

***Nephrops* Sentinel Fishery in Functional Unit 31 (Cantabrian Sea) 2019**

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INTRODUCTION

Nephrops landings in FU 31 (ICES Division 8c, Cantabrian Sea) have decreased a 98% from 1989 to 2016. ICES advice for this stock is on the basis of a data-limited approach since 2002, meaning that no analytical stock assessment is conducted in this FU. According to this approach, FU 31 is considered as category 3.1.4 stock (ICES, 2012) and it is assessed mainly by the analysis of the LPUE series trend. Until 2018 there were no *Nephrops* discards in this FU, therefore catches were equivalent to landings (ICES, 2018). In the FU 31 trawl fleet trips that catch *Nephrops* there are hauls directed and not directed to *Nephrops*. ICES recommendation for this FU has been zero catch since 2002. Results of the last assessments in 2016 indicated an extremely low abundance level and a zero TAC was also recommended for 2017, 2018 and 2019. Following this recommendation, a *Nephrops* TAC zero was established in the 8c division, where the FU 31 is located, for that triennium (EU, 2017). The 2019 assessment obtained the same conclusions and the zero TAC was extended for 2020, 2021 and 2022 (EU, 2020).

FU 25 fishing industry got the EU permission to do a *Nephrops* sentinel fishery in that FU since 2017 in order to continue a time series of *Nephrops* data from two commercial vessels presented by them to the WGBIE 2017 (Fernández et al., 2017). Later, FU 31 fishing industry asked for a similar sentinel in their area. ICES advised on the necessary level of catch and characteristics for it (ICES, 2019) and a sentinel fishery in FU 31 with a special quota of 0.7 t per year was carried out in July of 2019. The main results about *Nephrops* of that Sentinel are presented in this working document.

SURVEY OBJECTIVES

The main objective of the Sentinel fishery was to obtain a *Nephrops* abundance index representative of the FU 31 in the period with *Nephrops* TAC zero. Other objectives were to obtain *Nephrops* size composition and proportion of males.

METHODS

The survey was conducted between 10th July to 2nd August 2019 by two commercial vessels on the FU 31. It was chosen the month of July because it is the one with the highest CPUE in the FU (Figure 1) and in other months the low appearance of *Nephrops* in the catch could prevent the realization of the survey. The survey was designed and coordinated by IEO (C.O. A Coruña). Conditions of the authorization of the 2019 observers survey in Annex I.

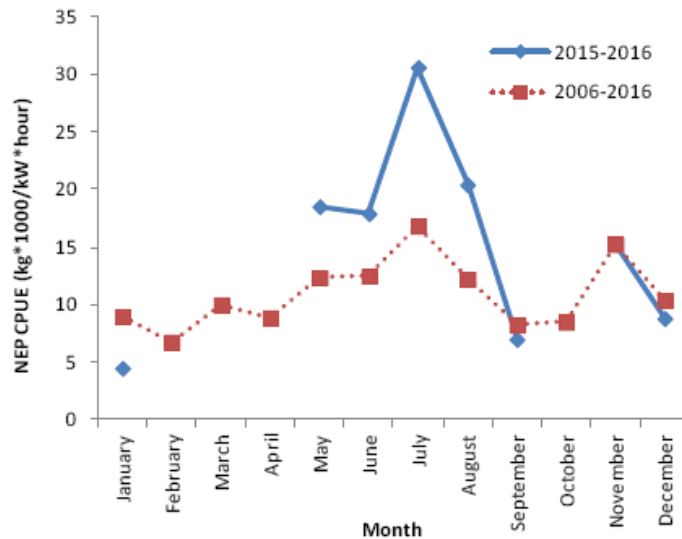


Figure 1. *Nephrops* CPUE in the commercial fleet in FU 31 (ICES, 2019).

