

**Wildfire Risk Governance Forum
November 13th, 2020**



Safety

Earthquake
Duck, Cover & Hold

Emergency Plan & Exit Strategy
Have a plan for yourself and your household

24/7 Nurse Care Line
If you experience a work-related discomfort or injury, call and notify your supervisor.

Wash your hands!

Wear a Mask

Practice social Distancing

Meeting Agenda

Date:	11/15/2020		
Desire Outcomes:	<ul style="list-style-type: none"> Inform: Decision Items & Action Items Decision: System Hardening "No Regrets" approach Inform: Outline Inspections program – focus areas & needed resources Decision: Enhanced Veg Management "No Regrets" approach 		
Meeting Agenda			
#	What - Content	Who - Facilitator(s)	Slide Number / Duration
1	Safety Minutes and Agenda		1-2 / 5 min
2	Decision and Action Item Review		3-11 / 15 min
3	System Hardening		12-15 / 20 min
4	System Inspections		16-18 / 20 min
5	Enhanced Vegetation Management		19-24 / 20 min
6	Follow ups and Next Steps		25-26 / 10 min

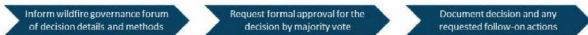
Decision and Action Item Review





Key Wildfire Risk Model Governance Forum Decision

Governance Forum Decision Approval Process



Workstream	Decision	Description	Approval Vote	Date
Risk Models	Adoption of the 2021 wildfire risk models for mitigation deployment	<ul style="list-style-type: none">Adopt the proposed ignition model for vegetation ignitions and technology for 2021 BPA workAdopt the proposed ignition model for equipment ignitions and technology for 2021 System Maintenance work	Approved Approved Approved Not Present	10/26/2020



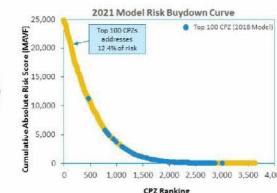
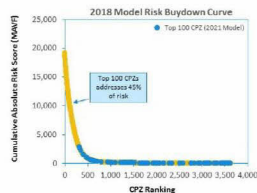
Key Decision – Adoption of the 2021 Risk Model for Mitigation Deployment

Approval Status	Approved										
Decision Detail	<p>The approval is for moving from the 2018 wildfire risk model to the 2021 wildfire risk model to inform system hardening, enhance vegetation management and inspections. These changes included:</p> <ul style="list-style-type: none"> • Update to vegetation ignition model (LoRe) • Update to conductor model (LoRe) • Update to consequence (core) 										
Concerns and Mitigations	<ul style="list-style-type: none"> • Inclusion of non-447D areas requested in the next model iteration • Inclusion of Egress model requested in the next model iteration • Resource availability to complete "hot risk informed planned work" was challenged • Detailed description of variables in particular "non-burnable areas" requested • The ability to calculate tree density within pswh was challenged 										
Approvals	<table border="1"> <tr><td>Approved</td></tr> <tr><td>Approved</td></tr> <tr><td>Approved</td></tr> <tr><td>Approved</td></tr> <tr><td>Abstain – Not Present</td></tr> </table>	Approved	Approved	Approved	Approved	Abstain – Not Present					
Approved											
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Approved											
Abstain – Not Present											
Action Items and Validations	<table border="1"> <tr> <td>Adoption of the 2021 wildfire risk model for mitigation deployment Deep dive risk model session</td> <td>Completed - Adopt the proposed ignition model for vegetation ignitions and Technosylva for 2021. UVM work</td> </tr> <tr> <td>Risk models comparison</td> <td>Completed - Conduct risk comparison between the 2018 risk model and 2021 risk model to highlight improvement of CP2s (Targeting top 100 circuits or CP2s)</td> </tr> <tr> <td>Deep dive risk model session</td> <td>Completed - Hold a Deep Dive Session with (1) the Federal Monitor and (2) the Operational Closure</td> </tr> <tr> <td>Model process documentation</td> <td>In Process - Bring the Model Process Level documentation to this forum for an official approval</td> </tr> <tr> <td>Egress Consideration</td> <td>Road Mapped - Factor in Egress into process for selecting the protection zones to be worked</td> </tr> </table>	Adoption of the 2021 wildfire risk model for mitigation deployment Deep dive risk model session	Completed - Adopt the proposed ignition model for vegetation ignitions and Technosylva for 2021. UVM work	Risk models comparison	Completed - Conduct risk comparison between the 2018 risk model and 2021 risk model to highlight improvement of CP2s (Targeting top 100 circuits or CP2s)	Deep dive risk model session	Completed - Hold a Deep Dive Session with (1) the Federal Monitor and (2) the Operational Closure	Model process documentation	In Process - Bring the Model Process Level documentation to this forum for an official approval	Egress Consideration	Road Mapped - Factor in Egress into process for selecting the protection zones to be worked
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Risk models comparison	Completed - Conduct risk comparison between the 2018 risk model and 2021 risk model to highlight improvement of CP2s (Targeting top 100 circuits or CP2s)										
Deep dive risk model session	Completed - Hold a Deep Dive Session with (1) the Federal Monitor and (2) the Operational Closure										
Model process documentation	In Process - Bring the Model Process Level documentation to this forum for an official approval										
Egress Consideration	Road Mapped - Factor in Egress into process for selecting the protection zones to be worked										



