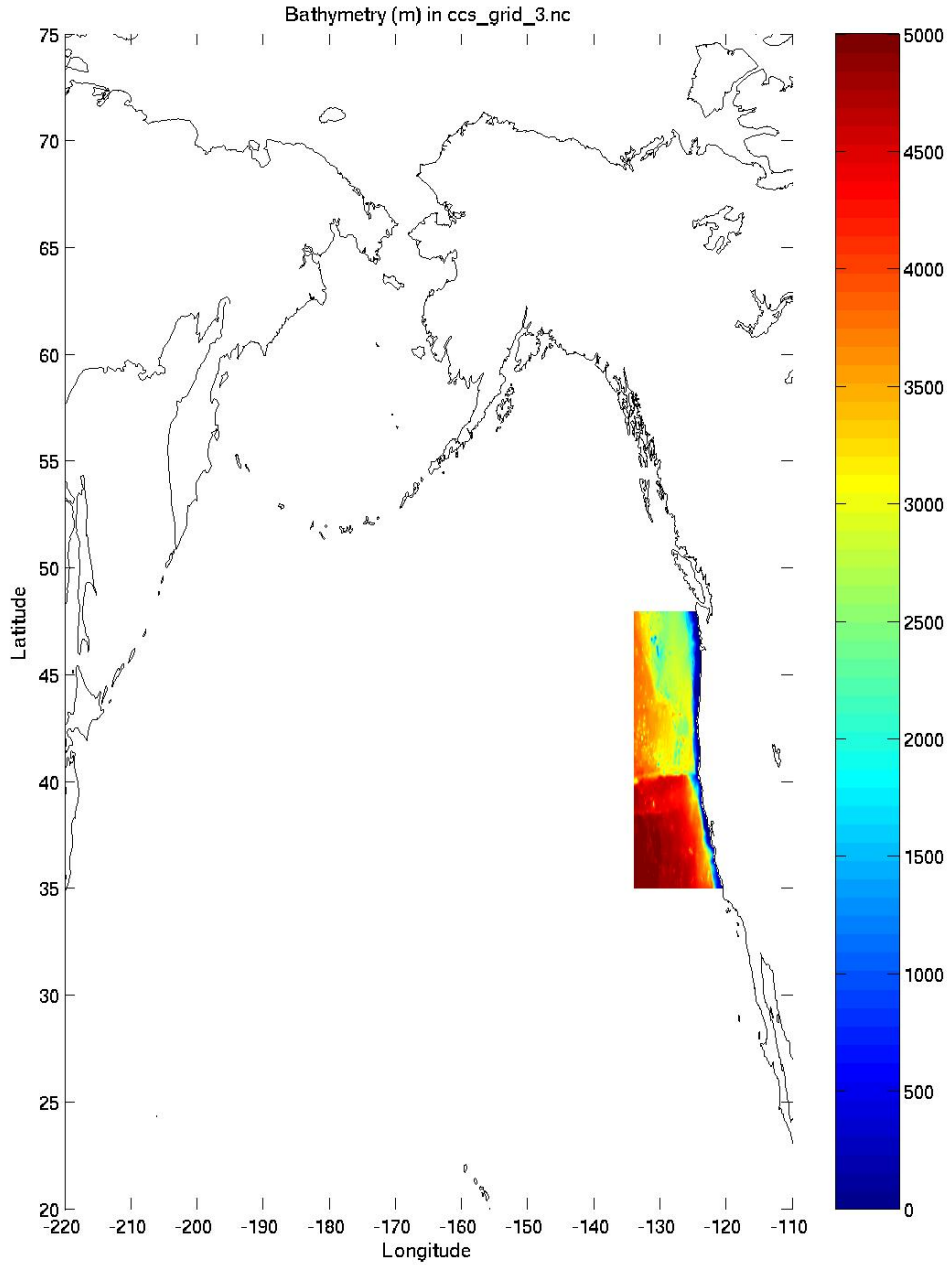
Bioenergetic Modeling of Salmon

- Not started yet (again)!
- Adapting basic coupled bioenergetic model core to work with Regional Ocean Modeling System (ROMS) stored fields (taking longer than anticipated)
- Resolving Issues

