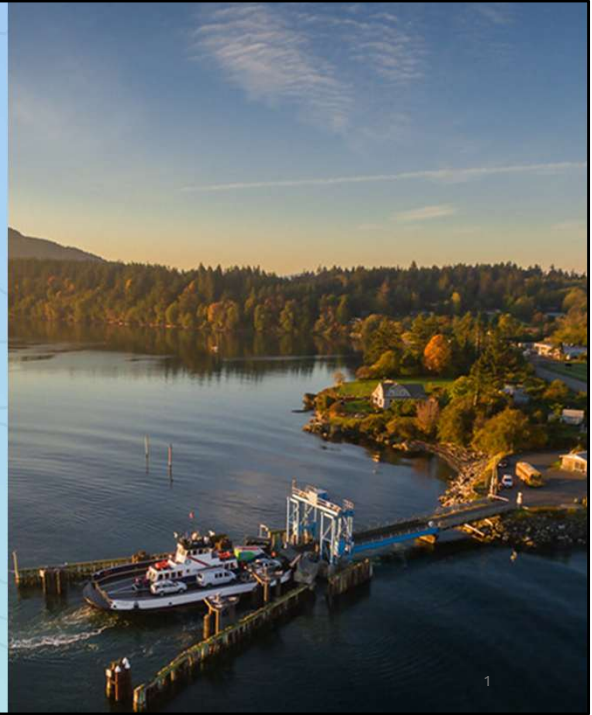


# Lummi Island Preparedness Survey: Implications for Evacuation Planning

*Western Washington University &  
Lummi Island Fire Department  
November 14th, 2025*



Hi everyone, thank you for coming to tonight's town hall. Today we are presenting to you about the process of writing an on-island evacuation plan for Lummi Island for wildfire and earthquake/tsunami events.



- Lummi Island Representatives
  - Fire Chief Michael Lish
  - Assistant Fire Chief John Granger
  - Fire Commissioner Bill Lee
  - Fire Commissioner Joan Moye
  - Fire Commissioner Dan Ohms
- WWU Research Team
  - Dr. Rebekah Paci-Green, Environmental Studies Dept
  - Research Assistants
    - Jeff Baker
    - Harry Grantz
    - Madisyn Cook
    - Rebeca Galpani
    - Max Edwards

## Lummi Island Fire Department Disaster Preparedness Team

- Lummi Island Representatives
  - Assistant Fire Chief John Granger
  - Fire Commissioner Joan Moye
- WWU Research Team
  - Dr. Rebekah Paci-Green, Environmental Studies
  - Research Assistants
    - Jeff Baker
    - Harry Grantz
    - Madisyn Cook
    - Rebeca Galpani
    - Max Edwards

- Evacuation Planning Case Studies (10 min)
  - Discussion (10 min)
- Lummi Island Preparedness and Evacuation Survey (30 min )
  - Discussion (15 min)
- Raffle! (10 min)
- Common Elements of Evacuation Plans (10min)
  - Discussion (15 min)

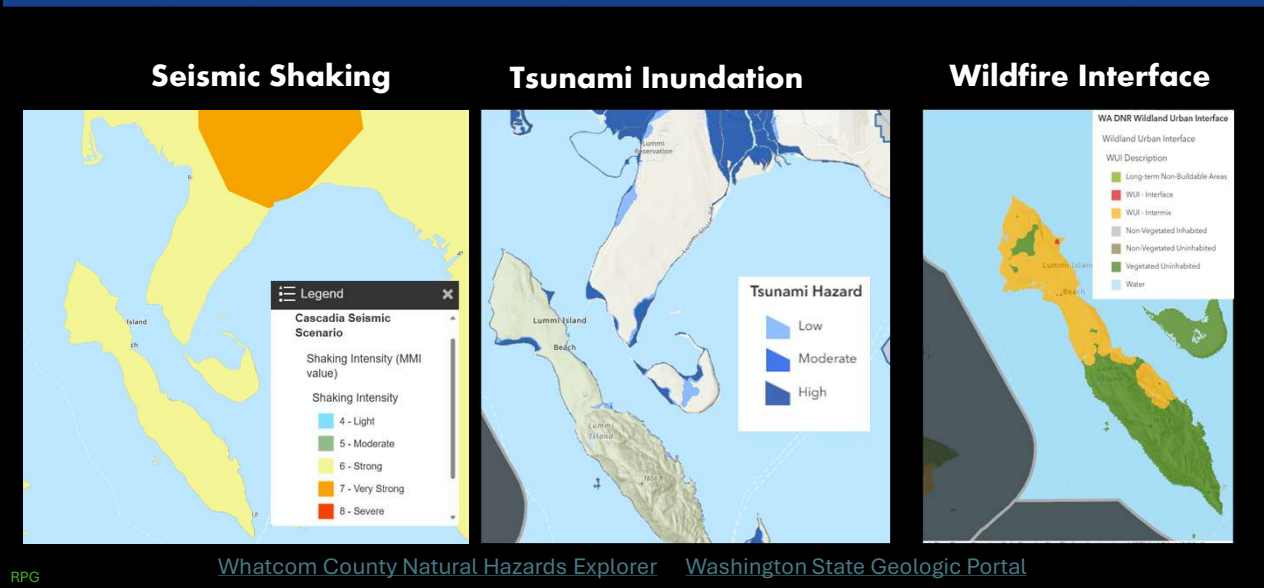
Introduce presenters

## Evacuation Plans

- Support safe and orderly exit from dangerous situation
- Provide clear instructions for how to escape, routes to use, and where to go

RPG





Lummi Island faces seismic risk and its associated tsunami risk, as well as wildfire risk. Though the island has not experienced these hazards in recent history, there is always a chance it may.

As the seismic scenario map for a Cascadia Subduction Zone earthquake displays, the island is expected to experience strong shaking throughout the island. Strong shaking is associated with movement of heavy furniture and light damage to interiors. It can also mean some poorly built or very old buildings sustain damage and unsecured chimneys may be at risk of cracking or toppling.

The larger threat associated with seismic activity is tsunami inundation, specifically around Legoe Bay Road and Lane Spit, highlighted in dark blue. In Whatcom County, that high tsunami hazard zone is associated with up to 18 feet of inundation. One concern for Lummi Island is that the the Lummi Reservation is expected to experience significant inundation that will most likely block roadways round the ferry landing and the Nooksack Delta, cutting off access to I5, Ferndale and Bellingham.

Wildfire risk pervades larger swaths of Lummi Island because of high levels of

wildland urban interface--the construction of homes and buildings directly next to flammable growth such as trees or brush. All of the inhabited portion of the island is designated a WUI – intermix, meaning it is comprised of low-density housing and undeveloped wildland vegetation. Large, high intensity fires have naturally occurred in Western Washington every 200-600 years, though my colleagues who study wildland fires in the region indicate that changes in climate, historic suppression of low-intensity fires, and pest infestation have made our forests more susceptible to high-intensity fires than in the past.

**Intermix: Lower-density housing mingled with undeveloped wildland vegetation**

- Challenges, best practices, and lessons learned
  - Lāhainā wildfire
  - Palisades wildfire
  - American Samoan tsunami
- Compare to Lummi Island context

We reviewed incident reports from small and isolated communities to identify recurring challenges, best practices, and lessons learned

Examples include Lahaina wildfire, Palisades wildfire, and American Samoan tsunami

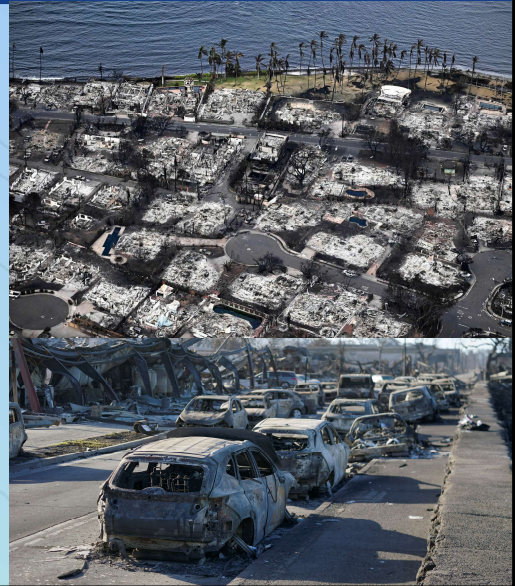
We don't mean to fearmonger by including disaster case studies, but we can learn from them



## Lāhainā, Maui, Hawai'i Wildfire August 8<sup>th</sup>-September 3<sup>rd</sup>, 2023

- Island w/ wildfire risk
- 11,000 population
- Fallen power line, high winds
- Loss of cell and power, evac order not received
- Tsunami siren not used
- Residents confused about where to go

JB



On August 8th, 2023, in Lahaina, Maui, Hawaii, a wildfire struck the small island town of 11,000 people. At 6:37 a.m. a fallen power line ignited dry vegetation in Lahaina and caught a fire that spread across Lahaina due to high winds. The fire inflicted road blockages throughout Lahaina from downed telephone poles, car accidents, and abandoned cars. The fire destroyed critical infrastructure such as cell towers and feedlines, causing power outages and loss of cell service throughout Lahaina. The tsunami siren was not sounded in case residents didn't know what to do upon hearing it.

