NOAA FISHERIES

NERO / NEFSC

Port Biological Sampling Program

A joint program of: NERO / NEFSC

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Terms of Reference

5. What are the major fishery dependent data sources successes and how should they be supported?

6. What are the major fishery dependent data limitations/weaknesses and how could they be resolved? Define potential improvements and priorities for recommended improvements.

Program History

Organizational location

- < 1994: NEFSC
- 1994 – present: NERO

Staffing

- < 1994: federal Port Agents (Co-op students, interns)
- 1994 – 2004: federal & contract Port Agents
- 2004 – 2011: contract port agents & federal PA
- 2011 to present: contract port samplers & federal PA

Program Organization

Program management

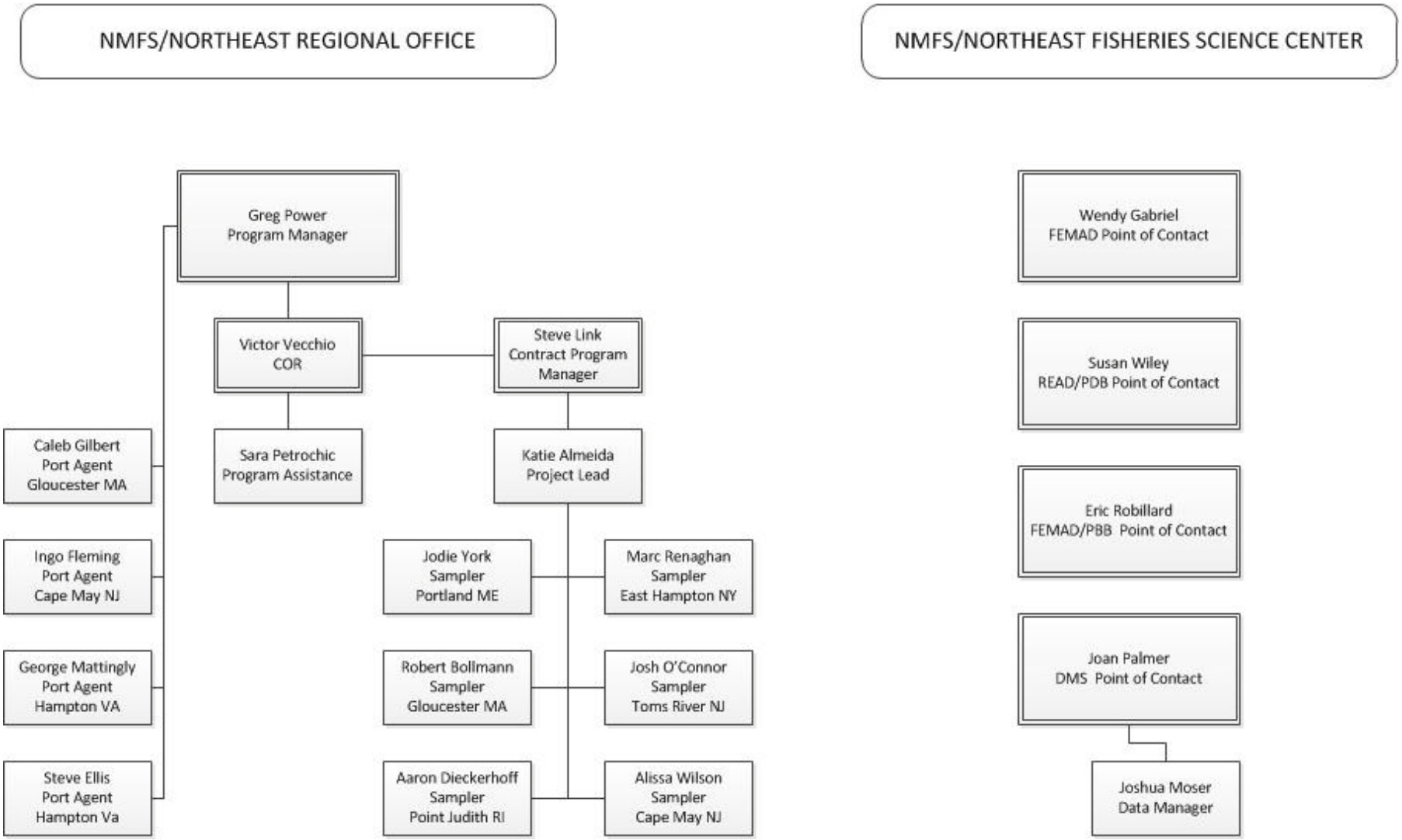
- NERO & NEFSC

Contract samplers

- Task order against contract for data services
- REMSA Inc., Hampton VA - current
- AIS Inc., New Bedford MA – winter 2014

Federal samplers

Program Organization (Doc #8-Dockside Sampling Team Organization Chart)



Program Conduct

- Stratification
- NEFSC request list
- Opportunity identification
- Sample collection
- Data processing
- Data quality

Stratification

- Sampling regions (7)
- Species (37)
- Market categories (all landed)
- Gear (all fished commercially)
- Stock area (single- and multiple-stock species)
- Calendar quarter

NEFSC Request List (Doc. #9-FY2013 NEFSC Biosamples request (Excel file))

