

**Preliminary Report**  
**Oceana Important Ecological Areas Seafloor Habitat Expedition**  
**Off the Central Oregon Coast**

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**Background and Summary of Key Results**

In August 2013 Oceana conducted a seven day research expedition in the Pacific Ocean waters off central Oregon to document and characterize seafloor habitats and their associated biological communities, ground-truth habitat data that formed the basis of our proposed additional Essential Fish Habitat Conservation Areas closed to bottom trawling, and to help inform and advance the long-term conservation and management of groundfish Essential Fish Habitat (EFH). Using a Remotely Operated Vehicle (ROV) mounted with a high definition camera, we recorded nearly 20 hours of video of the seafloor during the course of 23 dives, across five geographic study areas and in depths ranging from 29 to 365 meters. This summary provides preliminary analysis of the physical and biological structure at each area identified through continuous and interval video analysis techniques totaling 1,577 observations.

Oceana, Natural Resources Defense Council (NRDC) and Ocean Conservancy proposed that the South Nehalem Reef, Siletz Hotspot, North Daisy Bank, North Stonewall Bank and North Heceta Bank areas be designated as EFH Conservation Areas closed to bottom trawling as part of a coastwide Comprehensive Conservation Proposal submitted to the Pacific Fishery Management Council (PFMC) on July 31, 2013 (Oceana, NRDC, Ocean Conservancy 2013). This preliminary analysis provides the PFMC supplemental physical and biological habitat data for these proposal areas, as well as the co-occurrence of these habitats with fish species in the Pacific Coast Groundfish Fishery Management Plan. We also conducted dives inside the existing Daisy Bank and Stonewall Bank EFH Conservation Areas and the Cascade Marine Reserve and Protected Area (Siletz Reef) that will be closed by the Oregon Department of Fish and Wildlife to bottom trawling and other fishing activities in January 2014.

At all areas we confirmed the presence of hard and mixed substrates, documented cold-water corals, sponges and managed groundfish species. We documented gorgonian corals (Gorgonacea), sea whips and sea pens (Pennatulacea, a type of octocoral), soft corals (Alcyonacea), cup corals (Scleractinia) and hydrocorals (Stylasterinia) plus many different sponge types categorized by morphology. Gorgonian corals were identified at 16 of 23 dives and in all five areas. We documented many other invertebrates such as crinoids, anemones, tunicates and bryozoans that add to the biogenic structure of these areas. The physical structure of the habitats surveyed included a mix of hard rocky reef and low relief soft sediment. We identified a strong habitat association between sharpchin rockfish and glass sponges, barrel sponges, and other sponge types at Daisy Bank at 200 m depth.

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The nearshore and offshore reefs and banks we surveyed both in state and federal waters are biologically diverse, contain sensitive structure forming invertebrates, and are clearly essential fish habitat for managed fish species. Two of the surveyed areas (Stonewall and Daisy Bank) include areas currently closed to bottom trawling. This data confirms the presence of sensitive physical and biogenic habitat within all five proposed additional EFH Conservation Areas that we surveyed, thus validating the presence of these habitat types in areas recently identified by the PFMC EFH Review Committee in the current 5-year review, which were not identified in the original Amendment 19 process.

## **Methods**

### **ROV Survey**

We collected video of the seafloor using a Mariscope “Commander” ROV equipped with 2 cameras, 4 lights, and paired sizing lasers. One camera was connected by an optical umbilical cable to the surface, feeding the ROV operator and scientists aboard the research vessel real time data, used for steering and navigating the ROV. The second camera, a high definition camera mounted under the ROV, recorded the seafloor in 1080p high definition at 30 frames per second. The high definition video was used for all video analysis. Once arriving at the seafloor, the ROV was operated at a constant speed, attempting to maintain consistent linear transects and a height approximately 1 meter above the seafloor.

### **Video Analysis**

Video data recorded along the ROV transects were analyzed using a method to rapidly assess the benthic ecosystem within the study areas. This method involves two approaches for video analysis: continuous and interval analyses (detailed below). Each approach was utilized for gathering data on the physical and biological aspects of the seafloor ecosystem.

#### *Continuous Analysis*

The continuous approach involved the complete analysis of each video from start to finish. This approach allowed for the identification of all fish and structure-forming invertebrate species, resulting in a detailed species list for each transect. Where possible, each species was identified to the lowest taxonomic level. Species listed on the Federal Groundfish Fishery Management Plan (FMP) were grouped in a separate category than those unlisted. Unidentifiable fish species were grouped into sub-categories, such as unidentifiable rockfish, unidentifiable flatfish, young-of-the-year, and unidentifiable fish. The presence of structure-forming invertebrate species - corals, sponges, and large anemones – observed along each transect were logged based on their morphologies or order. Other species of invertebrates were also noted. Wherein a noteworthy species is unidentifiable, outside experts reviewed the video and provided comment.

