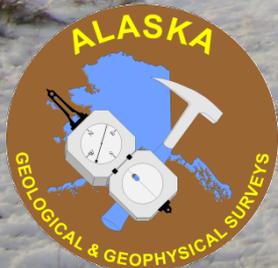


Real-time Communication and Emergency Coordination during Severe Coastal Storm Events in Alaska



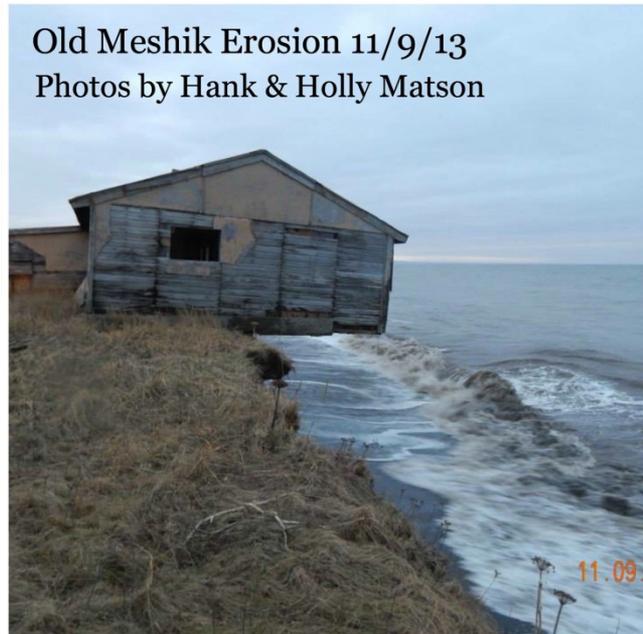
Nicole Kinsman
January 8, 2013

November 2013 Erosion - Pt. Heiden

October 11, 2013 (Gould, DGGS)



Old Meshik Erosion 11/9/13
Photos by Hank & Holly Matson



November 2013 Flooding - Stebbins

Photo from Ruth Carter, DOT



November 2013 Overtopping - Shaktoolik

Figures by Ruth Carter, DOT



NWS Public Information Statements & Hazard Advisories

Public Information Statement - Bethel

NOAK48 PABE 182339

PNSBET

AKZ155-190500-

PUBLIC INFORMATION STATEMENT

NATIONAL WEATHER SERVICE BETHEL AK

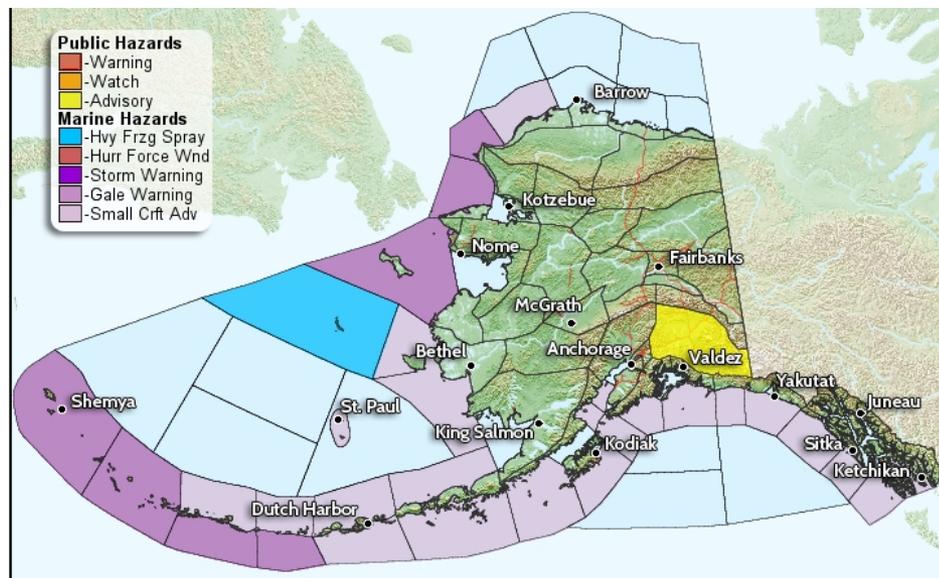
239 PM AKST WED DEC 18 2013

...SNOW AND BLOWING SNOW DEVELOPING TONIGHT...

