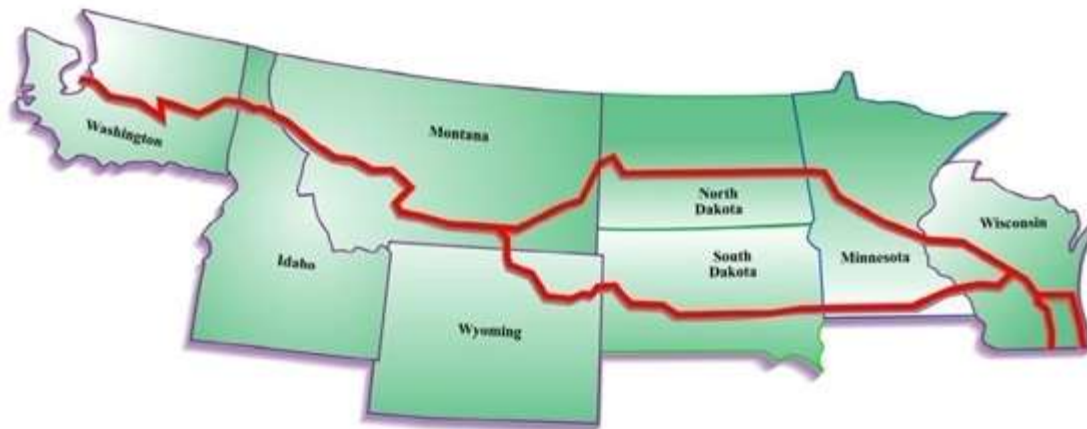




Technician's Forum



Sponsored by the Operations Task Force

August 16, 2017

This webinar will be recorded



Agenda

Technician's Forum

- Project background
- Feature presentations
 - Using iPads for Field Data Collection
 - Alternative Power Sources for Rural Deployment
- Closing comments

This webinar will be recorded

Background

- Forum recommended by Ops Task Force that meets monthly to discuss operational topics
- Task force recognized need for more technical discussions
 - More than WHAT agencies are doing
 - Focus on HOW agencies are doing it





Background

- Western States Forum suggested as a model
- Chose mini-forum format
 - 1.5 hours vs. 1.5 days
- North/West Passage states identified topics of most interest



www.westernstatesforum.org

Background

- Forum purpose is to provide technician's with an opportunity to talk with each other and learn about ITS deployments in other states



Photo courtesy of MnDOT



USING IPADS FOR FIELD DATA COLLECTION

Joe Schmit, Washington DOT

Using iPads for Field Data Collection



Joe Schmit, Technology Resource Manager
Maintenance Division - Washington State Department of Transportation

Our Team

Maintenance Division

- *Joe Schmit – Technology Resource Manager*
- *Oai Tang – Training and Tech Support Lead*
- *Pete Burkhard – Training and Tech Support Specialist*
- *Keisha Chinn – Data Management and GIS Manager*

IT Division

- *Josh Hudson – Lead App Developer*
- *Brian Blood – App Developer*
- *Reed Hunter – Lead GIS Developer*



Wildlife Carcass Removal Report

Office			Region																			
Hazel			Hazel																			
Date Removed	State Route	Mile Post	Setting	R/W Fencing	Species	Sex	Age	Other Wildlife (record name)	Comments	Reporter												
			Wooded	Open	Residential	Other	Shrubland	Open Low	Open High	Other	Unfenced Deer	Black Tailed Deer	White Tailed Deer	Elk	Big Horn Sheep	Mountain Sheep	Black Bear	Cougar	Male	Female	Adult	Juvenile
4/19/15	530	4.1	X																			
6/24/15	530	42.9	X																X	X		
6/30/15	530	26.6		X															X		X	
7/14/15	530	37.5	X																X			
7/21/15	530	37	X																X		X	
11/11/15	530	33.3		X															X	X		
11/11/15	530	34.7		X															X			
11/11/15	530	29.8	X																X		X	
11/24/15	530	33.5	X																X		X	
11/24/15	530	33.8	X																X			

CROSS CULVERT INVENTORY FOR STATE RT. 26 CONTROL SECTION 3830 PAGE 2

Whitman County

MP.	#	DATE	INLET	SIZE	END TYPE	TYPE	LENGTH	COMMENTS
		165/170	R or L		R L	CULVERT		
102.3	1		L	18"	P P	M-G	110'	
102.35	2		L	18"	P P	M-G	110'	
102.4	3		L	24"	B B	M-G	90'	
102.5	4		L	18"	P P	M-G	50'	
102.5	5		L	24"	H H	M-G	80'	
102.55	6		L	18"	P P	M-G	80'	
102.6	7		L	18"	P P	M-G	60'	
102.83	P		L	24"	E B	M-G	120'	
103.05	1		L	24"	H H	M-G	50'	
103.3	2		L	24"	P P	M-G	55'	
103.4	3		L	18"	P P	M-G	52'	
103.6	4		L	24"	P P	M-G	80'	
103.7	5		L	18"	P P	M-G	75'	
103.9	6		L	18"	P P	M-G	80'	
104.2	1		L	18"	P P	M-G	60'	
104.3	2		L	24"	P P	M-G	60'	
104.7	3		L	24"	P P	M-G	80'	
104.8	4		L	24"	P P	M-G	100'	
104.9	5		L	30"	H P	M-G	90'	
105.2	1		L	18"	P P	M-G	110'	
105.3	2		L	18"	P P	M-G	90'	
105.4	3		L	30"	P P	M-G	75'	
105.5	4		L	18"	P P	M-G	75'	
105.7	5		L	30"	H H	M-G	50'	
105.9	6		L	24"	H H	M-G	20'	

Map Reports Records Inventory Control Points Summary Records NW Weathernet Admin

Layers View: Basemap Tools Help Hide Header



(1 of 2)

