

# 2000 JUNO PIER MONITORING REPORT

## Volume II - Lighting and Disorientation Report



Palm Beach County Department of  
Environmental Resources Management



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# **2000 LIGHTING AND DISORIENTATION SURVEYS FOR SOUTH JUPITER AND JUNO BEACH INCLUDING THE JUNO BEACH FISHING PIER**

**Palm Beach County  
Department of Environmental  
Resources Management (ERM)**

## **Introduction**

Surveys to document coastal lighting and marine turtle hatchling disorientation events were permit requirements for the Juno Beach fishing pier (Florida Department of Environmental Protection (FDEP) Permit numbers 502637596 and PB-519) and the Juno Beach shore protection project (DEP 0127642-001-JC and United States Army Corps of Engineers 199706559 (IP-BP)), and were required in the approved sea turtle monitoring plan.

For the Juno Beach fishing pier, night time lighting surveys were required in Marinelife Center (MLC) Zones 1, 4, 5 and 8 (Figure 1) in 1998 (pre-construction) and 1999 (post-construction), and daily surveys of disorientations were also required for one year before construction (1998) and five years after construction (1999-2003). This document shall serve as the second year post-construction report for this project.

In February 2001, the Juno Beach Shore Protection Project was completed and nourished the beach from the north end of Zone 3 south to approximately one-quarter of Zone 7. Night time lighting surveys were required in Zones 1 through 8 in 2000 (pre-nourishment) and 2001-2002 (post-nourishment), and daily surveys of disorientations were also required through 2002. This document shall serve as the pre-construction monitoring report for this project.

## **Method**

On August 7, 2000, ERM and Town of Juno Beach staff surveyed approximately four miles of shoreline in the southern half of the Town of Jupiter and the entire shoreline of the Town of Juno Beach (Zones 1 - 8) (Figure 1). ERM staff conducting the survey included Paul Davis and Allison Holzhausen; Damian Peduto of the Town of Juno Beach was also in attendance. The survey began at 9:00 p.m. and continued until approximately 12:00 midnight. The sky was partly cloudy and hazy due to 3 to 5 foot seas, with a first quarter moon and low tide. The winds were from the southeast at 15 mph. The pier was closed for the night and unlit.

A detailed lighting survey was conducted along the coast, and for each light observed within the survey area [Zones 1 - 8 (southern end of Jupiter to the southern boundary of the Town of Juno Beach)], pertinent data were collected. The data collected included the building name or street name; the number and type of light(s); the location of the light(s) on the building; the approximate shore perpendicular distance of the light(s) from the beach; and a recommendation for correcting the lighting problem (Tables 1 & 2). For Zones 1 through 8, a code was assigned and referenced on location maps (Figures 2 - 9). ERM staff continue to work with property owners in Jupiter (Zones

1 - 4) to bring those lights into compliance. The Juno Beach information (Zones 5 - 8) was summarized and forwarded to the Town of Juno Beach with the understanding that enforcement actions for lights observed would be pursued (Table 2).

Although permit conditions for the Juno Beach fishing pier required stating the wattage of each bulb visible from the beach, this task proved to be virtually impossible. Most of the lights observed were inaccessible from the beach (e.g., located on private property, inside buildings and gated communities, or mounted on poles or traffic lights). Instead, the three panoramic photostations established within Zones 1, 4, 5 and 8 during the August 28, 1998 pre-construction inspection and photographed again during the July 12, 1999 post-construction inspection were photographed again to depict the relative intensities of the lights recorded (Figures 2, 5, 6 and 9). One panoramic photostation was established in each of Zones 2, 3, 6 and 7 during the 2000 survey as required by the Juno Beach shore protection project permit (Figures 3, 4, 7 and 8). Photographs were taken using the automatic exposure feature. Two different cameras were used, which accounts for the differences in exposure between the zones. Because of equipment problems, Zones 1 and 2 were photographed 3 days after the survey, or on August 10, 2000. Lighting conditions, however, were the same as on August 7, 2000. Zones 6 and 7 were photographed on December 18, 2000 and December 26, 2000 respectively, which is outside of sea turtle nesting season; therefore, lighting conditions were not the same as on the August 7, 2000 survey. The photographs show more illumination due to an increased population during the winter season and the Juno Beach Shore Protection Project to the north, which was in operation at the time the photographs were taken. The composite photographs were scanned and printed in a reduced format to facilitate binding (Appendix I). The original full size photographs provide better resolution and are kept on file at ERM.

Surveys for misorientation and disorientation were conducted daily by MLC staff during the morning beach surveys (Zones 1 - 10). Their contract requirements were to monitor all nests that were due to hatch in all zones in their survey area for hatchling tracks, record any tracks that did not directly enter the ocean and collect differentially corrected GPS positions for each disorientation event. All incidents were reported on standard FDEP Disorientation Incident Report Forms and submitted to the Florida Fish and Wildlife Conservation Commission (FWC).

## **Results**

In the pier study area (Zones 1, 4, 5 and 8), approximately ninety light sources were visible from the beach (Table 1). The number of light sources visible from the beach was greatest in Zone 5 (n=46), followed by Zones 1 (n=22), 4 (n=15) and 8 (n=7) (Table 3). Figures 2, 5, 6 and 9 show the locations of the lights listed in Table 1. These data differ from 1999 results, which revealed that Zone 1 (n=28) had the greatest number of lights, followed by Zones 4 (n=22), 8 (n=6) and 5 (n=5).

The major change in lighting was in Zone 5, which increased due to the partial occupancy of the northern building of Ocean Royale, a twelve-story condominium. This accounts for an additional 37 lights, excluding the 4 red aircraft warning lights. It is expected that these numbers will increase again in the 2001 inspection, assuming that both buildings will become almost fully occupied.

The number of disorientation events recorded within Zones 1, 4, 5 and 8 increased from 4 in 1999 to 25 in 2000, and the number of mis- or disoriented hatchlings increased from approximately 270

in 1999 to 1,760 in 2000 (Table 3). Copies of all reports are included as Appendix II.

### **Zone 1 (Control)**

Seven sources of light were visible from Zone 1 (Table 1; see photos Z1: P1, P2 and P3). Ocean Trails, Ocean Royale and Juno Beach are outside Zone 1, but are visible from within Zone 1. Ocean Trails Condominium is located approximately 1.6 miles north of Zone 1. Ocean Trails completed lighting modifications several years ago to comply with Palm Beach County's Sea Turtle Protection Ordinance, but continues to be a source of illumination at least as far south as Zone 4.

Just north of Zone 1, the Jupiter Reef Club has retrofitted six pole mounted parking lot lights to low pressure sodium (LPS) cutoff fixtures with shields in response to enforcement actions initiated by ERM. These lights produce very bright indirect illumination of vegetation and structures near the lights. ERM staff is currently working with the Jupiter Reef Club to improve shielding and modify porch lights, which are occasionally turned on during sea turtle nesting season.

The indirect glow observed on Ocean Crest (west of A1A) was exposed partially as a result of seagrape trimming activities conducted by the Town of Jupiter last year (prior to the 1999 survey and again in 2000) for most of the dunes in MLC Zones 1, 3 and 4. The seagrapes were lowered from 10-15' heights to 6-10' heights with considerable understory trimming at select locations. During 2000, one nest was disoriented in the northern end of Zone 1, resulting in approximately 30 disoriented hatchlings (Table 4). It is unclear from the information recorded on the disorientation report as to whether the Jupiter Reef Club parking lot lights or the glow on Ocean Crest that contributed to these disorientations.

The indirect glow observed at Jupiter by the Sea and Corinthian South was minimal relative to the direct interior lights, which were also identified as a problem the previous two year's surveys. The interior lights at Jupiter Key were only barely visible over the dune and were not visible from ground level.

To the south, the Ocean Club Condominium shielded the ceiling mounted breezeway lights and installed yellow bug lights on the northern side of the building two years ago. However, due to the seagrape trimming in 1999 and 2000, the retrofitted lights and additional floors were further exposed to the beach. These lights were the likely source of illumination for the two disorientation events which resulted in approximately 360 disoriented hatchlings (Table 4). The interior lights at both Ocean Club and Ocean Club II were minimal relative to the exterior lights. The newly occupied Ocean Royale Condominium (located in Zone 5) was clearly visible at least as far as the northern end of Zone 1. Condominiums in the Town of Juno Beach were visible to the south from within all areas of Zone 1. An urban glow from areas to the north and south was evident throughout all survey areas.

### **Zones 4 and 5 (Pier Impact)**

Five sources of light were visible from Zone 4 (Photos Z4: P1, P2 and P3) (Table 1), and three sources of light were visible from Zone 5 (Photos Z5: P1, P2 and P3). Again, Ocean Trails and the condominiums in the Town of Juno Beach were visible throughout these zones. Both Zones 4 and 5 were relatively bright as compared to the 1999 survey, mostly due to the partial occupancy of Ocean Royale. Zones 4 and 5 are proposed for beach nourishment in November 2000. While not



required as part of the pier permit, an additional lighting survey will be conducted after nourishment in an attempt to separate the effects of a wider beach from those of the pier. It is expected that the angles of visibility will increase following the nourishment, and additional lights will be exposed.