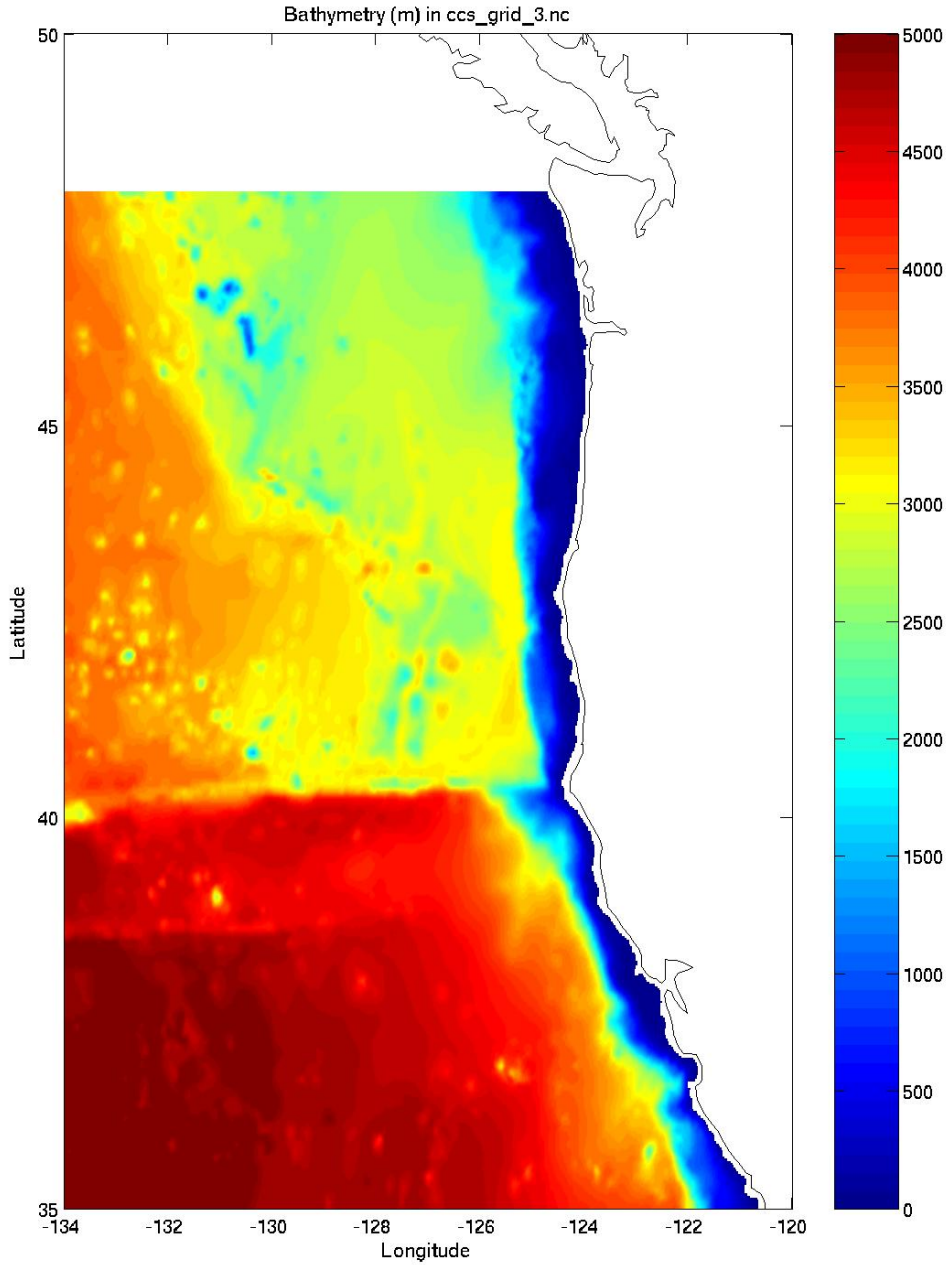
The ROMS CCS Domain

ca. 4 km horizontal resolution



The ROMS CCS Domain

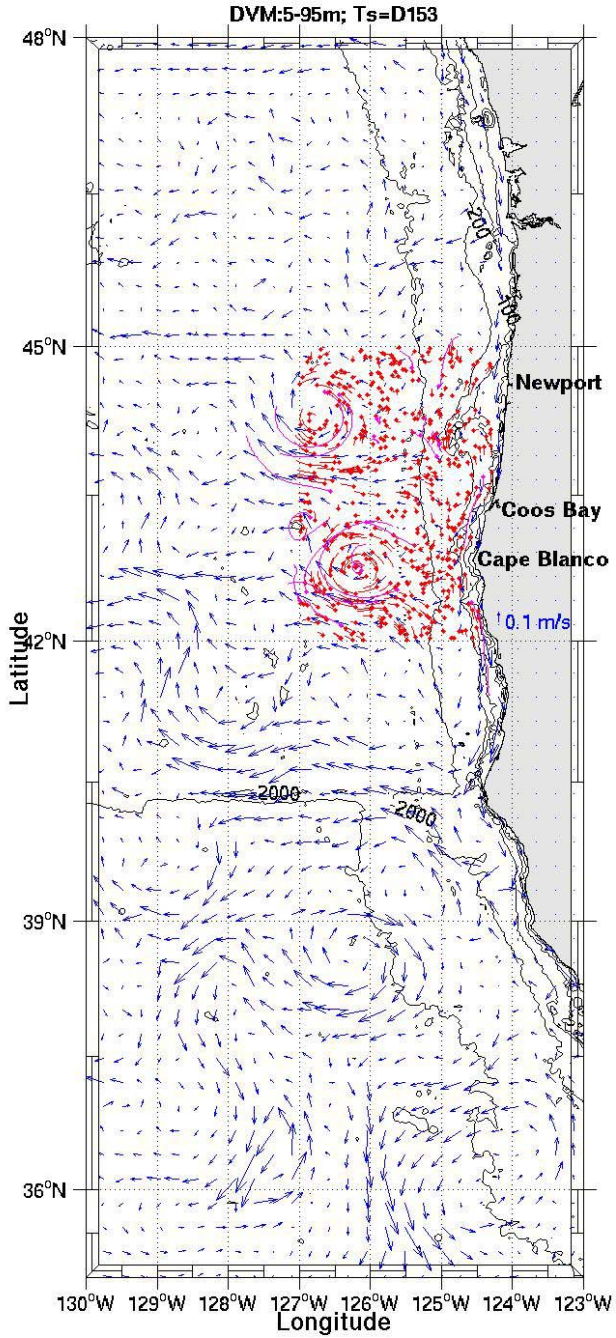
The bathymetry



The ROMS CCS Domain

