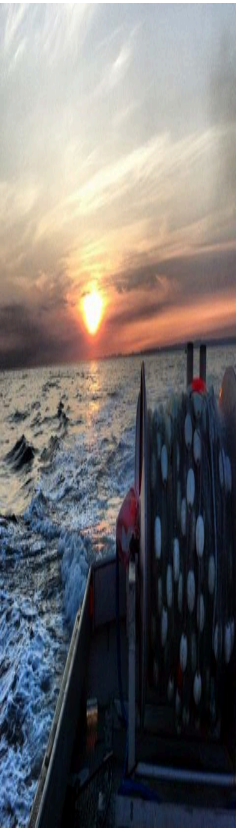
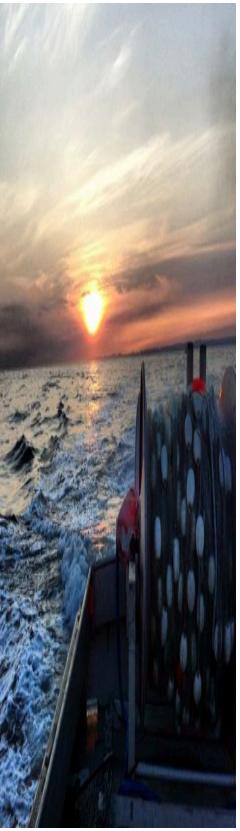


Cook Inlet

Salmon Fishery Management

2014 United Cook Inlet Drift Association



Utilizing Salmon Migration Patterns and Run Timing

Cook Inlet Salmon Fishery Management

The management that has evolved for UCI over the past decades was largely based on a set of assumptions that we now realize were incorrect. (For further information see "Fishery Related Aspects of Faulty Sonar Data, Over-Escapement and Impaired Habitat for Susitna Sockeye" in Board packet.)

Scientific data from genetic stock identification, Test Boat fishing and the recognition that Susitna sockeye escapements had been grossly undercounted since 1982 have contradicted those previous assumptions.

Scientific data can now inform an empirically-based management plan.

Cook Inlet Salmon Fishery Management

Previous assumptions:

–The Yentna Bendix sonar counter was assumed to be accurate when it indicated that escapements goals in the Susitna were not being met;

–Northern-bound sockeye stocks were thought to migrate though central Cook Inlet at particular times in particular areas.

–Assumptions were made that time and area restrictions to the drift fleet would help conserve those northern-bound stocks.

Through multi-year studies on escapement counts, stock composition, Test Boat fishing and genetic stock identification, ADF&G has accumulated data that refute these assumptions. (See References, final slide.)

It is critical to change UCI management to reflect the new information because management based on the flawed assumptions has had significant adverse effects.

Cook Inlet Salmon Fishery Management

Issues with current management:

- Compressed escapement and harvest of Kenai late-run sockeye;
- There is no methodology for measuring the effects of commercial fishery restrictions currently in regulation;
- Management focus on commercial fishery restrictions has diverted attention from growing habitat problems affecting salmon production;
- Harvest opportunity has been lost.

In 2013 UCI sockeye salmon had “one of the most compressed, if not the most compressed runs in UCI history.” (ADF&G 2013 UCI Commercial Salmon Season Summary)

Cook Inlet Salmon Fishery Management

These problems have been the result of efforts to restrict commercial fishing areas to allow the passage of Susitna salmon through the Central District. The restrictions were based on assumptions about fish migrations to solve a problem that did not exist.

These restrictions would not have been implemented if the Yentna sonar counter had been accurately counting sockeye salmon going back to 1982.

The restrictions were never scientifically evaluated. No studies were ever done, no data was ever generated that would allow the department or stakeholders to determine the effectiveness of the restrictions.

Cook Inlet Salmon Fishery Management

The restrictions placed on commercial fisheries to conserve northern sockeye stocks and other mandatory restrictions have been part of the state's prescriptive management approach to UCI salmon.

The management plans have been prescriptive and based on flawed assumptions.

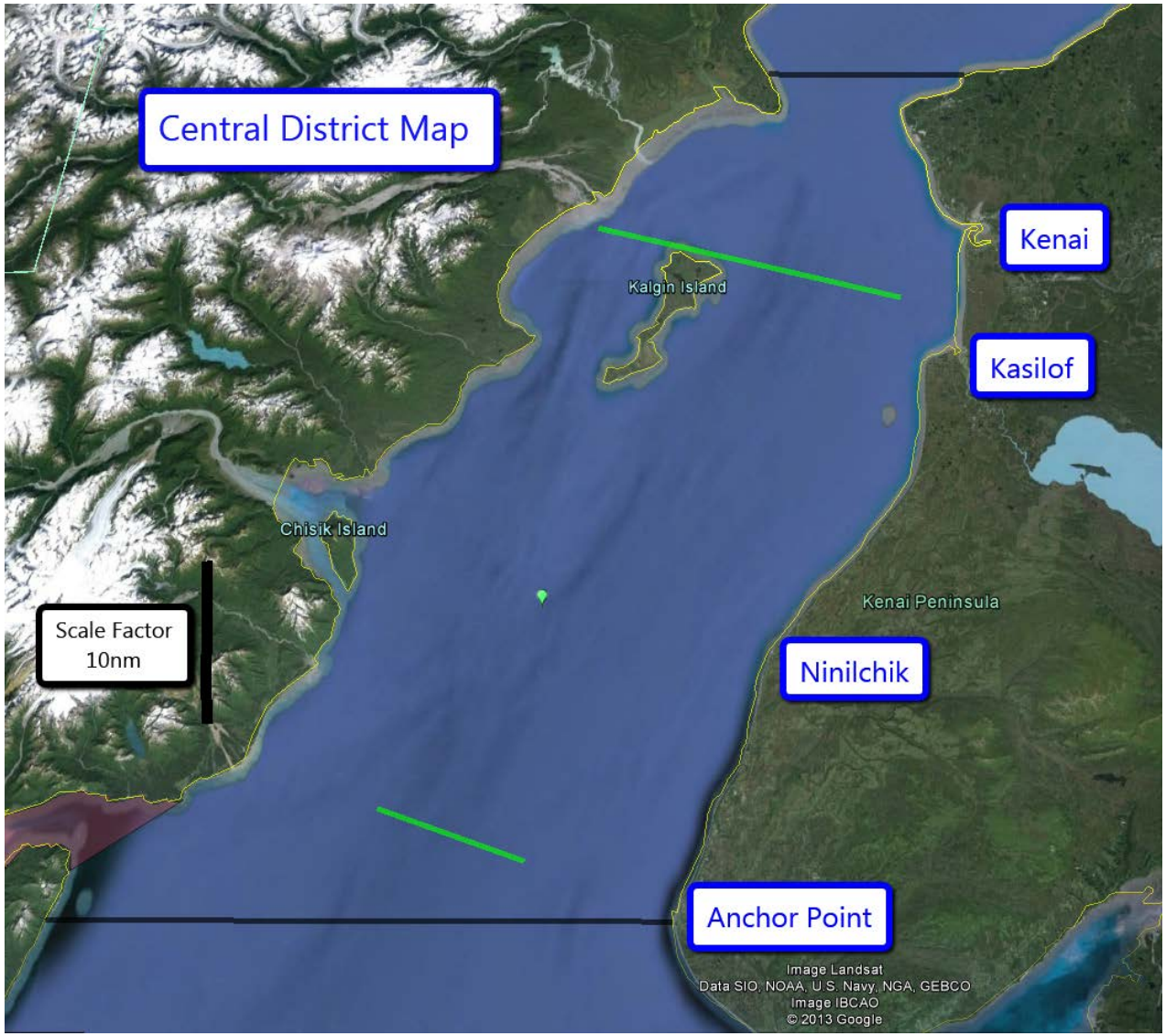
UCI salmon management plans should be adaptive and empirically-based.

We now have scientific data and tools to move in that direction.

Cook Inlet Salmon Fishery Management

The next seven slides illustrate the UCI Central District commercial fishing areas and restricted areas currently in regulation.

