

Bear Valley
Electric Service, Inc.
A Subsidiary of American States Water Company

2022 Wildfire Mitigation Plan

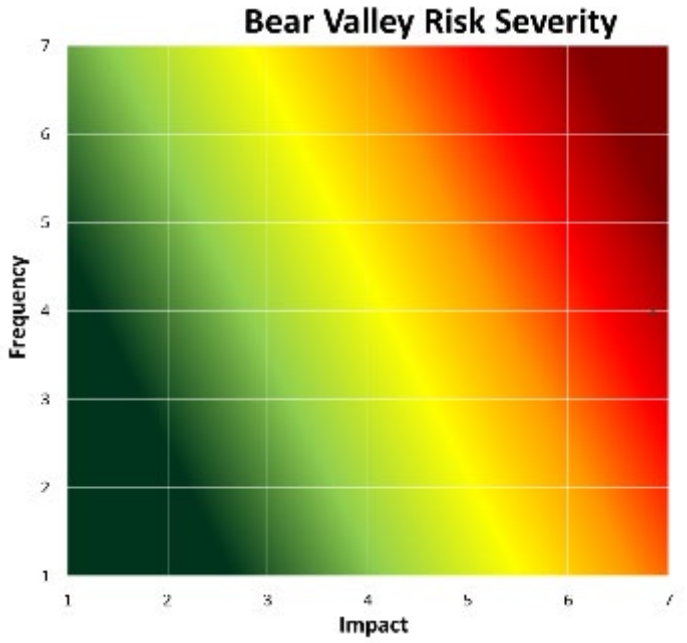
RISK ASSESSMENT AND MAPPING

May 18, 2022

Paul Marconi, President & Safety Committee Chairman, BVES, Inc.

Risk Model for SMJUs

- Decision 19-04-020 of April 25, 2019, Phase Two Decision Adopting Risk Spending Accountability Report Requirements and Safety Performance Metrics for Investor-owned Utilities and Adopting a Safety Model Approach for Small and Multi-jurisdictional Utilities provides requirements for SMJU risk modeling.
- 7x7 Logarithmic Risk Matrix
  - (Frequency vs. Impacts)
- Impact weights:
  - Public and Employee Safety
  - Reliability
  - Environmental
  - Quality of Service
  - Compliance
- Analyzed 90 mitigations
  - Cost of Project/Program
  - Period of Project/Program



Risk Score = Frequency * SUM $_{i=1 \text{ to } 5}$ (CategoryWeight $_i$ x 10^Impact $_i$)

Frequency	Frequency Years (Events/Year) [Min rate]	Frequency Years (Events/Year) [Max rate]	Frequency Value			Negligible(1)	Minor(2)	Moderate(3)	Major(4)	Extensive(5)	Severe(6)	Catastrophic(7)	
						1	2	3	4	5	6	7	
> 10 times per year	10	100	31.6228	7	0	316.23	3,162.28	31,622.78	316,227.77	3,162,277.66	31,622,776.60	316,227,766.02	7
1 - 10 times per year	1	10	3.1623	6	0	31.62	316.23	3,162.28	31,622.78	316,227.77	3,162,277.66	31,622,776.60	6
Once every 1 - 3 years	0.3300	1.0000	0.5745	5	0	5.74	57.45	574.46	5,744.56	57,445.63	574,456.26	5,744,562.65	5
Once every 3 - 10 years	0.1000	0.3333	0.1826	4	0	1.83	18.26	182.57	1,825.74	18,257.42	182,574.19	1,825,741.86	4
Once every 10 - 30 years	0.0333	0.1000	0.0577	3	0	0.58	5.77	57.74	577.35	5,773.50	57,735.03	577,350.27	3
Once every 30 - 100 years	0.0100	0.0333	0.0183	2	0	0.18	1.83	18.26	182.57	1,825.74	18,257.42	182,574.19	2
Once every 100+ Years	0.0033	0.0100	0.0058	1	0	0.06	0.58	5.77	57.74	577.35	5,773.50	57,735.03	1
				0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
					0	1	2	3	4	5	6	7	