Material
Maintenance WS
Equipment # 036
Sensor Reading 3/1
Date 4:0
Granular Name Salt
Material Type Soli
Road Temp. 28°
Air Temp. 32°



Washington State
Department of Transportation

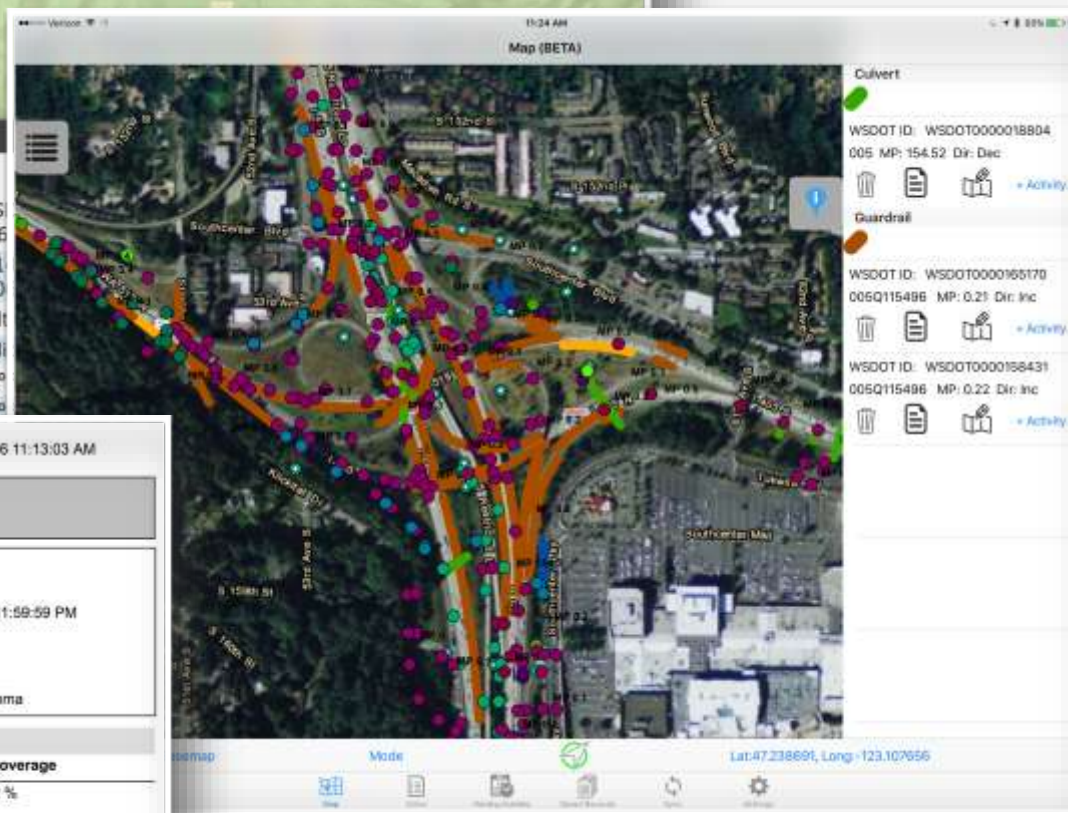
Report Date: 3/20/2016 11:13:03 AM

Feature Activity Coverage Report

Selection Criteria

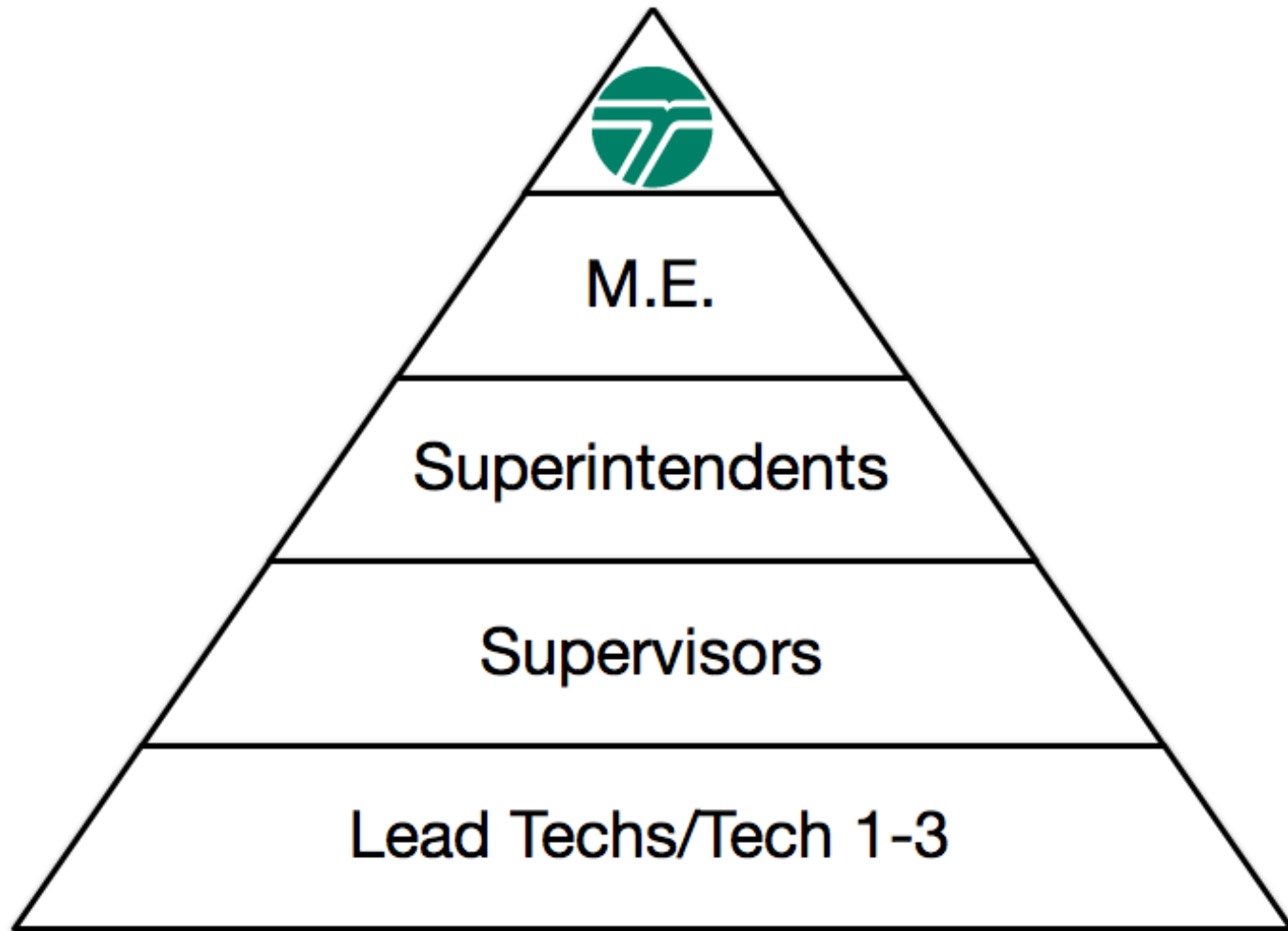
Feature Type: Catch Basin Activity: All
Start Date: 7/1/2015 12:00:00 AM End Date: 6/30/2016 11:59:59 PM
SR:
Start Mile Post: End Mile Post:
Region: Olympic Maintenance Area: Area 1 Tacoma