Of the twenty lights on the south side of Ocean at the Bluffs South identified during the 1999 inspection, only four were visible during the 2000 inspection (Table 1). These lights were exposed along only about 50 feet of beach for a short period of time during 1999, likely as a result of a wider, higher beach at this location. These lights will probably be further exposed following the beach nourishment.

The three sets of traffic lights at Marcinski Road (Zone 4), Juno Beach Park (Zone 4) and Loggerhead Park (Zone 5) were identified in the previous two inspections, and are now only visible at a long distance north and south of the traffic lights. The modifications made to the traffic lights two years ago, including the installation of deep shields around each lens, the reduction of the wattage of the lights and the installation of vertical louvers over all green lights seem to be working. Because of these modifications, the amount of beach illuminated by these three traffic lights has been substantially reduced. Because traffic is light and the two signals at the parks are for pedestrian crossings, the lights usually remain green at night. The louvers on the green lens create a very narrow view angle preventing the green light from being visible from the beach for approximately 1,600 feet. The yellow and red lights are not louvered for safety reasons but are only illuminated for short periods of time (1 minute or less). This fact, combined with the lower wattage and the lens shields, resulted in less light on the beach as compared to 1998. The long term plan for these traffic lights is to install a fixed span, which will prevent movement of the light and make it easier to maintain the aim of the lights.

Even with these modifications, three disorientation reports suggested that the traffic lights may have contributed to approximately 160 disoriented hatchlings (Table 4). These reports also listed street lights and Ocean Royale Condominium as possible sources of illumination for these disorientations. Because all three of these disorientations headed south toward the pier, then along the pier shadow, it is expected that these disorientations were more likely due to the Juno Beach condominiums or, less likely, the Ocean Royale Condominium.

The pier had a red navigation light located on the seaward end which was visible throughout all survey zones. The louvered LPS fixtures installed in the pier railings were not on at the time of the survey. Palm Beach County Parks manages these lights, and they are off from March 1 to October 31. To the south, the two lights identified at Seaview were visible from both Zones 4 and 5.

The partial occupancy of the north building of Ocean Royale resulted in an increase of 37 lights from 1999. The two twelve story condominium towers are the dominant feature of the landward horizon in the vicinity of the pier and can be observed from Zone 1 south to at least Zone 6. A lighting plan approval was issued by the Town of Juno Beach, but the lights do not yet comply with the approval. The 26 balcony lights on the west side of the north building were clearly visible to the north at least as far as the northern end of Zone 1. These lights, along with the interior lights observed, are the likely source of illumination for three (excluding the three disorientations mentioned above in association with the traffic lights) to six (including the three above) disorientation events in the general vicinity, resulting in the disorientation of approximately 250 to 410 hatchlings (Table 4).

The town has indicated that they will withhold final certificates of occupancy for the project until the lights are modified.

The tennis court lights at Loggerhead Park contribute a substantial amount of indirect illumination on the beach. These lights likely contributed to two (from the south end of Zone 5) to four (from the south end of Zone 5 and the north end of Zone 6) disorientation events, resulting in the disorientation of approximately 75 to 250 hatchlings (Table 4). Soon after this lighting survey, ERM contacted Palm Beach County Parks concerning these lights, and requested that they be placed on a timer. The lights are now turned off by 10:00 p.m. nightly. ERM has recommended that they further investigate a better solution for these lights this winter (following the nourishment). Corrective actions should include a combination of shields and better controls to prevent the lights from remaining on any longer than necessary.

The northern and southern urban glows were also evident throughout the zones. In addition, the illumination from the condominiums located in the Town of Juno Beach to the south was more apparent in Zones 4 and 5.

### **Zone 8 (Control)**

Zone 8 (Photos Z8: P1, P2 and P3) was mostly dark, with only four sources of lights identified within this zone from the scanned photographs. This zone is adjacent to a golf course and the low-rise condominiums in the Town of Juno Beach. The high-rise condominiums located in the Town of Juno Beach to the north was apparent throughout Zone 8. The southern glow, and to some extent the northern glow, were evident from Zone 8.

The interior lights at Cote de la Mer and Royal Homestead were minimal relative to other lights on the beach. There were only three exterior lights visible from this zone (from the Colony and Royal Homestead), and can easily be corrected with shields (Table 1).

During 2000, ten nests were disoriented within Zone 8, resulting in approximately 680 hatchlings being disoriented (Table 3). This was an increase in disorientations from 1999, in which there were only two disorientation events recorded, and approximately 120 disoriented hatchlings (Table 3). This increase in disorientations is likely due to an increased effort by surveyors looking for disorientations. Zone 8 is just south of the proposed beach nourishment, and will also be affected by the project as the sand moves southward and widens the beach.

### **Additional Information**

Additional information on lighting and disorientation outside the pier study limits was collected. The lighting survey conducted for the Town of Juno Beach Code Enforcement documented approximately 100 light sources from 19 units (as compared to 36 in 1999 and 84 in 1998) which were visible from the beach in Zones 5 through 8 (Table 2).

During 2000, for Zones 1 through 10, there were a total of 66 disorientation events, which affected 3,925 hatchlings (as compared to 21 events and 1,287 hatchlings from 1999) (Tables 3 & 4). The majority were from Zone 6 (11 events), Zone 7 (11 events) and Zone 8 (10 events), affecting 785, 547 and 680 hatchlings respectively. Zones 6 and 7 were also the main problem areas within the survey area in 1999. The condominiums in these zones appeared to be the brightest source of light

from all areas of the beach surveyed. The Juno Beach information was summarized and forwarded to the Town of Juno Beach with the understanding that enforcement actions would be pursued.

The MLC staff feels that the disorientations near Donald Ross Road (Zone 6) were caused by the new bright streetlights along Donald Ross Road, which produce an indirect glow on the beach. The continued glow coming from the southwest is a problem that can not be resolved solely through enforcement of lighting ordinances, primarily because the light sources are located inland (outside of the zone of jurisdiction of the ordinance). It appears the best way to prevent indirect illumination of areas east of the crest of the dune is to maintain a dark silhouette along the beach by allowing the dune vegetation, especially seagrapes, to flourish. There has been limited success in controlling seagrape trimming to reduce effects on sea turtles in the survey area. Modifications to coastal vegetation will continue to affect the study area.

### **Summary**

The areas surveyed appeared to be dark relative to other beaches throughout Palm Beach County. Lights that seemed most likely to misorient and/or disorient sea turtles in the pier study area were Ocean Royale (Zone 5), the tennis court lights at Loggerhead Park (Zone 5), Juno Beach Condominiums (Zones 6 - 8) and the glow to the south (all Zones).

Table 3 is a comparison of 1998, 1999 and 2000 data for each zone. In 2000, the control Zones (1 and 8) had a total of 29 lights (down from 34 in 1999) visible from the beach, while the impact Zones (4 and 5) had 61 lights (up from 27 in 1999) visible. The number of lights in Zones 1 and 4 decreased slightly from 1999, while the number in Zone 5 increased considerably. This increase is mostly due to the partial occupancy of Ocean Royale Condominium. The number of lights in Zone 8 remained relatively the same as in 1999, with an increase of only one light.

In 2000, the control zones (1 and 8) had thirteen disorientation events resulting in approximately 1,070 disoriented hatchlings, while the impact Zones (4 and 5) had twelve disorientation events resulting in approximately 690 disoriented hatchlings. A total of 25 disorientation events (approximately 1,760 disoriented hatchlings) were reported in the pier survey areas: three in Zone 1, five in Zone 4, seven in Zone 5 and ten in Zone 8 (Table 3). The increase in disorientations is likely partially due to an increased effort by the surveyors, especially in Zone 8, where there were no notable changes in the conditions on the beach. However, the increase in disorientations in Zones 4 and 5 are likely due to the partial occupancy of Ocean Royale Condominium. It is expected that there will be even more disorientations in 2001 as Ocean Royale becomes more fully occupied. There continues to be no evidence of hatchling orientation problems associated with the pier, which is expected since there were no lights illuminated on the pier (except for the red navigation lights).

It is expected that, in future surveys, Zones 4 and 5 will have a greater potential for change in the number of lights visible due to the combined effects of an increased occupancy of Ocean Royale Condominium and beach widening. Additional tall condominiums (e.g., Ocean Grande) are under construction in Zone 1 and should also affect future surveys.

ERM is continuing to work with property owners and municipalities to correct any lighting problems observed. However, the beach profile and angles of visibility are continually changing due to both

natural processes and human activities on the beach (e.g., construction, beach nourishment and seagrape trimming). ERM will continue to routinely conduct lighting surveys and work to modify the lights which are observed from the beach.



