



## Transcript of Video Interview with Wayne Ferren, recorded 2008.

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Janet Bridgers: Hello and welcome to Heroes of the Coast. I'm Janet Bridgers, with Earth Alert, and I'm very very pleased to have as our guest today California's preeminent wetlands biologist, Wayne Ferren. Now...working out of New Jersey. Wayne, it's especially wonderful to have you here because I know you're not here in California all the time.

Wayne: That's right, although it's my second home. I try to maintain my interest in both coasts. And so I still have projects and interests out here. It's wonderful to be here again.

JB: Thank you. We're here to talk about the Ormond Beach wetlands, but for the benefit of people who are not as familiar with wetlands, tell us what the primary benefits of coastal wetlands are considered to be.

Wayne: Coastal wetlands include many different types and I think we're probably going to focus on the estuarine wetlands that occur in coastal **embayments** that have a mouth that opens to the ocean at least occasionally and fresh water coming from streams to the coast from coastal mountains. This mixing provides an environment of transitional between the land and the ocean and so this wetland area has many benefits for both ecosystem services and socio-economic benefits for humans, and so we can look at both of these from a natural sense. They certainly provide an area for wildlife, for migratory birds, for **anadromous fish**, nurseries for marine fish, for estuarine-restricted plants and animals are found, for Southern California, and nowhere else in the world but here. We have a number of endemics that have evolved and adapted to our Mediterranean climate estuaries, which are themselves unique in the world. They occur only a few places and Southern California has that unique environment where we have drier, warmer summer and a cooler, moister winter and that combination provides a situation of wetlands along the coast and they go through a period of receiving water and then periods of evaporation...provides a stressful environment for some and opportunities for adaptation, evolution and **endemism**. So we have a rich biodiversity. We have migratory animals and we have anadromous fish such as steelhead that use the...So there's many different benefits for the environment. For humans, it provides both fisheries and recreational opportunities, and certain for the native Americans, cultural benefits for native plants and animals. So there is a wide array of benefits and services for

JB: And it seems sadly ironic that our understanding of how important wetlands are coincides with the time when they're disappearing so rapidly.

Wayne. That's true and I think ... You mentioned that I'm a New Jerseyan. New Jersey has an interesting situation of often being at the forefront because it's the densest state of the Union. It arrives at a crisis perhaps earlier than some others and so there's a need to understand we have to have wetlands, we have to have stormwater control. There are all sorts of things. Well, it's the same here in Southern California where there's an ever increasing populace, competition for

resources and one of the important things that I hadn't mentioned earlier is biofiltration and the importance of a wetland for water purification and the natural ability to provide clean and safe beaches, for example. We have a number of areas in Southern California that have beach closures, from Santa Barbara on south and often this is due to the fact that the wetlands have...that our stormwater simply comes right from the streets, right into the ocean and provides, at least periodic pollution, whereas if we had larger wetlands as we did historically, we might very well have this biofiltration able to culminate more purification for the beaches, so there's all sorts of links and we reach a point where we have beach closures, we have higher pollution issues, we have needs that have to be met in order to survive on the coast.

So you reach a point in which the stresses are there and we understand what the impacts have been so profound that we have to do something about it and we need to preserve, restore, reclaim these areas, not only because it's of benefit to our interest in wildlife and plants, but also because it's absolutely essential for us in order to have a future on the coast.

Janet: And Ormond Beach is one of these wetlands. You're originally from the East Coast, as we've mentioned, and do you remember when you first saw Ormond Beach, what your impressions were?

Wayne: Yes, it was around 1980 and I arrived in Santa Barbara, at UC Santa Barbara in 1978, so I hadn't been here that long, and I was very interested in seeing different wetlands. I'd studied wetlands back in the mid-Atlantic states and so it was interesting. There was some at the University in Santa Barbara and I had an opportunity with EPA and the Corps of Engineers to visit this area. And so it was fairly early in my study of the west to visit the area and I was impressed with its size. I was impressed with the diversity. And with the impacts that were so obvious there. And yet in spite of the profound effects that were visible, there is a resilience and that I think is the story of Ormond...the fact that Nature finds a way sometimes in spite of all the things that we may do. And so, endangered plants and animals survive and we have an opportunity to enhance this refuge to make it better, and so that was, I think, the first thing that struck my mind, the conflicts between the impacts and the resilience and the fact that there was still so much there.

