

DhruvangPatel_M3_Project3.R

dhruvang

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```
#name  
print("Dhruvang Patel")
```

```
## [1] "Dhruvang Patel"
```

```
#install plyr package  
r=getOption("repos")  
r["CRAN"]="http://cran.us.r-project.org"  
options(repos=r)  
install.packages("plyr")
```

```
## Installing package into 'C:/Users/dhruvang/Documents/R/win-library/4.1'  
## (as 'lib' is unspecified)
```

```
## package 'plyr' successfully unpacked and MD5 sums checked
```

```
## Warning: cannot remove prior installation of package 'plyr'
```

```
## Warning in file.copy(savedcopy, lib, recursive = TRUE): problem copying C:  
## \Users\dhruvang\Documents\R\win-library\4.1\00LOCK\plyr\libs\x64\plyr.dll to C:  
## \Users\dhruvang\Documents\R\win-library\4.1\plyr\libs\x64\plyr.dll: Permission  
## denied
```

```
## Warning: restored 'plyr'
```

```
##  
## The downloaded binary packages are in  
## C:\Users\dhruvang\AppData\Local\Temp\RtmpUHJisu\downloaded_packages
```

```
library(plyr)
```

```
#install FSA package  
install.packages("FSA")
```

```
## Installing package into 'C:/Users/dhruvang/Documents/R/win-library/4.1'  
## (as 'lib' is unspecified)
```

```
## package 'FSA' successfully unpacked and MD5 sums checked
##
## The downloaded binary packages are in
## C:\Users\dhruvang\AppData\Local\Temp\RtmpUHHJisu\downloaded_packages
```

```
library(FSA)
```

```
## ## FSA v0.9.1. See citation('FSA') if used in publication.
## ## Run fishR() for related website and fishR('IFAR') for related book.
```

```
##
## Attaching package: 'FSA'
```

```
## The following object is masked from 'package:plyr':
##
##      mapvalues
```

```
#install FSAdat package
install.packages("FSAdat")
```

```
## Installing package into 'C:/Users/dhruvang/Documents/R/win-library/4.1'
## (as 'lib' is unspecified)
```

```
## package 'FSAdat' successfully unpacked and MD5 sums checked
##
## The downloaded binary packages are in
## C:\Users\dhruvang\AppData\Local\Temp\RtmpUHHJisu\downloaded_packages
```

```
library(FSAdat)
```

```
## ## FSAdat v0.3.8. See ?FSAdat to find data for specific fisheries analyses.
```

```
#install magrittr package
install.packages("magrittr")
```

```
## Installing package into 'C:/Users/dhruvang/Documents/R/win-library/4.1'
## (as 'lib' is unspecified)
```

```
## package 'magrittr' successfully unpacked and MD5 sums checked
```

```
## Warning: cannot remove prior installation of package 'magrittr'
```

```
## Warning in file.copy(savedcopy, lib, recursive = TRUE):
## problem copying C:\Users\dhruvang\Documents\R\win-
## library\4.1\00LOCK\magrittr\libs\x64\magrittr.dll to C:
## \Users\dhruvang\Documents\R\win-library\4.1\magrittr\libs\x64\magrittr.dll:
## Permission denied
```

```
## Warning: restored 'magrittr'
```

```
##  
## The downloaded binary packages are in  
## C:\Users\dhruvang\AppData\Local\Temp\RtmpUHHJisu\downloaded_packages
```

```
library(magrittr)
```

```
#install dplyr package  
install.packages("dplyr")
```

```
## Installing package into 'C:/Users/dhruvang/Documents/R/win-library/4.1'  
## (as 'lib' is unspecified)
```

```
## package 'dplyr' successfully unpacked and MD5 sums checked  
##
```

```
## The downloaded binary packages are in  
## C:\Users\dhruvang\AppData\Local\Temp\RtmpUHHJisu\downloaded_packages
```

```
library(dplyr)
```

```
##  
## Attaching package: 'dplyr'
```

```
## The following objects are masked from 'package:plyr':  
##  
##   arrange, count, desc, failwith, id, mutate, rename, summarise,  
##   summarize
```

```
## The following objects are masked from 'package:stats':  
##  
##   filter, lag
```

```
## The following objects are masked from 'package:base':  
##  
##   intersect, setdiff, setequal, union
```

```
#install tidyverse package  
install.packages("tidyverse")
```

```
## Installing package into 'C:/Users/dhruvang/Documents/R/win-library/4.1'  
## (as 'lib' is unspecified)
```

```
## package 'tidyverse' successfully unpacked and MD5 sums checked  
##
```

```
## The downloaded binary packages are in  
## C:\Users\dhruvang\AppData\Local\Temp\RtmpUHHJisu\downloaded_packages
```

```
library(tidyverse)
```

```
## -- Attaching packages ----- tidyverse 1.3.1 --
```

```
## v ggplot2 3.3.5      v purrr 0.3.4
## v tibble 3.1.6       v stringr 1.4.0
## v tidyr 1.1.4        v forcats 0.5.1
## v readr 2.1.1

## -- Conflicts ----- tidyverse_conflicts() --
## x dplyr::arrange() masks plyr::arrange()
## x purrr::compact() masks plyr::compact()
## x dplyr::count() masks plyr::count()
## x tidyr::extract() masks magrittr::extract()
## x dplyr::failwith() masks plyr::failwith()
## x dplyr::filter() masks stats::filter()
## x dplyr::id() masks plyr::id()
## x dplyr::lag() masks stats::lag()
## x dplyr::mutate() masks plyr::mutate()
## x dplyr::rename() masks plyr::rename()
## x purrr::set_names() masks magrittr::set_names()
## x dplyr::summarise() masks plyr::summarise()
## x dplyr::summarize() masks plyr::summarize()
```

```
#install tidyr package
install.packages("tidyr")
```

```
## Warning: package 'tidyr' is in use and will not be installed
```

```
library(tidyr)