**Table 1. Beachfront Lighting Inspection for Juno Beach Fishing Pier - August 7, 2000. See Figures 2, 5, 6 and 9 for map code locations.**

MAP CODE	ZONE	BLDG/ADDRESS	#/TYPE	LOCATION	FT to BCH	RECOMMENDATION
1	1	Ocean Crest	mercury vapor glow on wall <sup>1</sup>	S side	300	Shield N side of lights
2	1	Jupiter Reef Club	1 incandescent landscape light	Middle unit, S side	100	Shield
3	1	Jupiter Reef Club	2 shielded pole mounted LPS <sup>1</sup>	Parking lot	40	Extend the shield
4	1	Jupiter by the Sea	2 interior <sup>1,2</sup>	N building, top floor	300	Draw drapes or turn off
5	1	Jupiter by the Sea	mercury vapor glow on all bldgs. <sup>1,2</sup>	N&E sides of 2 S bldgs. & E side of N bldg.	300	Shield lights from walls & reduce wattage
6	1	Jupiter by the Sea	1 interior	SE corner of S bldg, 2 <sup>nd</sup> floor from top	150	Draw drapes or turn off (brightest light on beach)
7	1	Corinthian South	glow on wall	N, S and E sides	200	Shield lights & reduce wattage
8	1	Jupiter Key	2 interior ceiling fan lights	S unit	150	Draw drapes or turn off (bright)
9	1	Ocean Club	8 shielded ceiling mounted indirect catwalk <sup>1,2</sup>	N side, top 2 floors	300	Extend shields & install low watt bugs/install recessed downlight
10	1	Ocean Club	glow on walls	S & NE sides	300	Shield lights & reduce wattage
11	1	Ocean Club	1 interior	SW unit, top floor	300	Draw drapes or turn off (dim)
12	1	Ocean Club II	interior	2 <sup>nd</sup> unit from N	200	Draw drapes or turn off
13 <sup>^</sup>	4	Ocean at the Bluffs S	4 flourescent wall packs <sup>1</sup>	S Catwalk	300	Shield (next year)
14	4	A1A @ Marcinski	traffic signal (4-2 in each dir.) <sup>1,2</sup>	Visible from S	70	Fixed span
15	4	A1A @ Juno Bch Park	traffic signal (4-2 in each dir.) <sup>1,2</sup>	2 visible from N and 2 from S	70	Fixed span
16	4	Pier	1 red navigation strobe	E end pier	300	NA

**Table 1. Beachfront Lighting Inspection for Juno Beach Fishing Pier - August 7, 2000. See Figures 2, 5, 6 and 9 for map code locations.**

MAP CODE	ZONE	BLDG/ADDRESS	#/TYPE	LOCATION	FT to BCH	RECOMMENDATION
17	4	Seaview	2 interior spots	SE bldg	100	Draw drapes or turn off
18	5	Ocean Royale <sup>3</sup>	4 red aircraft warning lights <sup>1</sup>	Top corners, visible to N, E, S (both bldgs)	300	NA
19	5	Ocean Royale <sup>3</sup> (from north)	2 yellow	N bldg, N balcony, 4 <sup>th</sup> floor from top	300	Shield or change fixture
20	5	Ocean Royale <sup>3</sup> (N)	26 yellow	N bldg, W balcony	300	Shield or change fixture
21	5	Ocean Royale (from south)	interior built-in lighting	N bldg, 3 <sup>rd</sup> floor from top, 2 <sup>nd</sup> unit from north	300	Draw drapes or turn off
22	5	Ocean Royale (S)	8 other interior lights	N bldg E side	300	Draw drapes or turn off
23	5	Loggerhead Park	VERY BRIGHT indirect glow	Tennis court lights	500	Turn off at dark and/or shield
24	5	A1A @ Loggerhead Park	pedestrian signal (4-2 in each dir.) <sup>1,2</sup>	Visible from N	50	Fixed span
25	8	Cote de la Mer	3 interior <sup>1</sup>	E side	150	Draw drapes or turn off
26	8	Colony (from north)	2 white incandescent lights	N bldg, W side	150	Shield
27	8	Royal Homestead	white incandescent light	W side catwalk	150	Shield
28	8	Royal Homestead	interior	SE unit	100	Draw drapes or turn off
			<b>90 Light Sources Total</b>			

<sup>1</sup> Same problems identified in 1999 inspection.

<sup>2</sup> Same problems identified in 1998 inspection.

<sup>3</sup> Visible from Zone 4 (to the north).

**Table 2. Lighting survey conducted for the Town of Juno Beach Code Enforcement. See Figures 7 and 8 for map code locations.**

**Beachfront Lighting Inspection at Juno Beach  
by Allison Holzhausen and Damian Peduto  
August 7, 2000, beginning at 9:00 p.m. (north to south)**

<u>Map Code</u>	<u>Location</u>	<u>Zone</u>	<u>Problem</u>	<u>Recommendation</u>
See Table 1	Seaview	4	middle building - 2 interior ceiling	draw drapes & turn off when not home
See Table 1	Ocean Royale	5	from north: N bldg. - 26 yellow balcony lights (west side)	shield or change fixture
See Table 1	Ocean Royale	5	N. bldg. - 2 yellow balcony lights (north side)	shield or change fixture
See Table 1	Ocean Royale	5	4 red aircraft lights	NA
See Table 1	Ocean Royale	5	from south: N bldg. - 3 <sup>rd</sup> floor from top/2nd unit from north interior built-in lighting	draw drapes or turn off
See Table 1	Ocean Royale	5	N bldg. - 7 other units w/ interior	draw drapes or turn off
See Table 1	Ocean Royale	5	6 red aircraft lights	NA
1	Loggerhead	6	HUGE glow from tennis courts lights Park	close park at dark during st season
2	San Remo	6	northern and southern most lantern style lights w/ 3 small candle lights	disconnect or shield
3	San Remo	6	3 <sup>rd</sup> unit from south - interior	draw drapes or turn off
4	Bet. San Remo & Shakelton Duplex	6	amber cobra drop lens streetlight on E. side of road (visible from both the N & S of duplex)	work with FPL to shield and install flat lens

**Table 2 (continued). Lighting survey conducted for the Town of Juno Beach Code Enforcement. See Figures 7 and 8 for map code locations.**

<u>Map Code</u>	<u>Location</u>	<u>Zone</u>	<u>Problem</u>	<u>Recommendation</u>
5	The Surf	6	amber incandescent wall mounted at NW of parking	turn off or shield
6	The Surf	6	interior white lights from parking windows	shield or shade windows
7	The Surf	6	from N - NW corner (near stop sign) pole mounted lantern style fluorescent	shield or redirect
8	The Surf	6	lanterns w/ yellow bug around pool deck <sup>1,2</sup>	much better - repaint shields as necessary
9	The Surf	6	ceiling fluorescent double tube in S stairwell <sup>1,2</sup>	ceiling mounted shield on east side ~3' x 1' or shade window
10	To south of	6	N amber drop lens cobra streetlight on W side road <sup>1,2</sup>	work with FPL to shield and install flat lens
11	The Surf		S amber drop lens cobra streetlight on E side road <sup>1,2</sup>	
12	The Tower	6	from north - 8 ceiling yellow incan. in W stairwell <sup>1,2</sup> (top 8 floors visible)	ceiling mounted shield on north side
13	The Tower	6	various interior	ask manager to remind residents to draw drapes or turn off
14	The Tower	6	south pool deck - 4 wall mounted white fluorescent	shield
15	Waterfront	6	various interior	ask manager to remind residents to draw drapes or turn off
16	Waterfront	6	indirect glow on S side of bldg. from pool (also on N side of 700 Ocean Dr. northern house)	turn off pool light at dark during st season
17	700 Ocean Dr.	6	2 <sup>nd</sup> house from N - uplight in palm tree	remove any uplights

**Table 2 (continued). Lighting survey conducted for the Town of Juno Beach Code Enforcement. See Figures 7 and 8 for map code locations.**

<u>Map Code</u>	<u>Location</u>	<u>Zone</u>	<u>Problem</u>	<u>Recommendation</u>
18	700 Ocean Dr. (continued)	6	1 <sup>st</sup> & 2 <sup>nd</sup> houses from S - uplights	remove any uplights
19	Juno by the Sea	7	from north - 4 stories of ceiling mounted yellow incandescent stairwell	shield
20	Juno by the Sea	7	from north - 3 <sup>rd</sup> floor from top, 2 <sup>nd</sup> unit from east porch wall mounted white incandescent	shield
21	Juno by the Sea	7	1 pole mounted shoebox in S. parking lot <sup>1,2</sup> (east one already off)	shield S and E sides
22	Juno by the Sea	7	2 pole mounted shoebox in N. parking lot <sup>1,2</sup> (east one already off)	shield S and E sides
23	Oceanfront at JB	7	uplights in palm trees in east yard	remove any uplights
24	Oceanfront at JB	7	various interior	ask manager to remind residents to draw drapes or turn off
25	Beachfront	7	various interior	ask manager to remind residents to draw drapes or turn off
26	Brigadoon	7	2-3 ceiling mounted yellow incandescent at pool house	shield east (NE or SE)
27	Nydal	7	N unit on W side - white wall mounted porch (worst problem of the night)	remove or shield & change to yellow
28	Nydal	7	interior ceiling fan light	turn off or draw drapes

**Table 2 (continued). Lighting survey conducted for the Town of Juno Beach Code Enforcement. See Figures 7 and 8 for map code locations.**

<u>Map Code</u>	<u>Location</u>	<u>Zone</u>	<u>Problem</u>	<u>Recommendation</u>
29	Pelican Walk	7	N side - uplights in palm trees	remove any uplights
30	Pelican Walk	7	SE house on Alicante - S wall glow	shield
See Table 1	Cote de la Mer	8	3 interior on E. side	turn off or draw drapes
See Table 1	Colony	8	from north - W side catwalk of N building: white incandescent lights	shield
See Table 1	Royale Homestead	8	W side white incandescent catwalk lights	shield
<b>Total (19 units):</b>	<b>100 lights</b>			

<sup>1</sup> Same problems identified in 1999 inspection (copy attached).