Developed annually by NEFSC

Provided to NERO prior to start of FY

BIOLOGICAL SAMPLING REQUIREMENTS SUMMARY - FY2013									
Region	Species	Mkt Cat	Gear	Stock Area	Oct-Dec	Jan-Mar	Apr-Jun	Jul-Sep	TOTAL
MA-N	AMERICAN PLAICE	LRG	OT	52,56	3	3	2	2	10
MA-N	AMERICAN PLAICE	MED	OT	51,52,56	2	2	2	2	8
MA-N	AMERICAN PLAICE	SM	OT	51,52,56	3	3	2	3	11
MA-S/CC	AMERICAN PLAICE	LRG	OT	52,53,56	1	1	1	2	5
MA-S/CC	AMERICAN PLAICE	MED	OT	52,53,56	2	2	1	2	7
MA-S/CC	AMERICAN PLAICE	SM	OT	52,53,56	2	1	1	2	6
MA-N	ATLANTIC COD	MKT	OT	52,53	3	3	3	2	11
MA-N	ATLANTIC COD	SCROD	OT	52,53	2	2	3	2	9
MA-N	ATLANTIC COD	WHALE	ALL	52,53	1	1	1	1	4
MA-S/CC	ATLANTIC COD	LRG	GN	52,53,56	1	1	1	2	5
MA-S/CC	ATLANTIC COD	LRG	LL	52,53	1	1	2	1	5
MA-S/CC	ATLANTIC COD	LRG	OT	52,53	3	3	3	2	11
VA/MD	BLACK SEA BASS	JUM/LRG	ALL	62	0	0	2	2	4
VA/MD	BLACK SEA BASS	JUM/LRG	OT	61-63	0	4	2	0	6
MA-S/CC	BLACK SEA BASS	MED	ALL	52,53	1	0	2	2	5
NY/LI	BLACK SEA BASS	MED	ALL	53-63	2	2	2	2	8

