Density of dens of the Red Fox (Vulpes vulpes) in the Dubai Desert Conservation Reserve

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Contents

Arabic Summary

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إن الثعلب الأحمر العربي (بوحصين) ينتمي إلى رتبة آكلات اللحوم وفصيلة الكلبيات، وهو يعرف أيضا بمجرّد **الثعلب** بما أنه أكثر أنواع الثعالب شيوعا،يعتبر الثعلب الأحمر والذئب الرمادي من أكثر اللواحم انتشارا في الكرة الأرضية مقارنة بأي ثدييات أخرى وذلك باستثناء الإنسان وبعض أنواع القوارض. يعتبر الثعلب الأحمر الحيوان الوحيد من فصيلة الكلبيات المسجل تواجده وانتشاره في جميع قارات الكرة الأرضية الخمسة بإجمالي تواجد في 83 دولة حول العالم.

يعتبر الثعلب الأحمر متوسط الحجم مقارنة بباقي فصيلة الكلبيات وأكبر نوع من أنواع الثعالب المسجلة الأخرى, يتراوح طول الحيوان من مقدمة أنفه ألي طرف ذيله حوالي (300 – 555مم) ووزن الجسم من (3 – 14 كجم) ويعتبر الذكر أكبر حجماً من الأنثى, إلا أن الثعلب الأحمر يعتبر أصغر بكثير في صحارى الشرق الأوسط مقارنة بنفس النوع في مناطق أخرى مثل الأنواع المسجلة من الثعلب الأحمر بالقارة الأوروبية.
إن الثعالب الحمراء حيوانات انتهازية قابلة للتكيف في العديد من البيئات ويتنوع نظامها الغذائي من اللافقاريات مثل (الخنافس والديدان الأرضية) حتى الثدييات الصغيرة والطيور (طيور المزارع) وكذلك الفواكه وثمار النباتات المختلفة.

فترة التزاوج تكون من شهر ديسمبر وحتى شهر فبراير من كل عام وخلال تلك الفترة يصدر الثعلب العديد من الأصوات الواضحة لجذب الإناث, ويقوم الثعلب بإنشاء جحور تحت الأرض لحماية الصغار خلال الفترة الأولى من حياتهم, يعتمد حجم الجحور على طبيعة البيئة المحيطة وكذلك على عدد أفراد الأسرة, يمكن أن تكون مداخل الجحور واحدة أو لها العديد من المداخل.

إن الهدف الأساسي من تلك الدراسة هو معرفة كم عدد أوكار الثعالب الحمراء الموجودة بمحمية دبي الصحراوية وتوثيق تواجدها على الخرائط بواسطة أجهزة تحديد المواقع الجغرافية مع تسجيل كم عدد الأوكار النشطة وكم عدد الغير نشط (يتم التفريق بين الأوكار النشطة والغير نشطة من خلال ملاحظة آثار الأقدام), ثانياً؛ الفترة الزمنية المستغلة للإقامة في تلك الأوكار وثالثاً؛ تحديد البيئات المفضلة للثعالب لبناء أوكارها داخل المحمية مع معرفة سبب تفضيل بيئة عن أخرى.

تقع منطقة الدراسة بمحمية دبي الصحراوية والموجودة بإمارة دبي على بعد 65كم من مركز مدينة دبي, مساحة المحمية 225كم2 والممثلة لحوالي 4.7% من مساحة إمارة دبي.تحتوى المحمية على العديد من البيئات الطبيعية المختلفة (نبوءات صخرية، كثبان رملية متحركة، كثبان رملية ثابتة، سهول حصوية و سهول رمليه)، تمت الدراسة خلال الفترة من شهر أغسطس 2010م وحتى شهر فبراير 2011م، تم الاعتماد على الخرائط الرقمية الحديثة لتقسيم المحمية للعديد من البيئات المختلفة وكانت خطة الدراسة تعتمد على المسوح الحقلية للجحور الموجودة في منطقة الدراسة، عند العثور على جحر أو وكر للثعالب يتم تسجيل قراءات الإحداثيات من خلال جهاز تحديد المواقع الجغرافية ويتم تصنيف الموقع إلى

