditions is most acute. This generational workforce vulnerability is examined further in the workforce dependency analysis later in this report; the operative point for the scenario architecture is that the labor segment most needed for surge capacity is structurally the segment least equipped to function under the infrastructure conditions the dual-theater scenario produces.

Key Insight: The youngest segment of the civilian workforce, heavily digitally dependent and without analog backup skills, represents a latent vulnerability that emerges rapidly when communications infrastructure degrades, precisely when their labor capacity is most needed.

Societal Stressors to Be Modeled

Seven domains of societal stress are operationalized in the analytical sections that follow: heating and energy insecurity (life-safety in cold-weather environments); food access (operating against the buffer timelines reconciled in Civil–Military Resource Allocation Tensions); water and sanitation (degrading when power or chemical supply is disrupted); medical access (constrained by the medevac and facility-capacity architecture developed in Medical Capacity); communications fragility (the master dependency developed in Communications Integrity); family readiness erosion (the workforce-family feedback loop developed in Family Readiness and Human Factors); and governance friction (the Days 3–7 inflection developed in Governance Tension Under Scarcity). Each domain has a distinct onset window, a distinct propagation pathway, and a distinct adjudication architecture; the integrated analytical claim is that the seven stressors do not operate sequentially but compound simultaneously, with each domain's degradation amplifying the others.



Comparative visual showing simultaneous activation of household-visible stressors against the Military Family Readiness System's deployment-era sequential model.

Workforce and operational stressors include workforce attrition affecting installation support functions, competition between operational and logistics aviation for constrained airfield capacity, reduced availability of maintenance and support personnel, and degraded operational capacity over time as compounding effects accumulate. The workforce dependency dynamic, including the generational digital-dependency vulnerability documented in the Scenario Conditions section, is examined in detail in the Vulnerability Assessment.

Governance and prioritization stressors include competing civilian and military claims on scarce fuel, food, transportation, and medical capacity; the absence of predefined adjudication mechanisms for those competing claims; the friction created by overlapping tribal, municipal, state, federal, and military jurisdictions without coordinated decision authority; and the commercial cargo prioritization decisions made by private operators with no obligation to account for defense sustainment requirements. The gap that matters most analytically is not the absence of governance frameworks but the gap between codified authority and the operational adjudication capacity available under scarcity, the paper-vs-real distinction this research applies throughout.

Community-level stressors include food insecurity and disruption to household and community sustainment, subsistence disruption where seasonal access or fuel availability is constrained, behavioral health and crisis service demand that exceeds available capacity, and disproportionate impacts on Alaska Native, rural, and remote communities that the GAO has documented as facing the highest baseline vulnerability with the least access to federal assistance programs. [61]

Installation and readiness stressors include reduced availability of civilian employees and contractors, increased family support demands on garrison leadership and installation services, greater competition for food, fuel, transportation, and medical resources, and degraded morale, retention, and readiness over time as household instability increases. [9; 39] Family readiness under these conditions is treated as a system variable in mission assurance rather than as a quality-of-life concern adjacent to it.

This is a cascading loop, not a linear dependency, and it functions as a force degrader on mission outcomes. Household instability produces workforce absenteeism. Absenteeism degrades logistics continuity and service delivery. That degradation feeds directly into mission impact at the installation level. The dynamic is not hypothetical; military family research documents the chain from household stressor to reduced mission focus, lower retention probability, and degraded unit cohesion, and that evidence base was built under normal operating conditions. An Arctic sustainment crisis would not introduce that chain. It would accelerate it, removing the time buffers and support access that currently interrupt the loop before it reaches operational consequence.

Days 0–14 Societal Stressor Onset by Domain

Stressor domains, onset windows, and household-visible conditions under Arctic dual-theater disruption.

Stressor Domain	Onset Window	Household-Visible Conditions
Heating and fuel scarcity	Days 0–7	Heating fuel deliveries delayed; households unable to remain in place without intervention.
Food access	Days 2–7	Empty shelves in remote and tribal communities (Days 2–3); urban hub shortages (Days 5–7); demand surge compounds.
Communications fragility	Days 0–14 (intermittent)	Inter-village contact lost; family coordination disrupted; behavioral health check-ins missed; governance communications degraded.
Behavioral health surge	Days 3–14	Surge capacity exceeded across remote, urban, and installation populations; provider continuity disrupted.
Workforce attrition	Days 3–14	Absenteeism driven by household stressors; reach-back routes constrained; relief logistics degraded.
Family readiness	Days 0–14 (compressed)	FRG and MFRS architecture exceeded simultaneously; informal networks eroded; hybrid model not yet in place.
Governance friction	Days 3–7 inflection	Authority adjudication concentrates; codified frameworks do not match operational decision-making capacity; improvisation fills gap.

Seven stressor domains with onset windows and household-visible conditions.

CIVIL-MILITARY AND GOVERNANCE MAPPING

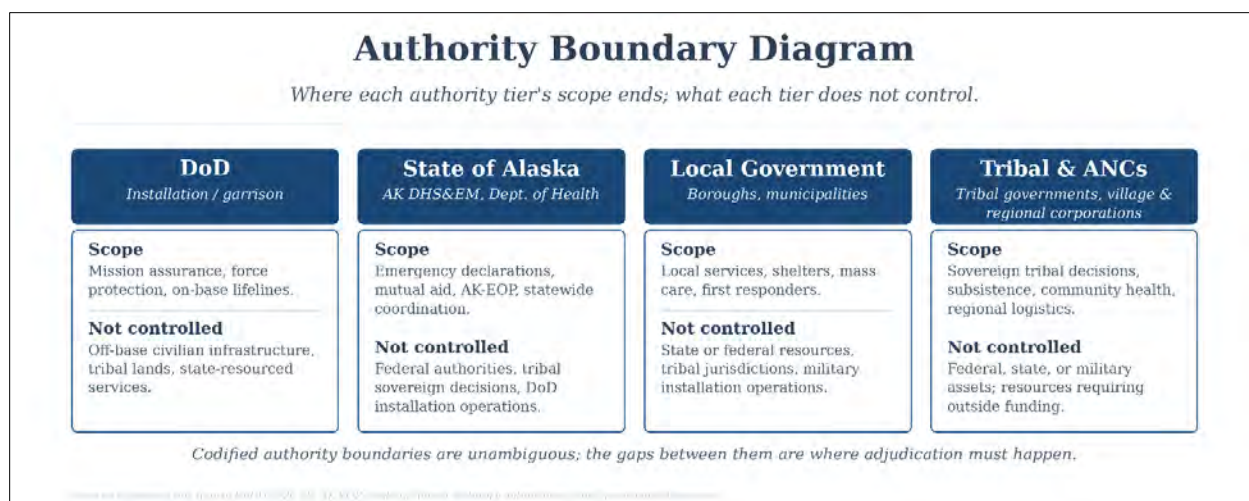
The Civil-Military and Governance Mapping deliverable translates the scenario conditions into a clear picture of who holds authority, who controls resources, and where decision-making friction is most likely to emerge during early-phase Arctic disruption. It is grounded in a recognition that governance is not an abstract planning consideration in this context, it is the mechanism through which disruption either stays manageable or cascades into systemic failure.

This section examines how Indigenous communities sustain continuity of society during early-phase disruption and how those practices intersect with garrison readiness, family stability, and shared civilian–military lifelines in the Arctic. It is grounded in the recognition that planning frameworks regularly underweight: many Arctic communities operate with minimal external resupply buffers and limited storage capacity, making local resilience systems essential to sustaining life, not supplemental to other systems.

The framing carried throughout this section is that tribal and Alaska Native communities are risk amplifiers in the continuity-of-society analysis, their stability stabilizes the regions in which Arctic installations operate, and their stress amplifies broader continuity-of-society risk. The framing is distinct from the dependency framing used in the companion study, where tribal communities are examined through an infrastructure dependency lens. The two framings are complementary, not interchangeable. All tribal and Alaska Native content here proceeds from sovereignty, consent, and reciprocity as governing principles.

Authority Structure: Who Decides What

The four-tier authority architecture this research examines, Department of Defense installation and garrison level, State of Alaska, local governments, and tribal governments and Alaska Native villages, is codified clearly on paper. The analytical concern is the gap between codified authority and operational adjudication capacity available under disruption, the paper-vs-real distinction this research applies throughout. At each tier, authority is bounded by systems the authority-holder does not control, populations the authority-holder does not directly cover, and time horizons the authority-holder cannot extend. The Days 0–14 window is the period during which those gaps are most consequential, because it is the period in which decisions must be made before the supplemental and federal resources that could close the gaps are operationally available.



Visual rendering of where each authority tier's scope ends and the next begins.

Authority Tier Summary: DoD, State, and Local

The DoD installation/garrison, State of Alaska, and local-government authority tiers are summarized in the Authority Tiers and Bounded Scope table below; tier-by-tier descriptions including scope, structural limits, and constituent bodies are in Appendix C. The Tribal Governments and Alaska Native Villages tier is described in full in the next subsection because of the dual-character analytical claim that anchors the differential vulnerability framework throughout this research.

Tribal Governments and Alaska Native Villages

Federally recognized tribal governments hold inherent sovereign authority over their citizens and lands. They have authority to declare emergencies and, if they choose, to seek Stafford Act assistance independently of the state. The ANCSA Regional Association documentation establishes the governance architecture: 12 regional corporations, more than 200 village corporations, tribal governments, regional nonprofits, and statewide Native organizations collectively control land, workforce, and local infrastructure on which regional defense operations and surrounding community sustainment both depend. [6] Control domains include community-level decisions over food systems including subsistence and limited commercial access, local decision-making and resource-sharing networks, traditional governance structures and community cohesion mechanisms, tribal health systems, and tribal workforce and land authority that the wider economy relies on but does not control.

The critical distinction is that tribal governments are not subordinate to state or local governments. Coordination failures during crises frequently stem from outside misunderstanding of this sovereignty, particularly under time-compressed conditions. The National Academies report documents explicitly that confusion about tribal authority worsens outcomes and that relationships must exist before disasters, including mutual aid relationships, culturally informed engagement, and inclusion of tribes in preparedness exercises. [32] Tribal authority in this research is therefore not a coordination variable to be managed within state-level allocation decisions but a

Tribal communities also occupy a distinctive analytical position across the differential vulnerability assessment this research applies. They are simultaneously among the populations with the highest baseline vulnerability under the GAO's federal assistance access analysis and among the populations with the most developed real (rather than paper) resilience capacity in food continuity, social cohesion, and traditional governance. This dual character is not a contradiction but an analytical reality that allocation frameworks built around uniform population-vulnerability assumptions cannot accommodate.

Four-Tier Authority Architecture Under Days 0-14 Disruption

*Codified authority is bounded at each tier; operational adjudication capacity is structurally limited.
The Days 3-7 inflection is where decisions concentrate.*

DoD	State of Alaska	Local Government	Tribal & Alaska Native
Installation / garrison	AK DHS&EM, Dept. of Health, National Guard	Boroughs, municipalities	Tribal governments, ANCs / village corps
<i>Bounded scope</i> Mission assurance, force protection, on-base lifelines	<i>Bounded scope</i> Emergency declarations, mutual aid, AK-EOP	<i>Bounded scope</i> Local services, shelters, mass care, first responders	<i>Bounded scope</i> Subsistence systems, community health, regional logistics

Days 3-7 Governance Inflection

Authority tiers converge on a narrow adjudication window; codified scope does not match operational decision-making capacity under simultaneous scarcity. Improvisation fills the gap.

Codified authority is paper; convergence-window adjudication capacity is real.

Source: Mission Assurance from Uncertain Events (MAUE) 30.2.0 (40) 7/2022-23; AK EOP; State of Alaska statutory authorities; (1)100 governance literature

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Authority Tiers and Bounded Scope

DoD, State of Alaska, local government, tribal governments, and Alaska Native villages.

Authority Tier	Constituent Bodies	Scope	Bounded Outside Scope
DoD	Installation and garrison commands	Mission assurance, force protection, on-base lifelines, garrison operations.	Off-base civilian infrastructure; tribal lands; state-resourced services; cross-jurisdictional decisions.
State of Alaska	AK DHS&EM, Dept. of Health and Social Services, Alaska National Guard	Emergency declarations, mutual aid, AK-EOP, statewide coordination, public health surge.	Federal authorities; tribal sovereign decisions; DoD installation operations; federally resourced response.
Local Government	Boroughs, municipalities, unincorporated communities	Local services, shelters, mass care, first responders, evacuation execution.	State or federal resources; tribal jurisdictions; military installation operations.
Tribal Governments and Alaska Native Villages	Federally recognized tribes; Alaska Native village and regional corporations	Sovereign tribal decisions; subsistence systems; community health aide programs; regional logistics through ANCs.	Federal, state, or military assets; resources requiring outside funding; cross-jurisdictional adjudication.

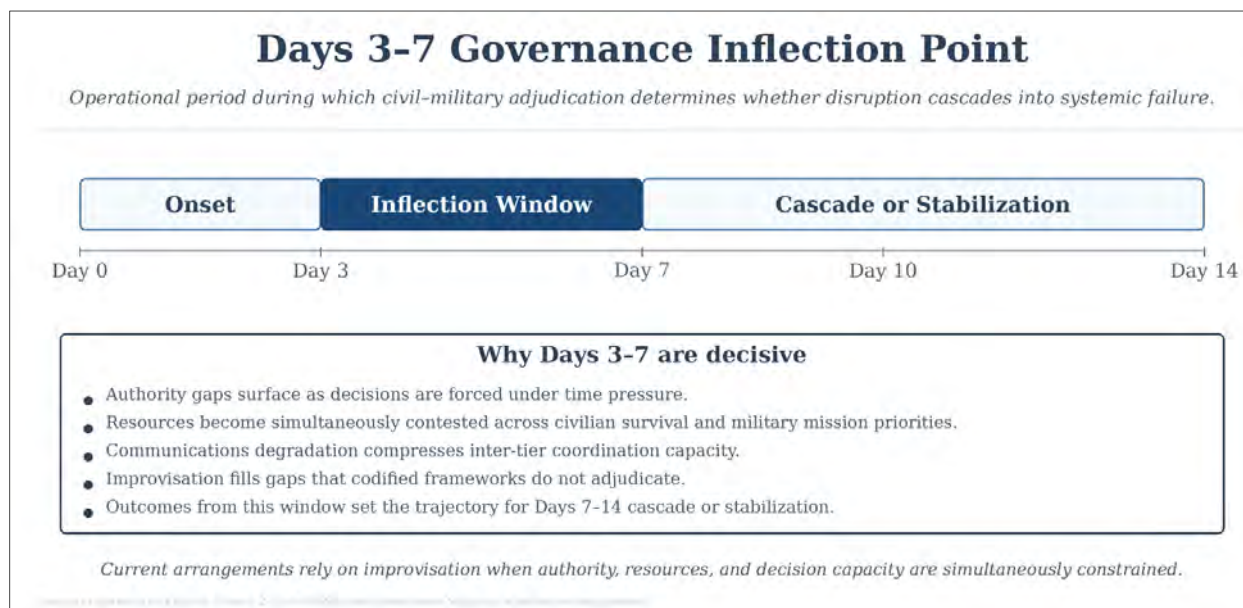
DoD, State of Alaska, local government, and tribal governments / Alaska Native villages with constituent bodies, scope, and bounded outside-scope conditions.

Civil-Military Resource Allocation Tensions

The scenario produces six categories of societal stressor that the research tracks across all subsequent analysis: heating and energy security at the household level; food security and access; communications integrity; governance tension under scarcity; and family displacement and household instability. These stressors do not emerge sequentially. They activate simultaneously within the Days 0–14 window, reinforce each other, and reach the workforce and family-readiness systems on which installation operations depend before any external support architecture has engaged.

This section translates the scenario conditions into a clear picture of who holds authority, who controls resources, and where decision-making friction is most likely to emerge during early-phase Arctic disruption. Governance is not an abstract planning consideration in this context. It is the mechanism through which disruption either remains manageable or cascades into systemic failure. The Day 3 to Day 7 interval is the analytical center of gravity for this mapping: decisions made in that interval either contain

the cascade or accelerate it, and decision-makers who wait for installation-level operational indicators before engaging will be acting after the window for effective intervention has closed.



Time-phased visual showing the inflection window during which civil-military adjudication decisions determine whether disruption cascades into systemic failure.

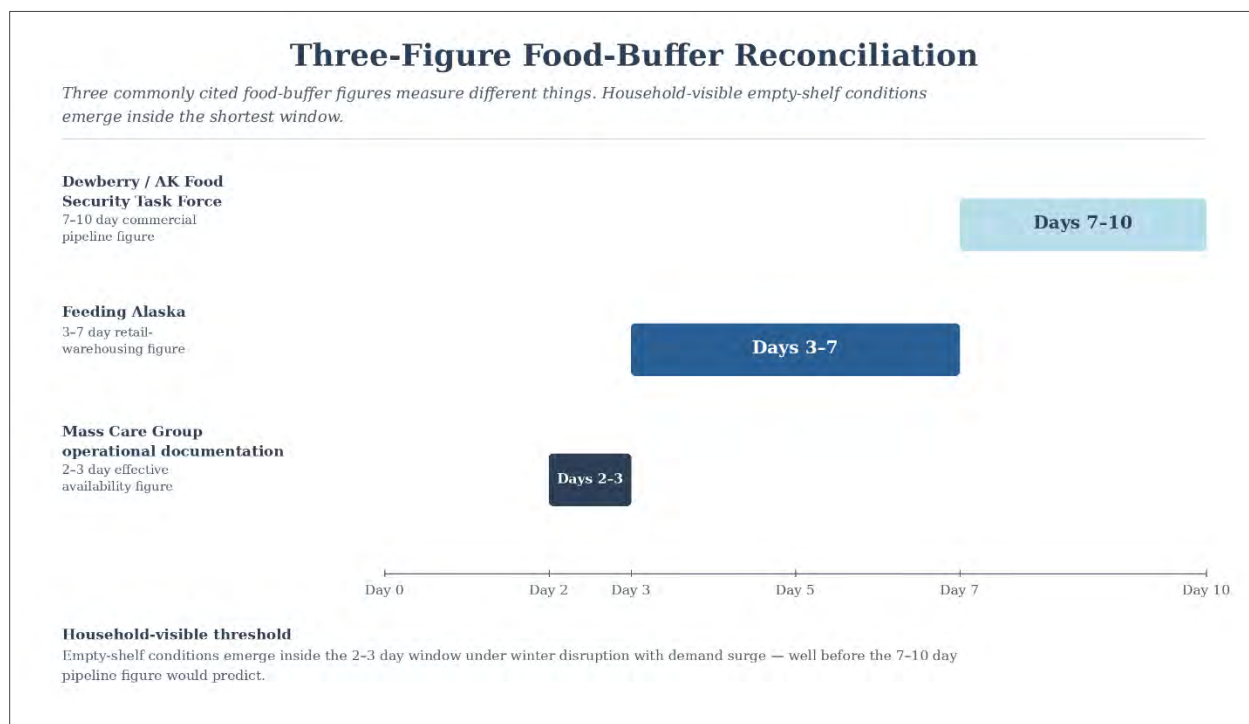
Food Security and Access

Alaska imports approximately 95 percent of its food, with roughly 95 percent of that volume arriving by sea; food departing the Port of Tacoma reaches Anchorage in approximately three days and retail shelves on the fourth day, with no meaningful statewide warehousing buffer [4; 23; 30]. Many Alaska communities maintain approximately seven to ten days of food supply under normal conditions, with rural and remote communities operating with substantially less. The Matanuska-Susitna Borough, which hosts a substantial civilian workforce supporting Joint Base Elmendorf-Richardson, recorded 13.3 percent food insecurity in 2023 and 49 percent of surveyed households reporting cut meal sizes or skipped meals in the prior twelve months [17]. These figures represent the pre-disruption baseline from which the Days 0–14 window accelerates, not the disruption-onset condition; the civilian workforce that installations depend on is already operating under measurable food stress before any disruption begins.

The distribution architecture compounds the structural risk. At the wholesale tier, a single produce distributor serves as the primary statewide supply node. At the retail tier, five chains dominate without a secondary tier capable of absorbing wholesale-level disruption. Families who turn to alternative retailers when one chain shows empty shelves will find that the alternatives draw from the same depleted wholesale supply. State emergency feeding plans that name these same commercial partners as their operational backbone draw from the same single-pipeline architecture as the commercial food system itself. This is the paper-redundancy condition applied to emergency feeding governance:

the institutional backup and the primary commercial supply chain share a common failure point.

Three food-buffer figures coexist in the literature and warrant explicit reconciliation. The seven-to-ten-day figure measures commercial pipeline inventory under normal flow [23]; [4]. The Feeding Alaska analysis documents a tighter three-to-seven-day window for retail warehousing capacity at the Port of Alaska, the inventory visible to households on store shelves during the first week of disruption [30]. State of Alaska Mass Care Group operational documentation identifies a still shorter two-to-three-day effective availability window under disruption conditions, when normal replenishment cadence is interrupted and household demand surge produces accelerated drawdown [48]. The three figures are not contradictory; they measure different things at different points in the supply chain, and their reconciliation is operationally consequential. Household-visible empty-shelf conditions emerge at the earlier end of the three-to-seven-day retail-warehousing range under winter conditions, and effective availability under demand surge collapses toward the two-to-three-day figure. Planning frameworks that anchor on the seven-to-ten-day pipeline figure systematically underestimate the speed at which household-level food insecurity emerges under disruption.



Reconciling the 7-10 day commercial pipeline figure, the 3-7 day retail-warehousing figure, and the 2-3 day effective-availability figure, marking the household-visible threshold.

Three-Figure Food-Buffer Reconciliation Summary

What each figure measures, its source, and household-visibility implications under winter disruption with demand surge.

Figure (Source)	Days	What It Measures and Household Implications
2023 Alaska Food Security Task Force	7–10 days	Commercial pipeline buffer: time from supply disruption at origin to depleted institutional inventory. Does not reflect retail empty-shelf timing.
Feeding Alaska	3–7 days	Retail and warehousing buffer: time from disruption to depletion of retail backstock. Reflects steady-state demand; does not account for demand surge.
Mass Care Group operational documentation	2–3 days	Effective availability under winter disruption with demand surge: time from disruption to household-visible empty-shelf conditions in remote and tribal communities. This is the operational threshold.

The three populations examined in this research face food access through different mechanisms with different effective time horizons. Military households have access to commissary supply chains drawing from the same commercial pipeline as civilian retail, with no meaningful redundancy benefit beyond what installation-level reserves provide. The civilian and contractor workforce faces the retail-tier shortfall directly, with the Matanuska–Susitna baseline establishing the pre-disruption strain. Alaska Native communities with active subsistence systems hold a real-redundancy capacity that the broader population does not, though the capacity is bounded by seasonal access and is not scalable to the statewide population level. The differential matters analytically because state-level allocation decisions under scarcity will apply differently across these three populations, and planning that assumes uniform population food access will underestimate where shortfalls emerge first and most acutely.

Key Insight: Household-visible food shortages emerge within five to seven days of sustained maritime disruption, triggering panic purchasing, hoarding, and workforce absenteeism that propagates directly into installation support degradation. The mechanism is a force degrader on mission outcomes, not a quality-of-life consequence adjacent to them.

Fuel and Energy Allocation

Military priority is aviation fuel, generators, and mission-essential power. Civilian and tribal priority is heating fuel for life-safety, a survival requirement in Arctic conditions, and electricity for homes, clinics, and water systems. Diverting fuel to installations can accelerate humanitarian risk in villages and off-base housing while simultaneously undermining the workforce availability and family stability that installation operations

depend on. The conflict risk is not abstract: it is a structurally inevitable competition between two survival priorities drawing from the same constrained supply.

Heating fuel disruption is the most life-safety-consequential household-level stressor in winter operating conditions. The research documents that approximately 200 remote Alaska communities rely primarily on diesel delivered by barge or air at costs documented at six to nine dollars per gallon, with limited storage and seasonally compressed delivery windows. [22; 57] Loss of fuel translates immediately into loss of electricity, heating, water and wastewater service, and communications, a cascading single-point-of-failure dynamic that makes fuel a master dependency in this analysis. Diesel generators in many remote facilities provide both electricity and recovered heat, so reductions in diesel use can inadvertently reduce heat output, creating secondary risks of freezing pipes and delayed generator startup. Heat-energy coupling is a distinctive Arctic dynamic underweighted in CONUS-informed resilience narratives.

For military families living off-post and for the civilian and contractor workforce living in communities that supply the installation, heating fuel is not separable from household stability. When heating fuel runs short, families relocate, lose work hours, or absorb cascading household disruption that propagates into workforce availability for the installations those families support. The research treats heating fuel disruption as a workforce variable, not only a humanitarian one.

Transportation and Mobility

Military priority is airlift prioritization and strategic cargo movement. Civilian and tribal priority is food resupply, medevac flights, and village logistics. The *RAND Plan Blue 21* wargame finding is directly applicable: airlift cannot replace maritime cargo volume at scale, and competition for limited airfields and aircraft forces zero-sum decisions between medical evacuation and military sustainment. There is no rapid substitute for a disrupted maritime resupply system, and planning frameworks that treat aviation as a reliable surge option are working from an incorrect baseline. [44]

Workforce Availability

Workforce availability under disruption is a contested resource across the three populations examined in this research. Military authorities prioritize mission-essential personnel and contractors. Civilian and tribal authorities prioritize logistics workers, fuel handlers, food distribution personnel, and shoreside and processing workers. The same regional workforce pool supplies both sets of priorities, and under scarcity conditions the populations hold legitimate but unreconciled claims on overlapping labor capacity. Family instability produces workforce absenteeism, workforce absenteeism degrades logistics and service continuity, and that degradation feeds directly into mission impact. The chain operates as a force degrader on mission outcomes, and workforce stability is therefore a linchpin variable not traditionally modeled in mission assurance frameworks, a gap this research is designed to address. Workforce continuity plans documented on paper, including succession plans, contingency staffing, and contractor backfill arrangements, are not equivalent to real workforce capacity available under early-phase disruption; the gap between the two is the paper-vs-real distinction this research applies throughout.

The civilian and contractor workforce most exposed to early-phase absenteeism is concentrated in entry-level food service, logistics, retail, transportation, and gig-economy roles, and is disproportionately younger. The generational digital-dependency vulnerability documented in the Scenario Conditions section compounds this exposure: the segment of the workforce most needed for surge capacity in those roles is also the segment least equipped to function when the communications and digital infrastructure they rely on degrades.

A specific workforce category warrants identification because its exposure runs through immigration and travel-policy decisions that do not currently appear in civil–military resource-tension analysis. Alaska's seafood sector employs approximately 27,000 shoreside processing workers, many of whom are seasonal, migrant, or international labor, including H-2B visa holders. [1; 19] Changes to immigration policy, travel restrictions, or transportation disruption during the Days 0–14 window would severely degrade processing capacity, with cascading effects on fishing fleets, local food supply, community economies, and the civilian workforce population on which installation sustainment indirectly depends. The implication for governance mapping is that workforce continuity is a lifeline dependency with policy-sensitive exposure: governance decisions about immigration, border access, or travel during simultaneous disruption can propagate through sectors not usually included in civil–military resource analysis, with consequences that reach installation operations through second-order pathways.

Key Insight: Workforce continuity is the connective tissue between household instability and mission impact, and its policy-sensitive exposures, including immigration, travel, and border access decisions, can degrade installation sustainment through second-order pathways that civil–military resource-tension frameworks do not currently capture.

Medical Capacity

Medical capacity is one of the contested resources at the heart of civil–military tensions during Arctic disruption, and it is a shared and limited resource across the three populations examined in this research. Regional hospital and clinical capacity must simultaneously serve military dependents, the civilian and contractor workforce, and Alaska Native populations, and the architectures through which each population accesses care are distinct. Military dependents access care through TRICARE-affiliated networks operating against the same regional capacity ceiling as the broader population. The civilian and contractor workforce relies on commercial healthcare with regional capacity limits and the workforce constraints documented earlier in this report. Alaska Native populations are served partly through the Indian Health Service and the Alaska Native Medical Center system, a distinct architecture with its own governance, its own surge limits, and its own real-redundancy profile that the broader system does not share. [31] Mutual aid agreements, MOUs between civilian hospitals and military medical facilities, and pre-positioned emergency response arrangements are codified on paper; real coordination capacity under simultaneous disruption across all three populations is a different question, and the paper-vs-real distinction this research applies throughout operates as forcefully in medical capacity as in any other domain.

Civilian healthcare collapse directly affects military dependents and the contractor workforce, increasing non-deployability and morale degradation, and operates as a force degrader on mission outcomes through the family readiness chain established in the Societal Stressors section. Behavioral health, crisis counseling, and family support service demand increases simultaneously with physical healthcare demand, stressing a system that has no meaningful surge capacity and that disproportionately affects the populations with the fewest substitution options. Medical evacuation capacity, constrained by weather, distance, and airfield limits as documented earlier in this report, is itself a contested resource across the three populations: the assets that could move a service member's dependent to higher-acuity care are the same assets that could move a rural community member or a tribal patient, and the prioritization decisions among those claims are not pre-adjudicated. Across all of these dimensions, medical capacity functions through communications connectivity that the Communications Integrity section documents as a compounding tension underneath every other allocation decision; medical triage, telehealth, regional coordination, and family notification all depend on the digital architecture whose vulnerabilities are developed there.

Key Insight: Medical capacity reveals the differential vulnerability framework most clearly. Three populations access care through three distinct architectures, none of which carries surge capacity adequate to absorb the others, and the contested assets including hospital beds, clinical staffing, medical evacuation, and behavioral health surge capacity have no pre-adjudicated prioritization framework when the populations' legitimate claims arrive simultaneously.

Communications Integrity

High-latitude communications fragility affects household, community, workforce, and command coordination simultaneously, and the architecture that produces this fragility is privately operated. Commercial telecommunications providers operating outside both DoD and emergency management cyber frameworks supply the core infrastructure on which crisis coordination depends. [15] Communications systems across agencies, communities, and installations are fragmented and frequently non-interoperable, and bandwidth limitations constrain real-time coordination during exactly the period when coordination matters most. [51] The 2022 Russian cyberattack on Viasat, which degraded civilian services across Europe as collateral to its military targeting, is the documented precedent for adversarial exploitation of commercial space infrastructure. [26] Communications access is therefore a contested resource across the three populations examined in this research: secure command-and-control connectivity for military authorities, public warning and coordination connectivity for state and tribal authorities, and household and workforce connectivity for the families and civilians on which both depend. Communications continuity plans codified on paper, including mutual aid agreements, fallback protocols, and commercial-to-government information sharing arrangements, are not equivalent to real coordination capacity under degraded conditions; the paper-vs-real distinction this research applies throughout operates as forcefully in communications as in any other domain.

Communications degradation in this environment functions as a force degrader on every coordination pathway it touches. It eliminates the information environment households

depend on to make decisions. It amplifies misinformation. It prevents compliance with emergency directives that reach populations only through digital channels. It destroys the informal coordination networks that substitute for formal systems in the early phase of disruption. And it disproportionately degrades the operational reliability of the population segment most needed for civilian surge capacity. The thirteen-to-thirty demographic documented in the Family Readiness section and elsewhere in this research has organized daily life around continuous connectivity, digital navigation, app-based information access, and digitally mediated peer and household coordination to a degree that earlier generations did not. When that infrastructure degrades, this population loses functional situational awareness rapidly, and the loss propagates simultaneously through three channels that the family structure depends on.

