

RISK ASSESSMENT REPORT

2023

Report Prepared by the Protecting Public Art Collections Project

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WASHINGTON STATE ART COLLECTION

Pilot Remote Risk Assessment Report

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Table of Contents

EXE	сит	IVE SUMMARY
١.	IN	TRODUCTION
۱۱.	BA	ACKGROUND
А		PILOT COUNTY SELECTION
В	•	DATA AND METHODOLOGIES
III.		STATISTICAL ANALYSIS
А		ARTWORK SITES
В		ARTWORKS
C	•	HAZARDS IN THE PILOT COUNTIES
IV.		HAZARD PROFILES
А		INTRODUCTION
В		AVALANCHE
С	•	COASTAL FLOODING
D		EARTHQUAKE
Ε		Hail
F		ICE STORM
G	i.	LANDSLIDE
Н		LIGHTNING
١.		Riverine Flooding
J.		Strong Wind
K	•	TORNADO
L		Tsunami
N	1.	VOLCANIC ACTIVITY
Ν	۱.	WILDFIRE
C).	WINTER STORM
v.	СС	DNCLUSION
A		RANKED HAZARDS
В	•	MITIGATION
C	•	Immediate Response Procedures
APP	EN	DIX I: RISK ASSESSMENT TECHNICAL INFORMATION
А		METHODOLOGY
В		NRI DATA PROFILES
APP	EN	DIX II: COUNTY CHARACTERISTICS RISK ANALYSIS

Executive Summary

From August 2022 to July 2023, the Protecting Public Art Collections Project Team conducted a pilot remote risk assessment of Washington's State Art Collection artworks located in six counties: Clark, Grays Harbor, Pierce, Skagit, Walla Walla, and Yakima. The assessment methodology, which was developed as part of the Protecting Public Art Collections project, included the assessment of the risk of 14 natural hazards to the artworks: avalanche, coastal flooding, earthquake, hail, ice storm, landslide, lightning, riverine flooding, strong wind, tornado, tsunami, volcanic activity, wildfire, and winter storm.

A **site level** risk assessment that identified sites in high-risk areas with high artwork counts was performed for each of the hazards. An **artwork level** risk assessment that identified high risk artworks based on location, material, and resilience factors was performed for coastal flooding, earthquake, riverine flooding, and wildfire. Data from the site and artwork level risk assessments including the percentage of the collection located in high-risk areas, the average frequency of event per site, and the potential for an event to severely damage an artwork were used to classify each of the 14 hazards as Low, Moderate, or High risk to pilot collections.

Hazard	Risk
Avalanche	Low
Coastal Flooding	Moderate
Earthquake	Moderate/High
Hail	Low
Ice Storm	Moderate
Landslide	Low
Lightning	Low
Riverine Flooding	Moderate
Strong Wind	Low
Tornado	Low
Tsunami	Moderate
Volcanic Activity	Moderate
Wildfire	Moderate
Winter Storm	Moderate

Table 1: Relative risk of natural h	nazards to Washington'	s State Art Collection
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Recommendations for emergency planning, mitigation, and response are provided for each hazard based on the assessment. This includes considerations for newly acquired (or relocated) artworks and lists of sites that should be prioritized for contact following a hazard event. Lists of specific artworks that should be prioritized for condition checks before and after hazard events are provided for coastal flooding, earthquake, riverine flooding, and wildfire.

In addition to the hazard-specific recommendations in the Hazard Profiles, high-priority recommendations for risk mitigation and immediate response are provided in the Conclusion. These recommendations are those that are most likely to lower the risk of damage caused by natural hazards to Washington's State Art Collection.

I. Introduction

Protecting Public Art Collections (PPAC) is an NEH-funded Research and Development project to create tools that address the unique needs of public art collections in emergency planning, specifically geographic diversity, and lack of regular physical access to and control of collection spaces. From August 2022 to July 2023, the Protecting Public Art Collections Project Team conducted a remote risk assessment of Washington State Art Collection¹ artworks located in six counties: Clark, Grays Harbor, Pierce, Skagit, Walla Walla, and Yakima. This pilot assessment was conducted as part of phase one of the <u>Protecting Public Art Collections</u> (PPAC) project.

The overall goal of the pilot assessment was to develop a methodology for assessing risks to collection objects using data captured in the ArtsWA collections database and the <u>FEMA National Risk Index (NRI)</u>, which is a publicly available dataset that spatially illustrates the risk of 18 natural hazards to every U.S. county and census tract. The risk assessment will support ArtsWA's future emergency planning, mitigation, and response efforts. Specifically, it will support decision making to:

- Update emergency response plans
- Identify sites at risk of being affected by hazards
- Identify artworks at risk of being affected by hazards
- Prioritize agency contact in the event of a hazard event
- Prioritize collections for condition assessment before a hazard event
- Prioritize collections for condition assessment after a hazard event

This risk assessment report includes an overview of the datasets and methodologies used in the assessment; **site level** risk assessment of 14 hazards: avalanche, coastal flooding, earthquake, hail, ice storm, landslide, lightning, riverine flooding, strong wind, tornado, tsunami, volcanic activity, wildfire, and winter weather; and **artwork level** risk assessment of four hazards: earthquake, coastal flooding, riverine flooding, and wildfire.

Phase II of the PPAC Project (pending grant funding) will include the expansion of the risk assessment to artworks located in the remaining 33 Washington counties and the completion of a full emergency preparedness and response plan for ArtsWA. The second phase will also incorporate other public art agencies and organizations.

¹ Washington's State Art Collection is managed by the Washington State Arts Commission (ArtsWA)

II. Background

This project began in the summer of 2020 when Janae Huber, Collections Manager at the Washington State Arts Commission (ArtsWA), Nicole Grabow, Director of Preventive Conservation at the Midwest Art Conservation Center (MACC), and Maddie Cooper, Principle at MC Conservation, began a collaboration to address unmet needs in the emergency planning resources available for the ArtsWA collection. Resources designed for museums, libraries, and archives were not fully applicable to the ArtsWA collection, which like many public art collections, spans many facilities and a broad geographic area.

To address this gap in resources, the project team applied for and received a Tier I (planning) National Endowment for the Humanities Research and Development Grant. The planning project, which was completed August 2023, included a survey of emergency response and preparedness needs for public art collections, the development of a remote risk assessment methodology for public art collections, and this assessment of risk to Washington's State Art Collections located in six pilot counties. The key objective of the assessment was to identify hazards that pose risk to artwork sites and individual at-risk artworks, which are metrics that can be used to support ArtsWA emergency planning, mitigation, and response.

Note that all risk assessments are limited by the possibility of unforeseen occurrences, the data used, and inherent subjectivities in interpretation.

A. Pilot County Selection

This risk assessment covered artworks located in six of the 39 total Washington counties: Clark, Grays Harbor, Pierce, Skagit, Walla Walla, and Yakima. Pilot counties were selected based on their Washington State Risk Index (WaSRI) scores as determined in the 2018 Washington State Risk and Vulnerability Assessment.² Additionally, the six selected counties were representative of the statistics for the whole collection by artwork type (painting, drawing, print, sculpture, etc.) and partner agency type (K-12 school, college, university, state agency). *See Appendix II: County Characteristics Risk Analysis*.

² Washington Emergency Management Division, "Washington State Enhanced Hazard Mitigation Plan: Risk and Vulnerability Assessment."

B. Data and Methodologies

1. Datasets

The risk assessment was completed using two main datasets: ArtsWA collections data and the FEMA National Risk Index. ArtsWA uses a collections management software called Mimsy XG, which is an Axiell product. Data captured in the collections management software is not public facing; object records contain information that is limited to internal use. To complete the risk assessment, collections data was exported to .csv files via SAP Crystal Reports. Collections data captured in the export included the following (data marked in blue was lexicon controlled³):

- ID Number
- Geo Coordinate Type
- Material Category 1 •
- Material Category 2
- Frame Category
- Glazing Category
- Engineering
- Engineering Date
- City

•

- Address
- Zip Code
- Latitude
- Longitude

- Artist
- Artwork Title
- Date
- Materials
- Measurements
- Artwork Type
- Artwork Site
- Agency
- Location
- Interior/Exterior
- Portable?

- Installation Type
- Site Type
- URL
- County
- Acquisition Method
- Acquisition Price
- Condition
- Condition Date
- Examined By
- Purpose
- Installation Type
- Site Type I

From this collection data, specific and detailed information, such as artwork material and whether or not the artwork was framed, could be taken into account as factors either mitigating or contributing to risk.

The second dataset used in the risk assessment was the FEMA National Risk Index. The Risk Index⁴ or NRI is a tool developed by FEMA's Natural Hazards Risk Assessment Program that looks at the risk of 18 natural hazards to every U.S. County and census tract⁵ including all 50 states, the District of Columbia, American Samoa, Commonwealth of the Northern Mariana Islands, Guam, Puerto Rico, and the U.S. Virgin Islands. Data for the NRI is contributed by academic, federal, state, local, and private institutions. The tool and the data behind it are freely available and consistently updated.

³ Lexicon controlled data is that which is limited to specific vocabulary, as in a drop-down menu list.

⁴ Zuzak et al., "National Risk Index Technical Documentation."

⁵ According to the United States Census Bureau, a census tract is, "a small, relatively permanent statistical subdivisions of a county or statistically equivalent entity... Census tracts generally have a population size between 1,200 and 8,000 people, with an optimum size of 4,000 people."

2. Hazards Selection

The 14 natural hazards included in the pilot risk assessment are:

- Avalanche
- Coastal Flooding
- Earthquake
- Hail
- Ice Storm
- Landslide
- Lightning
- Riverine Flooding
- Strong Wind
- Tornado

- Tsunami
- Volcanic Activity
- Wildfire
- Winter Weather

Not included:

- Cold Wave
- Heat Wave
- Drought
- Hurricane

The four hazards included in the NRI that were excluded from the risk assessment were hurricane, heat wave, cold wave, and drought. Hurricane was excluded because the state of Washington is not affected.⁶ Heat wave, cold wave, and drought were excluded from the risk assessment due to the indirect ways in which they affect collections. For example, effects of a heatwave on an artwork are heavily dependent on factors like the performance of the building envelope and mechanical systems, which are data not captured in the ArtsWA database.

All 14 of the hazards were evaluated for their effects at the **site level** in pilot counties. The purpose of the assessment was to identify artwork locations that are at high risk of a hazard event based on annualized frequency as compared to the rest of the state.

In addition to the site assessment, **artwork level** assessment was completed for all artworks in the six pilot counties. This level of assessment looked at four specific hazards: earthquake, coastal flooding, riverine flooding, and wildfire. Those hazards were chosen for risk assessment based on the concerns and experience of ArtsWA staff. The purpose of the artwork level assessment was to identify artworks that are candidates for condition checks before and/or after an event.

3. Methodology

To assess the risk of hazards to pilot sites and artworks, census-level data from the NRI had to be combined with collections data from the ArtsWA database. The use of ArcGIS software to combine the two datasets made the risk assessment possible by eliminating the need to manually enter hazard data related to the location of each individual artwork.

The first step in the assessment was the translation of collections data from the database to a map that connected artwork data to a point on a map (in ArcGIS this is referred to as a feature layer). To create a feature layer in ArcGIS, collections data including geographic coordinates was downloaded from the collections management system as a .csv file and then uploaded into ArcGIS Online.

⁶ "Hurricane is a term used for large storms that form over the Atlantic or Eastern Pacific Oceans

A map that included the artworks feature layer was layered with the publicly available National Risk Index Census Tracts feature layer⁷, which contains the full range of data for the 18 hazards included in the NRI. The two datasets were combined using the ArcGIS Online Join Feature by spatial relationship, which resulted in a dataset that linked NRI data to each artwork in the pilot analysis based on the census tract that the artwork was located in. This combined dataset was used to carry out both **site level** and **artwork level** assessments.

The amount of data included in the NRI is very large and ranges from frequency of each hazard to social vulnerability, community resilience, exposure, and historic loss. This breadth of data makes the NRI useful to a wide audience. For the purposes of this risk assessment, however, only data relating to the annual frequency of hazard occurrences, and to a far lesser extent, data relating to expected annual financial loss was used for assessment.

a. Site Level Assessment

Site level assessment was performed for each of the 14 hazards relevant to the state of Washington. The purpose of the site assessment was to identify sites at high *relative* risk of a hazard event based on annualized frequency compared to the rest of the state.

For this level of assessment, artwork sites located in census tracts with annualized frequencies that were in the 80th to 100th percentile for the state were identified for each hazard. A map of artworks color coded by state annual frequency percentile was layered with the corresponding annual frequency polygon map from the NRI. Figure 1 is an example of one of these maps.

⁷ FEMA National Risk Index, "National Risk Index Census Tracts."



Figure 1: Example of site risk assessment map

In addition to the map, a table was included that displays sites located in census tracts with high annualized frequencies that contain four or more artworks, which is the average number of artworks per site. For hazards with few sites located in high frequency areas, all sites are included in the table regardless of artwork count (Table 2).

Artwork Site	County	Artwork Count	Annualized Frequency	State Avalanche Frequency Percentile
Eatonville Middle School	Pierce	6	0.43	93%
University of Washington - Pack Forest	Pierce	5	0.43	93%
Eatonville High School	Pierce	1	0.43	93%

Table	2:	Example	of	site	risk	assessment	table
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b. Artwork Level Assessment

Artwork level assessment was performed on four hazards: coastal flooding, earthquake, riverine flooding, and wildfire. The purpose of the artwork level assessment was to identify artworks in high frequency hazard areas that were more vulnerable to damage than the average artwork. These artworks are good candidates for condition assessment and/or mediation before a hazard event, and priority condition check after a hazard event.

For artwork level assessments, each artwork was assigned a hazard-specific Risk Index Score derived from a variation of this simplified equation:

Risk = *Likelihood* x *Consequence*

This generalized equation is used by the National Risk Index to assign their measure of Risk Index Values to each census tract. In the NRI Risk Index Values equation, "Likelihood" is based on the annualized frequency of an event (or how many events will occur in one year) and "Consequence" is based on several factors including social vulnerability, community resilience, building exposure, and historic loss. The NRI Risk Index Values equation is designed to be a helpful measure for those working in emergency management on the state, local, and even community levels. *The equation doesn't, however, speak directly to the potential effects of hazards on artworks*.

In the equation developed for *this* artwork-specific assessment, "Likelihood" was based on the annualized frequency of the event (from the NRI data) and "Consequence" was a ratio of the vulnerability of an artwork's primary material and resilience factors that made the artwork less vulnerable. Resilience factors were derived from the collections database and included factors such as whether the artwork was located indoors or outdoors and whether or not it was framed, etc. The general equation developed to generate risk index scores follows:

Risk Index Score = Hazard Frequency x Material Vulnerability x $\frac{1}{Resilience}$

Material vulnerability and resilience factors differed depending on the hazard, but in general, each artwork was assigned a material vulnerability score between 1-4, a resilience score between 1-5, and a hazard frequency score that was equal to the annualized frequency of the hazard as reported in the NRI.

The *material vulnerability score* was assigned based on the artwork's primary material, where 4 corresponded to a material highly vulnerable to the hazard, 3 was moderately vulnerable, 2 was vulnerable, and 1 indicated a material that was not considered vulnerable. This is a similar scale to that which is utilized by conservators for assessing both light sensitivity and salvage response priority by material type. The *resilience score* was additive with scores between 1-5. Artworks received resilience score points based on things like a record of engineering or location in a low-risk site type like a college.

Artworks were split into two groups for analysis:

- Sculptures
- Works on paper, paintings, and textiles

The purpose of the split was to allow for more accurate resilience calculations. For example, whether or not an object is framed and glazed will affect the resilience of a work on paper, painting, or textile, but is not relevant to a sculpture.

A preliminary version of the equation was updated based on observations made during a March 2023 site visit to 13 artwork sites. During this visit, the project conservator compared the remote risk evaluation to an in-person evaluation and adjusted several of the resilience criteria.

The range of Risk Index Scores (RIS) for the four hazards included in the artwork level assessment can be found in Table 2. RIS varied greatly between hazards due to the wide variation in annualized frequency.

