

U.S. Coast Guard Ninth District

- Responsible for all Coast Guard operations in the U.S. Great Lakes
- 6,700 miles of shoreline and 1,500 miles of international border with Canada
- Headquartered in Cleveland, Ohio
- 6,000 active personnel
- Multi-mission services including search and rescue (SAR), maritime safety and security, maritime law enforcement

Need

- Focus towards Auxiliary stations in the Great Lakes
 - Assist parent stations in their operations
 - Operated mainly by Coast Guard volunteers & civilians
 - Number of volunteers decreased over recent years
 - Required analysts to develop possible courses of action
- Options include seasonal or weekend staffing, or at worst, closure
- Presents considerable risks to the boating public
- Imperative to perform a complete analysis of risks associated with various mitigation strategies

cgSARVA System

- Comprehensive visual analytics system
- Supports decision making and risk assessment
- Interactive analysis of trends, patterns and anomalies among Coast Guard operations
- Allows analysis of risks associated with closing one or more Coast Guard stations
 - Find optimal stations that absorb work load of the closing station
- Currently being used by analysts at the U.S. Ninth District & Atlantic Commands

System Overview

Calendar View

Max. Days: 7

2008-2009	M	T	W	R	F	S	S	Total
1/9-1/13			1	3	0	7	5	16
1/14-1/20	2	0	19	0	5	2	6	34
1/21-1/27	3	1	1	0	0	2	1	8
1/28-2/3	0	1	4	1	1	2	1	10
2/4-2/10	4	7	0	0	1	0	4	16
2/11-2/17	2	1	5	1	2	3	3	17
2/18-2/24	0	4	2	4	0	1	2	13
2/25-3/2	1	1	4	0	1	1	2	10
3/3-3/9	2	2	3	5	4	7	2	25
3/10-3/16	3	5	2	3	8	7	2	30
3/17-3/23	1	0	3	1	4	3	3	15
3/24-3/30	2	13	0	6	3	3	3	30
3/31-4/6	3	2	2	2	3	4	6	22
4/7-4/13	6	1	5	2	5	11	1	31
4/14-4/20	13	7	11	3	9	7	5	55
4/21-4/27	4	18	5	9	4	9	9	58
4/28-5/4	3	4	10	2	7	10	13	49
5/5-5/11	9	9	10	10	6	19	4	67
5/12-5/18	5	13	3	6	10	16	3	56
5/19-5/25	9	5	2	11	21	15	30	93
5/26-6/1	33	10	9	20	5	23	40	140
6/2-6/8	12	8	16	23	21	46	7	205
6/9-6/15	30	15	17	14	21	43	66	206
6/16-6/22	26	15	14	20	22	35	35	167
6/23-6/29	17	23	19	26	45	44	56	230
6/30-7/6	23	37	45	19	57	78	70	329
7/7-7/13	22	19	41	18	16	24	93	234
7/14-7/20	29	40	30	31	26	43	27	226
7/21-7/27	33	45	37	18	41	56	74	304
7/28-8/3	25	46	12	40	18	55	39	235
8/4-8/10	18	16	21	30	17	63	48	213
8/11-8/17	10	18	30	17	24	50	67	216
8/18-8/24	26	16	21	15	22	70	47	217
8/25-8/31	12	21	18	7	18	43	64	203
9/1-9/7	6	2	26	11	12	27	26	166
9/8-9/14	10	5	5	19	2	8	22	71
9/15-9/21	6	6	7	7	9	34	29	98
9/22-9/28	6	17	9	6	16	13	14	81
9/29-10/5	3	5	3	7	2	13	23	56
10/6-10/12	6	8	7	6	2	12	22	63
10/13-10/19	20	10	2	4	5	10	6	57
10/20-10/26	7	5	0	3	1	8	30	63
10/27-11/2	5	7	2	2	12	6	11	45
11/3-11/9	1	6	13	7	4	1	36	67
11/10-11/16	3	4	1	2	4	5	24	49
11/17-11/23	1	0	5	3	5	1	3	18
11/24-11/30	3	5	3	0	5	11	29	56
12/1-12/7	1	1	1	0	3	0	3	7
12/8-12/14	1	0	1	3	2	1	0	6
12/15-12/21	6	1	0	5	1	3	1	17
12/22-12/28	0	0	1	3	2	4	10	20
12/29-1/4	0	1	0	3	1	3	1	9
1/5-1/11	0	1	2	2	1	3	7	16

