

**Coastal Services Center  
National Oceanic and Atmospheric Administration  
U.S. Department of Commerce**

**Aerial Acquisition Report for  
Coastal California  
Digital Imagery**



NOAA Coastal Services Center  
Contract EA133C-05-CQ-1051  
Task Order: 21  
January 17, 2011

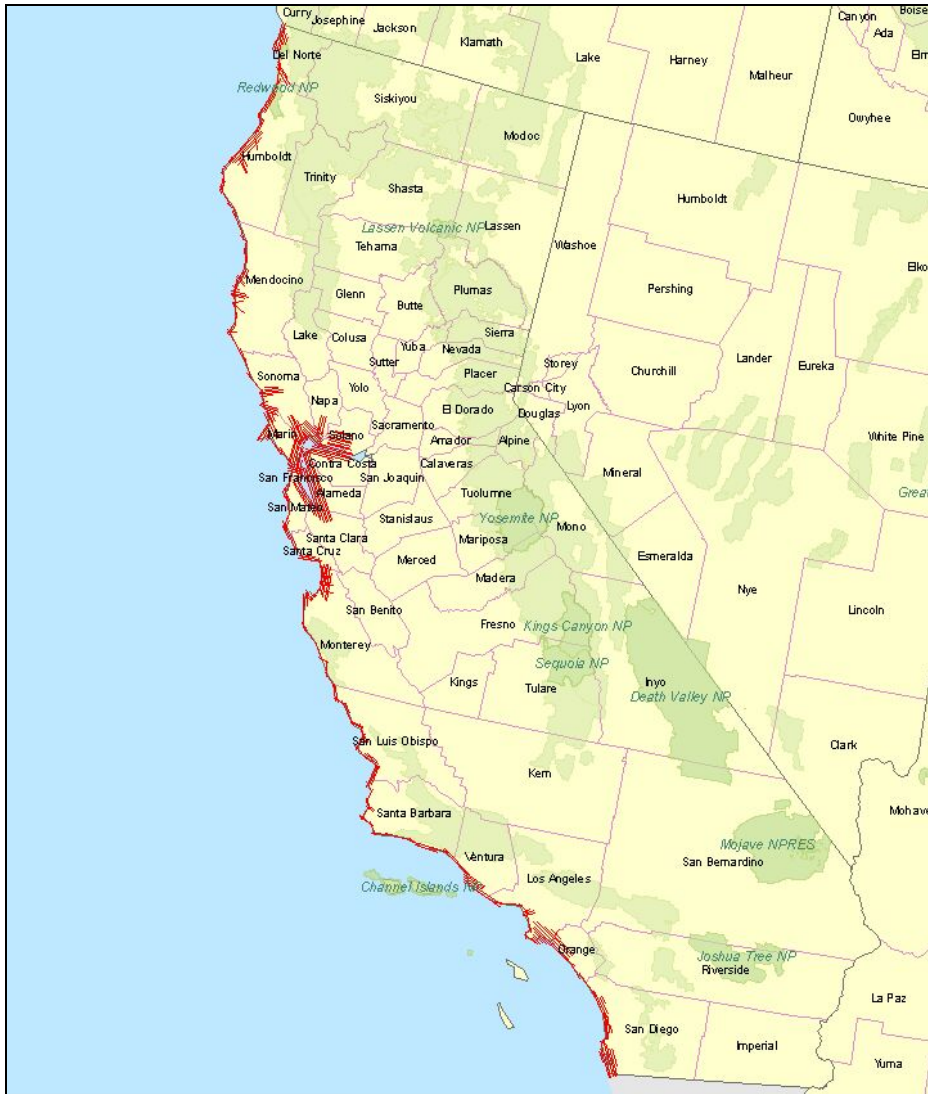
COASTAL CALIFORNIA DIGITAL IMAGERY  
AERIAL ACQUISITION REPORT

## 1 PROJECT OVERVIEW

Fugro EarthData is responsible for collecting and processing all planned digital-imagery acquisition flight lines for approximately 3774 square miles of Coastal California. The resulting imagery will be delivered to NOAA CSC in partnership with the California State Coastal Conservancy (SCC) and is intended for use in coastal management decision making, including applications such as sea level rise.

The Fugro EarthData team consists of two professional firms with a long history of working together as well as expertise in land surveying and airborne digital-imagery acquisition and processing. The following team member firms participated in this effort and their roles include:

- **Fugro EarthData** – Overall project management, quality control, digital imagery acquisition plan, survey control plan, acquisition of digital imagery, processing of digital imagery deliverables, and accuracy assessment of data.
- **TerraSurf, Inc. (TerraSurf)** – TerraSurf provided the necessary ground control surveys to assure accuracy on all deliverables and supported the aerial acquisition.



**Graphic 1: Flight Plan**

## 2 DATA ACQUISITION OVERVIEW

In order to meet the required survey and accuracy specifications for this project, the planned parameters for data capture were as follows:

Flight Parameters					
Acquisition Option	Ortho Pixel Resolution	Flying Height	Sidelap	Flight Line Miles	Number of Lifts
Standard	30cm	9,494'	30%	3833.74	13

**Table 1:** Planned Flight Parameters

The actual flight results for planned data capture are as follows:

Flight Results					
Acquisition Option	Ortho Pixel Resolution	Flying Height (average)	Sidelap	Flight Line Miles	Number of Lifts
Standard	30cm	9,391'	30%	5452.94	36

**Table 2:** Actual Flight Results

Fugro EarthData started acquiring data for the Coastal California Digital Imagery project on August 26<sup>th</sup>, 2010; and collection finished on November 29, 2010. Aircraft operations were undertaken from ten airports starting at McClellan-Palomar Airport (KCRQ) up to Arcata Airport (KACV). All collections were flown with the Conquest (N441S) and King Air (N652L) aircrafts.