Risk Model Action Items

Workstream	Action Item	Description	Responsible party	Resolution	Date
Risk Model	4-63-models comparison WGR - 10/30/2020	Create risk comparison between the 2018 risk model and 2021 risk model to highlight movement of CPZs. The getting the 100 (results of CPZs)	[Redacted]	Complete - See the Risk Model Followup Section	11/3/2020



Key Takeaways

- No CPZs in the top 100 overlap
- This will result in significant change to the prioritization and expected risk buydown of mitigations
- The 2018 risk results were not distance weighted, where the 2021 prioritization included a distance factor.



Risk Model Action Items

Workstream	Action Item	Description	Responsible party	Resolution	Date
NSR Model	Deep dive risk model session WDR-15/762320	NSR's Deep Dive session with (1) the Federal Monitor and (2) the Operational Observer	[REDACTED]	Complete - Meetings have been scheduled for 11/8 & 11/12	11/12/2020

Updates

- First Deep Dive session held on Monday 11/10/2020 at 1:00pm PST
- Second session will be held on Thursday 11/12/2020 at 12:30pm PST



Risk Model Action Items


Workstream	Action Item	Description	Responsible Party	Resolution	Date
risk model	risk model contributor	provide a detailed description of the top model contributors		complete - targeted for inclusion in open data release	11/13/2020

Vegetation Model - Contributors Description

Variable	Description
Tree height_max	Maximum tree height, in meters, from each 100m x 100m pixel area using the distribution grid
100-hour-fuels_weg	The dead fuel moisture data from GRDMET
Vapor-pressure-deficit_weg	The average vapor pressure deficit from the GRDMET dataset
Guay-summer-day-act	Percentage of days that have high frequency of gusts
WU	High frequency district
Precipitation_weg	The average daily precipitation from the GRDMET dataset
Impervious	Impervious ground cover (i.e. non-flammable)
Specific-humidity_weg	The average specific humidity from the GRDMET dataset
Burn index_weg	An derived variable based off of the geographical and topographical aspects of a location
Wind_max	The maximum wind velocity at a height of 10 meters from the Real-Time Mesoscale Analysis (RTMA) dataset at a resolution of 2.5km
Temperature_weg	The average temperature from the GRDMET dataset
Windy-summer-day-act	Percentage of days that have a high percentage of days with high average wind speed
Local-topography	The topographic position index (TPI) was extracted from a USGS digital elevation model (DEM) at 100-meter resolution
1000-hour-fuels_weg	The dead fuel moisture data from GRDMET
Energy-release_weg	Average release of energy from fuels