Janet: Before we get into the specifics, in general, you've talked about this contrast, the impacts versus the resilience. But slightly beyond that, in terms of language, what makes Ormond so special?

Wayne: Then there's something that may not come to mind immediately, but the fact that it has low elevation agricultural lands, fairly extensive, around it is unique because most of our wetlands have development right up to the edge and into the remaining small portions of estuaries. Ormond Beach has at least 1500 acres preserved, but many more acres of undeveloped agricultural land that actually could be the future for the landward migration of wetlands as the rise may occur with global climate change. So while there are important aspects about the biology and the homes, the habitats for endangered species and biodiversity, there are other interesting practical aspects that if you wanted to preserve an area to accommodate future wetlands, or if you wanted it to occur, that certainly is a very important aspect. It is significant and unique virtually because of that, because most of the wetlands are surrounded by railroads,

highways, housing developments, urbanization in general. So I think that context allows us to think much larger ...variations.

Janet: We're going to use the phrase "wetland communities" for the little ecosystems within the larger ecosystem and this kind of ...perhaps we should define, familiarize the viewers with the terms you use to define a wetland, and then how the different marshes, for example, are characterized by the way they differ from one to another.

Wayne: Well, Ormond Beach is more than about the wetlands because another aspect of Ormond is that we have a dune system intact. We have some adjacent palustrian wetland, we have a diversity of habitats that support a diversity of plants and animals. Some of these are mudflat and mudflat communities...plants and animals. We have intertidal salt marsh, brackish water marsh, with bulrushes and cattails, and some fresh water marsh ...submerging wetland. There are some tidal channels. There is a beach lagoon area. In fact that what we see are remnants of this larger estuary that extended all the way and beyond Hueneme Rd. It was a substantial ecosystem and part of the Oxnard Plain with coastal wetlands and so this... we have the beach community, which supports rare globos dune beetles. We have habitats for wildlife ...live along the beach. Like this combination of dune and dune seep, brackish edges, salt marsh, mud flats, palustrian edges, channels...the diversity of the plants and animals we see reflect the fact that there's this complex smaller habitats in the larger ecosystem.

Another important thing, because many sites are often confined to a few habitats, simply because of the impacts and fragmentation. Many of the coastal wetlands in California are small, simply ...the nature of water initially, and the fact that we don't have extensive barrier islands with large bays along the coast. We have an emerging coastline, different than some of the Eastern ...and there's this difference...

Janet: That's a geological ...

Wayne: The geological sense that the landscape....so we often have deltas building into the ocean and mountains lifting up near the ocean and if it wasn't for structure in many areas where we have faults and syncline folds, these basins that are created where sea level post-glaciation has risen as much as 300 feet, has arisen into these structural basins. Or, flooded the mouths of rivers, such as the nearby Santa Clara. So that dynamic aspect of the coast is one of the elements that's important here, but there's also a limited number of wetlands and they're smaller in size. It's the nature of the area. And so we have lost 75 to 99 percent of them and in that loss, those which are left are also left to a few habitats and not always as diverse as what we have at Ormond.

Janet: And also, would you say the proximity to the Channel Islands themselves and the Santa Monica Mountains increases the value of this wetland.