AS A LOW PRESSURE SYSTEM APPROACHES FROM THE SOUTHWEST RADAR INDICATES SNOW IS DEVELOPING THROUGHOUT THE REGION. WINDS ARE EXPECTED TO INCREASE TO 25 TO 30 MPH TONIGHT AND IS EXPECTED TO PRODUCE BLOWING SNOW WHICH WILL REDUCE VISIBILITIES TO ONE AND ONE HALF MILES AT TIMES. TOTAL SNOW ACCUMULATION THROUGH THE PERIOD IS EXPECTED TO BE UP TO 2 INCHES.

\$\$

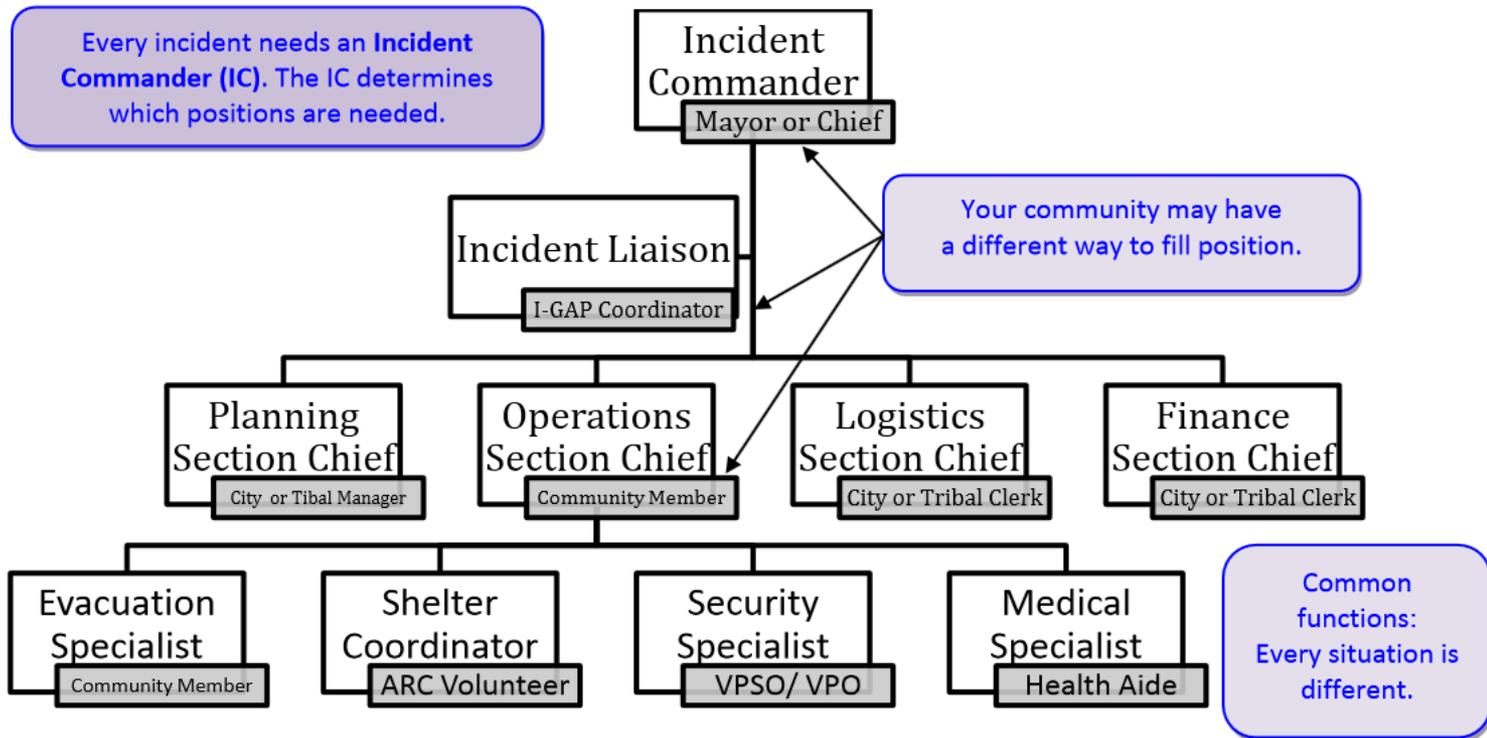
DA DEC 13



Small Community Emergency Response Plans



- Flip Charts to co-ordinate with State Emergency Operations Center (Anchorage)



