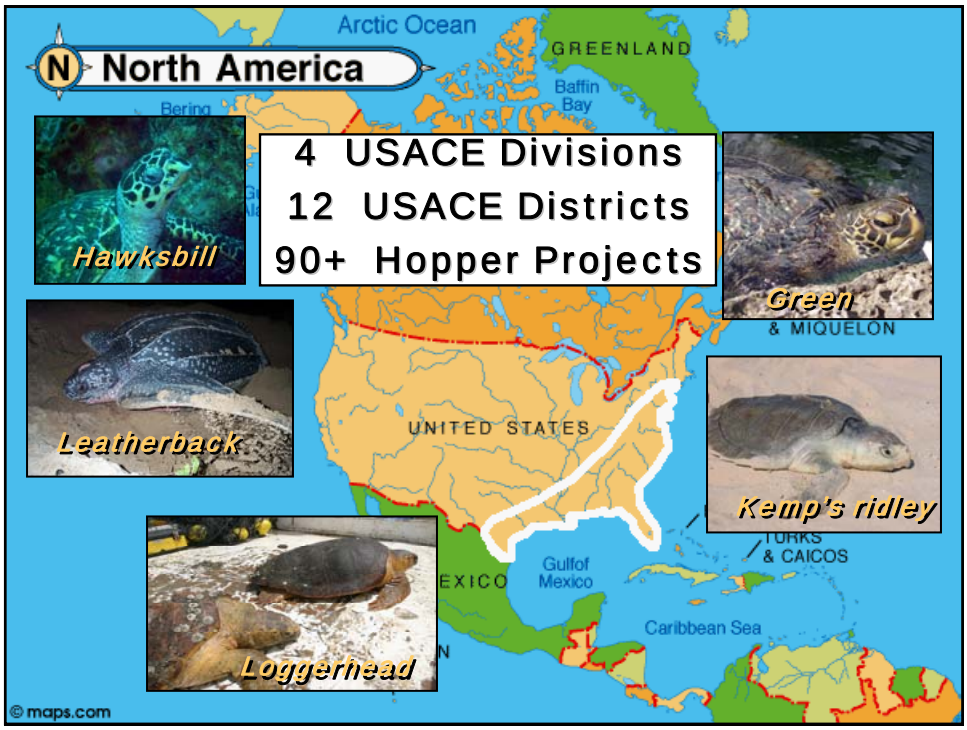
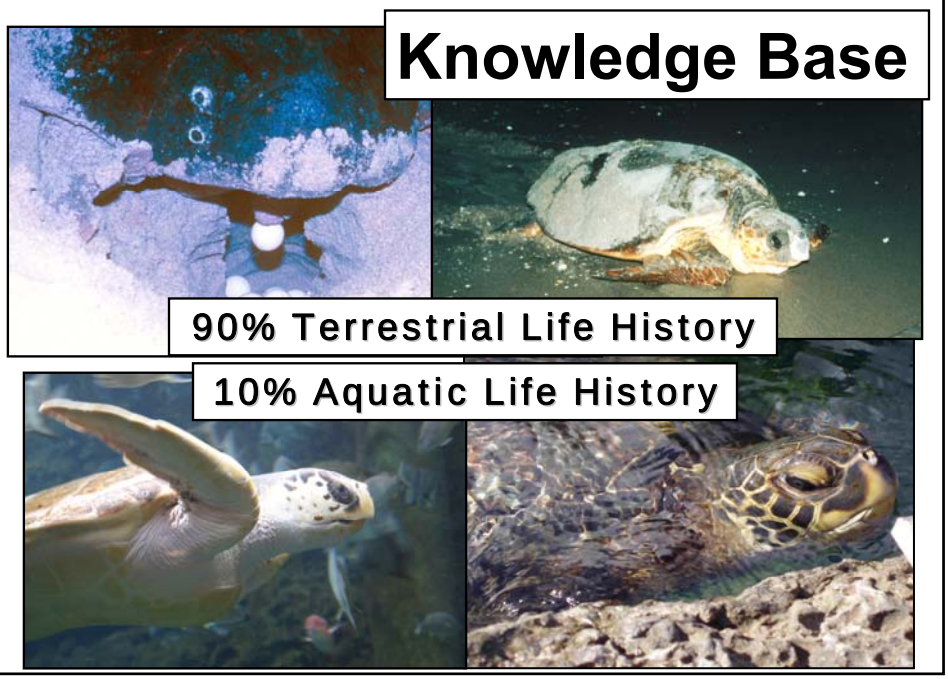
Dredging Windows for More Effective Sea Turtle Protection

DENA DICKERSON

Sensitive Species & Navigation Support Team
Environmental Laboratory
Engineer Research & Development Center
U.S. Army Corps of Engineers
Vicksburg, Mississippi





Hopper Dredging Window
1 Dec – 31 Mar

Based on Water Temp. & Nesting Timeline

Hatching

Nesting

JAN FEB ***MAR APR MAY JUN JUL AUG SEP OCT NOV*** DEC

Sea Turtle Protection Methods

Implemented 1992

- Minimize hopper use
- Dredging window
- Draghead turtle deflector
- Turtle relocation trawling

Risk Assessment Factors for Potential Dredging Impacts

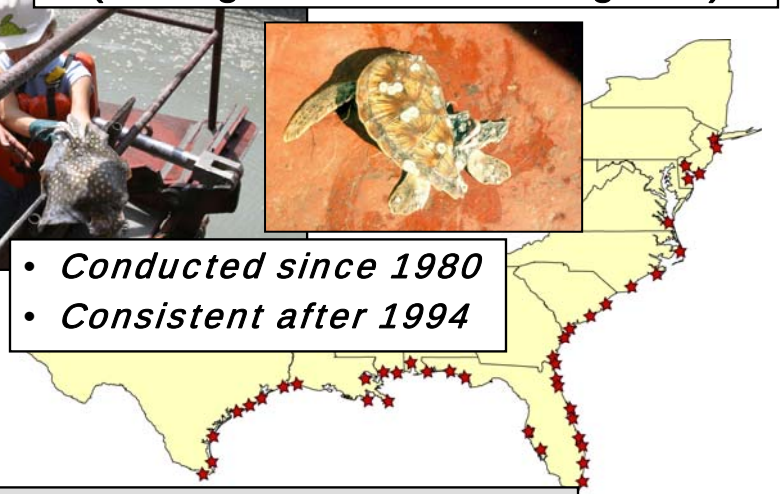
- Dredging project
  - **Location**
  - **Timing**
  - **Duration**
  - **Dredge & equipment type**
  - **Dredge operations**
- Species occurrence & behavior
- Habitat utilization at dredging site
- History of incidental take
  - **At location**
  - **By dredge**