Abstract

Arabian red fox den density, occupation rates, and habitat preference was investigated within the Dubai Desert Conservation Reserve. A total of 168 dens were located, of which only 64 were active. Dens sites were mainly established in sandy plains with predominance of *Leptadenia pyrotecnica* (order: family), with low human disturbance. A single camera trap was used on a rotational basis at six different dens to provide further insight into den utilization by Arabian fox.

Introduction

The Arabian red fox (*Vulpes vulpes arabica*) is a sub-species of the European red fox and belongs to the canid family which is compromised of foxes, wolves, jackals and dogs. Red foxes and grey wolves have the most extensive natural range of any land mammal (with the exception of humans and perhaps some rodents). Red foxes are the only canid present on five continents, and recorded in a total of 83 countries (Sillero-Zubiri *et. al* 2004).

The species *Vulpes vulpes* is a medium-sized canid and the largest fox in the genus *Vulpes*. Adult head and body length may range from 455-900mm, tail length from 300-555mm and body weight from 3-14kg, with males generally being larger than females (Nowak 1991). It is substantially smaller in the Middle East deserts (Macdonald et al. 1999) than in Europe.

Red foxes are adaptable and opportunistic omnivores, with a diet ranging from invertebrates (e.g. earthworms and beetles) to mammals and birds including game birds, and fruits (Macdonald 2000).

Mating occurs between December and February in the United Arab Emirates and at this time they are extremely vocal, this is however an Arabian Peninsula behaviour and may change according to location (Voigt and Macdonald 1984). Underground dens are needed to shelter cubs while they are very young. The size of the den depends on the type of habitat and group size (Bell 2010). The den entrance can be either a single entrance or a multiple entrance. The dens which are utilised in the D.D.C.R are recognised by there size, other species that have burrows in the area are the Uromastyx ageyptia leptieni (order: family) which are a lot smaller and have a more oval shape which are only found on gravel plains. The identification of dens was also done with the use of camera traps.

Dens of fox are commonly located under slabs of rock or dug at the base of trees or bushes (IUCN).

In United Arab Emirates, Rüppell's Foxes occur in a variety of desert habitats including sand sheets, sand dunes, gravel plains, and inter-dune sabkhas (Murdoch et al. 2007), but little is know about its denning behaviour.

Red foxes are believed to be common in the United Arab Emirates (UAE), where the Dubai Desert Conservation Reserve (D.D.C.R) represent a relatively large landscape.

This is the first systematic study on den ecology of red foxes in the D.D.C.R. The purpose of this study is to bring up information on the Arabian red fox den density, occupation rates, and habitat preference in desert environment within the Dubai Desert Conservation Reserve.

Study area

The study area is located on the Dubai Desert Conservation Reserve (D.D.C.R), in the Dubai Emirate. The reserve is located 65km outside of Dubai city, between Margham and Al Faqah, on the E66. It comprises an area of 225 squared kilometres, 4.7% of the Dubai Emirate. Five different habitat types may be found in the area, rock outcrops, shifting dunes, vegetated dunes, gravel plains and sandy plains. The D.D.C.R was established in 2003, with domestic livestock present in the area until the end of 2008. At the core of the D.D.C.R is the Al Maha Reserve, which was established earlier in 1999, and in this core area all the domestic livestock was excluded from inception (Simkins 2009).

Methodology

The study took place from August 2010 to February 2011 between 08:00H and 12:00H. The use of a recent satellite image of the reserve (IKIONOS 2008) enabled the classification of habitats: rocky outcrops, shifting dunes, vegetated dunes, gravel plains and sandy plains.