#### *Interval Analysis*

The interval approach sub-sampled the video in 30-second intervals. A video frame from each sample was assessed for the predominant substrate type and level of vertical relief. This approach produced a general overview of the seafloor habitat along each transect. Seafloor characteristics were classified as follows:

- Substrate: characterization of the seafloor composition was achieved by visual assessment and the use of sizing lasers projected into the camera’s view. Substrate can be characterized as mud (no grains visible), sand (grains visible), cobble (<20cm diameter),

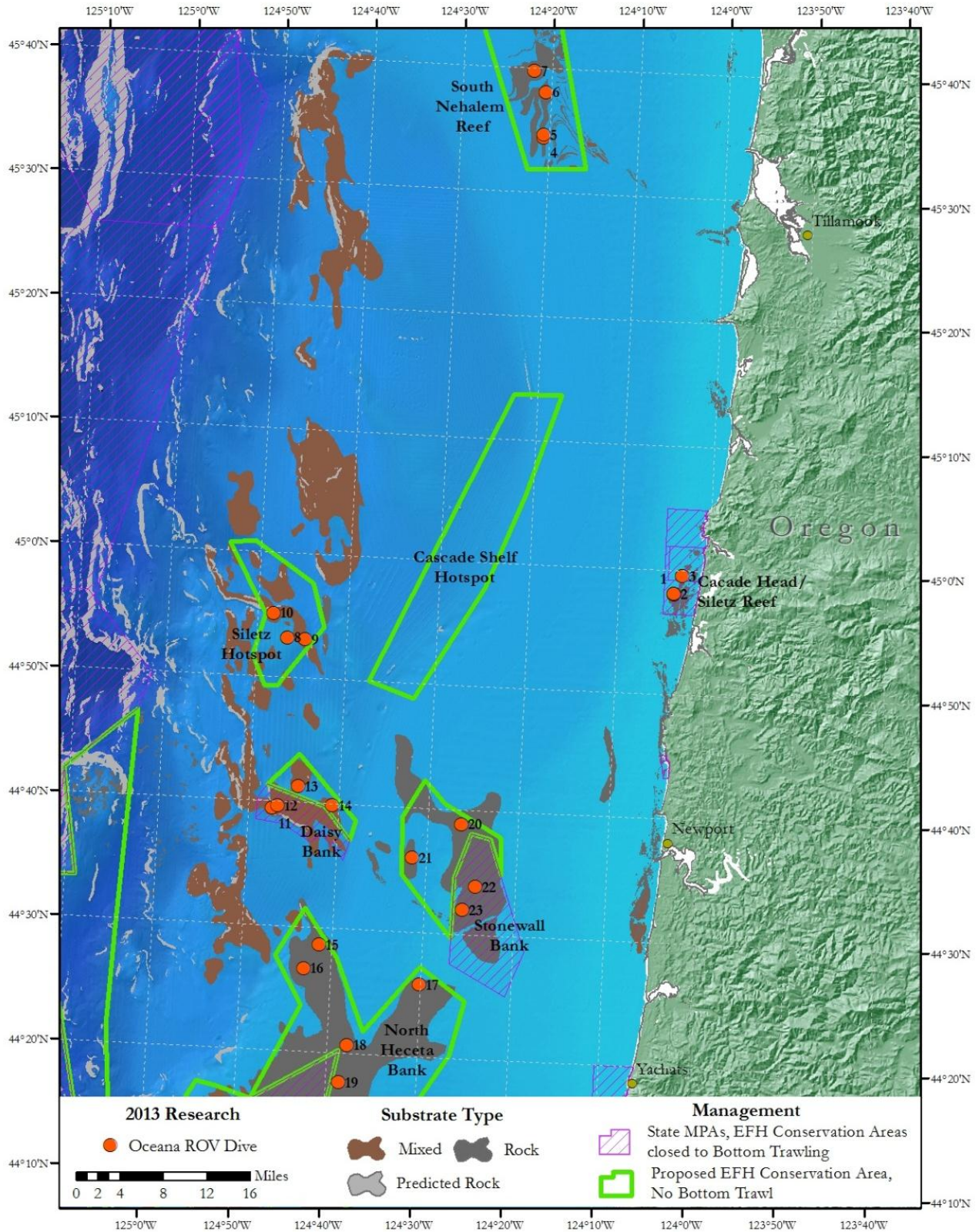
boulder (>20cm diameter), or bedrock (continuous reef) based on standardized categories derived by Green et al. (1999). The substrate type which accounted for the greatest proportion of habitat within the frame was recorded.