Catch Basin	HATS Feature Count	Total Feature Count	% Coverage
Cleaning: 511	5925	8.62 %	
Inspection: 3674	5925	62.01 %	
Repair: 2	5925	0.03 %	



***GET THE RIGHT INFORMATION INTO
THE RIGHT PEOPLES HANDS IN A
FORMAT THAT ALLOWS THEM TO
QUICKLY UNDERSTAND AND MAKE
DECISIONS.***

Empowered, Efficient and Effective



Highway Activities Tracking System (HATS) - Application

- Web app (developed in house)
 - .NET MVC web front end
 - Microsoft SQL Server 2014 back end database
 - ESRI ArcGIS SDE, ArcGIS Server
- Mobile app (developed in house)
 - iOS Swift for iPad
 - ESRI iOS SDK for GIS
 - SQLite database (for mobile offline sync)

Data stored on device

ActivityRecords	zero KB	1/11/16, 4:05 PM
FileLibrary	30.6 MB	6/1/16, 3:58 PM
HATS-basemap.geodatabase	279.2 MB	1/11/16, 4:04 PM
HATS-basemap.geodatabase-shm	32 KB	6/8/16, 8:36 AM
HATS-basemap.geodatabase-wal	zero KB	1/11/16, 4:04 PM
HATS-features.geodatabase	74.3 MB	6/8/16, 8:36 AM
HATS-features.geodatabase-shm	32 KB	6/8/16, 8:36 AM
HATS-features.geodatabase-wal	zero KB	6/8/16, 8:36 AM
hatsDB.sqlite3	254.8 MB	6/1/16, 3:58 PM

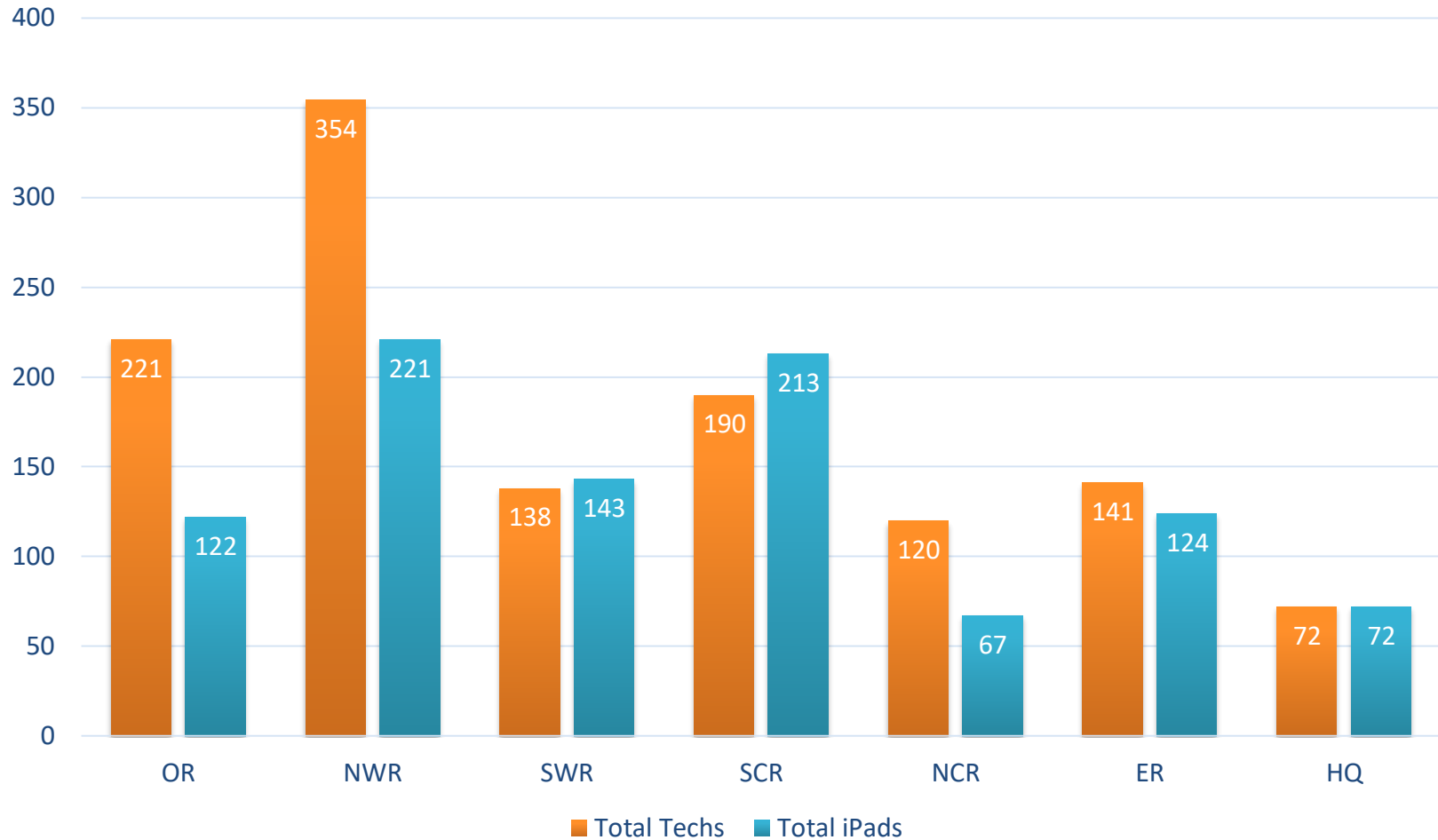
Entire app and data consumes roughly 600 MB of 32 GB storage