Although Lahaina had an evacuation plan, the residents had little to no warning that a fire was headed their way and had no time to prepare, and when evacuation was ordered, residents were confused about where to go and how to get there. The uncoordinated response between actors resulted in higher death rates and loss of infrastructure.

## Los Angeles Area Wildfires January 7<sup>th</sup>-30<sup>th</sup>, 2025

- 8 months of drought preceding
- Strong Santa Ana winds
- Small, isolated communities
- Elderly population
- 31 fatalities; over \$50B damage

RQ



On January 7<sup>th</sup>, 2025 10:20 a.m., a wildfire erupted in Palisades, California when strong winds picked up a smoldering fire started by an arsonist. As the wildfire began to spread closer to residences, the Los Angeles Fire Department released an evacuation order, but so many residents were already evacuating that gridlock had formed on the local road. By the following day, intense winds had pushed the wildfire across 15,000 acres through schools, neighborhoods and nursing homes, despite containment attempts by fire crews.

The Palisades community has many residents aged 65 and over who lived at home or in assisted living facilities. Responders did not have an adequate plan to assist the elderly or disabled folks who were unable to self-evacuate. The main road was rendered unusable because of abandoned cars in the roadway, blocking people from evacuating and response from accessing fire points.

## American Samoa Tsunami September 29<sup>th</sup>, 2009

- Earthquakes with 8.1 and 8.0 magnitude
- Little time between warning and tsunami arrival
- Tsunami waves up to 22 meters
- Main egress port damaged
- Cultural tsunami awareness saved lives

RQ



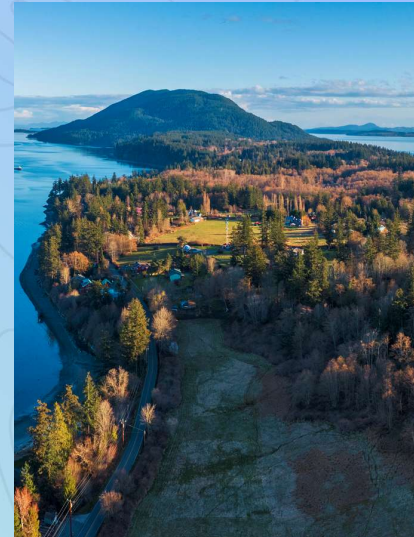
On September 29<sup>th</sup>, 2009, at 7:48 a.m. (HST) earthquakes with 8.1 and 8.0 magnitudes erupted 150 miles off the southwestern coast of American Samoa. After only 17 minutes, tsunami waves began to crash into coastal areas of the island territory. The first waves measured up to 4 meters but eventually reached a height of up to 22 meters, destroying houses, businesses, coral reefs, a power plant, and the main port of American Samoa.

Though the tsunami decimated infrastructure, much of the American Samoan population remained safe. High cultural awareness of earthquakes and tsunamis pervaded the island, so when people felt the earthquake, they knew to run to higher ground. Just that summer and fall, American Samoan community members had participated in EQ and TS training drills and mapping and signage for evacuation. Tsunami awareness saved many lives in the 2009 disaster.



## Case Study Themes

- One-road ingress/egress
  - Road blockages
  - Access and evac obstacles
- Assistance for those with functional limitations
  - Communication
  - Location
  - Resources
- Residents rely on government response
  - Communication
  - Structured coordination



HG

11

Major themes presented in the Lahaina and Palisades Wildfires and the American Samoan Tsunami include firstly that most scenarios include the use of one road as the primary ingress and egress. Heavy dependence on this single road runs risk of experiencing road blockages due to gridlocked or abandoned cars, fallen trees or powerlines, or damaged roads. These incidents can reduce evacuation options for residents and access for critical response activities. A good evacuation plan should identify and attempt to mitigate this potential risk.

Secondly, we need to plan for the assisted evacuation of those with functional limitations, including elderly and disabled folks and young children. Not only do we need a plan for the physical evacuation, but also a plan of how to communicate with people in the event itself. Knowing where people are located and what resources they require are important evacuation planning elements that demand our focus.

Finally, we need to recognize the important of a coordinated official response in a disaster, Residents often will not evacuate in a disaster until they receive a mandate from trusted local officials.



Think. Pair. Share.

What concerns do the case studies raise for you as residents of Lummi Island?  
What is similar? What is different?  
(10min)

RPG

12

- 1.) Turn to the people around you and discuss the question.
- 2.) Write common themes on your sticky note.
- 3.) Select a group speaker to share most important themes with the group.

## Lummi Island Preparedness and Evacuation Survey

- First step to understand current context
- Opportunity for students to learn research methods

RPG



You may have noticed this eager looking bunch of Western students knocking on your doors this summer....

## Survey Development

- Literature review of preparedness surveys
- 26 survey questions
- Online and paper surveys
- Division of island into “neighborhoods”
- Excluded visitors and vacationers

JB

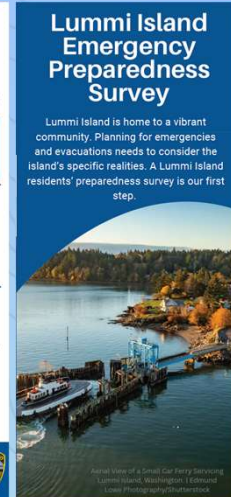
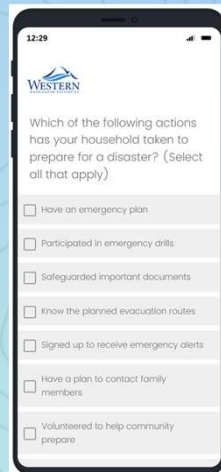


14

When developing the survey, we started with FEMA's national household preparedness survey. **Working with the Lummi Island representatives of the Disaster Preparedness Team**, we selected the questions that seemed most appropriate to the Lummi Island community **and then added questions that were specific to evacuation planning, especially evacuation planning on a small, rural island.** We also divided the island into nine areas based on their input. These are not formal divisions, but functional groupings that helped us plan our trips, ensure roughly proportional sampling across the island, and look for geographic patterns in the data.

## Survey Implementation

- Door knocking, door hangers, and information pamphlets
- Sampling of each neighborhood
- Saturday Market and ferry line
- 142 household responses
- Compiled results and calculated statistics



We offered these surveys both remotely and in person, both online and using paper copies. Before going out to survey, we asked Joan to post messages on local media sites to give Lummi Islanders a heads up about our coming, so people weren't caught off guard by strangers. We visited each of the nine areas we had identified, knocking on doors to survey residents. When people were not home, we left door hangers so residents could take the survey online once they'd returned home. We also had a booth at the Saturday Market and walked up and down ferry lines, delivering pamphlets with our information and access to the online survey. In total we collected 142 survey responses, which we processed through Excel and performed statistical analyses.



# Survey Results

## 1. General Preparedness and Expectations

## 2. Evacuation

## 3. Community Response Resources

RPG

16

We created 26 survey questions and offered them remotely and in person, both online and using paper copies. Survey questions were developed based on an existing FEMA Household Preparedness survey, but modified to fit the context of Lummi Island, largely shaped with the guidance of Joan Moyer.

Before going out to survey, we asked Joan to post messages on local media sites to give Lummi Islanders a heads up about our coming, so people weren't caught off guard by strangers. We grouped the neighborhoods into 9 larger areas and walked around each, knocking on doors to survey residents. When people were not home, we left door hangers so residents could take the survey online once they'd returned home. We also had a booth at the Saturday Market on island and walked up and down ferry lines, delivering pamphlets with our information and access to the online survey.

In total we collected 142 survey responses, which we processed through Excel and performed statistical analyses.

**Question:** Which of the following actions has your household taken to prepare for a disaster?

- High prevalence of actions related to island life
- Less prevalence of actions specific to emergency and disaster
- ~ 6 actions per household

Q4. Percentage Households Taking Selected Preparedness Actions (N=138)



Nearly all households had purchased residential insurance (85%) and most had set aside emergency supplies (67%) and money for emergencies (62%) and safeguarded important documents (57%). About half had made improvements to protect their home (54%), knew their evacuation route (54%), and signed up for emergency alerts (46%). Making emergency plans with family members, neighbors, or volunteering for community preparedness were actions less often taken, with only about a third of households doing so. Fewer than a fifth of the households (17%) had participated in emergency drills.

