



Risque d'impact sur les populations de poissons migrateurs de l'altération de la Garonne

Synthèse de la méthode Alter' et de
l'Analyse-Vulnérabilité-Risque (AVR)



Vue aérienne de la confluence de l'Ariège et de
la Garonne à Portet-sur-Garonne (31)
© Pierre Barthe AEAG

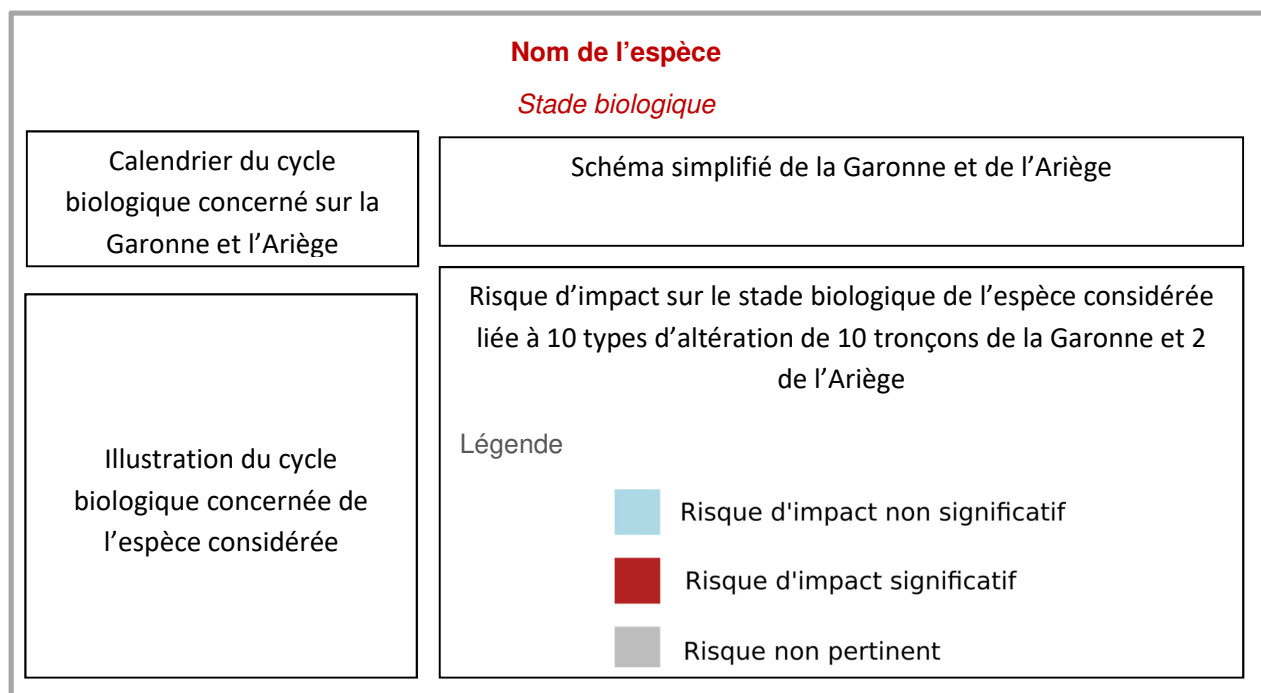


Juin 2020
Thibaut Féret (AEAG –MSR)

Pour mieux appréhender la problématique de l'affaiblissement des populations de migrateurs sur la Garonne, le groupement des bureaux d'études (Ecogéa, Adict et Géodiag) a proposé d'associer deux méthodes. D'une part, une analyse de type Aléa-Vulnérabilité-Risque (AVR) qui détermine, sur chaque secteur de la Garonne, les risques qu'un stade de développement ne se réalise pas de manière optimale. L'évaluation des risques repose sur la confrontation d'ensembles de données, récoltées sur le bassin par différents organismes, aux exigences biologiques de chaque stade de vie des différentes espèces. D'autre part, une analyse de type systémique (ALTER') hiérarchise les impacts directs et indirects affectant les différents stades de développement en structurant la connaissance du système socioécologique représentatif de chacun des stades de développement sur chaque secteur. Cette méthode s'affranchit de l'absence de données sur certains secteurs en intégrant les savoirs empiriques des acteurs de terrain, recueillis au cours d'ateliers participatifs ; autant d'occasions pour les acteurs d'harmoniser leur connaissance de la problématique. **Par leur complémentarité, les résultats issus de l'AVR et de ALTER' ont permis aux acteurs de se forger une vision globale des facteurs d'impact et des risques pesant sur les cycles biologiques des migrateurs, et des secteurs les plus difficiles pour chacune des espèces.**

Synthèse de 2 démarches complémentaires

Ces deux démarches complémentaires ont fait l'objet par la suite d'un travail aboutissant à la production d'une illustration synthétique des risques d'impact par espèce et stade de vie. Sur chacune d'elles, ce risque est évalué pour 10 types d'altération du milieu sur 12 tronçons de la Garonne ainsi que 2 sur l'Ariège. L'ensemble de ces 31 illustrations sont présentés dans ce document.