HATS – Mobile Hardware

- 1,200 iPad Air 2
 - 32 GB storage
 - Cellular chip (Verizon) – provides integrated GPS and A-GPS capabilities
 - GPS is recreational grade (+/- 10m)
 - Ruggedized with LifeProof Nuud case, hand and shoulder straps and floatation jacket when working on/around water
 - Four year life cycle



Employee to iPad Breakdown



Wireless Infrastructure

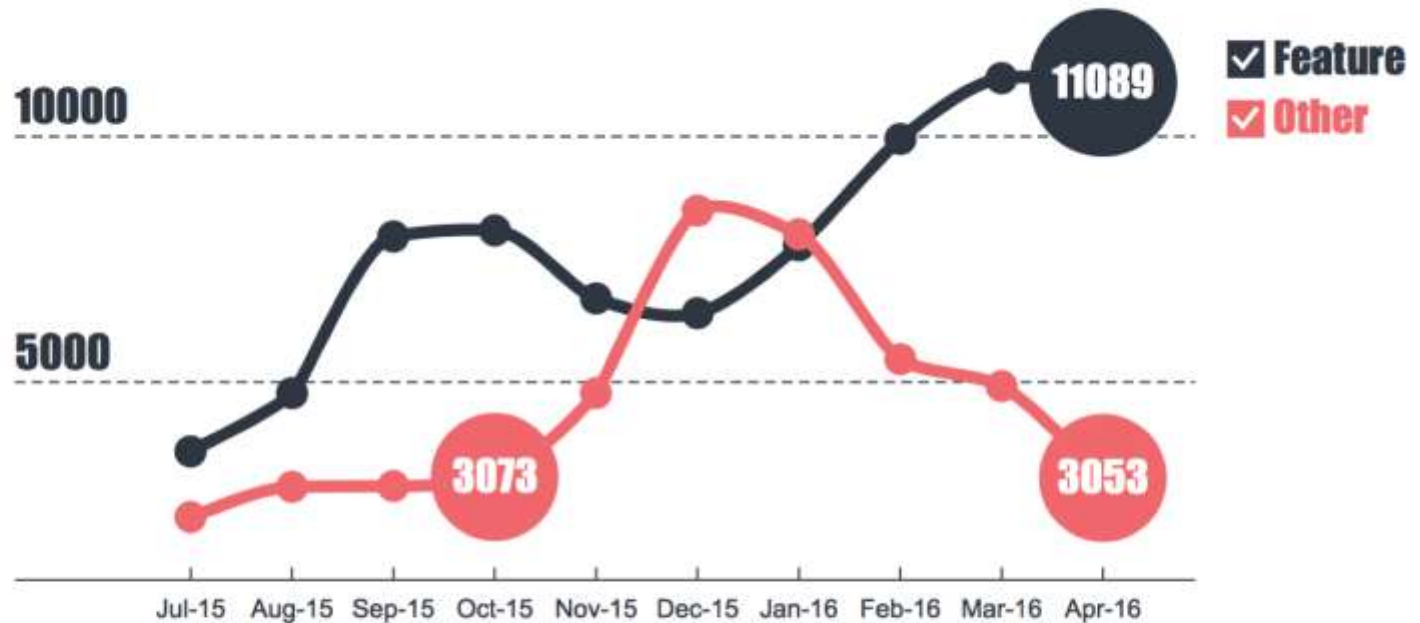
- The project required an overhaul and build out of existing wireless network
- 270 - Cisco® Aironet® 2700 Series wireless access points installed – connected shops in the yard and crew room
 - 2.4GHz 2.2dBi swivel dipole antenna primarily used
 - \$1100 per unit
- Implemented Controlled Based Wireless, Identity Services Engine (ISE) and Certificate Authority
 - WPA2, AES, WSDOT Active Directory username and password credentials, EAP-Fast and internally generated certificate

Cost Breakdown

- \$1.5 million overall
 - \$750k – iPad hardware and LifeProof protective gear
 - \$300k – Application development
 - \$300k – Wireless infrastructure
 - \$130k – ESRI software licensing
 - \$30k – Meraki MDM