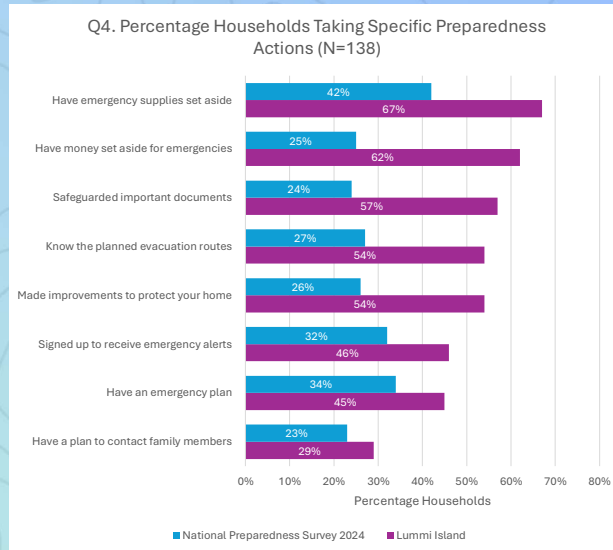
Lummi Island households had an average of six preparedness specific actions taken, and a standard deviation of three actions. Many residents stated they had an intuitive idea of what their emergency plan would be and did not explicitly need to discuss it with their household.

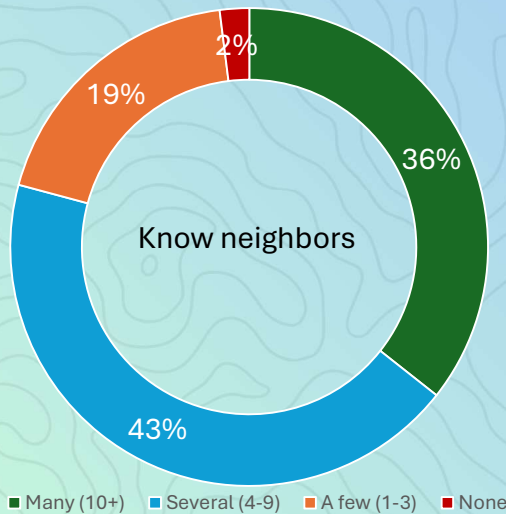
Q4: Which of the following actions has your household taken to prepare for a disaster?



**Much higher rates  
of preparedness  
action than  
national average!**

**Wildcard: visitors  
and vacationers**





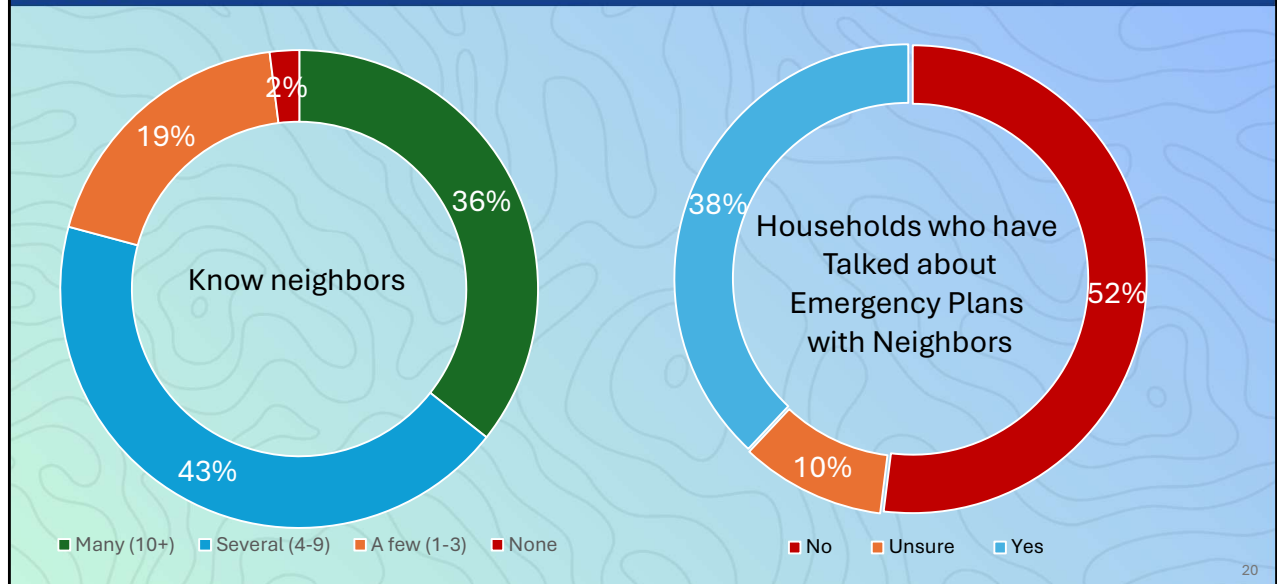
**Question:** How many of your immediate neighbors do you know well?

- High familiarity in most neighborhoods
- One in five households have low familiarity
- Neighbors don't know vacation rental neighbors

19

Lummi Island residents value neighborly connection, with nearly all (98%) households knowing the members of at least one or more immediate neighboring households well. One out of five (19%) households knew a few neighbors, half (44%) knew several, and one third (36%) knew many households. Neighbors did not know households that are vacation rental homes through platforms such as Airbnb, contributing to the 2% of participants who did not know any neighboring households.

*Q5. How many of your immediate neighbors do you know well?*



Many Lummi Island residents had ideas of what their plans would be with their neighbors in an emergency but had never actually discussed and agreed upon plans. Not all residents may have considered how a disaster would disrupt their ability to carry out typical activities, such as a major disaster disrupting cell phone communication or buckling roads. Just over a third had discussed plans with their neighbors (38%), such as having participated in Map Your Neighborhood (37%), a emergency planning program in which neighbors come together and discuss important planning items such as the location of propane tanks, backup generators; children, disabled, or elderly folks; and safe emergency assembly zones, among other disaster planning criteria.

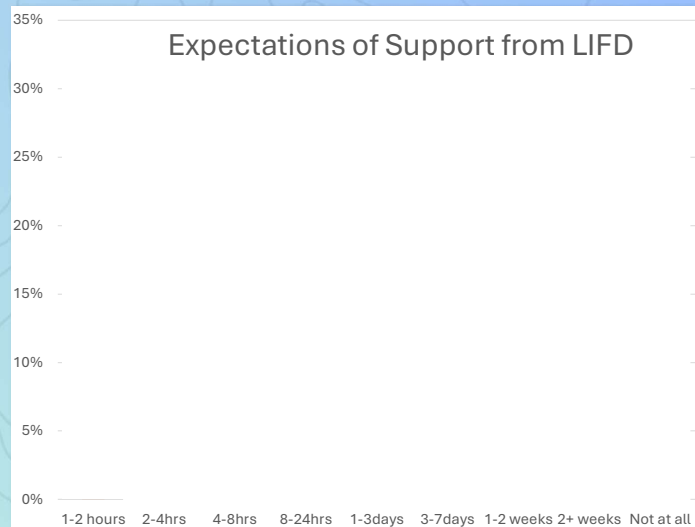
Regardless of formal discussions or planning, island residents were clear that they had an unspoken community agreement that everyone would help each other.

Q5. How many of your immediate neighbors do you know well?

Q6. Discussing disaster or emergency plans with neighbors

**Question:** How long for responders to reach your household in large-scale disaster?

- Wide-spread destruction hard to imagine
- 30% expected LIFD within a couple hours
- 73% expected LIFD within first 24 hours



21

Residents expected immediate response to personal emergency needs from the Lummi Island Fire District (LIFD) #11, the island's volunteer fire department, in a large-scale disaster. One out of three (30%) survey participants stated that in a large-scale disaster, the fire department would respond to their personal emergency needs within 1-2 hours, the smallest time increment option on our survey. Most (73%) of survey participants expected the Lummi Island fire district to respond to their personal emergency needs in 24 hours or less in a large-scale disaster. Many residents noted that the survey should have had a "less than one hour" option because the fire district could respond as quickly as 5 minutes.

Lummi Islanders' expectations for off-island authorities to respond to personal emergency needs was remarkably lower than for the local island Fire District. Very few survey respondents (20%) indicated they expected a response from off-island authorities in the first 24 hours. One quarter of survey participants (23%) expected response to personal needs from off-island authorities between 1-3 days. A handful of participants (5%) expected no response at all from off-island authorities.

Survey participants expect support from additional groups including Lummi

Island friends and neighbors (88%) and themselves or their household (82%). Half of survey participants also expect support from their insurance companies (51%) and off-island friends or family (48%), off-island nonprofits such as American Red Cross (43%).

*Q7. In a large-scale disaster or emergency affecting the region, how soon would you expect the local fire district on Lummi Island to respond to your emergency needs?*

*Q8. In a large-scale disaster or emergency affecting the region, how soon would you expect off-island authorities (Sheriff, Coast Guard, FEMA, or similar) to respond to your emergency needs?*

*Q9. In the event of a disaster or emergency, who else would you expect support from?*



- **Question:** How long for responders to reach your household in large-scale disaster?
  - Wide-spread destruction hard to imagine
  - 30% expected LIFD within a couple hours
  - 73% expected LIFD within first 24 hours

Initial Attack 38



Engine 38



Tender 38



Aid 38



22

Residents expected immediate response to personal emergency needs from the Lummi Island Fire District (LIFD) #11, the island's volunteer fire department, in a large-scale disaster. One out of three (30%) survey participants stated that in a large-scale disaster, the fire department would respond to their personal emergency needs within 1-2 hours, the smallest time increment option on our survey. Most (73%) of survey participants expected the Lummi Island fire district to respond to their personal emergency needs in 24 hours or less in a large-scale disaster. Many residents noted that the survey should have had a "less than one hour" option because the fire district could respond as quickly as 5 minutes.