Ground surveys were conducted throughout the reserve to locate den sites of Arabian foxes. Surveys are labour intensive and required the coverage of a large area, so a Rhino ATV was used to locate the dens, after which a more detailed survey was carried out on foot.

Once a fox den was located, coordinates were taken using GPS, and it was classified as active or inactive based on signs of fox activity (tracks, fresh faeces, etc.).

A digital camera was used to photograph each and every den found irrespective of the status, to help at a later stage to estimate habitat preference. Each den was also numbered so it was possible to go back to any particular den to retrieve additional information if necessary.

Dens were often dug under a particular plant species that was readily identified to verify potential association.

All den locations were downloaded onto Arc Map 9.3 (ESRI) as part of the mapping of the dens sites. A single infra-red camera trap was deployed at selected active dens to record photographs and video footage of activity in and around the den site. The camera trap would be left at each den site for a period of 28 days, 14 of those days the trap would be on photographic mode. After this period, the working mode would be switched to video for an additional 14 days.

Three months after the survey each recorded den was revisited to check the status of all the dens and verify whether changes have taken place.

Results and discussion

During the first survey the total number of dens found on the D.D.C.R were 156, of which 56 were active and 100 were inactive. While revisiting the sites a total of 168 dens were located of which 64 were active dens and 104 were inactive.

Fifty five percent of the dens were located at the base of *Leptadenia pyrotechnica* (fire/broom bush), 23% under *Heliotropium kotschyi*, 14 % under *Haloxylon salicornicum*, 7% on gravel plains and 1% in the side of sand banks.

It is possible that the complicated root system of *Leptadenia pyrotechnica* may favour the stability of the dens, and that would be the reason why Arabian foxes prefer a den supported by the species' root. The fact that the presence of roots may be a decisive factor for denning is supported by the few dens recorded on gravel plans or sand banks free of roots. Arabian foxes would prefer to have the additional stability provided by roots, and cover provided by plants, rather than the exposed habitats found in open gravel plains and sand banks.

Fox dens are concentrated on sandy plains, the dens which are found in the side of bank and on gravel plains only represent eight percent of the dens found on the reserve. As long as those plains have vegetated dunes either around the plains, or parallel to the plains, or in very close proximity to the plains.
The sandy dunes had no denning activity. Sand does not provide a good substrate to support a den, probably collapsing during excavation or soon after it.

With the use of the camera trap, it was found that any disturbance around the den such as those provoked by the investigators by setting up a camera trap, or walking around the den site, would induce the flight of the animal this happened on eight occasions while setting up the camera trap at active dens (Bell 2010), and such reaction to disturbance has also been observed elsewhere (Dragesco-Joffe 1993). The majority of dens would be in areas with the least disturbances. In the northern part of the reserve den density was lower due to high traffic from tour operators.
The eastern part of the reserve had a high density of dens with low traffic, where it concentrated *L. pyrotecnica* with vegetated dunes, offering protection from the wind aside from denning substrate.
If a den had not been disturbed, foxes would occupy that den from 2.5 months to 6 months. If a den had collapsed, foxes would abandon the site and would not re-open the den this was observed seven times during the survey and observed four times regarding the collapsing of dens (Bell 2010).
Foxes would also relocate to another den when the home den was infested with fleas this was observed three times (Bell 2010).

