

Spawning Predictions

Based on Dr. Chamberland and Dr. Banaszak's
(SECORE International and Corallium Lab)
CRC Larval Propagation Group Presentation



Predicting coral spawning



Spawning calendars



Key considerations



Exercises



Data collection

Reproductive Strategies

Brooding



Broadcast Spawning



Sexual Modes

Gonochoric



Hermaphroditic



Sexual Modes

Gonochoric



Hermaphroditic

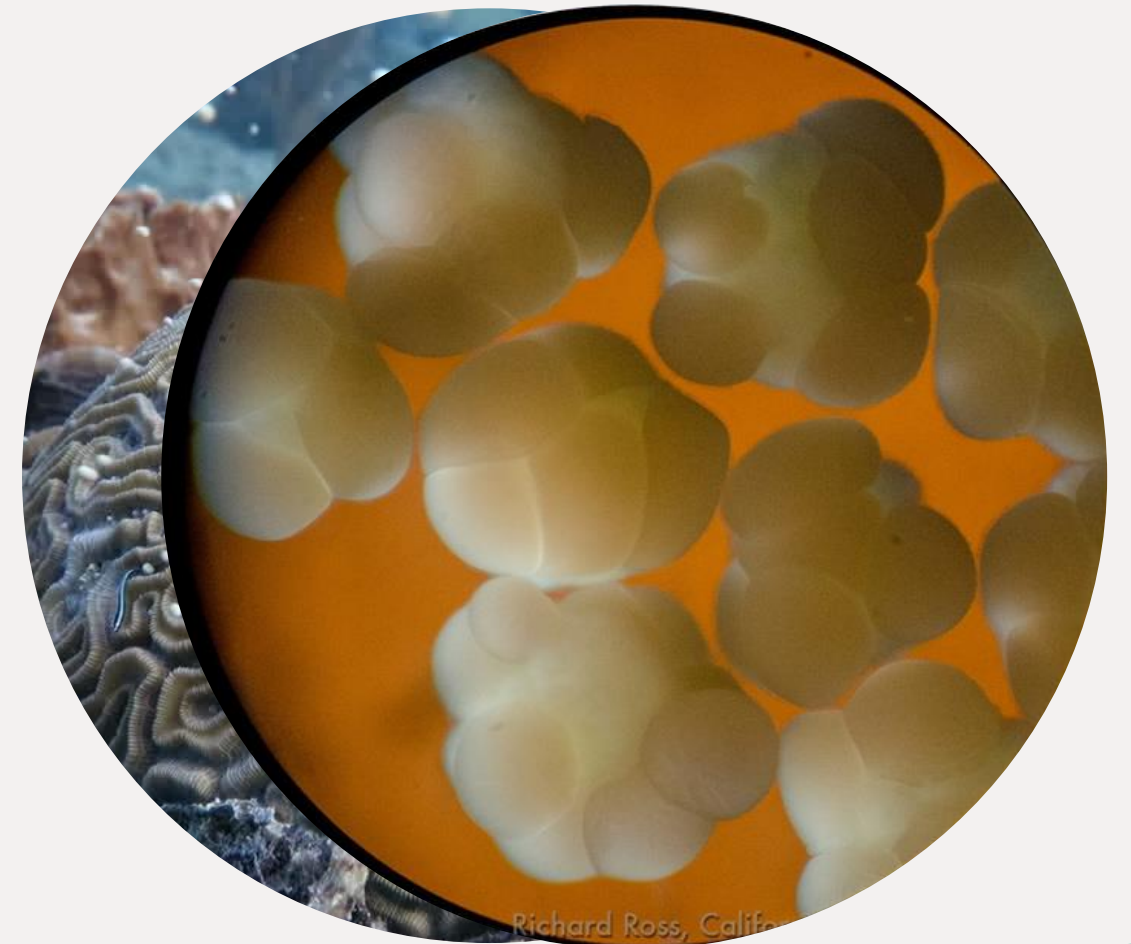


Sexual Modes

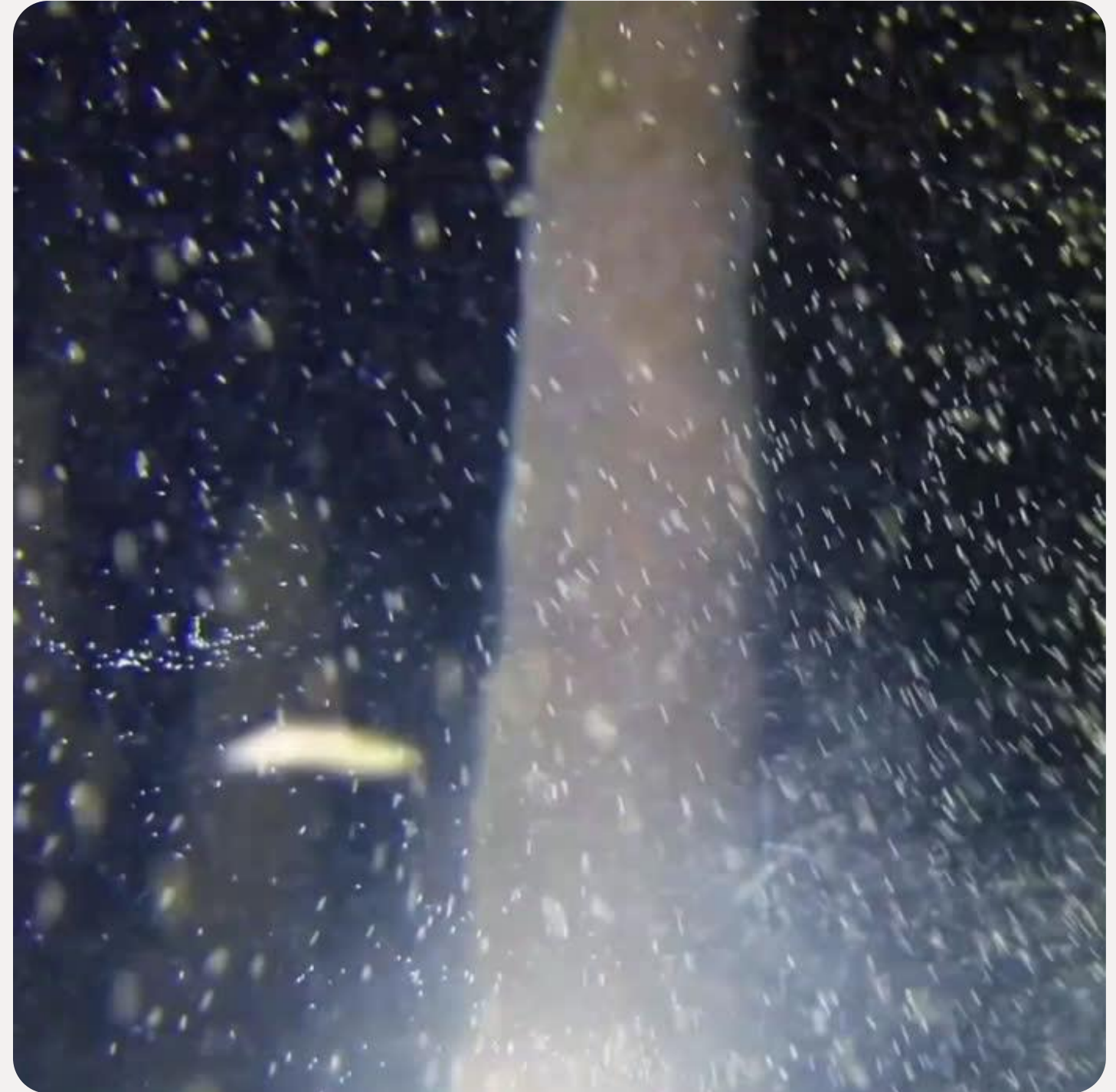
Gonochoric



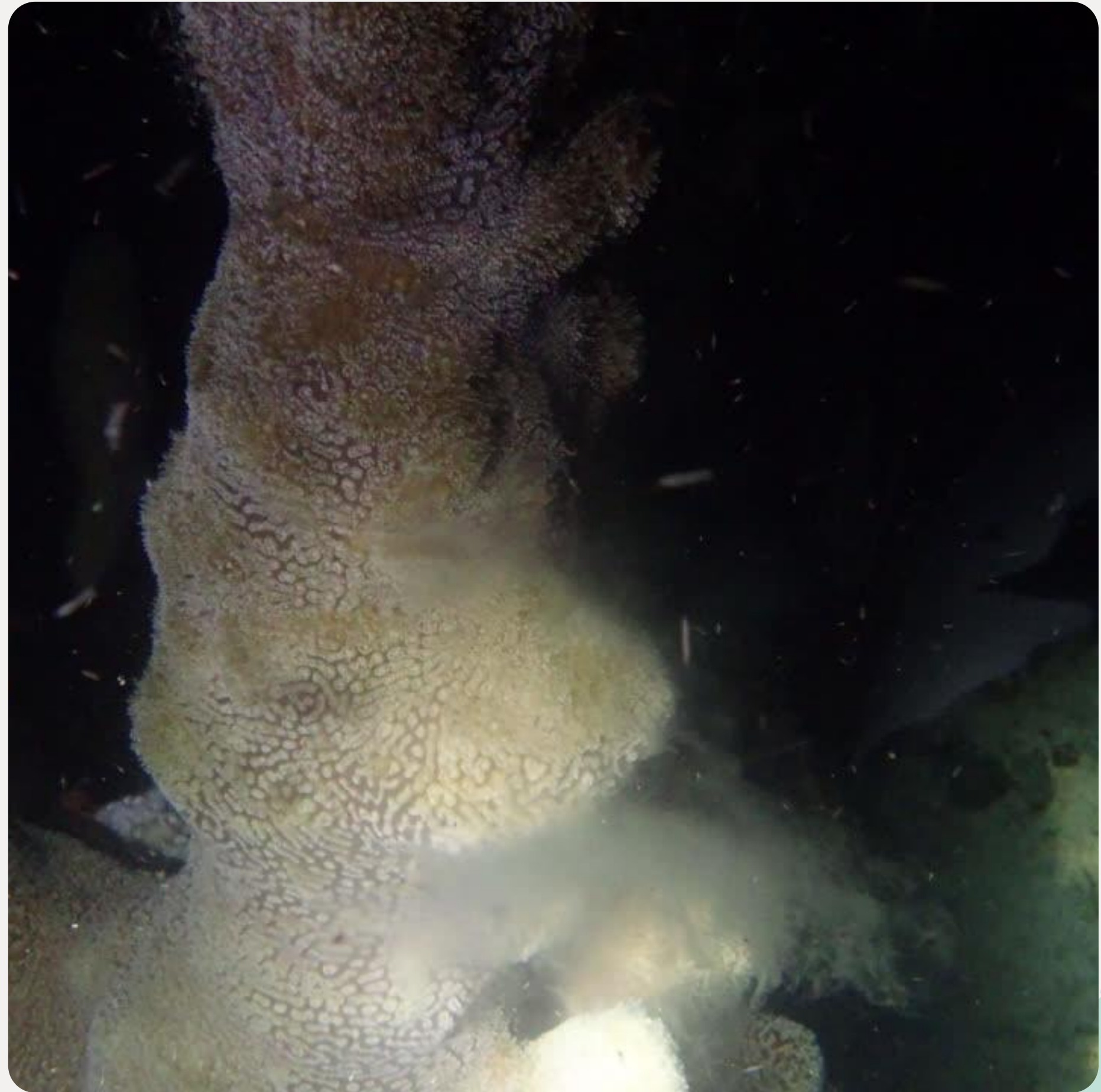
Hermaphroditic



Sequential Hermaphrodites



Simultaneous Hermaphrodites





Timing of reproduction



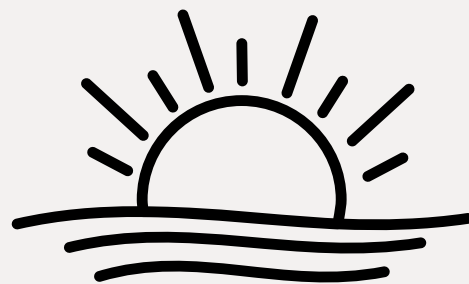
Seasonal change in sea surface temperature

Dictate the month, for most species is the month during which the SST increases the fastest



Lunar cycle

Corals spawn in phase with the lunar cycle, typically for 2 to 3 days between 2-9 days after full moon (AFM)



Solar cycle

The time of day of spawning is relative to the sunset time (minutes after sunset, MAS) and varies between species



Spring Corals

July Corals**

Montastrea Orbicella faveolata (185-200) Mountainous Star Coral
Pseudoplexoria striata group (185-200) Sweetwater Brain Coral



CARMABI

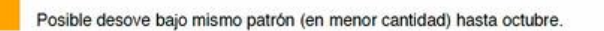


		JUNIO													
Noches despues de luna llena		0	1	2	3	4	5	6	7	8	9	10	11	12	13
FECHA		14	15	16	17	18	19	20	21	22	23	24	25	26	27
ATARDECER											19:31	19:31	19:32	19:32	19:32
<i>Diploria labyrinthiformis</i>	-70 a 10 min											Caribe			
		Caribe Mexicano 18:24-19:15													
		JULIO													
Noches despues de luna llena		0	1	2	3	4	5	6	7	8	9	10	11	12	13
FECHA		13	14	15	16	17	18	19	20	21	22	23	24	25	26
ATARDECER		19:32	19:31	19:31	19:31	19:31	19:31	19:30	19:30	19:30	19:29	19:29	19:29	19:28	19:28
<i>Acropora palmata</i>	140 a 190 min	Caribe													
		Mexico 21:43-22:35													
