Northeast Coastal Indicators Workshop
Web Survey results

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The Survey's Intent

- Obtain information on relative importance of the six identified workshop issue areas
- Understand the relative importance of key topics within each issue area
- Understand the relative importance of the key themes for communicating status and trends within issue area
- Provide back drop for straw indicators provided to the breakout sessions

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Who took the survey?

- 215 individuals
  - 28% science
  - 23% manager
  - 21% educator
  - 15% policy maker
  - 14% other
- Sector
  - 61% Public
  - 22% NGO
  - 11% Private
  - 7% Citizen

JobArena	Educator	Manager	Policy-maker	Scientist	Other	Total Responses
Citizen	3	2	5	3	6	**19**
Non-governmental	12	16	7	12	14	**61**
Private	11	2	2	11	3	**29**
Public	31	42	28	51	15	**167**
Total	**57**	**62**	**42**	**77**	**38**	**276**

NOTE: THE SAME PERSON OFTEN SELECTED MORE THAN ONE JOB DESCRIPTION

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Who took the survey?

- ME – 38%
- CT, MA – 12% each
- NB, NS – 7% each
- NH – 4%
- NY – 3%
- RI – 1%
- Other (federal?) – 17%

Jurisdiction	Educator	Manager	Policy-maker	Scientist	Other	Total Responses
Connecticut	5	10	5	9	3	**32**
Maine	31	19	17	26	12	**105**
Massachusetts	7	5	5	11	4	**32**
New Brunswick	4	4	2	4	4	**18**
New Hampshire	1	6	3	1	1	**12**
New York	4	1		3	1	**9**
Nova Scotia	3	3	2	5	5	**18**
Rhode Island	1	1		2		**4**
Other	1	13	8	16	8	**46**
Total	**57**	**62**	**42**	**77**	**38**	**276**

NOTE: THE SAME PERSON OFTEN SELECTED MORE THAN ONE JOB DESCRIPTION

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Who took the survey?

- Scientist (29%)
- Educator (21%)
- Manager (21%)
- Policy maker (15%)
- Other (15%)

JobDescrip	Embayment	Estuary	Harbor	Open Coastal Waters	Other	Total Responses
Educator	18	35	14	15	29	**111**
Manager	21	29	12	17	30	**109**
Policy-maker	12	19	8	12	24	**75**
Scientist	25	47	20	30	27	**149**
Other	11	19	13	15	20	**78**
Total	**87**	**149**	**67**	**89**	**130**	**522**

NOTE: THE SAME PERSON OFTEN SELECTED MORE THAN ONE JOB DESCRIPTION

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Where do we work?

- Estuaries (29%)
- Embayment and open coastal waters 17% each
- Harbors (13%)
- Other 25%
  - Navigable waters, coastal rivers and streams, coastal wetlands, watershed scale, coastal superfund sites, inland watersheds, mid shore to off shore, Gulf of Maine, open waters to continental shelf, coastal environments globally, estuaries outside of the northeast

JobDescrip	Embayment	Estuary	Harbor	Open Coastal Waters	Other	Total Responses
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Where do we work?

- Most jurisdictions cover a range of scales in their work
- Estuaries and other dominate scale
- Embayment and open coastal waters are about equally represented

Jurisdiction	Embayment	Estuary	Harbor	Open Coastal Waters	Other	Unknown	Total Responses
Connecticut	4	12	2	3	11	1	**33**
Maine	20	20	12	20	27	1	**100**
Massachusetts	9	10	5	2	4	1	**31**
New Brunswick	4	4	2	9	4		**23**
New Hampshire	2	3	2	2	4		**13**
New York		5	1		1		**7**
Nova Scotia	3	6	2	3	5		**19**
Rhode Island	1	2	1	1			**5**
Other	5	14	4	9	20	1	**53**
Total	**48**	**76**	**31**	**49**	**76**	**4**	**284**

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Where do we work?

- ME, NH, and RI tend to work evenly across the scales
- NB has high percent in open waters
- Estuaries scale tend to dominate by jurisdiction

Percent of juristiction category

Jurisdiction	Embayment	Estuary	Harbor	Open Coastal Waters	Other	Unknown
Connecticut	12	36	6	9	33	3
Maine	20	20	12	20	27	1
Massachusetts	29	32	16	6	13	3
New Brunswick	17	17	9	39	17	0
New Hampshire	15	23	15	15	31	0
New York	0	71	14	0	14	0
Nova Scotia	16	32	11	16	26	0
Rhode Island	20	40	20	20	0	0
Other	9	26	8	17	38	2

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Survey Results

- Survey included three elements
  - Management issues
  - Management topics
  - Indicator Themes
- Cross cut by
  - Scale
  - Jurisdiction
  - Job description

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Was scale important to the leading management issues?