- Relief: seafloor complexity was classified as low (<1m), medium (1-2m), and high (>2m). Within each frame, the vertical distances between the highest and lowest points were estimated from the sizing lasers.

The habitat data was recorded precisely at the last frame of every 30-second interval throughout the video. If the habitat was indistinguishable within the current frame (i.e., too silty, too high off seafloor, lights on ROV were out) or if the current frame spatially overlapped with the previous 30-second frame, the current frame was rejected from the final results.



Sharpchin rockfish (*Sebastes zacentrus*) with barrel sponge (left), sharpchin rockfish with vase sponge (top right), and expedition crew with ROV (bottom right).



**Figure 1.** Location of Oceana's August 2013 ROV Dives, Substrate, and Existing and Proposed Conservation Areas off Central Oregon

**Table 1.** Depth, # of 30-second video intervals analyzed and proportion of substrate type and relief at each dive site.

Dive Area	Dive #	Min Depth (meters)	Max Depth (meters)	#Good 30-sec Intervals	%Mud	%Sand	%Cobble	%Boulder	%Bedrock	%Low Relief	%Med Relief	%High Relief
Cascade	1*	29	42	13	0.00	0.00	0.00	7.69	92.31	92.31	7.69	0.00
Head/ Siletz Reef	2*	33	39	45	0.00	0.00	0.00	6.67	93.33	68.89	24.44	6.67
	3*	35	37	62	9.68	32.26	0.00	0.00	58.06	95.16	3.23	1.61
South Nehalem Reef	4	159	160	20	100.00	0.00	0.00	0.00	0.00	100.00	0.00	0.00
	5	156	161	99	97.98	0.00	0.00	0.00	2.02	91.92	7.07	1.01
	6	157	158	55	100.00	0.00	0.00	0.00	0.00	100.00	0.00	0.00
	7	157	158	62	100.00	0.00	0.00	0.00	0.00	100.00	0.00	0.00
Siletz Hotspot	8	257	265	101	0.00	100.00	0.00	0.00	0.00	99.01	0.99	0.00
	9	271	289	91	0.00	39.56	58.24	1.10	1.10	98.90	1.10	0.00
	10	328	365	48	0.00	68.75	25.00	6.25	0.00	95.83	4.17	0.00
Daisy Bank	11**	308	348	54	100.00	0.00	0.00	0.00	0.00	100.00	0.00	0.00
	12**	202	208	110	0.00	0.91	88.18	7.27	3.64	99.09	0.91	0.00
	13	231	235	94	93.62	0.00	2.13	4.26	0.00	98.94	1.06	0.00
	14	249	256	75	49.33	0.00	49.33	1.33	0.00	100.00	0.00	0.00
North Heceta Bank	15	139	144	77	55.84	0.00	33.77	10.39	0.00	94.81	5.19	0.00
	16	134	136	61	21.31	0.00	39.34	39.34	0.00	77.05	22.95	0.00
	17	85	87	77	100.00	0.00	0.00	0.00	0.00	98.70	0.00	1.30
	18	91	94	87	50.57	0.00	43.68	5.75	0.00	97.70	2.30	0.00
	19	77	79	63	3.17	1.59	25.40	7.94	61.90	92.06	7.94	0.00
Stonewall Bank	20	96	98	55	78.18	0.00	14.55	7.27	0.00	92.73	3.64	3.64
	21	135	136	35	74.29	0.00	25.71	0.00	0.00	100.00	0.00	0.00
	22**	52	59	82	0.00	10.98	9.76	6.10	73.17	92.68	4.88	2.44
	23**	59	65	111	10.81	0.00	13.51	9.01	66.67	83.78	10.81	5.41