Upper Cook Inlet Central District Commercial Fishing Area



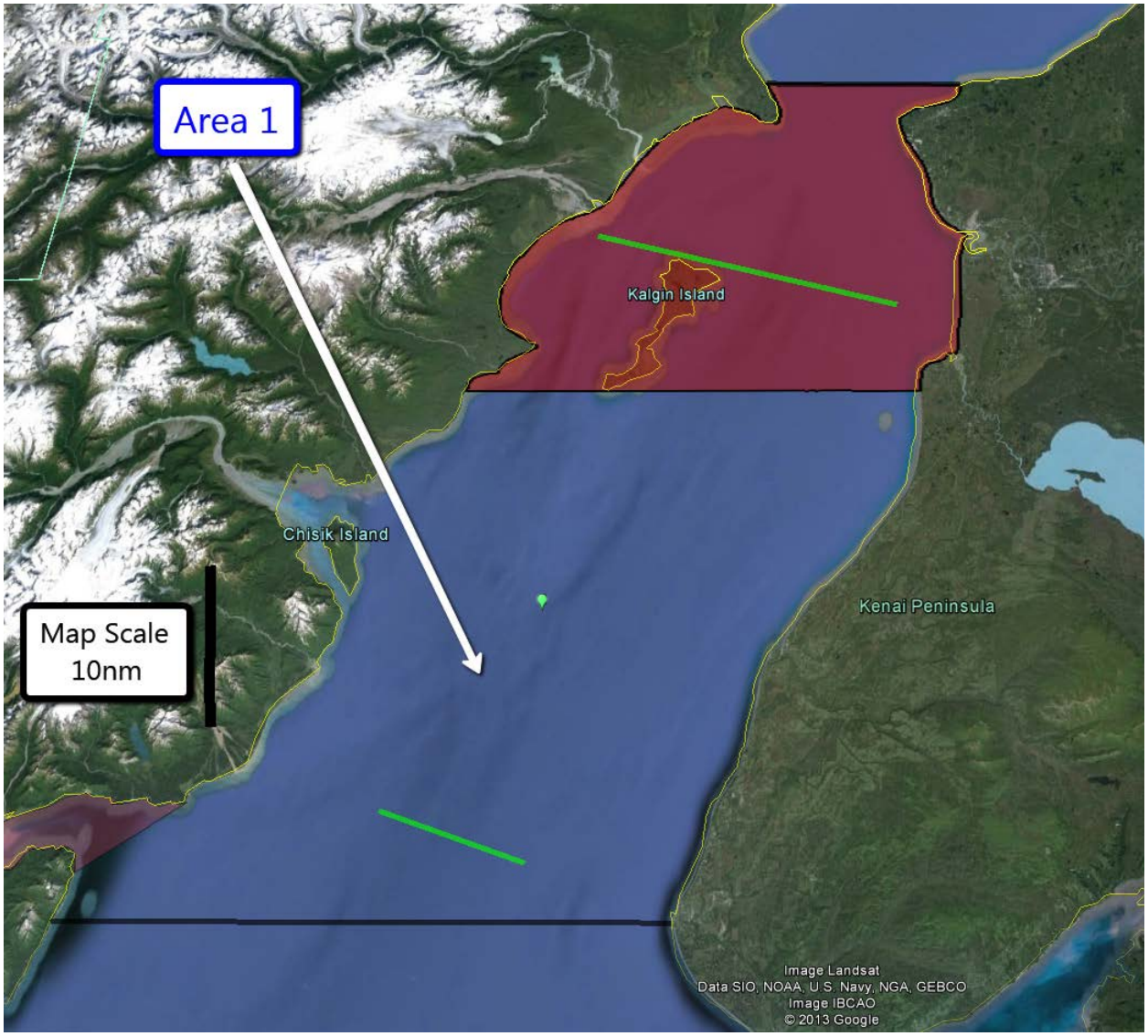
This is the Central District of UCI where all of the drift fishing and most of the setnetting occurs.

The black lines mark the southern and northern boundaries of the district.

The Susitna River is about 50 miles north of the northern boundary of the Central District.

The green lines mark the transects of the North and South Offshore Test Boat Fisheries.

Restricted Area 1



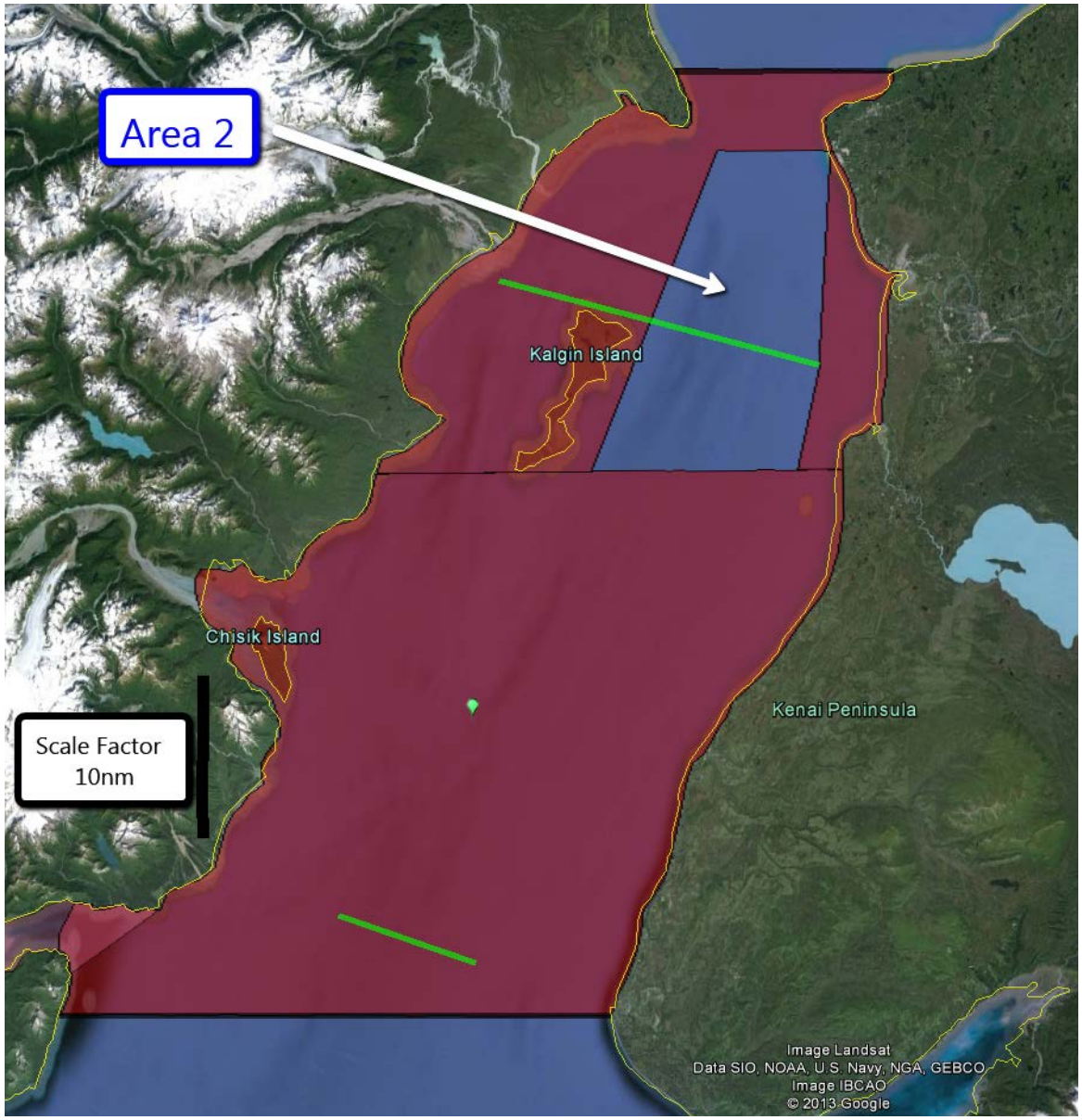
Area 1 is shown on the map in blue and is currently in regulation.

The red shaded area is closed to drift gillnetting when the drift fleet is restricted to Area 1.

Area 1 was created with the assumption that northern stocks might be more prevalent within the closed area at particular times.

There is no method for measuring the effectiveness of this restriction.

