

Fish!

South Bay Salt Ponds Fisheries Monitoring Program



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South Bay Salt Pond
Restoration Project

Wildlife, fish and conservation Biology
University of California, Davis



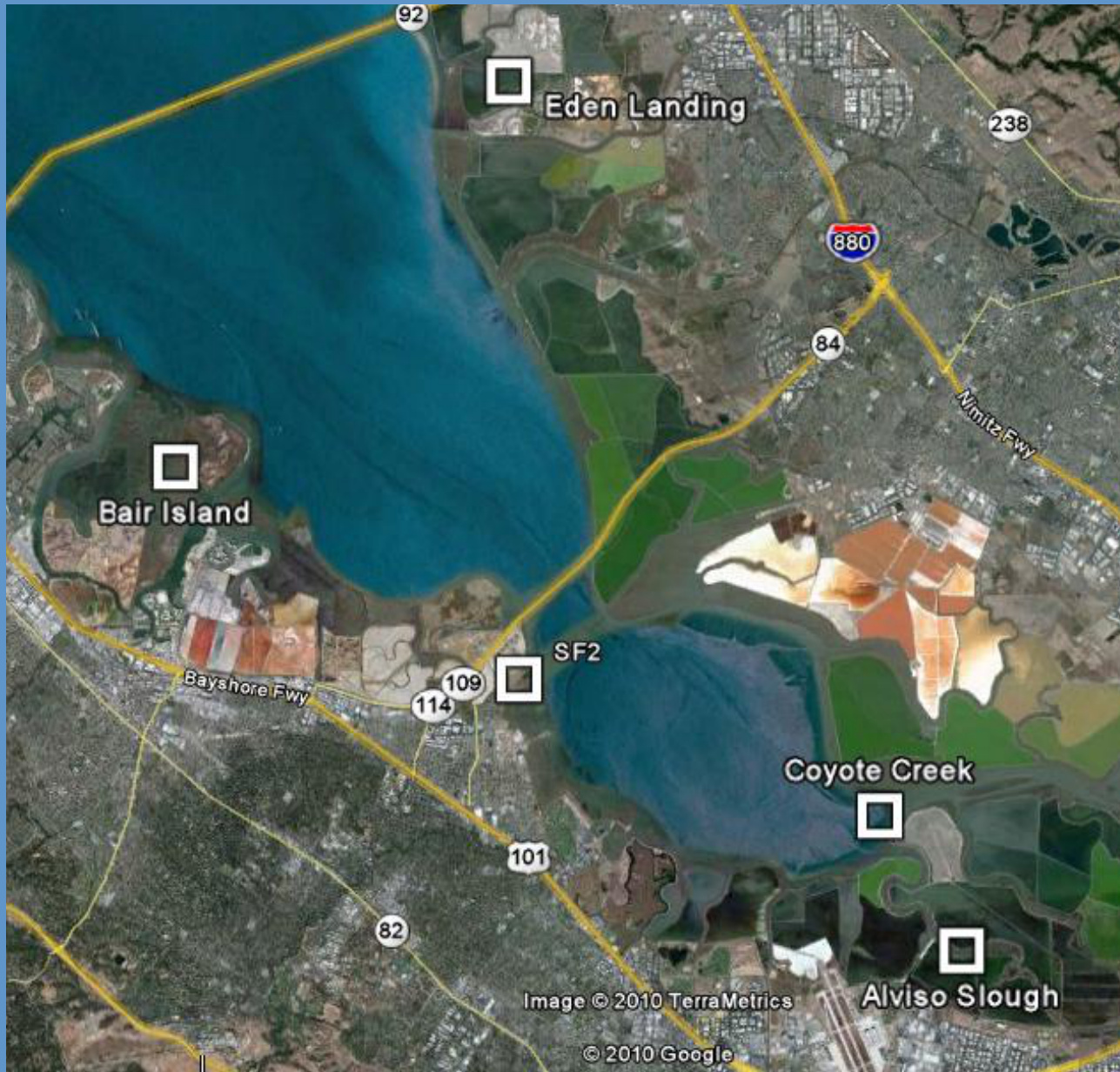
Project Objectives

- Monitor species abundance, assemblages and distribution during restoration
- Investigate the individual and population “health” of sentinel species in restoration areas