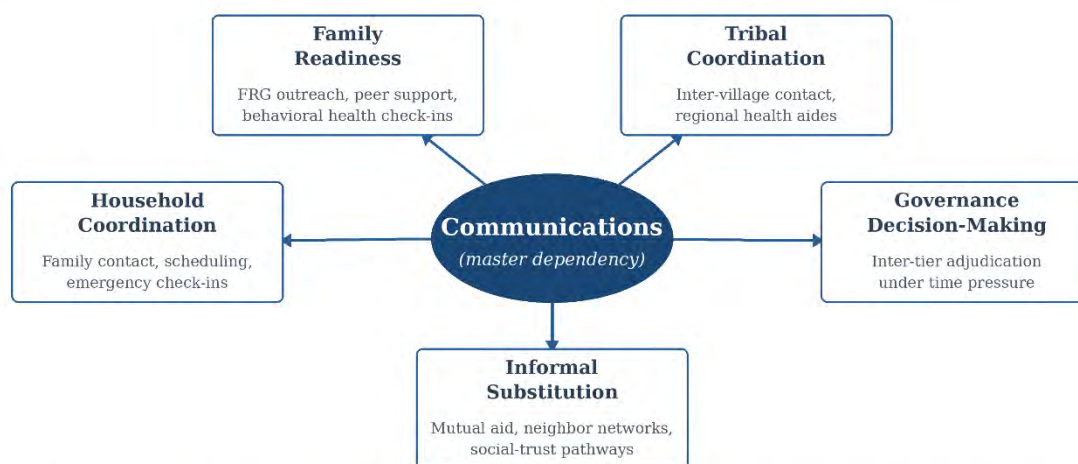
The first channel is the household information environment. Established young adults aged 27–30 typically function as household anchors, workplace supervisors, and information coordinators within their families; when their digital infrastructure degrades, the broader household's access to authoritative information, navigation, scheduling, and external communication degrades with them. The second channel is the digital architecture of the Family Readiness System itself. Family communication pathways that hold deployed and forward-stationed service members connected to their households, including the official and informal digital channels through which family readiness programs operate, depend on the same commercial infrastructure that the adversarial precedent named above demonstrates is exposed. Family readiness erosion under communications degradation is therefore not a slow weakening but a sudden severing of the information environment on which household stability, service member focus, and unit cohesion all depend. The third channel is the cohort-level coordination that the younger members of the family structure use to maintain employment, education, peer support, and community participation. Early and late teens lose school-based coordination, emerging adults lose campus and gig-economy coordination, and young independents lose the household-management coordination through which they support dependents and elders. Each loss feeds back into the household environment as additional demand on parents, spouses, and other adult anchors at precisely the moment those anchors are themselves operating under degraded conditions.

The implication for civil–military resource allocation is direct. Communications access is not parallel to the medical, food, and workforce tensions documented elsewhere in this deliverable; it is a compounding tension. Every other resource decision under scarcity depends on communications connectivity for demand signaling, allocation coordination, and feedback. The Days 0–14 window during which household and family-readiness consequences are most acute is the same window during which command coordination is most operationally critical, and the commercial-infrastructure governance gap means that the populations holding legitimate claims on communications connectivity have no predefined adjudication framework for resolving competing demands.

Key Insight: Communications degradation is a force degrader that propagates through the family structure simultaneously from three directions, household information environment, Family Readiness System architecture, and cohort-level coordination, with disproportionate impact on the thirteen-to-thirty demographic most needed for civilian surge capacity. The compounding effect makes communications continuity not parallel to but underneath every other civil–military resource allocation tension this deliverable examines.

Communications as Master Dependency, Human-Systems Cascade

Communications degradation cascades simultaneously through household, family readiness, tribal coordination, governance, and informal substitution networks.



Communications is to human systems what energy is to physical systems: the dependency that touches everything.

Hub-and-spoke visual designating communications as the human-systems master dependency, parallel to energy as master dependency in the companion study.

Governance Tension Under Scarcity

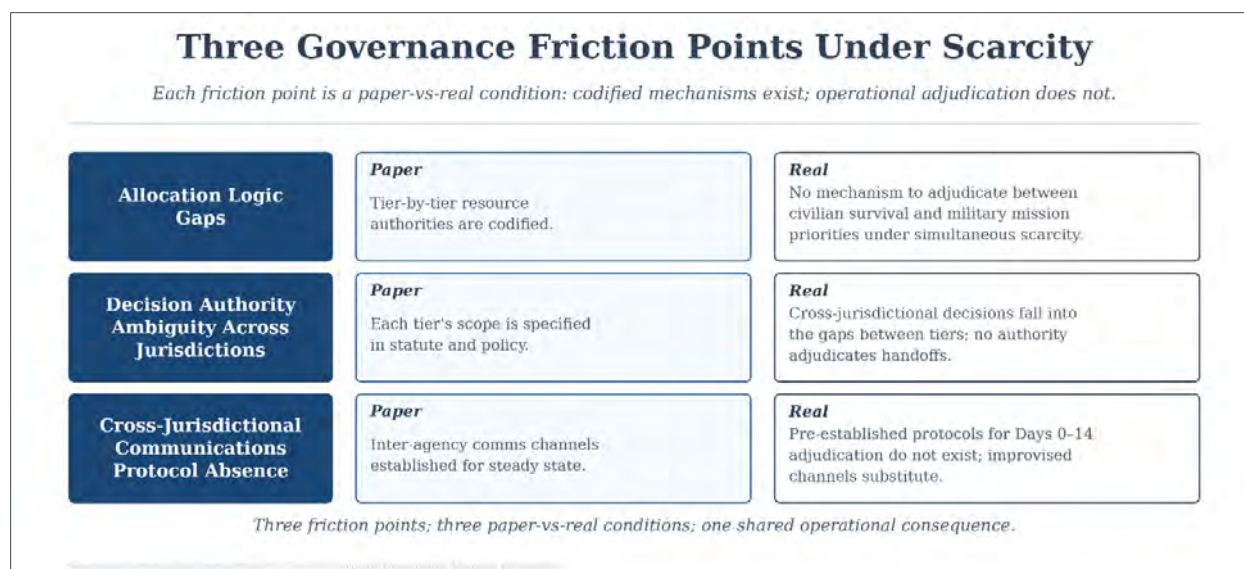
Governance tension is the meta-tension underneath the food, workforce, medical, and communications tensions developed in this deliverable. The other four tensions are *what* the populations contest under scarcity; governance tension is *how* those contests are adjudicated, and the conditions under which it operates are themselves a force degrader on mission outcomes when adjudication fails. Under disruption, state, local, military, and tribal authorities operate with different legal bases, different priorities, and different decision logics. Each holds authority over a portion of the response, and none holds authority over the whole. The absence of pre-established protocols for adjudicating competing claims across the three populations examined in this research is the paper-vs-real condition that this deliverable identifies as the structural source of friction: governance frameworks codified on paper do not produce the operational adjudication capacity available under disruption, and the gap between the two concentrates within the Days 3–7 governance inflection window when decisions either contain the cascade or accelerate it. The governance architecture itself, the authority structure across DoD

installation and garrison, State of Alaska, local governments, and tribal governments, and the operational friction points among them, is developed in the Civil–Military and Governance Mapping section that follows.

Key Insight: Governance tension does not sit alongside the other civil–military resource allocation tensions; it sits underneath them. Every contested resource in this deliverable depends on governance frameworks that have no pre-adjudicated mechanism for resolving simultaneous legitimate claims from three populations operating under three distinct authority architectures, and that adjudication gap is the operational variable that determines whether Arctic mission assurance holds or fails within the Days 3–7 inflection window.

Governance Friction Points

The Authority Structure section established the four-tier architecture, DoD installation and garrison, State of Alaska, local governments, and tribal governments, and identified the structural authority gaps within each tier. The friction points developed in this section are the operational consequences of those gaps: the specific conditions under which authority that is codified on paper fails to produce adjudication capacity under disruption, and under which decisions during the Days 3–7 inflection window concentrate the cascade rather than contain it. Each of the three friction points below is a paper-vs-real condition the research identifies as operationally consequential across the three populations examined: decision frameworks on paper that fail to activate as designed under real disruption, substitution options assumed in planning documents that do not exist in the operating environment, and jurisdictional authority codified on paper that produces confusion rather than coordination when multiple authorities engage simultaneously. The friction points operate as force degraders on mission outcomes when adjudication fails, and their concentration within the early-phase window is the analytical reason this research treats governance as the meta-tension underneath all other civil–military resource allocation tensions.



Visual presenting allocation logic gaps, decision authority ambiguity across jurisdictions, and cross-jurisdictional communications protocol absence, labeled as a paper-vs-real condition.

Decision Speed vs. System Reality

Military decision timelines operate in hours to days. Recovery of disrupted logistics flows operates in days to weeks. Civilian and tribal community survival decisions, household-level fuel, food, medical access, and whether to remain in place, operate on still different timelines that this research documents elsewhere. Existing coordination mechanisms across the four-tier authority architecture are not designed to align these timelines, and the absence of predefined frameworks for civil–military resource adjudication means that early-phase decisions are made under pressure without adequate authority structures. This mismatch creates unrealistic expectations and decision pressure at precisely the moment when deliberate, coordinated action is most needed.

Multi-jurisdictional coordination research on the Pacific Northwest documents a consistent pattern under simulated and actual disruption conditions that is directly applicable to Arctic governance mapping. [37] Formal coordination frameworks that specify information sharing, resource allocation protocols, and decision authority in pre-disaster planning documents consistently fail to activate as designed under actual disruption, not because the frameworks were poorly written but because the interpersonal and organizational relationships required to make them function had not been built during normal operations. The most common failure mode is not disagreement about authority but confusion about it: actors believing their counterparts have situational awareness they do not have, or assuming decision commitments have been made that have not been made, producing coordination gaps at precisely the moments when coordination is most urgently required. This finding reinforces this research's emphasis on pre-established adjudication mechanisms and exercised protocols as a precondition for effective early-phase response rather than as administrative refinements, and it is the empirical foundation for the paper-vs-real lens established earlier.

External Dependency Blind Spot

Many decision-makers across the four-tier authority architecture operate under planning assumptions that alternative sourcing is available when primary supply chains are disrupted. The operating environment does not support those assumptions. The infrastructure constraints that bound substitution, including the absence of continental rail connection, the absence of deep-draft northern ports, and the just-in-time logistics architecture with no strategic reserve, are documented in detail in the companion study; what matters for this research is that planning frameworks built on substitution availability assumptions produce governance decisions that the operating environment cannot execute, and that the gap between planning assumption and operational reality is a paper-vs-real condition that concentrates in the early-phase window when authorities are committing to allocation decisions based on assumptions about alternative supply that will not materialize. Reliance on private-sector substitution to fill the gap, often the implicit assumption in planning documents, requires coordination frameworks and pre-established agreements that do not currently exist with the specificity the scenario requires, and the development of those frameworks is one of the operational implications this deliverable carries forward.

Jurisdictional Overlap

State, local, military, and tribal authorities may issue conflicting guidance under disruption, and each authority operates within a legitimate scope of jurisdiction over different populations and different resources. State authorities focus on population survival across all communities simultaneously. Local authorities focus on the municipal and borough populations they directly serve. Military authorities focus on installation mission execution and the dependents, and contractor workforce associated with the installation. Tribal authorities focus on community continuity within their sovereign jurisdictions under the sovereignty, consent, and reciprocity framework established in the Research Foundation. Research on Indigenous disaster preparedness documents that outside systems often operate in silos, fail to align with tribal priorities or timelines, and that confusion about tribal authority worsens outcomes. [32] The State of Alaska Emergency Operations Plan confirms that no single agency controls all infrastructure or response capabilities, a structural reality that makes predefined coordination protocols essential and their absence consequential. [47] The jurisdictional overlap is therefore not a coordination inconvenience to be managed at the staff level; it is the paper-vs-real condition under which legitimate authorities holding partial jurisdiction must adjudicate competing claims from the three populations examined in this research with no pre-established mechanism for resolution.

Analytical Implications

Five analytical implications carry forward from the civil–military governance mapping into the deliverables that follow. First, collapse timelines are shorter than often assumed: the Days 0–14 window operates against household and community buffers that are measured in days rather than weeks, and the gap between codified authority and operational adjudication capacity is widest in the Days 3–7 inflection window. Second, resource conflicts are structurally inevitable rather than coordination failures, three populations holding legitimate claims on the same constrained resources produce

competing survival decisions that no after-event coordination mechanism can resolve at speed. Third, maritime dependency propagates as governance pressure: the single intermodal chokepoint at the West Coast maritime gateways converts logistics disruption into household-level resource conflict that the governance architecture must adjudicate. Fourth, the workforce is a critical dependency that crosses all three populations and that current civil–military resource-tension frameworks underweight systematically. Fifth, communications is the master dependency underneath every other allocation decision; medical triage, telehealth, regional coordination, and family notification all depend on the digital architecture whose vulnerabilities the Communications Integrity subsection develops.

Key Insight: The early-phase window cannot be addressed by designing adjudication mechanisms inside the disruption window. The conditions under which they would be needed are the conditions under which they cannot be designed. Pre-crisis investment in coordination protocols, exercised governance architectures, and pre-established trust-based relationships across the four-tier authority architecture is the only mechanism through which the gap between paper authority and operational adjudication capacity closes before disruption arrives.

TRIBAL AND ALASKA NATIVE RESILIENCE ASSESSMENT

The Tribal and Alaska Native Resilience Assessment examines how Indigenous communities sustain continuity of society during early-phase disruption and how those practices intersect with garrison readiness, family stability, and shared civil–military lifelines in the Arctic. It is grounded in a recognition that planning frameworks regularly underweight: many Arctic communities operate with minimal external resupply buffers and limited storage capacity, making local resilience systems essential to sustaining life rather than supplemental to other systems. The research approaches tribal and Alaska Native communities not as a vulnerable population requiring outreach and protection, but as a resilience architecture whose operational capacity already functions as a continuity mechanism in the Arctic and whose appropriate engagement is a precondition for effective civil–military coordination during the Days 0–14 window.

This deliverable surfaces three categories of findings: the protective factors that sustain community continuity when formal systems are stressed or unavailable; the constraints and failure points that define the limits of that resilience; and the governance realities that determine how decisions are made and resources allocated under scarcity conditions. Across all three categories, the differential vulnerability framework this research applies operates with particular force: tribal and Alaska Native communities occupy a dual analytical position as populations with the highest baseline vulnerability under federal assistance access metrics and as populations with the most developed real-redundancy resilience capacity in food continuity, social cohesion, and traditional governance, the dual character documented in the Authority Structure section.

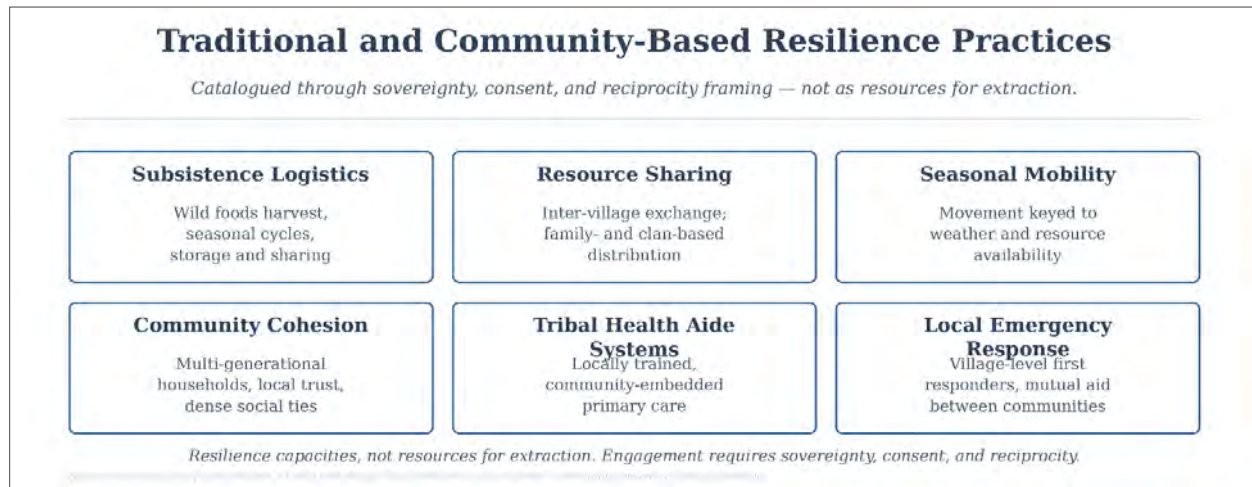
Engagement Protocol: Sovereignty, Consent, and Reciprocity

The findings developed in this deliverable rest on a defined engagement protocol that the research treats as a methodological requirement rather than as a courtesy or an ethical preference. The sovereignty, consent, and reciprocity framework established in the Research Foundation operates here as the standard under which tribal and Alaska Native resilience can be documented, analyzed, and translated into recommendations.

Direct engagement with tribal partners was not undertaken during this performance period. The three-month research window did not permit the relationship-building, consultation, and consent processes that the framework requires; the deliverable accordingly draws from existing literature, federally available data, and the analytical record. National Academies research documents that tribal engagement cannot be improvised under time pressure, and the research honors that finding by deferring direct engagement to a phase in which the protocols can be observed. [32]

The three components, sovereignty, consent, and reciprocity, operate as the engagement standard adopted for this research and are documented in operational detail in Appendix D. In summary: sovereignty recognizes federally recognized tribal governments as inherent sovereign authorities, not subordinate to state or local governments; consent

governs the scope of information sharing, attribution, and use of Indigenous knowledge; reciprocity structures engagement to deliver value to tribal partners rather than to extract data for federal or military use alone.



Visual cataloguing subsistence logistics, resource sharing, seasonal mobility, community cohesion, Tribal Health Aide systems, and local emergency response, framed through sovereignty, consent, and reciprocity.



Visual mapping the regional functions tribal governments, Alaska Native villages, and ANCs perform; framed through sovereignty, consent, and reciprocity.

Arctic Sustainment: Traditional and Community-Based Resilience Practices

The five resilience systems documented in this subsection, subsistence and seasonal lifeways, resource-sharing and mutual aid networks, community cohesion and governance, adaptation under infrastructure fragility, and hybrid supply systems, are presented at the level of analytical generality the sovereignty-consent-reciprocity protocol permits. Each is a real-redundancy resilience mechanism that operates during the Days 0–14 window in ways the formal commercial and governmental systems documented elsewhere in this report cannot replicate, and each is documented here to inform civil–military and governance planning rather than to extract operational detail that would belong to tribal partners.

Subsistence and Seasonal Lifeways

Subsistence systems are not supplemental to formal supply chains. They are a primary resilience mechanism that extends survival timelines and reduces immediate dependence on external supply flows during the period when formal logistics are most constrained. The Alaska Federation of Natives' community resilience documentation confirms that subsistence calendars affect availability, mobility, and workforce patterns in ways that commercial supply chain planning does not account for. [2] Storage, preservation, and local provisioning practices buffer communities against supply disruption in ways that no externally managed inventory system can replicate at comparable cost or speed. In the paper-vs-real framework this research applies, formal commercial supply chains operate as paper redundancy for subsistence-dependent communities while subsistence operates as real redundancy.

Indigenous harvesting is becoming riskier and less predictable due to climate change, a degradation of a primary resilience asset that planning frameworks have not yet incorporated. When subsistence access is constrained by weather, fuel limits, or safety restrictions, the communities most dependent on those systems face accelerated food insecurity while the formal supply chains that planning assumes will compensate are simultaneously disrupted. Subsistence systems and formal supply chains are not alternatives to each other; they are complements, and the failure of one accelerates the failure of the other.

Resource-Sharing and Mutual Aid Networks

Community redistribution norms covering food, fuel, childcare, and elder support function as informal logistics networks that replace formal distribution systems in the early phase of disruption, often Days 0–5, when formal logistics are unavailable and external assistance has not yet arrived. The National Academies' Indigenous disaster preparedness research documents these systems as operationally significant: decision rules for prioritization, informal coordination pathways, and community-level resource management practices that function effectively precisely because they are grounded in trust and relationships built before the crisis. [32]

Research emphasizes that relationships must exist before disasters, that mutual aid relationships, culturally informed engagement, and inclusion of tribes in preparedness

exercises cannot be improvised under time pressure. This finding aligns directly with the CRESCENT-derived governance research developed in the Governance Friction Points section: formal coordination frameworks fail under disruption when the interpersonal and organizational relationships required to make them function have not been built during normal operations. For civil–military planning, this is an operational finding: the resource-sharing networks that sustain communities in the first several days of disruption are not accessible to external coordination unless those relationships were established before the crisis began, and they are accessible only through engagement structures that respect sovereignty, consent, and reciprocity.

Key Insight: These systems function as early-phase distribution networks that often replace formal logistics in the first several days of disruption, and they are accessible to external coordination only through pre-established relationships engaged under sovereignty, consent, and reciprocity protocols.

Community Cohesion and Governance

Trust networks and local coordination pathways, both formal and informal leadership, enable collective decision-making under time pressure with a speed and legitimacy that external governance systems cannot replicate. Communities with strong governance and social cohesion maintain better outcomes under disruption, local decision-making capacity is strongly correlated with resilience, and externally imposed solutions consistently underperform community-driven approaches. Governance gaps analysis confirms that Indigenous inclusion would tilt the dominant mode of Arctic governance toward cooperation rather than conflict, a finding that positions tribal governance structures as strategic assets rather than coordination complications. [43]

Social cohesion stabilizes communities, reduces panic behavior, and supports workforce continuity in ways that no formal intervention can substitute for in the early-phase window.

Key Insight: Tribal governance structures function as strategic assets in Arctic mission assurance, and Arctic governance architectures that include tribal governance through sovereignty-consent-reciprocity protocols operate cooperatively in ways that architectures excluding it do not.

Adaptation Under Infrastructure Fragility

Local maintenance capacity and improvisation, the workarounds for limited power, communications, water, and transport, enable continuity of critical services despite infrastructure degradation that would halt operations in less adaptive systems. Community resilience documentation describes how local capacity, training, and community-led innovation have historically sustained essential functions under conditions that would be considered catastrophic failures in CONUS contexts.

The vulnerability hidden inside this capacity is operationally consequential. The dependency on specific individuals, the single points of failure in small communities who hold the knowledge and skills to maintain critical systems, is a workforce vulnerability of

equal magnitude to the infrastructure vulnerability itself, and the research identifies this dynamic explicitly. When those individuals are unavailable due to illness, injury, or workforce disruption, the entire system they maintain can fail regardless of the physical infrastructure's condition. The workforce-as-single-point-of-failure dynamic is the most acute manifestation of the broader workforce dependency analysis developed elsewhere in this report.

Key Insight: Local adaptation capacity enables continuity of critical services despite infrastructure degradation, and the dependency on specific individuals carrying that adaptive knowledge is a workforce single-point-of-failure vulnerability that planning frameworks must surface.

Hybrid Supply Systems

The integration of subsistence, resource-sharing, and limited commercial access sustains households under constrained conditions and creates a flexibility that allows communities to adapt across multiple resource pathways when any single pathway fails. Community resilience documentation confirms that this hybrid architecture, shifting between formal and informal supply channels based on availability and conditions, using barter and community exchange to offset gaps in cash-based or delivered goods, is a practiced and functional system rather than a theoretical fallback.

But hybrid supply systems have hard limits. They remain constrained by fuel availability, seasonality, and storage capacity. When fuel is diverted under governance allocation decisions, to installation operations, to priority military missions, or to competing civilian needs, the hybrid supply systems that sustain community resilience lose one of their most critical enabling conditions. The civil–military resource allocation tensions developed elsewhere in this report therefore operate directly on the resilience architecture this section documents: governance decisions about scarce fuel are not only resource decisions but also resilience-architecture decisions, and the populations whose resilience depends on hybrid supply systems bear the consequences of those decisions disproportionately.

Key Insight: Hybrid supply systems extend continuity under disruption by allowing communities to adapt across multiple resource pathways, and the most consequential governance decisions affecting tribal and Alaska Native community resilience are the ones that determine whether those systems retain access to the fuel, seasonality margins, and storage capacity they require to function.

Continuity Constraints and Risk Factors: Where Tribal and Alaska Native Communities Are Most Exposed

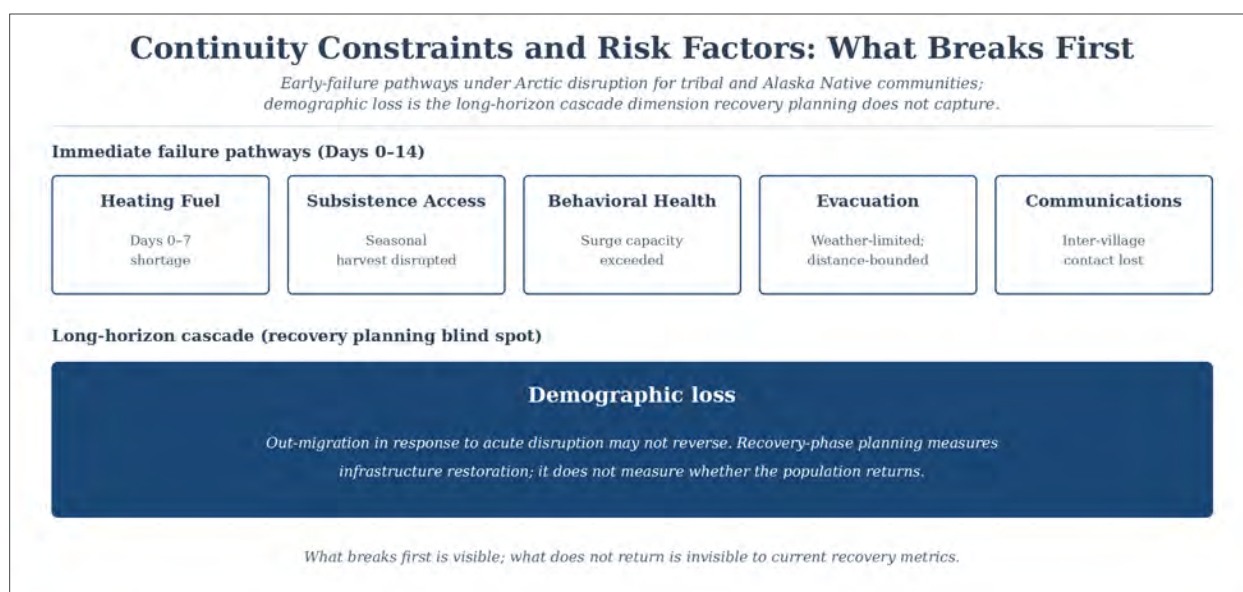
The continuity constraints documented across the Civil–Military and Governance Mapping deliverable, food fragility, fuel and storage dependency, transportation and access limitations, workforce constraints, medical and cold-chain fragility, communications fragility, and administrative capacity constraints, operate across all populations in Alaska under the dual-theater disruption scenario. This section examines

how each of those constraints falls differentially on tribal and Alaska Native communities and identifies the specific exposures the differential vulnerability framework this research applies surfaces for the populations developed in this deliverable. The framing operates under the sovereignty-consent-reciprocity protocol established in the Engagement Protocol section above.

Food System Fragility

The seven-to-ten-day commercial pipeline figure, the three-to-seven-day retail warehousing window, and the two-to-three-day effective availability window under disruption developed in the Food Security and Access section apply to the entire state. For tribal and rural communities, the differential is geographic and seasonal: communities operating without road access depend on barge resupply with a closed window from ice-in to spring breakup, and a disruption occurring during or after the fall barge cycle operates against communities that cannot receive bulk food resupply by the primary delivery mode until spring. Subsistence systems, as developed in the Arctic Sustainment subsection above, function as real-redundancy capacity in this differential, but the same climate-driven degradation of subsistence access that the Arctic Sustainment subsection documents means that the resilience asset is itself eroding precisely when commercial supply chain failure makes it most necessary.

Failure Point: Food insecurity emerges in tribal and rural communities on compressed timelines relative to urban Alaska when the commercial pipeline disruption coincides with subsistence access constraints, and the seasonal asymmetry of barge resupply concentrates the compression in the October-to-April window.



Visual rendering immediate failure pathways (heating fuel, subsistence access, behavioral health, evacuation, communications) and the long-horizon demographic-loss cascade that recovery-phase planning does not capture.

Fuel Supply and Storage Constraints

The fuel and lifeline analysis is developed in the companion study; what matters here is the tribal and Alaska Native–specific consequence of fuel disruption. Rural Alaska is heavily dependent on diesel-based microgrids with limited redundancy. For tribal communities, fuel disruption is not an operational constraint but a life-safety threat in Arctic winter conditions, where heating is not optional. The governance allocation framework developed in the Civil–Military Resource Allocation Tensions section operates directly on this exposure: diverting fuel to installations or to priority operations can accelerate humanitarian risk in villages and off-base housing while simultaneously undermining the workforce availability that installation operations require. The tribal differential here is severe, the populations whose resilience depends most heavily on hybrid supply systems are also the populations for whom fuel diversion produces the most acute life-safety consequence.

Failure Point: Fuel disruption in tribal and rural communities affects survivability directly, not only operational continuity, but also the populations most exposed to this differential are also those with the fewest commercial substitution options.

Transportation and Access Constraints

The Arctic transportation architecture is examined in detail in the companion study and in the Arctic Sustainment Modes framework in Scenario Conditions. The tribal and Alaska Native differential operates within the seasonal asymmetry the upstream sections develop: approximately 75 percent of communities are not road-accessible and depend on barge and air cargo as primary supply mechanisms, and the populations in those communities face disruption as an isolation event with immediate life-safety implications rather than as a logistics inconvenience. [22; 61] The October-to-April winter window compounds this differential because it eliminates the barge resupply option and concentrates dependence on bush plane aviation operating against weather and runway constraints. The transportation differential for tribal and rural communities is therefore not the absence of substitution options (which the companion study documents at the state level) but the compression of household and community resilience timelines into windows shorter than formal response systems can activate. [23; 5]

Failure Point: Transportation disruption in tribal and rural communities is an isolation event with immediate life-safety implications, and the seasonal asymmetry concentrates exposure in the October-to-April window when household reserves are already depleted

Workforce Availability

The workforce dependency analysis is developed in the Workforce Availability section of Civil–Military Resource Allocation Tensions and in the Workforce Digital Dependency subsection of Scenario Conditions. The tribal and Alaska Native differential is concentration: small communities operate with workforce pools where any given individual may hold an irreplaceable operational role, and the single-point-of-failure dynamic documented in the Adaptation Under Infrastructure Fragility subsection above operates with particular force in this population. The loss of even a few younger workers

to digital disorientation, misinformation, or inability to coordinate without connectivity represents a disproportionate system impact in communities where the workforce pool is already thin.

The differential exposure across Arctic communities is itself uneven. The Arctic Council's Emergency Prevention, Preparedness, and Response Working Group oil-spill preparedness assessment documents that approximately 25 percent of surveyed Arctic communities are adequately prepared relative to their risk exposure, approximately 50 percent are moderately prepared, and approximately 25 percent are inadequately prepared. Communities are located on average 120 or more miles from formal response centers and function as de facto first responders despite limited equipment, training, and integration with national response systems [7]. A meaningful fraction of Arctic communities is therefore structurally under-equipped for the risk profile they face, which is a planning condition civil–military coordination architectures must design around rather than treat as a deficiency to be remediated during disruption.

Failure Point: Workforce concentration in small communities and the documented preparedness differential across Arctic communities mean that workforce degradation in tribal and Alaska Native settings produces disproportionate system impacts and that approximately one quarter of Arctic communities face the risk profile with inadequate baseline preparedness.

Medical Access and Cold Chain Fragility

The Medical Capacity section in Civil–Military Resource Allocation Tensions develops the three-architecture differential for medical access across military, civilian/contractor, and Alaska Native populations and identifies medical evacuation as a contested resource with no pre-adjudicated prioritization. The tribal and Alaska Native–specific dimensions deserve identification here.