Data Collection Breakdown

HATS Data



Total Records Collected Since July 1, 2015

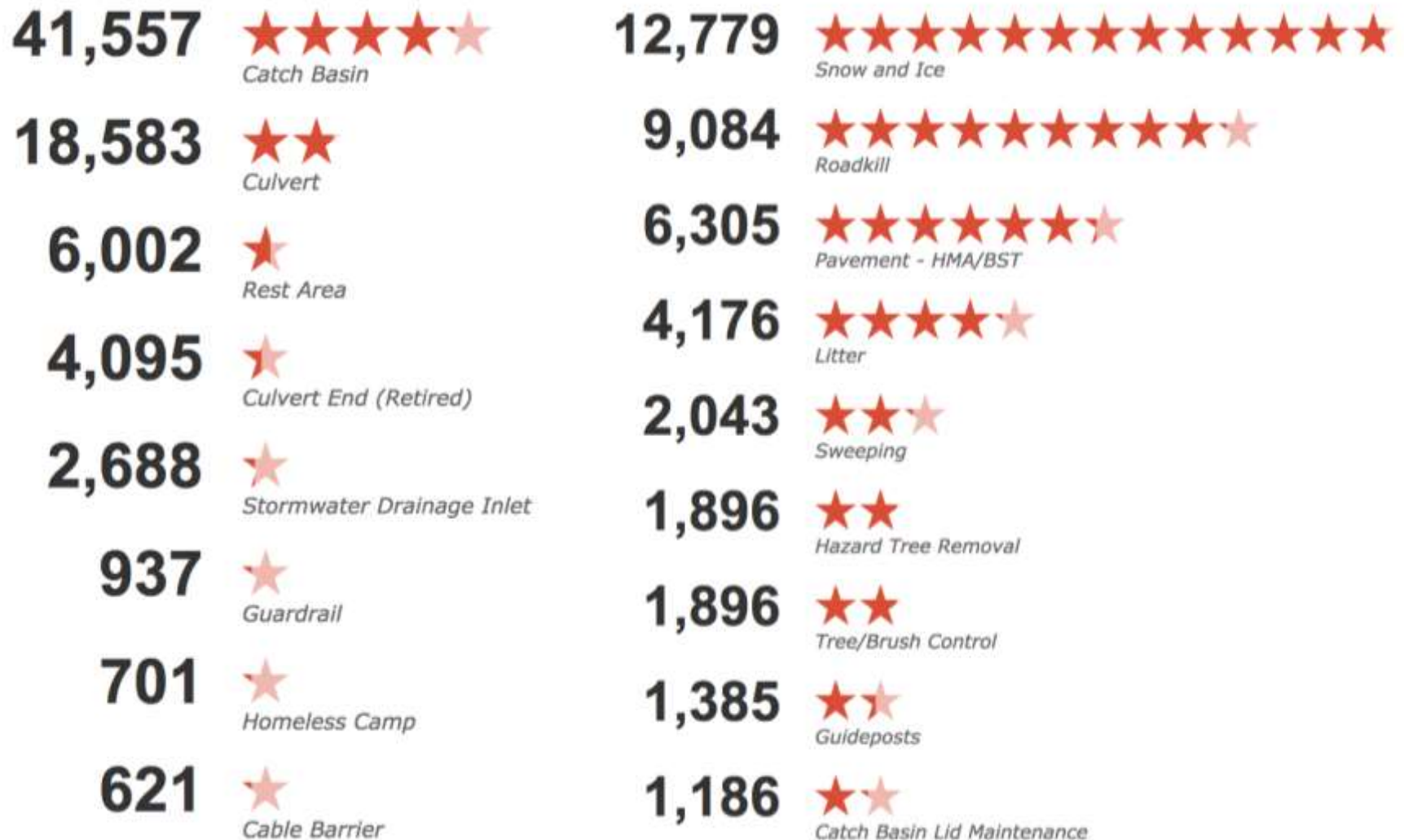
123,335

Data analysis

Winter increase in "other record" activities due to snow and ice data collection.

Spring/summer increase in feature based activities due to BMP, NPDES and drainage inspection requirements.

Data Collection Breakdown



LIVE APPLICATION DEMO

QUESTIONS FOR JOE?