Conductor Model - Contributors Description

Variable	Description
Nonflammable-area	Land surface description similar to imperviousness but includes surfaces that typically don't ignite when a spark occurs
Daily-precipitation_mean	The average daily precipitation from the GRDMET dataset
Conductor-material_acre	Aluminum conductor steel-reinforced
Estimated-conductor-age	Number of years since the installation year
Max-tree-height	Maximum tree height, in meters, for each 100m x 100m pixel area using the distribution grid
Reliability-Program-solve	Spans with more than three sags per phase
Vapor-pressure-deficit_mean	The average vapor pressure deficit from the GRDMET dataset
Conductor-size-2	Conductor size 2
Conductor-size-4	Conductor size 4
100-hour-fuels_mean	The dead fuel moisture data from GRDMET
Max-temperature_mean	The average maximum temperature from the GRDMET dataset
Wind-speed_mean	The average wind velocity at a height of 10 meters from the Real-Time Mesoscale Analysis (RTMA) dataset at a resolution of 2.5km
Local-topography	The topographic position index (TPI) was extracted from a USGS digital elevation model (DEM) at 100-meter resolution

 **Risk Model Action Items**

Workstream	Action Item	Description	Responsible party	Resolution	Date
Risk Models	Model process documentation	Bring the Model Process Level Documentation to this forum for an official approval	[REDACTED]	In Process - targeted for inclusion in deep dive sessions	11/20/2020

1 User Guide
Model procedure and details will be provided in the user guide to the forum for review at the 11/20 session



Risk Model Action Items

Workstream	Action Item	Description	Responsible party	Resolution	Date
Wildfire Governance Charter	Charter update	Update charter to include review of broader set of WFP risk reduction activities and projects (see slide)	[REDACTED]	Completed Risk charter has been updated, included in attached materials	11/05/2020

See updated slide for the updated wildfire governance Charter

Meeting Purpose:

- Drive decision making on:
 - Wildfire Governance Charter alignment on the top-level risk framework to guide the work, provide a focus to review key risk-based assumptions, and associated impacts
 - Work:
 - Review completion of the highest priority risk mitigation work (associated with investments, asset, strategy and operational needs, guide charter as needed)
 - Review the approved work plans completed and the quality of the completed work is monitored

Key Deliverables:

- Integrate individual wildfire mitigation action items into a single governance session
- Identify any issues on system hardware, operational expansion management, inspections and repairs and will expand into other areas of wildfire and PPS mitigation work
- Meeting topics and supporting material will adjust based on discussion and request from Working Directors

Attendees:

- Chair: Chief Risk Officer
- Working Members:
 - VP Asset, Risk Management & Community Wildfire Safety Program
 - VP Major Projects and Programs, Electric Operations
 - VP Wildfire Safety and Public Engagement
 - VP Chief Audit Officer
- Non-Voting Members:
 - VP Director, Electric Asset Strategy
 - VP Director, Major Programs & Project Delivery
 - VP Director, Risk Management
 - Director, CIP & M&P
- Workstream Lead:
 - System Hardware Director, Distribution Strategy
 - Enhanced Inspection Management, Director, Regulatory Management
 - Inspection & Repair Manager, Transmission Standards
- Facilitator:
 - VP Director, Risk - Special Projects

How Decisions are Made:

- Initial meeting agenda will be an addendum for decisions to be made
- A simple majority vote by attending committee members
- For broader: Chair hold the to-bring vote