Acknowledgements

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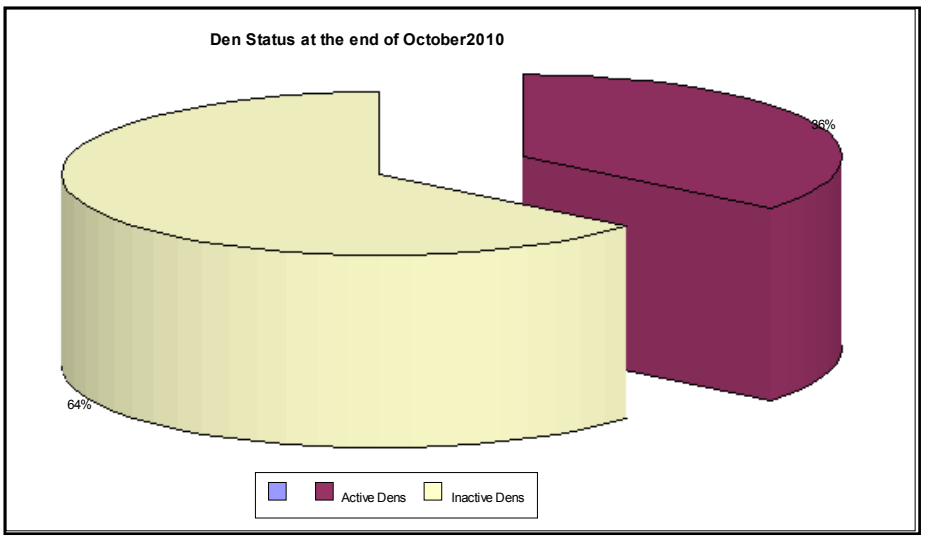