A flowfield snap (blue vectors) at 10 m; Initial particle location (red dot) and 14d? Trajectory (purple)

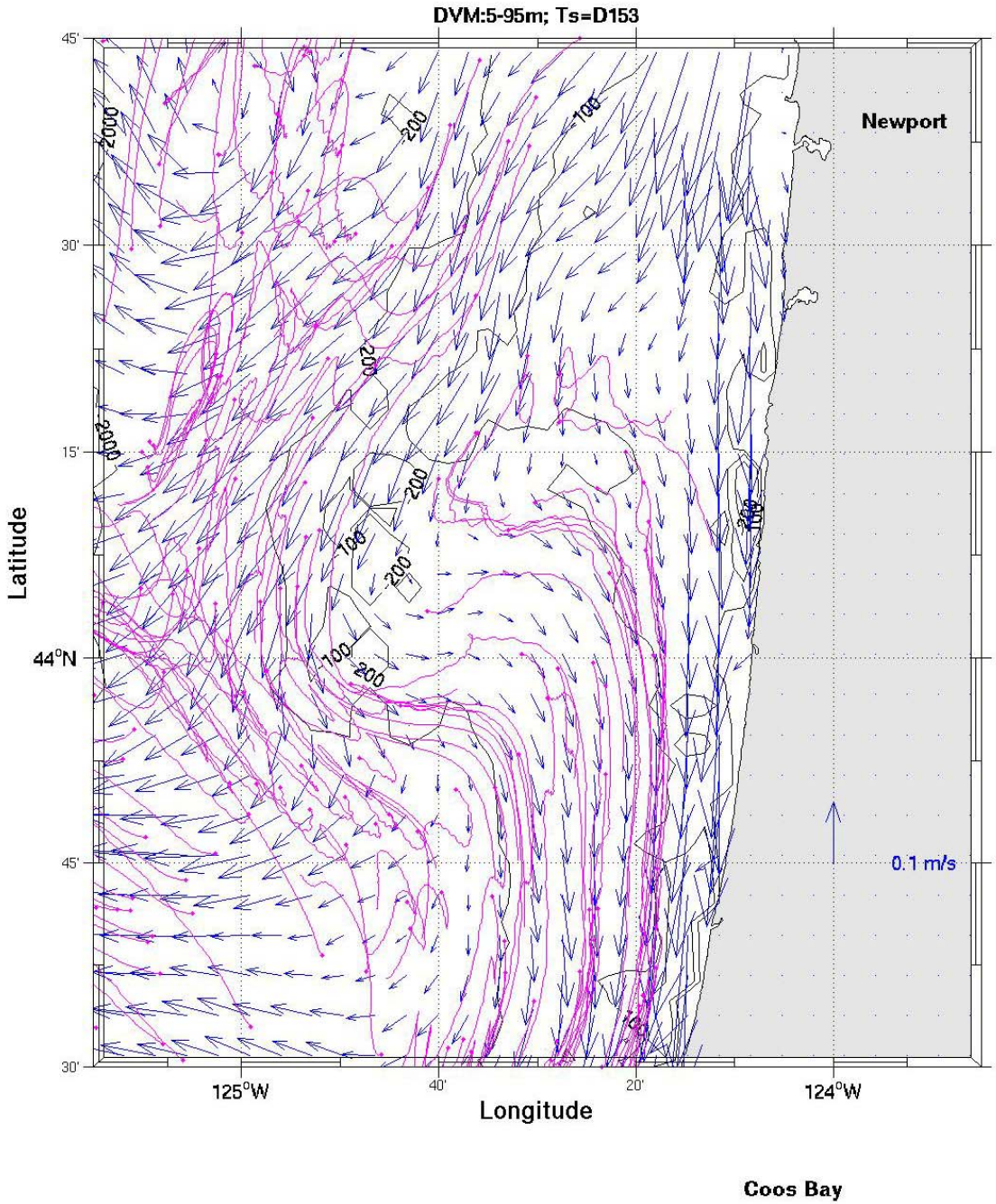
Flowfield vectors shown at only every 10th grid location in both X and Y