Collection ID	Aircraft	Date	Primary Airport	Secondary Airport
238_110_10004100_01	N441S	8/26/2010	KCRQ	
240_110_10004100_02	N441S	8/28/2010	KCRQ	
242_110_10004100_03	N441S	8/30/2010	KOXR	
247_024_10004100_01	N652L	9/4/2010	KCRQ	
247_110_10004100_04	N441S	9/4/2010	KOXR	
252_024_10004100_02	N652L	9/9/2010	KCRQ	
253_024_10004100_03	N652L	9/10/2010	KOXR	
253_110_10004100_05	N441S	9/10/2010	KMRY	
254_110_10004100_06	N441S	9/11/2010	KHWD	
254_110_10004100_07	N441S	9/11/2010	KHWD	
255_024_10004100_04	N652L	9/12/2010	KCRQ	
255_110_10004100_08	N441S	9/12/2010	KHWD	
257_024_10004100_05	N652L	9/14/2010	KCRQ	
257_024_10004100_06	N652L	9/14/2010	KOXR	
259_024_10004100_07	N652L	9/16/2010	KMRY	
259_110_10004100_09	N441S	9/16/2010	KSTS	KHWD
263_110_10004100_10	N441S	9/20/2010	KSTS	KHWD
264_024_10004100_08	N652L	9/21/2010	KMRY	
265_024_10004100_09	N652L	9/22/2010	KMRY	
265_110_10004100_11	N441S	9/22/2010	KSTS	KUKI
266_024_10004100_10	N652L	9/23/2010	KHWD	
266_024_10004100_11	N652L	9/23/2010	0Q5	KACV
266_110_10004100_12	N441S	9/23/2010	KSTS	

266_110_10004100_13	N441S	9/23/2010	KUKI	0Q5
267_024_10004100_12	N652L	9/24/2010	KCEC	
267_110_10004100_14	N441S	9/24/2010	KACV	
281_110_10004100_15	N441S	10/8/2010	KSMX	
300_110_10004100_16	N441S	10/27/2010	KMRY	
305_110_10004100_17	N441S	11/1/2010	KMRY	KHWD
306_110_10004100_18	N441S	11/2/2010	KHWD	
307_110_10004100_19	N441S	11/3/2010	KMRY	KHWD
312_110_10004100_20	N441S	11/8/2010	KHWD	
315_110_10004100_21	N441S	11/11/2010	KHWD	
316_110_10004100_22	N441S	11/12/2010	KHWD	
329_110_10004100_23	N441S	11/25/2010	KSTS	
333_110_10004100_24	N441S	11/29/2010	KACV	

**Table 3:** Data Acquisition List

### 3 DATA ACQUISITION

The flight plan for this project consisted of 289 flight lines divided into 9 blocks (A through I). In addition to meeting planned specifications, 81 of the 289 lines required tidal restrictions within 1.5 hours of MLLW in the following regions:

- Klamath River
- Tijuana River Estuary
- Humboldt Bay/Eel River Delta
- San Elijo Lagoon
- San Francisco Bay
- Pescadero River
- Elkhorn Slough

A minimum of two attempts at meeting tidal window restrictions was required. It was determined that if collection could not be completed within these two attempts, the MLLW tidal requirement would be removed.

On November 22, 2010 NOAA CSC gave Fugro EarthData approval to acquire data at MLLW plus 3 feet.

Fugro EarthData made two attempts without being able to acquire data at the MLLW tidal requirement due to weather and other project constraints; therefore, this tidal requirement for Klamath River (lines I020, I021, and I022) was removed; the lines for Klamath River were flown as non-tidal on September 24, 2010.

Acquisition Block	Collection
A	238_110_10004100_01
	240_110_10004100_02
	247_024_10004100_01
	255_024_10004100_04
	257_024_10004100_05
	257_024_10004100_06
B	242_110_10004100_03
	247_110_10004100_04
	253_024_10004100_03
	257_024_10004100_06
C	253_110_10004100_05
	259_024_10004100_07



	264_024_10004100_08
	265_024_10004100_09
	281_110_10004100_15
D	253_110_10004100_05
	264_024_10004100_08
	266_024_10004100_10
E	254_110_10004100_06
	254_110_10004100_07
	255_110_10004100_08
	259_110_10004100_09
	300_110_10004100_16
	305_110_10004100_17
	306_110_10004100_18
	312_110_10004100_20
	315_110_10004100_21
	316_110_10004100_22
	329_110_10004100_23
F	263_110_10004100_10
	265_110_10004100_11
	266_024_10004100_10
	266_110_10004100_12
	266_110_10004100_13
G	266_024_10004100_11
	266_110_10004100_13
	267_024_10004100_12
	267_110_10004100_14
H	252_024_10004100_02
I	307_110_10004100_19
	333_110_10004100_24

**Table 4:** Acquisition Block List

**BLOCK A**



**Graphic 2: Block A Flight Plan**

## BLOCK A



### Graphic 3: Block A Orthos

*Please note that the imagery contained in the block graphics are from rectified orthos of the raw data.*