Définition des 10 types d'altérations

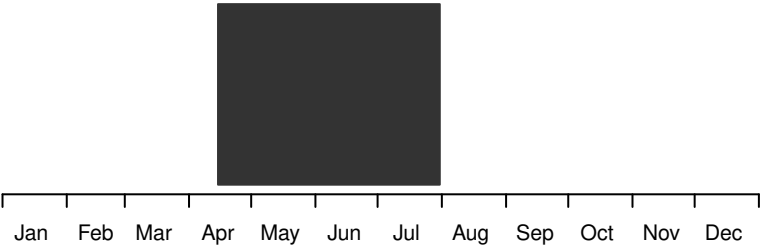
- **Pêche** : Evalue le risque d'impact sur le stade de l'espèce considérée par la pêche professionnelle et amateur ainsi que les captures accidentelles. Il se base sur les estimations de captures rapportées par les associations professionnelles (AAPPEDG, ADAPAEF33) ou l'association Migado ainsi que les périodes d'ouverture et le type de matériel utilisé
- **Bouchon vaseux** : Evalue le risque lié à la présence du bouchon vaseux de l'estuaire de la Gironde en se servant des débits qui favorisent son apparition dans le tronçon T2
- **Macropolluants** : Evalue le risque lié aux pollutions de la Garonne et de l'Ariège par les principaux macropolluants (Orthophosphates, Phosphore total, azote ammoniacale, Nitrates, DBO5, Oxygène, pH, Nitrites, MES)
- **Température** : Evalue le risque lié à une température trop faible ou trop élevée pour le bon déroulement du cycle biologique de l'espèce considérée
- **Micropollution** : Evalue le risque lié à la pollution par des micropolluants organiques dans l'eau et les sédiments de la Garonne, de l'Ariège et de leurs affluents
- **Hydrologie** : Evalue le risque lié à l'altération du fonctionnement hydrologique de la Garonne et de l'Ariège (Intensité des étiages, fréquence des pics de crue...)
- **Ouvrage** : Evalue le risque lié à la présence et aux caractéristiques de fonctionnement des obstacles à l'écoulement gênant la circulation du stade de l'espèce considérée
- **Cycle biologique** : Evalue le risque que le stade soit impacté par l'absence d'un autre stade de l'espèce considérée (absence de larves, non-déroulement de la phase de reproduction...)
- **Silure** : Evalue le risque lié à la prédation par le Silure

Grande alose

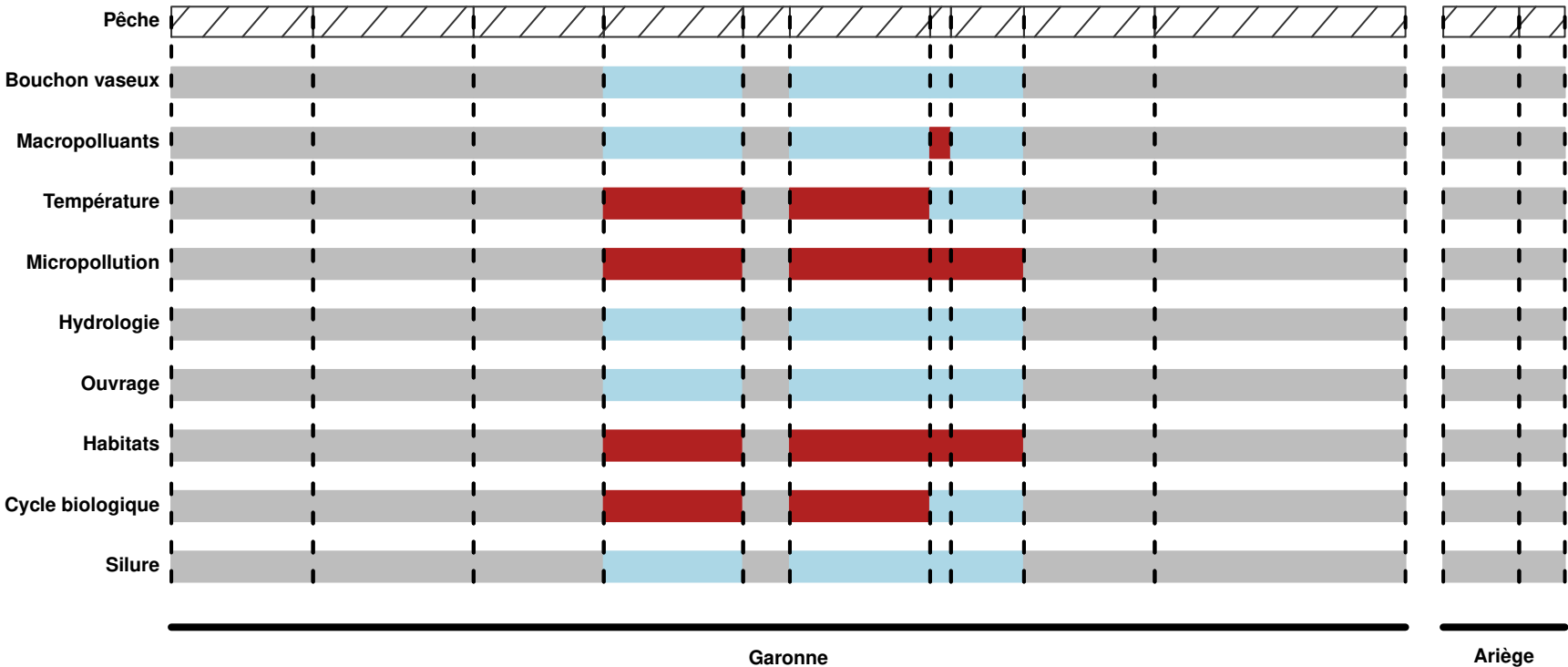
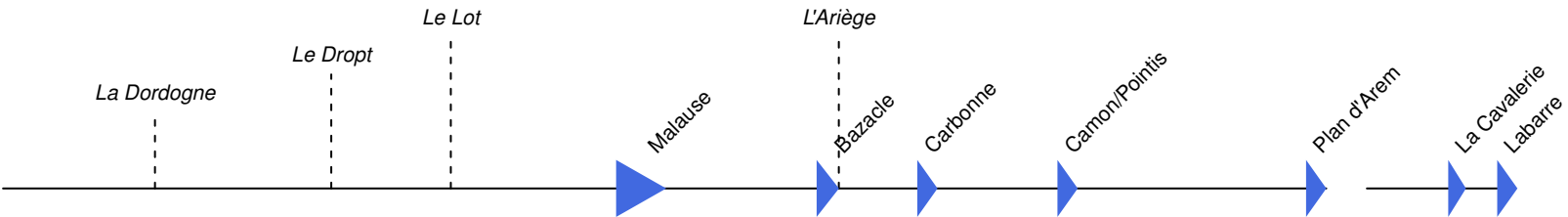
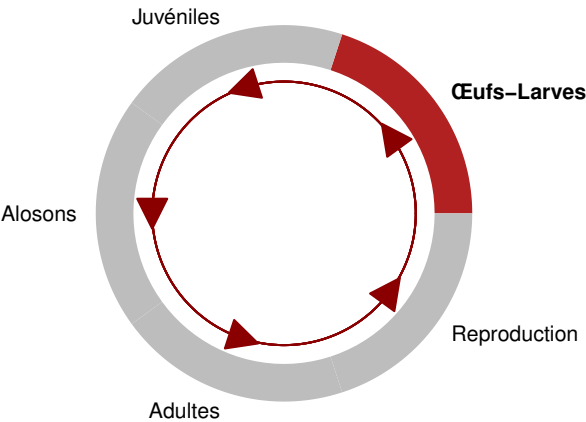
Grande Alose