With the aim of obtaining results representative of the whole Functional Unit 31, the FU assessment area (mud patches) was identified analysing the *Nephrops* location in the 2009-2016 VMS and logbooks data and excluding the rock and gravel sediment. This showed the existence of seven *Nephrops* patches with a total area of 5300 km² in the FU 31. The level of sampling was determined by a previous Special Request advice (ICES, 2019). In that Special Request Advice the level of sampling indicated was 7 fishing days directed to *Nephrops*. In FU 31 a vessel makes 4 hauls per day directed to *Nephrops*, therefore the level of sampling for the Sentinel was 28 hauls. The level of sampling was based in hauls instead of days with the objective of provide facilities and flexibility to the commercial vessel cooperating in the survey. These hauls were distributed in the mud patches proportionally to the area of each patch and, within each patch, randomly in 5 nm grid cells. The hauls were randomly distributed between the two commercial vessels of the survey. The vessel had to pass by a determined grid cell between the starting and the turning of the haul. The objective of this was to try to avoid that the vessels fished only in the zones with the higher *Nephrops* abundances during the sentinel fishery. The vessels could distribute these 28 hauls in the days they considered and combined them with other hauls. An observer on board from the IEO would supervise the hauls.

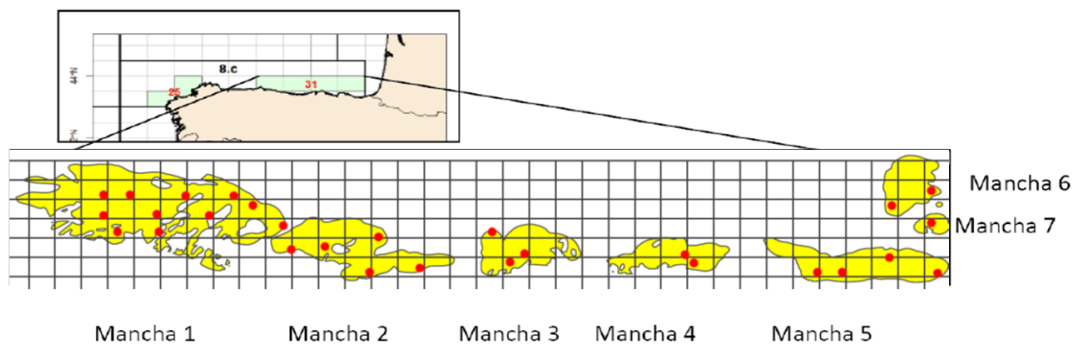


Figure 2. FU 31 *Nephrops* assessment area identification (yellow) and 28 planned hauls grid cells location (red points). Mancha = patch.

Observation and data collection methodology

The sentinel fishery was carried out in four trips, two by vessel. Each vessel did 3 days by trip (Vilaboa uno: 10-12 and 24-26 of July, O Cantiño: 16-18 and 31 of July and 1-2 of August). The vessels were two bottom trawlers “Vilaboa Uno”, with a total length of 31.5 m and 441.3 kW, based in the Santander port, and “O Cantiño”, with 28.5 m and 474.4 kW, based in the Burela port. The gear used was the usual (baca) with the regulatory 70 mm mesh size.

The duration of each haul was calculated as the elapsed time in hours between the moment in which the gear makes firm in the bottom to the beginning of the turned, therefore the effort unit was trawling hour. The observer followed the working protocol established, which consisted in:

1. General data collection of the trips and hauls, including latitude, longitude, depth and duration of the haul in hours.
2. For each haul, quantitative data of the total catch by specie, both landed and discarded.
3. Random sampling of *Nephrops* length (mm carapace Length) by sex in each haul. Proportion of sex.

All the information obtained by the observers was recorded in the IEO fishing database (SIRENO). *Nephrops* landings and size distribution were included in the 2019 FU 31 data uploaded in Intercatch.

Nephrops size composition by haul was obtained rising the sampling carried out on board using the length-weight relationship for males and females according to Fariña (1984).