Lummi Islanders' expectations for off-island authorities to respond to personal emergency needs was remarkably lower than for the local island Fire District. Very few survey respondents (20%) indicated they expected a response from off-island authorities in the first 24 hours. One quarter of survey participants (23%) expected response to personal needs from off-island authorities between 1-3 days. A handful of participants (5%) expected no response at all from off-island authorities.

Survey participants expect support from additional groups including Lummi



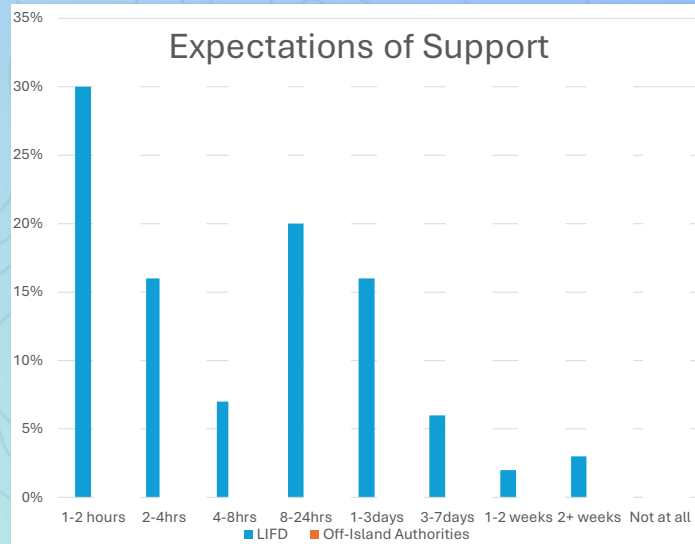
Island friends and neighbors (88%) and themselves or their household (82%). Half of survey participants also expect support from their insurance companies (51%) and off-island friends or family (48%), off-island nonprofits such as American Red Cross (43%).

*Q7. In a large-scale disaster or emergency affecting the region, how soon would you expect the local fire district on Lummi Island to respond to your emergency needs?*

*Q8. In a large-scale disaster or emergency affecting the region, how soon would you expect off-island authorities (Sheriff, Coast Guard, FEMA, or similar) to respond to your emergency needs?*

*Q9. In the event of a disaster or emergency, who else would you expect support from?*

- **Question:** How long for responders to reach your household in large-scale disaster?
  - Wide-spread destruction hard to imagine
  - LIFD expected within hours
  - Lower expectation of immediate off-island response



Residents expected immediate response to personal emergency needs from the Lummi Island Fire District (LIFD) #11, the island’s volunteer fire department, in a large-scale disaster. One out of three (30%) survey participants stated that in a large-scale disaster, the fire department would respond to their personal emergency needs within 1-2 hours, the smallest time increment option on our survey. Most (73%) of survey participants expected the Lummi Island fire district to respond to their personal emergency needs in 24 hours or less in a large-scale disaster. Many residents noted that the survey should have had a “less than one hour” option because the fire district could respond as quickly as 5 minutes.

Lummi Islanders’ expectations for off-island authorities to respond to personal emergency needs was remarkably lower than for the local island Fire District. Very few survey respondents (20%) indicated they expected a response from off-island authorities in the first 24 hours. One quarter of survey participants (23%) expected response to personal needs from off-island authorities between 1-3 days. A handful of participants (5%) expected no response at all from off-island authorities.

Survey participants expect support from additional groups including Lummi

Island friends and neighbors (88%) and themselves or their household (82%). Half of survey participants also expect support from their insurance companies (51%) and off-island friends or family (48%), off-island nonprofits such as American Red Cross (43%).

*Q7. In a large-scale disaster or emergency affecting the region, how soon would you expect the local fire district on Lummi Island to respond to your emergency needs?*

*Q8. In a large-scale disaster or emergency affecting the region, how soon would you expect off-island authorities (Sheriff, Coast Guard, FEMA, or similar) to respond to your emergency needs?*

*Q9. In the event of a disaster or emergency, who else would you expect support from?*

# Survey Results

1. General Preparedness and Expectations
2. Evacuation
3. Community Response Resources

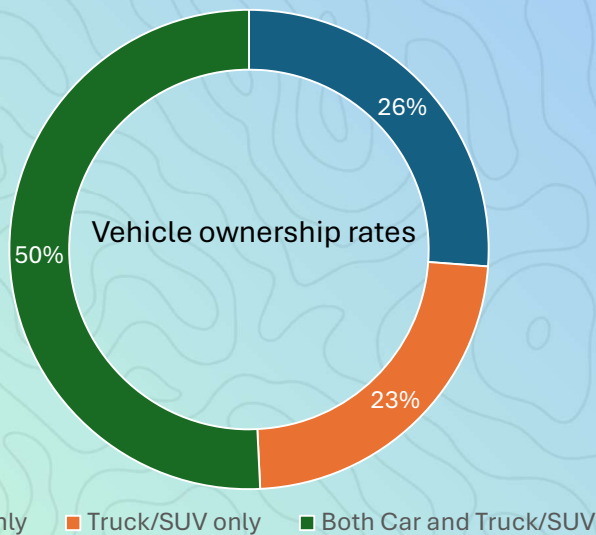
RPG

24

We created 26 survey questions and offered them remotely and in person, both online and using paper copies. Survey questions were developed based on an existing FEMA Household Preparedness survey, but modified to fit the context of Lummi Island, largely shaped with the guidance of Joan Moyer.

Before going out to survey, we asked Joan to post messages on local media sites to give Lummi Islanders a heads up about our coming, so people weren't caught off guard by strangers. We grouped the neighborhoods into 9 larger areas and walked around each, knocking on doors to survey residents. When people were not home, we left door hangers so residents could take the survey online once they'd returned home. We also had a booth at the Saturday Market on island and walked up and down ferry lines, delivering pamphlets with our information and access to the online survey.

In total we collected 142 survey responses, which we processed through Excel and performed statistical analyses.



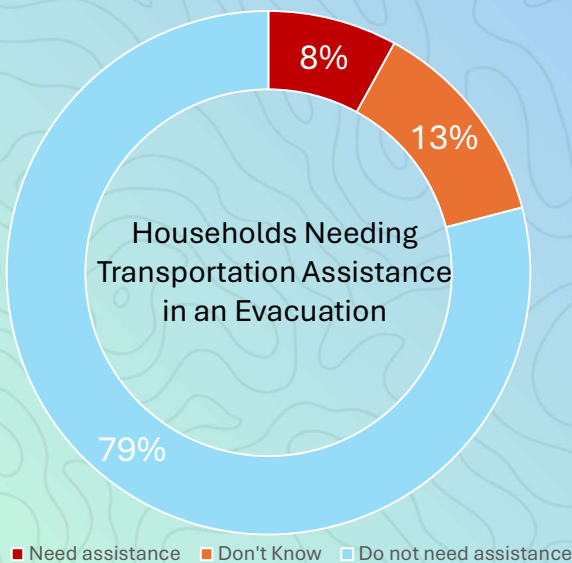
**Question:** Which of the following vehicles does your household have?

- All participants have one or more vehicles
- Bicycles, ATVs, and boat ownership rates also high

All respondents reported having at least one vehicle. A quarter (26%) had a passenger cars and a similar number (23%) had a truck or SUV. Half the respondents (50%) had both. These vehicles would allow many people to carpool or could carry response or relief equipment in an evacuation.

Additionally, bicycle, motorcycle, all-terrain vehicles (ATVs) and passenger boat ownership was very prevalent throughout Lummi Island. In particular, ten households stated they had larger boats that could hold more than 5 passengers. Assuming boats are undamaged in an emergency and are accessible via dock or beach landing, these ten larger boats, at minimum, could evacuate 50-60 people at a time.

*Q15. Which of the following vehicles does your household have?*



**Question:** Would your household require assistance with transportation to leave your home in an evacuation?

- 1 in 5 households may require assistance

26

While some residents indicate that they would need definitely assistance to evacuate from their home (8%) or stated they did not know (13%), most respondents (79%) would not require transportation assistance when evacuating their homes.

In fact, most (69%) felt they would still be able to self-evacuate even if injured or recovering from surgery, likely with the aid of a spouse or others in their household.

However, many responding to the question may have assumed they would be able to evacuate by vehicle. In a large-scale emergency, that may not always be possible.

