

# Capture and tagging of Black-necked Crane and Bar-headed Goose in Changthang Cold Desert Wildlife Sanctuary, Ladakh

April, 2014



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Wildlife Institute of India



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**Citation:** *WII, 2014. Capture and tagging of Black-necked Crane (Grus nigricollis) and Bar-headed Goose (Anser indicus) in Changthang Cold Desert Wildlife Sanctuary, Ladakh. A report by Wildlife Institute of India, Dehradun and Department of Wildlife Protection, Jammu & Kashmir. Pp. 32.*

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***Capture and tagging of Black-necked Crane  
and Bar-headed Goose in Changthang Cold  
Desert Wildlife Sanctuary, Ladakh***

***April, 2014***

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## Acknowledgments



**W**e express our deep sense of gratitude to Shri A. K. Singh, IFS, Principle Chief Conservator of Forests (Wildlife)/ Chief Wildlife Warden, Jammu and Kashmir for granting permission and for his immense support to work in Ladakh. We sincerely thank Dr. V. B. Mathur Director, Wildlife Institute of India and, Dr. P. K. Mathur, Dean, Wildlife Institute of India for providing his guidance and continuous support. We would like to thank Dr. Asad. R. Rahmani, Director, Bombay Natural History Society (BNHS) for providing neck collars and rings for tagging of birds, and for his guidance during field exercise.

We would like to take this opportunity to thank Sh. Ali Hussain and Mohd. Sikandar, Birds Trappers (BNHS), this exercise would not have been possible without their enormous dedication and hard work. We are grateful to Mr. Pankaj Chandan and Mr. Pushpinder Singh Jamwal, WWF, Leh for providing vehicle, man power and leg bands for conducting this exercise. We would like to thank Mr. Dhirtiman Mukherjee, Wildlife Photographer for capturing moments during the field exercise. We extend our special thanks and gratitude to Indian Army and ITBP for extending us cooperation during the field exercise in border areas. We would like to thank Mr. Simarandeep Singh, IAS, Deputy Commissioner/ Chief Executive Officer, Ladakh Autonomous Hill Development Council, Leh for granting permission to visit border areas. We would like to thank Dr. Samina Amin Charoo, Research Officer, Department of Wildlife Protection, J&K Govt. for her cooperation and support. We would like to thank Shri LobzangKhatup, Range Officer, Changthang Cold Desert Sanctuary and Shri TseringAngchuk, range Officer, Leh and their staff for assistance and cooperation.

Last but not least, special thanks to Shivam Shrotriya (WII), Sonamji, Rabgaisji, Nurbu, Parvez and Dawa, field staff of Department of Wildlife Protection, Changthang Wildlife Sanctuary and WWF, Leh for supporting in the field.



*Pic by: Dhirtiman Mukherjee*

## Executive Summary

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**M**odern satellite tracking techniques aid to study precise migration paths, stop over sites and habitat utilization. There is no information is available on migration patterns of water birds in Ladakh. Therefore we conducted a satellite based telemetry study on Black-necked crane (BNC) and Bar-headed goose (BHG) in Changthang Cold Desert Sanctuary. We initially did a reconnaissance survey, we counted 57 cranes and 182 geese in sanctuary, based on which; we shortlisted Chushul, Hanle and Rhongo mashes for capture and tagging of birds. We captured four BHG at Chushul using noose traps, two of them fitted with Platform Transmitter Terminals (PTT) and with conventional neck bands and rings. Whereas two other BHG were collared with only conventional neck bands and tagged with tarsus rings. We also fitted two BNC with PTT and tarsus bands, first at Chusul and second at Rhongo. Till date we received 810 locations with different location classes through ARGOS out of which 558 locations from class 3, 2, 1 & 0 were used for analysis. Preliminary findings revealed that maximum distance travelled by PTT fitted cranes from date of tagging till December 2013 ranged between 279 and 329 km and geese between 361 and 945 km. One of the PTTs of BHG stopped functioning from 30/10/2013 and another BHG fitted with PTT travelled to near Himachal Pradesh Border. Whereas two BHG fitted with only neckband and rings were reported from Gharana Wetland, Jammu. This study was able to track migration of BHG from Ladakh to Jammu via Himachal Pradesh (probably Pong Dam). The movement pattern of the PTT fitted birds are being tracked and may yield further information on their movement pattern and habitat utilization.

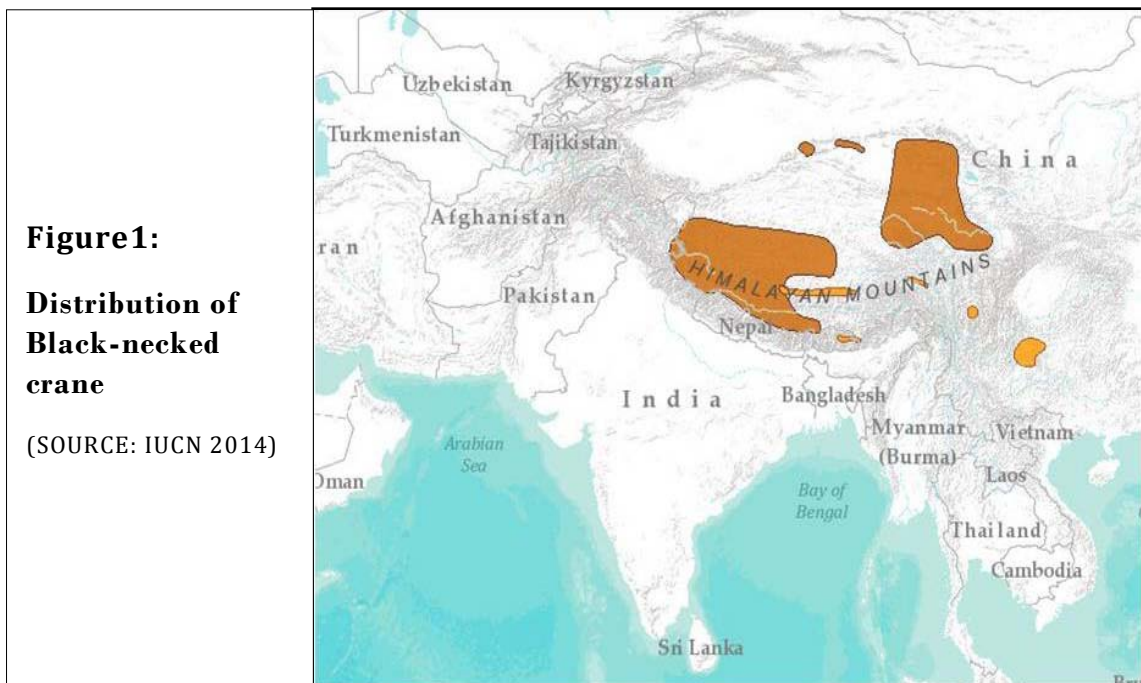


*Pushpinder S. Jamwal*



## Introduction

Satellite telemetry offers advance tool to understand movement pattern of migratory bird. In last few years scientific studies have recorded kilometers of migration details precisely with the help of small tracking device 'transmitter'. The Black-necked crane (*Grus nigricollis*) is an endangered species distributed in countries viz., China, India, Bhutan, Vietnam and Japan (Bishop 1996; Pfister 1998; Gole 1990). Globally, China harbours the major population of BNC in the Qunghai, Xinjiang, Gansu and Sichuan province as breeding grounds. And wintering grounds exist in Tibet, Yunnan, and Guizhou (Bishop 1994). In India, a small significant population breeds in Ladakh and winter populations have been recorded in Arunachal Pradesh and West Bengal (Betts 1954; Gole 1990; Choudhury 2002; Chandan et al. 2005). Likewise small population visits Bhutan (Pfister 1998). It is listed as 'Vulnerable' species in The IUCN Red List and protected as 'Schedule I' species in Wildlife (Protection) Act, 1972 India and J&K Wildlife Protection Act. Being an endangered and charismatic species, the state of J & K has given the status of the 'state bird'.



Globally, studies have been conducted on migration pattern of BNC. There are only two peer reviewed studies are available on telemetry of BNC (Qian et al. 2009; Liu et al. 2012). In India, first attempt was made by Chacko 1995 to understand the migration pattern through banding in Ladakh, India. Though, several reconnaissance surveys were carried out in early 80's to recent past (Gole 1983; Hussain and Pandav 2008; Hussain et al. 2008; Namgail et al. 2009; Sharma & Sidhu 2011). Few intensive studies were conducted on the breeding ecology of BNC in Ladakh (Hussain 1985; Pfister 1998; Chandan et al. 2005).

In contrast, the Bar-headed Goose (*Anser indicus*) (BHG) is well studied in India since 80's (Gole 1982). However, it is listed as 'Least Concern' species on IUCN Red List and widely distributed in China, India, Mongolia, Nepal, Vietnam, Thailand, Afghanistan, Pakistan, Tajikistan, Russia, Bhutan, Uzbekistan and Kyrgyzstan (IUCN 2012). Owing to highlighted as carrier of avian influenza, satellite based studies have been conducted in ranging countries of Asia (Prosser et al. 2009; Bourouiba et al. 2010; Hawkes et al. 2011; Prosser et al. 2011). In India, migration studies have been conducted in Sur Sarovar, Bharatpur and Gharana (Javed 2000; Kalra et al. 2011; WII 2013).

Ladakh harbours significant population of BNC and largest congregation of breeding population of BHG in India. Present study will play a vital role to understand their migratory routes, stop over sites and wintering habitats. Therefore our study will significantly contribute for long term conservation goals of BNC and BHG. The project was initiated in 2012, between the collaboration of Wildlife Institute of India and Department of Wildlife Protection, J&K. The broad objectives of project are as follows-

- 1.** To quantify present status of water-birds in with special reference to Black-necked Cranes and Bar-headed Geese in the Changthang Cold Desert Sanctuary, Ladakh and Gharana Wetland Conservation Reserve, Jammu.



2. To examine the habitat use and movement pattern of Black-necked Cranes and Bar-headed Geese in the Changthang Cold Desert Sanctuary, Ladakh and Gharana Wetland Conservation Reserve, Jammu.
3. To use this information to devise an effective management strategy for wetlands in the wintering grounds of the cranes and geese as well as their nesting or feeding and roosting sites.