<i>Diploria labyrinthiformis</i>	-70 a 10 min											Caribe			
													Mexico 18:35-19:10		
<i>Dendrogyra cylindrus</i>	90 a 155 min	Caribe													
		Mexico 19:25-??													
		AGOSTO													
Noches despues de luna llena		0	1	2	3	4	5	6	7	8	9	10	11	12	13
FECHA		11	12	13	14	15	16	17	18	19	20	21	22	23	24
ATARDECER		19:19	19:19	19:18	19:17	19:17	19:16	19:15	19:14	19:14	19:13	19:12	19:11	19:10	19:10
<i>Acropora palmata</i>	140 a 190 min	Caribe													
		Mexico 21:20-22:30													
<i>Diploria labyrinthiformis</i>	-70 a 10 min											Caribe			
													Mexico 18:35-19:10		



BAYAHIBE

Dendrogyra cylindrus
(80-140 minutos **después** del atardecer)





Using existing predictions

AGO	Días después de la luna llena	1	2	3	4	5	6	7	8
	Fecha	20-ago	21-ago	22-ago	23-ago	24-ago	25-ago	26-ago	27-ago
	Hora del atardecer	18:58	18:58	18:57	18:56	18:55	18:55	18:54	18:53
<i>Acropora cervicornis</i> (150-195 minutos después del atardecer)						21:25 – 22:10			
<i>Acropora palmata</i> (120-185 minutos después del atardecer)				20:55 – 22:00					
<i>Dendrogyra cylindrus</i> (80-140 minutos después del atardecer)				20:15 – 21:15					



Using existing predictions

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1. Species





Using existing predictions

AGO	Días después de la luna llena	1	2	3	4	5	6	7	8
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1. Species



2. Date

AUGUST 2024

SUN	MON	TUE	WED	THU	FRI	SAT
28	29	30	31	1	2	3
4	5	6	7	8	9	10
11	12	13	14	15	16	17
18	19 FM	20	21 1	22 2	23 3	24 4
25	26	27	28	29	30	31



Using existing predictions

AGO	Días después de la luna llena	1	2	3	4	5	6	7	8
	Fecha	20-ago	21-ago	22-ago	23-ago	24-ago	25-ago	26-ago	27-ago
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1. Species



2. Date

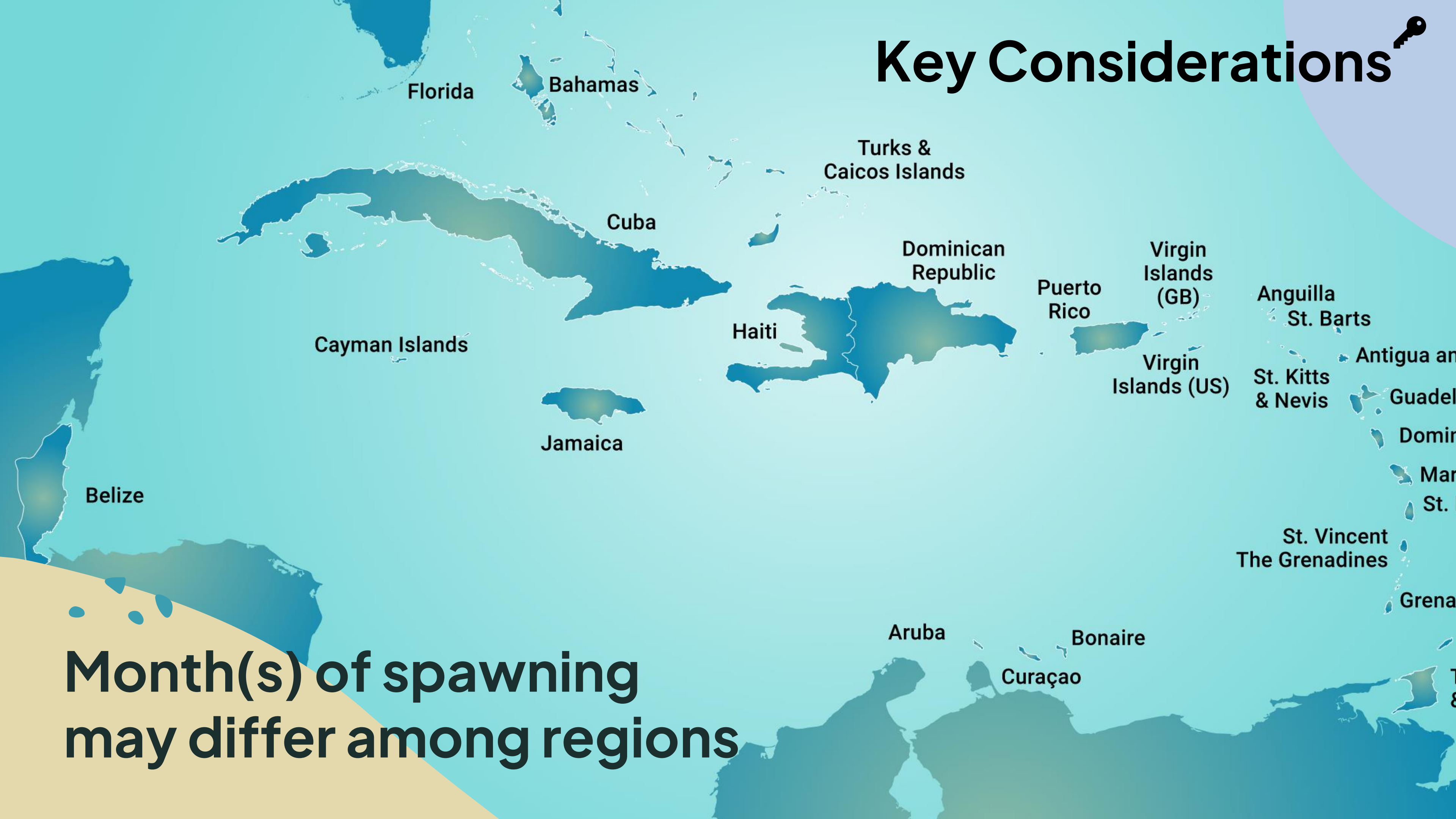
AUGUST 2024						
SUN	MON	TUE	WED	THU	FRI	SAT
28	29	30	31	1	2	3
4	5	6	7	8	9	10
11	12	13	14	15	16	17
18	19 FM	20	21 1	22 2	23 3	24 4
25	26	27	28	29	30	31