Œufs-Larves

Calendrier



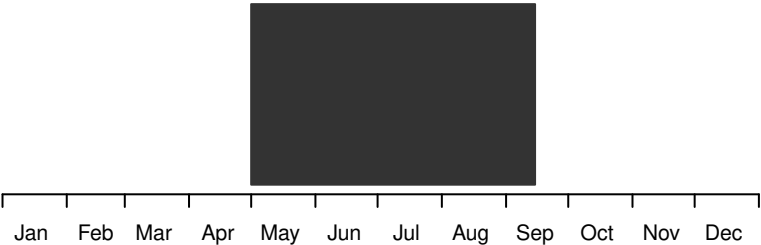
Cycle biologique



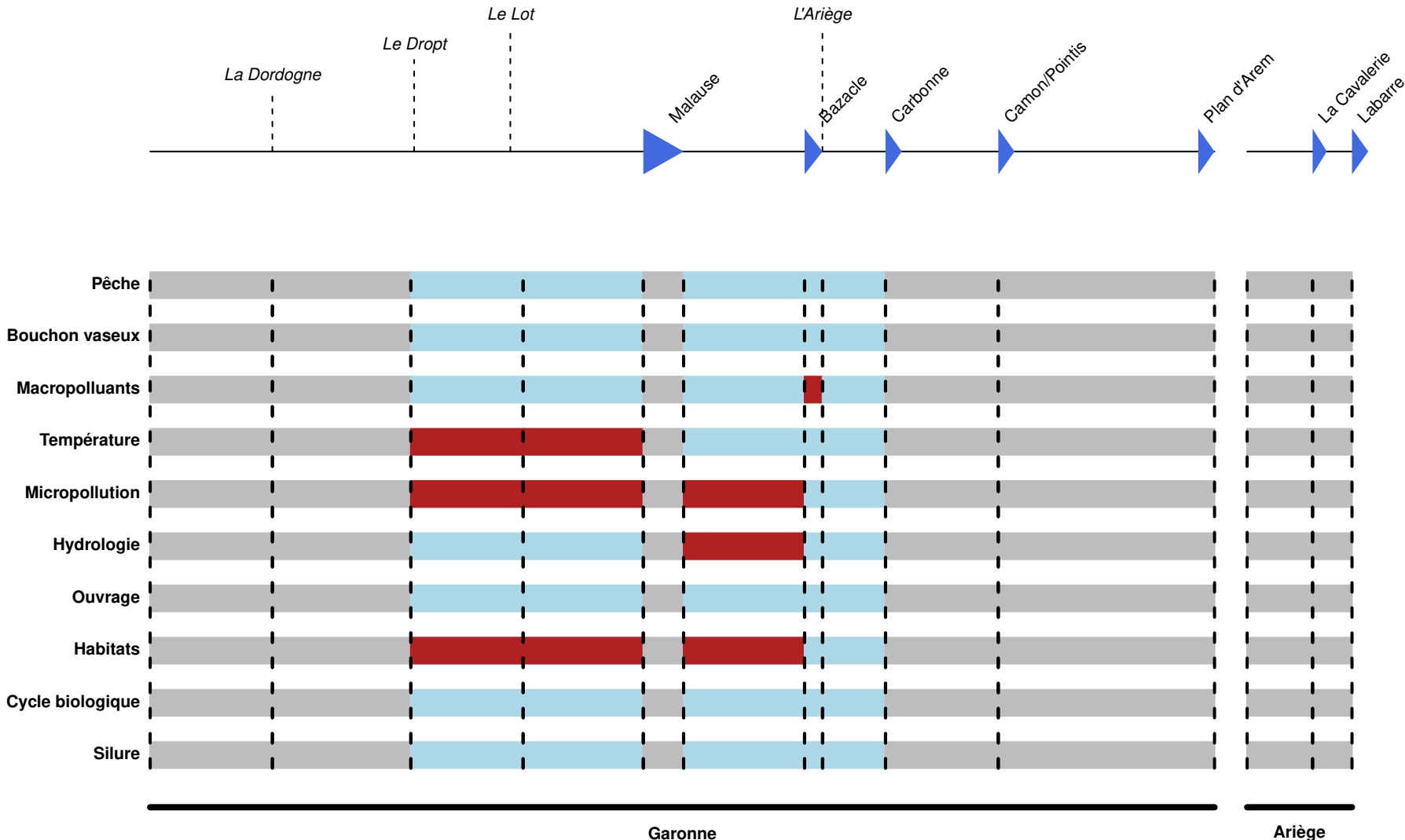
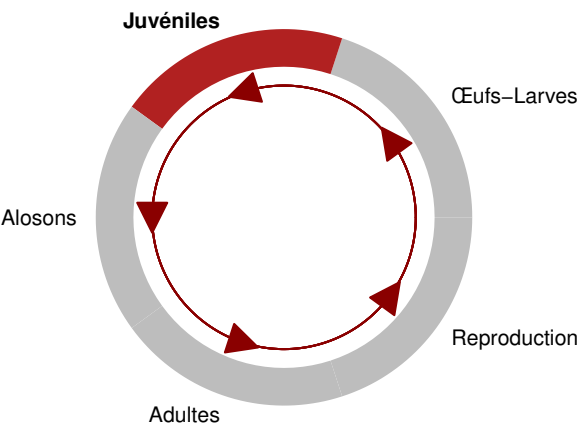
Grande Alose

