

Shorebird use of the Giacomini Wetlands Restoration area: 2011 Update

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INTRODUCTION

Audubon Canyon Ranch has been tracking shorebird use of Tomales Bay since 1989 (Kelly 2001, Stallcup and Kelly 2003). Changes in shorebird use revealed by these data will eventually provide the background needed to determine if local shorebird populations actually increase in response to the Giacomini Wetlands Restoration or, alternatively, if shorebirds using Tomales Bay simply shift their activities to include the newly restored wetlands.

SHOREBIRD USE IN TOMALES BAY

Shorebirds concentrate at the two ends of Tomales Bay, at Walker Creek delta to the north and Lagunitas Creek delta to the south, where suitable intertidal feeding areas are the largest. However, it is difficult to know how many birds are likely to occur in any one place. Shorebirds use feeding areas throughout the bay and numbers vary dramatically over time and space. In addition, Tomales Bay shorebirds forage in nearby seasonal freshwater wetlands that become suitable during winter. These areas include the dune slack meadows of Lawson's Landing at the north end of the bay, the extensive, seasonally wet lowlands east of Tomales, and, prior to restoration, the seasonally wet pastures on the Giacomini Ranch. To further challenge our understanding of shorebird use, baywide numbers vary with other, extrinsic influences, such as reproductive rates in the arctic, waves of migrant traffic moving through the area, and storm-driven, midwinter flights to other regions.

In spite of the substantial variation in shorebird use of Tomales Bay, observations of flock movements and experiments with banded birds (Kelly 2001) have revealed an important aspect of shorebird use: most species are represented by two distinct wintering populations--same species, but different groups of individuals—that occupy opposite ends of the bay. This information allows us to monitor shared (regional) variation in winter shorebird abundance and test predictions about changes in the proportional use of southern Tomales Bay after restoration.



SHOREBIRD SURVEYS IN THE GIACOMINI WETLANDS

We began counting birds in the Giacomini pasture in 1992, in anticipation of future opportunities for wetland restoration. Now, since the restoration began in 2008, we've increased our effort to monitor shorebirds in the developing wetlands. We have divided the wetlands into three survey areas (see map) and talented observers are tracking shorebird use eight times per year.

We thank the following observers for their excellence in conducting shorebird counts since the restoration of the Giacomini wetlands began in 2008:

Sarah Allen	Rowena Forest	Ian Morrison
Bob Baez	Fred Hanson	Bill Payne
Len Blumin	Roger Harshaw	Susan Poirier-Klein
S Codde	Carolyn Longstreth	Peter Pyle
Rig Currie	John Longstreth	Don Reinberg
Peter Dejung	Joan Lamphier	Lisa Smith
John Delosso	Galen Leeds	John Somers
Jules Evens	Vicki Leeds	
Mary Anne Flett	Sarah Millus	

Gwendolyn Toney
Sue Vanderwal
Tanis Walters

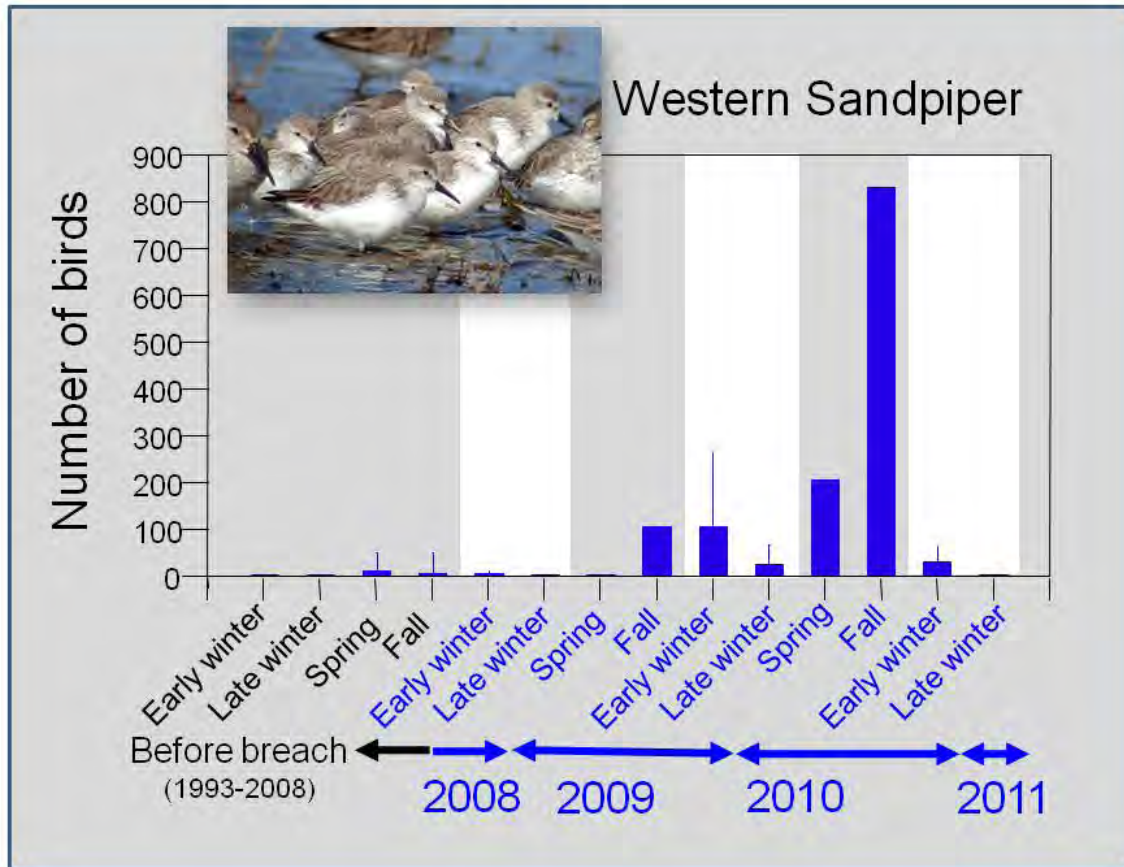
Penny Watson
Tom White
Patrick Woodworth

Will Wilson
David Wimpfheimer



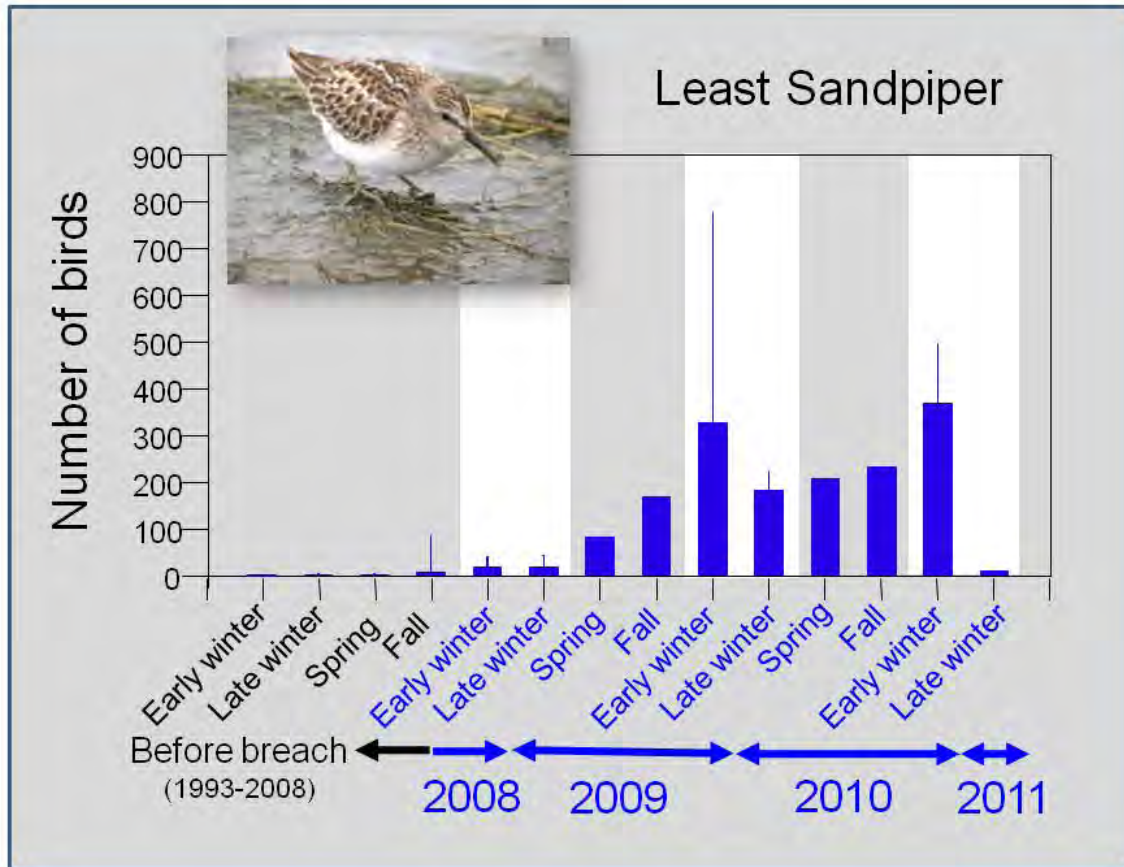
Format of graphs
Changes in shorebird use of Giacomini wetlands