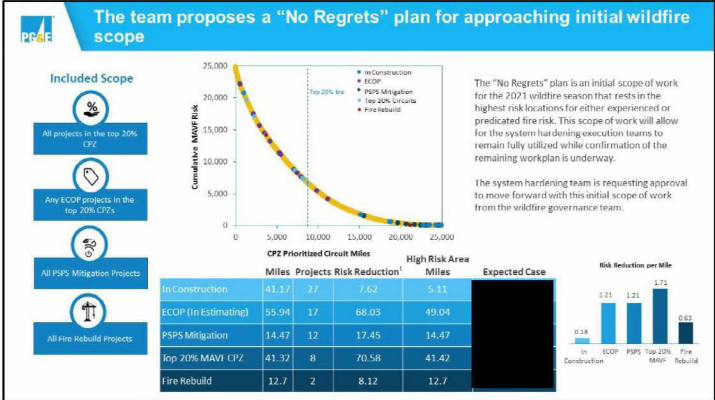
Meeting Logistics:

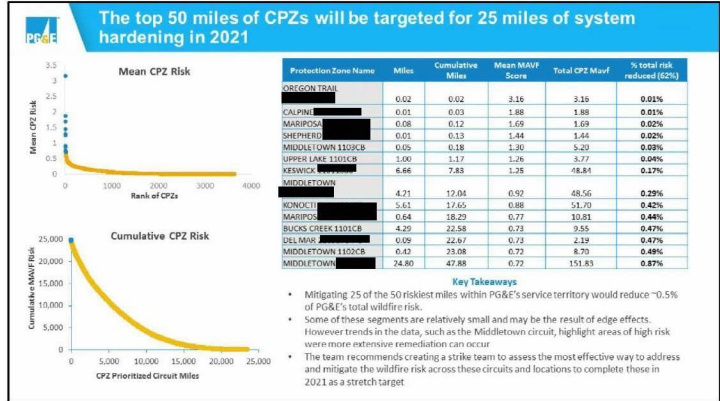
- Frequency/Duration: Weekly (every Friday)
- Materials:
 - Pre-read materials sent 1 day before meeting
 - Action items included in following meeting material
- Agenda: VP Director, Risk - Special Projects to approve final agenda

System Hardening



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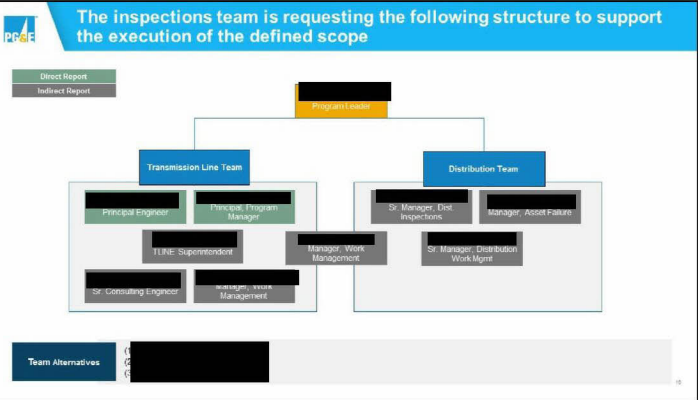


Overhead Inspections



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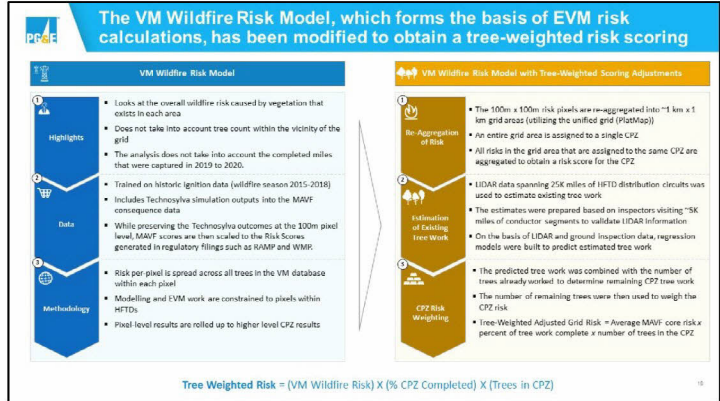