Juveniles

Calendrier



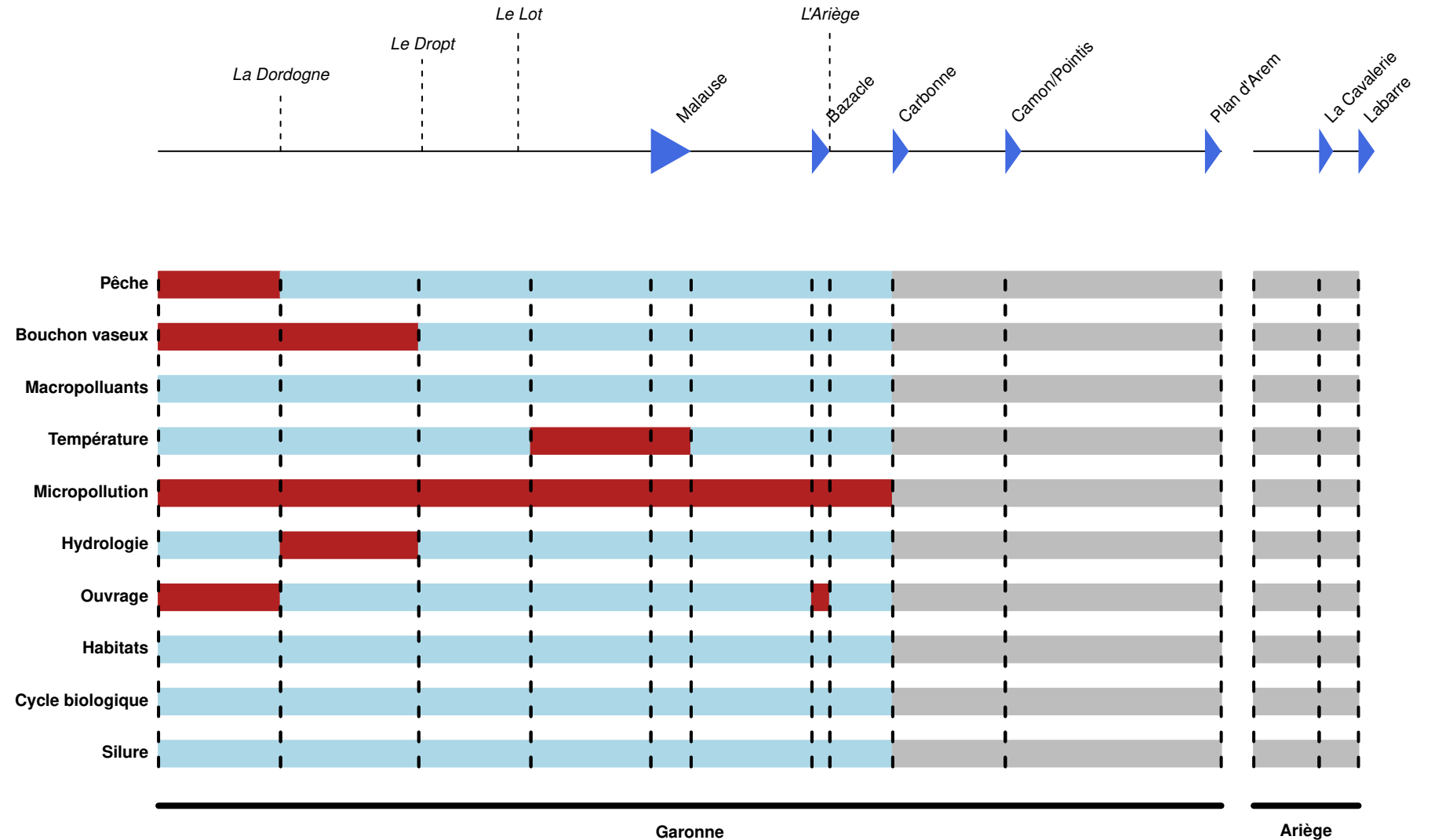
Cycle biologique



Alosons

11

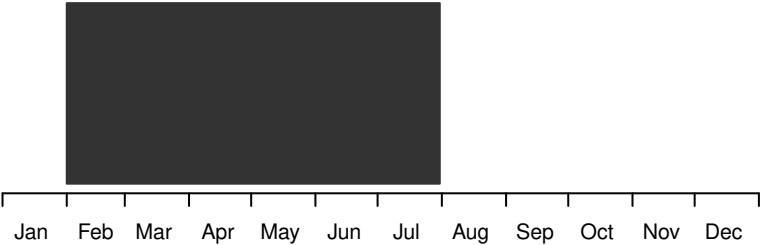