- Response was uneven across the scales and issues
  - Climate change received highest number of responses
  - Coastal development and health of fisheries received fewest number of responses
- Estuaries and open water seemed to be scales receiving the most responses within each issue,
  - although importance varied across the management issues
- Further analysis required to draw conclusions

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How important are the following leading management issues?

- All six management issues were rated as important to very important
- Many chose to only address issues with which they were familiar, thus the number of responses among the issues varied from 81 to 207
  - Climate change and coastal eutrophication received the most responses
  - Contaminants in the food chain and human effects on aquatic habitats received the next highest number of responses
  - Effects of coastal development and land use and health of fisheries received the fewest responses

Issue	Very Important	Important	Somewhat Important	Not Important	Total Respnse
Climate change on the environment	124	77	6	0	207
Contaminants in the food chain	100	47	0	0	147
Effects of coastal development and land use change on the environment	62	12	0	0	74
Effects of coastal eutrophication	106	57	2	0	165
Health of fisheries	66	15	0	0	81
Human effects on aquatic habitats	93	15	0	0	108
Other	23	3	3	0	29

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Topic issue responses

Issue area	Respondents	Percent ranking topic issues
Fisheries	~112	27 to 49
Contaminant	~105	25 to 52
Eutrophication	~117	35 to 71
Coastal development	~181	23 to 45
Marine habitat	~126	16 to 68
Climate change	~90	32 to 62

- Almost all respondents rated topic issues as important/very important

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Importance of topic issues by jurisdiction and scale

- Unevenness in the number of respondents by jurisdiction makes it hard to determine if there are differences in emphasis across the jurisdiction and scale
- Estuaries and open water tended to be scales receiving most responses within each issue topic but the actual indication of importance varied across the issue topics
- A substantial number of responses under other topic issues were made
- Further analysis required to draw conclusions

- Following presentation focuses on overall response to the issues and themes

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How important are the following fisheries issues?

- Affect of changing fish stocks on coastal (biological?) communities (49%) received highest response
- Fishing practices on non target species slightly fewer responses
- Levels of commercial stock and changes in species composition lowest response

Issue	Very Important	Important	Somewhat Important	Not Important	No Response	Percent Responding
Affect of changing fish stocks on coastal communities	40	15	0	0	57	49.1
Changes in species composition and biomass	29	2	0	0	83	27.2
Fish harvesting practices on non-target species and habitats	47	5	0	0	62	45.6
The levels of commercial and recreational fish stocks	29	4	0	0	81	28.9

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How important are the following contaminant issues?

- Changes in contaminant sources had highest response (52%)
- Fate and transport (41%) and lethal sublethal effects (42%) were lower but similar
- Extent of contamination received the lowest response

Issue	Very Important	Important	Somewhat Important	Not Important	No Response	Percent Responding
Changes in the sources of contaminants	45	10	0	0	50	52.4
Extent of contamination in the marine environment	20	6	0	0	80	24.5
Fate and transport of contaminants	30	12	0	0	61	40.8
Lethal and sub-lethal effects of contminants on fisheries and people	38	5	1	0	60	42.3

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How important are the following eutrophication issues?

- Potential for eutrophication (71%) and effects on human use (73%) had highest response
- Extent of eutrophication received the next highest response (51%)
- Rate, sources, and marine effects were lowest in that order

Issue	Very Important	Important	Somewhat Important	Not Important	No Response	Percent Responding
Concern for potential eutrophication	58	21	2	0	33	71.1
Effect of eutrophication on human use	48	32	5	0	32	72.6
Effect of eutrophication on the marine ecosystem	33	7	1	0	76	35
Extent of eutrophication in the region	41	18	1	0	57	51.3
Major sources of nutrients	43	2	1	0	71	39.3
Rate of eutrophication in the region	32	17	3	0	65	44.4

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How important are the following coastal development issues?