<sup>2</sup> Same problems identified in 1998 inspection (copy attached).

Note: The 1999 survey referenced 8 sources resulting in 36 lights and the 1998 survey referenced 13 sources resulting in 84 lights.



**Table 3. Summary of lights and disorientation for all Zones (Zones 1 through 10) and for the Juno pier study area (Zones 1, 4, 5 and 8) for 1998, 1999 and 2000.**

	Zone 1			Zone 2			Zone 3			Zone 4			Zone 5			Zone 6			Zone 7			Zone 8			Zone 9			Zone 10			Total		
	98	99	00	98	99	00	98	99	00	98	99	00	98	99	00	98	99	00	98	99	00	98	99	00	98	99	00	98	99	00	98	99	00
# Light Sources	14	28	22	0	0	0	0	0	0	3	22 <sup>1</sup>	15	1	5	46 <sup>2</sup>	0	19	29	1	8	18	4	6	7	-	-	-	-	-	-	23	88	137
# Disorientation Events	0	1	3	?	?	4	?	?	0	0	1	5 <sup>3</sup>	0	0	7	?	?	11	?	?	11	2	2	10	?	?	9	?	?	6	2	4	66
# Disoriented Hatchlings	0	70	390	?	?	215	?	?	0	0	80	310	0	0	380	?	?	785	?	?	547	160	120	680	?	?	353	?	?	265	160	270	3925

Juno Pier Study Area	Zone 1			Zone 4			Zone 5			Zone 8			Sub Total		
	98	99	00	98	99	00	98	99	00	98	99	00	98	99	00
# Light Sources	14	28	22	3	22 <sup>1</sup>	15	1	5	46 <sup>2</sup>	4	6	7	22	61	90
# Disorientation Events	0	1	3	0	1	5 <sup>3</sup>	0	0	7	2	2	10	2	4	25
# Disoriented Hatchlings	0	70	390	0	80	310	0	0	380	160	120	680	160	270	1760

<sup>1</sup> 20 of these lights were visible from only ~50 feet of beach.

<sup>2</sup> 41 of these lights (4 of the same ones identified during 1999 and 37 additional lights) were from Ocean Royale, which became partially occupied during the time period between the 1999 and 2000 lighting inspection.

<sup>3</sup> The increase in disorientations in Zone 4 in 2000 is partially due to the increase in lighting associated with Ocean Royale, which is located in Zone 5, but also in visible from the beach in Zone 4. A portion of the overall increase in disorientations in 2000 is likely due to an increase in effort by the surveyors on the beach.

? These data were collected during previous years, but no analyses or reporting was required as a part of any permit requirements; therefore, these data are not provided in this report.

- No lighting survey conducted in Zones 9 and 10.

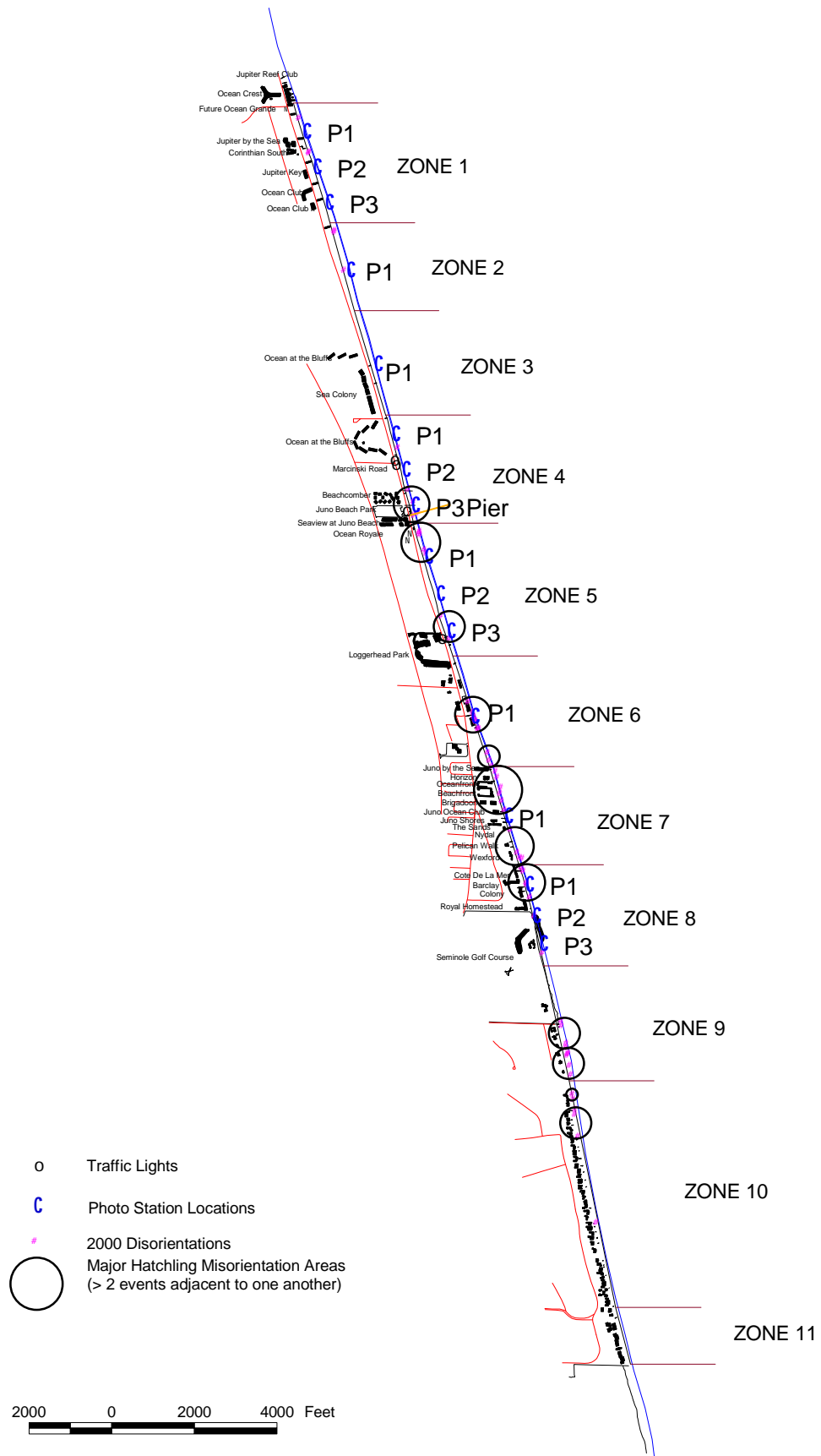
Note: The pier is located in Zone 4, just north of the Zone 4/5 boundary.

**Table 4. Summary of disorientation reports for Zones 1 through 10 for 2000 (arranged north to south).**

Date	MLC Zone	# Disoriented	Referenced Light	Likely Light
8/8/00	1I	30	Ocean Grande crane	Ocean Crest or Jupiter Reef Club
8/1/00	1F	300	Ocean Grande crane	Ocean Club
7/27/00	1F	60	condo	Ocean Club
8/8/00	2F	50	-	urban glow to south
8/19/00	2F	100	-	urban glow to south
8/8/00	2D	50	-	urban glow to south
6/26/00	2	15	-	urban glow to south
8/8/00	4E	50	-	Ocean Royale
7/21/00	4C	80	traffic light/pier/condo	Juno condos or Ocean Royale
7/21/00	4B	30	traffic light/pier/condo	Juno condos or Ocean Royale
7/21/00	4A	50	traffic light/pier/condo	Juno condos or Ocean Royale
7/29/00	4A	100	-	urban glow or Juno condos
8/4/00	5J	50	-	Ocean Royale or urban glow or Juno
9/2/00	5J	100	-	Ocean Royale or urban glow or Juno
8/29/00	5J	100	-	Ocean Royale
7/25/00	5I	15	-	urban glow or Juno condos
8/23/00	5H	40	-	urban glow or Juno condos
7/29/00	5D	25	-	tennis court lights or Juno condos
8/4/00	5B	50	-	tennis court lights or Juno condos
7/11/00	6A	130	San Remo Condominium	San Remo Condominium
7/28/00	6C/D	70	parking garage w/ glass	Surf or Tower Condominiums
9/2/00	6D	75	-	tennis court lights or Juno condos
7/28/00	6D	100	boat?	Juno condos or urban glow to south
9/1/00	6D	100	-	tennis court lights or Juno condos
7/7/00	6C/D	30	parking garage	Juno condos or urban glow to south
7/27/00	6E	60	condo/street light	streetlight or Juno condos
7/21/00	6E	15	condo?	Juno condos or urban glow to south
8/9/00	6G	100	-	Juno condos/development
9/1/00	6G	30	-	Juno condos/development
8/18/00	6G/7A	75	-	Juno condos/development
8/4/00	7A	100	-	Juno condos/development
7/21/00	7A	50	condo	Juno condos/development
8/29/00	7B	25	-	Juno condos/development
7/27/00	7B	12	condo/street light?	Juno condos/development