For example, the highest earthquake frequency region in the state has an annualized frequency of 3.15×10^{-2} (or three events in one hundred years) while the highest coastal flooding frequency region in the state has an annualized frequency of 11.1 (or 11.1 events per year).

Hazard	Minimum RIS	Maximum RIS
Coastal Flooding	0	21.32
Earthquake	3.635 x 10 ⁻⁴	4.204 x 10 ⁻²
Riverine Flooding	0	6.833
Wildfire	0	2.576 x 10 ⁻²

Table 3: Range of RIS by hazard

Note that there may be specific artworks whose vulnerability and resilience is not accurately represented by the catalog information used for this risk assessment, or that cannot be separated out from other less vulnerable materials due to the way that information is recorded. Remote risk assessment will always be subject to error and, as in all risk assessments, should be considered an estimation only.

More detailed information on the assignment of material vulnerability and resilience scores for each hazard at the **artwork level** can be found in <u>Appendix I: Risk Assessment Technical Information</u>.

Artworks with RIS in the 80th to 100th percentiles for the pilot collection were included in tables in this report. In addition to those tables, pilot artworks were mapped and color coded based on RIS percentile and layered with the corresponding annual frequency polygon map from the NRI. Those maps were then integrated into an ArcGIS Dashboard which allows users to view not only the map, but also tables of relevant artwork data and an embedded view of the My Public Art Portal. A static example of an artwork level risk assessment dashboard can be found in Figure 2.



Figure 2: Screen grab of the earthquake artwork level risk dashboard

III. Statistical Analysis

Basic statistical analysis was performed on both the collections data provided by ArtsWA and the hazard data from the FEMA National Risk Index. The purpose of the statistical assessment was to identify trends in artwork sites, artworks, and hazards evaluated in the risk assessment.

A. Artwork Sites

1,343 artworks were included in the risk assessment located at 328 artwork sites managed by 82 agencies. The distribution of artwork sites included in the assessment can be seen in Figure 3. Table 4 shows the number of artwork sites in each pilot county with the corresponding population. The number of artworks and artwork sites in each county is commensurate with the population size.



Figure 3: Sites in pilot counties with artwork count

Table 4: Artworks an	nd artwork sites	by pilot county
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County	Population ⁸	Sites	Artworks
Pierce	920,483	141	594
Clark	503,148	73	283
Yakima	256,420	63	252
Skagit	129,360	22	110
Grays Harbor	75,462	18	59
Walla Walla	62,555	11	45

⁸ Population taken from the FEMA NRI; cites population as of 2020

242 or 86% of artwork sites included were public schools, 24 or 7.3% were state agencies, 14 or 4.3% were colleges, and 3 or 0.9% were universities. The average number of artworks per site was 4 with a minimum of 1 and a maximum of 44. The average number of artworks was higher at college and university campuses⁹ than in public schools, state agencies, and other site types (Table 5).

Site Type	Average Artworks per site
College	14.1
Public School	3.51
State Agency	3.88
University	18.67
Other	1.40

Table 5: Average Artwork Count by Site Type

B. Artworks

The ArtsWA collection database categorizes artworks by material using a lexicon-controlled field called Material Category 1 (primary material). There is a Material Category 2 (secondary material) that is utilized only for mixed media objects. Materials include:

- Painting paint on fabric
- Painting paint on rigid surface/mixed media
- Sculpture coated metals
- Sculpture concrete
- Sculpture electrical or mechanical components
- Sculpture glass
- Sculpture kinetic, passive or human-operated
- Sculpture landscapes
- Sculpture mixed media
- Sculpture other metals

- Sculpture plastics/acrylics/polyesters
- Sculpture stone/ceramics/terracotta
- Sculpture uncoated ferrous metals
- Sculpture wood
- Textile/fiber/organic materials
- Work on paper collaged or cut paper
- Work on paper drawing
- Work on paper painting
- Work on paper photograph
- Work on paper print

⁹ A distinction was made between "College" and "University" within the Site Type field of the ArtsWA database

1,343 total artworks were assessed. When grouped by root material (painting, sculpture, work on paper, textile) there were 433 sculptures, 567 works on paper, 262 paintings, and 81 textile works (Fig. 4). Works on paper were the most common artworks by general type across all site types apart from colleges, where sculptures were the most common (Table 6).



Figure 4: Artworks by material

Table 6: Artwork by site type

Primary Material	College	Public School	State Agency	University
Paper	69 (35%)	420 (42%)	51 (55%)	27 (48%)
Sculpture	84 (42%)	300 (30%)	33 (35%)	9 (16%)
Painting	34 (17%)	205 (21%)	8 (9%)	15 (27%)
Textile	11 (5.6%)	64 (6%)	1 (1%)	5 (9%)
Overall	198	989	93	56

The median date of creation for an artwork included in the assessment was 1995 and the oldest artwork included was dated 1965. 50% of the artworks were dated between 1988 and 2003 (Figure 5).¹⁰



Figure 5: Distribution of artworks by date

1. Works on Paper

The most common form of work on paper included in the analysis was "Work on paper – photograph," and the least common was "Work on paper – collaged or cut paper" (Table 7).

Framing and glazing were both identified as data contributing to resilience for works on paper.¹¹ Most works on paper were framed. The analysis included only 11 unframed works on paper. Most works on paper were also glazed in some way. 54 had no glazing (Figure 6). 4.94% of the works on paper analyzed were glazed using UV filtered acrylic glazing, which is the current standard for ArtsWA framed collections. The median date of a work on paper was 1993, which is slightly older than the collection as a whole.

Primary Material	Artworks
Work on paper - photograph	177
Work on paper - print	168
Work on paper - painting	140
Work on paper - drawing	55
Work on paper - collaged or cut paper	27

Table 7: Works on paper by primary material

¹⁰ Note that age was not used as a vulnerability or resilience factor in artwork level risk assessment, but it could be used in the future or with another collection

¹¹ Appendix I includes resilience factors for coastal flooding, earthquake, riverine flooding, and wildfire



Figure 6: Framing and glazing status of works on paper

2. Sculpture

The most common form of sculpture included in the analysis was "Sculpture – glass," which made up 8.27% of the entire pilot collection. The least common form of sculpture included was "Sculpture – landscapes" (Table 8).

Table 8: Sculptures

Primary Material	Artworks
Sculpture - glass	111
Sculpture - other metals	83
Sculpture - coated metals	74
Sculpture - wood	48
Sculpture - stone/ceramics/terracotta	38
Sculpture - plastics/acrylics/polyesters	30
Sculpture - uncoated ferrous metals	16
Sculpture - electrical or mechanical components	11
Sculpture - concrete	9
Sculpture - mixed media	7
Sculpture - kinetic, passive or human-operated	5
Sculpture - landscapes	1



Figure 7: Sculptures by location

Whether or not an artwork was sited outside, portability, existence of engineering documentation, and location type were identified as data contributing to resilience for sculpture. 73% of sculptures analyzed were interior and 26% were exterior¹² (Fig. 7). Sculptures were split relatively evenly between portable and non-portable. 52% of sculptures analyzed were non-portable and 48% were portable. Of non-portable sculptures, 54% had some record of engineering. Those non-portable sculptures with some record of engineering were skewed newer than those with no record of engineering (Fig. 8). The median date of all sculptures in the pilot collection was 1999, which is slightly newer than the rest of the collection.



Figure 8: Non-portable sculpture date distribution by engineering status

3. Paintings and Textiles

There were 343 artworks classified as either paintings or textiles included in the analysis. "Painting – paint on fabric" artworks were the most common form of artwork in the entire pilot collection, making up 14%.

¹² Other refers to sculptures with both interior and exterior portions

"Textile/fiber/organic materials" and "Paintings – paint on rigid surface/mixed media" each made up 6% of the entire pilot collection (Table 9).

Primary Material	Artworks	% of entire collection
Painting - paint on fabric	188	14%
Textile/fiber/organic materials	81	6%
Painting - paint on rigid surface/mixed media	74	6%

Framing and glazing were both identified as data contributing to resilience for paintings and textiles. Most paintings were framed, but of those that were framed, most were unglazed. Most textile objects were unframed, but of those that were framed, most were glazed (Table 10). The median date of a painting was 1995 and the median date of a textile was 1995, which is consistent with the median date of the entire pilot collection.

Table 10: Artworks with framing and glazing status

Primary Material	Framing	Artworks	Glazing	Artworks
Painting	Eramod	216	Glazed	38
	Frameu	210	Unglazed	178
	Unframed	46	Glazed	1
	Uniramed		Unglazed	45
Textile/fiber/organic materials	Framad	26	Glazed	15
	Frameu		Unglazed	11
			Glazed	0
	Unframed	55	Unglazed	55

C. Hazards in the Pilot Counties

The FEMA National Risk Index calculates a hazard-specific Expected Annual Loss Ratio (ALR)¹³ for each U.S. County. The ALR is a good measure of the relative threat of high frequency/low consequence hazards to low frequency/high consequence hazards. When Washington counties were compared to the rest of the United States, the ALR was high (80th percentile and above) for earthquake and moderate (between 50th and 80th percentiles) for coastal flooding, landslide, tsunami, volcano, and wildfire (Table 11).

When comparing the difference between the ALRs of the state versus the pilot counties taken together 14 of the 18 natural hazards were within 7 percentage points, which indicates that the counties selected for the pilot analysis are generally representative of the state for most hazards. However, counties

¹³ Expected Annual Loss (EAL) is the average economic loss (in buildings, population, or agriculture) in dollars resulting from natural hazards each year

included in the pilot had a significantly lower ALR for wildfire, volcano, tsunami, and avalanche than the state as a whole. This indicates that those four hazards may have been underrepresented in the pilot assessment.

Hazard	Washington Annual Loss Ratio National Percentile	Pilot Counties Annual Loss Ratio National Percentile	Difference
Earthquake	89	94	-5
Landslide	78	73	5
Coastal Flooding	74	72	2
Volcano	69	58	11
Wildfire	55	36	19
Tsunami	51	40	11
Avalanche	37	26	11
Ice Storm	31	34	-3
Riverine Flooding	25	19	6
Winter Weather	23	16	7
Hail	16	10	6
Strong Wind	12	9	3
Tornado	9	9	0
Lightning	4	3	1

Table 11: Comparison of the ALR for the state of Washington versus the pilot counties

When the annualized frequency of hazards in pilot counties were individually compared to the rest of the state, counties with high rates of natural hazards emerged. Pierce County has a high annualized frequency of avalanche, earthquake, ice storm, landslide, volcano, and winter weather. Pierce County is also the county with the highest population and greatest number of artworks and artwork sites included in the pilot analysis. Yakima County has high annualized frequency of four hazards included in the analysis, Skagit county is high in three hazards, Clark, Grays Harbor, and Walla Walla counties are high in two hazards each (Table 12). Note that hazard frequency varies widely across the state.

Table 12: Annualized frequency state percentile; high percentiles (80-100) are highlighted in red, medium percentiles (50-80) are highlighted in green, and low percentiles (0-50) are highlighted in yellow

	Counties								
Hazards	Clark	Clark Grays Harbor Pierce Skagit Walla Walla Yakima							
Avalanche	#N/A ¹⁴	#N/A	96	81	33	67			
Coastal Flooding	6	100	24	59	#N/A	#N/A			
Earthquake	55	82	84	63	24	47			
Hail	45	5	29	26	92	58			
Ice Storm	100	76	89	66	74	16			
Landslide	24	58	95	82	13	89			

¹⁴ The NRI assigns an annualized frequency to areas that are considered not at risk for that hazard type

Lightning	42	3	47	32	71	63
Riverine Flooding	61	13	13	42	71	97
Strong Wind	45	18	21	29	100	61
Tornado	39	74	63	18	32	95
Tsunami	6	71	53	41	0	0
Volcano	83	0	88	54	0	75
Wildfire	24	21	45	29	68	89
Winter Weather	37	16	82	97	29	66

While it is helpful to use county-level data for broad statistical analysis, the benefit of the NRI is that it provides hazard data on the census tract level¹⁵, which is representative of areas much smaller than counties. Site level and artwork level risk assessment was carried out using census tract level data. This assessment is documented in the following section.

¹⁵ Census tracts are geographical areas defined by the United States census bureau. Census tracts generally have a population size between 1,200 and 8,000 people, with an optimum size of 4,000 people. Because they are based on population size and not geographic size, hazard data is more accurate for more populous areas and less accurate for less populous areas where census tracts are much larger geographically.

IV. Hazard Profiles

A. Introduction

The risk assessment was performed for the risk of 14 natural hazards to pilot collections. As indicated in previous sections, site level assessments were performed for all 14 hazards, and artwork level assessments were performed for four hazards: coastal flooding, earthquake, riverine flooding, and wildfire. NRI definitions of hazards, summaries of these assessments, and recommendations for ArtsWA are included in the following sections by hazard. Technical information about the NRI data and the hazard-specific RIS assessment is included in Appendix I.

B. Avalanche

"An avalanche is a mass of snow in swift motion traveling down a mountainside."¹⁶

1. Assessment Summary

There are five artwork sites located in census tracts where avalanche frequency was considered high (annualized frequency is in the 80th to 100th percentile for the state). That includes three sites in Pierce



Figure 9: Artworks with avalanche annualized frequency

¹⁶ Hazard definitions were taken directly from the National Risk Index Technical Documentation

County and two sites in Skagit County. 37 artworks are located in these high-risk sites representing 2.76% of the pilot collection. The average frequency of an avalanche per site is 0.225 per year.

Artwork Site	County	Artwork Count	Avalanche Annualized Frequency	State Avalanche Frequency Percentile
Eatonville Middle School	Pierce	6	0.43	93%
University of Washington - Pack Forest	Pierce	5	0.43	93%
Eatonville High School	Pierce	1	0.43	93%
Concrete School District	Skagit	5	0.15	81%
Concrete Elementary School	Skagit	3 (1 exterior)	0.15	81%

Table 13: Artwork sites in areas with high avalanche frequency relative to the rest of the state

2. Recommendations

Overall, avalanche is a **low-risk** to ArtsWA pilot collections. The percentage of the collection located in high frequency areas is low at 2.76% and though the average frequency per site is moderate at 0.225 events per year, the geographically contained nature of the hazard makes it likely that avalanches affecting artwork sites are less likely that what is expressed in the NRI data. That said, there are steps that ArtsWA can take to reduce the risk of damage to artworks caused by avalanche:

- Consider avalanche exposure when placing artworks in areas with high avalanche frequency. Artworks most susceptible to damage caused by avalanches are exterior, so ensure that exterior artworks are designed and/or installed in collaboration with engineers.
- In the event of an avalanche, prioritize affected sites that have exterior artworks, followed by sites with high artwork counts.

C. Coastal Flooding

"Coastal Flooding is when water inundates or covers normally dry coastal land as a result of high or rising tides or storm surges."

1. Assessment Summary

Site Level

There are 38 artwork sites located in census tracts where coastal flooding frequency was considered high (frequency is in the 80th to 100th percentile for the state). That includes 16 sites in Grays Harbor County, 15 sites in Pierce County, and 6 sites in Skagit County. 108 artworks are located in these high-risk sites representing 8.04% of the pilot collection. The average frequency of coastal flooding event per site is 0.847 per year.

Table 14: Artwork sites with four or more artworks in high frequency coastal flooding areas relative to the rest of the state

Artwork Site	County	Artwork	Coastal Flooding	State Coastal Flooding
		Count	Annualized Frequency	Frequency Percentile

Montesano Junior-Senior High School	Grays Harbor	5	11.1	100%
Robert Gray Elementary School	Grays Harbor	5	10.7	100%
Grays Harbor College	Grays Harbor	12	10.7	100%
Ocosta Junior-Senior High School	Grays Harbor	7	5.9	99%
Edison Elementary School	Skagit	13	3.6	94%
Sherman Elementary School	Pierce	4	3.2	93%
Hilltop Heritage Middle School	Pierce	4	3.2	91%
Harbor Ridge Middle School	Pierce	7	3.2	91%
Saltar's Point Elementary School	Pierce	4	3.1	83%
Discovery Elementary School	Pierce	5	3.1	82%



Figure 10: Artworks with coastal flooding frequency

Artwork Level

There were 25 artworks with high Risk Index Scores (RIS) for coastal flooding (score was in the 80th to 100th percentile for the collection), which is 3.20% of the pilot collection.¹⁷ 43 artworks had moderate RIS for coastal flooding (score was in the 50th to 80th percentile for the collection) and 72 artworks had low RIS for coastal flooding (score was below the 50th percentile for the collection). Of those artworks with high RIS, 23 were in Grays Harbor County, one was in Pierce County, and one was in Skagit County. The site with the most artworks with a high RIS was Grays Harbor College, which had 9 artworks considered high or moderate risk.