- The four seasonal periods in black on the bottom left of each graph show the 15-year average of seasonal abundance on the Giacomini pasture *before tidal action was reintroduced in October 2008*. Shorebird use during this time was relatively unimportant because there was very little wetland habitat available and the numbers were usually near zero. Post-restoration, seasonal periods are indicated on the right (in blue).
- The abundance bars show seasonal means and maximum abundances.
- The white bands behind the bars highlight winter periods, when most shorebirds are resident. The gray areas in between the white bars are the fall and spring migratory periods.



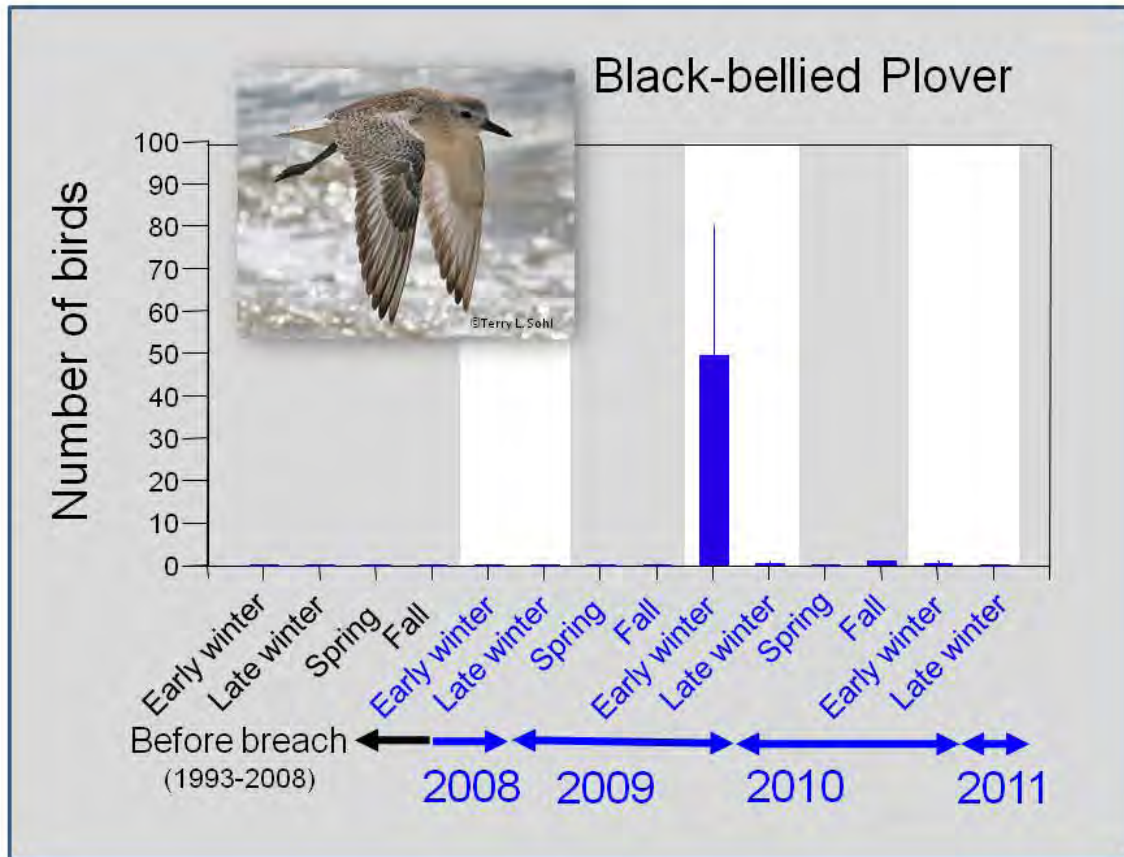
WESTERN SANDPIPER

There was only a token occurrence of Western Sandpiper in the Giacomini Wetlands during the first winter after restoration, and a small-but-regular occurrence in the second winter. In the fall migration before the second winter, some Western Sandpipers were interested enough to drop in. That was probably the first opportunity for fall migrants to consider the new wetlands. This is potentially important, because fall migrating juveniles select wintering areas to which they tend to return year after year. During the migration periods of 2010, dramatically larger numbers of Western Sandpipers occurred in the wetlands, suggesting an influx of potential new recruits to the wintering population. The number of wintering Westerns in 2010-2011 however, was minimal.