Opportunity Identification

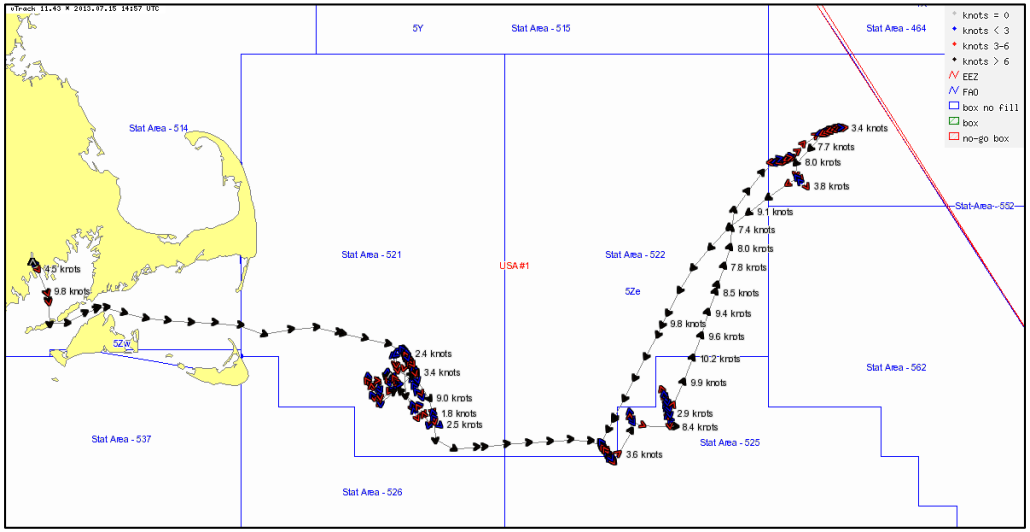
Request list

Within-quarter comparison of requested vs. collected samples

Looking for samples

- VMS email, catch reports, v-Track, historical knowledge, dealer/VTR reports

Within-quarter flexibility adjustments



V-Track plot of single trip

Sample Collection

Sample targeting

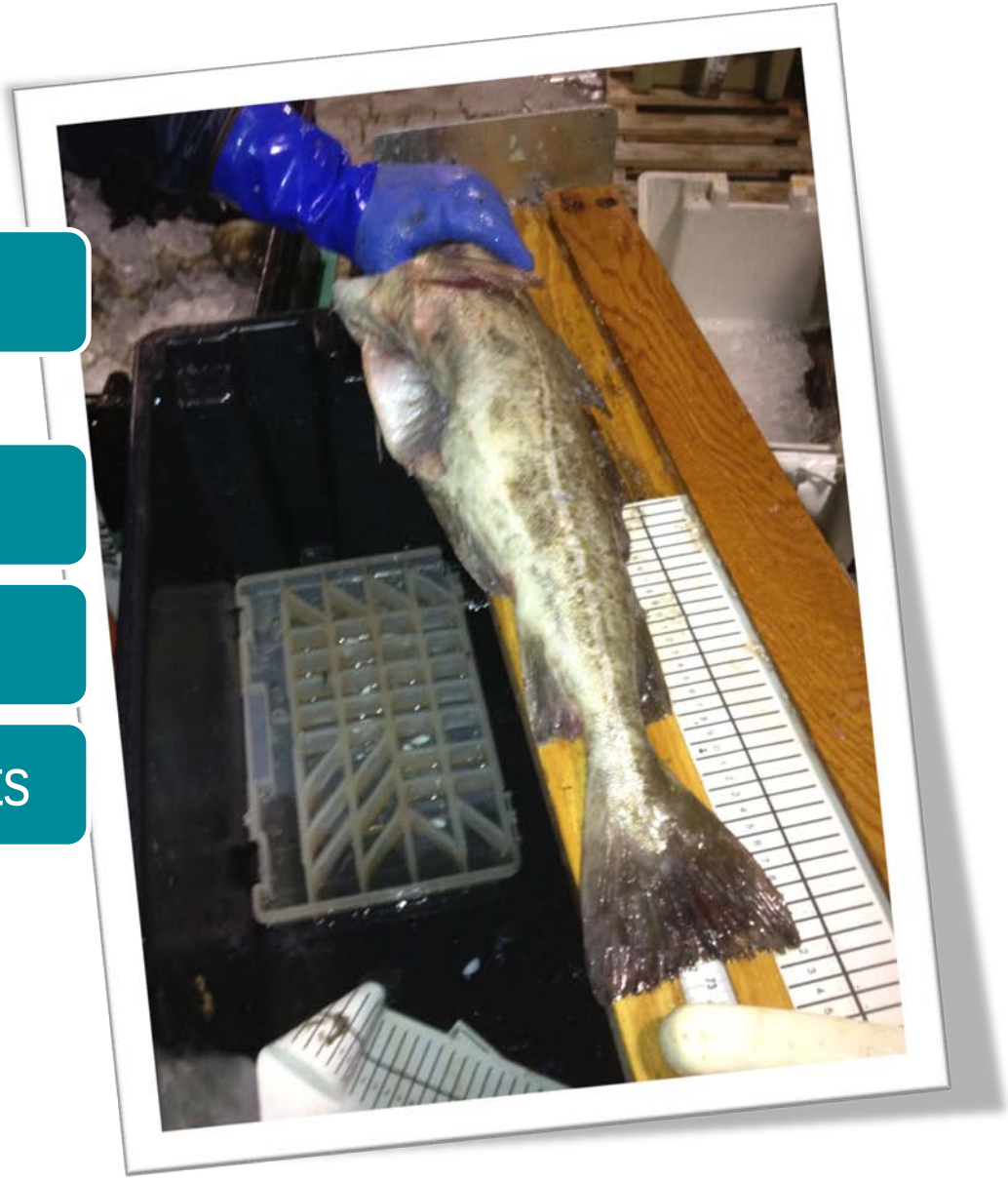
- Doc. #5 Sample Targeting Process

Dealer set up

Data collection

Standard sample requirements

- # lengths & ages, age structures
- Docs. # 1-Manual & 2-Work Instructions



Data Processing

Length data keyed into Biological Sample Monitoring Database System (BSMDBS) web form

- Doc. #3-BSM Web Entry System

Within 1 week of collection

Available immediately on BSDMBS web site

Available to users in Oracle tables

- BSMDBS (raw data)
- CFDBS

Age structures shipped to FEMAD/PBB

Data Quality

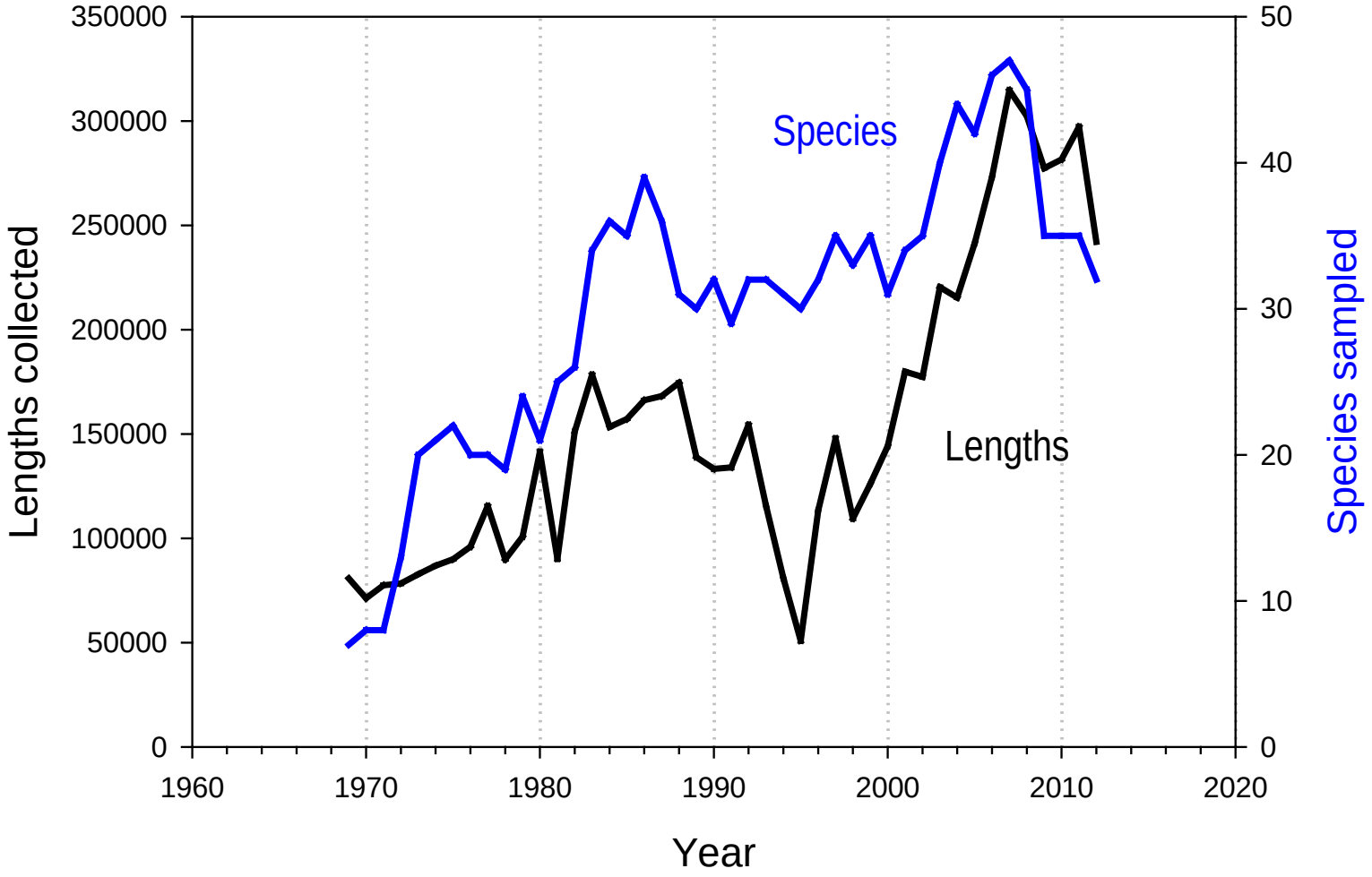
BSM audits

- Duplicate data
- Missing data elements
- Inappropriate length

Subsequent audits

- Docs. #4-Sampling Program Review Manual, #6–Sample Updating Process & #7-Guidelines for Samplers on Missing or Inaccurate Vessel Trip Reports
- Update trip identification fields
- Missing dealer or VTR reports
- Duplicate data
- Missing data elements