The present study is Phase-II of the project whilst Phase-I was conducted in Gharana Wetland Conservation Reserve, Jammu in 2013. In Phase-II, concurrently two BNC and two BHG were fitted with PTTs in Changthang Cold Desert Wildlife Sanctuary, Ladakh.



*Pic by: Intesar Suhail*



## Study Site

### **Changthang Cold Desert Wildlife Sanctuary**

Changthang is among one of the largest protected areas of Jammu and Kashmir with an area of 4000 km<sup>2</sup>. It is situated in eastern Ladakh within Indian Trans Himalayan bio-geographic zone (Rodgers and Panwar 1988) and lies between 32° 19' to 34° 35' N Latitudes and 77° 45' to 79° 45' E Longitudes. The Changthang area is replete with the high altitude lakes mostly situated in between 4400 m and 5000 m. The capturing exercises were carried out at Chushul, Hanle and Rhongo (near Tibra) wetlands of sanctuary.



***Changthang Wildlife Sanctuary***

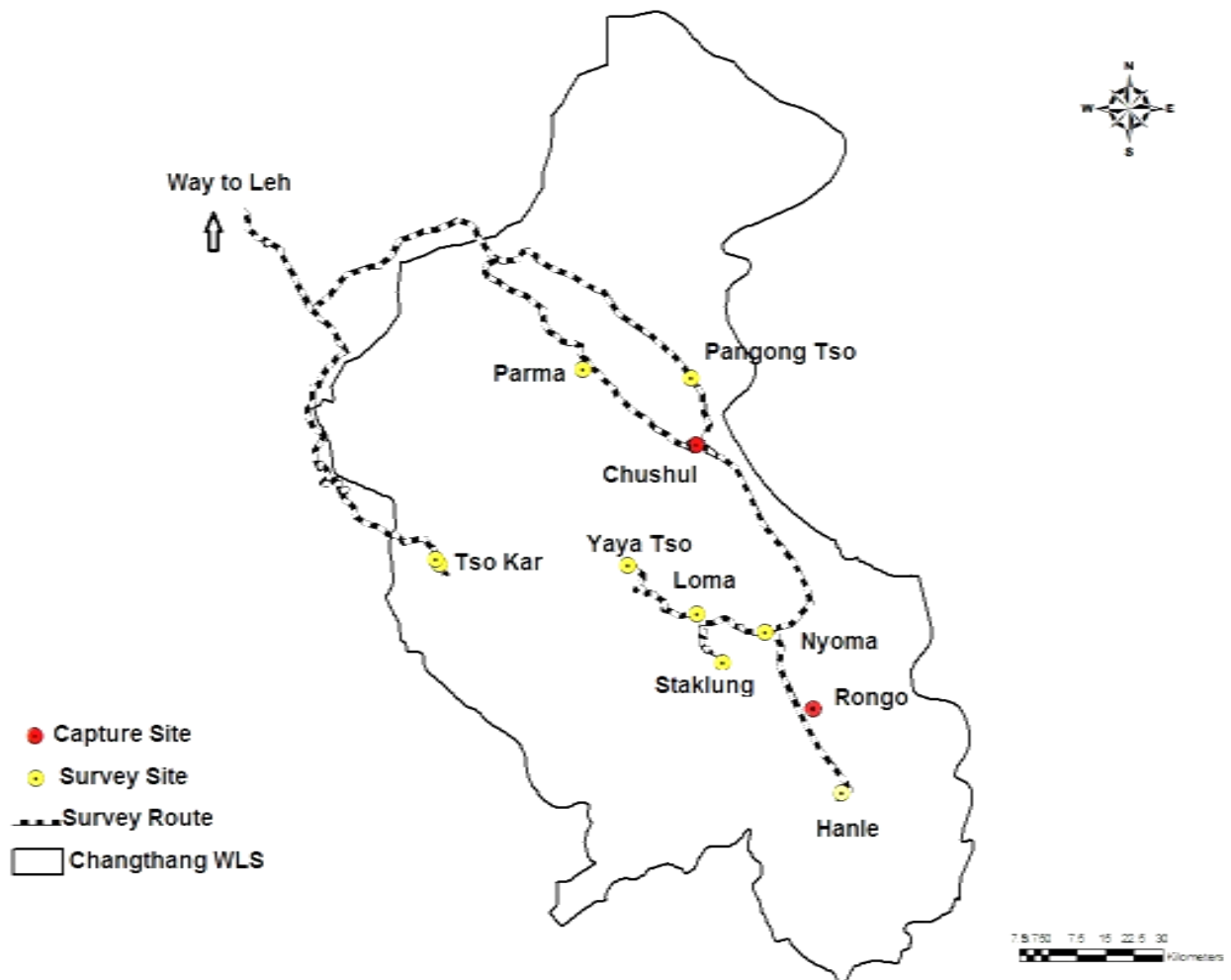
*Pic: Shivam Shrotriya*



## Methods & Results

### *Reconnaissance survey*

We did a reconnaissance survey in 17 wetlands of the Changthang WLS between 10/08/2013 to 04/09/2013. The total efforts were done about 1000 kms by vehicle transects and 40 kms by foot walk along the shorelines of wetlands in morning (7:00-12:00 hrs) and evening (13:00-18:00 hrs) (Figure 2). After reconnaissance survey, we identified and prioritized sites for capturing BHG and BNC. We counted total of n=57 BNC in Changthang WLS during the survey (Table 1). The suitable sites like Chushul, Hanle and Hanle-Indus river plains were



**Figure 2: Survey route in Changthang Cold Desert Sanctuary**

suggested for deployment of PTTs. The maximum numbers of BNC were recorded from the Chushul and Hanle marshes.

Besides, we observed total of n=182 BHG from Tso Kar, Chushul and Hanle marshes. The maximum number was recorded from Tso Kar and Statspuk marshes however owing to logistic problems; we selected Chushul and Hanle marshes for capture exercise. Eventually, we tagged BHG at only Chushul marshes.

**Table 1: Locations of Black-necked crane in Changthang Cold Desert Sanctuary**

Date	Place/ Wetland	GPS Location	Altitude (m)	BNC count			
				A	SA	J/C	Total
		Latitude (N)/Longitude (E)					
10/08/2013	Pangong Tso	33.94095/ 78.43936	4253	--	--	--	--
23/08/2013	Statspuk Tso	33.25997/ 78.05218	4540	2	1	--	3
24/08/2013	Tso Kar	33.31483/ 78.03828	4544	4	--	--	4
29/08/2013	Lungparma	33.91144/ 78.28123	4364	2	--	2	4
29/08/2013	Harong	33.94979/ 78.23955	4223	2	--	--	2
30/08/2013	TsiGul	33.57872/ 78.62433	4381	2	--	--	16
	Tso-Nyak	33.62883/ 78.67683	4308	4	1	1	
	Rala-tingru	33.58292/ 78.67161	4319	8	--	--	
31/08/2013	Loma/Nyoma	33.17666/ 78.85146	4149	6	--	--	6
	Staklung	33.11402/ 78.73392	4147	2	--	--	2
	Rhongo (Tibra)	33.06928/ 78.83761	4175	2	--	1	3
	LalPahri	32.95461/ 78.90545	4200	2	--	--	2
02/09/2013	Raar	32.78085/ 78.95075	4283	2	--	--	13
	Hanle Monastery	32.78888/ 78.99480	4270	2	--	--	
	Jungdemo	32.80335/ 78.95991	4273	2	--	--	
	Astrophysics Guest House	32.77782/ 78.97606	4269	1	2	--	
	Bug	32.75582/ 78.95672	4283	4	--	--	
04/09/2013	Yaya Tso	33.32634/ 78.48467	4689	2	--	--	2
<b>Grand Total</b>				<b>49</b>	<b>4</b>	<b>4</b>	<b>57</b>



Trial



Capture

\*A: Adult, SA: Sub Adult, J: Juvenile, C:Chick

### *Capture exercise*

The capture exercise was carried out between 14/09/2013 to 22/09/2013. The different important components of capture exercise are as follows:

#### *a) Capturing of birds*

We used spherical nylon trap used for capture of water birds. These traps were made from Nylon and size of trap varied with bird species (Figure 3). Mostly noose traps were preferable to deploy in foraging areas of target species. We used n=840 noose traps for capturing of BNC and BHG. The PTT was attached with Teflon harness and backpack method was used for deployment of PTT with



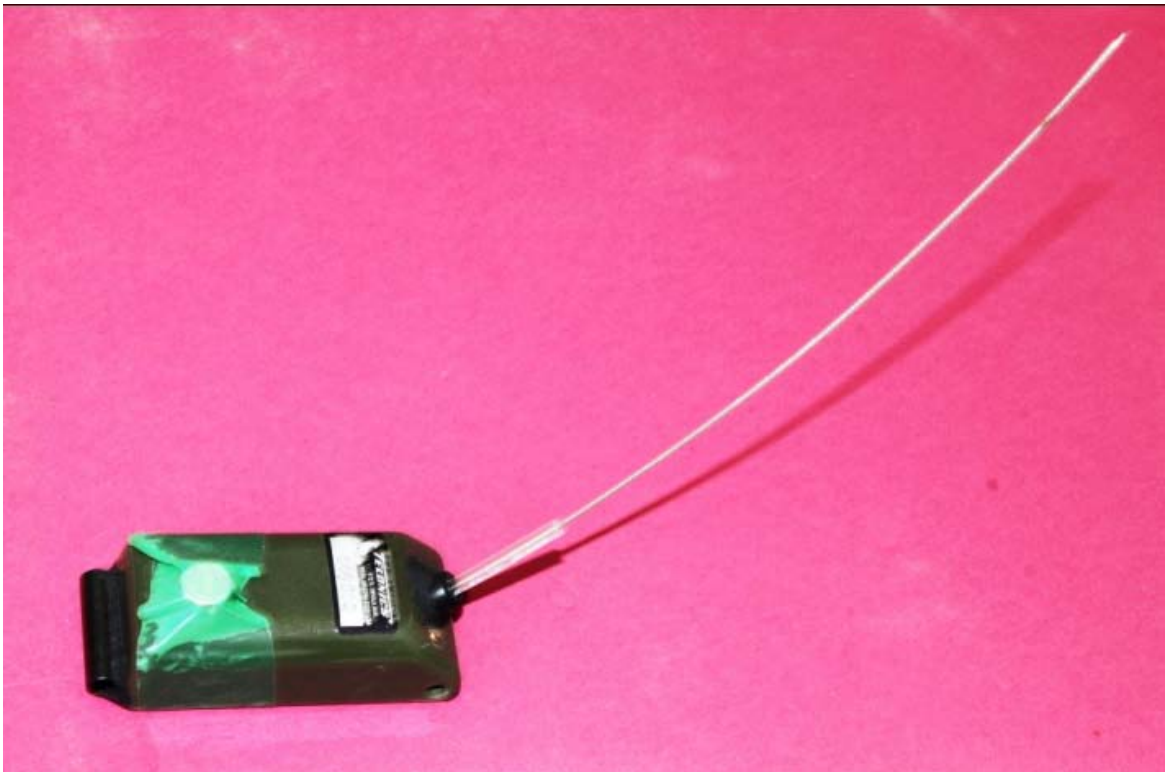
epoxy (appendix 1). On an average 384 manpower fetched for the capturing of BNC and BHG. Total four BHG were captured from Chushul and out of four only two BHG were fitted with PTTs while two BHG tagged with neck band and ring. One BNC was captured and fitted with PTT at Tsi-Gul Tso (Chushul). Subsequently one BNC was captured and fitted with PTT at Rhongo (Tibra) area of Hanle-Indus River marshland as well. We

took necessary biometric measurements of PTTs fitted birds within restricted time (Table 2). However, we made efforts to capture BNC and BHG at Hanle marshes but unfortunately no bird was captured during exercise.