3. Time

ago	Sunset
22 ♡	18:57 ←
23 ♡	18:56 ←

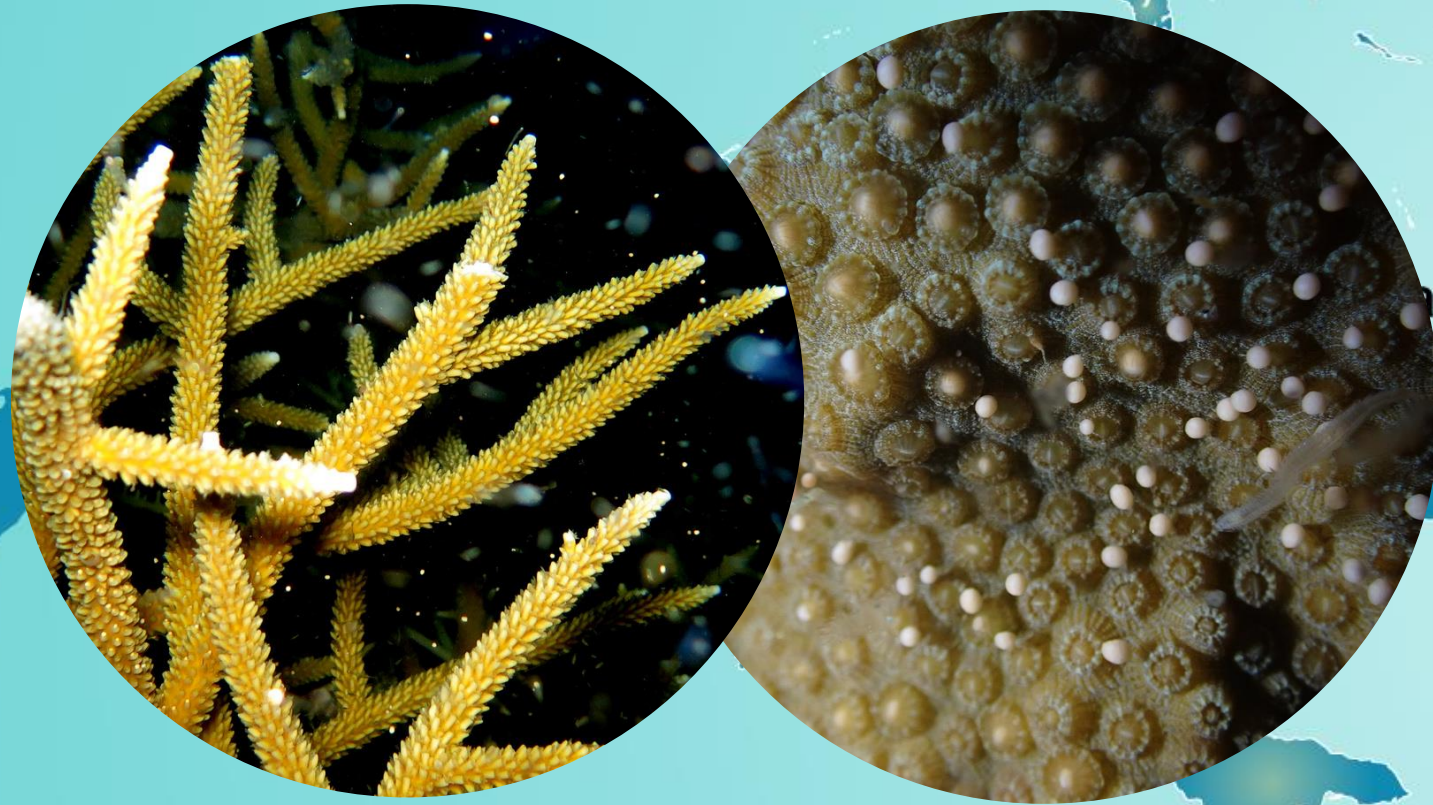
20:17–21:17

Key Considerations[🔑]



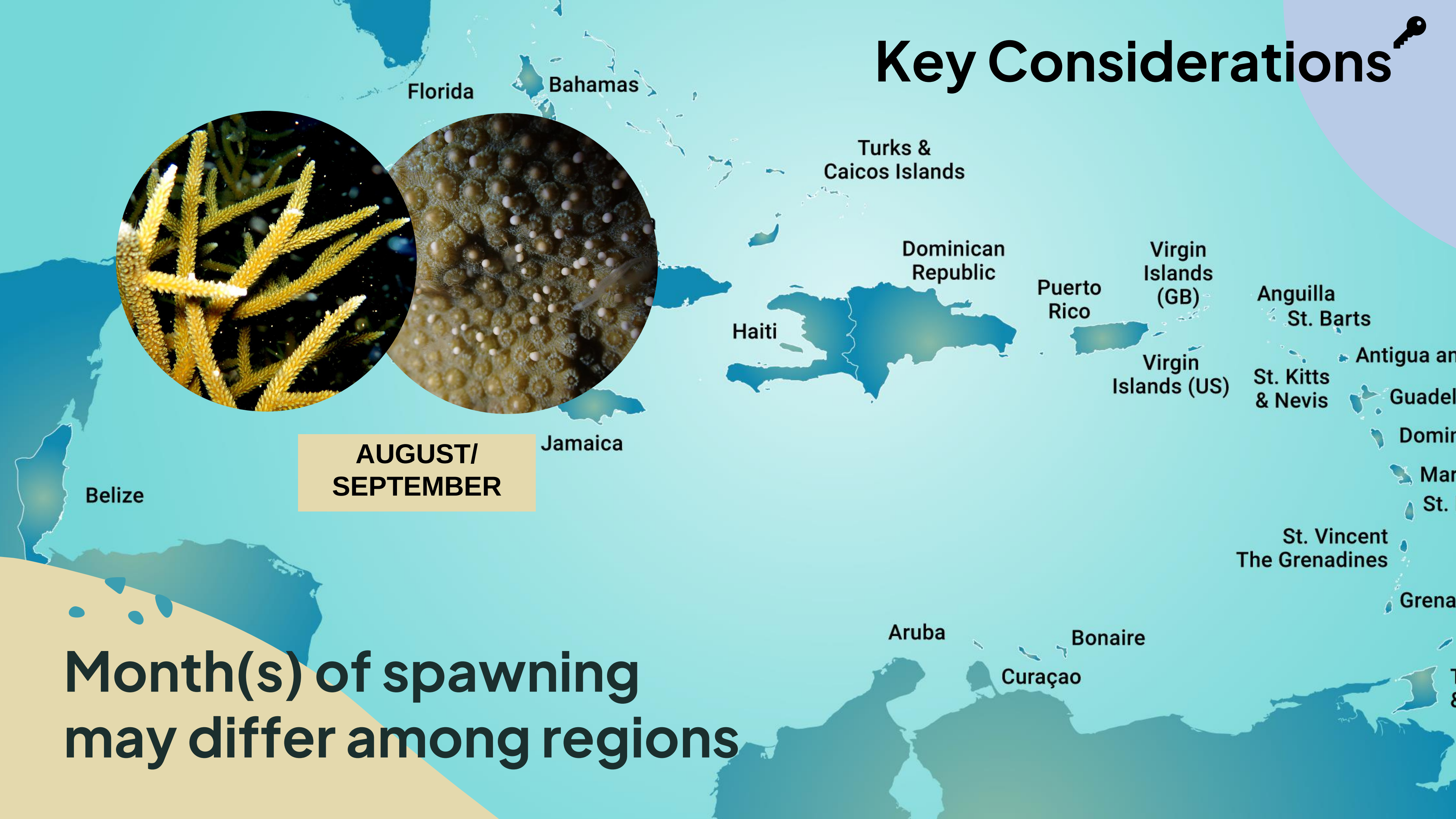
**Month(s) of spawning
may differ among regions**