52395311497453528386610371

Time Series View

Total Count

Change tick frequency: 25 Grid Lines Line Graph Bar Graph Current Value: 1193 Separate Total COTP Distress Type Unit Type

COTP Color Legend

- Buffalo Cotp Zone
- Detroit Cotp Zone
- Duluth Cotp Zone
- Lake Michigan Cotp Zone
- Saulte Ste. Marie Cotp Zone

Map View

View Color Scheme Visualize Heatmap Distress Type Units COTP Zone Data Risk Assessment Help

Map showing the Great Lakes region with various cities and distress points. A heatmap overlay shows areas of higher activity in red and orange. A vertical dashed line is at month 1193.

Distress Menu

SAR Select all Select none

Search:

- 121.5 MHz EPRB
- 243.0 MHz ELT
- 406 MHz EPRB
- 406 MHz PLB
- Abandoned/Derelict
- Adrift (Unmanned)
- Aground
- Aircraft Emergency
- Alleged Violation of Law/Regulation
- Allison
- Anchored (Unmanned)
- Arrest Procedures
- Assist Other Agency
- Beet by Weather
- Boating Under the Influence/Cite and Release
- Boating Under the Influence/Retaining for Local Authorities
- Bomb Threat
- Bomb Threat Against Commercial Vessel/Facility
- Bomb Threat Against Military Vessel/Facility
- Breakaway
- Bridge Closures
- Bridge Jumper
- Building Intruder and Duress Alarm
- Capsize
- Capsize Vessel
- Cargo/Container Inspection
- Casualties to CG Cutters & Aircraft
- Civil Disorders / Disturbances
- Collision
- Commercial Fishing Vessel Safety
- Commercial Vessel Safety Enforcement
- Compassionate Transport
- Decedent Affairs
- Dependent Emergencies
- Derelict Vessel
- Disoriented Vessel
- Diving Accident
- Drug Trafficking
- Escalated
- Enforcement of Security Zones and other Marine Events
- Equipment Failure

