

Marine Finfish Aquaculture Resources in Southern California

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Aquaculture America 2020
Honolulu, Hawaii
February 9-12th

HSWRI Founded in 1963



Milton Shedd
Visionary Founder of SeaWorld




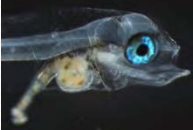






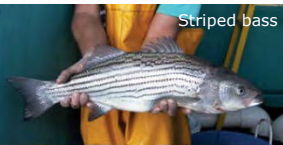

HSWRI Re-dedication Ceremony (1977)



**World-renowned Marine Biologist
Dr. Carl Hubbs and His Wife, Laura**

Mission: *“To return to the sea some measure of the benefits derived from it.”*

Finfish Aquaculture Experience at HSWRI – Species and Phases of Development

		Spawning	Hatchery	Fingerling	Growout	Market testing
Species	Phase					
	 CA yellowtail		X	X	X	X
 White seabass		X	X	X	X	X
 CA Halibut		X	X	X	X	X
 Striped bass		<div style="border: 1px solid black; padding: 5px; display: inline-block;"> Spawning and pond-reared by commercial growers  </div>			X	X

Finfish Aquaculture Experience at HSWRI - Technology

Small-scale R&D



Hatchery Production



Ocean Growout

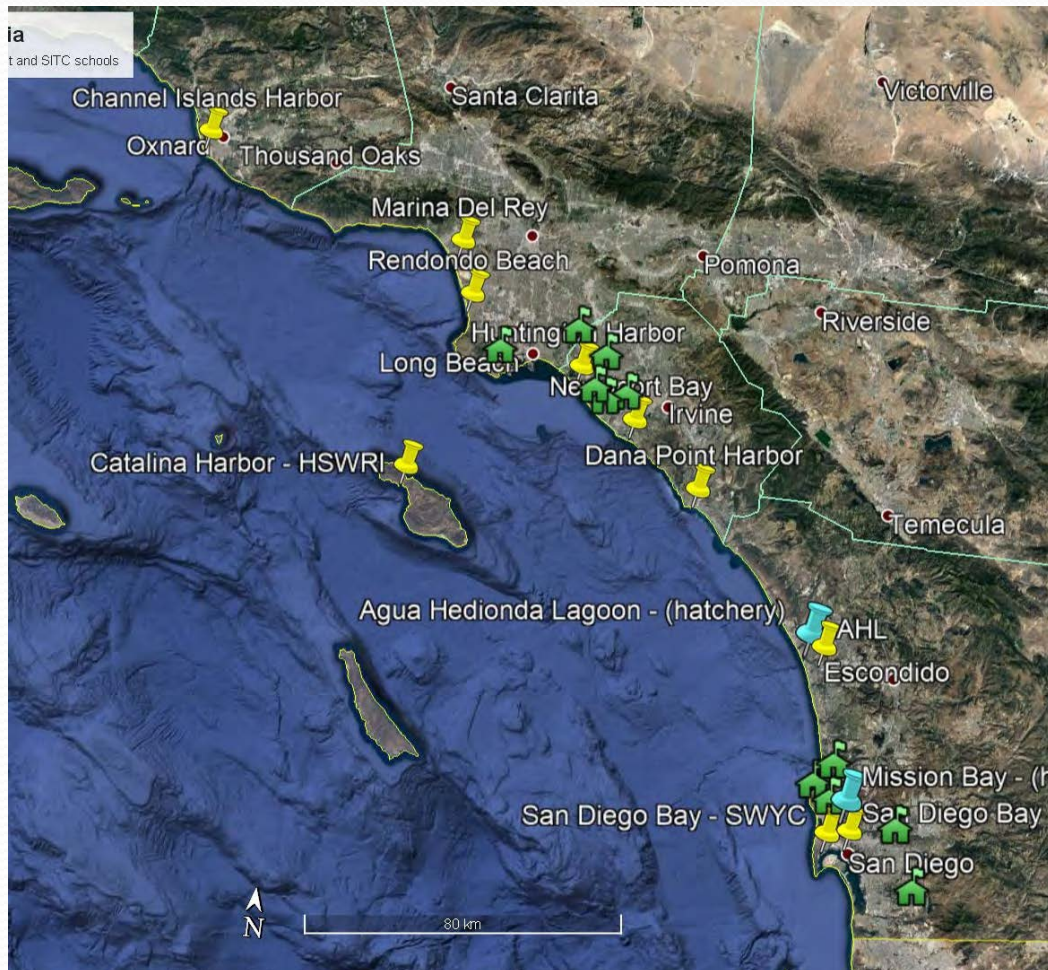


Southern California - General



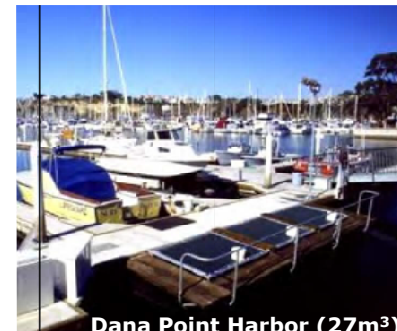
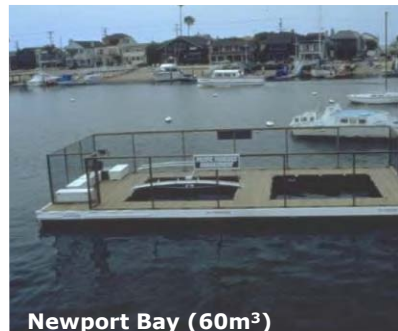
- + Mild climate and seas
- + Excellent species
- + Proximity to seafood markets
- + Commercial fishing history/infrastructure
- + Port interest
- + Sportfishing industry
- + University system
- Heavy coastal use
- Political/regulatory environment

Southern California – Ed/Outreach



- 10 coastal growout facilities (volunteer)
- 11 Seabass in the Classroom (SITC) schools
- 2 research/production facilities