**BLOCK B**



**Graphic 4:** Block B Flight Plan



**Graphic 5:** Block B Orthos



**BLOCK C**



**Graphic 6:** Block C Flight Plan

**BLOCK C**



**Graphic 7: Block C Orthos**

BLOCK D



Graphic 8: Block D Flight Plan

## BLOCK D



### Graphic 9: Block D Orthos

BLOCK F



Graphic 10: Block F Flight Plan



BLOCK F



## Turning Spatial Data into Knowledge



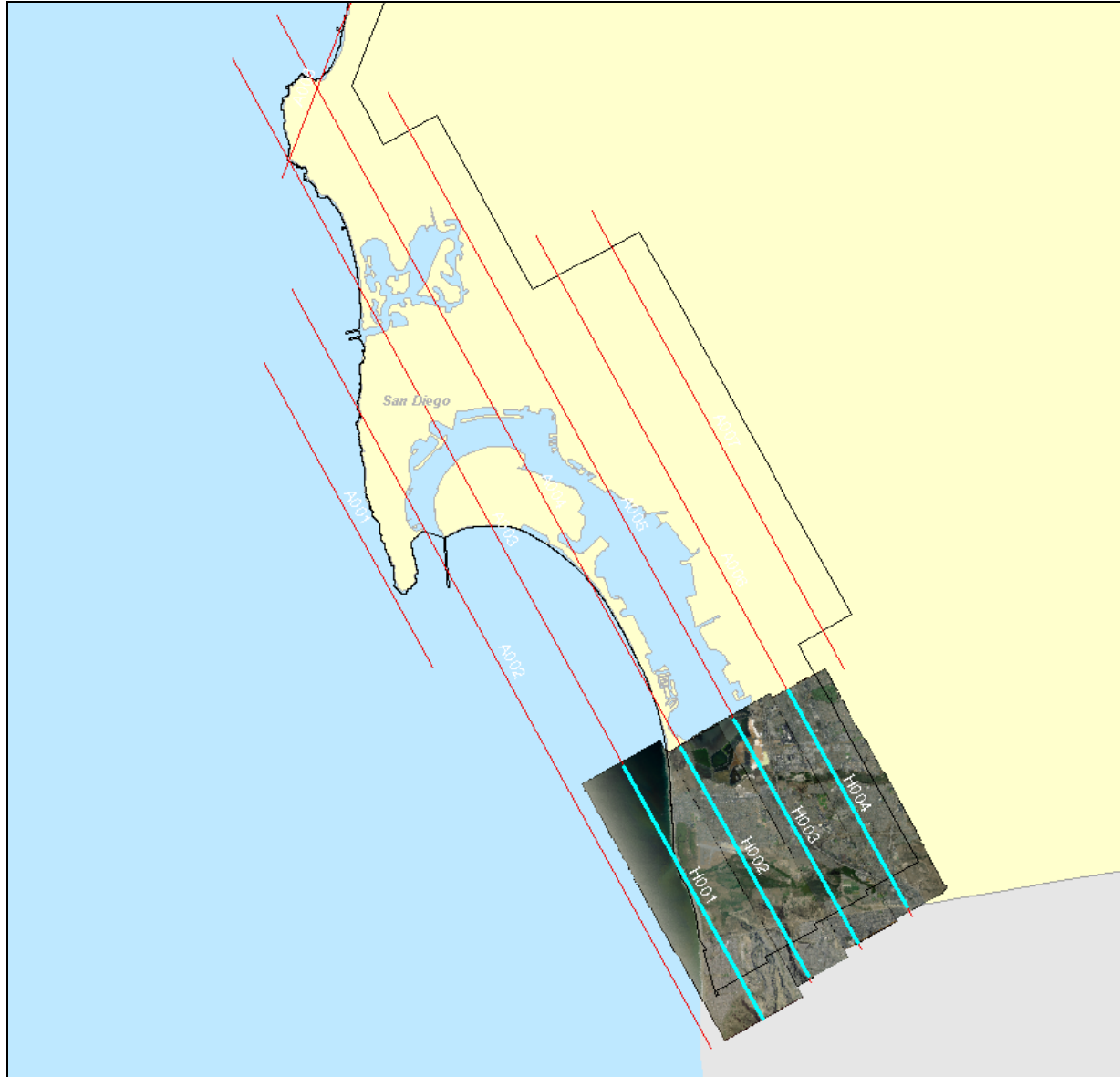
BLOCK G



Graphic 13: Block G Orthos

## TIDAL RESTRICTED AREAS

### Tijuana River



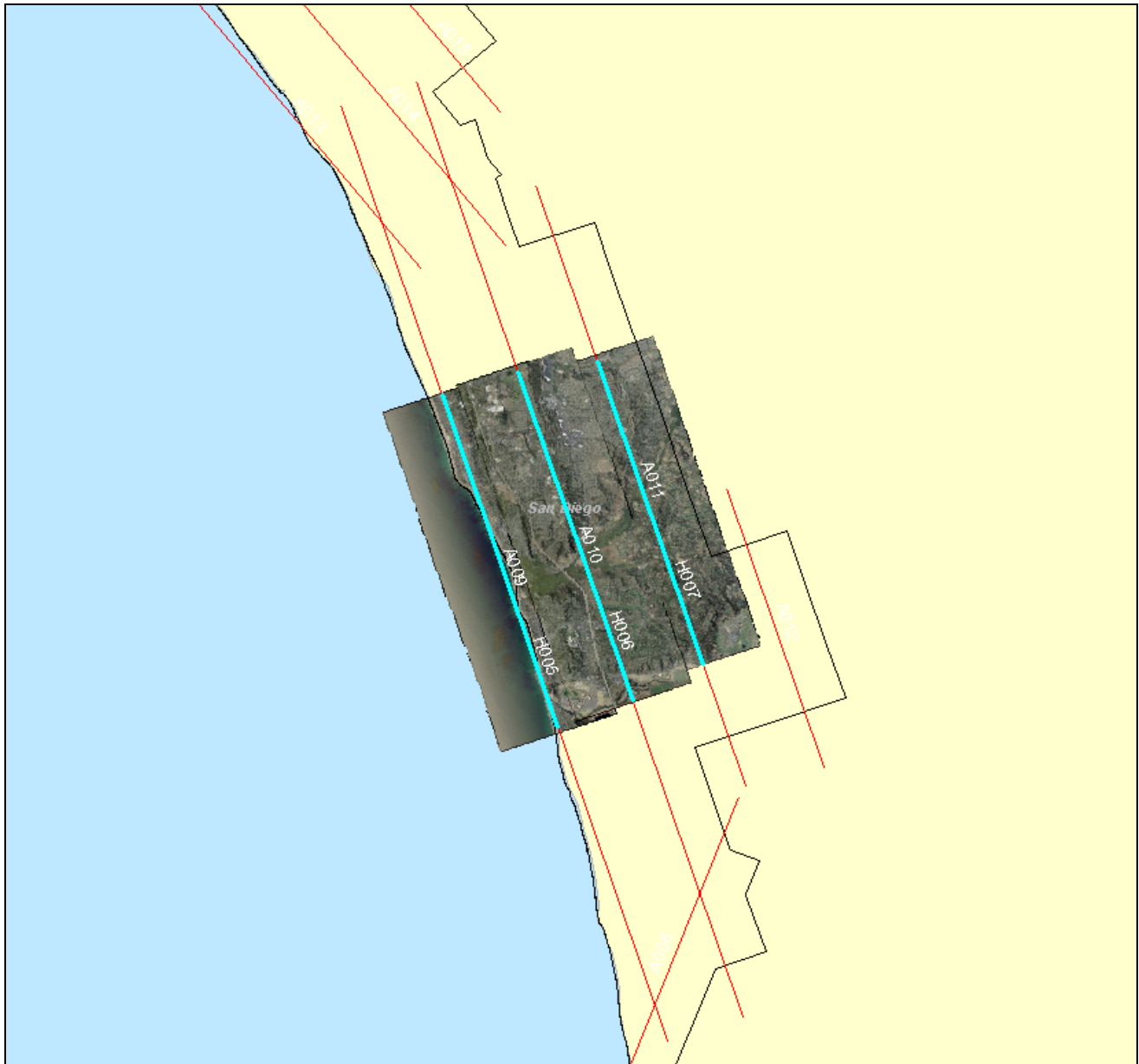
**Graphic 14:** Tijuana River Block H Tidal Lines