Time Slider

Play

Month: 7 Year: 2008

1/2003 9/2010

Day Week Month Year

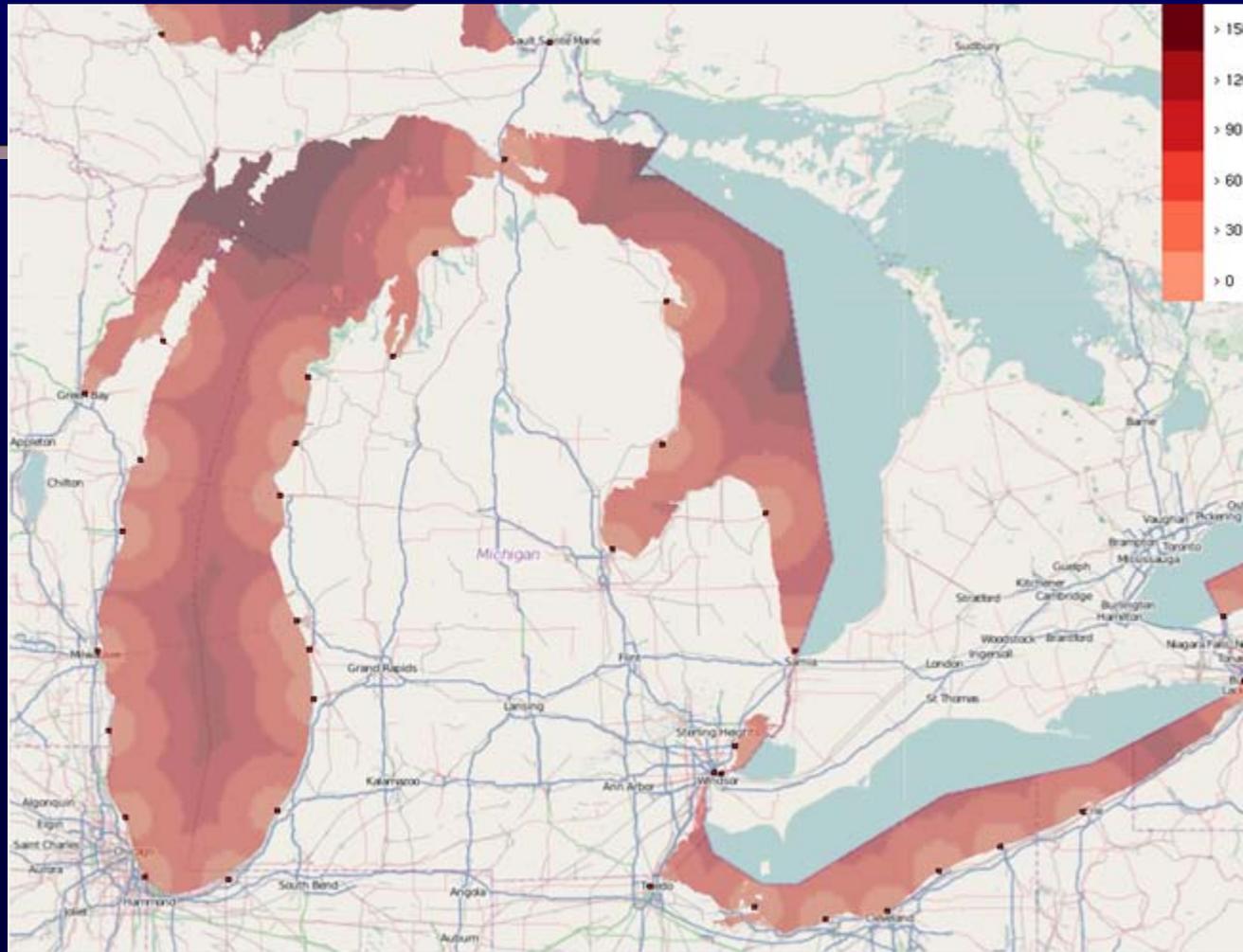
Custom Range: 1/7/2003 to 9/30/2010

Boating Season Non Boating Season

Risk Assessment

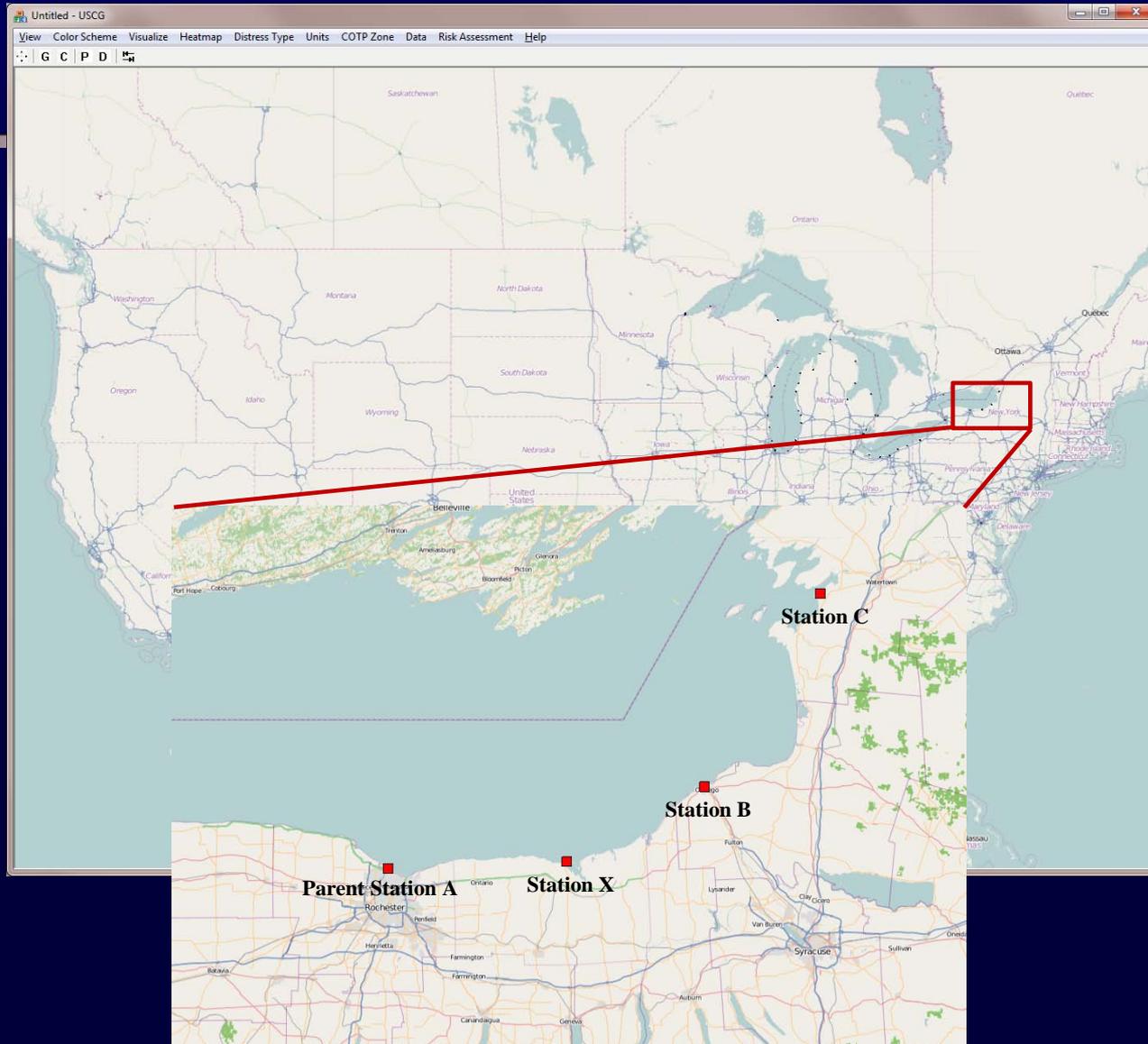
- Coast Guard policy mandates a sortie launch within 30 minutes and have an asset on scene within 120 minutes
- Closing stations requires a thorough assessment to determine stations that :
 - Present the least maritime risks when closed
 - Can successfully absorb these closing stations
- Finding the optimal balance between costs of different decisions

System Features: SAR Risk Profile



Time taken by CG stations to deploy an asset to the Great Lakes to respond to a SAR incident.

Risk Assessment Scenario



Risk Assessment Scenario – contd.

Unit Shut Down Menu - Average Response

Select all Select none

Search:

- CG STA 0
- CG STA 1
- CG STA 2
- CG STA 3
- CG STA 4
- CG STA Y
- CG STA 6
- CG STA X
- CG STA 8
- CG STA 9
- CG STA 10
- CG STA 11
- CG STA 12
- CG STA 13
- CG STA 14
- CG STA 15
- CG STA 16
- CG STA 17
- CG STA 18
- CG STA 19
- CG STA C
- CG STA 21
- CG STA 22
- CG STA 23
- CG STA 24
- CG STA 25
- CG STA 26
- CG STA 27
- CG STA 28
- CG STA 29
- CG STA E
- CG STA 31
- CG STA B
- CG STA 33
- CG STA 34
- CG STA A
- CG STA 36
- CG STA 37
- CG STA 38
- CG STA 39
- CG STA 40

Max Speed (nmph):

All Dates to

Risk Assessment Scenario – contd.