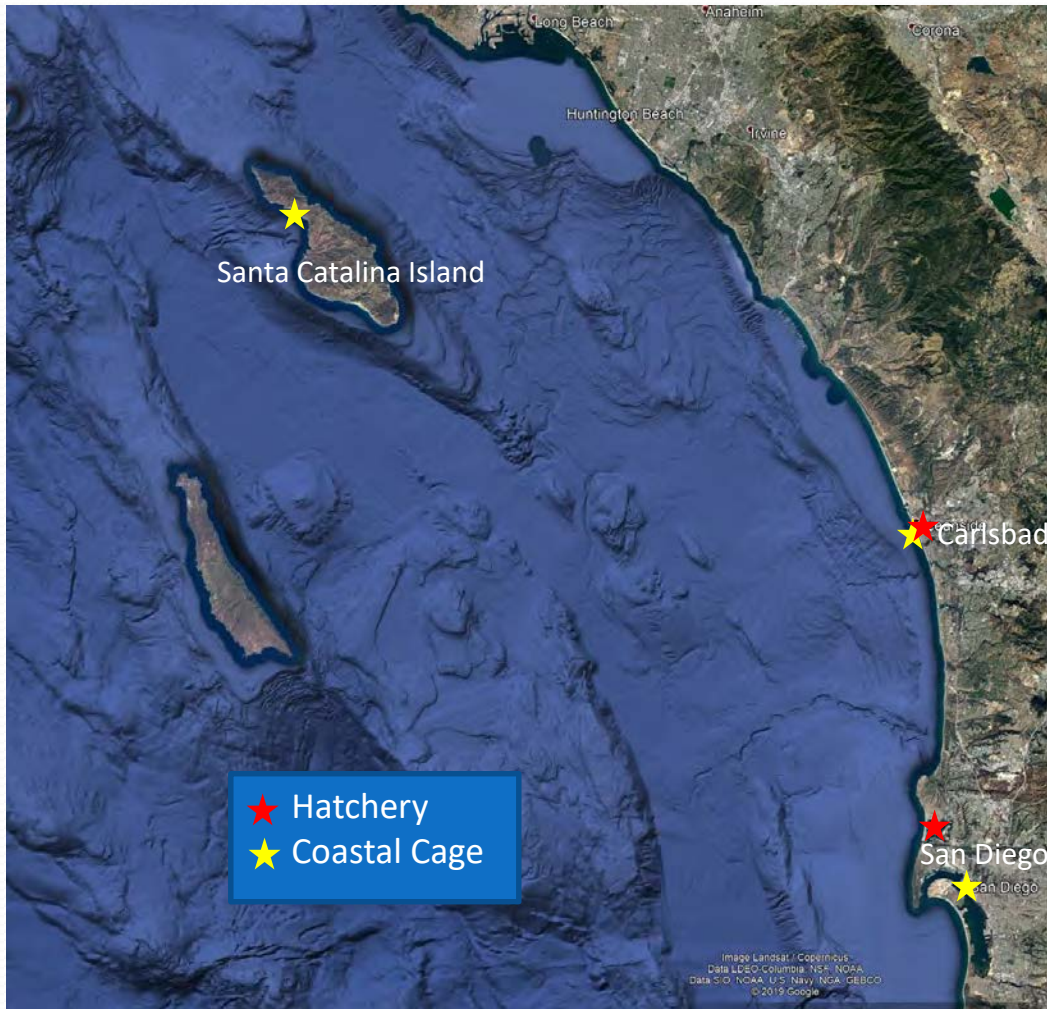
Examples of Growout Facilities



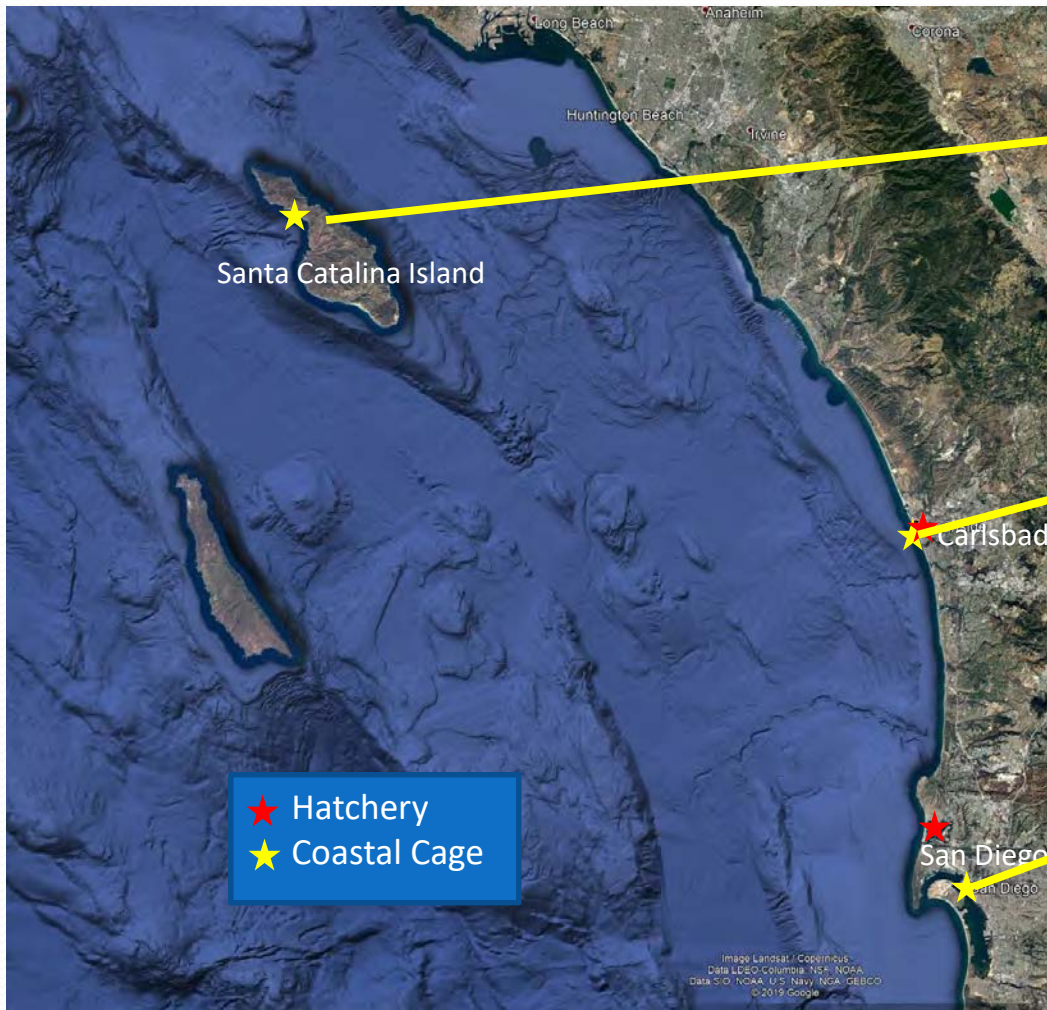
SITC in Action



Southern California – HSWRI Facilities



Southern California – HSWRI Facilities



- Catalina Island (1997)
- Four cages of 500m³ each

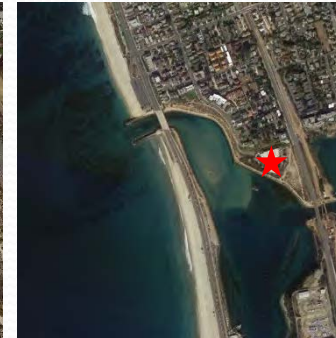