Restricted Area 2

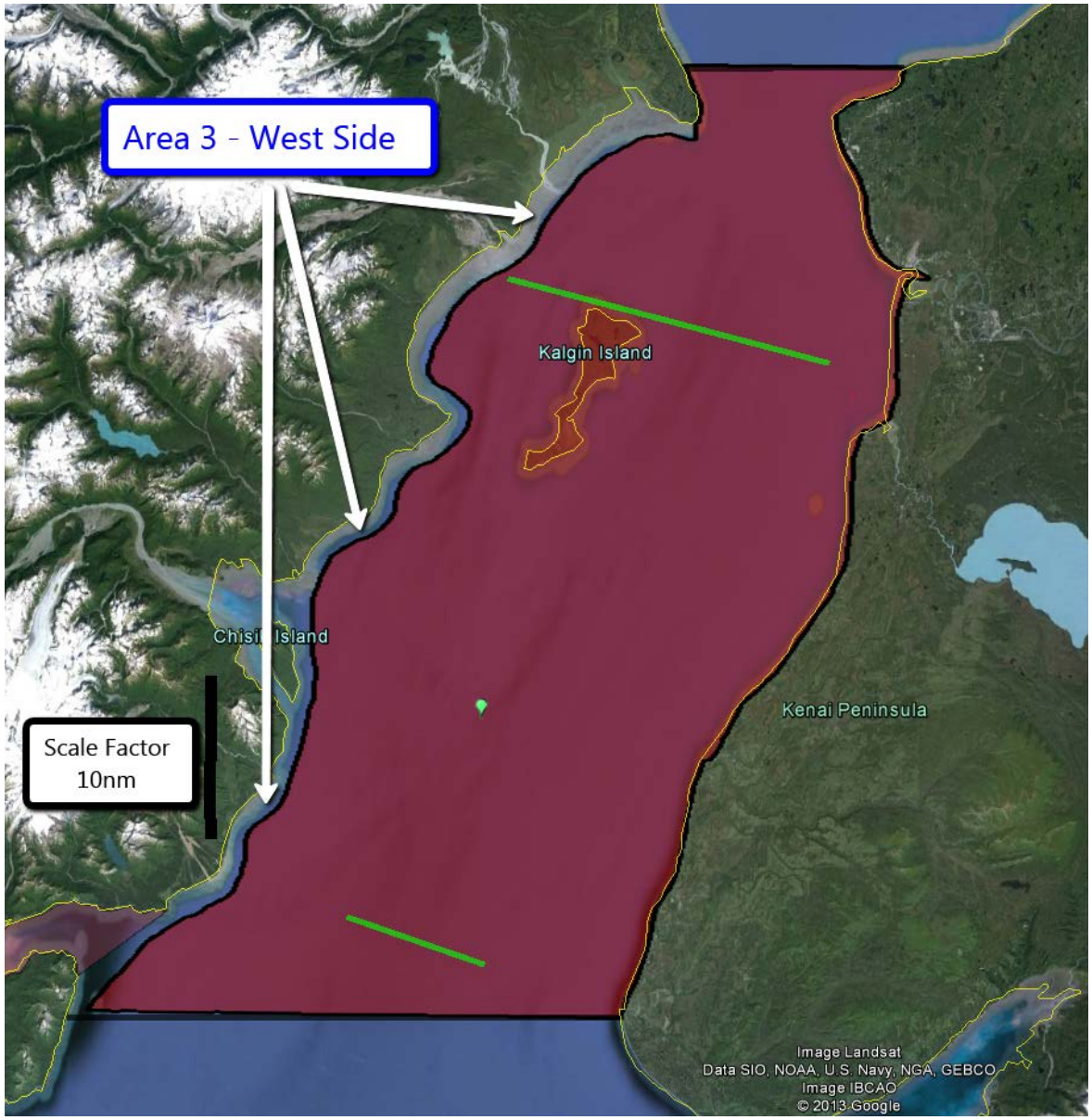


Area 2 is shown on the map in blue and is currently in regulation. Restricting the commercial fishery to this area is based on assumptions about northern bound sockeye.

There is no method for measuring the effectiveness of this restriction.

Studies utilizing genetic stock identification have found that northern-bound sockeye are intermingled with other Cook Inlet stocks both spatially and temporally.

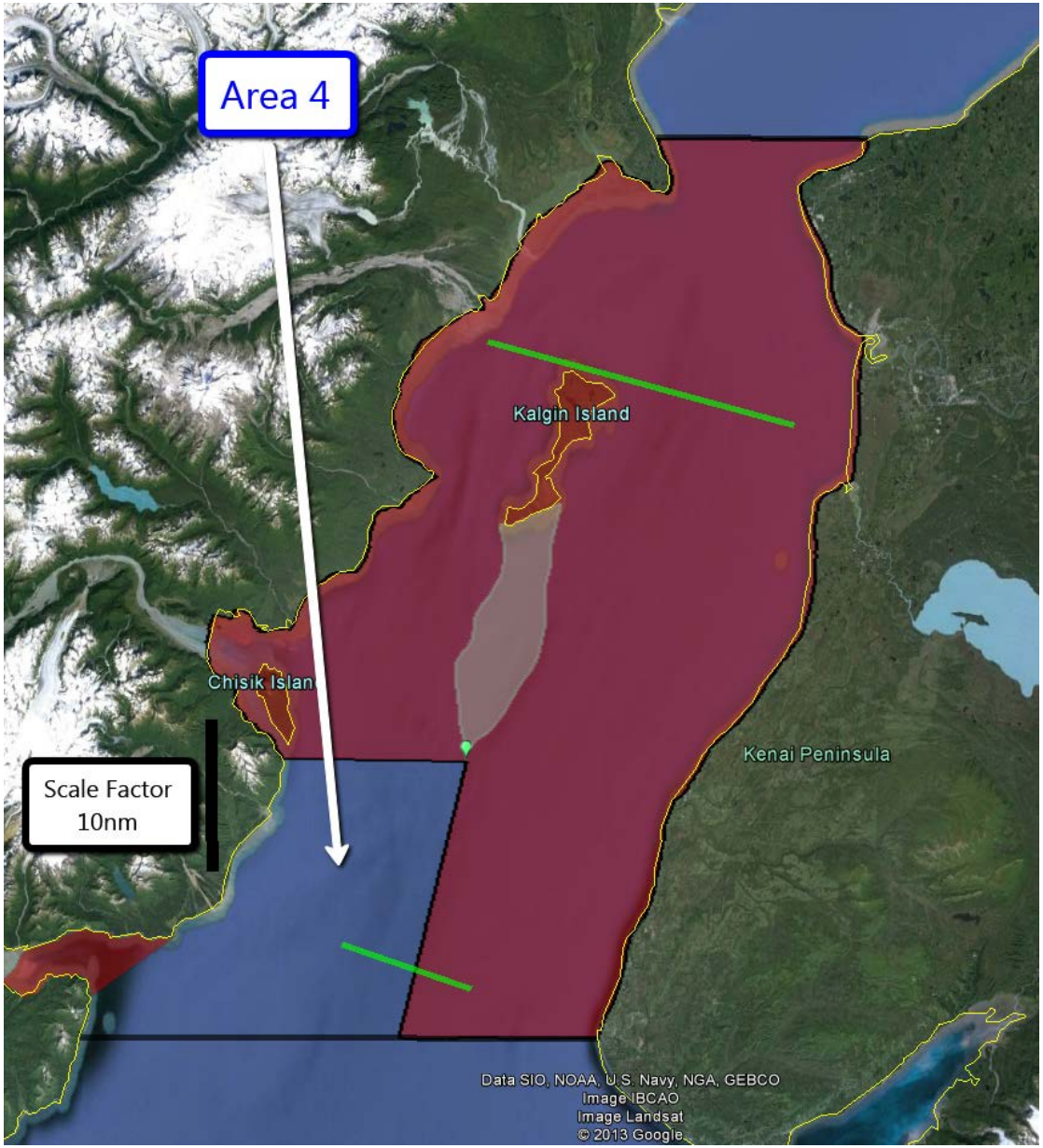
Restricted Area 3



Area 3 was placed in regulation 9 years ago to provide for coho fishing opportunities in August.

Area 3 is a coho fishery rather than a sockeye fishery. It functions for its purpose.