Photo courtesy of A. Chandos

Study Area



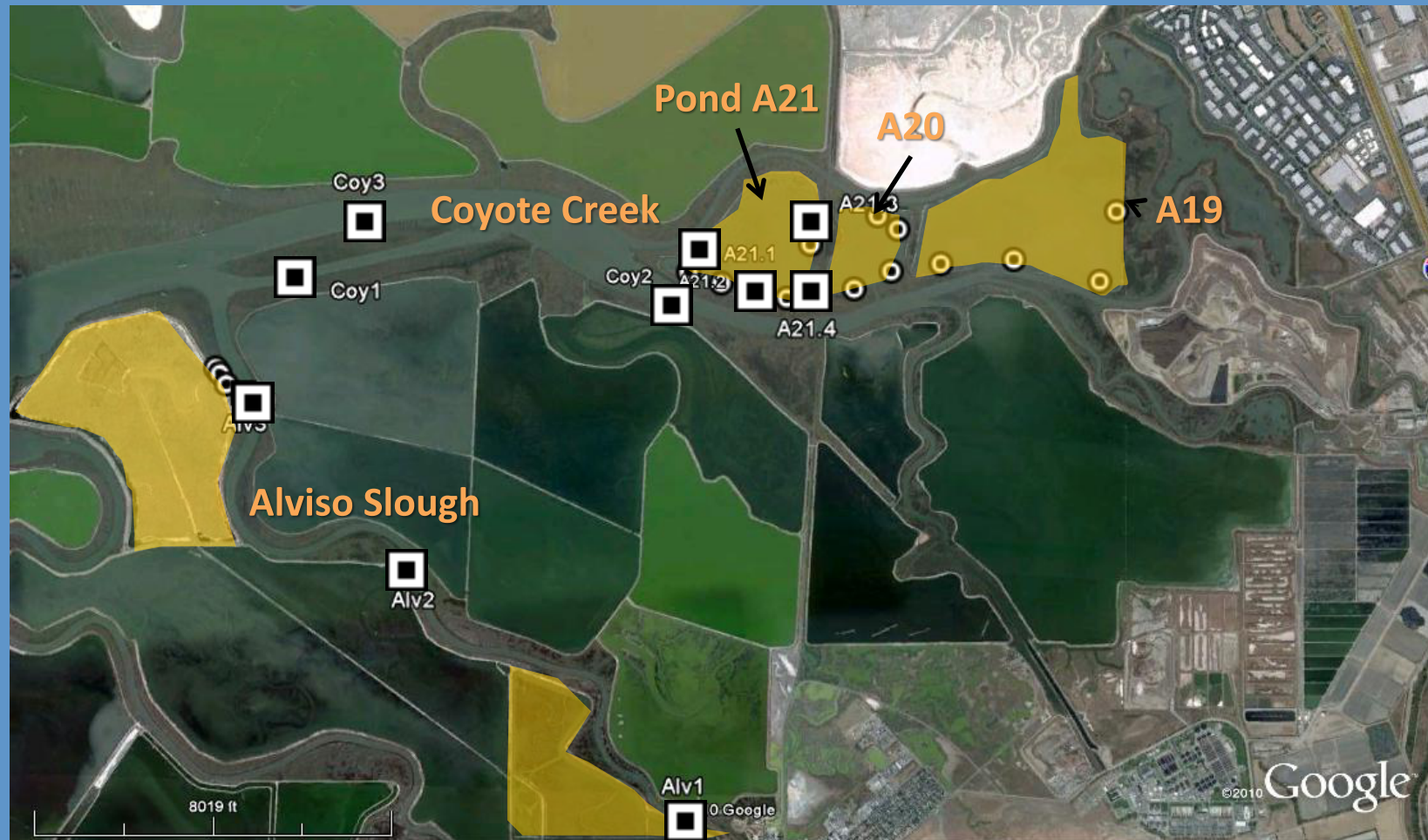
Bair Island Sampling Sites



□ = Otter trawl station

⊙ = Trap Location

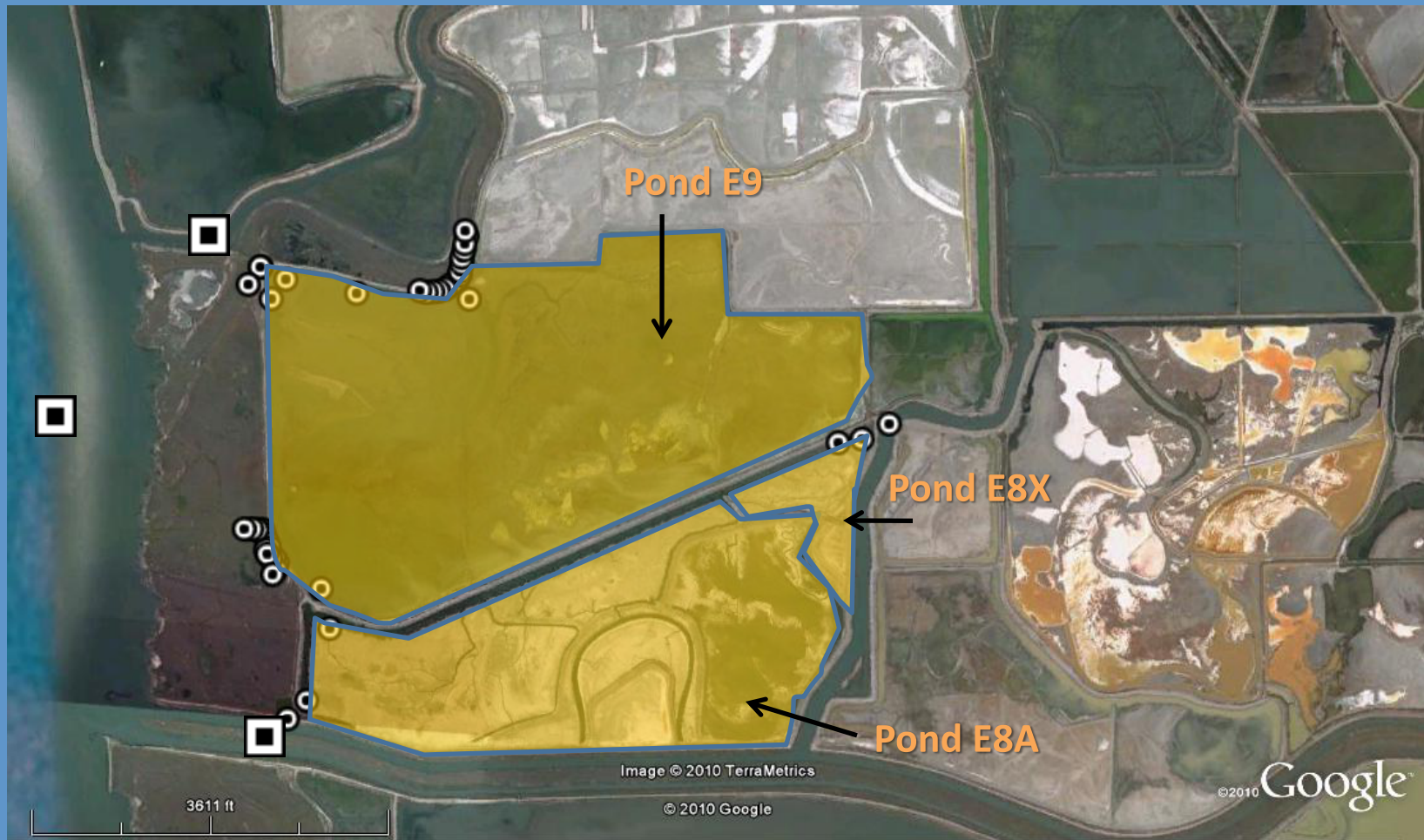
Alviso Slough and Coyote Creek



□ = Otter trawl station

○ = Trap Location

Eden Landing Sampling Sites



□ = Otter trawl station

⊠ = Trap Location

Open Bay



Broad Shallow Sloughs



Restoration Ponds-SF2



Flooded Ponds- A19



Intertidal Creeplets



How do you sample such different habitats?

- Habitats are variable – thus a variety of methods have been employed.
 - Methods utilized include:
 - Benthic “otter” trawl- Sloughs
 - minnow trap- Intertidal
 - clover trap- Ponds
 - “Crain” trawl SF2
 - Hook and line- Pond outlets

Otter Trawl-

Sloughs, Open Bays, Flooded Ponds