RESULTS

The vessels did 45 hauls during the Sentinel survey and caught a total of 1158 kg of *Nephrops*, but only 953 kg of *Nephrops* were declared. The *Nephrops* special quota for this survey was 700 kg. The discrepancy between the *Nephrops* catch and what was declared was identified applying the length-weight relation to the length distributions obtained by the observer on board.

The two vessels distributed the 28 hauls planned between them by areas and they did not respect the random distribution planned.

14 of the hauls could not be identified in the VMS data, therefore there were not used in the CPUE estimates. In those 14 hauls, 344 kg of *Nephrops* were caught.

From the 31 remaining hauls, 2 of them were nocturnal and 29 diurnal. The nocturnal were not taken into account because *Nephrops* remains in burrows at night (Chapman, 1980). The *Nephrops* catch in the nocturnal hauls was zero.

In the 29 diurnal hauls, 813.72 kg of *Nephrops* were caught. 4 hauls were out of the *Nephrops* patches (27.54 kg of *Nephrops*).

From the 25 remaining hauls (768.18 kg of *Nephrops*), only 16 hauls were in the grid cells indicated (compare Figures 2 and 3), which represent 427.38 kg of *Nephrops*, when should have been 28 hauls. None of the 9 remaining hauls (358.8 kg of *Nephrops*) were in the grid

cells randomly selected and some of them were declared in one patch but the VMS data indicated that they were in other patch. Information by haul (date, hour, duration, depths and *Nephrops* catch) in Annex II.

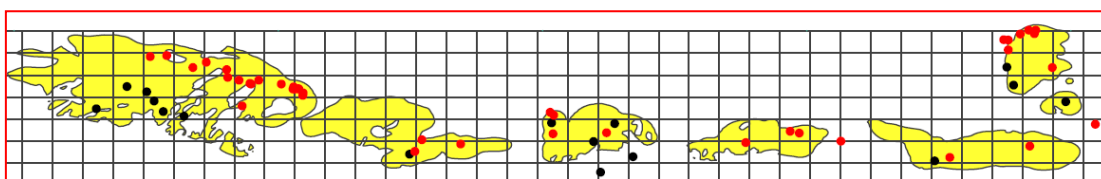


Figure 3. VMS points of FU 31 Sentinel fishery 29 diurnal hauls. Red: points of the hauls with *Nephrops* catch. Black: Points of the hauls without *Nephrops* catch.

In the 31 hauls identified in the VMS, a total catch of 7528 kg of different species (fishes, crustaceans, molluscs, etc) were caught, and the percentage of discard was 19%. In these hauls the *Nephrops* catch obtained was 813.72 kg and the percentage of *Nephrops* discard was 10%.

Nephrops CPUE

The CPUE in the *Nephrops* assessment area (patches) in the total diurnal hauls was 7.7 kg/hour. If we take into account only the 16 hauls that were made in the planned grid cells, the CPUE was 7.1 kg/hour. Final CPUEs were obtained with the average of the patches CPUE weighted to the patches areas.

Table 1. *Nephrops* CPUE (kg/hour) in the FU 31 Sentinel fishery 2019.

Nep catch	Planned Hauls		Total diurnal hauls	
	No.	CPUE (kg/hour)	No.	CPUE (kg/hour)
	427.38 kg		813.72 kg	
Patch 1	6	6.9	11	7.3
Patch2	3	4.6	3	4.6
Patch 3	2	3.7	3	2.5
Patch 4	0	-	1	4.4
Patch 5	2	4.7	3	9.5
Patch 6	2	24.0	3	22.5
Patch 7	1	0	1	0.0
Total patches	16	7.1	25	7.7
Out of patches	-	-	4	3.1
Total	16	-	29	-

Size composition and sex-ratio of the *Nephrops* catch

A total of 12033 individuals were measured, 6054 males and 5999 females. The percentage of males was 50%. Carapace length fluctuated from 28 mm to 86 mm in males and from 27 mm to 66 mm CL in females (Figure 4). Mean sizes were 45.4 in males and 41.4 in females.