*Q10. Would your household require assistance with transportation to leave your home in an evacuation?*

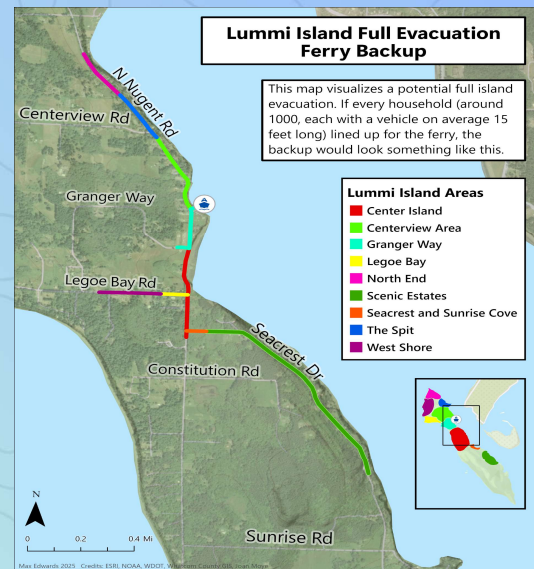
*Q11. Injuries and post-surgery recovery can temporarily limit the mobility of members of your household. In this scenario, what assistance would your household need to evacuate to an on-island assembly area?*

**Analysis:** How long is the ferry line for a full island evacuation?

- Assumption 1000\* cars trying to evacuate at once
- Simultaneous evacuation would create long backups
- 50 ferry runs ~ 17 hours

ME

\*About 500 households according to census, which excludes vacationers. About 1,050 geo-coded addresses on the island, though some don't have houses.

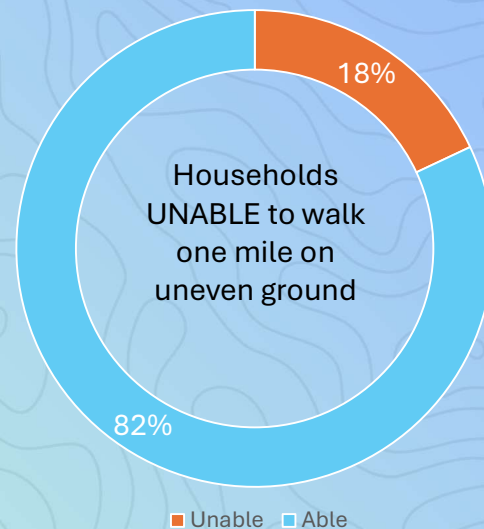


I originally estimated the number of households by designating parcels with a building value that would indicate a house, then converted those parcels to points, then used that as the household count (839). Later on I found address point data online (1049) and began to use that, as provided it provided more accurate positioning for the houses. However, I'm realizing that number is an overestimate as some address points don't have houses.

Some emergencies may damage or clog roadways and **require evacuation on foot.**

**Question:** Are all adults in your household able to walk, unaided on uneven ground, for up to a mile?

- 1 in 5 households may have an adult needing assistance



28

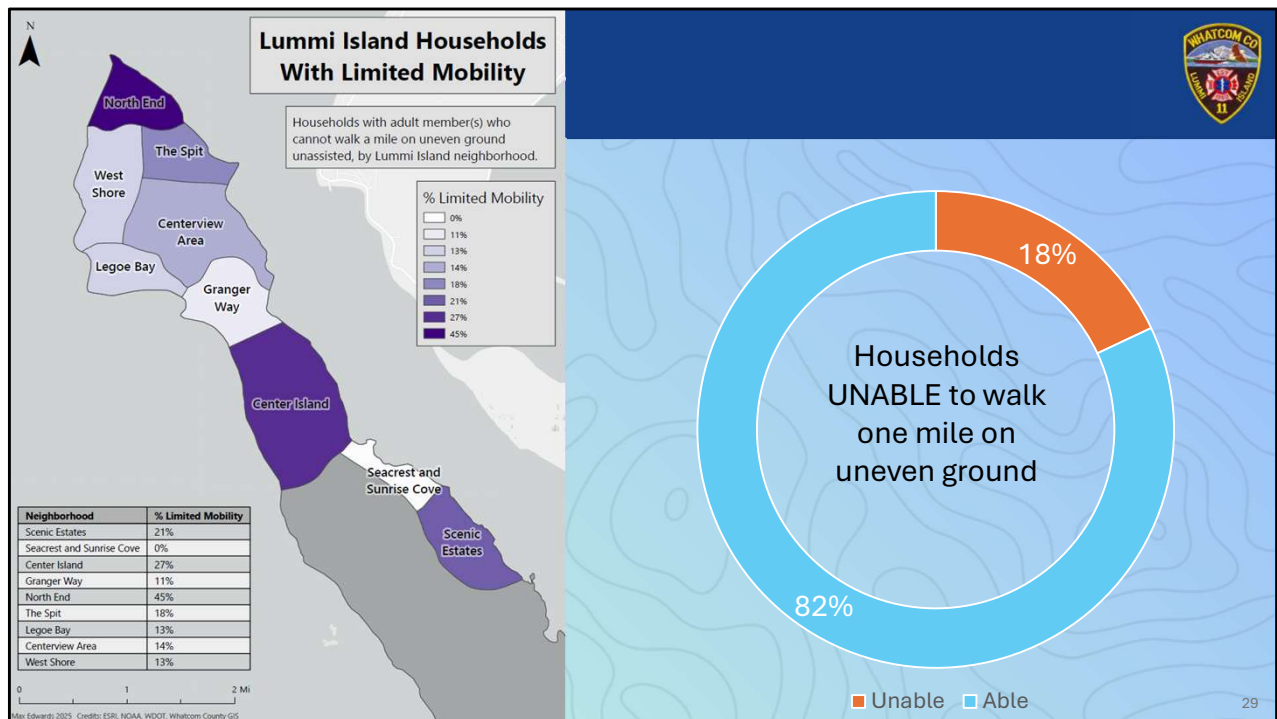
For that reason, we also asked people whether the adults in their household would be able to walk unaided on uneven ground for up to a mile. Most households (82%) stated all adults would be able to walk a mile on uneven ground without assistance.

Nearly one-fifth (18%) of survey participants had one or more adult household members who would be unable to walk a mile on uneven ground without assistance.

*Q10. Would your household require assistance with transportation to leave your home in an evacuation?*

*Q12. Of the people that live in your Lummi Island household, how many of the adults may be UNABLE TO WALK A MILE on uneven ground without assistance?*



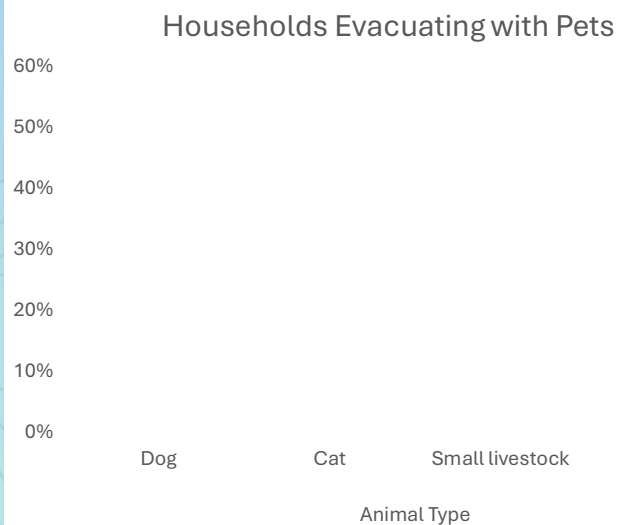


The percentage of households with one or more adults who might struggle to walk unassisted for a mile varied across the island quite considerably. Of those who responded to the survey, nearly half the households in North End/Point Migley fell into this category. Households in Center Island and Scenic Estates also had about one in five households with an adult who could not walk a mile on uneven ground unassisted. Nearly as many (18%) of the households on The Spit, an area within the tsunami evacuation zone, may also have difficulty evacuating on foot.

*Q12. Of the people that live in your Lummi Island household, how many of the adults may be UNABLE TO WALK A MILE on uneven ground without assistance?*

**Question:** In an evacuation, which, if any, pets or livestock would you plan to evacuate with?

- Over half the households anticipate evacuating with dogs, cats, or small livestock
- Owners of large livestock unsure what to do

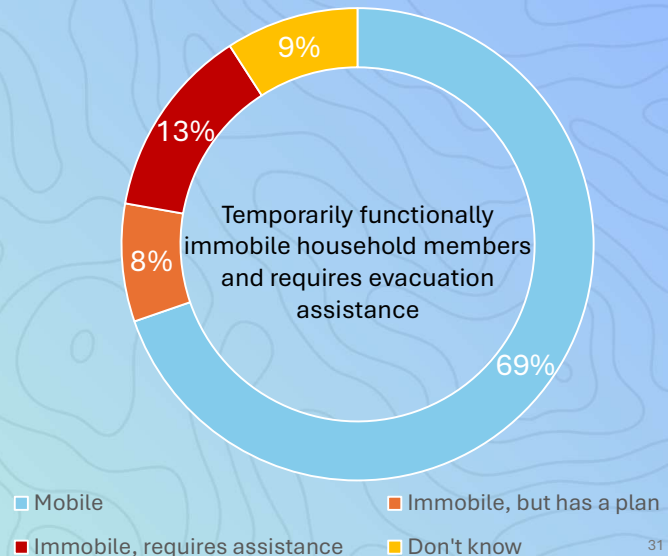


Slightly over half (54%) of households have at least one animal that they plan to bring in the event of an evacuation. Dogs are the most common (38%) with cats next (20%). Although no respondents reported plans to take large livestock (horses, cattle, etc.) in an evacuation, some reported to researchers that they did not know how best to protect large animals in a disaster.