Program Results



Program Results

2012 Summary

3,689 Samples (32 species)

242,561 lengths
41,980 ages

Annually, commercial port sampling is reviewed and sampling requests are updated

Species	Samples	Lengths	Ages
ANGLER (GOOSEFISH)	92	6,629	713
BLUEFISH	132	8,037	2,702
BUTTERFISH	22	2,111	150
COD	498	17,896	6,707
CUSK	85	747	661
FLOUNDER, WINTER	149	8,812	2,806
FLOUNDER, SUMMER	151	10,086	3,355
FLOUNDER, WITCH	158	4,268	1,777
FLOUNDER, YELLOWTAIL	188	17,435	4,520
FLOUNDER, AM. PLAICE	109	7,173	2,125
FLOUNDER, SAND-DAB	1	100	25
HADDOCK	226	10,277	6,539
HAGFISH	18	1,835	.
HAKE, RED	32	3,179	.
HAKE, WHITE	97	6,864	.
HALIBUT, ATLANTIC	53	53	24
MACKEREL, ATLANTIC	27	2,386	275
REDFISH	15	1,448	340
POLLOCK	139	9,238	2,421
SCUP	103	9,554	2,560
SEA BASS, BLACK	135	7,686	2,704
DOGFISH, SPINY	51	4,058	.
TILEFISH, GOLDEN	90	7,443	1,576
OFFSHORE HAKE	9	859	.
HAKE, SILVER	174	14,943	.
CRAB, RED	15	1,537	.
LOBSTER, AMERICAN	68	6,862	.
QUAHOG, OCEAN	181	5,430	.
CLAM, SURF	224	6,725	.
SCALLOP, SEA	172	32,059	.
SQUID (LOLIGO)	207	20,031	.
SQUID (ILLEX)	68	6,800	.

Examples of Stratification

Sampling Strata used at the NEFSC:

- Region-species–market category–gear–stock area-quarter
  - sex info is collected for some species with external characteristic like lobsters, redfish, spiny dogfish;
    yellowtail flounder (ovary seen through skin)

- "Standard Sample" = 100 lens/25 ages (50 length/10 ages)

BIOLOGICAL SAMPLING REQUIREMENTS SUMMARY - FY2013

Region	*Species*	*Mkt Cat*	*Gear*	*Stock Area*	*Oct-Dec*	*Jan-Mar*	*Apr-Jun*	*Jul-Sep*	*TOTAL*
MA-N	WITCH FLOUNDER	LRG	OT	51,52,56	3	3	3	3	**12**
MA-S/CC	WITCH FLOUNDER	LRG	OT	51,52,56	2	2	2	2	**8**
ME/NH	WITCH FLOUNDER	LRG	OT	51,52,56	2	2	2	2	**8**
MA-N	WITCH FLOUNDER	MED	OT	51,52,56	2	2	2	2	**8**
MA-S/CC	WITCH FLOUNDER	MED	OT	51,52,56	1	1	1	1	**4**
ME/NH	WITCH FLOUNDER	MED	OT	51,52,56	1	1	1	1	**4**
MA-N	WITCH FLOUNDER	SM/PW	OT	51,52,56	5	5	5	5	**20**
MA-S/CC	WITCH FLOUNDER	SM/PW	OT	51,52,56	2	2	2	2	**8**
ME/NH	WITCH FLOUNDER	SM/PW	OT	51,52,56	1	1	1	1	**4**
	WITCH FLOUNDER			**TOTAL**	**19**	**19**	**19**	**19**	**76**

Region	Species	Mkt Cat	Gear	Stock Area	Oct-Dec	Jan-Mar	Apr-Jun	Jul-Sep	TOTAL
MA-N	ATLANTIC COD	LRG	OT	56	2	2	2	1	**7**
MA-N	ATLANTIC COD	MKT	OT	56	2	2	2	2	**8**
MA-N	ATLANTIC COD	SCROD	OT	56	2	2	2	2	**8**
MA-N	ATLANTIC COD	WHALE	ALL	56	1	1	1	1	**4**
MA-S/CC	ATLANTIC COD	LRG	OT	56	1	2	2	1	**6**
MA-S/CC	ATLANTIC COD	MKT	OT	56	2	2	2	2	**8**
MA-S/CC	ATLANTIC COD	SCROD	OT	56	2	1	2	1	**6**
MA-S/CC	ATLANTIC COD	WHALE	ALL	56	1	1	1	1	**4**
MA-S/CC	ATLANTIC COD	LRG	LL	56	1	1	1	1	**4**
MA-S/CC	ATLANTIC COD	MKT	LL	56	1	1	1	1	**4**
MA-S/CC	ATLANTIC COD	SCROD	LL	56	1	1	1	1	**4**
MA-S/CC	ATLANTIC COD	Steaker	LL	56	1	1	1	1	**4**
ME/NH	ATLANTIC COD	LRG	OT	56	1	1	1	1	**4**
ME/NH	ATLANTIC COD	MKT	OT	56	1	1	1	1	**4**
ME/NH	ATLANTIC COD	SCROD	OT	56	0	1	1	1	**3**
ME/NH	ATLANTIC COD	WHALE	ALL	56	1	1	1	1	**4**
MA-N	ATLANTIC COD	LRG	OT	52,53	2	2	2	2	**8**
MA-N	ATLANTIC COD	LRG	GN	52,53	1	1	1	1	**4**
MA-N	ATLANTIC COD	MKT	GN	52,53	1	1	2	2	**6**
MA-N	ATLANTIC COD	MKT	OT	52,53	2	2	2	2	**11**
MA-N									
MA-N									
MA-S/CC									
MA-S/CC									
MA-S/CC									
MA-S/CC									
MA-S/CC									
MA-S/CC									
MA-S/CC									
MA-S/CC									
MA-S/CC									
MA-S/CC									
MA-S/CC									
MA-S/CC									
ME/NH									
ME/NH									
ME/NH									
ME/NH									
ME/NH									
ME/NH									
MA-N									
MA-N									
MA-N	ATLANTIC COD	MKT	GN	51	1	1	2	2	**6**
MA-N	ATLANTIC COD	MKT	OT	51	1	3	3	2	**9**
MA-N	ATLANTIC COD	SCROD	GN	51	1	1	1	1	**4**
MA-N	ATLANTIC COD	SCROD	OT	51	2	2	1	1	**6**
MA-S/CC	ATLANTIC COD	LRG	GN	51	1	1	1	1	**4**
MA-S/CC	ATLANTIC COD	LRG	LL	51	1	1	1	1	**4**
MA-S/CC	ATLANTIC COD	MKT	GN	51	1	1	2	2	**6**
MA-S/CC	ATLANTIC COD	MKT	LL	51	1	1	1	1	**4**
MA-S/CC	ATLANTIC COD	SCROD	GN	51	1	1	1	1	**4**
MA-S/CC	ATLANTIC COD	SCROD	LL	51	1	1	1	1	**4**
ME/NH	ATLANTIC COD	LRG	GN	51	1	1	1	1	**4**
ME/NH	ATLANTIC COD	LRG	OT	51	1	1	1	1	**4**
ME/NH	ATLANTIC COD	MKT	GN	51	1	1	2	2	**6**
ME/NH	ATLANTIC COD	MKT	OT	51	1	1	1	2	**5**
ME/NH	ATLANTIC COD	SCROD	GN	51	1	1	1	1	**4**
ME/NH	ATLANTIC COD	SCROD	OT	51	1	1	1	1	**4**
ME/NH	ATLANTIC COD	STEAKER	ALL	51	1	1	1	1	**4**
ME/NH	ATLANTIC COD	WHALE	ALL	51	1	1	1	1	**4**
	ATLANTIC COD			**TOTAL**	**73**	**77**	**86**	**77**	**313**