Artwork Title	Artist	Date	Primary Material	Artwork Site	RIS
	1	Grays	Harbor County	1	
Mystery""	Kathy Gore-Fuss	2000	Textile/fiber/organic materials	Robert Gray Elementary School	21.3
Years of Corn I""	Rachel Brumer	1995	Textile/fiber/organic materials	Oakville High School	21.3
The Dory (Rapture of the Deep)""	Cork Marcheschi	2003	Sculpture - electrical or mechanical components	City of Hoquiam	21.3
Hoquiam Beacon""	Cork Marcheschi	2003	Sculpture - electrical or mechanical components	City of Hoquiam	21.3
It Was Further Than I Thought""	Leland Standley	1983-85	Painting - paint on fabric	Oakville High School	16.0
Catch of the Day""	Patti Warashina	1996	Work on paper - painting	Montesano Junior- Senior High School	14.8
Message to Magritte""	Rob Gischer	1982	Work on paper - painting	Montesano Junior- Senior High School	14.8
Five Boats""	Donna Mossholder	1990	Work on paper - painting	Robert Gray Elementary School	14.2
Illuminated with Rays of Truth""	Louise Williams	1994	Work on paper - painting	Grays Harbor College	14.2
Banners""	Joellen Benjamin-Fay	1978	Textile/fiber/organic materials	Miller Junior High	14.2
Sunburst Sidewalk""	Robert Haft	1977	Work on paper - photograph	Montesano Junior- Senior High School	11.1
I Know Where I Came From""	Leland Standley	1996	Painting - paint on fabric	Montesano Junior- Senior High School	11.1
Eden III""	Carolyn Krieg	1996	Work on paper - photograph	Beacon Avenue Elementary	11.1
Anchor""	Denise Anderson	1998	Painting - paint on fabric	McDermoth Elementary	10.7
The Grays Harbor College Tapestry""	Cecilia Blomberg	2004	Textile/fiber/organic materials	Grays Harbor College	10.7
Night Ocean""	Aki Sogabe	1992	Work on paper - collaged or cut paper	Grays Harbor College	10.7
Geometries: Cross""	Karen Guzak	1992	Work on paper - print	Grays Harbor College	8.0

Table 15: Artworks with coastal flooding risk index ratings of "high"

¹⁷ Note that use of RIS for artwork level assessment allows the assessor to narrow the scope of high-risk artworks from the 108 artworks located at high frequency sites to 25 artworks that are high risk in location and material.

Shadow Trees""	Carolyn Duniway Hoffman	1983	Work on paper - photograph	Grays Harbor College	8.0		
Windswept Hillside""	William Self	1988	Work on paper - photograph	Grays Harbor College	8.0		
Quarried Marble""	Jim Colbert	1988	Painting - paint on fabric	Grays Harbor College	8.0		
Secrets""	Toni Lawson Norris	1990	Work on paper - painting	North Beach Junior/Senior High School	7.4		
Gene Pool""	Linda Beaumont	1983	Sculpture - concrete	Hoquiam Middle School	6.9		
Out Where Grays Harbor Meets the Pacific ""	Mike DeVoe	2006	Sculpture - wood	Grays Harbor College	6.1		
		Pie	rce County				
Going to the Water""	Stuart Nakamura	1988	Painting - paint on rigid surface/mixed media	Voyager Elementary	9.3		
	Skagit County						
"Stilt Series VI"	Scott Mansfield	1997	Work on paper - collaged or cut paper	Conway School	6.4		



Figure 11: Artworks with coastal flooding RIS percentiles

2. Recommendations

Overall, coastal flooding is a **moderate-risk** to ArtsWA collections. The percentage of the collection that is high risk is low (3.2% of the collection has high RIS), but the average frequency of coastal flooding events per artwork site is high at 0.847 and the frequency of events in high risk areas is very high. There are three sites in Grays Harbor County, for example, that are located in census tracts that experience over 10 coastal

flooding events annually. There are steps that ArtsWA can take to reduce the risk of damage to artworks caused by coastal flooding:

- Consider coastal flooding exposure when placing artworks in areas with high frequency. Artworks
 most susceptible to damage caused by coastal flooding are unframed and glazed works on paper,
 textiles and paintings on canvas. Artworks located in basements and first floors are also more
 susceptible to damage, so consider installing artwork on higher floors.¹⁸
- Prioritize condition checks for high RIS artworks and consider resilience boosting measures like addressing condition issues and, where appropriate, framing artworks to current ArtsWA standards.
- In the event of coastal flooding in Grays Harbor County, prioritize contact with Grays Harbor College, which has 8 high RIS artworks and Montesano Junior-Senior High School, which has 4 high RIS artworks.
- In the event of coastal flooding in Pierce County, prioritize contact with Voyager Elementary, which has one high risk artwork.
- In the event of coastal flooding in Skagit County, prioritize contact with Conway School, which has one high RIS artwork.

D. Earthquake

"An earthquake is a shaking of the earth's surface by energy waves emitted by slowly moving tectonic plates overcoming friction with one another underneath the earth's surface."

1. Assessment Summary

Site Level

There are 77 artwork sites located in census tracts where earthquake frequency was considered high (frequency is in the 80th to 100th percentile for the state). That includes 70 sites in Pierce County, 4 sites in Skagit County, and three sites in Grays Harbor County. 322 artworks are located in these high-risk sites representing 23.98% of the pilot collection. The average frequency of an earthquake event per site is 0.0064 per year.

Table 16: Artwork sites with four or more artworks in areas with high earthquake frequency relative to the rest of the state

Artwork Site	County	Artwork Count	Earthquake Annualized Frequency	State Earthquake Frequency Percentile
Saltar's Point Elementary School	Pierce	4	0.0315	99%
Hilltop Heritage Middle School	Pierce	4	0.0276	99%
Sherman Elementary School	Pierce	4	0.0221	99%
Ocosta Junior-Senior High School	Grays Harbor	7	0.0198	99%

¹⁸ Note that the floor on which an artwork is installed is not considered in the RIS equation because that information is not captured in the database in a lexicon-controlled field.

Discovery Elementary School	Pierce	5	0.0113	96%
Harbor Ridge Middle School	Pierce	7	0.0101	94%
Edison Elementary School	Skagit	13	0.0101	94%
Truman Middle School	Pierce	11	0.0086	90%
Tacoma Community College	Pierce	41	0.0086	90%
Franklin Elementary School	Pierce	7	0.0086	89%
Edison Elementary School	Pierce	6	0.0086	89%
Manitou Elementary	Pierce	7	0.0086	89%
Lincoln High School	Pierce	4	0.0085	88%
University of Washington - Tacoma	Pierce	38	0.0085	88%
Court of Appeals, Division II	Pierce	17	0.0085	88%
Meeker Middle School	Pierce	5	0.0085	87%
Blix Elementary School	Pierce	8	0.0085	87%
Sheridan Elementary	Pierce	5	0.0085	86%
Lister Elementary School	Pierce	5	0.0085	86%
Clover Park Technical College	Pierce	16	0.0085	85%
Thompson Elementary	Pierce	5	0.0084	81%
Spanaway Lake High School	Pierce	15	0.0084	81%
Woodland Elementary	Pierce	7	0.0084	81%
Hedden Elementary	Pierce	4	0.0084	80%



Figure 12: Artworks with earthquake annualized frequency

Artwork Level

There were 268 artworks with high RIS for earthquake, which is 20% of the pilot collection. 404 artworks had moderate RIS for earthquake and 671 artworks had low RIS for earthquake. Of those artworks with high RIS, 208 were in Pierce County, 24 were in Clark County, 19 were in Skagit County, and 17 were in Grays Harbor County. The site with the most artworks with a risk index rating of high is Tacoma Community College, which had 16 artworks considered high risk. Foothills Elementary had 13 artworks considered high risk.

Artwork Title	Artist	Date	Primary Material	Artwork Site	RIS	
			Grays Harbor County			
Gene Pool""	Linda Beaumont	1983	Sculpture - concrete	Hoquiam Middle School	0.0220	
Pierce County						
West""	Richard La Londe	1994	Sculpture - glass	Saltar's Point Elementary School	0.0420	
Water #1""	Douglas Hansen	1985	Sculpture - glass	Steilacoom High School	0.0420	
Join Together""	Sonja Blomdahl	2007	Sculpture - glass	Thompson Elementary	0.0168	

Table 17: Artworks in the	98th	percentile o	of earthd	nuake	risk	index	scores
	2000	percentine o	j cartine	Juanc	1151	mack	500705

Going to the Water""	Stuart Nakamura	1988	Painting - paint on rigid surface/mixed media	Voyager Elementary	0.0163
New Wave One and New Wave Two""	Douglas Hansen	1979	Sculpture - glass	Gig Harbor High School	0.0150
Wind Pavillion""	Anita Margrill	1997	Sculpture - coated metals	Town of Steilacoom	0.0140
Acts of Kindness""	Julie Prather	2009	Sculpture - glass	University Place Primary	0.0138
Crossroads""	Richard C. Elliott	2007	Sculpture - glass	Jefferson Elementary School	0.0138
Some Art is Hot Air""	Bill Will	1991	Sculpture - electrical or mechanical components	Tacoma Community College	0.0138
Amulet for Creative Learning""	Lanny Bergner	2006	Sculpture - glass	Giaudrone Middle School	0.0137
Tools for School""	Joyce Moty	1984	Sculpture - concrete	Discovery Elementary School	0.0135
Tools for School""	Joyce Moty	1984	Sculpture - concrete	Discovery Elementary School	0.0135
Tools for School""	Joyce Moty	1984	Sculpture - concrete	Discovery Elementary School	0.0135
Tools for School""	Joyce Moty	1984	Sculpture - concrete	Discovery Elementary School	0.0135
Fly Away""	Guy Kemper	2022	Sculpture - glass	Pierce College - Fort Steilacoom	0.0133
Breakthrough""	Richard Corrin	1988	Sculpture - stone/ceramics/terracotta	Point Defiance Elementary	0.0133
Whirligig""	Victor Moore	1986	Sculpture - kinetic, passive or human-operated	Liberty Middle School	0.0133
Whirligig""	Victor Moore	1986	Sculpture - kinetic, passive or human-operated	Liberty Middle School	0.0133
Whirligig""	Victor Moore	1986	Sculpture - kinetic, passive or human-operated	Liberty Middle School	0.0133
Whirligig""	Victor Moore	1986	Sculpture - kinetic, passive or human-operated	Liberty Middle School	0.0128
Time Traveler""	Marvin Oliver	1997	Sculpture - glass	Mountain View Junior High	0.0127
Jeffersonian Ideal""	Hugh Webb	1999	Painting - paint on rigid surface/mixed media	Sherman Elementary School	0.0126
Scope""	Robert Teeple	1990	Sculpture - electrical or mechanical components	Tacoma Community College	0.0115
Stories from Caney Creek""	Mildred Howard	Date unk	Sculpture - glass	Tacoma Community College	0.0115
Stories from Caney Creek: Galveston""	Mildred Howard	Date unk	Sculpture - glass	Tacoma Community College	0.0115
Intervals""	Rae Mahaffey	2009	Sculpture - glass	Gray Middle School	0.0114



Figure 13: Artworks with earthquake risk index ratings

2. Recommendations

Overall, earthquake is a **moderate/high-risk** to ArtsWA pilot collections. A high volume of artworks is exposed to high earthquake frequency (24%) relative to the rest of the state, but the average frequency of earthquake events per artwork site is low at 0.0064 when compared to other hazards. For example, the highest frequency area represented in the pilot study has a frequency of 3.15 earthquake events every 100 years compared to a hazard like ice storm in which each artwork site is exposed to an *average* of about one event per year. The high impact nature of earthquake events, however, makes it a moderate/high risk to collections overall. There are steps that ArtsWA can take to reduce the risk of damage to artworks caused by earthquake:

- Consider earthquake exposure when placing artworks in areas with high frequency. Artworks most susceptible to damage caused by earthquake are sculptures that are suspended and those that were not designed and installed in collaboration with engineers.
- Prioritize condition checks for high RIS artworks (Table 17) and consider resilience boosting measures like addressing condition issues, paying close attention to the method and stability of installation, and where appropriate, framing artworks to current ArtsWA standards.
- In the event of a large-scale earthquake that affects the Cascadia subduction zone, prioritize communication with Tacoma Community College, which has 16 artworks with high RIS, then Foothills Elementary, which has 13 artworks with high RIS, then Spanaway Lake High School, which has 9 artworks with high RIS.

E. Hail

"Hail is a form of precipitation that occurs during thunderstorms when raindrops, in extremely cold areas of the atmosphere, freeze into balls of ice before falling towards the earth's surface."

1. Assessment Summary

There are 11 artwork sites that have exterior artworks and are located in census tracts where hail frequency was considered high (in the 80th to 100th percentile for the state). That includes 5 sites in Yakima County, 5 sites in Walla Walla County, and one site in Clark County. 24 artworks are located in these high-risk sites representing 1.79% of the pilot collection. The average frequency of a hail event per site is 0.0602 per year.

Artwork Site	County	Exterior Artwork Count	Hail Annualized Frequency	State Hail Frequency Percentile
Edison Elementary School	Walla Walla	1	0.412	100%
Walla Walla Community College	Walla Walla	7	0.406	99%
Port of Walla Walla	Walla Walla	2	0.406	99%
Walla Walla Veterans Home	Walla Walla	2	0.401	99%
Washington State Penitentiary	Walla Walla	1	0.401	99%
Yakima Valley College - Grandview	Yakima	1	0.154	85%
Yakima Valley Technical Skills Center - Sunnyside	Yakima	2	0.154	85%
Sunnyside High School	Yakima	4	0.154	85%
Yakima Valley SunDome	Yakima	1	0.097	81%
Yakima Valley Technical Skills Center (YV-TECH)	Yakima	1	0.097	81%
Jemtegaard Middle School and Columbia River Gorge Elementary	Clark	2	0.091	81%

Table 18: Artwork sites with exterior artworks in areas with high hail frequency relative to the rest of the state



Figure 14: Exterior Artworks with hail annualized frequency

2. Recommendations

Overall, hail is **low-risk** to ArtsWA pilot collections. The average frequency of a hail event per site is moderate at 0.0602 events per year, but only 1.79% of the collection is exterior and located in high frequency areas and the impact of a hail event is low when compared to other hazards. That said, there are steps that ArtsWA can take to reduce the risk of damage to artworks caused by hail:

- Consider hail exposure when placing artworks in areas with high frequency. Artworks most susceptible to damage caused by hail are exterior artworks made with glass, soft metal like aluminum, and coated or painted sculptures.
- When performing condition checks in areas with high hail frequency, consider artwork exposure to the hazard.

F. Ice Storm

"An Ice Storm is a freezing rain situation (rain that freezes on surface contact) with significant ice accumulations of 0.25 inches or greater."

1. Assessment Summary

There are 115 artwork sites where ice storm risk was considered high (in the 80th to 100th percentile for the state). That includes 73 sites in Clark County, 20 sites in Pierce County, 15 sites in Skagit County, 4 sites in Walla Walla County, and three sites in Grays Harbor. 456 Artworks are located in these high-risk

sites representing 33.95% of the pilot collection. The average frequency of an ice storm per site is 0.828 per year.