Key Considerations[🔑]

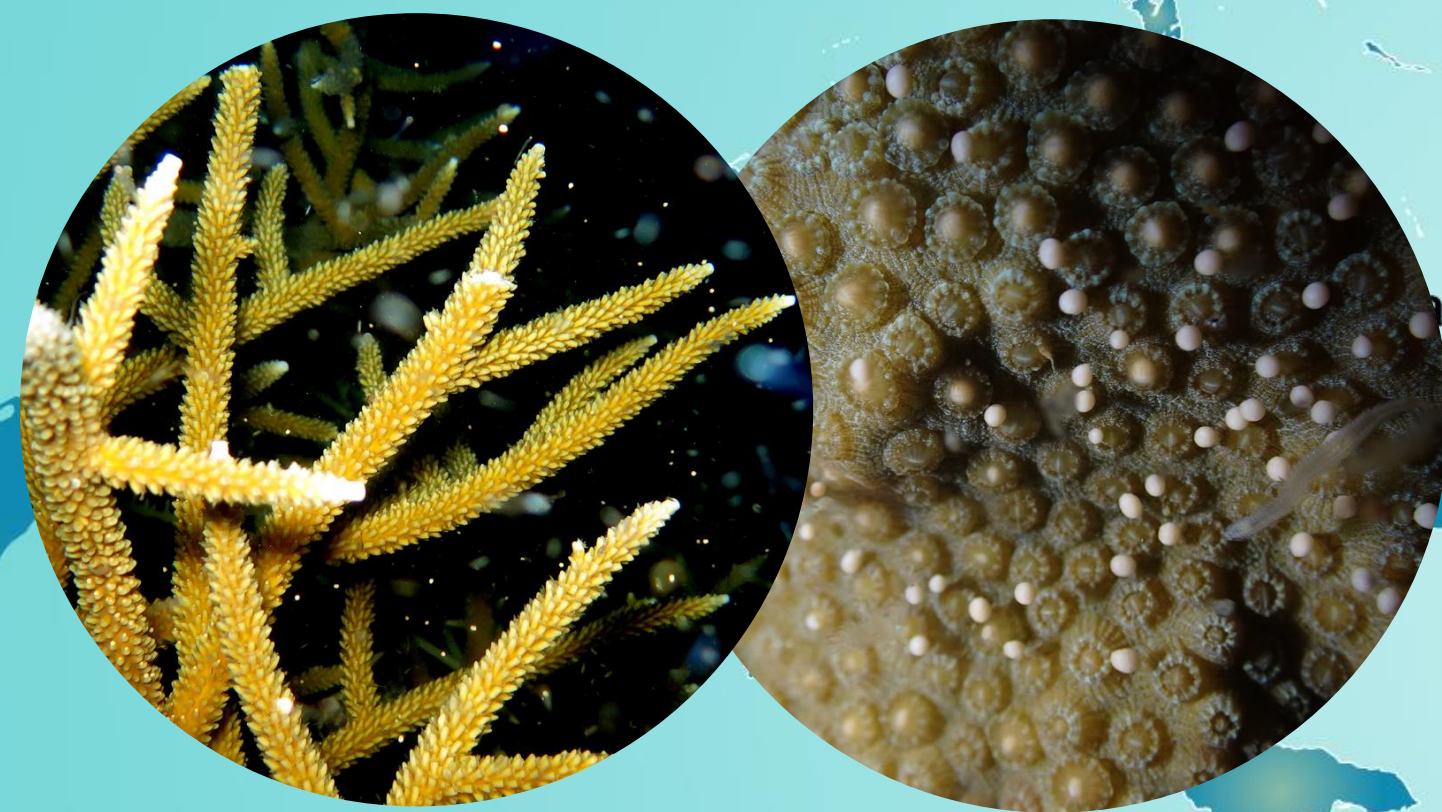


**AUGUST/
SEPTEMBER**

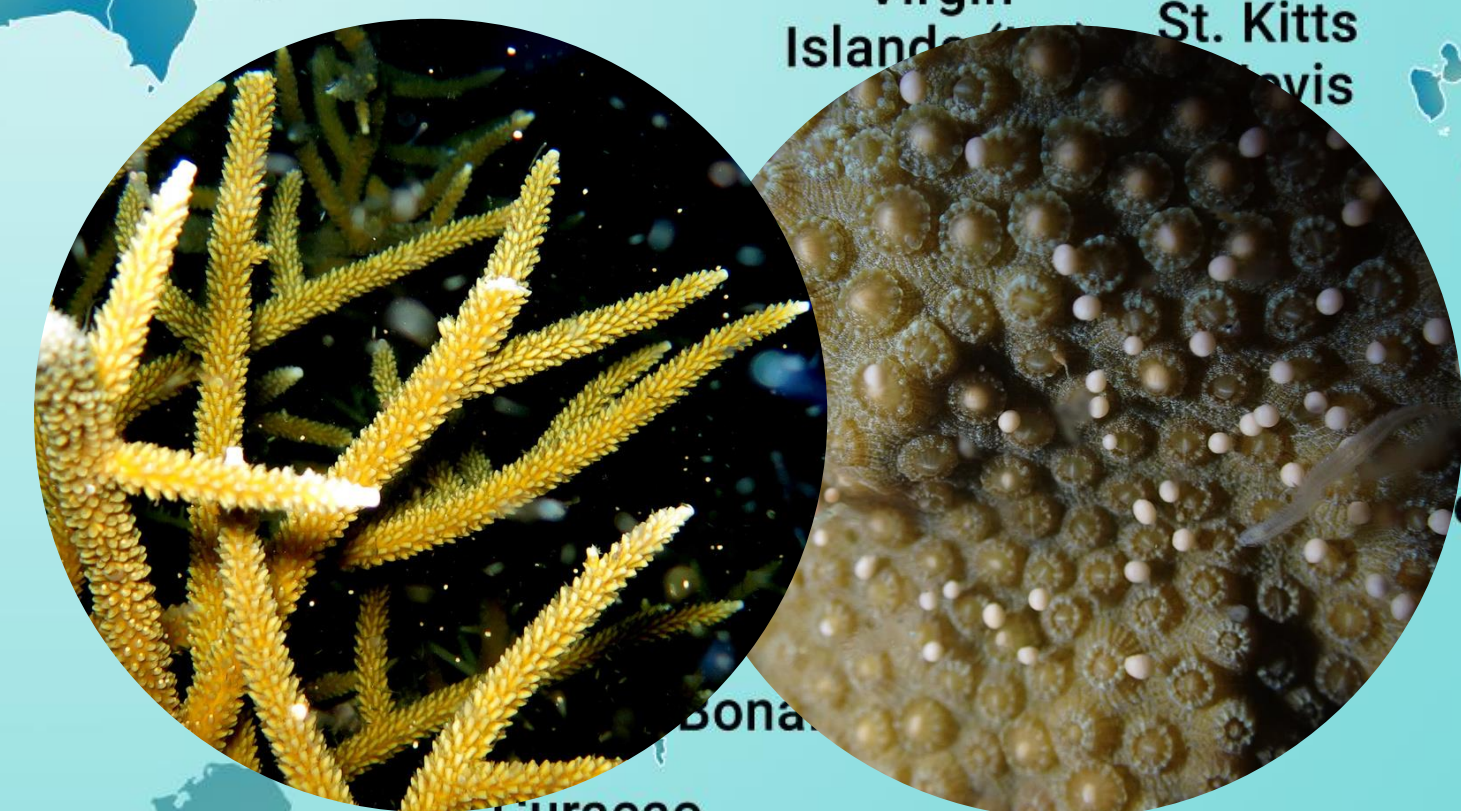
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Key Considerations[🔑]