Annual Sea Turtle Take Limits
(Set by NMFS)

North Atlantic – North of North Carolina
Varies by Project

	REGIONAL Limits	
	Gulf	South Atlantic
Loggerheads	40	35
Kemp's ridley	20	7
Greens	14	7
Hawksbills	4	2
Leatherbacks	None designated	

Incidental Take Monitoring
(Dredge Observer Program)



- *Conducted since 1980*
- *Consistent after 1994*

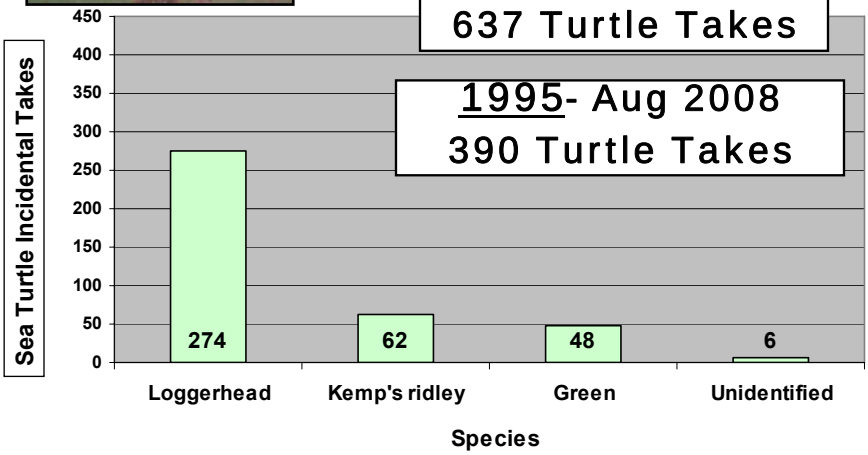
90+ Project Sites Monitored

http://el.erdc.usace.army.mil/seaturtles/

Documented Sea Turtle Takes

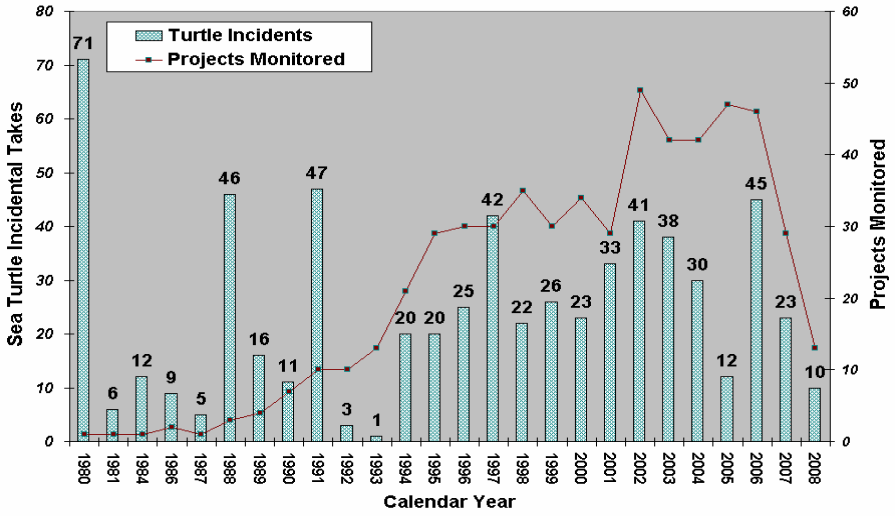
1980- Aug 2008
637 Turtle Takes

1995- Aug 2008
390 Turtle Takes



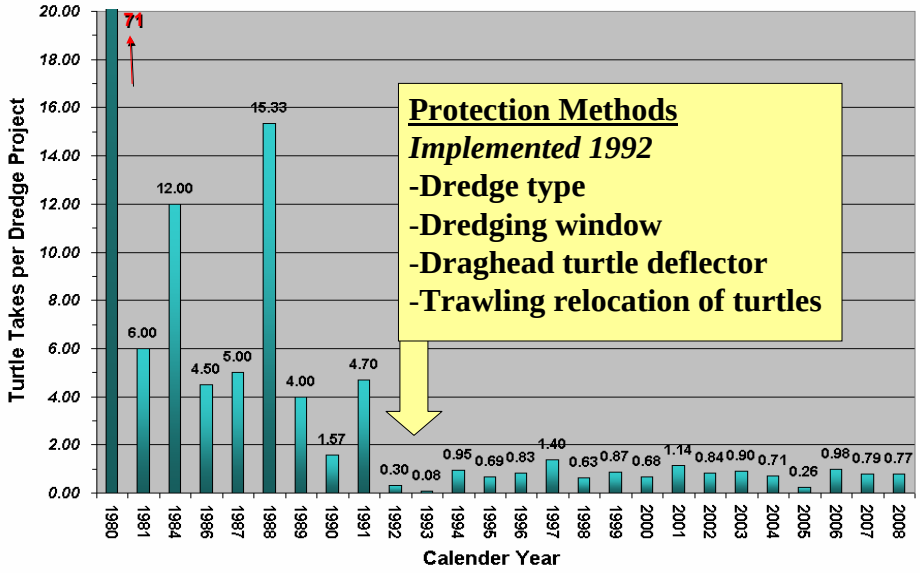
Annual Sea Turtle Takes & Dredge Projects Monitored

(1980 – Aug 2008)