Table 19: Artwork sites with four or more artworks in areas with high ice storm frequency relative to the rest of the state

Artwork Site	County	Artwork	Ice Storm Annualized	State Ice Storm
		Count	Frequency	Frequency Percentile
Lake Shore Elementary	Clark	4	1.86	99%
Lincoln Elementary	Clark	5	1.86	99%
Captain Strong Elementary School	Clark	18	1.86	99%
Mountain View High School	Clark	6	1.86	99%
Benjamin Franklin Elementary	Clark	5	1.86	98%
Illahee Elementary School	Clark	6	1.86	97%
Washington State School for the Blind	Clark	8	1.86	97%
Clark College	Clark	29	1.86	97%
Harney Elementary	Clark	16	1.86	97%
Prairie High School	Clark	12	1.86	97%
Laurin Middle School	Clark	4	1.86	97%
Yacolt Elementary	Clark	11	1.86	97%
Washington State University - Vancouver	Clark	13	1.86	97%
Washington Elementary School	Clark	8	1.86	97%
Cascade Middle School_Clark	Clark	4	1.86	97%
River Homelink School	Clark	6	1.86	97%
Pioneer Elementary_Clark	Clark	4	1.86	97%
Daybreak Primary	Clark	4	1.86	97%
Department of Licensing - Vancouver Branch	Clark	4	1.86	97%
Maple Grove School	Clark	10	1.86	97%
Eleanor Roosevelt Elementary School	Clark	5	1.86	97%
Hayes Freedom High School	Clark	19	1.86	97%
Harmony Elementary	Clark	5	1.86	97%
Amboy Middle School	Clark	5	1.85	93%
Ocosta Junior-Senior High School	Grays Harbor	7	1.56	92%
Saltar's Point Elementary School	Pierce	4	2.26	100%
Hilltop Heritage Middle School	Pierce	4	2.02	99%
Sherman Elementary School	Pierce	4	1.60	92%
Discovery Elementary School	Pierce	5	0.95	89%
Elk Ridge Elementary	Pierce	7	0.94	88%
Harbor Ridge Middle School	Pierce	7	0.85	85%
Edison Elementary School_Skagit	Skagit	13	1.11	91%

Skagit Valley College	Skagit	9	0.83	85%
Mount Vernon High School	Skagit	14	0.83	85%
Cascade Middle School_Skagit	Skagit	8	0.83	84%
Department of Natural Resources - Northwest Regional Office	Skagit	11	0.83	84%
Burlington-Edison High School	Skagit	4	0.83	84%
Northwest Career and Technical Academy	Skagit	9	0.83	84%
Harriet Rowley Elementary	Skagit	15	0.83	84%
Walla Walla Veterans Home	Walla Walla	7	0.73	81%
Employment Security Department - Walla Walla Job Service Center	Walla Walla	8	0.73	81%



Figure 15: Artworks with Ice Storm Frequency

2. Recommendations

Overall, ice storm is a **moderate-risk** to ArtsWA pilot collections. The percentage of the pilot collection located in high frequency areas is high at 33.4% and the average frequency of an ice storm per site is high at 0.828 events per year. However, the impact of an ice storm event on collections is low when compared to other hazards. There are steps that ArtsWA can take to reduce the risk of damage to artworks caused by ice storm:

• Consider ice storm exposure when placing artworks in areas with high frequency. Artworks most susceptible to damage caused by ice storm are exterior, so consider material when installing

outdoor sculpture and ensure that the surrounding area is free of overhanding branches and brush, which can become heavy with ice and fall.

• In the event of a heavy ice storm, prioritize affected sites that have exterior artworks, followed by sites with high artwork counts.

G. Landslide

"A landslide is the movement of a mass of rock, debris, or earth down a slope."

1. Assessment Summary

There are 53 artwork sites where landslide frequency was considered high (in the 80th to 100th percentile for the state). That includes 28 sites in Pierce County, 11 sites in Grays Harbor County, 5 sites in Clark County, 5 sites in Skagit County, three sites in Yakima County, and one site in Walla Walla County. 146 Artworks are located in these high-risk sites representing 10.87% of the pilot collection. The average frequency of a landslide per site is 0.0268 per year.

Table 20: Artwork sites with four or more artworks in areas with high landslide frequency relative to the rest of the state

Artwork Site	County	Artwork Count	Landslide Annualized Frequency	State Landslide Frequency Percentile
Eatonville Middle School	Pierce	6	0.417	99%
University of Washington - Pack Forest	Pierce	5	0.417	99%
Hilltop Heritage Middle School	Pierce	4	0.269	98%
Hedden Elementary	Pierce	4	0.333	98%
Sherman Elementary School	Pierce	4	0.214	97%
Lake Shore Elementary	Clark	4	0.250	97%
Grays Harbor College	Grays Harbor	12	0.093	93%
Elk Ridge Elementary	Pierce	7	0.083	87%
Saltar's Point Elementary School	Pierce	4	0.036	87%
Robert Gray Elementary School	Grays Harbor	5	0.083	87%
Ocosta Junior-Senior High School	Grays Harbor	7	0.028	86%
Discovery Elementary School	Pierce	5 (4 exterior)	0.015	84%
Edison Elementary School	Skagit	13	0.013	83%
Harbor Ridge Middle School	Pierce	7	0.014	83%


Figure 16: Artworks with landslide frequency

Overall, landslide is a **low-risk** to ArtsWA pilot collections. The percentage of the pilot collection located in high frequency areas is low at 10.87% and the average frequency of landslide per site is low at 0.0268 events per year. The geographically contained nature of the hazard makes it likely that landslides actually affecting artwork sites are less likely than what is expressed in the NRI data. Nevertheless, there are steps that ArtsWA can take to reduce the risk of damage to artworks caused by landslide:

- Consider landslide exposure when placing artworks in areas with high landslide frequency. Artworks most susceptible to damage caused by landslides are exterior, so ensure that exterior artworks are designed and/or installed in collaboration with engineers.
- In the event of landslide, prioritize affected sites that have exterior artworks, followed by sites with high numbers of artworks.

H. Lightning

"Lightning is a visible electrical discharge or spark of electricity in the atmosphere between clouds, the air, and/or the ground often produced by a thunderstorm."

1. Assessment Summary

There are 30 artwork sites where lightning frequency is considered high (in the 80th to 100th percentile for the state). That includes 11 sites in Pierce County, 10 sites in Walla Walla County, 7 sites in Clark County,

and two sites in Yakima County. 153 artworks are located in these high-risk sites representing 11.39% of the pilot collection. The average frequency of lightning events per site is 0.963 per year.

Artwork Site	County	Outdoor Artwork Count	Lightning Annualized Frequency	State Lightning Frequency Percentile
Town of Steilacoom	Pierce	1	4.46	99%
Edison Elementary School	Walla Walla	1	2.04	88%
Walla Walla Veterans Home	Walla Walla	2	1.93	88%
Walla Walla Community College	Walla Walla	7	1.60	85%
Port of Walla Walla	Walla Walla	2	1.60	85%
McNeil Island Special Commitment Center	Pierce	1	1.54	83%
Pleasant Valley Elementary	Clark	1	1.50	83%
Pleasant Valley Middle School	Clark	1	1.50	83%
Fisher's Landing Elementary	Clark	1	1.48	82%
Sumner High School	Pierce	1	1.47	82%

Table 21: Artwork sites with outdoor artworks areas with high lightning frequency relative to the rest of the state



Figure 17: Artworks with lightning frequency

Overall, lightning is a **low-risk** to ArtsWA pilot collections. The percentage of the pilot collection located in high frequency areas is low at 11.39% and the average frequency of lightning events per site is high at 0.963 events per year. The very contained nature of the hazard makes it likely that lightning events actually affecting artwork sites is less likely than what is expressed in the NRI data. Nevertheless, there are steps that ArtsWA can take to reduce the risk of damage to artworks caused by lightning:

• Consider lightning exposure when placing artworks in areas with high frequency. Artworks most susceptible to damage caused by lightning are exterior, so consider material when installing outdoor sculpture and ensure that the surrounding area is free of overhanging branches and brush.

I. Riverine Flooding

"Riverine Flooding is when streams and rivers exceed the capacity of their natural or constructed channels to accommodate water flow and water overflows the banks, spilling into adjacent low-lying, dry land."

1. Assessment Summary

Site Level

There are 85 artwork sites where riverine flooding frequency was considered high (the 80th to 100th percentile for the state). That includes 47 sites in Clark County, 30 sites in Yakima County, and 8 sites in Walla Walla County. 316 artworks are located in these high-risk sites representing 23.53% of the pilot collection. The average frequency of riverine flooding events per site was 0.287 per year.

Table 22: Artwork sites w	vith four or more art	tworks in areas w	ith high riverine	flooding frequency	relative to the rest
of the state					

Artwork Site	County	Artwork Count	Riverine Flooding Annualized Frequency	State Riverine Flooding Frequency Percentile
Simcoe Elementary	Yakima	15	1.708	97%
Naches Valley Middle School	Yakima	14	1.708	97%
Toppenish Middle School	Yakima	5	1.708	97%
Artz-Fox Elementary School	Yakima	10	1.708	97%
Mabton High School	Yakima	5	1.708	97%
Cottonwood Elementary	Yakima	4	1.708	97%
Martin Luther King Jr. Elementary	Yakima	9	1.708	97%
Highland High School	Yakima	9	1.708	97%
McClure Elementary School	Yakima	4	1.708	97%
Walla Walla Veterans Home	Walla Walla	7	0.625	88%
Employment Security Department - Walla Walla Job Service Center	Walla Walla	8	0.625	88%
Walla Walla Community College	Walla Walla	17	0.625	88%
Laurin Middle School	Clark	4	0.417	85%
River Homelink School	Clark	6	0.417	85%
Illahee Elementary School	Clark	6	0.417	85%
Daybreak Primary	Clark	4	0.417	85%
Pioneer Elementary	Clark	4	0.417	85%
Maple Grove School	Clark	10	0.417	85%
Eleanor Roosevelt Elementary School	Clark	5	0.417	85%
Benjamin Franklin Elementary	Clark	5	0.417	85%
Amboy Middle School	Clark	5	0.417	85%
Yacolt Elementary	Clark	11	0.417	85%
Prairie High School	Clark	12	0.417	85%
Washington State University - Vancouver	Clark	13	0.417	85%
Captain Strong Elementary School	Clark	18	0.417	85%
Hayes Freedom High School	Clark	19	0.417	85%



Figure 18: Artworks with riverine flooding frequency

Artwork Level

There were 268 artworks with a high RIS for riverine flooding, which is 20% of the pilot collection. 402 artworks had a moderate RIS and 673 artworks had a low RIS for riverine flooding. Of those artworks with a risk index rating of high, 122 were in Clark County, 107 were in Yakima County, 28 were in Walla Walla County, 10 were in Skagit County, and one was in Pierce County. The site with the most artworks with a risk index rating of high was Hayes Freedom High School in Clark County, which had 19 artworks considered high risk. Captain Strong Elementary in Clark County had 17 artworks considered high risk.

Table 23: Artworks in the	98th percentile of r	riverine flooding risk	index scores
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Artwork Title	Artist	Date	Artwork Site	RIS				
Yakima County								
Border Abstractions: San Diego / Tijuana""	Kristen Ramirez	2018	Simcoe Elementary	2.28				
I Choose Light""	Nikita Ares	2019	Simcoe Elementary	2.28				
The Sun Sees What We Do This Day""	Dale Gottlieb	2011	Union Gap School	2.28				
The Moxee Tapestry""	Cecilia Blomberg	2010	Moxee Elementary School	2.28				
Anne Frank""	Dale Gottlieb	2000	Highland High School	2.28				
Early Morning Encampment""	Jo Fyfe	1999	Toppenish Middle School	2.28				

In Restauro I""	Judith Poxson Fawkes	1996	McClure Elementary School	2.28
The Bend""	Spike Mafford	1996	Naches Valley Middle School	2.56
Cat's Life""	Lani Tanaka	1996	Moxee Elementary School	2.56
Overwatering""	Lani Tanaka	1996	Moxee Elementary School	2.56
Autumn""	Aki Sogabe	1995	Naches Valley Middle School	2.28
Sunset""	Aki Sogabe	1996	Naches Valley Middle School	2.28
Cascade Mountains""	Anne Fiske	1996	Naches Valley Middle School	2.28
Birthday House""	Sally Sellers	1995	Naches Valley Middle School	2.28
The Codependent and the Deep Blue Sea""	Phil Brazeau	1991	Cottonwood Elementary	2.28
Nightwatcher""	Bet Borgeson	1991	Artz-Fox Elementary School	2.56
YelLowstone Fire""	Heidi Oberheide	1990	Artz-Fox Elementary School	2.28
Long Lost Beauty""	Lucy Liu	1982	Artz-Fox Elementary School	2.28
Untitled from the ""Work"" series (carpentry)""	Connie Ritchie	1987	Martin Luther King Jr. Elementary	6.83
Untitled 1986""	Kathleen Coyle	1986	Martin Luther King Jr. Elementary	2.28
Two Women Rowing""	Jeffrey Keith	1986	Martin Luther King Jr. Elementary	2.56
Site #20: Men at Work""	Juliana Heyne	1988	Stanton Academy	2.56
Old Style Athabascan Beaded Men's Jacket Yoke""	Eunice Carney	1988	Mabton High School	2.28
Test Pit II""	Madge Gleeson	1982	Union Gap School	2.28
The Cleman Mountains at Naches""	George Stillman	1980	Naches Valley High School	2.28
Silent Migration""	Ken Spiering	1979	West Valley Junior High	2.28



Figure 19: Artworks with riverine flooding risk index ratings

Overall, riverine flooding is **moderate risk** to ArtsWA collections. The percentage of the collection with high RIS is high at 20% and the average frequency of riverine flooding events per artwork site is moderate at 0.287. The frequency of events in high-risk areas is lower than coastal flooding, however. The sites in the highest frequency areas are located in census tracts that experience 1.7 events per year. There are steps that ArtsWA can take to reduce the risk of damage to artworks caused by riverine flooding:

- Consider riverine flooding exposure when placing artworks in areas with high frequency. Artworks
 most susceptible to damage caused by riverine flooding are unframed and glazed works on paper,
 textiles and paintings on canvas. Artworks located in basements and first floors are also more
 susceptible to damage, so consider installing artwork on higher floors.¹⁹
- Prioritize condition checks for high RIS artworks and consider resilience boosting measures like addressing condition issues and, where appropriate, framing artworks to current ArtsWA standards.

¹⁹ Note that the floor on which an artwork is installed is not considered in the RIS equation because that information is not captured in the database in a lexicon controlled field.

- In the event of riverine flooding in Clark County, prioritize contact with Hayes Freedom High School, which has 19 high RIS artworks and Captain Strong Elementary School, which has 17 high RIS artworks.
- In the event of riverine flooding in Yakima County, prioritize contact with Simcoe Elementary, which has 15 high RIS artworks and Naches Valley Middle School, which has 14 high RIS artworks.
- In the event of riverine flooding in Walla Walla County, prioritize contact with Walla Walla Community College, which has 10 high RIS artworks and the Walla Walla Job Service Center, which has 8 high RIS artworks.
- In the event of riverine flooding in Skagit County, prioritize contact with Harriet Rowley Elementary, which has 5 high RIS artworks.
- In the event of riverine flooding in Pierce County, prioritize contact with Voyager Elementary, which has one high RIS artwork.

J. Strong Wind

"Strong Wind consists of damaging winds, often originating from thunderstorms, that are classified as exceeding 58 mph."

1. Assessment Summary

There are 57 artwork sites where strong wind frequency was considered high (in the 80th to 100th percentile for the state). That includes 46 sites in Yakima County and 11 sites in Walla Walla County. 213 artworks are located in these high-risk sites representing 15.86% of the pilot collection. The average frequency of strong wind events per site was 0.0595 per year.

