

SURVEY OF EGRETS AND HERONS USING COLLEGE OF MARIN ECOLOGICAL STUDY AREA AND ADJACENT SLOUGH

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INTRODUCTION

The Friends of Corte Madera Creek Watershed have a goal of restoring the creek to as close to natural conditions as possible under the constraint that much of the watershed is heavily urbanized. As part of this goal they have undertaken restoration of the College of Marin's (COM) Ecological Study Area (ESA) by replacing exotic vegetation with native trees and shrubs.

The ESA is located in Kentfield, Figure 1. It is bordered on the east, north and part of the west side by a slough, which was the main channel of the creek prior to canalization by an Army Corps of Engineers flood control project. A Marin Sanitary District transfer station is also on the western border. A bike and hiking trail that parallels the creek borders the southern side.

The ESA was a tidal wetland adjacent to Corte Madera Creek that was filled with the hope of eventual development. When it became obvious that development would not be allowed, the property was donated to the COM. A biology teacher used the site for class field trips and ecological studies, but the site was not used for years after his retirement. Exotic plants increased and now dominate the site. The restoration proposal stimulated interest in the site and several COM teachers are now utilizing it for class work.

The restoration project will have long term biological benefits, because there are many more native animal species that are adapted to utilizing native than exotic vegetation. However there are concerns about possible short-term negative impacts. Owners of neighboring properties are concerned about the removal of trees that screen the Marin Sanitary District's transfer station and the heavily used bike and hiking trail. Many people including neighboring property owners and path users enjoy observing egrets and herons that perch in the trees and forage in the slough adjacent to the ESA. These people are concerned that tree removal may reduce the suitability of the site for the birds. Environmental groups such as the Marin Audubon Society also have expressed interest in the restoration project and share this concern.

This report presents results of a survey that I conducted at the request of the Friends of Corte Madera Creek Watershed to obtain a better understanding of use of the ESA and slough by egrets and herons and presents recommendations for restoration and maintenance of the site.

METHODS

I originally planned to tag the site's trees and record the use of each tree by species of egrets and herons on a bi-weekly schedule for one year. I tagged 50 trees in October, 2003 with the help of two COM horticulture students of Fernando Agudelo-Silva. The effort convinced me that it would be impractical to record the use of each tree. Many of the trees are very close together and in many cases it would be necessary to be very close to birds to determine what tree they were actually perched in. The close approach would likely disturb the birds, as happened when I tagged the trees, and would be very time consuming. In addition it soon became apparent that the egrets and herons were only utilizing trees adjacent to the slough and were most visible from the slough side of the trees.

I decided to modify the survey plan. I used a Nikon COOLPIX 4500 digital camera to photograph trees adjacent to the slough that were visible from the trail and McAllister Avenue, Figure 1, and conducted surveys from those two locations. Portions of the slough and adjacent trees were not visible from the two observation locations because of private property and not surveyed. The position of each bird found was noted on copies of the photos. A number of birds were seen foraging or roosting along the edge of the slough but not perched in vegetation. The locations of these birds were also noted. Egrets and Herons were identified to species. Black-crowned Night Herons were classified as adults or juveniles. It was also noted whether a bird was foraging or roosting. Alert birds in the water, at the waters edge, or perched in an alert mode on vegetation (usually less than 1 meter above the water) were recorded as foraging. Non-alert or preening birds, usually perched in vegetation more than 1 meter above the water, were recorded as roosting. Surveys were only done during daylight and usually in the morning. This procedure was used from November, 2003 through March, 2004.

It became obvious that egrets and herons were utilizing almost all of the visible mature trees and shrubs adjacent to the ESA side of the slough. I decided it would be more productive to modify the survey plan again. I stopped recording the locations of the birds and started visiting the site much more frequently. I thought that this modification would provide a more solid data base on frequency and types of utilization of the area by the birds. I followed the revised procedure from April, 2004 through March, 2005 and was visiting the site almost every other day by September, 2004.

RESULTS

I visited the site 142 times between November, 2003 and March, 2005, Table 1. Five species of egrets and herons were observed: (ordered by decreasing abundance) Black-crowned Night- Heron (*Nycticorax nycticorax*), Snowy Egret (*Egretta thula*), Great Egret (*Ardea alba*), Green Heron (*Butorides virescens*) and Great Blue Heron (*Ardea herodias*). When averaged by month, over 4 egrets and/or herons were observed per visit.