### Tijuana River Flight Plan

Tidal Flight Plan		
Line Number	Acquisition Date	Collection
H001	9/9/2010	252_024_10004100_02
H002	9/9/2010	252_024_10004100_02
H003	9/9/2010	252_024_10004100_02
H004	9/9/2010	252_024_10004100_02

Non Tidal Flight Plan		
Line Number	Acquisition Date	Collection
A003	9/14/2010	257_024_10004100_05
A004	9/14/2010	257_024_10004100_05
A005	9/12/2010	255_024_10004100_04
A006	9/12/2010	255_024_10004100_04

## San Elijo Lagoon



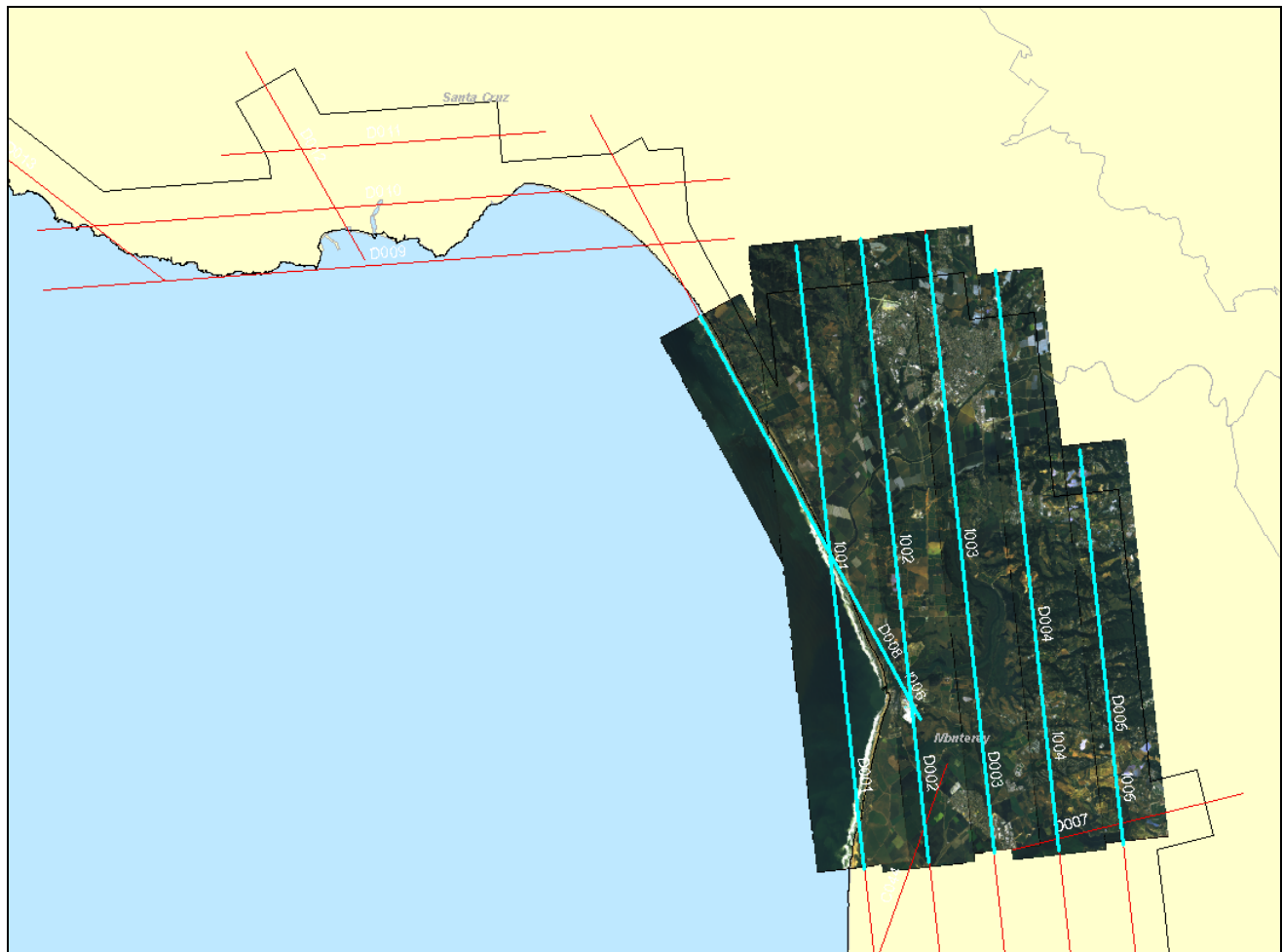
**Graphic 15: San Elijo Lagoon Block H Tidal Lines**