The nearest Coast Guard Air Station to the Arctic is approximately 820 nautical miles south of Utqiagvik, a distance that makes medevac response a multi-day operation under normal conditions. [18] Energy disruption directly affects healthcare and emergency services through the fuel and power dependencies they share with every other system. When medevac capacity is constrained and pharmaceutical cold chains are disrupted simultaneously, the medical system's failure is rapid and its consequences for vulnerable populations, elderly, medically dependent, and pediatric, are severe.

The University of Washington Disaster Resilience Research Network research surfaces a specific cold-chain failure-mode pattern in resource-constrained settings that is operationally consequential under Arctic disruption. [61] Cold-chain failures in pharmaceutical supply chains spanning multiple transfer points and weather-dependent access windows are typically not single catastrophic temperature excursions; they are a sequence of small degradations, brief power interruptions, transport delays, transfer handling failures, that individually fall below failure thresholds but cumulatively compromise product integrity in ways that may not be immediately detectable. Under Arctic dual-theater conditions, simultaneous power, fuel, communications, and transportation degradation produces precisely the conditions in which cumulative cold-

chain compromise emerges without a single triggering event, and the consequences are concentrated in the populations whose health maintenance depends most heavily on regular pharmaceutical resupply, the elderly, those with chronic conditions, and the medically vulnerable households whose stability affects workforce availability.

Failure Point: Medical evacuation distances and cumulative cold-chain compromise under Arctic dual-theater conditions concentrate medical-system failure consequences in tribal and Alaska Native communities with the highest pharmaceutical-dependent populations and the longest distances from acute care.

Communications and Information Reliability

The Communications Integrity section in Civil–Military Resource Allocation Tensions develops the three-population analysis of communications as a contested resource and the three-channel propagation of communications degradation through the family structure. The tribal and Alaska Native differential is the same digital infrastructure dependency documented for the 13–30 demographic broadly, intensified by community remoteness: in rural and tribal communities where distances are greater and infrastructure more fragile, communications degradation eliminates not only formal coordination but also the informal coordination networks that the resilience architecture documented in the Arctic Sustainment subsection depends on for early-phase response.

Failure Point: Communications degradation in tribal and Alaska Native communities eliminates both formal and informal coordination simultaneously, compounding the resilience-architecture vulnerability that this deliverable documents.

Administrative Capacity Constraints

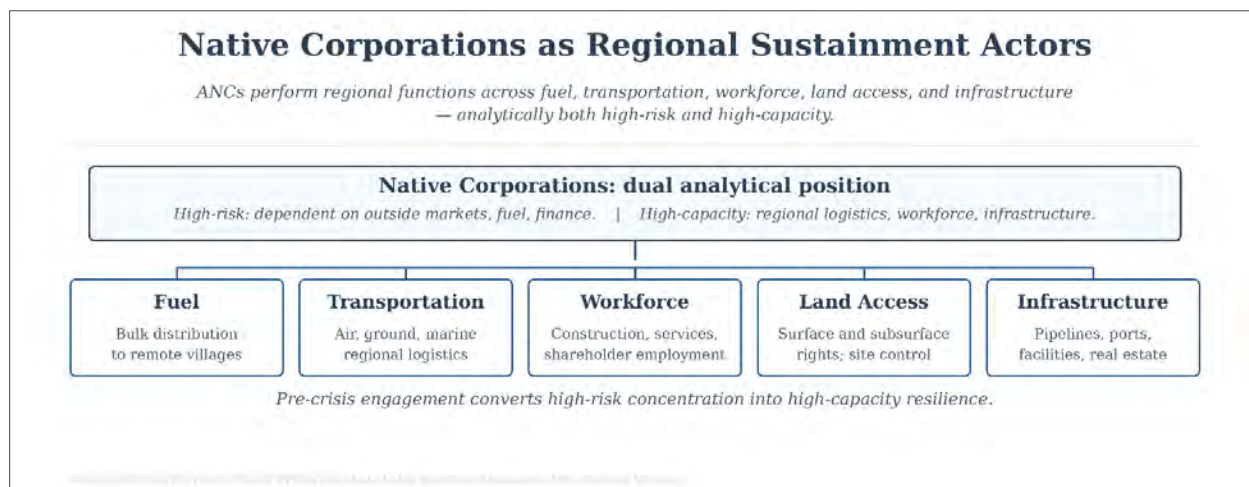
Administrative limitations can delay or prevent access to support even when resources exist. The GAO found that 20 federal programs each had at least one characteristic that could obstruct access for small remote communities, including competitive grants, cost-share requirements, cost-benefit analysis rules that disadvantage small populations, and national competition that small remote communities cannot win against urban applicants with larger administrative capacity. [61] The National Academies' Indigenous disaster preparedness research confirms that federal systems often operate in silos and fail to align with tribal priorities or timelines. [32] The jurisdictional overlap analysis developed in Governance Friction Points operates here as well: during a crisis, when coordination demands are highest and administrative capacity is most stretched, these structural barriers can prevent communities from accessing the external support they need precisely when the need is most acute.

Key Insight: The administrative capacity constraint is the paper-vs-real condition applied to federal program access: programs that exist on paper to serve small remote and tribal communities frequently cannot be accessed in practice because the access mechanisms are designed for jurisdictions with larger administrative capacity, and the gap is most consequential precisely during disruption when the programs are most needed.

Native Corporations as Regional Sustainment Actors

The four ANCSA regional corporations whose territorial footprints contain the populations and infrastructure most consequential for Arctic homeland defense, Arctic Slope Regional Corporation (ASRC), Cook Inlet Region, Inc. (CIRI), Doyon, Limited, and NANA Regional Corporation, are not adjacent to the Arctic sustainment system; they are integral components of it. Each corporation is the largest private landowner, employer, and economic actor in its region. Each operates infrastructure and workforce systems on which the surrounding civilian population depends and on which installation operations indirectly rely. Each holds inherent sovereign authority that no federal, state, or military command can substitute. The continuity-of-society analysis treats these four corporations as regional sustainment actors whose stability stabilizes the broader operating environment for Arctic mission assurance, and whose engagement in continuity-of-society planning proceeds under sovereignty, consent, and reciprocity, on terms agreed by the corporations and the tribal governments whose interests they represent. [6]

This subsection profiles each corporation's regional sustainment role, drawing on publicly available corporate, ANCSA, and federal sources. The profiles are descriptive rather than evaluative; the analytical claim that organizes them is that the four corporations together operate the substantial portion of land, workforce, energy, transportation, hospitality, healthcare, and federal contracting capacity that determines what is operationally feasible in their respective regions during the Days 0–14 disruption window the research models. Engagement of each corporation in Arctic homeland defense planning is a relational and consensual process, not a transactional one, and the planning horizons that produce operationally meaningful coordination extend well beyond a single research engagement.



Visual showing ANC regional functions (fuel, transportation, workforce, land access, infrastructure) and dual high-risk / high-capacity analytical position

Profiles of the Four Regional Corporations

The four ANCSA regional corporations cited as regional sustainment actors in this research, Arctic Slope Regional Corporation (ASRC) on the North Slope, Cook Inlet Region, Inc. (CIRI) in Southcentral Alaska and the Anchorage/JBER operating environment, Doyon, Limited in Interior Alaska and the Fairbanks/ALCAN operating environment, and NANA Regional Corporation in the Northwest Arctic and the Kotzebue operating environment, together operate the substantial portion of land, workforce, energy, transportation, hospitality, healthcare, and federal contracting capacity that determines what is operationally feasible in their respective regions during the Days 0–14 window the research models. Each corporation operates infrastructure and workforce systems on which the surrounding civilian population depends and on which installation operations indirectly rely; each holds standing relationships with the tribal governments and Alaska Native villages within its region; and each operates under the sovereignty/consent/reciprocity engagement protocol described above.

The four corporations' sustainment roles span the full lifeline architecture this research examines, from in-state refined-fuels production and last-mile fuel distribution (ASRC), through regional power generation and Alaska Native medical infrastructure (CIRI), through Interior corridor and ALCAN-adjacent operations and tourism infrastructure relevant to evacuation scenarios (Doyon), to federal contracting at scale and named installation-services support at JBER (NANA). Full corporate profiles, including geographic regions served, business lines, infrastructure assets, workforce reach, and operational role under disruption, are in Appendix J.

Implications for Arctic Continuity-of-Society Planning

Three implications carry forward from the four corporate profiles into the analytical sections that follow. First, Arctic homeland defense operations in each of the four regions examined operate inside a sustainment environment that is substantially structured by the regional corporation. ASRC's North Slope operations, CIRI's Cook Inlet and Anchorage footprint, Doyon's Interior and ALCAN-adjacent land base, and NANA's Northwest Arctic operating environment together constitute the operational context inside which Arctic continuity of society either holds or fails. Treating the regional corporations as adjacent stakeholders rather than as integral sustainment actors mischaracterizes the operating environment in ways the dual-theater scenario would expose immediately under disruption.

Second, the corporations' sustainment roles span the full lifeline architecture the working draft examines. Energy-and-fuel: ASRC's Petro Star refining and Eskimos, Inc. distribution; CIRI's Fire Island Wind and Cook Inlet energy operations. Transportation and logistics: Doyon's Interior corridor presence and Fairbanks-anchored operations; NANA's Red Dog transportation system. Workforce and contractor sustainment: Akima's federal-contracting footprint; NMS's installation services; ASRC and Doyon family-of-companies workforce networks. Medical and healthcare: Southcentral Foundation's ANMC role under CIRI affiliation. Hospitality and lodging: Doyon Tourism's Denali corridor properties; NMS's Anchorage, Fairbanks, and Kotzebue hotels. The cross-sector

reach is not incidental; it is the structural reason why Native corporation engagement is consequential to every deliverable in this research, not only to the tribal-resilience deliverable in which this subsection sits.

Third, engagement with the regional corporations is governed by sovereignty, consent, and reciprocity throughout. Each corporation operates on terms agreed by its shareholders and the tribal governments whose interests its land base, workforce, and revenue distribution serve. The pre-crisis relational infrastructure required for continuity-of-society coordination during the Days 0–14 window cannot be improvised at the moment of disruption; it must be built during the period before disruption, sustained through it, and continued afterward. The PSEMA Network architecture developed in the closing section of this report identifies the connective infrastructure through which sustained engagement of this kind becomes operationally feasible across the lifeline sectors and partner categories examined; the regional corporations are integral participants in that architecture, on terms set by the corporations themselves.

Key Insight. The four ANCSA regional corporations operating in the territories most consequential for Arctic homeland defense, ASRC, CIRI, Doyon, and NANA, are integral components of the regional sustainment architecture, not adjacent stakeholders. Their stability stabilizes the operating environment in which Arctic mission assurance is sustained or degraded; their engagement in continuity-of-society planning proceeds under sovereignty, consent, and reciprocity; and the relational infrastructure required for that engagement to perform under the Days 0–14 window is built before the disruption, not during it.

FAMILY READINESS AND HUMAN FACTORS

Family Readiness and Human Factors is the fourth deliverable and the one that most directly translates the operational findings of the preceding deliverables into the human dimension of Arctic mission assurance. Where the prior deliverables map the scenario conditions, governance architecture, and tribal resilience systems that shape community stability, this deliverable examines how those conditions affect the families, workers, and individual human systems whose stability is the prerequisite for everything else.

The finding that anchors this deliverable is simple and consequential: family readiness in the Arctic is inseparable from infrastructure performance and workforce stability. It is not a quality-of-life consideration. It is a functional component of system performance, and it operates as a force degrader on mission outcomes when degraded. Arctic disruption conditions compress and intensify its stressors within the first Days 0–14, before external support can meaningfully intervene, and they do so differentially across the three populations examined in this research: military families, the civilian and contractor workforce families, and Alaska Native families whose engagement operates under the sovereignty, consent, and reciprocity framework established in the Tribal and Alaska Native Resilience Assessment.

Family Readiness as a System Variable

The infrastructure constraints that define the operating environment for this deliverable, including the road inaccessibility, fuel and energy dependency, commercial inventory limits, and healthcare access constraints documented in the Scenario Conditions and the Civil–Military and Governance Mapping deliverable, produce immediate household-level effects when lifeline systems degrade. The infrastructure framing itself is developed in those sections and in the companion study; what matters at this level is what those constraints mean at the household level and how the consequences propagate into workforce, family, and mission outcomes.

When lifeline systems are degraded, household-level effects are immediate. Heating and energy insecurity emerge quickly in cold-weather environments where temperature is a life-safety variable. Food access becomes constrained within days, on the compressed timeline developed in the Food Security and Access subsection. Water and sanitation systems degrade when power or chemical supply is disrupted. Healthcare access is limited by the distance, medevac availability, and facility capacity constraints documented in the Medical Capacity subsection and developed further in the Tribal and Alaska Native Resilience Assessment.

The empirical magnitudes that anchor this finding are specific and operationally consequential. The Penn State Military Families Research Institute documents family-related stressors, frequent relocations, childcare shortages, spousal unemployment, financial strain, marital stress, social isolation, and caregiving burdens, reduce deployability, focus, morale, and mental health, with divorce or separation linked to approximately 15 percent of military suicides and family relationship problems appearing

in more than 25 percent of military suicides. [40; 39] The same research records that strong spousal support is associated with retention increases of up to 1.98 times for senior officers, with marital satisfaction functioning as a key predictor of retention. The Office of People Analytics finds that spousal support for staying on active duty is associated with actual retention behavior and identifies spousal and familial support as top predictors of retention intentions [54; 38]. These are not directional findings. They are specifically quantified, operationally consequential magnitudes, and they convert the family-readiness-as-system-variable framing from analytical claim to documented force-readiness pathway with measurable degradation rates and recoverable upside.

Federal program evidence reinforces that targeted family-stability investment produces measurable readiness return. RAND's assessment of the My Career Advancement Account scholarship program documents that spouse-employment support produces 10 percentage-point employment-rate increases during use and 6–8 percentage-point sustained advantage years later [42]. The MyCAA findings establish that the family-stability investment pathway is operationally productive and measurable, which directly supports this research's argument that integrated workforce-family planning is a Tier 1 resilience investment rather than a downstream welfare program.

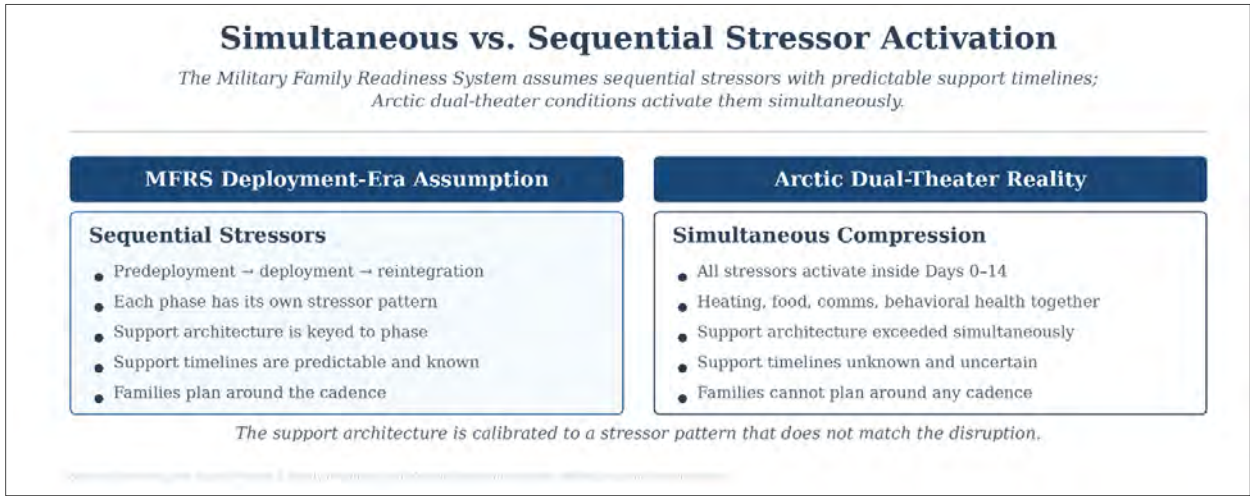
Key Insight: Household stability is directly dependent on infrastructure performance. Disruption to lifelines produces immediate and compounding effects at the family level, not gradual degradation that allows time for adjustment, and the family-level consequences operate as a force degrader on mission outcomes through the workforce-family feedback loop developed below.



Visual showing the four pre-crisis household stressors with recommendation rate as the central baseline indicator.

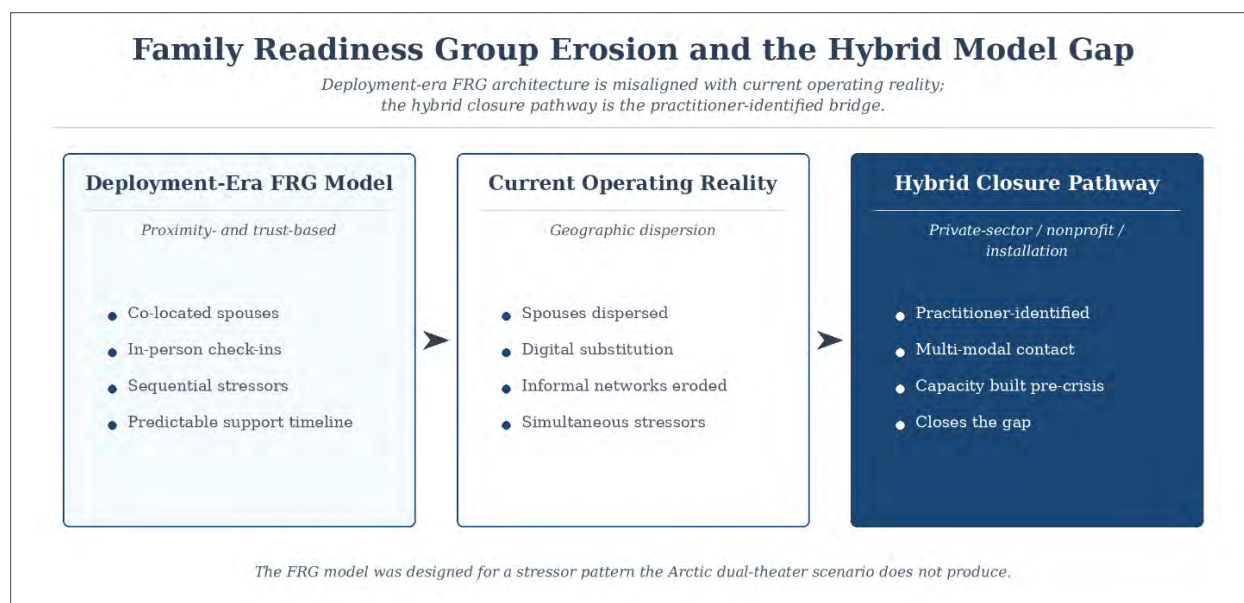
Family Readiness Group Erosion

The Family Readiness Group model, developed during prior decades around the deployment cycle and the assumption of physical proximity among unit families, has eroded substantially. The decline reflects three structural shifts: the digitization of family communication that has dispersed informal support across platforms rather than concentrated it in the unit-based group; the reduced operational tempo of certain deployment patterns that has reduced the perceived urgency of FRG participation; and the shift in family composition that has made the deployment-centric, spouse-anchored FRG model less representative of the population it was designed to serve. The research documents that the existing Military Family Readiness System was built around a deployment model in which stressors are largely sequential and support timelines are predictable. [33] Arctic supply disruption does not fit that model.



Two-column comparison of the MFRS deployment-era assumption against Arctic dual-theater reality.

Under the dual-theater scenario, FRG erosion compounds the loss of communications and proximity simultaneously. The pathways through which family readiness historically operated, informal phone trees, in-person check-ins, base-anchored child care exchange, deployed-family social support, depend either on the connectivity that disruption degrades or on the physical proximity that supply chain disruption disturbs through household relocation, fuel insecurity, and workforce displacement. The digital channels through which contemporary family readiness programs operate are themselves exposed to the commercial-infrastructure governance gap documented in the Communications Integrity subsection; the family-readiness digital architecture and the communications architecture share the same vulnerability profile, and degradation propagates through both simultaneously. The research treats FRG erosion not as a programmatic decline to be addressed at leisure but as the disappearance of an absorber that the Family Readiness System had assumed would still be there.



Three-column comparison: deployment-era FRG model, current operating reality, and the hybrid private-sector/nonprofit/installation closure pathway.

Workforce-Family Feedback Loop

The relationship between workforce performance and family stability is not linear; it is a feedback loop that accelerates system degradation in ways single-variable planning frameworks do not capture, and it operates as a force degrader on mission outcomes throughout the Days 0–14 window:

Household instability → Workforce degradation → System degradation → Increased household stress

Three structural conditions intensify this loop in the Arctic. The workforce is small, so each absence is proportionally more significant than in larger systems. The workforce is highly local, meaning the same people who operate fuel systems and staff distribution points are members of the communities experiencing household impacts. And external support arrives slowly, days to weeks, meaning the loop runs without interruption during the period it is most consequential.

Key Insight: Workforce availability is both dependent on and a driver of family stability, creating a feedback loop that can accelerate system degradation faster than any single-variable planning model predicts, and the loop functions as a force degrader on mission outcomes that no formal intervention can interrupt once it is running at scale.



Closed-loop diagram showing the three-leg feedback among household stressors, workforce attrition, and installation/community service degradation under Days 0–14 compression.

The Generational Preparedness Gap as an Operational Variable

The family readiness and workforce-family findings established earlier in this section identify household instability as a leading indicator of mission degradation. A further dimension of that finding, surfaced in the Interim Report and developed further here, is the convergence of household exposure and workforce role concentration within a single demographic segment: the population approximately thirteen to thirty years of age. This convergence is operationally significant because the same demographic that disproportionately staffs the entry-level civilian workforce positions identified throughout this research as essential to early-phase sustainment, including food distribution, fuel handling, transportation support, logistics, warehousing, retail operations, childcare, and community services, is also the segment of the Alaska population most dependent on uninterrupted digital infrastructure and least prepared to function effectively when that infrastructure degrades. The Communications Integrity subsection develops the three-channel propagation through which this demographic’s digital dependency degrades the broader family structure under disruption; what follows here develops the demographic itself as an operational variable.

The vulnerability is not rooted in capability or willingness. It is structural. Younger Alaskans have organized their daily lives around continuous connectivity, digital navigation, app-based information access, and just-in-time service delivery to a degree

that previous generations did not. Many have not experienced extended loss of internet access, cellular connectivity, GPS, digital banking, or social media communication. Analog fallback competencies, such as map reading, offline coordination, manual communication, and operating without instant information access, were retained by older generations through lived experience but have not been acquired organically by the cohorts now entering the workforce. The result is a population segment whose operational effectiveness is implicitly conditioned on infrastructure availability that the dual-theater scenario examined in this research assumes will be degraded for an extended period.

This produces what the Interim Report described as a dangerous inversion within Arctic sustainment planning. A population segment that planners might theoretically count as available surge capacity, given physical capability, mobility, and workforce participation, instead risks becoming an additional source of demand on already strained community systems. The same individuals expected to staff fuel stations, distribute food, support transportation networks, and provide community services during Days 0–14 may be among the first to lose functional situational awareness when communications degrade, and may experience disorientation, information panic, and reduced workforce reliability at precisely the moment community labor capacity is most needed. Communications degradation, identified throughout this research as a force degrader that amplifies every other failure mode, has a disproportionately accelerated effect on this demographic because their coordination, social support, and information environment have been almost entirely digitally mediated.

The exposure is compounded by the position this demographic occupies within Alaska's preparedness culture. Traditional preparedness frameworks reach younger school-aged children through school drills, severe weather exercises, and parent-led safety education. They reach older household leaders, homeowners, parents, and retirees through insurance systems, household preparedness activities, financial planning, and community emergency organizations. The thirteen-to-thirty demographic occupies the space between, transitioning out of school-based preparedness frameworks and not yet engaged through the homeownership, household, or financial preparedness systems that typically reach older adults. They occupy a transitional civic space in which neither structured emergency education nor practical continuity messaging reliably reaches them, even though their workforce roles and community presence have become operationally essential.

This research therefore identifies the generational preparedness gap not as a public education concern but as a system variable affecting workforce continuity, community stabilization, and ultimately mission assurance. The household instability documented earlier in this section becomes more consequential when the household members responsible for surge support are themselves digitally disoriented, socially mobile, and operationally unprepared for prolonged disruption. Family readiness erosion intersects with workforce erosion through this demographic, and the two erosions reinforce one another rather than appearing as separate problems.

The demographic gap is not a fixed condition. The research finds that preparedness behavior evolves developmentally across the thirteen-to-thirty age range and that the

demographic is more accurately understood as a progression of five distinct behavioral and developmental cohorts rather than a single audience. Early teens (ages 13–15) remain heavily dependent on parents, schools, and structured authority systems, with limited analog problem-solving experience but high responsiveness to school-based and gamified preparedness engagement. Late teens (ages 16–18) begin exercising independent judgment while remaining strongly influenced by peers and social identity and begin entering the civilian workforce sectors identified above. Emerging adults (ages 18–22) enter periods of mobility, financial instability, and inconsistent self-sufficiency while simultaneously occupying many of the flexible labor positions that become operationally essential during disruption. Young independents (ages 23–26) increasingly manage households, dependents, and workplace responsibilities, and their preparedness behavior becomes more practical and resource-driven. Established young adults (ages 27–30) function as household anchors, workplace supervisors, and community influencers, with the highest potential to serve as cohort anchors for preparedness culture among their peers and within their families.

Recognition of this developmental progression is operationally relevant because it identifies an addressable systems design problem rather than a fixed deficit. Preparedness systems calibrated to a single generic outreach model for a thirteen-to-thirty population will not produce behavioral change at scale, but systems calibrated to the distinct behavioral characteristics, communication preferences, social motivations, and economic realities of each cohort can progressively transition the demographic from digitally dependent consumers of emergency information into adaptive contributors to household and community continuity. The Recommendations section of this report carries this developmental framework into specific near-, mid-, and long-term actions designed to convert the generational preparedness gap from a liability into a structured resilience asset.

This finding also has implications beyond Alaska. The behavioral and technological patterns identified within the Alaska thirteen-to-thirty population are not unique to the state. The same digital dependency, the same workforce concentration in entry-level continuity roles, and the same exclusion from traditional preparedness frameworks are present across the continental United States. Alaska is simply the operating environment in which the consequences of those patterns become operationally visible earliest, because geography, isolation, climate, and infrastructure fragility compress failure timelines and remove the recovery buffers that mask the same vulnerabilities elsewhere. In this sense, the generational preparedness gap identified in Alaska functions as an early indicator of a national continuity challenge, and Alaska functions as a strategic stress laboratory for preparedness systems that may need to be redesigned at national scale in the coming decade.

The implication for Arctic mission assurance is direct. Continuity of operations depends on continuity of society. Continuity of society depends on whether the civilian workforce, much of which is concentrated in the thirteen-to-thirty demographic, can function effectively when digital systems, logistics networks, and communications infrastructure fail simultaneously. The recommendations that follow treat this demographic accordingly: not as a vulnerable population requiring outreach and protection, but as a

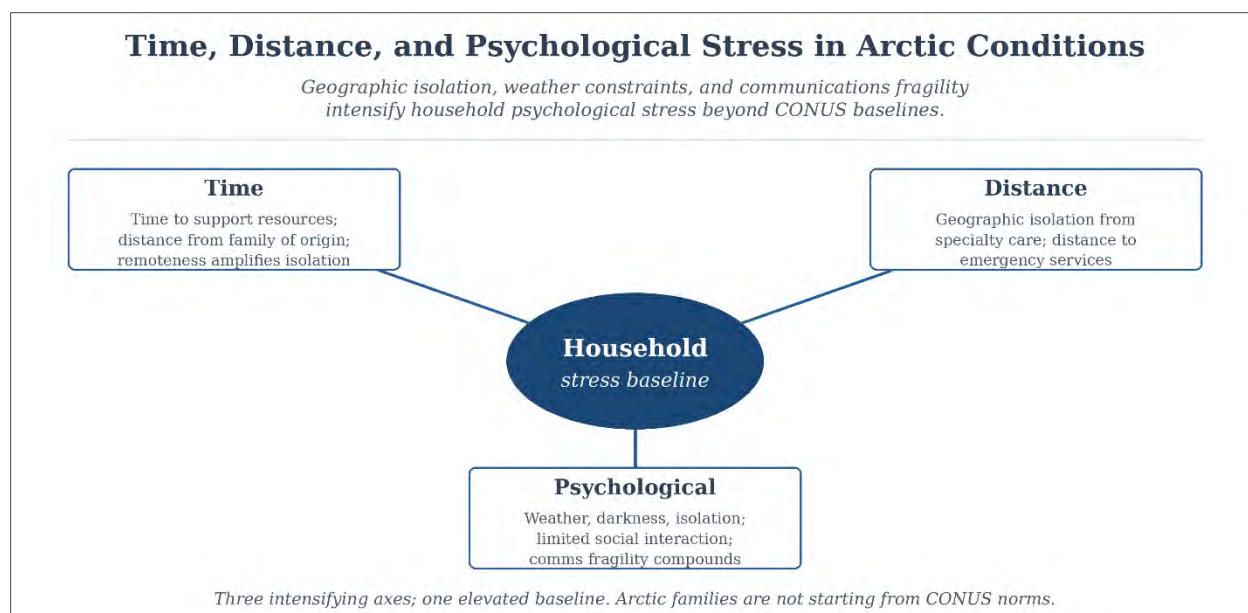
strategic resilience asset whose preparedness, adaptability, and workforce continuity directly influence installation readiness, governance stability, and community survivability throughout the Arctic region.

Age Cohorts 13–30: Key Differentiating Factors and Behavioral Characteristics				
<i>Distinct developmental stages require distinct approaches to engagement, messaging, and preparedness.</i>				
AGE COHORT (Years)	COHORT NAME	KEY DIFFERENTIATING FACTORS	BEHAVIORAL CHARACTERISTICS	PREPAREDNESS IMPLICATION
 13–15	Early Teens (Awareness & Guided Preparedness)	- Highly dependent on parents, schools, and authority figures - Limited independent decision-making - Low risk perception; concrete thinking - High receptivity to routine and structure - Heavy digital use; limited analog skills	- Learn best through visuals, games, and repetition - Seek approval from adults and peers - Impulse-driven but value fairness and teamwork - Short attention cycles; prefer interactive learning - Motivated by belonging and recognition	- Focus on awareness and basic skills - Use gamification and scenario play - Build habits through school & family - Emphasize simple, repeatable actions - Normalize preparedness as part of daily life
 16–18	Late Teens (Personal Responsibility Onset)	- Increasing independence (driving, jobs) - Strong peer influence and social identity - Begins weighing consequences - Exploration of risk and autonomy - Entry into workforce / community roles	- Highly influenced by peers and social norms - Seeks status, trust, and responsibility - Willing to help when meaning is clear - Values skills, credentials, and experiences - Responsive to challenges and competitions	- Emphasize personal responsibility - Leverage peer ambassador programs - Offer certifications and practical skills - Connect preparedness to leadership - Reinforce real-world relevance
 18–22	Emerging Adults (Independent Decision-Making)	- Living away from home (college, early jobs) - High mobility and schedule variability - Financially constrained - Optimistic bias; underestimates risk - Relies heavily on digital connectivity	- Values freedom, flexibility, and convenience - Information-seeking but time-poor - Adapts quickly when engaged - Socially connected but geographically fluid - May deprioritize preparedness until disrupted	- Make it easy, mobile, and practical - Promote personal/household readiness - Use digital-first with offline fallbacks - Integrate in campuses & workplaces - Link preparedness to independence
 23–26	Young Independents (Stability & Responsibility Expansion)	- Establishing careers and households - Managing finances and obligations - May have dependents - Balancing work, life, and future planning - Increasing long-term decision-making	- Goal-oriented and future-focused - Seeks practical tools and efficiency - Strong sense of responsibility for others - Values reliability, stability, and security - Will act when benefits are clear	- Focus on household and financial resilience - Provide tools, checklists, and resources - Engage through employers and insurers - Highlight protection of family and assets - Tie to continuity of income and stability
 27–30	Established Young Adults (Proactive Planning & Community Leadership)	- More settled in careers and communities - Often homeowners or long-term renters - Influences peers, teams, and neighbors - Stronger civic identity and networks - Builds legacy and long-term security	- Takes initiative and plans ahead - Natural leaders and mentors - Invested in community outcomes - Values effectiveness and impact - Motivated by protecting what they've built	- Empower as leaders and mentors - Involve in planning and decision-making - Promote community service and drills - Support neighborhood/tribal initiatives - Emphasize legacy and community impact
<i>Understanding these cohort differences enables tailored outreach, training, and engagement strategies that build lifelong resilience and community continuity.</i>				

Time, Distance, and Psychological Stress

Arctic disruption imposes an extended period of self-reliance, days to weeks before external assistance arrives, that planning frameworks consistently underestimate. Families must sustain themselves under uncertainty without the information, resources, or social support available in non-Arctic environments. The workforce must make consequential decisions under prolonged stress with incomplete information and limited external guidance.