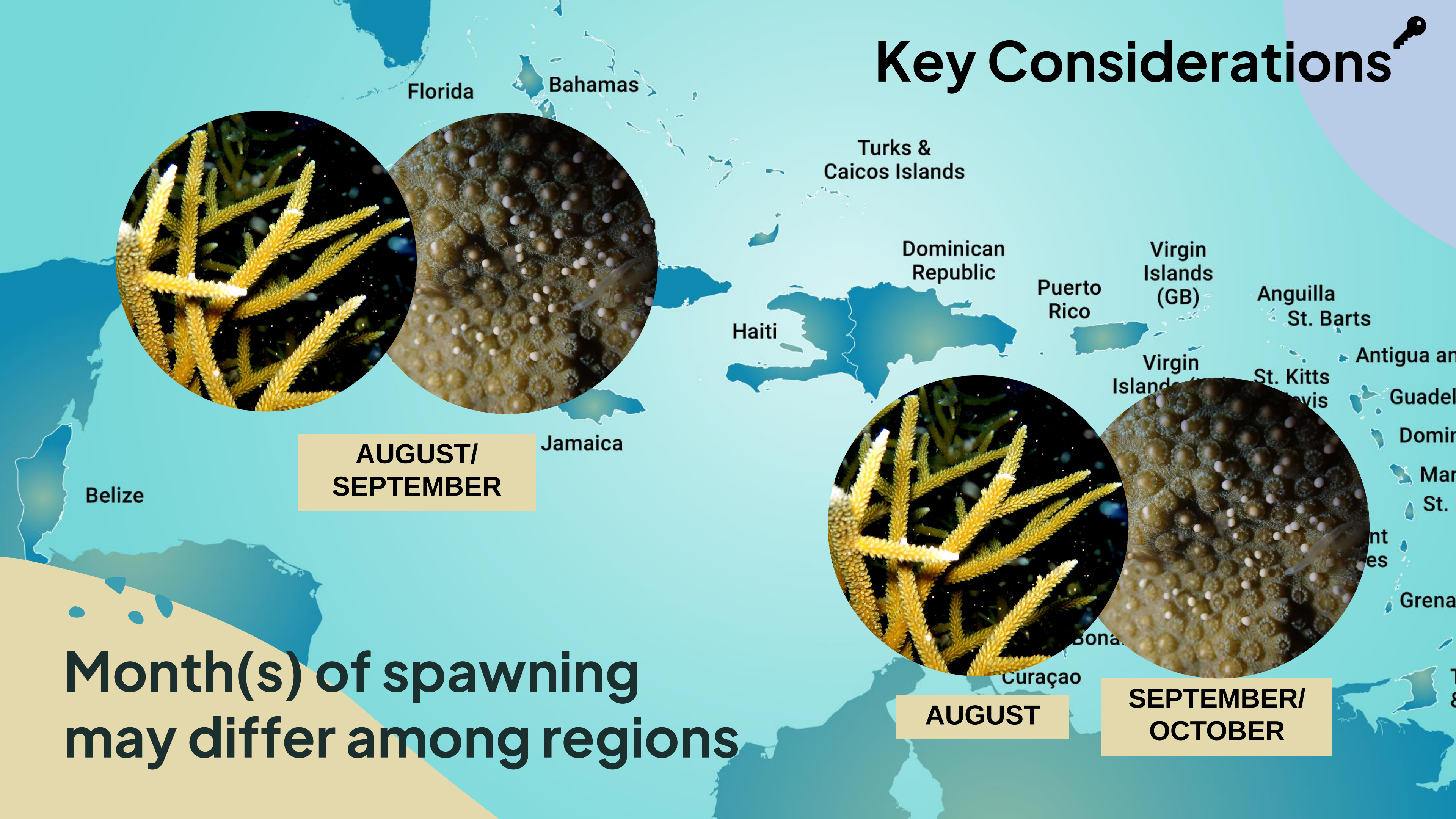
**AUGUST/
SEPTEMBER**



AUGUST

**SEPTEMBER/
OCTOBER**

**Month(s) of spawning
may differ among regions**





Key considerations

SPLIT SPAWNING

Split spawning can happen if the full moon occurs:

- Very early in the month
- Very late in the month
- Twice on the same month

August 2023

Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
		1 ^{FM}	2	3	4	5
6	7	8	9	10	11	12
13	14	15	16	17	18	19
20	21	22	23	24	25	26
27	28	29	30 ^{FM}	31		



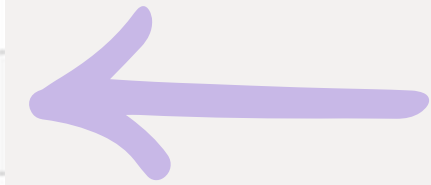
Key considerations

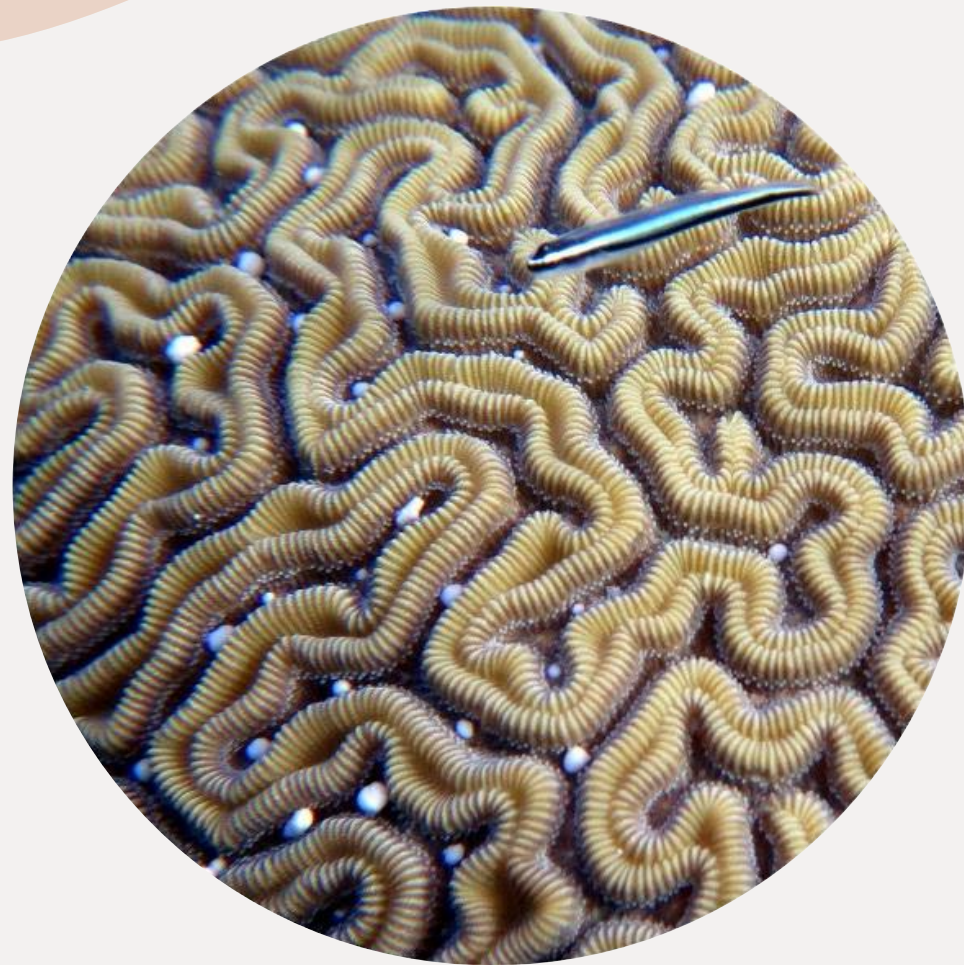
FULL MOON

Time at which the Full Moon has its maximum brilliance differs every month

A FM rising early, before sunrise, may result in spawning one day earlier

Full Moon 2023	
6 de ene	19:07
5 de feb	14:28
7 de mar	8:40
6 de abr	0:34
5 de may	13:34
3 de jun	23:41
3 de jul	7:38
1 de ago	14:31
30 de ago	21:35
29 de sep	5:57
28 de oct	16:24
27 de nov	5:16
26 de dic	20:33