#2.Import the dataset
bio <- read.csv("C:/Users/dhruvang/Downloads/inchBio.csv")
bio
```

	netID	fishID	species	tl	w	tag	scale
## 1	12	16	Bluegill	61	2.9		FALSE
## 2	12	23	Bluegill	66	4.5		FALSE
## 3	12	30	Bluegill	70	5.2		FALSE
## 4	12	44	Bluegill	38	0.5		FALSE
## 5	12	50	Bluegill	42	1.0		FALSE
## 6	12	65	Bluegill	54	2.1		FALSE
## 7	12	66	Bluegill	27	NA		FALSE
## 8	13	68	Bluegill	36	0.5		FALSE
## 9	13	69	Bluegill	59	2.0		FALSE
## 10	13	70	Bluegill	39	0.5		FALSE
## 11	13	71	Bluegill	34	0.5		FALSE
## 12	13	73	Bluegill	40	1.0		FALSE
## 13	13	74	Bluegill	35	0.5		FALSE
## 14	13	75	Bluegill	32	1.0		FALSE
## 15	13	76	Bluegill	37	0.5		FALSE
## 16	13	77	Bluegill	38	1.0		FALSE
## 17	13	78	Bluegill	69	7.0		FALSE
## 18	13	80	Bluegill	39	1.0		FALSE
## 19	13	81	Bluegill	37	0.5		FALSE
## 20	13	82	Bluegill	38	1.0		FALSE
## 21	13	83	Bluegill	47	NA		FALSE

## 22	14	86	Bluegill	33	0.5	FALSE
## 23	14	87	Bluegill	31	1.5	FALSE
## 24	14	88	Bluegill	36	1.5	FALSE
## 25	4	118	Bluegill	150	60.0	TRUE
## 26	4	119	Bluegill	193	145.0	TRUE
## 27	4	120	Bluegill	185	123.0	TRUE
## 28	4	121	Bluegill	152	67.0	TRUE
## 29	4	122	Bluegill	160	75.0	TRUE
## 30	4	123	Bluegill	185	118.0	TRUE
## 31	4	124	Bluegill	170	100.0	TRUE
## 32	4	125	Bluegill	135	35.0	TRUE
## 33	4	126	Bluegill	183	120.0	TRUE
## 34	4	127	Bluegill	168	90.0	TRUE
## 35	4	128	Bluegill	165	85.0	TRUE
## 36	4	129	Bluegill	178	100.0	TRUE
## 37	4	130	Bluegill	193	155.0	TRUE
## 38	4	131	Bluegill	193	140.0	TRUE
## 39	4	132	Bluegill	201	180.0	TRUE
## 40	4	133	Bluegill	203	185.0	TRUE
## 41	4	134	Bluegill	99	15.0	TRUE
## 42	5	138	Bluegill	135	42.0	TRUE
## 43	5	139	Bluegill	38	2.0	FALSE
## 44	5	140	Bluegill	41	NA	FALSE
## 45	5	141	Bluegill	41	NA	FALSE
## 46	5	142	Bluegill	46	NA	FALSE
## 47	5	143	Bluegill	165	68.0	TRUE
## 48	5	144	Bluegill	43	NA	FALSE
## 49	5	145	Bluegill	51	4.0	FALSE
## 50	5	146	Bluegill	203	184.0	TRUE
## 51	5	147	Bluegill	168	98.0	TRUE
## 52	5	148	Bluegill	152	62.0	TRUE
## 53	5	149	Bluegill	64	NA	FALSE
## 54	5	150	Bluegill	157	76.0	TRUE
## 55	10	151	Bluegill	173	100.0	TRUE
## 56	10	152	Bluegill	173	95.0	TRUE
## 57	10	153	Bluegill	185	130.0	TRUE
## 58	10	154	Bluegill	218	250.0	TRUE
## 59	10	155	Bluegill	206	197.0	TRUE
## 60	10	156	Bluegill	165	78.0	TRUE
## 61	10	157	Bluegill	152	72.0	TRUE
## 62	10	158	Bluegill	170	98.0	TRUE
## 63	9	161	Bluegill	206	175.0	TRUE
## 64	9	162	Bluegill	191	144.0	TRUE
## 65	9	163	Bluegill	193	148.0	TRUE
## 66	9	164	Bluegill	183	130.0	TRUE
## 67	9	165	Bluegill	201	185.0	TRUE
## 68	9	166	Bluegill	221	225.0	TRUE
## 69	9	167	Bluegill	165	80.0	FALSE
## 70	9	168	Bluegill	206	180.0	TRUE
## 71	9	169	Bluegill	203	175.0	TRUE
## 72	9	170	Bluegill	165	NA	TRUE
## 73	9	171	Bluegill	193	160.0	FALSE
## 74	9	172	Bluegill	173	NA	FALSE
## 75	6	176	Bluegill	213	200.0	TRUE

## 76	6	177	Bluegill	155	74.0	TRUE
## 77	6	178	Bluegill	157	62.0	TRUE
## 78	6	179	Bluegill	211	220.0	TRUE
## 79	6	180	Bluegill	188	149.0	TRUE
## 80	6	181	Bluegill	188	139.0	TRUE
## 81	6	182	Bluegill	196	132.0	TRUE
## 82	6	183	Bluegill	188	139.0	TRUE
## 83	6	184	Bluegill	160	73.0	TRUE
## 84	6	185	Bluegill	196	120.0	TRUE
## 85	6	186	Bluegill	221	242.0	TRUE
## 86	6	187	Bluegill	180	130.0	TRUE
## 87	6	188	Bluegill	152	70.0	TRUE
## 88	6	189	Bluegill	140	40.0	TRUE
## 89	6	190	Bluegill	203	170.0	TRUE
## 90	6	191	Bluegill	145	52.0	TRUE
## 91	6	192	Bluegill	147	32.0	TRUE
## 92	11	193	Bluegill	211	218.0	TRUE
## 93	11	194	Bluegill	147	60.0	TRUE
## 94	11	195	Bluegill	152	70.0	TRUE
## 95	17	196	Bluegill	203	192.0	TRUE
## 96	17	197	Bluegill	132	31.0	TRUE
## 97	17	199	Bluegill	142	59.0	TRUE
## 98	20	201	Bluegill	140	54.0	TRUE
## 99	15	203	Bluegill	142	40.0	TRUE
## 100	15	206	Bluegill	147	30.0	TRUE
## 101	15	207	Bluegill	119	20.0	TRUE
## 102	16	210	Bluegill	229	280.0	TRUE
## 103	16	211	Bluegill	224	260.0	TRUE
## 104	16	212	Bluegill	224	260.0	TRUE
## 105	16	213	Bluegill	224	240.0	TRUE
## 106	16	214	Bluegill	150	60.0	TRUE
## 107	16	215	Bluegill	137	60.0	TRUE
## 108	21	217	Bluegill	94	14.0	TRUE
## 109	21	219	Bluegill	130	38.0	TRUE
## 110	26	220	Bluegill	132	49.0	TRUE
## 111	26	221	Bluegill	137	41.0	TRUE
## 112	23	224	Bluegill	114	20.0	TRUE
## 113	27	226	Bluegill	127	20.0	TRUE
## 114	27	228	Bluegill	122	20.0	TRUE
## 115	28	230	Bluegill	137	50.0	TRUE
## 116	28	231	Bluegill	234	280.0	TRUE
## 117	37	322	Bluegill	152	NA	TRUE
## 118	37	356	Bluegill	201	NA	TRUE
## 119	206	501	Bluegill	38	0.7	FALSE
## 120	205	502	Bluegill	43	1.4	FALSE
## 121	205	503	Bluegill	56	1.5	FALSE
## 122	205	504	Bluegill	53	1.4	FALSE
## 123	205	505	Bluegill	38	1.0	FALSE
## 124	205	506	Bluegill	48	1.8	FALSE
## 125	205	507	Bluegill	48	1.4	FALSE
## 126	205	508	Bluegill	36	0.6	FALSE
## 127	205	509	Bluegill	30	0.3	FALSE
## 128	205	510	Bluegill	36	0.8	FALSE
## 129	205	511	Bluegill	51	1.3	FALSE

##	130	205	512	Bluegill	58	2.4		FALSE
##	131	205	513	Bluegill	33	0.7		FALSE
##	132	205	514	Bluegill	38	1.0		FALSE
##	133	205	515	Bluegill	33	0.6		FALSE
##	134	205	516	Bluegill	56	2.8		FALSE
##	135	205	517	Bluegill	33	1.1		FALSE
##	136	205	518	Bluegill	53	2.0		FALSE
##	137	205	519	Bluegill	66	4.5		FALSE
##	138	205	520	Bluegill	71	4.9		FALSE
##	139	101	533	Bluegill	213	190.0		TRUE
##	140	101	538	Bluegill	216	198.0	1021	TRUE
##	141	101	539	Bluegill	216	210.0	1022	TRUE
##	142	101	540	Bluegill	231	258.0	1023	TRUE
##	143	101	541	Bluegill	193	138.0		TRUE
##	144	101	542	Bluegill	226	236.0	1024	TRUE
##	145	101	543	Bluegill	163	75.0		TRUE
##	146	101	544	Bluegill	224	229.0	1025	TRUE
##	147	101	545	Bluegill	178	101.0		TRUE
##	148	101	546	Bluegill	180	110.0		TRUE
##	149	101	547	Bluegill	239	295.0	1015	TRUE
##	150	101	548	Bluegill	183	113.0		TRUE
##	151	101	549	Bluegill	211	191.0	1018	TRUE
##	152	101	550	Bluegill	191	139.0		TRUE
##	153	101	552	Bluegill	191	137.0		TRUE
##	154	101	553	Bluegill	201	165.0		TRUE
##	155	101	554	Bluegill	178	103.0		TRUE
##	156	101	555	Bluegill	201	166.0		TRUE
##	157	101	556	Bluegill	180	115.0		TRUE
##	158	101	557	Bluegill	165	89.0		TRUE
##	159	101	558	Bluegill	191	121.0		TRUE
##	160	101	559	Bluegill	157	78.0		TRUE
##	161	101	560	Bluegill	152	63.0		TRUE
##	162	101	561	Bluegill	206	181.0	1075	TRUE
##	163	101	562	Bluegill	147	60.0		TRUE
##	164	101	563	Bluegill	163	74.0		TRUE
##	165	101	564	Bluegill	180	101.0		TRUE
##	166	101	565	Bluegill	193	141.0		TRUE
##	167	101	566	Bluegill	216	228.0	1074	TRUE
##	168	101	567	Bluegill	229	266.0	1073	TRUE
##	169	101	568	Bluegill	168	93.0		TRUE
##	170	101	569	Bluegill	163	74.0		TRUE
##	171	101	570	Bluegill	165	82.0		TRUE
##	172	101	571	Bluegill	231	274.0	1072	TRUE
##	173	101	572	Bluegill	201	151.0		TRUE
##	174	101	573	Bluegill	188	129.0		TRUE
##	175	101	574	Bluegill	175	98.0		TRUE
##	176	101	575	Bluegill	145	57.0		TRUE
##	177	101	576	Bluegill	152	62.0		TRUE
##	178	101	577	Bluegill	175	107.0		TRUE
##	179	101	578	Bluegill	221	240.0	1071	TRUE
##	180	101	580	Bluegill	178	110.0		TRUE
##	181	101	581	Bluegill	211	208.0	1069	TRUE
##	182	101	583	Bluegill	140	48.0		TRUE
##	183	101	585	Bluegill	173	96.0		TRUE

## 184	101	586	Bluegill	152	73.0		TRUE
## 185	101	587	Bluegill	213	198.0	1066	TRUE
## 186	107	621	Bluegill	203	156.0	1065	TRUE
## 187	107	622	Bluegill	221	242.0	1064	TRUE
## 188	107	623	Bluegill	203	187.0	1063	TRUE
## 189	107	624	Bluegill	229	242.0	1062	TRUE
## 190	107	625	Bluegill	170	83.0		TRUE
## 191	104	658	Bluegill	213	197.0	1099	TRUE
## 192	104	659	Bluegill	229	255.0	1098	TRUE
## 193	104	660	Bluegill	185	111.0		TRUE
## 194	103	689	Bluegill	206	NA	1107	TRUE
## 195	103	695	Bluegill	137	45.3		TRUE
## 196	103	697	Bluegill	147	50.9		TRUE
## 197	103	699	Bluegill	66	3.4		TRUE
## 198	103	700	Bluegill	150	54.5		TRUE
## 199	103	701	Bluegill	142	48.8		TRUE
## 200	103	703	Bluegill	150	50.9		TRUE
## 201	111	717	Bluegill	130	35.0		TRUE
## 202	111	718	Bluegill	137	45.0		TRUE
## 203	111	719	Bluegill	132	39.0		TRUE
## 204	111	722	Bluegill	137	43.0		TRUE
## 205	111	726	Bluegill	137	50.0		TRUE
## 206	113	742	Bluegill	135	39.0		TRUE
## 207	114	755	Bluegill	66	3.1		FALSE
## 208	116	761	Bluegill	97	10.9		FALSE
## 209	116	762	Bluegill	91	10.6		FALSE
## 210	112	774	Bluegill	203	171.0	1045	TRUE
## 211	112	780	Bluegill	76	6.1		FALSE
## 212	112	781	Bluegill	109	19.0		FALSE
## 213	120	802	Bluegill	94	10.7		TRUE
## 214	120	803	Bluegill	84	8.9		TRUE
## 215	120	804	Bluegill	91	10.6		TRUE
## 216	120	805	Bluegill	84	8.7		TRUE
## 217	120	806	Bluegill	86	9.3		TRUE
## 218	120	807	Bluegill	69	4.0		TRUE
## 219	119	824	Bluegill	119	25.0		TRUE
## 220	122	826	Bluegill	132	33.0		TRUE
## 221	12	7	Bluntnose Minnow	59	2.0		FALSE
## 222	12	8	Bluntnose Minnow	58	1.7		FALSE
## 223	12	10	Bluntnose Minnow	54	1.5		FALSE
## 224	12	11	Bluntnose Minnow	60	1.7		FALSE
## 225	12	12	Bluntnose Minnow	78	2.3		FALSE
## 226	12	14	Bluntnose Minnow	62	2.2		FALSE
## 227	12	17	Bluntnose Minnow	59	2.0		FALSE
## 228	12	18	Bluntnose Minnow	63	2.5		FALSE
## 229	12	19	Bluntnose Minnow	58	2.0		FALSE
## 230	12	21	Bluntnose Minnow	71	3.8		FALSE
## 231	12	22	Bluntnose Minnow	55	2.5		FALSE
## 232	12	24	Bluntnose Minnow	60	2.2		FALSE
## 233	12	25	Bluntnose Minnow	51	2.0		FALSE
## 234	12	26	Bluntnose Minnow	52	1.8		FALSE
## 235	12	27	Bluntnose Minnow	64	2.5		FALSE
## 236	12	28	Bluntnose Minnow	67	4.0		FALSE
## 237	12	29	Bluntnose Minnow	63	2.0		FALSE

##	238	12	31	Bluntnose Minnow	65	2.0	FALSE
##	239	12	32	Bluntnose Minnow	67	3.0	FALSE
##	240	12	33	Bluntnose Minnow	71	4.8	FALSE
##	241	12	34	Bluntnose Minnow	66	3.0	FALSE
##	242	12	35	Bluntnose Minnow	73	4.0	FALSE
##	243	12	36	Bluntnose Minnow	67	4.0	FALSE
##	244	12	37	Bluntnose Minnow	51	2.5	FALSE
##	245	12	38	Bluntnose Minnow	58	1.5	FALSE
##	246	12	39	Bluntnose Minnow	71	3.8	FALSE
##	247	12	40	Bluntnose Minnow	52	1.5	FALSE
##	248	12	41	Bluntnose Minnow	61	1.5	FALSE
##	249	12	42	Bluntnose Minnow	58	1.5	FALSE
##	250	12	43	Bluntnose Minnow	72	3.0	FALSE
##	251	12	45	Bluntnose Minnow	68	NA	FALSE
##	252	12	46	Bluntnose Minnow	57	1.5	FALSE
##	253	12	47	Bluntnose Minnow	58	1.5	FALSE
##	254	12	48	Bluntnose Minnow	58	2.0	FALSE
##	255	12	49	Bluntnose Minnow	58	2.5	FALSE
##	256	12	51	Bluntnose Minnow	61	3.0	FALSE
##	257	12	52	Bluntnose Minnow	57	1.0	FALSE
##	258	12	53	Bluntnose Minnow	70	2.0	FALSE
##	259	12	54	Bluntnose Minnow	64	2.5	FALSE
##	260	12	55	Bluntnose Minnow	61	1.0	FALSE
##	261	12	56	Bluntnose Minnow	56	1.0	FALSE
##	262	12	57	Bluntnose Minnow	58	NA	FALSE
##	263	12	58	Bluntnose Minnow	66	4.0	FALSE
##	264	12	59	Bluntnose Minnow	59	2.0	FALSE
##	265	12	60	Bluntnose Minnow	62	1.5	FALSE
##	266	12	61	Bluntnose Minnow	64	2.5	FALSE
##	267	12	62	Bluntnose Minnow	63	1.5	FALSE
##	268	12	63	Bluntnose Minnow	61	1.8	FALSE
##	269	12	64	Bluntnose Minnow	64	3.0	FALSE
##	270	13	79	Bluntnose Minnow	72	5.0	FALSE
##	271	13	84	Bluntnose Minnow	71	4.0	FALSE
##	272	205	522	Bluntnose Minnow	61	2.1	FALSE
##	273	201	523	Bluntnose Minnow	56	NA	FALSE
##	274	101	589	Bluntnose Minnow	64	1.4	FALSE
##	275	101	590	Bluntnose Minnow	46	0.5	FALSE
##	276	101	591	Bluntnose Minnow	53	1.0	FALSE
##	277	101	592	Bluntnose Minnow	58	1.7	FALSE
##	278	101	593	Bluntnose Minnow	56	1.0	FALSE
##	279	101	594	Bluntnose Minnow	58	1.1	FALSE
##	280	101	595	Bluntnose Minnow	58	1.0	FALSE
##	281	101	596	Bluntnose Minnow	56	1.0	FALSE
##	282	101	597	Bluntnose Minnow	53	1.0	FALSE
##	283	101	598	Bluntnose Minnow	51	0.8	FALSE
##	284	101	599	Bluntnose Minnow	56	0.8	FALSE
##	285	101	600	Bluntnose Minnow	56	1.0	FALSE
##	286	101	601	Bluntnose Minnow	58	1.0	FALSE
##	287	101	603	Bluntnose Minnow	64	1.4	FALSE
##	288	101	605	Bluntnose Minnow	58	1.2	FALSE
##	289	101	606	Bluntnose Minnow	61	1.3	FALSE
##	290	101	607	Bluntnose Minnow	69	1.8	FALSE
##	291	101	608	Bluntnose Minnow	64	1.4	FALSE

##	292	101	609	Bluntnose Minnow	53	0.8	FALSE
##	293	101	610	Bluntnose Minnow	64	1.4	FALSE
##	294	101	611	Bluntnose Minnow	61	1.2	FALSE
##	295	101	612	Bluntnose Minnow	51	0.7	FALSE
##	296	101	613	Bluntnose Minnow	56	1.1	FALSE
##	297	101	614	Bluntnose Minnow	56	1.0	FALSE
##	298	101	615	Bluntnose Minnow	53	0.9	FALSE
##	299	101	616	Bluntnose Minnow	58	1.2	FALSE
##	300	101	617	Bluntnose Minnow	53	0.8	FALSE
##	301	101	618	Bluntnose Minnow	53	0.9	FALSE
##	302	101	619	Bluntnose Minnow	66	1.5	FALSE
##	303	101	620	Bluntnose Minnow	61	1.3	FALSE
##	304	102	638	Bluntnose Minnow	74	3.9	FALSE
##	305	102	639	Bluntnose Minnow	61	2.2	FALSE
##	306	102	640	Bluntnose Minnow	84	1.3	FALSE
##	307	102	642	Bluntnose Minnow	53	1.3	FALSE
##	308	102	643	Bluntnose Minnow	56	2.1	FALSE
##	309	102	644	Bluntnose Minnow	56	1.4	FALSE
##	310	102	645	Bluntnose Minnow	61	2.0	FALSE
##	311	111	727	Bluntnose Minnow	79	3.8	FALSE
##	312	116	763	Bluntnose Minnow	74	3.4	FALSE
##	313	121	816	Bluntnose Minnow	51	1.2	FALSE
##	314	121	817	Bluntnose Minnow	79	3.9	FALSE
##	315	121	818	Bluntnose Minnow	74	3.8	FALSE
##	316	121	819	Bluntnose Minnow	64	1.9	FALSE
##	317	121	820	Bluntnose Minnow	51	1.0	FALSE
##	318	121	821	Bluntnose Minnow	51	1.1	FALSE
##	319	121	822	Bluntnose Minnow	64	2.1	FALSE
##	320	121	823	Bluntnose Minnow	51	1.2	FALSE
##	321	125	832	Bluntnose Minnow	81	2.8	FALSE
##	322	125	833	Bluntnose Minnow	81	3.2	FALSE
##	323	125	834	Bluntnose Minnow	79	4.1	FALSE
##	324	13	72	Iowa Darter	61	NA	FALSE
##	325	205	521	Iowa Darter	53	1.1	FALSE
##	326	203	524	Iowa Darter	46	0.6	FALSE
##	327	203	525	Iowa Darter	44	0.6	FALSE
##	328	203	526	Iowa Darter	46	0.6	FALSE
##	329	203	527	Iowa Darter	43	0.4	FALSE
##	330	101	602	Iowa Darter	56	0.9	FALSE
##	331	101	604	Iowa Darter	51	0.8	FALSE
##	332	102	641	Iowa Darter	48	1.0	FALSE
##	333	106	646	Iowa Darter	38	0.6	FALSE
##	334	106	647	Iowa Darter	46	0.9	FALSE
##	335	106	648	Iowa Darter	43	0.8	FALSE
##	336	106	649	Iowa Darter	48	1.0	FALSE
##	337	106	650	Iowa Darter	41	0.5	FALSE
##	338	106	651	Iowa Darter	41	0.7	FALSE
##	339	106	652	Iowa Darter	43	0.6	FALSE
##	340	106	653	Iowa Darter	43	0.6	FALSE
##	341	106	654	Iowa Darter	46	0.9	FALSE
##	342	105	711	Iowa Darter	48	0.7	FALSE
##	343	105	712	Iowa Darter	46	0.7	FALSE
##	344	115	730	Iowa Darter	48	0.8	FALSE
##	345	115	731	Iowa Darter	48	0.8	FALSE

##	346	115	732	Iowa Darter	51	1.0		FALSE
##	347	115	733	Iowa Darter	51	1.1		FALSE
##	348	116	764	Iowa Darter	51	1.2		FALSE
##	349	116	765	Iowa Darter	48	0.9		FALSE
##	350	116	766	Iowa Darter	51	0.9		FALSE
##	351	116	767	Iowa Darter	43	0.5		FALSE
##	352	116	768	Iowa Darter	51	1.2		FALSE
##	353	116	769	Iowa Darter	56	1.2		FALSE
##	354	116	770	Iowa Darter	53	1.1		FALSE
##	355	116	771	Iowa Darter	43	0.9		FALSE
##	356	14	85	Largemouth Bass	68	3.5		TRUE
##	357	3	89	Largemouth Bass	338	NA	g0996	TRUE
##	358	1	90	Largemouth Bass	356	NA	y06073	TRUE
##	359	1	91	Largemouth Bass	328	NA	o0449	TRUE
##	360	1	92	