Enhanced Vegetation Management

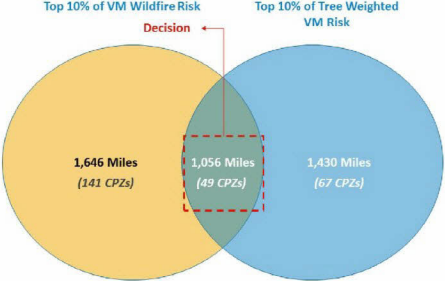


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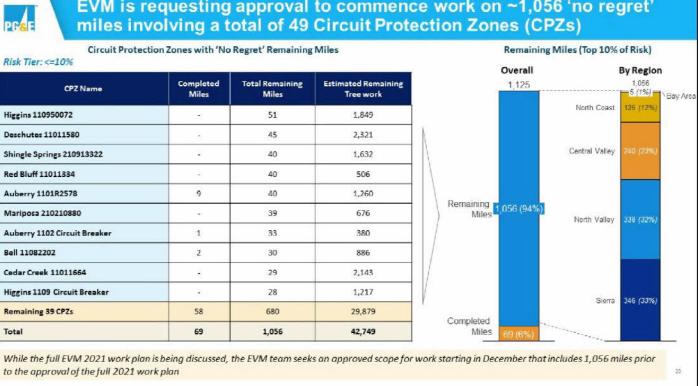


A "no regrets" approach of tackling the CPZs identified as high risk by both models is proposed for adoption to operationalize work



49 CPZs and 1,056 miles were common across the VM Wildfire risk ranking and the Tree Weighted risk ranking. Both models highlight these areas as high impact, and should be prioritized for EVM work.

Note: CPZs indicated are based on the draft 2021 EVM Plan targeting 2,295 miles



2021 Draft EVM Plan

Key Features and Scope Areas

Circuit Protection Zones (CPZs)

- The 2021 plan incorporates the **concept of the CPZ** – a term coined by the Asset Strategy team
- CPZs are being used because they are **tied to isolation devices** on circuits, and in the case of PSPS events, indicate a way to isolate a circuit from a certain point.

Plan rationale

- The 2021 LVM plan has been prepared with the intent that:
 - The plan **avoids any System Hardening projects** in 2021
 - Need final 2021 System Hardening Plan in order to complete full 2021 proposed projects

Scope


- The plan targets **190,000 trees** and **2,295 miles** of distribution circuits.
- The plan envisions a **pre-inspection of between 894-979K trees, tree work of an estimated 171-210K trees and removal of an estimated 107-148K trees**
- The current plan has been prepared on the basis of a tree-based weighted analysis of risk across CPZs to take into account tree work already completed – a variable that is missing from the VM Wildfire Risk model

Regional Distribution of Targeted Mileage (miles)

Region	Mileage (miles)	Percentage
Central Coast	18	1%
Central Valley	785	34%
North Coast	408	18%
North Valley	605	27%
Sierra	888	39%
Total	2,295	100%

Other Considerations

- Plan inputs:** The plan has been prepared on the basis of work completed and risk from the VM Wildfire Risk Model
- The plan overlaps with inputs from local subject matter experts (SMEs), prior inspections and local customer/agency contacts
- Regions:** Plan targets have been balanced with respect to a 12-year plan across each of the regions
- Estimated cost:** A direct cost of **~\$445 million** is estimated for pre-inspection and tree work spend