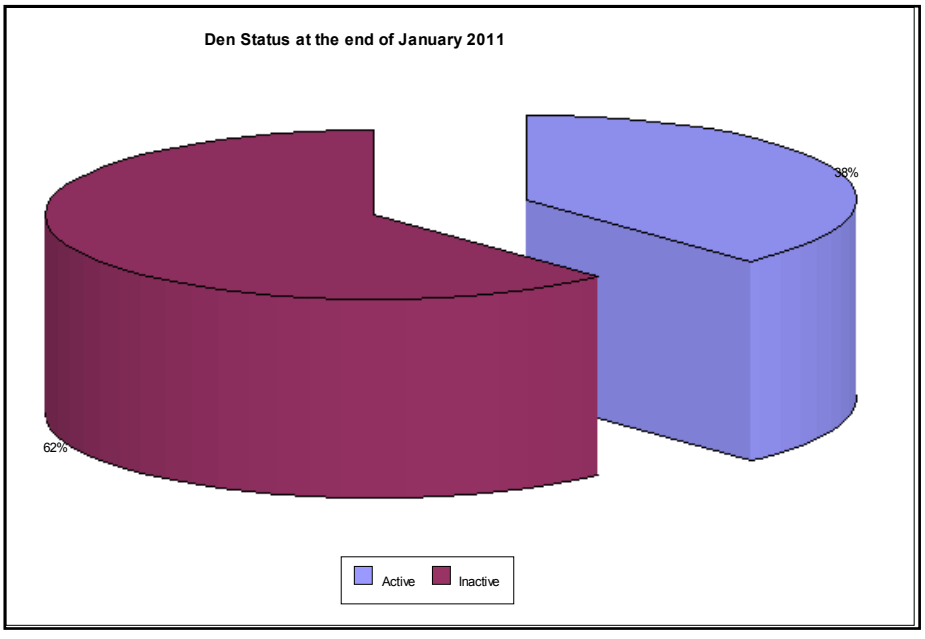
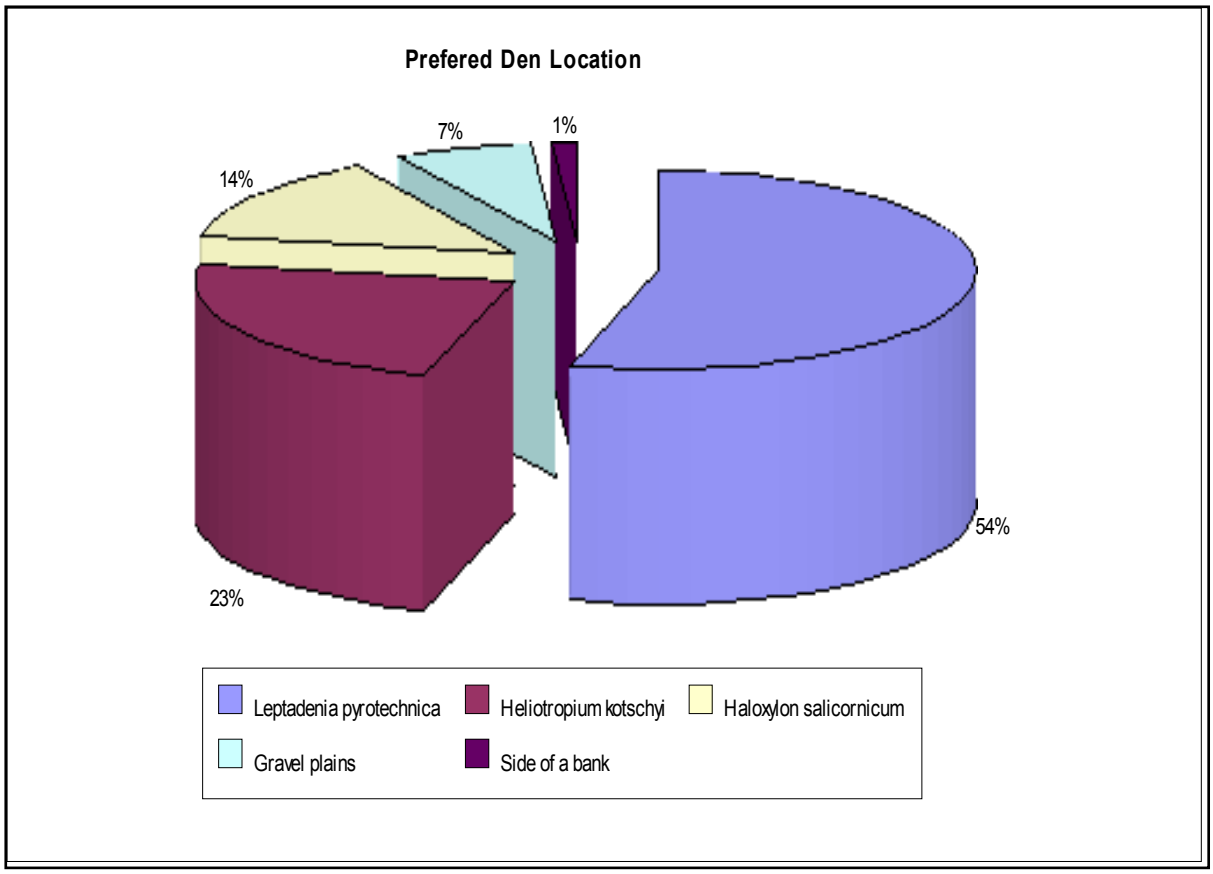
Appendix A – Status of dens at the end of October 2010