**Table 4 (continued). Summary of disorientation reports for 2000 (arranged north to south).**

<b>Date</b>	<b>MLC Zone</b>	<b># Disoriented</b>	<b>Referenced Light</b>	<b>Likely Light</b>
8/19/00	7C	25	-	Juno condos/development
7/21/00	7C	60	condo	Juno condos/development
7/28/00	7E	60	boat?	Juno condos/development
7/11/00	7F	110	Cote de la Mer	Juno condos/development
8/19/00	7G	15	-	Juno condos/development
8/17/00	7G	40	-	Juno condos/development
7/27/00	7G	50	condo/single-family home?	Juno condos/development
7/11/00	8A	120	condo (Mexican style)	low level condos
8/18/00	8A	100	-	low level condos
8/23/00	8A	50	-	low level condos
7/10/00	8A/B	25	-	low level condos
7/28/00	8B	30	boat?	low level condos
7/11/00	8B	90	condo	low level condos
7/11/00	8B	120	condo?	low level condos
8/4/00	8C	75	-	low level condos
7/28/00	8D	40	-	urban glow
7/27/00	8G	30	condo/boat?	urban glow
7/22/00	9E	14	condo	urban glow
7/27/00	9F	100	single-family	urban glow
8/1/00	9G	50	-	urban glow
7/25/00	9G	20	-	urban glow
9/1/00	9H	40	-	single-family homes or urban glow
8/24/00	9H	40	-	single-family homes
7/22/00	9H	9	condo	single-family homes
7/27/00	9H	20	condo/boat?	single-family homes
8/4/00	9	60	-	single-family homes
7/27/00	10B	25	condo/boat?	single-family homes
7/7/00	10B	20	-	single-family homes
8/4/00	10C	75	-	single-family homes
8/25/00	10C	50	-	single-family homes
7/27/00	10E	20	condo/boat?	single-family homes
8/23/00	10K	75	-	single-family homes
<b>Total</b>	<b>66</b>	<b>3925</b>		



- o Traffic Lights
- C Photo Station Locations
- 2000 Disorientations
- Major Hatchling Misorientation Areas (> 2 events adjacent to one another)



Department of Environmental Resources Management

FIGURE 1.  
 LOCATIONS OF PHOTO STATIONS AND  
 MAJOR HATCHLING MISORIENTATION AREAS  
 ALL ZONES, 2000

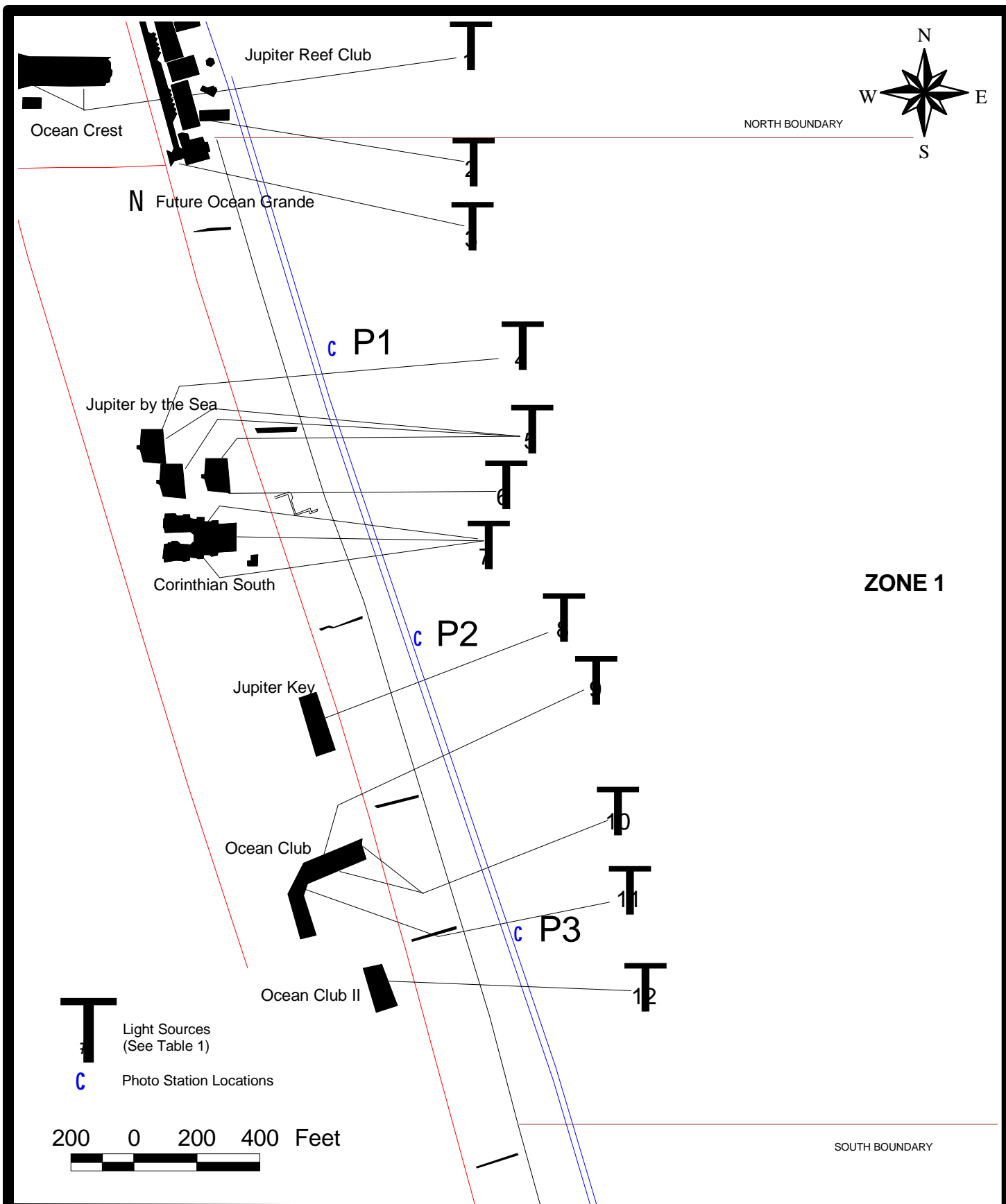
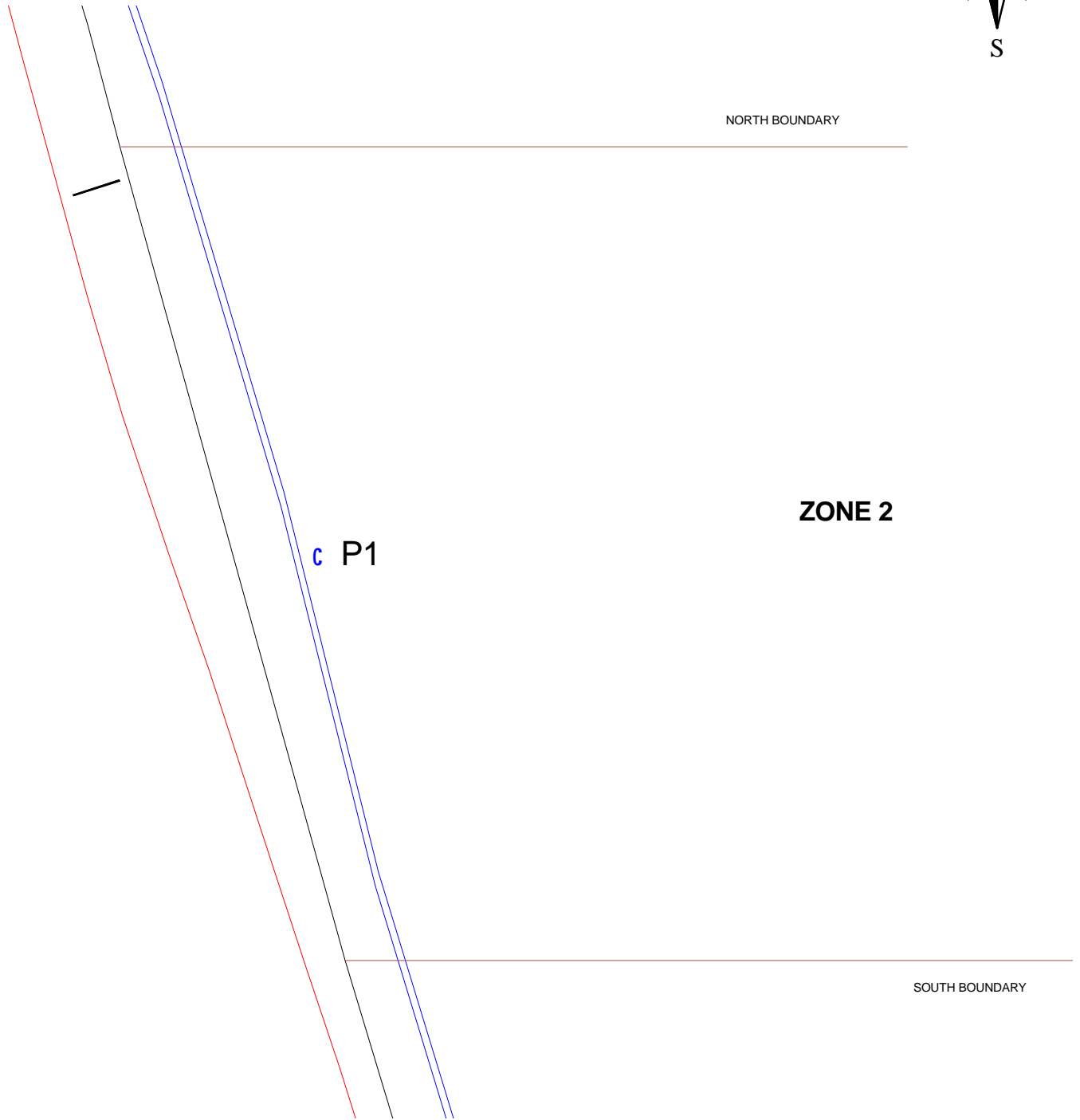
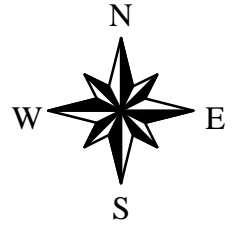