Wayne: Well what we have ...habitats, certainly for breeding pelicans on the islands, which use the coast in proximity to Ormond and one of the unfortunate things that happens with all of our wetlands is that they're fragmented from their larger watershed. And so if there was still a contiguous, in a habitat sense, to some of the areas at Santa Monica Mountains, we might have

more coyotes and so one of the stresses that has occurred is the elimination of many of the upper-level predators. They, in turn, would eat the middle-level predators that forage on birds...ground-nesting birds. So the ground nesting birds become more threatened without the link to predators who eliminate the prey ....And so one of the problems we find to restore the functions of the ecosystem of a whole is thinking about how you would link it to the watershed, often with a lack of coyotes in some estuaries, humans have to trap some of the raccoons, feral cats and other animals to reduce their numbers and to allow ground nesting birds to survive. So not all the functions are still present in some of these and while we certainly have Santa Monica Mountains and Channel Islands and some other nearby larger landscapes, places like Ormond are impacted by the fact that they don't have all the linkages they used to have either along the riparian corridors that lead to them or to nearby mountains and areas...These are some of the dilemmas in trying to manage the ecosystems...how we try to develop balances in the landscape.

Janet: Some of those could be recreated

Wayne: Possible, corridors, corridors could be. Not everybody wants coyotes in their neighborhood. And so what happens is that we then sometimes rigorously manage these systems, or not all of the remaining wetlands can support the plants they used to. So what we look at then regionally...Can we support all the historic functions that we know existed among all the estuaries, rather than have every estuary support them? So if we want halibut nursery, perhaps a halibut nursery for young of the year of halibut which mature inside of estuaries, not in the ocean, perhaps Ormond isn't the best place for them, as we don't have a lot of open water habitat unless we restore it that way. But Ormond on the other hand has so many significant remaining functions that it may one of those that can support a broader array than some of the other estuaries which may support one or two well, but not a broad array of them. So scale, size has something to do with Ormond being larger as a remnant, certainly has greater capacity and gives us a chance to think about how we fit those pieces back together. What I think we need to keep in mind that we have to take a regional perspective and where does Ormond fit into the context of other sites such as Ballona wetlands nearby or all the way up to Carpinteria salt marsh in Santa Barbara County, and down to the San Diego group of estuaries. And functions that are especially endemic to that area, we're more able to preserve and how we do it regionally. And Ormond in that case will play a major role in the regional sustainability and recovery of these areas.

Janet: Please go through the different little ecosystem for people who don't have that familiarity. Now what characterizes a salt marsh? Is salt a clue?

Wayne: Assuming that we mean salt marshes in an estuarine context, go back to that definition, because salt marshes may occur in the desert or elsewhere, and so it's a broad term. And so we're defining it to mean coastal salt marshes that occur in estuaries and, as I indicated, an estuary would have a mouth to the ocean that at least seasonally would have some ocean input and ocean-derived salt is an important part of what an estuary is and then it would also have some fresh water input from the watersheds to provide that mixing environment. So in Southern California, because again we have this Mediterranean climate with a lot of evaporation in summer, many marshes become hyper-saline, or more saline than sea water. And so we have special environments in some of these areas that are permanently hyper-saline, or permanently

saltier than seawater, with special areas where stapholino beetles are found. So there's adaptation again and the idea of biodiversity, even some of these stressful environments will have plants and animals adapted to them.

One of my special environments that I like with all these fluctuating salinity zones, or very saline, or uri-haline, hali (sodium chloride from the ocean) so we sometimes distinguish these coastal salt marshes as haline marshes and refer to saline marshes as perhaps desert, but we can get very academic about some things and we want to think in terms of the coastal salt marshes. Well, these fluctuating zones along the edge of the estuary are found only in Mediterranean climates where we have winter rains...there's enough rain fall that it reduces the salinity. That allows rare annual plants to grow during low salinity. They grow, flower, produce seed and die as summer hyper-salinity increases with evaporation and so this special zone along the edge of the estuary is extremely important for supporting these rare plants and animals, and some of the animals as well, but especially the rare annuals that only grow in that environment. And so Ormond Beach has some of them, and another estuaries in the region. Unfortunately, those are often higher and drier and the first place to be filled in and built on for parking lots, airports...airports all over the world are built in coastal marshes often and in estuaries because they're flat large areas that you would need for them and so these rare habitats are often some of the first ones to be filled in. You have salt marsh harvest mice, salt marsh shrews that occur in some of these transition zones and for some of the plants and some of the animals that occur down in the salt marsh environments, the fluctuating tides, the high tide-low tide areas in these marshes, find refuges in these higher transition zones during extreme high tides, or during storms, so one of the things that's important about the transition zones including these fluctuating salinity zones is for biodiversity refuges, important areas that it's not just the lower tidal salt marshes that we think of with estuaries, with a combination of regular tidal flushing or irregular flushing, but it's all these peripheral areas that provide the support, the refuges, the areas within that are often lost and so if we have only the lower salt marsh preserved, you've lost most of the biodiversity in the ecosystem without the peripheral areas that are so important.