Fire Safety Matrix

Circuit Information																						Wildfire T&D Hardening												O&M Programs Implemented											
Algorithm Input = AI				AI		AI	AI	AI	AI	AI							AI	AI	AI	AI	AI	AI						AI								AI	AI	AI	AI	AI	AI	AI			
Circuit	Substation	Wildfire Risk Group	Overall Risk Weighting	Risk Ranking	Voltage (kV)	High Fire Threat District Tier	Vegetation Density	Wind Intensity	# of Customers	# of Wood Poles	# of Fire Resistant Composite Poles	# of LWS Poles	# of Ductile Iron Poles	Bare Wire OH Circuit Miles	Covered Conductor OH Circuit Miles	UG Circuit Miles	# of Tree Attachments	# of Expulsion Fuses	# of Level 1 Deficiencies to be Corrected	# of Level 2 Deficiencies to be Corrected	Top Ten Worst Performing Circuit (1=Worst NR=Not Ranked)	Pole Loading Program (Percent Complete)	Tree Attachment Removal Program	Repalce OH Bare Wire with Covered Conductor	Replace Expulsion Fuses	Evacuation Route Hardening	Circuit Sectionalized to Reduce PSPS Impact	Fault Indicators	Replace AR with Pulse Conditioned Intellirupter	Circuit Meters Installed On All Phases Remotely Monitored	Install FUSR	Enhanced Vegetation Management	GO-165 Ground Patrol	GO-165 5-Year Inspections	GO-165 Intrussive Inspections	Bi-Annual LiDAR Survey	3rd Party Annual Ground Patrol	GO-174 Substation Inspections	Substation Electrical Equipment Preventative Maintenance	Exacter Survey	Fly-over Video Inspection Survey	Evaluate Protective Settings & Optimize for Fire Safety
Radford	SCE Feed	30521	0.2950	1	34.5	3	High	High	3403	89	0	0	0	2.82	0	0.02	0	0	0	0	NR	0%	None		NA			NA		X		X	X	X	X	X	X	NA		Next WMP	Next WMP
Shay	SCE Feed	11585	0.1120	2	34.5	2	High	High	9627	610	0	0	0	13.35	3.82	0.39	0	0	0	0	3	15%	None		NA			33.3%		X		X	X	X	X	X	X	NA		Next WMP	Next WMP
Baldwin	SCE Feed	8409	0.0813	3	34.5	2	High	High	11305	256	0	0	0	8.61	0.33	0.5	0	0	0	0	2	3%	None		NA			0.0%		X		X	X	X	X	X	X	NA		Next WMP	Next WMP
Boulder	Village	2951	0.0285	10	4.16	2	High	High	2046	1007	0	0	0	17.68	0	1.8	86	30	0	0	5	90%						100.0%		X		X	X	X	X	X	X	2021		Next WMP	Next WMP
North Shore (Fawnskin)	Fawnskin	6538	0.0632	4	4.16	2	High	High	1523	923	0	0	0	15.83	0	8.09	56	0	0	0	6	0%						33.3%		X		X	X	X	X	X	X			Next WMP	Next WMP
Erwin Lake	Maltby	5053	0.0488	6	4.16	2	High	High	2533	1058	0	0	0	21.83	0	7.41	7	0	0	0	NR	64%						82.9%		X		X	X	X	X	X	X			Next WMP	Next WMP
Pioneer (Palomino)	Palomino	2659	0.0257	13	4.16	2	Low	Medium	537	602	0	0	0	13.89	2.5	2.95	0	38	0	0	NR	20%	None					NA		X		X	X	X	X	X	X	2023		Next WMP	Next WMP
Clubview	Moonridge	3660	0.0354	8	4.16	2	High	Medium	1984	508	0	0	0	10.18	0	0.27	88	0	0	0	9	0%						60.0%				X	X	X	X	X	X	2023		Next WMP	Next WMP