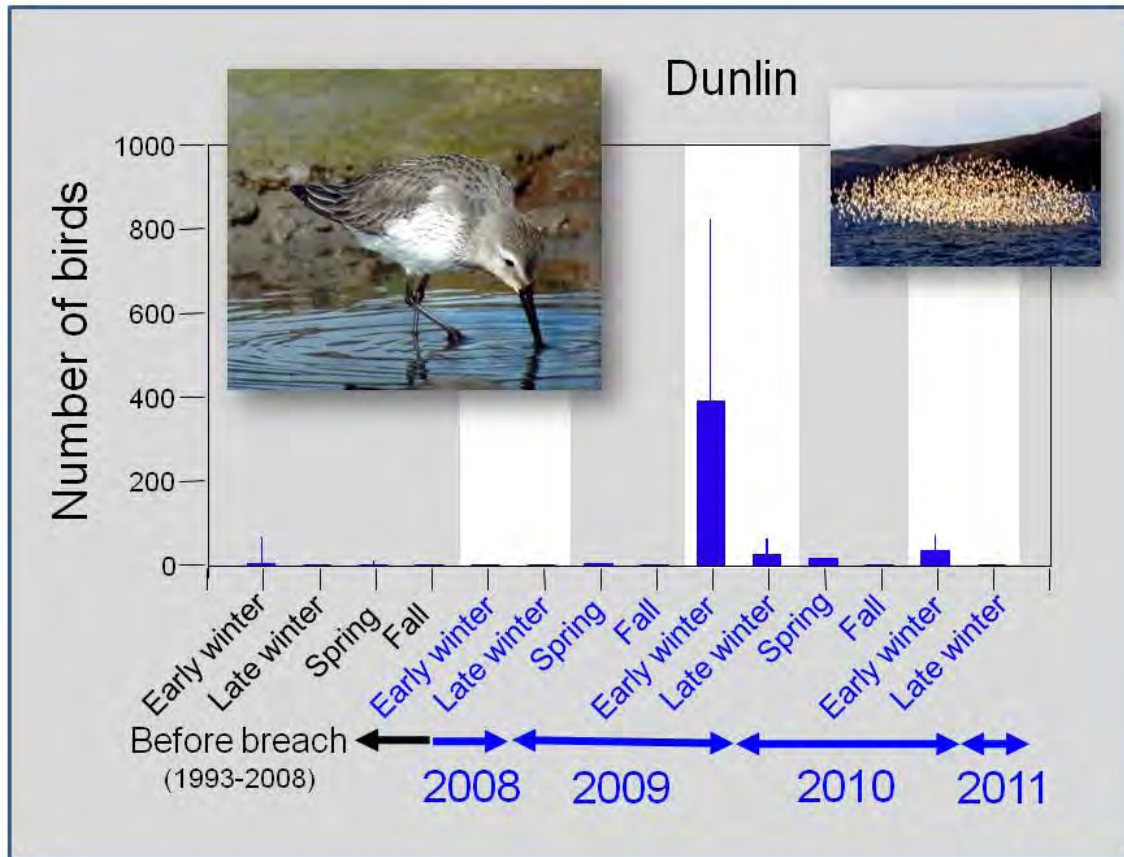
LEAST SANDPIPER

Least Sandpipers have exhibited a general, continuing increase in the Giacomini Wetlands, although there was a dramatic decline in late winter 2011. Least Sandpipers may be especially well-suited to forage in the restoring wetlands, because unlike other small sandpipers, they tend to forage in fine, silty mud away from the water line and are able to forage under the vegetation cover of relict pasture grasses. Other sandpipers avoid foraging in areas without a full view of the sky that allows them to scan for approaching falcons.



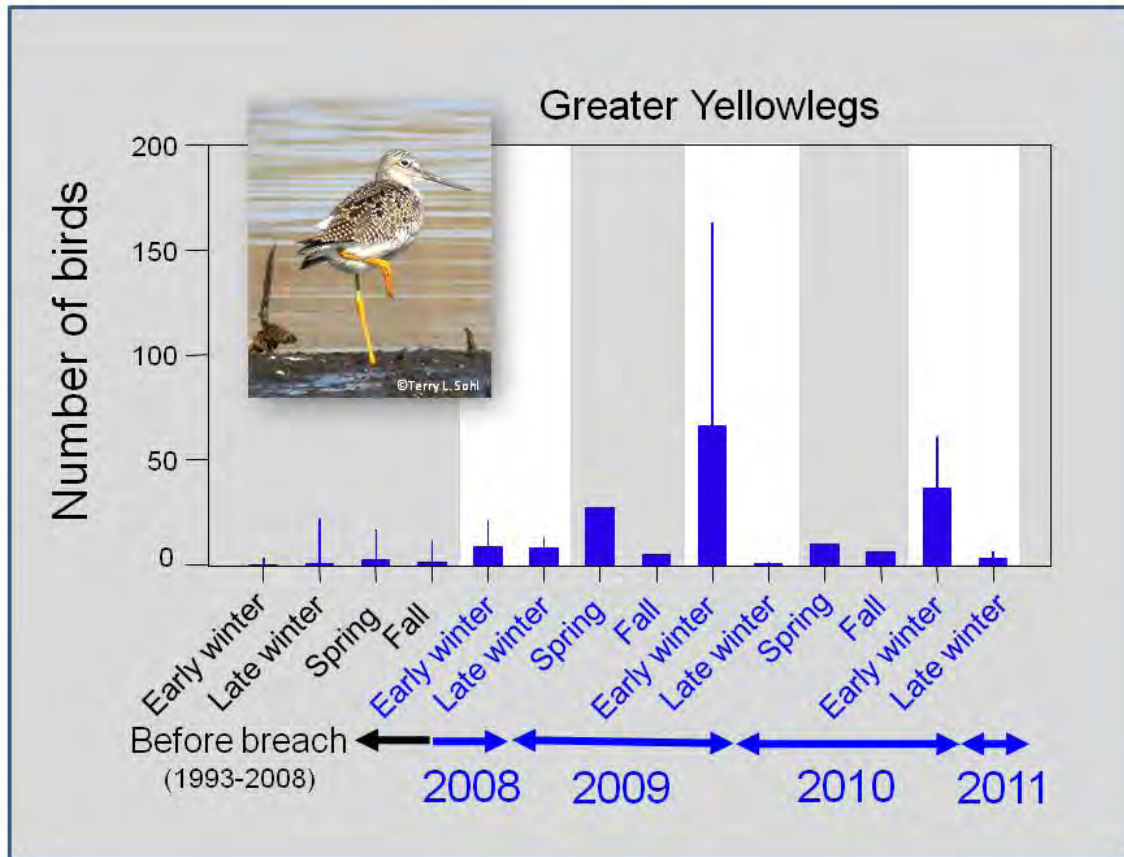
BLACK-BELLIED PLOVER

The influx of Black-bellied Plovers into the Giacomini Wetlands observed in early winter 2009 was more than occur normally in all of southern Tomales Bay. The late winter decline is not surprising because, for unknown reasons, they were rare throughout the bay at the end of that winter. As with other species, abundances were low in the winter of 2010-2011.