Critically, these conditions arise not from deployment but from disruption. The planning frameworks designed to support families during overseas deployments are structurally misaligned with the household-level survival challenges that Arctic disruption produces, and that misalignment is most acute during the Days 0–14 window when decisions are most consequential. [35]

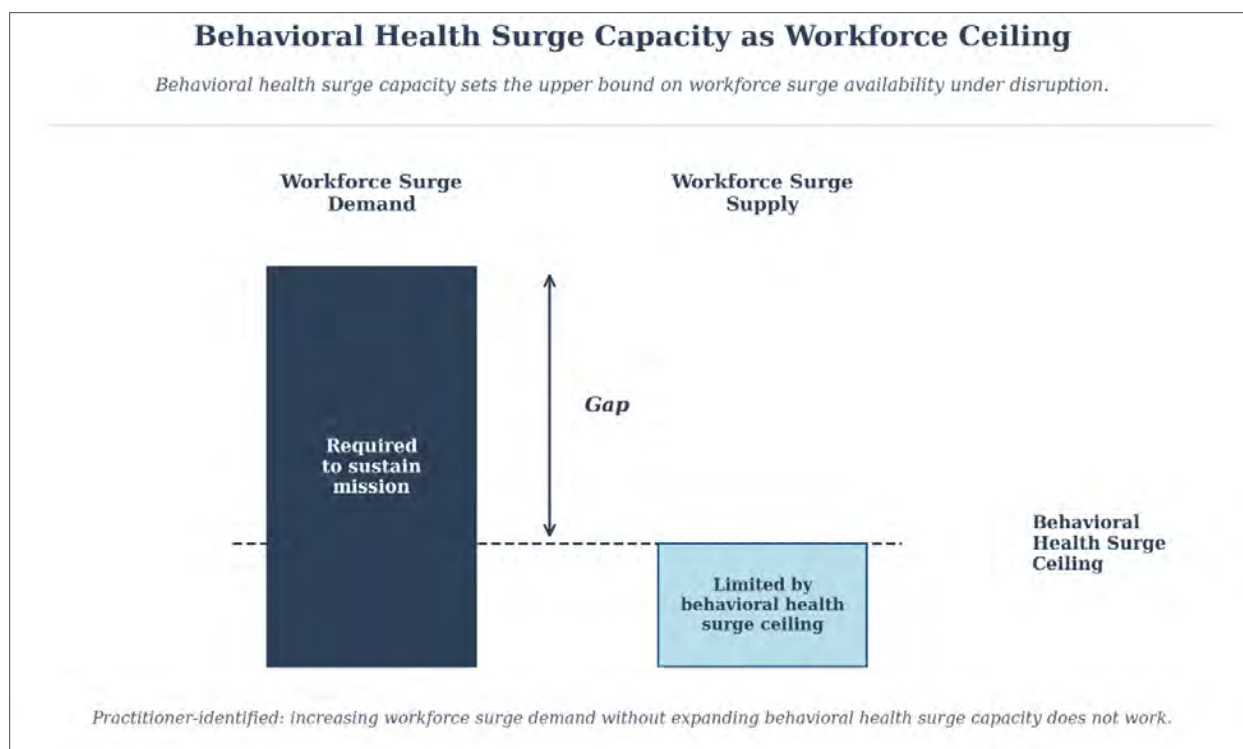


Hub-and-spoke visual rendering the three intensifying axes (time, distance, psychological) that elevate household stress baselines beyond CONUS norms.

Behavioral Health Surge Capacity

Behavioral health is the human-systems variable most likely to be underweighted by infrastructure-anchored planning models. Under prolonged Arctic disruption, behavioral health load increases at the household, community, workforce, and service-member levels simultaneously. Civilian behavioral health systems supporting military dependents, contractors, and tribal communities operate at or near capacity under blue-sky conditions; their surge capacity in Days 0–14 is structurally limited. The behavioral health architecture operates differently across the three populations examined in this research: military families access behavioral health through TRICARE-adjacent and military behavioral health systems; the civilian and contractor workforce accesses behavioral health through commercial systems with the same regional capacity ceilings the Medical Capacity subsection documents; and Alaska Native populations access behavioral health through the Indian Health Service and tribal behavioral health systems under the distinct architecture developed in the Tribal and Alaska Native Resilience Assessment. [31]

The research treats behavioral health capacity as operational infrastructure on the same footing as fuel storage and communications redundancy. Loss of behavioral health access during disruption does not produce a downstream welfare consequence; it accelerates the workforce-family feedback loop, raises non-deployability rates, and degrades unit cohesion in ways that translate directly into mission risk. Pre-crisis investment in behavioral health surge capacity, particularly capacity that bridges the military, civilian, and tribal systems through which Arctic populations actually receive care, is a Days 0–14 resilience requirement.



Bar-chart visual depicting how behavioral health surge capacity sets the upper bound on workforce surge availability under disruption.

The behavioral-health-as-operational-infrastructure framing this research carries is anchored in the population-health framework documented by the University of Washington Disaster Resilience Research Network and the Department of Health Systems and Population Health. [63; 61] The framework holds that community disaster outcomes are determined by baseline health status, social connectivity, and institutional access more than by hazard severity or formal response speed. Pharmaceutical disruption is treated as a lifeline failure with a time-sensitivity gradient that is qualitatively different from other lifelines: a food disruption becomes acute over days to weeks, a fuel disruption forces operational changes within hours to days, but a pharmaceutical disruption affecting insulin-dependent, dialysis-dependent, oxygen-dependent, or time-sensitive-mental-health patients produces irreversible harm within hours to days. In an Arctic operating environment where chronic conditions are prevalent among both military families and Alaska Native communities, this acceleration effect operates as a workforce-degradation mechanism the linear infrastructure-only models do not capture. The cumulative cold-chain failure-mode pattern, in which sequential small degradations rather than single catastrophic excursions compromise pharmaceutical integrity, is developed in the Continuity Constraints section of the Tribal and Alaska Native Resilience Assessment, where it intersects with medical evacuation distances and tribal pharmaceutical dependence.

The same framework treats informal social networks, neighbors checking on vulnerable community members, household-level medication sharing, informal transportation arrangements enabling care access, as a primary early-phase health resilience mechanism

providing a volume of health support in the first 72 hours to two weeks of a major disruption that formal emergency health systems cannot replicate. Erosion of those networks under stress is therefore simultaneously a social, public-health, and workforce event.

Family Displacement and Household Instability

Family displacement under prolonged Arctic stress operates through several pathways. Households unable to secure heating fuel may relocate temporarily or permanently. Families that lose access to childcare or eldercare drop out of the workforce. Spouses and dependents separated from deployed or forward-stationed service members through communications degradation absorb the morale and stability cost that the Family Readiness System was designed to mitigate. The research documents that family-related stressors at this scale do not produce a queue of welfare cases that can be addressed in sequence; they activate simultaneously and compound through the workforce and readiness systems that depend on family stability.

Informal Support Systems, Human Services, and Resource Competition

Arctic communities rely heavily on local knowledge, informal coordination networks, cross-trained personnel, and community-level resource sharing to sustain continuity under normal conditions. These systems are operationally significant and developed in detail in the Arctic Sustainment subsection of the Tribal and Alaska Native Resilience Assessment, but they have limits. They are not designed for large-scale or prolonged disruption. They depend on communications, available workforce, and functioning infrastructure to coordinate. When those enabling conditions degrade, informal support systems degrade with them, often more rapidly than formal systems because they have no institutional structure to maintain.

Human services systems, childcare, healthcare, and social support, are closely tied to workforce participation in ways that planning frameworks treat as secondary but which the research base confirms are primary operational dependencies. Limited childcare availability forces workforce members to choose between their employer and their household. Healthcare systems operating near capacity under normal conditions cannot absorb the demand increases that disruption produces. Dependence on transportation and energy systems means that when those systems are stressed, human services are stressed simultaneously. The loss of any of these functions reduces workforce availability, which further degrades system performance, which extends the timeline before recovery is achievable.

Under constrained conditions, resource allocation decisions create competition between operational requirements and community survival needs that existing governance frameworks are not designed to resolve. The Civil–Military Resource Allocation Tensions section documents this competition across fuel, food, transportation, medical capacity, communications access, and the meta-tension of governance adjudication itself. The family readiness dimension of that competition is the one most consistently absent from

planning, yet it is the dimension through which workforce degradation most directly accelerates. When families cannot secure heating fuel, food, or childcare, the workers who operate critical infrastructure cannot report to work. That is the mechanism through which resource allocation decisions made at the governance level produce operational degradation at the system level.

Underweighted Populations in Family Readiness Analysis

Five population categories within the military and contractor community warrant explicit identification because they are underweighted in existing family-readiness literature and particularly exposed under Arctic disruption conditions. Each category is exposed to a distinct pathway of household-stability degradation under disruption, and the family-readiness architecture and the hybrid public-private-nonprofit support models proposed in the Recommendations section are designed to absorb these categories, not only the spouse-and-dependent baseline that the deployment-era FRG model assumed.

Single service members face the absence of a household partner to absorb impact, leaving the service member to manage both operational and household-stabilization responsibilities simultaneously under conditions where neither set of responsibilities can be deferred.

Military caregivers, the cornerstones of support for wounded, ill, and injured veterans, are documented as a large, stressed, often hidden population [45]. Under disruption, the formal care systems they substitute for, and the household supports they themselves require degrade simultaneously, producing a compounded exposure that single-category planning frameworks cannot address.

Non-traditional family structures, including blended families, multigenerational households, and households organized around relationships not anchored by a single service-member spouse, are not represented in the deployment-era FRG model and are not reliably reached by the support pathways that model produced.

Dual-career households face joint-employment-disruption rather than single-spouse stress: when both partners' employment is exposed to the same Arctic disruption, the household loses both income streams and both workplace-anchored support structures simultaneously.

Families with exceptional family needs depend on specialized healthcare, educational, and behavioral health services that intensify under conditions of constrained access. Any single specialized service interruption produces disproportionate household impact, and the cumulative cold-chain dynamic developed in the Tribal and Alaska Native Resilience Assessment's Continuity Constraints section is particularly consequential for these households because of their pharmaceutical and medical-equipment dependencies.

Key Gaps This Research Surfaces

Five planning gaps emerge consistently across the literature and the preceding deliverables. Each is a paper-vs-real condition in the framework this research applies throughout: codified planning assumptions on paper that the operating environment does not support under disruption.

Workforce is not modeled as a primary constraint. Frameworks that assume required personnel will be present and functional systematically underestimate the household dependencies that make that assumption false under disruption.

Household dependencies are absent from infrastructure and mission planning models. The systems that sustain households and the systems that sustain installations are the same systems. Planning that models one without the other cannot accurately predict how disruption propagates.

Time-to-recovery assumptions are consistently optimistic. The Days 0–14 window must be planned as a period of near-complete self-reliance. Arctic geography and competing demands make shorter timelines unrealistic.

Informal coordination networks are invisible in formal frameworks. The mutual aid and community-coordination systems documented in the Tribal and Alaska Native Resilience Assessment provide genuine resilience, but their degradation under sustained stress is equally invisible until it is too late to compensate.

Human services are not treated as operational dependencies. Childcare, healthcare, and social support are the enabling infrastructure for workforce participation. Plans that exclude them cannot execute because the workforce those plans depend on cannot function without them.

Bottom Line: Family readiness in the Arctic is inseparable from infrastructure performance and workforce stability, and it operates as a force degrader on mission outcomes when degraded across the three populations examined in this research. Human-system dynamics are not secondary considerations; they are central drivers of system resilience and operational feasibility under Arctic conditions, and the paper-vs-real gap between codified family readiness frameworks and the operational support capacity available under disruption is the analytical condition this deliverable identifies as most consequential for mission assurance planning.

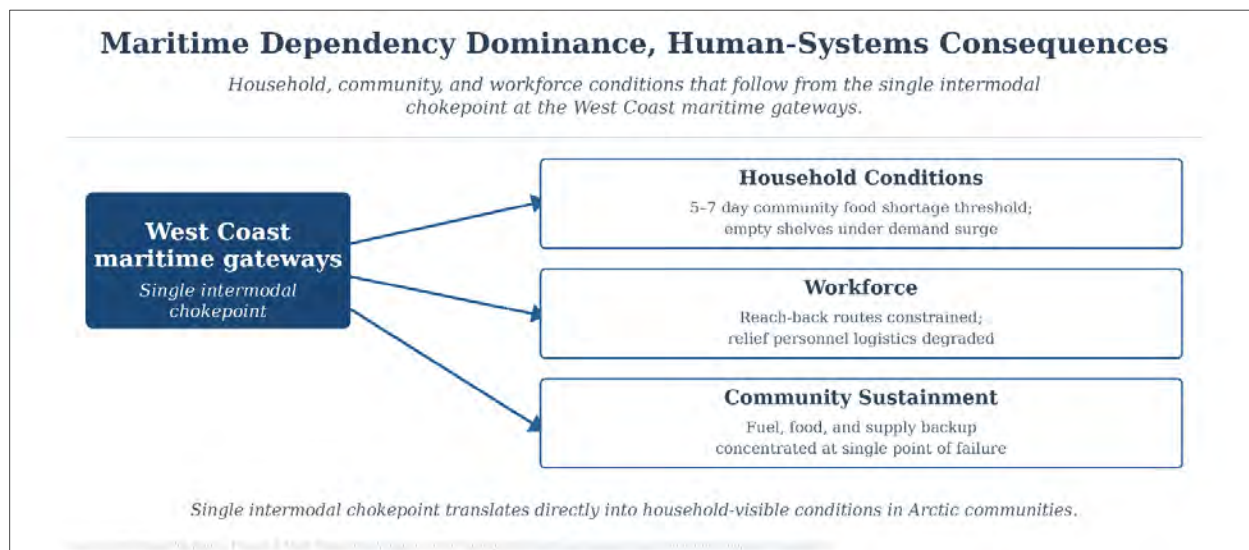
INFRASTRUCTURE & MULTI-MODAL SUSTAINMENT SNAPSHOT

This section examines the multi-modal sustainment environment through which the human-systems consequences traced elsewhere in this research arrive at households, communities, the workforce, and installations. The structural infrastructure analysis is the work product of the companion study; what follows reads infrastructure conditions through the human-systems lens.

Maritime Dependency Dominance

Alaska's supply architecture has no realistic multi-modal alternative. The infrastructure conditions that produce this dependency, including the consolidation of statewide inbound freight and fuel at the Port of Alaska, the absence of a continental rail connection, and the absence of a deep-draft northern port, are examined in the companion study; what matters is that maritime dependency propagates into household, family, workforce, and installation consequence within days, not weeks, of disruption.

When maritime throughput degrades, community-level shortages follow within days across the three populations. The Food Security and Access subsection reconciles the buffer figures and the differential vulnerability pattern; what matters here is that household-level food and fuel shortages are the mechanism through which maritime disruption becomes operational degradation, and that all three populations depend on the same single intermodal hub.



Visual showing household, community, and workforce conditions cascading from the single intermodal chokepoint at the West Coast maritime gateways.

Airlift Limitations: Not Scalable

Aviation is the mode most frequently cited in contingency planning as the alternative when maritime routes are disrupted. The evidence is consistent: airlift cannot substitute for maritime cargo volumes at scale. The historical record on aviation-based sustainment under primary-infrastructure denial, including the Berlin Airlift case and the throughput constraints it establishes, is developed in the companion study, where the structural analysis of airlift capacity, fuel dependencies, and crew availability under Arctic conditions is the work of that study's sustainment analysis.

What matters for this research is what the airlift constraint produces at the human-systems level. Arctic airfields are simultaneously constrained by weather, fuel availability, maintenance capacity, and crew availability. When maritime disruption constrains fuel supply, it constrains aviation at the same moment. Every cargo flight also competes with medical evacuation and operational staging for limited airfield capacity, and medical evacuation is itself a contested resource across the three populations, as developed in the Medical Capacity subsection: the assets that could move a service member's dependent to higher-acuity care are the same assets that could move a rural community member or a tribal patient, and the prioritization decisions are not pre-adjudicated. Aviation can prioritize high-value, low-volume cargo during the acute phase. It cannot sustain a population.

Overland: ALCAN Constraints

The ALCAN is the primary overland contingency and the one most frequently overstated in planning documents. The sustainment mode hierarchy developed in Scenario Conditions identifies it as a constrained-redundancy mode operating at approximately 350 vehicles per day against a theoretical lane capacity an order of magnitude higher, with approximately 1,200 miles of Canadian transit creating sovereign decision points U.S. planning cannot resolve unilaterally.

For this research, the ALCAN constraint is the human-systems consequence of overestimating its capacity. Planning frameworks that assume the ALCAN can substitute for disrupted maritime supply commit governance and household decisions to a transportation mode whose practical surge capacity cannot meet community-level demand at the volume or speed Arctic communities require. The Interior Alaska communities along the ALCAN corridor, including the Doyon land base that the Tribal and Alaska Native Resilience Assessment identifies as central to any cross-border surge planning, absorb the consequences of those overestimates first. Fuel deliveries by tanker truck carry a fraction of maritime volume at higher cost over longer timelines, and the cross-border sovereignty dimension means that even the limited capacity the ALCAN provides operates under decision points that U.S. planning cannot unilaterally resolve. [23 ;52]

Civilian vs Military Competition Across Modes

Each constrained mode produces direct civil–military resource allocation tension, and the tensions are structurally identical to the food, workforce, medical, communications, and governance tensions developed in detail in the Civil–Military Resource Allocation Tensions section. Aviation airfield capacity, fuel, and crew availability are shared between military cargo flights and civilian medical evacuation, civilian resupply, and operational staging. Maritime port prioritization can delay civilian resupply for the communities that supply the installation workforce, propagating into the household-level food and fuel access that the Food Security and Access subsection documents at canonical depth. ALCAN throughput is shared between military convoys and commercial supply, and the Canadian sovereignty dimension introduces a governance layer that U.S. planning cannot resolve unilaterally.

There is no predefined framework for adjudicating these competitions. [12; 16] Under the dual-theater scenario, allocation decisions will be made by installation commanders, state officials, tribal governments, and commercial operators without shared authority or shared frameworks; those uncoordinated decisions operate as a force degrader through the Days 3–7 governance inflection window.

Key Insight: Civil–military competition for constrained transportation modes is the multi-modal expression of the resource allocation tensions developed throughout this research. The absence of pre-adjudicated frameworks for resolving competing legitimate claims from the three populations is the structural condition that determines whether multi-modal disruption stays manageable or cascades by Days 7–14.

Civilian–Military Mode Competition Matrix			
Points across maritime, aviation, and overland modes where civilian sustainment requirements and military mission requirements draw on the same constrained capacity.			
	Maritime	Aviation	Overland
Civilian Sustainment	Bulk supply (fuel, food, goods) no pre-established adjudication	Charter cargo; seasonal access no pre-established adjudication	ALCAN-dependent freight no pre-established adjudication
Military Mission	Pre-positioned stocks; sealift no pre-established adjudication	Airlift; force projection no pre-established adjudication	Force movement; resupply no pre-established adjudication

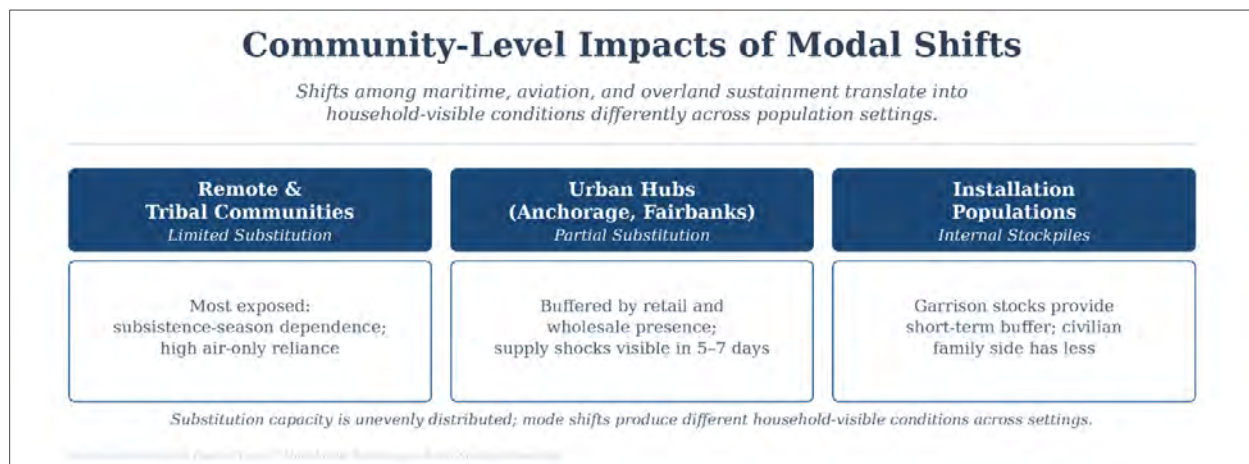
Civilian and military demand on the same constrained capacity; no pre-established adjudication anywhere across the matrix.

2×3 matrix rendering points across maritime, aviation, and overland modes where civilian sustainment and military mission requirements compete for the same constrained capacity, with no pre-established adjudication flagged in each cell.

Community-Level Impacts of Modal Shifts

Modal-shift consequences fall differentially across the three populations examined in this research. Rural and remote communities, most dependent on maritime barge delivery and furthest from aviation and overland alternatives, experience the deepest household-level shortages first, and they experience them through the seasonal asymmetry developed in Scenario Conditions: a disruption occurring during or after the fall barge cycle operates against communities that cannot receive bulk resupply by the primary delivery mode until spring. Alaska Native and tribal communities at the end of logistics chains face these conditions with the least institutional access to federal assistance programs the GAO documents and with the most developed real-redundancy resilience capacity through subsistence, mutual aid, and traditional governance that the Tribal and Alaska Native Resilience Assessment documents under the sovereignty, consent, and reciprocity protocol. The dual character of tribal communities, as populations of both high baseline vulnerability and high resilience capacity, operates inside modal-shift consequence as forcefully as anywhere in this report.

Military families living off-post face identical conditions to the civilian communities around them; there is no separate supply chain that insulates them. Installation commissaries, themselves dependent on disrupted maritime supply, cannot absorb the demand increases that surrounding community shortages produce. The civilian and contractor workforce supporting installations lives in the same communities, faces the same modal-shift consequences, and absorbs the same household-level disruption that propagates into workforce absenteeism, installation service degradation, and the workforce-family feedback loop developed in the Family Readiness and Human Factors section.



Three-column visual showing how modal shifts translate into household-visible conditions across remote/tribal communities, urban hubs, and installation populations.

Energy Through a Societal Lens

Energy disruption reaches households first and longest. Heating fuel shortage in Arctic winter conditions is a life-safety event, not a comfort question. The companion study documents the structural fragility of Alaska's energy architecture; this research documents what that fragility produces at the human-systems layer across the three populations examined.

When energy systems degrade, the household-level consequences activate simultaneously: heating loss in cold weather, water and sanitation system failure where pumping depends on power, refrigeration loss for food and medication storage, and communications loss when household connectivity depends on charged devices. For military families living off-post, for the civilian and contractor workforce supporting installations, and for the tribal and Alaska Native communities whose stability stabilizes the regions in which Arctic installations operate, energy disruption is not separable from household viability. For tribal and rural communities specifically, the consequence is the life-safety threat developed in the Tribal and Alaska Native Resilience Assessment's Continuity Constraints section: heating is not optional, and the populations whose resilience depends on hybrid supply systems bear the consequences of fuel diversion disproportionately.

The implication for installation operations is direct. The same workforce that operates installation logistics, food service, transportation, and maintenance is absorbing the household-level energy disruption alongside their service-member or DoD civilian colleagues. Workforce availability under energy disruption is not a function of commute logistics. It is a function of whether the workforce's homes are habitable, and the workforce-family feedback loop developed in Family Readiness operates as a force degrader on installation operations through this household-habitability variable.

Food Through a Societal Lens

Food disruption reaches communities through panic purchasing, hoarding, and household stress before it reaches installation commissaries through resupply degradation. The household-visible empty-shelf timeline documented in the Food Security and Access subsection of Civil–Military Resource Allocation Tensions emerges within the three-to-seven-day retail warehousing window under winter conditions, and effective availability under demand surge collapses toward the two-to-three-day figure. Within this window, household-level stress produces workforce absenteeism, school disruption, and the family-readiness erosion this research documents throughout.

Emergency feeding architectures provide partial mitigation but are constrained by the same single-pipeline distribution system that supplies the commercial food system, the paper-redundancy condition applied to emergency feeding governance developed in Food Security and Access. The state's Mass Care Group Feeding Support Operations Guide identifies commercial partners and feeding protocols, but those protocols draw from the same upstream supply that is disrupted at scenario onset. [48] The implication for installation populations is that household-level food access cannot be separated from community-level food access. Military families, off-post DoD civilians, the contractor workforce, and the surrounding civilian communities participate in the same food

distribution architecture, and Alaska Native communities with active subsistence systems hold a real-redundancy capacity that the broader population does not though it is bounded by seasonal access and not scalable to the statewide population level.

Communications Through a Societal Lens

Communications disruption is the master dependency that compounds every other failure mode, and the Communications Integrity subsection develops it as a force degrader that propagates through the family structure simultaneously from three directions: the household information environment, the Family Readiness System digital architecture, and cohort-level coordination among the thirteen-to-thirty demographic most needed for civilian surge capacity. The structural communications analysis is examined in the companion study; this research traces what communications degradation produces at the household, family, and workforce levels.

Family readiness depends on communications. Spouse-to-deployed-service-member contact, school-to-home coordination, employer-to-workforce coordination, household-to-utility coordination, and tribal-to-state coordination all run on the same commercial telecommunications and satellite infrastructure that disruption degrades. When communications fail, family readiness mechanisms that were already eroded by the FRG decline lose the digital substitute that had partially compensated. The research documents that family-side communications loss reaches readiness through three pathways simultaneously: degraded service-member focus on mission, increased non-deployability driven by household-level uncertainty, and the morale impact of prolonged separation without contact pathways.

The generational preparedness gap documented in the Family Readiness and Human Factors section compounds the communications failure: the population most needed for community surge capacity is the population least equipped to function when digital infrastructure fails, and the three-channel family-structure propagation that Communications Integrity develops operates with particular force in rural and tribal communities where distances are greater and infrastructure more fragile.

Shelter and Local Mobility Through a Societal Lens

Shelter capacity in the Arctic is constrained by the same infrastructure conditions that constrain other lifelines. Households displaced by heating fuel shortage, household water failure, or behavioral health crisis cannot easily relocate to higher-capacity shelter; the capacity does not exist at scale, and the local mobility required to reach it is itself constrained by fuel and weather conditions.

Local mobility, the ability of community members to reach work, schools, medical facilities, food distribution, and behavioral health services, is the variable through which infrastructure disruption becomes daily-life disruption. When local mobility degrades, workforce availability degrades, school attendance degrades, and behavioral health access degrades all at once. The military and contractor workforce that drives installation operations is dependent on this same local mobility infrastructure, and the implication is the operational variable this research surfaces throughout: when household viability and local mobility degrade together, workforce availability degrades, and the cascade chain

that the Family Readiness and Human Factors section develops at the workforce-family feedback loop level operates as a force degrader on installation operations

Cascading Impact Narratives: Human Systems Dimensions

The findings developed across the preceding sections do not operate as separable variables. They cascade through a coupled human-systems architecture in which infrastructure disruption becomes household instability, household instability becomes workforce degradation, workforce degradation becomes system failure, and system failure becomes mission impact. This section traces those cascades narratively, in the operational sequence in which they emerge during the Days 0–14 window.

Cascade One: Maritime Disruption to Household Insecurity

West Coast port degradation at scenario onset reduces Alaska-bound throughput within the first 72 hours. By Day 4, food shipments from the Port of Tacoma that would normally reach Anchorage retail shelves on the fourth day are visibly delayed. Price volatility appears in local markets within Day 5. By Day 7, panic purchasing and rationing behavior emerge in communities across Southcentral Alaska, and households with limited storage, transportation, or income flexibility, the population segments the differential vulnerability framework this research applies surfaces as most exposed, begin facing food access constraints. By Day 10, the buffer in many rural and tribal communities, already thin under blue-sky conditions and developed at canonical depth in the Tribal and Alaska Native Resilience Assessment's Continuity Constraints section, is exhausted, and food insecurity becomes a community-level condition rather than a household-level concern.

The cascade does not stop at food. Heating fuel deliveries operate on the same maritime architecture, and fuel shortages produce household-level life-safety conditions in winter operating temperatures. Pharmaceutical cold-chain disruptions affect families dependent on prescription medications, including the cumulative cold-chain failure pattern developed in the Tribal and Alaska Native Resilience Assessment's Continuity Constraints section. Mail and parcel delays affect families dependent on regular delivery cadence. Each of these arrives at the household level before it arrives at the installation level.

Cascade Two: Household Insecurity to Workforce Degradation

Household-level disruption translates into workforce absenteeism through the multiple pathways developed at canonical depth in the Family Readiness and Human Factors section: childcare disruption, eldercare disruption, transportation disruption driven by fuel and weather conditions, communications disruption preventing employer coordination, and behavioral health load pulling workforce members away from work to care for household members. Each pathway operates simultaneously, not sequentially, and each reaches the civilian and contractor workforce that operates installation services, the local healthcare, public safety, and emergency response workforce on which both communities and installations depend, and the family readiness organizations, behavioral health providers, and community sustainment organizations whose own personnel are absorbing household-level disruption alongside the populations they serve.

Key Insight: Workforce degradation under Arctic disruption is not a logistics problem. It is a household-stability problem expressed through the workforce, and it operates as a force degrader on mission outcomes through the workforce-family feedback loop developed in the Family Readiness and Human Factors section.

Cascade Three: Workforce Degradation to Installation Service Failure

Installation service degradation begins within the first week of disruption. The contractor workforce that operates base food service, logistics, transportation, and maintenance is drawn from the surrounding communities and absorbs the same household disruption, the workforce-and-community coupling developed in the Workforce Availability subsection of Civil–Military Resource Allocation Tensions. The civilian DoD workforce is identically affected. The military family population living off-post is absorbing both household disruption and the family readiness erosion described elsewhere in this research.