- Agua Hedionda Lagoon (2003)
- Two cages of 195m³ each

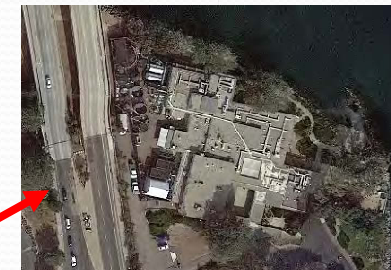


- San Diego Bay (2003)
- Two cages of 55 and 115m³ each

Southern California – HSWRI Facilities

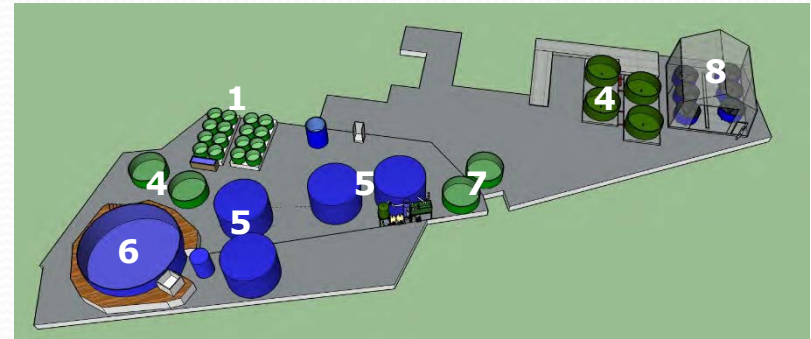


- Marine fish hatchery (1995)
- 2,000 m² (22,000 ft²)