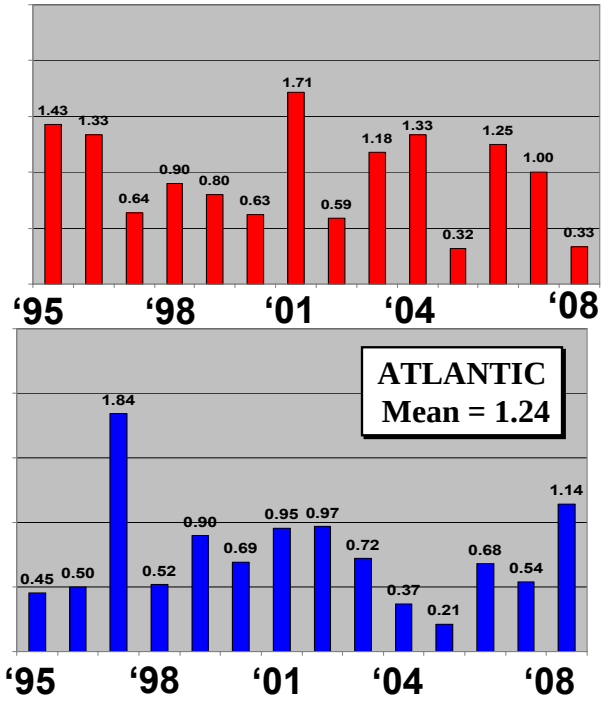


Annual Turtle Takes/Project

(1980 - Aug 2008)



Annual Takes Per Project

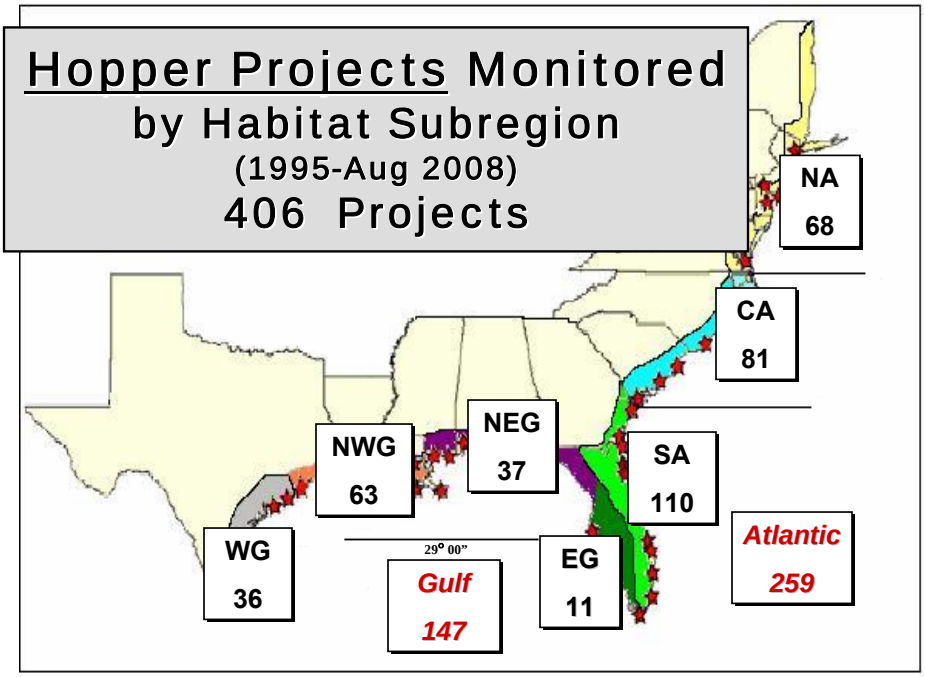


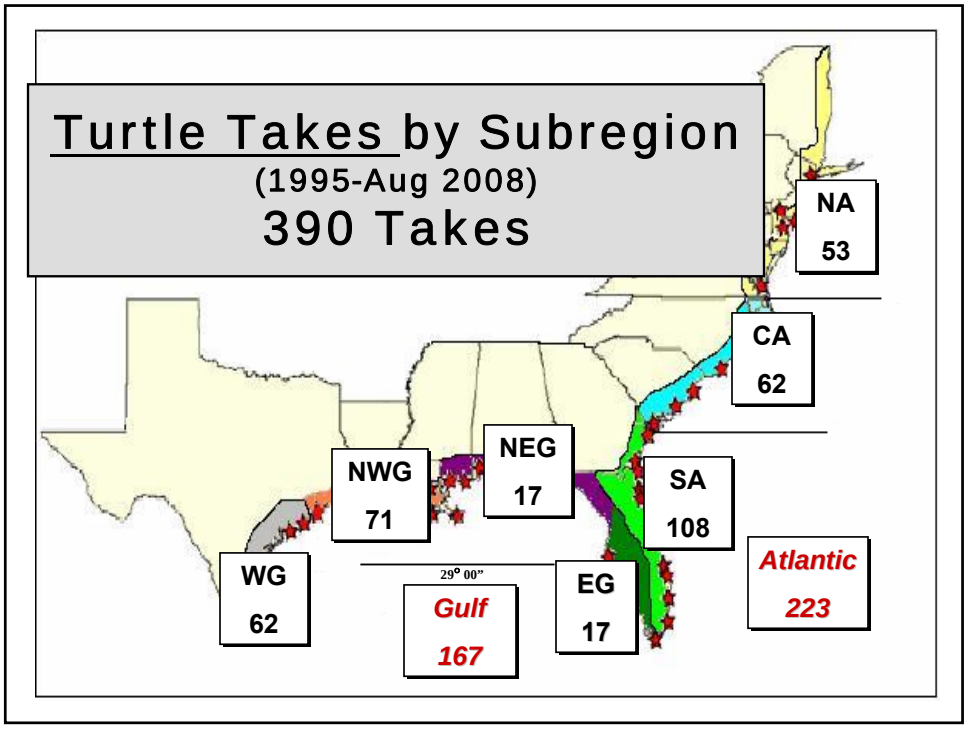
Evaluations for More Effective Sea Turtle Protection