As installation services degrade, demand on installation support functions increases simultaneously. Garrison leadership faces growing pressure to provide household-level support to military families absorbing community-level disruption. Installation medical capacity faces increased demand from dependents whose civilian healthcare access is constrained, operating within the three-architecture medical access framework developed in the Medical Capacity subsection. Installation behavioral health capacity faces surge from service members and dependents absorbing prolonged stress without external support, operating within the three-population behavioral health architecture developed in the Behavioral Health Surge Capacity subsection of Family Readiness.

The combination of degraded service capacity and increased service demand is the structural condition under which installation readiness erodes, and it operates as a force degrader on mission outcomes. It is not a logistics failure. It is a workforce-family-system failure, and it is the operational variable this research is designed to surface.

Cascade Four: Tribal and Community System Stress to Regional Instability

In parallel with the installation-facing cascade, tribal and Alaska Native communities absorb their own version of the disruption. Subsistence access constraints, fuel shortage in remote communities, communications degradation, and the loss of pre-positioned mutual aid relationships produce community-level stress that reaches the regional level when multiple communities absorb disruption simultaneously. The Tribal and Alaska Native Resilience Assessment develops the resilience architecture, including subsistence and seasonal lifeways, resource-sharing and mutual aid networks, community cohesion and governance, adaptation under infrastructure fragility, and hybrid supply systems, under the sovereignty, consent, and reciprocity framework that governs engagement with tribal authorities.

External decisions, fuel diversion, transportation prioritization, commercial supply allocation, can unintentionally collapse local resilience systems that planning frameworks do not even know exist. The Community Health Aide Program networks through which primary medical care reaches many remote communities, the village logistics arrangements that move food and fuel across last-mile distances, and the informal

coordination pathways that operate before formal systems engage all depend on enabling conditions, fuel, communications, workforce availability, that are themselves degrading. When tribal systems lose their ability to function as the early-phase stabilizers this research documents, the populations they serve become dependent on formal systems that have no surge capacity to absorb the additional load. The four ANCSA regional corporations developed in the Native Corporations as Regional Sustainment Actors subsection of the Tribal and Alaska Native Resilience Assessment are integral participants in this cascade rather than adjacent stakeholders, and engagement with them under sovereignty, consent, and reciprocity protocols is a precondition for any meaningful coordination during the Days 0–14 window.

Key Insight: The cascade pathways do not run in series. They run in parallel, and they reinforce each other. The Days 0–14 window is the period during which all four cascades activate simultaneously across the three populations examined in this research, and the absence of pre-established coordination capacity is the structural condition that determines whether any of them can be contained before they reach mission impact.

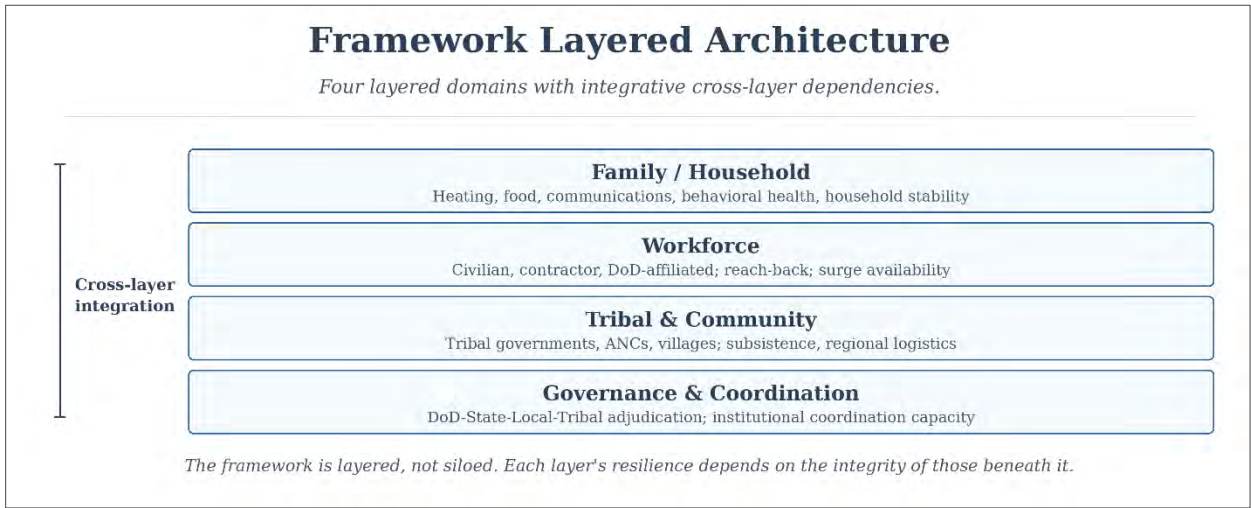
Cascade Five: Governance Authority Gap to System-Wide Failure

Underlying all four operational cascades is the governance authority gap, the paper-vs-real condition this research applies most forcefully to Arctic mission assurance. The absence of pre-established protocols for adjudicating competing civilian and military claims on scarce resources, developed at canonical depth in the Governance Tension Under Scarcity subsection of Civil–Military Resource Allocation Tensions and in the Governance Friction Points section of Civil–Military and Governance Mapping, means that each of the four cascades runs without a coordinating mechanism that could slow or contain it. Resource allocation decisions are made under time pressure by actors holding partial authority, with incomplete information, and without the relational infrastructure that would allow coordination across sectors and jurisdictions. Each uncoordinated decision compounds the next.

The Days 3–7 governance inflection window is the period during which this fifth cascade either activates the others or constrains them. Decisions that allocate fuel to installation operations without recognition of household heating implications, that prioritize military airlift without recognition of medevac and food resupply implications, that draw on the civilian and contractor workforce without recognition of household-level conditions, and that proceed without sustained engagement of tribal authorities under sovereignty, consent, and reciprocity, accelerate every other cascade in the system. The governance authority gap is the cascade amplifier this research identifies as the most consequential planning gap in current Arctic mission assurance frameworks, and it operates as a force degrader on mission outcomes when adjudication fails.

PRELIMINARY MULTI-MODAL RESILIENCE FRAMEWORK

The Preliminary Multi-Modal Resilience Framework integrates findings across scenario development, civil–military and governance mapping, tribal and Alaska Native resilience, family readiness and human factors, infrastructure and sustainment analysis, and stakeholder engagement into a unified model for Arctic homeland defense. The framework identifies the layers that must be preserved under disruption, the design principles that should guide investment, the cost–benefit logic for prioritization, and the integrated model that grounds the recommendations developed in the next section.



Visual rendering of the four framework layers with cross-layer integration bracket.

Framework Proposition

The framework is built around one central proposition: Arctic resilience is the ability of communities, installations, and shared civil–military systems to absorb disruption, prioritize scarce resources, sustain essential human needs, and preserve operational continuity during the Days 0–14 window without assuming rapid external relief. Under this framing, resilience is not simply redundancy in infrastructure. It is the combined performance of five interdependent layers, each operating across the three populations examined in this research, military, civilian and contractor, and Alaska Native, under the differential vulnerability framework and the sovereignty, consent, and reciprocity protocol that govern engagement across the populations. The paper-vs-real distinction this research applies throughout operates as the central analytical lens through which the framework distinguishes layers that exist on paper from layers that produce operational capacity under disruption.

Framework Layers

Layer 1: Governance and Scarcity Management

Governance under Arctic disruption is the layer through which authority, priority, and resource allocation are adjudicated across the four-tier authority architecture developed in the Authority Structure section: DoD installation and garrison, State of Alaska, local governments, and tribal governments. Its adequacy determines whether scarcity is managed with speed, consistency, and legitimacy, and its failure operates as a force degrader on mission outcomes during the Days 3–7 governance inflection window when decisions either contain the cascade or accelerate it. Key capabilities include pre-established adjudication mechanisms for cross-tier resource allocation, multi-authority coordination frameworks operating under the sovereignty-consent-reciprocity protocol with tribal authorities, information-sharing protocols supporting situational awareness under time pressure, exercised procedures tested before disruption rather than during it and sustained relational infrastructure across the four tiers developed before the disruption window opens. Failure modes are developed at canonical depth in Governance Tension Under Scarcity and Governance Friction Points: the absence of pre-agreed prioritization mechanisms producing ad hoc allocation under stress; overlapping authorities without pre-coordinated decision rules creating friction at the moments when speed is most operationally critical; and coordination capacity that exists on paper but has not been exercised failing when activated under time pressure, the canonical paper-vs-real condition applied to governance.

Layer 2: Human Factors and Family Readiness

Human factors are the transmission layer through which infrastructure disruption becomes workforce degradation and system failure. Household stability determines workforce availability; workforce availability determines system function. The workforce-family feedback loop developed at canonical depth in the Family Readiness and Human Factors section operates as a force degrader on mission outcomes, and the canonical three-population differential framework operates within this layer as forcefully as in any other. Key capabilities include resilient family readiness architecture operating without dependence on the connectivity that disruption degrades, hybrid public-private-nonprofit family support models that absorb load when formal channels weaken, behavioral health surge capacity bridging the military, civilian, and tribal systems through which Arctic populations actually receive care, household-level preparedness extension to populations currently underserved including the thirteen-to-thirty demographic developed in the Generational Preparedness Gap as an Operational Variable subsection, and integrated workforce-family planning that treats household stability as an operational variable. Failure modes are developed at canonical depth in Family Readiness and Human Factors: FRG erosion compounding the loss of communications and proximity simultaneously; behavioral health saturation preventing surge across the three-population behavioral health architecture; and the workforce-family feedback loop accelerating without interruption during the Days 0–14 window.

Layer 3: Critical Infrastructure and Lifeline Performance

Critical infrastructure performance, the integrity of fuel, energy, communications, transportation, medical supply, and food distribution systems, is developed at canonical analytical depth in the companion study; this framework treats it as a layer through which the human-systems consequences this research traces are produced. Key capabilities are named here for completeness, with each anchored to the human-systems consequence it protects rather than to the infrastructure capability itself: fuel storage and pre-positioning, which protects household heating viability, workforce availability, and the hybrid supply systems on which tribal community resilience depends; heat-energy resilience, which protects life safety in Arctic winter conditions and workforce home habitability; multi-layer communications redundancy, which protects the three-channel family-structure propagation pathway developed in the Communications Integrity subsection; healthcare and behavioral health surge capacity, which protects the three-population medical access framework developed in the Medical Capacity subsection; and the human-services infrastructure including childcare, eldercare, and food assistance, which protects workforce participation through the workforce-family feedback loop. Failure modes are developed at canonical depth in the companion study and operate at the human-systems level through the cascade pathways traced in the Infrastructure and Multi-Modal Sustainment Snapshot.

Layer 4: Tribal and Community Resilience Systems

Tribal and community resilience systems are operational infrastructure that extends survival timelines, stabilizes households, and buys time for formal response. The resilience architecture is developed at canonical depth in the Arctic Sustainment subsection of the Tribal and Alaska Native Resilience Assessment under the sovereignty, consent, and reciprocity protocol. Key capabilities include subsistence systems that operate as real-redundancy capacity for the communities that practice them, resource-sharing networks that function as informal logistics during the Days 0–5 window when formal logistics are unavailable, community governance and social cohesion that enable collective decision-making at speed external systems cannot match, hybrid supply systems that allow communities to adapt across multiple resource pathways within the limits set by fuel availability and seasonality, and tribal-state-federal coordination grounded in sovereignty, consent, and reciprocity that recognizes tribal governance structures as strategic assets rather than coordination complications. The four ANCSA regional corporations developed in the Native Corporations as Regional Sustainment Actors subsection are integral participants in this layer rather than adjacent stakeholders.

Layer 4 capabilities are grounded in the four community-resilience determinants identified across 25 Arctic case studies in the Stockholm Environment Institute Arctic Resilience Report [49]: capacity for self-organization, the local decision-making and coordination at speed external systems cannot match; diversity of response options, the flexibility to adapt across multiple resource pathways when any single pathway fails; integration of knowledge systems, including Indigenous knowledge, traditional resource management, and locally validated operational practice; and ability to manage uncertainty and surprise, the disposition and the institutional habits that allow communities to act effectively under conditions of incomplete information. Communities that maintain cohesion, shared governance, and adaptive practices produce measurably

better outcomes under stress; externally imposed solutions consistently underperform community-driven approaches; and place-based partnerships built before disruption are the structural condition under which the four determinants operate effectively. The framework treats these determinants not as background characteristics but as the specific capability set that Layer 4 investment is designed to preserve and strengthen.

Failure modes include external decisions inadvertently collapsing local resilience systems that planning frameworks do not even know exist, the loss of irreplaceable individuals holding community-critical knowledge (the workforce-as-single-point-of-failure dynamic developed in the Continuity Constraints section), and the generational preparedness gap converting potential surge capacity into additional demand.

Layer 5: Multi-Modal Sustainment Pathways

Multi-modal sustainment pathways describe the hierarchical transportation architecture through which Arctic sustainment operates: maritime primary and load-bearing, aviation non-scalable, ALCAN constrained redundancy, last-mile fragile. The substitution limits across these modes are developed at canonical depth in the Arctic Sustainment Modes section of Scenario Conditions and in the Infrastructure and Multi-Modal Sustainment Snapshot deliverable. The framework treats the substitution gap as a Layer 5 condition rather than as a planning oversight to be corrected during the disruption window, and the human-systems consequences of that substitution limit, including the differential exposure across the three populations examined in this research, propagate into the household, workforce, family, and installation outcomes the other layers operate on. Key capabilities include maritime gateway resilience, aviation capacity for medical evacuation and time-sensitive cargo recognized as a contested resource without pre-adjudicated prioritization, ALCAN throughput capacity recognizing Canadian sovereign decision points and seasonal constraints, and last-mile distribution including barge, bush aviation, Bypass Mail, and village-level mobility. Failure modes include maritime concentration risk producing statewide effects from single-node failure, aviation substitution assumptions failing because aviation cannot absorb bulk volumes at scale, and last-mile fragility compounding disruption disproportionately in remote and tribal communities.

Cross-Layer Integrative Findings

Pre-crisis posture determines Days 0–14 trajectory. The coordination capacity, resource pre-positioning, federal supply chain intelligence architecture, relational infrastructure, and community-level distribution capacity operative at Day 0 will determine whether the Days 0–14 window is manageable or cascading. The window for effective intervention closes faster than planning frameworks assume; what is not in place before disruption cannot be constructed during it.

Cascade timing is measured in days, not weeks. Cross-disaster supply chain analysis documents that post-disaster cascades reach crisis conditions within 72 hours in some operating environments and within the first week in others. The Days 0–14 Arctic framing is consistent with this observed pattern, and the Days 3–7 governance inflection window developed in Authority Structure and Governance Tension Under Scarcity is the period within which consequential decisions either contain or accelerate systemic degradation.

Concurrent stressors are plausible, not hypothetical. The dual-theater scenario the framework addresses is operationally plausible through a single geophysical event independent of any adversarial scenario and is plausible through coordinated or opportunistic adversary activity given the simultaneity problem identified in the National Defense Strategy. The framework treats concurrent stressors as a planning baseline rather than a contingency.

Substitution & Redundancy Reality Check at the Human Systems Layer

Planning frameworks across federal, state, military, and commercial systems in Alaska contain coordination architectures, family readiness programs, mutual aid agreements, and tribal consultation mechanisms that exist on paper. The gap between paper coordination architectures and real coordination capacity is the determining variable in early-phase resilience. The gap operates across four domains.

Family Readiness. The Military Family Readiness System contains formal architecture: command-level family readiness officers, unit-level FRG structures, garrison family service organizations, behavioral health service lines, and community partnership programs. The FRG decline developed in Family Readiness and Human Factors has reduced the operational reach of unit-level structures; digital substitutes depend on the communications integrity that disruption degrades; and garrison and community service organizations operate at staffing levels with no surge capacity for Days 0–14 conditions. The Family Readiness System available on paper at Day 0 is not the system operationally available during disruption.

Civil–Military Coordination. The State of Alaska Emergency Operations Plan establishes the State Emergency Operations Center as the central coordination hub; DoD Defense Coordinating Officer functions integrate with the state architecture during declared emergencies; federal coordination under the National Response Framework provides additional structure. Three gaps surface at the operational layer: protocols for adjudicating competing civilian and military claims on scarce resources are underdeveloped; the relational infrastructure that allows formal protocols to function under time pressure depends on relationships built through prior collaborative work; and the federal cross-sector supply chain coordination architecture lacks a permanent entity capable of aggregating information and producing actionable allocation guidance during disruption.

Tribal Coordination. Statutory consultation mechanisms are documented in federal regulation, agency-specific consultation protocols, and tribal-state-federal coordination forums. Statutory consultation does not substitute for substantive operational engagement. Where trust-based relational infrastructure has not been built before a crisis under the sovereignty/consent/reciprocity protocol, tribal coordination pathways will not become available during one. The four ANCSA regional corporations are integral participants in this architecture, not adjacent stakeholders, and engagement under the sovereignty/consent/reciprocity protocol is the operational expression of the framework's commitment.

Behavioral Health. The three-population behavioral health architecture is developed in Family Readiness and Human Factors. On paper the architecture covers the population; in practice, civilian behavioral health systems operate at or near capacity under blue-sky conditions, military behavioral health programs face their own surge constraints, and the integration across the three architectures is partial at best. Under Days 0–14 conditions, behavioral health load increases at every level simultaneously while the systems delivering behavioral health are themselves degrading.

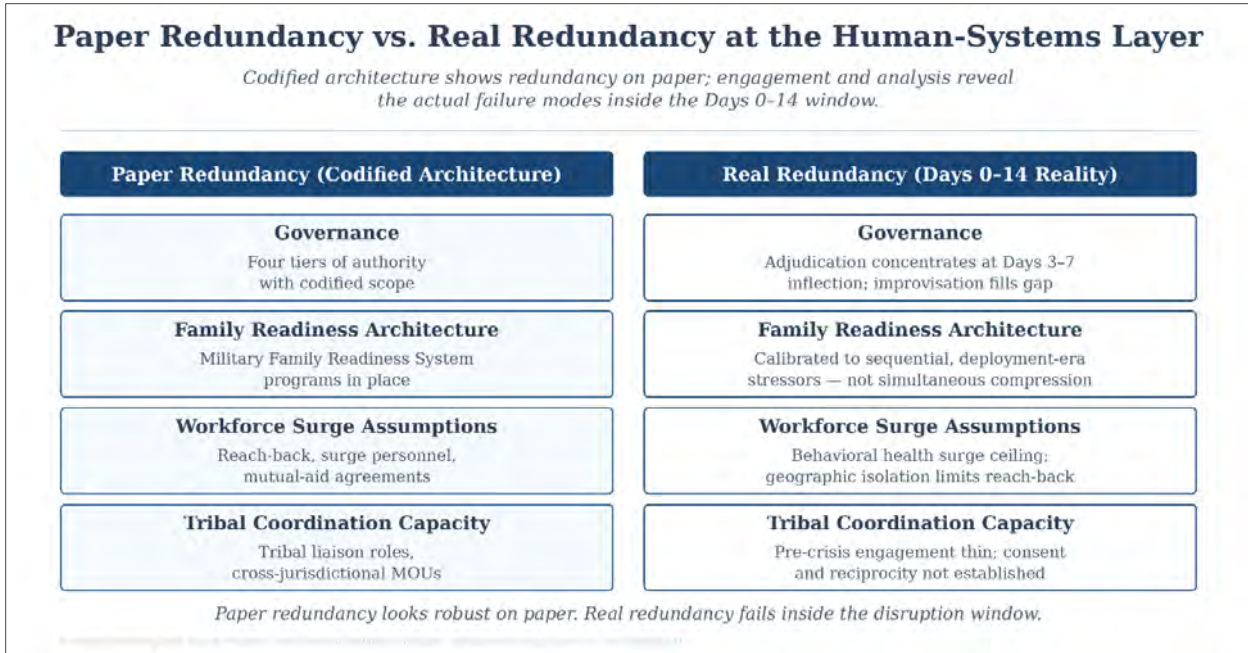
Substitution and Redundancy Reality Check at the Human-Systems Layer		
Where substitution and redundancy exist on paper versus where they are actually available inside the Days 0–14 window.		
	On Paper	In the Days 0–14 Window
Family Readiness	Multiple support programs: MFRS, MFLC, FRG, base svcs	Programs operate sequentially; do not stack under compression
Workforce	Reach-back, mutual-aid, contractor surge agreements	Behavioral health surge ceiling limits effective reach-back
Tribal Coordination	Tribal liaison roles, cross-jurisdictional MOUs	Pre-crisis engagement thin; sovereignty-consent not established
Governance	Four tiers of authority with codified scope	Adjudication concentrates at Days 3–7; improvisation fills gap

Paper-layer substitution and redundancy do not survive the Days 0–14 compression.

Source: Interim Joint Force: Project 3, Performance Pillar: Staff Readiness, Human Factors and Behavior

Two-column comparison applied to family readiness, workforce, tribal coordination and governance, paper architecture vs. Days 0–14 reality.

Key Insight: The paper-vs-real gap at the human-systems layer is not an oversight. It is the structural consequence of designing coordination architectures around peacetime operating conditions and expecting them to function under disruption conditions for which they were not exercised. Closure of that gap, across family readiness, civil–military coordination, tribal engagement under sovereignty-consent-reciprocity, and behavioral health across the three populations examined in this research, is a Days 0–14 resilience requirement, not an administrative refinement.



Side-by-side conceptual comparison applied to governance, family readiness architecture, workforce surge assumptions, and tribal coordination capacity.

Institutional Coordination as a Risk Amplifier

Institutional coordination across the four-tier authority architecture is one of the largest single risk amplifiers in the framework. Three concrete failure modes operate at this layer.

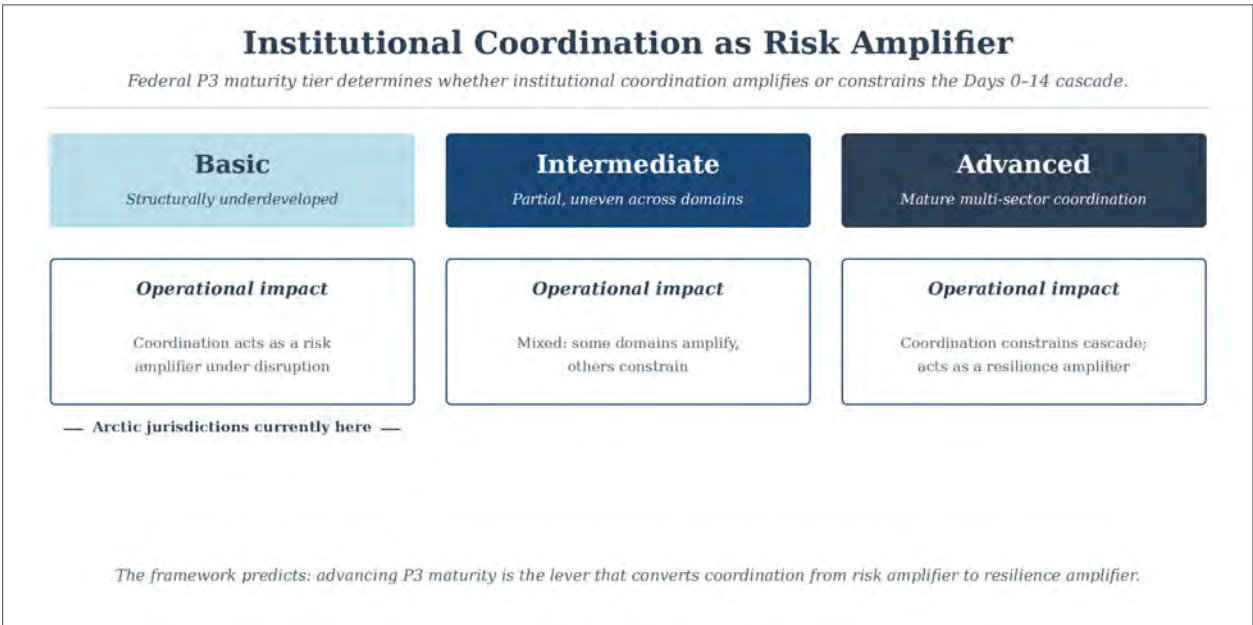
Governance Authority Gaps as Cascade Accelerants. The four-tier authority architecture (DoD installation/garrison, state, local, tribal) carries codified scope and codified bounded-outside-scope conditions; under disruption, the gap between codified scope and operational adjudication capacity is widest at the Days 3–7 inflection window when decisions must be made before the supplemental resources that could close the gaps are operationally available. Authority gaps function as cascade accelerants because they produce ad hoc allocation under time pressure, and ad hoc allocation accelerates cascade rather than containing it.

Civil–Military Friction Under Scarcity. Resource conflicts between civilian and military priorities are structurally inevitable under disruption: limited supply, competing survival claims, and no pre-adjudicated framework for resolving them. The friction is not a coordination failure to be corrected by better communication; it is the operational expression of three populations holding legitimate claims on the same constrained resources under conditions where the adjudication architecture has not been pre-established. Communications degradation amplifies the friction by removing the information environment that pre-adjudicated allocation would depend on.

Intergovernmental and Federal Cross-Sector Coordination. Coordination across federal, state, and tribal authorities depends on relationships, exercised protocols, and pre-

established information-sharing pathways that take time to build. The federal architecture lacks a permanent cross-sector supply chain coordination capability calibrated to the Arctic operating environment; FEMA's P3 framework, CISA's critical infrastructure coordination, and DoD's Defense Coordinating Officer functions each operate within their own authorities but do not aggregate into the integrated cross-sector coordination capability the dual-theater scenario requires. [27; 21; 55]

Key Insight: Institutional coordination is not a neutral variable in Arctic continuity of society. The architectures that exist on paper are necessary but not sufficient; the relational infrastructure, the exercised protocols, and the pre-established adjudication mechanisms operating under the sovereignty, consent, and reciprocity protocol are the variables that translate paper into capacity.



Three-tier ladder (Basic, Intermediate, Advanced) showing how P3 maturity determines whether institutional coordination amplifies or constrains the cascade; Arctic jurisdictions currently positioned at Basic / low-Intermediate.

Design Principles

Facilitate commercial restoration rather than substitute government distribution

Government’s most effective role during the Days 0–14 window is facilitation of commercial supply chain restoration rather than substitution of temporary government distribution for commercial flow. Government distribution capacity that consumes maritime, aviation, or ALCAN throughput that commercial operators need can actively delay restoration of the same flow it is intended to bridge.

Treat continuity of society as continuity of operations

The communities surrounding Arctic installations are the operational substrate on which defense operations depend. Resilience investment that treats community continuity as adjacent to military readiness operates on a model the workforce-family-system loop developed in this research does not preserve, and the differential vulnerability framework across the three populations examined operates across this principle as forcefully as anywhere in the framework.

Plan for Days 0–14 self-reliance

External assistance and resupply in the Arctic context arrives in days to weeks, not hours. The Days 0–14 window must be planned for as a period of near-complete self-reliance, and the Days 3–7 governance inflection window within it is the period during which consequential decisions either contain or accelerate the cascade. Investments timed to mature after Day 14 are valuable for recovery but do not affect the determinative window.

Engage tribal communities through sovereignty, consent, and reciprocity

Tribal coordination capacity is a function of pre-existing trust-based relational infrastructure under the sovereignty-consent-reciprocity protocol developed in the Engagement Protocol section of the Tribal and Alaska Native Resilience Assessment, not statutory consultation alone. External decisions must protect rather than degrade tribal resilience systems, and engagement must proceed on terms agreed by tribal participants and return usable findings to tribal participants. The four ANCSA regional corporations developed in the Native Corporations as Regional Sustainment Actors subsection are integral participants in this coordination.

Recognize human services as operational infrastructure

Childcare, healthcare, food assistance, school nutrition, behavioral health, and community-level distribution nodes are not support functions; they are the operational infrastructure through which household stability is sustained across the three populations examined in this research, and their under-resourcing is a first-order contributor to workforce degradation during disruption through the workforce-family feedback loop developed in the Family Readiness and Human Factors section.

Invest in relational and coordination infrastructure as resilience inputs

Pre-established, trust-based relationships across the four-tier authority architecture and among community actors are the substrate on which institutional scaffolding operates. Relational infrastructure cannot be improvised on defense timelines; it must be treated as a pre-disruption investment comparable in priority to fuel storage and communications redundancy, and the CRESCENT-derived finding from Governance Friction Points that formal coordination frameworks fail under disruption when interpersonal and organizational relationships have not been built during normal operations applies with particular force in the Arctic context.

Treat institutional trust as a pre-event resilience variable

Institutional trust is not generated in the moment of crisis by competent communication. It is accumulated over time through demonstrated responsiveness, equitable treatment, and consistent delivery on commitments. [10; 24; 61] Populations whose trust in military,

government, and emergency-management institutions has been eroded by prior experiences of inequitable treatment, broken commitments, or consultation without action will not generate the cooperative behavioral responses that plans assume under stress. Institutional trust is therefore itself a paper-vs-real condition: paper trust documented through statutory consultation does not produce real trust unless it is accumulated through pre-crisis relational investment. The implication for Arctic mission assurance is direct: the quality of community response to official guidance during disruption is largely determined by relational and institutional investments made before the disruption, not by message design or communication channel optimization during it.

Cost-Benefit Posture

Resilience investments are organized across three tiers by cost–benefit logic, ordered by the ratio of operational impact to capital requirement. Tier 1 captures the investments with the highest return: capabilities that strengthen more than one layer at once, leverage existing infrastructure and relationships rather than requiring new construction, and can begin operating within months of investment if resourced. Their capital costs are modest relative to the cascade-prevention value they generate. Tier 2 captures high-impact investments within a single layer, targeted capabilities that close specific gaps and produce substantial value within their domain but do not deliver the cross-layer multiplier of Tier 1. Tier 3 captures specialized or longer-horizon capabilities with higher capital requirements, longer time-to-impact, or narrower applicability; these are important for sustained resilience but assume Tier 1 and Tier 2 foundations are in place. The table that follows lays out the priority investments at each tier. The sequencing matters: the research identifies Tier 1 as the lever that converts coordination from a risk amplifier into a resilience amplifier, and Tiers 2 and 3 produce their full return only once that foundation is established.

Cost-Benefit Posture: Resilience Investment Tiers

Resilience investments organized by cost-benefit logic; Tier 1 strengthens multiple layers at once.

Tier	Investment Logic	Priority Investments
Tier 1 <i>Cross-layer</i>	Highest ratio of operational impact to capital requirement. Strengthens more than one layer simultaneously. Capital costs are modest relative to cascade-prevention value. Leverages existing infrastructure and relationships. Can begin operating within months of investment if resourced.	- Fuel storage and heat-energy resilience - Civil-military prioritization protocols - Multi-layer communications redundancy - Pre-disruption relational infrastructure with tribal, state, local, and installation partners under the sovereignty-consent-reciprocity protocol - Federal cross-sector supply chain intelligence integration - Formal coordination architecture investment
Tier 2 <i>Single-layer</i>	High-impact within a single layer. Targeted investments that close specific capability gaps. Substantial value within their domain, but do not produce the cross-layer multiplier of Tier 1.	- Workforce continuity planning for civilian and contractor populations supporting Arctic installations - Behavioral health surge capacity expansion across the three-population architecture - Household-level preparedness extension programs reaching the 13-30 demographic and other populations currently underserved by federal preparedness education - Integrated civil-military exercise series
Tier 3 <i>Long-horizon</i>	Specialized or longer-horizon capabilities. Higher capital requirement, longer time-to-impact, or narrower applicability. Important for sustained resilience but require Tier 1 and Tier 2 foundation first.	- Specialized capabilities developed in the Recommendations section - Longer-horizon infrastructure and capability investments - Multi-year resilience studies and operational piloting

Tier 1 yields the highest cascade-prevention return per dollar; Tiers 2 and 3 build on that foundation.