**Table 2: Biometric measurements of Captured Birds**

Date	Species ID	Transmitter No.	Neck Band/ Ring No.	Weight (kg)	Place of capture
16/09/2013	BNC130047	669864	--	--	Tsi-Gul
17/09/2013	BHG130046	663888	K-26/ 12201	2.72	Rala
----do----	BHG130044	669863	K-25/ 12202	2.79	Tingru
----do----	BHG	--	K-24/ 12203	--	Rala
----do----	BHG	--	K-27/12204	--	Tingru
21/09/2013	BNC130045	669862	--	--	Rhongo

*b) Performance of Transmitters:* Telonics TAV-2656 Platform Transmitter Terminal (PTT) with 55 gm weight was fitted on two BNC and two BHG (Figure 4). Assuggested by peer reviewed studies, the



**Figure 4: TAV-2656 Platform Terminal Transmitter (PTT)**

PTT weight was not exceeded from 3-4% weight of target bird species'. The PTT was set to be received location in 6 hrs interval with 1 year life span battery. Presently, three PTTs are functioning properly while bird with ID BHG110046 has malfunctioned. We received total 810 locations from all PTTs till early December. However locations 3, 2, 1 & 0 were used for movement pattern analysis. Total of 69% locations were used for analysis (Table 3). Location class A and B were excluded from analysis owing to low accuracy.

**Table 3: Locations received from PTTs**

Individual ID	Total locations	LC 3	LC 2	LC 1	LC 0	LC A	LC B
BHG130044	240	21	43	56	46	30	44
BHG130046	127	15	17	29	15	15	36
BNC130045	197	28	35	42	26	24	42
BNC130047	240	47	33	37	22	29	72
<b>Grand Total</b>	<b>804</b>	<b>111</b>	<b>128</b>	<b>164</b>	<b>109</b>	<b>98</b>	<b>194</b>

c) *ARGOS CLS*: The locations from PTTs were received by ARGOS. Generally, ARGOS provides different location class (LC) as 3, 2, 1, 0, A, B and Z. However, only LC 3 to 0 was used for the analysis.



*Pic by: Dhirtiman Mukherjee*

*d) Landscape use by PTT fitted birds*

To date, three PTTs are functioning properly. Within a one flight, BHG130044 moved around 120 km from Pangong Lake to near Himachal border. Among the all PTT tagged birds BHG130044 moved maximum distance with total of 945 km from Pangong Tso to near Himachal border (Figure 5).

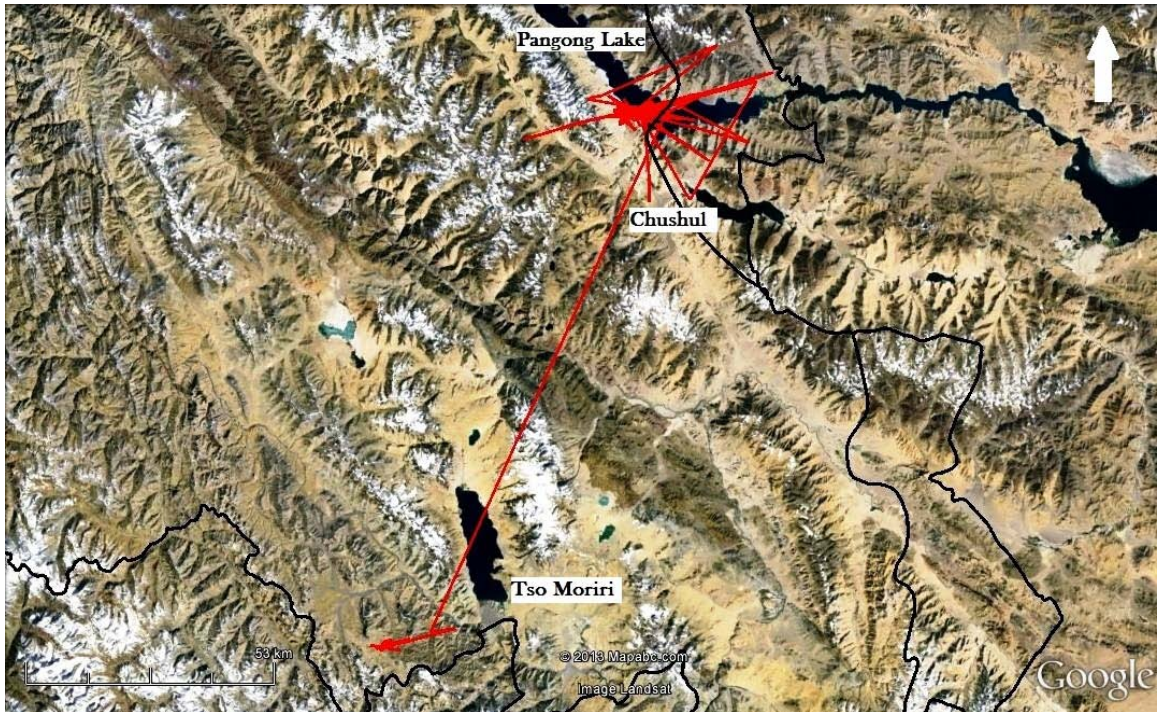
The BHG130046 is not functioning since last of October, 2103. However, total 361 km movement was recorded till the month of October (Figure 6). The bird travelled in and around capturing site Chushul and Chinese territory. Mostly, bird was restricted in and around capture site Rala marshes (Chushul) though on few occasions used Tsi-Gul and Tso- Nyak marshes of Chushul area.

Cranes are still using their capturing and nearby areas. To date, the total movement of BNC130047 has recorded 279 km in and around of the capturing site TsiGul (Chushul) (Figure 7). The bird has three core areas of use first TsiGul, second near Pangong Lake and third Tso-Nyak marshes of Chushul. Only for one occasion bird visited Tibetan Autonomous region.

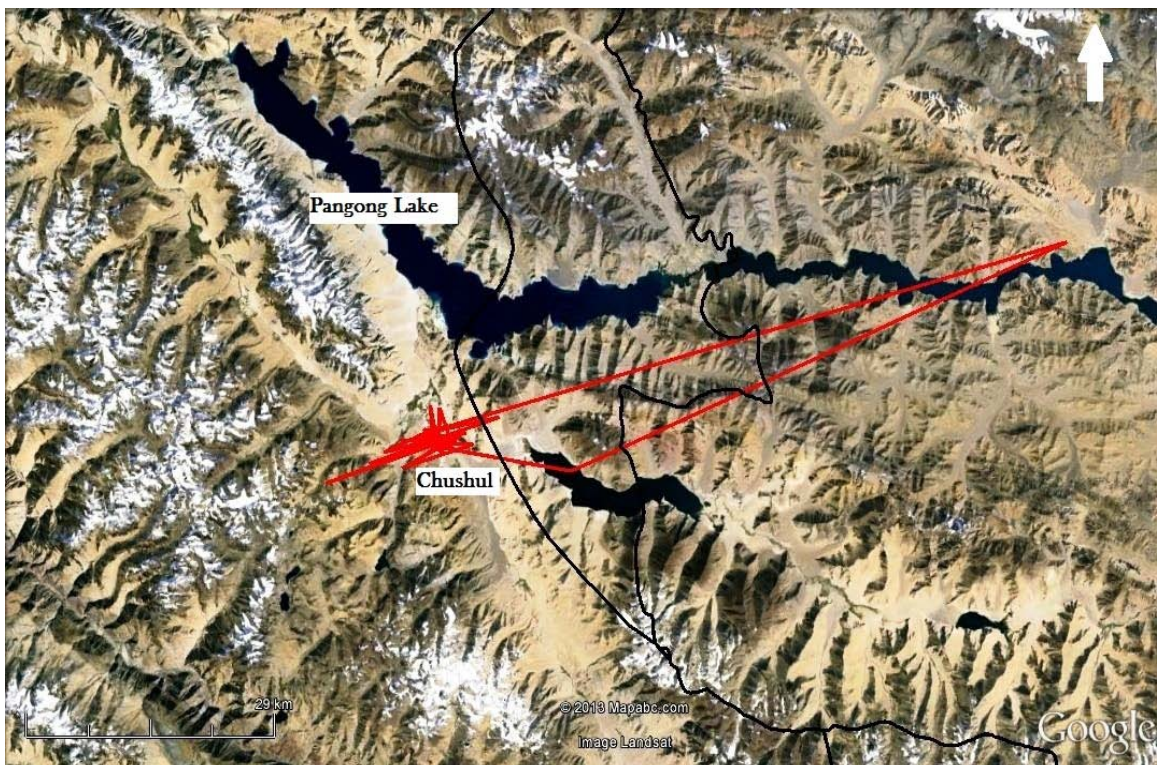
The second BNC130045 moved 329 km in and around capturing site Rhongo (Figure 8). The bird is using the Hanle-Indus marshes and occasionally shifted near Tibra village. On two occasions bird visited areas near line of actual control (LAC). Nevertheless, bird is using wetlands in these areas.