- 4,542 L/m (1,200 gpm) seawater system
- 100% dedicated

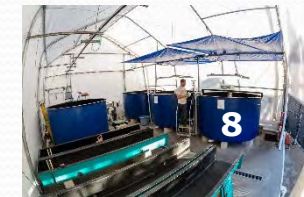


- Main offices/laboratory (1994)
- 2,800 m² (30,000 ft²)
- 1,324 L/m (350 gpm) seawater system
- ~30% dedicated

Mission Bay Laboratory

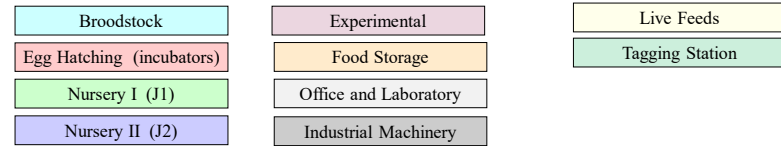
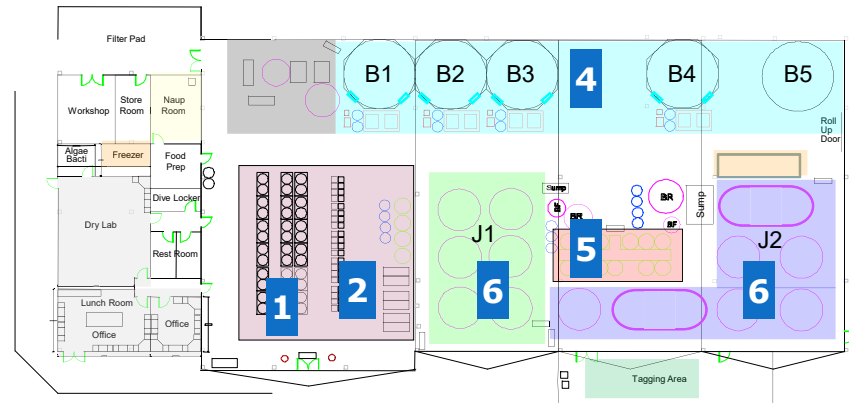