## San Elijo Lagoon Flight Plan

Tidal Flight Plan		
Line Number	Acquisition Date	Collection
H005	9/9/2010	252_024_10004100_02
H006	9/9/2010	252_024_10004100_02
H007	9/9/2010	252_024_10004100_02

Non Tidal Flight Plan		
Line Number	Acquisition Date	Collection
A009	8/26/2010	238_110_10004100_01
A010	8/26/2010	238_110_10004100_01
A011	8/26/2010	238_110_10004100_01

## Elkhorn Slough



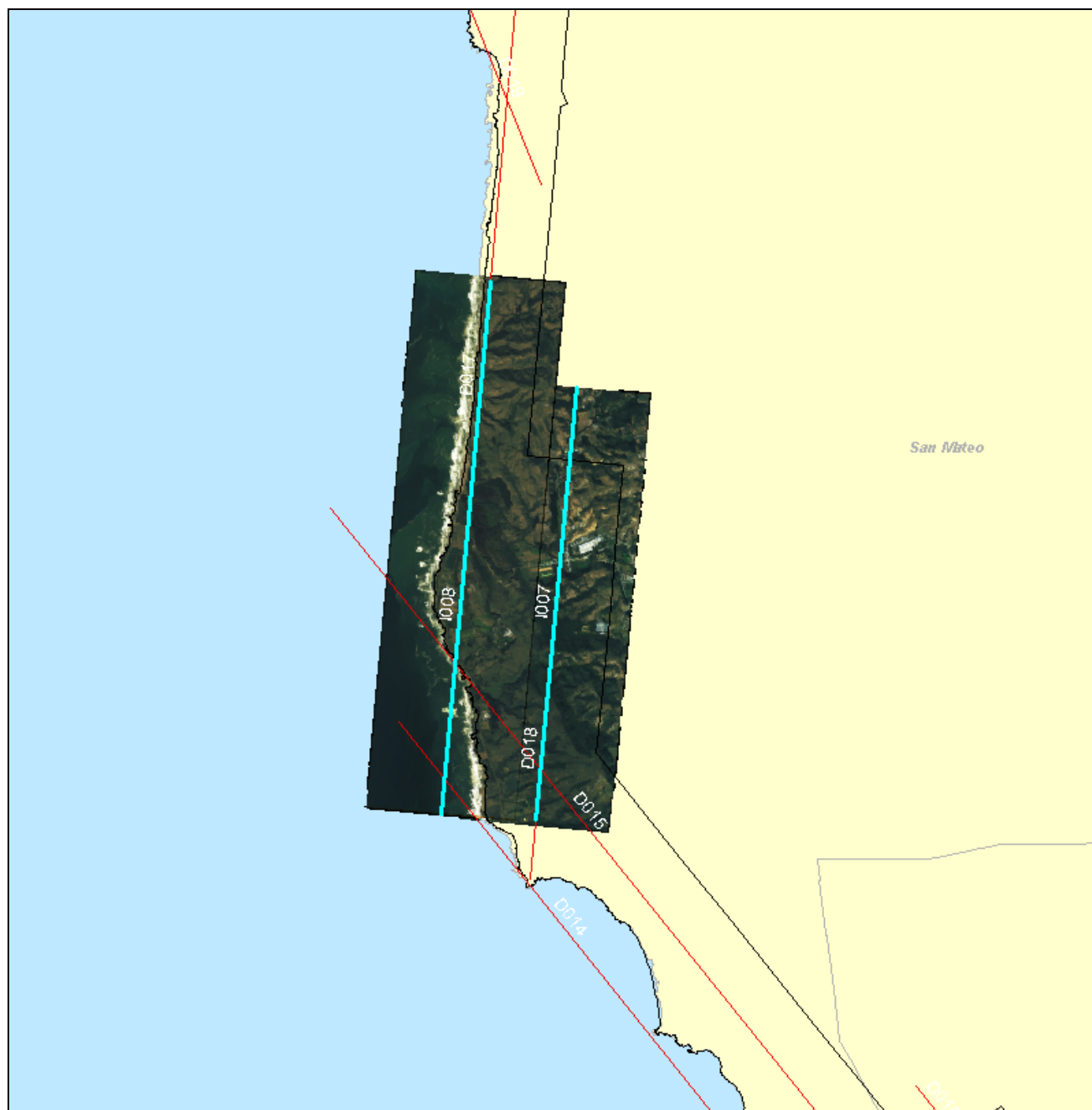
**Graphic 16:** Elkhorn Slough Block I Tidal Lines

## Elkhorn Slough Flight Plan

Tidal Flight Plan		
Line Number	Acquisition Date	Collection
I001	11/3/2010	307_110_10004100_19
I002	11/3/2010	307_110_10004100_19
I003	11/3/2010	307_110_10004100_19
I004	11/3/2010	307_110_10004100_19
I005	11/3/2010	307_110_10004100_19
I006	11/3/2010	307_110_10004100_19

Non Tidal Flight Plan		
Line Number	Acquisition Date	Collection
D001	9/10/2010	253_110_10004100_05
D002	9/10/2010	253_110_10004100_05
D003	9/10/2010	253_110_10004100_05
D004	9/10/2010	253_110_10004100_05
D005	9/10/2010	253_110_10004100_05
D008	9/10/2010	253_110_10004100_05