Minnow Trapping- Intertidal Creeklets, Restoration Ponds



Crain Trawl- Shallow Sloughs, Restoration Ponds



Hook & Line- Pond Outlets



Environmental Parameters

- Recorded at each sampling site
- Parameters measured include:
 - Salinity (ppt)
 - Temperature (°C)
 - Transparency (Secchi depth in cm)
 - Tidal stage
 - Specific conductance (μS)
 - Dissolved Oxygen (mg/L)

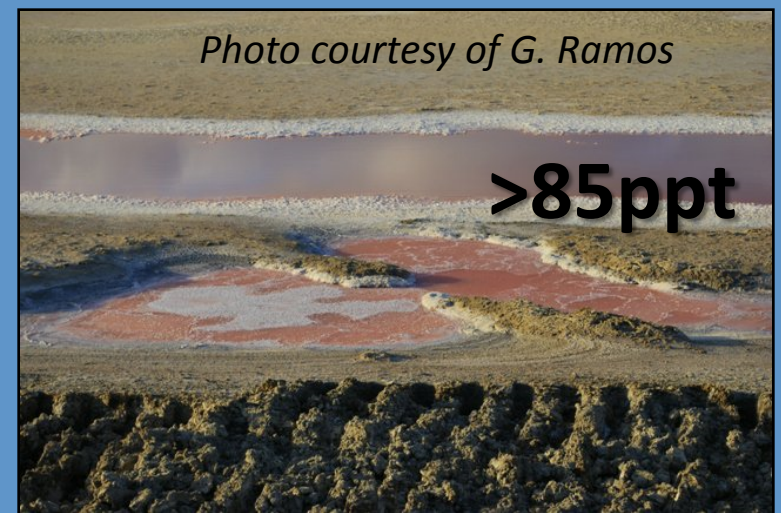


J. Hobbs

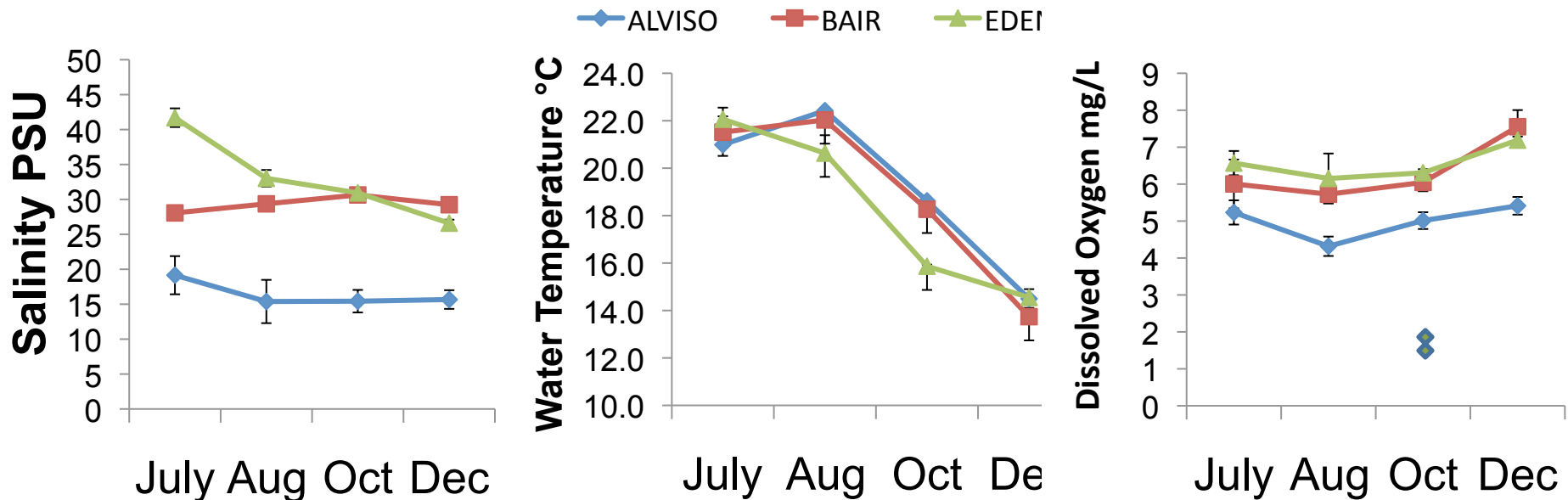
Salt Ponds are Salty



- Sloughs and SF Bay
- Freshwater influence- Alviso and Coyote Creek
- Ponds with no or little tidal action. A6, A8



Summary of Environmental Parameters



- Salinity and D.O. lower in Alviso Slough
- Water temperature colder at Eden Landing
- Temperatures declined in Oct and Dec.
- Hypoxic event in Alviso and Coyote Slough in Oct.