Sampling Request for COD:

Region x Species x Market Category x Gear x Stock Area x Quarter

GM and GB stocks (plus EGB stock component)

Gulf of Maine Haddock Length Sampling by market category and quarter

Year	Large				Scrod				Total lengths	Commercial landings (mt)	Metric tons/100 lengths
	QTR 1	QTR 2	QTR 3	QTR 4	QTR 1	QTR 2	QTR 3	QTR 4			
1977		197	358		382	511	481	569	2498	3230.1	129.3
1978	149	35	200		223	322	179	203	1311	4382.5	334.3
1979	195		124	100	114			66	599	4130.6	689.6
1980		319	102		51	175	257	201	1105	6317.6	571.7
1981		52	257	638	53	358	514	381	2253	5720.4	253.9
1982	103		1361	104	473	53	273	154	2521	5637.0	223.6
1983											136.7
1984											152.5
1985											74.7
1986											66.0
1987											49.1
1988											55.8
1989											64.2
1990											157.6
1991											42.1
1992											75.9
1993	combined 1992 & 1994 and ran annual				103	56	125		284	193.0	68.0
1994		100	52	297				219	668	120.1	18.0
1995	62				194				256	173.0	67.6
1996	77			427		92		100	696	246.6	35.4
1997	120	255	497	355		124	358	147	1856	588.6	31.7
1998	309	111	78	313	689	49	156	35	1740	885.2	50.9
1999	117		300	211			214	102	944	542.5	57.5
2000	488	313	339	107	414	259	105	287	2312	737.9	31.9
2001	528	93	207	579	353	108	66	847	2781	929.1	33.4
2002	729	210		262	348	143	247	161	2100	976.9	46.5
2003	792	348	1282	1043	485	216	716	513	5395	1023.0	19.0
2004	1898	942	101	601	1021	1085	262	451	6361	946.5	14.9
2005	1313	325	573	752	661	449	733	769	5575	961.5	17.2
2006	1193	687	453	617	928	535	569	514	5496	618.2	11.2
2007	817	348	1016	616	781	360	768	400	5106	673.7	13.2
2008	789	472	351	141	566	466	348	295	3428	508.5	14.8
2009	1248	409	142	181	568	306	135	119	3108	486.0	15.6
2010	1018	214	187	614	600	239	135	156	3163	561.1	17.7

Length sampling intensity for GM haddock has increased over time.
In 2010, 18 mt per 100 lengths