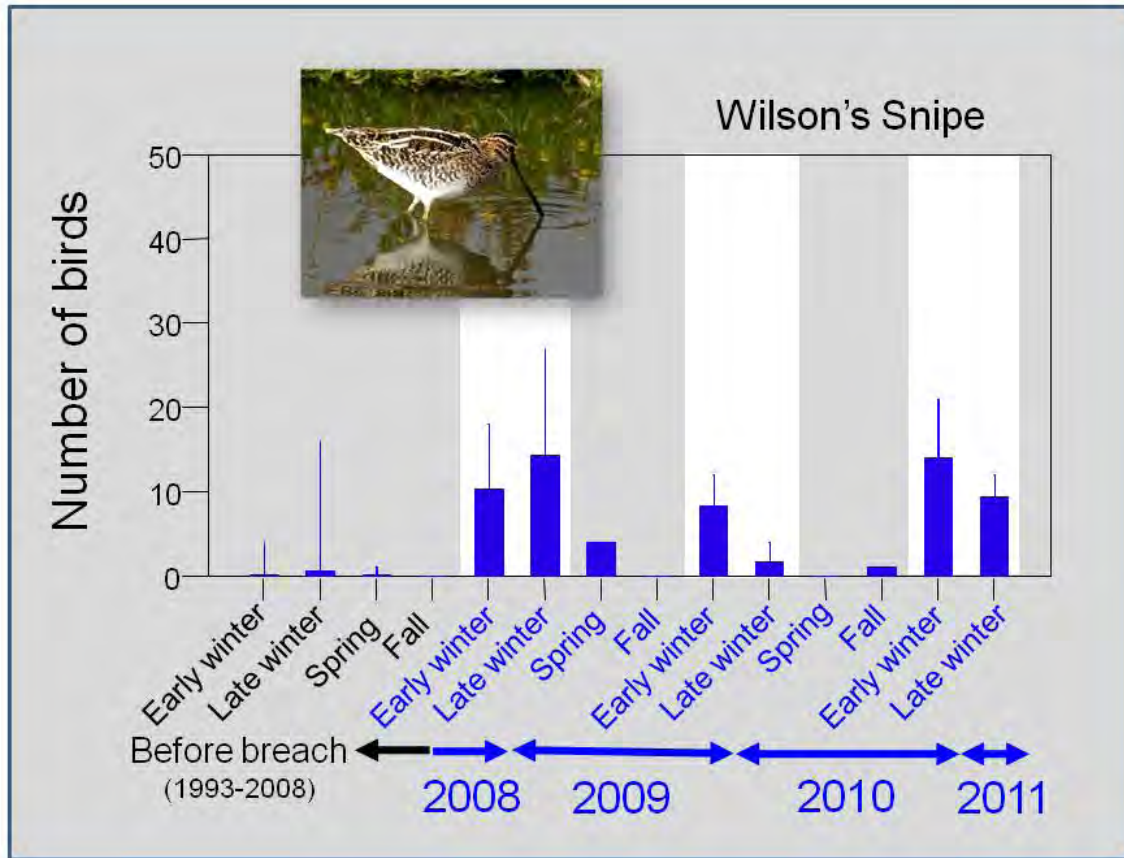
DUNLIN

Dunlins are the most abundant shorebird in Tomales Bay, with up to *10,000 individuals* in winter. Dunlins did not appear in the Giacomini Wetlands until the second winter after the restoration began. These shorebirds molt in the arctic before they migrate, so they are the last shorebird to arrive (generally in late September and October) and are never observed during the fall migration census period (late August). As with other species few Dunlin occurred in the Giacomini Wetlands in the winter of 2010-2011.



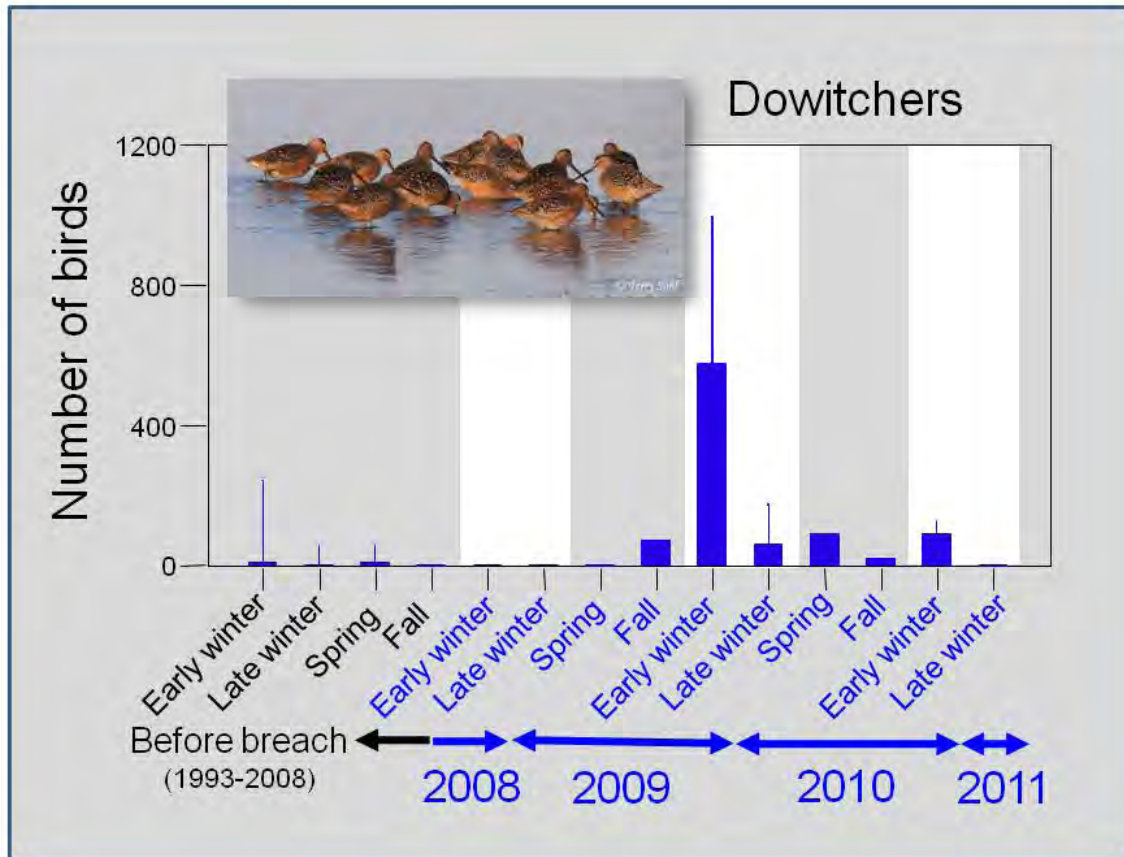
GREATER YELLOWLEGS

We have long known that the puddles and upper sloughs of extreme southern Tomales Bay are somehow “magic” for yellowlegs. Now, Greater Yellowlegs forage across extensive shallows on the east side of the restoration area, where they chase fast-moving fishes and other aquatic prey. Since the 2008 restoration, the abundance of yellowlegs has increased substantially, with regular use of tidally flooded areas. However, the continuing development of new tidal sloughs and drainage patterns, and increased tidal exposure of mud flats, might eventually reduce the extent of open water feeding areas for yellowlegs.



WILSON'S SNIPE

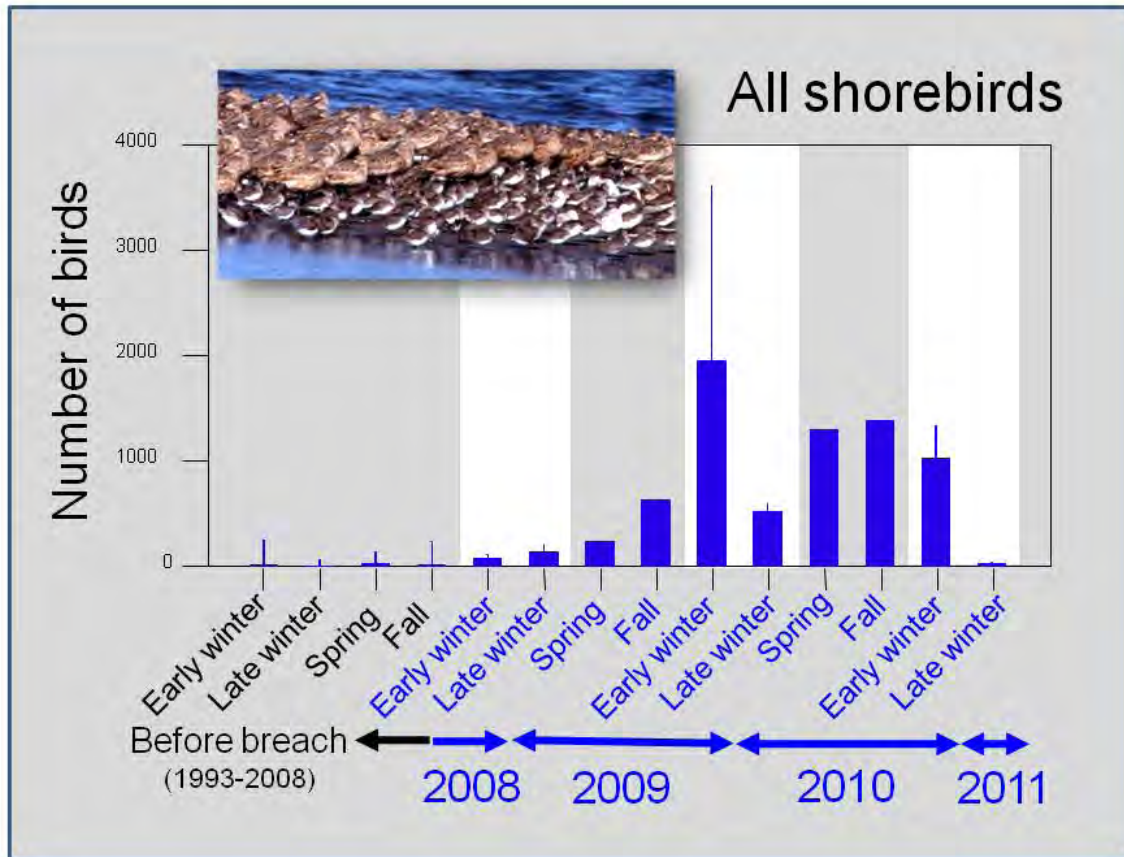
The wet grassy areas around the margins of the Giacomini Ranch have always attracted Wilson's Snipe. Since the restoration, snipe have expanded into new, wet grassy areas on the east and south sides of the wetlands. Snipe are difficult to detect, so many may not appear in censuses. The considerable transitional habitat around the perimeter of the wetlands, and elevational gradients that exceed sea level rise predictions, suggest that the restoration area may provide suitable habitat for snipe into the distant future.