Table 24: Artwork sites with outdoor artworks in areas with high strong wind frequency relative to the rest of the state

Artwork Site	County	Outdoor Artwork Count	Strong Wind Annualized Frequency	Strong Wind Annualized Frequency State Percentile
Edison Elementary School	Walla Walla	1	0.367	100%
Port of Walla Walla	Walla Walla	2	0.365	100%
Walla Walla Community College	Walla Walla	7	0.365	100%
Walla Walla Veterans Home	Walla Walla	2	0.364	99%
Washington State Penitentiary	Walla Walla	1	0.364	99%
Yakima Valley College - Grandview	Yakima	1	0.286	95%
Yakima Valley Technical Skills Center - Sunnyside	Yakima	2	0.286	95%
Sunnyside High School	Yakima	4	0.286	95%
Yakima Valley Technical Skills Center (YV-TECH)	Yakima	1	0.140	82%
Yakima Valley SunDome	Yakima	1	0.140	82%
Davis High School	Yakima	1	0.072	80%
Yakima Valley College	Yakima	4	0.072	80%



Figure 20: Artworks with strong wind frequency

Overall, strong wind is a **low risk** to ArtsWA pilot collections. The percentage of the pilot collection located in high frequency areas is low at 15.86% and the average frequency of a strong wind event per site is moderate at 0.0595 events per year. There are steps that ArtsWA can take to reduce the risk of damage to artworks caused by strong wind:

• Consider strong wind exposure when placing artworks in areas with high frequency. Artworks most susceptible to damage caused by strong wind are exterior. Ensure that exterior artworks are designed and/or installed in collaboration with engineers and that surrounding areas are free of overhanging branches and brush.

K. Tornado

"A Tornado is a narrow, violently rotating column of air that extends from the base of a thunderstorm to the ground and is visible only if it forms a condensation funnel made up of water droplets, dust, and debris."

1. Assessment Summary

There are 65 artwork sites where tornado frequency was considered high (in the 80th to 100th percentile for the state). That includes 16 sites in Clark County, 13 sites in Grays Harbor County, 16 sites in Pierce County, 7 sites in Skagit County, 4 sites in Walla Walla County, and 9 sites in Yakima County. 190 artworks are located in these high-risk sites representing 14.15% of the pilot collection. The average frequency of tornado events per site was 0.0008 per year.

Artwork Site	County	Artwork Count	Tornado Annualized Frequency	State Tornado Frequency Percentile
University of Washington - Pack Forest	Pierce	5	0.01157	97%
Eatonville Middle School	Pierce	6	0.01157	97%
Amboy Middle School	Clark	5	0.00991	96%
Concrete School District	Skagit	5	0.00507	94%
Mabton High School	Yakima	5	0.00472	94%
Artz-Fox Elementary School	Yakima	10	0.00472	94%
Elma Elementary	Grays Harbor	6	0.00203	90%
Yacolt Elementary	Clark	11	0.00160	89%
Highland High School	Yakima	9	0.00159	89%
Kapowsin Elementary School	Pierce	7	0.00159	89%
Walla Walla Community College	Walla Walla	17 (7 Ext)	0.00086	86%
Pioneer Elementary	Clark	4	0.00066	84%
Elk Ridge Elementary	Pierce	7	0.00046	81%
Montesano Junior-Senior High School	Grays Harbor	5	0.00047	81%
Elma Middle School	Grays Harbor	4	0.00039	80%
Grays Harbor College	Grays Harbor	12	0.00042	80%

Table 25: Artwork sites with four or more artworks in areas with high tornado frequency relative to the rest of the state



Figure 21: Artworks with tornado frequency

Overall, tornado is a **low risk** to ArtsWA pilot collections. The percentage of the pilot collection located in high frequency areas is low at 14% and the average frequency of tornado events per site is low at 0.0008 events per year. There are steps that ArtsWA can take to reduce the risk of damage to artworks caused by tornado:

• Consider tornado exposure when placing artworks in areas with high frequency. Artworks most susceptible to damage caused by tornado are exterior. Ensure that exterior artworks are designed and/or installed in collaboration with engineers and that surrounding areas are free of overhanging branches and brush.

L. Tsunami

"A Tsunami is a wave or series of waves generated by an earthquake, landslide, volcanic eruption, or even a large meteor hitting the ocean and causing a rise or mounding of water at the ocean surface. A Tsunami can travel across the open ocean at about 500 mph and slow down to about 30 mph as it approaches land, causing it to grow significantly in height."

1. Assessment Summary

There are 16 artwork sites located in areas where tsunami frequency was considered high (the 80th to 100th percentile for the state). That includes 8 sites in Grays Harbor County, 6 sites in Pierce County, and

two sites in Clark County. 92 Artworks are located in these high-risk sites representing 6.85% of the pilot collection. The average frequency of tsunami events per site was 0.0036 per year.

Table 26: Artwork sites with four or more artworks in areas with high tsunami frequency relative to the rest of the state

Artwork Site	County	Artwork Count	Tsunami Annualized Frequency	State Tsunami Frequency Percentile
Ocosta Junior-Senior High School	Grays Harbor	7	0.03601	100%
Court of Appeals, Division II	Pierce	17	0.00900	99%
Robert Gray Elementary School	Grays Harbor	5	0.00900	99%
Hilltop Heritage Middle School	Pierce	4	0.00900	99%
University of Washington - Tacoma	Pierce	38	0.00900	99%
Lincoln Elementary	Clark	5	0.00450	98%



Figure 22: Artworks with tsunami frequency

2. Recommendations

Overall, tsunami is a **moderate risk** to ArtsWA pilot collections. The percentage of the pilot collection located in high frequency areas is low at 6.85% and the average frequency of tsunami per site is low at 0.00363 events per year. That said, the impact of tsunami on artworks would be extreme. In the event of

a tsunami, it is likely artworks in affected sites would be either completely lost or severely damaged. There are some steps that can be taken to mitigate the risk of tsunami to ArtsWA collections.

- Consider tsunami exposure when placing artworks in areas with high frequency.
- In the event of a tsunami, prioritize affected sites that have high numbers of artworks.

M. Volcanic Activity

"Volcanic Activity occurs via vents that act as a conduit between the Earth's surface and inner layers, and erupt gas, molten rock, and volcanic ash when gas pressure and buoyancy drive molten rock upward and through zones of weakness in the Earth's crust."

1. Assessment Summary

There are 114 artwork sites where volcanic activity frequency was considered high (the 80th to 100th percentile for the state). That includes 73 sites in Clark County, 40 sites in Pierce County, and one site in Yakima County. 422 artworks are located in these high-risk sites representing 31.42% of the pilot collection. The average frequency of volcanic activity events per site was 0.0029 per year.

Table 27: Artwork sites with four or more artworks in areas with high volcanic activity frequency relative to the rest of the state

Artwork Site	County	Artwork Count	Volcanic Activity Annualized Frequency	State Volcanic Activity Frequency Percentile
Saltar's Point Elementary School	Pierce	4	0.00861	100%
Hilltop Heritage Middle School	Pierce	4	0.00768	100%
Bethel Middle School	Pierce	7	0.00627	99%
Bethel High School	Pierce	7	0.00627	99%
Centennial Elementary	Pierce	9	0.00627	99%
Pioneer Valley Elementary	Pierce	12	0.00627	98%
North Star Elementary	Pierce	9	0.00627	98%
Graham Elementary	Pierce	9	0.00627	98%
Kapowsin Elementary School	Pierce	7	0.00627	98%
Eatonville Middle School	Pierce	6	0.00627	98%
University of Washington - Pack Forest	Pierce	5	0.00627	98%
Sherman Elementary School	Pierce	4	0.00627	96%
Liberty Middle School	Pierce	5	0.00611	95%
Lake Shore Elementary	Clark	4	0.00467	94%
Lincoln Elementary	Clark	5	0.00459	94%
Amboy Middle School	Clark	5	0.00459	94%
Mountain View High School	Clark	6	0.00459	94%
Captain Strong Elementary School	Clark	18	0.00459	94%
Clark College	Clark	29	0.00459	93%
Laurin Middle School	Clark	4	0.00459	93%
Benjamin Franklin Elementary	Clark	5	0.00459	93%

Illahee Elementary School	Clark	6	0.00459	93%
Washington State School for the Blind	Clark	8	0.00459	93%
Harney Elementary	Clark	16	0.00459	93%
Prairie High School	Clark	12	0.00459	93%
Department of Licensing - Vancouver Branch	Clark	4	0.00459	87%
Washington Elementary School	Clark	8	0.00459	87%
Cascade Middle School	Clark	4	0.00459	87%
Daybreak Primary	Clark	4	0.00459	87%
River Homelink School	Clark	6	0.00459	87%
Pioneer Elementary	Clark	4	0.00459	87%
Yacolt Elementary	Clark	11	0.00459	87%
Harmony Elementary	Clark	5	0.00459	87%
Maple Grove School	Clark	10	0.00459	87%
Eleanor Roosevelt Elementary School	Clark	5	0.00459	87%
Washington State University - Vancouver	Clark	13	0.00459	87%
Hayes Freedom High School	Clark	19	0.00459	87%
Glacier View Junior High	Pierce	5	0.00457	86%
Discovery Elementary School	Pierce	5	0.00362	83%
Harbor Ridge Middle School	Pierce	7	0.00325	82%



Figure 23: Artworks with volcanic activity frequency

Overall, volcanic activity is a **moderate risk** to ArtsWA pilot collections. The percentage of the pilot collection located in high frequency areas is high at 31.42% and the average frequency of volcanic activity events per site is low at 0.00289 events per year. The repercussions of volcanic activity like fire and lahar would likely be almost entirely destructive to artworks located in affected sites. Recommendations are given to prevent damage caused by ash fallout.

- Consider volcanic activity exposure when placing artworks in areas with high frequency. Artworks that are most at risk to damage caused by volcanic ash are unframed works on paper and paintings, so consider framing and glazing artworks in high frequency areas to current ArtsWA standards.
- In the event of an ash event caused by volcanic activity, prioritize communication with sites that have a large number of artworks.

N. Wildfire

"A Wildfire is an unplanned fire burning in natural or wildland areas, such as forest, shrub lands, grasslands, or prairies."

1. Assessment Summary

Site Level

There are 60 artwork sites where wildfire frequency was considered high (the 80th to 100th percentile for the state). That includes 11 sites in Clark County, two sites in Grays Harbor County, 9 sites in Pierce County, 4 sites in Skagit County, 9 sites in Walla Walla County, and 25 sites in Yakima County. 221 artworks are located in these high-risk sites representing 16.46% of the pilot collection. The average frequency of a wildfire event per site was 0.000398 per year.

Table 28: Artwork sites with four or more artworks in areas with high wildfire frequency relative to the rest of the state

Artwork Sito	County	Artwork	Wildfire Annualized	State Wildfire
Artwork Site	County	Count	Frequency	Frequency Percentile
Mabton High School	Yakima	5	0.01288	99%
Artz-Fox Elementary School	Yakima	10	0.01288	99%
Cottonwood Elementary	Yakima	4	0.00823	97%
Highland High School	Yakima	9	0.00780	97%
McClure Elementary School	Yakima	4	0.00622	96%
Naches Valley Middle School	Yakima	14	0.00382	94%
Walla Walla Community College	Walla Walla	17	0.00132	90%
Simcoe Elementary	Yakima	15	0.00126	90%
Employment Security Department - Walla Walla Job Service Center	Walla Walla	8	0.00012	86%
Walla Walla Veterans Home	Walla Walla	7	0.00012	86%
Concrete School District	Skagit	5	0.00012	86%
Pioneer Elementary	Clark	4	0.00007	85%
University of Washington - Pack Forest	Pierce	5	0.00004	84%
Eatonville Middle School	Pierce	6	0.00004	84%
Foothills Elementary	Pierce	33	0.00002	82%
Elk Ridge Elementary	Pierce	7	0.00002	82%
Elma Elementary	Grays Harbor	6	0.00002	81%



Figure 24: Artworks with wildfire frequency

Artwork Level²⁰

There were 235 artworks with a high RIS for wildfire, which is 17% of the pilot collection. 307 artworks had a moderate RIS and 801 artworks had a low RIS. Of those artworks with a risk index rating of high, 23 were in Clark County, 12 were in Grays Harbor County, 50 were in Pierce County, 19 were in Skagit County, 40 were in Walla Walla County, and 91 were in Yakima County. The site with the most artworks with a risk index rating of high was Foothills Elementary in Pierce County, which had 20 artworks considered high risk. Walla Walla Community College had 17 artworks considered high risk.

Table 29: Artworks in with	wildfire RIS scores in the 9	98th percentile and above
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Artwork Title	Artist	Date	Primary Material	Artwork Site	RIS
		Ya	kima County		
Old Style Athabascan Beaded Men's Jacket Yoke""	Eunice Carney	1988	Textile/fiber/organic materials	Mabton High School	0.0258
Horse Heaven Hills""	Donald Barrie	1978	Painting - paint on fabric	Mabton High School	0.0258

²⁰ RIS were assigned based on the susceptibility of an artwork to damage caused by contact with wildfire ash and fallout. The damage caused by direct contact with wildfire is so destructive that assigning RIS to individual artworks is not informative as destruction would be near complete for all except some metal artworks. See Appendix I for more information.

Fall Chair""	Julie Paschkis	1991	Painting - paint on rigid surface/mixed media	Artz-Fox Elementary School	0.0193
			Painting - paint on rigid	Artz-Fox Elementary	
St. George and the Dragon""	Ron Hinson	1988	surface/mixed media	School	0.0193
	Alfredo				
Gatito""	Arreguin	1993	Painting - paint on fabric	Cottonwood Elementary	0.0165
Anne Frank""	Dale Gottlieb	2000	Textlie/fiber/organic	Highland High School	0.0156
	Least Feelew	1000	Deinting againt on fabric		0.0150
The Aqueduct	Janet Essley	1999	Painting - paint on fabric	Artz-Eox Elementary	0.0156
Nightwatcher""	Bet Borgeson	1991	Work on paper - drawing	School	0.0147
			Painting - paint on rigid		
Mural of Mt. Adams""	Donald Barrie	1979	surface/mixed media	White Swan High School	0.0140
Alphabet of a Sympathetic			Work on paper -	Artz-Fox Elementary	
Dialect""	Ken Spiering	2000	photograph	School	0.0129
Skagit Valley Tulips""	Mindi Katzman	1990	Painting - paint on fabric	Mabton High School	0.0129
N 0 1		1004		Artz-Fox Elementary	0.0400
Young Goat""	Bet Borgeson	1991	Work on paper - drawing	School Artz Fox Flomontany	0.0129
Lavered Mountains""	Sam Kimura	1986	nhotograph	School	0.0129
	Heidi	1500	priotograph	Artz-Fox Elementary	0.0125
YelLowstone Fire""	Oberheide	1990	Work on paper - painting	School	0.0129
				Artz-Fox Elementary	
Long Lost Beauty""	Lucy Liu	1982	Work on paper - painting	School	0.0129
"Noar Almira W/A"	Dick Carvov	1000	Work on paper -	Mahtan High School	0.0120
Nedr Alffilia, WA	Ludith Poyson	1988	Tevtile/fiber/organic	McClure Elementary	0.0129
In Restauro I'''	Fawkes	1996	materials	School	0.0124
	Kathleen		Painting - paint on rigid		
Passage in Stone""	Caprario	2000	surface/mixed media	Highland High School	0.0117
				Yakima National Guard	
	William	2004	Deinting agint on febrie	Armory and Readiness	0.0000
	Brennen	2004	Sculpture - electrical or	Artz-Eox Elementary	0.0099
Untitled""	Nanci Pitkethly	1991	mechanical components	School	0.0097
	,		Painting - paint on rigid	McClure Elementary	
Night Garden""	Elissa Greisz	1991	surface/mixed media	School	0.0093
Open Air: 3:30 AM""	Nanci Pitkethly	1991	Sculpture - wood	Mabton High School	0.0086
				Selah Intermediate	
Selah Valley Mural""	John Killmaster	1979	Painting - paint on fabric	School	0.0086
The Codependent and the	Dhil Brazoou	1001	Work on paper painting	Cottonwood Elementary	0.0092
	Filli DiaZedu	1991			0.0082
Cateteria #2""	Gu Xiong	1993	Work on paper - print	Cottonwood Elementary	0.0082



Figure 25: Artworks with wildfire risk index ratings

Overall, wildfire is **moderate risk** to ArtsWA collections. The percentage of the collection with high RIS is moderate at 20% and the average frequency of wildfire events per artwork site is low at 0.0004 annually. The effects of poor air quality, soot, and ash, which this risk assessment addresses, can cover geographic areas that are likely larger than what is expressed in the NRI data. There are steps that ArtsWA can take to reduce the risk of damage to artworks caused by wildfire:

- Consider wildfire exposure when placing artworks in areas with high frequency. Artworks most susceptible to damage caused by wildfire-driven poor air quality are unframed and glazed works on paper, textiles and paintings on canvas or exterior uncoated metal or mixed media sculpture.
- Prioritize condition checks for high RIS artworks and consider resilience boosting measures like addressing condition issues and, where appropriate, framing artworks to current ArtsWA standards.
- In the event of a wildfire in Yakima County, prioritize contact with Simcoe Elementary, which has 15 high RIS artworks and Naches Valley Middle School, which has 14 high RIS artworks.
- In the event of a wildfire in Pierce County, prioritize contact with Foothills Elementary, which has 20 high RIS artworks and Elk Ridge Elementary, which has 7 high RIS artworks.
- In the event of a wildfire in Walla Walla County, prioritize contact with Walla Walla Community College, which has 17 high RIS artworks and the Walla Walla Job Service Center, which has 8 high RIS artworks.
- In the event of a wildfire in Clark County, prioritize contact with Pioneer Elementary and Amboy Middle Schools which both have 4 high RIS artworks.