Largemouth Bass	305	NA	o0448	TRUE
##	361	1	93	Largemouth Bass	386	NA	o0447	TRUE
##	362	1	94	Largemouth Bass	310	NA	g0985	TRUE
##	363	1	95	Largemouth Bass	262	NA		TRUE
##	364	1	96	Largemouth Bass	305	NA	g0986	TRUE
##	365	1	97	Largemouth Bass	315	NA	g0987	TRUE
##	366	1	98	Largemouth Bass	371	NA	g1000	TRUE
##	367	1	99	Largemouth Bass	338	NA	g0999	TRUE
##	368	1	100	Largemouth Bass	239	NA		TRUE
##	369	1	101	Largemouth Bass	236	NA		TRUE
##	370	1	102	Largemouth Bass	348	NA	g0997	TRUE
##	371	2	104	Largemouth Bass	307	NA	o0501	TRUE
##	372	2	105	Largemouth Bass	323	NA	o0506	TRUE
##	373	2	106	Largemouth Bass	231	NA		TRUE
##	374	2	107	Largemouth Bass	216	NA		TRUE
##	375	2	108	Largemouth Bass	325	NA	o0507	TRUE
##	376	2	109	Largemouth Bass	399	NA	o0510	TRUE
##	377	2	110	Largemouth Bass	333	NA	o0511	TRUE
##	378	2	111	Largemouth Bass	356	NA	o0512	TRUE
##	379	2	112	Largemouth Bass	274	NA		TRUE
##	380	17	198	Largemouth Bass	259	190.0		TRUE
##	381	27	227	Largemouth Bass	137	20.0		TRUE
##	382	29	232	Largemouth Bass	279	NA	o0516	TRUE
##	383	29	233	Largemouth Bass	351	NA	o0517	TRUE
##	384	29	234	Largemouth Bass	307	NA	o0518	TRUE
##	385	29	235	Largemouth Bass	325	NA	o0520	TRUE
##	386	29	237	Largemouth Bass	330	NA	o0521	TRUE
##	387	29	239	Largemouth Bass	282	NA	o0523	TRUE
##	388	29	240	Largemouth Bass	262	NA		TRUE
##	389	29	241	Largemouth Bass	391	NA	o0524	TRUE
##	390	29	242	Largemouth Bass	262	NA		TRUE
##	391	29	243	Largemouth Bass	295	NA	o0525	TRUE
##	392	30	244	Largemouth Bass	305	NA	o0550	TRUE
##	393	30	245	Largemouth Bass	193	NA		TRUE
##	394	30	246	Largemouth Bass	254	NA		TRUE
##	395	30	247	Largemouth Bass	246	NA		TRUE
##	396	30	248	Largemouth Bass	330	NA	o0549	TRUE
##	397	30	249	Largemouth Bass	300	NA		TRUE
##	398	30	250	Largemouth Bass	284	NA		TRUE
##	399	30	251	Largemouth Bass	371	NA	o0548	TRUE

##	400	30	252	Largemouth Bass	335	NA	o0547	TRUE
##	401	30	253	Largemouth Bass	305	NA	o0546	TRUE
##	402	30	254	Largemouth Bass	254	NA		TRUE
##	403	30	255	Largemouth Bass	318	NA	o0545	TRUE
##	404	30	256	Largemouth Bass	348	NA	o0544	TRUE
##	405	30	257	Largemouth Bass	343	NA	o0543	TRUE
##	406	30	258	Largemouth Bass	325	NA	o0542	TRUE
##	407	30	259	Largemouth Bass	333	NA	o0541	TRUE
##	408	30	260	Largemouth Bass	330	NA	o0540	TRUE
##	409	30	261	Largemouth Bass	381	NA	o0539	TRUE
##	410	30	262	Largemouth Bass	320	NA	o0538	TRUE
##	411	30	263	Largemouth Bass	272	NA		TRUE
##	412	30	264	Largemouth Bass	312	NA	o0536	TRUE
##	413	30	265	Largemouth Bass	310	NA	o0535	TRUE
##	414	30	266	Largemouth Bass	297	NA		TRUE
##	415	31	270	Largemouth Bass	307	NA	o0533	TRUE
##	416	31	271	Largemouth Bass	310	NA	o0532	TRUE
##	417	31	272	Largemouth Bass	277	NA		TRUE
##	418	33	273	Largemouth Bass	130	NA		TRUE
##	419	32	274	Largemouth Bass	140	NA		TRUE
##	420	35	275	Largemouth Bass	239	NA		TRUE
##	421	35	276	Largemouth Bass	236	NA		TRUE
##	422	35	277	Largemouth Bass	320	NA	o0519	TRUE
##	423	35	278	Largemouth Bass	241	NA		TRUE
##	424	35	279	Largemouth Bass	343	NA	g0988	TRUE
##	425	35	280	Largemouth Bass	226	NA		TRUE
##	426	35	281	Largemouth Bass	211	NA		TRUE
##	427	35	282	Largemouth Bass	409	NA	g0990	TRUE
##	428	35	284	Largemouth Bass	371	NA	o0991	TRUE
##	429	35	285	Largemouth Bass	312	NA	o0989	TRUE
##	430	35	286	Largemouth Bass	333	NA	y00003	TRUE
##	431	35	287	Largemouth Bass	338	NA	y00228	TRUE
##	432	35	288	Largemouth Bass	282	NA		TRUE
##	433	35	289	Largemouth Bass	302	NA		TRUE
##	434	35	290	Largemouth Bass	305	NA	y160016	TRUE
##	435	35	291	Largemouth Bass	376	NA	o0534	TRUE
##	436	35	292	Largemouth Bass	251	NA		TRUE
##	437	35	293	Largemouth Bass	338	NA	y2519	TRUE
##	438	35	294	Largemouth Bass	318	NA	y00034	TRUE
##	439	35	295	Largemouth Bass	312	NA	y00123	TRUE
##	440	35	296	Largemouth Bass	272	NA		TRUE
##	441	35	297	Largemouth Bass	394	NA	o0531	TRUE
##	442	35	298	Largemouth Bass	363	NA	o0530	TRUE
##	443	35	299	Largemouth Bass	320	NA	y01525	FALSE
##	444	36	300	Largemouth Bass	307	NA	o0529	TRUE
##	445	36	301	Largemouth Bass	330	NA	o0528	TRUE
##	446	36	302	Largemouth Bass	318	NA	o0527	TRUE
##	447	36	303	Largemouth Bass	302	NA		TRUE
##	448	36	304	Largemouth Bass	277	NA		TRUE
##	449	36	305	Largemouth Bass	241	NA		TRUE
##	450	36	306	Largemouth Bass	318	NA	o0526	TRUE
##	451	36	307	Largemouth Bass	297	NA		TRUE
##	452	36	308	Largemouth Bass	318	NA	y01598	TRUE
##	453	36	309	Largemouth Bass	373	NA	y01600	TRUE

## 454	36	310	Largemouth Bass	290	NA		TRUE
## 455	36	311	Largemouth Bass	300	NA		TRUE
## 456	36	312	Largemouth Bass	318	NA	y01603	TRUE
## 457	36	313	Largemouth Bass	333	NA	y01604	TRUE
## 458	36	314	Largemouth Bass	356	NA	y01605	TRUE
## 459	36	315	Largemouth Bass	180	NA		TRUE
## 460	36	316	Largemouth Bass	305	NA	y01606	TRUE
## 461	37	317	Largemouth Bass	211	NA		TRUE
## 462	37	318	Largemouth Bass	320	NA	y00385	TRUE
## 463	37	320	Largemouth Bass	236	NA		TRUE
## 464	37	321	Largemouth Bass	193	NA		TRUE
## 465	37	323	Largemouth Bass	249	NA		TRUE
## 466	37	324	Largemouth Bass	318	NA	y01601	TRUE
## 467	37	325	Largemouth Bass	211	NA		TRUE
## 468	37	326	Largemouth Bass	254	NA		TRUE
## 469	37	327	Largemouth Bass	318	NA	y00023	TRUE
## 470	37	328	Largemouth Bass	427	NA	y00316	TRUE
## 471	37	329	Largemouth Bass	345	NA	y00220	TRUE
## 472	37	330	Largemouth Bass	330	NA	y00011	TRUE
## 473	37	331	Largemouth Bass	320	NA	y01534	TRUE
## 474	37	332	Largemouth Bass	356	NA	y00028	TRUE
## 475	37	333	Largemouth Bass	325	NA	y00009	TRUE
## 476	37	336	Largemouth Bass	297	NA		TRUE
## 477	37	337	Largemouth Bass	201	NA		TRUE
## 478	37	338	Largemouth Bass	257	NA		TRUE
## 479	37	339	Largemouth Bass	206	NA		TRUE
## 480	37	340	Largemouth Bass	201	NA		TRUE
## 481	37	341	Largemouth Bass	251	NA		TRUE
## 482	37	342	Largemouth Bass	239	NA		TRUE
## 483	37	343	Largemouth Bass	203	NA		TRUE
## 484	37	344	Largemouth Bass	262	NA		TRUE
## 485	37	345	Largemouth Bass	272	NA		TRUE
## 486	37	346	Largemouth Bass	353	NA	y00025	TRUE
## 487	37	347	Largemouth Bass	318	NA	y00229	TRUE
## 488	37	348	Largemouth Bass	330	NA	y00409	TRUE
## 489	37	349	Largemouth Bass	292	NA		TRUE
## 490	37	352	Largemouth Bass	318	NA	y00006	TRUE
## 491	37	353	Largemouth Bass	335	NA	y00015	TRUE
## 492	37	354	Largemouth Bass	295	NA		TRUE
## 493	37	355	Largemouth Bass	323	NA	y00027	TRUE
## 494	101	536	Largemouth Bass	318	407.0	1019	TRUE
## 495	101	551	Largemouth Bass	178	60.0		TRUE
## 496	101	588	Largemouth Bass	221	117.0		TRUE
## 497	102	630	Largemouth Bass	429	1070.0	1058	TRUE
## 498	102	631	Largemouth Bass	394	737.0	1057	TRUE
## 499	102	632	Largemouth Bass	361	548.0	1056	TRUE
## 500	104	656	Largemouth Bass	251	172.0		TRUE
## 501	104	657	Largemouth Bass	386	688.0	1100	TRUE
## 502	103	702	Largemouth Bass	361	579.0	1115	TRUE
## 503	111	713	Largemouth Bass	348	556.0	1117	TRUE
## 504	114	759	Largemouth Bass	168	48.0		TRUE
## 505	116	760	Largemouth Bass	71	3.1		FALSE
## 506	112	801	Largemouth Bass	168	52.0		FALSE
## 507	109	836	Largemouth Bass	424	864.0	1518	TRUE

##	508	109	837	Largemouth Bass	328	410.0	1519	TRUE
##	509	109	838	Largemouth Bass	315	385.0	1520	TRUE
##	510	109	839	Largemouth Bass	325	338.0	1521	TRUE
##	511	109	840	Largemouth Bass	274	235.0		TRUE
##	512	109	841	Largemouth Bass	348	NA	1522	TRUE
##	513	109	842	Largemouth Bass	318	386.0	o6860	TRUE
##	514	109	843	Largemouth Bass	333	460.0	1523	TRUE
##	515	109	844	Largemouth Bass	386	547.0	1524	TRUE
##	516	109	845	Largemouth Bass	384	540.0	1525	TRUE
##	517	109	846	Largemouth Bass	249	NA		TRUE
##	518	109	847	Largemouth Bass	307	320.0	1532	TRUE
##	519	109	848	Largemouth Bass	323	420.0	1776	TRUE
##	520	109	849	Largemouth Bass	315	406.0	1777	TRUE
##	521	109	850	Largemouth Bass	351	486.0	1778	TRUE
##	522	109	851	Largemouth Bass	249	274.0		TRUE
##	523	109	852	Largemouth Bass	287	265.0		TRUE
##	524	109	853	Largemouth Bass	307	338.0	1779	TRUE
##	525	109	854	Largemouth Bass	302	358.0		TRUE
##	526	109	855	Largemouth Bass	297	333.0		TRUE
##	527	109	856	Largemouth Bass	320	386.0	o0526	TRUE
##	528	109	857	Largemouth Bass	333	483.0	1780	TRUE
##	529	109	858	Largemouth Bass	333	426.0	1781	TRUE
##	530	109	859	Largemouth Bass	307	295.0	1782	TRUE
##	531	109	860	Largemouth Bass	229	132.0		TRUE
##	532	109	861	Largemouth Bass	201	92.0		TRUE
##	533	109	862	Largemouth Bass	201	88.0		TRUE
##	534	110	864	Largemouth Bass	325	436.0	1784	TRUE
##	535	110	865	Largemouth Bass	325	412.0	1785	TRUE
##	536	110	866	Largemouth Bass	323	444.0	1786	TRUE
##	537	110	867	Largemouth Bass	272	233.0		TRUE
##	538	129	868	Largemouth Bass	363	624.0	1787	TRUE
##	539	129	869	Largemouth Bass	353	561.0	1788	TRUE
##	540	129	871	Largemouth Bass	264	211.0		TRUE
##	541	129	872	Largemouth Bass	315	367.0	1790	TRUE
##	542	129	873	Largemouth Bass	239	157.0		TRUE
##	543	129	874	Largemouth Bass	330	433.0	1791	TRUE
##	544	129	875	Largemouth Bass	239	154.0		TRUE
##	545	129	876	Largemouth Bass	300	292.0		TRUE
##	546	129	877	Largemouth Bass	310	351.0		TRUE
##	547	129	878	Largemouth Bass	330	436.0	o0507	TRUE
##	548	129	880	Largemouth Bass	267	244.0		TRUE
##	549	129	881	Largemouth Bass	330	437.0	1793	TRUE
##	550	129	882	Largemouth Bass	234	133.0		TRUE
##	551	129	883	Largemouth Bass	315	409.0	1794	TRUE
##	552	129	884	Largemouth Bass	310	330.0	1795	TRUE
##	553	129	885	Largemouth Bass	251	187.0		TRUE
##	554	129	886	Largemouth Bass	226	132.0		TRUE
##	555	129	887	Largemouth Bass	254	168.0		TRUE
##	556	129	888	Largemouth Bass	320	385.0	1796	TRUE
##	557	129	889	Largemouth Bass	305	324.0	1797	TRUE
##	558	129	890	Largemouth Bass	333	461.0	1798	TRUE
##	559	129	891	Largemouth Bass	224	110.0		TRUE
##	560	130	892	Largemouth Bass	310	346.0	1799	TRUE
##	561	130	893	Largemouth Bass	345	450.0	1800	TRUE

##	562	130	894	Largemouth Bass	333	443.0	1701	TRUE
##	563	130	895	Largemouth Bass	348	537.0	1702	TRUE
##	564	130	896	Largemouth Bass	305	306.0	1703	TRUE
##	565	130	897	Largemouth Bass	343	485.0	o0997	TRUE
##	566	130	898	Largemouth Bass	318	383.0	1019	FALSE
##	567	130	899	Largemouth Bass	310	348.0	1704	TRUE
##	568	130	900	Largemouth Bass	292	NA		TRUE
##	569	130	901	Largemouth Bass	272	242.0		TRUE
##	570	130	902	Largemouth Bass	257	173.0		TRUE
##	571	130	903	Largemouth Bass	312	371.0	y00229	TRUE
##	572	130	904	Largemouth Bass	257	207.0		TRUE
##	573	130	905	Largemouth Bass	305	320.0	1705	TRUE
##	574	130	906	Largemouth Bass	312	349.0	o0529	TRUE
##	575	130	907	Largemouth Bass	378	723.0	1706	TRUE
##	576	130	908	Largemouth Bass	348	571.0	1707	TRUE
##	577	130	909	Largemouth Bass	295	315.0		TRUE
##	578	130	910	Largemouth Bass	338	462.0	1708	TRUE
##	579	131	911	Largemouth Bass	300	342.0		TRUE
##	580	131	912	Largemouth Bass	264	215.0		TRUE
##	581	131	913	Largemouth Bass	251	180.0		TRUE
##	582	131	914	Largemouth Bass	378	646.0	1709	TRUE
##	583	131	915	Largemouth Bass	325	377.0	1785	FALSE
##	584	12	9	Pumpkinseed	75	6.5		FALSE
##	585	12	13	Pumpkinseed	53	2.2		FALSE
##	586	12	15	Pumpkinseed	28	1.0		FALSE
##	587	12	20	Pumpkinseed	51	1.5		FALSE
##	588	12	67	Pumpkinseed	61	4.0		FALSE
##	589	9	159	Pumpkinseed	188	120.0		TRUE
##	590	9	160	Pumpkinseed	191	185.0		TRUE
##	591	20	200	Pumpkinseed	191	200.0		TRUE
##	592	21	216	Pumpkinseed	152	80.0		TRUE
##	593	23	223	Pumpkinseed	201	210.0		TRUE
##	594	27	225	Pumpkinseed	130	20.0		TRUE
##	595	24	229	Pumpkinseed	229	320.0		TRUE
##	596	124	835	Pumpkinseed	175	130.0		TRUE
##	597	203	528	Tadpole Madtom	41	0.5		FALSE
##	598	203	529	Tadpole Madtom	33	0.2		FALSE
##	599	203	530	Tadpole Madtom	30	0.2		FALSE
##	600	203	531	Tadpole Madtom	30	0.3		FALSE
##	601	106	655	Tadpole Madtom	46	1.3		FALSE
##	602	115	734	Tadpole Madtom	38	1.0		FALSE
##	603	4	113	Yellow Perch	239	150.0		TRUE
##	604	4	114	Yellow Perch	267	170.0		TRUE
##	605	4	115	Yellow Perch	262	175.0		TRUE
##	606	4	116	Yellow Perch	257	157.0		TRUE
##	607	4	117	Yellow Perch	257	160.0		TRUE
##	608	9	173	Yellow Perch	221	105.0		TRUE
##	609	9	174	Yellow Perch	226	150.0		TRUE
##	610	9	175	Yellow Perch	282	230.0		TRUE
##	611	20	202	Yellow Perch	226	122.0		TRUE
##	612	15	204	Yellow Perch	244	130.0		TRUE
##	613	15	205	Yellow Perch	272	200.0		TRUE
##	614	23	222	Yellow Perch	229	110.0		TRUE
##	615	102	633	Yellow Perch	249	164.0	1055	TRUE

## 616	102	634	Yellow Perch	264	208.0	1054	TRUE
## 617	102	635	Yellow Perch	254	173.0	1053	TRUE
## 618	102	636	Yellow Perch	249	158.0	1052	TRUE
## 619	105	704	Yellow Perch	114	14.1		TRUE
## 620	105	705	Yellow Perch	102	9.7		TRUE
## 621	105	706	Yellow Perch	119	13.6		TRUE
## 622	105	707	Yellow Perch	79	4.0		TRUE
## 623	105	708	Yellow Perch	81	4.3		TRUE
## 624	105	709	Yellow Perch	79	4.1		TRUE
## 625	105	710	Yellow Perch	74	3.4		TRUE
## 626	111	714	Yellow Perch	307	340.0	1118	TRUE
## 627	115	728	Yellow Perch	94	6.3		FALSE
## 628	115	729	Yellow Perch	79	4.2		FALSE
## 629	113	735	Yellow Perch	267	201.0	1026	TRUE
## 630	114	756	Yellow Perch	297	327.0	1043	TRUE
## 631	116	772	Yellow Perch	91	6.8		TRUE
## 632	116	773	Yellow Perch	84	4.5		TRUE
## 633	112	796	Yellow Perch	229	123.0	1046	TRUE
## 634	112	797	Yellow Perch	239	135.0	1047	TRUE
## 635	122	825	Yellow Perch	249	152.0	1156	TRUE
## 636	125	827	Yellow Perch	221	113.0	1696	TRUE
## 637	125	828	Yellow Perch	84	4.6		TRUE
## 638	125	829	Yellow Perch	91	7.1		TRUE
## 639	125	830	Yellow Perch	81	4.1		TRUE
## 640	125	831	Yellow Perch	71	2.1		TRUE
## 641	1	103	Black Crappie	284	NA	g0998	TRUE
## 642	5	135	Black Crappie	305	NA	o0513	TRUE
## 643	5	136	Black Crappie	305	NA	o0514	TRUE
## 644	5	137	Black Crappie	267	275.0	o0515	TRUE
## 645	16	208	Black Crappie	295	380.0	g0995	TRUE
## 646	16	209	Black Crappie	274	260.0	g0994	TRUE
## 647	21	218	Black Crappie	152	46.0		TRUE
## 648	29	238	Black Crappie	279	NA	o0522	TRUE
## 649	30	267	Black Crappie	290	NA	o0537	TRUE
## 650	24	268	Black Crappie	330	580.0		TRUE
## 651	24	269	Black Crappie	307	440.0		TRUE
## 652	35	283	Black Crappie	290	NA	o0408	TRUE
## 653	37	319	Black Crappie	300	NA	y00384	TRUE
## 654	37	334	Black Crappie	297	NA	y00020	TRUE
## 655	37	335	Black Crappie	297	NA	y00318	TRUE
## 656	37	350	Black Crappie	297	NA	yunknown	TRUE
## 657	37	351	Black Crappie	290	NA	y09000	TRUE
## 658	101	532	Black Crappie	320	508.0	1014	TRUE
## 659	101	534	Black Crappie	305	443.0	1016	TRUE
## 660	101	535	Black Crappie	307	440.0	1017	TRUE
## 661	101	537	Black Crappie	287	379.0	1020	TRUE
## 662	102	626	Black Crappie	307	461.0	y00318	TRUE
## 663	102	627	Black Crappie	310	466.0	1061	TRUE
## 664	102	628	Black Crappie	315	536.0	1060	TRUE
## 665	102	629	Black Crappie	323	565.0	1059	TRUE
## 666	113	753	Black Crappie	155	47.0		TRUE
## 667	113	754	Black Crappie	147	37.0		TRUE
## 668	112	798	Black Crappie	188	102.0		FALSE
## 669	112	799	Black Crappie	330	606.0	1048	TRUE