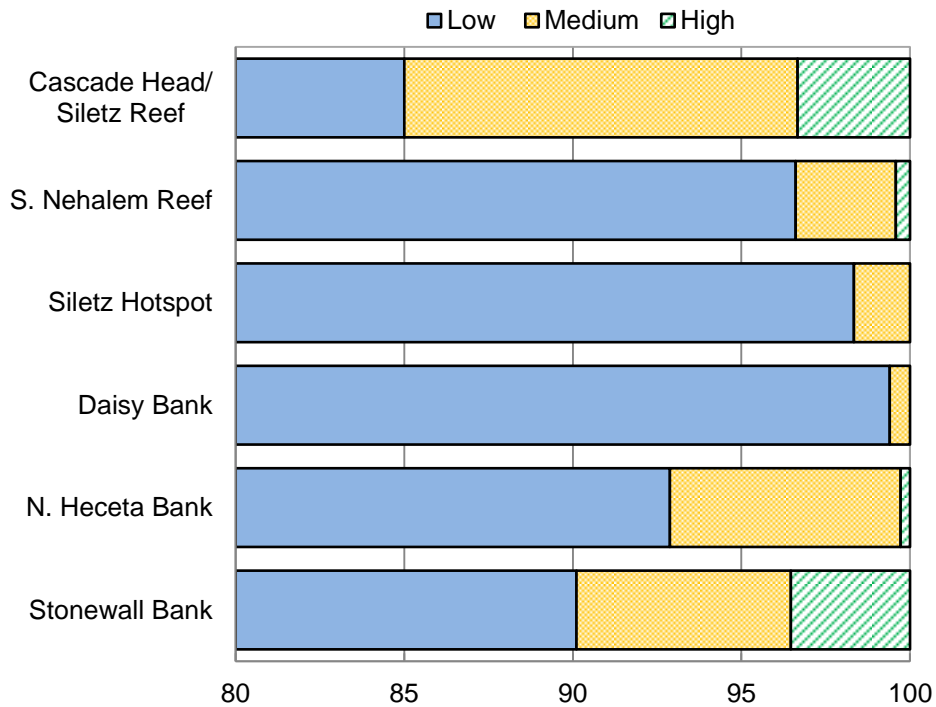
\* Inside existing State marine protected area/ reserve

\*\*EFH Conservation Area closed to bottom trawling

**Table 2:** Summary percentages of seafloor substrate type observed at each area.

Site	Mud	Sand	Cobble	Boulder	Bedrock
Cascade Head/ Siletz Reef	5.00	16.67	0.00	3.33	75.00
S. Nehalem Reef	99.15	0.00	0.00	0.00	0.85
Siletz Hotspot	0.00	70.83	27.08	1.67	0.42
Daisy Bank	53.75	0.30	40.84	3.90	1.20
N. Heceta Bank	49.04	0.27	28.49	11.51	10.68
Stonewall Bank	28.62	3.18	14.13	6.71	47.35

**Figure 2.** Summary of seafloor relief observed at each area.



**Table 3.** Summary of FMP Species observed at each site.

<b>FMP Species</b>	<b>Cascade Head / Siletz Reef</b>	<b>South Nehalem Reef</b>	<b>Siletz Hotspot</b>	<b>Daisy Bank</b>	<b>North Heceta Bank</b>	<b>Stonewall Bank</b>
Quillback Rockfish	<b>X</b>					<b>X</b>
Olive or Yellowtail Rockfish						<b>X</b>
Redbanded or Flag Rockfish				<b>X</b>		
Sharpchin Rockfish			<b>X</b>	<b>X</b>	<b>X</b>	
Pacific Ocean Perch			<b>X</b>	<b>X</b>		
Vermillion Rockfish						<b>X</b>
Canary Rockfish	<b>X</b>	<b>X</b>				<b>X</b>
Pygmy Rockfish					<b>X</b>	
Shortspine Thornyhead			<b>X</b>	<b>X</b>		
Thornyhead species			<b>X</b>	<b>X</b>		
Black Rockfish	<b>X</b>					
Greenstriped Rockfish		<b>X</b>	<b>X</b>	<b>X</b>	<b>X</b>	<b>X</b>
Blue Rockfish						<b>X</b>
Splitnose Rockfish			<b>X</b>			
China Rockfish	<b>X</b>					
Rosy or Rosethorn Rockfish		<b>X</b>	<b>X</b>	<b>X</b>	<b>X</b>	<b>X</b>
Yelloweye Rockfish				<b>X</b>		<b>X</b>
Lingcod	<b>X</b>			<b>X</b>	<b>X</b>	<b>X</b>
Kelp Greenling	<b>X</b>					<b>X</b>
Spotted Ratfish						<b>X</b>
Longnose Skate				<b>X</b>		
Slender Sole						<b>X</b>
Dover Sole		<b>X</b>	<b>X</b>	<b>X</b>	<b>X</b>	<b>X</b>
Other/Unidentifiable Skate		<b>X</b>	<b>X</b>	<b>X</b>		
Other/Unidentifiable Flatfish	<b>X</b>	<b>X</b>	<b>X</b>	<b>X</b>	<b>X</b>	<b>X</b>
Other/Unidentifiable Rockfish		<b>X</b>	<b>X</b>	<b>X</b>	<b>X</b>	<b>X</b>
Young-of-the-year Rockfish	<b>X</b>					<b>X</b>