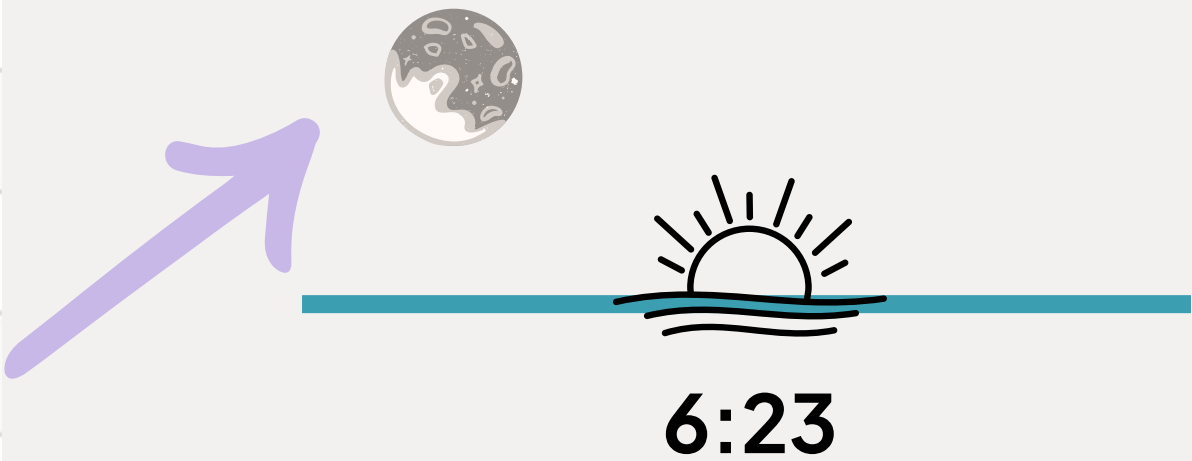


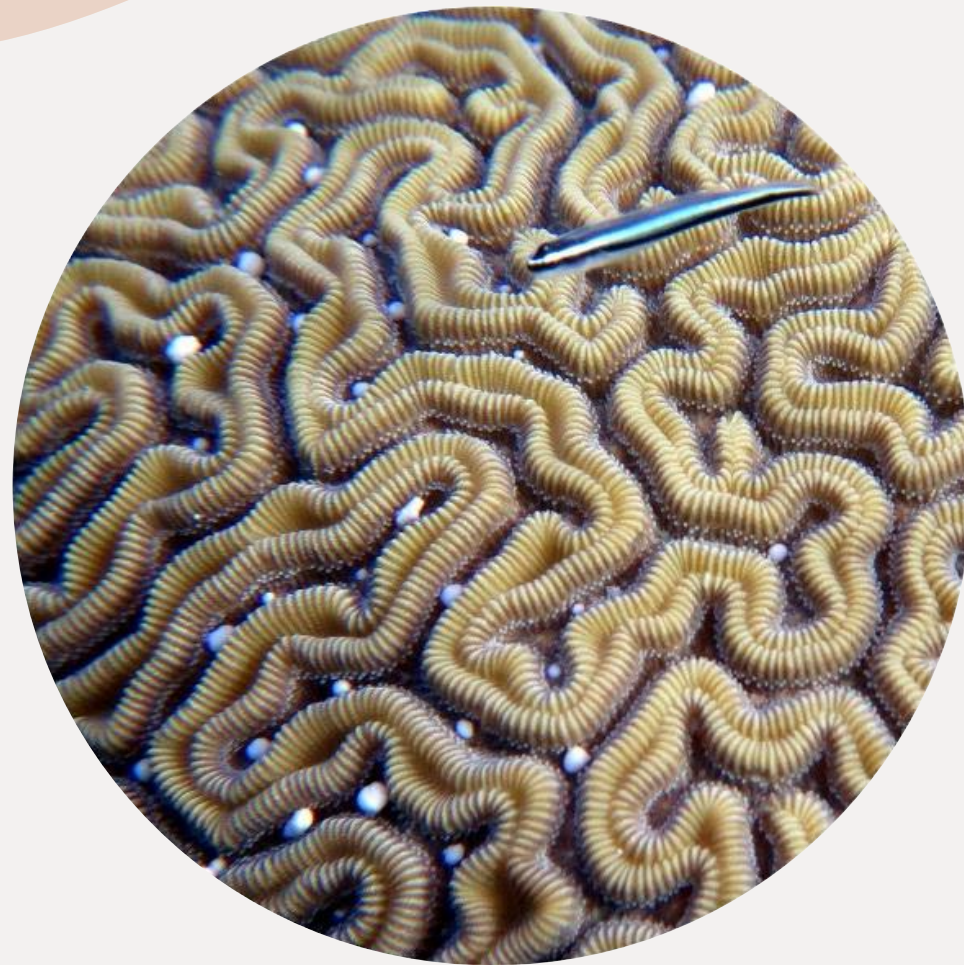
Diploria labyrinthiformis

May–June
9–12 days AFM

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1 de ago	14:31
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28 de oct	16:24
27 de nov	5:16
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APRIL



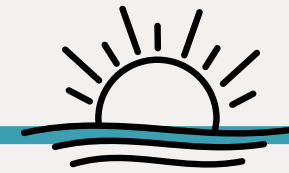


Diploria labyrinthiformis

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Full Moon	
6 de ene	19:07
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1 de ago	14:31
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29 de sep	5:57
28 de oct	16:24
27 de nov	5:16
26 de dic	20:33

APRIL



6:23

MAY



6:02



April 2023

Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
						1
2	3	4	5 FM+1	6 FM	7	8
9	10	11	12	13	14 9	15 10
16 11	17 12	18	19	20	21	22
23	24	25	26	27	28	29
30						

May 2023

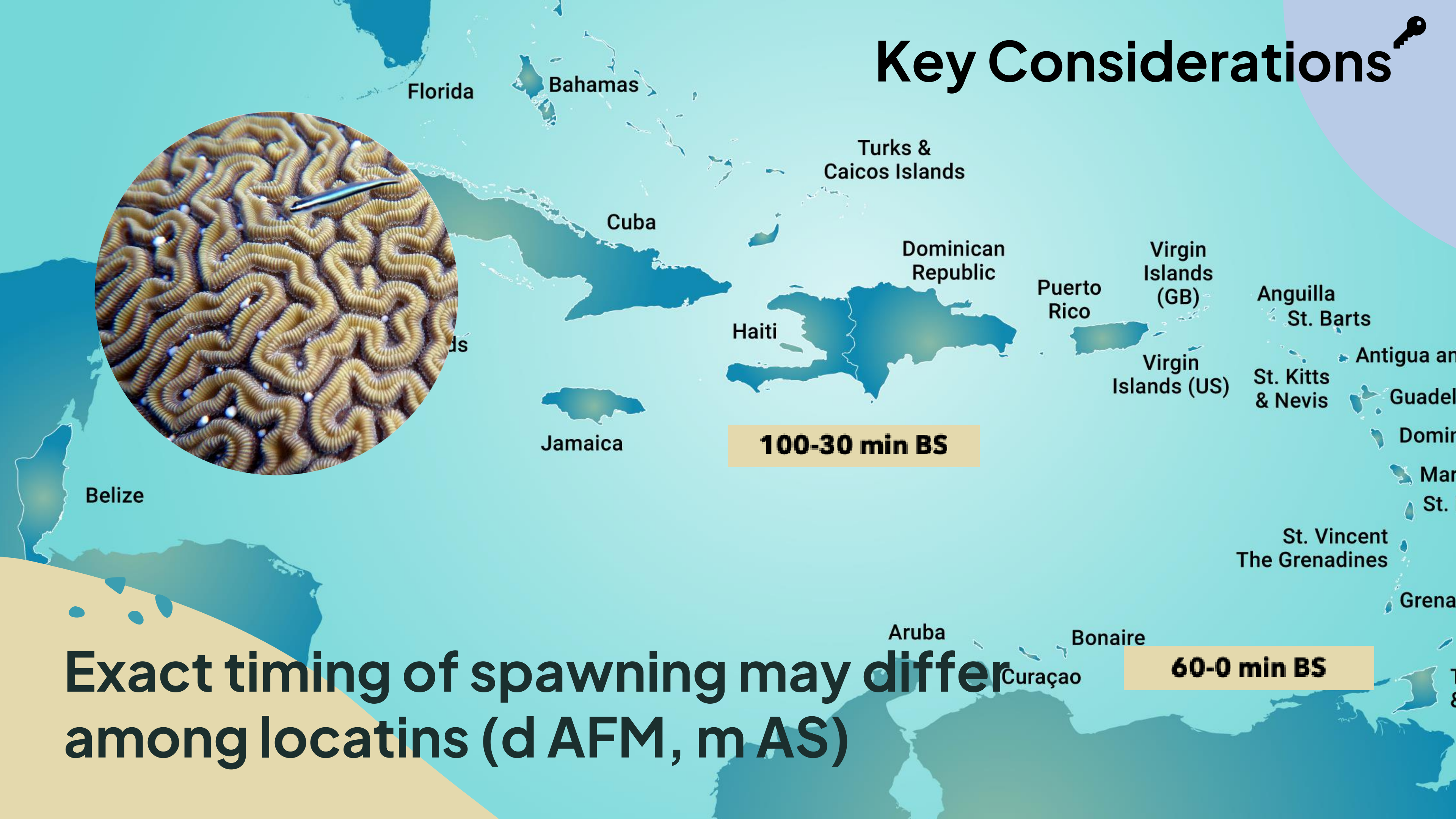
Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
	1	2	3	4	5 FM	6
7	8	9	10	11	12	13
14 9	15 10	16 11	17 12	18	19	20
21	22	23	24	25	26	27
28	29	30	31			

Key Considerations[🔑]



Sunset time differs
between regions & throughout the year

Key Considerations[🔑]