```
## 670 112 800 Black Crappie 292 362.0 1049 TRUE
## 671 121 808 Black Crappie 323 509.0 1050 TRUE
## 672 121 809 Black Crappie 282 352.0 1700 TRUE
## 673 121 812 Black Crappie 142 37.0 TRUE
## 674 110 863 Black Crappie 307 415.0 1783 TRUE
## 675 129 870 Black Crappie 279 344.0 1789 TRUE
## 676 129 879 Black Crappie 302 397.0 1792 TRUE
```

```
#3.Display head, tail, and structure of bio
#First five
head(bio, 5)
```

```
## netID fishID species t1 w tag scale
## 1 12 16 Bluegill 61 2.9 FALSE
## 2 12 23 Bluegill 66 4.5 FALSE
## 3 12 30 Bluegill 70 5.2 FALSE
## 4 12 44 Bluegill 38 0.5 FALSE
## 5 12 50 Bluegill 42 1.0 FALSE
```

```
#Last five
tail(bio, 5)
```

```
## netID fishID species t1 w tag scale
## 672 121 809 Black Crappie 282 352 1700 TRUE
## 673 121 812 Black Crappie 142 37 TRUE
## 674 110 863 Black Crappie 307 415 1783 TRUE
## 675 129 870 Black Crappie 279 344 1789 TRUE
## 676 129 879 Black Crappie 302 397 1792 TRUE
```