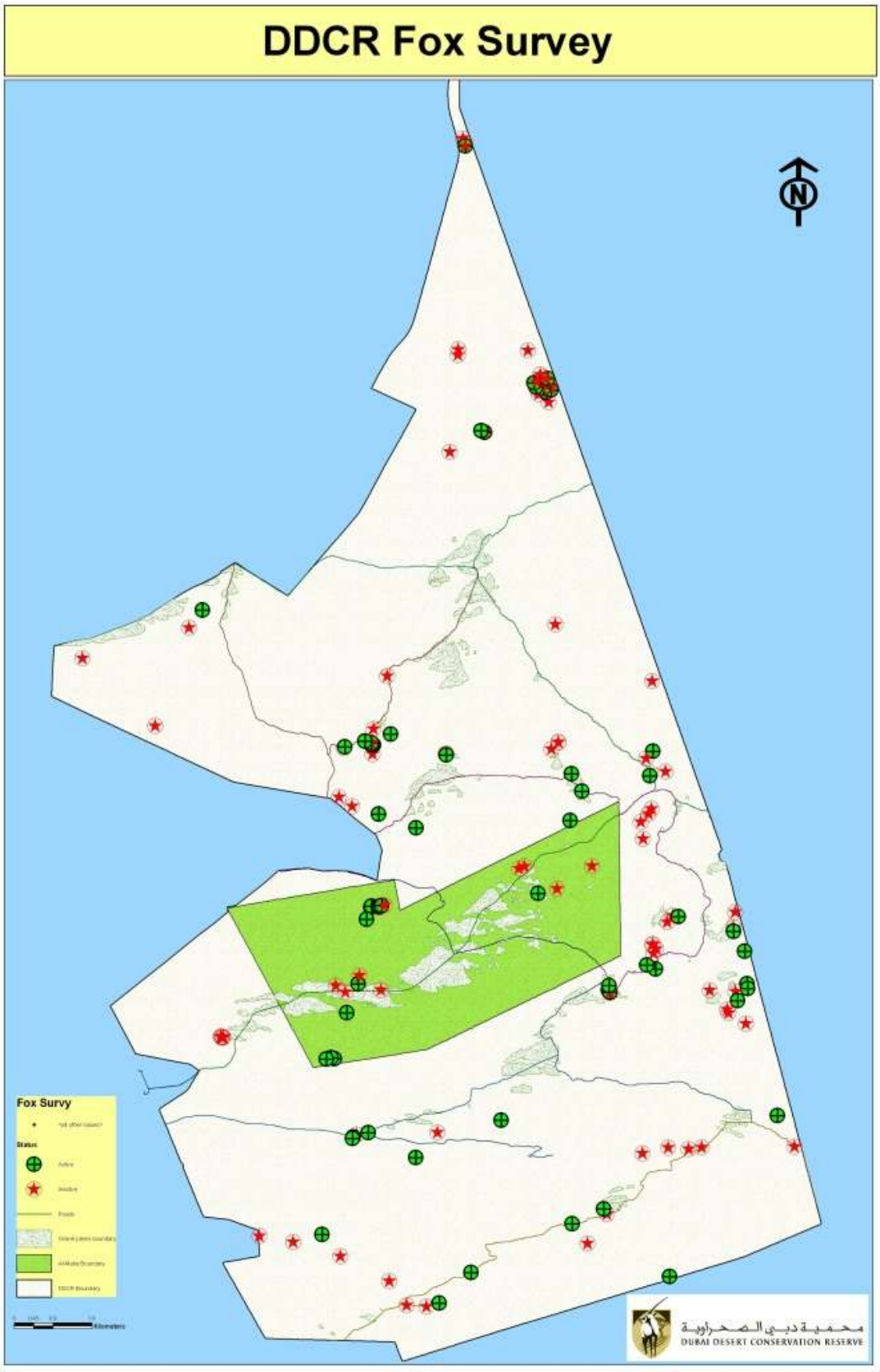
Appendix B – Status of dens at the end of January 2011



