**Cook Inlet Modeling Working Group**

**Bathymetry Teleconference, March 9, 2011**

Presenter: Rich Patchen from NOAA-Office of Coast Survey, Silver Spring

Host: AOOS (Darcy Dugan)

*Participants: Lyon Lanerolle (NOAA-NOS, Silver Spring), Matt Forney (NOAA), Ray Chapman (USACE Vicksburg), Carl Schoch, Terry Thompson (KBRR), Tal Ezer (Old Dominion Univ.), Amy Holman (NOAA), Kris Holderied (NOAA Kasitsna Bay Lab), Rob Bochenek (AOOS), Darcy Dugan (AOOS), David Oliver (Terrasond), Yi Chao (NASA JPL/UCLA)*

*Structure*: Rich Patchen gave a short presentation about the work he and colleague Lyon Lanerolle are doing to develop a Digital Elevation Model (DEM) for Cook Inlet as part of their larger scale circulation modeling project in the region. The presentation was followed by questions, discussion, and ideas for collaboration.

Meeting Summary

Rich and Lyon are approaching the data collection and assimilation in the following five steps:

1. *Acquire and combine all NOAA National Ocean Service (NOS) and any other bathymetry sounding data (i.e. NOS/OCS, NESDIS/NGDC).* Rich realizes there may be local engineering firms who have more bathymetry data, and would be interested in including it if it is available.
2. *Acquire and combine all available LIDAR data* (from NOS/NGS, NOS/CSC, USGS). The LIDAR data should be very useful, but requires experience, and Rich and Lyon are still learning how to handle it. Kris Holderied has helped identify LIDAR, and if people know of additional data, Rich is interested. Rich will send out what he’s already accumulated so people can see the gaps.
3. *For regions without LIDAR data, acquire and combine all available shore-line data [NOS/NGS].* This might be through remote sensing, or a database of shoreline for mean high water and mean low water. The idea is to use the shoreline and take it to the same datum; then connect it to the LIDAR data where there are gaps. Rich hopes not to rely on this method too often but it may be necessary in some place.
4. *QC all of the above and verify quality*.
5. *First combine bathymetry data and LIDAR to form shore-line naturally; thereafter, for areas with no LIDAR data, use shore-line to demarcate land-sea boundary*.

Rich and Lyon will be creating two products: (1) a DEM, and (2) a database that makes available individual soundings. Rich and Lyon will decide whether it makes sense to put the DEM onto a new model grid, but it will be made available on Rich’s grid regardless. These products won’t be built as a particular GIS layer of bathymetry, but will be able to be used within a GIS package. The datasets for soundings that weren’t used in Rich’s grid will be made available too.

When NGDC conducted bathymetry work in Kachemak Bay, they produced a technical write up that Rich and Lyon will use as a guide for the Cook Inlet DEM. Marcus Glenn is the contact at NGDC that Rich and Lyon will use for help. If anyone on the call would like to assist with LIDAR data, they are welcome to. Rich will make sure all the data goes into one datum to produce a continuous bathymetry/topography base.

The graphics in the last three slides of Rich’s presentation shows data that hasn’t been circulated yet, and is the most recent of the NOS soundings data. Rich will incorporate these new datasets into the model; all the bathymetry is referenced to Mean Lower Low Water (MLLW). The OPR numbers are available for reference.

The hydrographic data is available at NGDC and is stored as Bathymetric Attributed Grid Object (BAG). BAGS – it helps group bathymetry soundings and their associated bathymetry for a particular region. Rich and Lyon are in the process of converting them into files which can be used for the Cook Inlet model grid. More recent data will be used to update the 2004 data, and some will repeat some of the older wetting/drying model runs.

The timeframe for having the bathymetry and LIDAR done is 4 or 5 month. Rich is happy to make new bathymetry in MLLW available earlier (within a month or so) but if you’re willing to wait another few months, you will get the whole thing.

Clearly there are some challenges -- look at any nautical chart and you will see the northern regions of Cook Inlet are pretty tough. However, Rich is confident in their progress, and has a fantastic resource in Lyon who is doing the technical work.

Some questions:

Q: Will you leave selective soundings on a grid for DEMs? Will it be a regular grid that you disseminate?

A: Rich and Lyon are working with original raw soundings. The product will be the soundings (if people want them) and also the grid. The gridding process is a decimation process and the range of resolution right now is 1km to 10’s of meters in the model.