```
#structure of bio
structure(bio)
```

```
## netID fishID species t1 w tag scale
## 1 12 16 Bluegill 61 2.9 FALSE
## 2 12 23 Bluegill 66 4.5 FALSE
## 3 12 30 Bluegill 70 5.2 FALSE
## 4 12 44 Bluegill 38 0.5 FALSE
## 5 12 50 Bluegill 42 1.0 FALSE
## 6 12 65 Bluegill 54 2.1 FALSE
## 7 12 66 Bluegill 27 NA FALSE
## 8 13 68 Bluegill 36 0.5 FALSE
## 9 13 69 Bluegill 59 2.0 FALSE
## 10 13 70 Bluegill 39 0.5 FALSE
## 11 13 71 Bluegill 34 0.5 FALSE
## 12 13 73 Bluegill 40 1.0 FALSE
## 13 13 74 Bluegill 35 0.5 FALSE
## 14 13 75 Bluegill 32 1.0 FALSE
## 15 13 76 Bluegill 37 0.5 FALSE
## 16 13 77 Bluegill 38 1.0 FALSE
## 17 13 78 Bluegill 69 7.0 FALSE
## 18 13 80 Bluegill 39 1.0 FALSE
## 19 13 81 Bluegill 37 0.5 FALSE
```

## 20	13	82	Bluegill	38	1.0	FALSE
## 21	13	83	Bluegill	47	NA	FALSE
## 22	14	86	Bluegill	33	0.5	FALSE
## 23	14	87	Bluegill	31	1.5	FALSE
## 24	14	88	Bluegill	36	1.5	FALSE
## 25	4	118	Bluegill	150	60.0	TRUE
## 26	4	119	Bluegill	193	145.0	TRUE
## 27	4	120	Bluegill	185	123.0	TRUE
## 28	4	121	Bluegill	152	67.0	TRUE
## 29	4	122	Bluegill	160	75.0	TRUE
## 30	4	123	Bluegill	185	118.0	TRUE
## 31	4	124	Bluegill	170	100.0	TRUE
## 32	4	125	Bluegill	135	35.0	TRUE
## 33	4	126	Bluegill	183	120.0	TRUE
## 34	4	127	Bluegill	168	90.0	TRUE
## 35	4	128	Bluegill	165	85.0	TRUE
## 36	4	129	Bluegill	178	100.0	TRUE
## 37	4	130	Bluegill	193	155.0	TRUE
## 38	4	131	Bluegill	193	140.0	TRUE
## 39	4	132	Bluegill	201	180.0	TRUE
## 40	4	133	Bluegill	203	185.0	TRUE
## 41	4	134	Bluegill	99	15.0	TRUE
## 42	5	138	Bluegill	135	42.0	TRUE
## 43	5	139	Bluegill	38	2.0	FALSE
## 44	5	140	Bluegill	41	NA	FALSE
## 45	5	141	Bluegill	41	NA	FALSE
## 46	5	142	Bluegill	46	NA	FALSE
## 47	5	143	Bluegill	165	68.0	TRUE
## 48	5	144	Bluegill	43	NA	FALSE
## 49	5	145	Bluegill	51	4.0	FALSE
## 50	5	146	Bluegill	203	184.0	TRUE
## 51	5	147	Bluegill	168	98.0	TRUE
## 52	5	148	Bluegill	152	62.0	TRUE
## 53	5	149	Bluegill	64	NA	FALSE
## 54	5	150	Bluegill	157	76.0	TRUE
## 55	10	151	Bluegill	173	100.0	TRUE
## 56	10	152	Bluegill	173	95.0	TRUE
## 57	10	153	Bluegill	185	130.0	TRUE
## 58	10	154	Bluegill	218	250.0	TRUE
## 59	10	155	Bluegill	206	197.0	TRUE
## 60	10	156	Bluegill	165	78.0	TRUE
## 61	10	157	Bluegill	152	72.0	TRUE
## 62	10	158	Bluegill	170	98.0	TRUE
## 63	9	161	Bluegill	206	175.0	TRUE
## 64	9	162	Bluegill	191	144.0	TRUE
## 65	9	163	Bluegill	193	148.0	TRUE
## 66	9	164	Bluegill	183	130.0	TRUE
## 67	9	165	Bluegill	201	185.0	TRUE
## 68	9	166	Bluegill	221	225.0	TRUE
## 69	9	167	Bluegill	165	80.0	FALSE
## 70	9	168	Bluegill	206	180.0	TRUE
## 71	9	169	Bluegill	203	175.0	TRUE
## 72	9	170	Bluegill	165	NA	TRUE
## 73	9	171	Bluegill	193	160.0	FALSE

## 74	9	172	Bluegill	173	NA	FALSE
## 75	6	176	Bluegill	213	200.0	TRUE
## 76	6	177	Bluegill	155	74.0	TRUE
## 77	6	178	Bluegill	157	62.0	TRUE
## 78	6	179	Bluegill	211	220.0	TRUE
## 79	6	180	Bluegill	188	149.0	TRUE
## 80	6	181	Bluegill	188	139.0	TRUE
## 81	6	182	Bluegill	196	132.0	TRUE
## 82	6	183	Bluegill	188	139.0	TRUE
## 83	6	184	Bluegill	160	73.0	TRUE
## 84	6	185	Bluegill	196	120.0	TRUE
## 85	6	186	Bluegill	221	242.0	TRUE
## 86	6	187	Bluegill	180	130.0	TRUE
## 87	6	188	Bluegill	152	70.0	TRUE
## 88	6	189	Bluegill	140	40.0	TRUE
## 89	6	190	Bluegill	203	170.0	TRUE
## 90	6	191	Bluegill	145	52.0	TRUE
## 91	6	192	Bluegill	147	32.0	TRUE
## 92	11	193	Bluegill	211	218.0	TRUE
## 93	11	194	Bluegill	147	60.0	TRUE
## 94	11	195	Bluegill	152	70.0	TRUE
## 95	17	196	Bluegill	203	192.0	TRUE
## 96	17	197	Bluegill	132	31.0	TRUE
## 97	17	199	Bluegill	142	59.0	TRUE
## 98	20	201	Bluegill	140	54.0	TRUE
## 99	15	203	Bluegill	142	40.0	TRUE
## 100	15	206	Bluegill	147	30.0	TRUE
## 101	15	207	Bluegill	119	20.0	TRUE
## 102	16	210	Bluegill	229	280.0	TRUE
## 103	16	211	Bluegill	224	260.0	TRUE
## 104	16	212	Bluegill	224	260.0	TRUE
## 105	16	213	Bluegill	224	240.0	TRUE
## 106	16	214	Bluegill	150	60.0	TRUE
## 107	16	215	Bluegill	137	60.0	TRUE
## 108	21	217	Bluegill	94	14.0	TRUE
## 109	21	219	Bluegill	130	38.0	TRUE
## 110	26	220	Bluegill	132	49.0	TRUE
## 111	26	221	Bluegill	137	41.0	TRUE
## 112	23	224	Bluegill	114	20.0	TRUE
## 113	27	226	Bluegill	127	20.0	TRUE
## 114	27	228	Bluegill	122	20.0	TRUE
## 115	28	230	Bluegill	137	50.0	TRUE
## 116	28	231	Bluegill	234	280.0	TRUE
## 117	37	322	Bluegill	152	NA	TRUE
## 118	37	356	Bluegill	201	NA	TRUE
## 119	206	501	Bluegill	38	0.7	FALSE
## 120	205	502	Bluegill	43	1.4	FALSE
## 121	205	503	Bluegill	56	1.5	FALSE
## 122	205	504	Bluegill	53	1.4	FALSE
## 123	205	505	Bluegill	38	1.0	FALSE
## 124	205	506	Bluegill	48	1.8	FALSE
## 125	205	507	Bluegill	48	1.4	FALSE
## 126	205	508	Bluegill	36	0.6	FALSE
## 127	205	509	Bluegill	30	0.3	FALSE

## 128	205	510	Bluegill	36	0.8		FALSE
## 129	205	511	Bluegill	51	1.3		FALSE
## 130	205	512	Bluegill	58	2.4		FALSE
## 131	205	513	Bluegill	33	0.7		FALSE
## 132	205	514	Bluegill	38	1.0		FALSE
## 133	205	515	Bluegill	33	0.6		FALSE
## 134	205	516	Bluegill	56	2.8		FALSE
## 135	205	517	Bluegill	33	1.1		FALSE
## 136	205	518	Bluegill	53	2.0		FALSE
## 137	205	519	Bluegill	66	4.5		FALSE
## 138	205	520	Bluegill	71	4.9		FALSE
## 139	101	533	Bluegill	213	190.0		TRUE
## 140	101	538	Bluegill	216	198.0	1021	TRUE
## 141	101	539	Bluegill	216	210.0	1022	TRUE
## 142	101	540	Bluegill	231	258.0	1023	TRUE
## 143	101	541	Bluegill	193	138.0		TRUE
## 144	101	542	Bluegill	226	236.0	1024	TRUE
## 145	101	543	Bluegill	163	75.0		TRUE
## 146	101	544	Bluegill	224	229.0	1025	TRUE
## 147	101	545	Bluegill	178	101.0		TRUE
## 148	101	546	Bluegill	180	110.0		TRUE
## 149	101	547	Bluegill	239	295.0	1015	TRUE
## 150	101	548	Bluegill	183	113.0		TRUE
## 151	101	549	Bluegill	211	191.0	1018	TRUE
## 152	101	550	Bluegill	191	139.0		TRUE
## 153	101	552	Bluegill	191	137.0		TRUE
## 154	101	553	Bluegill	201	165.0		TRUE
## 155	101	554	Bluegill	178	103.0		TRUE
## 156	101	555	Bluegill	201	166.0		TRUE
## 157	101	556	Bluegill	180	115.0		TRUE
## 158	101	557	Bluegill	165	89.0		TRUE
## 159	101	558	Bluegill	191	121.0		TRUE
## 160	101	559	Bluegill	157	78.0		TRUE
## 161	101	560	Bluegill	152	63.0		TRUE
## 162	101	561	Bluegill	206	181.0	1075	TRUE
## 163	101	562	Bluegill	147	60.0		TRUE
## 164	101	563	Bluegill	163	74.0		TRUE
## 165	101	564	Bluegill	180	101.0		TRUE
## 166	101	565	Bluegill	193	141.0		TRUE
## 167	101	566	Bluegill	216	228.0	1074	TRUE
## 168	101	567	Bluegill	229	266.0	1073	TRUE
## 169	101	568	Bluegill	168	93.0		TRUE
## 170	101	569	Bluegill	163	74.0		TRUE
## 171	101	570	Bluegill	165	82.0		TRUE
## 172	101	571	Bluegill	231	274.0	1072	TRUE
## 173	101	572	Bluegill	201	151.0		TRUE
## 174	101	573	Bluegill	188	129.0		TRUE
## 175	101	574	Bluegill	175	98.0		TRUE
## 176	101	575	Bluegill	145	57.0		TRUE
## 177	101	576	Bluegill	152	62.0		TRUE
## 178	101	577	Bluegill	175	107.0		TRUE
## 179	101	578	Bluegill	221	240.0	1071	TRUE
## 180	101	580	Bluegill	178	110.0		TRUE
## 181	101	581	Bluegill	211	208.0	1069	TRUE

##	182	101	583	Bluegill	140	48.0		TRUE
##	183	101	585	Bluegill	173	96.0		TRUE
##	184	101	586	Bluegill	152	73.0		TRUE
##	185	101	587	Bluegill	213	198.0	1066	TRUE
##	186	107	621	Bluegill	203	156.0	1065	TRUE
##	187	107	622	Bluegill	221	242.0	1064	TRUE
##	188	107	623	Bluegill	203	187.0	1063	TRUE
##	189	107	624	Bluegill	229	242.0	1062	TRUE
##	190	107	625	Bluegill	170	83.0		TRUE
##	191	104	658	Bluegill	213	197.0	1099	TRUE
##	192	104	659	Bluegill	229	255.0	1098	TRUE
##	193	104	660	Bluegill	185	111.0		TRUE
##	194	103	689	Bluegill	206	NA	1107	TRUE
##	195	103	695	Bluegill	137	45.3		TRUE
##	196	103	697	Bluegill	147	50.9		TRUE
##	197	103	699	Bluegill	66	3.4		TRUE
##	198	103	700	Bluegill	150	54.5		TRUE
##	199	103	701	Bluegill	142	48.8		TRUE
##	200	103	703	Bluegill	150	50.9		TRUE
##	201	111	717	Bluegill	130	35.0		TRUE
##	202	111	718	Bluegill	137	45.0		TRUE
##	203	111	719	Bluegill	132	39.0		TRUE
##	204	111	722	Bluegill	137	43.0		TRUE
##	205	111	726	Bluegill	137	50.0		TRUE
##	206	113	742	Bluegill	135	39.0		TRUE
##	207	114	755	Bluegill	66	3.1		FALSE
##	208	116	761	Bluegill	97	10.9		FALSE
##	209	116	762	Bluegill	91	10.6		FALSE
##	210	112	774	Bluegill	203	171.0	1045	TRUE
##	211	112	780	Bluegill	76	6.1		FALSE
##	212	112	781	Bluegill	109	19.0		FALSE
##	213	120	802	Bluegill	94	10.7		TRUE
##	214	120	803	Bluegill	84	8.9		TRUE
##	215	120	804	Bluegill	91	10.6		TRUE
##	216	120	805	Bluegill	84	8.7		TRUE
##	217	120	806	Bluegill	86	9.3		TRUE
##	218	120	807	Bluegill	69	4.0		TRUE
##	219	119	824	Bluegill	119	25.0		TRUE
##	220	122	826	Bluegill	132	33.0		TRUE
##	221	12	7	Bluntnose Minnow	59	2.0		FALSE
##	222	12	8	Bluntnose Minnow	58	1.7		FALSE
##	223	12	10	Bluntnose Minnow	54	1.5		FALSE
##	224	12	11	Bluntnose Minnow	60	1.7		FALSE
##	225	12	12	Bluntnose Minnow	78	2.3		FALSE
##	226	12	14	Bluntnose Minnow	62	2.2		FALSE
##	227	12	17	Bluntnose Minnow	59	2.0		FALSE
##	228	12	18	Bluntnose Minnow	63	2.5		FALSE
##	229	12	19	Bluntnose Minnow	58	2.0		FALSE
##	230	12	21	Bluntnose Minnow	71	3.8		FALSE
##	231	12	22	Bluntnose Minnow	55	2.5		FALSE
##	232	12	24	Bluntnose Minnow	60	2.2		FALSE
##	233	12	25	Bluntnose Minnow	51	2.0		FALSE
##	234	12	26	Bluntnose Minnow	52	1.8		FALSE
##	235	12	27	Bluntnose Minnow	64	2.5		FALSE

##	236	12	28	Bluntnose Minnow	67	4.0	FALSE
##	237	12	29	Bluntnose Minnow	63	2.0	FALSE
##	238	12	31	Bluntnose Minnow	65	2.0	FALSE
##	239	12	32	Bluntnose Minnow	67	3.0	FALSE
##	240	12	33	Bluntnose Minnow	71	4.8	FALSE
##	241	12	34	Bluntnose Minnow	66	3.0	FALSE
##	242	12	35	Bluntnose Minnow	73	4.0	FALSE
##	243	12	36	Bluntnose Minnow	67	4.0	FALSE
##	244	12	37	Bluntnose Minnow	51	2.5	FALSE
##	245	12	38	Bluntnose Minnow	58	1.5	FALSE
##	246	12	39	Bluntnose Minnow	71	3.8	FALSE
##	247	12	40	Bluntnose Minnow	52	1.5	FALSE
##	248	12	41	Bluntnose Minnow	61	1.5	FALSE
##	249	12	42	Bluntnose Minnow	58	1.5	FALSE
##	250	12	43	Bluntnose Minnow	72	3.0	FALSE
##	251	12	45	Bluntnose Minnow	68	NA	FALSE
##	252	12	46	Bluntnose Minnow	57	1.5	FALSE
##	253	12	47	Bluntnose Minnow	58	1.5	FALSE
##	254	12	48	Bluntnose Minnow	58	2.0	FALSE
##	255	12	49	Bluntnose Minnow	58	2.5	FALSE
##	256	12	51	Bluntnose Minnow	61	3.0	FALSE
##	257	12	52	Bluntnose Minnow	57	1.0	FALSE
##	258	12	53	Bluntnose Minnow	70	2.0	FALSE
##	259	12	54	Bluntnose Minnow	64	2.5	FALSE
##	260	12	55	Bluntnose Minnow	61	1.0	FALSE
##	261	12	56	Bluntnose Minnow	56	1.0	FALSE
##	262	12	57	Bluntnose Minnow	58	NA	FALSE
##	263	12	58	Bluntnose Minnow	66	4.0	FALSE
##	264	12	59	Bluntnose Minnow	59	2.0	FALSE
##	265	12	60	Bluntnose Minnow	62	1.5	FALSE
##	266	12	61	Bluntnose Minnow	64	2.5	FALSE
##	267	12	62	Bluntnose Minnow	63	1.5	FALSE
##	268	12	63	Bluntnose Minnow	61	1.8	FALSE
##	269	12	64	Bluntnose Minnow	64	3.0	FALSE
##	270	13	79	Bluntnose Minnow	72	5.0	FALSE
##	271	13	84	Bluntnose Minnow	71	4.0	FALSE
##	272	205	522	Bluntnose Minnow	61	2.1	FALSE
##	273	201	523	Bluntnose Minnow	56	NA	FALSE
##	274	101	589	Bluntnose Minnow	64	1.4	FALSE
##	275	101	590	Bluntnose Minnow	46	0.5	FALSE
##	276	101	591	Bluntnose Minnow	53	1.0	FALSE
##	277	101	592	Bluntnose Minnow	58	1.7	FALSE
##	278	101	593	Bluntnose Minnow	56	1.0	FALSE
##	279	101	594	Bluntnose Minnow	58	1.1	FALSE
##	280	101	595	Bluntnose Minnow	58	1.0	FALSE
##	281	101	596	Bluntnose Minnow	56	1.0	FALSE
##	282	101	597	Bluntnose Minnow	53	1.0	FALSE
##	283	101	598	Bluntnose Minnow	51	0.8	FALSE
##	284	101	599	Bluntnose Minnow	56	0.8	FALSE
##	285	101	600	Bluntnose Minnow	56	1.0	FALSE
##	286	101	601	Bluntnose Minnow	58	1.0	FALSE
##	287	101	603	Bluntnose Minnow	64	1.4	FALSE
##	288	101	605	Bluntnose Minnow	58	1.2	FALSE
##	289	101	606	Bluntnose Minnow	61	1.3	FALSE

##	290	101	607	Bluntnose Minnow	69	1.8	FALSE
##	291	101	608	Bluntnose Minnow	64	1.4	FALSE
##	292	101	609	Bluntnose Minnow	53	0.8	FALSE
##	293	101	610	Bluntnose Minnow	64	1.4	FALSE
##	294	101	611	Bluntnose Minnow	61	1.2	FALSE
##	295	101	612	Bluntnose Minnow	51	0.7	FALSE
##	296	101	613	Bluntnose Minnow	56	1.1	FALSE
##	297	101	614	Bluntnose Minnow	56	1.0	FALSE
##	298	101	615	Bluntnose Minnow	53	0.9	FALSE
##	299	101	616	Bluntnose Minnow	58	1.2	FALSE
##	300	101	617	Bluntnose Minnow	53	0.8	FALSE
##	301	101	618	Bluntnose Minnow	53	0.9	FALSE
##	302	101	619	Bluntnose Minnow	66	1.5	FALSE
##	303	101	620	Bluntnose Minnow	61	1.3	FALSE
##	304	102	638	Bluntnose Minnow	74	3.9	FALSE
##	305	102	639	Bluntnose Minnow	61	2.2	FALSE
##	306	102	640	Bluntnose Minnow	84	1.3	FALSE
##	307	102	642	Bluntnose Minnow	53	1.3	FALSE
##	308	102	643	Bluntnose Minnow	56	2.1	FALSE
##	309	102	644	Bluntnose Minnow	56	1.4	FALSE
##	310	102	645	Bluntnose Minnow	61	2.0	FALSE
##	311	111	727	Bluntnose Minnow	79	3.8	FALSE
##	312	116	763	Bluntnose Minnow	74	3.4	FALSE
##	313	121	816	Bluntnose Minnow	51	1.2	FALSE
##	314	121	817	Bluntnose Minnow	79	3.9	FALSE
##	315	121	818	Bluntnose Minnow	74	3.8	FALSE
##	316	121	819	Bluntnose Minnow	64	1.9	FALSE
##	317	121	820	Bluntnose Minnow	51	1.0	FALSE
##	318	121	821	Bluntnose Minnow	51	1.1	FALSE
##	319	121	822	Bluntnose Minnow	64	2.1	FALSE
##	320	121	823	Bluntnose Minnow	51	1.2	FALSE
##	321	125	832	Bluntnose Minnow	81	2.8	FALSE
##	322	125	833	Bluntnose Minnow	81	3.2	FALSE
##	323	125	834	Bluntnose Minnow	79	4.1	FALSE
##	324	13	72	Iowa Darter	61	NA	FALSE
##	325	205	521	Iowa Darter	53	1.1	FALSE
##	326	203	524	Iowa Darter	46	0.6	FALSE
##	327	203	525	Iowa Darter	44	0.6	FALSE
##	328	203	526	Iowa Darter	46	0.6	FALSE
##	329	203	527	Iowa Darter	43	0.4	FALSE
##	330	101	602	Iowa Darter	56	0.9	FALSE
##	331	101	604	Iowa Darter	51	0.8	FALSE
##	332	102	641	Iowa Darter	48	1.0	FALSE
##	333	106	646	Iowa Darter	38	0.6	FALSE
##	334	106	647	Iowa Darter	46	0.9	FALSE
##	335	106	648	Iowa Darter	43	0.8	FALSE
##	336	106	649	Iowa Darter	48	1.0	FALSE
##	337	106	650	Iowa Darter	41	0.5	FALSE
##	338	106	651	Iowa Darter	41	0.7	FALSE
##	339	106	652	Iowa Darter	43	0.6	FALSE
##	340	106	653	Iowa Darter	43	0.6	FALSE
##	341	106	654	Iowa Darter	46	0.9	FALSE
##	342	105	711	Iowa Darter	48	0.7	FALSE
##	343	105	712	Iowa Darter	46	0.7	FALSE

##	344	115	730	Iowa Darter	48	0.8		FALSE
##	345	115	731	Iowa Darter	48	0.8		FALSE
##	346	115	732	Iowa Darter	51	1.0		FALSE
##	347	115	733	Iowa Darter	51	1.1		FALSE
##	348	116	764	Iowa Darter	51	1.2		FALSE
##	349	116	765	Iowa Darter	48	0.9		FALSE
##	350	116	766	Iowa Darter	51	0.9		FALSE
##	351	116	767	Iowa Darter	43	0.5		FALSE
##	352	116	768	Iowa Darter	51	1.2		FALSE
##	353	116	769	Iowa Darter	56	1.2		FALSE
##	354	116	770	Iowa Darter	53	1.1		FALSE
##	355	116	771	Iowa Darter	43	0.9		FALSE
##	356	14	85	Largemouth Bass	68	3.5		TRUE
##	357	3	89	Largemouth Bass	338	NA	g0996	TRUE
##	358	1	90	Largemouth Bass	356	NA	y06073	TRUE
##	359	1	91	Largemouth Bass	328	NA	o0449	