Unit Shut Down Menu - Average Response

Select all Select none

Search:

CG STA 0
CG STA 1
CG STA 2
CG STA 3
CG STA 4
CG STA Y
CG STA 6
CG STA X
CG STA 8
CG STA 9
CG STA 10
CG STA 11
CG STA 12
CG STA 13
CG STA 14
CG STA 15
CG STA 16
CG STA 17
CG STA 18
CG STA 19
CG STA C
CG STA 21
CG STA 22
CG STA 23
CG STA 24
CG STA 25
CG STA 26
CG STA 27
CG STA 28
CG STA 29
CG STA E
CG STA 31
CG STA B
CG STA 33
CG STA 34
CG STA A
CG STA 36
CG STA 37
CG STA 38
CG STA 39
CG STA 40

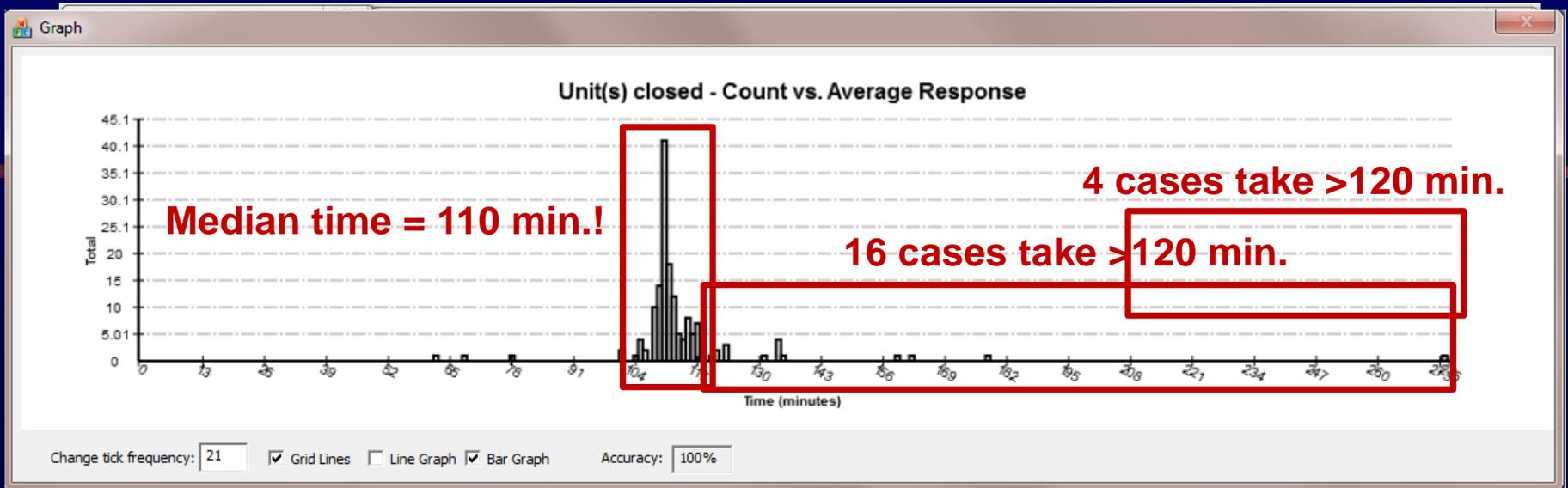
Max Speed (nmph): 15

All Dates 1/ 1/2006 to 9/30/2010

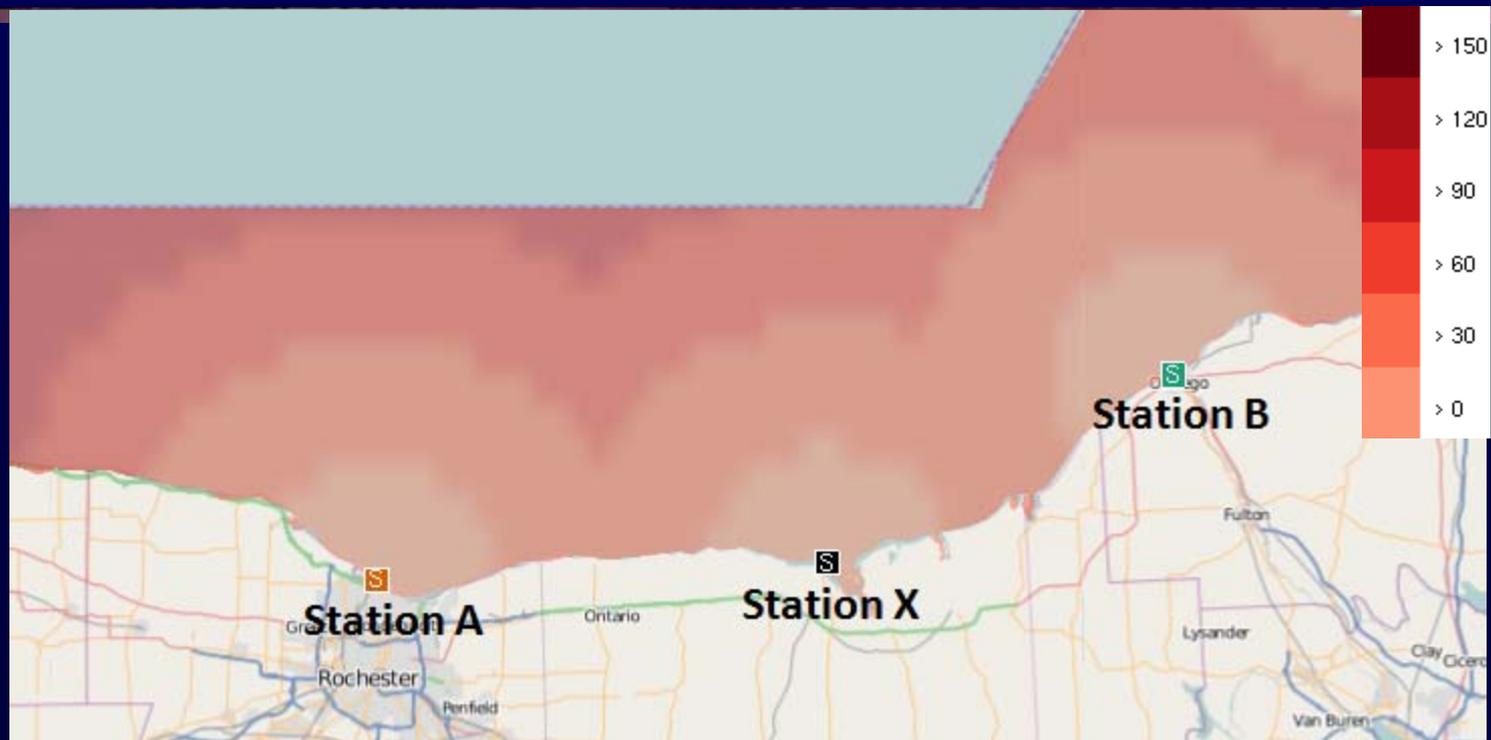
Close AUXOP Station X

Set asset speed

Risk Assessment Scenario – contd.