Restricted Area 4

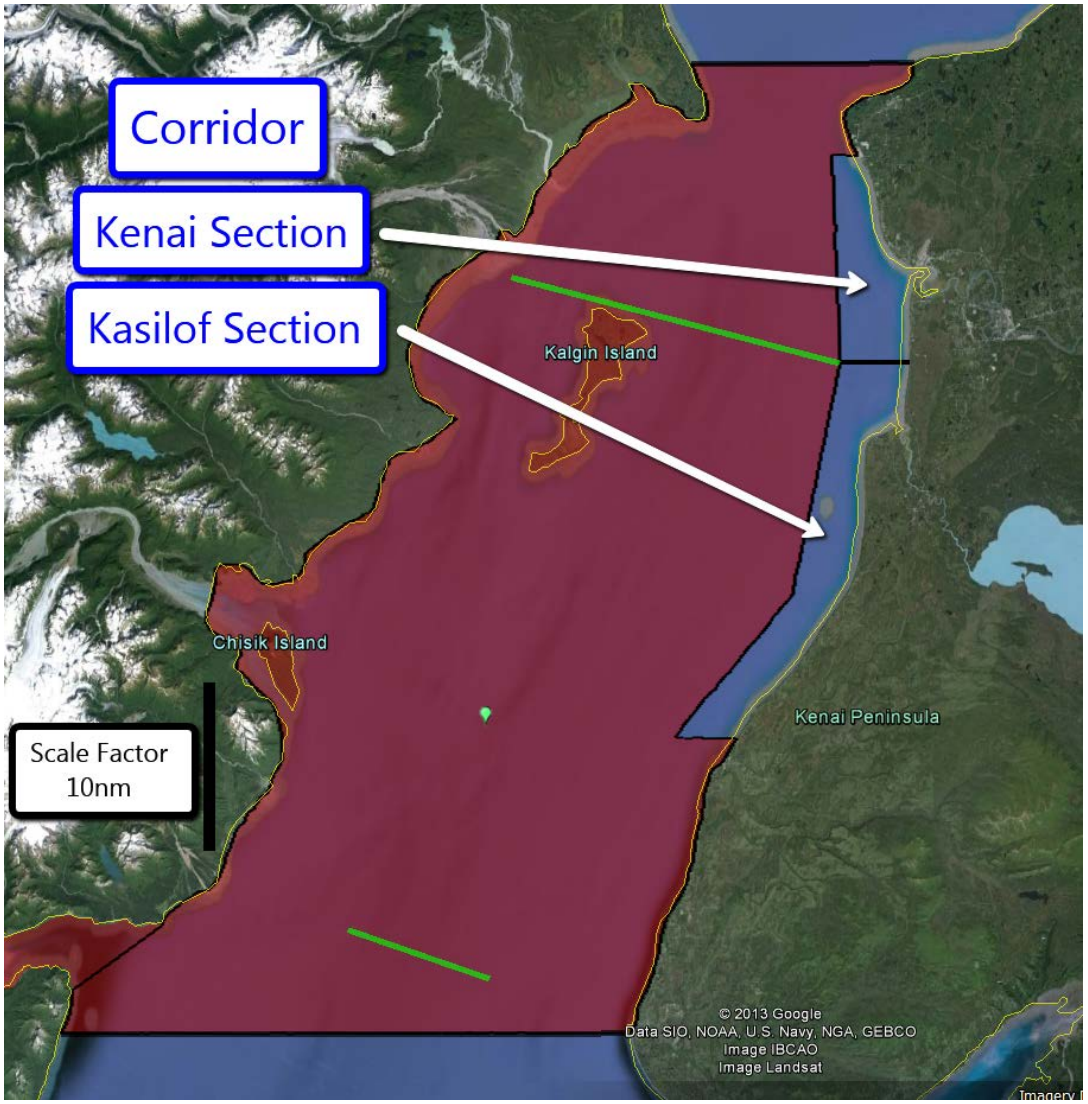


Area 4 was placed in regulation 9 years ago. It was intended to provide coho, late sockeye, pink and chum fishing opportunities in August.

The boundaries were based on assumptions with no method for measuring the effectiveness of this restriction.

The green dot at the northeast corner of the area is the Kalgin Navigation Buoy (the “Can”) marking the southern tip of a sandbar that extends north to Kalgin Island and is dry at low tide.

Restricted Area - Corridor



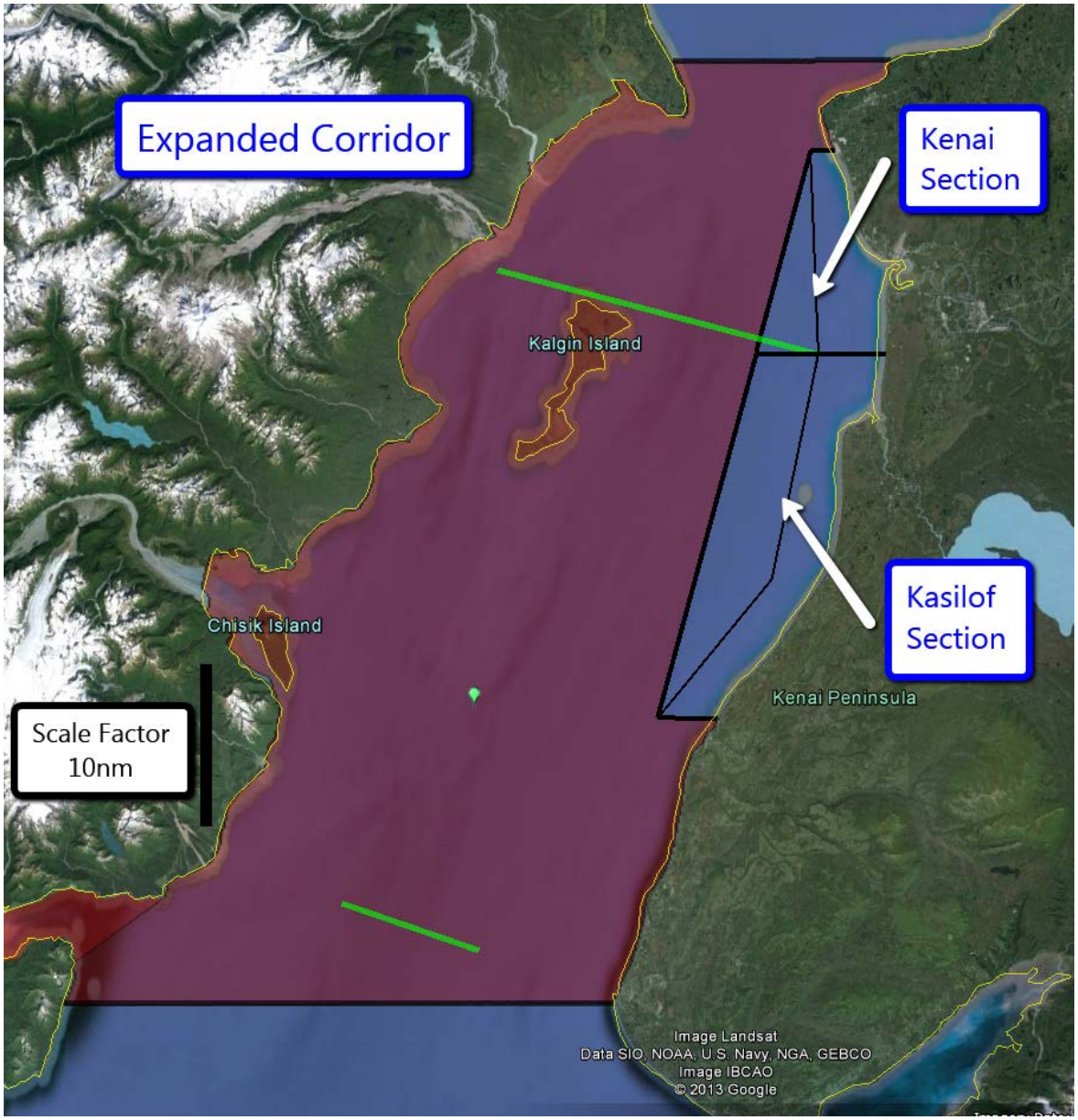
This Corridor is a revision of the Corridor that has been in regulation since 1982 to target Kenai and Kasilof sockeye.

Genetic testing has shown that salmon stocks, including northern-bound sockeye, can be as intermingled in the Corridor as they are in the central inlet.

The first mile and a half offshore in this area is open to setnetting only.

This Corridor is difficult to fish and greatly reduces efficiency.

Restricted Area - Expanded Corridor

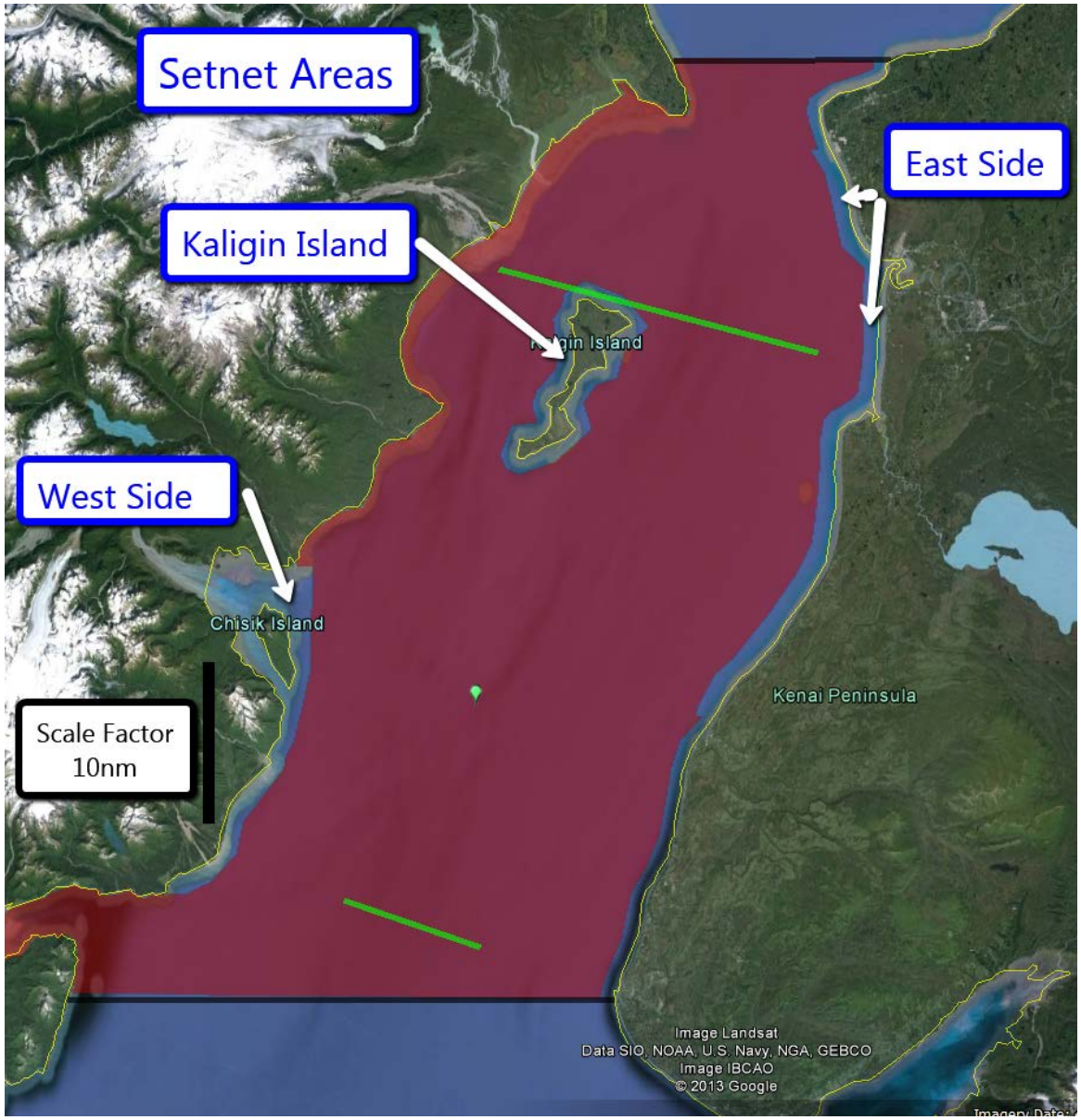


This Expanded Corridor was put into regulation 3 years ago. It has been used in place of regular Monday and Thursday Central District or Area 1 fishing periods.