TRUE
##	360	1	92	Largemouth Bass	305	NA	o0448	TRUE
##	361	1	93	Largemouth Bass	386	NA	o0447	TRUE
##	362	1	94	Largemouth Bass	310	NA	g0985	TRUE
##	363	1	95	Largemouth Bass	262	NA		TRUE
##	364	1	96	Largemouth Bass	305	NA	g0986	TRUE
##	365	1	97	Largemouth Bass	315	NA	g0987	TRUE
##	366	1	98	Largemouth Bass	371	NA	g1000	TRUE
##	367	1	99	Largemouth Bass	338	NA	g0999	TRUE
##	368	1	100	Largemouth Bass	239	NA		TRUE
##	369	1	101	Largemouth Bass	236	NA		TRUE
##	370	1	102	Largemouth Bass	348	NA	g0997	TRUE
##	371	2	104	Largemouth Bass	307	NA	o0501	TRUE
##	372	2	105	Largemouth Bass	323	NA	o0506	TRUE
##	373	2	106	Largemouth Bass	231	NA		TRUE
##	374	2	107	Largemouth Bass	216	NA		TRUE
##	375	2	108	Largemouth Bass	325	NA	o0507	TRUE
##	376	2	109	Largemouth Bass	399	NA	o0510	TRUE
##	377	2	110	Largemouth Bass	333	NA	o0511	TRUE
##	378	2	111	Largemouth Bass	356	NA	o0512	TRUE
##	379	2	112	Largemouth Bass	274	NA		TRUE
##	380	17	198	Largemouth Bass	259	190.0		TRUE
##	381	27	227	Largemouth Bass	137	20.0		TRUE
##	382	29	232	Largemouth Bass	279	NA	o0516	TRUE
##	383	29	233	Largemouth Bass	351	NA	o0517	TRUE
##	384	29	234	Largemouth Bass	307	NA	o0518	TRUE
##	385	29	235	Largemouth Bass	325	NA	o0520	TRUE
##	386	29	237	Largemouth Bass	330	NA	o0521	TRUE
##	387	29	239	Largemouth Bass	282	NA	o0523	TRUE
##	388	29	240	Largemouth Bass	262	NA		TRUE
##	389	29	241	Largemouth Bass	391	NA	o0524	TRUE
##	390	29	242	Largemouth Bass	262	NA		TRUE
##	391	29	243	Largemouth Bass	295	NA	o0525	TRUE
##	392	30	244	Largemouth Bass	305	NA	o0550	TRUE
##	393	30	245	Largemouth Bass	193	NA		TRUE
##	394	30	246	Largemouth Bass	254	NA		TRUE
##	395	30	247	Largemouth Bass	246	NA		TRUE
##	396	30	248	Largemouth Bass	330	NA	o0549	TRUE
##	397	30	249	Largemouth Bass	300	NA		TRUE

## 398	30	250	Largemouth Bass	284	NA		TRUE
## 399	30	251	Largemouth Bass	371	NA	o0548	TRUE
## 400	30	252	Largemouth Bass	335	NA	o0547	TRUE
## 401	30	253	Largemouth Bass	305	NA	o0546	TRUE
## 402	30	254	Largemouth Bass	254	NA		TRUE
## 403	30	255	Largemouth Bass	318	NA	o0545	TRUE
## 404	30	256	Largemouth Bass	348	NA	o0544	TRUE
## 405	30	257	Largemouth Bass	343	NA	o0543	TRUE
## 406	30	258	Largemouth Bass	325	NA	o0542	TRUE
## 407	30	259	Largemouth Bass	333	NA	o0541	TRUE
## 408	30	260	Largemouth Bass	330	NA	o0540	TRUE
## 409	30	261	Largemouth Bass	381	NA	o0539	TRUE
## 410	30	262	Largemouth Bass	320	NA	o0538	TRUE
## 411	30	263	Largemouth Bass	272	NA		TRUE
## 412	30	264	Largemouth Bass	312	NA	o0536	TRUE
## 413	30	265	Largemouth Bass	310	NA	o0535	TRUE
## 414	30	266	Largemouth Bass	297	NA		TRUE
## 415	31	270	Largemouth Bass	307	NA	o0533	TRUE
## 416	31	271	Largemouth Bass	310	NA	o0532	TRUE
## 417	31	272	Largemouth Bass	277	NA		TRUE
## 418	33	273	Largemouth Bass	130	NA		TRUE
## 419	32	274	Largemouth Bass	140	NA		TRUE
## 420	35	275	Largemouth Bass	239	NA		TRUE
## 421	35	276	Largemouth Bass	236	NA		TRUE
## 422	35	277	Largemouth Bass	320	NA	o0519	TRUE
## 423	35	278	Largemouth Bass	241	NA		TRUE
## 424	35	279	Largemouth Bass	343	NA	g0988	TRUE
## 425	35	280	Largemouth Bass	226	NA		TRUE
## 426	35	281	Largemouth Bass	211	NA		TRUE
## 427	35	282	Largemouth Bass	409	NA	g0990	TRUE
## 428	35	284	Largemouth Bass	371	NA	o0991	TRUE
## 429	35	285	Largemouth Bass	312	NA	o0989	TRUE
## 430	35	286	Largemouth Bass	333	NA	y00003	TRUE
## 431	35	287	Largemouth Bass	338	NA	y00228	TRUE
## 432	35	288	Largemouth Bass	282	NA		TRUE
## 433	35	289	Largemouth Bass	302	NA		TRUE
## 434	35	290	Largemouth Bass	305	NA	y160016	TRUE
## 435	35	291	Largemouth Bass	376	NA	o0534	TRUE
## 436	35	292	Largemouth Bass	251	NA		TRUE
## 437	35	293	Largemouth Bass	338	NA	y2519	TRUE
## 438	35	294	Largemouth Bass	318	NA	y00034	TRUE
## 439	35	295	Largemouth Bass	312	NA	y00123	TRUE
## 440	35	296	Largemouth Bass	272	NA		TRUE
## 441	35	297	Largemouth Bass	394	NA	o0531	TRUE
## 442	35	298	Largemouth Bass	363	NA	o0530	TRUE
## 443	35	299	Largemouth Bass	320	NA	y01525	FALSE
## 444	36	300	Largemouth Bass	307	NA	o0529	TRUE
## 445	36	301	Largemouth Bass	330	NA	o0528	TRUE
## 446	36	302	Largemouth Bass	318	NA	o0527	TRUE
## 447	36	303	Largemouth Bass	302	NA		TRUE
## 448	36	304	Largemouth Bass	277	NA		TRUE
## 449	36	305	Largemouth Bass	241	NA		TRUE
## 450	36	306	Largemouth Bass	318	NA	o0526	TRUE
## 451	36	307	Largemouth Bass	297	NA		TRUE

##	452	36	308	Largemouth Bass	318	NA	y01598	TRUE
##	453	36	309	Largemouth Bass	373	NA	y01600	TRUE
##	454	36	310	Largemouth Bass	290	NA		TRUE
##	455	36	311	Largemouth Bass	300	NA		TRUE
##	456	36	312	Largemouth Bass	318	NA	y01603	TRUE
##	457	36	313	Largemouth Bass	333	NA	y01604	TRUE
##	458	36	314	Largemouth Bass	356	NA	y01605	TRUE
##	459	36	315	Largemouth Bass	180	NA		TRUE
##	460	36	316	Largemouth Bass	305	NA	y01606	TRUE
##	461	37	317	Largemouth Bass	211	NA		TRUE
##	462	37	318	Largemouth Bass	320	NA	y00385	TRUE
##	463	37	320	Largemouth Bass	236	NA		TRUE
##	464	37	321	Largemouth Bass	193	NA		TRUE
##	465	37	323	Largemouth Bass	249	NA		TRUE
##	466	37	324	Largemouth Bass	318	NA	y01601	TRUE
##	467	37	325	Largemouth Bass	211	NA		TRUE
##	468	37	326	Largemouth Bass	254	NA		TRUE
##	469	37	327	Largemouth Bass	318	NA	y00023	TRUE
##	470	37	328	Largemouth Bass	427	NA	y00316	TRUE
##	471	37	329	Largemouth Bass	345	NA	y00220	TRUE
##	472	37	330	Largemouth Bass	330	NA	y00011	TRUE
##	473	37	331	Largemouth Bass	320	NA	y01534	TRUE
##	474	37	332	Largemouth Bass	356	NA	y00028	TRUE
##	475	37	333	Largemouth Bass	325	NA	y00009	TRUE
##	476	37	336	Largemouth Bass	297	NA		TRUE
##	477	37	337	Largemouth Bass	201	NA		TRUE
##	478	37	338	Largemouth Bass	257	NA		TRUE
##	479	37	339	Largemouth Bass	206	NA		TRUE
##	480	37	340	Largemouth Bass	201	NA		TRUE
##	481	37	341	Largemouth Bass	251	NA		TRUE
##	482	37	342	Largemouth Bass	239	NA		TRUE
##	483	37	343	Largemouth Bass	203	NA		TRUE
##	484	37	344	Largemouth Bass	262	NA		TRUE
##	485	37	345	Largemouth Bass	272	NA		TRUE
##	486	37	346	Largemouth Bass	353	NA	y00025	TRUE
##	487	37	347	Largemouth Bass	318	NA	y00229	TRUE
##	488	37	348	Largemouth Bass	330	NA	y00409	TRUE
##	489	37	349	Largemouth Bass	292	NA		TRUE
##	490	37	352	Largemouth Bass	318	NA	y00006	TRUE
##	491	37	353	Largemouth Bass	335	NA	y00015	TRUE
##	492	37	354	Largemouth Bass	295	NA		TRUE
##	493	37	355	Largemouth Bass	323	NA	y00027	TRUE
##	494	101	536	Largemouth Bass	318	407.0	1019	TRUE
##	495	101	551	Largemouth Bass	178	60.0		TRUE
##	496	101	588	Largemouth Bass	221	117.0		TRUE
##	497	102	630	Largemouth Bass	429	1070.0	1058	TRUE
##	498	102	631	Largemouth Bass	394	737.0	1057	TRUE
##	499	102	632	Largemouth Bass	361	548.0	1056	TRUE
##	500	104	656	Largemouth Bass	251	172.0		TRUE
##	501	104	657	Largemouth Bass	386	688.0	1100	TRUE
##	502	103	702	Largemouth Bass	361	579.0	1115	TRUE
##	503	111	713	Largemouth Bass	348	556.0	1117	TRUE
##	504	114	759	Largemouth Bass	168	48.0		TRUE
##	505	116	760	Largemouth Bass	71	3.1		FALSE

##	506	112	801	Largemouth Bass	168	52.0		FALSE
##	507	109	836	Largemouth Bass	424	864.0	1518	TRUE
##	508	109	837	Largemouth Bass	328	410.0	1519	TRUE
##	509	109	838	Largemouth Bass	315	385.0	1520	TRUE
##	510	109	839	Largemouth Bass	325	338.0	1521	TRUE
##	511	109	840	Largemouth Bass	274	235.0		TRUE
##	512	109	841	Largemouth Bass	348	NA	1522	TRUE
##	513	109	842	Largemouth Bass	318	386.0	o6860	TRUE
##	514	109	843	Largemouth Bass	333	460.0	1523	TRUE
##	515	109	844	Largemouth Bass	386	547.0	1524	TRUE
##	516	109	845	Largemouth Bass	384	540.0	1525	TRUE
##	517	109	846	Largemouth Bass	249	NA		TRUE
##	518	109	847	Largemouth Bass	307	320.0	1532	TRUE
##	519	109	848	Largemouth Bass	323	420.0	1776	TRUE
##	520	109	849	Largemouth Bass	315	406.0	1777	TRUE
##	521	109	850	Largemouth Bass	351	486.0	1778	TRUE
##	522	109	851	Largemouth Bass	249	274.0		TRUE
##	523	109	852	Largemouth Bass	287	265.0		TRUE
##	524	109	853	Largemouth Bass	307	338.0	1779	TRUE
##	525	109	854	Largemouth Bass	302	358.0		TRUE
##	526	109	855	Largemouth Bass	297	333.0		TRUE
##	527	109	856	Largemouth Bass	320	386.0	o0526	TRUE
##	528	109	857	Largemouth Bass	333	483.0	1780	TRUE
##	529	109	858	Largemouth Bass	333	426.0	1781	TRUE
##	530	109	859	Largemouth Bass	307	295.0	1782	TRUE
##	531	109	860	Largemouth Bass	229	132.0		TRUE
##	532	109	861	Largemouth Bass	201	92.0		TRUE
##	533	109	862	Largemouth Bass	201	88.0		TRUE
##	534	110	864	Largemouth Bass	325	436.0	1784	TRUE
##	535	110	865	Largemouth Bass	325	412.0	1785	TRUE
##	536	110	866	Largemouth Bass	323	444.0	1786	TRUE
##	537	110	867	Largemouth Bass	272	233.0		TRUE
##	538	129	868	Largemouth Bass	363	624.0	1787	TRUE
##	539	129	869	Largemouth Bass	353	561.0	1788	TRUE
##	540	129	871	Largemouth Bass	264	211.0		TRUE
##	541	129	872	Largemouth Bass	315	367.0	1790	TRUE
##	542	129	873	Largemouth Bass	239	157.0		TRUE
##	543	129	874	Largemouth Bass	330	433.0	1791	TRUE
##	544	129	875	Largemouth Bass	239	154.0		TRUE
##	545	129	876	Largemouth Bass	300	292.0		TRUE
##	546	129	877	Largemouth Bass	310	351.0		TRUE
##	547	129	878	Largemouth Bass	330	436.0	o0507	TRUE
##	548	129	880	Largemouth Bass	267	244.0		TRUE
##	549	129	881	Largemouth Bass	330	437.0	1793	TRUE
##	550	129	882	Largemouth Bass	234	133.0		TRUE
##	551	129	883	Largemouth Bass	315	409.0	1794	TRUE
##	552	129	884	Largemouth Bass	310	330.0	1795	TRUE
##	553	129	885	Largemouth Bass	251	187.0		TRUE
##	554	129	886	Largemouth Bass	226	132.0		TRUE
##	555	129	887	Largemouth Bass	254	168.0		TRUE
##	556	129	888	Largemouth Bass	320	385.0	1796	TRUE
##	557	129	889	Largemouth Bass	305	324.0	1797	TRUE
##	558	129	890	Largemouth Bass	333	461.0	1798	TRUE
##	559	129	891	Largemouth Bass	224	110.0		TRUE

##	560	130	892	Largemouth Bass	310	346.0	1799	TRUE
##	561	130	893	Largemouth Bass	345	450.0	1800	TRUE
##	562	130	894	Largemouth Bass	333	443.0	1701	TRUE
##	563	130	895	Largemouth Bass	348	537.0	1702	TRUE
##	564	130	896	Largemouth Bass	305	306.0	1703	TRUE
##	565	130	897	Largemouth Bass	343	485.0	o0997	TRUE
##	566	130	898	Largemouth Bass	318	383.0	1019	FALSE
##	567	130	899	Largemouth Bass	310	348.0	1704	TRUE
##	568	130	900	Largemouth Bass	292	NA		TRUE
##	569	130	901	Largemouth Bass	272	242.0		TRUE
##	570	130	902	Largemouth Bass	257	173.0		TRUE
##	571	130	903	Largemouth Bass	312	371.0	y00229	TRUE
##	572	130	904	Largemouth Bass	257	207.0		TRUE
##	573	130	905	Largemouth Bass	305	320.0	1705	TRUE
##	574	130	906	Largemouth Bass	312	349.0	o0529	TRUE
##	575	130	907	Largemouth Bass	378	723.0	1706	TRUE
##	576	130	908	Largemouth Bass	348	571.0	1707	TRUE
##	577	130	909	Largemouth Bass	295	315.0		TRUE
##	578	130	910	Largemouth Bass	338	462.0	1708	TRUE
##	579	131	911	Largemouth Bass	300	342.0		TRUE
##	580	131	912	Largemouth Bass	264	215.0		TRUE
##	581	131	913	Largemouth Bass	251	180.0		TRUE
##	582	131	914	Largemouth Bass	378	646.0	1709	TRUE
##	583	131	915	Largemouth Bass	325	377.0	1785	FALSE
##	584	12	9	Pumpkinseed	75	6.5		FALSE
##	585	12	13	Pumpkinseed	53	2.2		FALSE
##	586	12	15	Pumpkinseed	28	1.0		FALSE
##	587	12	20	Pumpkinseed	51	1.5		FALSE
##	588	12	67	Pumpkinseed	61	4.0		FALSE
##	589	9	159	Pumpkinseed	188	120.0		TRUE
##	590	9	160	Pumpkinseed	191	185.0		TRUE
##	591	20	200	Pumpkinseed	191	200.0		TRUE
##	592	21	216	Pumpkinseed	152	80.0		TRUE
##	593	23	223	Pumpkinseed	201	210.0		TRUE
##	594	27	225	Pumpkinseed	130	20.0		TRUE
##	595	24	229	Pumpkinseed	229	320.0		TRUE
##	596	124	835	Pumpkinseed	175	130.0		TRUE
##	597	203	528	Tadpole Madtom	41	0.5		FALSE
##	598	203	529	Tadpole Madtom	33	0.2		FALSE
##	599	203	530	Tadpole Madtom	30	0.2		FALSE
##	600	203	531	Tadpole Madtom	30	0.3		FALSE
##	601	106	655	Tadpole Madtom	46	1.3		FALSE
##	602	115	734	Tadpole Madtom	38	1.0		FALSE
##	603	4	113	Yellow Perch	239	150.0		TRUE
##	604	4	114	Yellow Perch	267	170.0		TRUE
##	605	4	115	Yellow Perch	262	175.0		TRUE
##	606	4	116	Yellow Perch	257	157.0		TRUE
##	607	4	117	Yellow Perch	257	160.0		TRUE
##	608	9	173	Yellow Perch	221	105.0		TRUE
##	609	9	174	Yellow Perch	226	150.0		TRUE
##	610	9	175	Yellow Perch	282	230.0		TRUE
##	611	20	202	Yellow Perch	226	122.0		TRUE
##	612	15	204	Yellow Perch	244	130.0		TRUE
##	613	15	205	Yellow Perch	272	200.0		TRUE

## 614	23	222	Yellow Perch	229	110.0		TRUE
## 615	102	633	Yellow Perch	249	164.0	1055	TRUE
## 616	102	634	Yellow Perch	264	208.0	1054	TRUE
## 617	102	635	Yellow Perch	254	173.0	1053	TRUE
## 618	102	636	Yellow Perch	249	158.0	1052	TRUE
## 619	105	704	Yellow Perch	114	14.1		TRUE
## 620	105	705	Yellow Perch	102	9.7		TRUE
## 621	105	706	Yellow Perch	119	13.6		TRUE
## 622	105	707	Yellow Perch	79	4.0		TRUE
## 623	105	708	Yellow Perch	81	4.3		TRUE
## 624	105	709	Yellow Perch	79	4.1		TRUE
## 625	105	710	Yellow Perch	74	3.4		TRUE
## 626	111	714	Yellow Perch	307	340.0	1118	TRUE
## 627	115	728	Yellow Perch	94	6.3		FALSE
## 628	115	729	Yellow Perch	79	4.2		FALSE
## 629	113	735	Yellow Perch	267	201.0	1026	TRUE
## 630	114	756	Yellow Perch	297	327.0	1043	TRUE
## 631	116	772	Yellow Perch	91	6.8		TRUE
## 632	116	773	Yellow Perch	84	4.5		TRUE
## 633	112	796	Yellow Perch	229	123.0	1046	TRUE
## 634	112	797	Yellow Perch	239	135.0	1047	TRUE
## 635	122	825	Yellow Perch	249	152.0	1156	TRUE
## 636	125	827	Yellow Perch	221	113.0	1696	TRUE
## 637	125	828	Yellow Perch	84	4.6		TRUE
## 638	125	829	Yellow Perch	91	7.1		TRUE
## 639	125	830	Yellow Perch	81	4.1		TRUE
## 640	125	831	Yellow Perch	71	2.1		TRUE
## 641	1	103	Black Crappie	284	NA	g0998	TRUE
## 642	5	135	Black Crappie	305	NA	o0513	TRUE
## 643	5	136	Black Crappie	305	NA	o0514	TRUE
## 644	5	137	Black Crappie	267	275.0	o0515	TRUE
## 645	16	208	Black Crappie	295	380.0	g0995	TRUE
## 646	16	209	Black Crappie	274	260.0	g0994	TRUE
## 647	21	218	Black Crappie	152	46.0		TRUE
## 648	29	238	Black Crappie	279	NA	o0522	TRUE
## 649	30	267	Black Crappie	290	NA	o0537	TRUE
## 650	24	268	Black Crappie	330	580.0		TRUE
## 651	24	269	Black Crappie	307	440.0		TRUE
## 652	35	283	Black Crappie	290	NA	o0408	TRUE
## 653	37	319	Black Crappie	300	NA	y00384	TRUE
## 654	37	334	Black Crappie	297	NA	y00020	TRUE
## 655	37	335	Black Crappie	297	NA	y00318	TRUE
## 656	37	350	Black Crappie	297	NA	yunknown	TRUE
## 657	37	351	Black Crappie	290	NA	y09000	TRUE
## 658	101	532	Black Crappie	320	508.0	1014	TRUE
## 659	101	534	Black Crappie	305	443.0	1016	TRUE
## 660	101	535	Black Crappie	307	440.0	1017	TRUE
## 661	101	537	Black Crappie	287	379.0	1020	TRUE
## 662	102	626	Black Crappie	307	461.0	y00318	TRUE
## 663	102	627	Black Crappie	310	466.0	1061	TRUE
## 664	102	628	Black Crappie	315	536.0	1060	TRUE
## 665	102	629	Black Crappie	323	565.0	1059	TRUE
## 666	113	753	Black Crappie	155	47.0		TRUE
## 667	113	754	Black Crappie	147	37.0		TRUE