*Q23. In an evacuation, which, if any, pets or livestock would you plan to evacuate with?*

- **Question:** Might injuries or post-surgery recovery temporarily limit mobility of your household members and require evacuation assistance?

- More than 1 in 10 will need assistance



Two-thirds (69%) of survey participants felt they would still be able to self-evacuate even if injured or recovering from surgery, likely with the aid of a spouse or others in their household.

A small portion (8%) stated that had a transportation plan with neighbors, who could help if they were injured or temporary mobility limitation; others (13%) indicated that injuries or post-surgery recovery may necessitate temporary transportation assistance in an evacuation.

*Q11. Injuries and post-surgery recovery can temporarily limit the mobility of members of your household. In this scenario, what assistance would your household need to evacuate to an on-island assembly area?*

# Survey Results

1. General Preparedness and Expectations
2. Evacuation
3. Community Response Resources

RPG

32

We created 26 survey questions and offered them remotely and in person, both online and using paper copies. Survey questions were developed based on an existing FEMA Household Preparedness survey, but modified to fit the context of Lummi Island, largely shaped with the guidance of Joan Moyer.

Before going out to survey, we asked Joan to post messages on local media sites to give Lummi Islanders a heads up about our coming, so people weren't caught off guard by strangers. We grouped the neighborhoods into 9 larger areas and walked around each, knocking on doors to survey residents. When people were not home, we left door hangers so residents could take the survey online once they'd returned home. We also had a booth at the Saturday Market on island and walked up and down ferry lines, delivering pamphlets with our information and access to the online survey.

In total we collected 142 survey responses, which we processed through Excel and performed statistical analyses.

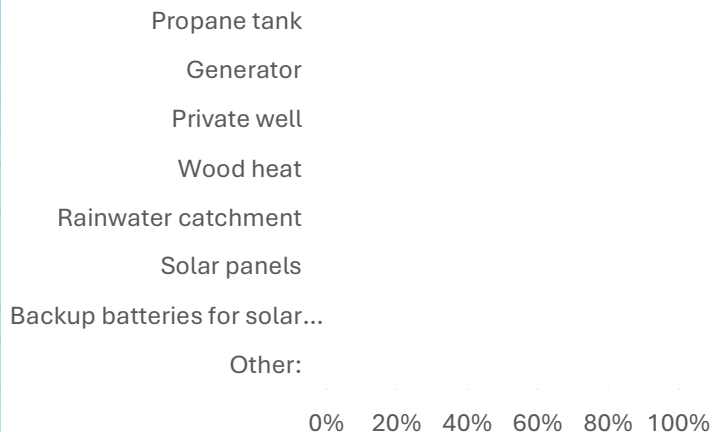
**Question:** Which of the following stand-alone utilities does your household have?

- High prevalence of stand-alone utilities

### Some Lingering Uneasiness

- Unused, still functioning?
- How long generator fuel last?
- Well use without power?

### Percent Residents with Stand-alone Utilities



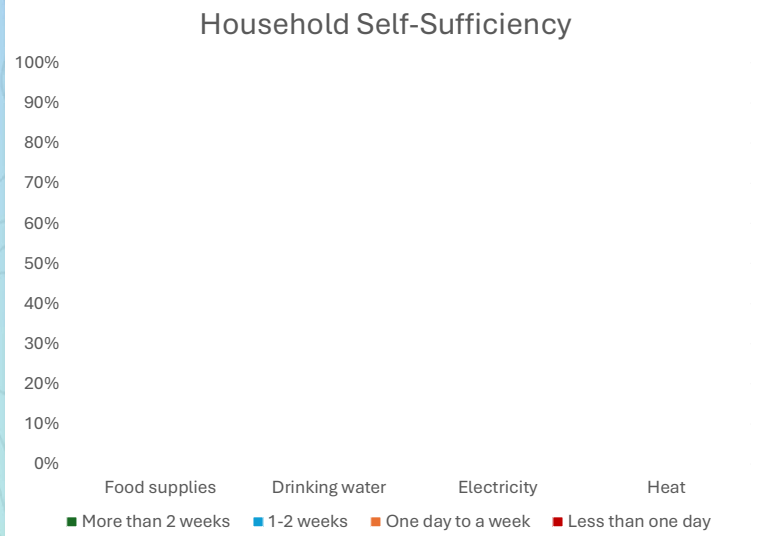
Standalone utilities are important assets in disaster events because they can provide electricity, water, heat and other essential services that can substitute for public services that may be disrupted. Over half the households had propane tanks, generators, private wells, and wood heat (84%, 66%, 60%, and 57% respectively).

Islanders noted they had not used some of these backup utilities in years and that they could potentially be out of service. Participants who had standalone generators also commented that they did not know how long their generators could operate for in an emergency event. Those with private wells also may not have considered whether they knew how to use a manual pump to access their private well in the case of a loss of power.

*Q13. Which of the following standalone utilities, if any, does your household have? (Select all that apply)*

**Question:** How long can you provide for your own household's needs with no outside assistance or reliance on public utilities?

- High food, water, heat and medical self-sufficiency
- Dependence on public electricity



In disaster scenarios, weather events can disrupt people's access to outside assistance or public utilities for essential survival services such as food supplies, drinking water, electricity, heating, and medication.

**Food Supplies.** Nearly half (43%) of residents said they had stored food provisions that would last more than two weeks and another third (36%) said they generally had provisions that would last 1-2 weeks.

**Drinking Water.** One third of participants could provide their household with drinking water for more than 2 weeks and nearly as many (29%) said they had supplies for 1-2 weeks.

**Electricity.** Only about 1 in five (21%) participants could provide electricity to their household for more than two weeks without public utilities, likely with the use of solar panels and backup batteries. Some households (17%) would not be able to provide electricity to their homes for more than one day, if at all, without public utilities.

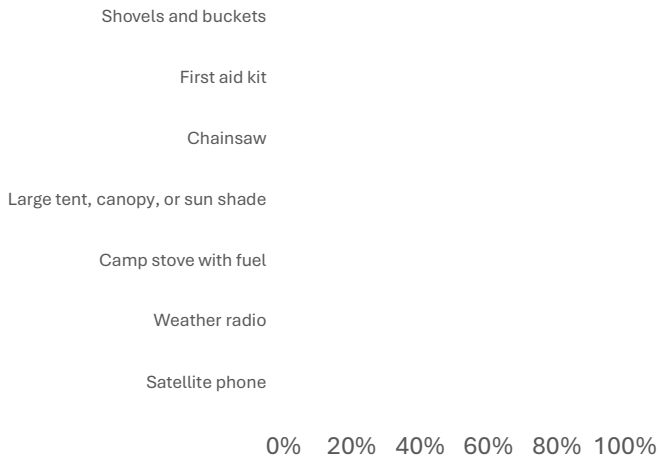
**Heating.** One-third (31%) of respondents could heat their households for 1-2 weeks and one-half (50%) for more than two weeks.

**Medication.** Two-thirds (66%) of households had enough backup medication to provide for their house for more than 2 weeks and a quarter (27%) had enough for 1-2 weeks. The remainder (15%) had enough medication for less than one week

without outside assistance.

*Q14. How long can you provide for your own household's needs with no outside assistance or reliance on public utilities?*

### Household Tools and Equipment



**Question:** Which of the following household tools or equipment does your household have?

- Shovels, buckets, and first aid kits are ubiquitous
- Chainsaws, tents/shades and camp stoves are also common among residents
- Half have weather radios; 1 in 10, sat phones

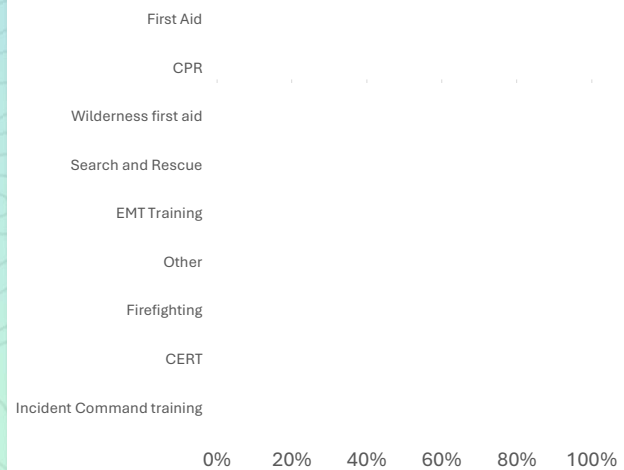
35

Virtually all households (98%) have shovels and buckets (98%) and first aid kits (91%). At least two-thirds also have chainsaws, tents, sunshades, and camp stoves. With over half (53%) reporting weather radios and 10% owning satellite phones—and these phones and radios spread out across north, central and south island—most neighborhoods are likely to be informed about conditions, even without cell coverage.