FIGURE 2.  
 LOCATIONS OF PHOTOSTATIONS AND LIGHT SOURCES.  
 ZONE 1, 2000



Department of Environmental Resources Management



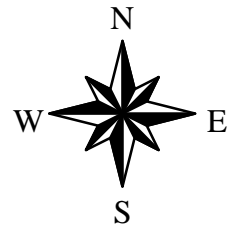
**c** Photo Station Locations



Department of Environmental Resources Management

FIGURE 3.  
LOCATIONS OF PHOTOSTATIONS.  
ZONE 2, 2000





NORTH BOUNDARY

Zone 3

c P1

Sea Colony

c Photo Station Locations

SOUTH BOUNDARY

Ocean at the Bluffs

200 0 200 400 Feet



Department of Environmental Resources Management

FIGURE 4.  
LOCATIONS OF PHOTOSTATIONS.  
ZONE 3, 2000

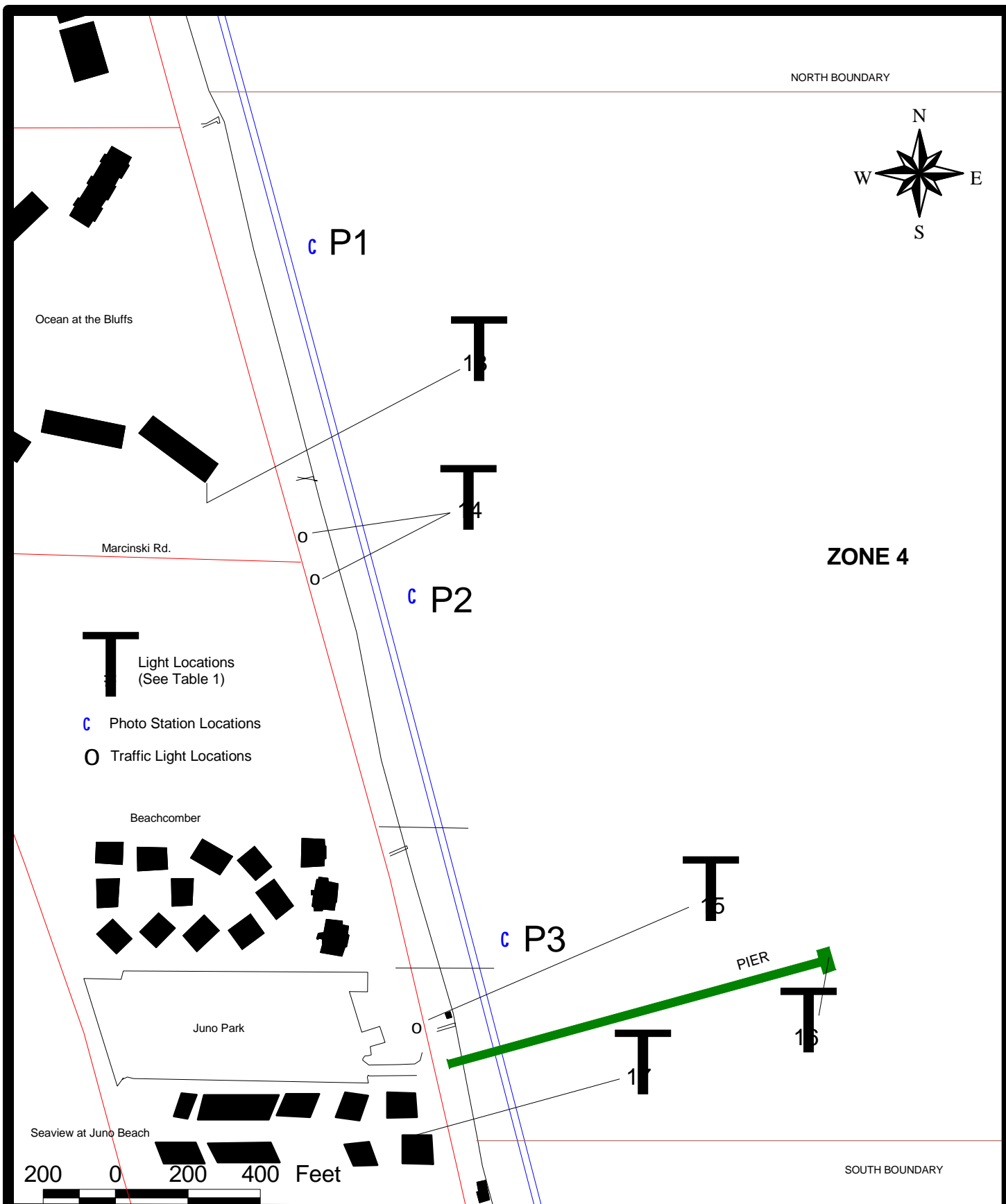


FIGURE 5.

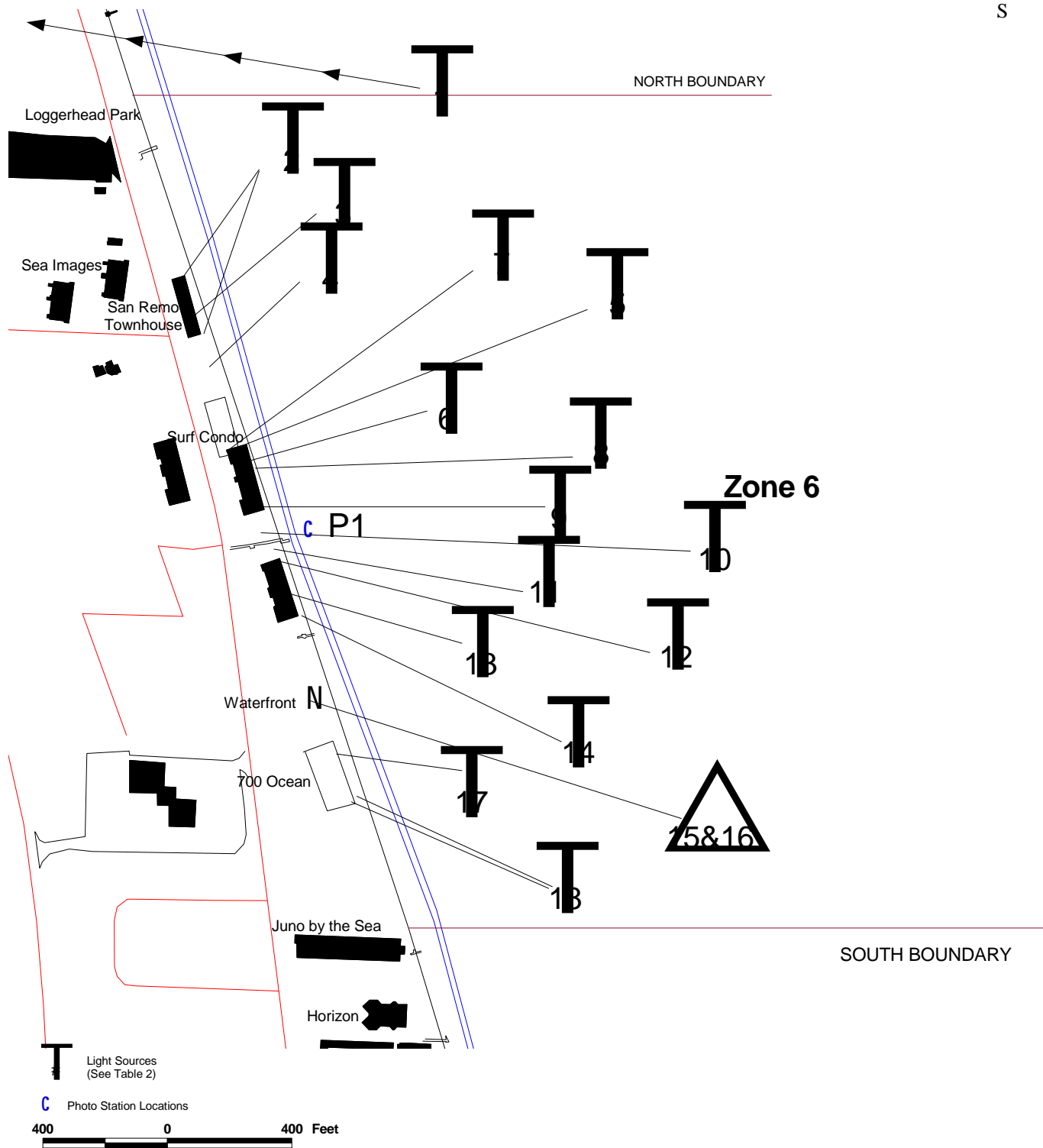
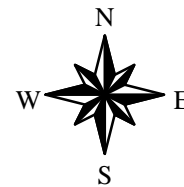
LOCATIONS OF PHOTO STATIONS AND LIGHT LOCATIONS.