## Pescadero River



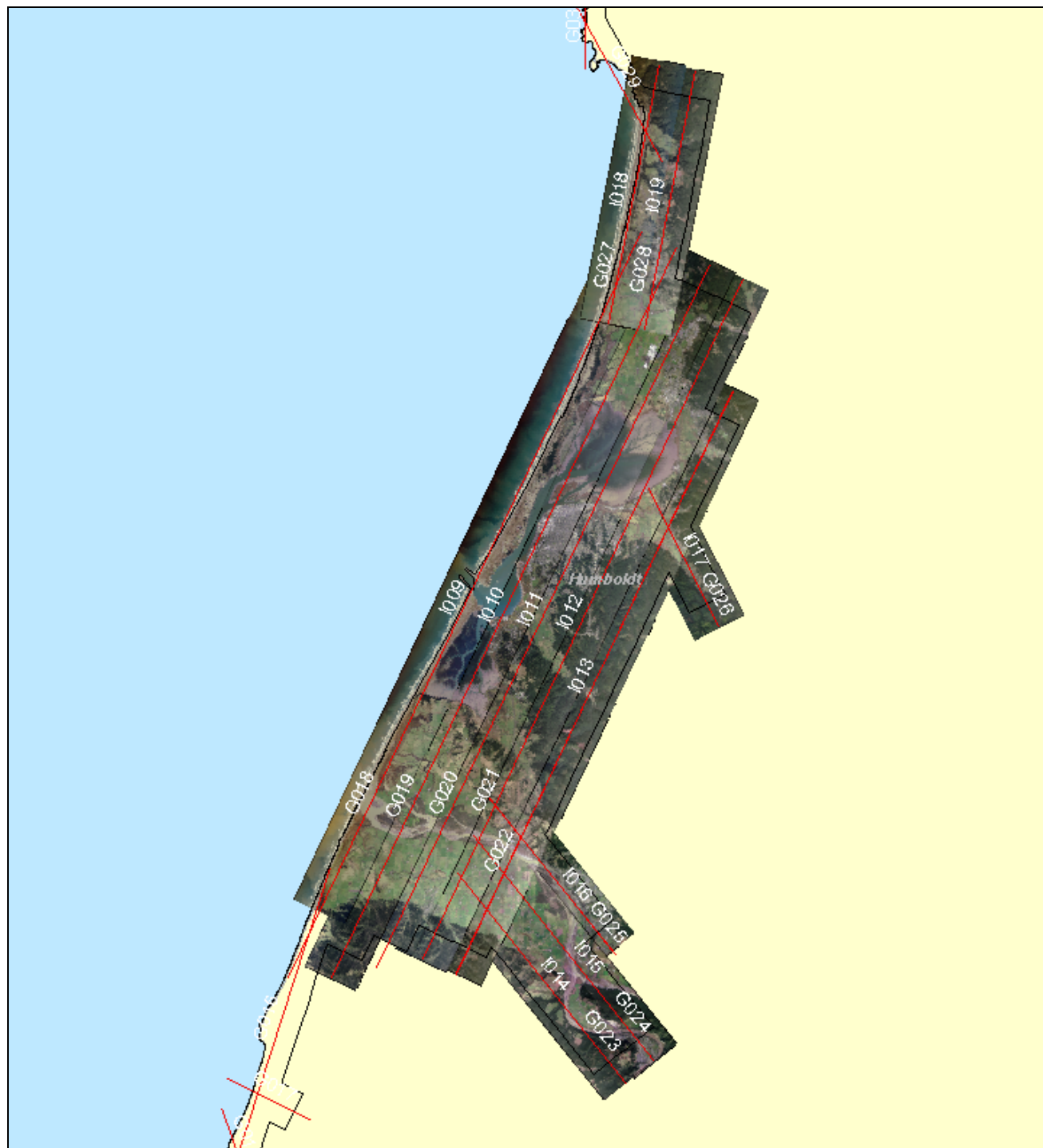
**Graphic 17: Pescadero River Block I Tidal Lines**

## Pescadero River Flight Plan

Tidal Flight Plan		
Line Number	Acquisition Date	Collection
I007	11/3/2010	307_110_10004100_19
I008	11/3/2010	307_110_10004100_19

Non Tidal Flight Plan		
Line Number	Acquisition Date	Collection
D017	9/23/2010	266_024_10004100_10
D018	9/23/2010	266_024_10004100_10