Fish Abundance-Trawls

Rank	Species	July	Aug	Oct	Dec	Total
1	3-spinned stickleback	236	223	827	392	1678
2	Northern anchovy	208	250	53	38	549
3	Topsmelt	5	21	50	316	392
4	Staghorn sculpin	81	61	68	43	253
5	Arrow Goby	55	74	8	5	142
6	Longfin smelt				61	61
7	Yellowfin goby	28	13	8	6	55
8	Shiner surf perch	19	9	8	2	38
9	Pacific Herring				23	23
10	Bat ray	7	7	1		15
11	Starry flounder	1	2	10	1	14
12	Threadfin shad				12	12
13	Prickly sculpin	9	1			10
14	American Shad				8	8
15	Leopard Shark	3	3	2		8
16	Bay pipefish		7			7
17	Rainwater killifish		1	5	1	7
18	Speckled sand dab			1	5	6
19	Brown smoothound		5			5
20	Diamond Turbot				5	5
21	Mississippi silverside			2	3	5
22	Barred surf perch	1	2			3
23	Bay pipefish	2				2
24	Shimofuri goby	1		1		2
25	Shokahaze goby				2	2
26	English sole				1	1
27	Longjaw mudsucker			1		1
28	Plainfin midshipmen			1		1
29	Striped bass		1			1
30	Sacramento sucker	1				1

Pelagic "open water" Species

- >3300 Fish
- 30 species
- 98% Native by abundance

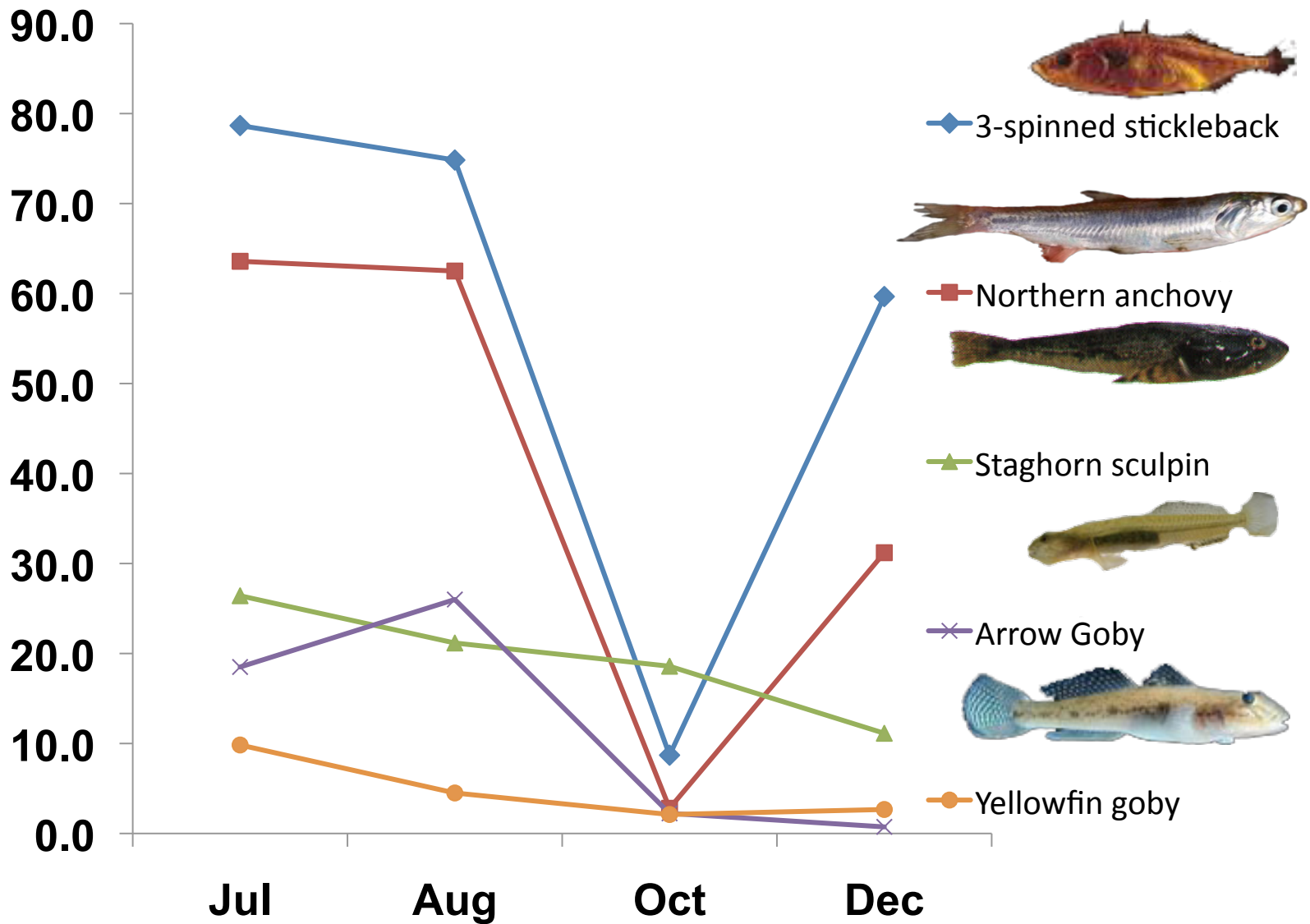


Benthic "bottom dwelling Species"