Taken from Palmer et al. WP C Stock Assessment Update February 2012

Gulf of Maine Haddock Age Sampling by market category and quarter

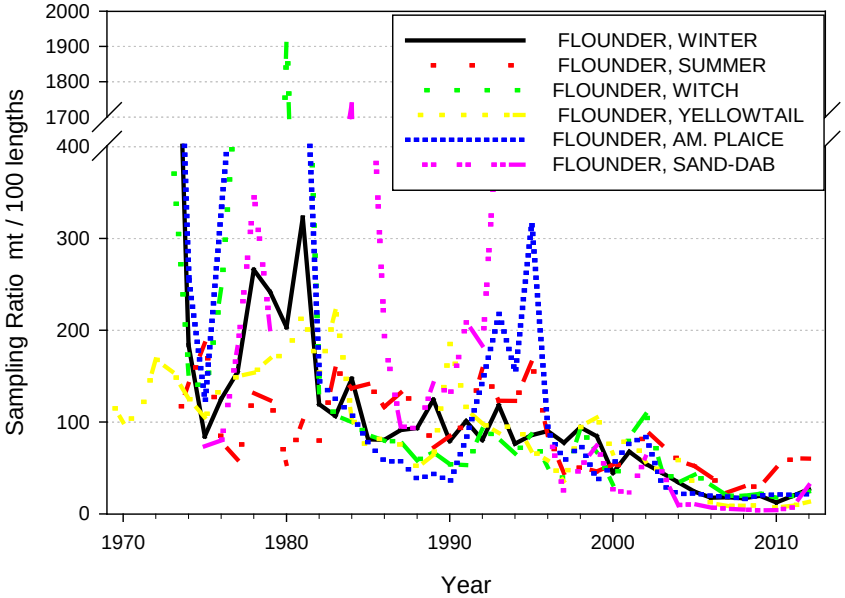
Year	Large				Scrod				Combined				Total ages	Commercial landings (mt)	Metric tons/100 ages
	QTR 1	QTR 2	QTR 3	QTR 4	QTR 1	QTR 2	QTR 3	QTR 4	QTR 1	QTR 2	QTR 3	QTR 4			
1977		40	57		112	155	175	220	112	195	232	220	1421	3230.1	227.3
1978	40	20	39		80	115	50	49	120	135	89	49	687	4382.5	637.9
1979	48		25	45	30			16	*78*		*25*	*61*	210	4130.6	1966.9
1980		58	20		17	39	68	46	17	97	88	46	418	6317.6	1511.4
1981		15	61	147	14	105	124	80	14	120	185	227	869	5720.4	658.3
1982	20		284	21	103	14	75	45	123	14	359	66	799	5637.0	705.5
1983	65	214	225	110	90	90	77	43	155	304	302	153	1214	5593.4	460.7
1984		21	229	94	47	31	47	31	*47*	*52*	276	125	656	2792.8	425.7
1985	95	140	135	148	95	64	95	10	190	204	230	158	1046	2234.3	213.6
1986	49	61	149	55	54	75	58	61	103	136	207	116	810	1590.4	196.3
1987	36	24	125	105	40	14	28	45	76	38	153	150	544	829.2	152.4
1988	18		17	39	86		15		104		*32*	*39*	276	416.2	150.8
1989												*42*	201	263.8	131.3
1990												*37*	142	433.3	305.2
1991												87	395	430.9	109.1
1992												*83*	238	311.8	131.0
1993													184	193.0	104.9
1994												196	315	120.1	38.1
1995													144	173.0	120.2
1996												109	178	246.6	138.6
1997												137	607	588.6	97.0
1998												166	567	885.2	156.1
1999												105	403	542.5	134.6
2000												129	1138	737.9	64.8
2001												374	1130	929.1	82.2
2002												158	1019	976.9	95.9
2003	250	88	431	274	161	90	308	199	411	178	739	473	2559	1023.0	40.0
2004	500	142		41	283	206	33	41	783	348	33	82	1809	946.5	52.3
2005	251	48	211	314	157	122	274	246	408	170	485	560	2422	961.5	39.7
2006	634	165	287	255	444	268	294	225	1078	433	581	480	3803	618.2	16.3
2007	392	166	501	322	391	172	387	193	783	338	888	515	3667	673.7	18.4
2008	424	309	205	69	261	226	168	149	685	535	373	218	2615	508.5	19.4
2009	720	293	141	106	273	150	77	70	993	443	218	176	2400	486.0	20.3
2010	619	117	133	292	322	75	51	47	941	192	184	339	2151	561.1	26.1

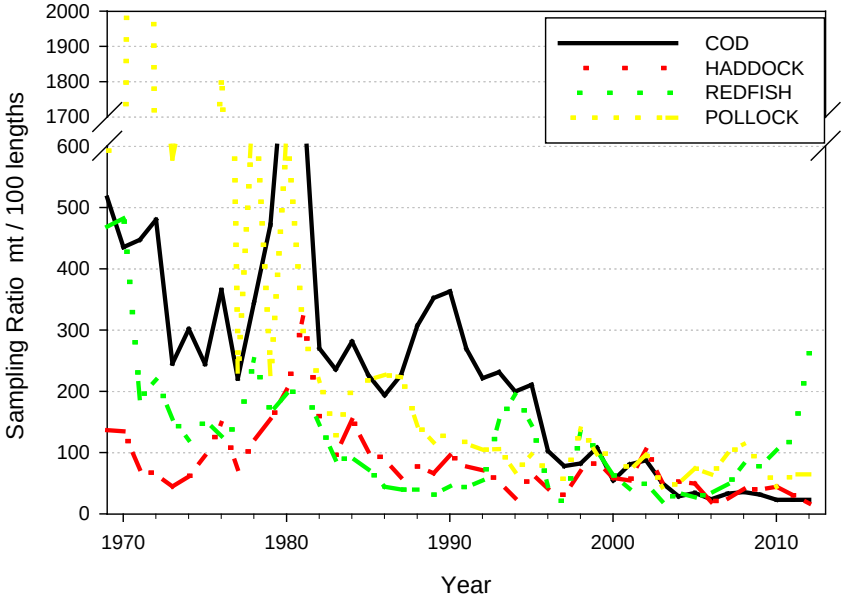
Age sampling intensity for GM haddock has also increased over time.