Appendix C – Preferred Den Location within the D.D.C.R



Appendix D – Den location within the D.D.C.R



Appendix E – Locations & Status of Dens within the D.D.C.R

id	x	y	status	waypoints
1	55.61261	24.79618	Inactive	DEN001
2	55.61213	24.79623	Inactive	DEN002
3	55.61213	24.79625	Inactive	DEN003
4	55.64336	24.82300	Inactive	DEN004
5	55.64333	24.82300	Active	DEN005
6	55.64349	24.82320	Active	DEN006
7	55.64484	24.82304	Active	DEN007
8	55.64491	24.82304	Active	DEN008
9	55.64508	24.82300	Active	DEN009
10	55.64522	24.82313	Active	DEN010
11	55.63317	24.75517	Active	DEN011
12	55.64555	24.82331	Active	DEN012
13	55.64619	24.82336	Inactive	DEN013
14	55.64066	24.80709	Active	DEN014
15	55.68207	24.82678	Inactive	DEN015
16	55.64038	24.77592	Inactive	DEN016
17	55.63960	24.77531	Active	DEN017
18	55.69302	24.80528	Inactive	DEN018
19	55.70248	24.81013	Active	DEN019
20	55.67527	24.83145	Inactive	DEN020
21	55.67411	24.83107	Inactive	DEN021
22	55.69268	24.80575	Active	DEN022
23	55.69306	24.80536	Active	DEN023
24	55.69304	24.80534	Inactive	DEN024
25	55.63765	24.85598	Inactive	DEN025
26	55.64676	24.87088	Inactive	DEN026
27	55.63791	24.85616	Active	DEN027
28	55.64540	24.80582	Inactive	DEN028
29	55.61251	24.79599	Inactive	DEN029
30	55.61253	24.79594	Inactive	DEN030
31	55.61227	24.79599	Inactive	DEN031
32	55.61228	24.79605	Inactive	DEN032
33	55.69284	24.80676	Active	DEN033
34	55.63599	24.80674	Inactive	DEN034
35	55.63828	24.80108	Active	DEN035
36	55.64093	24.80880	Inactive	DEN036
37	55.62015	24.75486	Inactive	DEN037
38	55.63803	24.80539	Inactive	DEN038
39	55.73140	24.77338	Inactive	DEN039
40	55.70542	24.74647	Active	DEN040
41	55.64244	24.82049	Active	DEN041

42	55.71909	24.82199	Inactive	DEN042
43	55.71873	24.81888	Inactive	DEN043
44	55.72101	24.81388	Active	DEN044
45	55.71874	24.81797	Active	DEN045
46	55.72153	24.80709	Active	DEN046
47	55.71381	24.80578	Inactive	DEN047
48	55.72169	24.80611	Active	DEN048
49	55.71916	24.80556	Inactive	DEN049
50	55.71957	24.80360	Active	DEN050
51	55.71741	24.80182	Inactive	DEN051
52	55.72134	24.79887	Inactive	DEN052
53	55.71771	24.80112	Inactive	DEN053
54	55.72789	24.77976	Active	DEN054
55	55.68927	24.83156	Inactive	DEN055
56	55.67598	24.93835	Inactive	DEN056
57	55.67809	24.82581	Active	DEN057
58	55.62715	24.75359	Inactive	DEN058
59	55.63698	24.75070	Inactive	DEN059
60	55.64713	24.74550	Inactive	DEN060
61	55.66413	24.74728	Active	DEN061
62	55.65076	24.74054	Inactive	DEN062
63	55.65490	24.74022	Inactive	DEN063
64	55.65751	24.74096	Active	DEN064
65	55.68838	24.75333	Inactive	DEN065
66	55.68518	24.75740	Active	DEN066
67	55.69241	24.75938	Inactive	DEN067
68	55.69169	24.76040	Active	DEN068
69	55.67043	24.77884	Active	DEN069
70	55.63574	24.79159	Active	DEN070
71	55.63501	24.79176	Active	DEN071
72	55.63406	24.79147	Inactive	DEN072
73	55.71210	24.77326	Inactive	DEN073
74	55.70938	24.77289	Inactive	DEN074
75	55.70514	24.77315	Inactive	DEN075
76	55.69978	24.77201	Inactive	DEN076
77	55.65718	24.77629	Inactive	DEN077
78	55.64277	24.77621	Active	DEN078
79	55.69944	24.84065	Inactive	DEN079
80	55.70166	24.84340	Inactive	DEN080
81	55.70103	24.84234	Inactive	DEN081
82	55.69995	24.83715	Inactive	DEN082
83	55.70609	24.82125	Inactive	DEN083
84	55.70728	24.82099	Active	DEN084
85	55.70495	24.81992	Inactive	DEN085
86	55.70069	24.81102	Active	DEN086