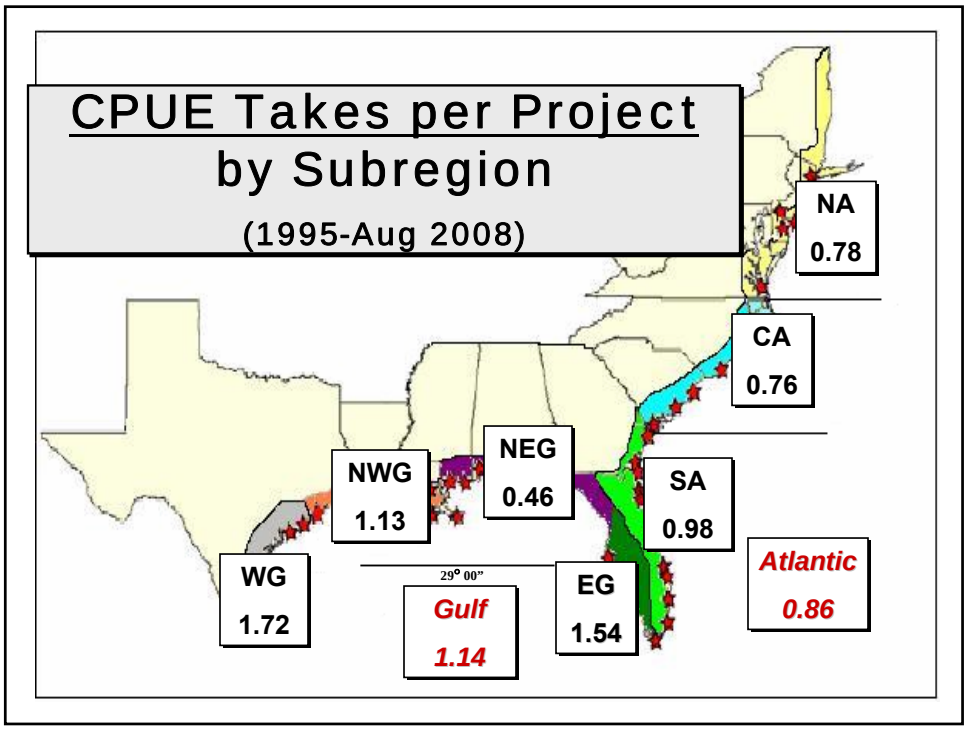
- Sea Turtle Risk Assessment Program (STRAP) – Web-based GIS tool
- Historical take rate analyses by:
  - **Months – dredging windows**
  - **Dredge vessel**
  - **Protective efforts – relocation trawling (WODCON 2007)**

TURTLE HABITAT SUBREGIONS

Subregion	*USACE District*
West Gulf	**Galveston**
Northwest Gulf	**Galveston & New Orleans**
Northeast Gulf	**Mobile**
East Gulf	**Jacksonville**
South Atlantic	**Savannah & Jacksonville**
Central Atlantic	**Wilmington & Charleston**
North Atlantic	**Norfolk, Baltimore, New York, Philadelphia, New England**

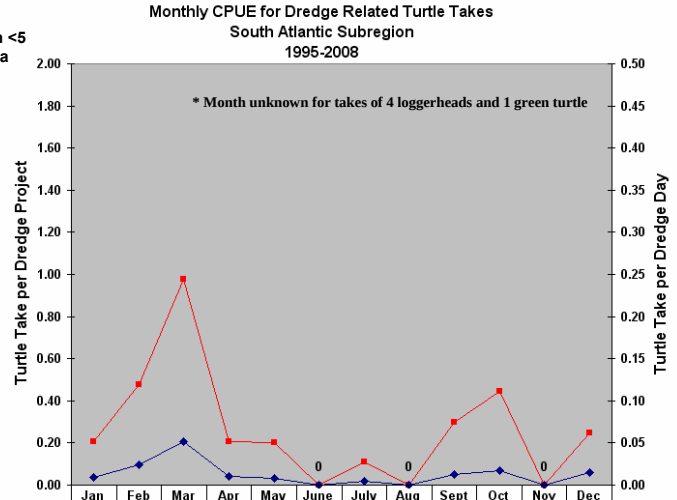



Turtle Takes by Subregion
(1995-Aug 2008)
390 Takes
NA
53
CA
62
NEG
17
NWG
71
SA
108
WG
62
29° 00"
Gulf
167
EG
17
Atlantic
223


CPUE Takes per Project
by Subregion
(1995-Aug 2008)
NA
0.78
CA
0.76
NEG
0.46
NWG
1.13
SA
0.98
WG
1.72
29° 00"
Gulf
1.14
EG
1.54
Atlantic
0.86

*Months excluded with <5 dredging days unless a turtle was taken.

N/A = No projects

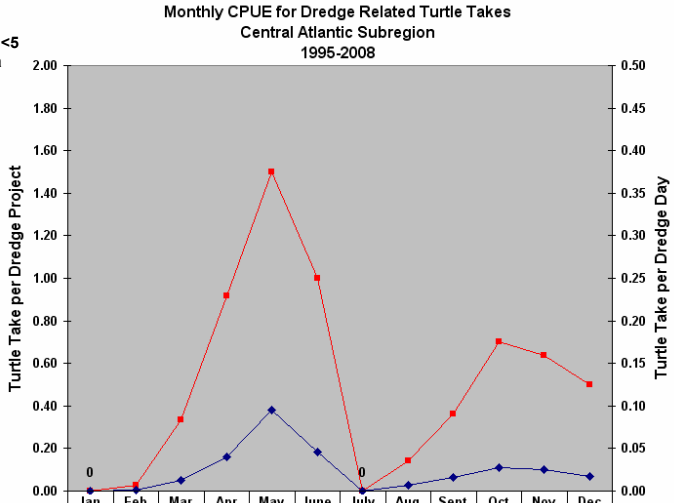


	Jan	Feb	Mar	Apr	May	June	July	Aug	Sept	Oct	Nov	Dec
Turtle Take per Dredge Project	0.2045	0.4792	0.9787	0.2059	0.2000	0	0.1111	0	0.3000	0.4444	0	0.2500
Turtle Take per Dredge Day	0.0093	0.0237	0.0520	0.0099	0.0085	0	0.0040	0	0.0124	0.0171	0	0.0148

Month	Jan	Feb	Mar	Apr	May	June	July	Aug	Sept	Oct	Nov	Dec
Total Turtle Takes	9	23	46	7	4	0	1	0	3	4	0	6
Total Projects	44	48	47	34	20	11	9	11	10	9	9	24
Total Dredge Days	967	969	885	710	469	249	249	200	242	234	216	405

*Months excluded with <5 dredging days unless a turtle was taken.