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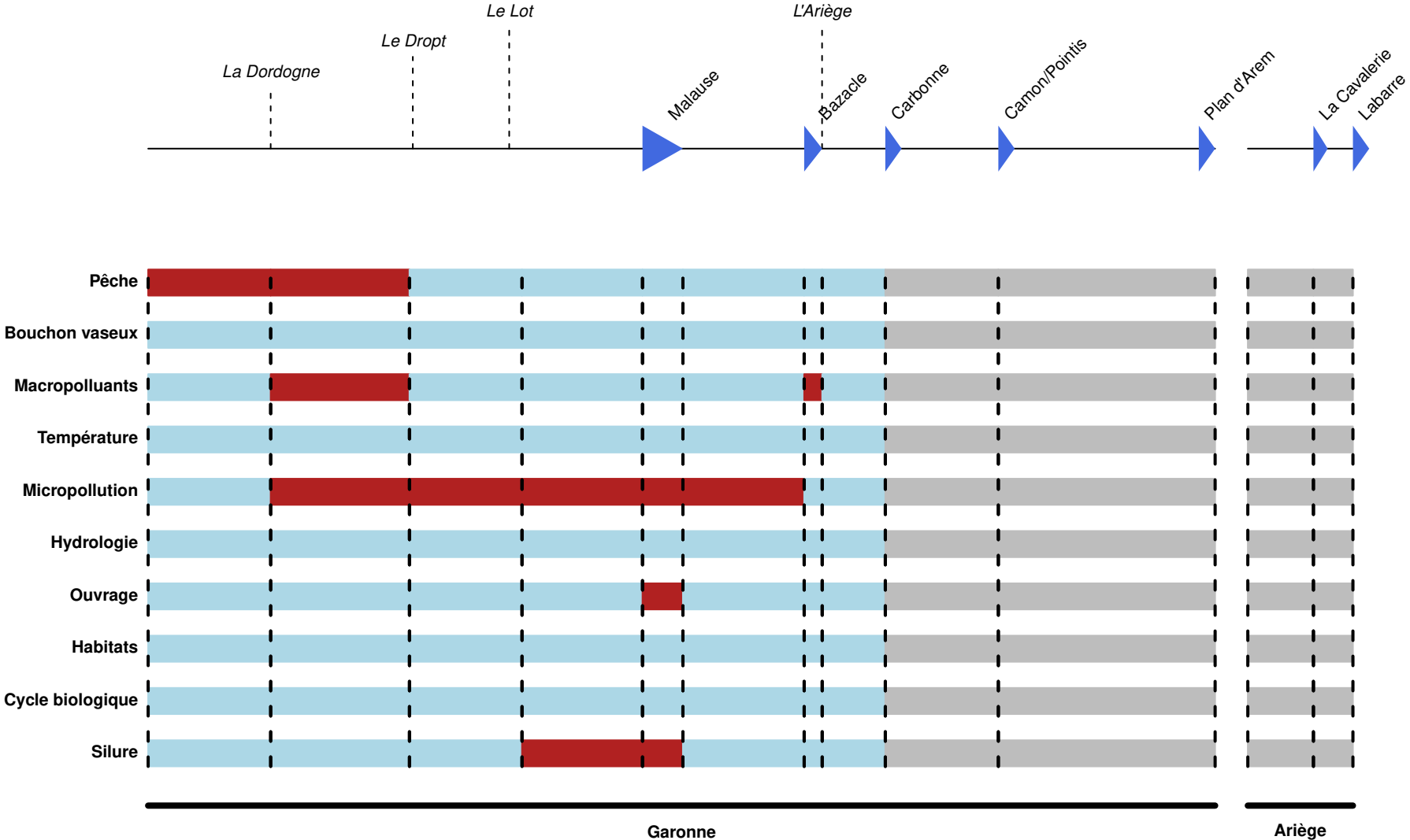
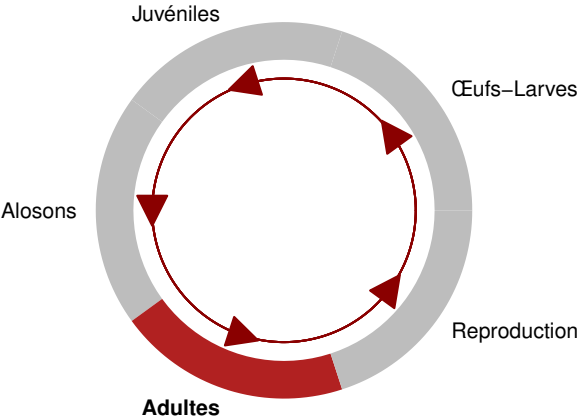
Grande Alose