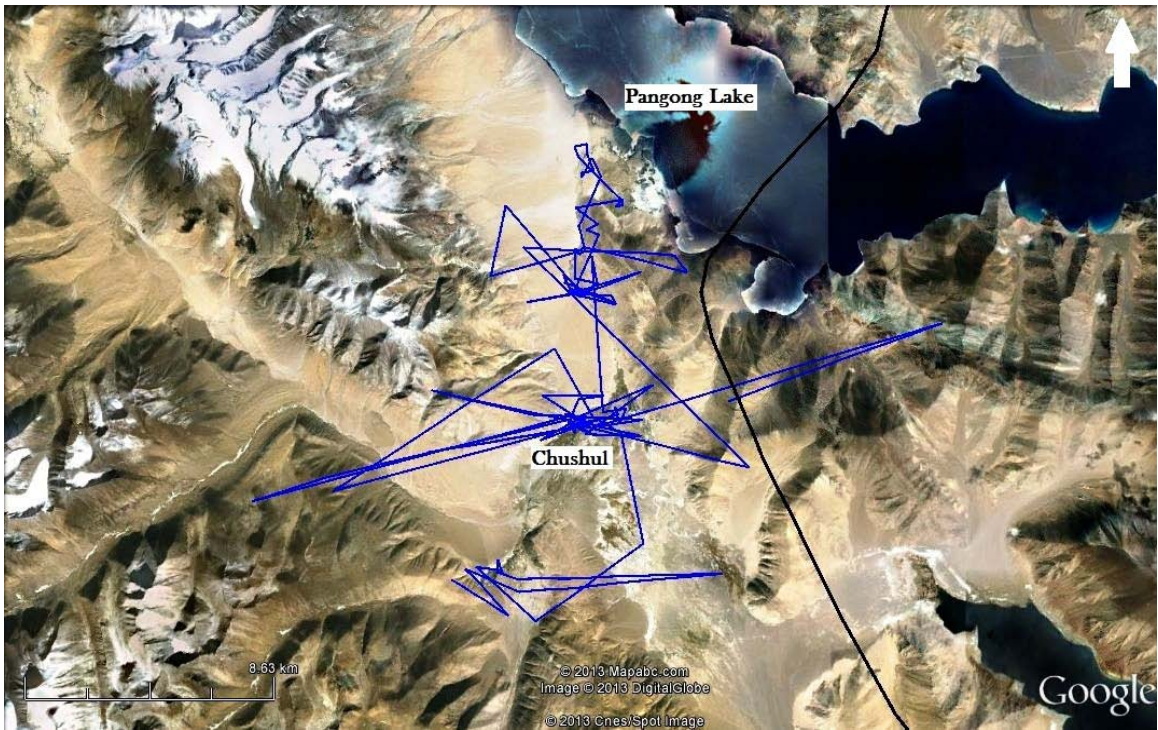
**Figure 5: Movement pattern of BHG130044**



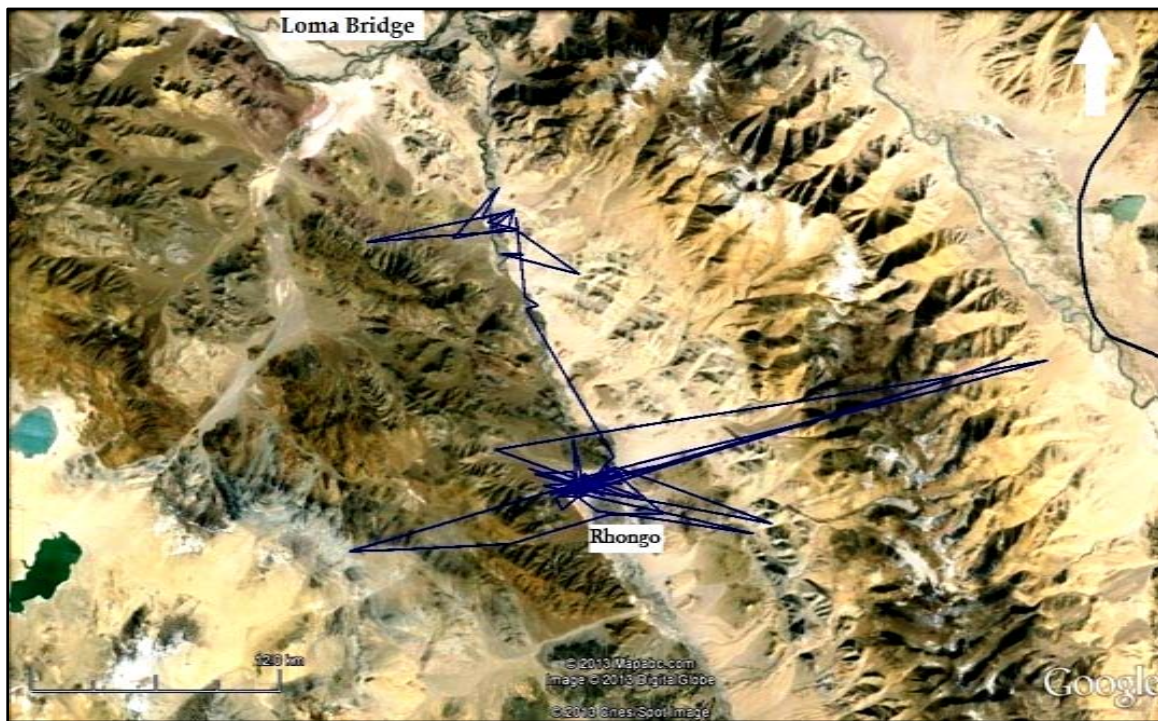
**Figure 6: Movement pattern of BHG130046**



**Figure 7: Movement pattern of BNC130047**



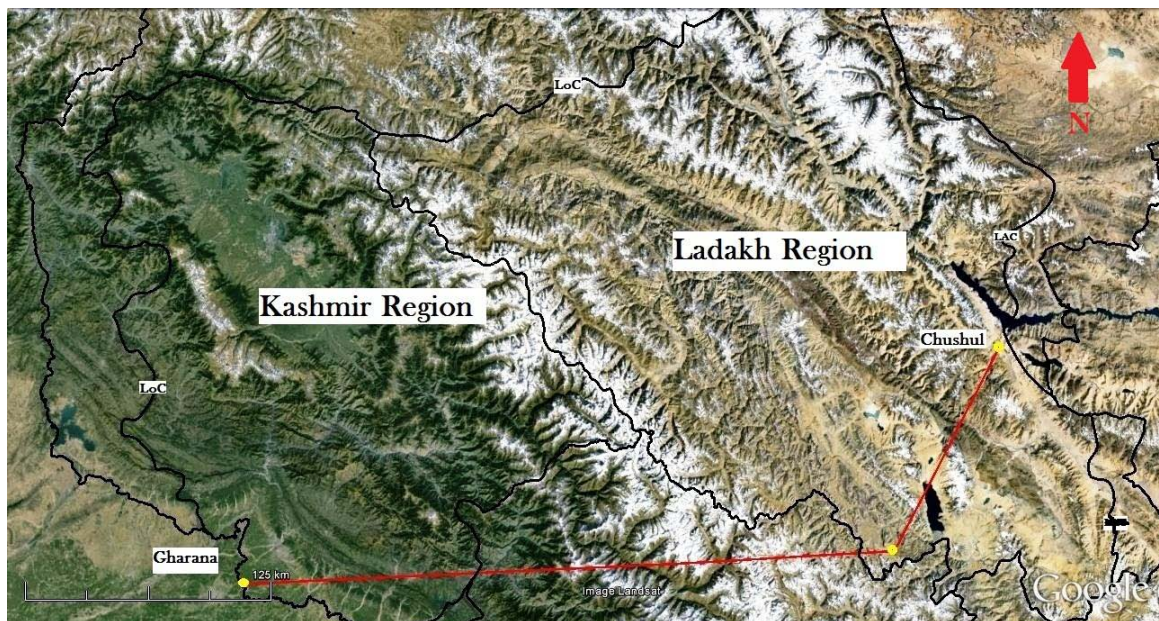
**Figure 8: Movement pattern of BNC130045**



*d) Migration by conventionally collared and ringed birds*

We confirmed the winter migration of collared BHG with neck bands. In recent geese collared with ID no. K-24 and K-27 has sighted in Gharana Wetland Conservation Reserve; Jammu (Figure 9). Thus geese must have travelled minimum 400 km linear distance in between Chushul marshes and Gharana Wetland.

**Figure 9: Likely movement of K-24 and K-27 from Chushul to Gharana**



Besides, previous studies revealed the winter migration towards low altitudes and moderately warmer wetlands (Qian et al. 2009; Liu et al. 2012). However, paradoxical to the previous thoughts BNCs are still utilizing the areas of Changthang WLS instead of migrating towards China or other wintering sites. Nonetheless, it is early to state about migration behavior and wintering sites of BNC. Further results will reveal more about the movement pattern and habitat use of BNC and BHG in Ladakh and possible wintering sites. Furthermore, we are planning to deploy more satellite transmitters on BNC in Ladakh.



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## **Appendix1: Capture Protocol for the Black-necked Crane in Ladak**

### **Capturing**

- Capture & Deployment sites: Chushul, Rongo and Hanle
- First two days observation of birds and locate different individuals/ pairs in capture sites.
- Try to locate the foraging sites of target birds.
- Noose traps should be used at day time.

### **Handling**

- At least two persons should handle bird. One to hold body and wings and, another head and legs. At first, hold the head part of bird then wings.
- One person can restrain the bird's head and legs to prevent injuries caused if the bird struggle to escape.
- Cover bird eye with a clean cloth. Nostrils must be open to allow bird to breath.
- To avoid physiological shock the bird should be kept in sheltered, well-ventilated area and away from the human disturbance.

### **Deployment of transmitters**

- Do not keep bird for long time duration in capture.
- Use Teflon harness for deployment of PTTs.
- Check PTTs before deployment either working or not and remove magnet switch from PTT.
- PTT should be fitted carefully with proper attachment, and harness should be positioned in right way within wings.
- Leave some gap between PTT and back of bird for making flight comfortable.
- Scratches, cuts and wounds should be clean with water and sterile saline before releasing.
- Finally put bird on the ground for releasing near water body or marshland from it was captured earlier. Do not release at any random site.