So salt marsh is a loaded word, because think in terms that in many ways they can be those that are flushed regularly and they have some ??, those which are perhaps 50% of the time flooded and have pickleweed dominated, as well as that are 10% of the time flooded and that are seasonally hypersaline and have shoregrass and rare plants as the salt marsh goldsfield that flower again only during this rare opportunity for winter rain followed by salt hypersalinity. So salt marsh includes all of these things.

Janet: Now the next category is a transitional idea, the brackish marsh. How is a brackish marsh different from a salt marsh?

Wayne: Well, not all estuaries have brackish marshes in this part of the world, because of our Mediterranean climate and often lack of fresh water coming in, but many of the large rivers do, because, for example, the Santa Clara, which occurs during the Oxnard Plain, like Ormond Beach. We have a lot of fresh water coming in and those brackish marshes occur in a mixing zone where if you have enough fresh water coming into an estuary that's open with tidal salt water coming in, then you have a salinity that is less than sea water regularly enough to support cattails and bulrushes and plants that we think of brackish. What separates an estuary and its

wetlands from adjacent areas is often considered to be the salinity of .5 parts per 1000. The background salinity, the landscape, may be less than less than .5 parts per 1000, but any more than .5 is suggesting that it is, in fact, derived from the ocean and therefore salt marsh, or if the salinity is especially 35 parts per 1000 it's ocean. So somewhere between 35 and .5 is brackish. And in many estuaries, you have that mixing of salt water and fresh water, giving that brackish salinity and that supports plants and animals different than perhaps would be in saltwater areas.

So it is a technical definition that separates ocean salinity from fresh water.

Janet: Now we have just a couple of minutes to talk about fresh water marshes, but those are contiguous?

Wayne: Sometimes. In a natural setting, where you have a contiguous riparian zone coming down rivers and streams, floating into the estuary, you would have the highest tide limits defining where the estuary is and its brackish or salt marshes and fresh water marshes, maybe of seeps and springs, or along these riparian corridors where you generally have very low or absent ocean derived salt. Now in larger rivers, you would have fresh water tidal zones. In New Jersey, you have something like the Delaware River with many many miles of fresh water inter-tidal and then non-tidal fresh water. Here we have very little fresh water coming out many times and so we have a confined area of salt and brackish marsh and then fresh water marshes nearby. Very few examples of tidal fresh water. But those fresh water marshes are important for all the breeding birds and for other functions as well, and in a healthy integrated ecosystem you expect to find a combination of fresh water marshes, riparian forests and scrublands, fresh water seeps and springs, brackish marshes, salt marshes, hypersaline marshes, mud flats and back to Ormond, many of these things still exist in the area. You have our brackish marshes, salt marshes, hypersaline areas, dune and beach areas, so the fact that it has still all of those is very important.

Janet: That's the segue that we're going to use to wrap up this half hour and then we'll continue this conversation. Viewers....

End of Pt. 1 of interview

Janet: Hello and welcome to Heroes of the Coast. Very happy to have with us today wetlands biologist Wayne Ferren.

Wayne: Thank you. It's wonderful to be here again.