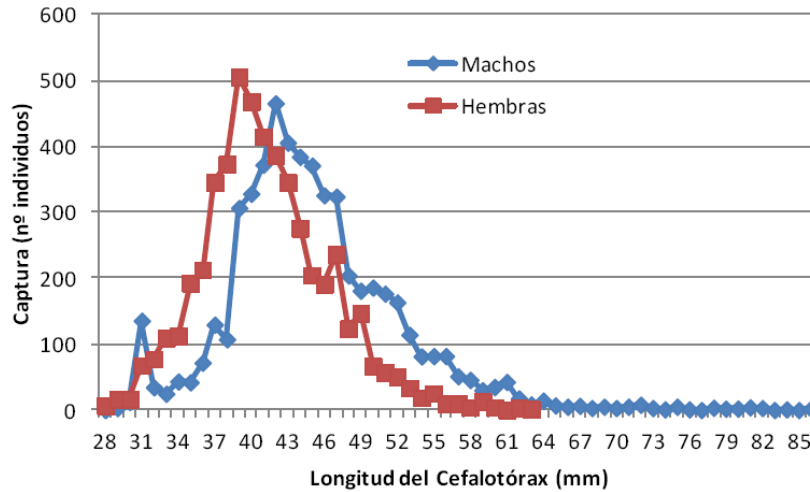


Figure 4. Length frequency distribution for *Nephrops* catch for males (blue) and females (red).

DISCUSSION

Nephrops CPUE values obtained in the Sentinel fishery (Table 1, 7.1 and 7.7 kg/hour) are higher than the maximum of the FU 31 commercial fleet time series 2009-2016 (0.6 kg/hour) (Figure 5). Other *Nephrops* LPUE data from adjacent Functional Unit (Figure 6) are similar to the commercial fleet information (Table 2).

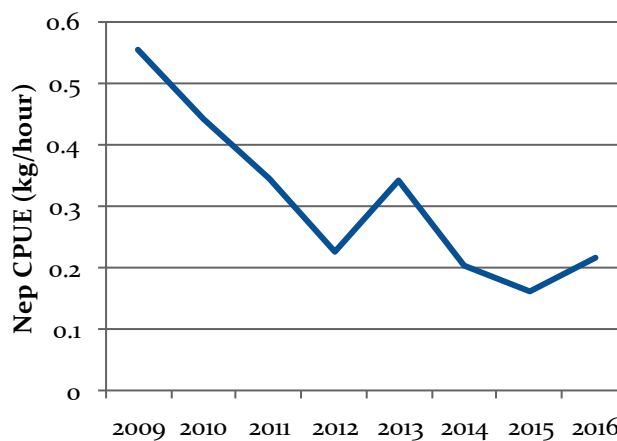


Figure 5. FU 31 *Nephrops* LPUE in kg/hour 2009-2016 from the commercial fleet.

Table 2. *Nephrops* LPUE (kg/hour) from other data sources and adjacent functional unit.

	NEP LPUE (kg/hour)
FU 31 Sentinel 2019	7.1
FU 31 commercial fleet 2016	0.2
FU 31 “Demersales” trawl survey 2019	0.1
FU 25 commercial fleet 2016	0.3
FU 25 “Demersales” trawl survey 2019	0.1

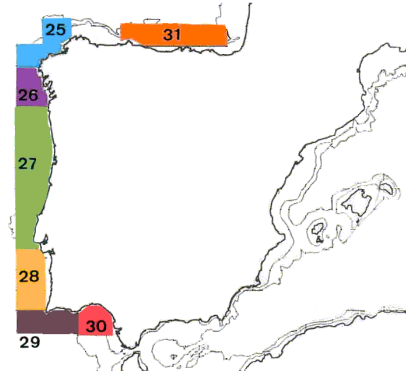


Figure 6. Location of different Functional Units of *Nephrops*.