## Appendix 2: Poster Presented in Seminar

# Tracking Movement Pattern of Bar-headed Goose and Black-necked Crane in Jammu and Kashmir

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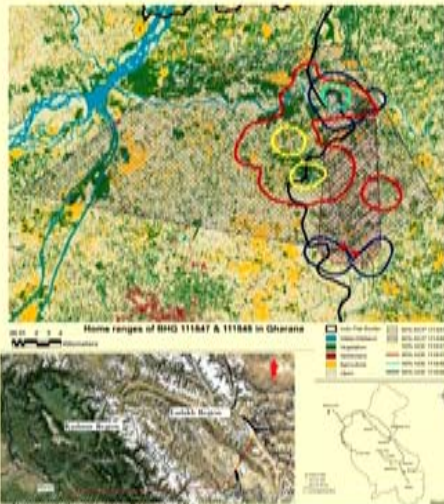


### Introduction

- Bar-headed goose, *Anser indicus*, is a long distance, highest flying migrant in India, suspected carrier of H5N1 from North Asia (Prosser et al. 2011).
- India harbours breeding as well as non-breeding populations. Breeding population in Ladakh (Gole, 1982) whereas, the non breeding migratory populations in other parts of country.
- Globally, Black-necked Crane *Grus nigricollis* is the only high altitude crane among 15 species, breeds in Ladakh and winter population has reported from Arunachal Pradesh and West Bengal in India (Chandan et al. 2005).
- Our study will contribute in understanding migratory paths specific to North-West India studying both breeding and wintering populations for BHG & BNC.

### Objective

To understand migration pattern of Bar-headed Goose and Black-necked Crane



### Study Sites

- Gharana Wetland Conservation Reserve, Jammu** - Situated in Tawi flood plains (32°32' 26" N & 74°41' 24"E) with area of 1 km<sup>2</sup>. Overall 90 species of water birds have been recorded including winter visitor species.
- Changthang Cold Desert Wildlife Sanctuary, Ladakh**
  - Area: 4000 km<sup>2</sup>
  - Location: 32° 19' to 34° 35' N & 77° 45' to 79° 18' E

### Methods

#### A. Capturing

Eleven bar-headed geese were captured in Gharana and Changthang. Two black-necked cranes in Changthang by using noose traps and four geese were randomly selected for the deployment of PTTs.

Four BHG and two BNCs were fitted with Telonics transmitters with backpack harness and with expected battery life of 9-12 months and weight ranging from 29 = 45 gm. Four BHG were fitted with neck collars.

#### B. Telemetry

PTTs programmed to receive five locations in every 24 hour cycle with different accuracy classes (high accuracy location classes (LC)-3, 2, 1, & 0; low accuracy classes-A, B & Z).

We used ArcGIS 9.3 (Hawth's tool) for spatial analysis in terms of movement and home range (Ueta 2000).

### References

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- Acknowledgements**  
Director & Director, WWS  
Shri. A. K. Singh, I.P.S., Chief Wildlife Warden J&K.  
CCF Jammu, Govt. of J&K, Department of Wildlife Protection.  
Wildlife Warden, Lakh.  
Dr. Ar. H. Mahajan, Director WWWS  
Sh. Krishnan Mukherjee - Wildlife Photographer  
All Research and Support  
WWF Lakh Office Staff  
Special thanks to staff of Gharana Wetland and Changthang WLS.



### Results and Discussion

In contrary to previous studies, instead of migrating to Tibetan plateau or north Asia, two birds (from Gharana) used the Tawi River flood plains of India and Pakistan in Jammu and Sialkot respectively till August 2012.

The BHG 111847 used 394 km long stretch of the Tawi flood plains while BHG 111848 used only 55 km long stretch of the river bed.

The home range of BHG 111847 was 378.27 km<sup>2</sup> (95% Minimum Convex Polygon (MCP)) and 85.45 km<sup>2</sup> (95% Kernel Density Estimator (KD)), while BHG 111848 home range was 66 km<sup>2</sup> (95% MCP) and 36.89km<sup>2</sup> (95% KD).

In Ladakh, Two birds fitted with conventional collar and rings recently sighted at Gharana Wetland, Jammu. However, PTTs fitted BHG is using wetlands near Himachal border.

The BHG 130044 (in red) moved 945 km and BHG 130046 (in yellow) moved 360 km in Changthang. Both BNC 130047 and 130045 are using Changthang as well.

Eventually, this information will be helpful in conserving vital areas and judging their status as disease carriers.

No. of locations received from PTTs

Individual ID	Total Locations	LC-3	LC-2	LC-1	LC-0	LC-A	LC-B	Open PTT Functional
111847	90	97	107	79	104	94	79	90
111848	97	13	8	10	22	1	23	90
130044	340	21	43	50	46	30	44	Functional
130045	197	5	5	20	10	10	50	40

**Appendix 3: Data received from the BHG 130044**

<b>Bird ID</b>	<b>Lat</b>	<b>Lon</b>	<b>Location Class</b>	<b>Date</b>	<b>Time</b>
130044	33.54500	78.70972	0	9/17/2013	14:37:19
130044	33.58917	78.71139	0	9/17/2013	15:22:19
130044	33.72056	78.69972	0	9/18/2013	18:49:20
130044	33.72583	78.68750	2	9/18/2013	20:55:30
130044	33.72083	78.65722	2	9/18/2013	21:31:20
130044	33.72111	78.66417	3	9/18/2013	21:50:05
130044	33.70833	78.68028	1	9/20/2013	9:44:25
130044	33.70972	78.67861	1	9/20/2013	9:50:50
130044	33.71333	78.67361	3	9/20/2013	10:36:50
130044	33.70000	78.81889	0	9/21/2013	20:43:21
130044	33.73083	78.64861	0	9/21/2013	20:52:51
130044	33.71944	78.68194	2	9/21/2013	21:29:51
130044	33.72861	78.63944	0	9/22/2013	2:22:21
130044	33.71528	78.69556	1	9/23/2013	4:04:34
130044	33.62083	78.84833	0	9/23/2013	4:57:52
130044	33.72028	78.67806	2	9/23/2013	5:15:52
130044	33.69111	78.69222	1	9/23/2013	5:44:52
130044	33.75250	78.85056	0	9/23/2013	8:04:22
130044	33.71722	78.67889	1	9/24/2013	20:19:22
130044	33.71722	78.68611	1	9/24/2013	22:44:22
130044	33.71028	78.63139	1	9/26/2013	7:29:53
130044	33.77417	78.94333	0	9/26/2013	9:10:23
130044	33.77278	78.96278	0	9/26/2013	9:53:23
130044	33.72028	78.68389	1	9/28/2013	1:15:38
130044	33.72194	78.63139	1	9/28/2013	2:58:33
130044	33.71694	78.68778	1	9/28/2013	3:40:53
130044	33.71778	78.67917	2	9/28/2013	5:50:53
130044	33.71750	78.68889	2	9/28/2013	6:16:53
130044	33.71333	78.66028	1	9/29/2013	14:06:54
130044	33.73056	78.70667	0	9/29/2013	16:38:20
130044	33.71944	78.67167	2	10/1/2013	4:47:54
130044	33.72111	78.64722	1	10/1/2013	6:13:24
130044	33.72306	78.70306	1	10/1/2013	6:21:54
130044	33.69306	78.64556	1	10/2/2013	15:56:55
130044	33.71361	78.65417	1	10/2/2013	17:01:55
130044	33.71333	78.68361	3	10/2/2013	18:10:25
130044	33.71417	78.67389	2	10/2/2013	19:49:25
130044	33.71806	78.67528	3	10/2/2013	21:05:25



130044	33.74417	78.65583	1	10/4/2013	5:52:10
130044	33.71833	78.67583	2	10/4/2013	9:59:26
130044	33.70944	78.61472	0	10/4/2013	10:15:38
130044	33.70861	78.66694	2	10/5/2013	17:32:56
130044	33.71972	78.67806	2	10/5/2013	19:51:56
130044	33.71972	78.67639	3	10/5/2013	21:24:56
130044	33.71861	78.67639	2	10/5/2013	21:39:56
130044	33.72278	78.68417	1	10/7/2013	6:36:57
130044	33.70944	78.69778	0	10/7/2013	9:38:27
130044	33.71028	78.72056	1	10/7/2013	9:46:57
130044	33.70222	78.67806	1	10/7/2013	10:39:27
130044	33.71861	78.66944	1	10/8/2013	14:27:45
130044	33.72056	78.67528	3	10/8/2013	15:09:57
130044	33.71944	78.67278	2	10/8/2013	15:17:20
130044	33.72222	78.66139	1	10/8/2013	16:07:40
130044	33.70361	78.65972	1	10/8/2013	16:46:57
130044	33.72639	78.67000	2	10/8/2013	19:25:57
130044	33.71472	78.68500	3	10/10/2013	4:07:43
130044	33.72417	78.70528	1	10/10/2013	4:52:58
130044	33.74139	78.57528	0	10/10/2013	6:39:28
130044	33.84417	78.87389	0	10/10/2013	8:18:58
130044	33.71861	78.68028	2	10/11/2013	16:22:06
130044	33.70917	78.68056	2	10/11/2013	16:41:28
130044	33.72056	78.67278	3	10/11/2013	20:37:28
130044	33.71722	78.68611	1	10/13/2013	5:31:29
130044	33.71528	78.69000	3	10/13/2013	7:47:06
130044	33.69944	78.64583	0	10/13/2013	9:27:59
130044	33.70806	78.67611	1	10/13/2013	10:03:59
130044	33.71472	78.66806	3	10/13/2013	10:25:09
130044	33.71722	78.68611	1	10/13/2013	5:31:29
130044	33.71528	78.69000	3	10/13/2013	7:47:06
130044	33.69944	78.64583	0	10/13/2013	9:27:59
130044	33.70806	78.67611	1	10/13/2013	10:03:59
130044	33.71472	78.66806	3	10/13/2013	10:25:09
130044	33.71944	78.67250	3	10/14/2013	20:03:59
130044	33.72278	78.67389	3	10/14/2013	21:44:29
130044	33.71972	78.67611	2	10/14/2013	22:23:29
130044	33.71833	78.68556	1	10/14/2013	23:58:29
130044	33.70472	78.66556	2	10/16/2013	8:55:30
130044	33.71556	78.68528	0	10/16/2013	9:29:45
130044	33.71000	78.70056	1	10/16/2013	10:48:40