## Humboldt Bay



### Graphic 18: Humboldt Bay Block I Tidal Lines

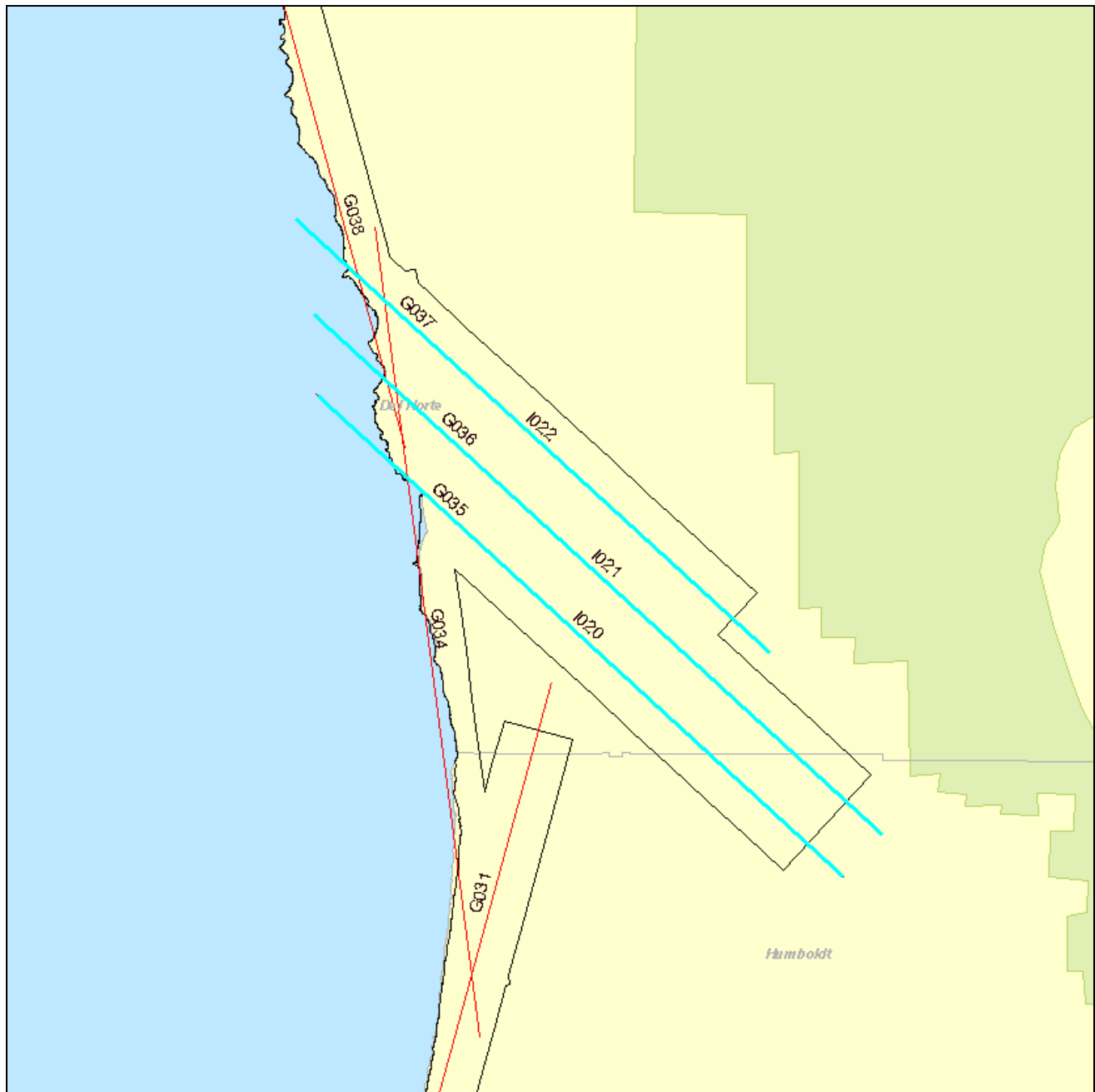


### Humboldt Bay Flight Plan

Tidal Flight Plan			Non Tidal Flight Plan		
Line Number	Acquisition Date	Collection	Line Number	Acquisition Date	Collection
I009	11/29/2010	333_110_10004100_24	G018	9/24/2010	267_110_10004100_14
I010	11/29/2010	333_110_10004100_24	G019	9/24/2010	267_110_10004100_14
I011	11/29/2010	333_110_10004100_24	G020	9/24/2010	267_110_10004100_14
I012	11/29/2010	333_110_10004100_24	G021	9/24/2010	267_110_10004100_14
I013	11/29/2010	333_110_10004100_24	G022	9/24/2010	267_110_10004100_14
I014	11/29/2010	333_110_10004100_24	G023	9/24/2010	267_110_10004100_14
I015	11/29/2010	333_110_10004100_24	G024	9/24/2010	267_110_10004100_14
I016	11/29/2010	333_110_10004100_24	G025	9/24/2010	267_110_10004100_14
I017	11/29/2010	333_110_10004100_24	G026	9/24/2010	267_110_10004100_14
I018	11/29/2010	333_110_10004100_24	G027	9/24/2010	267_110_10004100_14
I019	11/29/2010	333_110_10004100_24	G028	9/24/2010	267_110_10004100_14



## Klamath River



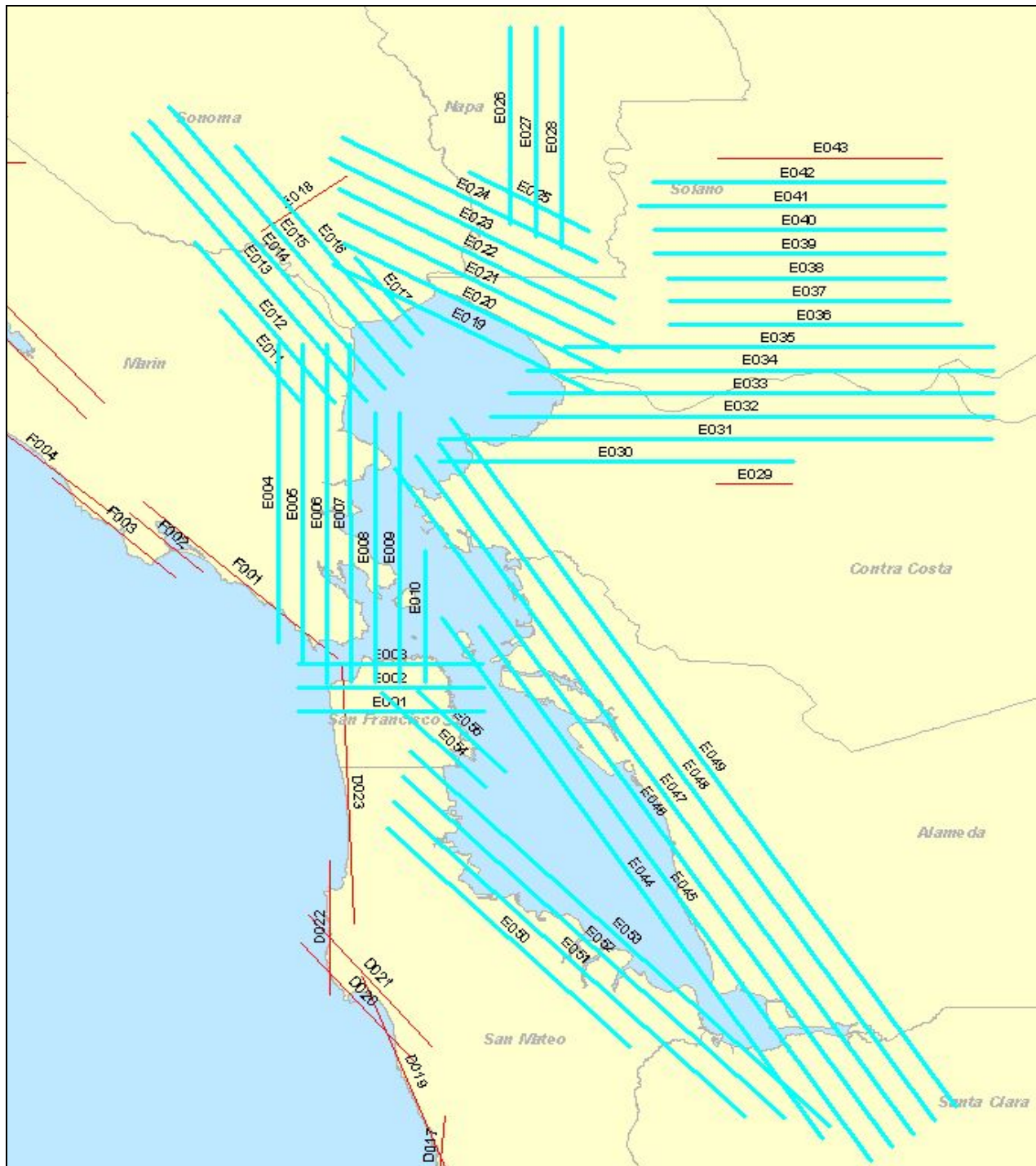
**Graphic 19:** Klamath River Block I Tidal Lines