Q: You can get shoreline from satellite data. Will you be doing that?

A: Satellite data isn’t always accurate enough. But it could be used to help validate their grid for comparison purposes. (Tal Ezer will make this satellite data available to Rich).

Q: Will the final product be packaged in netcdf?

A: Yes. The earlier Rich can get some sample data to Rob Bochenek at AOOS, Rob can get set up to receive it to make visualizations. Rich mentioned they are in compliance with standard netcdf formatting. We can also make the data available in other formats, such as ASCII or as Matlab files.

Q: is it a nested ROMS, or one level resolution?

A: It is one basic model grid, which has pretty high resolution, and then several nests from Kachemak Bay and one from Fire Island north. (1 km down to 60 m).

Q: Do you plan to use a curvilinear grid?

A: Yes. It includes lower Cook Inlet and Shelikoff Straits.

Q: It seems like it would be useful to have soundings from the USACE. Are those available?

A: In addition to the 2008 NOAA data for upper Knik arm, the USACE took a whole series of transects over 2009 and 2010 (recently), and there was a Cook Inlet navigation channel survey that was fairly recent. Localized surveys were done around McKenzie Shoal as well, since it is a point of interest for the Port of Anchorage. Terrasond conducted these surveys, but they don’t own the data and would need permission to distribute it but. Ken Eisses or Alan Churchill would be good contacts for Rich. Ray Chapman will send the emails to Rich for those contacts.

Note: David Oliver from Terrasond mentioned that if Terrasond has a multi beam project out of Kenai, and there isn’t much existing data there, they will try to include inland river areas where Rich needs information. Now that David is aware of Rich’s project, he can looks for ways to leverage other projects or look for data for areas where Rich’s is sparse or low res. To accelerate this process, Rich will send David a plot a scatter diagram showing where they already have data. David mentioned he is open to helping in other ways too. Terrasond is used to working with LIDAR data in the Kenai – they are point files (xyz) and shouldn’t be too awkward for Rich to work with.

Q: How would we visualize the data for this project?

A: Rob Bochenek from AOOS is interested. He said they would probably take the gridded product that covers the entire Cook Inlet. One Rich has output from his operational ROMS model, Rob can start working with that too. (By 2013 there will be a forecast system for the whole region, run through the NOAA high performance computing cluster, pushed to the THREDDS server run by NOS/CO-OPS, and distributed through PORTS system.)

Note: Rich’s team will not be working on model visualizations. Rob is thinking about interactive web based products, although Kris Holderied also mentioned the importance of paper products – for people to have in hand on a boat, or for city planners, harbor masters, visitors, etc.

Note: David Oliver is interested in receiving the single point data from Rich and displaying it in Fledermous for people to see the bathymetry coverage. With the Fledermous technology, he can create fly-throughs that will be available for the working group to view through a free downloadable software viewer (Fledermous software is ordinarily very expensive but the viewer is free). Fledermous also has relationship with ESRI so the data can be exported directly into ESRI system for web-based presentations. It also exports into Google Earth. David plans to make this dataset into Fledermous regardless, and will make it broadly available. Once people view it and understand what’s available, we could have future conversations about further products to produce

Q: Any talk about taking this data to the ellipsoid?

A: Unfortunately Vdatum for Alaska will not be available until FY13. A VDatum project was supposed to be done for Kachemak Bay, but is was not completed. Matt Forney of NOAA will talk to Glenn to confirm this.

Note: Matt will forward Rich the email address of James Adair at USACE who distributes data.

Q: Is Rich linked in with Jeff . Matt thinks this model will aid in assessing the planned hydro survey for Cook Inlet Rich says they’re right down the hall but hasn’t talked to them. Rich will talk to both.

**Closing:** The group is very excited about Rich and Lyon’s project. Another telecon will be held in several months once the grid is complete. Rich will report on the product, everyone can view David’s Fledermous fly-through, and the group can discuss visualization through AOOS.

**Action items:**

1. Rich will send out a graphic showing bathymetry he’s already accumulated so people can see the gaps. (He has a plot scatter diagram that would be especially useful to David Oliver).
2. Tal Ezer (Old Dominion University) will make Cook Inlet satellite data available to Rich
3. Ray Chapman (USACE) will send contact information for Ken Eisses or Alan Churchill to Rich.
4. Matt Forney (NOAA) will forward Rich the email address of James Adair at USACE who distributes data.