Goldmine	Moonridge	5569	0.0538	5	4.16	2	High	Medium	1698	567	0	0	0	13.2	0	5.26	76	7	0	0	1	0%						40.0%				X	X	X	X	X	X	2023		Next WMP	Next WMP
Paradise	Maltby	2754	0.0266	12	4.16	2	Medium	Medium	1895	549	0	0	0	9.85	0	2	69	0	0	0	8	0%						33.3%		X		X	X	X	X	X	X			Next WMP	Next WMP
Sunset	Maple	3583	0.0346	9	4.16	2	High	Medium	1918	505	0	0	0	10.67	0	0.5	52	0	0	0	NR	0%						0.0%		X		X	X	X	X	X	X	2021		Next WMP	Next WMP
Sunrise (Maple)	Maple	2650	0.0256	14	4.16	2	High	Medium	1506	348	0	0	0	7.79	0	3.86	36	0	0	0	NR	0%						0.0%		X		X	X	X	X	X	X	2021		Next WMP	Next WMP
Holcomb (Bear City)	Bear City	4516	0.0436	7	4.16	2	High	Medium	1587	615	0	0	0	13.25	0	0.85	33	109	0	0	NR	0%						50.0%		X		X	X	X	X	X	X	2021		Next WMP	Next WMP
Georgia	Pineknot	1594	0.0154	18	4.16	2	Medium	Medium	1023	348	0	0	0	5.91	0	3.95	63	76	0	0	NR	0%						100.0%				X	X	X	X	X	X	2023		Next WMP	Next WMP
Eagle	Pineknot	2072	0.0200	15	4.16	2	Medium	Medium	959	323	0	0	0	7.38	0	1.53	16	104	0	0	NR	0%						33.3%				X	X	X	X	X	X	2023		Next WMP	Next WMP
Harnish (Village)	Village	385	0.0037	21	4.16	2	Low	Medium	254	83	0	0	0	1.34	0	1.21	13	38	0	0	NR	0%						NA		X		X	X	X	X	X	X	2021		Next WMP	Next WMP
Garstin	Meadow	1370	0.0132	19	4.16	2	Medium	Medium	1055	277	0	0	0	5.09	0.82	3	15	124	0	0	NR	5%						25.0%		X		X	X	X	X	X	X	2022		Next WMP	Next WMP
Lagonita	Village	2932	0.0283	11	4.16	2	Medium	High	1103	453	0	0	0	7.46	0	1.43	60	116	0	0	7	0%						100.0%		X		X	X	X	X	X	X	2021		Next WMP	Next WMP
Interlaken	Meadow	1891	0.0183	16	4.16	2	Medium	Medium	880	280	0	0	0	6.45	0	3.55	27	113	0	0	NR	0%						50.0%		X		X	X	X	X	X	X	2022		Next WMP	Next WMP
Castle Glen (Division)	Division	1733	0.0167	17	4.16	2	Medium	Medium	1188	343	9	0	0	6.74	0.19	3.68	45	80	0	0	NR	5%						100.0%		X		X	X	X	X	X	X	2022		Next WMP	Next WMP
Country Club	Division	845	0.0082	20	4.16	2	Medium	Medium	605	180	0	0	0	3.18	0	0.94	10	15	0	0	10	0%						33.3%		X		X	X	X	X	X	X	2022		Next WMP	Next WMP
Fox Farm	Meadow	-8	-0.0001	26	4.16	2	Low	Medium	35	4	0	0	0	0	0	0.84	0	0	0	0	NR	0%	None					NA		X		X	X	X	X	X	X	2022		Next WMP	Next WMP
Pump House (Lake)	Lake	178	0.0017	22	4.16	2	Low	Medium	4	22	0	0	0	0.64	0	0.02	0	10	0	0	NR	0%	None					NA		X		X	X	X	X	X	X			Next WMP	Next WMP
Lift (Summit TOU)	Summit	30	0.0003	23	4.16	2	Low	Medium	1	1	0	0	0	0.1	0	0	0	0	0	0	NR	0%	None	NA		NA	NA	NA		X		X	X	X	X	X	X	2023		Next WMP	Next WMP
Skyline (Summit Res)	Summit	0	0.0000	24	4.16	2	Low	Medium	0	0	0	0	0	0	0	0	0	0	0	0	NR	100%	None	NA		NA	NA	NA		X		X	X	X	X	X	X	2023	NA	NA	Next WMP
Geronimo (Bear Mtn.)	Bear Mtn.	0	0.0000	24	4.16	2	Low	Medium	1	0	0	0	0	0	0	0.03	0	0	0	0	NR	100%	None	NA		NA	NA	NA		X		X	X	X	X	X	X	2022	NA	NA	Next WMP