The birds were seen in the trees adjacent to the slough on the banks or in the water of the slough, Figures 2 and 3. The dominant tree was the introduced Bailey acacia (*Acacia baileyana*) with a few black acacias (*Acacia melanoxyton*) and two native California buckeyes (*Aesculus californica*). I observed egrets and herons in most of the mature acacias. The birds usually perched on branches that overhung or were very close to the slough. Only one bird of interest, a green heron, was found on a buckeye branch on one of the two buckeyes under observation. The buckeye used by the green heron was on the ESA side of the slough along a stretch that was parallel and close to McAllister Avenue, Figure 3. Egrets and herons did not use acacias along this stretch other than to perch on a dead branch near the water while foraging. The other buckeye was on the opposite side of the slough along a stretch that was parallel and close to the bike and hiking trail, Figure 2. Egrets and herons did not utilize trees along this stretch. More details of tree use are given in the captions of Figures 2 and 3.

Overall egrets and herons used the area more for roosting than feeding, Table 1, but all species other than Black-crowned Night-herons and Great Blue Herons foraged more than roosted there. High averages of combined counts of roosting Great and Snowy Egrets tended to occur when the number of feeding birds was high, Figure 4, and the Spearman's correlation coefficient (0.55) between the two variables was significant at the 95% level of confidence. While the monthly averages were correlated, often on a given visit to the site all of the Snowy Egrets were either feeding or foraging, but not both. The correlation (-0.11) between counts of roosting and feeding Black-crowned Night herons was not significant, Figure 4.

Egret and heron use of the area was highest November-January and then declined to very low levels during the spring nesting season, Figure 5. Numbers fluctuated at modest levels during summer and early fall. October and February were transition months.

DISCUSSION

Most of the live and dead mature trees of the ESA that border the slough were utilized during the day by egrets and herons. Trees that were close to McAllister Avenue and the bike-hiking trail were not. However I often observed egrets and herons foraging along the sides and in the slough in these two areas. Also the foraging birds seldom seemed to be disturbed by passing people and their pets. It seems likely that while the birds do not fear nearby humans while alert, they are adapted to rest in locations less vulnerable to disturbance. This apparent adaptation may serve to both avoid possible predation while not alert and also allow a relatively peaceful rest.

Two species used the area more for roosting than foraging. Great Blue Herons do not frequent the area very often and there are not sufficient data to support any speculation. Black-crowned Night-herons tend to feed at night more than the other species. They likely fed in the slough and/or nearby areas during

the night when I did not make counts, and the ESA trees provide a site near the night foraging areas that is sufficiently disturbance free.

Great Egrets, Snowy Egrets, and Green Herons mostly foraged at the site. There was a considerable amount of data on Snowy Egrets. The data suggest that they may have used the trees for resting while waiting for better feeding conditions in the nearby area and/or while digesting a meal, because often on a given visit to the site all of the Snowy Egrets were either feeding or foraging, but not both.

The nearest documented nesting site for Black-crowned Night-herons and Great and Snowy Egrets is West Marin Island (Shuford 1993) and there are no other significant nesting sites for Black-crowned Night-herons or Snowy Egrets in Marin County. Large numbers of Great Egrets also nest at Audubon Canyon Ranch. If members of these species that used the ESA and slough for foraging during the nesting season were nesting birds, they likely nested at West Marin Island, which is about 6 km away. The Marin Breeding Atlas (Shuford 1993) documented Green Heron breeding in the Lagunitas Creek Watershed and cited documentation of a nest with three young in Ross in 1935. I have observed Green Herons along Corte Madera Creek near the ESA during the nesting season and have speculated that they nest nearby, but have not been able to confirm it. Great Blue Herons nest in small numbers at numerous Marin County locations (Shuford 1993). While little is known about migration patterns of egrets and herons, it seems reasonable to guess that at least some of the birds using the ESA and slough during the non-nesting season nest in Marin County.

RECOMMENDATIONS

While the study was underway, the Friends of Corte Madera Creek Watershed obtained funding to remove some of the trees at site. Based on preliminary results, I advised them that tree removal within the interior of the ESA would not reduce habitat for egrets and herons and many of the interior exotic trees have been removed. The Friends have also planted native trees to replace the exotics. I continue to recommend that it would be safe to remove the interior trees. In addition, it should be safe to remove trees near the bike and hiking trail on the side opposite to the ESA and near McAllister Avenue. It probably would be best to remove trees between April and September when few egrets and herons are at the site. A few other species of birds probably utilize the non-exotic trees for nesting. Tree removal between July and September would minimize disturbance of these birds.