87	55.70211	24.81346	Inactive	DEN087
88	55.70199	24.81538	Inactive	DEN088
89	55.70192	24.81520	Inactive	DEN089
90	55.70266	24.81435	Inactive	DEN090
91	55.63670	24.84583	Inactive	DEN091
92	55.63939	24.84390	Inactive	DEN092
93	55.64490	24.84227	Active	DEN093
94	55.64365	24.85473	Active	DEN094
95	55.64349	24.85659	Active	DEN095
96	55.64386	24.85659	Active	DEN096
97	55.64364	24.85682	Active	DEN097
98	55.64326	24.85697	Active	DEN098
99	55.64344	24.85705	Active	DEN099
100	55.64341	24.85715	Inactive	DEN100
101	55.64204	24.85740	Active	DEN101
102	55.64744	24.85881	Active	DEN102
103	55.65885	24.85479	Inactive	DEN103
104	55.65909	24.85481	Inactive	DEN104
105	55.65902	24.85451	Active	DEN105
106	55.65270	24.83944	Active	DEN106
107	55.68506	24.85063	Active	DEN107
108	55.68479	24.84094	Active	DEN108
109	55.64388	24.85995	Inactive	DEN109
110	55.70457	24.85113	Inactive	DEN110
111	55.70193	24.85528	Active	DEN111
112	55.70059	24.85383	Inactive	DEN112
113	55.70184	24.86982	Inactive	DEN113
114	55.68233	24.85722	Inactive	DEN114
115	55.68234	24.85715	Inactive	DEN115
116	55.68084	24.85575	Inactive	DEN116
117	55.70135	24.85020	Active	DEN117
118	55.68171	24.88161	Inactive	DEN118
119	55.63949	24.77506	Active	DEN119
120	55.68031	24.92766	Inactive	DEN120
121	55.67823	24.92930	Inactive	DEN121
122	55.67980	24.92966	Active	DEN122
123	55.68036	24.93003	Inactive	DEN123
124	55.68080	24.93018	Active	DEN124
125	55.68077	24.93069	Inactive	DEN125
126	55.68046	24.93076	Inactive	DEN126
127	55.67920	24.93056	Active	DEN127
128	55.67896	24.93053	Inactive	DEN128
129	55.67807	24.93008	Inactive	DEN129
130	55.67768	24.93080	Active	DEN130
131	55.67938	24.93195	Inactive	DEN131

132	55.68009	24.93255	Active	DEN132
133	55.67989	24.93254	Inactive	DEN133
134	55.67724	24.93163	Active	DEN134
135	55.67777	24.93190	Inactive	DEN135
136	55.67854	24.93337	Inactive	DEN136
137	55.68710	24.84721	Active	DEN137
138	55.65265	24.77107	Active	DEN138
139	55.66290	24.98143	Inactive	DEN139
140	55.66285	24.98143	Inactive	DEN140
141	55.66249	24.98233	Inactive	DEN141
142	55.66296	24.98074	Active	DEN142
143	55.66298	24.98077	Inactive	DEN143
144	55.65973	24.91734	Inactive	DEN144
145	55.66693	24.92136	Active	DEN145
146	55.66699	24.92144	Inactive	DEN146
147	55.66620	24.92170	Active	DEN147
148	55.66141	24.93747	Inactive	DEN148
149	55.66146	24.93861	Inactive	DEN149
150	55.60829	24.88453	Active	DEN150
151	55.60551	24.88090	Inactive	DEN151
152	55.58337	24.87457	Inactive	DEN152
153	55.59849	24.86057	Inactive	DEN153
154	55.68476	24.84918	Inactive	DEN154
155	55.70058	24.84980	Inactive	DEN155
156	55.61601	24.79593	Inactive	DEN156
157	55.62732	24.79811	Active	DEN157
158	55.64376	24.82282	Inactive	DEN158
159	55.64369	24.75012	Active	DEN159
160	55.64525	24.75044	Active	DEN160
161	55.64533	24.75041	Inactive	DEN161