- Fragmentation on priority species (45%) and land use change on terrestrial habitats (42%) highest response
- Changes in land cover was next (26%)
- Changes in water and hydrology received lowest response

Issue	Very Important	Important	Somewhat Important	Not Important	No Response	Percent Responding
Changes in land cover	39	8	0	0	134	26
Changes in water quality and hydrology	36	6	0	0	140	23.1
Effect of fragmentation on priority species	64	17	0	0	100	44.8
Effect of land use change on terrestrial habitats	55	21	0	0	106	41.8

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How important are the following marine aquatic habitat issues?

- Type, location and effects of restoration (68%) and (66%) had highest response
- Coastal armoring and sediment management next (55%) followed by change in extent and quality of submerged aquatic vegetation (42%)
- Changes in coastal and tidal wetlands received lowest response (16%)

Issue	Very Important	Important	Somewhat Important	Not Important	No Response	Percent Responding
Changes in sediment character and quality	51	29	3	0	43	65.9
Changes in the extent and quality of coastal and tidal wetlands	16	4	0	0	106	15.9
Changes in the extent and quality of submerged aquatic vegetation	39	13	0	0	72	41.9
Coastal armoring and sediment management practices	51	15	3	0	57	54.8
Health and diversity of aquatic habitats	29	7	0	0	87	29.3
Type location and effects of restoration activities	61	22	3	0	40	68.3

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How important are the following climate change issues?

- Effect of sea level rise and changing weather patterns on coastal infrastructure and erosion receive fewest responses (32%)
- Effect on hydrology and fresh water inputs and biodiversity changes from temperature received the most responses (62%) followed closely by climate related shifts on biota (60%)

Issue	Very Important	Important	Somewhat Important	Not Important	No Response	Percent Responding
Climate-related regime shifts in biota	40	13	0	0	36	59.6
Effect of climate change and changing weather patterns on hydrology and fresh water inputs	45	11	0	0	34	62.2
Effect of sea level rise and changing weather patterns on coastal infrastructure & erosion	23	6	0	0	63	31.5
Effect on biodiversity related to water temperatures	36	19	1	0	34	62.2

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How useful are the following themes in communicating the status and trends of the fishery?

Theme	Very Useful	Useful	Somewhat Useful	Not Useful	No Response	Percent Responding	>somewhat useful
Populations of harvested species	20	2	0	0	39	36.1	22
• Increase/decrease in species diversity	20	3	0	0	43	34.8	23
• Status of commercial finfish stocks	22	3	0	0	40	38.5	25
• Status of forage fish species abundance/distribution	31	4	0	0	29	54.7	35
• Status of lobster stocks	23	6	2	0	33	48.4	31
Bottom type	22	18	7	0	16	74.6	47
Catch per unit effort	29	8	4	0	22	65.1	41
Commercial by-catch of non-target fish species and protected resources	30	7	0	0	26	58.7	37
Days fished by commercial/recreational vessels	24	26	4	0	11	83.1	54
Direct recreational fishing expenditures/multiplier effect in the regional economy	21	29	2	0	11	82.5	52
Economic contribution of fisheries and related industries in coastal communities	22	14	0	0	29	55.4	36

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How useful are the following themes in communicating the status and trends of the fishery?

Gear deployment information	27	17	6	0	13	79.4	50
Miles of stream open to fish migration	21	18	2	0	24	63.1	41
Relative fish abundance	30	5	1	0	29	55.4	36
Shellfish landings	23	12	2	0	24	60.7	37
Value of commercial landings	22	18	2	0	22	65.6	42

- Top themes
  - Days fished by commercial/recreational vessels
  - Direct recreational fishing expenditures/multiplier effect in the regional economy
  - Gear deployment information
  - Bottom type
  - Value of commercial landings
  - Stream reach open to fish migration
  - Fish abundance and shellfish landings
  - Status of forage fish species abundance/distribution

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How useful are the following themes in communicating the status and trends of contaminants??

Theme	Very Useful	Useful	Somewhat Useful	Not Useful	No Response	Percent Responding	>somewhat useful
Tissue contamination levels	18	2	0	0	36	35.7	20
• clams & mussels	17	4	0	0	38	35.6	21
• fish	17	6	0	0	37	38.3	23
• marine birds and mammals	26	8	0	0	24	58.6	34
Bathing beach closures	16	12	3	0	29	51.7	31
Loading of contaminants to the marine environment	21	7	1	0	26	52.7	29
• atmospheric	31	9	1	0	19	68.3	41
• land-based	22	8	1	0	29	51.7	31
Sediment and water contamination levels	22	6	0	0	34	45.2	28
Shellfish acreage closed to harvesting	21	10	2	0	28	54.1	33

- **Top themes:** loading, bathing beach closures, shellfish acreage closed, contaminant levels in birds and mammals, levels of contaminants in sediment and water

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How useful are the following themes in communicating the status and trends of eutrophication?