DOWITCHERS

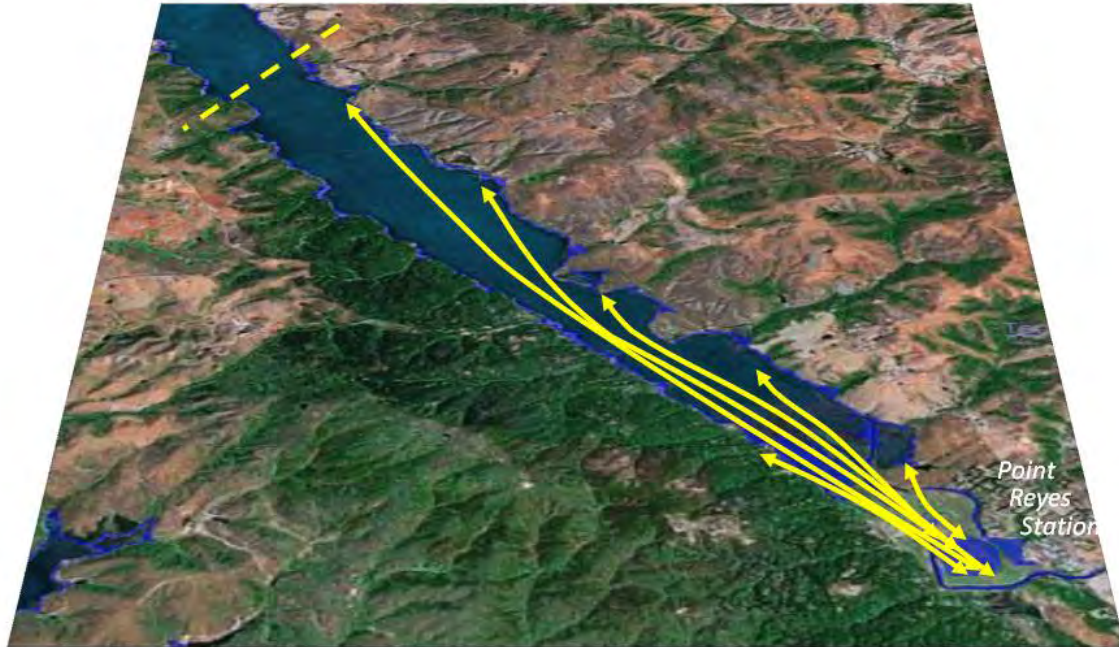
A flock of dowitchers flew into the Giacomini Wetlands on the day the levees were breached. However, dowitchers did not occur during censuses in the first winter. This is not surprising because shorebirds fly to and from other sites in Tomales Bay. There was a strong influx of dowitchers in December of 2009; many if not most of those birds were Long-billed Dowitchers.

Short-billed and Long-billed Dowitchers can be difficult to distinguish in the field. Short-billed Dowitchers are more common in this area during migration. Long-billed Dowitchers are a wintering species that prefers fresh and brackish waters, such as the ponded areas on the east and south sides of the Giacomini Wetlands restoration area. Increased use of the wetlands by dowitchers suggests that a new wintering group of Long-billeds might become established at the Giacomini wetlands.



ALL SHOREBIRDS

We have seen a strong, gradual increase in overall shorebird use of the Giacomini wetlands since the reintroduction of tidal action in October of 2008. These numbers reveal increases in the number of wintering birds and greater numbers during migration periods. The general decline in shorebird use during late winter, 2011, was consistent with a baywide decline and not likely related to the local effects of wetland restoration. Such dramatic differences are likely to continue, resulting in considerable variation in shorebird use among years and seasons.



MAP OF SOUTHERN TOMALES BAY

Although shorebirds are clearly using the new wetlands, it would be valuable to know if the increased habitat provided by the Giacomini Wetlands Restoration Project will actually increase the size of wintering shorebird populations in Tomales Bay. Continued monitoring of bird use is likely to provide an answer. However, based on current results, which reflect sometimes dramatic variation in shorebird numbers in both the Giacomini Wetlands and throughout Tomales Bay, it is too soon to know.

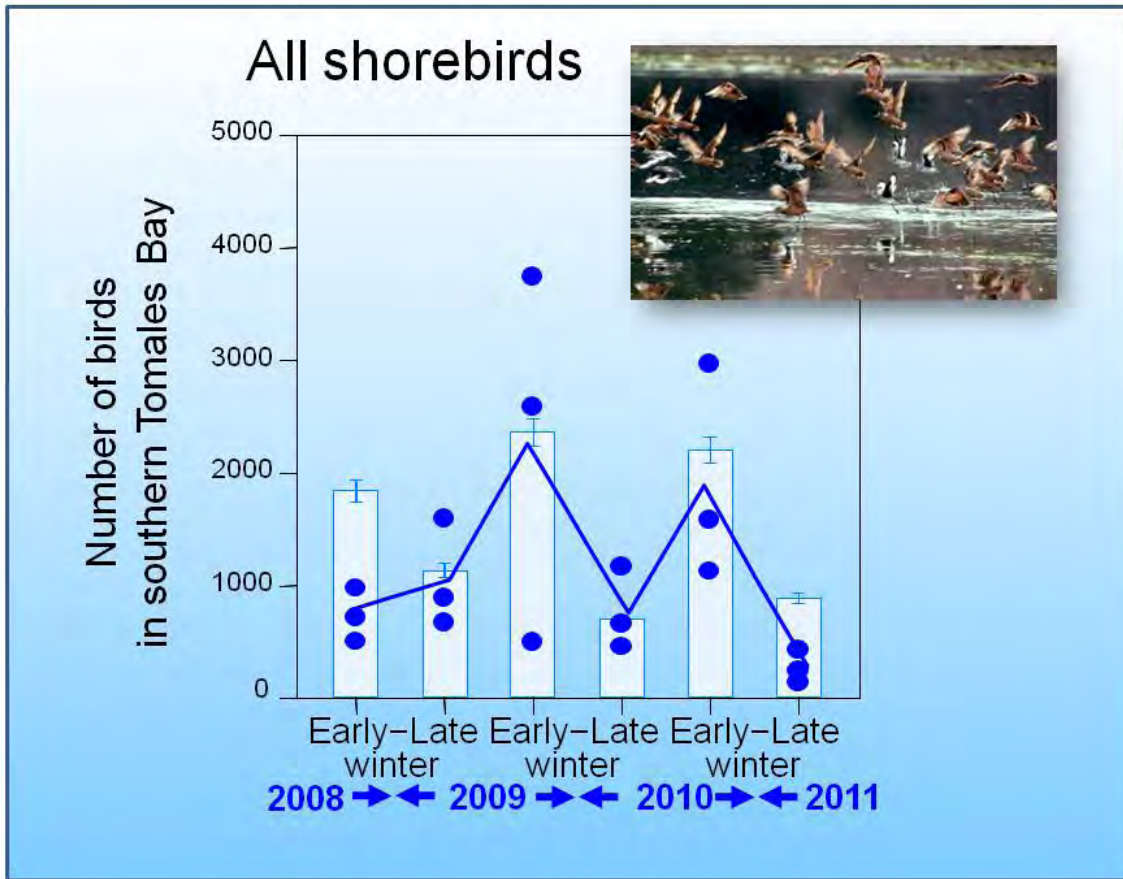
Frequent movements of shorebirds from the Giacomini Wetlands to and from other areas in southern Tomales Bay challenge Interpretation of monitoring data.. However, since the bay probably supports two distinct wintering populations of most species (see above), we can use the abundances in northern Tomales Bay as a control for comparing abundances in southern Tomales Bay before and after restoration.