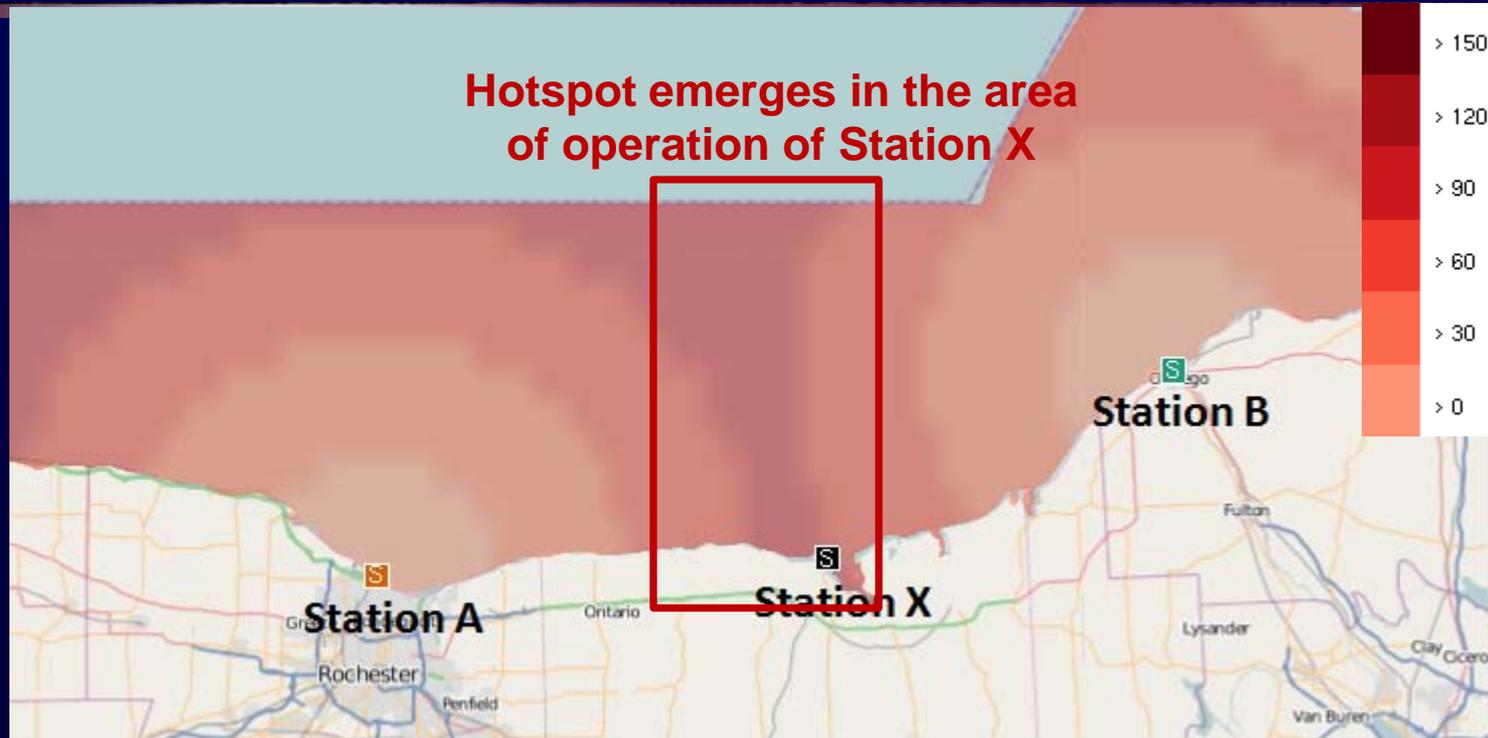


Risk Assessment Scenario – contd.



Average response time risk profile when station X is operational

Risk Assessment Scenario – contd.



Average response time risk profile when station X is closed

Conclusions and Future Work

- cgSARVA provides analysts with a suite of tools for risk assessment within the maritime domain
- Demonstrates the benefits of visual analytics in the maritime domain
- Future: Deploying the system to assist in the analysis & optimization of all Coast Guard operations
- Expanding use to other Coast Guard Districts

Acknowledgements

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Thank you

Coast Guard Search and Rescue Visual Analytics
(cgSARVA)

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