I suggest removal of seedling exotic trees but not mature exotics in the areas utilized by the birds. When an exotic dies from natural causes, I suggest leaving the snag, which egrets and herons will likely continue to use. Native trees could be planted nearby to eventually replace the dead trees. Some native trees have already been planted in relatively open segments of the areas utilized by the birds. When these trees begin to be utilized by egrets and herons, consideration could be given to girdling very nearby exotics. Snags of the girdled

trees should be left standing as recommended for trees dieing from natural causes.

The ESA is now fenced off from public use. There has been some discussion about allowing more frequent public access. I recommend against this and think that access should be limited to occasional restoration and maintenance efforts and controlled use by COM faculty and students. The egrets and herons apparently are not using trees for roosting near McAllister Avenue and the trail because of disturbances by passing humans and their pets. Increase public access to the area could result in increased disturbances sufficient to cause abandonment by the birds.

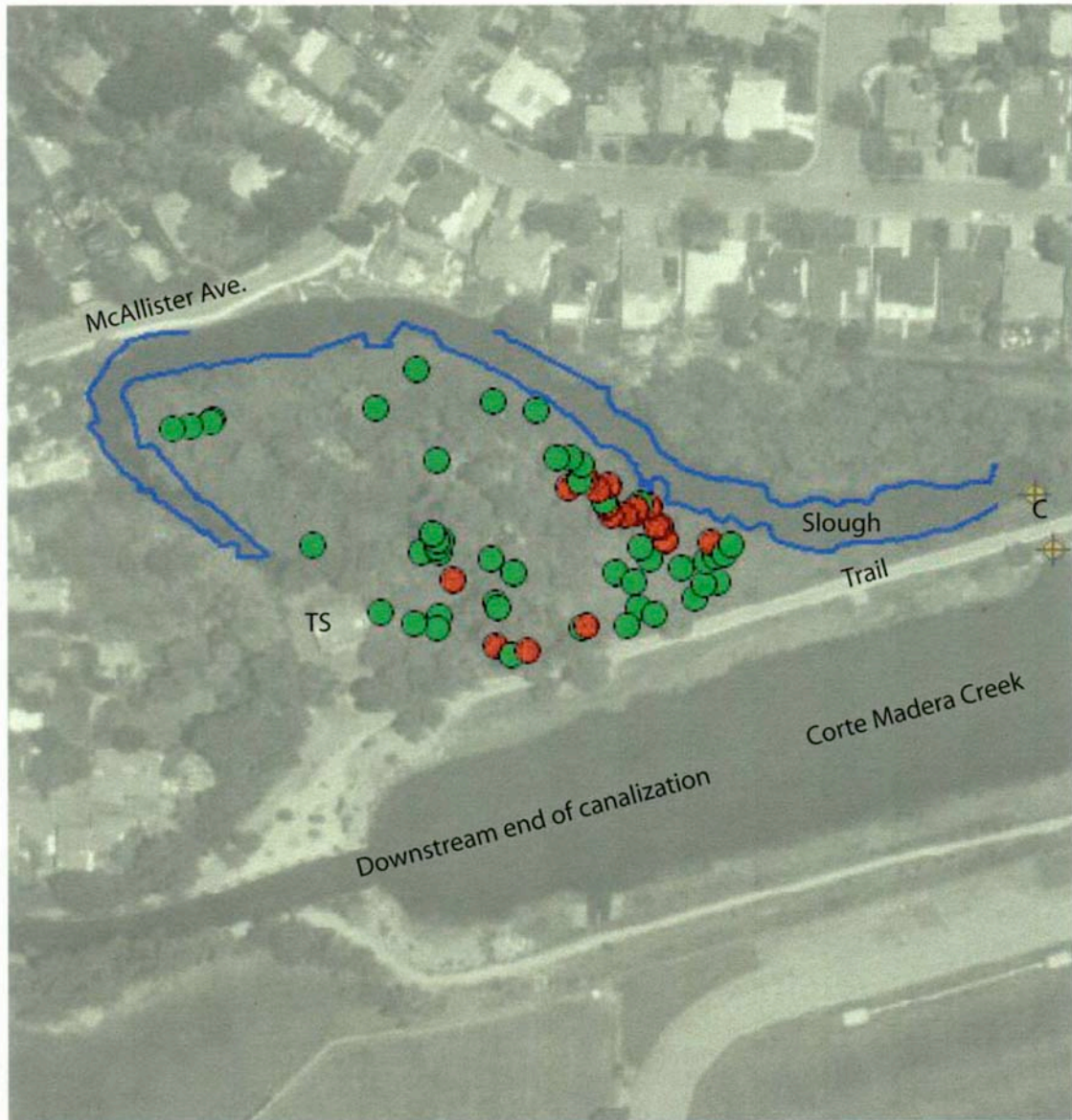
Not only are egrets and herons using the slough for foraging, but I have also observed Double-crested Cormorants, Hooded Mergansers and Belted Kingfishers preying for food there. The slough apparently provides a good habitat for fish that these birds feed on. This habitat is threatened by being filled in with silt. The culvert that connects the slough to Corte Madera Creek does not provide adequate tidal flows and the slough has become noticeably shallower along the trail in recent years. It appears that tidal circulation will eventually be eliminated if the culvert is not improved and the suitability of the slough for fish and foraging be will be significantly impacted. I recommend that the culvert be improved.