- Designed to prioritize risk mitigations at the circuit level and account for changing conditions.
- Works in conjunction with Risk Safety Model Approach for Small and Multi-jurisdictional Utilities (SMJUs).

Fire Safety Model Look Ahead

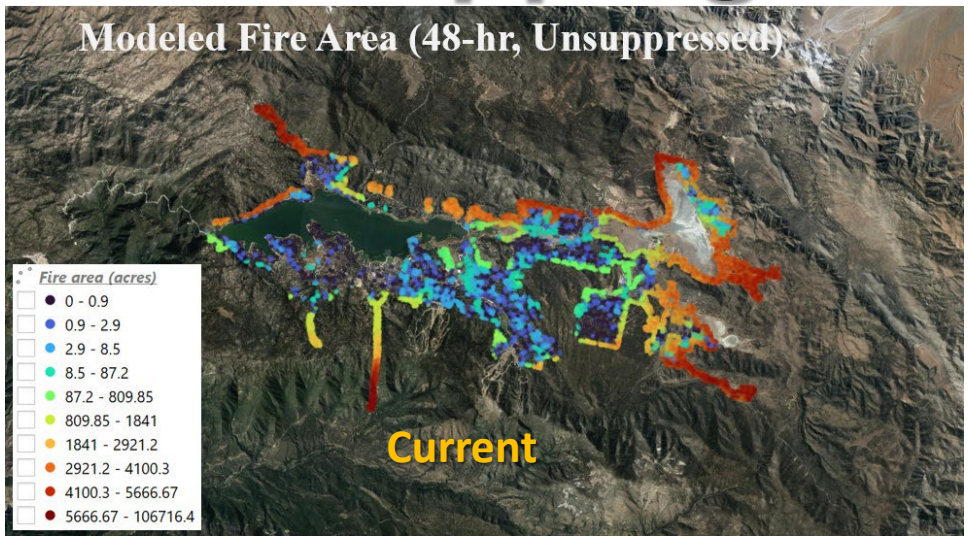
- Allows planning Team to focus on highest risk circuits and provide an outlook on where the mitigations are taking the system.
- Allows interim mitigations to be applied to those circuits that will not see hardening efforts for a few years.

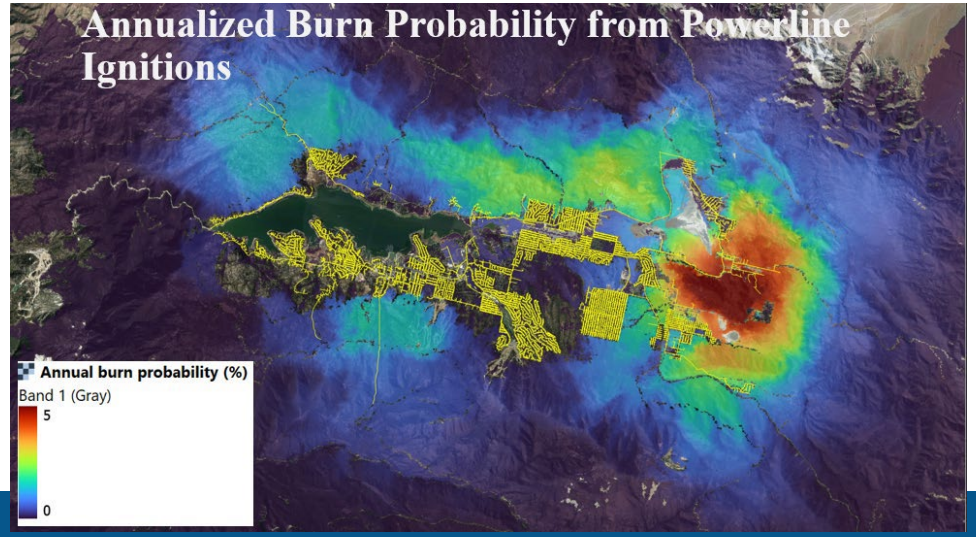
Circuit	Substation	2019 Wildfire Risk Group	2020 Wildfire Risk Group	2021 Wildfire Risk Group	2022 Wildfire Risk Group	2024 Wildfire Risk Group	2032 Wildfire Risk Group
Radford	SCE Feed	30521	30521	31215	522	522	77
Shay	SCE Feed	14230	14230	7103	4053	0	0
Baldwin	SCE Feed	7185	7185	7606	6884	4311	0
Boulder	Village	3351	3351	1230	1141	0	0
North Shore (Fawnskin)	Fawnskin	7518	7518	6721	6721	5218	0
Erwin Lake	Maltby	7401	7401	2006	1379	150	0
Pioneer (Palomino)	Palomino	5706	5706	2426	2426	1214	0
Clubview	Moonridge	3460	3460	3331	2826	1574	0
Goldmine	Moonridge	5559	5559	4491	4491	3623	0
Paradise	Maltby	2754	2754	2894	1646	1303	0
Sunset	Maple	3583	3583	2533	2533	2225	0
Sunrise (Maple)	Maple	2650	2650	2217	2217	2117	0
Holcomb (Bear City)	Bear City	5916	5916	4205	4120	4070	0
Georgia	Pineknot	1919	1919	1280	1280	1280	0
Eagle	Pineknot	2072	2072	1813	1813	1746	67
Harnish (Village)	Village	385	385	793	786	786	312
Garstin	Meadow	2440	2440	1392	1366	1291	0
Lagonita	Village	2023	2023	1576	1539	1539	0
Interlaken	Meadow	3275	3275	1652	1472	1422	0
Castle Glen (Division)	Division	1982	1982	2365	1725	1725	0
Country Club	Division	984	984	709	693	626	0
Fox Farm	Meadow	0	0	0	0	0	0
Pump House (Lake)	Lake	287	287	202	202	202	92
Lift (Summit TOU)	Summit	28	28	627	627	627	622
Skyline (Summit Res)	Summit	0	0	0	0	0	0
Geronimo (Bear Mtn.)	Bear Mtn.	0	0	0	0	0	0
		115230	115230	90386	52464	37571	1170