Tank Vol (L)	Number (#)	RAS?	Temperature Control?	Light Control?	Life Stage	ID
1,000	16	X	X		Juvenile	1
320	24	X	X	X	Larvae-early juvenile	2
320	15	X	X	X	Larvae-early juvenile	3
11,500	6				Young brood or market size*	4
32,000	4	1	1		Broodstock (YT and Halibut)	5
140,000	1	1			Broodstock YT	6
8,000	2				Quarantine/misc	7
5,400	4		X	X	Larval rearing	8

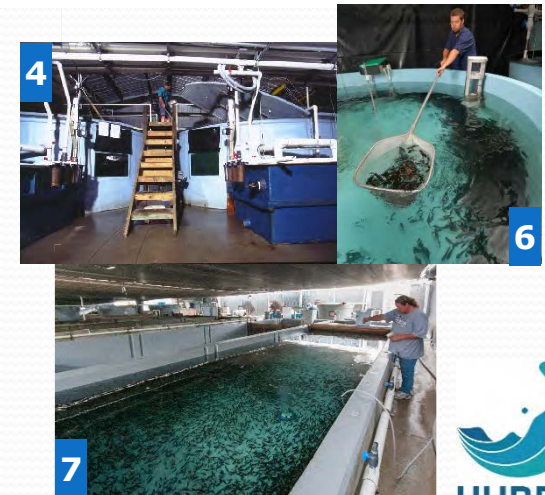


- + rotifer and *Artemia* daily feeding capacity of 1 billion and 500 million, respectively
- + seasonal egg production for YT and halibut; 44 and 170 million in 2019
- + offices, cubicles, meeting rooms, auditorium

Carlsbad Hatchery



Tank Vol (L)	Number (#)	RAS?	Temperature Control?	Light Control?	Life Stage	ID
320	36	X	X	X	Larvae-early juvenile	1
80	40	X	X	X	Larvae-early juvenile	2
1,000	12				Juvenile	3
44,000	5	X	X	X	Broodstock White Seabass	4
1,650	12	X	X	X	Hatching/early larval	5
8,000	14	X	X	X	Early juvenile	6
28,000	6				Juvenile	7
64,000	3				Juvenile	8
38,000	2	X			Broodstock quarantine	9