It was based on assumptions about the movement of northern stocks.

In 2011 the percentage of Susitna sockeye caught in this Corridor was slightly higher than the percentage caught during inlet-wide openings.

Setnet Areas



Setnet Areas have been in use and regulation for over 75 years.

Cook Inlet Salmon Fishery Management

There is no evidence that the fishing restrictions used in the Central District work to conserve northern stocks.

What we have learned from the use of mandatory restrictions is that they prevent fishery managers from reacting to real-time information during the season. The restrictions also interfere with the biologists' ability to manage the whole fishery.

The results of restrictions have been compressed harvests and escapements and over-escapements. Compressed escapements and over-escapements both contribute to adverse density effects.

Compressed harvests undermine the ability of all users to harvest salmon and significantly reduce the quality of the processed product.

Cook Inlet Salmon Fishery Management

The science-based tools and data sets that are available to manage the fishery include:

- Commercial harvest in real-time
- Commercial catch records
- Escapement counters
- Genetic stock identification
- Off-shore Test Boat fishing

Upper Cook Inlet Offshore Test Boat Fishery

Data is now available from two test boats to track how, when and what salmon are moving through Cook Inlet.

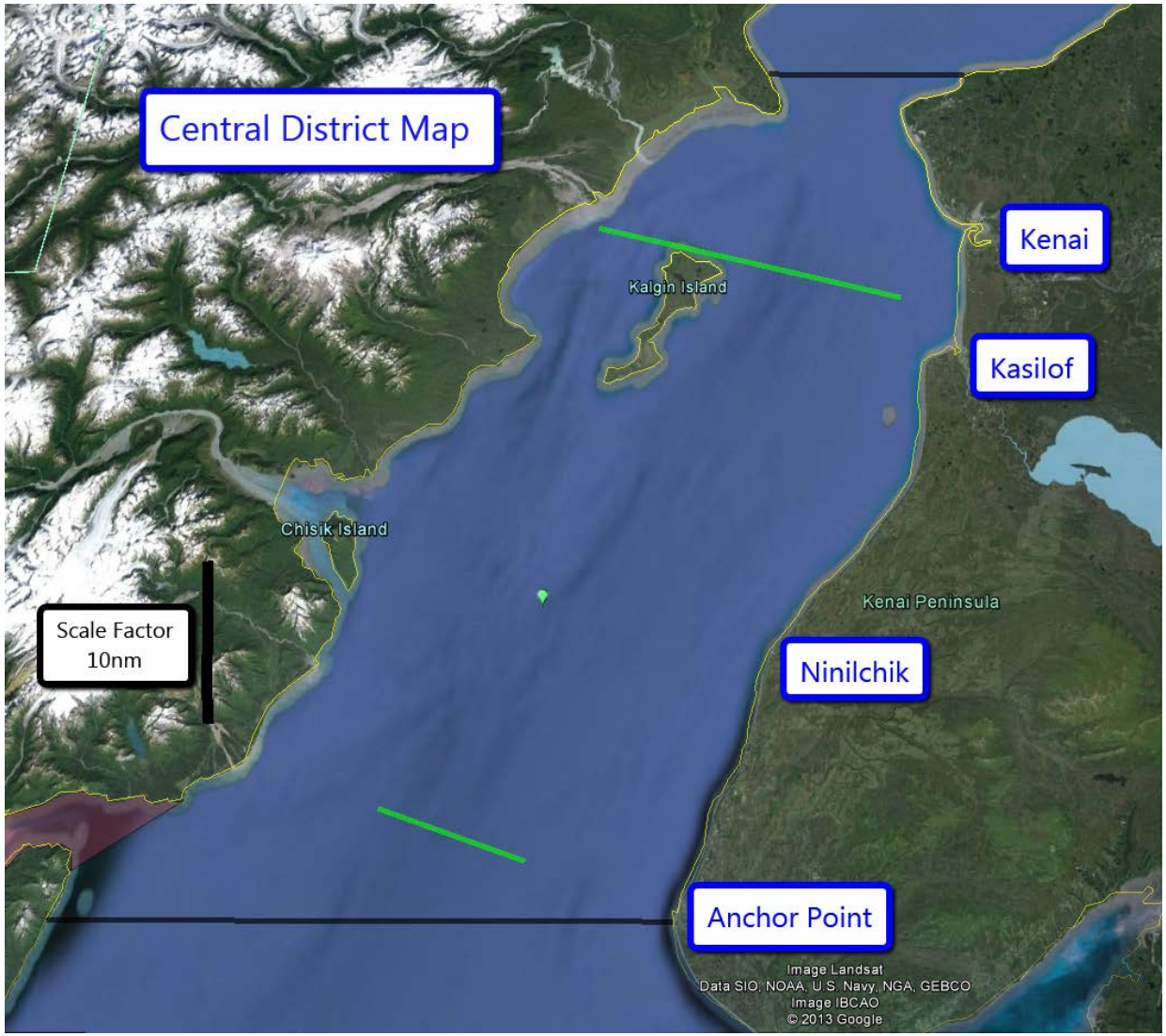
The program is designed to estimate the number of sockeye salmon that enter the district per index point or “CPUE.”

Chartered gillnet vessels fish in predetermined locations for a specific time period. These stations are fished every day starting July 1 for about a month. Time, air and water temperature, wind direction and speed, turbidity and salinity are all recorded.

An ADF&G technician on board selects sockeye and coho salmon for measurement and genetic sampling. The genetic samples are sent to the ADF&G laboratory for testing.

A numeric index based on the number of salmon caught is generated for all species to estimate run strength.

Upper Cook Inlet Offshore Test Fish Project



The 2 green lines show the locations of the Offshore Test Fisheries.

North Boat - Kasilof Line

Fishes 7 locations on a transect line that runs just north of Kalgin Island

South Boat - Anchor Point Line

Fishes 6 locations on a transect line that runs between Anchor Point and the Red River Delta

What do the test boats tell us?

Salmon can move very quickly through Cook Inlet.

Northern stocks are intermingled with other stocks both temporally and spatially.

Many variables including wind, tide and water temperatures all affect the entry patterns.

Kenai River stocks often move toward the river in large groups.

There is a high level of variability in migration patterns from year to year.

2011 Test Boat Index and Kenai Escapement

Date	South Test Boat Index	Kenai River Mile 19 Daily Sonar Count	Kenai River Mile 19 Sonar Count Total
7/1/2011	18	2,256	2,256
7/2/2011	62	4,260	6,516
7/3/2011	57	3,084	9,600
7/4/2011	13	2,244	11,844
7/5/2011	19	4,272	16,116
7/6/2011	13	4,647	20,763
7/7/2011	4	5,302	26,065
7/8/2011	7	4,737	30,802
7/9/2011	34	6,522	37,324
7/10/2011	257	6,846	44,170
7/11/2011	158	3,510	47,680
7/12/2011	172	3,102	50,782
7/13/2011	312	3,822	54,604
7/14/2011	243	6,400	61,004
7/15/2011	378	2,916	63,920
7/16/2011	291	27,826	91,746
7/17/2011	131	230,643	322,389
7/18/2011	109	177,053	499,442
7/19/2011	36	87,978	587,420
7/20/2011	135	113,178	700,598
7/21/2011	54	90,426	791,024
7/22/2011	263	37,974	828,998
7/23/2011	162	106,313	935,311
7/24/2011	153	110,772	1,046,083
7/25/2011	121	79,518	1,125,601
7/26/2011	138	77,982	1,203,583
7/27/2011	29	73,092	1,276,675
7/28/2011	138	55,470	1,332,145

In 2011 ADF&G used only the South Test Boat.

The numbers in the second column (“Index”) are mathematically derived to reflect sockeye passage.

The spike in the index on July 10 indicates a large movement of sockeye into the Central District.

Seven days later those fish had moved 40 miles up Cook Inlet and 19 miles up the Kenai River.