Theme	Very Useful	Useful	Somewhat Useful	Not Useful	No Response	Percent Responding	>somewhat useful
Change in SAV abundance	28	5	3	0	21	63.2	36
Chlorophyll A concentrations	27	14	3	0	17	72.1	44
Dissolved oxygen levels	17	5	0	0	41	34.9	22
Epiphyte abundance	27	16	3	0	13	78	46
Macroalgal abundance	25	10	4	0	22	63.9	39
Nutrient concentrations	19	16	0	0	27	56.5	35
Nutrient loading	15	9	0	0	38	38.7	24
Presence of harmful algae	20	8	1	0	30	49.2	29

- Top themes
  - Epiphyte abundance
  - Chlorophyll a concentrations
  - Macro algal abundance
  - Change ins SAV abundance
  - Nutrient concentrations
  - Harmful algal blooms
  - Nutrient loading

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How useful are the following themes in communicating the status and trends of coastal development?

Theme	Very Useful	Useful	Somewhat Useful	Not Useful	No Response	Percent Responding	>somewhat useful
Aerial extent of priority terrestrial habitats	53	9	1	0	43	59.4	63
• Acreage of farmland conversion to urban uses	36	17	1	0	53	50.5	54
• Acreage of large undeveloped blocks remaining	27	6	0	0	74	30.8	33
• Acreage of undeveloped land	28	8	0	0	70	34	36
Acreage of land protected/conserved	38	12	0	0	57	46.7	50
Demographics (by watershed): changes in population density	45	6	0	0	57	47.2	51
Housing starts	52	24	2	0	26	75	78
Land Conversion	24	3	0	0	70	27.8	27
Status of threatened or endangered plant and animal species	52	17	0	0	39	63.9	69
Status of wildlife species	53	23	0	0	33	69.7	76
Trends in impervious surfaces coverage	35	4	1	0	66	37.7	40
Vehicle miles traveled	46	40	10	0	9	91.4	96

- **Top themes:** Vehicle miles traveled, Housing starts, status of wild life, status of threatened endangered species, extent of priority terrestrial habitats, acreage protected/conserved, watershed demographics

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How useful are the following themes in communicating the status and trends of marine aquatic habitats?

Theme	Very Useful	Useful	Somewhat Useful	Not Useful	No Response	Percent Responding	>somewhat useful
Biodiversity index	26	16	3	0	24	65.2	45
Extent and distribution of various benthic habitats (e.g. eel grass wetlands)	14	3	0	0	53	24.3	17
Extent and location of non-native species	33	4	1	0	32	54.3	38
Shoreline armoring and sediment movement	37	9	1	0	23	67.1	47
Water quality (temperature salinity dissolved oxygen light transmissivity turbidity)	23	9	0	0	38	45.7	32

- Top themes
  - Shoreline armoring and sediment movement
  - Biodiversity index
  - Non native species
  - Water quality

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How useful are the following themes in communicating the status and trends of climate change?

Theme	Very Useful	Useful	Somewhat Useful	Not Useful	No Response	Percent Responding	>somewhat useful
Appearance of sentinel species tied to seasonal climate changes	24	2	0	0	18	59.1	26
Biodiversity index	18	8	2	0	16	63.6	28
Days with unhealthy levels of ozone pollution	13	13	2	0	18	60.9	28
Number of extreme storm events	16	6	1	0	21	52.3	23
Rate of sea level rise	15	3	0	0	28	39.1	18
Species at risk with changes in climate	15	7	0	0	23	48.9	22

- Top themes
  - Biodiversity index
  - Days of unhealthy ozone
  - Sentinel species tied to seasonal climatic changes

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Straw indictors and metrics

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Straw regional indictors - Fisheries

Commercial fish/shellfish landings (Metric: Total annual landing by species state [port] [watershed])

Changes in target trophic level species (i.e., % top predators, % prey species, etc.), (Metric: Average annual abundance by water body [state] [port])

Average size/age class of landings (Metric: Annual distribution of age/size class by species by port)

Annual recreational fishing days logged (Metric: Total annual recreational fishing days by port/state)

Total annual number recreational fish caught (Metric Total annual recreational fish caught by port/state)