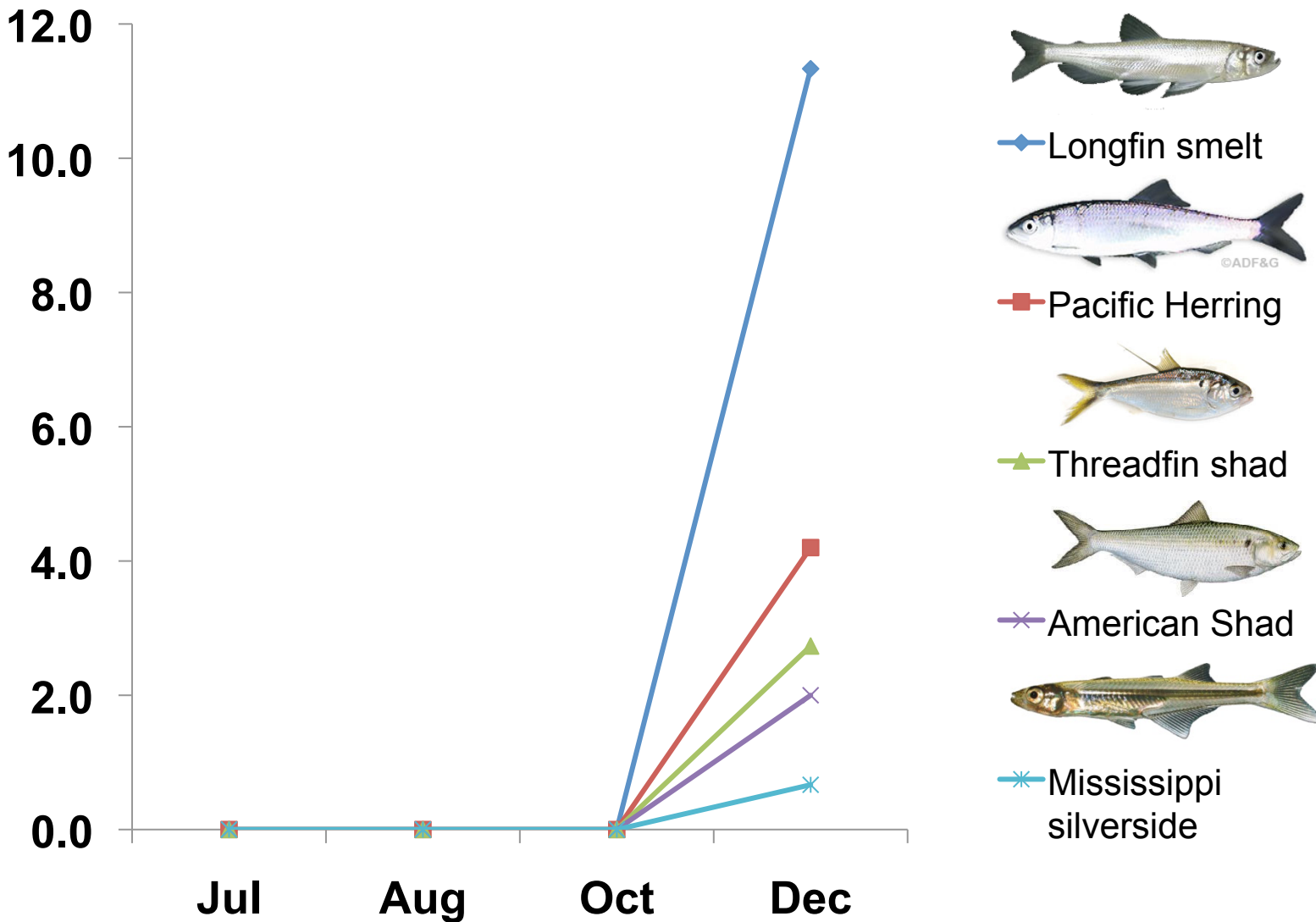
Otter Trawl Catches-Sloughs Summer Assemblage