**Table 4:** Summary of structure-forming invertebrate species observed at each site.

<b>Structure-forming Sessile Inverts</b>	<b>Cascade Head/ Siletz Reef</b>	<b>South Nehalem Reef</b>	<b>Siletz Hotspot</b>	<b>Daisy Bank</b>	<b>North Heceta Bank</b>	<b>Stonewall Bank</b>
White Plumose Anemone	<b>x</b>	<b>x</b>			<b>x</b>	<b>x</b>
Urticina Anemone	<b>x</b>					<b>x</b>
Other/Unidentifiable Anemone			<b>x</b>	<b>x</b>	<b>x</b>	
Foliose Sponge	<b>x</b>		<b>x</b>	<b>x</b>	<b>x</b>	<b>x</b>
Branching Sponge	<b>x</b>	<b>x</b>		<b>x</b>	<b>x</b>	<b>x</b>
Vase Sponge	<b>x</b>		<b>x</b>	<b>x</b>	<b>x</b>	
Barrel Sponge		<b>x</b>	<b>x</b>	<b>x</b>	<b>x</b>	
Shelf Sponge				<b>x</b>	<b>x</b>	
Other/Unidentifiable Sponge			<b>x</b>	<b>x</b>	<b>x</b>	<b>x</b>
Hydrocoral						<b>x</b>
Gorgonian coral	<b>x</b>	<b>x</b>	<b>x</b>	<b>x</b>	<b>x</b>	<b>x</b>
Sea Whip/Pen		<b>x</b>	<b>x</b>	<b>x</b>		<b>x</b>
Mushroom Soft-Coral			<b>x</b>			
Cup Coral	<b>x</b>				<b>x</b>	<b>x</b>



**Table 5.** Summary of FMP species and coral and sponge observed on the same dive.

FMP Species	Foliose Sponge	Branching Sponge	Vase Sponge	Barrel Sponge	Shelf Sponge	Other/Unidentifiable Sponge	Hydro-coral	Gorgonian	Sea Whip /Pen	Mushroom Soft-Coral	Cup Coral
Quillback Rockfish	X	X	X			X	X	X			
Olive or Yellowtail Rockfish	X	X				X	X	X			X
Redbanded or Flag Rockfish						X		X			
Sharpchin Rockfish	X		X	X	X	X	X	X		X	
Pacific Ocean Perch	X	X	X		X	X		X	X	X	
Vermillion Rockfish	X	X				X	X	X			
Canary Rockfish	X	X	X			X	X	X			X
Pygmy Rockfish	X		X	X	X	X		X			X
Shortspine Thornyhead	X	X	X	X	X	X		X		X	
Thornyhead species	X	X	X	X	X	X		X	X	X	
Black Rockfish	X	X	X					X			X
Greenstriped Rockfish	X	X	X	X	X	X		X	X	X	X
Blue Rockfish	X	X				X	X	X			X
Splitnose Rockfish	X		X	X		X				X	
China Rockfish	X		X	X				X			X
Rosy or Rosethorn Rockfish	X	X	X	X	X	X	X	X		X	X
Yelloweye Rockfish	X	X	X	X	X	X	X	X			X
Lingcod	X	X	X	X	X	X	X	X			X
Kelp Greenling	X		X	X		X	X	X			X
Spotted Ratfish	X	X							X		X
Longnose Skate	X	X	X	X	X	X		X			

**Table 5** (continued). Summary of FMP species and coral and sponge observed on the same dive.

FMP Species	Foliose Sponge	Branching Sponge	Vase Sponge	Barrel Sponge	Shelf Sponge	Other/ Unidentifiable Sponge	Hydro-coral	Gorgonian	Sea Whip/Pen	Mush room Soft-Coral	Cup Coral
Slender Sole	x	x							x		x
Dover Sole	x	x		x		x		x	x	x	x
Other/Unidentifiable Skate	x	x	x	x	x	x		x		x	
Other/Unidentifiable Flatfish	x	x	x	x	x	x		x	x	x	x
Other/Unidentifiable Rockfish	x	x	x	x	x	x	x	x	x	x	x
Young-of-the-year Rockfish	x		x	x		x	x	x			x

## References

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