Sources informing this figure: Project 2 Cost-Benefit Posture analysis; stakeholder engagement.

This framework prioritizes resilience investments by their ability to reduce cascading Arctic sustainment failures while maximizing operational impact across civilian and defense lifeline systems.

STAKEHOLDER ENGAGEMENT

Stakeholder engagement methodology, instrument design, and the three engagement principles are documented in the Stakeholder Engagement Detail section. Question architecture and the core question set are documented in Appendix E. The substantive engagement findings are presented below, organized first by sector, then synthesized across sectors to identify cross-sector convergences and divergences carried forward into the Mitigation and Recommendations sections. Findings should be read through the paper-vs-real distinction this research applies throughout: engagement consistently surfaces the gap between coordination architectures, family readiness programs, continuity frameworks that exist on paper and the operational capacity those frameworks produce under disruption across the three populations examined in this research.

Sectors Engaged

Engagement across the lifeline sectors examined in this research drew on three complementary inputs: a structured survey instrument distributed across sector contacts, informal conversations with operators and subject-matter experts conducted under the three-month performance window, and a literature review of authoritative public sources, sector reporting, federal and state planning documents, and prior PSEMA engagement records. Findings in this section reflect the convergence of these inputs rather than a structured interview program; where a finding rests primarily on one input, the attribution is identified.

Energy and Fuel

The analysis examined power generation, bulk fuel, aviation fuel, heating fuel, and the single-source aviation gasoline dependency at the Port of Alaska. The infrastructure conditions that ground these dependencies, including the in-state refining capacity, the Cook Inlet natural gas depletion trajectory, and the Western Alaska diesel distribution architecture, are developed in detail in the companion study. This research surfaces the human-systems consequences of these dependencies as practitioners experience them.

The literature and operator reporting consistently indicate that stated reserve windows do not reliably distinguish between summer and winter operating conditions; reserve figures presented in days-of-supply terms frequently reflect summer or normal-season inventory cadences and do not account for the full winter window between fall barge delivery and spring breakup. This is the seasonal asymmetry developed in Scenario Conditions, surfaced at the operator level. The single-source dependency at the Port of Alaska for aviation gasoline is a structural condition documented across operator filings and state planning records, with no immediate mitigation identified. [23] Informal conversations with sector contacts reinforced the workforce constraint: trained linemen are scarce, transformer lead times have lengthened due to global supply chain conditions, and remote microgrid repair depends on a workforce that must be flown in using the same fuel that is constrained, the workforce-as-single-point-of-failure dynamic developed at canonical depth in the Continuity Constraints section of the Tribal and Alaska Native

Resilience Assessment. For tribal and rural communities specifically, fuel disruption operates as a life-safety threat developed in the same section.

Transportation and Logistics

The analysis examined ports, including the Port of Alaska and the Tacoma-to-Alaska maritime corridor, maritime carriers, trucking, and aviation cargo. The infrastructure detail behind these dependencies, including the six identified contingency port alternatives, the Alaska Railroad emergency freight activation pathway, and the ALCAN Highway pre-staging requirements, is developed in the companion study and in the Arctic Sustainment Modes section of Scenario Conditions. This research surfaces the human-systems consequences and the practitioner-level confirmation of paper-vs-real conditions.

The throughput-versus-capacity distinction was reinforced across both the literature and informal conversations with sector contacts. Port operations reporting consistently establishes that nameplate capacity figures do not reflect operational throughput under crew, equipment, or weather constraints. ALCAN reporting and informal conversations distinguished between theoretical road capacity and operational truck throughput under emergency winter conditions absent pre-staged fueling and rest infrastructure. Aviation sector reporting characterizes airlift as a constrained supplemental mode, not a substitute for maritime cargo at sustainment volumes, the framing developed at canonical depth in the Airlift Limitations subsection of the Infrastructure and Multi-Modal Sustainment Snapshot. The workforce-mobility waiver issue surfaced consistently across the literature: cross-border trucking surge along the ALCAN depends on Canadian provincial permitting, hours-of-service waiver activation, and CDL endorsement coordination that is not pre-positioned. [52]

Food and Retail Distribution

The analysis examined wholesale distribution, grocery, cold chain, warehouse operations, and the four-day Tacoma-to-shelf transit cycle. Analytical scope included the primary food service distributors operating from limited Alaska locations; the sole produce distributor operating from a single Anchorage location; and the dominant retail tier whose geographic and organizational concentration creates the single-pipeline architecture identified in the Food Security and Access subsection of Civil–Military Resource Allocation Tensions.

Sector engagement and the literature converge on the structural conditions established in Food Security and Access: the four-day Tacoma-to-shelf cycle and the absence of major in-state warehousing mean that stated reserve figures reflect inventory in transit and on shelves rather than warehouse storage, and disruption of the replenishment cycle produces shortfall faster than stated reserve windows suggest. The three-figure buffer reconciliation developed in Food Security and Access (seven-to-ten-day commercial pipeline, three-to-seven-day retail warehousing, two-to-three-day effective availability under demand surge) is operationally consistent with what practitioners describe. The single-source concentration at the wholesale tier is documented in state distribution analyses. Informal conversations with food security and emergency management contacts identified subsistence and informal provisioning systems as material to community

resilience but not visible in formal supply chain analysis, the real-redundancy capacity developed in the Arctic Sustainment subsection of the Tribal and Alaska Native Resilience Assessment for Alaska Native communities specifically. The continued dependency of state feeding operations on the same commercial pipeline whose disruption would trigger plan activation is the paper-redundancy condition documented at canonical depth in Food Security and Access and confirmed at the operator level here. [4; 48]

Communications and Data Systems

The analysis examined satellite operators, fiber networks, commercial carriers, and Arctic ground station operators. Analytical focus addressed contractual resilience commitments, network segmentation practices, cyber incident response capacity, and private-sector decision pathways for service continuity during conflict, the conditions under which the paper-vs-real condition developed in the Communications Integrity subsection of Civil–Military Resource Allocation Tensions is most directly produced at the operator level.

The literature and operator reporting establish that no single satellite architecture provides full Arctic coverage and that commercial provider service availability during conflict is a discretionary commercial decision, not a contractual guarantee. [11; 25] This is the commercial-infrastructure governance gap developed in Communications Integrity, confirmed at the operator level. Cyber incident response capacity for Arctic ground stations is documented as adequate for routine threat profiles but has not been exercised against the integrated cyber-and-jamming scenario the research models. Multi-orbit satellite redundancy is identified across the literature as the most achievable near-term communications resilience investment, with terrestrial backup systems requiring longer pre-incident investment cycles. [11] Communications degradation operates as a force degrader on every coordination pathway it touches, the canonical framing developed in Communications Integrity, and the engagement-level finding here reinforces that operator-level discretion in service availability is a structural feature rather than a recoverable contractual condition.

Medical Supply, Cold Chain, and Medical Evacuation

The analysis examined pharmaceutical distributors, cold-chain logistics, hospital systems, medical evacuation operators, Indian Health Service facilities, and Alaska Native tribal health organizations. The analytical structure treated these as lifeline dependency nodes whose failure produces nonlinear workforce and community destabilization across the three populations examined in this research. [31]

Pharmaceutical cold-chain failure under simultaneous power, fuel, and communications disruption is documented across the literature as a non-recoverable outcome within the Days 0–14 window, the cumulative cold-chain failure-mode pattern developed at canonical depth in the Continuity Constraints section of the Tribal and Alaska Native Resilience Assessment. [58; 60] Insulin, antibiotics, oxygen, and dialysis supplies are consistently identified across pharmaceutical distribution reporting as the categories where depletion produces life-threatening outcomes within days. [58; 62] Medical evacuation sector reporting establishes that aviation fuel allocation directly constrains medevac capacity and that no pre-established prioritization framework governs fuel

allocation between medical evacuation, cargo airlift, installation sustainment, and defense operational requirements, the contested-resource finding developed in the Medical Capacity subsection of Civil–Military Resource Allocation Tensions. The Indian Health Service and tribal health system facilities are integral nodes in the three-architecture medical access framework developed in Medical Capacity, and their failure would compound rather than mitigate civilian healthcare capacity gaps.

Warehousing and Distribution Nodes

The analysis examined regional hubs, intermodal staging, and pre-positioning operations. Analytical focus addressed capacity for emergency cargo prioritization, surge handling under degraded scheduling, and the relationships between commercial warehousing and the state and federal emergency response architecture that would activate under disruption conditions. The workforce-and-distribution coupling is developed at canonical depth in the Workforce Availability subsection of Civil–Military Resource Allocation Tensions and in the Food Security and Access subsection where single-pipeline architecture and absence of major in-state warehousing combine to produce the buffer compression Alaska experiences.

Workforce and Maintenance Operators

The analysis gave specific attention to the transient, seasonal, and locally rooted labor pools on which critical systems depend, and whose availability is itself dependent on community conditions including household-level access constraints and economic reserve depth that determine whether workforce members can sustain work attendance under disruption. This is the workforce-family feedback loop developed at canonical depth in the Family Readiness and Human Factors section, operating across the three populations examined in this research. The workforce concentration in small communities and the single-point-of-failure dynamic for irreplaceable individuals holding community-critical knowledge are developed in the Continuity Constraints section of the Tribal and Alaska Native Resilience Assessment.

Emergency Management and Coordination Entities

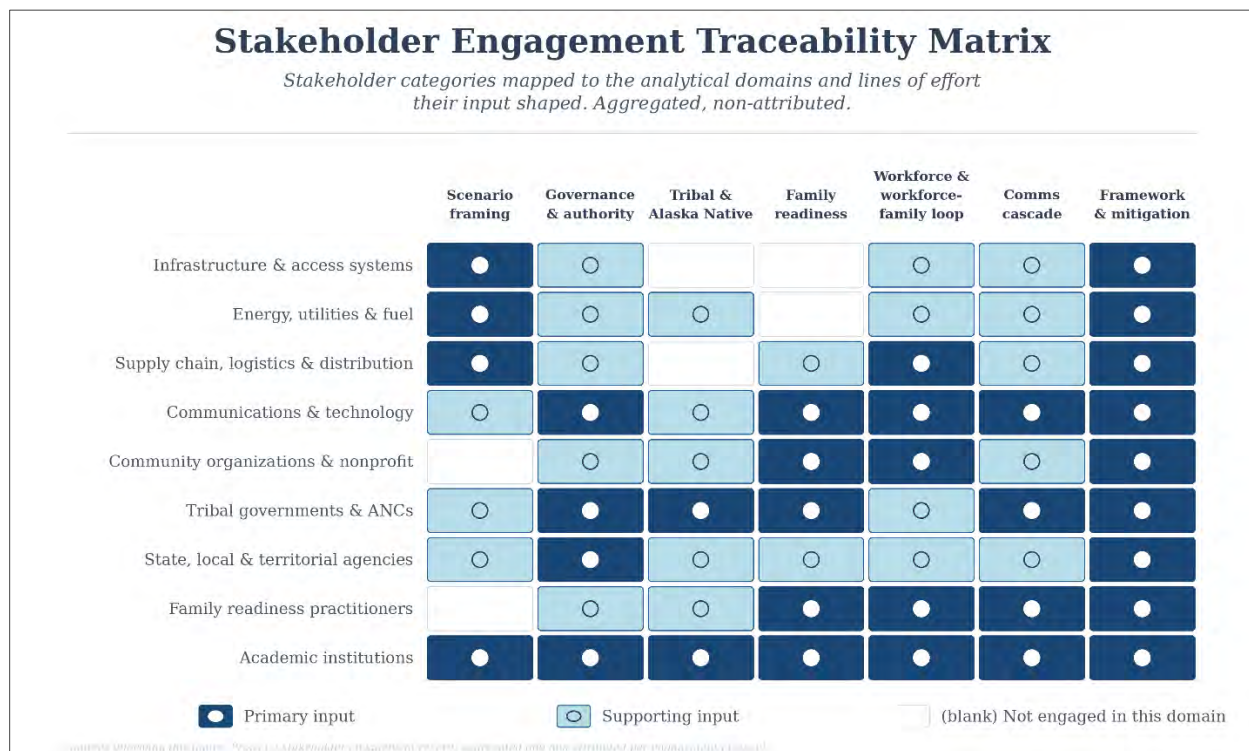
The analysis examined state, federal, and interagency coordination architectures, structured to engage with rather than duplicate existing convening bodies, including the Alaska Mass Care Group and Feeding Task Force, the Alaska Food Value Chain Coordination Council stood up in 2025 under the USDA Regional Food Systems Partnership framework, and the partnership architecture that operates under Alaska's Partnership for Infrastructure Protection. [3; 48]

The federal P3 maturity finding, that Arctic jurisdictions operate predominantly at the Basic or low-Intermediate tier of federal partnership maturity, is documented in the literature and reinforced in informal conversations with state and local emergency management contacts. [27] This connects directly to the Institutional Coordination as a Risk Amplifier subsection of the Multi-Modal Resilience Framework, where the P3 maturity tier is identified as one of the structural inputs determining whether institutional coordination amplifies or constrains the Days 0–14 cascade. The absence of pre-established civil–military adjudication frameworks for fuel, airlift, medical evacuation, and communications prioritization is a structural condition documented

across federal planning reviews and developed at canonical depth in the Governance Tension Under Scarcity subsection of Civil–Military Resource Allocation Tensions and in the Governance Friction Points section; closure of this gap requires policy and exercise investment rather than capital infrastructure. The Mass Care Group, Feeding Task Force, and Alaska Food Value Chain Coordination Council are functioning state-level coordination architectures whose integration with installation and contractor sustainment requirements is incomplete but achievable through deliberate engagement. [3; 48]

Findings in this section reflect the three-month performance window and the engagement modalities available within it. Validation through structured stakeholder engagement, including direct interviews with operators across the sectors examined and direct engagement with tribal partners under the sovereignty, consent, and reciprocity protocol established in the Tribal and Alaska Native Resilience Assessment’s Engagement Protocol section, is identified in the recommendations as a near-term follow-on requirement.

Engagement was distributed across the analytical domains examined in this research; substantial inputs concentrate around cascade dynamics, sector interdependency, risk mitigation, and recommendations shaping. The summary below documents the stakeholder categories engaged and the input domains each contributed.



Matrix showing which stakeholder categories contributed to which analytical domains and recommendation lines of effort.

Stakeholder Engagement Sectors and Inputs

Stakeholder Category	Input Domains	Engagement Intensity
Maritime & port operators	Cascade dynamics, sector interdependency, risk mitigation, recommendations	Substantial
Logistics & 3PL providers	Cascade dynamics, sector interdependency, risk mitigation	Substantial
Energy & fuel distributors	Sector interdependency, risk mitigation, recommendations	Substantial
Telecom & satellite providers	Cascade dynamics, risk mitigation	Substantial
Healthcare & EM organizations	Risk mitigation, recommendations shaping	Substantial
Tribal & Alaska Native organizations	Recommendations shaping (risk amplifier framing)	Moderate to substantial
DoD installation liaisons	Sector interdependency, workforce & operations	Substantial
Cross-border (US–CAN) entities	Cascade dynamics, sector interdependency	Moderate

Cross-Sector Assumption Misalignments

The most analytically valuable findings from the engagement were the cross-sector assumption misalignments, the seams at which operators from adjacent sectors held incompatible beliefs about each other's behavior under disruption. These misalignments are operator-level expressions of the paper-vs-real condition this research applies throughout: assumptions documented on paper across sectors fail to align with operational capacity those sectors describe under disruption. Three categories of misalignment recurred consistently across the engagement.

First, downstream operators consistently overestimated the resilience of upstream supply chains. Fuel distributors assumed that maritime delivery cycles would adjust to disruption faster than maritime operators believed they could. Healthcare operators assumed pharmaceutical distribution networks would prioritize Alaska medical supply over other regions; pharmaceutical distributors did not confirm that prioritization would occur absent specific pre-incident agreement. Installation logistics personnel assumed commercial cargo prioritization would account for defense sustainment requirements; commercial carriers confirmed that defense priority is not built into their routine cargo allocation logic.

Second, regulatory and waiver pathway assumptions were inconsistent across operators. Some assumed Jones Act waivers would be available reactively under disruption conditions; the FEMA Restoring Flow guide and the operators with direct waiver experience confirmed that waiver readiness is a pre-incident planning capability. Some assumed Canadian provincial waivers for ALCAN trucking surge would be expedited under emergency conditions; ALCAN operators identified specific procedural and documentation requirements that have not been pre-positioned. [28]

Third, communications continuity assumptions diverged significantly across sectors. Operators dependent on commercial satellite communications generally assumed service availability under disruption conditions; satellite operators acknowledged the discretionary character of service continuity decisions during conflicts and the structural absence of governance frameworks requiring service preservation. This misalignment is particularly consequential because it produces a coordination failure mode in which downstream operators continue to operate under invalidated communications continuity assumptions while the system they depend on has already begun degrading service. Communications failure operates as a force degrader across every other lifeline category, and the misalignment between downstream operator assumptions and upstream operator behavior is the mechanism through which that force-degrader effect compounds at the cross-sector level.

Engagement Findings Carried Forward

Three engagement findings are carried forward into the Mitigation and Recommendations sections that follow. First, the paper-vs-real condition is confirmed at the operator level across multiple sectors, validating the Substitution and Redundancy Reality Check at the Human Systems Layer developed in the Multi-Modal Resilience Framework as an operationally grounded conclusion rather than a documentary inference. Second, the master-dependency role of energy is confirmed by operators across sectors, reinforcing the prioritization of fuel and energy resilience as the highest-return Tier 1 investment category developed in the Cost-Benefit Posture. Third, the absence of pre-established civil–military coordination frameworks is identified by emergency management and lifeline operators as the single most consequential governance gap, validating coordination architecture and P3 development as the highest-return, lowest-capital-cost mitigation category available within the current planning window, the framework finding that operates as a force degrader on mission outcomes when adjudication fails.

Question Architecture

The structured question framework was organized around six analytical emphasis areas, Failure Pathways, Throughput and Capacity Constraints, Resource Competition and Prioritization, Time Sensitivity, Substitution and Operational Reality, and Governance and Authority Gaps, each calibrated to the dual-theater scenario and tied to a canonical home subsection in the body of this report. The full question framework, including the six-area probe lines and the core question set, is in Appendix E.

Synthesized Findings

The synthesis below presents the engagement findings organized by analytical emphasis area. The April 30, 2026, extended response deadline closed the engagement window for the analysis carried into this report; where stakeholder input materially extends, qualifies, or contradicts literature-derived findings, that integration is reflected in the relevant analytical section rather than as a standalone block of practitioner data. The structured survey instrument produced thematic insights rather than statistically representative response percentages; convergent themes across survey responses, informal conversations, and literature are reported here, not calculated response rates.

Convergence on the Days 0–14 Cascade Pathway

Across sectors, three operational concerns emerged with unusual consistency: transportation and logistics interruption as the earliest warning sign that infrastructure has begun to degrade; workforce shortages and absenteeism as the binding constraint on whether operations continue; and communications and IT system disruptions as the third recurring concern. The recurring sequence walks the cascade from the outside in: external transportation degrades first, internal workforce availability follows, and the coordination layer that would normally compensate is itself degraded by communications loss. No sector framed its own internal capacity as the cascade entry point, the cascade is overwhelmingly described as exogenous, originating in shared infrastructure and propagating inward.

Practitioners describe fuel, power, and communications as failing together because they share underlying infrastructure, validating the analytical position that failure is convergent rather than sequential. The most distinctive practitioner characterization comes from emergency management consulting, which frames communications loss as the cascade amplifier that "force[s] organizations to make choices with bad information." A long-horizon dimension surfaced from the engineering and hazard mitigation sector worth flagging: practitioners describe post-event population displacement as a cascading consequence that does not reverse, communities depopulated under prolonged disruption may not return, converting an acute incident into permanent demographic loss.

Convergence on the Human-Systems Variables that Determine Cascade Trajectory

Engagement consistently surfaces the workforce, family readiness, tribal coordination, communications, and behavioral health as the variables through which infrastructure disruption becomes operational degradation. The civilian and contractor workforce that operates installation support functions emerged as the population most consistently identified as the operational point of failure; this workforce is drawn from the surrounding communities, lives in the same housing stock, and depends on the same supply chains as their non-DoD-affiliated neighbors. Garrison leadership reported that workforce stability under disruption is the variable most likely to determine whether installation services hold or fail, and that current planning frameworks underweight it systematically. Family readiness practitioners confirmed that the FRG decline is

operationally consequential and that hybrid public-private-nonprofit-tribal models are the operational priority for rebuilding family readiness.

Tribal practitioners described the engagement gap directly: statutory consultation is not engagement, and engagement that occurs only when the federal or state system has a request to make is not engagement at all, pre-crisis investment in coordinated outreach, in tribal participation in exercises and planning workshops, and in sustained presence at existing coordination forums is the only mechanism through which tribal coordination becomes operationally available. Communications degradation was identified across all stakeholder populations as the failure mode that compounds every other failure mode, with family readiness organizations, garrison leadership, tribal practitioners, and state emergency management each identifying loss of communications in their specific domain as the variable most consequential to operational continuity. Behavioral health practitioners identified surge capacity as the operational ceiling on workforce sustainment: the three-population behavioral health architecture operates at or near capacity under blue-sky conditions, and Days 0–14 conditions produce simultaneous demand surge while the systems themselves degrade.

Practitioners Already Know the Architecture They Need

A consistent observation across stakeholder engagement was that practitioners, across military, civilian, tribal, and nonprofit roles, already know what coordination architecture would be operationally useful. The recommendations that emerged are not novel discoveries; they are operational asks articulated repeatedly across prior crises that have not been resourced or sustained between them. Pre-staging civil–military coordination protocols, hardening family communications, exercising paper governance architectures, building hybrid family readiness models, and engaging tribal partners under sovereignty/consent/reciprocity were each identified by multiple stakeholder populations as actions that have been recommended before and remain incomplete. The implication is that the recommendations advanced in this research are not asking the planning system to discover new actions; they are asking it to resource, sustain, and exercise actions that practitioners have already identified, and to do so before the next disruption rather than after it. This is the operational expression of the paper-vs-real lens established earlier: the architecture that exists on paper is not the architecture that exists in operational practice, and the closure of that gap is the analytical foundation of the recommendations developed in the next section.

Key Insight: Stakeholder engagement consistently confirms the analytical findings developed across the deliverables. Practitioner reality and analytical framing converge on the same set of operational priorities, the same Days 0–14 focus, the same human-systems resilience requirements, and the same paper-vs-real condition operating across the three populations examined in this research under the sovereignty, consent, and reciprocity protocol governing tribal engagement. The convergence is not a validation of the research; it is a description of the operational environment that the planning system has not yet fully addressed.

RECOMMENDATIONS

The recommendations developed below translate the integrated findings of the seven deliverables, the Preliminary Multi-Modal Resilience Framework, and the stakeholder engagement results into specific, actionable lines of effort organized across three time horizons. Each recommendation is tagged by the five-criteria framework, Mission Impact, Cascade Risk, Time Sensitivity, Feasibility, and Dual-Use Value, and identifies the external partners responsible for the line of effort. The companion study advances infrastructure-side recommendations under its own analytical lens; the two recommendation sets are designed to integrate at the planning level, not to overlap. The tiering reflects implementation horizon rather than priority: near-term investments are not more important than long-term ones, but they are the investments that close the Days 0–14 gap before the next disruption requires those frameworks to exist.

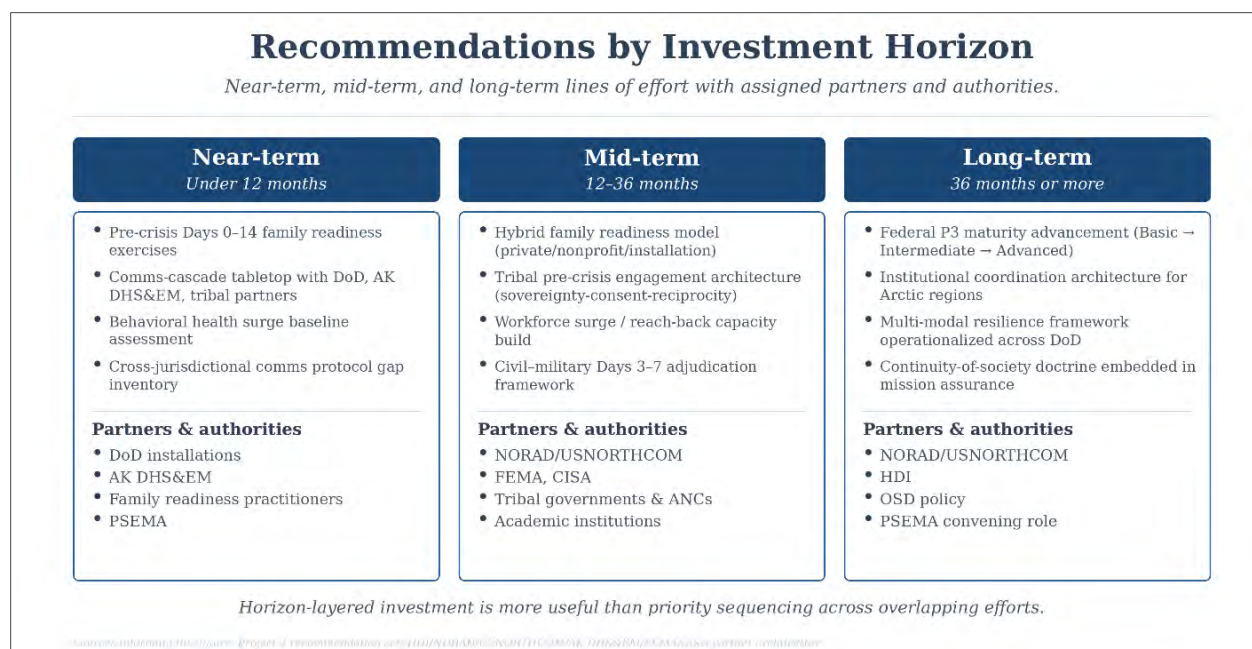
The three-tier structure reflects the analytical conclusion that Arctic mission assurance requires layered investment across overlapping time horizons rather than sequential prioritization. Near-term recommendations close gaps that the Days 0–14 window would expose immediately if disruption occurred today. Mid-term recommendations build the institutional and infrastructure capacity that converts near-term mitigations from improvisation into sustained operational architecture. Long-term recommendations identify the research, infrastructure, and coordination investments whose return is realized over multi-year horizons, but whose initiation cannot wait for those horizons to begin.

External partner identifiers used throughout this section refer to the following entities. The Homeland Defense Institute is the primary contracting and convening institution for Arctic homeland defense research priorities. NORAD and USNORTHCOM are the operational mission assurance authorities. Alaska DHS&EM is the state-level emergency management authority. FEMA holds federal authority for emergency response coordination, supply chain resilience programs, and the Public-Private Partnership maturity framework. CISA holds federal authority for critical infrastructure protection and cybersecurity coordination. Tribal governments and Alaska Native organizations hold sovereign authority over tribal lands, communities, and citizens, and operate under sovereignty, consent, and reciprocity protocols. Academic institutions, including the Ted Stevens Center for Arctic Security Studies, RAND Corporation, the Naval Postgraduate School, and university research centers with Arctic specialization, provide the analytical capacity for follow-on research and validation. PSEMA functions across these recommendations as the connective infrastructure described in the next section of this report.

Recommendations Roll-Up by Investment Horizon and Decision Authority

Near-term (under 12 months), mid-term (12–36 months), and long-term (36 months or more) lines of effort with assigned partners and authorities.

Horizon	Recommendation Line of Effort	Decision Authority / Partners
Near-term (Under 12 months)	• Pre-crisis Days 0–14 family readiness exercises. • Comms-cascade tabletop with DoD, AK DHS&EM, and tribal partners. • Behavioral health surge capacity baseline assessment. • Cross-jurisdictional communications protocol gap inventory.	DoD installations AK DHS&EM Family readiness practitioners PSEMA
Mid-term (12–36 months)	• Hybrid family readiness model (private-sector / nonprofit / installation). • Tribal pre-crisis engagement architecture (sovereignty, consent, reciprocity). • Workforce surge / reach-back capacity build. • Civil–military Days 3–7 adjudication framework.	NORAD / USNORTHCOM FEMA, CISA Tribal governments and ANCs Academic institutions
Long-term (36 months or more)	• Federal P3 maturity advancement (Basic → Intermediate → Advanced). • Institutional coordination architecture for Arctic regions. • Multi-modal resilience framework operationalized across DoD. • Continuity-of-society doctrine embedded in mission assurance.	NORAD / USNORTHCOM OSD policy PSEMA (convening role)



Tiered visual organizing near-term (under 12 months), mid-term (12–36 months), and long-term (36 months or more) recommendations with assigned partners and authorities.

Near-Term Recommendations (Under 12 Months)

Civil–Military Coordination Protocol Pre-Staging. Establish, exercise, and pre-position protocols for adjudicating competing civilian and military claims on scarce fuel, food, transportation, medical capacity, and communications under Days 0–14 Arctic disruption conditions. Build the protocols around the existing Alaska Emergency Operations Plan and Defense Coordinating Officer integration and exercise them before they are needed. The Days 3–7 governance inflection identified in the Civil–Military and Governance Mapping section is the operational window the protocols must support: decisions made during this window determine whether disruption cascades into systemic failure, and current arrangements rely on improvisation when authority, resources, and decision-making capacity are already constrained. Pre-staged protocols should cover allocation logic for each scarce resource category, explicit identification of decision authority across jurisdictions, communications protocols for cross-jurisdictional coordination when commercial communications are degraded, and integration with tribal coordination protocols pre-staged under the *Tribal Coordination Protocol Pre-Staging Under Sovereignty, Consent, and Reciprocity* recommendation.

Family Communications Hardening. Pre-position hardened communications equipment, exercised analog protocols, and backup family communications pathways with family readiness organizations, garrison family service offices, and the hybrid public-private-nonprofit family support networks identified in stakeholder engagement. Address communications resilience at the household level, not only the command level. Communications failure is identified throughout this research as a force degrader that amplifies every other failure mode, and the workforce-family feedback loop runs faster

when households cannot reach service members and service members cannot reach households. Implementation should include physical equipment pre-positioning at garrison and community sites, exercised analog protocols documented and distributed to family readiness organization participants, periodic communications-degraded exercises at the household level rather than only at command echelons, and integration with the offline coordination architecture developed under the *Household-Level Preparedness Extension to Underserved Populations* recommendation and in the *Arctic Rising Generation Preparedness Campaign Framework* section.

Exercise-Based Validation of Paper Governance Architectures. Conduct integrated civil–military exercises that stress-test paper coordination architectures under Days 0–14 conditions, with explicit emphasis on the human-systems consequences traced in this research. Exercise findings should drive revision of the protocols and identification of the relational infrastructure gaps that paper architectures depend on. The paper-versus-real distinction developed throughout this research applies directly here: documented coordination architectures regularly fail to perform as designed when stressed under conditions that include workforce absenteeism, communications degradation, and concurrent civilian and military demand on the same resources. Exercise design should integrate the Days 3–7 governance inflection window, the workforce-family feedback loop, tribal coordination protocols under sovereignty protocols where applicable, and the behavioral health surge ceiling identified in the *Behavioral Health Surge Capacity Expansion* recommendation. Iteration cycles should be sustained, not one-time.

