

Text Messaging: A real-time method to report simple fisheries data

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Overview of Presentation

- Introduction
- Pilot project with for-hire operators.
- King mackerel tournament data collection.
- Black Sea Bass "hail-in, hail-out" demonstration project.
- Live demo on RecText.org?



Electronic Data Collection

- Universal need for quicker access to data.
- Most electronic reporting methods have been developed or configured with the commercial sector in mind.
- Other design considerations must be considered if developing a reporting tool for the recreational and for-hire sectors.
- Computers are getting smaller and more powerful but still remain relatively "expensive" – especially if routine internet connection is needed outside of home.



Mobile phones for data collection?

- 4 Billion mobile phones in use (60% of the world population).
- Mobile phones adopted at a pace unmatched by other emerging technologies; US = 84% and 263 M.
- 98% of consumer's phones are capable of sending and receiving text messages, regardless of whether a "text" plan is in place.



Mobile phones for data collection?

- More people in the U.S. (and globally) have a mobile phone than an Internet-connected PC.
- Globally, mobile data traffic will double every year through 2013, increasing 66 times between 2008 and 2013, according to Cisco System's Visual Networking Index.





Short Message Service (aka text messaging)

- Defined in 1985 to allow for simple communication between mobile devices.
- Can be used with automated systems.
- SMS is the "king" of data because it works with all phones across all carriers the world over.
- Industry average \$0.11 per message.
- Principle drawbacks: limited to 160 characters, delivery not guaranteed.



Designing a Data Collection System

- Reporting tool is the "lowest common denominator" available to industry.
- Desired system attributes:
 - inexpensive
 real-time
 scalable
 accessible
 - Provide info to satisfy all data users
- Core information for recreational reporting should include at least:

Anglers, Catch, Effort



Concise "language" needed with SMS

- Needs to be simple and compact to fit the 160 character maximum for SMS.
- Codes for self reporting should be identifiable.

RECTEXT

(Reporting of Effort and Catch via TEXT messaging)



www.RecText.org

FISH	CODE	FISH	CODE
Albacore, False	FA	Perch, Silver	PE
Amberjacks	AM	Pigfish	PI
Barracuda	BA	Pinfish	PN
Bass, Striped	SB	Pompano	PP
Bluefish	BL	Porgy, Red	RP
Bonito	BO	Porgy, Whitebone	WP
Cobia	co	Porgies, Other	OP
Croaker, Atlantic	CR	Sailfish	SA
Dolphin	DO	Sea Bass, Black	BS
Drum, Black	BD	Shad, American	AS
Drum, Red	RD	Shad, Hickory	HS
Eel, American	EE	Shark, Blacktip	TS
Flounder, Southern	FL	Shark, Dogfish	DF
Flounder, Summer	SF	Shark, Sharpnose	SS
Grouper, Gag	GG	Sharks, Other	ок
Grouper, Red	RG	Sheepshead	SD
Grouper, Scamp	SG	Snapper, Red	RS
Grouper, Snowy	SN	Snapper, Vermilion	VS
Grouper, Warsaw	XG	Snappers, Other	OS
Groupers, Other	OG	Spot	SP
Grunt, White	WG	Tarpon	ТА
Grunts, Other	ON	Triggerfish, Gray	TR
Jacks, Other	OJ	Trout, Speckled	ST
Kingfishes	KI	Tuna, Blackfin	вт
Mackerel, King	KM	Tuna, Bluefin	BF
Mackerel, Spanish	SM	Tuna, Other	от
Marlin, Blue	BM	Tuna, Yellowfin	ΥT
Marlin, White	WM	Wahoo	WA
		Weakfish	WE

Example Fishing Report To: xxxxx Msg: rec n4 e6 rs4 rs8r Where: rec = keyword

- **n4** = 4 anglers fished
- e6 = we fished 6 hrs
- **rs4** = we kept 4 red snapper
- **rs8r** = we released 8 red snapper



Data Collection - Overview



Baker and Oeschger, Marine and Coastal Fisheries, 1:143-154, 2009



Pilot Project with For-Hire Captains

- See how well it works "in the field."
- Controlled environment, reports not validated.

Biases eliminated:

- used prepaid, preregistered phones
- reports not publicized
- no knowledge of other participants
- \$100 honorarium

 Captains asked to submit a single text message report at the completion of each fishing trip.



- Number of trips per year: 40 200.
- Range of full time fishing experience: 5 16 years.
- Daily cell phone use for voice: 10-50 times.
- 4 had sent texts, 2 had not.
- 3 texted on a daily / weekly basis.
- Age range: 25-55+





Database view

recreational fishing data

RECTEXT is an experimental data collection and display system designed for marine recreational fishermen in North Carolina. Fishermen enrolled in the study can update the database real-time by texting trip-level catch and effort information to the website via their cell-phone. The password protected website uses a SQL database to archive and display current and archived fishing reports.