 Action Items					
Workstream	Action Item (Initial Date)	Description	Responsible party	Resolution	Date
Enhanced Vegetation Management	EVM Risk Ruydown Curve WGR- 11/3/2020	Plot and show the 1130 miles (80-90% Carry Over Work that needs to be finished) on the EVM-027 Dike/Tree and Overhang (Wgh/oa) Risk Ruydown Curve		Not Applicable – Scope has moved away from the prior Carryover plan	11/13/2020
Enhanced Vegetation Management	EVM programs timeframes WGR- 11/3/2020	Determine the overall time frame and pace for the EVM program when 50k+ potential trees are factored into the 2200 miles of WFD Circuits. Understand which of the 2200 miles need EVM work		In Process – Forecast program time is being developed alongside tree weighted risk	11/20/2020
Enhanced Vegetation Management	EVM programs and resources WGR- 11/3/2020	Provide a full picture of all vegetation management work outside of just the enhanced vegetation management.		In Process – Review of other programs underway, dependent upon total EVM scope for resourcing	11/20/2020
Enhanced Vegetation Management	System hardening and EVM work overlay WGR- 11/3/2020	Evaluate the areas that are being targeted by system hardening to align for operational efficiencies between the two programs. Dependency on 2021 SH Work plan		Not Applicable – Changes to system assets and structure limit ability to complete to EVM standards	11/13/2020
Enhanced Vegetation Management	Tree density statistic WGR- 11/3/2020	Show tree density from the 2019 and 2020 work. Provide tree density number per mile processed so we show future work 2021, 2022		Ready Mapped – UDM Tree density will be examined for inclusion in future risk modeling	11/13/2020

Follow-Ups and Next Steps



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Upcoming Review Agenda Items

11/20/2020

- Final Decision on System Hardening Plan (If feasible)
- Initial Review into Inspections 2021 Plan
- Initial Review into Repairs 2021 Plan
- Close out Completed Action Items

12/01/2020

- Final Decision on EVM 2021 Plan (If feasible)
- Decision Items needed for Inspections 2021 Work Plan
- Close out Completed Action Items

12/08/2020

- Decision needed on Inspection. Initial views of 2021 Work Plan
- Decisions needed on Repairs 2021 Work Plan
- Tier 1 – Overhead Conductor Replacement Discussion

24



Complete Action Items from 11/09/2020 (Federal Monitor Meeting)

Workstream	Action Item	Description	Responsible party	Resolution	Date
Risk Models	Risk Model Comparison WGR: 10/30/2020	Include high risk areas outside of MFD (non-Eric) in the next iteration of the Du Model	[REDACTED]	Risk Mapped - This will be added as an enhancement to the model roadmap	11/23/20
Risk Models	Risk Model Enhancement	Incorporate 2019 LIDAR data and species data in the next iteration of the Du Model	[REDACTED]	Risk Mapped - This will be added as an enhancement to the model roadmap	11/23/20
Risk Models	Risk Model Enhancement	Include signs on the consequence side for the next iteration of the Du Model	[REDACTED]	Risk Mapped - This will be added as an enhancement to the model roadmap	11/23/20
Risk Models	Model Documentation	Asa to be added to charters slide 22 (see 11.09.2020 Wildlife Risk Model Review Packet)	[REDACTED]	Completed	11/23/20

25

Complete Action items

Workstream	Action Item	Description	Responsible party	Resolution	Date
Inspection	Inspection Workstream Owner	Schedule meeting to identify the owner of the inspection and/or repair workstream		Completed – inspection lead identified	10/21/2020
Risk model	Risk Model Deep Dive	The risk model needed further detailed discussion before voting and approval could take place		Completed – Follow up session held 10/27. Detail on the risk model was provided in advance of 10/30 approval meeting.	10/23/2020
RIM	RIM review meeting	Schedule additional meeting for RIM review		Completed – Follow up meeting was held on 11/05	11/05/2020
Governance meetings	Meeting updates	Update meeting to be 90 minutes		Completed – future meetings updated – effective 11/13	11/05/2020
Governance meetings	A [REDACTED] future meetings	[REDACTED] to be added to future meetings to provide additional direction from audit		Completed – [REDACTED] as been added to all future governance meetings	10/23/2020