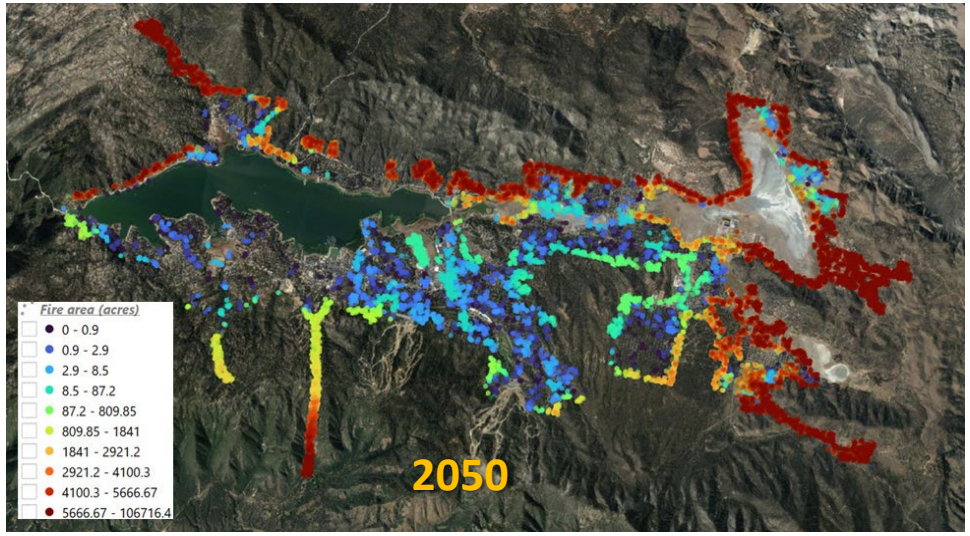
High
Moderate
Low

Ignition Probability Risk Model / Mapping

- BVES worked with a consultant to develop a model aimed to address four separate subtasks of the Risk Mapping Program including:
  - Ignition probability mapping showing the probability of ignition along overhead electric lines and equipment,
  - Match drop simulations showing the potential wildfire consequence of ignitions that occur along electric lines and equipment under current (2021) conditions,
  - Match drop simulations showing the potential wildfire consequence of ignitions that occur along the electric lines and equipment under future (2050) conditions, and
  - Summarized risk maps showing overall ignition probability and estimated wildfire consequence/risk under current and future conditions.