Family Readiness Group Rebuilding Through Hybrid Public-Private-Nonprofit Structures. Resource the rebuilding of family readiness capacity through hybrid models that combine military family services, civilian nonprofit capacity (including organizations identified in stakeholder engagement), faith-based networks, and tribal community capacity where applicable. The traditional Family Readiness Group structure has eroded in ways the Family Readiness & Human Factors section documents, and the gap will not be closed by single-channel solutions. The hybrid model should preserve military command relationships while distributing operational delivery across civilian and nonprofit partners with the geographic reach, household-level access, and sustained presence that traditional FRG structures no longer reliably provide. Implementation should include identification of partner organizations with demonstrated household-level family support capacity, formal partnership agreements that preserve command relationships while enabling civilian delivery, funding mechanisms that support sustained operation rather than episodic surge response, and integration with the family communications hardening developed under the *Family Communications Hardening* recommendation.

Tribal Coordination Protocol Pre-Staging Under Sovereignty, Consent, and Reciprocity. Pre-stage tribal coordination protocols with Alaska Native governments and organizations under sovereignty, consent, and reciprocity protocols, focused on Days 0–14 resource allocation, communications coordination, and reciprocal information flow. The relationships and decision protocols that underpin coordination during disruption must exist before disruption, not be improvised during it. Engagement proceeds on terms

agreed by tribal participants and returns usable findings to participating communities. Implementation should be tribal-led in design and delivery, not externally designed and offered to tribal participants. Sovereignty is non-substitutable: tribal governments are not subordinate actors in the state or federal response chain, and protocols that fail to recognize that distinction will not function under stress. The pre-staging effort should include identification of coordination points across tribal, state, and federal jurisdictions, communications protocols that operate when commercial systems are degraded, reciprocal information flow architecture that returns useful findings to participating communities, and integration with the formalized tribal consultation architecture developed under the *Formalized Tribal Consultation Architecture* recommendation.

Household-Level Preparedness Extension to Underserved Populations.

Extend household-level preparedness engagement to the population segment identified throughout this research as both operationally essential and structurally underserved by existing preparedness frameworks: the demographic approximately thirteen to thirty years of age. The research identifies this population as the segment most likely to staff the entry-level civilian workforce roles that become operationally critical during Days 0–14, and simultaneously the segment most dependent on uninterrupted digital infrastructure and least prepared to function effectively when that infrastructure degrades. Traditional preparedness frameworks reach younger school-aged children through school-based programs and older household leaders through homeownership, insurance, and household systems, but they do not reliably reach the population between.

Implementation should establish a statewide Arctic Rising Generation Preparedness Initiative jointly administered by the State of Alaska, tribal governments under sovereignty, consent, and reciprocity protocols, school systems, military family readiness organizations, and community nonprofits. The initiative should be calibrated to the developmental progression of the thirteen-to-thirty demographic rather than treating the population as a single audience. The cohort architecture, engagement methodology, offline coordination protocols, functional role assignment, and pilot design that operationalize this recommendation are developed in *Arctic Rising Generation Preparedness Awareness Campaign Framework*. The *Household-Level Preparedness Extension to Underserved Populations* recommendation establishes the recommendation; recommendation and in the *Arctic Rising Generation Preparedness Campaign Framework* section establishes the framework.

Workforce Continuity Planning for Civilian and Contractor Populations.

Establish workforce continuity planning protocols for the civilian and contractor populations supporting Arctic installations and the communities surrounding them. The research identifies the civilian and contractor workforce as the single most consequential point of failure in Arctic installation sustainment. This recommendation functions as the operational complement to the *Household-Level Preparedness Extension to Underserved Populations* recommendation: where household-level preparedness builds capacity at the family unit, workforce continuity planning builds the workforce-side architecture that converts that preparedness into reliable surge capacity during Days 0–14.

Implementation should focus on three components: identification and pre-registration of essential civilian workforce positions, with particular emphasis on entry-level roles concentrated in the eighteen-to-thirty demographic; establishment of rapid activation procedures, emergency credentialing pathways, and pre-negotiated incentive structures that reduce improvisation during crisis conditions; and integration of workforce continuity planning into local emergency operations plans and Defense Coordinating Officer coordination architecture. A structured Arctic Youth Continuity Corps should be established as a volunteer and workforce reserve system for participants ages 16–30, with established young adults occupying leadership and mentorship roles to build durable preparedness behavior through identity, status, and social belonging within preparedness participation.

The workforce-family feedback loop is the analytical basis for treating these two recommendations as coupled rather than independent: household instability creates workforce absenteeism; workforce absenteeism degrades community sustainment; degraded sustainment compounds household instability. Funding and program-design decisions should treat the *Household-Level Preparedness Extension to Underserved Populations* recommendation and the *Workforce Continuity Planning for Civilian and Contractor Populations* recommendation as a single integrated initiative.

Mid-Term Recommendations (12 to 36 Months)

Behavioral Health Surge Capacity Expansion. Expand behavioral health surge capacity for the populations identified throughout this research as exposed to compounding stress during Days 0–14: military families, civilian and contractor workforce, tribal communities, and Alaska Native households living with infrastructure fragility as a baseline rather than a disruption. Behavioral health capacity is the ceiling on workforce surge capacity. When household stress, family instability, and community uncertainty accumulate faster than behavioral health systems can absorb, workforce availability degrades regardless of how robust other resilience investments may be. Implementation should include workforce development to expand the trained behavioral health provider pool serving Arctic populations, tele-behavioral health infrastructure capable of operating with degraded but not fully failed communications, integration with the family readiness rebuilding developed under the *Family Readiness Group Rebuilding Through Hybrid Public-Private-Nonprofit Structures* recommendation, and tribal-led behavioral health programming under sovereignty protocols where applicable. Capacity should be scaled to surge demand under Days 0–14 conditions rather than steady-state demand.

Formalized Tribal Consultation Architecture. Formalize the tribal consultation architecture outlined in the *Tribal Coordination Protocol Pre-Staging Under Sovereignty, Consent, and Reciprocity* including pre-stages, moving from pre-positioned protocols to durable institutional coordination. The formalization should preserve sovereignty, consent, and reciprocity as governing principles and should be designed and led by tribal entities rather than designed externally and offered to tribal participants. Statutory consultation does not replace substantive operational engagement, and the architecture established here should support both. The architecture should also support

tribal-led intergenerational resilience programs that transfer continuity competencies to younger cohorts, pairing younger participants with elders and community leaders to transfer subsistence continuity practices, analog navigation, resource-sharing protocols, environmental hazard recognition, community governance traditions, and survival and adaptation skills. The appropriate role for federal and state actors is to support tribal-designed and tribal-led programs rather than to design programs and seek tribal participation.

Integrated Civil–Military Exercise Series Stressing Societal Sustainment Thresholds. Establish a sustained integrated civil–military exercise series that explicitly stresses societal sustainment thresholds rather than treating community continuity as background context. Exercises should include the human-systems consequences traced throughout this research: workforce availability under prolonged disruption, family readiness under communications degradation, tribal coordination under sovereignty constraints, behavioral health under cumulative stress, and the household-level cascade pathways that determine whether disruption stabilizes or accelerates. Exercise design should incorporate the cohort-based engagement framework developed in recommendation and in the *Arctic Rising Generation Preparedness Campaign Framework* section, the workforce continuity architecture developed in the *Workforce Continuity Planning for Civilian and Contractor Populations* recommendation, and the Days 3–7 governance inflection identified throughout. The series builds on the near-term exercise validation developed in the *Exercise-Based Validation of Paper Governance Architecture* recommendation, moving from initial protocol validation to sustained societal sustainment threshold testing.

Federal Cross-Sector Supply Chain Coordination Capability. Develop federal cross-sector supply chain coordination capability that integrates the human-systems dependencies developed in this research with the infrastructure and lifeline dependencies developed in the companion study. Cross-sector coordination should treat workforce availability, family readiness, and community sustainment as supply chain variables rather than externalities and should support the Days 3–7 governance inflection identified in the Civil–Military and Governance Mapping section. The capability should be designed to operate alongside FEMA, CISA, and DoD Defense Coordinating Officer architectures rather than duplicate them. Implementation should include cross-sector coordination protocols that align human-systems and infrastructure-systems dependencies, communications and data-sharing architecture that operates under degraded conditions, integration with the federal industrial-base resilience frameworks established under [64], and explicit treatment of the Alaska operating environment as distinct from CONUS supply chain assumptions.

Long-Term Recommendations (36 Months or More)

Multi-Year Continuity-of-Society Modeling. Establish a multi-year continuity-of-society modeling capability that supports the longitudinal analysis this research identifies as necessary but cannot complete within a three-month performance period. The objective is to develop the validation and quantification framework that translates the

analytical findings of this research into decision-grade parameters for long-horizon Arctic planning.

Modeling should integrate the variables identified across the coupled recommendations of this research: the demographic, behavioral, and developmental variables identified in the *Household-Level Preparedness Extension to Underserved Populations* recommendation and the *Arctic Rising Generation Preparedness Campaign Framework*; the workforce continuity variables identified in the *Workforce Continuity Planning for Civilian and Contractor Populations* recommendation; the tribal resilience variables identified in the *Formalized Tribal Consultation Architecture*; and the behavioral health surge variables identified in the *Behavioral Health Surge Capacity Expansion* recommendation.

The modeling capability should also support development of a Community Resilience Index measuring household preparedness levels, workforce redundancy, youth readiness participation, analog communications capability, fuel continuity resilience, and community mutual aid participation. Communities should be benchmarked against the index periodically to identify areas requiring intervention investment.

Longitudinal Family Readiness Studies Under Prolonged Arctic Disruption.

Establish longitudinal family readiness studies focused on the prolonged Arctic disruption conditions this research examines through scenario stress testing. Existing family readiness research, including the Blue Star Families Military Family Lifestyle Survey and the work of the Penn State Military Families Research Institute, establishes the baseline conditions; longitudinal studies should examine how those baselines evolve under sustained Arctic operational stress, how the workforce-family feedback loop manifests over multi-year horizons, and how the cohort-based engagement framework developed in recommendation and in the *Arctic Rising Generation Preparedness Campaign Framework* section affects family readiness outcomes when applied at scale. Studies should integrate with the Community Resilience Index developed in the *Multi-Year Continuity-of-Society Modeling* recommendation and inform iteration of the family communications hardening, FRG rebuilding, and household preparedness extension recommendations in earlier tiers.

Operational Piloting of Integrated Human-Systems Resilience Frameworks.

Conduct operational piloting of the integrated human-systems resilience frameworks developed across this research: the cohort-based engagement framework developed in the *Arctic Rising Generation Preparedness Campaign Framework*; the workforce surge capacity model developed in the *Workforce Continuity Planning for Civilian and Contractor Populations* recommendation; the tribal-led intergenerational resilience programs developed in the *Formalized Tribal Consultation Architecture* recommendation; and the behavioral health surge capacity expansion developed in the *Behavioral Health Surge Capacity Expansion* recommendation.

Piloting should occur in selected Alaska communities representing the operational diversity of the Arctic continuity environment: military-adjacent communities, tribal communities under sovereignty, consent, and reciprocity protocols, rural Alaska hubs,

university towns, and high logistics-dependency regions. The objective is to validate the integrated framework under operational conditions and to surface implementation constraints that cannot be identified through analytical work alone.

Piloting should support institutionalization of preparedness as civic infrastructure within Arctic social systems, treating preparedness as equivalent to transportation, utilities, and public health systems. Implementation should include dedicated preparedness education standards, recurring statewide exercises, public continuity awareness campaigns, household resilience benchmarks, and community readiness scoring systems. A parallel component is establishment of permanent civil–military–tribal preparedness governance through enduring coordination architecture, with established young adults trained through the Arctic Youth Continuity Corps progressing into permanent coordination roles over time.

Arctic Societal Sustainment Testbed (Paired with Companion Study Infrastructure Testbed). Establish an Arctic societal sustainment testbed paired with the companion study’s infrastructure testbed to support integrated, sustained research on Arctic continuity. The two testbeds should function as connected research infrastructure rather than separate facilities, reflecting the integrated nature of the human-systems and infrastructure-systems dependencies developed across both research lines. The societal sustainment testbed should support the operational piloting described in the *Operational Piloting of Integrated Human-Systems Resilience Framework* recommendation the longitudinal family readiness studies described in the *Longitudinal Family Readiness Studies Under Prolonged Arctic Disruption* recommendation, and the multi-year continuity-of-society modeling described in the *Multi-Year Continuity-of-Society Modeling* recommendation. The pairing with the companion study’s infrastructure testbed enables Arctic continuity research that treats infrastructure dependencies and human-systems dependencies as a single integrated problem set, consistent with the integrated finding that continuity of society is a prerequisite for continuity of operations rather than a downstream consequence.

In the *Arctic Rising Generation Preparedness Campaign Framework* section, which follows, develops the Arctic Rising Generation Preparedness Awareness Campaign Framework that operationalizes *Household-Level Preparedness Extension* recommendation at the level of cohort architecture, engagement methodology, and pilot design. The implementation supporting detail for each recommendation, Five-Criteria Framework tags, Lead Actors, and Supporting Partners, is consolidated in the summary table below and developed in full in the Appendix K.

Key Insight: The recommendations developed across these three tiers are not asking the planning system to discover new actions. They are asking it to resource, sustain, and exercise actions that practitioners and the literature have repeatedly identified, and to do so before the next disruption rather than after it. The convergence between practitioner reality, analytical framing, and the recommendation set is the strongest evidence the research can offer that the actions identified here are operationally consequential.

Mitigation Prioritization Matrix (Five-Criteria Framework)

Five criteria applied to the Project 2 recommendation set; human-systems oriented, parallel to the companion study's infrastructure-layer framework.

Mission Impact	Degree to which the action protects or restores mission-essential human-systems conditions (workforce, family readiness, governance capacity).
Cascade Risk	Likelihood that inaction triggers downstream failure across family, workforce, tribal, and governance layers.
Time Sensitivity	Whether the action must be in place pre-crisis or can be developed inside the Days 0-14 window.
Feasibility	Availability of authority, partner capacity, and resourcing to execute within near- and mid-term horizons.
Dual-Use Value	Extent to which the action serves both day-to-day mission assurance and crisis-window resilience.

Applied to the Project 2 recommendation set to surface priority lines of effort.

Visual rendering of the Mission Impact, Cascade Risk, Time Sensitivity, Feasibility, and Dual-Use Value criteria; human-systems oriented.

Mitigation Prioritization Criteria and Definitions

Five-Criteria Framework, human-systems oriented; parallel to the companion study's infrastructure-layer framework.

Criterion	Definition (Human-Systems Oriented)
Mission Impact	Degree to which the action protects or restores mission-essential human-systems conditions — workforce availability, family readiness, governance adjudication capacity, tribal coordination — under contested Arctic conditions.
Cascade Risk	Likelihood that inaction triggers downstream failure across family, workforce, tribal, and governance layers within the Days 0–14 compression window.
Time Sensitivity	Whether the action must be in place pre-crisis (capacity-building, relationship-establishment) or can be developed inside the Days 0–14 window (improvised response capacity).
Feasibility	Availability of authority, partner capacity, and resourcing to execute within near- (under 12 months), mid- (12–36 months), or long-term (36 months or more) horizons.
Dual-Use Value	Extent to which the action serves both day-to-day mission assurance and crisis-window resilience — building capacity that pays off in steady state as well as disruption.

ARCTIC RISING GENERATION PREPAREDNESS CAMPAIGN FRAMEWORK

Introduction: A Twenty-Year Foundation for Preparedness Campaign Design

The Arctic Rising Generation Preparedness Awareness Campaign Framework developed in this section is not built on a theoretical proposition. It is built on more than twenty years of demonstrated competency in the design, deployment, and sustainment of public-facing preparedness education, behavioral engagement, and family-centered awareness campaigns. The campaign architecture proposed for the thirteen-to-thirty Arctic demographic draws directly on an established body of work led by IDEAS, the creative and engagement firm responsible for the original Kids Get a Plan preparedness initiative developed in partnership with the Florida Division of Emergency Management (FDEM). That partnership produced one of the most behaviorally effective youth preparedness platforms in the United States, combining narrative storytelling, character-driven engagement, gamified learning, educational publishing, parent and teacher integration guides, multilingual accessibility, and real-world preparedness activities into an integrated ecosystem capable of influencing both youth behavior and household readiness simultaneously.

The Kids Get a Plan model has now expanded beyond its Florida origins. The PSEMA Foundation, a 501(c)(3) nonprofit affiliated with the Private Sector Emergency Management Association, executed an agreement with the Florida Division of Emergency Management to assume ownership of the assets developed under the Kids Get a Plan preparedness campaign. The agreement preserves the integrity of the existing materials and authorizes the Foundation to extend, adapt, and expand the platform into new initiatives, new audiences, and new operational environments. The Foundation's stewardship of these assets establishes the legal, organizational, and operational foundation upon which an Arctic-focused continuity engagement initiative can be built without reconstructing core methodology from the ground up.

The most recent expansion of the Kids Get a Plan platform is directly relevant to this research. The campaign added a fifth book, *Turn Around, Don't Drown*, developed as a partnership between the Florida Division of Emergency Management and the Alaska Division of Homeland Security and Emergency Management (Alaska DHS&EM) and featuring an Alaskan moose as its central character. The addition is significant for two reasons. First, it demonstrates that the Kids Get a Plan model has already been successfully adapted to an Alaskan context and to an Alaskan state emergency management partner, establishing both methodological precedent and an existing working relationship with the state agency identified throughout this research as a central governance node in Arctic continuity coordination. Second, it confirms that the platform's narrative architecture, character-driven engagement model, and family-extension methodology translate across geographies and hazard profiles, an essential prerequisite for the cohort-based Arctic framework developed in the sections that follow.

Taken together, the IDEAS design legacy, the PSEMA Foundation's ownership of the Kids Get a Plan assets, the demonstrated FDEM–Alaska DHS&EM partnership, and the established cross-state adaptation of the platform provide the operational foundation for the framework presented in this section. The Arctic Rising Generation Preparedness Initiative is not proposed as a new campaign requiring the construction of a methodology, an asset library, a legal vehicle, or an institutional relationship with Alaska emergency management. Each of those elements is already in place. What this section establishes is the cohort architecture, engagement methodology, offline coordination protocol, functional role assignment system, and pilot design through which the existing platform is extended to address the continuity-of-society challenge identified throughout this research. The framework that follows is therefore best understood as the operational application of a twenty-year preparedness campaign capability to a newly identified strategic resilience problem.

This section develops the framework that operationalizes the recommendation *Household-Level Preparedness Extension to Underserved Populations* and supports the recommendation *Workforce Continuity Planning for Civilian and Contractor Populations*. The framework specifies the cohort architecture, engagement methodology, offline coordination protocols, functional role assignment, and pilot design for the Arctic Rising Generation Preparedness Initiative. It is presented as a standalone section because the operational detail required to translate R-6 into deployed capability exceeds the scope of a single recommendation entry and because the framework integrates content across multiple recommendations and findings. The recommendation *Household-Level Preparedness Extension to Underserved Populations* establishes the recommendation; this section establishes the framework.

Strategic Foundation

The Arctic continuity challenge identified throughout this research is not only an infrastructure problem; it is a behavioral engagement problem. The generational preparedness gap identified in the *Key Finding 7* converts potential surge capacity into additional demand because the same demographic that staffs the entry-level civilian workforce positions essential during Days 0–14 is also the segment most dependent on uninterrupted digital infrastructure and least prepared to function effectively when that infrastructure degrades. The workforce-family feedback loop established earlier in this report runs faster, not slower, when the demographic at the workforce vector cannot maintain functional situational awareness under degraded communications.

This research therefore treats the thirteen-to-thirty demographic not as a vulnerable population requiring outreach and protection, but as a strategic resilience asset whose preparedness, adaptability, and workforce continuity directly influence installation readiness, governance stability, and community survivability throughout the Arctic region. The framework below is the operational architecture for that treatment. It is built around five developmental cohorts, an engagement methodology calibrated to each cohort, an offline coordination protocol that does not assume communications availability, a functional role assignment system that replaces the dependent-population

framing with a contributor-population framing, and a pilot design that places youth and young adults in operational roles rather than passive observer roles.

This treatment of the thirteen-to-thirty demographic as a strategic resilience asset is grounded in two converging bodies of research. Bostrom, Morgan, Fischhoff, and Atman's mental models approach to risk communication establishes that preparedness messaging fails not when it carries insufficient information, but when it does not connect to how the audience actually processes risk; effective communication requires eliciting the mental models the audience already holds and constructing messages that close identified gaps rather than delivering comprehensive technical content. The cohort architecture developed in this section is the operational expression of that finding: a thirteen-year-old, a twenty-two-year-old, and a twenty-eight-year-old hold systematically different mental models of risk, of institutional authority, and of what constitutes an adequate response, and a campaign that addresses them as a single audience will fail to engage any of them effectively. Ellis's comparative analysis of whole-of-society preparedness cultures in Finland, Sweden, Estonia, and Latvia reinforces the second analytical premise: durable national preparedness culture is not built by improving the delivery of awareness campaigns but by embedding shared risk awareness and practiced cooperation into civic life over sustained periods. Ellis further documents that the individualized, market-oriented preparedness model dominant in the United States distributes preparedness burden inequitably toward households with fewer resources and weaker institutional connectivity, a finding that intersects directly with the Arctic operating environment, where contractor households, military families in lower pay grades, and rural and tribal communities are simultaneously the populations with thinnest preparedness reserves and the populations whose stability is most operationally consequential. The framework that follows is designed against both of these findings: cohort-calibrated to engage actual mental models, and structured to build practiced, distributed continuity capability rather than to multiply input metrics. [10; 24]

The framework is consequential beyond Alaska. The same digital dependency, the same workforce concentration in entry-level continuity roles, and the same exclusion from traditional preparedness frameworks are present across the continental United States. Alaska is the operating environment in which the consequences become operationally visible earliest, and the framework developed here positions Alaska as a strategic stress laboratory for preparedness systems that may need to be redesigned at national scale in the coming decade.

Cohort Architecture

The thirteen-to-thirty demographic is not a single audience. It is a progression of five distinct behavioral and developmental stages, each requiring different approaches to communication, engagement, training, and operational integration. A preparedness campaign that treats this population as a homogeneous group will fail to meaningfully influence behavior before or during crisis conditions. The framework therefore proposes separate preparedness approaches for each of the five cohorts, calibrated for the possibility of prolonged disruption involving extended power outages, loss of internet and cellular connectivity, supply chain degradation, fuel scarcity, transportation disruption,

reduced emergency response availability, and long-duration isolation from external assistance.

Early Teens (ages 13–15): Awareness and Guided Preparedness. This cohort remains heavily dependent on parents, teachers, schools, and structured authority systems. Their understanding of emergencies is often abstract and media-driven rather than experiential. They respond most effectively to visual storytelling, gamified learning, team-based activities, repetition and routine, scenario-based simulation, and social participation. This group is also among the most digitally immersed populations and may possess little to no analog problem-solving experience. The strategic objective for this cohort is to normalize preparedness as a routine life skill while reducing psychological dependence on continuous connectivity. Outreach should occur primarily through schools, youth organizations, sports programs, tribal youth initiatives, community recreation systems, and museum and science center partnerships. Messaging should avoid fear-based framing and instead present preparedness as adventure readiness, team survival, problem-solving capability, leadership development, and helping family and community.

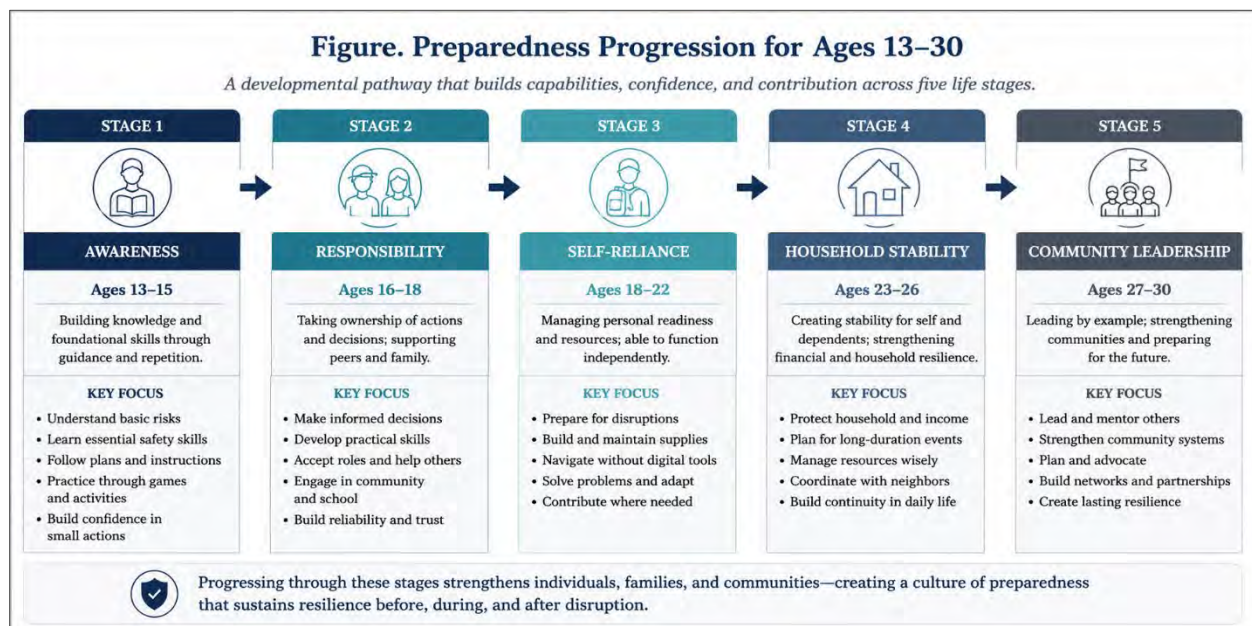
Late Teens (ages 16–18): Personal Responsibility and Social Influence. This cohort begins making independent decisions regarding transportation, employment, peer relationships, risk-taking, and social identity. Peer influence is extremely powerful at this stage; preparedness behaviors can therefore spread socially if positioned correctly. This group also begins entering the civilian workforce sectors identified as critical to continuity operations: retail, food service, fuel stations, transportation support, logistics, and childcare. The strategic objective is to transform preparedness into a marker of maturity, competence, and reliability. Outreach should leverage social media creators, peer ambassadors, youth influencers, student leadership groups, athletic programs, tribal youth mentors, and junior ROTC and cadet systems. Messaging should emphasize independence, responsibility, capability under pressure, protecting friends and family, and leadership during crisis. Preparedness should be framed less as survivalism and more as practical readiness and reliability.

Emerging Adults (ages 18–22): Independent Decision-Making Under Instability. This cohort is often living away from home, financially unstable, highly mobile, renting housing, changing jobs frequently, and socially transient. Many underestimate risk and assume systems will recover rapidly. This cohort is operationally significant because it occupies many of the flexible labor positions critical during disruptions: warehousing, delivery systems, transportation, hospitality, retail logistics, and seasonal workforce roles. The strategic objective is to develop continuity-minded independence. Outreach should occur through colleges and universities, trade schools, employers, housing systems, military spouse networks, social venues, and workplace onboarding. Messaging should focus on self-reliance, continuity planning, financial resilience, practical preparation, and community responsibility. Preparedness should be positioned as part of adulthood.

Young Independents (ages 23–26): Household Stability and Workforce Continuity. This cohort increasingly manages careers, long-term housing, families or dependents, financial obligations, and workplace leadership responsibilities. Their preparedness behavior becomes more practical and resource-driven. The strategic objective is to transform this cohort into stabilizers of household and workforce continuity. Outreach should occur through employers, insurance providers, professional associations, parenting networks, housing systems, and military family readiness programs. Messaging should emphasize protecting household stability, supporting dependents, maintaining income continuity, community responsibility, and workforce reliability.

Established Young Adults (ages 27–30): Community Leadership and Resilience Multiplication. This cohort increasingly serves as household anchors, community influencers, workplace supervisors, parents, volunteer leaders, and social organizers. They are most capable of becoming force multipliers for preparedness culture. The strategic objective is to transition this cohort into continuity leaders and resilience mentors. Outreach should position this group as protectors, organizers, mentors, community leaders, and continuity stewards. Messaging should emphasize civic responsibility, family protection, community continuity, and long-term resilience. This cohort should increasingly help train younger groups, becoming the bridge between institutional preparedness systems and neighborhood-level implementation.

Across all five cohorts, the preparedness progression should intentionally evolve from awareness to responsibility to self-reliance to household stability to community leadership. The underlying strategic principle is that long-duration Arctic disruption cannot be managed solely through government response systems. Alaska’s continuity of society will depend heavily on whether younger generations possess analog skills, emotional resilience, community coordination capability, household continuity capacity, reduced digital dependency, and practical operational competence.



Engagement Architecture

Engagement architecture for the initiative should be designed as a multi-platform, online-and-offline ecosystem rather than a single-channel digital campaign. Addressing the Arctic continuity challenge requires the ability to translate complex continuity concepts into developmentally calibrated engagement systems capable of influencing attitudes, habits, preparedness behaviors, and community participation across multiple age cohorts simultaneously.

The architecture should include digital engagement tools, mobile-first preparedness resources, social media messaging strategies, peer ambassador campaigns, community activation programs, analog preparedness materials, printed guides, scenario-based simulations, educational toolkits, local workshop content, environmental graphics, community challenge systems, interactive public installations, and offline-ready preparedness packets. Offline capability is particularly important because communications degradation, identified throughout this research as a force degrader, will erode the digital channels through which contemporary engagement campaigns typically operate. The engagement architecture itself must remain operational under the conditions it is designed to prepare populations for.

The methodology should align with established practice in family-centered, cohort-specific preparedness engagement design, grounded in the mental models approach to risk communication developed by Bostrom, Morgan, Fischhoff, and Atman [10]. That approach requires audience research before message design, comparative analysis of expert and lay mental models to identify the specific gaps and misconceptions that messaging must close, iterative testing against measurable behavioral and cognitive outcomes rather than dissemination metrics, and targeted message construction that addresses identified gaps rather than overwhelming audiences with comprehensive technical content. Applied to the five-cohort framework, the methodology calls for separate elicitation of each cohort's existing mental models of Arctic disruption, infrastructure dependency, institutional authority, and protective action, including the systematic gaps in each, and construction of cohort-specific messaging that closes the gaps actually present rather than the gaps planners assume to be present. The methodology should also incorporate integration of educational content with formal learning standards, extension of engagement into households and communities through family-oriented programming, and culturally grounded storytelling and intergenerational engagement approaches in tribal communities under sovereignty, consent, and reciprocity protocols. A competitive selection of qualified providers should be conducted to develop the initiative's content, materials, and delivery architecture, with mental models elicitation and behavioral outcome measurement specified as required methodological components. The methodology should also incorporate continuity-oriented communication systems that remain useful even during prolonged internet or power degradation, and offline-ready preparedness packets for environments where digital delivery cannot be relied upon.

Offline Coordination Protocols

Communities should establish offline coordination architecture in parallel with the cohort-based engagement framework. The architecture should include predefined physical rally points, time-based check-in schedules, printed emergency communication maps, neighborhood information hubs, radio relay protocols, and analog contact systems. For emerging adults and young independents living independently and supporting flexible workforce roles, the emphasis should be campus systems, dormitory coordination plans, workplace continuity procedures, and community-based emergency communication structures.