SAMPLE INCIDENT COMMAND SYSTEM (ICS) ORGANIZATION CHART

NWS Surge Information

National Weather Service
Meteorological Development Laboratory

Site Map News Organization Search NWS All NOAA Go

Main Site
 Mirror Site

ABOUT

- Manual
- Disclaimer
- About Datums

DATUM

- Highest Astro. Tide
- Mean Higher High Water
- Mean Sea Level
- Mean Lower Low Water

REGIONS

- Northeast
- Mid-Atlantic
- Southeast
- Gulf
- Northwest
- Alaska
- Gulf of Alaska

STATUS MAP

- Map(0-48)
- Map(0-12)
- Map(12-24)
- Map(24-48)
- Map(48-72)
- Map(72-96)
- Map(0-96)

STATIONS

Select station Go

- Port Heiden, AK
- Egegik, AK

LEGEND

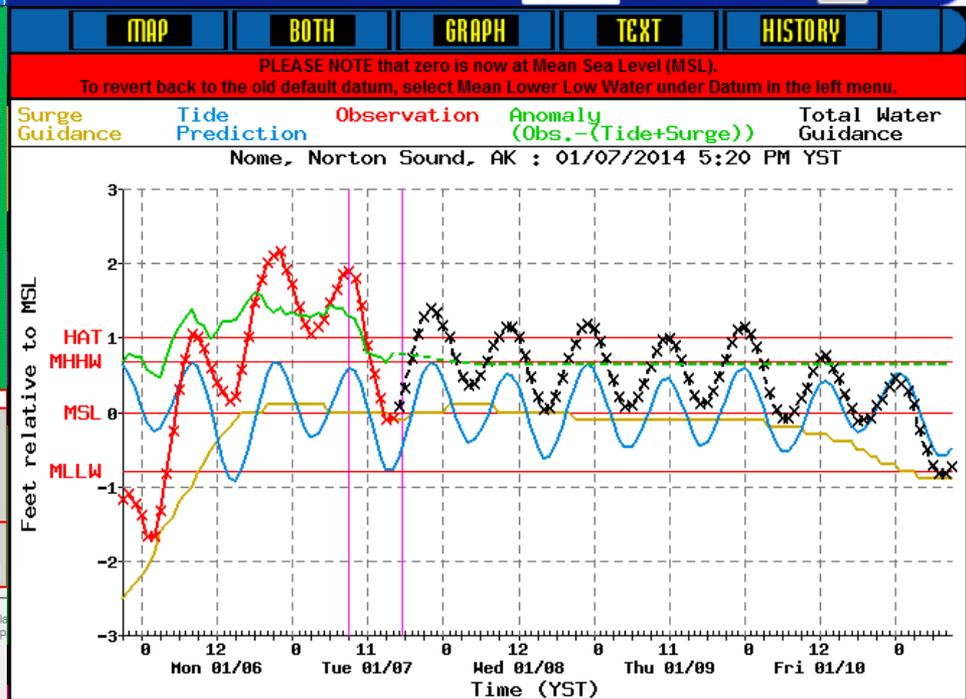
- Max Water Level
- HAT
- MHHW
- MSL
- MLLW
- No Obs.

HAT: Highest Astronomical Tide
 MHHW: Mean Higher High Water

Station colors for 0-48 hours beginning: 01/07/2014 5:20 PM YST

US Dept of Commerce
 National Oceanic and Atmospheric Administration
 National Weather Service
 Meteorological Development Laboratory

Author mdl_webmaster@noaa.gov
 1325 East West Highway
 Silver Spring, MD 20910
 Page last Modified: November 13, 2013.