Improved circulation may remove some of the sediment, but a careful study of the hydrology of the slough may indicate that some of the sediments should be removed by dredging. Consideration should be given to the desirability of maintaining slopes along the edges that allow wading by foraging egrets and herons. Also there is a sill that now precludes complete drainage of the slough at low tide. On the positive side, the resulting low tide pond provides habitat for fish and their predators. On the negative side, the pond probably increases the rate of silting and may increase the probability of noxious algae blooms. A properly designed reduced sill may result in reduced silting and probability of noxious algae blooms while maintaining the benefits of a low tide pond.

LITERATURE CITED

Shuford, W. D. 1993. The Marin County breeding bird atlas: A distributional and natural history of coastal California birds. California Avifauna Series 1. Bushtit Books, Bolinas Ca. 480 pp.

Figure 1. Map of ESA and surrounding area based on a Spring 2004 GIS project of Melissa Lewis, student of Jim Locke (College of Marin). Melissa determined tree locations April 8, 2004.



LEGEND

- Circles = Trees within the ESA recorded in the GIS layer (red: exotic and green: native)
- S = Marin Sanitary District transfer station
- C = location of culvert connecting the slough to the creek

Note: The background aerial photo is out of date and shows some trees that no longer exist, including some recorded on the GIS layer.

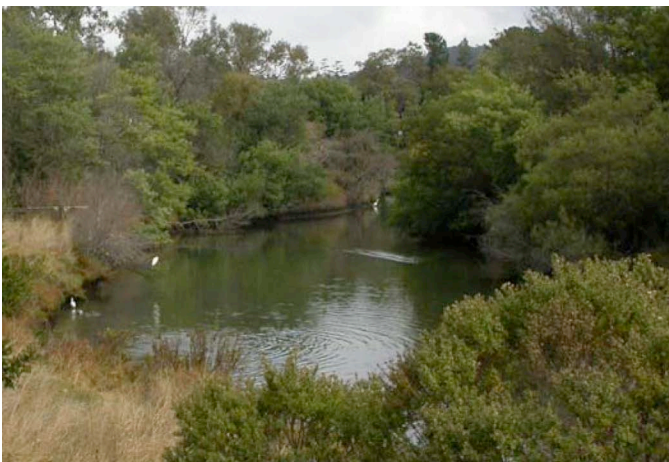
Figure 2. Photos of trees adjacent to slough that are visible from the bike and hiking trail.



A. Viewed from path adjacent to the ESA, a great egret (far bird) and a snowy egret (close bird) forage along the slough. The culvert connecting to the main channel is to the right of the snowy egret. No egrets or herons were observed in the trees seen in this photo.



B. A snowy egret forages along the side of the slough opposite the ESA. Egrets and herons were observed in the trees on both sides of egret.



C. One snowy egret forages along the ESA side of the slough (closest bird), while another forages from a shrub; a great egret forages along the side further up the slough. Egrets and herons were observed in all of the trees on the ESA side of the slough shown here. The coyote brush in the lower right of the photo is very close to the trail, and was never observed being used by herons or egrets.