## Klamath River Flight Plan

Tidal Flight Plan		
Line Number	Acquisition Date	Collection
I020	n/a	n/a
I021	n/a	n/a
I022	n/a	n/a

Non Tidal Flight Plan		
Line Number	Acquisition Date	Collection
G035	9/24/2010	267_024_10004100_12
G036	9/24/2010	267_024_10004100_12
G037	9/24/2010	267_024_10004100_12

## San Francisco Bay



**Graphic 20:** San Francisco Bay Block E Tidal Lines; note that lines E018, E029, and E043 were flown as non tidal.

## San Francisco Bay



**Graphic 21:** San Francisco Bay Block E Tidal Lines with Orthos



## San Francisco Bay Flight Plan

Tidal Flight Plan		
Line Number	Acquisition Date	Collection
E001	11/1/2010	305_110_10004100_17
E002	11/1/2010	305_110_10004100_17
E003	11/1/2010	305_110_10004100_17
E004	11/1/2010	305_110_10004100_17
E005	11/1/2010	305_110_10004100_17
E006	11/1/2010	305_110_10004100_17
E007	11/1/2010	305_110_10004100_17
E008	11/1/2010	305_110_10004100_17
E009	11/1/2010	305_110_10004100_17
E010	11/1/2010	305_110_10004100_17
E011	11/1/2010	305_110_10004100_17
E012	11/1/2010	305_110_10004100_17
E013	11/25/2010	329_110_10004100_23
E014	11/25/2010	329_110_10004100_23
E015	11/25/2010	329_110_10004100_23
E016	11/25/2010	329_110_10004100_23
E017	11/8/2010	312_110_10004100_20
E018	N/A	N/A
E019	11/11/2010	315_110_10004100_21
E020	11/11/2010	315_110_10004100_21
E021	11/11/2010	315_110_10004100_21
E022	11/11/2010	315_110_10004100_21
E023	11/11/2010	315_110_10004100_21
E024	11/11/2010	315_110_10004100_21
E025	11/11/2010	315_110_10004100_21
E026	11/25/2010	329_110_10004100_23
E027	11/25/2010	329_110_10004100_23
E028	11/25/2010	329_110_10004100_23
E029	N/A	N/A
E030	11/2/2010	306_110_10004100_18
E031	11/2/2010	306_110_10004100_18
E032	11/11/2010	315_110_10004100_21
E033	10/27/2010	300_110_10004100_16
E034	11/8/2010	312_110_10004100_20
E035	11/11/2010	315_110_10004100_21
E036	10/27/2010	300_110_10004100_16
E037	10/27/2010	300_110_10004100_16
E038	10/27/2010	300_110_10004100_16
E039	10/27/2010	300_110_10004100_16
E040	10/27/2010	300_110_10004100_16
E041	10/27/2010	300_110_10004100_16
E042	10/27/2010	300_110_10004100_16
E043	N/A	N/A

Non Tidal Flight Plan		
Line Number	Acquisition Date	Collection
E001		
E002		
E003		
E004		
E005		
E006		
E007		
E008		
E009		
E010		
E011		
E012		
E013		
E014		
E015		
E016		
E017		
E018	9/16/2010	259_110_10004100_09
E019		
E020		
E021		
E022		
E023		
E024		
E025		
E026		
E027		
E028		
E029	9/11/2010	254_110_10004100_07
E030		
E031		
E032		
E033		
E034		
E035		
E036		
E037		
E038		
E039		
E040		
E041		
E042		
E043	9/12/2010	255_110_10004100_08

## FUGRO EARTHDATA, INC.

### AERIAL ACQUISITION REPORT FOR COASTAL CALIFORNIA DIGITAL IMAGERY



E044	11/1/2010	305_110_10004100_17
E045	11/2/2010	306_110_10004100_18
E046	11/12/2010	316_110_10004100_22
E047	11/12/2010	316_110_10004100_22
E048	11/11/2010	315_110_10004100_21
E049	11/11/2010	315_110_10004100_21
E050	11/12/2010	316_110_10004100_22
E051	11/12/2010	316_110_10004100_22
E052	11/12/2010	316_110_10004100_22
E053	11/12/2010	316_110_10004100_22
E054	11/1/2010	305_110_10004100_17
E055	11/1/2010	305_110_10004100_17

E044		
E045		
E046		
E047		
E048		
E049		
E050		
E051		
E052		
E053		
E054		
E055		