#Nome, Norton Sound, AK : 01/08/2014 02:20:42 GMT (units in feet MSL)

#Date(GMT)	Surge	Tide	Obs	Fcst	Anom	Comment
01/06 06Z	-2.50	0.65	-1.18	99.90	0.67	
01/06 07Z	-2.40	0.52	-1.10	99.90	0.78	(max)
01/06 08Z	-2.30	0.31	-1.24	99.90	0.75	
01/06 09Z	-2.20	0.07	-1.39	99.90	0.74	
01/06 10Z	-2.10	-0.15	-1.68	99.90	0.57	(min)
01/06 11Z	-1.90	-0.25	-1.67	99.90	0.48	
01/06 12Z	-1.60	-0.21	-1.34	99.90	0.47	
01/06 13Z	-1.50	-0.06	-0.84	99.90	0.72	

The Communication Issue

New NWS Situational Awareness Bulletins



National Weather Service
Alaska Region



Situational Awareness Bulletin

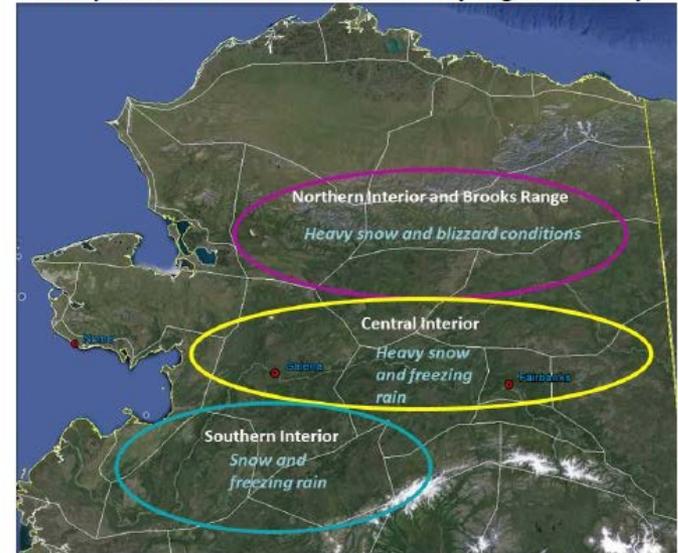
November 10, 2013

Updates highlighted in yellow

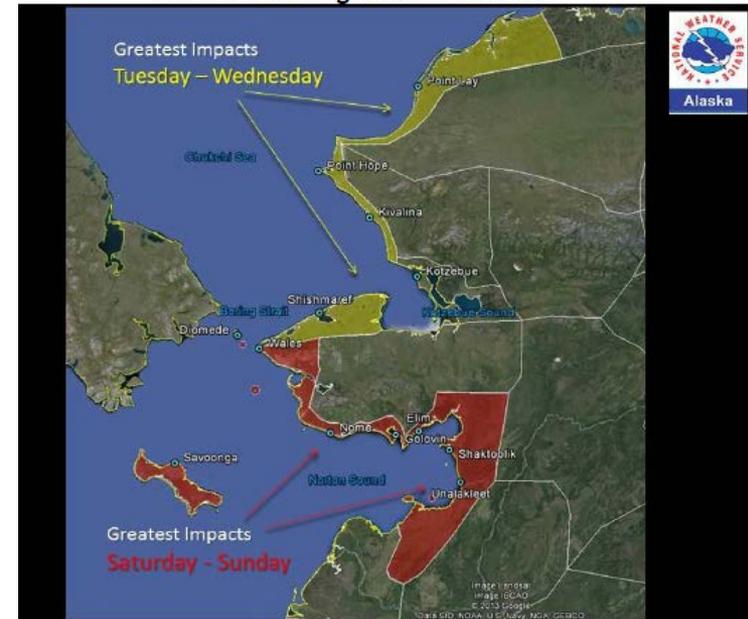
A series of storms continues to bring high surf and coastal flooding to Alaska's west coast, with greatest impacts expected this weekend and again mid-week. A main concern is the duration of time the coastline will be exposed to storm surge and high surf as three systems impact the region. In addition, significant precipitation events are expected further inland with the current storm systems.