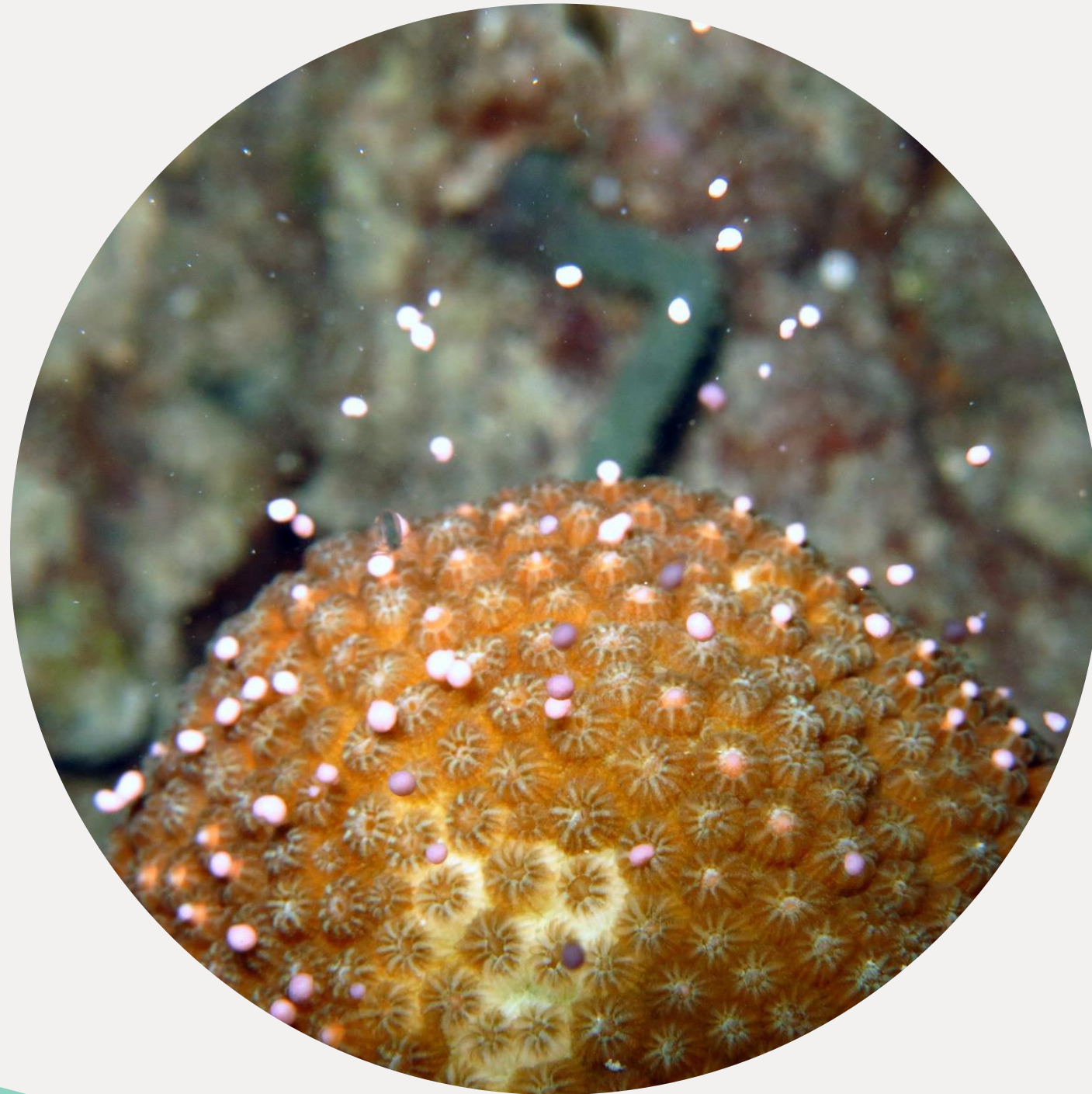


Exact timing of spawning may differ among locations (d AFM, m AS)

60-0 min BS



Exercise– *Orbicella annularis*



Bayahibe, DR

September

5–8 days AFM
Most likely 6–7 AFM

190–240 MAS



Exercise– Days




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FULL MOON**




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BRILLIANCE TIME**




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Moon Phases 2024 – Lunar Calendar

Time/GeneralWeather ▾Time ZoneDST ChangesSun & Moon ▾

Sun & Moon TodaySunrise & SunsetMoonrise & MoonsetMoon PhasesEclipsesNight Sky



Moon: 2.5%
Waxing Crescent

Current Time:7 de jun de 2024, 16:03:31

Moon Phase Tonight:Waxing Crescent

First Quarter:14 de jun de 2024, 1:18 (Next Phase)

New Moon:6 de jun de 2024, 8:37 (Previous Phase)

! Permalink for Santo Domingo: Moon phases for Santo Domingo, Dominican Republic

Moon Phases for Santo Domingo, 6 de jun de 2024 – 28 de jun de 2024

New Moon

First Quarter

Full Moon

La Romana

La RomanaDominican Republic

Cerro La Romana (mountain)Estado Cojedes - Venezuela

La Romana (fifth-order administrative division)Provincia de La Vega - Dominican Republic

La Romana (locality)Estado Carabobo - Venezuela

La Romana (locality)Estado Bolívar - Venezuela

La Romana (mountain)Molise - Italy

La Romana (populated locality)Estado Zulia - Venezuela

La Romana (populated place)Departamento de Izabal - Guatemala

La Romana (populated place)Jalisco - Mexico

La Romana (populated place)Sinaloa - Mexico

La Romana (populated place)Departamento del Petén - Guatemala

La Romana (populated place)Departamento del Petén - Guatemala

La Romana (populated place)Alicante - Spain

La Romana (populated place)

Bayahibe, DR
September
5-8 days AFM
Most likely 6-7 AFM
190-240 MAS

timeanddate.com

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6 de junio8:37

14 de junio1:18

21 de junio21:07
Strawberry Moon

28 de junio17:53

Moon Phases for La Romana, Dominican Republic in 2024

Showing moon phases for: 2024 Go

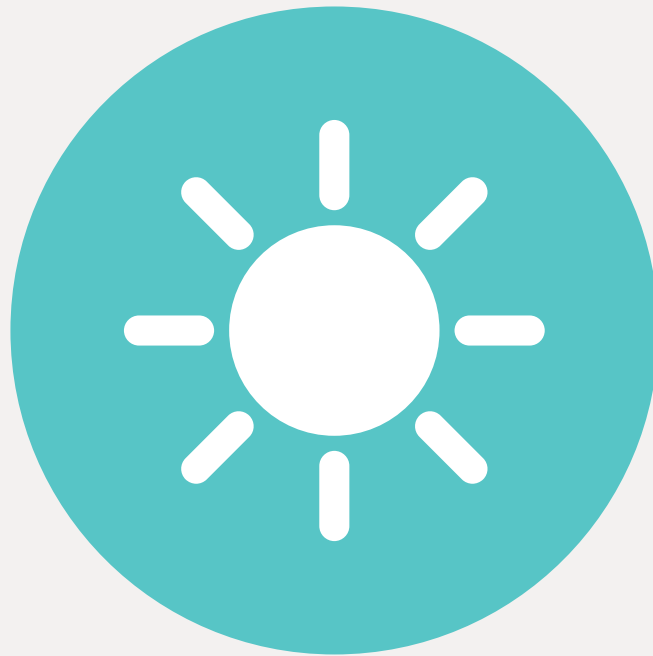
Lunation	New Moon		First Quarter		Full Moon		Third Quarter		Duration
1249							3 de ene	23:30	29d 12h 25m
1250	11 de ene	7:57	17 de ene	23:52	25 de ene	13:54	2 de feb	19:18	29d 11h 02m
1251	9 de feb	18:59	16 de feb	11:00	24 de feb	8:30	3 de mar	11:23	29d 10h 01m
1252	10 de mar	5:00	17 de mar	0:10	25 de mar	3:00	1 de abr	23:14	29d 9h 20m
1253	8 de abr	14:20	15 de abr	15:13	23 de abr	19:48	1 de may	7:27	29d 9h 01m
1254	7 de may	23:21	15 de may	7:48	23 de may	9:53	30 de may	13:12	29d 9h 16m
1255	6 de jun	8:37	14 de jun	1:18	21 de jun	21:07	28 de jun	17:53	29d 10h 20m
1256	5 de jul	18:57	13 de jul	18:48	21 de jul	6:17	27 de jul	22:51	29d 12h 16m
1257	4 de ago	7:13	12 de ago	11:18	19 de ago	14:25	26 de ago	5:25	29d 14h 42m
1258	2 de sep	21:55	11 de sep	2:05	17 de sep	22:34	24 de sep	14:49	29d 16h 54m
1259	2 de oct	14:49	10 de oct	14:55	17 de oct	7:26	24 de oct	4:03	29d 17h 58m
1260	1 de nov	8:47	9 de nov	1:55	15 de nov	17:28	22 de nov	21:27	29d 17h 34m
1261	1 de dic	2:21	8 de dic	11:26	15 de dic	5:01	22 de dic	18:18	29d 16h 05m
1262	30 de dic	18:26							29d 14h 09m

* All times are local time for La Romana. They take into account refraction. Dates are based on the Gregorian calendar. Current lunation cycle is highlighted yellow. Special events are highlighted blue. Hover over events for more details.