Janet: We're here to talk more about Ormond Beach, specifically the wetland in Ventura County, between the Pt. Hueneme Pier and the Pt. Mugu Naval Air Station boundary, but also in general about endangered species and how wetlands restoration in the process of recovering species also. This is pretty important work and we're going to start by talking about one of the bird species at Ormond Beach that is tremendously endangered, though just listed as threatened, and that's the Snowy Plover.

Wayne: One of the ...of Ormond, we've talked of many in the past, is the fact we have a shoreline with wet and dry sand areas, adjacent dunes and then transition environments and so forth, and this preserved intact section of the coast provides breeding habitat for shore birds such as the Snowy Plovers which is very vulnerable to loss of shoreline, shoreline erosion issues, beach access and recreational issues, vehicles running chicks and eggs and predation by increasing numbers of crows and so there are many opportunity for impact for these little shore birds that breed in this kind of rack material and open sand between the dunes and the wet sand area. Of course, they feed in the wet sand, so you have a food supply issues as well and very few areas support breeding populations, and so there's been quite a decline. It's a global issue for these types of birds, and in our example, we have snowy plovers that are a good example of highly... [unable to decipher]

Janet. It's ironic that they found a biological niche, an adaptation of nesting in the sand and that does not serve them well.

Wayne: Well, they can be impacted by big storms, they can wipe out the nesting area. A lot of recreational activities. Beach grooming is enormously effective in eliminating populations of shore birds because highly groomed beaches like some of our urbanized beach areas that are, of course, for recreation, are groomed with tractors eliminating rack and cleaning up on a regular basis. There's no way to support beach nesting birds or birds that even feed in the area because it's the decomposing kelp off the beach that produces the nutrients, which provides the food chain support for the invertebrates in the sand. And so if you eliminate food source for the invertebrates, you're also eliminating the food source for the birds that eat them. So it's this interesting element of urbanization, recreation, beach grooming, all sorts of impacts, and then shoreline erosion, or the development of our beaches [?] with bulkheads and ultimately sea level rise perhaps with global climate change. There are lots of issues related to survival on the beach and I think certainly our keystone species for this could be thought of as our snowy plovers. We do have success stories, certainly, at places like Coal Oil Pt. Reserve at UC Santa Barbara where beach management is ...habitat and you have a wonderfully restored population there. Here at Ormond we actually have a persisting population but there are demands and challenges with beach access and [unable to decipher].

Least terns are another one that we can talk about. And they are beach nesting birds and crows are really a certain impact and increasing crow populations also increasing urbanization, the crows can get in and eat the eggs and young and so we have a need to figure out how to control these predators, in addition to recreational issues, other shoreline management issues, so it's very challenging, with many competitive activities for the same space and various places in the world will have seasonally fenced off beaches for having their seasonal activity of breeding so that they can at least breed and then as the chicks mature, they can at least forage and perhaps manage with the other habitats that are there, but the breeding element is very important and very difficult to achieve given the shoreline conditions throughout So. Cal.

Janet: Now there a number of other endangered species that are found at Ormond Beach. One is a little bird called the Belding savannah sparrow.

Wayne: This is one of my favorite birds because they are endemic to the California estuarine province that extends from Santa Barbara down to San Diego and Baja and they're found only in salt marshes. Now stating that, what I mean, is that they breed, as far as we know, in the tidal pickle weed habitat. Pickleweed is *Salicornia virginica*, the Latin name for this plant that grows in salt water and these little birds nest at some of the higher elements of it, so they're not completely inundated all the time with the salt water. And they hide their nests in some of these higher transitional pickleweed areas. They usually don't breed in nontidal areas, so you might have impounded portions of estuaries... a lot of our estuaries have dikes and various impoundments where you have areas that are no longer tidally influenced and that changes the environment entirely. It may have pickleweed surviving. But it doesn't get flushed with the tide, it doesn't get the same kind of nutrient embellishments and it diminishes the importance for us of that so the vegetation may appear to be everywhere but not the same breeding habitat. And then you have their foraging issues. They're also preyed on by crows. Another activity... so groundnesting birds, beach birds as we talked about, salt marsh birds, have lots of challenges. They certainly... this is a threatened bird in the State of California, or endangered in California as a state-listed bird and it requires special management and where we have a number of estuaries that support populations, it's often not a matter of having habitat. If it's not fully functional as an estuary. Are crows preying? I have actually seen, at least at Carpinteria salt marsh, crows watch where the adult lands in the marsh and the birds will crawl in the vegetation to where the nest is, and learn where the eggs are and go to prey on them. So they're very smart. And these are the challenges of managing these areas. Today, our sensitive habitats we cannot just preserve them in the context of the modern coast. We need to figure out how to manage them in perpetuity to allow for some of the changes, some of the impacts and figure out how they survive in this current physical condition.