ALTERNATIVE POWER SOURCES FOR RURAL DEPLOYMENT

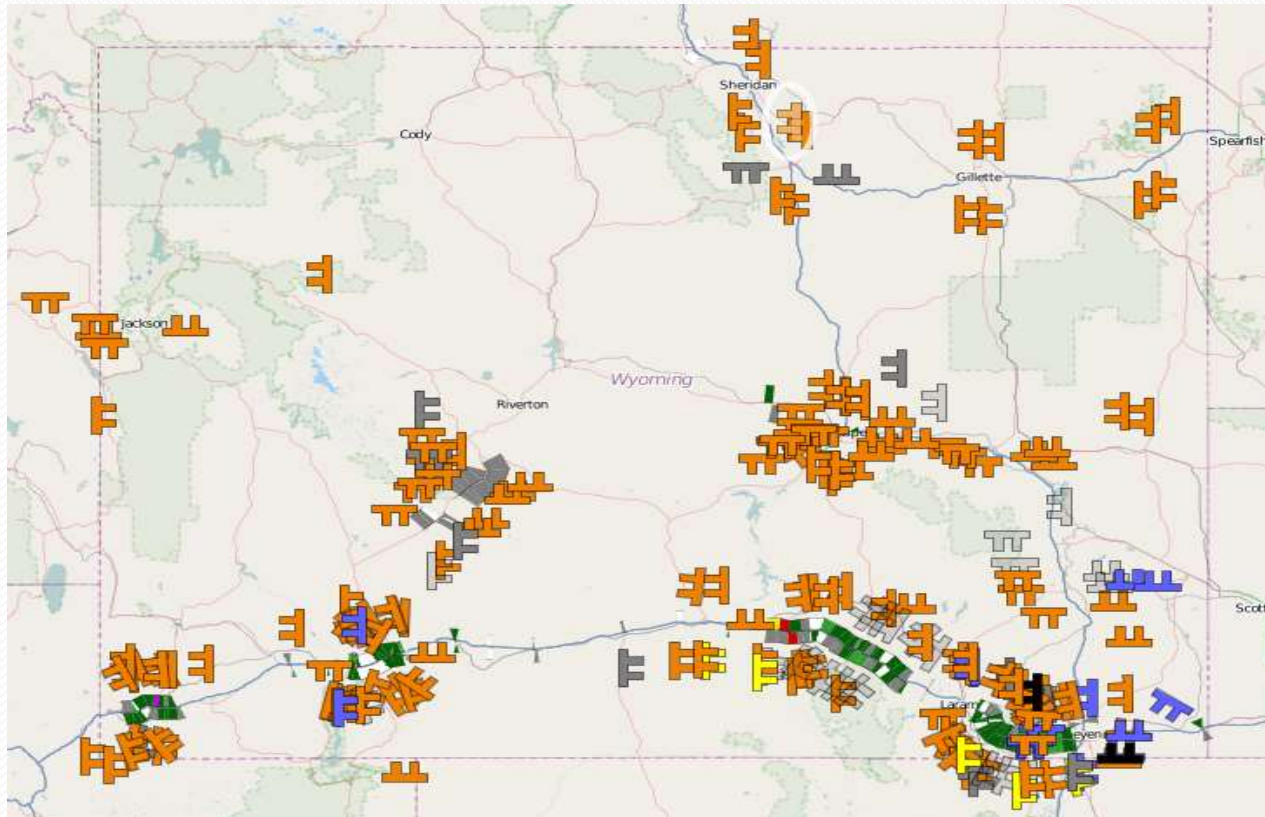
Jason Fernandez, Wyoming DOT

Alternative power sources for rural deployment

Road Map

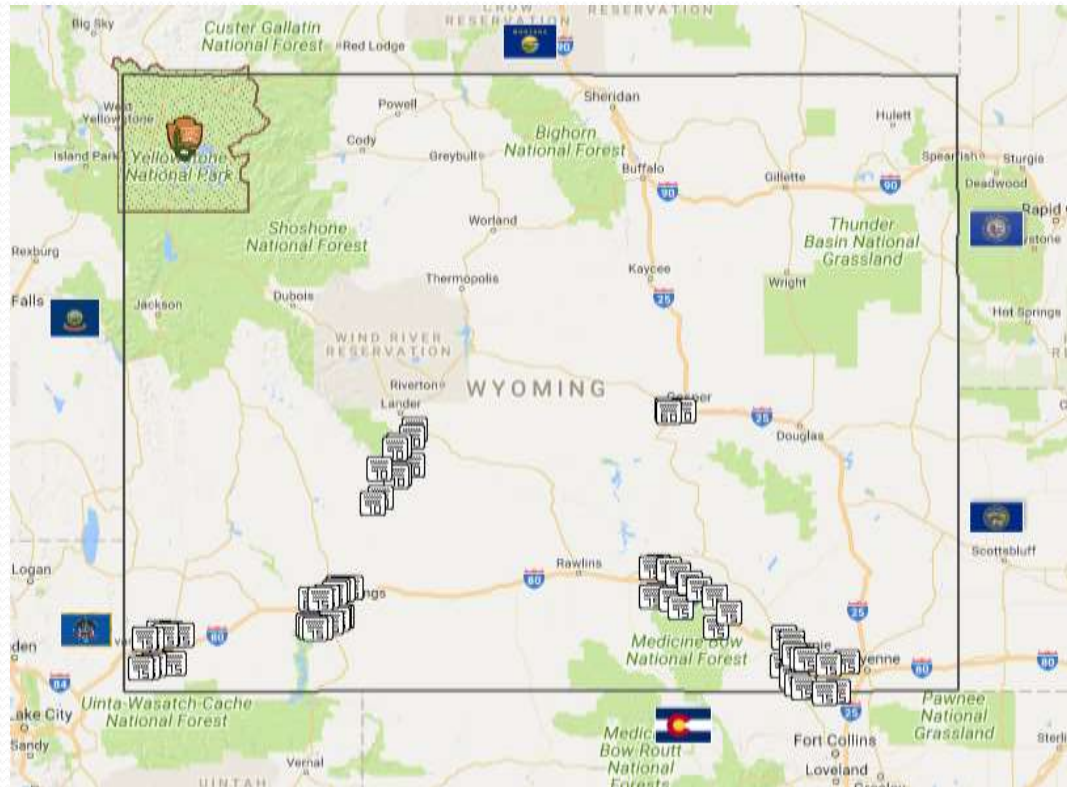
1. Background Information
2. Solar
3. Wind generation
4. Conclusions/Recommendations
5. Question & Answer Session

Background Information



137 DMS spread over 97,914 square miles

Variable Speed Limits



- 6 Current VSL zones
 - 4 zones on I-80(67 VSLs)
 - 1 zone on I-25(currently 3 VSLs plans for 18)
 - 1 zone on Wyoming 28 (10 VSLs)
 - Soon to come on I-90

88 VSLs currently

Road Weather Information System



92 RWIS stations

Solar deployments

Current Spec

- 325 W photovoltaics
 - Nearly 60 Volt max.
 - 5.6 Amp
 - 25 year service life
-
- We have used Kyocera, BP, and others