Mean Catch/Trawl



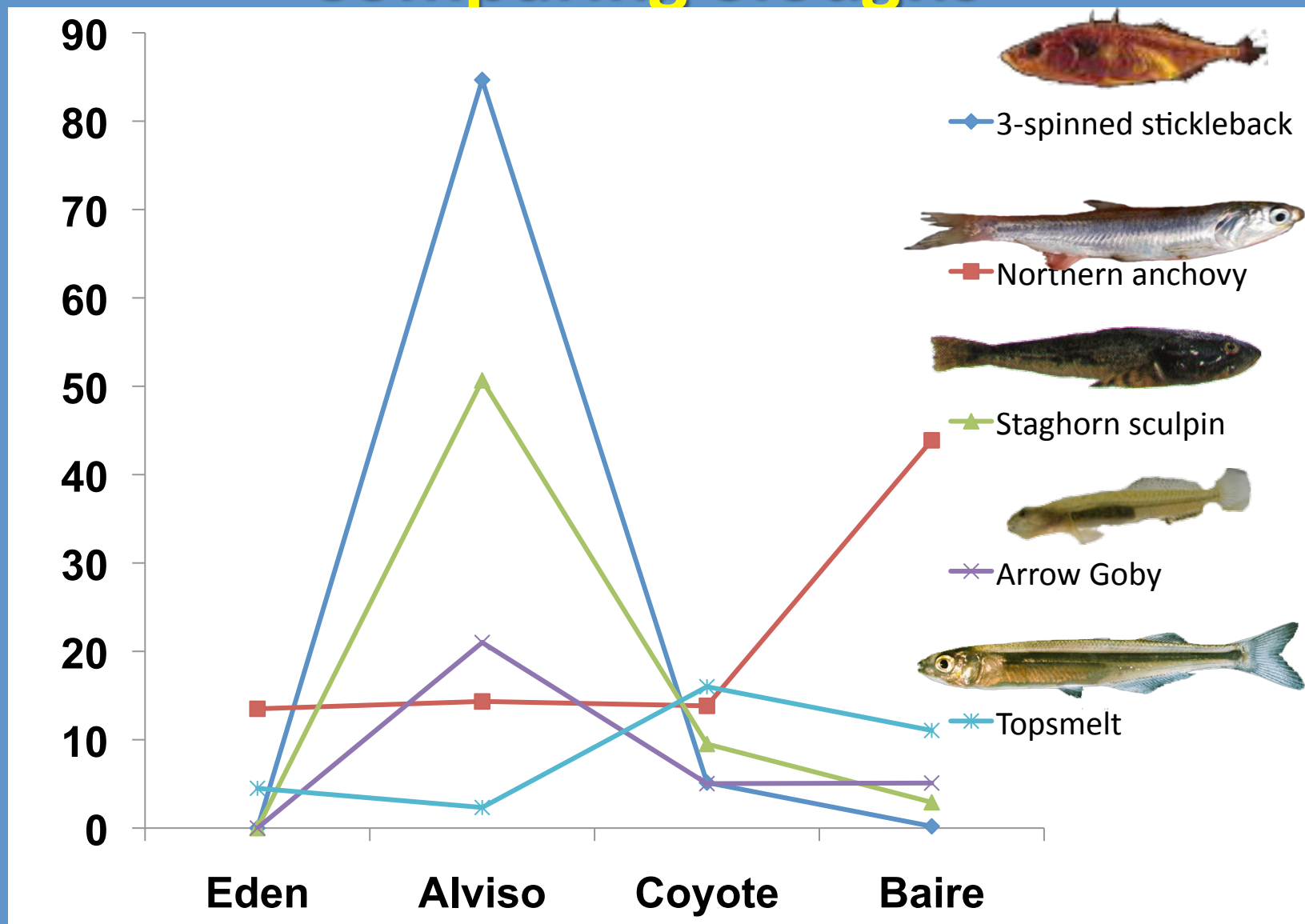
Otter Trawl Catches-Sloughs Winter Assemblage