N/A = No projects

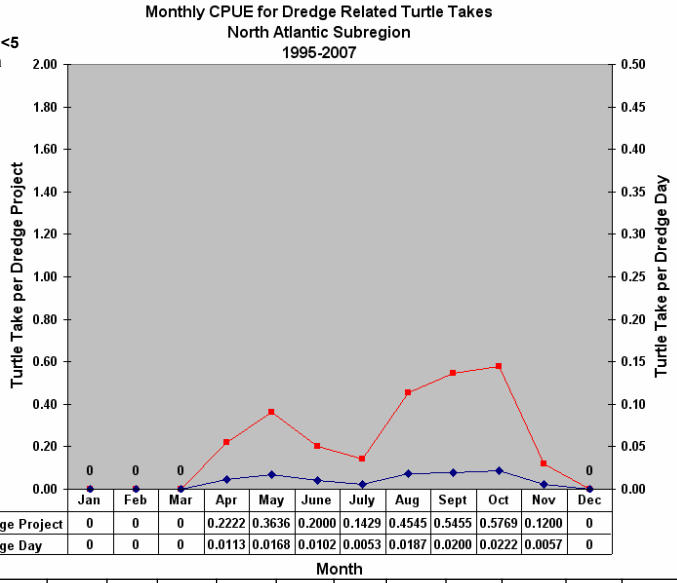


	Jan	Feb	Mar	Apr	May	June	July	Aug	Sept	Oct	Nov	Dec
Turtle Take per Dredge Project	0	0.0286	0.3333	0.9167	1.5000	1.0000	0	0.1429	0.3636	0.7000	0.6364	0.5000
Turtle Take per Dredge Day	0	0.0010	0.0130	0.0399	0.0952	0.0455	0	0.0074	0.0162	0.0279	0.0247	0.0170

Month	Jan	Feb	Mar	Apr	May	June	July	Aug	Sept	Oct	Nov	Dec
Total Turtle Takes	0	1	12	11	6	1	0	1	4	7	7	12
Total Projects	36	35	36	12	4	1	4	7	11	10	11	24
Total Dredge Days	984	1010	926	276	63	22	63	136	247	251	283	707

*Months excluded with <5 dredging days unless a turtle was taken.

N/A = No projects

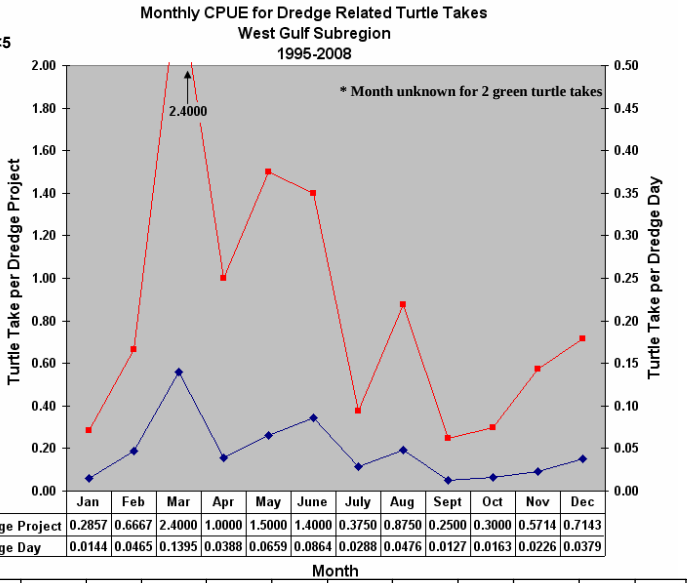


	Jan	Feb	Mar	Apr	May	June	July	Aug	Sept	Oct	Nov	Dec
Turtle Take per Dredge Project	0	0	0	0.2222	0.3636	0.2000	0.1429	0.4545	0.5455	0.5769	0.1200	0
Turtle Take per Dredge Day	0	0	0	0.0113	0.0168	0.0102	0.0053	0.0187	0.0200	0.0222	0.0057	0

Month	Jan	Feb	Mar	Apr	May	June	July	Aug	Sept	Oct	Nov	Dec
Total Turtle Takes	0	0	0	2	4	4	3	10	12	15	3	0
Total Projects	9	4	6	9	11	20	21	22	22	26	25	9
Total Dredge Days	198	102	154	177	238	394	568	534	601	676	525	249

*Months excluded with <5 dredging days unless a turtle was taken.

N/A = No projects

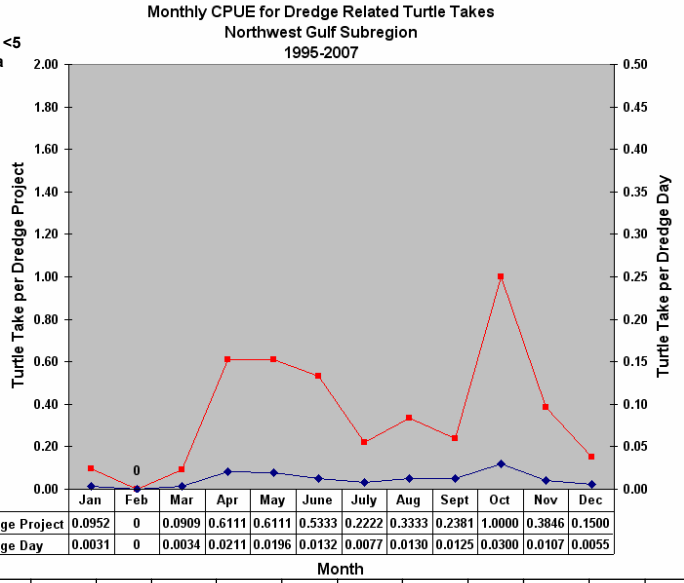


	Jan	Feb	Mar	Apr	May	June	July	Aug	Sept	Oct	Nov	Dec
Turtle Take per Dredge Project	0.2857	0.6667	2.4000	1.0000	1.5000	1.4000	0.3750	0.8750	0.2500	0.3000	0.5714	0.7143
Turtle Take per Dredge Day	0.0144	0.0465	0.1395	0.0388	0.0659	0.0864	0.0288	0.0476	0.0127	0.0163	0.0226	0.0379

Month	Jan	Feb	Mar	Apr	May	June	July	Aug	Sept	Oct	Nov	Dec
Total Turtle Takes	2	6	12	4	6	7	3	7	1	3	4	5
Total Projects	7	9	5	4	4	5	8	8	4	10	7	7
Total Dredge Days	139	129	86	103	91	81	104	147	79	184	177	132

*Months excluded with <5 dredging days unless a turtle was taken.