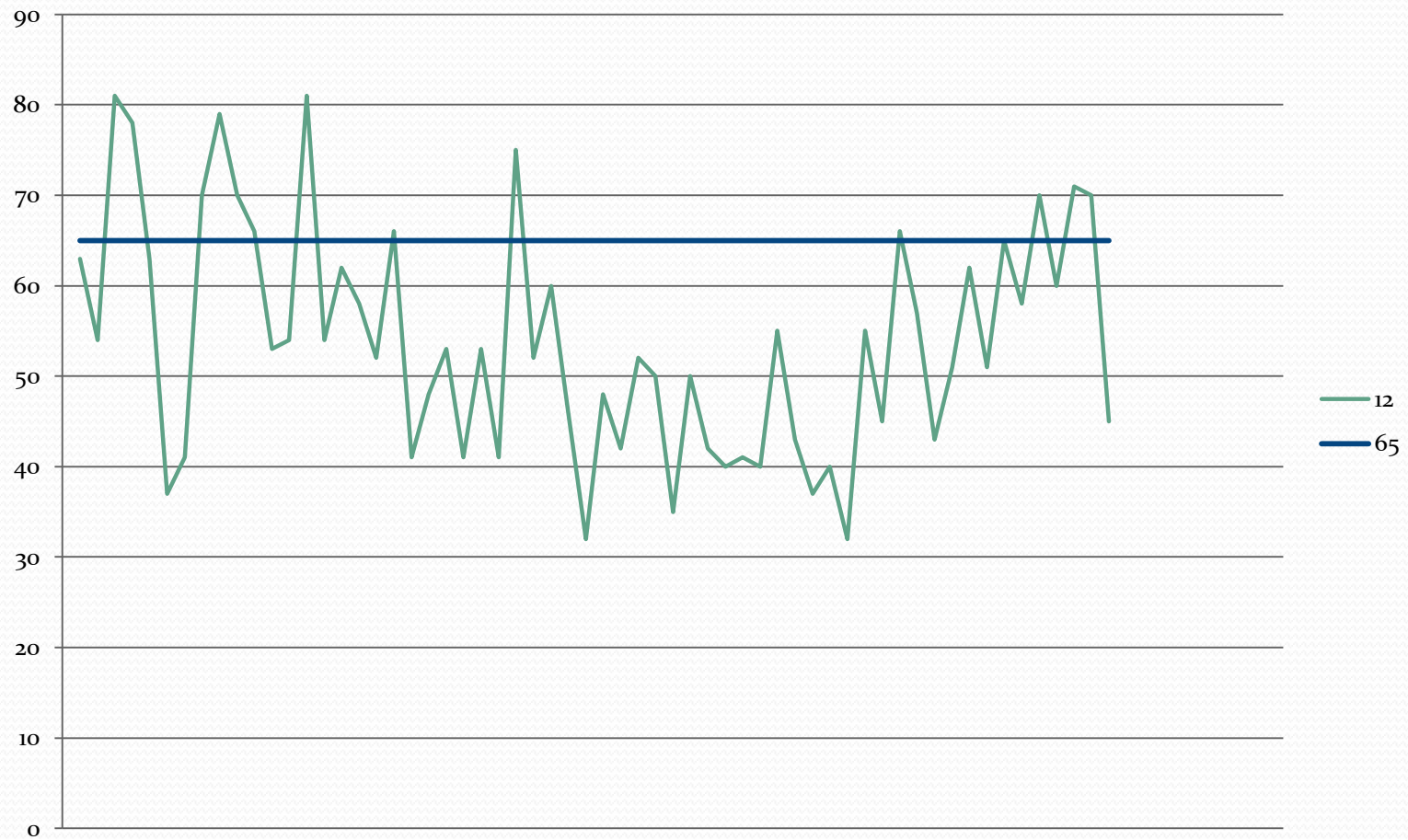


Lessons learned

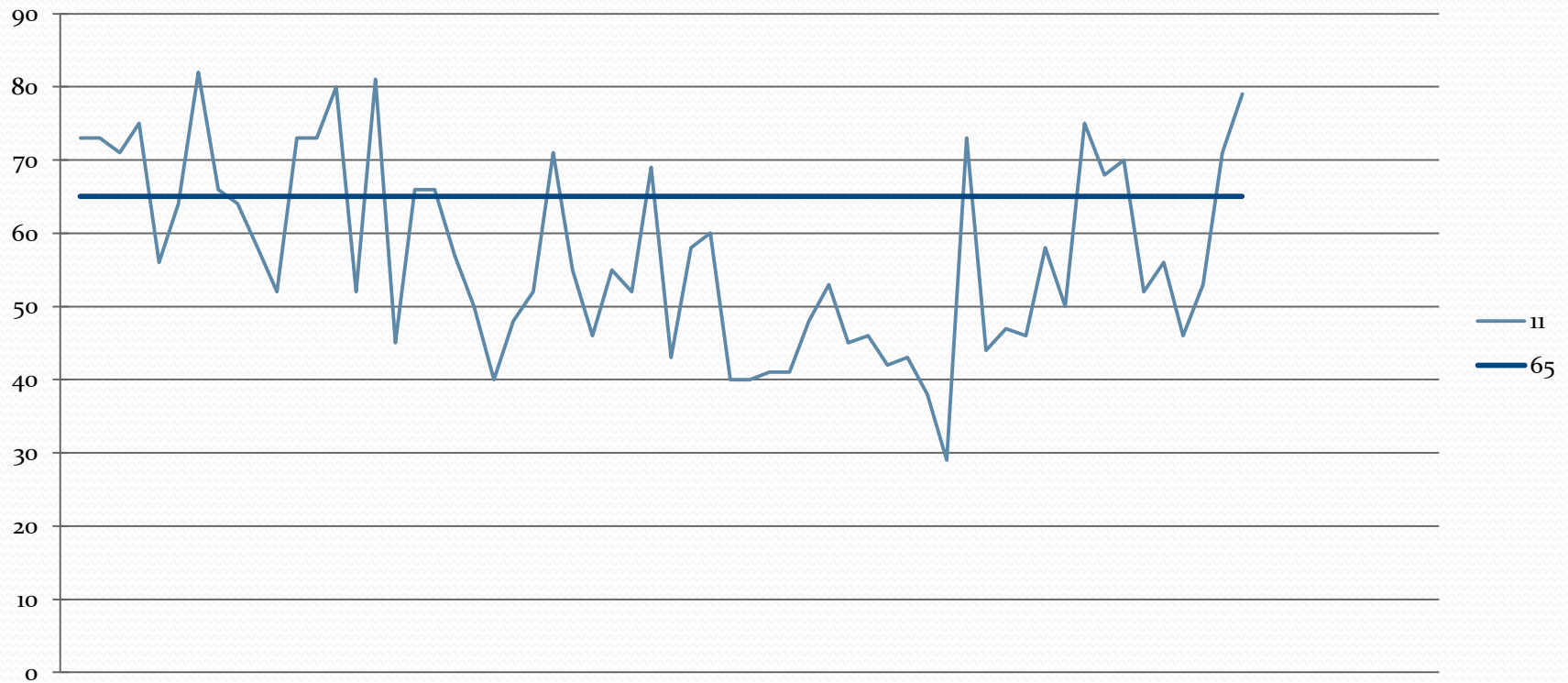
- Avoid damage to solar cells from snow removal
 - Place installation as far away from road alignment as possible
 - Deter of road collisions
 - When plowing, stop snow from hitting installation
 - Put installation on alignment so that cell face away from road
- Snow build up needs to be removed from installations