*Q16. Which of the following tools or equipment does your household have?*



### Resident First Responder Skills



**Question:** Which of the following first responder skills do you or your household possess?

- High prevalence of First Aid and CPR
- Past training, but little recent practice
- Confidence in community response even without training

36

Many households had someone with first responder skills. Almost all had someone who knew CPR (85%) and basic First Aid (71%), with all other skills falling between 10% and 20% prevalence. Thus, at least a few residents within each neighborhood are likely to have each type of skill. Some mentioned having past skills/training but no recent practice, which could limit their effectiveness. EMT training is limited to volunteer firefighters, whose extensive breadth and depth of training are tracked by the Fire District. “Other” skills residents reported included healthcare provider, HAM radio, and nurse aid training.

*Q17. Which of the following first responder skills do you or your household possess?*

### Community Support Skills

Food preparation/service (large volume)

Small boat operation

Childcare

Construction

0% 20% 40% 60% 80%

**Question:** Which of the following community support skills do you or your household possess?

- Food prep –potlucks often mentioned
- Small boat operation, childcare, and construction widespread
- ~2+ skills per household

37

Lummi Islanders have a wide and comprehensive variety of community support skills that could be useful in an emergency shelter or staging situation. Food preparation, small boat operation, childcare and construction were prevalent skills (67%, 52%, 48%, and 44% respectively). The average household reports having at least two of the skills listed. Many residents indicated in comments or in conversation with team members that they are proud of their ability to contribute to the community and willing to use these skills if needed.

*Q18. Which of the following community support skills do you or your household possess?*

- Desire for preparedness meetings, workshops, or reinstating of CERT training (6 comments)
- Concern over off-island, including concerns about a lack of public dock, limitation of ferry, damage to ferry dock in an earthquake (6 comments)
- Concern over evacuation routes, including not knowing them, single road egress (3 comments)
- Availability of resources, especially location of water holding tanks and heavy equipment )
- Unclear what siren means when it goes off (1 comment)



Think. Pair. Share.

Have the survey results  
revealed important  
disaster planning  
aspects that you'd like  
to focus on in an island  
evacuation plan?  
(15min)

RPG

39

- 1.) Turn to the people around you and discuss the question.
- 2.) Write common themes on your sticky note.
- 3.) Select a group speaker to share most important themes with the group.

Drawing for participation  
prizes



## Lummi Island Big Picture

- Exposure to large-scale hazards
- Limited egress
- Vulnerable groups
- Limited formal response capacity



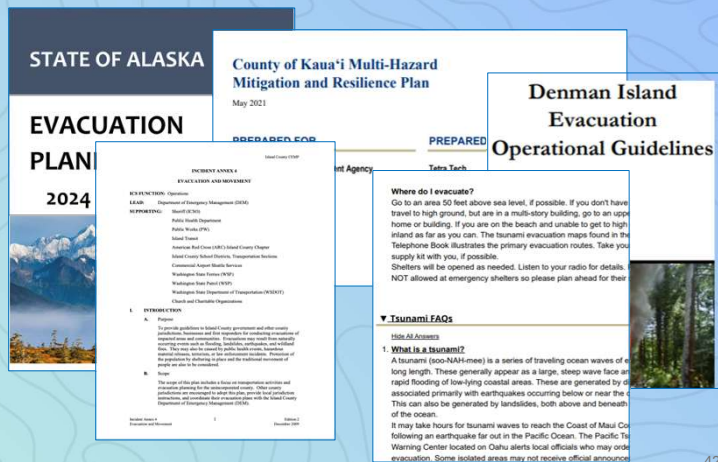
Develop an **Evacuation Plan?**

RPG



## Review of Good Practice

- Review of several relevant evacuation plans
- Identified seven common elements of evacuation plans



So for this part, we wanted to make sure our evacuation plan built on proven strategies instead of reinventing the wheel. We started by reviewing several existing evacuation plans from coastal and island communities — including ones from the State of Alaska, Kaua‘i County in Hawai‘i, and Denman Island in British Columbia. These places share similar challenges with Lummi Island, like limited evacuation routes, ferry dependency, and geographic isolation.

Through that review, we identified seven key elements that consistently appeared across effective evacuation plans. These became the foundation for our own recommendations. We focused on what worked — clear communication systems, defined roles for emergency managers, accessible routes for residents, and procedures that account for people with disabilities or limited mobility.

Overall, this step helped us align our approach with best practices while still adapting to the specific needs and geography of Lummi Island.



## Common elements of island evacuation plans

- Community overview
- Roles and responsibilities

### Roles

#### PRIMARY AGENCY

- Bellingham Police Department

**Emergency Communications** staff shall ensure the delivery of coordinated, prompt, reliable, and actionable information to the whole community through the use of clear, consistent, accessible, and culturally and linguistically appropriate methods to effectively **relay information** regarding any threat or hazard, as well as the actions being taken, and the assistance being made available, as appropriate.

Bellingham CEMP (2025)

- Bellingham School District
- Public Works

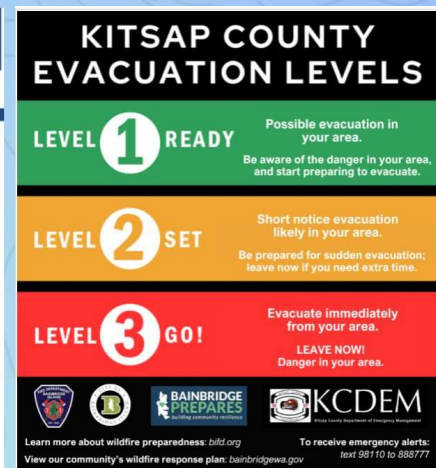
- The Community overview is usually an introductory paragraph explaining the situation of the area for which the evacuation plan is being written. This briefs emergency personnel about who they are working for and what they can expect about the community and the hazards it faces.
- Plans then tend to have a section on roles and responsibilities of all potentially participating organizations that may be called upon for resources in a disaster, depending on the severity of the event and the capacity of local organizations to cope. It's important to define roles and responsibilities so all actors know who to look to and so all essential activities are addressed. Roles and responsibilities will help off-island authorities know who to contact when responding to an emergency.
- Local, a Lummi Island evacuation plan may need to define the roles of:
  - LIFD
  - Neighborhood leads
  - Safe assembly zone personnel



- Off-island, it may be relevant to work with other organizations to understand what role they are able to play. Off island, these may include:
  - Whatcom County emergency management
  - Coast Guard
  - FEMA
  - American Red Cross
  - Public Works
  - Salvation Army
  - Etc.

## Common elements of island evacuation plans

- Community overview
- Roles and responsibilities
- Response criteria



Many plans have clear criteria for initiating a response. These could be defined geographically, temporally or based upon risk. For instance, several plans included a evacuation levels that were based upon population impacted, size of the hazard, or how quickly a hazard was going to occur. After reviewing multiple evacuation plans, we found that most successful ones share a similar structure. These elements create a consistent framework that helps communities organize and respond effectively during emergencies.

They usually start with a community overview, which gives context—like geography, population, and key risks. Next is a clear outline of roles and responsibilities, identifying who does what before, during, and after an evacuation.

Response criteria explain when evacuations are triggered and what conditions make them necessary. Then there's the phasing of evacuation actions, which breaks the process into stages—such as warnings, voluntary evacuations, and mandatory orders.

We also looked at means or modes of evacuation, which can include ferries, boats, or air transport, depending on what's available. Staging and sheltering locations are mapped by area, ensuring residents know where to go if transportation or routes are limited.

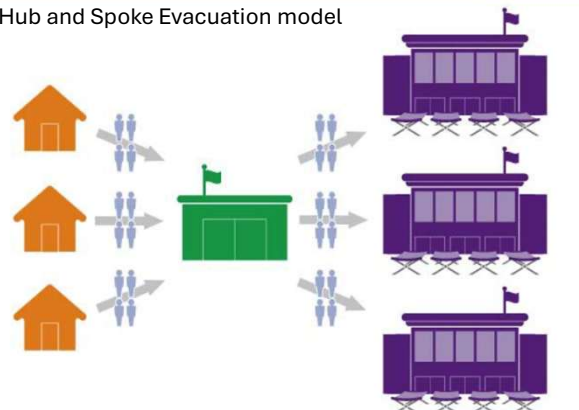
Finally, strong communication plans were a universal feature. These define how updates are shared across agencies and with the public, especially through local media, alerts, and accessible formats for vulnerable populations.

Together, these seven elements form the foundation of a reliable and community-centered evacuation plan—something we're applying directly to Lummi Island's context.

## Common elements of island evacuation plans

- Community overview
- Roles and responsibilities
- Response criteria
- Phasing of evacuation actions
  - Should vulnerable groups be evacuated first? If so, which groups?
  - Should evacuation be staggered by area to reduce congestion and prioritize areas most at risk?

Hub and Spoke Evacuation model



RPG

45

Another common element is an explicit discussion of evacuation phasing.