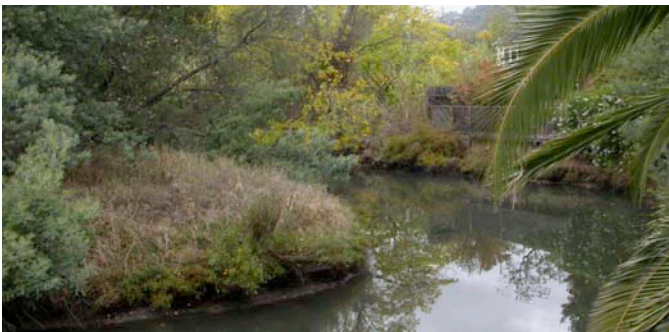
Figure 3. The slough as seen from McAllister Avenue.



A. A snowy egret forages along the ESA side of the slough, looking downstream. During the study, egrets and herons used all of the trees along that side for roosting. Birds were observed standing in the water or walking along the banks throughout the area shown in these three photographs.



B. The California buckeye, here in its dormant stage, was observed only once being used by a green heron and never by egrets. No birds were seen using the live acacias, but were seen several times on the dead branch extending into the slough.



C. Egrets and herons were seldom observed roosting in the living trees in this view of the slough looking upstream.

Figure 4. Monthly average number counted roosting as a function of monthly average number counted feeding at the ESA and slough, November, 2003 to March, 2005.

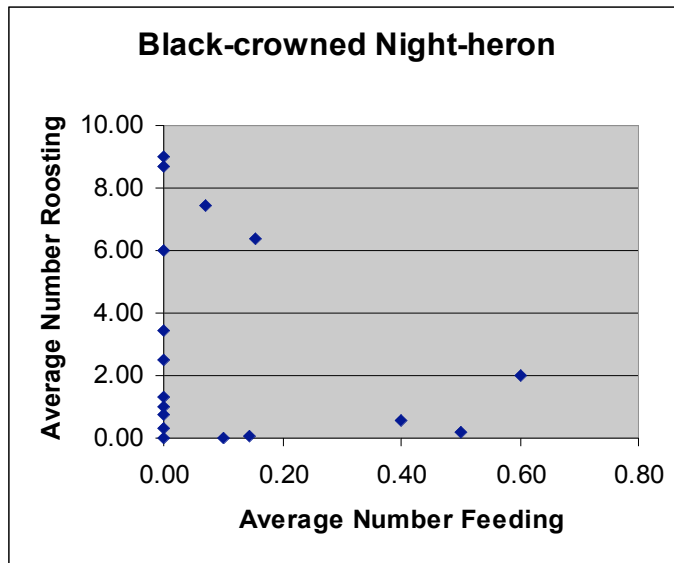
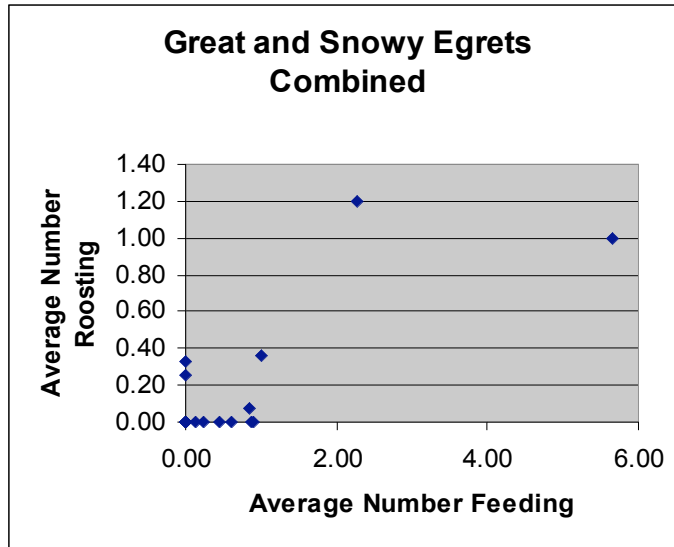


Figure 5. Monthly average combined counts of egrets and herons at the ESA and slough.