N/A = No projects

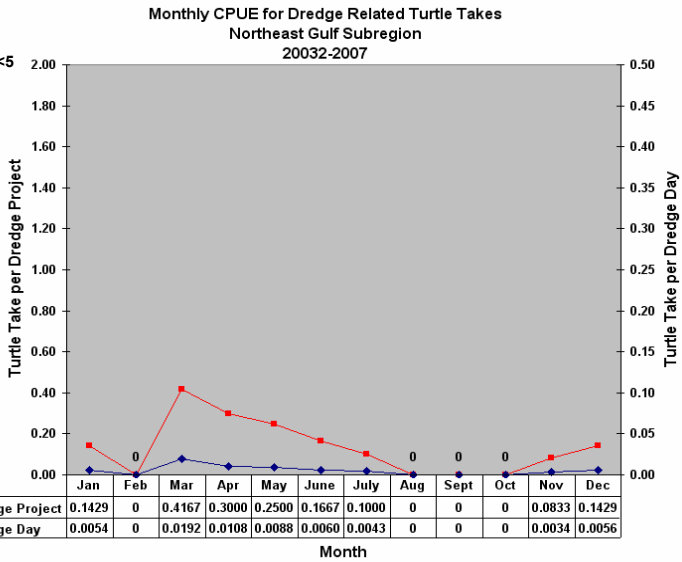


	Jan	Feb	Mar	Apr	May	June	July	Aug	Sept	Oct	Nov	Dec
Turtle Take per Dredge Project	0.0952	0	0.0909	0.6111	0.6111	0.5333	0.2222	0.3333	0.2381	1.0000	0.3846	0.1500
Turtle Take per Dredge Day	0.0031	0	0.0034	0.0211	0.0196	0.0132	0.0077	0.0130	0.0125	0.0300	0.0107	0.0055

Month	Jan	Feb	Mar	Apr	May	June	July	Aug	Sept	Oct	Nov	Dec
Total Turtle Takes	2	0	2	11	11	8	4	7	5	13	5	3
Total Projects	21	21	22	18	18	15	18	21	21	13	13	20
Total Dredge Days	641	585	592	522	560	607	521	537	399	434	466	541

*Months excluded with <5 dredging days unless a turtle was taken.

N/A = No projects

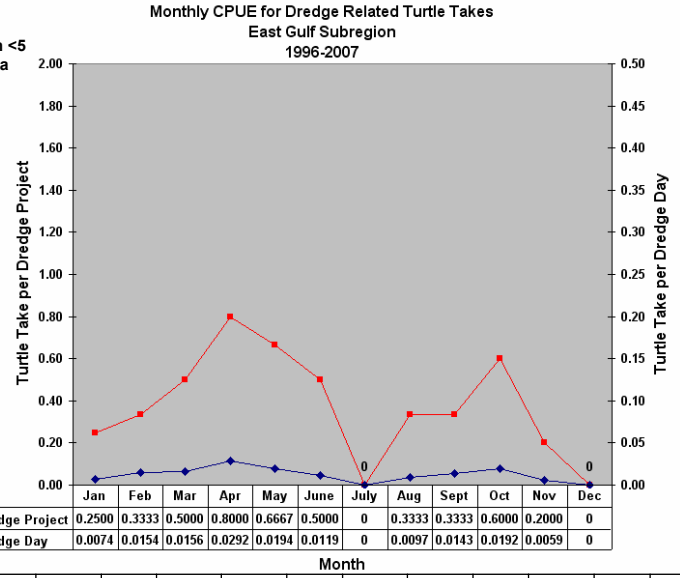


	Jan	Feb	Mar	Apr	May	June	July	Aug	Sept	Oct	Nov	Dec
Turtle Take per Dredge Project	0.1429	0	0.4167	0.3000	0.2500	0.1667	0.1000	0	0	0	0.0833	0.1429
Turtle Take per Dredge Day	0.0054	0	0.0192	0.0108	0.0088	0.0060	0.0043	0	0	0	0.0034	0.0056

Month	Jan	Feb	Mar	Apr	May	June	July	Aug	Sept	Oct	Nov	Dec
Total Turtle Takes	1	0	5	3	3	2	1	0	0	0	1	1
Total Projects	7	9	12	10	12	12	10	8	8	14	12	7
Total Dredge Days	186	170	260	278	339	332	232	166	212	363	296	179

*Months excluded with <5 dredging days unless a turtle was taken.

N/A = No projects

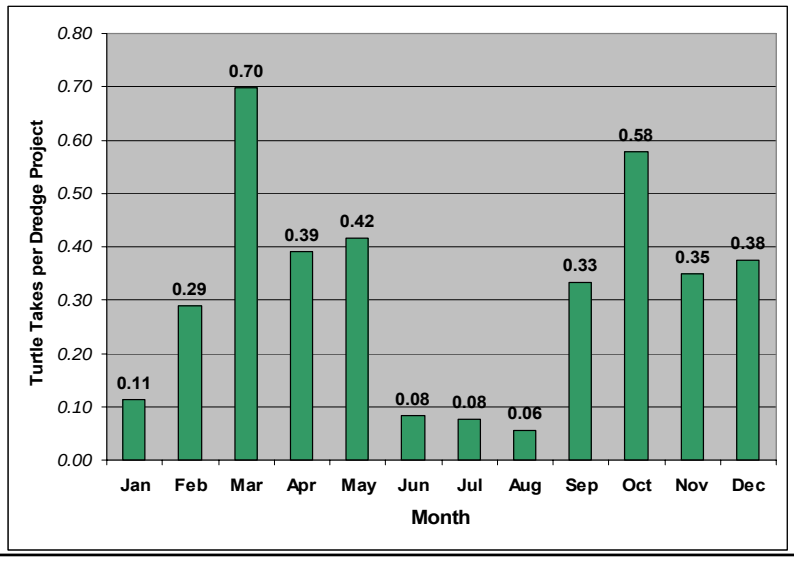


	Jan	Feb	Mar	Apr	May	June	July	Aug	Sept	Oct	Nov	Dec
Turtle Take per Dredge Project	0.2500	0.3333	0.5000	0.8000	0.6667	0.5000	0	0.3333	0.3333	0.6000	0.2000	0
Turtle Take per Dredge Day	0.0074	0.0154	0.0156	0.0292	0.0194	0.0119	0	0.0097	0.0143	0.0192	0.0059	0