```
## 668 112 798 Black Crappie 188 102.0 FALSE
## 669 112 799 Black Crappie 330 606.0 1048 TRUE
## 670 112 800 Black Crappie 292 362.0 1049 TRUE
## 671 121 808 Black Crappie 323 509.0 1050 TRUE
## 672 121 809 Black Crappie 282 352.0 1700 TRUE
## 673 121 812 Black Crappie 142 37.0 TRUE
## 674 110 863 Black Crappie 307 415.0 1783 TRUE
## 675 129 870 Black Crappie 279 344.0 1789 TRUE
## 676 129 879 Black Crappie 302 397.0 1792 TRUE
```

#4. Create object with spices record

```
counts <- table(bio$species)
counts
```

```
##
## Black Crappie Bluegill Bluntnose Minnow Iowa Darter
## 36 220 103 32
## Largemouth Bass Pumpkinseed Tadpole Madtom Yellow Perch
## 228 13 6 38
```

#5. Display just names of spices

```
unique(bio$species)
```

```
## [1] "Bluegill" "Bluntnose Minnow" "Iowa Darter" "Largemouth Bass"
## [5] "Pumpkinseed" "Tadpole Madtom" "Yellow Perch" "Black Crappie"
```

#6. Create object with different species

```
tmp <- table(bio$species)
tmp
```

```
##
## Black Crappie Bluegill Bluntnose Minnow Iowa Darter
## 36 220 103 32
## Largemouth Bass Pumpkinseed Tadpole Madtom Yellow Perch
## 228 13 6 38
```

#7. Create subset and display first five

```
tmp2 <- subset(bio, select = species)
head(tmp2, 5)
```

```
## species
## 1 Bluegill
## 2 Bluegill
## 3 Bluegill
## 4 Bluegill
## 5 Bluegill
```

#8. Creating table and addressing the class

```
w <- table(bio$species)
w
```

```
##
##      Black Crappie      Bluegill Bluntnose Minnow      Iowa Darter
##           36           220           103           32
##  Largemouth Bass      Pumpkinseed  Tadpole Madtom      Yellow Perch
##           228           13           6           38
```

```
class(w)
```

```
## [1] "table"
```

```
#9. Converting table name
```

```
t <- as.data.frame(w)
```

```
t
```

```
##           Var1 Freq
## 1   Black Crappie  36
## 2     Bluegill  220
## 3 Bluntnose Minnow 103
## 4     Iowa Darter  32
## 5 Largemouth Bass 228
## 6     Pumpkinseed  13
## 7   Tadpole Madtom   6
## 8     Yellow Perch  38
```

```
#10. Extract Frequency information
```

```
t$Freq
```

```
## [1]  36 220 103  32 228  13   6  38
```

```
#11. Creating cSpec table for species
```

```
cSpec<-table(bio$species)
```

```
cSpec
```

```
##
##      Black Crappie      Bluegill Bluntnose Minnow      Iowa Darter
##           36           220           103           32
##  Largemouth Bass      Pumpkinseed  Tadpole Madtom      Yellow Perch
##           228           13           6           38
```

```
#12. Creating cSpecPct table with percent of record
```

```
cSpecPct <- prop.table(cSpec)*100
```

```
cSpecPct
```

```
##
##      Black Crappie      Bluegill Bluntnose Minnow      Iowa Darter
##      5.325444      32.544379      15.236686      4.733728
##  Largemouth Bass      Pumpkinseed  Tadpole Madtom      Yellow Perch
##      33.727811      1.923077      0.887574      5.621302
```

```
class(cSpecPct)
```

```
## [1] "table"
```

```
#13. Change to dataframe
```

```
u <- as.data.frame(cSpecPct)
u
```

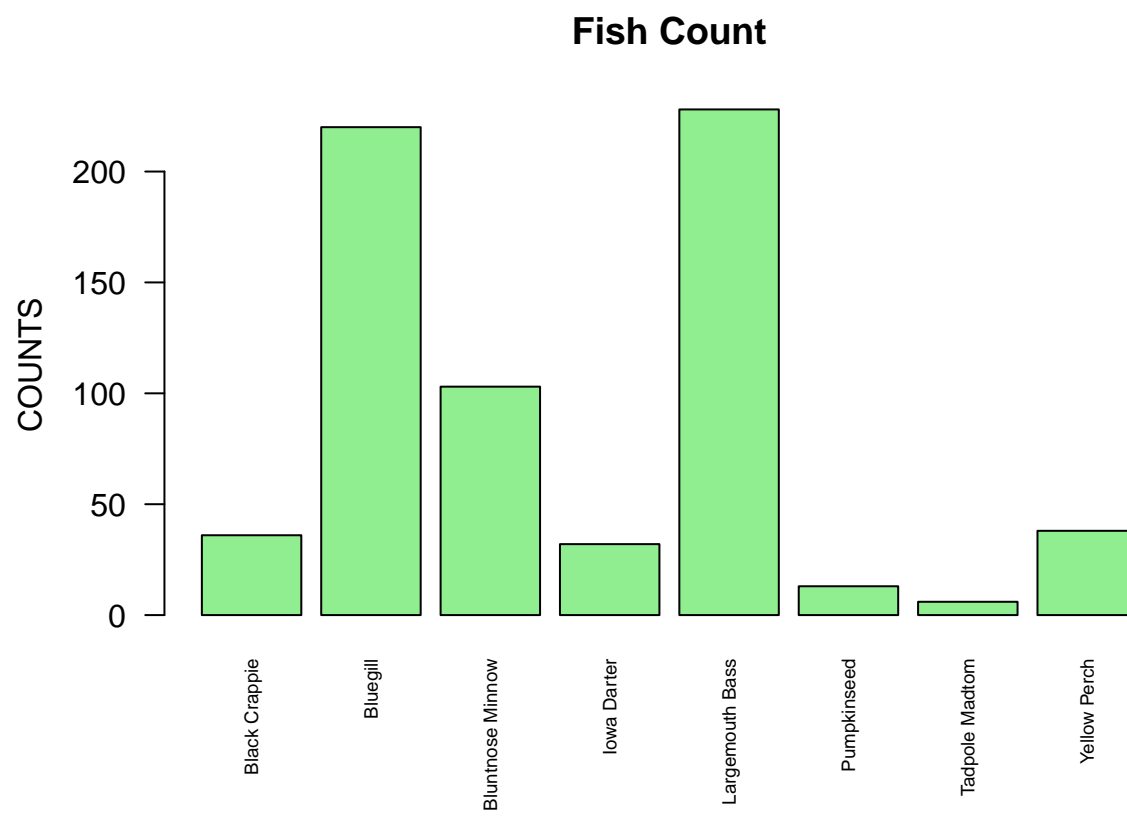
```
##           Var1      Freq
## 1  Black Crappie 5.325444
## 2   Bluegill 32.544379
## 3 Bluntnose Minnow 15.236686
## 4   Iowa Darter  4.733728
## 5 Largemouth Bass 33.727811
## 6   Pumpkinseed  1.923077
## 7 Tadpole Madtom  0.887574
## 8   Yellow Perch  5.621302
```

```
class(u)
```

```
## [1] "data.frame"
```

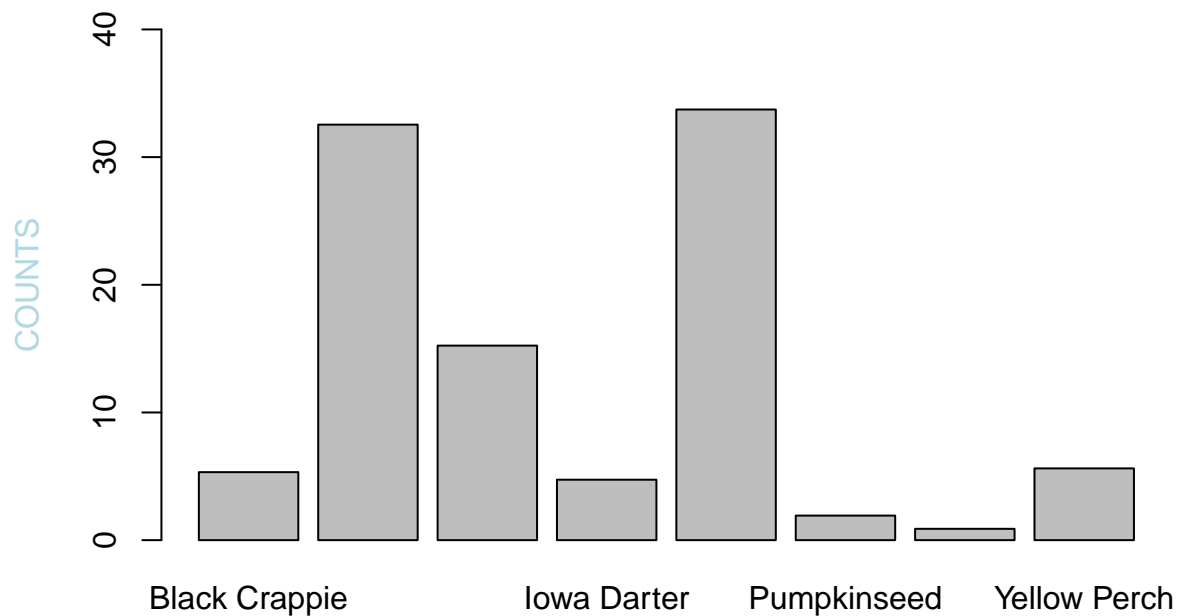
```
#14. creating barplot
```

```
barplot(cSpec, main = "Fish Count",
        ylab = "COUNTS",
        col = "light green",
        las=2,
        cex.names = 0.60)
```

```
#15. Creating barplot named Fish relative Frequency  
barplot(cSpecPct, main = "Fish Relative Frequency",  
        ylim=c(0,40),  
        ylab = "COUNTS",  
        col.lab="light blue")
```

Fish Relative Frequency



#16. Rearrange in descending order

```
d <- u[order(-u$Freq),]
d
```

```
##           Var1      Freq
## 5 Largemouth Bass 33.727811
## 2           Bluegill 32.544379
## 3 Bluntnose Minnow 15.236686
## 8           Yellow Perch 5.621302
## 1           Black Crappie 5.325444
## 4           Iowa Darter 4.733728
## 6           Pumpkinseed 1.923077
## 7           Tadpole Madtom 0.887574
```

#17. Rename columns in table

```
names(d)[names(d)=="Var1"] <- "Species"
names(d)[names(d)=="Freq"] <- "RelFreq"
d
```

```
##           Species  RelFreq
## 5 Largemouth Bass 33.727811
## 2           Bluegill 32.544379
## 3 Bluntnose Minnow 15.236686
## 8           Yellow Perch 5.621302
## 1           Black Crappie 5.325444
```

```
## 4      Iowa Darter  4.733728
## 6      Pumpkinseed  1.923077
## 7      Tadpole Madtom 0.887574
```

```
#18. Add variable to the table
t$Freq
```

```
## [1] 36 220 103 32 228 13 6 38
```

```
tdesc <- t[order(-t$Freq),]
tdesc$Freq
```

```
## [1] 228 220 103 38 36 32 13 6
```

```
d <- d %>% mutate(cumfreq=cumsum(d$RelFreq), counts=tdesc$Freq, cumcounts=cumsum(tdesc$Freq))
d
```

```
##           Species  RelFreq  cumfreq counts cumcounts
## 5  Largemouth Bass 33.727811 33.72781    228        228
## 2      Bluegill 32.544379 66.27219    220        448
## 3 Bluntnose Minnow 15.236686 81.50888    103        551
## 8      Yellow Perch  5.621302 87.13018     38        589
## 1      Black Crappie  5.325444 92.45562     36        625
## 4      Iowa Darter  4.733728 97.18935     32        657
## 6      Pumpkinseed  1.923077 99.11243     13        670
## 7      Tadpole Madtom 0.887574 100.00000      6        676
```

```
#19. Creating parameter variable
def_par <- par(no.readonly = TRUE)
def_par
```

```
## $xlog
## [1] FALSE
##
## $ylog
## [1] FALSE
##
## $adj
## [1] 0.5
##
## $ann
## [1] TRUE
##
## $ask
## [1] FALSE
##
## $bg
## [1] "transparent"
##
## $bty
## [1] "o"
```

```

##
## $cex
## [1] 1
##
## $cex.axis
## [1] 1
##
## $cex.lab
## [1] 1
##
## $cex.main
## [1] 1.2
##
## $cex.sub
## [1] 1
##
## $col
## [1] "black"
##
## $col.axis
## [1] "black"
##
## $col.lab
## [1] "black"
##
## $col.main
## [1] "black"
##
## $col.sub
## [1] "black"
##
## $crt
## [1] 0
##
## $err
## [1] 0
##
## $family
## [1] ""
##
## $fg
## [1] "black"
##
## $fig
## [1] 0 1 0 1
##
## $fin
## [1] 6.5 4.5
##
## $font
## [1] 1
##
## $font.axis
## [1] 1

```