Adultes

Calendrier



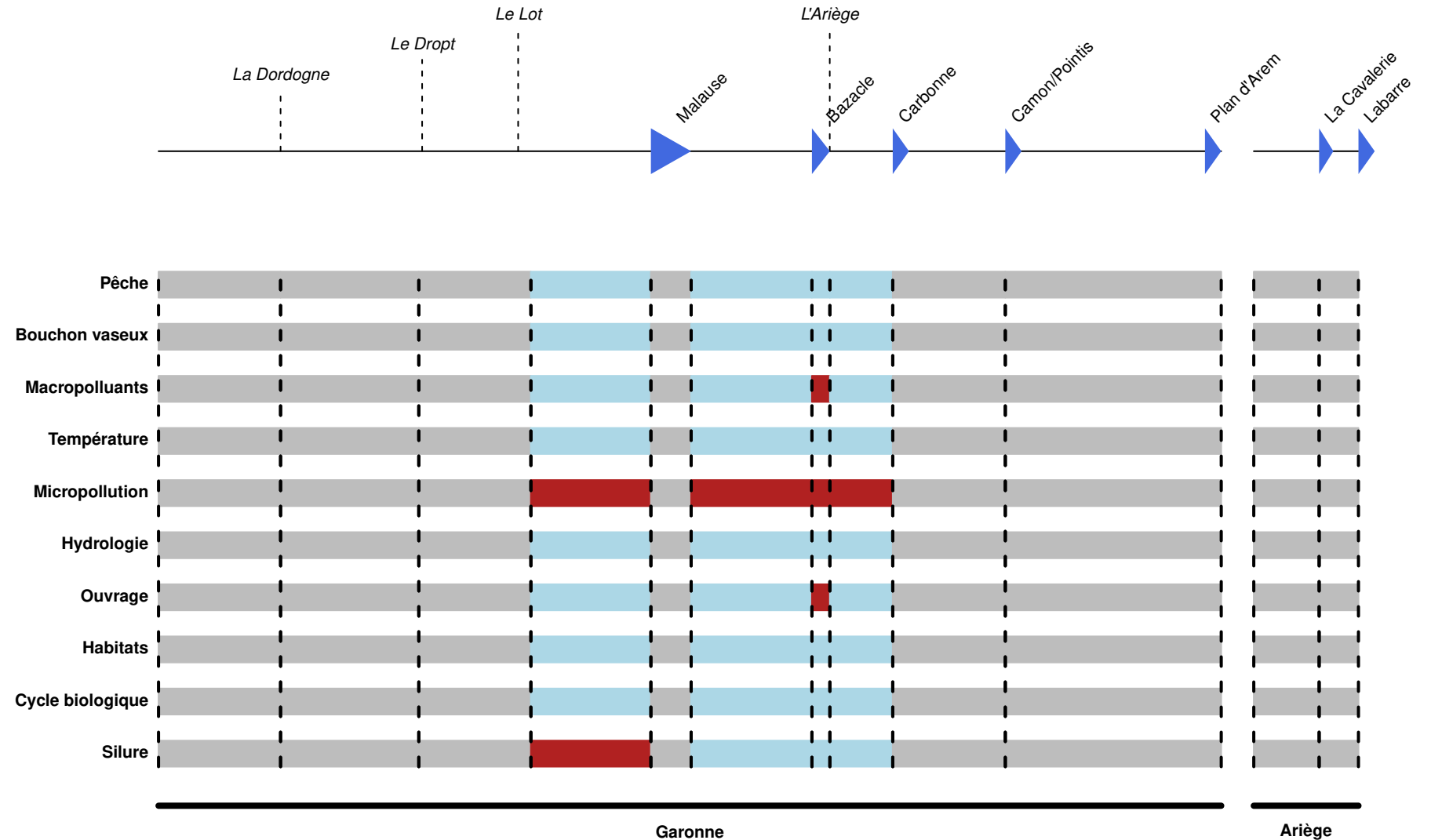
Cycle biologique



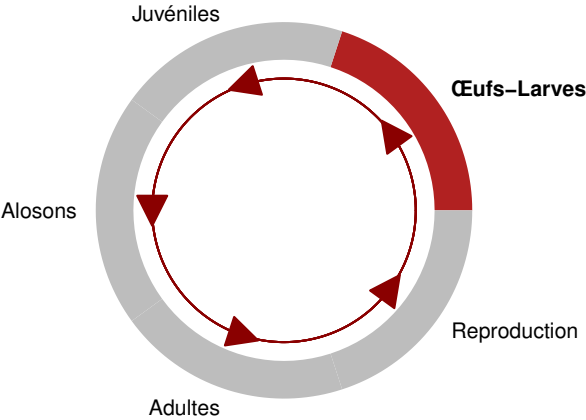
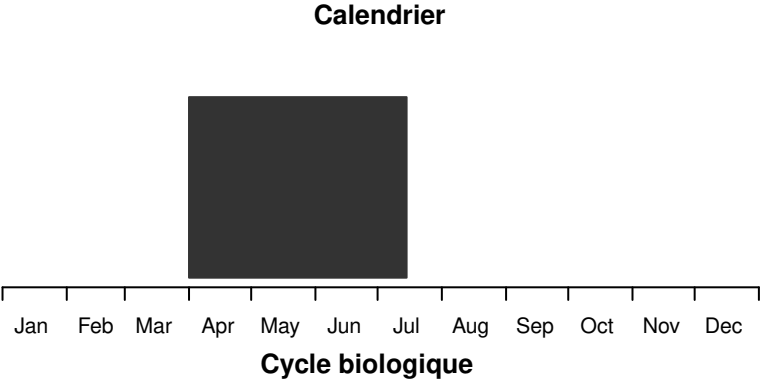
Reproduction