Wind Generation

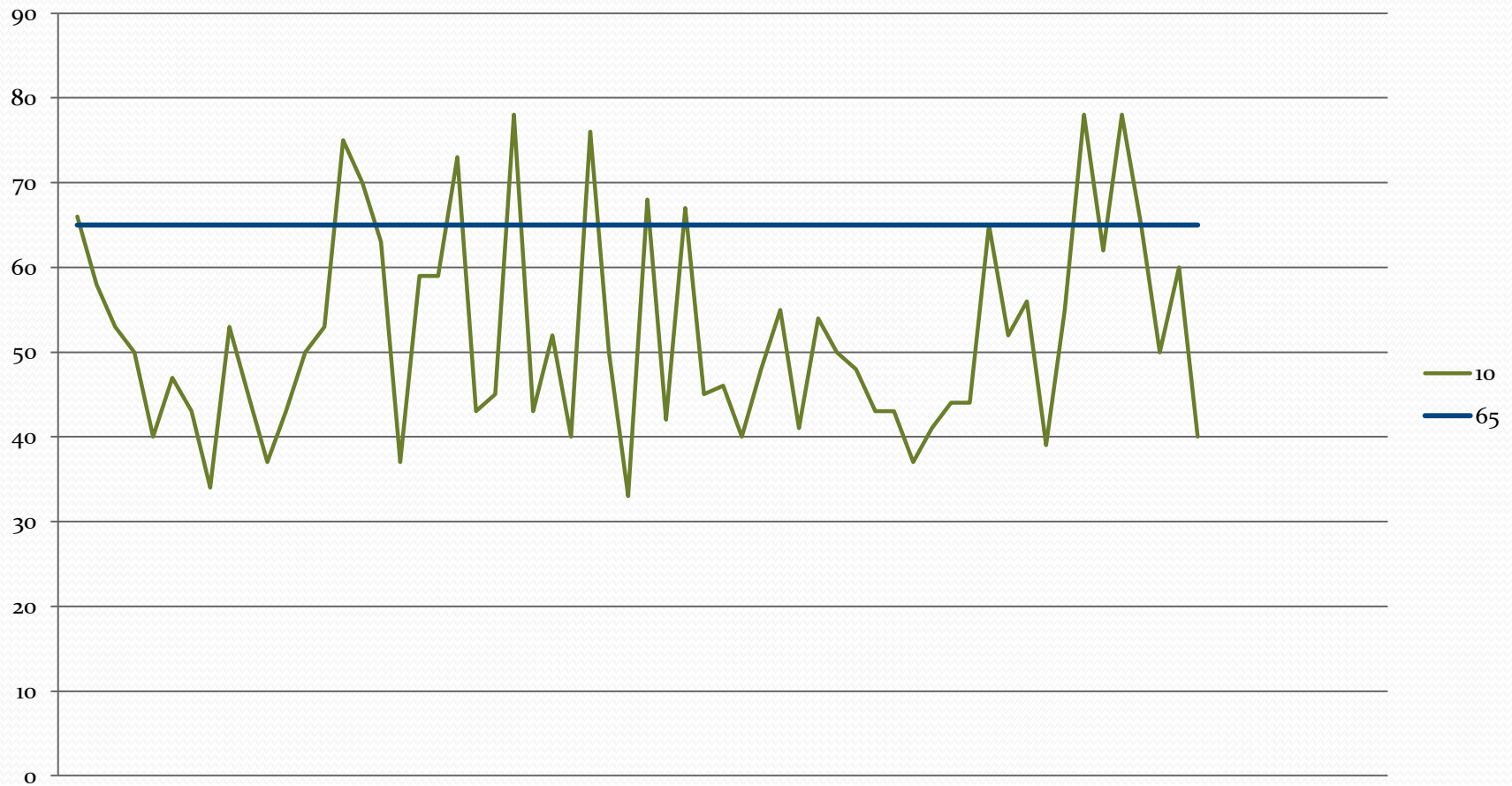
2012 wind total



2011 wind total



2010 wind total



Primus AR30

- Voltage 12V or 24V
- 400 Watts
- Start-up wind speed= 8 MPH
- Monthly Output @12-13.4MPH= 30 KWH
- Low Maintenance



Taisei (Vertical Axis Wind turbine)

- 400 Watts @27 MPH winds
- Min wind velocity =6 MPH
- Max wind velocity=130 MPH



Lessons learned

- Make sure supporting structure can withstand strong conditions



Conclusions

Weakest link

- Chemical storage of energy
 - Currently spec is 6 batteries (@approx \$275 per Battery)
- Replacement life
- Frequent maintenance



QUESTIONS FOR JASON?



ANY OTHER QUESTIONS?





Closing Comments

- **Contacts for more information**
 - Joe Schmit, Washington DOT
 - schmitj@wsdot.wa.gov, 360-705-7838
 - Jason Fernandez, Wyoming DOT
 - jason.fernandez@wyo.gov, 307-777-2956
 - Brandon Beise, North Dakota DOT
 - bbeise@nd.gov, 701-328-4359

www.nwpassage.info/projects/phase11/?project=11.1