Action Item Tracking

Workstream	Action Item	Description	Responsible Party	Resolution	Date
Risk Models	Risk models comparison WGR - 10/30/2020	Compare risk comparison between the 2018 risk model and 2023 risk model to highlight movement of CRs (Targeting top 100 in utility ERF).		Completed	11/11/2020
Risk Models	Deep dive risk model session WGR - 10/30/2020	Hold a Deep Dive Session with (1) the Federal Monitor and (2) the Operational Observer.		Completed	11/11/2020
Risk Models	Risk model contributors	Highlight contributors to the risk model.		Completed	11/11/2020
Risk Models	Model process documentation	Bring the Model Process documentation to the fore for an official approval.		In Process - In progress for inclusion in deep dive sessions.	11/20/2020
Risk Models	Egress Consideration	Factor in Egress into process for selecting the protection zone to be worked.		Road Mapped - Egress has been considered as a future enhancement for the risk model.	11/09/2020
Workforce Governance Charter	Charter update	Update charter to include review of broader set of WFR risk reduction activities and project oversight.		Complete Risk charter has been updated, included in attached materials.	11/09/2020



Action Items from 11/09/2020 (Federal Monitor Meeting)

Workstream	Action Item	Description	Responsible party	Resolution	Date
Risk Models	Risk models comparison WGR – 10/29/2020	include high risk areas outside of RTD (see Enr) in the next iteration of the Da Model		Road Mapped – This will be added as an enhancement to the model road map	XXX
Risk Models	Risk Model Enhancement	incorporate 2018/19 DAIR data and routing data in the next iteration of the Da model		Road Mapped – This will be added as an enhancement to the model road map	XXX
Risk Models	Risk Model Enhancement	include Egress on the comparison side for the next iteration of the Da Model		Road Mapped – This will be added as an enhancement to the model road map	XXX
Risk Models	Model documentation	area to be added to charts on slide 22 (see 11/09/2020 email for Risk Model for new Peak 1)		Completed	11/18/2020

Appendix

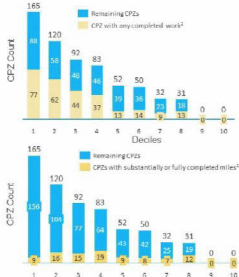


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Comparison of the Tree Weighted model to the Dx Model

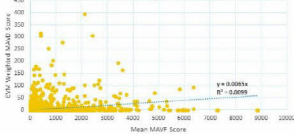
Overlap between the Risk Models



Key Take-aways

- The correlation between the EVM weighted prioritization scores and the MAVF score is low at 0.0099
- Of the top 20% of circuits that were identified in the Dx model, 285 remained in the top two deciles of the Tree Weighted model.
- Of the top 100 CPZs, only 14 were common across both prioritization lists
- Over 10% of the CPZs identified to have risk in the Dx model were zero risk locations in the tree weighted model.

MAVF vs. EVM Weighted MAVF Score



PG&E 22 circuits have seen at least five unique PSPS events in the 2019-2020 timeframe

Seven PSPS Events			Six PSPS Events			Five PSPS Events		
Circuit Name	County	Total Customer Events	Circuit Name	County	Total Customer Events	Circuit Name	County	Total Customer Events
ORO FINO 1101	BUTTE	25091	WYANDOTTE 1103	BUTTE	13105	WYANDOTTE 1107	BUTTE	14544
ORO FINO 1102	BUTTE	21561	NOTRE DAME 1104	BUTTE	4317	BANGOR 1101	YUBA	12328
PARADISE 1104	BUTTE	14710	PARADISE 1106	BUTTE	3503	DOBBINS 1101	YUBA	7096
PARADISE 1105	BUTTE	12054				CHALLENGE 1102	YUBA	6719
CLARK ROAD 1102	BUTTE	10410				KANAKA 1101	BUTTE	4572
PARADISE 1103	BUTTE	5534				BANGOR 1101	BUTTE	4315
BUTTE 1105	BUTTE	3194				KANAKA 1101	YUBA	417
BIG BEND 1102	BUTTE	2772				CHALLENGE 1102	BUTTE	266
WYANDOTTE 1105	BUTTE	2560				BUCKS CREEK 1101	PLUMAS	35
BIG BEND 1101	BUTTE	2332						