(Source – ADF&G)

2012 Test Boat Index and Kenai Escapement

Date	South Test Boat Index	North Test Boat Index	Kenai River Mile 19 Sonar Daily Count	Kenai River Mile 19 Sonar Total Count
7/1/2012	66	23	3,970	3,970
7/2/2012	25	5	8,970	12,940
7/3/2012	45	11	7,067	20,007
7/4/2012	49	7	5,514	25,521
7/5/2012	64	10	4,913	30,434
7/6/2012	58	7	3,426	33,860
7/7/2012	70	10	3,648	37,508
7/8/2012	62	8	5,466	42,974
7/9/2012	11	7	6,470	49,444
7/10/2012	53	24	6,774	56,218
7/11/2012	151	15	12,054	68,272
7/12/2012	181	84	9,726	77,998
7/13/2012	127	431	10,548	88,546
7/14/2012	136	381	20,214	108,760
7/15/2012	67	109	119,274	228,034
7/16/2012	16	285	196,356	424,390
7/17/2012	196	284	72,726	497,116
7/18/2012	84	273	31,606	528,722
7/19/2012	137	240	28,722	557,444
7/20/2012	217	217	40,230	597,674
7/21/2012	91	278	97,914	695,588
7/22/2012	43	258	110,898	806,486
7/23/2012	15	142	88,255	894,741
7/24/2012	5	168	51,222	945,963
7/25/2012	3	126	61,420	1,007,383
7/26/2012	7	106	61,812	1,069,195
7/27/2012	47	49	65,250	1,134,445
7/28/2012	15	57	63,438	1,197,883

In 2012 ADF&G used the South and North Test Boats.

The highlighted cells show the rapid movement of sockeye salmon up Cook Inlet and 19 miles up the Kenai River.

(Source – ADF&G)

2013 Test Boat Index and Kenai Escapement

Date	South Test Boat Index	North Test Boat Index	Kenai River Mile 19 Sonar Daily Count	Kenai River Mile 19 Sonar Total Count
7/1/2013	47	1	7,530	7,530
7/2/2013	46	4	4,380	11,910
7/3/2013	73	24	4,164	16,074
7/4/2013	60	13	10,655	26,729
7/5/2013	93	6	11,454	38,183
7/6/2013	49	4	4,915	43,098
7/7/2013	101	6	3,508	46,606
7/8/2013	6	39	3,514	50,120
7/9/2013	105	52	6,814	56,934
7/10/2013	11	32	18,270	75,204
7/11/2013	113	107	33,702	108,906
7/12/2013	88	3	10,086	118,992
7/13/2013	17	49	9,090	128,082
7/14/2013	No Data	632	24,520	152,602
7/15/2013	18	807	93,151	245,753
7/16/2013	183	217	247,084	492,837
7/17/2013	No Data	162	215,636	708,473
7/18/2013	No Data	116	117,785	826,258
7/19/2013	No Data	51	92,771	919,029
7/20/2013	20	93	81,281	1,000,310
7/21/2013	12	12	38,302	1,038,612
7/22/2013	64	15	24,900	1,063,512
7/23/2013	14	16	29,796	1,093,308
7/24/2013	108	18	17,993	1,111,301
7/25/2013	42	48	13,542	1,124,843
7/26/2013	6	15	21,954	1,146,797
7/27/2013	21	20	29,100	1,175,897
7/28/2013	5	13	28,039	1,203,936

In 2013 the South Test Boat did not detect a large movement of sockeye into the Central District.

On July 14 the North Test Boat detected a very large body of fish.

Within 24 hours those fish were starting to show at the Kenai sonar counter 19 miles up the river.

(Source – ADF&G)

Utilizing Migration Patterns and Run Timing

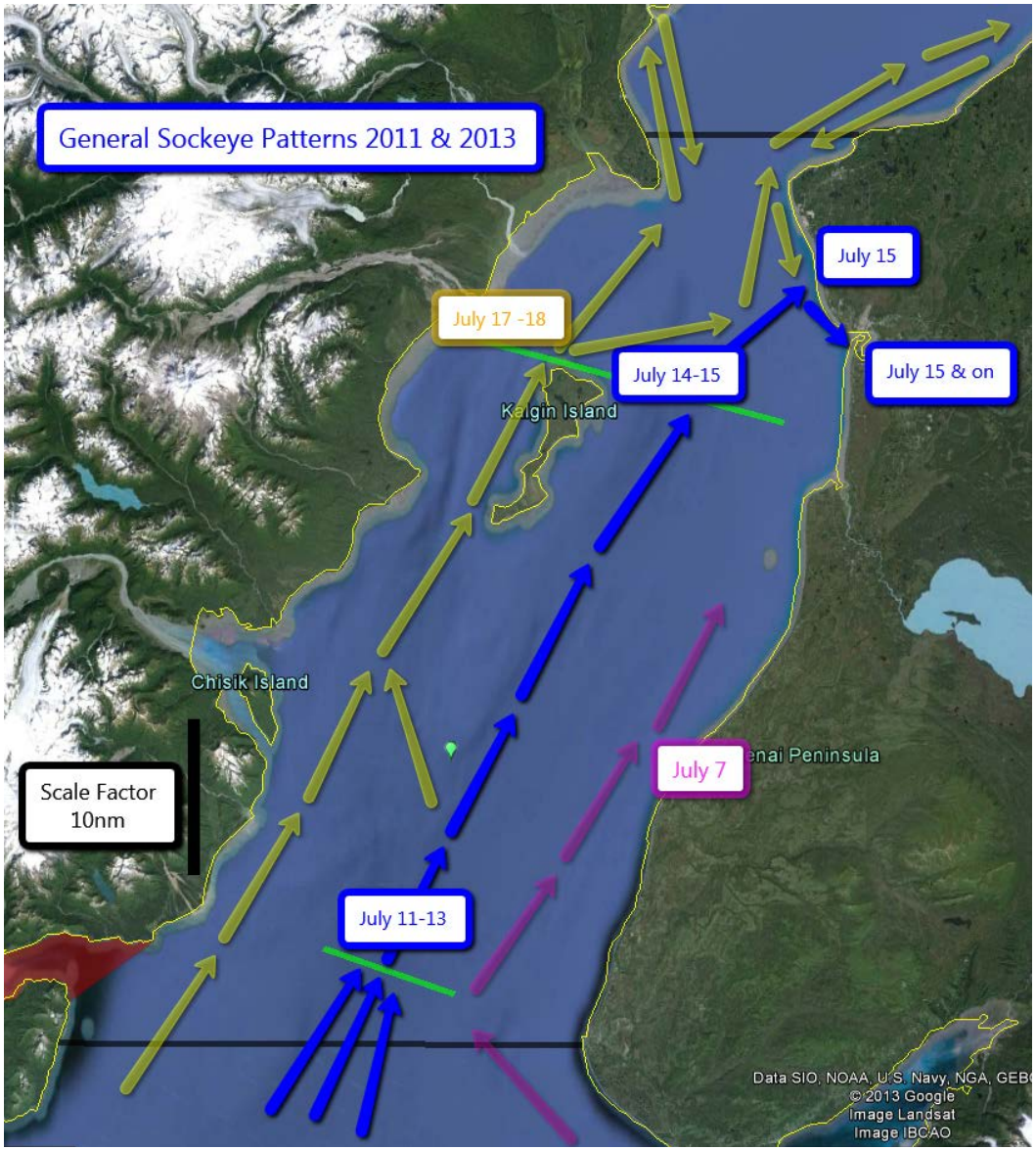
Adaptive management is essential in order to respond to this rapid movement of salmon.

Managers should be able to open fisheries with as little as one hour notice, regardless of any pre-determined restrictions to time or area.

Timely responses utilizing both the drift and setnet fleets to observed fish movements can prevent compression of escapement timing.

Historical observation has shown that commercial fishing activity disperses large schools of fish, slowing their migration to the river.