- Areas and timing of greatest impacts:
 - Norton Sound and Bering Strait: Greatest impacts this weekend.
 - Kotzebue Sound: Impacts starting this weekend and lasting through mid week
 - Western North Slope Coast: Impacts starting this weekend and lasting through mid week
 - Interior Alaska: precipitation impacts lasting into Sunday, potentially a second and third round of impacts later this week
- **Storm #1** (last Wednesday - Friday's storm) has moved off and is no longer affecting the area, however the remaining high surge is contributing to the effects from the current storm.
- **Storm #2:** currently affecting the mainland and expected to last through Monday morning:
 - Norton Sound and Bering Strait:
 - Communities of greatest concern include Unalakleet, St Michaels and Stebbins
 - Coastal flooding peaked Sunday night and is expected to diminish through Monday
 - Southern Chukchi Sea and Kotzebue Sound: Storm surge of 3 to 5 feet is expected to peak Sunday night, waning Monday.
 - Western North Slope Coast: High surf is forecast Sunday night into Monday.
 - Northern Interior and Southern Brooks Range: Heavy snow and blizzard conditions are expected through Sunday morning. Between one foot and 16 inches of snow are expected over this area. Highways through the Brooks Range will be impacted and potentially closed at the summits.
 - Central Interior, including Fairbanks: 6 to 8 inches of snow has fallen. There may be up to 1/10 of an inch of freezing rain, but this is no longer expected to be a major impact.

Precipitation Areas of Concern Friday Night - Sunday



Coastal Flooding Areas of Concern



DGGS Web-mapping Application for coastal geohazard vulnerability



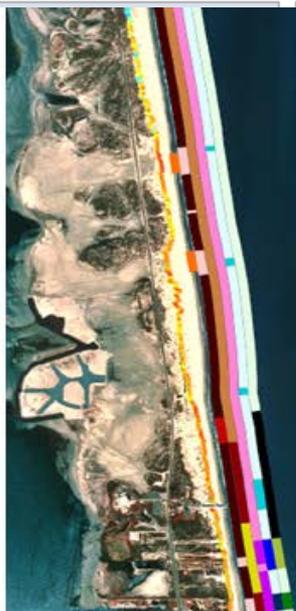
Interactive Maps



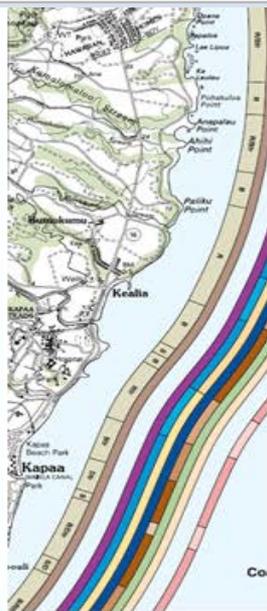
Southeast Fajardo
Puerto Rico
Mercado, SeaGrant 2011



Bar Harbor
Maine
Dickson et al., MGS 2006



Port Isabel
Texas
Peterson & Morton, USGS 2006



Kapaa
Hawaii
Fletcher et al., USGS 2002



Nameloc Heights
Massachusetts
Ramsey et al. 2005



Alaska
DGGS 2012

A stop-gap Communication Tool from DCCED Community Maps

Example from the current Golovin DCCED Community Map (2004)

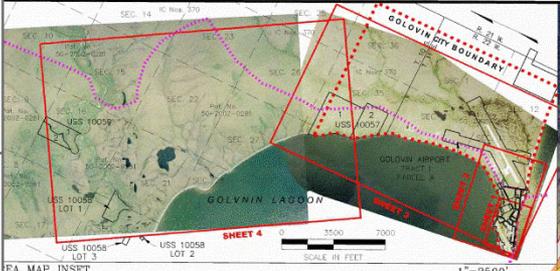
A conceptual idea to address the need for improved and expedited resident/NWS communication during storm events that have the potential to cause coastal flooding

- Created from the DCCED CAD DSM source data
- All maps would require a disclaimer regarding:
 - Vertical and horizontal accuracies (location specific)
 - Does not account for terrain modifications since map was last updated (sometimes up to 10 years ago)
 - Setup, wave and runup conditions = all locations are approximate due to local effects
 - Not all areas in one color may be inundated at any given time for a particular storm event (will vary with storm directions and magnitude, could add an index grid over the top)
- Displayed elevation zones patterns are consistent with flood progression and final inland extents of November 2011 Storm mapped by DGGs (was between the purple and magenta scenarios)
- This is not a vulnerability map product but a visual aid to facilitate communication in emergency situations.