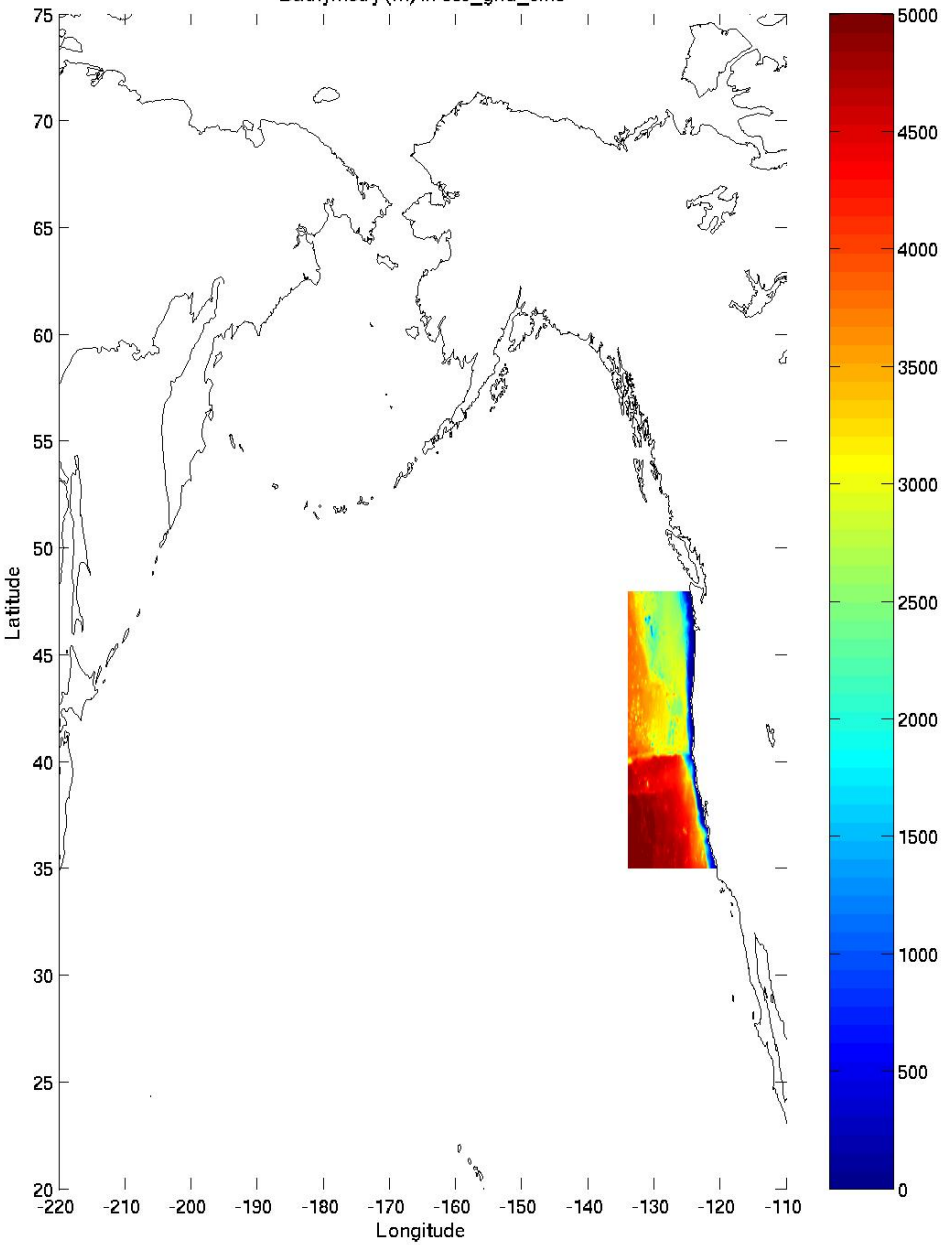


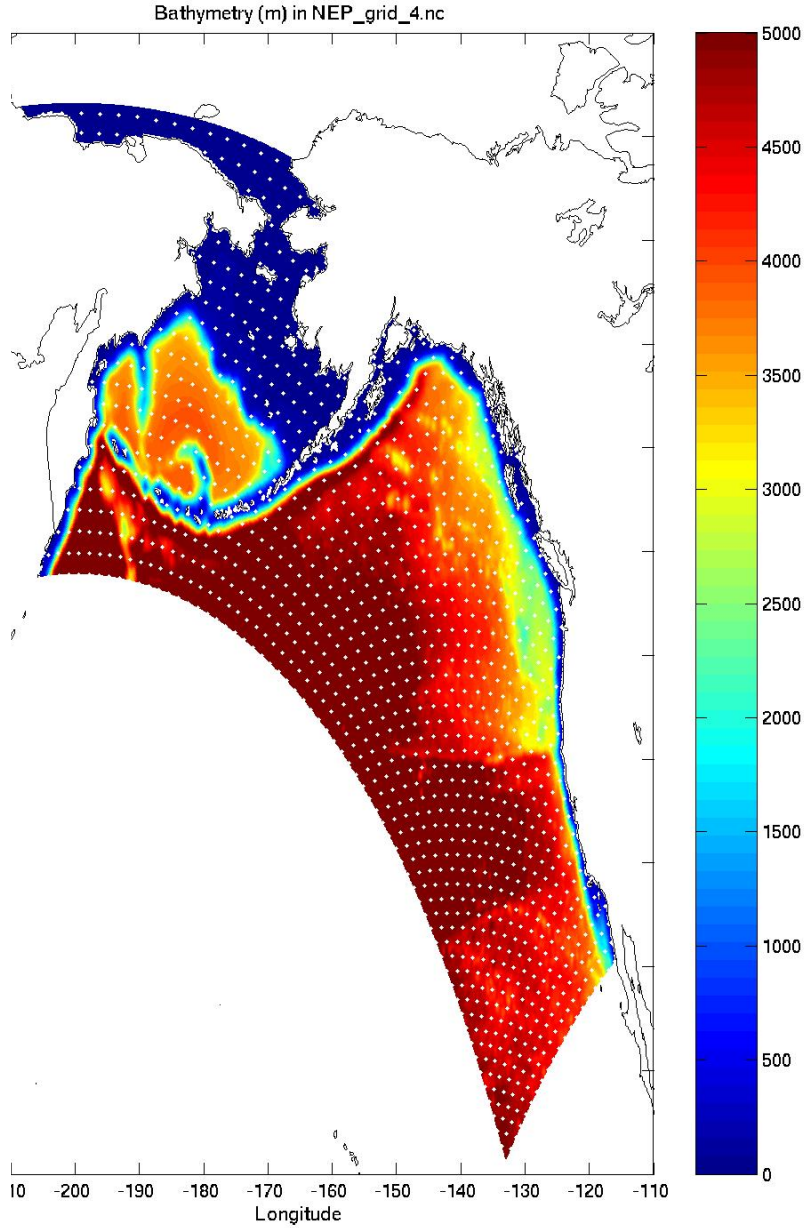
The ROMS CCS Domain (Zoomed to Heceta Bank)

A flowfield snap (blue vectors) at
10 m; Initial particle location (red dot) and 14d? Trajectory (purple)