General Sockeye Patterns 2011 & 2013

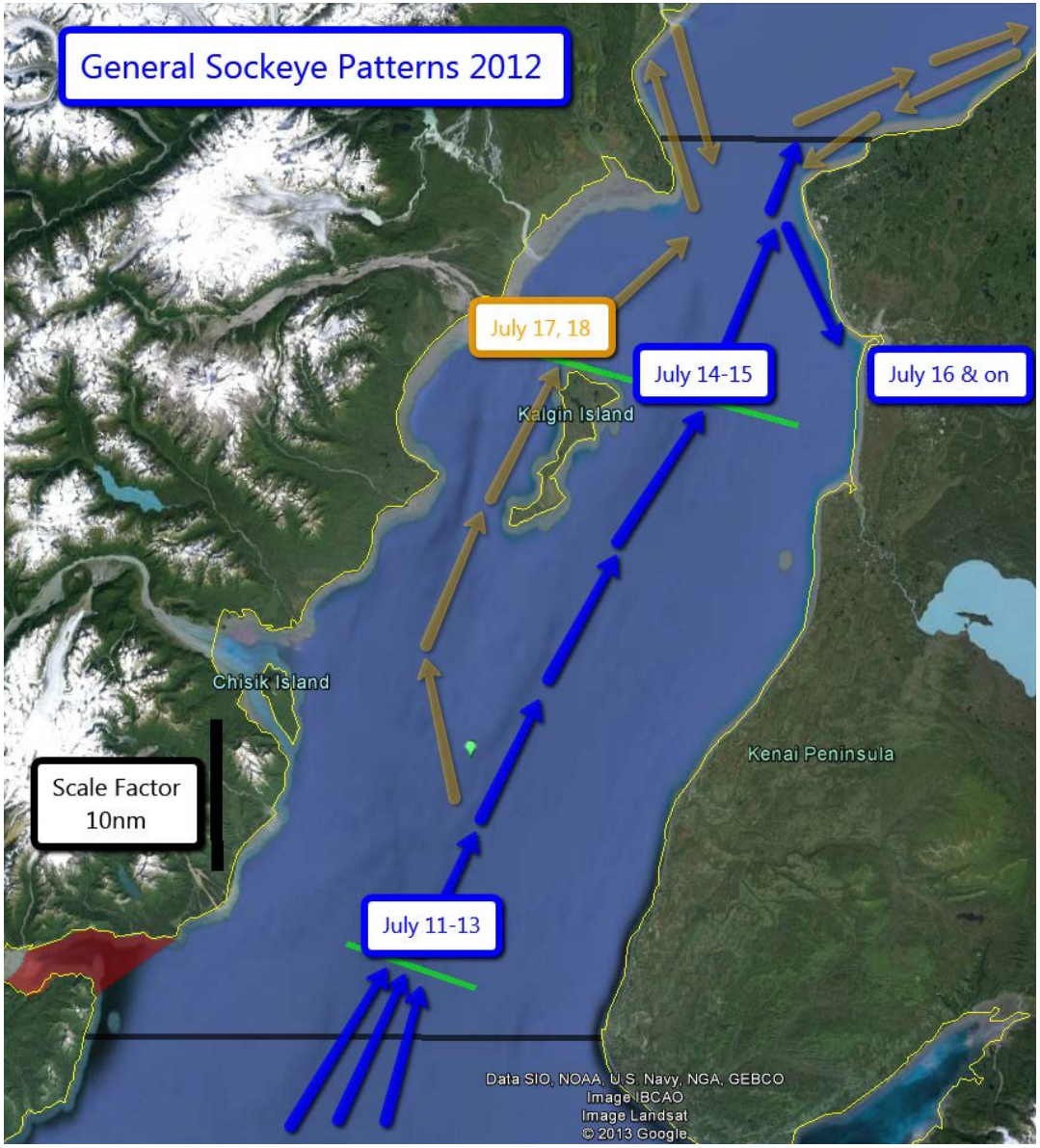


This map depicts movements of sockeye through the Central District in 2011 and 2013. Major fish movements are shown with the blue arrows, minor movements in other colors.

The arrow segments represent approximate half-day, or 12 hour, movements in the direction of the arrow. Dates, where known, are placed appropriately.

Both years had similar patterns with east and west components. 2011 had a steady east side pattern throughout the season. In 2013 there was an east side movement, but only during the early part of July.

General Sockeye Patterns 2012

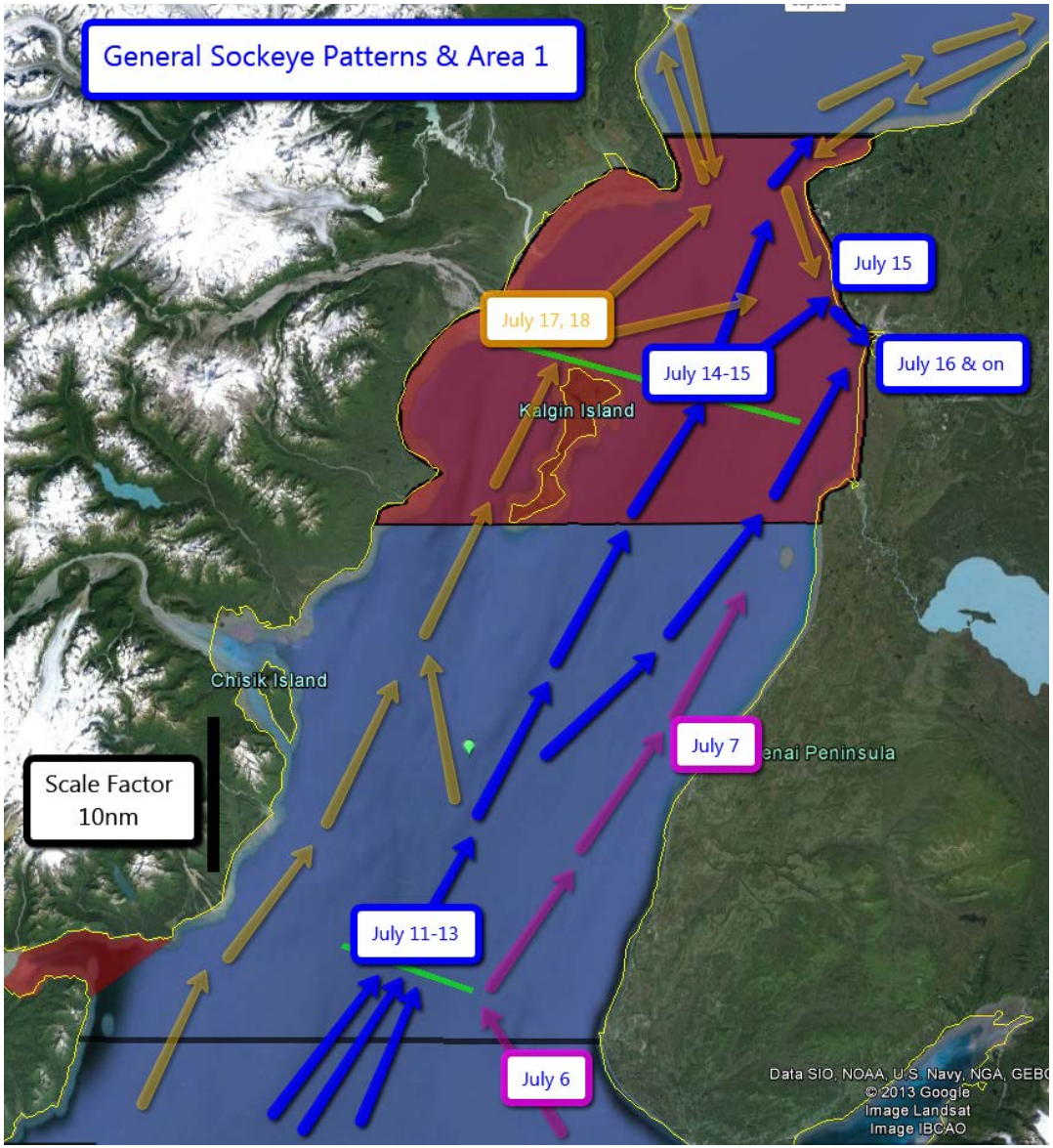


In 2012 almost the entire fish movement pattern was concentrated in the center of the inlet.

As seen in the previous slide, some salmon moved into the Northern District before heading back south. This is a typical pattern. Kenai and Kasilof sockeye can exceed 50% of the stock composition of the Northern District setnet harvest.

It is also typical for those fish to move close to shore along Salamatof Beach on their way back south.