In 2010, 26 mt per 100 ages

Taken from Palmer et al. WP C Stock Assessment Update February 2012

Program Results – Sampling Intensity





Program Results – CVs for Numbers at age

BioStat Bootstrapping for Estimating Uncertainty in Commercial Landings at Age

By Legault, Brooks, and Seaver

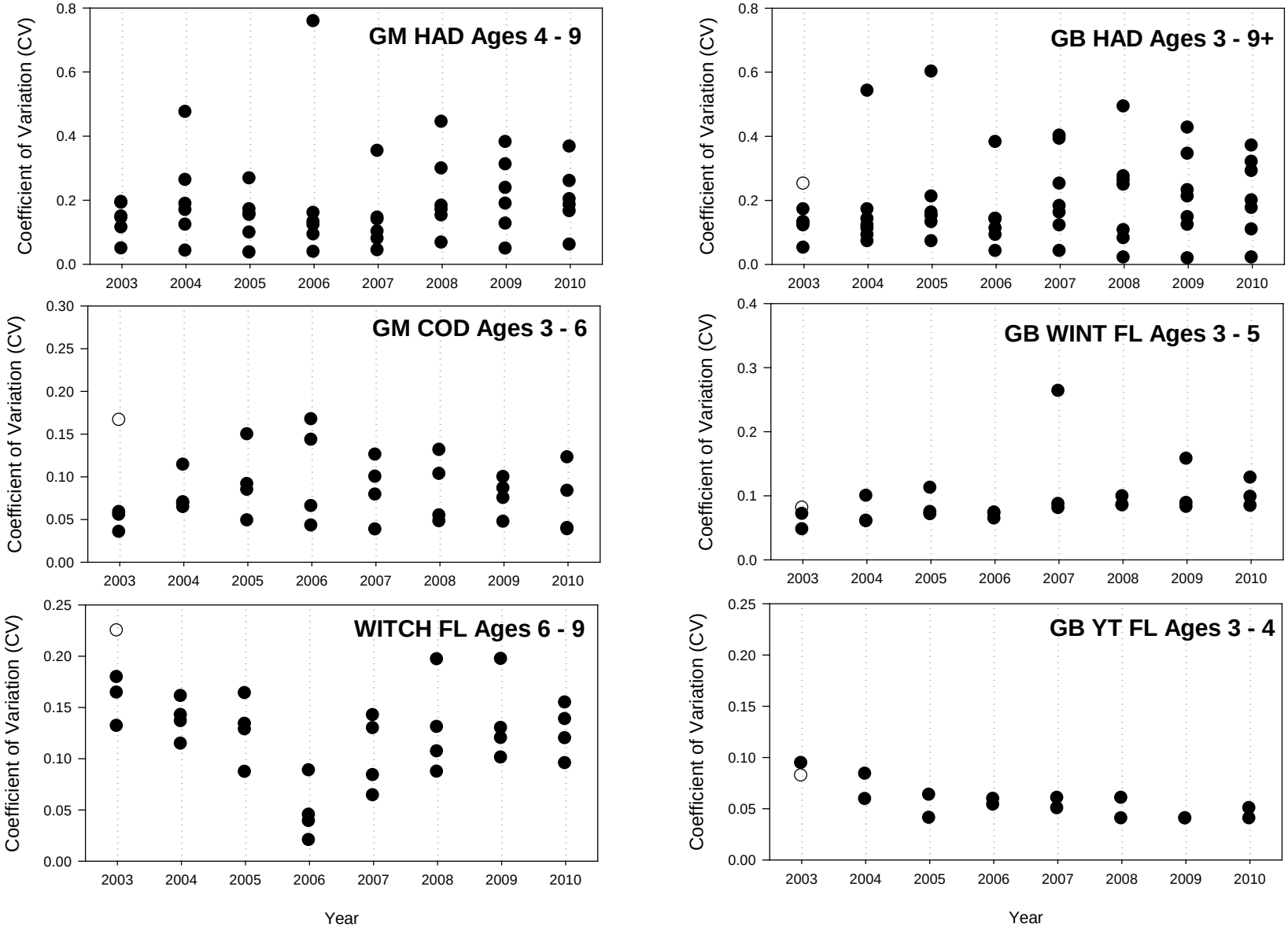
Groundfish Assessment Review Meeting 2008 WP #6

Example: Witch Flounder CVs for numbers of fish at age

Year	age4	age5	age6	age7	age8	age9	age10	age11+
2003	0.70	0.29	0.22	0.16	0.13	0.18	0.26	0.17
2004	0.47	0.25	0.16	0.11	0.14	0.14	0.20	0.16
2005	0.49	0.21	0.13	0.09	0.13	0.16	0.18	0.13
2006	0.20	0.12	0.09	0.04	0.02	0.04	0.06	0.07
2007	0.35	0.24	0.14	0.06	0.08	0.13	0.15	0.15
2008	0.43	0.29	0.20	0.09	0.11	0.13	0.17	0.17
2009	0.41	0.19	0.20	0.13	0.10	0.12	0.25	0.42
2010		0.26	0.14	0.12	0.10	0.15	0.11	0.16

The CV by age, as well as the covariance matrix, can be used as an indicator of sufficiency of sampling when deciding a plus group, or for modifying future sample collection requests, or can inform precision of estimates for some stock assessment models.

Program Results – CVs for Numbers at Age



Participation in ACCSP

NEFSC sampling targets are integrated into the Atlantic Coast Cooperative Statistics Program's Biological Review Panel sampling target matrix

Example: Witch flounder for FY2011

REGION	COMMON_NAME	MKT_CAT	GRADE	GEAR	STAT_AREA	QTR1_ LEN	QTR2_ LEN	QTR3_ LEN	QTR4_ LEN	TOTAL	MAX_INDIV	ADDL_MEAS	MAX_AGES	AGES_REQ	AGE_TYPE
MA-N	WITCH FLOUNDER	LRG	Round	OT	51,52,56	300	300	300	300	1200	100		25	300	Otolith
MA-S/CC	WITCH FLOUNDER	LRG	Round	OT	51,52,56	200	200	200	200	800	100		25	200	Otolith
ME/NH	WITCH FLOUNDER	LRG	Round	OT	51,52,56	200	200	200	200	800	100		25	200	Otolith
MA-N	WITCH FLOUNDER	MED	Round	OT	51,52,56	200	200	200	200	800	100		25	200	Otolith
MA-S/CC	WITCH FLOUNDER	MED	Round	OT	51,52,56	100	100	100	100	400	100		25	100	Otolith
ME/NH	WITCH FLOUNDER	MED	Round	OT	51,52,56	100	100	100	100	400	100		25	100	Otolith
MA-N	WITCH FLOUNDER	SM/PW	Round	OT	51,52,56	150	150	150	150	600	50		10	120	Otolith
MA-S/CC	WITCH FLOUNDER	SM/PW	Round	OT	51,52,56	50	50	50	50	200	50		10	40	Otolith
ME/NH	WITCH FLOUNDER	SM/PW	Round	OT	51,52,56	50	50	50	50	200	50		10	40	Otolith
	WITCH FLOUNDER				**TOTAL**	**1350**	**1350**	**1350**	**1350**	**5400**				**1300**	

Participation in National Working Group

Sampling Intensity and Processing (SIP) Working Group
Cross-Regional Strategic Planning for Fishery-Dependent Biological Sampling

The purposes of this project are to:

(1) quantify the intensity of biological sampling of commercial fisheries within each region,

(2) distribute funds specified for biological sampling strategically among the NOAA Fisheries Science Centers based on the assessment of sampling intensity,

(3) provide a tool for assessing biological sampling needs within regions,

(4) provide a basis for requesting additional funding for biological sampling, and

(5) demonstrate biological sampling successes.