ZONE 4, 2000



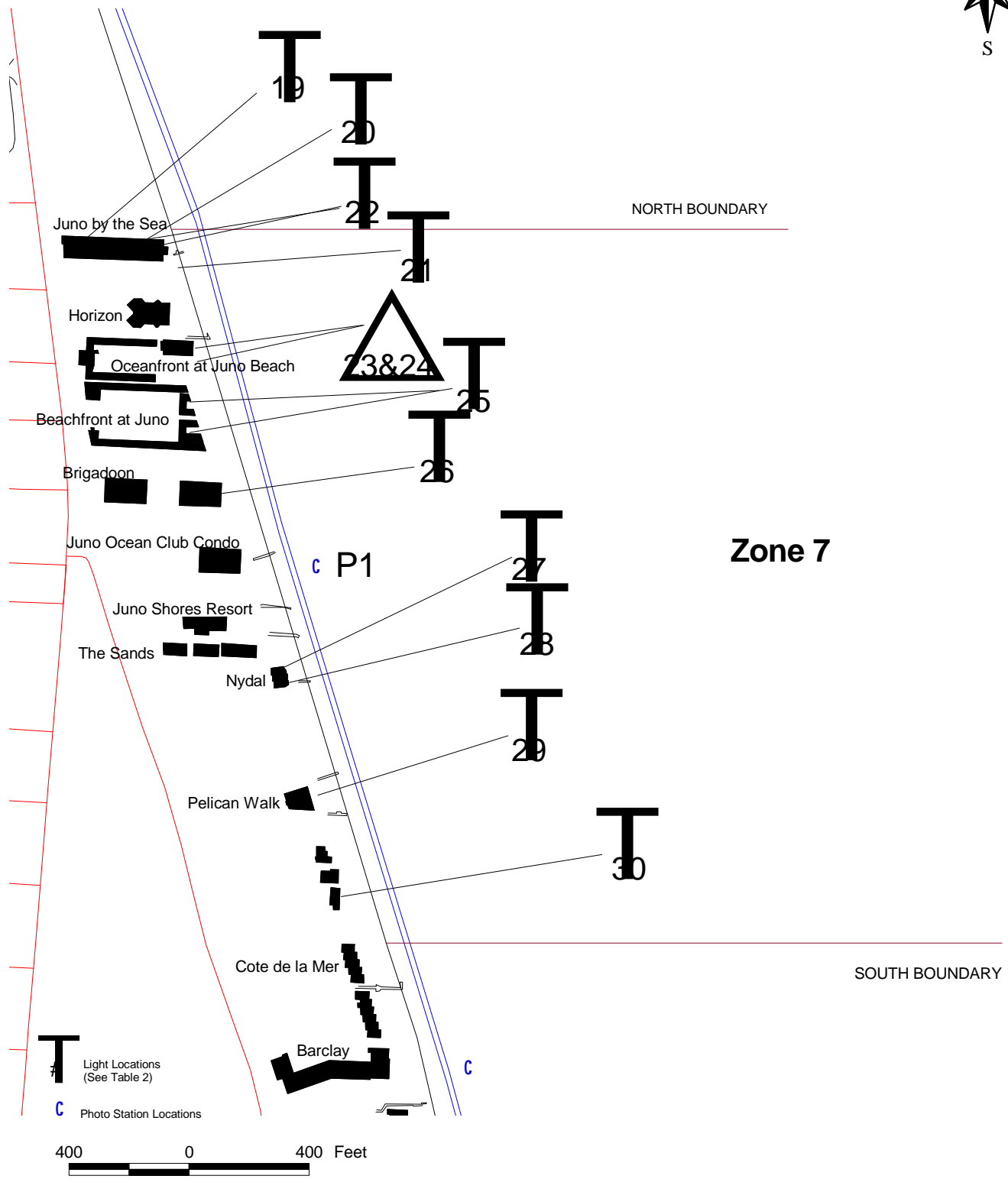
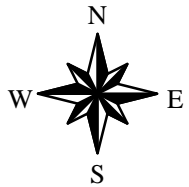
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FIGURE 7.  
LOCATIONS OF PHOTOSTATIONS AND LIGHT SOURCES.  
ZONE 6, 2000