A B C D E F G H I J

1
2
3
4
5
6

1
2
3
4
5
6



Color-Indexed Elevation Zones

- Null
- Orange
- Yellow
- Chartreuse
- Green
- Cyan
- Blue
- Purple
- Magenta
- White

BUILDING KEY

1. Oilon Garage	11. Chuk Traditional Home
2. Shop Store	12. Old Bohala Clinic
3. City Hall	13. UPS Quarters
4. City Shop / Post Office	14. Old Fire Hall / Storage
5. Warehouse	15. Toolshed
6. Subsid Storage	16. Old Fish Processing Plant
7. Old Church	17. New Fire Hall
8. M.L. Owen School	18. Power Plant
9. School	19. New Walkateria
10. New Health Clinic	20. Water Tank

Community Map GOLOVIN

64° 02' 41" N 163° 01' 45" W (NAD 83)
 Approximate Elevation: 82'
 Township 11 South, Range 22 West, N.E.M. AK
 U.S.G.S. Quadrangle 5060M03 C-3; Alaska
 CAPE Nome RECORDING DISTRICT

LEGEND

SCALE 1"=100'
 Date of Photography: June 6, 2004
 Magnetic Declination computed by U.S.G.S. Geomag
 Program name AK-3000/09; model as of July 8, 2004

GOLOVIN TOWNSITE US SURVEY 5038

LOT NO.	BK/NO.	DEED TYPE	OWNERSHIP	BK. NO.	PAGE NO.	DATE	LOT NO.	BK/NO.	DEED TYPE	OWNERSHIP	BK. NO.	PAGE NO.	DATE
1	2	Oil Span Lease	City of Golovin	327	527	6/25/1992	1	2	Quit Claim Deed	City of Golovin	327	527	6/25/1992
2	2	Quit Claim Deed	City of Golovin	327	527	6/25/1992	2	10	Quit Claim Deed	City of Golovin	327	527	6/25/1992
3	2	Quit Claim Deed	City of Golovin	327	527	6/25/1992	3	2	Quit Claim Deed	City of Golovin	327	527	6/25/1992
4	2	Quit Claim Deed	City of Golovin	327	527	6/25/1992	4	10	Quit Claim Deed	City of Golovin	327	527	6/25/1992
5	2	Quit Claim Deed	City of Golovin	327	527	6/25/1992	5	10	Quit Claim Deed	City of Golovin	327	527	6/25/1992
6	2	Quit Claim Deed	City of Golovin	327	527	6/25/1992	6	10	Quit Claim Deed	City of Golovin	327	527	6/25/1992
7	2	Quit Claim Deed	City of Golovin	327	527	6/25/1992	7	10	Quit Claim Deed	City of Golovin	327	527	6/25/1992
8	2	Quit Claim Deed	City of Golovin	327	527	6/25/1992	8	10	Quit Claim Deed	City of Golovin	327	527	6/25/1992
9	2	Quit Claim Deed	City of Golovin	327	527	6/25/1992	9	10	Quit Claim Deed	City of Golovin	327	527	6/25/1992
10	2	Quit Claim Deed	City of Golovin	327	527	6/25/1992	10	10	Quit Claim Deed	City of Golovin	327	527	6/25/1992
11	2	Quit Claim Deed	City of Golovin	327	527	6/25/1992	11	10	Quit Claim Deed	City of Golovin	327	527	6/25/1992
12	2	Quit Claim Deed	City of Golovin	327	527	6/25/1992	12	10	Quit Claim Deed	City of Golovin	327	527	6/25/1992
13	2	Quit Claim Deed	City of Golovin	327	527	6/25/1992	13	10	Quit Claim Deed	City of Golovin	327	527	6/25/1992
14	2	Quit Claim Deed	City of Golovin	327	527	6/25/1992	14	10	Quit Claim Deed	City of Golovin	327	527	6/25/1992
15	2	Quit Claim Deed	City of Golovin	327	527	6/25/1992	15	10	Quit Claim Deed	City of Golovin	327	527	6/25/1992
16	2	Quit Claim Deed	City of Golovin	327	527	6/25/1992	16	10	Quit Claim Deed	City of Golovin	327	527	6/25/1992
17	2	Quit Claim Deed	City of Golovin	327	527	6/25/1992	17	10	Quit Claim Deed	City of Golovin	327	527	6/25/1992
18	2	Quit Claim Deed	City of Golovin	327	527	6/25/1992	18	10	Quit Claim Deed	City of Golovin	327	527	6/25/1992
19	2	Quit Claim Deed	City of Golovin	327	527	6/25/1992	19	10	Quit Claim Deed	City of Golovin	327	527	6/25/1992
20	2	Quit Claim Deed	City of Golovin	327	527	6/25/1992	20	10	Quit Claim Deed	City of Golovin	327	527	6/25/1992