Sun and Moon times today for La Romana | Moonrise and moonset times for La Romana | Sunrise and sunset times for La Romana



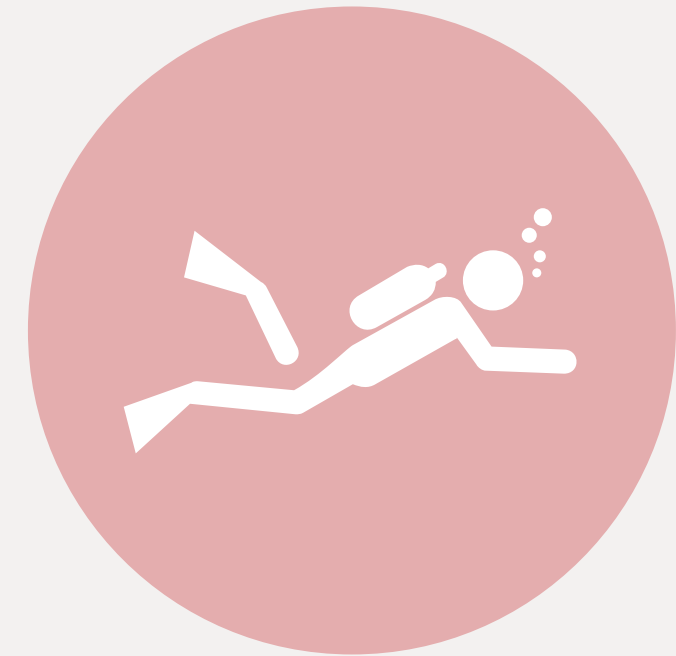
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 Moon Phases 2024 – Lunar Calendar for Dominican Republic

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Moon: 2.5%
Waxing Crescent

Current Time:7 de jun de 2024, 17:53

Moon Phase Tonight:Waxing Crescent


First Quarter:14 de jun de 2024, 1:18

New Moon:6 de jun de 2024, 8:37



Moon Phases for La Romana, 6 de jun de 2024 – 28 de jun de 2024


New Moon



6 de junio

8:37


First Quarter



14 de junio

1:18


Full Moon



21 de junio

21:07

Third Quarter



28 de junio


































17:53

Septiembre 2024 — Sun in La Romana

< agosto **septiembre** octubre >

Month: septiembre ▼ Year: 2024 ▼ **Go**

2024	Sunrise/Sunset		Daylength		Astronomical Twilight		Nautical Twilight		Civil Twilight		Solar Noon	
sep	Sunrise	Sunset	Length	Diff.	Start	End	Start	End	Start	End	Time	Mil. km
1 ▼	6:21 → (81°)	18:49 ← (279°)	12:28:09	−0:59	5:07	20:03	5:33	19:37	5:59	19:11	12:35 (79,5°)	150,958
2 ▼	6:21 → (82°)	18:48 ← (278°)	12:27:09	−1:00	5:07	20:02	5:33	19:36	5:59	19:10	12:35 (79,1°)	150,922
3 ▼	6:21 → (82°)	18:47 ← (278°)	12:26:08	−1:00	5:08	20:01	5:33	19:35	5:59	19:10	12:35 (78,8°)	150,886
4 ▼	6:21 → (82°)	18:47 ← (277°)	12:25:08	−1:00	5:08	20:00	5:34	19:34	5:59	19:09	12:34 (78,4°)	150,849
5 ▼	6:22 → (83°)	18:46 ← (277°)	12:24:07	−1:00	5:08	19:59	5:34	19:33	6:00	19:08	12:34 (78,0°)	150,812
6 ▼	6:22 → (83°)	18:45 ← (277°)	12:23:06	−1:00	5:08	19:58	5:34	19:33	6:00	19:07	12:34 (77,6°)	150,774
7 ▼	6:22 → (84°)	18:44 ← (276°)	12:22:05	−1:01	5:09	19:57	5:34	19:32	6:00	19:06	12:33 (77,3°)	150,735
8 ▼	6:22 → (84°)	18:43 ← (276°)	12:21:04	−1:01	5:09	19:56	5:35	19:31	6:00	19:05	12:33 (76,9°)	150,696
9 ▼	6:22 → (84°)	18:42 ← (275°)	12:20:03	−1:01	5:09	19:56	5:35	19:30	6:00	19:04	12:32 (76,5°)	150,657
10 ▼	6:22 → (85°)	18:42 ← (275°)	12:19:01	−1:01	5:09	19:55	5:35	19:29	6:01	19:03	12:32 (76,1°)	150,617
11 ▼	6:23 → (85°)	18:41 ← (275°)	12:18:00	−1:01	5:10	19:54	5:35	19:28	6:01	19:03	12:32 (75,8°)	150,577
12 ▼	6:23 → (86°)	18:40 ← (274°)	12:16:58	−1:01	5:10	19:53	5:35	19:27	6:01	19:02	12:31 (75,4°)	150,537
13 ▼	6:23 → (86°)	18:39 ← (274°)	12:15:57	−1:01	5:10	19:52	5:36	19:26	6:01	19:01	12:31 (75,0°)	150,496
14 ▼	6:23 → (86°)	18:38 ← (273°)	12:14:55	−1:01	5:10	19:51	5:36	19:25	6:01	19:00	12:31 (74,6°)	150,455
15 ▼	6:23 → (87°)	18:37 ← (273°)	12:13:53	−1:01	5:10	19:50	5:36	19:24	6:01	18:59	12:30 (74,2°)	150,414
16 ▼	6:23 → (87°)	18:36 ← (273°)	12:12:51	−1:01	5:11	19:49	5:36	19:24	6:02	18:58	12:30 (73,8°)	150,373
17 ▼	6:24 → (88°)	18:35 ← (272°)	12:11:49	−1:01	5:11	19:48	5:36	19:23	6:02	18:57	12:30 (73,5°)	150,332
18 ▼	6:24 → (88°)	18:35 ← (272°)	12:10:47	−1:01	5:11	19:47	5:37	19:22	6:02	18:56	12:29 (73,1°)	150,292
19 ▼	6:24 → (88°)	18:34 ← (271°)	12:09:45	−1:02	5:11	19:46	5:37	19:21	6:02	18:55	12:29 (72,7°)	150,251

2024	Sunrise/Sunset	
sep	Sunrise	Sunset
20 	6:24  (89°)	18:33  (271°)
21 	6:24  (89°)	18:32  (271°)
22 	6:24  (90°)	18:31  (270°)
23 	6:25  (90°)	18:30  (270°)
24 	6:25  (91°)	18:29  (269°)
25 	6:25  (91°)	18:28  (269°)
26 	6:25  (91°)	18:28  (268°)
27 	6:25  (92°)	18:27  (268°)
28 	6:25  (92°)	18:26  (268°)
29 	6:26  (93°)	18:25  (267°)
30 	6:26  (93°)	18:24  (267°)

Bayahibe, DR
September
5-8 days AFM
Most likely 6-7 AFM
190-240 MAS

	A	B	C	D	E
1	Sunset time	Spawning from	Spawning until	Prediction from	Prediction until
2	18:30	3:10	4:00	=A2+B2	22:30
3					
4					

Bayahibe, DR
September
5-8 days AFM
Most likely 6-7 AFM
190-240 MAS

	A	B	C	D	E
1	Sunset time	Spawning from	Spawning until	Prediction from	Prediction until
2	18:30	3:10	4:00	21:40	22:30
3					
4					



Exercise- Results

SEP	Días después de la luna llena	3	4	5	6	7	8	9
	Fecha	20-sep	21-sep	22-sep	23-sep	24-sep	25-sep	26-sep
	Hora del atardecer	18:33	18:32	18:31	18:30	18:29	18:28	18:28
	<i>Orbicella annularis</i> (190-240 minutos después del atardecer)					21:40 – 22:30		

Recommendations

Use spawning predictions from your own island/region

If they do not exist:

- Base your dive plan on known spawning times for the closest location
- Be conservative: dive early and dive a lot! (start at least one day before predictions)



Spawning Monitoring

Date:Species:
Site:d AFM:
Depth:Sunset time:
Area (m²):# colonies monitored:
Observer(s):# colonies spawned:
Monitoring start:
Monitoring end:

# Colony	# Cup	Setting Time	Spawning Start	Spawning End

Data Collection



- Add what is of interest to your project:
- Colony condition
 - M or F
 - Colony size

Spawning Monitoring

Date: Aug 22,

Species: **Dcyl**

Site: **Playto4**

d AFM: 3

Depth: 5-6 m

Sunset time: 18:57

Area (m²):

colonies monitored: 5

Observer(s): Rit

colonies spawned:

Monitoring starta 20:15

Monitoring end: 21:15

[illegible]

Spawning Monitoring

Date: Aug 22,

Species: OANN

Site: 2024 Playita

d AFM: 3

Depth: 5-6 m

Sunset time: 18:57

Area (m²):

colonies monitored: 5

Observer(s): Rit

colonies spawned: 2

Monitoring start: 20:15

Monitoring end: 21:15

[illegible]



Data Sharing

Contribute to the new
Centralized Caribbean Coral Spawning Database
for your own records, predictions and for regional efforts



Data Sharing

Contribute to the new
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for your own records, predictions and for regional efforts

Thank you!