CPUE values can remain high even when stocks are rapidly depleted (hyperstability) (ICES, 2019). This can happen if catches rates are derived from fishing activities that remain concentrated in areas or periods of relatively higher abundance (Figures 7 and 1, respectively), as it happened in the FU 31 Sentinel fishery (Figure 3). In both cases, the CPUE is not representative of the abundance of the stock.

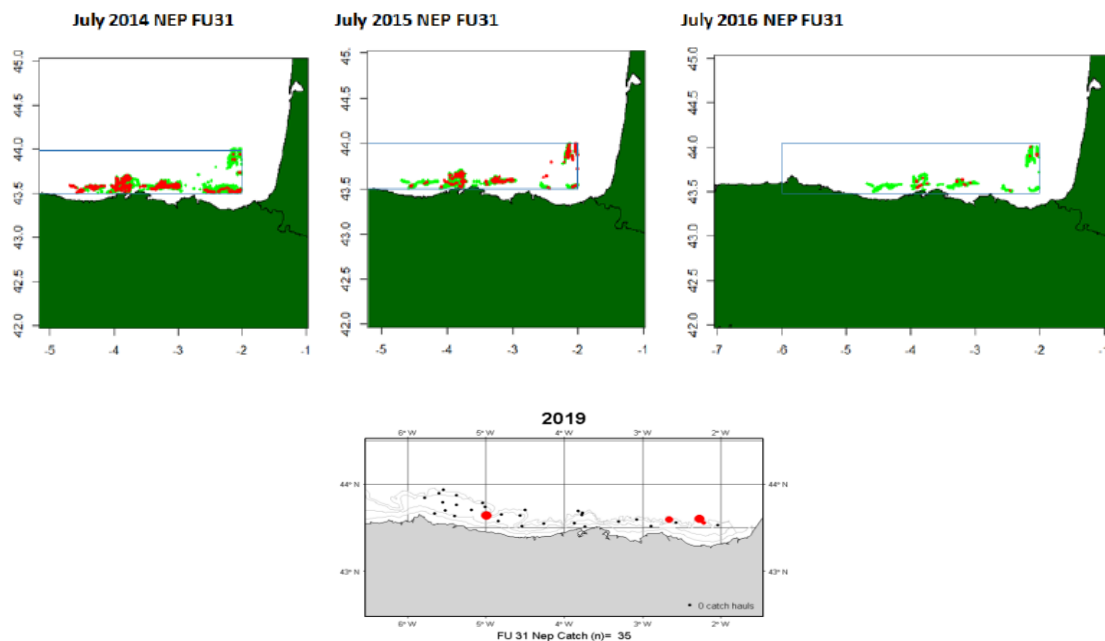


Fig. 7. *Nephrops* presence in FU 31. Up: commercial fleet (red: $Nep \geq 10\%$ of daily catch). Down: survey (red: $Nep \text{ kg/haul} > 0$). In blue FU 31 limits.

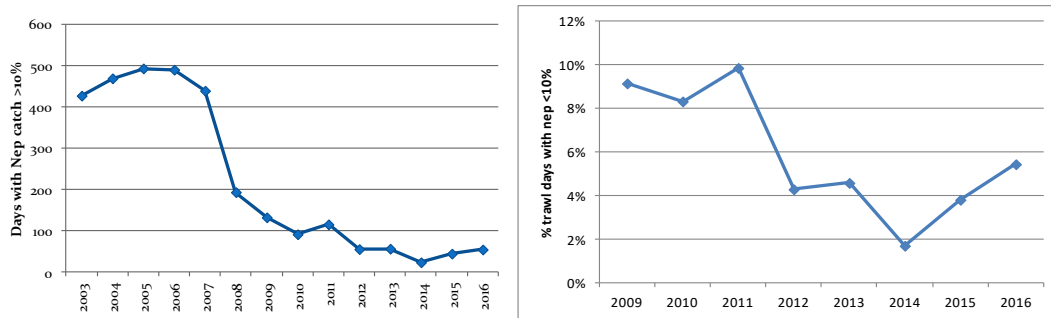


Figure 8. FU 31 trawl days with *Nep* catches $\geq 10\%$ (left: absolute figures, right: percentage from the total trawl fishing days) (logbooks)