the 1990s, the number of people in the United States who are 65 years of age or older has increased by 50 percent. The number of people aged 75 and older has increased by 100 percent. The number of people aged 85 and older has increased by 200 percent. The number of people aged 95 and older has increased by 400 percent. The number of people aged 100 and older has increased by 1,000 percent. The number of people aged 105 and older has increased by 2,000 percent. The number of people aged 110 and older has increased by 4,000 percent. The number of people aged 115 and older has increased by 8,000 percent. The number of people aged 120 and older has increased by 16,000 percent. The number of people aged 125 and older has increased by 32,000 percent. The number of people aged 130 and older has increased by 64,000 percent. The number of people aged 135 and older has increased by 128,000 percent. The number of people aged 140 and older has increased by 256,000 percent. The number of people aged 145 and older has increased by 512,000 percent. The number of people aged 150 and older has increased by 1,024,000 percent. The number of people aged 155 and older has increased by 2,048,000 percent. The number of people aged 160 and older has increased by 4,096,000 percent. The number of people aged 165 and older has increased by 8,192,000 percent. The number of people aged 170 and older has increased by 16,384,000 percent. The number of people aged 175 and older has increased by 32,768,000 percent. The number of people aged 180 and older has increased by 65,536,000 percent. The number of people aged 185 and older has increased by 131,072,000 percent. The number of people aged 190 and older has increased by 262,144,000 percent. The number of people aged 195 and older has increased by 524,288,000 percent. The number of people aged 200 and older has increased by 1,048,576,000 percent. The number of people aged 205 and older has increased by 2,097,152,000 percent. The number of people aged 210 and older has increased by 4,194,304,000 percent. The number of people aged 215 and older has increased by 8,388,608,000 percent. The number of people aged 220 and older has increased by 16,777,216,000 percent. The number of people aged 225 and older has increased by 33,554,432,000 percent. The number of people aged 230 and older has increased by 67,108,864,000 percent. The number of people aged 235 and older has increased by 134,217,728,000 percent. The number of people aged 240 and older has increased by 268,435,456,000 percent. The number of people aged 245 and older has increased by 536,870,912,000 percent. The number of people aged 250 and older has increased by 1,073,741,824,000 percent. The number of people aged 255 and older has increased by 2,147,483,648,000 percent. The number of people aged 260 and older has increased by 4,294,967,296,000 percent. The number of people aged 265 and older has increased by 8,589,934,592,000 percent. The number of people aged 270 and older has increased by 17,179,869,184,000 percent. The number of people aged 275 and older has increased by 34,359,738,368,000 percent. The number of people aged 280 and older has increased by 68,719,476,736,000 percent. The number of people aged 285 and older has increased by 137,438,953,472,000 percent. The number of people aged 290 and older has increased by 274,877,906,944,000 percent. The number of people aged 295 and older has increased by 549,755,813,888,000 percent. The number of people aged 300 and older has increased by 1,099,511,627,776,000 percent. The number of people aged 305 and older has increased by 2,199,023,255,552,000 percent. The number of people aged 310 and older has increased by 4,398,046,511,104,000 percent. The number of people aged 315 and older has increased by 8,796,093,022,208,000 percent. The number of people aged 320 and older has increased by 17,592,186,044,416,000 percent. The number of people aged 325 and older has increased by 35,184,372,088,832,000 percent. The number of people aged 330 and older has increased by 70,368,744,177,664,000 percent. The number of people aged 335 and older has increased by 140,737,488,355,328,000 percent. The number of people aged 340 and older has increased by 281,474,976,710,656,000 percent. The number of people aged 345 and older has increased by 562,949,953,421,312,000 percent. The number of people aged 350 and older has increased by 1,125,899,906,842,624,000 percent. The number of people aged 355 and older has increased by 2,251,799,813,685,248,000 percent. The number of people aged 360 and older has increased by 4,503,599,627,370,496,000 percent. The number of people aged 365 and older has increased by 9,007,199,254,740,992,000 percent. The number of people aged 370 and older has increased by 18,014,398,509,481,984,000 percent. The number of people aged 375 and older has increased by 36,028,797,018,963,968,000 percent. The number of people aged 380 and older has increased by 72,057,594,037,927,936,000 percent. The number of people aged 385 and older has increased by 144,115,188,075,855,872,000 percent. The number of people aged 390 and older has increased by 288,230,376,151,711,744,000 percent. The number of people aged 395 and older has increased by 576,460,752,303,423,488,000 percent. The number of people aged 400 and older has increased by 1,152,921,504,606,846,976,000 percent. The number of people aged 405 and older has increased by 2,305,843,009,213,693,952,000 percent. The number of people aged 410 and older has increased by 4,611,686,018,427,387,904,000 percent. The number of people aged 415 and older has increased by 9,223,372,036,854,775,808,000 percent. The number of people aged 420 and older has increased by 18,446,744,073,709,551,616,000 percent. The number of people aged 425 and older has increased by 36,893,488,147,419,103,232,000 percent. The number of people aged 430 and older has increased by 73,786,976,294,838,206,464,000 percent. The number of people aged 435 and older has increased by 147,573,952,589,676,412,928,000 percent. The number of people aged 440 and older has increased by 295,147,905,179,352,825,856,000 percent. The number of people aged 445 and older has increased by 590,295,810,358,705,651,712,000 percent. The number of people aged 450 and older has increased by 1,180,591,620,717,411,303,424,000 percent. The number of people aged 455 and older has increased by 2,361,183,241,434,822,606,848,000 percent. The number of people aged 460 and older has increased by 4,722,366,482,869,645,213,696,000 percent. The number of people aged 465 and older has increased by 9,444,732,965,739,290,427,392,000 percent. The number of people aged 470 and older has increased by 18,889,465,931,478,580,854,784,000 percent. The number of people aged 475 and older has increased by 37,778,931,862,957,161,709,568,000 percent. The number of people aged 480 and older has increased by 75,557,863,725,914,323,419,136,000 percent. The number of people aged 485 and older has increased by 151,115,727,451,828,646,838,272,000 percent. The number of people aged 490 and older has increased by 302,231,454,903,657,293,676,544,000 percent. The number of people aged 495 and older has increased by 604,462,909,807,314,587,353,088,000 percent. The number of people aged 500 and older has increased by 1,208,925,819,614,629,174,706,176,000 percent. The number of people aged 505 and older has increased by 2,417,851,639,229,258,349,412,352,000 percent. The number of people aged 510 and older has increased by 4,835,703,278,458,516,698,824,704,000 percent. The number of people aged 515 and older has increased by 9,671,406,556,917,033,397,649,408,000 percent. The number of people aged 520 and older has increased by 19,342,813,113,834,066,795,298,816,000 percent. The number of people aged 525 and older has increased by 38,685,626,227,668,133,590,597,632,000 percent. The number of people aged 530 and older has increased by 77,371,252,455,336,267,181,195,264,000 percent. The number of people aged 535 and older has increased by 154,742,504,910,672,534,362,390,528,000 percent. The number of people aged 540 and older has increased by 309,485,009,821,345,068,724,781,056,000 percent. The number of people aged 545 and older has increased by 618,970,019,642,690,137,449,562,112,000 percent. The number of people aged 550 and older has increased by 1,237,940,039,285,380,274,899,124,224,000 percent. The number of people aged 555 and older has increased by 2,475,880,078,570,760,549,798,248,448,000 percent. The number of people aged 560 and older has increased by 4,951,760,157,141,521,099,596,496,896,000 percent. The number of people aged 565 and older has increased by 9,903,520,314,283,042,199,192,993,792,000 percent. The number of people aged 570 and older has increased by 19,807,040,628,566,084,398,385,987,584,000 percent. The number of people aged 575 and older has increased by 39,614,081,257,132,168,796,771,975,168,000 percent. The number of people aged 580 and older has increased by 79,228,162,514,264,337,593,543,950,336,000 percent. The number of people aged 585 and older has increased by 158,456,325,028,528,675,187,087,900,672,000 percent. The number of people aged