Department of Environmental Resources Management

FIGURE 8.  
LOCATIONS OF PHOTOSTATIONS AND LIGHT SOURCES.  
ZONE 7, 2000

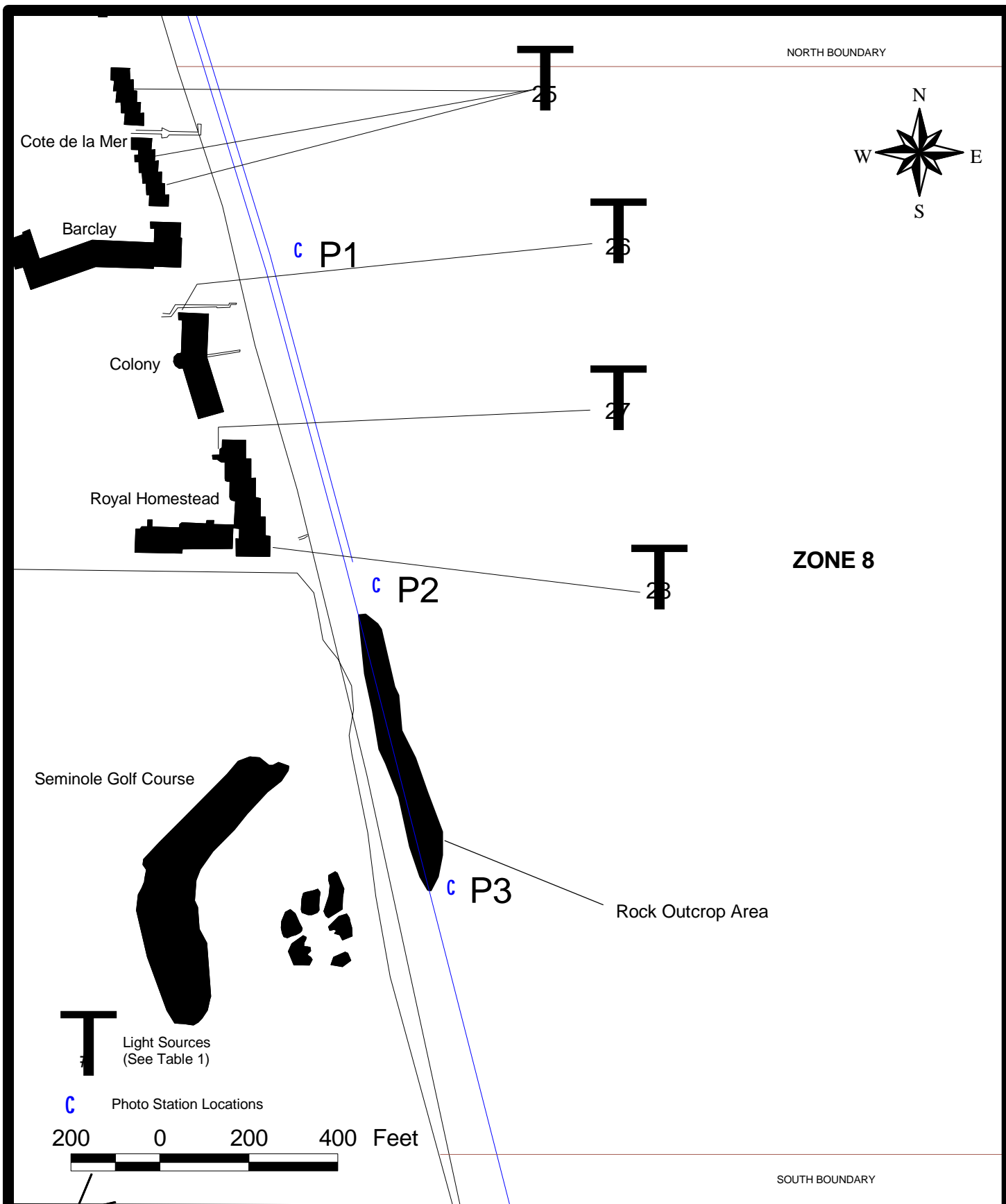


FIGURE 9.  
 LOCATIONS OF PHOTO STATIONS AND LIGHT SOURCES  
 ZONE 8, 2000



Department of Environmental  
 Resources Management



APPENDIX I

PANORAMIC PHOTOSTATIONS

ZONES 1 THROUGH 8







Jupiter Reef Club

Oranithia South  
Jupiter by the Sea

Ocean Trails  
Zone 1 (Z1)  
Photostation 3 (P3)  
801000

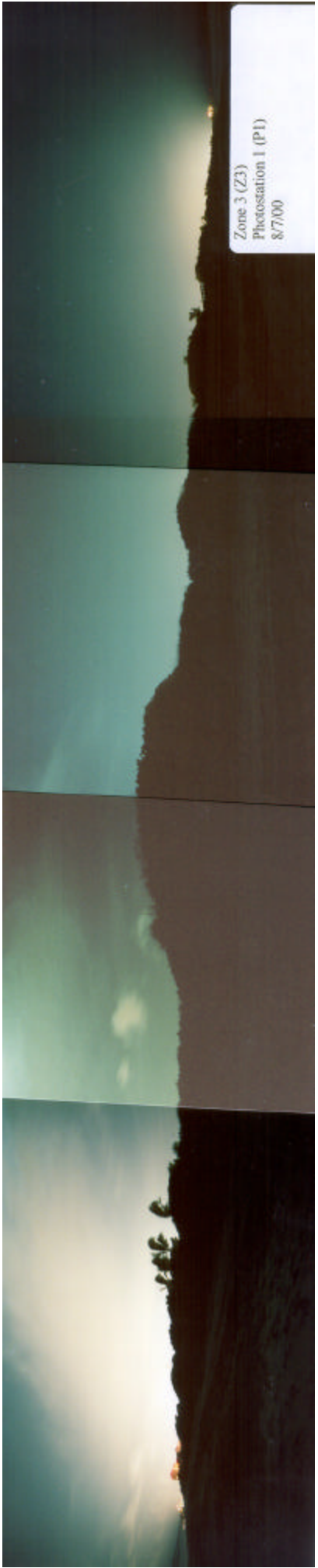
Ocean Club

Ocean Club

AUG 10 200

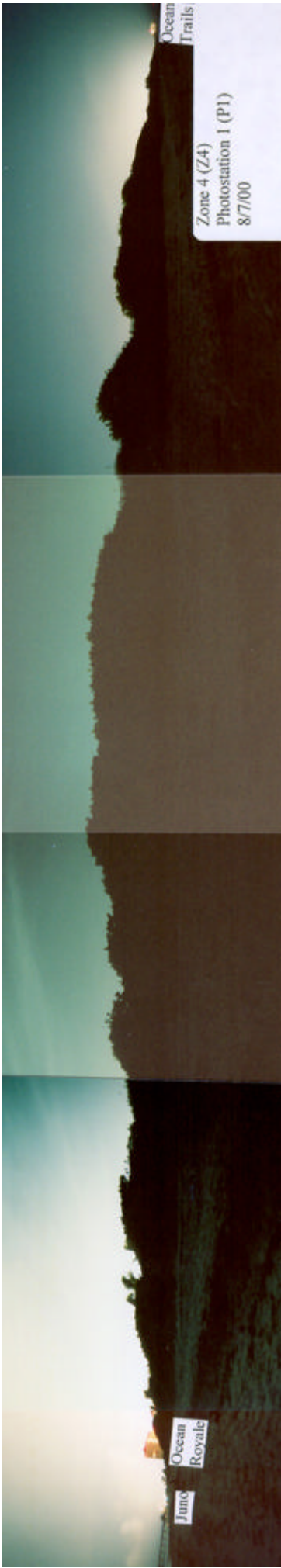
Lance Ocean Royals





Zone 3 (Z3)  
Photostation 1 (P1)  
8/7/00





June  
Ocean  
Royale

Ocean  
Trails  
Zone 4 (Z4)  
Photostation 1 (P1)  
8/7/00



Ocean  
Trails

Zone 4 (Z4)  
Photostation 2 (P2)  
8/7/00



Marcinski  
Road



Ocean  
Royale

Imco



Juno

Ocean Seriview  
Royale

Juno  
Park

Juno  
Park

Ocean Seriview  
Royale

Ocean  
Trails

Zone 4 (Z4)  
Photostation 3 (P3)  
8/7/00

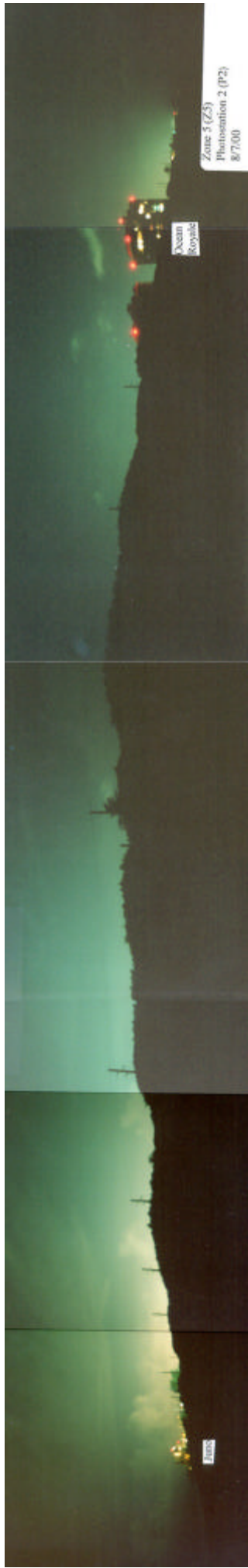


Zone 5 (Z5)  
Photographs 1 (P1)  
07/00

LAKERS

LAKERS

LAKERS

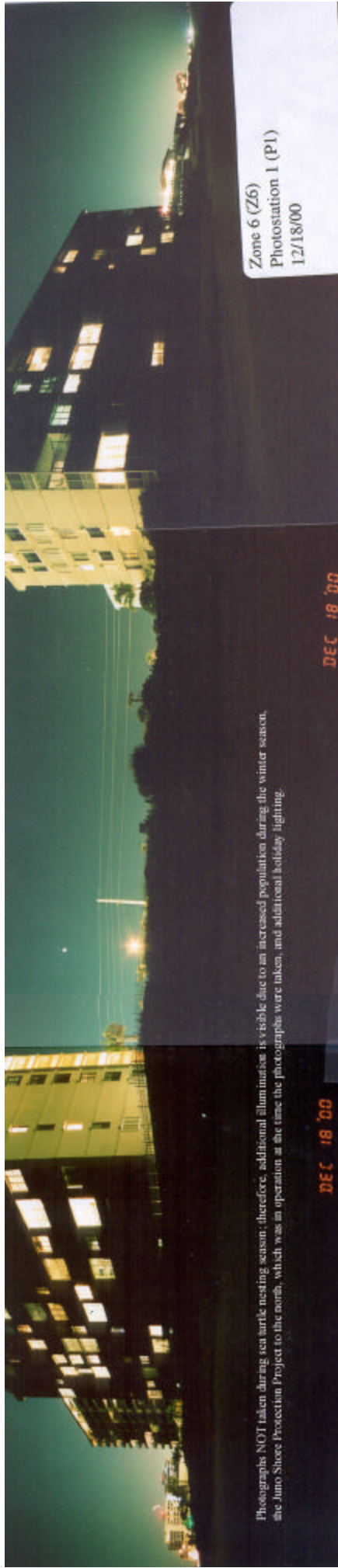


Zone 5 (Z5)  
Photograph 2 (P2)  
8/7/00

Ocean  
Royale

1005





Zone 6 (Z6)  
Photostation 1 (P1)  
12/18/00

Photographs NOT taken during sea turtle nesting season; therefore, additional illumination is visible due to an increased population during the winter season. The Juno Shore Protection Project to the north, which was in operation at the time the photographs were taken, and additional holiday lighting.

DEC 18 '00

DEC 18 '00



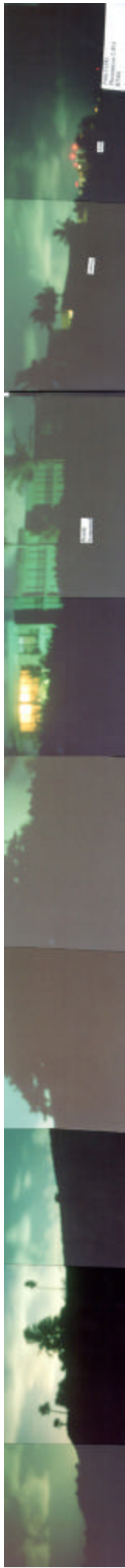


Photographs NOT taken during sea turtle nesting season; therefore, additional illumination is visible due to an increased population during the winter season. The Jiro Shore Protection Project to the north, which was in operation at the time the photographs were taken, and additional highway lighting.

Zone 7 (27)  
Photograph 1 (P1)  
12/26/00









Berkeley Landing  
Golf Course

1000

Zone 8 (23)  
Photostation 3 (P3)  
8/7/09

APPENDIX II

DISORIENTATION REPORTS

FOR ALL ZONES

(ARRANGED NORTH TO SOUTH)

Copies of Disorientation Reports available from Palm Beach County  
Department of Environmental Resources Management upon request at  
(561) 233-2400.