The number of FU 31 bottom trawl fishing days with a catch of *Nephrops* equal or higher than a 10% has decreased since 2006 (Figure 8, left). In 2016, only the 5% of the trawl days in FU 31 had a *Nephrops* catch equal or higher than 10% (Figure 8, right). Probably, the fleet has been finding less and less *Nephrops* yield in the last years and in less fishing grounds and FU 31 Sentinel the activity has been concentrated in those grounds.

CONCLUSIONS

- FU 31 CPUE rates obtained in the Sentinel fishery are higher than the maximum of the 1989-2016 FU 31 CPUE time series.
- The Sentinel fishery in the area and period of high abundance has led to a hyperstability of the catch rates.
- Therefore, *Nephrops* CPUE data from FU 31 Sentinel fishery 2019 are not representative of the stock state.

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Annex I

Observers survey framework authorized by the General Secretariat of Fisheries (SGP).



MINISTERIO
DE AGRICULTURA, PESCA
Y ALIMENTACIÓN

SECRETARÍA GENERAL DE PESCA

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ASUNTO:	CAMPAÑA IEO - CENTINELA - CIGALA UF-31	
S/REF:	N/REF:	TMS/JAF
FECHA:	15 de julio de 2019	
NUMERO PAGINAS INCLUYENDO PORTADA: 2		

En el marco del estudio del IEO en relación a una campaña sobre el índice de población de cigala en la Unidad Funcional (UF) 31, se autoriza al buque pesquero "O CANTIÑO", "3ªFE-2-9-97", Código U.E.: ESP000023639 a realizar, esta campaña.

La presente autorización queda subordinada a las siguientes condiciones:

- **Arte de pesca autorizado:** Arrastre de fondo, según Anexo I del Reglamento (CE) nº 850/98 del Consejo de 30 de marzo de 1998.
- **Periodo de validez de la autorización:** 7 días durante el mes de julio de 2019 de lunes a viernes.
- **Zona de actividad:** Unidad funcional 31, correspondiente al Caladero Nacional del CNW (CIEM VIIIc).
- **Especies objetivo:** Cigala (*Nephrops norvegicus*). Con posibilidad de estudio de otras especies secundarias (gallo, rape, merluza, etc). El **tope** de capturas de **cigala** será de **350 kg** para la totalidad de la campaña.
- Será obligatorio por parte del patrón del pesquero, reseñar en el diario de a bordo que la marea se encuentra bajo campaña científica, para ello tendrá que cumplimentar en el DEA en "Salida de Puerto" el campo "Actividad prevista" con la opción "Investigación científica".
- Las cantidades de capturas serán contabilizadas a parte de la cuota general asignada a España hasta el máximo del 2% sobre dicha cuota.

CVELAZAQUEZ, 147
28002 MADRID
TEL: 913471949



- Las capturas se deberán desembarcar en el puerto de Avilés, puerto habitual de descarga de este pesquero, permitiendo su comercialización, excepto ejemplares de tamaño inferior al reglamentario.
- La campaña tiene un tope de capturas máximo de cigala de 350kg, por lo tanto una vez alcanzado dicho tope, se tendrá que dar por finalizada la campaña. Así mismo, indicar que los ejemplares por debajo de la talla mínima de referencia para la conservación, no se podrán llevar a puerto ya que están sujetas a la exención de "alta supervivencia", por tanto se tendrán que descartar, así como posibles capturas por encima del tope establecido.
- El pesquero deberá disponer de un equipo de localización de buques vía satélite (caja azul) que se encuentre activo y operativo durante su permanencia en la mar.
- Deberá encontrarse a bordo personal del IEO los días efectivos de investigación y solo se considerarán esos días dentro de la presente autorización.
- Se deberá cumplir con todo lo establecido por el Reglamento (CE) nº 1224/2009 del Consejo, de 20 de noviembre de 2009, por el que se establece un régimen comunitario de control.
- A fin de poder conocer los días concretos de actividad, será necesario comunicar a esta Subdirección General (inspecpm@mapama.es) con al menos 24h de antelación el día o días a llevar a cabo dicha actividad.