- In the event of a wildfire in Skagit County, prioritize contact with Harriet Rowe Elementary and the Concrete School District, which both have 5 high RIS artworks.
- In the event of a wildfire in Grays Harbor County, prioritize communication with Elma Elementary, which has 6 high RIS artworks.

O. Winter Storm

"Winter Weather consists of winter storm events in which the main types of precipitation are snow, sleet, or freezing rain."

1. Assessment Summary

There are 76 artwork sites where winter storm frequency was considered high (in the 80th to 100th percentile for the state). 63 sites in Yakima County, 5 sites in Skagit County, 4 sites in Pierce County, three sites in Clark County, and one site in Grays Harbor County. 293 Artworks are located in these high-risk sites representing 21.81% of the pilot collection. The average frequency of winter storm events per site was 2.06 per year.

Table 30: Artwork sites with four or more artworks in areas with high winter storm frequency relative to the rest of the state

Artwork Site	County	Artwork Count	Winter Storm Annualized Frequency	State Winter Storm Frequency Percentile
Concrete School District	Skagit	5	19.56	100%
Eatonville Middle School	Pierce	6	13.84	99%
University of Washington - Pack Forest	Pierce	5	13.84	99%
Highland High School	Yakima	9	6.94	96%
Kapowsin Elementary School	Pierce	7	5.97	95%
Amboy Middle School	Clark	5	4.21	86%
Mabton High School	Yakima	5	4.08	85%
Artz-Fox Elementary School	Yakima	10	3.81	85%
Naches Valley Middle School	Yakima	14	3.81	85%
Adams Elementary School	Yakima	4	3.03	83%
Discovery Lab School	Yakima	6	3.03	83%
Washington Middle School	Yakima	18	3.03	83%
Franklin Middle School	Yakima	7	3.03	83%
Martin Luther King Jr. Elementary	Yakima	9	3.03	83%
Roosevelt Elementary School, Yakima	Yakima	5	3.03	83%
Toppenish Middle School	Yakima	5	3.03	83%
Yakima Valley College	Yakima	14	3.03	83%
Simcoe Elementary	Yakima	15	3.03	82%
Ridgeview Elementary	Yakima	26	3.03	82%
Grandview Middle School	Yakima	5	3.03	82%
Whitney Elementary	Yakima	6	3.03	82%

Cottonwood Elementary	Yakima	4	3.03	82%
McClure Elementary School	Yakima	5	3.03	82%
Wilson Middle School	Yakima	4	3.03	82%
Yakima Valley College -	Yakima	5		82%
Grandview			3.03	
Sunnyside High School	Yakima	6	3.03	82%
Washington Elementary	Yakima	4	3.03	82%
Harrison Middle School	Yakima	5	3.03	82%



Figure 26: Artworks with winter storm frequency

Overall, winter storm is a **moderate risk** to ArtsWA pilot collections. The percentage of the pilot collection located in high frequency areas is moderate at 21.81% and the average frequency of winter weather events per site is very high at 20.56 events per year. That said, the impact of a winter storm on collections is low when compared to other hazards. There are steps that ArtsWA can take to reduce the risk of damage to artworks caused by winter storm:

• Consider winter storm exposure when placing artworks in areas with high frequency. Artworks most susceptible to damage caused by winter storm are exterior, so consider material when installing outdoor sculpture and ensure that the surrounding area is free of overhanding branches and brush, which can become heavy with snow/ice and fall.

• In the event of a winter storm, prioritize affected sites that have exterior artworks, followed by sites with high numbers of artworks.

V. Conclusion

Following the completion of the risk assessment, the project team drew conclusions about the risks to pilot artworks and synthesized high-priority actions for mitigation and response. The following sections outline these recommendations.

A. Ranked Hazards

Following the completion of the Hazard Profiles, the project team ranked the 14 hazards based on a scale of Low, Moderate, and High risk to pilot counties. Rankings are based on data from the site level and artwork level risk assessments including the average frequency of event per site, percentage of the collection located in high-risk areas, and the potential for an event to severely damage an artwork. Overall, Earthquake was found to be a Moderate/High risk and Coastal Flooding, Ice Storm, Riverine Flooding, Tsunami, Volcanic Activity, Wildfire, and Winter Storm were found to be Moderate risks to collections included in the pilot study.

Hazard	Risk
Avalanche	Low
Coastal Flooding	Moderate
Earthquake	Moderate/High
Hail	Low
Ice Storm	Moderate
Landslide	Low
Lightning	Low
Riverine Flooding	Moderate
Strong Wind	Low
Tornado	Low
Tsunami	Moderate
Volcanic Activity	Moderate
Wildfire	Moderate
Winter Storm	Moderate

Table 31: Relative risk of natural hazards to Washington's State Art Collection

In addition to ranking the hazards overall, the project team also synthesized hazard-specific recommendations into a list of high priority recommendations for risk mitigation and immediate response. The following recommendations represent the steps most likely to prevent and/or mitigate damage to pilot Washington State Art Collections based on the formal risk assessment.

B. Mitigation

Mitigation is the act of reducing the severity of an event like a natural hazard. There are recommendations for steps toward hazard mitigation included in the *recommendations* section of each Hazard Profile. In addition to those hazard-specific steps, some high-priority actions are included in this section.

1. Engineering Assessment

Earthquake was the highest risk to pilot Washington collections of the 14 hazards analyzed. Large (nonportable) sculptures that were not engineered had some of the highest Earthquake RIS scores of all pilot artworks. The following is a list of non-portable sculptures with no record of engineering that are in the

top 90th percentile of RIS scores for earthquake. These 31 artworks should be considered for checks by engineers within the next 1-5 years.

ID	Title	Artist	Date	Site	Earthquake RIS Score
WSAC2006.007.002A- B	Join Together""	Sonja Blomdahl	2007	Thompson Elementary	0.997
WSAC2007.018.002A- E	Crossroads""	Richard C. Elliott	2007	Jefferson Elementary School	0.994
WSAC1983.192.001	Tools for School""	Joyce Moty	1984	Discovery Elementary School	0.989
WSAC1983.192.002	Tools for School""	Joyce Moty	1984	Discovery Elementary School	0.989
WSAC1983.192.003	Tools for School""	Joyce Moty	1984	Discovery Elementary School	0.989
WSAC1983.192.004	Tools for School""	Joyce Moty	1984	Discovery Elementary School	0.989
WSAC2020.038.000	Fly Away""	Guy Kemper	2022	Pierce College - Fort Steilacoom	0.988
WSAC1988.038.00A-B	Breakthrough""	Richard Corrin	1988	Point Defiance Elementary	0.985
WSAC1989.003.000	Dinosaur""	Betz Bernhard	1989	Reed Elementary	0.979
WSAC1998.005.000	Vertical Penduling with Patty Quake""	Dan Senn	1999	University of Washington - Tacoma	0.979
WSAC1986.073.000	Power to Move""	Maxine Martell	1987	Clover Park High School	0.978
WSAC2006.007.003A- B	Join Together""	Sonja Blomdahl	2007	Thompson Elementary	0.975
WSAC2006.007.004A- B	Join Together""	Sonja Blomdahl	2007	Thompson Elementary	0.975
WSAC1993.165.000	Zukunft""	Liz Mapelli	1994	Sumner High School	0.968
WSAC2001.056.001	Migration I""	Ralph Helmick and Stuart Schechter	2003	Stafford Creek Corrections Center	0.958
WSAC2004.003.001- 003	Rhythms""	Marvin Rosenberg and Lilli Ann Killen Rosenberg	2004	Midland Elementary	0.956
WSAC2008.025.000	Parlour Fan Quilt""	Ross Palmer Beecher	2010	Pioneer Middle School	0.956
WSAC1999.080.000	Circumnavigating the Century""	Jack Archibald	2001	Clover Park Technical College - South Hill	0.946
WSAC1993.143.000	Quixote's Comet""	Jack Archibald	1995	Washington State Patrol - District I Headquarters, Tacoma	0.945
WSAC2012.014.000	"Core"	Lanny Bergner	2006	Northwest Career and Technical Academy	0.943
WSAC2012.015.000	"SOS"	Lanny Bergner	2010	Northwest Career and Technical Academy	0.943
WSAC2012.016.000	"Fruit Full"	Lanny Bergner	2007	Northwest Career and Technical Academy	0.943
WSAC2003.051.00A-P	Alluvial Benchmarks""	Pam Beyette	2003	White River High School	0.942
WSAC2012.012.000	"Constellation Maker"	Lanny Bergner	2012	Northwest Career and Technical Academy	0.931
WSAC1989.069.000	Fawcett School Animal Mural""	Gordon Bryan	1990	Fawcett Elementary School	0.925

Table 32: Non-portable sculptures with no record of engineering in the top 90th percentile of RIS scores for earthquake

WSAC2001.056.002	Migration II""	Ralph Helmick and Stuart Schechter	2003	Stafford Creek Corrections Center	0.916
WSAC2017.028.000	Nature Provides""	Amy Cheng	2020	Western State Hospital	0.915
WSAC2004.011.000	The Island""	Jerry Mayer	2005	McNeil Island Special Commitment Center	0.906
WSAC2002.024.00A-D	"The Four Elements (Earth, Water, Fire, and Air)"	Steve Gardner	2003	University of Washington - Tacoma	0.901
WSAC1999.074.000	Garden of Meditation""	Haiying Wu	2002	Western State Hospital	0.9
WSAC2012.013.000	"Inside and Outside"	Lanny Bergner	2006	Northwest Career and Technical Academy	0.9

2. Condition Checks

The artwork-level risk assessment takes into account the resilience of a particular artwork based on factors related to its material composition, location, how it was mounted/framed, its condition, and in some cases, whether it was checked by an engineer. While the factors contributing to the resilience of each artwork differed depending on the hazard being assessed, all four of the artwork-level assessments included "condition" as a resilience factor²¹. The following is a list of artworks with last known condition ratings of missing, poor, fair, or damaged that in the top 90th percentile of combined RIS rating.²² These artworks should be prioritized for condition checks in the next 1-5 years.

Table 33: Artworks in poor, fair, damaged, or missing condition in the 90th percentile and above of combined RIS scores for Coastal Flooding, Earthquake, Riverine Flooding, and Wildfire

ID	Title	Artist	Date	Primary Material	Site	
Clark County						
WSAC1976.002.000	Mountain Scene""	Al Uskoski	1976	Sculpture - wood	Hockinson Heights Primary	
WSAC1995.474.001	PENTA-HOUSE""	Vicki Scuri	1997	Sculpture - wood	Fisher's Landing Elementary	
WSAC1996.021.000	Sticks and Stones: River of Change""	Ken Spiering	1998	Sculpture - coated metals	Frontier Middle School	
WSAC1996.070.000	Purple Basket""	Dona Anderson	1996	Textile/fiber/organic materials	Yacolt Elementary	
WSAC1996.247.000	Ice""	Linda Kraus- Perez	1995	Painting - paint on fabric	Yacolt Elementary	
WSAC2002.080.000	Untitled""	Ron Hinson	2002	Painting - paint on fabric	Benjamin Franklin Elementary	
WSAC2009.014.00A -D	Re-Union""	Jim Hirschfield and Sonya Ishii	2010	Sculpture - kinetic, passive or human- operated	Union High School	

²¹ The condition of the artworks captured by the database is a simple rating most often given by non-ArtsWA on-site examiners in regular inventories of the collection

²² The combined RIS rating is the sum of RIS ranks of coastal flooding, earthquake, riverine flooding, and wildfire

WSAC2010.007.00A -K	Just Let Looking Look""	Kim Brown	2011	Sculpture - glass	Helen Baller Elementary
		Grays H	arbor Count	ý	·
WSAC1986.013.000	It Was Further Than I Thought""	Leland Standley	1983-85	Painting - paint on fabric	Oakville High School
WSAC1996.282.000	Years of Corn I""	Rachel Brumer	1995	Textile/fiber/organic materials	Oakville High School
WSAC2002.001.001	Hoquiam Beacon""	Cork Marcheschi	2003	Sculpture - electrical or mechanical components	City of Hoquiam
WSAC2002.001.002	The Dory (Rapture of the Deep)""	Cork Marcheschi	2003	Sculpture - electrical or mechanical components	City of Hoquiam
WSAC2005.016.00A -B	Out Where Grays Harbor Meets the Pacific; Upriver Grays Harbor""	Mike DeVoe	2006	Sculpture - wood	Grays Harbor College
		Pier	ce County		
WSAC1980.041.000	Untitled""	Bill Rades	1976	Painting - paint on fabric	Governor John Rogers High School
WSAC1983.192.001	Tools for School""	Joyce Moty	1984	Sculpture - concrete	Discovery Elementary School
WSAC1983.192.002	Tools for School""	Joyce Moty	1984	Sculpture - concrete	Discovery Elementary School
WSAC1983.192.003	Tools for School""	Joyce Moty	1984	Sculpture - concrete	Discovery Elementary School
WSAC1983.192.004	Tools for School""	Joyce Moty	1984	Sculpture - concrete	Discovery Elementary School
WSAC1988.037.000	Untitled""	Ross Palmer Beecher	1988-89	Painting - paint on rigid surface/mixed media	DeLong Elementary School
WSAC1989.005.00A -D	A Spirit of Place''''	Peggy Hitchcock	1988-89	Painting - paint on rigid surface/mixed media	Roosevelt Elementary School
WSAC1990.247.000	Futz the Great""	Fred Sodt	1989	Painting - paint on rigid surface/mixed media	Foothills Elementary
WSAC1991.084.000	Going to the Water""	Stuart Nakamura	1988	Painting - paint on rigid surface/mixed media	Voyager Elementary
WSAC1991.131.000	Horizon""	Michael Brophy	1991	Painting - paint on fabric	Centennial Elementary
WSAC1992.073.000	There/Now""	Layne Goldsmith	1987	Textile/fiber/organic materials	Drum Intermediate School
WSAC1993.034.000	Currents""	Stephen Yates	1992	Painting - paint on fabric	Idlewild Elementary School
WSAC2002.160.000	Marica""	Alfredo Arreguín	2001	Painting - paint on fabric	Hilltop Heritage Middle School
		Yakir	ma County		
WSAC2000.012.000	15-7-20""	Richard C. Elliott	2000	Sculpture - plastics/acrylics/poly esters	McClure Elementary School

C. Immediate Response Procedures

Immediate response procedures are the first steps ArtsWA staff should take upon learning of a natural hazard event in the state that may have affected collections. The goal for these immediate response steps is to get timely information on all damaged artworks. Hazard events included in these procedures are those that were determined to be moderate to high risk to Washington's State Art Collections. *Site contact information will need to be filled in by ArtsWA staff.*

- 1. Coastal Flooding
- In the event of coastal flooding in Greys Harbor County:
 - Contact **Grays Harbor College** for artwork condition checks. There are 8 artworks with high RIS scores at this location.
 - Contact **Montesano Junior-Senior High School** for artworks condition checks. There are 4 artworks with high RIS scores at this location.
 - Contact **Robert Gray Elementary School**, the **City of Hoquiam**, and **Oakville High School** for artwork condition checks. There are 2 artworks with high RIS scores at this location.
- In the event of coastal flooding in Pierce County:
 - Contact **Voyager Elementary** for artwork condition checks. There is one artwork with a high RIS score at this location.
- In the event of coastal flooding in Skagit County:
 - Contact **Conway School** for artwork condition checks. There is one artwork with a high RIS score at this location.