SIP Working Group - Sampling Rubric

There are two components to the rubric:

1) **Data Inadequacy** - An evaluation of sampling performance for each species. Higher scores correspond to inadequate data collection and thus the need for more funding. Lower scores correspond to better data collection and thus the need for less funding.

2) **Species Emphasis** - A weighted score based on the importance/value for each species. Higher scores correspond to more important species and thus the need for more funding. Lower scores correspond to less important species and thus the need for less funding.

Program Strengths

Flexibility in sampling opportunities

- Able to modify targets within quarter
- Positioned in all major ports

Cost effective

- Pay only for lengths collected
- Samples requested can be modified w/o contract change

Participation in HQ Sample Intensity and Processing WG

Coordination between groups & sharing of information

- Bi-weekly & monthly program calls
- Program and issue management web systems (Wiki & Jira)
- Information sharing on current industry activities
- Shared infrastructure

Program Challenges

Low landings in some strata

- Fewer sampling opportunities
- Harder to find
- Smaller sample sizes

Limited collection technology

Under reporting of multiple areas on VTR

Multiple stock area trips

- Cod, haddock, yellowtail flounder, winter flounder, monkfish, red hake, and silver hake

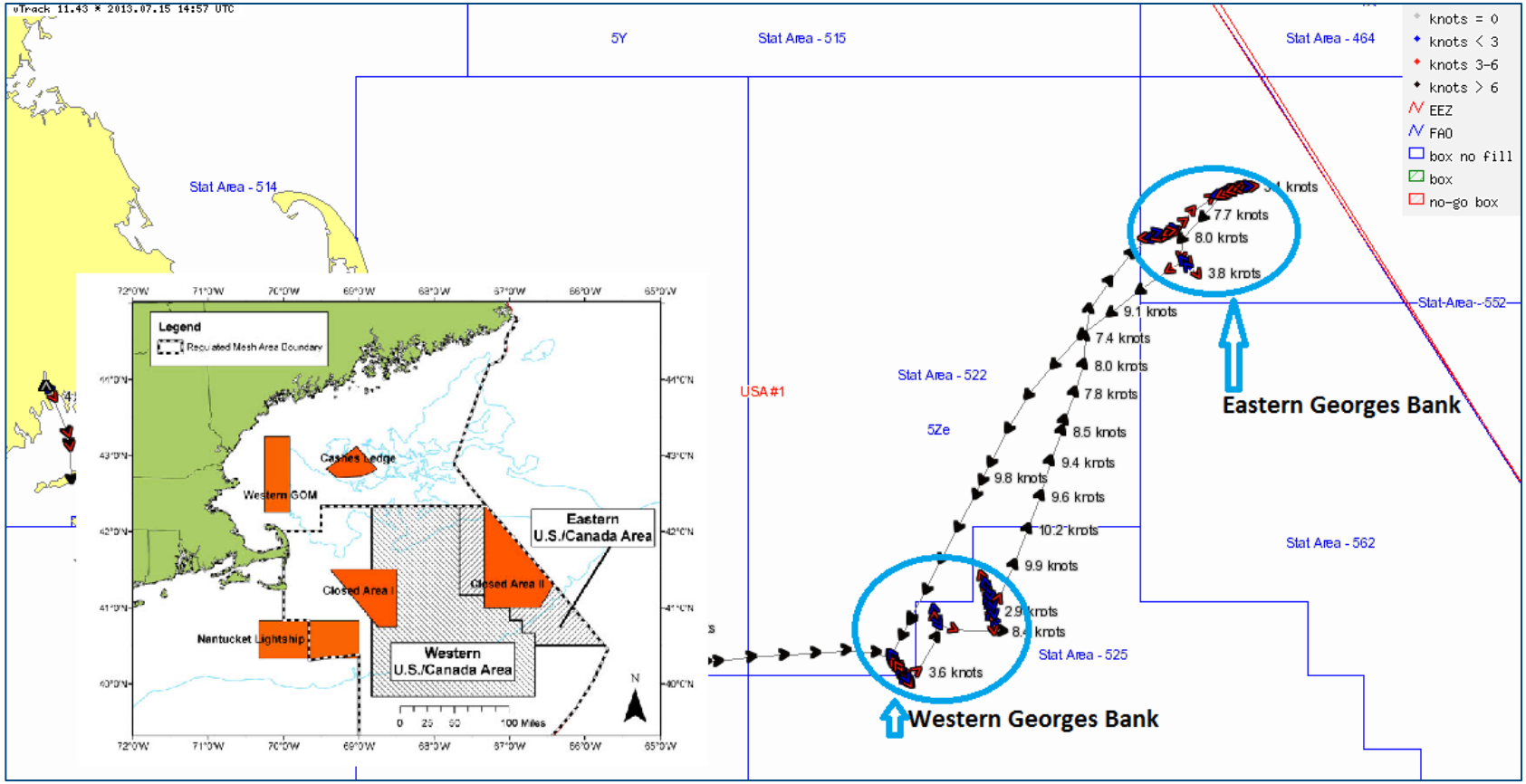
Contract type changes (time vs. per sample vs. per length)

- New biases, changes in precision?

Program Challenges

Multiple stock area trips

- Trip could not be sampled for cod



Program Improvement Suggestions

Improve collection technology

Develop near-real time monitoring

Better access and utilization of current data

- Derived data sets, dealer, VTR, VMS

Better coordination

- Other NMFS-NE fishery dependent programs
- Match sample requests to current landings
- State partners / ACCSP

Questions