Esta autorización es complementaria a la licencia comunitaria y a las respectivas autorizaciones de pesca que disponga cada pesquero y por tanto deberá llevarse a bordo.

La presente autorización se concede exclusivamente para el ámbito de la actividad pesquera y, por tanto, está condicionado al cumplimiento de la normativa en materia de seguridad y demás aspectos de la navegación que exige la Dirección General de la Marina Mercante.

La Subdirectora General de Control e Inspección


Teresa Molina Schmid



Annex II

Characteristics of hauls carried out during observers survey and *Nephrops* catch by haul.

SURVEY HAUL	TRIP	TRIP HAUL	HAUL STARTING DATE	HAUL STARTING HOUR	HAUL DURATION (HOURS)	HAUL STARTING DEPTH (M)	NEP CATCH (KG)
1	1	1	10 July 2019	10:40	1.8	538	84
2	1	2	10 July 2019	13:40	4.2	274	120
3	1	3	10 July 2019	18:54	4	585	0
4	1	4	11 July 2019	0:01	4	622	0
5	1	5	11 July 2019	6:10	2	256	0
6	1	6	11 July 2019	9:55	3.3	399	12
7	1	7	11 July 2019	14:56	1.9	147	37
8	1	8	11 July 2019	17:55	1.3	433	43
9	1	9	11 July 2019	20:32	2		0
10	1	10	11 July 2019	23:45	5		0
11	1	11	12 July 2019	6:15	3		0
12	1	12	12 July 2019	6:24	2.4	293	22
13	1	13	12 July 2019	9:51	1.8	155	16
14	1	14	12 July 2019	16:20	2		0
15	2	1	16 July 2019	7:30	6.0	512	96
16	2	2	16 July 2019	14:30	4.0	402	66
17	2	3	16 July 2019	19:30	2.0	161	0
18	2	4	17 July 2019	7:15	4.0	421	32
19	2	5	17 July 2019	12:15	4.8	594	108
20	2	6	17 July 2019	18:15	3.3	201	0
21	2	7	17 July 2019	22:30	3.0	159	0
22	2	8	18 July 2019	2:15	3.7	192	0
23	2	9	18 July 2019	6:30	4.1	768	20
24	2	10	18 July 2019	11:48	4.5	549	86
25	2	11	18 July 2019	17:20	3.3	154	0
26	3	1	24 July 2019	6:30	1.8	168	0
27	3	2	24 July 2019	9:46	5.2	384	38
28	3	3	24 July 2019	16:25	2.2	375	14
29	3	4	24 July 2019	23:30	5.2		0
30	3	5	25 July 2019	7:02	2.2	144	0
31	3	6	25 July 2019	10:57	6.9	463	51
32	3	7	25 July 2019	18:19	1.5	130	0
33	3	8	25 July 2019	23:50	6.0	165	0
34	3	9	26 July 2019	7:17	1.5	144	0
35	3	10	26 July 2019	10:04	6.2	236	27
36	3	11	26 July 2019	18:30	0.8	128	0
37	4	1	31 July 2019	6:55	3.9	393	22
38	4	2	31 July 2019	11:45	3.9	457	56
39	4	3	31 July 2019	16:45	4.9	530	68
40	4	4	01 August 2019	7:00	6.5	157	68
41	4	5	01 August 2019	14:15	6.4	393	72
42	4	6	02 August 2019	3:20	1.7	119	0
43	4	7	02 August 2019	6:00	3.4	141	0
44	4	8	02 August 2019	10:00	2.3	155	0
45	4	9	02 August 2019	13:00	2.7	137	0