Flowfield vectors shown at only every 2nd grid location in both X and Y




Bathymetry (m) in ccs_grid_3.nc
Latitude
Longitude
75
70
65
60
55
50
45
40
35
30
25
20
-220
-210
-200
-190
-180
-170
-160
-150
-140
-130
-120
-110
5000
4500
4000
3500
3000
2500
2000
1500
1000
500
0

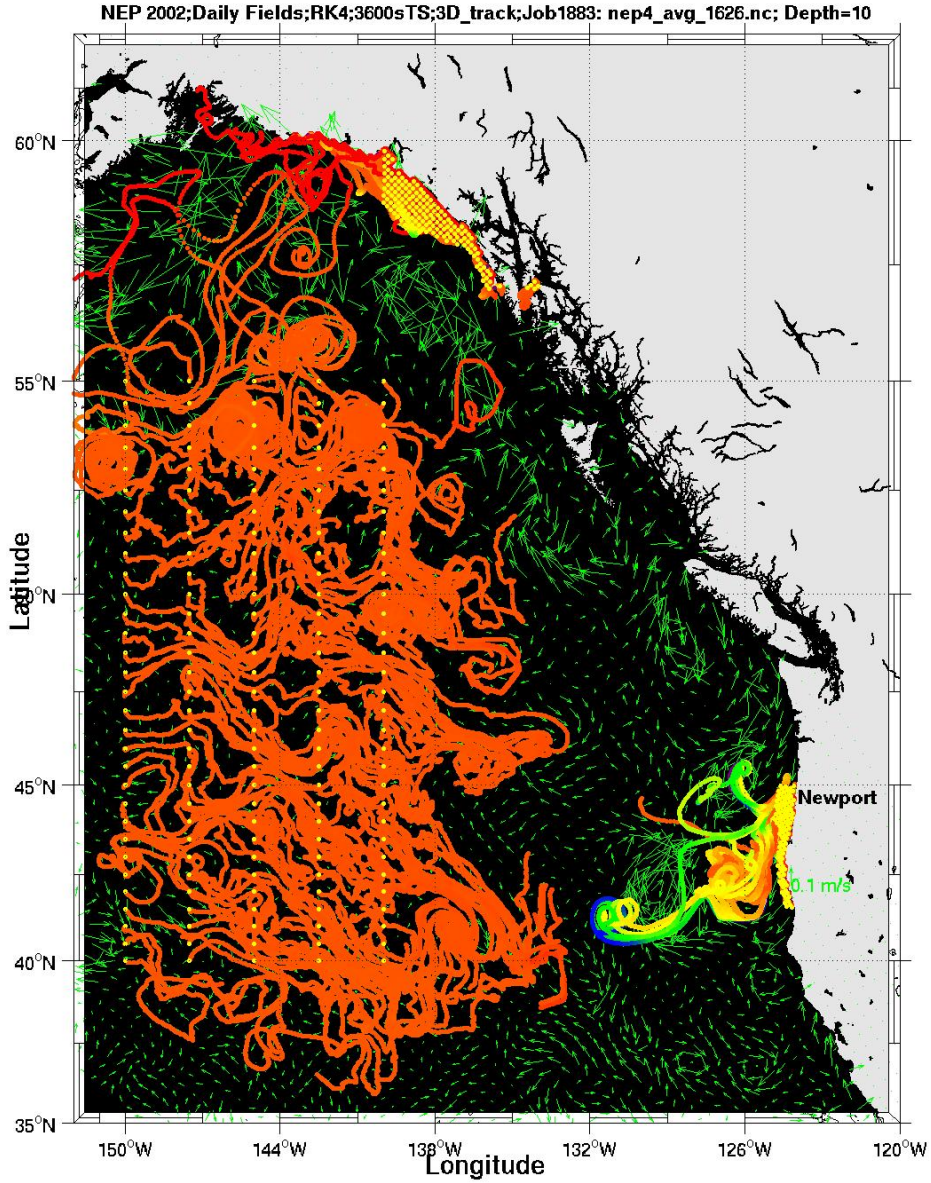

Bathymetry (m) in NEP_grid_4.nc
Longitude
10
-200
-190
-180
-170
-160
-150
-140
-130
-120
-110
5000
4500
4000
3500
3000
2500
2000
1500
1000
500
0