SOUTHERN TOMALES BAY GRAPHS

Format of graphs

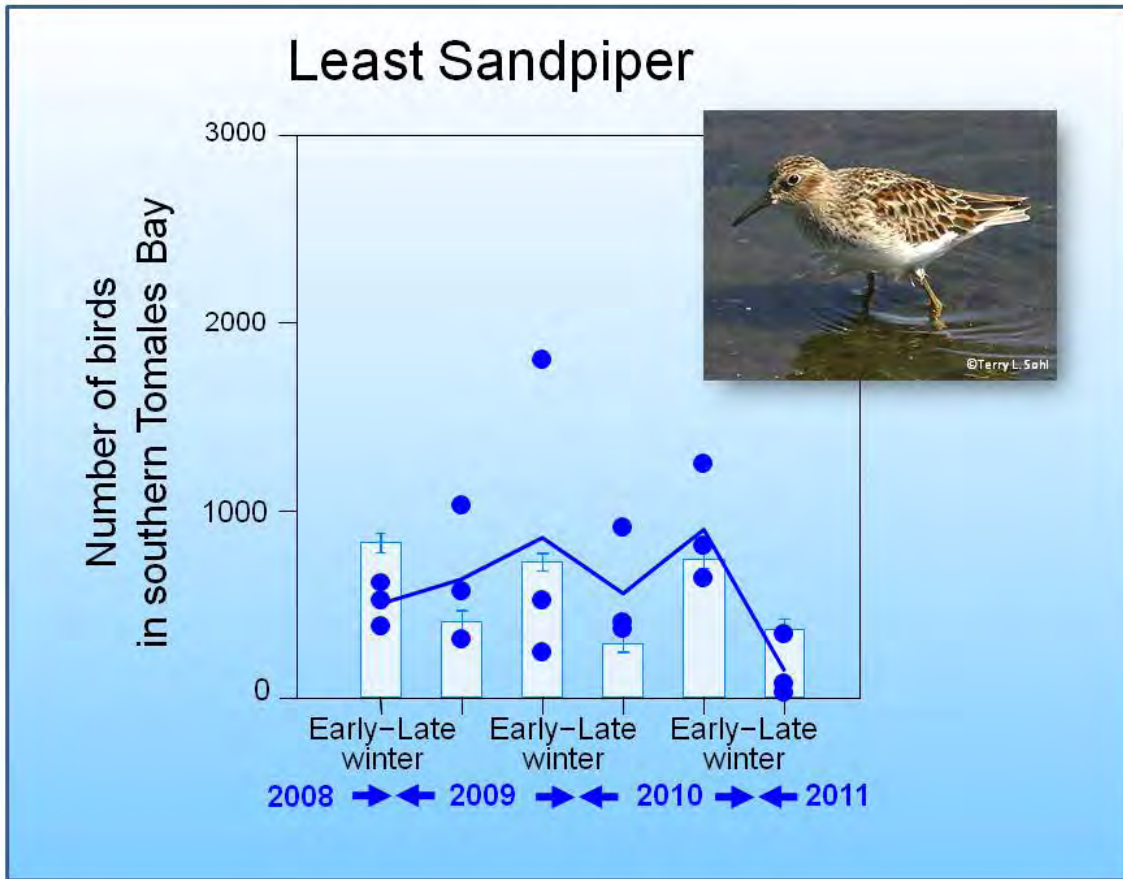
Effects on winter shorebird abundances in southern Tomales Bay

- If the Giacomini Wetlands Restoration increases the number of shorebirds that winter in southern Tomales Bay, average winter abundances after restoration (solid line) should consistently exceed predictions (bars).
- Filled circles: daily early- and late-winter counts after the 2008 restoration.
- Solid line: average early- and late-winter abundances since the 2008 restoration.
- Bars: expected early- and late-winter abundances if restoration had not occurred, using (1) predictions of proportional abundance from linear regressions between northern and southern Tomales Bay, based on 15 years of monitoring before the restoration and (2) the current number of birds in northern Tomales Bay. Error bars: 95% confidence intervals of the predicted long-term average.
- *We emphasize that these preliminary results are preliminary and anecdotal.* These results do not account for annual variation in regional winter abundances since the 2008 restoration. In addition, it is important to consider that the effects of habitat restoration on shorebird use are continuing and are likely to build over time. Although anecdotal, these early comparisons can be interesting or suggestive.



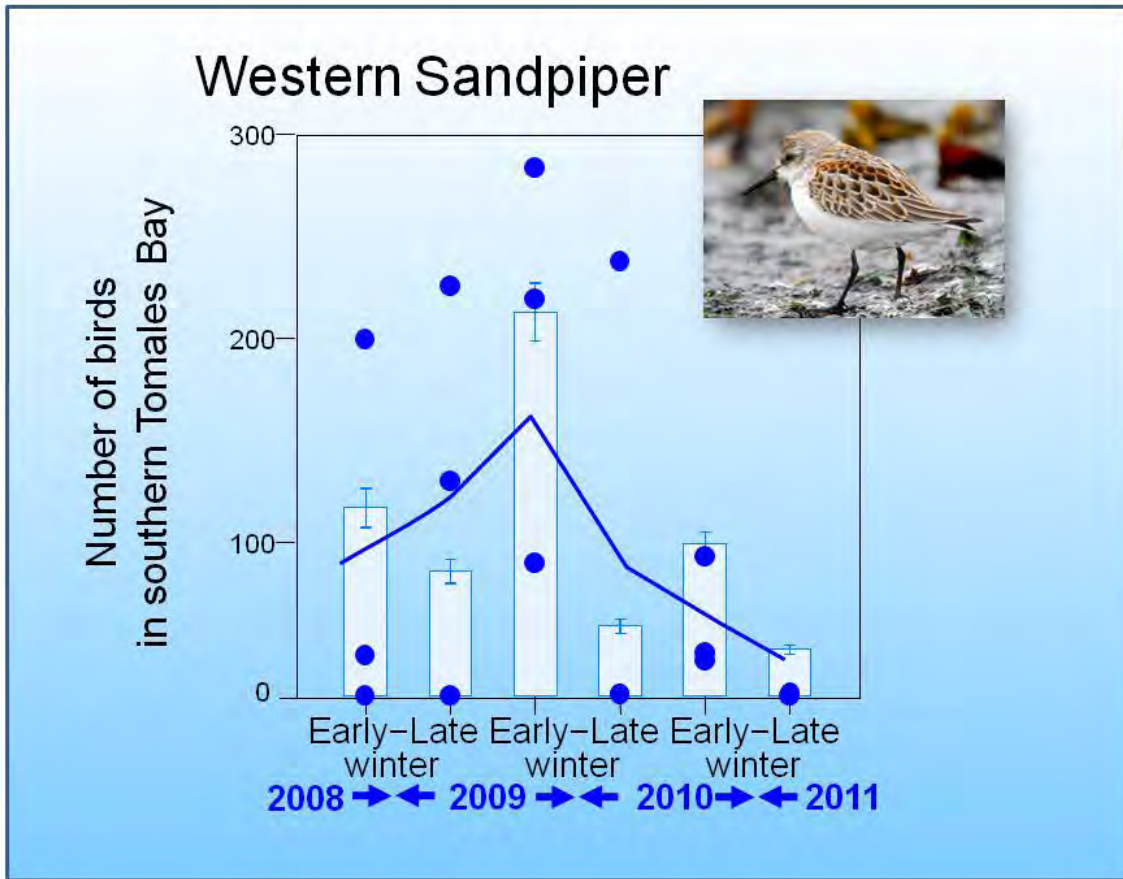
ALL SHOREBIRDS

So far, with the exception of fewer-than-expected numbers in early winter of 2008 and late-winter 2011, shorebird numbers in southern Tomales Bay closely match predictions before restoration. However, these results are only anecdotal because they do not account for annual variation in regional numbers since the 2008 restoration. Because the effects of habitat restoration on shorebird use are continuing and are likely to build over time, winter shorebird numbers could increase in future years.