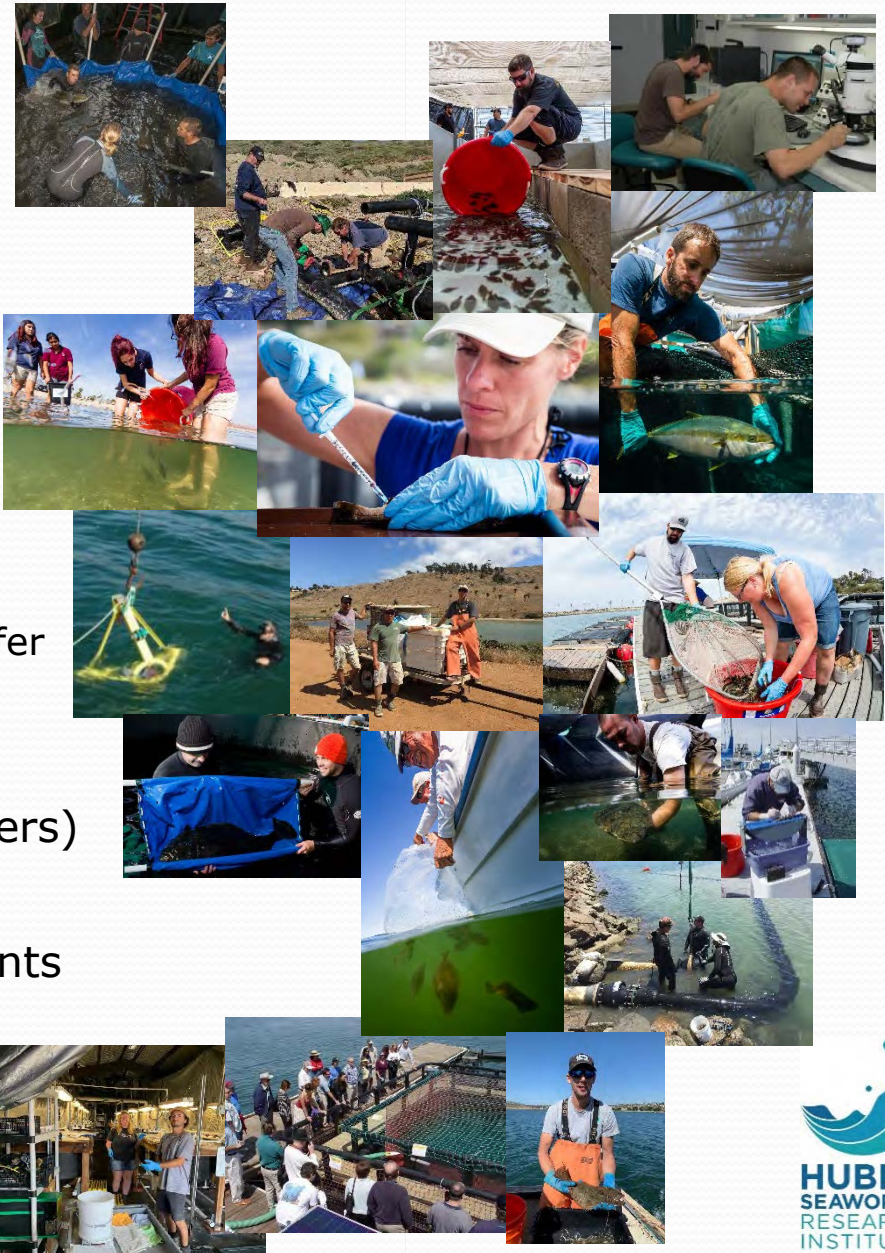


+ *Artemia* production capacity of 650 million per day
 + year-round WSB egg production; 330 million in 2019

People

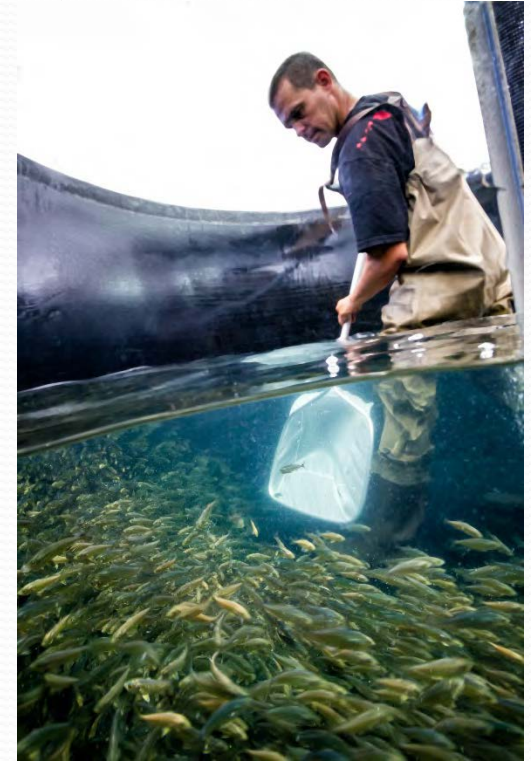
- Overall (~20 production, research, support, education)
- Current research focus/expertise
 - Nutrition (all life stages)*
 - Fish health
 - Genetics*
 - Physiology*
 - Systems design/engineering/tech transfer
 - Fisheries ecology/population biology
 - IMTA*
- Cage Operations (1.5 + many volunteers)
- DSO + 2-3 certified divers
- Education (Ed Coordinator, grad students and interns)

* Supported heavily by collaborators!



Summary

- Good physical and biological environment / difficult political and regulatory
- Extensive and long-term presence in SoCal – especially with seabass
- Excellent (and unique) land-based facilities for research and production
- Active and reliable spawning of three top candidate species
- Dedicated and highly experienced staff who are:
 - Practical and creative
 - Results-oriented
 - Collaborative



Thank You!