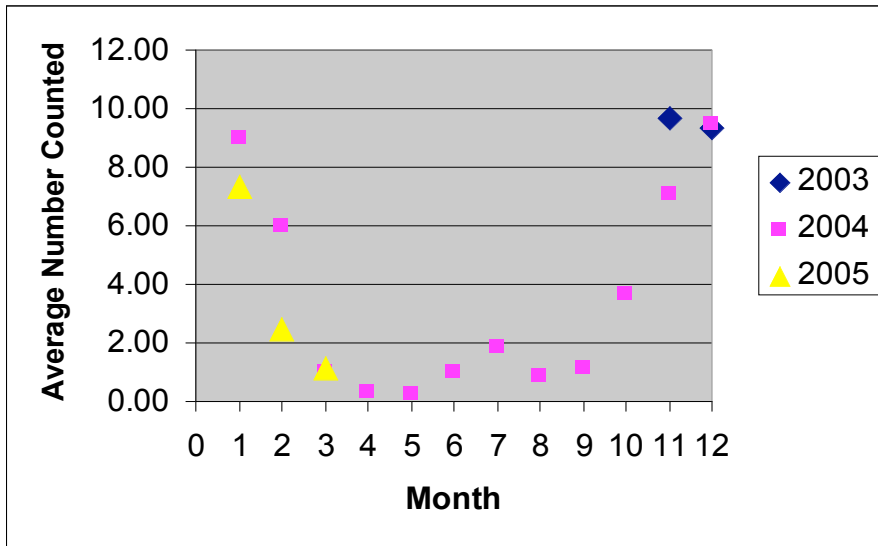


Table 1. Results of surveys of ESA and adjacent slough.

R. signifies roosting; F. signifies foraging.
Species order based on average counts.

Month	Number of Visits	Average Count/Visit													
		Black-crowned Night-heron				Snowy Egret		Great Egret		Green Heron		Great Blue Heron		All Species	
		Adult		Juvenile		R.	F.	R.	F.	R.	F.	R.	F.	R.	F.
		R.	F.	R.	F.										
Nov. 2003	3	1.33	0.33	0.00	0.00	1.00	3.67	0.00	2.00	0.00	1.00	0.33	0.00	2.67	7.00
Dec. 2003	3	6.67	0.00	2.00	0.00	0.33	0.00	0.00	0.00	0.33	0.00	0.00	0.00	9.33	0.00
Jan. 2004	2	7.50	0.00	1.50	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	9.00	0.00
Feb. 2004	2	5.50	0.00	0.50	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	6.00	0.00
Mar. 2004	1	0.00	0.00	1.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.00	0.00
Apr. 2004	3	0.33	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.33	0.00
May 2004	4	0.00	0.00	0.00	0.00	0.25	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.25	0.00
Jun. 2004	4	0.75	0.00	0.00	0.00	0.00	0.25	0.00	0.00	0.00	0.00	0.00	0.00	0.75	0.25
Jul. 2004	10	0.20	0.50	0.00	0.00	0.00	0.40	0.00	0.50	0.00	0.30	0.00	0.00	0.20	1.70
Aug. 2004	10	0.00	0.10	0.00	0.00	0.00	0.50	0.00	0.10	0.00	0.20	0.00	0.00	0.00	0.90
Sep. 2004	14	0.07	0.14	0.00	0.00	0.00	0.79	0.07	0.07	0.00	0.00	0.00	0.00	0.14	1.00
Oct. 2004	15	2.00	0.60	0.00	0.00	0.00	0.80	0.00	0.07	0.00	0.20	0.00	0.00	2.00	1.67
Nov. 2004	15	3.47	0.00	0.00	0.00	1.00	1.67	0.20	0.60	0.00	0.13	0.00	0.00	4.67	2.40
Dec. 2004	14	7.43	0.07	0.00	0.00	0.21	0.79	0.14	0.21	0.00	0.57	0.07	0.00	7.86	1.64
Jan. 2005	13	6.38	0.15	0.00	0.00	0.00	0.46	0.00	0.00	0.00	0.15	0.15	0.00	6.54	0.77
Feb. 2005	14	2.43	0.00	0.07	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	2.50	0.00
Mar. 2005	14	0.53	0.27	0.00	0.13	0.00	0.13	0.00	0.00	0.00	0.07	0.00	0.00	0.53	0.60
All Visits	142	2.62	0.13	0.30	0.01	0.16	0.56	0.02	0.21	0.02	0.15	0.03	0.00	3.16	1.05