130044	33.72194	78.64889	1	10/16/2013	12:31:30
130044	33.71778	78.67417	2	10/17/2013	21:12:30
130044	33.71444	78.67639	3	10/17/2013	21:47:00
130044	33.72250	78.68417	2	10/17/2013	22:46:00
130044	33.71444	78.64194	0	10/18/2013	0:19:30
130044	33.68250	78.68167	0	10/18/2013	0:30:00
130044	33.70778	78.65917	1	10/19/2013	10:40:01
130044	33.79000	79.00083	0	10/19/2013	11:16:31
130044	33.71000	78.69500	0	10/19/2013	13:45:27
130044	33.72000	78.67694	1	10/20/2013	22:56:01
130044	33.77306	78.96194	0	10/21/2013	0:24:31
130044	33.54806	78.80306	0	10/21/2013	0:57:02
130044	33.71611	78.68917	2	10/22/2013	11:46:02
130044	33.70361	78.68611	1	10/22/2013	12:11:19
130044	33.72111	78.68111	2	10/22/2013	13:49:10
130044	33.72222	78.67889	1	10/22/2013	15:20:02
130044	33.72056	78.67861	3	10/22/2013	15:49:45
130044	33.72222	78.68389	0	10/22/2013	16:12:02
130044	33.71972	78.68556	2	10/24/2013	0:29:33
130044	33.70972	78.67472	1	10/24/2013	4:03:03
130044	33.72583	78.64472	1	10/24/2013	4:14:33
130044	33.71056	78.68056	2	10/24/2013	5:04:03
130044	33.71417	78.68472	2	10/24/2013	5:40:15
130044	33.72611	78.68833	1	10/25/2013	13:55:18
130044	33.72639	78.68389	2	10/25/2013	15:09:51
130044	33.72278	78.68306	3	10/25/2013	15:57:33
130044	33.72778	78.65139	2	10/25/2013	16:51:53
130044	33.69194	78.66667	1	10/27/2013	3:58:34
130044	33.71472	78.66528	2	10/27/2013	4:56:16
130044	33.71278	78.66972	2	10/27/2013	5:07:14
130044	33.72000	78.63194	1	10/27/2013	5:39:34
130044	33.72583	78.70194	2	10/27/2013	6:56:04
130044	33.66778	78.42528	0	10/28/2013	15:51:40
130044	33.72222	78.67833	1	10/28/2013	16:17:04
130044	33.73667	78.71944	0	10/28/2013	16:37:04
130044	33.71222	78.74028	0	10/28/2013	20:53:04
130044	33.72056	78.66056	0	10/30/2013	4:28:35
130044	33.72306	78.67111	0	10/30/2013	4:40:05
130044	33.74278	78.80444	0	10/30/2013	8:03:15
130044	33.71917	78.67778	2	10/31/2013	20:21:05
130044	33.72111	78.67944	2	10/31/2013	22:33:53

130044	33.70750	78.65056	0	11/2/2013	7:31:05
130044	33.71472	78.68917	1	11/2/2013	9:45:06
130044	33.72306	78.69028	2	11/3/2013	21:29:06
130044	33.72472	78.68083	1	11/3/2013	23:42:06
130044	33.72028	78.67833	2	11/4/2013	0:14:06
130044	33.70083	78.66167	1	11/5/2013	8:40:21
130044	33.71806	78.67667	2	11/5/2013	10:50:16
130044	33.72278	78.70472	0	11/5/2013	11:00:06
130044	33.72111	78.67833	0	11/5/2013	13:11:26
130044	33.71778	78.67611	1	11/6/2013	23:08:07
130044	33.72000	78.67889	3	11/7/2013	0:41:47
130044	33.74972	78.62056	1	11/7/2013	1:29:37
130044	33.74972	78.62056	1	11/7/2013	1:29:37
130044	33.72222	78.66194	0	11/8/2013	10:15:17
130044	33.71944	78.67528	2	11/8/2013	11:27:07
130044	33.65472	78.94000	0	11/8/2013	13:16:59
130044	33.73639	78.76528	0	11/8/2013	15:40:07
130044	32.73917	78.19833	1	11/9/2013	23:57:37
130044	32.73806	78.20083	1	11/10/2013	3:54:33
130044	32.74444	78.25472	0	11/10/2013	4:15:08
130044	32.70944	78.08667	1	11/11/2013	13:22:37
130044	32.70556	78.08500	1	11/11/2013	15:07:37
130044	32.70639	78.08944	3	11/14/2013	15:44:33
130044	32.71194	78.09083	2	11/14/2013	16:07:33
130044	32.71472	78.06167	1	11/16/2013	4:23:31
130044	32.70944	78.09250	0	11/16/2013	4:41:41
130044	32.70583	78.12972	0	11/16/2013	8:20:01
130044	32.71000	78.09083	2	11/17/2013	16:22:00
130044	32.71472	78.06167	1	11/16/2013	4:23:31
130044	32.70944	78.09250	0	11/16/2013	4:41:41
130044	32.70583	78.12972	0	11/16/2013	8:20:01
130044	32.71000	78.09083	2	11/17/2013	16:22:00
130044	32.72444	78.11000	0	11/19/2013	7:47:28
130044	32.72139	78.09361	0	11/19/2013	9:53:28
130044	32.70972	78.08417	3	11/20/2013	23:56:26
130044	32.71056	78.08972	2	11/23/2013	21:14:54
130044	32.71083	78.08972	3	11/23/2013	23:19:54
130044	32.70917	78.09333	2	11/24/2013	0:21:24
130044	32.70917	78.08472	1	11/24/2013	0:53:54
130044	32.70917	78.08694	2	11/25/2013	10:27:23
130044	32.70972	78.08694	0	11/26/2013	22:46:52

130044	32.71139	78.09306	2	11/27/2013	1:00:21
130044	32.70806	78.07556	1	11/28/2013	15:54:50
130044	32.71222	78.08639	1	12/1/2013	16:00:17
130044	32.71139	78.07944	1	12/1/2013	16:32:17
130044	32.72694	78.15361	0	12/6/2013	8:03:12

**Appendix 4: Data received from the BHG 130045**

<b>BirdID</b>	<b>Lat</b>	<b>Lon</b>	<b>Location Class</b>	<b>Date</b>	<b>Time</b>
130045	33.05667	78.85278	1	9/21/2013	20:43:11
130045	33.05694	78.84583	3	9/21/2013	20:54:22
130045	33.05722	78.84083	3	9/21/2013	21:30:58
130045	33.04722	78.88250	1	9/22/2013	2:21:30
130045	33.06833	78.84806	2	9/23/2013	4:05:17
130045	33.07139	78.83444	2	9/23/2013	4:55:52
130045	33.07694	78.84861	1	9/23/2013	5:16:42
130045	33.06861	78.84528	3	9/23/2013	5:44:40
130045	33.06417	78.81639	1	9/23/2013	8:03:16
130045	33.08667	78.84056	1	9/23/2013	8:43:36
130045	33.07278	78.83111	3	9/24/2013	20:19:56
130045	33.07444	78.83556	2	9/24/2013	21:58:20
130045	33.06833	78.83639	0	9/24/2013	22:44:04
130045	33.06833	78.83611	2	9/26/2013	7:29:39
130045	33.07611	78.84806	3	9/26/2013	9:11:34
130045	33.06306	78.77083	0	9/26/2013	9:54:34
130045	33.06750	78.85056	1	9/28/2013	5:49:39
130045	33.07333	78.84917	1	9/28/2013	6:19:18
130045	33.03778	78.85333	2	9/29/2013	14:07:55
130045	33.03389	78.86000	1	9/29/2013	16:38:19
130045	33.03250	78.85389	3	9/29/2013	18:04:54
130045	32.96611	78.89861	1	10/2/2013	15:57:10
130045	32.95917	78.89028	2	10/2/2013	17:00:21
130045	32.95972	78.90167	1	10/2/2013	18:11:00
130045	32.95028	78.88306	3	10/24/2013	0:02:34
130045	32.95222	78.88417	2	10/24/2013	0:29:00
130045	32.94333	78.87083	2	10/24/2013	4:03:00
130045	32.94833	78.86778	3	10/24/2013	4:19:35
130045	32.95111	78.87111	2	10/24/2013	5:03:30
130045	32.95028	78.88306	3	10/24/2013	0:02:34
130045	32.95222	78.88417	2	10/24/2013	0:29:00
130045	32.94333	78.87083	2	10/24/2013	4:03:00
130045	32.94833	78.86778	3	10/24/2013	4:19:35
130045	32.95111	78.87111	2	10/24/2013	5:03:30
130045	32.95361	78.88028	3	10/25/2013	13:56:25
130045	32.96028	78.89722	1	10/25/2013	15:06:34
130045	32.95528	78.88306	2	10/25/2013	15:56:23
130045	32.94889	78.89250	1	10/27/2013	3:23:50