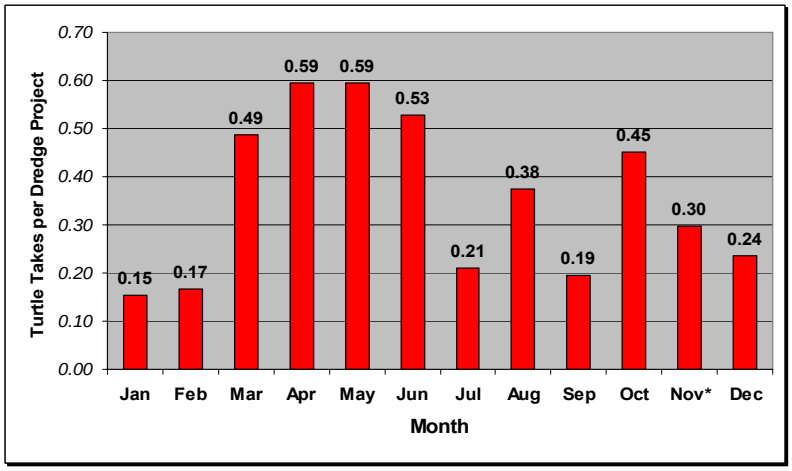
Month	Jan	Feb	Mar	Apr	May	June	July	Aug	Sept	Oct	Nov	Dec
Total Turtle Takes	1	1	2	4	2	1	0	1	1	3	1	0
Total Projects	4	3	4	5	3	2	2	3	3	5	5	4
Total Dredge Days	136	65	128	137	103	84	67	103	70	156	169	145

Monthly CPUE

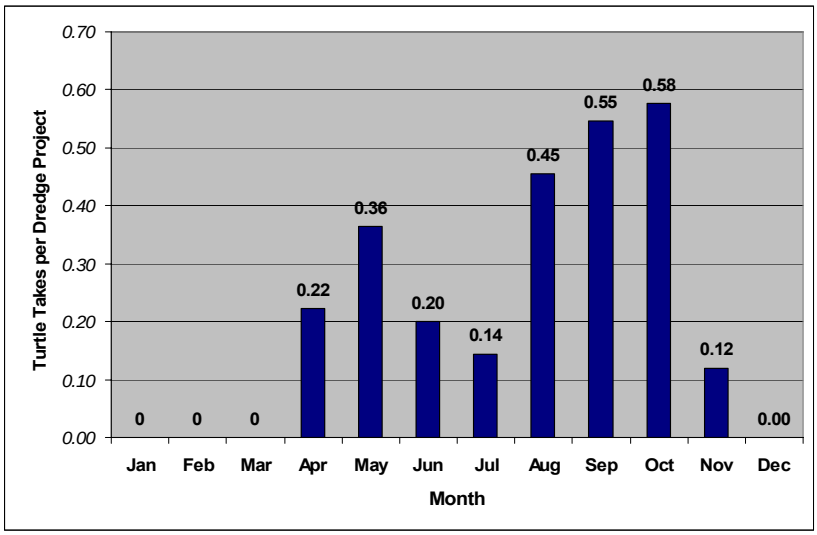
South/Central Atlantic



Monthly CPUE
Gulf



Monthly CPUE
North Atlantic



Evaluations on Dredging Windows

Data provides evidence for:

<u>REDUCTIONS</u> in turtle takes

<u>FLEXIBILITY</u> in dredge schedules

By:

- Refining dredging windows within turtle habitat subregions.

-Allowing summer dredging if no beach disposal required.

Recommendations for Action

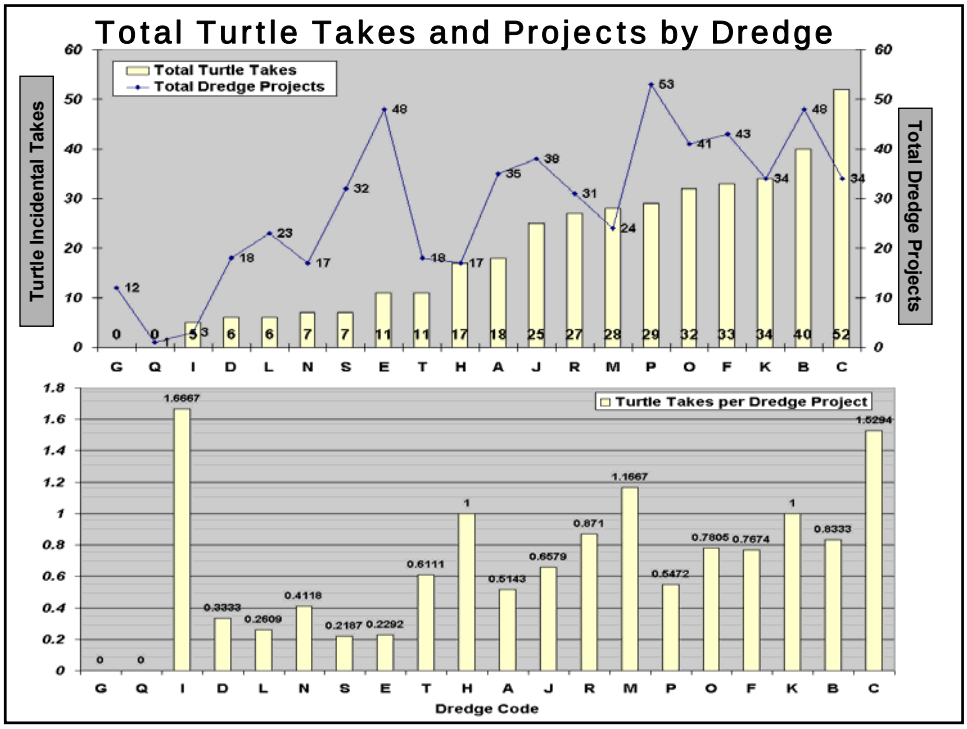
- **Include new data in South Atlantic Regional Biological Assessment**
- **Discuss expanded/flexible dredging windows with NMFS for Regional Biological Opinions**
- **Conduct demonstrations of expanded "safer" windows at selected projects**