Janet: Now a very enigmatic bird, the light-footed clapper rail.

Wayne: Well, it's one of our most endangered birds in California, and again, another ground... marsh-nesting bird. So it's not up in the trees. It nests frequently in cordgrass, where it builds its nest that can actually float somewhat with the tide, so it's higher... it's usually off the ground in things like bulrushes. We now have some actually breeding in nearby brackish and freshwater marshes, rather than in some of these salt marsh areas, such as Camp Pendleton, Santa Margarita

river mouth, which is an interesting change. You usually think of them being in salt marshes, so it shows there's either adaptation or that they've always had other habitats that we weren't fully aware of. At places like Carpenteria salt marsh, they've nested historically in pickleweed habitat and so the entire salt marsh area is not in cordgrass which doesn't occur in some of the estuaries like Carpenteria. But there, the lack of coyotes is often significant, because without the upper level predators, just like I mentioned in our previous discussion, the middle level predators have a tendency to collect and expand in number and so these middle level predators often eat eggs and young of groundnesting birds. And so the introduction of things like red fox, rather than the native grey ones, feral cats, increasing numbers of raccoons, in the urban environment like that, all over threats to survival of ...now the good news is that ...some experimentation in translocating and reintroducing these and trying to recover populations that have been lost and so there's hope that we can maybe manage this. And as I said previously, it's a regional issue. Not just individual estuaries, but can the sweep of remaining salt marshes support all the functions they once used to? Now Ormond has the luxury of having a large size, various types of habitats. Its future is bright in the restoration potential of ....

Janet: You mentioned predators and there are birds who are also predators...the raptors and some of them are rare and seen at Ormond, the peregrine falcon, bald eagle and then others that are more common, if you care to list some of them, the kites.

Wayne: First, endangered, threatened, and rarity of this group of sensitive species that can be listed either as federal or state, local levels, of interested counties, perhaps, where the general plan, so we have kind of the large capital "E" endangered, state and federal listed, and then we have those which make might called endangered or threatened, which perhaps aren't listed, in technical terms, but may be on Native Plant Society or Audubon lists of plants or birds of concern, and so there are many different ranges of threatened and endangered, sometimes it's a political issue of getting something listed or not, so there's actually a larger list of animals of concern than what might be those which are actually listed. But we do have quite a few that either are known to be in the region or might make use of it in the future. Bald eagles, of course, are quite interesting, and are having a recovery successes on some of our coastal islands and one hopes that with restored marshes along the coast, we might see more of these birds that are known to catch fish. What we do have some of our fishing ??, for example, which are seen here in winter and seasonal use of the estuaries. There's a whole suite of birds that are sometimes federally listed and of greater concern, and have political ramifications and then a whole suite of birds that are of concern in ??? declining in number, of increasing concern as habitats are impacted. So...and of course, this is all part of the ?? biodiversity issues for ??? huge diversity of migratory birds, which may not breed here, but nonetheless, the habitats are important for them. And so we have visiting birds of concern, and we have resident birds, like Belding Savannah sparrow, we spoke of, and then we have those that may the area incidentally, like peregrines that cover a broad range and in that range is the Ormond Beach area. So there's lots of different use by sensitive birds, whether they're resident, migratory, or incidental and places with enough landscape preserved, like at Ormond, allow all this to go on, and so it benefits and enriches our lives. It's actually great to experience a place to go and see these things and understand that we must be optimistic, and the future, I think...restoration and the recovery of endangered species, one must be optimistic and believe we can do this, otherwise, it's the wrong business to be in and

I remain an eternal optimist and believe we can do these things, and we can recover and preserve habitat for our endangered species and recover the populations of ???