Construction Ready				Other In Flight			
Protection Zone Name	Project Miles	Mean MAVT Score	Total Project MAVT	Protection Zone Name	Project Miles	Mean MAVT Score	Total Project MAVT
KONNCT	0.82	0.0091	0.003	LOS GATOS	0.41	0.0125	0.038
KONNCT	0.78	0.0091	0.060	LOS GATOS	0.87	0.0125	0.080
PINE GROVE	0.41	0.0098	0.028	LOS GATOS	0.77	0.0128	0.071
PINE GROVE	2.40	0.0098	0.049	LOS GATOS	1.50	0.0125	0.138
PINE GROVE	1.45	0.0098	0.018	LOS GATOS	0.50	0.0125	0.048
WEST POINT	1.94	0.0035	0.060	LOS GATOS	0.87	0.0125	0.080
WEST POINT	1.01	0.0035	0.031	LOS GATOS	1.00	0.0125	0.148
WEST POINT	1.61	0.0035	0.039	LOS GATOS	1.48	0.0125	0.137
WEST POINT	0.80	0.0035	0.075	LOS GATOS	0.88	0.0125	0.054
WEST POINT	1.11	0.0035	0.074	KONNCT	0.58	0.0091	0.046
WEST POINT	1.05	0.0035	0.053	KONNCT	0.50	0.0091	0.040
MWVU	2.39	0.0030	0.080	EL DORADO	10.15	0.0041	0.282
MWVU	2.18	0.0031	0.051	MWVU 1E	1.80	0.0038	0.074
MWVU	0.76	0.0031	0.015	PINE GROVE	1.50	0.0030	0.059
SPRING	0.81	0.0031	0.014	WEST POINT	1.26	0.0035	0.039
SALT SPRING	1.30	0.0009	0.011	WEST POINT	1.45	0.0035	0.044
SALT SPRING	1.02	0.0009	0.010	MWVU 1E	11.60	0.0029	0.228
SALT SPRING	2.07	0.0009	0.027	CAMP EYES	0.44	0.0011	0.008
SALT SPRING	1.80	0.0009	0.028	CAMP EYES	1.59	0.0011	0.029
SALT SPRING	1.00	0.0009	0.020	CAMP EYES	1.95	0.0011	0.041
SALT SPRING	1.79	0.0009	0.011	CAMP EYES	1.90	0.0011	0.033
SALT SPRING	1.05	0.0009	0.014	CAMP EYES	0.87	0.0011	0.015
SALT SPRING	1.04	0.0009	0.014	CAMP EYES	8.87	0.0011	0.115
MWVU	1.88	0.0002	0.008	HEWLETT	2.74	0.0017	0.054
MWVU	2.05	0.0002	0.008	SALT SPRING	1.81	0.0009	0.019
				MWVU 1E	2.28	0.0007	0.014
				MWVU 1E	1.44	0.0002	0.003

Estimating Complete			
Protection Zone Name	Project Miles	Mean MAVT Score	Total Project MAVT
PINE GROVE	1.58	0.0038	0.050
PINE GROVE	1.34	0.0038	0.019
WEST POINT	1.83	0.0035	0.056
WEST POINT	2.81	0.0035	0.080
SALT SPRING	1.48	0.0009	0.012
MWVU 1E	2.19	0.0002	0.012
MWVU	1.89	0.0002	0.004

Key Takeaways			
Category	Count	Total Miles	Total MAVT
Construction Ready	25	135	0.003
Estimating Complete	7	13	0.003
Other in Flight	27	62	0.003
Other in Flight (to be stopped)	350	1,165	0.003