This map was prepared by Kawerak Inc. in cooperation with the Alaska Department of Commerce, Community, and Economic Development (Commerce) using funding from the Bureau of Indian Affairs Transportation Planning, Alaska Native Tribal Health Consortium, Alaska Village Electric Cooperative, and funding from the Initiative for Accelerated Infrastructure Development (IAID). The IAID is supported by grants from the Denali Commission, USDA Rural Development, Alaska Department of Transportation and Public Facilities and Commerce. Kawerak Inc. contracted with Global Positioning Services Incorporated in May of 2004 to prepare the map. The original AutoCAD drawings or orthophoto has been revised or added to as described:
 Elevation ranges have been highlighted by DGGS for potential use in hazard impact communication

A B C D E F G H I J

Community Specific Tables

Golovin – Version 1.1 Last Updated Dec. 18, 2013

*Best available local datum offsets as computed by Jacquelyn Smith, UAF

Map Color-Index	NAVD88 Elevation	Local MLLW*	Local MSL*
	<i>in meters</i>		
Orange	0.0 – 1.0	-1.3 – -0.3	-1.5 – -0.5
Yellow	1.0 – 2.0	-0.3 – 0.7	-0.5 – 0.5
Chartreuse	2.0 – 3.0	0.7 – 1.7	0.5 – 1.5
Green	3.0 – 4.0	1.7 – 2.7	1.5 – 2.5
Cyan	4.0 – 5.0	2.7 – 3.7	2.5 – 3.5
Blue	5.0 – 6.0	3.7 – 4.7	3.5 – 4.5
Purple	6.0 – 7.0	4.7 – 5.7	4.5 – 5.5
Magenta	7.0 – 8.0	5.7 – 6.7	5.5 – 6.5
White	8.0 – above	6.7 – above	6.5 – above

Color-indexed DCCED Maps

Pros

- Visual, and rapid communication platform that can be viewed by NWS, emergency command center and local emergency response teams
- On well-known maps that are already trusted by residents
- Critical infrastructure is labeled and mapped- useful for people who are not used to interpreting the layout of their town from an aerial view AND for modelers unfamiliar with a site
- Since no data is ON the map, the tables can be updated to account for improved local datum information, sea level change, etc. and can be used to convey total surge heights w/ or w/o runup heights and also can account for tide conditions
- No need to explain if the height projections are in MSL, MHHW, geodetic elevations to those that are uninterested
- Could link colors to typical recurrence intervals for first-order community planning (i.e. the magenta zone roughly corresponds to our current understanding of a 100-year storm event for this area)

Cons

- The DCCED DSM models are available in most communities, but not all
- The DSM resolution varies, but in areas with better elevation models (lidar for example) the color zones could be made with the best available and still placed on the DCCED maps
- Color zones are restricted to DCCED map coverage, which sometimes excludes evacuation road routes etc.
- Still requires an improved understanding of local tide datums, and solid storm surge modeling
- Local runup effects will still be difficult to predict in most areas
- While I added a grid for this, it could still be difficult to convey some of the nonlinear effects (i.e. to the green zones on the front side of a barrier island and yellow in the lee OR excluding low-lying inland areas if overtopping will not fill them)