Janet: The pelicans are another success story.

Wayne: Yes, they are. And they breed in our coastal islands and they certainly use the coast. They use the marshes that we have, and channels, they successfully rest, forage and are part of our wonderful landscape, so you see them fly over the coast or rest on the beaches and they're part of the California experience and to not have had them, or to have almost lost them is truly, it's remarkable to see the recovery, and once again an indication that we can take charge of some of our pollution, and landuse practices, that these success stories do give us hope.

Janet: Not something that's part of the California story, but most people don't know about it is endangered fish, unless you've got your head under the water. Tidewater goby is another endangered species at Ormond Beach. Tell us about that one.

Wayne: Well in Southern California, we have several fish of interest in estuaries, fish such as small tidewater goby occurs in brackish water areas, not in those that are more typically always saline. So some of your large bay-like estuaries, with nearly permanent open mouths and water that's almost the salinity of seawater aren't the home of these fish. These occur in brackish water estuaries that have enough fresh water to reduce the salinity and provide an environment that they survive in and they're found in these small canyon mouth, river mouth estuaries that often have the mouths blocked off by sand or in periods of time when we don't have rain, and that allows the build up of fresh water, or you have enough groundwater seepage from sand bars and dunes nearby that produce this brackish environment, some special plants like this one species of wiggin grass will grow in it and you have linkage of plants and animals representing this brackish environment.

Now these little fish, when it does rain a lot, get blasted to the ocean and may wind up in different river or creek mouths and so there's a period of time in which they're in the ocean, and back in the estuaries again. There's an interesting relationship. So speaking of fish, then we have those fish in estuaries that live their whole lives in estuaries, such as long-jawed mud suckers. They are estuarine-restricted fish. Then you have those which are fish that use the estuaries only as young-of-the-year, such as halibut. Halibut lives only in the ocean, but there are estuaries absolutely essential to maintaining the adults because the young-of-the-year grow up in estuarine channels and the declining halibut populations in areas is due to the nursery grounds are gone. And then we have fish that may come in with the tides and go out with the tides, forage in the marshes, stingrays, sharks, coming in eating crabs and going back to the ocean and then we have fish that are anadromous, such as steel-head, another endangered fish, which occurs in areas like the Santa Clara River nearby Ormond, which spawn in the estuaries and the rivers and spend their adult lives in the ocean. And then we have tidewater gobies, which experience both an ocean and estuarine environment. They're found only in brackish water, rather than salt water, such as halibut. Again, not all of these wonderful resources that are dependent on estuaries are found in any one estuary. To preserve all of those for the Southern California estuarine province, we need to think in terms of the various types of estuaries, and certainly at Ormond, we have habitat for tidewater gobies. So when you think in terms of endangered fish, endangered birds,

endangered plants, at least sensitive, declining things such as globos dune beetles, rare butterflies, wandering skipper butterflies, they are in the salt grasses ??? All of these sensitive, declining, rare or endangered animals and plants, a broad array are all found at Ormond, so I think is an indication of resilience and value of the site, in spite of the various impacts that have occurred.

Janet: Tell us more about now, about your experience in doing restoration work. It's obviously a lot of work, and a very expensive, but you've seen it happen.