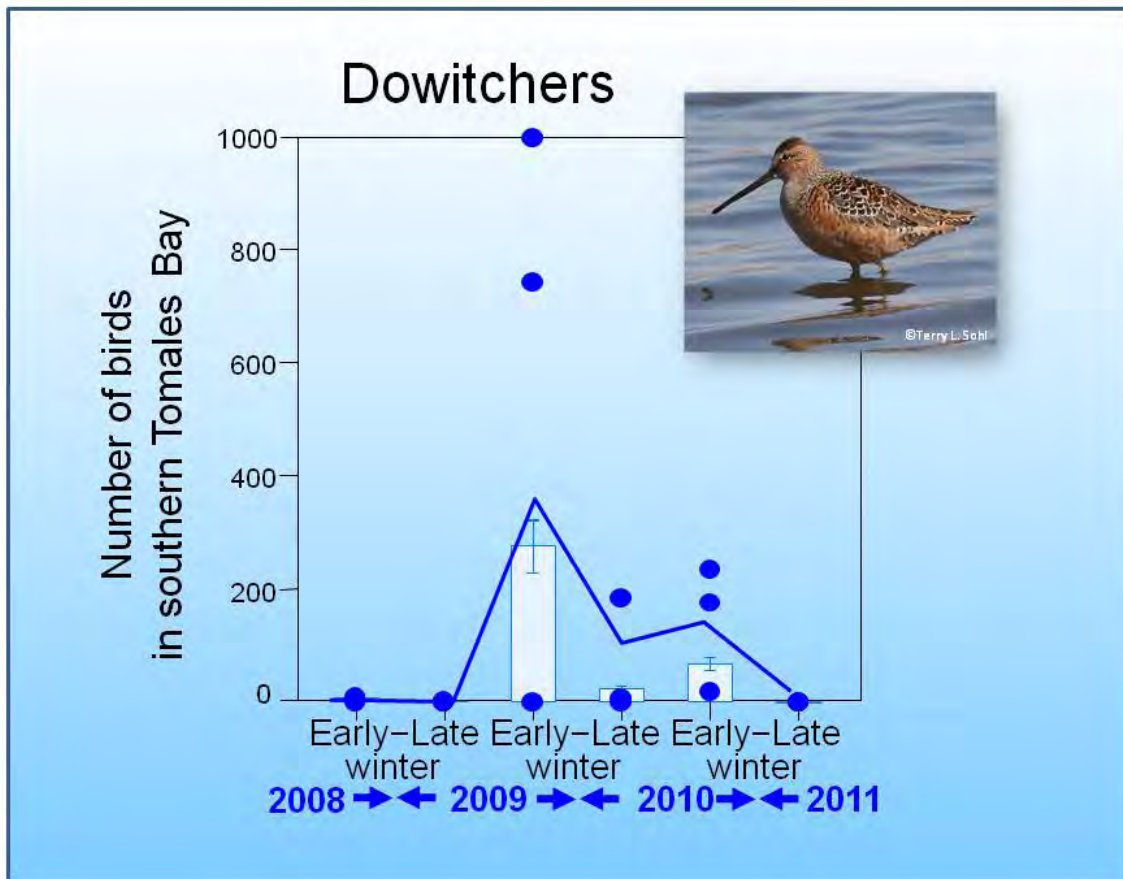
LEAST SANDPIPER

With the exception of low numbers at the end of the 2010-2011 winter, the number of Least Sandpipers in southern Tomales Bay during late winter periods, after tidal action was reintroduced into the Giacomini Wetlands in 2008, has been slightly greater (in 2009 and 2010) than predicted *without restoration*. We do not know yet if these differences were the result of habitat restoration. The late-winter abundances of several shorebird species declined, for unknown reasons, in late winter 2011.



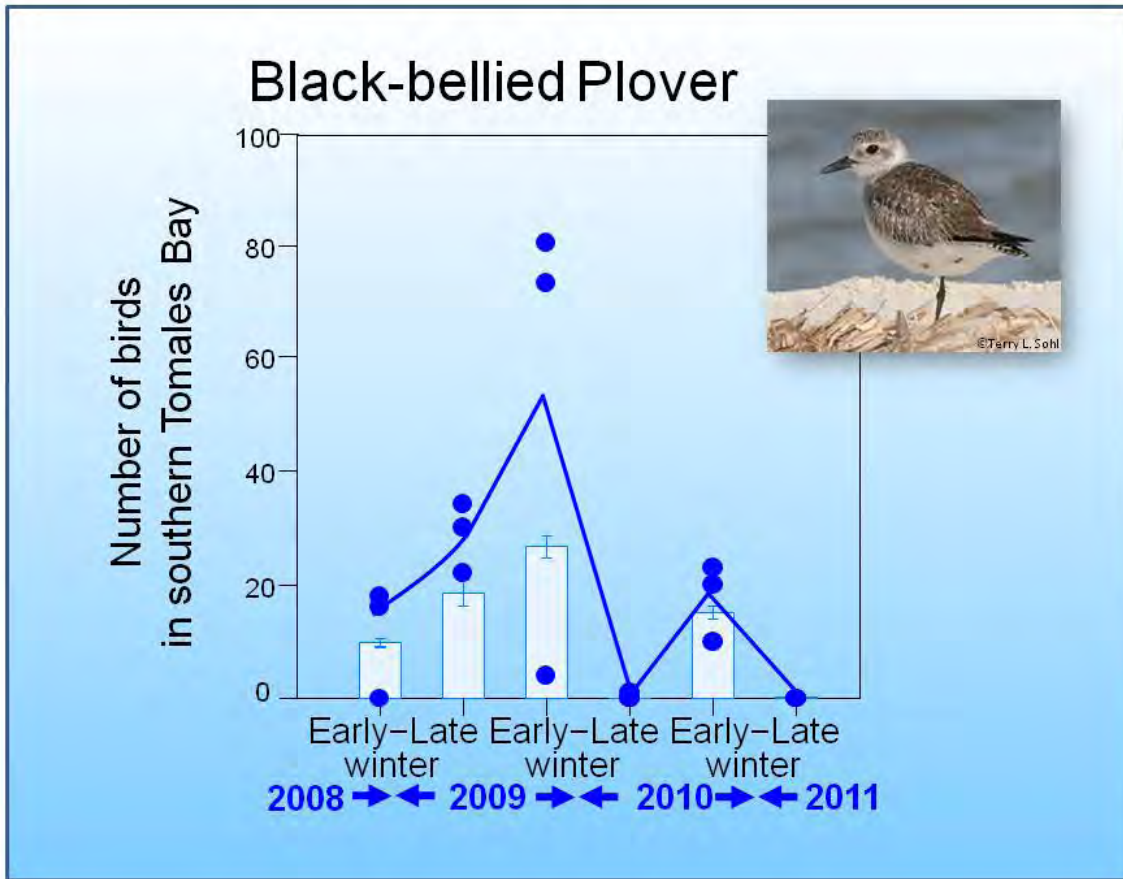
WESTERN SANDPIPER

As with Least Sandpipers (above), the number of Western Sandpipers in southern Tomales Bay during late winter since the 2008 restoration was slightly greater than predicted *without restoration* (in 2009 and 2010, but not 2011). Seeing this, one might wonder if the new wetland might provide, in some years, an important late-winter refuge for shorebirds. However, it is too soon to know if the average number of birds using Tomales Bay in late winter will be enhanced.