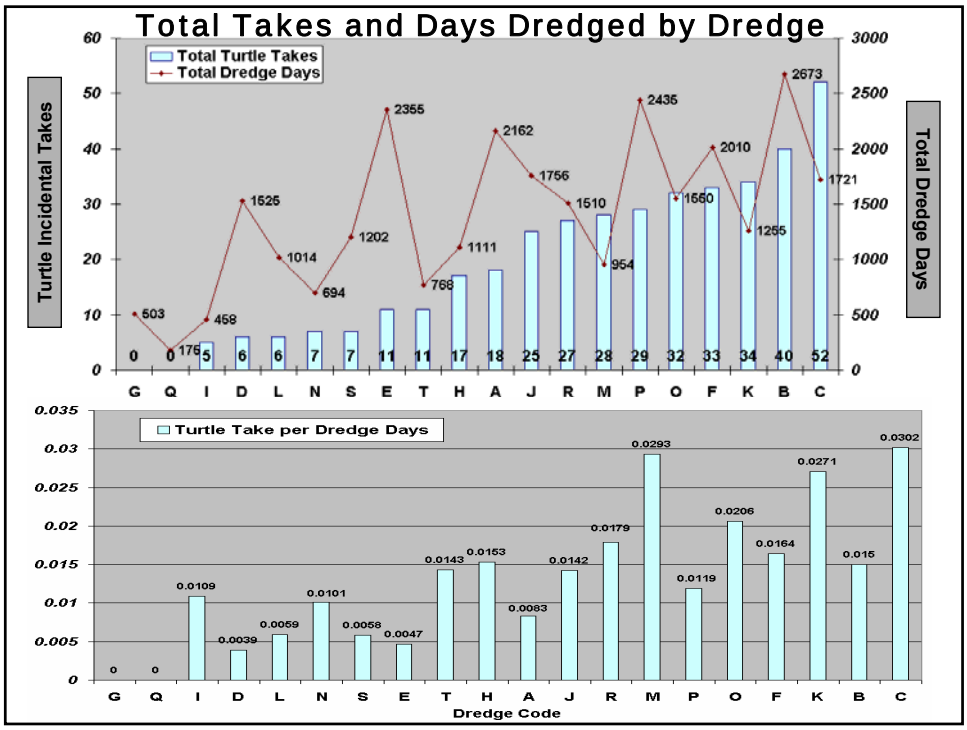
2003 Gulf Regional Biological Opinion Section 10.2

"Additional research, development, and <u>improved performance</u> is needed before the V-shaped rigid deflector draghead <u>can replace seasonal restrictions</u> as a method of reducing sea turtle captures during hopper dredging activities. Development of a more effective deflector draghead or other entrainment-deterring device could potentially <u>reduce the need for sea turtle relocation or result in expansion of the winter dredging window</u>……"

Turtle Takes by Dredge ('95-Aug '08)

Dredge Code	Total Takes	% Total Logger-Cc	% Total Kemp's-Lk	% Total Greens-Cm
A	18	3.7	9.7	4.2
B	40	9.6	9.7	16.7
C	52	14.7	12.9	6.2
D	6	1.1	1.6	4.2
E	11	2.6	1.6	6.2
F	33	11.8	1.6	0
G	0	0	0	0
H	17	3.3	9.7	4.2
I	5	1.8	0	0
J	25	7.7	3.2	2.1
K	34	9.2	11.3	4.2
L	6	1.1	1.6	4.2
M	28	8.1	6.5	4.2
N	7	1.1	0	8.3
O	32	6.6	6.5	18.7
P	29	7.7	3.2	6.2
Q	0	0	0	0
R	27	4.8	17.7	6.2
S	7	2.2	1.6	0
T	11	2.9	1.6	4.2


Total Turtle Takes and Projects by Dredge
Total Turtle Takes
Total Dredge Projects
Turtle Incidental Takes
Total Dredge Projects
G Q I D L N S E T H A J R M P O F K B C
Turtle Takes per Dredge Project
Dredge Code


Total Takes and Days Dredged by Dredge
Total Turtle Takes
Total Dredge Days
Turtle Incidental Takes
Total Dredge Days
G Q I D L N S E T H A J R M P O F K B C
Turtle Take per Dredge Days
Dredge Code

Sea Turtle Entrainment & Protection (STEP) Score

('95-Aug '08)

Dredge Code	STEP SCORE	Total Takes	% Total Take
E	4.2	11	2.8
D	7.2	6	1.6
S	7.2	7	1.8
A	7.4	18	4.6
P	7.4	29	7.5
G	7.8	0	0
L	8.4	6	1.6
Q	8.6	0	0
J	9.2	25	6.4
B	9.8	40	10.3
F	10.6	33	8.5
N	10.8	7	1.8
O	11.8	32	8.2
T	12	11	2.8
R	13	27	7
H	13.8	17	4.4
I	14	5	1.3
K	14.2	34	8.8
C	14.8	52	13.4
M	15.6	28	7.2

Mean Ranking:

- Total Takes
- Total # projects
- CPUE Takes/Proj.
- Total # days
- CPUE Takes/Days

Evaluations on Take Rates by Dredge

Preliminary Conclusions:

- Take rates vary widely among dredges
- Dredges with:
  - **High take rates → consistently high**
  - **Low take rates → consistently low**
  - **Medium take rates → highly variable**
- Historical take rates target:
  - **Sources of incidental takes**
  - **Equipment & protocols for improved protection**

Recommendation for Action

- **Understand your STEP Score**
  - **Contact Dena Dickerson (ERDC)**
- **PDT to establish "unacceptable" vessel take rate**
- **Investigate causes of high & low take rates**
- **Implement modifications to reduce take rates by vessel**