```

##
## $font.lab
## [1] 1
##
## $font.main
## [1] 2
##
## $font.sub
## [1] 1
##
## $lab
## [1] 5 5 7
##
## $las
## [1] 0
##
## $lend
## [1] "round"
##
## $lheight
## [1] 1
##
## $ljoin
## [1] "round"
##
## $lmitre
## [1] 10
##
## $lty
## [1] "solid"
##
## $lwd
## [1] 1
##
## $mai
## [1] 1.02 0.82 0.82 0.42
##
## $mar
## [1] 5.1 4.1 4.1 2.1
##
## $mex
## [1] 1
##
## $mfcoll
## [1] 1 1
##
## $mfg
## [1] 1 1 1 1
##
## $mfrow
## [1] 1 1
##
## $mgp
## [1] 3 1 0

```

```

##
## $mkh
## [1] 0.001
##
## $new
## [1] FALSE
##
## $oma
## [1] 0 0 0 0
##
## $omd
## [1] 0 1 0 1
##
## $omi
## [1] 0 0 0 0
##
## $pch
## [1] 1
##
## $pin
## [1] 5.26 2.66
##
## $plt
## [1] 0.1261538 0.9353846 0.2266667 0.8177778
##
## $ps
## [1] 12
##
## $pty
## [1] "m"
##
## $smo
## [1] 1
##
## $srt
## [1] 0
##
## $tck
## [1] NA
##
## $tcl
## [1] -0.5
##
## $usr
## [1] -0.176 9.976 0.000 40.000
##
## $xaxp
## [1] 0 8 4
##
## $xaxs
## [1] "r"
##
## $xaxt
## [1] "s"

```

```
##
## $xpd
## [1] FALSE
##
## $yaxp
## [1] 0 40 4
##
## $yaxs
## [1] "r"
##
## $yaxt
## [1] "s"
##
## $ylbias
## [1] 0.2
```

#20.Creating Barplot

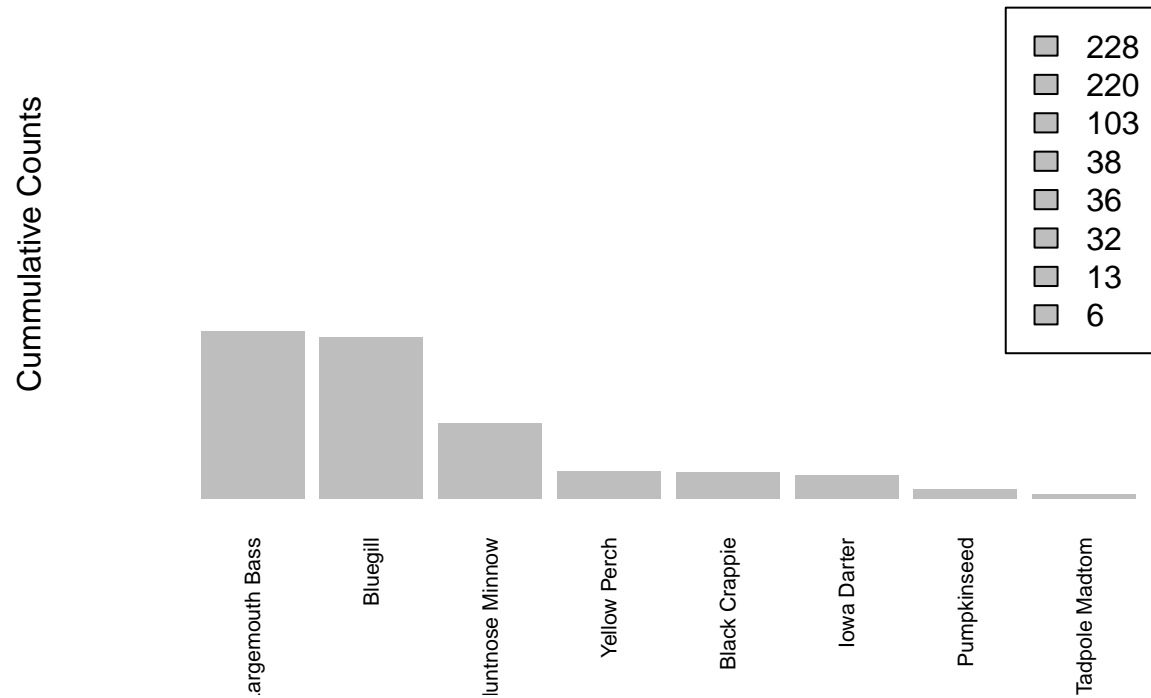
```
pc <- barplot(d$counts, width = 1, space = 0.15, border = NA, axes = F, ylim = c(0, 3.05*228), ylab = "Cumulative Probability")
```

```
## Warning in plot.window(xlim, ylim, log = log, ...): "na.rm" is not a graphical
## parameter
```

```
## Warning in axis(if (horiz) 2 else 1, at = at.l, labels = names.arg, lty =
## axis.lty, : "na.rm" is not a graphical parameter
```

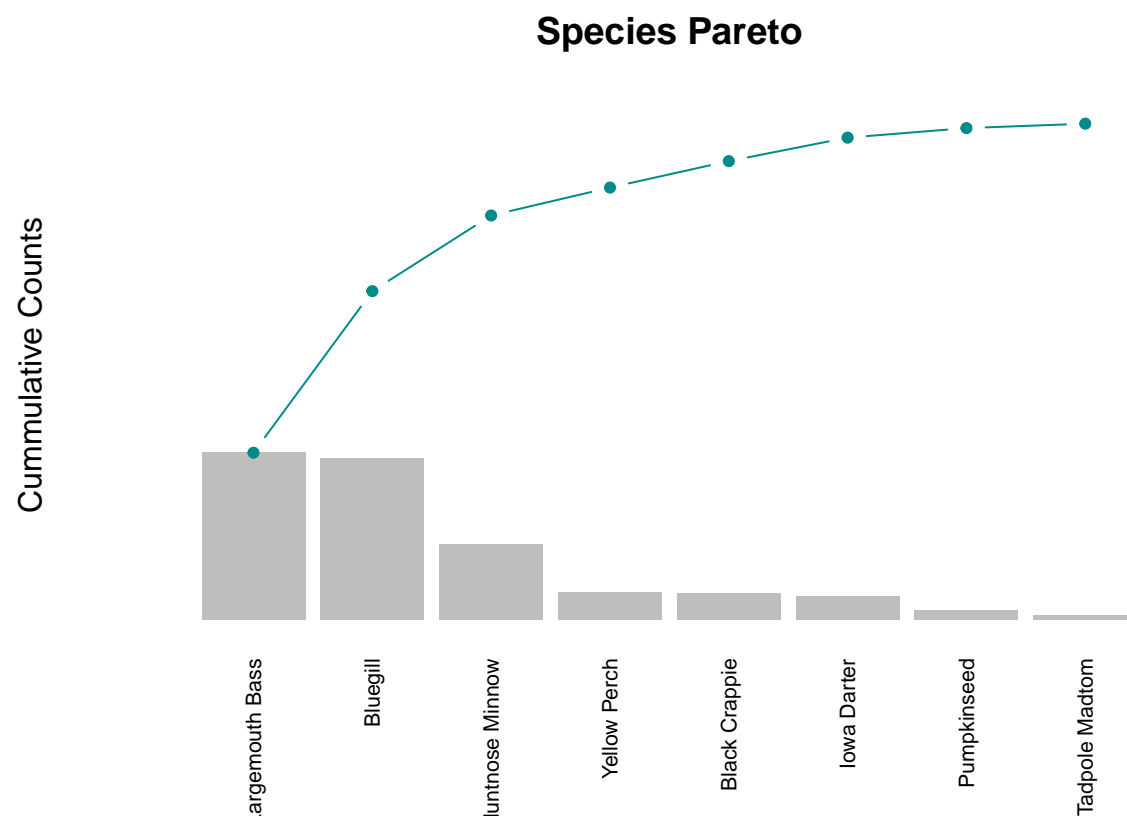
```
## Warning in title(main = main, sub = sub, xlab = xlab, ylab = ylab, ...): "na.rm"
## is not a graphical parameter
```

Species Pareto



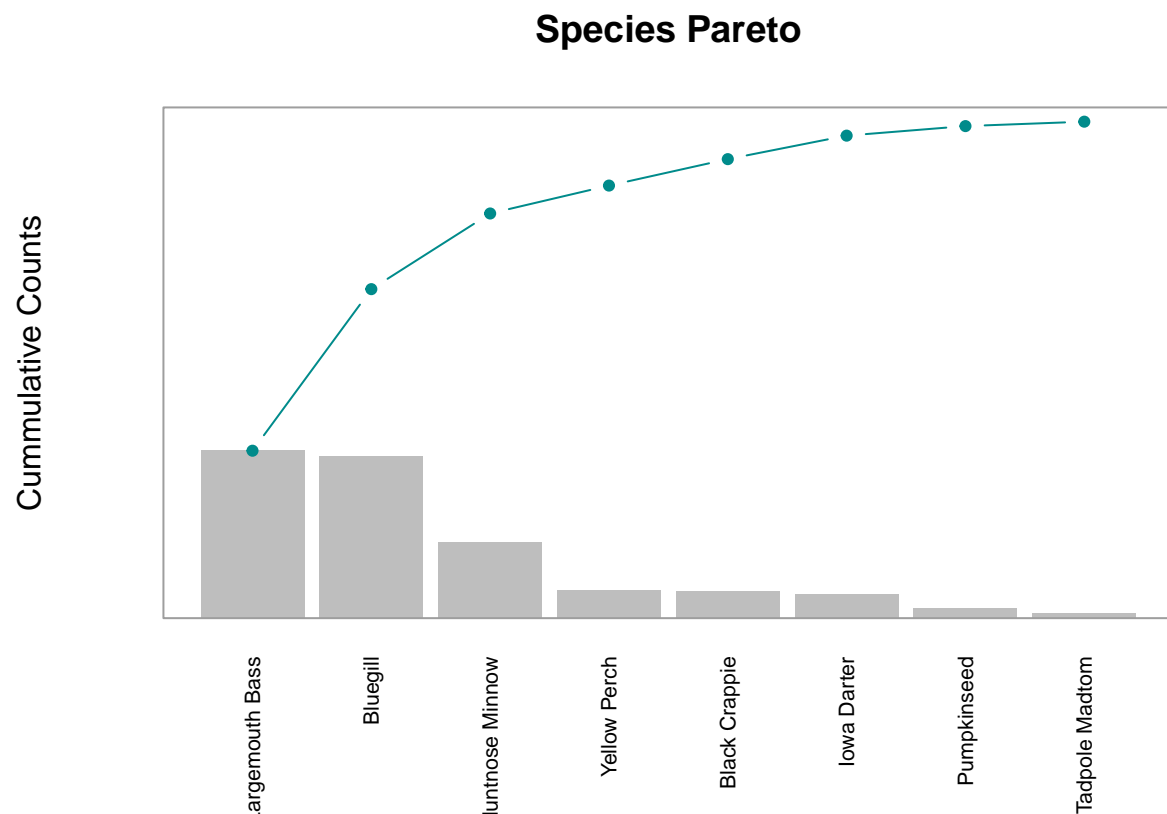
#21. Add cumulative counts

```
pc <- barplot(d$counts, width = 1, space = 0.15, border = NA, axes = F, ylim = c(0, 3.05 * 228), ylab = "Cumulative Counts")
lines(pc, d$cumcounts, type = "b", cex = 0.7, pch = 19, col = "cyan4")
```

#22. Placing grey box around plot

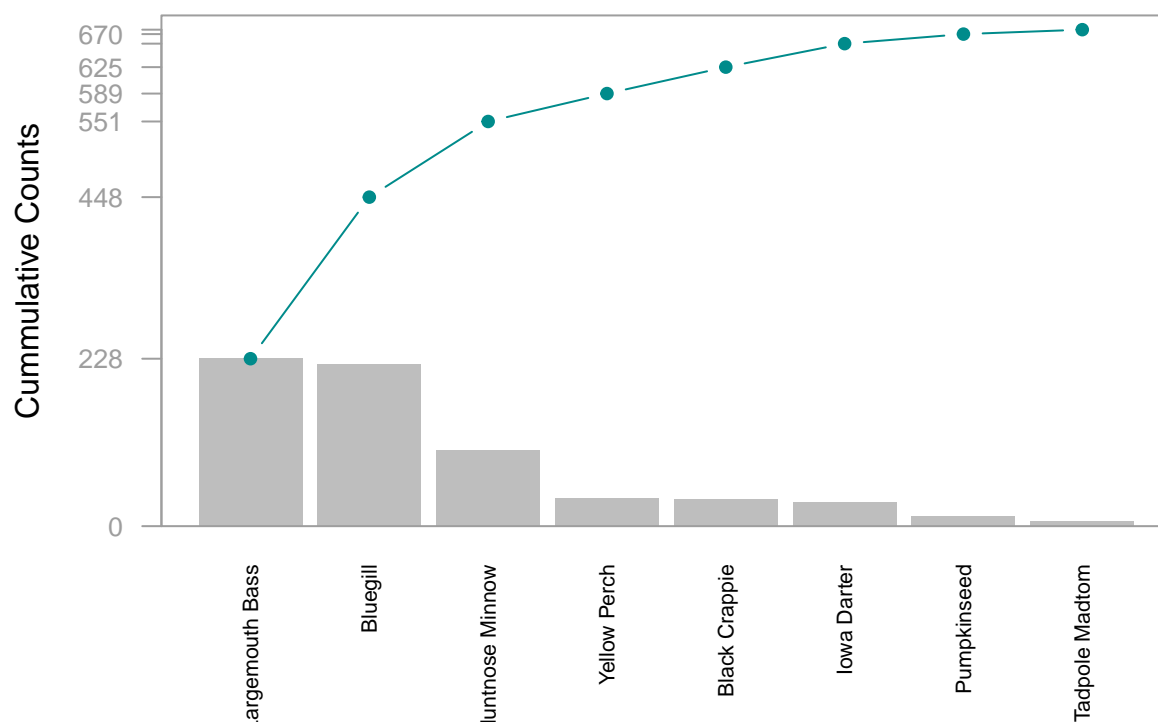
```
pc <- barplot(d$counts, width = 1, space = 0.15, border = NA, axes = F, ylim = c(0, 3.05 * 228), ylab = "Cumulative Counts", col = "grey62")
lines(pc, d$cumcounts, type = "b", cex = 0.7, pch = 19, col = "cyan4")
box(col = "grey62")
```



#23. Add left axis in plot

```
pc <- barplot(d$counts, width = 1, space = 0.15, border = NA, axes = F, ylim = c(0, 3.05 * 228), ylab = "Cumulative Counts")
lines(pc, d$cumcounts, type = "b", cex = 0.8, pch = 19, col = "cyan4")
box(col = "grey62")
axis(side = 2, at = c(0, d$cumcounts), las = 1, col.axis = "grey62", col = "grey62", cex.axis = 0.8)
```

Species Pareto



#24,25. Add axis on right and add name in title

```
pc <- barplot(d$counts, width = 1, space = 0.15, border = NA, axes = F, ylim = c(0, 3.05*228), ylab = "Cumulative Counts")
lines(pc, d$cumcounts, type = "b", cex = 0.8, pch = 19, col = "cyan4")
box(col = "grey62")
axis(side = 2, at = c(0, d$cumcounts), las = 1, col.axis = "grey62", col = "grey62", cex.axis = 0.8)
axis(side = 4, at = c(0, round(d$cumfreq)), labels = paste(c(0, round(d$cumfreq)), "%", sep = ""),
     las = 1, col.axis = "cyan4", col = "cyan4", cex.axis = 0.8)
```

Species Pareto Dhruvang Patel