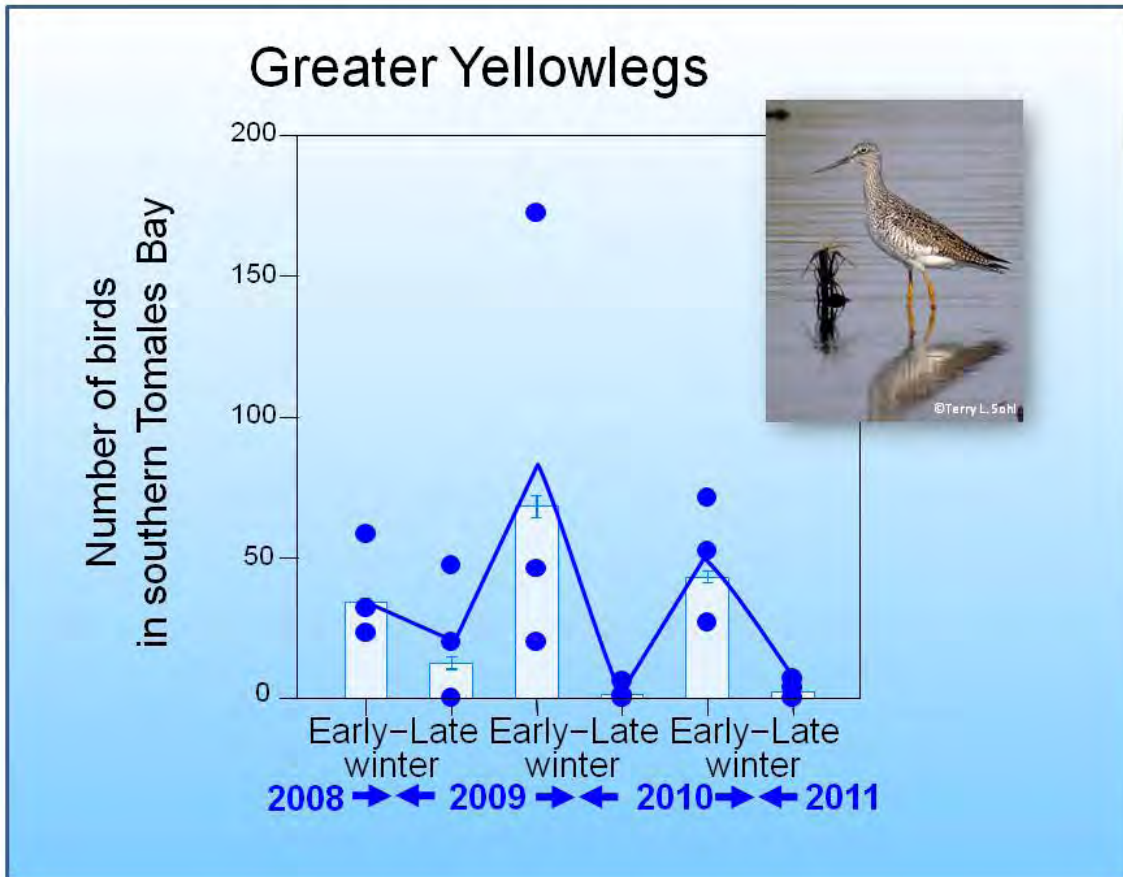
DOWITCHERS

Dowitchers wintering in this area of California typically reflect a predominance of Long-billed Dowitchers; Short-billed Dowitchers are more abundant during migration. In Southern Tomales Bay, greater-than-expected numbers of dowitchers (primarily Long-billed Dowitchers) occurred during the last two winters. The late winter decline in 2011 was associated with a virtual absence of dowitchers using Tomales Bay. Increased winter use of the Giacomini Wetlands (see above) suggests that restored habitat might substantially enhance wintering numbers of Long-billed in Tomales Bay—a possibility that could be revealed over the next few winters.



BLACK-BELLIED PLOVER

Annual Influxes of Black-bellied Plovers into the Giacomini Wetlands Restoration area (see above) have coincided with greater-than-predicted numbers in southern Tomales Bay. Future monitoring will indicate whether Black-bellied Plover numbers are consistently higher in southern Tomales Bay after the reintroduction of tidal action into the restoration area. The late winter declines in 2010 and 2011 were regional as numbers plovers dropped to nearly zero throughout the bay.



GREATER YELLOWLEGS

The number of Greater Yellowlegs in southern Tomales Bay has been slightly greater than expected since the 2008 restoration of the Giacomini Wetlands. Since the restoration began, flooding in the northeast portion of the Giacomini Wetlands has resulted in persistent shallow ponding which favors Greater Yellowlegs. As wetland structure changes with the continuing restoration process, evolving drainage patterns could shift habitat conditions to favor other species. Although yellowlegs are likely to continue using the Giacomini Wetlands, the long-term effects on numbers that winter in southern Tomales Bay remains unknown.



FUTURE SHOREBIRD USE

Shorebird use of the Giacomini Wetlands is likely to continue evolving, with changes in the relative abundances of species as drainage patterns, vegetation, and patterns of tidal exposure continue to evolve. Whether these changes will increase the number of shorebirds in Tomales Bay or, alternatively, provide benefits limited to the enhanced use of alternative (restored) feeding areas, remains a mystery. However, this mystery is likely to be resolved during the next few-to-several years by continued monitoring of shorebird use.

One aspect of the restoration process that is likely to benefit shorebirds is the likely population growth of amphipods, polychaete worms, tiny clams, and other intertidal invertebrate prey, as restored tidal feeding areas continue to mature. However, this process is gradual.

Shorebird numbers in Tomales Bay often decline in response to increased winter rainfall, increased stream flow, and lower salinities (Kelly 2001a, 2001b). Periods of heavy winter runoff occur frequently in the Giacomini Wetlands, and heavy runoff can kill, smother, or wash away invertebrate prey. Reduced salinities can cause estuarine prey to sink deeper into the mud, beyond the reach or foraging shorebirds. Storm-

driven deposition of sediment and debris can degrade the quality of shorebird feeding areas. The sensitivity of shorebirds to such processes is associated with dynamic variation in their use of southern Tomales Bay, which is influenced strongly by runoff from Lagunitas Creek.

Small sandpipers, such as Western Sandpipers and Dunlins, forage on the thin, slimy layer of biofilm that forms on tidally exposed mudflats (Kuwae et al 2008) and provides a nutritious, mucilaginous mixture of microbes and detritus. Heavy runoff during harsh winters might dramatically alter the formation and availability of biofilm for small shorebirds. Therefore, the benefits of restoring shorebird foraging habitat in a seasonally dynamic area such as the Giacomini Wetlands are difficult to determine.

Dynamic hydrographic conditions in the Giacomini Wetlands are likely to be associated with dramatic variation in shorebird use. Although we are seeing clear benefits and increased use of the Giacomini Wetlands by shorebirds, we don't yet know how or when or to what extent this area will benefit these birds. Shorebirds might benefit strongly from the new wetland feeding areas, but numbers are likely to climb and fall dramatically if feeding areas are periodically degraded by heavy winter storms and flooding.

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