This section considers and answers questions around whether there are vulnerable groups that may need priority evacuation.

More generally, it might also consider ways to avoid congestion by laying out a staggering plan, such as one that evacuates high risk areas first, followed by moderate, and then low risk areas.

Such phasing can be for both on-island movement from one area to another, or for off-island evacuation.

Some plans we reviewed used what FEMA calls a "hub and spoke evacuation model". This approach has individuals or households evacuate to one or more centralized assembly areas. From the assembly area, those managing the evacuation can identify needs and triage urgency. Individuals and households are then sent from the staging area to an evacuation location. Through the hub and spoke model, people with critical transportation needs can be targeted for evacuation first.

### Common elements of island evacuation plans

- Community overview
- Roles and responsibilities
- Response criteria
- Phasing of evacuation actions
- Means/mode of evacuation

#### The Evacuation Process

Evacuations can be done in three ways:

- 1. Self-Evacuation:**  
When individuals make the decision to evacuate although there is no official Evacuation Order in place for their area. This can be especially helpful for residents living in care facilities or other at-risk populations that may need more time. Although Emergency Management BC (EMBC) typically provides ESS support only to those that are ordered to evacuate, they may consider support for those that leave early due to special circumstances.
- 2. Tactical Evacuation:**  
Directed by Fire and/or RCMP due to extreme risk or threat to public safety. No order is required.
- 3. Strategic Evacuation:**  
EOC opens, a State of Local Emergency is declared, and an Evacuation Order is issued.

Note: A State of Local Emergency (SoLE) is declared only when it is necessary to exercise one or more of the powers available to local authorities under the *Emergency Program Act*.

The next common element is a discussion of means and modes of evacuation. This means identifying available vehicles and other kinds of transportation, as well as options for self-evacuation and assisted evacuation.

- Mapping household vehicle availability here was the first step; the plan should also consider all official vehicles at LIFD, potential county DEM resources, etc
- Private boats are present in meaningful quantities – participation would be voluntary but should be investigated

## Common elements of island evacuation plans

- Community overview
- Roles and responsibilities
- Response criteria
- Phasing of evacuation actions
- Means/mode of evacuation
- Assembly/sheltering locations by area



- Clearly identified staging and sheltering locations by zones
  - Include backup options if the primary site for a neighborhood is compromised or full

The WA DNR created a tsunami evacuation map for Lummi Island in 2012. Each area has different evacuation methods as displayed by distinct symbology. The red arrows on the West and North Shores and Scenic Estates display run uphill, whereas Legoe Bay Rd, Nugent Rd and center island areas are instructed to drive to Beach School and Lummi Island Grange, the designated shelters.

## Common elements of island evacuation plans

- Community overview
- Roles and responsibilities
- Response criteria
- Phasing of evacuation actions
- Means/mode of evacuation
- Staging/sheltering locations by area
- Communication plans

### Public & Media Communications

When requests for information are received from the public or media, they should be referred to the CVRD website or Call Centre (if activated). The website and Call Centre will be kept current with up-to-date information. The Call Centre will assist when possible in providing additional support. Media can also be referred to the Information Officer assigned to the EOC or site (if activated).

Where possible, all messaging provided should be supplied and/or approved by the EOC Information Officer or Director. This is to ensure information is accurate and consistent.

### Public Messaging

Key messaging for the public should be clear and concise, yet include enough information to enable activities they are advised or required to do.

The initial messaging to those in the risk area should be clear and concise.

DI Evacuation Guidelines – Section 2 C

### These may include:

- Door-to-door notifications (Fire, RCMP, SAR, other volunteers)
- Social Media (CVRD Facebook, CVRD Twitter, Emergency Management BC)
- Local Radio (The Goat 98.9 FM, The Eagle 97.3 FM, CBC 92.5 FM, CHFR 96.5 FM)
- Local television (SHAW Local Community Programming - Channel 4)
- Public Address Systems (fire and police vehicles)
- CVRD Emergency Notification System (registration required)
- Alert Ready (offers push notifications to cell phones)
- Telephone network or tree (i.e. Neighbourhood Coordinators)
- One Call Now notification system (i.e. ESS and Neighbourhood Coordinators)
- Print Media (flyers, notices, newspapers)
- Amateur Radio (messages relayed via the EOC's Emergency Radio Communications system)
- CVRD web site (<https://www.comexcalibur.ca/>)
- Call Centre (Regional or Provincial)
- Notice Boards
- TTY (teletypewriter) messages
- Media, utilizing close captioning and sign language interpreters

After reviewing multiple evacuation plans, we found that most successful ones share a similar structure. These elements create a consistent framework that helps communities organize and respond effectively during emergencies.

They usually start with a community overview, which gives context—like geography, population, and key risks. Next is a clear outline of roles and responsibilities, identifying who does what before, during, and after an evacuation.

Response criteria explain when evacuations are triggered and what conditions make them necessary. Then there's the phasing of evacuation actions, which breaks the process into stages—such as warnings, voluntary evacuations, and mandatory orders.

We also looked at means or modes of evacuation, which can include ferries, boats, or air transport, depending on what's available. Staging and sheltering

locations are mapped by area, ensuring residents know where to go if transportation or routes are limited.

Finally, strong communication plans were a universal feature. These define how updates are shared across agencies and with the public, especially through local media, alerts, and accessible formats for vulnerable populations.

Together, these seven elements form the foundation of a reliable and community-centered evacuation plan—something we’re applying directly to Lummi Island’s context.

- Effective, redundant communication plans for authorities and residents
  - Remember that power may go out and cell networks may be overloaded or inoperative
  - Make sure residents know what every possible siren means



## Common elements of island evacuation plans

- Community overview
- Roles and responsibilities
- Response criteria
- Phasing of evacuation actions
- Means/mode of evacuation
- Staging/sheltering locations by area
- Communication plans
- **Supplies (public/private)**

Amount	Item	Amount to Re-stock
4	• Clipboards – each holding: ◦ 3 Evacuation Tracking Sheets with procedures (Each sheet will do 10 locations)	
4 Bags	• Rolls of flagging tape per base: ◦ 2 Yellow, 2 Pink, 1 Red	
6	• Spare Evacuation Tracking Sheets (Each sheet will do 10 locations)	
120	• Info Sheets ◦ Info for Evacuees (Printed back to back)	
1 pack	• Large Zip Lock bags (To place over clipboard)	

**Evacuee – Items to Pack**  
(If safe, practical, and time permits)

**Pack these:**

- ☐ Prescriptions or special medications
- ☐ Change of clothing (consider the weather)
- ☐ Extra eyeglasses or contact lenses
- ☐ Keys (home & car)
- ☐ Credit cards, cash
- ☐ Cellphones and chargers
- ☐ Documents: DL, passports, Care Card, Home & Auto Insurance
- ☐ Pet **supplies**: food, water, bowls, medications, leashes/kennel
- ☐ Baby supplies: clothing, baby food, formula, diapers, etc.
- ☐ Hearing aids & equipment for people with disabilities

**If time allows, consider:**

- ☐ Easily carried valuables, family photos, other irreplaceable items
- ☐ Personal computer information on hard drives and disks
- ☐ Laptops and chargers
- ☐ Contact lists (phone and email)

HG

49

- Public supplies:
  - Pre-positioned response supplies where feasible
  - These may be limited; can also be moved from central storage to peripheral sites as a response begins
- Private supplies:
  - Recommendations for household supplies (go-bags)
  - Simple and standardized; residents can tailor their kit to their own needs and preferences

## Evacuation Plans **Caveats**

- No way to plan for all possibilities.
- Real evacuations require flexibility and creativity.
- Benefit of evacuation plan comes from the process.
- Best plans are ones with widespread participation.

RPG



## Whatcom County Plan

- CEMP includes 5pg annex on evacuation
- Establishes authority to call evacuation and evacuation levels
- Mostly conceptual in nature
- Only mention of Lummi Island is that it is accessed by ferry

RPG

### WHATCOM COUNTY COMPREHENSIVE EMERGENCY MANAGEMENT PLAN



October 2022  
Whatcom County Sheriff's Office Division of Emergency Management  
311 Grand Avenue  
Public Safety Building  
Bellingham, WA 98225

1



Think. Pair. Share.

Should Lummi Island  
develop an  
evacuation plan?  
What should the  
process look like?  
(15min)

RPG

52

- 1.) Turn to the people around you and discuss the question.
- 2.) Write common themes on your sticky note.
- 3.) Select a group speaker to share most important themes with the group.

## What might come next?

- Document tonight's feedback
- Form an Island Evacuation Committee
- Gather information
- Draft plan
- Public Review
- Periodic evaluation & updates



Photo by Carl Hanson, courtesy of [www.washingtonruralheritage.org](http://www.washingtonruralheritage.org)

53

Just guessing at these, may need some guidance from RPG  
Time estimates would be good if we're ready to give them

# Thank You!

*Active and involved  
communities are safer  
communities!*

*We look forward to  
continued engagement as  
we build these plans*