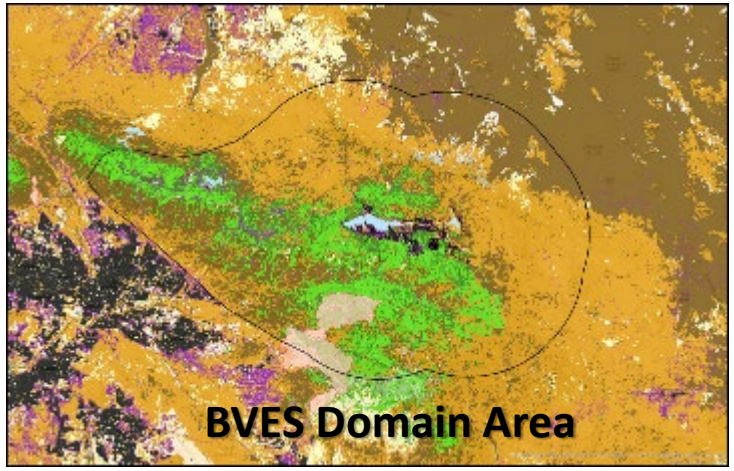


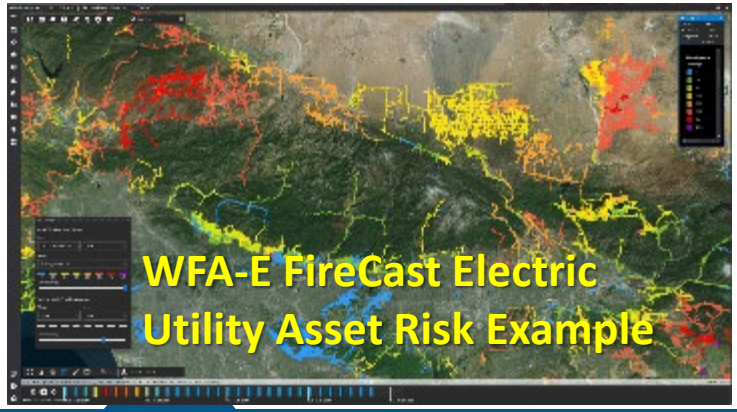




2022 Initiatives

BVES is working with Technosylva to implement wildfire forecasting applications in the BVES Domain Area.





- **Wildfire Analyst™ Enterprise Subscription**
  - **FireSim** – on-demand, real time fire spread predictions and impact analysis
  - **FireCast** – wildfire risk forecasting for customer assets and service territories using daily weather prediction integration to support PSPS and response operations
  - **Wildfire Risk Reduction Model (WRRM)** – asset risk analysis using historical weather climatology to support Wildfire Mitigation Plan (WMP) development and mitigation planning
- **Data Analytics Subscriptions:** In addition to the core risk data production and software subscription with WFA-E, Technosylva will provides several data analytics subscriptions that enhance the quality of the fire behavior modeling and subsequent risk forecasting. These include:
  - **Weather Prediction Data Subscription:** Advanced WRF weather prediction data subscription. This data is derived once daily at 2km spatial resolution, and hourly temporal resolution. Each daily WRF forecast will be 100 hours, providing the ability to forecast weather events days in advance of them occurring.
  - **Surface & Canopy Fuels Data Subscription:** Continual update to the surface and canopy fuels data throughout the calendar year to accommodate for large fires and other landscape disturbances. This is important to retain accurate fire modeling and risk outputs dependent on changes that occur with fuels data.
  - **Life Fuel Moisture & Dead Fuel Moisture Data Subscription:** Daily modeling and production of herbaceous and woody Live Fuel Moisture (LFM) data along with Dead Fuel Moisture (DFM) datasets. LFM and DFM are not typically included with weather WRF data and are critical for accurate fire modeling and risk analysis.
  - **Building Loss Factor Data Subscription:** Detailed analysis within the BVES domain to define a building-level loss factor based on historical loss analysis. This data must be developed for the CA and NV portion of the service territory. This data allows an estimate of buildings destroyed to be included for each fire spread prediction, and for all asset risk metrics. This is intended to supplement the standard Buildings Threatened metric that is provided with WFA-E.
  - **RAVE Data Subscription:** Risk Associated with Value Exposure (RAVE) data provides additional detailed data that describes the locational risk factors and susceptibility within the BVES domain area. This enhanced data includes risk factors such as social vulnerability and egress that can be used to adjust BVES risk outputs by incorporating the factors into risk calculations. Areas with additional risk factors, such as poor egress, will increase asset risk scores providing more detailed and accurate risk information to support both operational and mitigation decision making.
  - **WindNInja High Resolution Wind Data Subscription:** Specific areas within California with significant terrain issues require a more detailed analysis of local wind situations that can occur to greatly affect wildfire spread. To address these requirements higher resolution wind predictions are necessary, at 200 meter resolution, compared to conventional WRF wind predictions at 2 km. WindNinja data enhances the accuracy of fire spread predictions by capturing the local terrain details that occur, that are not captured in WRF models.



Questions?

Our Values

In pursuing our mission, the board of directors, management and the company´s employees are guided by the shared Values presented below:

Integrity - Building trust through honest communications and doing what is right
Teamwork - Maximizing efficiency through collaboration and individual strengths
Respect - Valuing diversity and treating all stakeholders with fairness
Excellence in Service - Striving for excellence and quality in everything we do
Accountability - Taking ownership of one´s actions