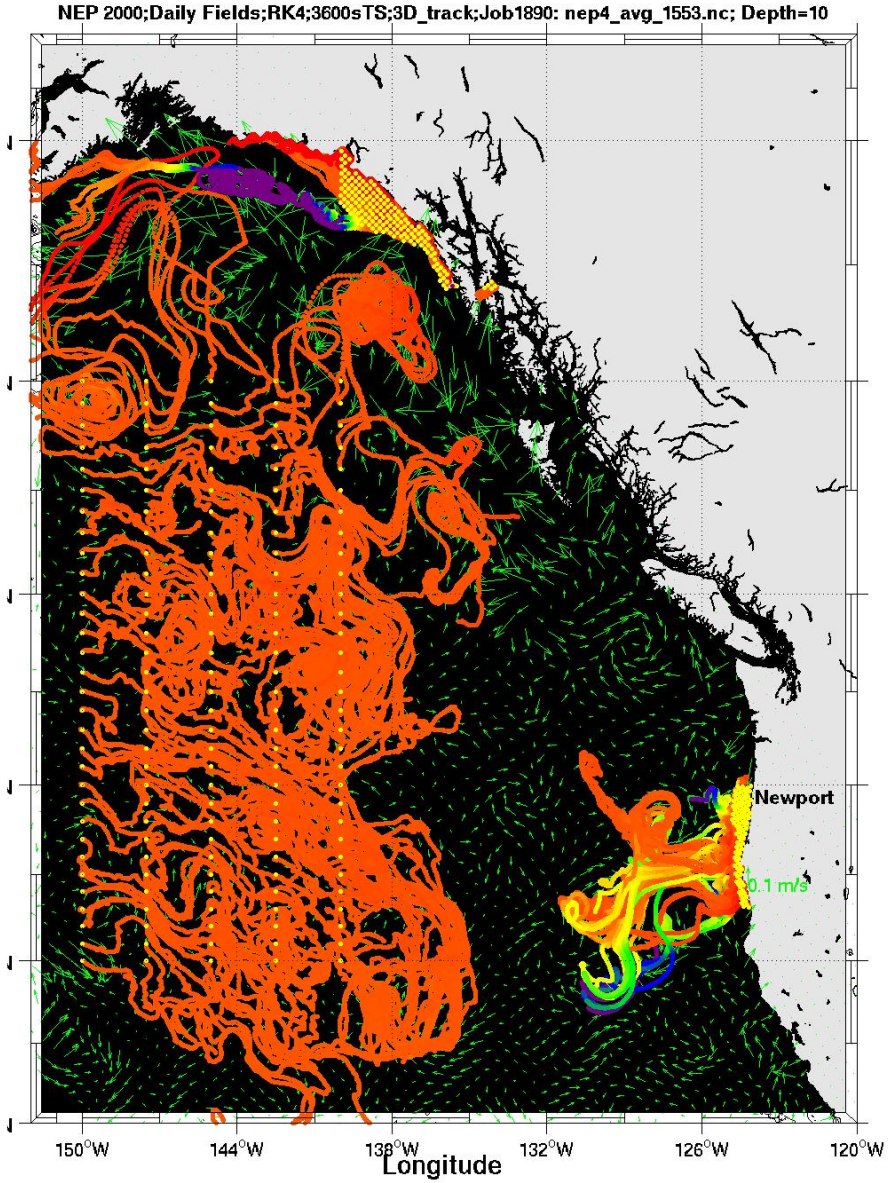
NEP Domain

- Forced with reanalysis winds; boundary conditions from a larger domain model
- Run for period from 1 January 1958 to 31 December 2004 (47 years), includes multiple El Nino's, Regime Shifts, and 2002 cold intrusion
- Physical fields (T,S,u,v,w) stored as daily averages. Each snapshot is ca. 200 Mb, so one year is 73 Gb (47 years is 3.5 Tb)
- Nobody has evaluated the fields from this run yet. So, I've been. Strategy (1) is to examine passive particle trajectories for period of 15 Apr – 1 Oct each year—the upwelling season.

NEP Particle Tracking Details

- Particles are seeded into 3 regions:
  - Central Region (155 particles) – to examine interannual variability in transport of the North Pacific Current and determine patterns of bifurcation
  - CGOA (159 particles at all grid points <700 m bottom depth)
  - CCS (102 particles at all grid points <700 m bottom depth)
- Initial Depth of all particles is 10 m
  - Some simulations have fixed depth (stay at 10 m)
  - Others experience vertical advection (change depth)
- Only consider advection (no vertical diffusion yet)