Site	Contact Name	Phone	Email		
Grays Harbor County					
Grays Harbor College					
Montesano Junior-Senior High					
School					
Robert Gray Elementary School					
City of Hoquiam					
Oakville High School					
	Pierce County				
Voyager Elementary					
Skagit County					
Conway School					

Contact Information

2. Earthquake

- In the event of an earthquake that affects the Cascadia subduction zone:
 - Contact **Tacoma Community College** for artwork condition checks. There are 16 artworks with high RIS scores at this location.
 - Contact **Foothills Elementary** for artwork condition checks. There are 13 artworks with high RIS scores at this location.

- Contact **Spanaway Lake High School** for condition checks. There are 9 artworks with high RIS scores at this location.
- Contact **Centennial Elementary School** for condition checks. There are 6 artworks with high RIS scores at this location.

Site	Contact Name	Phone	Email
Tacoma Community College			
Foothills Elementary School			
Spanaway Lake High School			
Centennial Elementary School			

- 3. Ice Storm
- In the event of a heavy ice storm affecting Clark County:
 - Contact **Washington State School for the Blind** for artwork condition checks. This location is in a high ice storm frequency area and has 6 exterior artworks.
 - Contact **Evergreen High School** for artwork condition checks. This location is in a high ice storm frequency area and has 3 exterior artworks.
- In the event of a heavy ice storm affecting Pierce County:
 - Contact **Discovery Elementary School**. This location is in a high ice storm frequency area and has 4 exterior artworks.
- In the event of a heavy ice storm affecting Walla Walla County:
 - Contact **Walla Walla Veterans Home** for artwork condition checks. This location is in a high ice storm frequency area and has 2 exterior artworks.

Site	Contact Name	Phone	Email
Clark County			
Washington State School for			
the Blind			
Evergreen High School			
Pierce County			
Discovery Elementary School			
Walla Walla County			
Walla Walla Veterans Home			

Contact Information

- 4. Riverine Flooding
- In the event of riverine flooding in Clark County:
 - Contact **Hayes Freedom High School** for artwork condition checks. There are 19 artworks with high RIS scores at this location.
 - Contact **Captain Strong Elementary School** for artwork condition checks. There are 17 artworks with high RIS scores at this location.

- Contact **Prairie High School** and **Yacolt Elementary School** for artwork condition checks. There are 10 artworks with high RIS scores at each of these locations.
- In the event of riverine flooding in Yakima County:
 - Contact **Simcoe Elementary** for artwork condition checks. There are 15 artworks with high RIS scores at this location.
 - Contact **Naches Valley Middle School** for artwork condition checks. There are 14 artworks with high RIS scores at this location.
 - Contact **Artz-Fox Elementary School** for artwork condition checks. There are 10 artworks with high RIS scores at this location.
- In the event of riverine flooding in Walla Walla County:
 - Contact **Walla Walla Community College** for artwork condition checks. There are 10 artworks with high RIS scores in this location.
 - Contact the **Walla Walla Job Service Center** for artwork condition checks. There are 8 artworks with high RIS scores at this location.
- In the event of riverine flooding affecting Skagit County:
 - Contact **Harriet Rowley Elementary** for artwork condition checks. There are 5 artworks with high RIS scores at this location.

Site	Contact Name	Phone	Email		
	Clark County				
Hayes Freedom High School					
Captain Strong Elementary					
School					
Prairie High School					
Yacolt Elementary					
Yakima County					
Simcoe Elementary					
Naches Valley Middle School					
Artz-Fox Elementary School					
Walla Walla County					
Walla Walla Community College					
Walla Walla Job Service Center					
Skagit					
Harriet Rowley Elementary					

5. Tsunami

- Contact the **University of Washington Tacoma** for artwork condition checks. This location is in a high tsunami frequency area and has 38 artworks.
- Contact the **Court of Appeals, Division II** for artwork condition checks. This location is in a high tsunami frequency area and has 17 artworks.

Contact Information

Site	Contact Name	Phone	Email
University of Washington –			
Tacoma			
Court of Appeals Division II			

- 6. Volcanic Activity
- Contact **Clark College** for artwork condition checks. This location is in a high volcanic activity frequency area and has 29 artworks.
- Contact **Hayes Freedom High School** for artwork condition checks. This location is in a high volcanic activity frequency area and has 19 artworks.
- Contact **Captain Strong Elementary School** for artwork condition checks. This location is in a high volcanic activity frequency area and has 18 artworks.
- Contact **Harney Elementary** for artwork condition checks. This location is in a high volcanic activity frequency area and has 16 artworks.

Site	Contact Name	Phone	Email
Clark College			
Hayes Freedom High School			
Captain Strong Elementary			
School			
Harney Elementary			

7. Wildfire

- In the event of a wildfire affecting Yakima County:
 - Contact **Simcoe Elementary** for artwork condition checks. There are 15 artworks with high RIS scores in this location.
 - Contact **Naches Valley Middle School** for artwork condition checks. There are 14 artworks with high RIS scores in this location.
 - Contact **Artz-Fox Elementary School** for artwork condition checks. Ther are 10 artworks with high RIS scores in this location.
- In the event of a wildfire affecting Pierce County:
 - Contact **Foothills Elementary** for artwork condition checks. There are 20 artworks with high RIS scores at this location.
 - Contact **Elk Ridge Elementary** for artwork condition checks. There are 7 artworks with high RIS scores in this location.
- In the event of a wildfire affecting Walla Walla County:
 - Contact Walla Walla Community College for artwork condition checks. There are 17 artworks with high RIS scores in this location.
 - Contact the **Walla Walla Job Service Center** for artwork condition checks. There are 8 artworks with high RIS scores in this location.
- In the event of a wildfire affecting Clark County:

- Contact **Pioneer Elementary** and **Amboy Middle School** for artwork condition checks. There are 4 artworks with high RIS scores at each of these locations.
- In the event of a wildfire affecting Skagit County:
 - Contact **Harriet Rowley Elementary** and **Concrete School District** for artwork condition checks. There are 5 artworks with high RIS scores in each of these locations.
- In the event of a wildfire affecting Grays Harbor County:
 - Contact **Elma Elementary** for artwork condition checks. There are 6 artworks with high RIS scores at this location.

Site	Contact Name	Phone	Email	
Yakima County				
Simcoe Elementary				
Naches Valley Middle School				
Artz-Fox Elementary				
	Pierce	County		
Foothills Elementary				
Elk Ridge Elementary				
Walla Walla County				
Walla Walla Community College				
Walla Walla Job Service Center				
	Clark C	County		
Pioneer Elementary				
Amboy Middle School				
Skagit County				
Harriet Rowley Elementary				
Concrete School District				
Grays Harbor County				
Elma Elementary				

- 8. Winter Storm
- In the event of a serious winter storm in Yakima County:
 - Contact **Yakima County College** for artwork condition checks. This location is in an area with high winter storm frequency and has 6 exterior artworks.
 - Contact **Sunnyside High School** for artwork condition checks. This location is in an area with high winter storm frequency and has 4 exterior artworks.
- In the event of a serious winter storm in Clark County:
 - Contact Jemtegaard Middle School and Comumbia River Gorge Elementary for artwork condition checks. This location is in a high winter storm frequency area and has 2 exterior artworks.

Contact Information

Site	Contact Name	Phone	Email
Yakima County			
Yakima Valley College			
Sunnyside High School			
Clark County			
Jemtegaard Middle School and			
Columbia River Gorge			
Elementary			

Appendix I: Risk Assessment Technical Information

A. Methodology

The first step in the assessment was the translation of collections data from the database to a map that connected artwork data to a point on a map (in ArcGIS this is referred to as a feature layer). To create a feature layer in ArcGIS, collections data including geographic coordinates was downloaded from the collections management system as a .csv file and then uploaded into ArcGIS Online.

A map that included the artworks feature layer was layered with the National Risk Index Census Tracts feature layer²³, which contains the full range of data for the 18 hazards included in the NRI. The two datasets were combined using the ArcGIS Online Join Feature by spatial relationship, which resulted in a dataset that linked NRI data to each artwork in the pilot analysis based on the census tract that the artwork was located in. This combined dataset was used to carry out both **site level** and **artwork level** assessments.

1. Site Level Assessment

Site level assessment was performed for each of the 14 hazards common in Washington State. The purpose of the site assessment was to identify sites at high *relative* risk of a hazard event based on annualized frequency compared to the rest of the state. For this level of assessment, artwork sites located in census tracts with annualized frequencies that were in the 80th to 100th percentile for the state were identified for each hazard. A map of artworks color coded by state annual frequency percentile was layered with the corresponding annual frequency polygon map from the NRI.

In addition to the map, a table was included that displays sites located in census tracts with high annualized frequencies that contain four or more artworks, which is the average number of artworks per site. For hazards with few sites located in high frequency areas, all sites are included in the table regardless of artwork count.

2. Artwork Level Assessment

For artwork level assessments, each artwork was assigned a hazard-specific Risk Index Score derived from a variation of this simplified equation:

Risk = Likelihood x Consequence

This generalized equation is used by the National Risk Index to assign their measure of Risk Index Values to each census tract. In the NRI Risk Index Values equation, "Likelihood" is based on the annualized frequency of an event (or how many events will occur in one year) and "Consequence" is based on several factors including social vulnerability, community resilience, building exposure, and historic loss. The NRI Risk Index Values equation is designed to be a helpful measure for those working in emergency management on the state, local, and even community levels. *The equation doesn't, however, speak directly to the potential effects of hazards on artworks.*

²³ FEMA National Risk Index, "National Risk Index Census Tracts."

In the equation developed for *this* artwork-specific assessment, "Likelihood" was based on the annualized frequency of the event (from the NRI data) and "Consequence" was a ratio of the vulnerability of an artwork's primary material and resilience factors that made the artwork less vulnerable. Resilience factors were derived from the collections database and included things like whether the artwork was located indoors or outdoors, whether it was framed, etc. The general equation developed to generate risk index scores follows:

Risk Index Score = hazard frequency x material vulnerability x $\frac{1}{resilience}$

Material vulnerability and resilience factors differed depending on the hazard, but in general, each artwork was assigned a material vulnerability score between 1-4, a resilience score between 1-5, and a hazard frequency score that was equal to the annualized frequency of the hazard as reported in the NRI.

The *material vulnerability score* was assigned based on the artwork's primary material, where 4 corresponded to a material highly vulnerable to the hazard, 3 was moderately vulnerable, 2 was vulnerable, and 1 indicated a material that was not considered vulnerable. The *resilience score* was additive with scores between 1-5. Artworks received resilience score points based on things like a record of engineering or location in a low-risk site type like a college.

Artworks were split into two groups for analysis:

- Sculptures
- Works on paper, paintings, and textiles

The purpose of the split was to allow for more accurate resilience calculations. For example, whether an object is framed and glazed will affect the resilience of a work on paper, painting, or textile, but is not relevant to a sculpture.

A preliminary version of the equation was updated based on observations made during a March 2023 visit to 13 artwork sites. During this visit, the project conservator compared the remote risk evaluation to an in-person evaluation and adjusted several of the resilience criteria.

Note that there may be specific artworks whose vulnerability and resilience is not accurately represented by the catalog information used for this risk assessment, or that cannot be separated out from other less vulnerable materials due to the way that information is recorded. Remote risk assessment will always be subject to error and, as in all risk assessments, should be considered an estimation only.

Artworks with RIS in the 80th to 100th percentiles for the pilot collection were included in tables in this report. In addition to those tables, pilot artworks were mapped and color coded based on RIS percentile and layered with the corresponding annual frequency polygon map from the NRI. Those maps were then integrated into an ArcGIS Dashboard which allows users to view not only the map, but also tables of relevant artwork data and an embedded view of the My Public Art Portal, ArtsWA's public-facing, online searchable database.

The following sections include material vulnerability and resilience specifications for the four hazards for which artwork level assessment was performed.

a. Coastal Flooding RIS Specifications

Material Vulnerability and Resilience Scores were assigned based on the susceptibility of an artwork to damage caused by contact with liquid water or the humidity associated with standing water. Complications associated with coastal flooding like physical forces, contaminants, etc. were not considered in this assessment.

Material Vulnerability Scores were assigned using the following values, where 4 equates to higher vulnerability and 1 indicates a material that is not particularly vulnerable:

Material Category	Material Vulnerability Score
Sculpture - electrical or mechanical components	4
Work on paper - painting	4
Textile/fiber/organic materials	4
Work on paper - collaged or cut paper	4
Painting - paint on rigid surface/mixed media	3
Sculpture - landscapes	3
Painting - paint on fabric	3
Work on paper - photograph	3
Work on paper - print	3
Work on paper - drawing	3
Sculpture - kinetic, passive or human-operated	2
Sculpture - mixed media	2
Sculpture - wood	2
Sculpture - uncoated ferrous metals	2
Sculpture - glass	1
Sculpture - concrete	1
Sculpture - stone/ceramics/terracotta	1
Sculpture - plastics/acrylics/polyesters	1
Sculpture - coated metals	1
Sculpture - other metals	1

Resilience scores were assigned based on the following equations:

Sculpture:

Condition	Resilience Points
Artworks start with one point to prevent a zero in the denominator of the RIS equation	1
Artwork <i>is</i> interior	1
Artwork is not ground installed	1
Artwork is not located in a Public School	1
Artwork does not have a secondary material listed (mixed media)	0.5
Artwork is in good condition	0.5
Possible Total	5

Works on paper, textiles, paintings:

Condition	Resilience Points
Artworks start with one point to prevent a zero in the denominator of the RIS equation	1
Artwork is not located in a Public School	1
Artwork does not have a secondary material listed (mixed media)	1
Artwork is glazed with UV filtered acrylic glazing (current ArtsWA standard)	1
Artwork is in good condition	1
Possible Total	5

b. Earthquake RIS Specifications

Material Vulnerability and Resilience Scores were assigned based on the susceptibility of an artwork to damage caused by physical forces associated with *at least* minor shaking. Complications associated with earthquake damage including power outage, flooding, etc. were not considered in this assessment.

Material Vulnerability Scores were assigned using the following values:

Material Category	Material Vulnerability Score
Sculpture - electrical or mechanical components	4
Sculpture - kinetic, passive or human-operated	4
Sculpture - glass	4
Sculpture - concrete	3
Sculpture - stone/ceramics/terracotta	3
Sculpture - mixed media	3
Sculpture - plastics/acrylics/polyesters	3
Painting - paint on rigid surface/mixed media	2
Sculpture - wood	2
Sculpture - uncoated ferrous metals	2
Sculpture - coated metals	2
Sculpture - landscapes	2
Sculpture - other metals	2
Painting - paint on fabric	1
Work on paper - photograph	1
Work on paper - painting	1
Textile/fiber/organic materials	1
Work on paper - print	1
Work on paper - collaged or cut paper	1
Work on paper - drawing	1

Resilience scores were assigned based on the sum of resilience points assigned for the following conditions:

Sculpture:

Condition	Resilience Points
Artworks start with one point to prevent a zero in the denominator of the RIS equation	1
Artwork is engineered	1
Artwork <i>is not</i> suspended	1
---	-----
Artwork is not located in a Public School	1
Artwork is exterior	0.5
Artwork is in good condition	0.5
Possible Total	5

Works on paper, textiles, paintings:

Condition	Resilience Points
All artworks start with one point to prevent a zero in the denominator of the RIS equation	1
Artwork is framed	1
Artwork is not glazed with glass or unknown glazing	1
Artwork is not located in a Public School	1
Artwork is glazed with UV filtered acrylic glazing (current ArtsWA standard)	0.5
Artwork is in good condition	0.5
Possible Total	5

c. Riverine Flooding RIS Specifications

Material Vulnerability and Resilience Scores were assigned based on the susceptibility of an artwork to damage caused by contact with liquid water or the humidity associated with standing water. Complications associated with riverine flooding like physical forces, contaminants, etc. were not considered in this assessment.