Mean Catch/Trawl



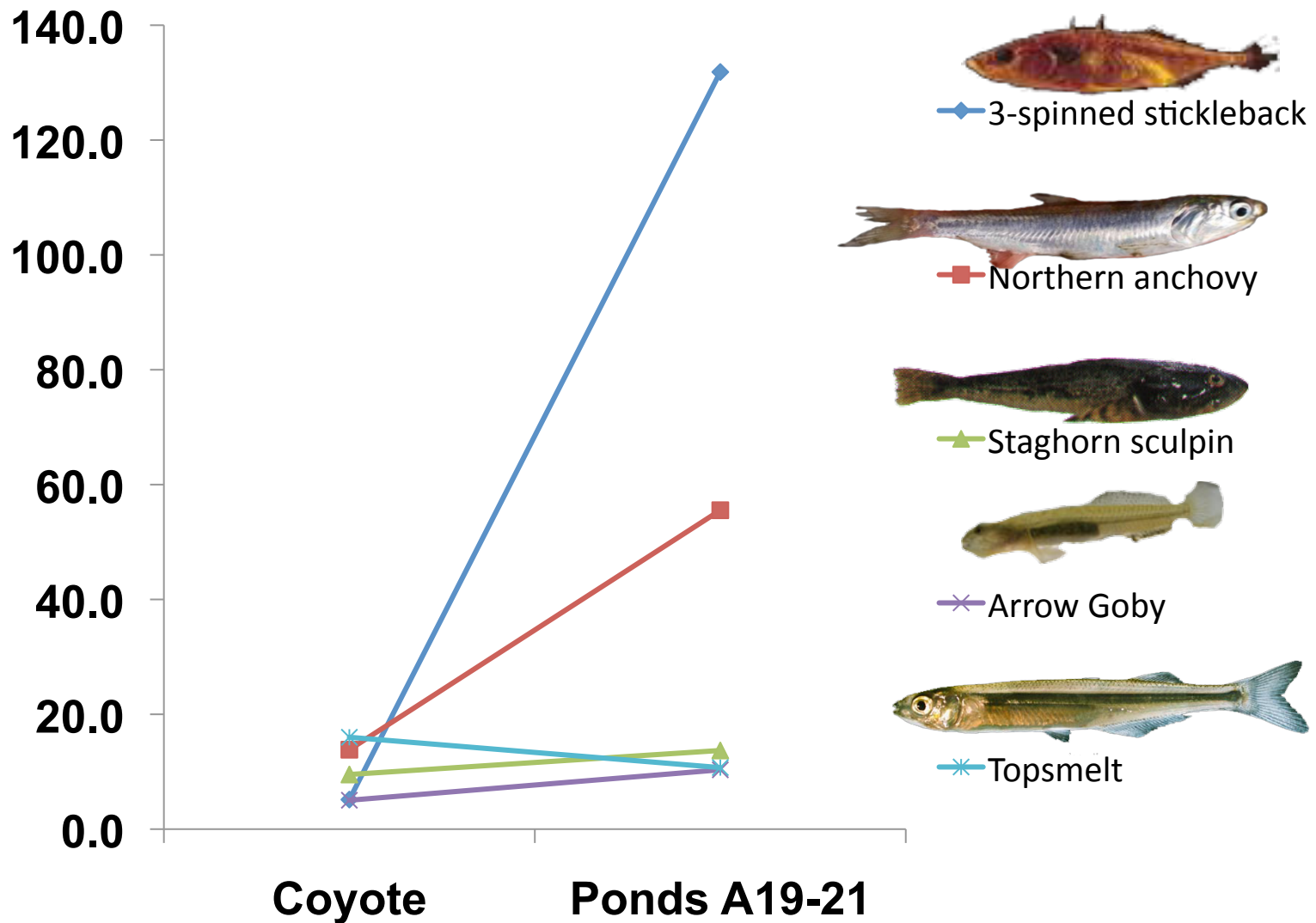
Otter Trawl Catches- Comparing Sloughs

Mean Catch/Trawl



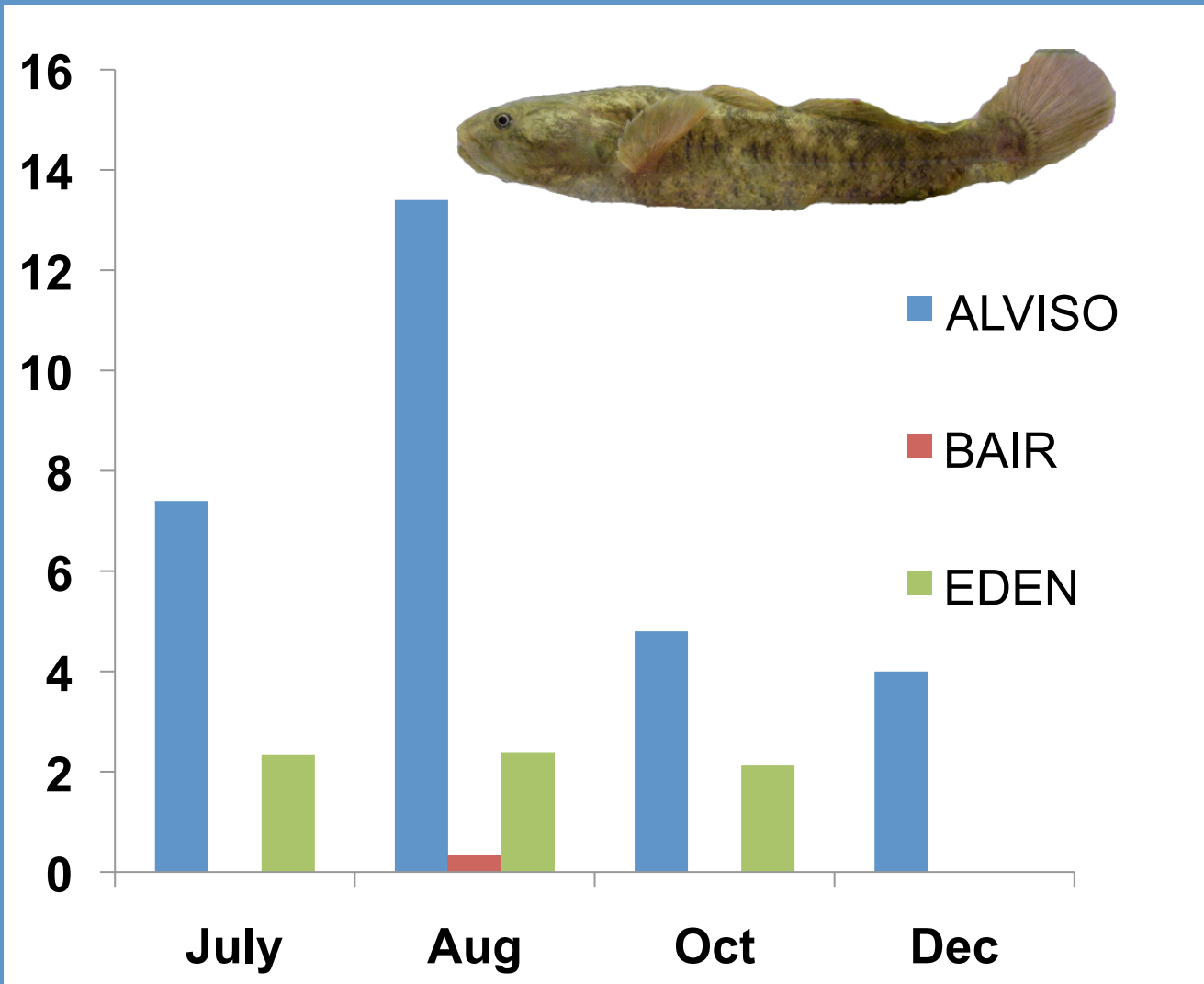
Otter Trawl- Comparing Ponds-Sloughs

Mean Catch/Trawl



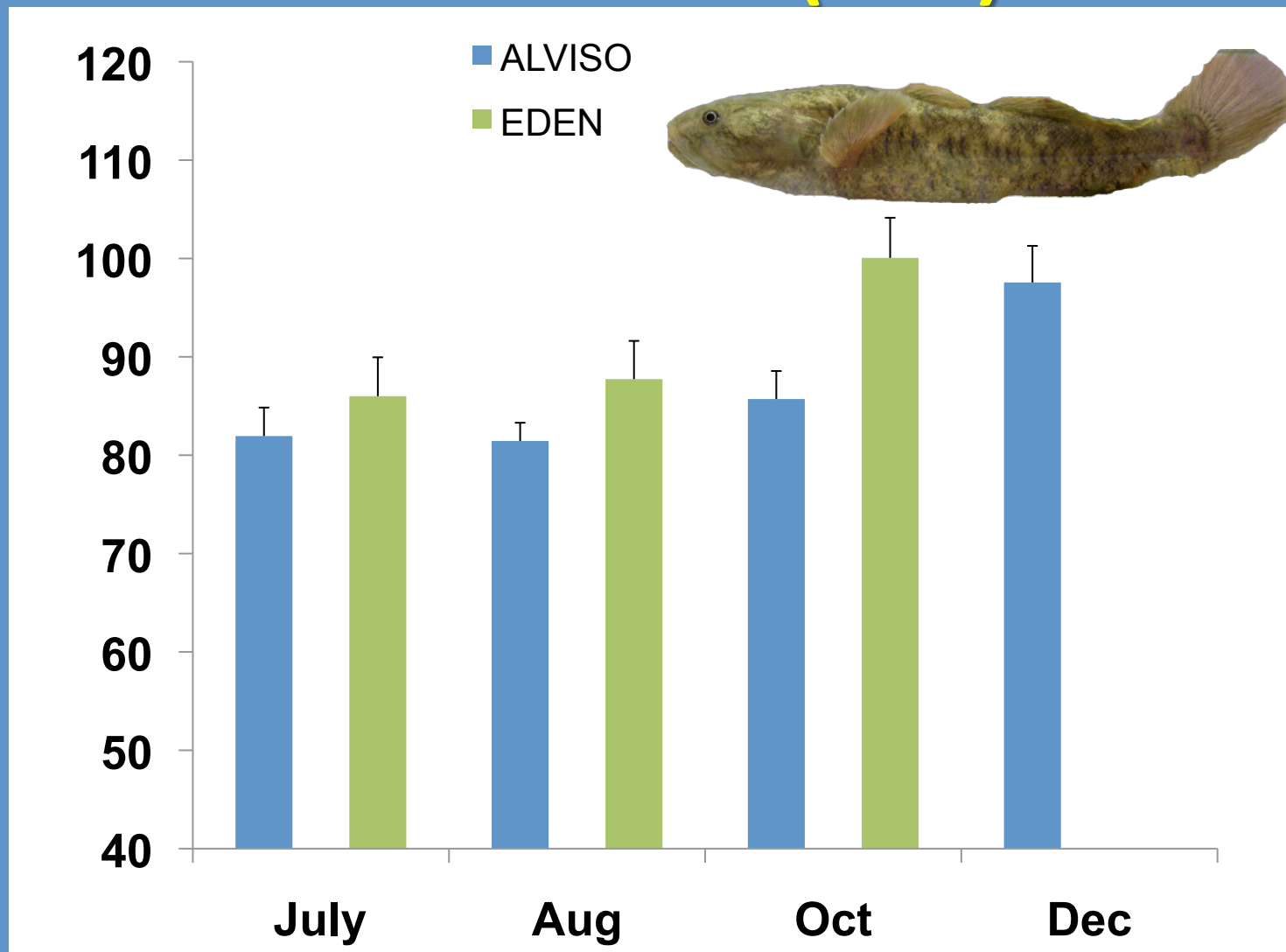
Minnow Trap- Sentinel Species-Longjaw Mudsucker

Mean Catch/Trap

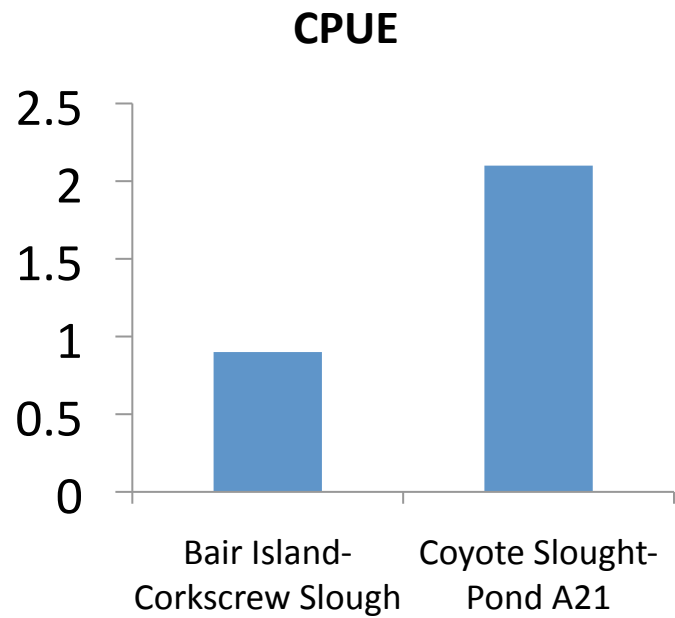


Sentinel Species-Longjaw Mudsucker- Mean Size SL (mm)

Mean Catch/Trap



Predator exploitation of restored ponds...



Common Invertebrate Bycatch

- *Crangon sp.* (Bay shrimp)
- *Hemigrapsus oregonensis*
- *Geukensia demissa* (Ribbed mussel)
- *Palaemon macrodactylus* (Oriental shrimp)
- *Musculista senhousia* (Asian mussel)
- *Mya arenaria* (Soft shell clam)
- *Corbula amurensis* (Overbite clam)
- *Philine auriformis* (Sea slug)
- *Cancer magister* (Dungeness crab)
- *Cerithidia sp.* & *Battilaria sp.*
- Decorator crab (ID pending)



Conclusions



- Fish are abundant in the South Bay
- Several euryhaline species from the northern estuary are present....Longfin smelt, Threadfin Shad
– POD?



- Restored ponds have greater abundances of prey species and supported higher catch rates of large predators.



Further Studies

- Spring- Mark-Recapture of sentinel species longjaw mudsucker and staghorn sculpin- estimate survival near restoration ponds.
- Development of Hg markers in otoliths with laser ablation ICP-MS.
- Lipid content analysis of sentinel species.
- Distribution and abundance of the zooplankton and the asian clam *corbula amurensis*.

“Thanks for all the fish” – Douglas Adams

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