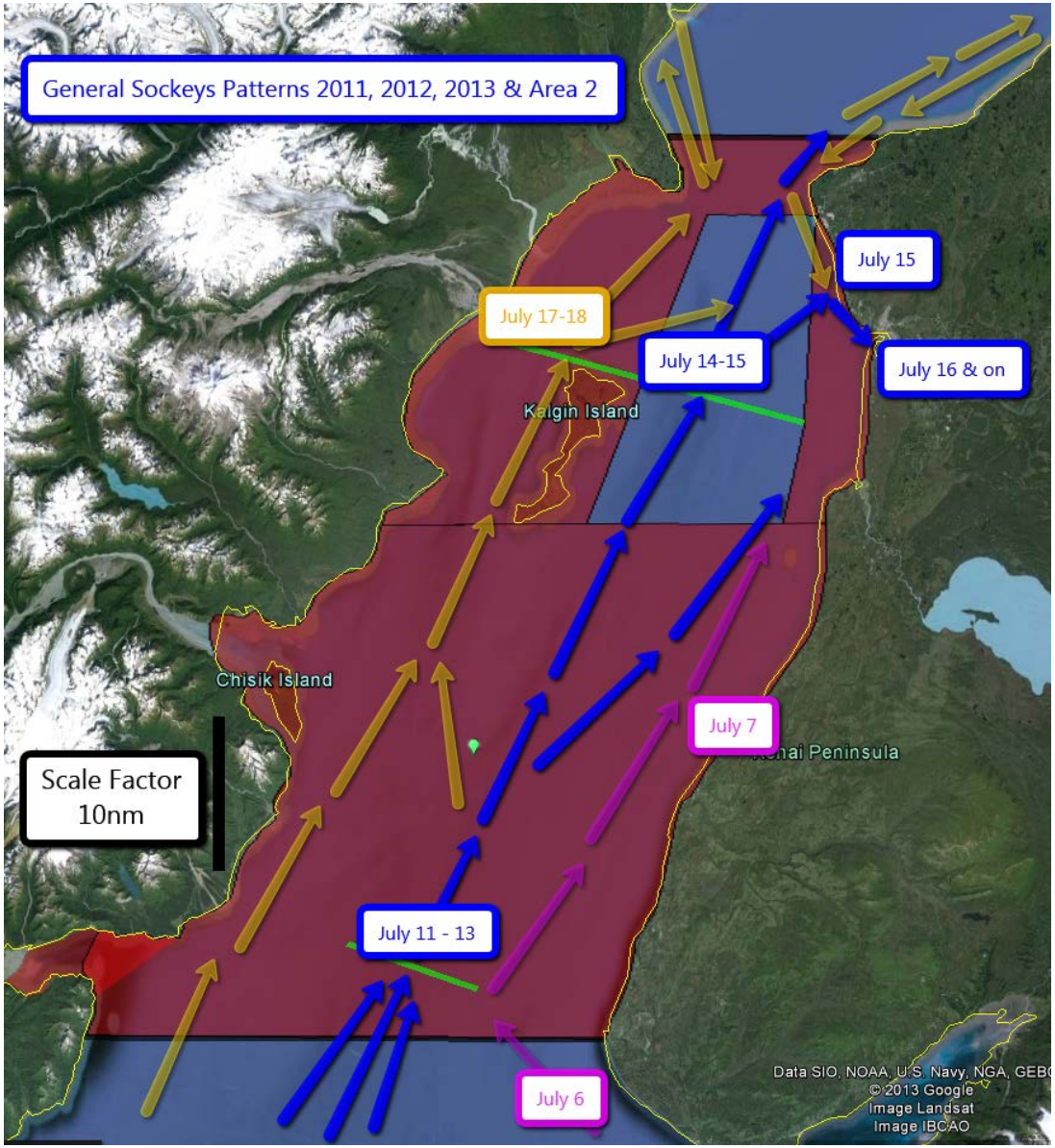
General Sockeye Patterns 2011, 2012, 2013 and Restricted Area 1



As this map indicates, all northward movements of sockeye pass through Area 1.

They generally spend 2 to 2.5 days in Area 1.

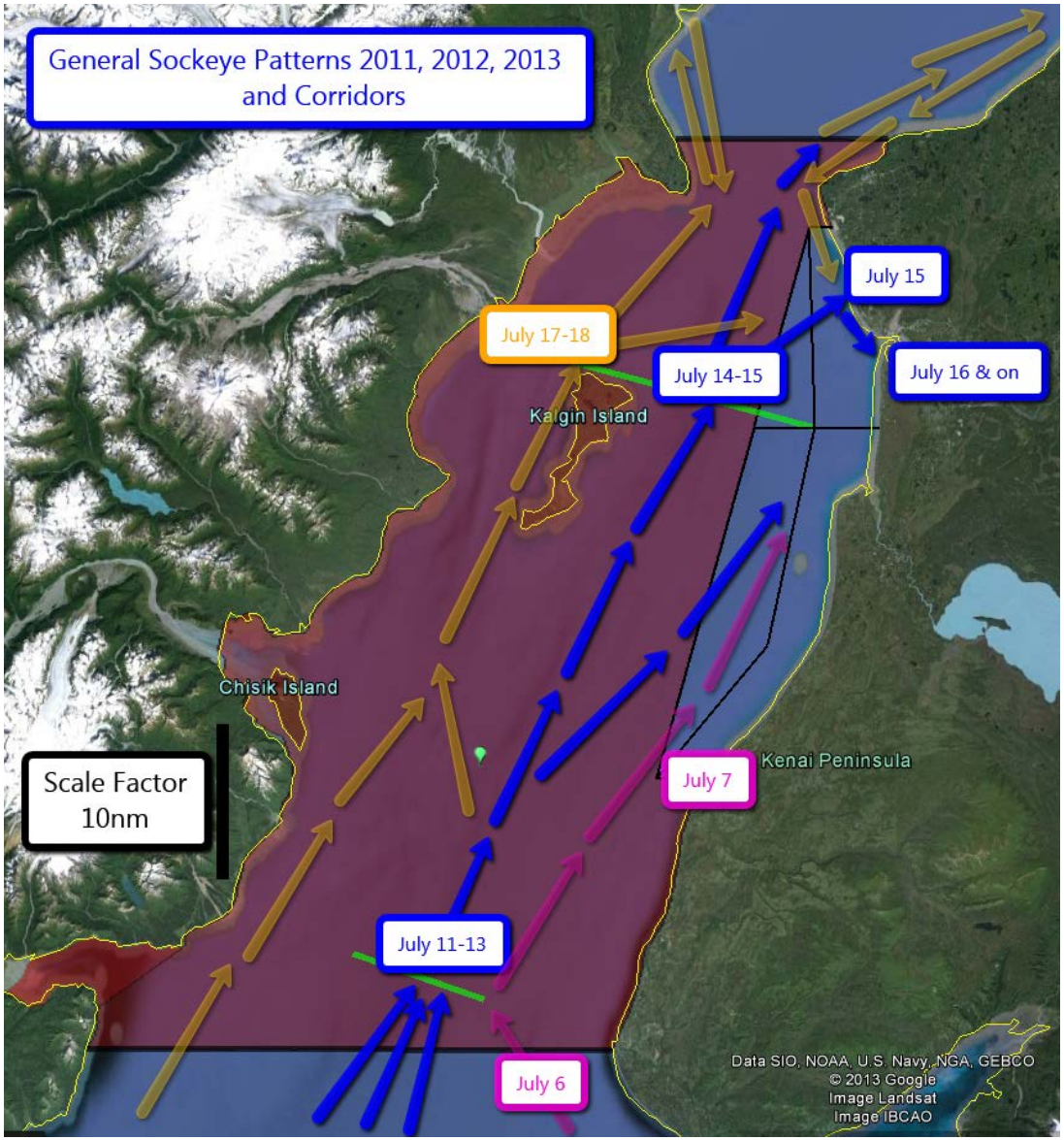
General Sockeye Patterns 2011, 2012, 2013 and Restricted Area 2



This map shows that sockeyes may be in Area 2 for only 12-24 hours before moving out of the area.

If Area 2 is intended to be used for harvesting fish detected at the North Test Boat line, then Emergency Openings with 1-2 hour notices should be utilized.

General Sockeye Patterns 2011, 2012, 2013 and Corridors



Sockeye spend a day or less moving through both Corridors.

Genetic testing has shown that salmon stocks, including northern-bound sockeye, are as intermingled in the Corridor as they are in the central inlet.

Utilizing Migration Patterns and Run Timing

This salmon movement information can be used to spread the harvest and the escapement throughout the run.

It is ADF&G policy to spread the escapement throughout the run.

- Compressed run timing and escapement decreases biological diversity. Diversity adds to a stock's resilience.
- Diversity decreases the risk of a local catastrophic event that could jeopardize an entire stock.
- Spreading escapement reduces potential for adverse density dependent effects.
- High densities of salmon passing through the sonar beam leads to undercounting of escapement.
- All user groups benefit as harvest opportunity is spread out over time.

Current UCI management amplifies compressed run and escapement timing.

The restrictions placed on the drift fleet to conserve northern sockeye stocks, and other mandatory restrictions such as setnet fishing “windows”, have been part of the state’s prescriptive management approach to UCI salmon.

These restrictions have prevented fishery managers from responding appropriately to real-time information during the season.

In 2012, from July 15 through 23, at least 785,981 sockeye entered the Kenai River. This was 50% of the total escapement (1,581,555) in just 9 days.

In 2013, from July 15 through 20, at least 844,462 sockeye entered the Kenai River. Over 62 % of the total escapement (1,354,554) in just 6 days. Possibly the most compressed run in Cook Inlet history.

Current UCI management amplifies compressed harvests

Compressed harvests result from compressed runs.

In recent years Cook Inlet seafood processors have been forced to purchase 25% of their entire season's sockeye pack in one day.

Compressed harvests lead to significant decreases in the quality and value of fish harvested. Harvesters don't have the time to chill and handle the fish carefully. Seafood plants get plugged and can't process the fish in a timely manner. In response, the seafood companies often have to put the harvesters on limits, with economic losses for all.

The additional consequence is that the harvestable surplus of salmon at that point cannot be effectively harvested, resulting in over-escapements into the rivers.

Premium quality fish destined for a fresh market are worth 2 to 3 times more than a lesser quality frozen product.

Conclusions

The management that has evolved for UCI over the past decades was largely based on a set of assumptions that we now realize were incorrect.

Scientific data from genetic stock identification, Test Boat fishing and the recognition that Susitna sockeye escapements had been grossly undercounted since 1982 have contradicted those previous assumptions.

Scientific data can now inform an empirically-based management plan. Any fishing restrictions should be scientifically justifiable, have set goals and measurable objectives.

UCI salmon management plans need to be adaptive rather than prescriptive so that fishery managers can respond appropriately to real-time run information.

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