Material Vulnerability Scores were the same as those for Coastal Flooding and were assigned using the following values:

Material Category	Material Vulnerability Score		
Sculpture - electrical or mechanical components	4		
Work on paper - painting	4		
Textile/fiber/organic materials	4		
Work on paper - collaged or cut paper	4		
Painting - paint on rigid surface/mixed media	3		
Sculpture - landscapes	3		
Painting - paint on fabric	3		
Work on paper - photograph	3		
Work on paper - print	3		
Work on paper - drawing	3		
Sculpture - kinetic, passive or human-operated	2		
Sculpture - mixed media	2		
Sculpture - wood	2		
Sculpture - uncoated ferrous metals	2		
Sculpture - glass	1		
Sculpture - concrete	1		
Sculpture - stone/ceramics/terracotta	1		
Sculpture - plastics/acrylics/polyesters	1		

Sculpture - coated metals	1
Sculpture - other metals	1

Resilience scores were the same as for Coastal Flooding and assigned based on the following equations:

Sculpture:

Condition	Resilience Points
Artworks start with one point to prevent a zero in the denominator of the RIS equation	1
Artwork <i>is</i> interior	1
Artwork is not ground installed	1
Artwork is not located in a Public School	1
Artwork does not have a secondary material listed (mixed media)	0.5
Artwork is in good condition	0.5
Possible Total	5

Works on paper, textiles, paintings:

Condition	Resilience Points
Artworks start with one point to prevent a zero in the denominator of the RIS equation	1
Artwork is not located in a Public School	1
Artwork does not have a secondary material listed (mixed media)	1
Artwork is glazed with UV filtered acrylic glazing (current ArtsWA standard)	1
Artwork is in good condition	1
Possible Total	5

d. Wildfire RIS Specifications

Material Vulnerability and Resilience Scores were assigned based on the susceptibility of an artwork to damage caused by contact with wildfire ash and fallout. The damage caused by direct contact with wildfire is so destructive that assigning RIS to individual artworks is not informative as destruction would be near complete for all except some metal artworks.

Material Vulnerability Scores were assigned using the following values:

Material Category	Material Vulnerability Score		
Painting - paint on fabric	4		
Work on paper - photograph	4		
Work on paper - painting	4		
Textile/fiber/organic materials	4		
Work on paper - print	4		
Work on paper - collaged or cut paper	4		
Work on paper - drawing	4		
Sculpture - electrical or mechanical components	3		
Painting - paint on rigid surface/mixed media	3		
Sculpture - landscapes	3		
Sculpture - kinetic, passive or human-operated	2		

Sculpture - mixed media	2
Sculpture - plastics/acrylics/polyesters	2
Sculpture - wood	2
Sculpture - uncoated ferrous metals	2
Sculpture - other metals	2
Sculpture - glass	1
Sculpture - concrete	1
Sculpture - stone/ceramics/terracotta	1
Sculpture - coated metals	1

Resilience scores were assigned based on the following equations:

Sculpture:

Condition	Resilience Points
Artworks start with one point to prevent a zero in the denominator of the RIS equation	1
Artwork is not located in a Public School	1
Artwork <i>is</i> interior	1
Artwork does not have a secondary material listed (mixed media)	1
Artwork is in good condition	1
Possible Total	5

Works on paper, textiles, paintings:

Condition	Resilience Points
Artworks start with one point to prevent a zero in the denominator of the RIS equation	1
Artwork is not located in a Public School	1
Artwork is glazed	2
Artwork does not have a secondary material listed (mixed media)	0.5
Artwork is in good condition	0.5
Possible Total	5

B. NRI Data Profiles

1. Avalanche

"An avalanche is a mass of snow in swift motion traveling down a mountainside."

Avalanche annualized frequency data reported in the NRI was based on historic avalanche loss causing occurrences reported in the Arizona State University Spatial Hazard Events and Losses Database (SHELDUS) for a period of record of 60 years. Locations that intersect Avalanche Forecast Reporting Zones as defined by the National Avalanche Center (NAC) were given a minimum annualized frequency of 0.01.

2. Coastal Flooding

"Coastal Flooding is when water inundates or covers normally dry coastal land as a result of high or rising tides or storm surges."

Coastal flooding annualized frequency data reported in the NRI was based on five types of coastal flooding:

- *Minor High Tidal Flooding Event Areas* defined by the National Oceanic and Atmospheric Administration (NOAA)
- Moderate High Tidal Flooding Event Areas defined by NOAA
- Major High Tidal Flooding Event Areas defined by NOAA
- 1% Annual Chance Flood Hazard Areas defined by the National Flood Insurance Program (NFHL)
- 0.2% Annual Chance Flood Hazard Areas defined by NFHL

Data for these five types of flooding was modeled to produce a single annualized frequency for each census tract.

3. Earthquake

"An earthquake is a shaking of the earth's surface by energy waves emitted by slowly moving tectonic plates overcoming friction with one another underneath the earth's surface."

Earthquake annualized frequency data reported in the NRI represents the area-weighted probability of events (at least minor damage shaking) per year. Data is based on the US Geological Survey (USGS) data model for the 100-year probability of minor damage earthquake shaking.

4. Hail

"Hail is a form of precipitation that occurs during thunderstorms when raindrops, in extremely cold areas of the atmosphere, freeze into balls of ice before falling towards the earth's surface."

Hail annualized frequency data reported in the NRI is based on recorded hail events from the National Weather Service Storm Prediction Center's Severe Weather Database Files spanning 34 years from 1986-2019.

5. Ice Storm

"An Ice Storm is a freezing rain situation (rain that freezes on surface contact) with significant ice accumulations of 0.25 inches or greater."

Ice Storm annualized frequency data reported in the NRI is based on ice storms that resulted in the damage of ice-sensitive structures (overhead power, phone and cable TV lines, communication towers, and trees) as recorded by the United States Army Core of Engineers Cold Regions Research and Engineering Laboratory (CRREL). Annualized frequency values represent the number of events in event-days per year. For census blocks that have zero recorded events but are located in counties where events could occur were assigned a minimum annualized frequency of 0.01489.

6. Landslide

"A landslide is the movement of a mass of rock, debris, or earth down a slope."

Landslide annualized frequency data reported in the NRI is based on landside events recorded by NASA's Cooperative Open Online Landslide Repository Map (COOLR) for each census tract over a period from 1910-2021. A minimum annualized frequency of 0.01 is assigned to census tracts in which there were no

recorded landslides over the period of record but are located in areas where landslides were deemed possible.

7. Lightning

"Lightning is a visible electrical discharge or spark of electricity in the atmosphere between clouds, the air, and/or the ground often produced by a thunderstorm."

Lightning annualized frequency data reported in the NRI was based on cloud to ground lightning strikes recorded by the National Centers for Environmental Information's Cloud-to-Ground Lightning Strikes database for each census tract over a period from 1991-2012.

8. Riverine Flooding

"Riverine Flooding is when streams and rivers exceed the capacity of their natural or constructed channels to accommodate water flow and water overflows the banks, spilling into adjacent low-lying, dry land."

Riverine Flooding annualized frequency data reported in the NRI is based on events recorded by the National Centers for Environmental Information's Storm Events Database for each location over a period from 1996-2019. A minimum annualized frequency of 0.01 is assigned to locations with no recorded historical event that are located within the 1% annual chance riverine floodplain by the FEMA National Flood Insurance Program.

9. Strong Wind

"Strong Wind consists of damaging winds, often originating from thunderstorms, that are classified as exceeding 58 mph."

Strong Wind annualized frequency data reported in the NRI was based on events recorded by the National Weather Service and compiled by the Storm Prediction Center for each location over a period from 1986-2019.

10. Tornado

"A Tornado is a narrow, violently rotating column of air that extends from the base of a thunderstorm to the ground and is visible only if it forms a condensation funnel made up of water droplets, dust, and debris."

Tornado annualized frequency data reported in the NRI is based on events recorded by the National Weather Service and compiled by the Storm Prediction Center for each location over a period from 1950-2019. A minimum annualized frequency of 0.01 is assigned to those locations where historic events have not been recorded but are in areas where a tornado event is possible.

11. Tsunami

"A Tsunami is a wave or series of waves generated by an earthquake, landslide, volcanic eruption, or even a large meteor hitting the ocean and causing a rise or mounding of water at the ocean surface. A Tsunami can travel across the open ocean at about 500 mph and slow down to about 30 mph as it approaches land, causing it to grow significantly in height." Tsunami annualized frequency data reported in the NRI is based on Washington State Department of National Resources' Tsunami Inundation Data and the National Geophysical Data Center's Global Historical Tsunami Database (1800-2021) to model runup events per location per year. A minimum annualized frequency of 0.004501 is assigned to locations with no recorded historical runup events in areas where tsunami runup events are possible.

12. Volcanic Activity

"Volcanic Activity occurs via vents that act as a conduit between the Earth's surface and inner layers, and erupt gas, molten rock, and volcanic ash when gas pressure and buoyancy drive molten rock upward and through zones of weakness in the Earth's crust."

Volcanic Activity annualized frequency data reported in the NRI is based on the Global Volcano Model's Volcano-Population Exposure Index (9310 BCE – 2022) for volcanos that are considered active by the Global Volcano Model.

13. Wildfire

"A Wildfire is an unplanned fire burning in natural or wildland areas, such as forest, shrub lands, grasslands, or prairies."

Wildfire annualized frequency data reported in the NRI is based on the burn probability (BP) dataset from the U.S. Forest Service Missoula Fire Sciences Laboratory. BP data is calculated using the geospatial Fire Simulation (FSim) system. BP is the probability of an area being burned by a large fire based on landscape, contemporary weather conditions, and probability of containment. The annualized frequency represents the BP of a location in a given year.

14. Winter Storm

"Winter Weather consists of winter storm events in which the main types of precipitation are snow, sleet, or freezing rain."

Winter Storm annualized frequency data reported in the NRI was based on event-days recorded by the National Weather Service Winter Weather Alerts aggregated by the Iowa State University's Iowa Environmental Mesonet for each location over a period from 2005-2022.

Appendix II: County Characteristics Risk Analysis

County Analysis

Assessed by risk level, risk type, and artworks' statistical significance to the Collection as a whole

								Number of	
			Cureulative Risk per				Comparison of Artwork Category to Overall Collection. Grade	d Partner Agency	
	Region of WA	Pag. Density:	Emergency				A-C for how well artworks statistically align with Collection as	Types	
Country	State	Persons/liq. Mi.	Management Division	Highest Risk Types	Number of Artworks	N of the Collectio	m awhole.	Represented	Key Institutions
Okanagan	Central	5-10	High	Avalanche; Drought; Flaods; Severe weather; Wildlives	5	1	1% C - very high painting, low stalpture		1
Douglas.	Central	30-50	Median	Drought; Severe weather	1	6	0% C - sample tao small		1
Grant	Central	30-50	Medium	Drought; Severe weather		4	1% C - high painting, low sculpture		3 Big Bend Community College
KING BAS	Central	30-30	Median	Avalanche	4	9	1% C - all WOPs are photographs		3 Central Washington University
Chelan	Central	39-50	Medium High	Avalanche; Drought	6	8	1% A		4 Wenatchee Valley College
Klickitat	Central	30-20	Medium High	Wildlines	1		0% C - sample tao small		1
									Vakima Valley-Community College; 1 National Guard Readiness
Yakima	Central	50-100	Medium High	Drought, Severe weather; Willnes	23	4	386. B - Nigh painting, slightly law sculpture		4 Center
literal pro-	Central	100-200	Medium Low	Drought; Landslides	5	1	1% B - high textiles, low photography		2
Jefferson	Caastal	10-20	Median	Landslides	2	0	d% C - cample too small		2
Gallam	Coastal	30-50	Medium High	Earthquake; Landslides	20	8	2% B - high painting, low sculpture and textiles		3 Peninsula College, 3 correctional facilities
Groys Radion	Coastal	30-50	Medium High	Earthquake; Flood, Tsunami			1% 8 - high photographs		4. Grays Harbor College; 1 correctional facility
Pacific	Coastal	30-50	Medium High	Earthquakes; Floods; Tsunamis	1		1% C - high WOPs, low painting and sculpture		2
Which has been	Caastal	30-20	Mediam Low	Floads			0% C - sample tao small		1
Asstin	Lastern.	30-50	Low				0% C - cample tao small		1 Walla Walla Community College - branch campus
Lancola	Lactern.	D1	Low	Houde	1	1	dis C - cample tao small		1
Pend Orelle	Lactore	5-30	Low	Wildfines	1	1	0% C - cample tao small		1
									Eastern Washington University, Spakane Community College,
									Spokane Falls Community College, Northwest Museum of Arts and
Spokane	Listern	300-600	Low	Drought			ets # - high sculpture, low WOPs		b Culture; 1 correctional facility
Whiteman	Lastern	30-50	Low	Drought, Severe weather		1	1% C - sample tao small, very high sculpture		3 Washington State University
Adams	Kastern	5-30	Medium Low	Severe weather			Citic C - cample tao small		1
Columbia	Listern	04	Mediaria Low				dis N/A		
Perry	Lactorn .	0.9	Medium Low		1		dis C - cample tao small		1
Pranktin	Kastern	10-200	Medium Low	Drought, hevere weather			2% C - high sculpture, low WOPs		h Columbia Raon Callege
Garnets.	Lastern .	0-5	Mediarit fore				dis N/A		
Mevels	Liden.	10-20	Media/R Low	WICHER	1		dts C - cample tao small		1
							AN A low science high contracts		wata wata community comprised and wata weekant money a
Walls Walls	Lacient	39-90	Medium Low	Diought, severe weather	4	<i>r</i>	216 B - Iow paerong, high scarpture		4 correctional facility
httage 1	Nor David.	19-208	ruga	Ploads, Volcano			216 A - Low Leader		a prafic analy coulds
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William Courses	Margarithman 1	53,529	LEAR				test a		A thelicology Technical Contexts and Contexts and Context on the Context of Context of Contexts of Con
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									Observed College Westbiostop Meterses Means Westbiostop Vourb
Citate .	Paget Sound	400-700	Medium		10	4	5% 8 - Nah textiles, key WOPs		A Academy
Mason	Puppt Sound	50-200	Medium				2% B - Neh souldture, low painting		3 Obmaic College - branch campus
Island.	Paget Sound	200-600	Medium High	widtes.			1% C - cample too ongil		3 Start Valey College - branch carries
									Edmands Community College, Evenet: Community College: WELL-
Singhomish	Paget Sound	300-600	Medium High		29		6% 8 - low WOPs, high painting and sculpture		5 Executi
									South Pupert Sound Community College. The Eventness State
Thursdon	Paget Sound	300-400	Medium High	Earthquakes	78		here some an		& College; Numerous state agencies
Lowis	Southwest.	39-50	High	Floads Landslides			2% C - very high souldture, law pointing		I Centralia Callege: 1 youth rehabilitation facility
Mamania	Southwest	5-30	High	Avalanche: Landulides: Volcano			0% N/A		8
Clark	Southwest.	400-700	Medium High	Witawa	39	4	6% A		& Clark College; WSU - Vancouver
Cowline	Southwest.	\$9-100	Medium High		1		1% C - high painting, low sculpture		I Lower Columbia College
				Selected pillet counties.	139	, ,	176		

Rey.

Orange Text + Medium High disaster rick level Red Text - High disaster rick level