Legend

	FA	Albecore, False	PI	Pigfish
	AM	Amberjacks	PN	Pinfish
ased	BA	Barracuda	PP	Pompano
	SB	Bass, Striped	RP	Porgy, Red
	BL	Bluefish	WP	Porgy, Whitebone
her	во	Bonito	OP	Porgies, Other
	со	Cobia	SA	Sailfish
Consiste	CR	Croaker, Atlantic	BS	Sea Bass, Black
Spanish	DO	Dolphin	AS	Shad, Amercian
	BD	Drum, Black	HS	Shad, Hickory
ummer	RD	Drum, Red	TS	Shark, Blacktip
	EE	Eel, American	DF	Shark, Dogfish
	FL	Flounder, Southern	SS	Shark, Sharpnose
ummer	SF	lounder, Summer OK Sharks, O	Sharks, Other	
unniner	GG	Grouper, Gag	SD	Sheepshead
ktin	RG	Grouper, Red	RS	Snapper, Red
Other	SG	Grouper, Scamp	VS	Snapper, Vermilion
Black	SN	Grouper, Snowy	OS	Snappers, Other
	WG	Grouper, Warsaw	SP	Spot
	OG	Groupers, Other	TA	Tarpon
ummer	WG	Grunt, White	TR	Triggerfish, Gray
	ON	Grunts, Other	ST	Trout, Speckled
tlantic	OJ	Jacks, Other	BT	Tuna, Blackfin
ktip	KI	Kingfishes	BF	Tuna, Bluefin
Other	KM	Mackerel, King	OT	Tuna, Other
	SM	Mackerel, Spanish	YT	Tuna, Yellow fin
Spanish	BM	Marlin, Blue	WA	Wahoo
	WM	Marlin, White	WE	Weakfish
outhern	PE	Perch, Silver		

Record data for XXXXXXXXXXXXXXXX

Record	ID	Date	# Anglers	Trip length	Fish kept	Fish released
214	xxxxxx	🗙 uly 30, 2008, 2:43 pm	4	4	7 Mackerel, Spanish 2 Porgies, Other 2 Sheepshead	3 Porgies, Other
210	xxxxxx	July 26, 2008, 5:55 am	2	4	14 Mackerel, Spanish 1 Flounder, Summer	12 Mackerel, Spanish
208	XXXXXX	July 24, 2008, 1:19 pm	4	4		3 Flounder, Summer 3 Bluefish 5 Pinfish
207	xxxxxx	July 23, 2008, 8:19 pm	2	4	3 Bluefish 1 Flounder, Summer	2 Flounder, Summer
206	xxxxxx	July 22, 2008, 6:27 pm	4	4		2 Shark, Blacktip 3 Snappers, Other 5 Sea Bass, Black
202	xxxxxx	July 19, 2008, 9:17 am	2	7		7 Drum, Red 6 Flounder, Summer 2 Bluefish
199	XXXXXX	July 9, 2008, 3:16 pm	2	4		12 Croaker, Atlantic 1 Shark, Blacktip 1 Snappers, Other
196	xxxxxx	July 3, 2008, 3:15 pm	4	6	1 Weakfish 12 Mackerel, Spanish	4 Mackerel, Spanish
194	XXXXXX	July 2, 2008, 4:03 pm	2	4	1 Flounder, Southern	2 Flounder, Southern 2 Bluefish



Effort and Catch Results



- 6 captains
- 4.5 months
- I28 reports
- 1,957 fish
- 27 of 58 species
- 43% released
- Release rates for

Red drum (90%) Trout (36%) Flounder (58%)



Errors

- 5 (3.9%) of the 128 reports received had errors, but all were easily corrected.
- The 128 reports contained a total of 548 separate data fields.
 99.1% of data submitted correctly.
- 4 of 5 errors made by oldest captains, each with no prior TM experience.





Time of reporting



Date



Indirect content validation





Compared to web-based reporting

- + access by anyone with standard cell phone
- + anglers access / query data remotely
- + "on-site submission" and "realtime" allows for validation of reports.
- must use defined "language" (Rectext)
- more difficult to get same amount of info
- users may need training / practice
- some phones easier to text than others



Next Project...KMT Data Collection

- Attributes of this system should allow us to collect a little bit of data from most anglers over a very short period of time and perform "on-site" validations of anglers reports.
- KMT harvest may = 30-50% of rec landings in NC, yet events are not surveyed to determine extent of effort and catch.
- Goal = Validate self-reported lengths on-site and determine if angler reported information is similar to that observed by scientists / weighmasters.





KMT Data Collection Methods

- Distribute sampling packets at registration.
- Boats can participate by returning a traditional paper datasheet (\$) or a text message report (\$\$\$) anytime prior to awards to be in drawing.
- Anglers report effort and disposition of catch by species; also lengths in cm for kept and released kings.





KMT Reference Card





KMT Voluntary Angler Reporting











Black Sea Bass Trip Notification









Twitter as the aggregator



BSB Trip Notification #1



Wave data from UNCW CORMP station ILM2, www.cormp.org

BSB Trip Notification #2





Wave data from UNCW CORMP station ILM2, www.cormp.org

#2 Detailed View



Sea Grant

Wave data from UNCW CORMP station ILM2, www.cormp.org

For-Hire Trip Notification?





 Most states utilize the "Captain's Call" approach for the For-Hire survey .

• Robust survey, but labor intensive. Difficult to verify effort on guide boats.

• Simple SMS notification by Captain would provide secondary indication of effort.



GSM Phone Tags vs. VMS/Satellite

- GSM based "phone tags" have been shown to be more cost effective than satellite based tracking tags and provide same data.
- Phone tags transmit data using SMS over GSM cellular networks only when phone has reception – captures and stores data until then.
- Could this be a low-cost alternative to record vessel movement at a fraction of VMS cost?



Cronin and McDowell, Journal of Experimental Marine Biology and Ecology 362 (2008) 43–48



Thank You



GSM Coverage Maps



GSM = Global System for Mobile Communications, ~80% of world market. ~3 Billion subscribers in 212 countries and territories.



SMS Cost Estimate for NC For-Hire



- 275,000 trips (2007)
- 800 vessels
- 344 trips / year
- 2 texts per trip (out and in) @
 \$0.11 ea and Admin @ \$0.05 ea.



<u>Cost per trip:</u> Operator: = \$0.22 per trip Admin: = \$0.10 per trip

<u>Cost per year:</u> Operator: = \$76 per year Admin: = \$60,500 per year*