Miles of stream open to fish migration (Metric: Miles open to migration by watershed [state])

Fisheries (fish and shellfish) populations (Metrics: by state water body type

- Annual estimate of commercial stocks
- Annual change in abundance of "key species"
- Standing stock of oysters, scallops, m. mercenaria, mussels, etc.
- Abundance, biomass, species richness, species evenness)

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Gear deployment characteristics (Metric: By gear type the total deployments and miles or area fished annually)

Straw regional indictors - Contaminants

Chemical loading to the coastal zone: (Metric: Annual input from point, nonpoint source, atmosphere by water body [state])

Beach closures (metric: Number of beach closing by year by state [water body]

Tissue contamination levels (shellfish, fish, birds, mammals) (metric: yearly average concentration of contaminants [which ones?] in representative species by water body [state?]

Shellfish closures (metric: days of closure per year by state, [acre days of activity])

Sediment contamination levels (Metric: Area of impacted sediments by state [water body] by year)

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Straw regional indictors - Eutrophication

Epiphyte distribution and abundance (Metric: annual estimate of acres of epiphytes by water body [state?])

Chlorophyll concentration (Metric: annual [seasonal?] [surface waters?] aerial based average chlorophyll concentration by water body)

SAV distribution and abundance (Metric:

- annual estimate of acres of epiphytes by water body [state?])
- Seagrass Nutrient Pollution Index

Macroalgal distribution and abundance (Metric: annual estimate of acres of epiphytes by water body [state?])

Nutrient concentrations in receiving waters –Annual [seasonal] average [dissolved inorganic nitrogen], [particulate organic nitrogen], [particulate organic carbon], [TDN], [ammonium], [nitrate/nitrite], [total dissolved phosphorous], [phosphate], [silicate] by water body type [state])

Harmful algal species (metric: Annual frequency and duration of occurrence by species by water body [state])

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Nutrient loading to the coastal zone: (Metric: Annual input from point, nonpoint source, atmosphere by water body)

Straw regional indictors – Land use/coastal development

Coastal development (Metric: by watershed [state?]

- Annual rate of coastal population growth of development)
- Area and changes in impervious surfaces
- Vehicle miles traveled

Regional Habitat types (Metric: by watershed and water body [state]

- extent [acres] and distribution of habitat types (which type?]
- quality of habitat by type which type?])

Priority habitat types (Metric: by watershed [state] by year

- Extent of unfragmented forests by watershed)
- Acres of restored salt marsh and tidal wetlands
- Extent of forest buffers
- Riparian Forest Buffer Conservation and restoration
- Areas of lands conserved
- Terrestrial Protected Areas- the percentage of land protected through legal mechanisms

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Straw regional indictors – Marine aquatic habitat

Miles of stream open to fish migration (Metric: Miles open to migration by watershed [state] by year)

Regional Habitat types (Metric: by watershed and water body [state]

- extent [acres] and distribution of habitat types (which type?]
- quality of habitat by type which type?])

Priority habitat types (Metric: by watershed [state] by year

- Acres of salt marsh and tidal wetlands [lost; restored]
- Areas of lands conserved
- Eel grass distribution
- Macro algae extent /diversity
- Biodiversity by habitat

Non native species (Metric: Distribution and abundance [presence?] of non native species by water body type [state?])

Water quality: (Metric: Average annual [seasonal] by coastal water type [state?]

- water temperature
- light penetration [turbidity]
- nutrient condition

other??

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Straw regional indictors – Climate Change

Climate Change: (Metric:

- Annual [seasonal] water temperature by water body type [state?])
- Annual [seasonal] air temperature by watershed [state?])
- Annual rate [height] of sea level rise by state [harbor]
- Annual number and frequency of extreme storm events [define extreme]
- Annual Carbon dioxide emissions [change in CO2 in atmosphere]

Levels of unhealthy ozone (Metric: number of days annually by state [watershed] of ozone levels above state standards [area of unhealthy levels?].

Biodiversity (Metric:

- changes in biodiversity by habitat and water body type [link to climate change metric?])
- Number of at risk species per watershed [habitat][state] per year
- Changes in species range expansions or declines)

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On to the breakouts

- "It is time to look at the macro scale more, we have become too reductionistic and mechanistic."
- From Odum: Always select the scale one size larger than your problem because it is half driven from the large scale, that is the first principle of the system approach.

From Scott Nixon's keynote address to the 2003 ERF meeting regarding our coastal programs

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