130045	32.96222	78.89500	1	10/27/2013	3:59:25
130045	32.94028	78.92417	1	10/27/2013	4:56:52
130045	32.94083	78.89583	0	10/27/2013	5:07:32
130045	32.92917	78.84389	0	10/27/2013	5:44:08
130045	32.92778	78.76000	0	10/28/2013	15:50:46
130045	32.95583	78.88389	3	10/28/2013	16:14:15
130045	32.95833	78.88028	2	10/28/2013	16:34:59
130045	32.94806	78.91222	0	10/28/2013	20:55:46
130045	32.94889	78.90361	0	10/30/2013	4:30:24
130045	32.97056	78.83639	0	10/30/2013	4:40:03
130045	33.00472	79.12889	0	10/30/2013	8:01:52
130045	32.95583	78.87444	0	10/31/2013	20:22:41
130045	32.95528	78.87778	2	10/31/2013	22:02:19
130045	32.95583	78.87972	2	10/31/2013	22:34:51
130045	32.95000	78.87083	1	11/2/2013	7:30:49
130045	32.95639	78.88472	2	11/2/2013	9:13:00
130045	32.96083	78.89833	1	11/2/2013	9:41:27
130045	32.95389	78.87972	2	11/3/2013	21:30:46
130045	32.95361	78.87694	1	11/3/2013	22:02:17
130045	32.95472	78.87889	2	11/3/2013	23:41:24
130045	32.95167	78.88444	1	11/4/2013	0:15:27
130045	32.95167	78.88556	1	11/5/2013	8:39:24
130045	32.95444	78.88833	2	11/5/2013	10:50:33
130045	32.96167	78.89889	0	11/5/2013	11:00:43
130045	32.93556	78.98111	0	11/5/2013	13:12:53
130045	32.95167	78.88472	3	11/6/2013	23:07:49
130045	32.95306	78.87861	3	11/7/2013	0:39:50
130045	32.95167	78.87667	3	11/7/2013	1:30:09
130045	32.95472	78.87722	1	11/8/2013	10:15:57
130045	32.95194	78.86806	1	11/8/2013	11:27:07
130045	32.95361	78.87944	1	11/8/2013	13:17:26
130045	32.95444	78.88194	1	11/8/2013	15:39:45
130045	32.95167	78.88139	3	11/9/2013	23:28:07
130045	32.96000	78.87639	1	11/10/2013	1:35:11
130045	32.95944	78.85694	2	11/10/2013	3:57:01
130045	32.94972	78.89472	1	11/10/2013	4:15:19
130045	32.96194	78.85361	0	11/11/2013	13:23:29
130045	32.95556	78.87583	1	11/11/2013	16:44:46
130045	32.95361	78.87750	3	11/11/2013	16:46:18
130045	32.95028	78.88917	1	11/13/2013	4:50:51
130045	32.95389	78.87667	1	11/13/2013	5:00:45

130045	32.95444	78.90306	0	11/14/2013	15:45:15
130045	32.95500	78.87722	3	11/14/2013	16:08:07
130045	32.95417	78.86139	0	11/16/2013	4:24:37
130045	32.93111	78.97139	0	11/16/2013	4:42:24
130045	32.94250	78.88889	0	11/16/2013	5:27:54
130045	32.95083	78.87639	1	11/16/2013	8:19:53
130045	32.95528	78.87306	1	11/17/2013	16:22:18
130045	32.95417	78.87750	2	11/17/2013	20:39:31
130045	32.95861	78.90194	1	11/19/2013	7:46:00
130045	32.95556	78.89167	1	11/19/2013	9:53:11
130045	32.95472	78.87722	1	11/20/2013	20:06:25
130045	32.95167	78.88222	3	11/20/2013	22:13:30
130045	32.95250	78.87639	2	11/20/2013	23:56:11
130045	32.95750	78.88528	2	11/22/2013	8:56:35
130045	32.95833	78.88167	1	11/22/2013	10:44:29
130045	32.95139	78.88806	3	11/22/2013	11:02:47
130045	32.95917	78.88333	1	11/22/2013	12:26:40
130045	32.95472	78.88139	2	11/22/2013	12:37:20
130045	32.95361	78.87806	3	11/23/2013	21:14:30
130045	32.95222	78.87917	3	11/23/2013	23:19:14
130045	32.95278	78.87944	3	11/24/2013	0:22:04
130045	32.95167	78.88083	3	11/24/2013	0:54:36
130045	32.95917	78.89556	1	11/25/2013	10:27:27
130045	32.95028	78.86500	1	11/25/2013	11:10:22
130045	32.95472	78.88528	2	11/25/2013	12:43:54
130045	32.95472	78.88528	2	11/25/2013	12:43:54
130045	32.95194	78.87750	1	11/26/2013	22:46:27
130045	32.95333	78.87889	1	11/27/2013	3:50:56
130045	32.95417	78.87333	3	11/28/2013	11:38:47
130045	32.95111	78.87667	3	11/28/2013	12:48:56
130045	32.95139	78.87444	2	11/28/2013	15:54:28
130045	32.94917	78.86833	0	12/1/2013	15:44:15
130045	32.95139	78.88111	2	12/1/2013	16:00:51
130045	32.94889	78.88167	3	12/1/2013	16:33:02
130045	32.94917	78.86833	0	12/1/2013	15:44:15
130045	32.95139	78.88111	2	12/1/2013	16:00:51
130045	32.94889	78.88167	3	12/1/2013	16:33:02
130045	32.95333	78.88222	1	12/3/2013	4:17:15
130045	32.95167	78.88528	0	12/3/2013	4:37:35
130045	32.95250	78.88250	1	12/4/2013	15:22:13
130045	32.95083	78.88444	0	12/4/2013	15:30:12

130045	32.95250	78.89000	2	12/6/2013	5:13:36
130045	32.96444	78.93833	0	12/6/2013	8:02:53
130045	32.95500	78.87944	2	12/7/2013	20:24:12
130045	32.95278	78.88278	2	12/7/2013	22:24:10
130045	32.97444	78.87722	0	12/9/2013	11:12:57
130045	32.95278	78.87889	2	12/12/2013	8:39:22
130045	32.96167	78.90028	1	12/12/2013	10:39:20
130045	32.95056	78.88056	0	12/12/2013	13:48:26
130045	33.00611	79.10917	0	12/15/2013	10:03:41
130045	32.96056	78.91722	0	12/15/2013	11:19:55
130045	32.95278	78.88056	2	12/15/2013	13:53:57



**Appendix 5: Data received from the BHG 130046**

<b>Bird ID</b>	<b>Lat</b>	<b>Lon</b>	<b>Location Class</b>	<b>Date</b>	<b>Time</b>
130046	33.59139	78.67333	0	9/17/2013	12:58:46
130046	33.76389	79.49056	0	9/17/2013	15:18:37
130046	33.54972	78.85194	0	9/18/2013	18:49:47
130046	33.57778	78.67250	2	9/18/2013	21:31:21
130046	33.58083	78.69083	1	9/20/2013	9:45:21
130046	33.58361	78.68472	3	9/20/2013	10:36:40
130046	33.61500	78.68611	0	9/20/2013	12:27:35
130046	33.58694	78.69722	1	9/21/2013	20:43:05
130046	33.58083	78.69250	1	9/21/2013	20:56:41
130046	33.58389	78.69889	2	9/21/2013	21:29:35
130046	33.58583	78.67389	0	9/22/2013	2:22:32
130046	33.57000	78.68722	2	9/23/2013	5:15:05
130046	33.58139	78.68861	3	9/23/2013	5:45:03
130046	33.54306	78.54222	0	9/23/2013	8:02:29
130046	33.58444	78.69361	1	9/24/2013	20:20:08
130046	33.57861	78.70861	1	9/24/2013	22:43:15
130046	33.58500	78.68500	3	9/26/2013	7:31:01
130046	33.56111	78.59556	0	9/26/2013	9:54:14
130046	33.58417	78.69361	2	9/28/2013	1:14:38
130046	33.58139	78.69111	1	9/28/2013	2:58:53
130046	33.58028	78.69583	2	9/28/2013	3:41:22
130046	33.58306	78.68750	1	9/28/2013	5:20:03
130046	33.57639	78.67917	2	9/28/2013	5:47:57
130046	33.57500	78.69111	3	9/28/2013	6:17:24
130046	33.59361	78.71306	1	9/29/2013	14:08:04
130046	33.58583	78.71000	1	9/29/2013	14:52:52
130046	33.55611	78.63694	0	9/29/2013	16:40:30
130046	33.57833	78.72778	0	9/29/2013	18:05:35
130046	33.57944	78.67833	1	10/1/2013	4:35:04
130046	33.58083	78.68917	2	10/1/2013	4:47:54
130046	33.56917	78.66750	2	10/1/2013	6:13:56
130046	33.57028	78.67278	1	10/1/2013	6:22:43
130046	33.58417	78.68389	2	10/2/2013	15:57:27
130046	33.58972	78.71889	1	10/2/2013	17:02:11
130046	33.58778	78.69472	0	10/2/2013	18:10:23
130046	33.57333	78.69361	2	10/2/2013	19:48:02
130046	33.58111	78.68750	1	10/4/2013	4:58:07
130046	33.58528	78.67000	3	10/4/2013	6:42:29

130046	33.58306	78.67861	2	10/4/2013	9:59:21
130046	33.58139	78.68194	3	10/4/2013	10:15:53
130046	33.57944	78.68250	1	10/5/2013	17:33:20
130046	33.61750	78.67444	0	10/5/2013	18:14:55
130046	33.58000	78.67639	2	10/5/2013	20:56:23
130046	33.58639	78.69139	3	10/5/2013	21:24:17
130046	33.58472	78.70167	3	10/5/2013	21:40:18
130046	33.58167	78.68694	3	10/7/2013	9:39:20
130046	33.58250	78.68583	3	10/7/2013	9:47:05
130046	33.58333	78.68556	3	10/7/2013	11:24:13
130046	33.57861	78.68722	2	10/8/2013	15:11:33
130046	33.58778	78.70583	1	10/8/2013	15:18:10
130046	33.57972	78.68417	2	10/8/2013	16:04:15
130046	33.58611	78.68111	2	10/8/2013	16:49:12
130046	33.58750	78.69306	3	10/10/2013	3:33:04
130046	33.58250	78.68639	3	10/10/2013	4:53:55
130046	33.58333	78.63556	1	10/10/2013	8:19:02
130046	33.58444	78.67833	1	10/10/2013	8:57:29
130046	33.57417	78.70194	1	10/11/2013	16:22:20
130046	33.58333	78.67972	2	10/11/2013	16:40:34
130046	33.58000	78.70083	1	10/11/2013	20:36:41
130046	33.58417	78.68944	1	10/13/2013	5:28:10
130046	33.59389	78.67306	1	10/13/2013	7:47:00
130046	33.58083	78.65194	0	10/13/2013	10:03:51
130046	33.58417	78.68944	1	10/13/2013	5:28:10
130046	33.59389	78.67306	1	10/13/2013	7:47:00
130046	33.58083	78.65194	0	10/13/2013	10:03:51
130046	33.59139	78.67861	3	10/16/2013	9:32:26
130046	33.59167	78.67889	1	10/17/2013	21:13:24
130046	33.60472	78.76222	1	10/18/2013	0:19:39
130046	33.58639	78.69083	1	10/18/2013	0:27:24
130046	33.57194	78.61417	0	10/21/2013	0:24:58
130046	33.59611	78.68250	2	10/22/2013	11:44:13
130046	33.57861	78.67861	1	10/24/2013	0:30:47
130046	33.58750	78.68306	3	10/25/2013	15:59:36
130046	33.59444	78.66583	1	10/27/2013	4:03:17
130046	33.58889	78.66917	1	10/28/2013	20:54:14
130046	33.59778	78.69639	0	10/30/2013	8:04:11