Implementation should include practical exercises simulating cellular outage conditions, GPS disruption, extended power loss, transportation interruptions, and loss of digital payment systems. Exercises within the engagement framework should also intentionally remove access to phones, internet, GPS, and social media for defined intervals, not as punitive measures but to reduce panic responses associated with future real-world infrastructure loss. The intent is to build comfort operating without digital dependency before, rather than during, a disruption event. The operational rationale is direct: younger populations lose functional situational awareness rapidly when connectivity disappears, and pre-established analog coordination systems reduce that loss of functionality during the Days 0–14 window when workforce reliability matters most.

Functional Role Assignment

Preparedness messaging directed at younger populations should transition away from framing them solely as dependents requiring protection. Preparedness programming should assign practical continuity roles within families and communities. Role categories should include information relay support, supply distribution assistance, childcare continuity support, elder welfare checks, local transportation assistance, community communications runners, and volunteer logistics support.

For young independents (ages 23–26), the assignment should integrate workplace continuity, financial resilience, and household emergency planning, recognizing that these individuals increasingly occupy essential civilian workforce positions supporting logistics, retail distribution, transportation, and childcare systems identified as critical dependencies in this research. For established young adults (ages 27–30), role assignment should extend into community leadership, mutual aid coordination, neighborhood continuity planning, and youth mentorship within the framework itself.

Assigning functional responsibility produces two operational benefits. It improves behavioral ownership of preparedness behavior at the household and community level, and it expands available community surge capacity by formalizing roles that would otherwise be filled, if at all, through improvisation during Days 0–14. The role assignment system is the bridge between the cohort-based engagement framework developed in this section and the workforce continuity architecture developed under the recommendation *Workforce Continuity Planning for Civilian and Contractor Populations*.

Pilot Design and Implementation Sequence

Initial implementation pilots should be conducted in five community types representing the operational diversity of the Arctic continuity environment: military-adjacent communities, tribal communities under sovereignty, consent, and reciprocity protocols, rural Alaska hubs, university towns, and high logistics-dependency regions. Each community type stress-tests different elements of the framework: military-adjacent pilots stress the integration with family readiness organizations and workforce continuity for installation-supporting civilian workforce; tribal pilots stress the intergenerational resilience component developed in the recommendation Formalized Tribal Consultation Architecture under tribal-led design; rural Alaska hubs stress the offline coordination protocols and analog skills curriculum; university towns stress the emerging adults and young independents engagement methodology; and high logistics-dependency regions stress the functional role assignment system at the entry-level workforce vector.

Exercises within the pilots should model Days 0–14 supply degradation, communications disruption, fuel allocation conflict, food access limitations, and workforce absenteeism. Exercises should intentionally include youth and young adults in operational roles rather than passive observer roles, with role assignment drawn from the functional role categories above. The rationale is grounded in the Days 3–7 governance inflection identified throughout this research: pilot exercises are necessary to identify where younger populations can support stabilization rather than compound instability, and where cohort-specific preparedness produces measurable surge capacity benefit that justifies investment in the framework’s scaling beyond pilot communities.

Pilot evaluation should integrate with the Community Resilience Index developed the *Multi-Year Continuity-of-Society Modeling* recommendation and inform iteration of the framework before scaling. The pilot-to-scale sequence is intentional: pilots run for 18 to 24 months, evaluation occurs against the index, framework revisions are integrated, and scaling proceeds based on validated outcomes rather than pre-pilot assumptions. The evaluation posture is deliberately outcome-based rather than input-based, consistent with the empirical observation that preparedness programs which measure success through inputs, materials distributed, sessions held, awareness raised, kits assembled, consistently produce documentation of activity without producing the behavioral, household, and community continuity capability that the activity was intended to generate. Pilot success criteria should therefore be defined in terms of measurable continuity outcomes under simulated disruption: household reserve adequacy, workforce reliability under degraded conditions, analog coordination functionality during connectivity loss, cohort-specific behavioral change relative to baseline, and community-level surge capacity availability during exercise scenarios. Framework scaling beyond pilot communities should be conditioned on demonstrated outcome performance rather than on documented pilot completion.

Connections to Other Sections of the Report

This framework is connected to several sections of the report and should be read alongside them rather than as an independent document. The *Family Readiness & Human Factors* section develops the generational preparedness gap as an operational variable and provides the analytical foundation for the demographic treatment used here. In the *Recommendation* section the *Household-Level Preparedness Extension* is the recommendation that this framework operationalizes. And the *Workforce Continuity Planning* recommendation is the coupled recommendation that converts household-level preparedness into reliable workforce surge capacity. The *Functional Role Assignment* section is the bridge between the two. The *Formalized Tribal Consultation Architecture* is the recommendation under which the tribal intergenerational resilience component of this framework is delivered, tribal-led under sovereignty, consent, and reciprocity protocols. The *Operational Piloting* is the long-term recommendation under which the framework moves from pilot to validated capability and eventually to institutionalized civic infrastructure. The *Preliminary Multi-Modal Resilience Framework* section provides the cost–benefit posture against which framework investments are evaluated.

FROM RECOMMENDATIONS TO IMPLEMENTATION

Three observations close the recommendation set. The recommendations are layered, not sequenced, near-term, mid-term, and long-term lines must run concurrently, because sequencing would extend the resilience-building horizon beyond the time the threat environment supports. They require sustained external partnership rather than individual line-item execution, with the connective infrastructure developed below as the architecture under which the recommendations become operationally executable. And they are evidence-based but not exhaustive: the dual-theater scenario, the dependency mapping, the risk assessment, and the substitution analysis converge on the recommendations identified here, but the recommendations should be read as the floor of what Arctic mission assurance requires, not as the ceiling.

The institutional scaffolding required to sustain implementation, and the existing Alaska coordination architecture exists; what remains is the deliberate alignment of investment, policy, and coordination commitment to the specific conditions that make the Arctic both the most demanding and the most consequential environment for homeland defense mission assurance.

The Coordination Gap This Research Has Identified

The recommendations developed in this report identify multiple external partners across every line of effort: the Homeland Defense Institute, NORAD and USNORTHCOM, Alaska DHS&EM, FEMA, CISA, tribal governments and Alaska Native organizations, academic institutions, and the private-sector operators across the seven lifeline sectors examined in this research. The recommendations themselves are operationally executable. What this section names directly is the connective infrastructure under which they become operationally executable, and the institutional gap that infrastructure exists to fill.

The most analytically significant institutional finding of this research is direct. There is no sustained, trust-based, operationally tested intermediary connecting Department of Defense components to the family readiness organizations, civilian and contractor workforce networks, tribal and Alaska Native governance structures, behavioral health systems, faith-based networks, and community organizations that together sustain Arctic mission assurance at the human-systems layer. Every population in that list is operationally consequential during Days 0–14 disruption. None is currently connected to DoD through a sustained intermediary that combines non-attribution, sector neutrality, and operational credibility. The protocols on paper assume a connector that does not exist with the reach, trust, and operational credibility the Days 0–14 window requires.

The consequence under the dual-theater scenario is direct. Commercial operators, port authorities, maritime carriers, rail operators, trucking companies, telecommunications providers, and pharmaceutical distributors, make cargo prioritization and service-availability decisions based on commercial logic that does not account for defense sustainment requirements. Installation commanders hold authority over on-base

resource allocation but have no control over the commercial cargo prioritization or civilian workforce availability on which sustainment depends. State authority can reallocate scarcity across competing populations but cannot create supply. Tribal governments hold sovereign authority over land, workforce, and local infrastructure that defense operations depend on but operate outside formal defense coordination architectures. The result is a structural fragmentation that no individual entity can resolve unilaterally, and that no after-event coordination mechanism can match for speed.

Three structural facts beneath this fragmentation make the gap analytically primary rather than peripheral. First, the privately operated lifelines and human-systems partners that sustain Arctic operations are owned, operated, and led outside DoD authority; mission assurance therefore depends on cross-sector coordination that no single contract, command, or agency is positioned to deliver. Second, the federal partnership architecture has known gaps for the function this research identifies, FEMA's P3 model is calibrated to civilian disaster response, CISA holds critical infrastructure protection authority without functioning as an operational intermediary for Arctic contested-logistics, and DoD itself cannot be sector-neutral by definition because it is one of the parties whose interests must be coordinated. Third, trust-based intermediation is not a function that contracts can produce. The relationships across commercial operators, federal agencies, state authorities, tribal governments, and academic institutions that the recommendations require depend on sustained engagement under non-attribution protocols, cross-sector translation that respects sectoral confidentiality, and operational credibility built through consistent presence in the spaces where lifeline systems and defense requirements actually intersect. None of those conditions can be created transactionally during a disruption.

The PSEMA Network as Connective Infrastructure

The recommendations developed in the previous section identify what must happen across near-term, mid-term, and long-term horizons to close the gap between current Arctic mission assurance capacity and the demands the dual-theater scenario imposes. Every recommendation identifies multiple external partners: the Homeland Defense Institute, NORAD and USNORTHCOM, Alaska DHS&EM, FEMA, CISA, tribal governments and Alaska Native organizations, academic institutions, and the private-sector operators across the seven lifeline sectors examined in this research. The recommendations are operationally executable. What requires explicit articulation is the connective infrastructure under which they become operationally executable.

This section names that requirement directly and develops the partnership case that follows from it. The most analytically significant institutional finding of this research is that the architecture necessary to translate between defense mission requirements and the privately operated systems that sustain them, the connective infrastructure that the recommendations and the contested-logistics literature both identify as essential, does not currently exist within the federal architecture at the maturity Arctic mission assurance requires. The Private Sector Emergency Management Association, whose institutional identity, mission, membership composition, and operational posture are described in the Research Sponsor and Institutional Context section earlier in this report, is positioned to

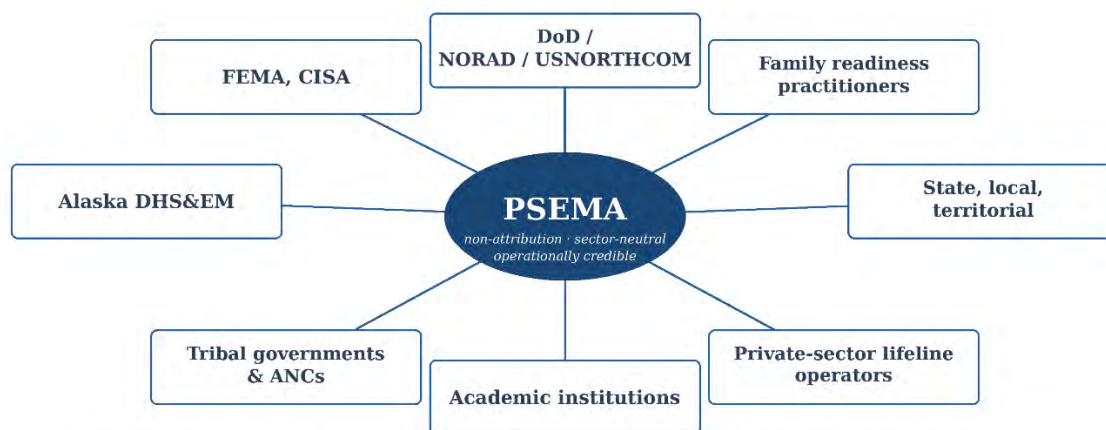
fill that gap. This section explains what the gap is, why a sector-neutral, non-attribution intermediary is the architecture required to close it, how PSEMA is structured to operate as that intermediary across the lifeline sectors examined in this research, the specific connection points through which the network engages the external partners the recommendations name, and the continuation availability PSEMA offers to extend this research into the multi-year horizon the analytical record establishes as necessary.

This research has documented the human-systems coordination weakness that determines whether Arctic continuity of society holds under disruption. The weakness is specific and operationally consequential: there is no sustained, trust-based, operationally tested intermediary connecting DoD and military components to the family readiness organizations, civilian and contractor workforce networks, tribal and Alaska Native governance structures, behavioral health systems, faith-based networks, and community organizations that together sustain Arctic mission assurance at the human-systems layer. The protocols on paper assume an intermediary that does not exist with the reach, trust, and operational credibility the Days 0–14 window requires.

The Private Sector Emergency Management Association is positioned to fill that role, and this section articulates why and how. The framing is integrated with the companion study's PSEMA Network section to present a unified connective architecture across both research lines: where the companion study positions PSEMA as the intermediary connecting DoD to the privately operated lifeline systems on which Arctic operations depend, this research positions PSEMA as the intermediary connecting DoD to the human-systems partners through whom continuity of society is sustained.

PSEMA as Connective Infrastructure

Non-attribution, sector-neutral, operationally credible intermediary linking federal, state, tribal, academic, and private-sector partners.



PSEMA's role is connective: holding cross-sector signal where attribution-sensitive boundaries would otherwise prevent it.

Sources: Defending this figure is report 1. From Research and Analysis in the Arctic region - PSEMA's network architecture.

Visual depicting PSEMA's sector-neutral intermediary role linking business, industry, , associations, government, nonprofit, and academic.

Why a Sector-Neutral Intermediary Is The Architecture Required, and Why PSEMA Fits It

The Private Sector Emergency Management Association occupies an institutional position uniquely suited to closing this gap. PSEMA operates as a non-attribution, sector-neutral, operationally credible intermediary across the categories of private-sector lifeline operators that Arctic mission assurance depends on: energy and fuel providers, transportation and logistics firms, telecommunications and technology companies, food distribution and supply chain partners, medical and pharmaceutical providers, warehousing and cold-chain operators, and humanitarian and disaster-relief organizations. The non-attribution posture is operationally consequential: it enables candid practitioner engagement with the operators who would otherwise be constrained from discussing system vulnerabilities and operational limits in attributed forums, generating the kind of operational data this research has documented as essential to validated mitigation planning.

The sector-neutrality is structurally important because the dependencies this research has mapped are cross-sector. A coordination architecture anchored in any single lifeline category, energy, transportation, communications, food, medical, would replicate the fragmentation that the dependency mapping identifies as the underlying vulnerability. PSEMA's design is the inverse: it is anchored in the cross-sector logic that the cascade pathways require, with sustained relationships across the operator categories whose interactions determine system performance under disruption.

The connective infrastructure Arctic mission assurance requires has a specific institutional shape. It must be non-attribution, because the operational realities that determine system performance under disruption cannot be surfaced in attributed forums. It must be sector-neutral, because the dependencies this research has mapped are cross-sector and a coordination architecture anchored in any single lifeline category would replicate the fragmentation the dependency mapping identifies as the underlying vulnerability. And it must be sustained across pre-incident, incident, and post-incident periods, because the trust and relational continuity that operational coordination depends on cannot be built transactionally once a disruption is underway.

These three characteristics are the operational posture established as PSEMA's institutional foundation in the Research Sponsor and Institutional Context section. This subsection makes the operational case for why they are the right architecture for the gap this research has identified and translates them into three concrete mechanisms through which the PSEMA network closes the paper-redundancy gap at the coordination layer where it originates.

PSEMA's institutional position addresses the paper-redundancy gap at the layer where it originates: the coordination and governance architecture that determines whether documented redundancies translate into operational throughput. PSEMA operates as a sustained intermediary across the categories of private-sector lifeline operators and human-systems partners that Arctic mission assurance depends on, energy and fuel providers; transportation and logistics firms; telecommunications and technology

companies; food distribution, supply chain, and humanitarian feeding organizations; medical and pharmaceutical providers; engineering and infrastructure resilience consultancies; tribal and Alaska Native organizations; family readiness and behavioral health networks; and the federal, state, and academic partners whose engagement the recommendations require. The cross-sector reach is not incidental; it is the structural condition that makes the three mechanisms below operationally feasible.

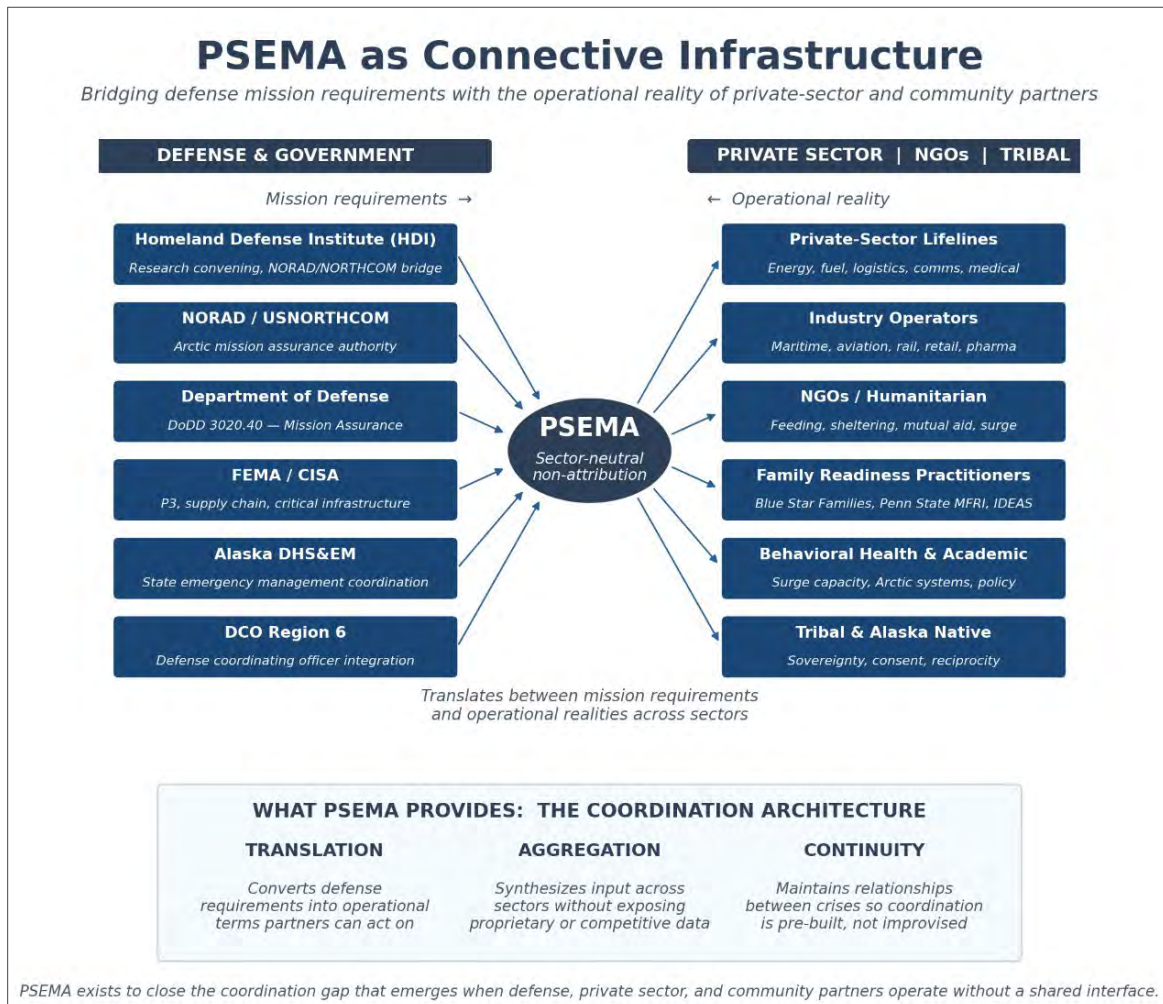
First, PSEMA converts episodic engagement into sustained engagement architecture. The federal Public-Private Partnership maturity model identifies sustained engagement as the precondition for the operational coordination that disruption response requires [27]. Episodic engagement, incident-only, transaction-only, contract-only, produces the paper-redundancy condition that disruption response exposes. Sustained engagement, pre-incident, through-incident, post-incident, with consistent participants and consistent analytical posture, converts paper relationships into operational architecture. Business Emergency Operations Center architectures connecting commercial lifeline operators, installation commanders, state emergency management, and tribal governments produce the institutional infrastructure through which civil-military resource adjudication can occur under time pressure. PSEMA is structured for the sustained mode rather than the episodic one.

Second, PSEMA functions as the cross-sector translation layer that no single agency or sector is positioned to provide. Defense components understand defense mission requirements; commercial operators understand commercial operating realities; tribal governments understand tribal sovereignty; federal civilian agencies understand federal civilian authority. The translation across these vocabularies, frameworks, and decision-making paradigms is itself the function the contested-logistics literature identifies as missing. [46] Without a sector-neutral translator, each party operates from a partial mental model of how the others will behave under stress, and the assumption misalignments that result are themselves a primary cascade trigger. PSEMA's sector-neutral positioning makes the translation function structurally feasible because PSEMA is not a party to the operational decisions whose coordination it facilitates.

Third, PSEMA produces and disseminates the integrated analytical products that close the information-asymmetry condition that paper redundancy depends on. When defense planners assume that contractual relationships produce operational continuity under stress, when commercial operators assume that defense requirements will be coordinated through standing channels that do not exist at the maturity assumed, and when state and tribal authorities assume that federal-level coordination architecture will deploy at the pace disruption requires, the asymmetry of expectations among the parties is what produces the paper-redundancy outcome. Integrated analytical products, like this research and its companion study, convert asymmetric expectations into shared analytical foundation, against which expectations can be calibrated and operational coordination architecture can be built. The non-attribution posture is what makes the underlying operational data accessible to the analytical record at all; the sector-neutral positioning is what makes the cross-sector synthesis possible; and the sustained engagement is what allows the analytical products

to track evolving conditions across the multi-year horizon Arctic mission assurance requires.

Operational Implication: Paper redundancy at the governance and coordination layer cannot be closed by infrastructure investment, by additional contracts, or by federal directive alone. It can be closed only by sustained, sector-neutral, operationally credible intermediation that converts episodic engagement into continuous architecture. PSEMA is the connective infrastructure positioned to fill that role across the lifeline sectors examined in this research.



Connection Points: How PSEMA Connects to the External Partners

The recommendations developed in this report identify specific external partners across every line of effort, the full mapping of recommendations to lead actors and supporting partners is consolidated in the Appendix B. The PSEMA network connects to those partners through specific institutional pathways developed over years of sustained engagement. Six connection point categories warrant explicit identification.

HDI and the Homeland Defense Research Architecture

PSEMA's research engagement with the Homeland Defense Institute, including this research effort and its companion study, establishes a direct working relationship with the institutional convening function for Arctic homeland defense research priorities. HDI's partner architecture provides connection to NORAD and USNORTHCOM operational requirements, to interagency research priorities, and to the academic institutions whose analytical capacity supports follow-on research. The connection point is direct, current, and operationally productive; this report itself is a worked example of the architecture in operation.

NORAD/USNORTHCOM Mission Partners

PSEMA's strategic conversations with current and former NORAD and USNORTHCOM leadership establish the operational requirements that the analytical record of this research is designed to support. The connection point provides direct access to the mission assurance authorities that hold Arctic homeland defense responsibility, and to the J-staff equivalents whose operational planning incorporates the findings the research delivers. Sustained engagement converts episodic strategic dialogue into a continuous information architecture supporting both research and operational coordination.

Alaska DHS&EM, FEMA, CISA, and the Federal Emergency Management Architecture

PSEMA's institutional standing within the emergency management community connects directly to Alaska DHS&EM at the state level, FEMA at the federal level, and CISA for critical infrastructure coordination. These connections are particularly consequential because the recommendations developed in this report depend on the public-private partnership maturity progression, the federal supply chain resilience programs, and the critical infrastructure protection coordination that these agencies hold. PSEMA's positioning within the emergency management community, rather than adjacent to it, makes the connection operationally substantive rather than nominal.

Tribal Governments and Alaska Native Organizations

PSEMA's tribal partnerships operate under sovereignty, consent, and reciprocity throughout. Tribal governments are sovereign entities whose engagement with PSEMA proceeds on terms agreed by tribal participants. Reciprocity ensures that PSEMA-mediated coordination returns usable findings to tribal participants rather than extracting data. The connective role is structurally limited: PSEMA does not represent tribal governments or speak for them; it provides the coordination infrastructure through which tribal-DoD-state-federal coordination can occur on tribal terms.

Family Readiness Practitioners and Behavioral Engagement Partners

PSEMA's connection to the family readiness ecosystem combines two complementary capacities. The first is family-research and household-support reach: Blue Star Families, the Penn State Military Families Research Institute, the National Military Family Association, and the broader military family research and support community provide the family readiness coordination capacity that the FRG decline has left open, with bidirectional flow that surfaces practitioner reality from family readiness organizations to

DoD planning and surfaces DoD operational requirements to family readiness organizations in operationally usable form.

The second capacity is behavioral engagement and preparedness campaign design, anchored by IDEAS. IDEAS is the creative and engagement firm that designed the original *Kids Get a Plan* preparedness platform in partnership with the Florida Division of Emergency Management, one of the most behaviorally effective youth preparedness platforms in the United States. The platform's assets are now owned by the PSEMA Foundation under an agreement with the Florida Division of Emergency Management that authorizes extension, adaptation, and expansion into new audiences and operational environments. The platform has already been adapted to an Alaskan context through the *Turn Around, Don't Drown* expansion developed with the Alaska Division of Homeland Security and Emergency Management. For this research, the IDEAS connection point is operationally consequential: it is the partner through which the *Household-Level Preparedness Extension to Underserved Populations* recommendation and the Arctic Rising Generation Preparedness Initiative move from analytical proposal to deployed campaign capability, without reconstructing methodology, asset library, legal vehicle, or state-agency relationship from the ground up. The combined connection point, family research and support networks paired with a twenty-year behavioral engagement and campaign-design capability, is the architecture through which the household-level and family-readiness recommendations of this report become operationally executable.

Behavioral Health Systems and Academic Institutions

PSEMA's connections to behavioral health systems operationalize the surge capacity gap this research identifies as the workforce-sustainment ceiling, including the trained provider pool, tele-behavioral health infrastructure capable of operating under degraded communications, and tribal-led behavioral health programming under sovereignty protocols. PSEMA's research collaboration with the Ted Stevens Center for Arctic Security Studies, with university research centers specializing in Arctic homeland security, and with research institutions including RAND, the Naval Postgraduate School, and the broader contested-logistics research community provides connection to the analytical capacity required for follow-on research. The connection is operationally productive because academic partners contribute the methodological depth and the multi-year research horizons that single-program engagements cannot sustain, including the longitudinal family readiness studies and multi-year continuity-of-society modeling identified in the long-term recommendations.

Private-Sector Lifeline Operators Across the Seven Sectors

PSEMA's standing engagement spans the seven lifeline sectors examined in this research, and the cross-sectoral reach is the architecture that converts research findings into operationally executable coordination across the recommendations of this report.

Continuation Availability

The recommendations developed in this report exceed the engagement window of this research. Near-term lines of effort begin within twelve months of report submission; mid-term lines require sustained execution across one to three years; long-term and follow-on research lines identify investments whose multi-year horizons begin now but extend well beyond the current research engagement. Each tier requires the connective infrastructure described in this section to operate effectively, and that infrastructure cannot be reconstructed at each transition between research phases.

PSEMA views this research as a foundational exploration of Arctic continuity of society and is positioned to continue the connective infrastructure function across the recommendations identified in this report and across the follow-on research priorities the analytical record supports. Continuation availability is offered to HDI, NORAD/USNORTHCOM, and the broader interagency partnership architecture as a structural commitment, not as a transactional offer.

Specifically, PSEMA is positioned to support the following continuation lines of effort: convening and facilitation of the tabletop exercises identified in the near-term recommendations; engagement architecture development for the sustained stakeholder engagement and the public-private partnership maturity progression identified in the mid-term recommendations; cross-sector facilitation of the operational piloting cross-sector facilitation of the operational piloting and Arctic societal sustainment testbed concepts (paired with the companion study's infrastructure testbed) identified in the long-term recommendations, ongoing coordination with academic partners on the extended sustainment modeling and multi-year resilience studies that exceed the engagement window of this research; and continuing analytical work as new data, new operational conditions, or new research priorities emerge from the integrated picture this report and its companion study deliver.

The closing analytical proposition is straightforward. Arctic homeland defense cannot be sustained against the dual-theater disruption scenario this research models without the layered investment, the institutional coordination, and the connective infrastructure that the recommendations and this section together identify. Closing the gap between current capacity and what the threat environment requires is not a single-program effort; it is a sustained, multi-partner, multi-year line of work whose return is realized over horizons that no single research engagement can encompass. PSEMA is structured for that horizon, positioned within the network the recommendations require, and committed to the continuation availability the analytical record establishes as essential.

CONCLUSION

This research presented its analytical foundation in March 2026 through the Interim Report and has, across the seven completed deliverables and this final report, established the practitioner-validated, integrated picture of human-systems resilience that Arctic homeland defense requires. The analytical architecture is in place. The framework is integrated. The recommendations are tiered, tagged, and grounded in stakeholder engagement that converges on the same operational priorities as the literature and the deliverable findings.

The central claim that organizes this research is operationally direct: continuity of society is a prerequisite for continuity of operations in the Arctic, not a downstream consequence. The communities surrounding Arctic installations are the operational substrate on which defense operations depend. Their workforce operates installation services. Their stability determines military family readiness. Their governance systems shape the resource allocation decisions that determine whether disruption stays manageable or cascades by Day 14. Arctic mission assurance planning that treats community continuity as adjacent to military readiness operates on a model that the workforce-family-system loop documented across this research does not preserve.

The Days 0–14 window is the period during which everything matters most. Household and community stress accumulates fastest. Governance coordination mechanisms are least prepared. The absence of pre-established relationships, trust, and authority clarity is most operationally consequential. The Day 3 to Day 7 governance inflection window concentrates this dynamic: decisions made in that interval either contain the cascade or accelerate it, and decision-makers who wait for installation-level operational indicators before engaging will be acting after the window for effective intervention has closed.

The recommendations developed in this report address the gap. Near-term actions in civil–military coordination protocol pre-staging, family communications hardening, exercise-based validation of paper governance architectures, family readiness rebuilding through hybrid public-private-nonprofit structures, tribal coordination protocol pre-staging under sovereignty, consent, and reciprocity, and household-level preparedness extension to underserved populations are practitioner-validated, operationally feasible, and resourceable within the current grant horizon. Mid-term workforce continuity planning, behavioral health surge capacity expansion, formalized tribal consultation architecture, integrated civil–military exercise series, and federal cross-sector supply chain coordination capability address the system-level gaps that near-term protocol work cannot fully close. Long-term continuity-of-society modeling, longitudinal family readiness studies, operational piloting of integrated frameworks, and an Arctic societal sustainment testbed paired with the companion study's infrastructure testbed identify the follow-on agenda that translates this research's analytical foundation into sustained operational capability.

The PSEMA Network is the connective infrastructure that addresses the human-systems coordination weakness this research has documented. The framing integrates with the companion study's PSEMA Network section to present a unified connective architecture across both research lines, and PSEMA's continuation availability for follow-on research and operational piloting is the practical mechanism through which the recommendations advanced in this report can move from analytical findings into operational capability.

The end state this research argues for is direct. NORAD/USNORTHCOM, the Homeland Defense Institute, federal interagency partners, the State of Alaska, tribal governments and Alaska Native organizations under sovereignty, consent, and reciprocity, and the family readiness, civilian and contractor workforce, behavioral health, and community sustainment organizations whose operational role this research documents, treat continuity of society in the Arctic as a mission assurance requirement on the same footing as physical infrastructure resilience. They invest accordingly. They exercise the protocols before disruption. They build the relational infrastructure on which paper architectures depend. They engage tribal partners through sovereignty, consent, and reciprocity, before the crisis arrives. They recognize that the Days 0–14 window will not wait for institutional response architecture to mature, and that the architecture in place at Day 0 is the architecture that will govern.

The research has done what a three-month engagement window allows. The follow-on agenda identifies what the next horizon of work requires. PSEMA is committed to that next step and welcomes the opportunity to discuss how this research can be extended and deepened in support of Arctic homeland defense and the communities, families, tribal nations, and civilian workforce that make it possible.