Wayne: Yes, I've been involved since the mid 80s when we really started vernal pool restoration, and moved on to salt marshes, coastal ?? grasslands, oak woodlands, and now involved in restoring salt marshes and other habitats in the Atlantic states. And as I said before, it's an uplifting and optimistic thing and that both the sign that we know a lot about a system is being able to put it back together again. And in the narrowest sense, restoration is really restoring something back to the way it was. We rarely ever do that. We often don't know what an area was like. We have left over pieces. We didn't enough about it when it was intact. So we often do enhancements, creations and recreations and sometimes, maybe restoration. But the science of restoration ecology has all of these activities, endangered species recovery, exotic plant and animal eradication, enhancements and restorations or creations of habitat and in a place like Ormond Beach, you would have many of these things going on. Obviously, endangered species recovery and habitat enhancements, exotic plant and animal removal. At Carpinteria Salt Marsh, we have experience at restoring, in a fairly accurate sense, a portion of the marsh. We have historic aerial photographs, we know a lot about the site. There's decades worth of research as a university reserve that allows an understanding of all the functions and we were able to take 15 acres, working with a broad array of agencies, through the Univeristy, homeowners associations, state, federal local agencies in restoring this area and finding a great success in recovering things such as the endangered salt marsh birds beak, a federally listed endangered plant, and restoring habitat for fish, and taking fill and removing it and recreating wetlands where they were, providing transition areas for pygmy blue butterfly foraging, which is a locally restricted to the edges of these marshes, that require members of the spinach family for the larvae to feed on, and wandering skippers and having belding savannah sparrows at the site. So that's one of many examples where along the coast, we now have actual examples that have been studied, ground broke in 1997, so Carpinteria has a ten-year anniversary this year and seeing that part of the marsh restored. It took 10 years to break the ground, to raise the funding, acquire the property, different permits and design the project and then 10 years hence, I think we can remain very optimistic and there's a number of these that can be done. But then, maintaining things such as birds such as clapper rails there is a challenge, because the lack of coyotes and upper level predators, because of various other issues that may be difficult for these smaller marshes to support so places like Ormond Beach, or Newport Back Bay, which have a sustainable larger population of clapper rails are seen as extremely key to the species. There are also areas from which we can translocate populations to places like restored Ormond, so Ormond Beach... we proceed with a restoration plan that includes habitat for the clapper rails, we have donor areas that might be able to contribute, from which we can translocate and reintroduce clapper rails and perhaps have a sustainable population at Ormond. It's kind of dangerous to have only a few sustainable populations. If any one large impact occurred, you could lose the species, so it is important to have these other areas and Ormond remains the site that could very well support

clapper rails with proper restoration goals for the site and there are those folks who are working on that.

Janet: we're in the last couple of moments and I'm always surprised at how fast the time goes, but have you seen, in the areas that you've worked in, that it's possible to also make to combine endangered species rehabilitation with access to the public in a meaningful way for the public.

Wayne: Yes. Again at Carpinteria salt marsh, the focus with the City of Carpinteria was to create the Carpinteria salt marsh nature park. On the periphery of the restored wetland and so we have a nice little amphitheatre for teaching classes. We have an interpretive trail with signage. It is a formal park within the City of Carpinteria, co-managed through a group of folks from the University, the City and homeowners' associations in the county. And that access includes a docent program with weekly lead tours, from 1997 to now. And it is part of the City's education program. So that allows school children to come, interpretive signs learn about the ?? ecosystems ...but to understand the importance for the program of the endangered species and to even perhaps witness them with Savannah sparrows flying around, the bird's beak in flower, so I believe that almost all of these projects that have the opportunity for access should have some meaningful focused access because we need to have an informed public to vote for the proper initiatives and approve the bonds that help raise the money to fund this fairly expensive type of activity, so it is extremely important to have access and I can think of several successful examples. The Ormond Beach Task Force is extremely important. Long term group, a group of scientific advisors and others working together at Ormond to see that not only is the eco-system, but we have this ??? of informed voters.

Janet: Wayne: Thank you so much. I think that the idea that no one does this all by themselves, that these are gigantic team projects that then come back to benefit the entire community.

[end of interview]