**Appendix 6: Data received from the BNC 130047**

<b>Bird ID</b>	<b>Lat</b>	<b>Lon</b>	<b>Location Class</b>	<b>Date</b>	<b>Time</b>
130047	33.57667	78.60806	1	9/16/2013	13:09:26
130047	33.56444	78.63028	1	9/17/2013	7:04:16
130047	33.57556	78.61833	3	9/17/2013	9:59:06
130047	33.57972	78.61306	1	9/17/2013	10:22:22
130047	33.57222	78.63444	1	9/17/2013	10:53:31
130047	33.57806	78.71556	0	9/18/2013	18:47:28
130047	33.57639	78.63361	2	9/20/2013	9:44:41
130047	33.57861	78.62583	1	9/20/2013	10:36:40
130047	33.58278	78.62611	3	9/20/2013	12:26:23
130047	33.57861	78.62750	2	9/21/2013	20:55:29
130047	33.57917	78.62778	3	9/21/2013	21:30:08
130047	33.58028	78.61750	1	9/22/2013	2:22:34
130047	33.56278	78.64111	2	9/23/2013	4:02:23
130047	33.58778	78.68389	0	9/23/2013	8:02:50
130047	33.62361	78.67500	1	9/24/2013	20:21:53
130047	33.62917	78.66361	2	9/24/2013	21:57:26
130047	33.65111	78.64861	0	9/26/2013	9:11:23
130047	33.60556	78.56250	0	9/26/2013	9:53:45
130047	33.62972	78.67389	1	9/28/2013	1:15:25
130047	33.63222	78.67250	3	9/28/2013	2:58:19
130047	33.62667	78.67444	1	9/28/2013	3:43:39
130047	33.63167	78.67694	3	9/28/2013	5:47:54
130047	33.63056	78.66778	2	9/28/2013	6:18:46
130047	33.68111	78.66333	2	9/29/2013	14:08:25
130047	33.67222	78.66556	2	9/29/2013	16:38:29
130047	33.67389	78.65667	2	9/29/2013	18:04:51
130047	33.68389	78.65667	3	10/1/2013	4:47:17
130047	33.68167	78.65833	3	10/1/2013	6:13:23
130047	33.68306	78.66056	3	10/1/2013	6:23:53
130047	33.68222	78.66083	2	10/2/2013	15:57:38
130047	33.68889	78.65889	3	10/2/2013	17:00:34
130047	33.69111	78.65806	3	10/2/2013	18:09:41
130047	33.69250	78.65917	3	10/4/2013	10:15:11
130047	33.70722	78.66694	2	10/5/2013	17:32:02
130047	33.71333	78.66333	1	10/5/2013	18:15:56
130047	33.70861	78.66056	1	10/5/2013	19:43:05
130047	33.70694	78.65917	2	10/5/2013	20:03:02
130047	33.70861	78.65944	3	10/5/2013	21:25:46

130047	33.70889	78.66417	3	10/5/2013	21:45:24
130047	33.71444	78.66139	1	10/7/2013	6:34:08
130047	33.71778	78.66139	1	10/7/2013	9:38:59
130047	33.71694	78.65639	3	10/7/2013	9:47:08
130047	33.71333	78.65806	3	10/7/2013	10:39:22
130047	33.69917	78.67556	2	10/8/2013	14:27:01
130047	33.69778	78.67556	3	10/8/2013	15:19:16
130047	33.69750	78.67278	3	10/8/2013	16:07:02
130047	33.69972	78.67583	3	10/8/2013	16:49:49
130047	33.69694	78.65694	1	10/10/2013	3:30:42
130047	33.69139	78.66583	2	10/10/2013	4:53:07
130047	33.68972	78.66111	2	10/10/2013	5:10:46
130047	33.68806	78.66611	3	10/10/2013	8:15:46
130047	33.66917	78.65611	1	10/11/2013	16:19:09
130047	33.67000	78.65667	3	10/11/2013	20:37:58
130047	33.66917	78.65833	3	10/14/2013	20:03:58
130047	33.66972	78.66056	2	10/14/2013	21:44:56
130047	33.66806	78.65833	3	10/14/2013	22:22:44
130047	33.67278	78.65250	2	10/16/2013	7:15:27
130047	33.66611	78.67194	1	10/19/2013	10:38:55
130047	33.66528	78.67306	1	10/19/2013	13:44:46
130047	33.66833	78.67111	0	10/20/2013	22:58:09
130047	33.66889	78.65611	2	10/20/2013	23:17:24
130047	33.66611	78.63750	0	10/21/2013	0:24:36
130047	33.67083	78.66667	2	10/24/2013	0:01:47
130047	33.67583	78.68306	2	10/24/2013	0:32:14
130047	33.66972	78.65778	3	10/24/2013	1:21:35
130047	33.67083	78.65861	3	10/24/2013	4:01:43
130047	33.66972	78.65917	3	10/24/2013	5:04:11
130047	33.66611	78.67194	1	10/19/2013	10:38:55
130047	33.66528	78.67306	1	10/19/2013	13:44:46
130047	33.66889	78.65611	2	10/20/2013	23:17:24
130047	33.66611	78.63750	0	10/21/2013	0:24:36
130047	33.67083	78.66667	2	10/24/2013	0:01:47
130047	33.67583	78.68306	2	10/24/2013	0:32:14
130047	33.66972	78.65778	3	10/24/2013	1:21:35
130047	33.67083	78.65861	3	10/24/2013	4:01:43
130047	33.66972	78.65917	3	10/24/2013	5:04:11
130047	33.67528	78.65194	0	10/25/2013	13:56:54
130047	33.66917	78.65528	3	10/27/2013	3:24:12
130047	33.67028	78.65778	1	10/27/2013	3:58:20

130047	33.67028	78.65778	1	10/27/2013	3:58:20
130047	33.69750	78.62917	0	10/27/2013	4:53:59
130047	33.67444	78.62361	0	10/28/2013	15:53:14
130047	33.68278	78.65806	3	10/28/2013	16:15:27
130047	33.68417	78.66000	3	10/28/2013	16:35:14
130047	33.67583	78.70139	1	10/28/2013	20:54:45
130047	33.68139	78.69639	1	10/30/2013	4:29:42
130047	33.68389	78.63611	0	10/30/2013	8:04:19
130047	33.68139	78.69639	1	10/30/2013	4:29:42
130047	33.68389	78.63611	0	10/30/2013	8:04:19
130047	33.61278	78.72583	0	11/4/2013	0:10:57
130047	33.62694	78.65500	1	11/8/2013	13:14:22
130047	33.62639	78.65694	2	11/13/2013	4:50:32
130047	33.62611	78.65861	3	11/13/2013	4:59:28
130047	33.62139	78.64278	2	11/14/2013	15:45:03
130047	33.62806	78.65750	3	11/14/2013	16:08:09
130047	33.62583	78.66583	1	11/16/2013	4:22:58
130047	33.62278	78.68306	0	11/16/2013	4:41:33
130047	33.62333	78.66083	2	11/16/2013	5:27:33
130047	33.63944	78.68778	1	11/16/2013	8:20:48
130047	33.62861	78.65694	3	11/17/2013	16:23:06
130047	33.62944	78.65528	3	11/17/2013	20:39:02
130047	33.62583	78.66583	1	11/16/2013	4:22:58
130047	33.62278	78.68306	0	11/16/2013	4:41:33
130047	33.62333	78.66083	2	11/16/2013	5:27:33
130047	33.63944	78.68778	1	11/16/2013	8:20:48
130047	33.62861	78.65694	3	11/17/2013	16:23:06
130047	33.62944	78.65528	3	11/17/2013	20:39:02
130047	33.60250	78.53167	0	11/19/2013	7:48:15
130047	33.61000	78.56000	0	11/19/2013	9:54:31
130047	33.62806	78.65389	2	11/20/2013	21:46:35
130047	33.62417	78.66000	2	11/20/2013	23:52:14
130047	33.62806	78.65472	3	11/20/2013	23:54:58
130047	33.63472	78.65806	1	11/22/2013	8:56:30
130047	33.63583	78.66833	2	11/22/2013	11:01:58
130047	33.63611	78.64389	1	11/22/2013	12:25:27
130047	33.62556	78.66306	2	11/23/2013	21:13:48
130047	33.63000	78.65250	3	11/23/2013	23:18:54
130047	33.62861	78.66083	3	11/24/2013	0:21:23
130047	33.62639	78.65778	3	11/24/2013	0:54:59
130047	33.62611	78.66056	3	11/25/2013	10:28:38

130047	33.61778	78.59917	1	11/25/2013	11:10:38
130047	33.62583	78.65917	0	11/26/2013	22:46:37
130047	33.62667	78.65694	3	11/27/2013	0:47:06
130047	33.62806	78.66556	2	11/28/2013	11:40:18
130047	33.62667	78.65611	2	11/28/2013	12:48:48
130047	33.62722	78.65361	1	11/28/2013	15:54:55
130047	33.62278	78.66472	1	11/28/2013	16:35:52
130047	33.62833	78.65361	1	11/30/2013	4:54:22
130047	33.62361	78.65667	1	11/30/2013	5:36:22
130047	33.62722	78.65611	3	12/1/2013	16:02:00
130047	33.62806	78.65333	3	12/1/2013	16:32:58
130047	33.62722	78.65611	3	12/1/2013	16:02:00
130047	33.62806	78.65333	3	12/1/2013	16:32:58
130047	33.63778	78.60111	0	12/3/2013	4:37:17
130047	33.62972	78.64111	0	12/6/2013	4:25:59
130047	33.62806	78.68361	2	12/6/2013	5:13:14
130047	33.62556	78.66389	1	12/6/2013	5:20:51
130047	33.65917	78.80139	0	12/6/2013	8:04:34
130047	33.63417	78.71722	0	12/9/2013	9:11:50



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