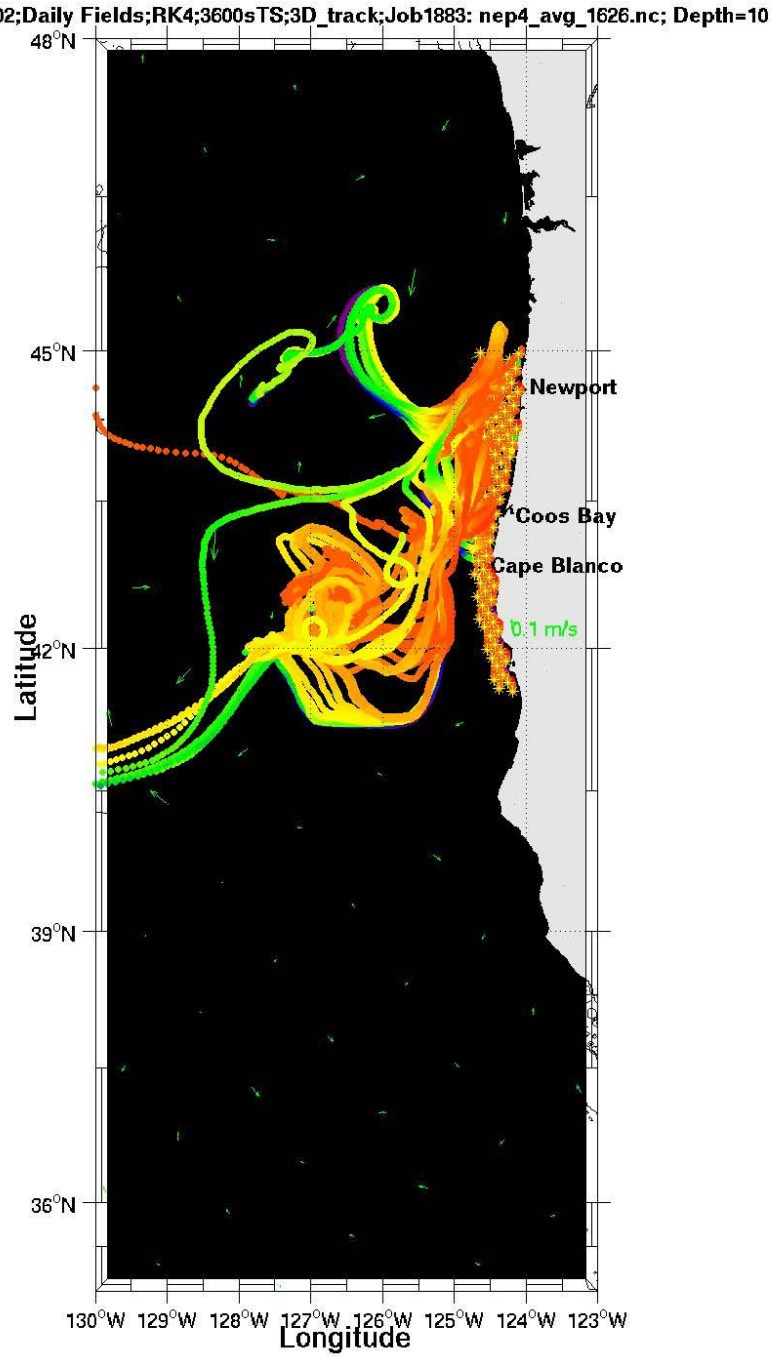

NEP 2002;Daily Fields;RK4;3600sTS;3D_track;Job1883: nep4_avg_1626.nc; Depth=10
60°N
55°N
50°N
45°N
40°N
35°N
Latitude
150°W
144°W
138°W
132°W
126°W
120°W
Longitude
Newport
0.1 m/s


NEP 2000;Daily Fields;RK4;3600sTS;3D_track;Job1890: nep4_avg_1553.nc; Depth=10
150°W
144°W
138°W
132°W
126°W
120°W
Longitude
Newport
0.1 m/s

The NEP Domain (Zoomed to CCS region only)

Particle trajectories from 15 Apr to 1 Oct 2002; Trajectory path is color coded by depth of particle; orange is 10m; red is shallower; >50m is dark blue

Green vectors are snapshot of flow; only every 5th vector plotted



Bioenergetic Modeling of Salmon

- Not started yet (again)!
- I have a GLOBEC salmon diet summary (table and figure) from Ric (by species, by cruise, weight and number for 42 different prey types; summarized into 11 prey types (3 fish types; 3 euphausiid categories; Hyperiidie, Brachyura, Cancer magister megalopae; other crustacea; other
- From Cheryl, I have 2000 and 2002 BPA Bongo Net samples to provide in situ prey abundance (density and carbon weight info)
- Maybe next time (fingers crossed)!