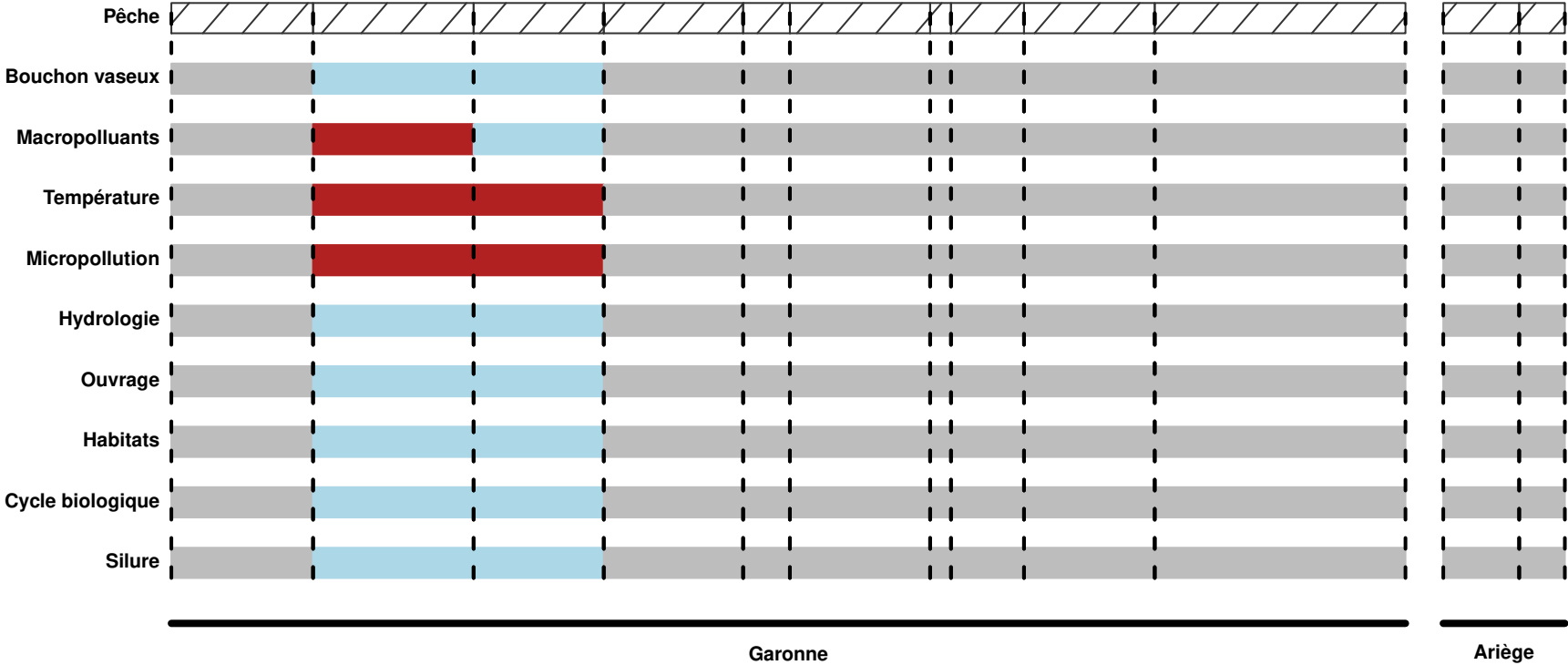
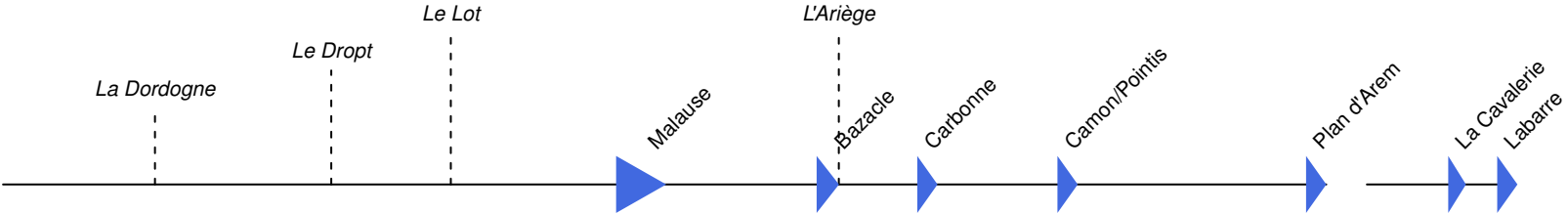
Cycle biologique



Alose feinte



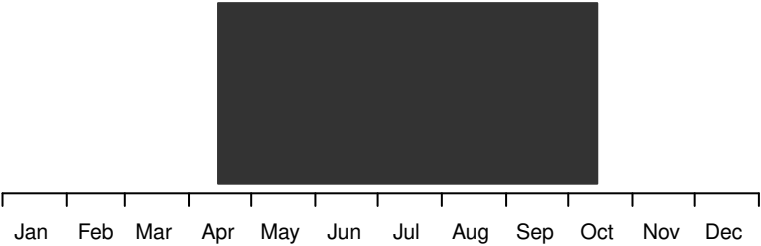
Alose feinte
Œufs-Larves



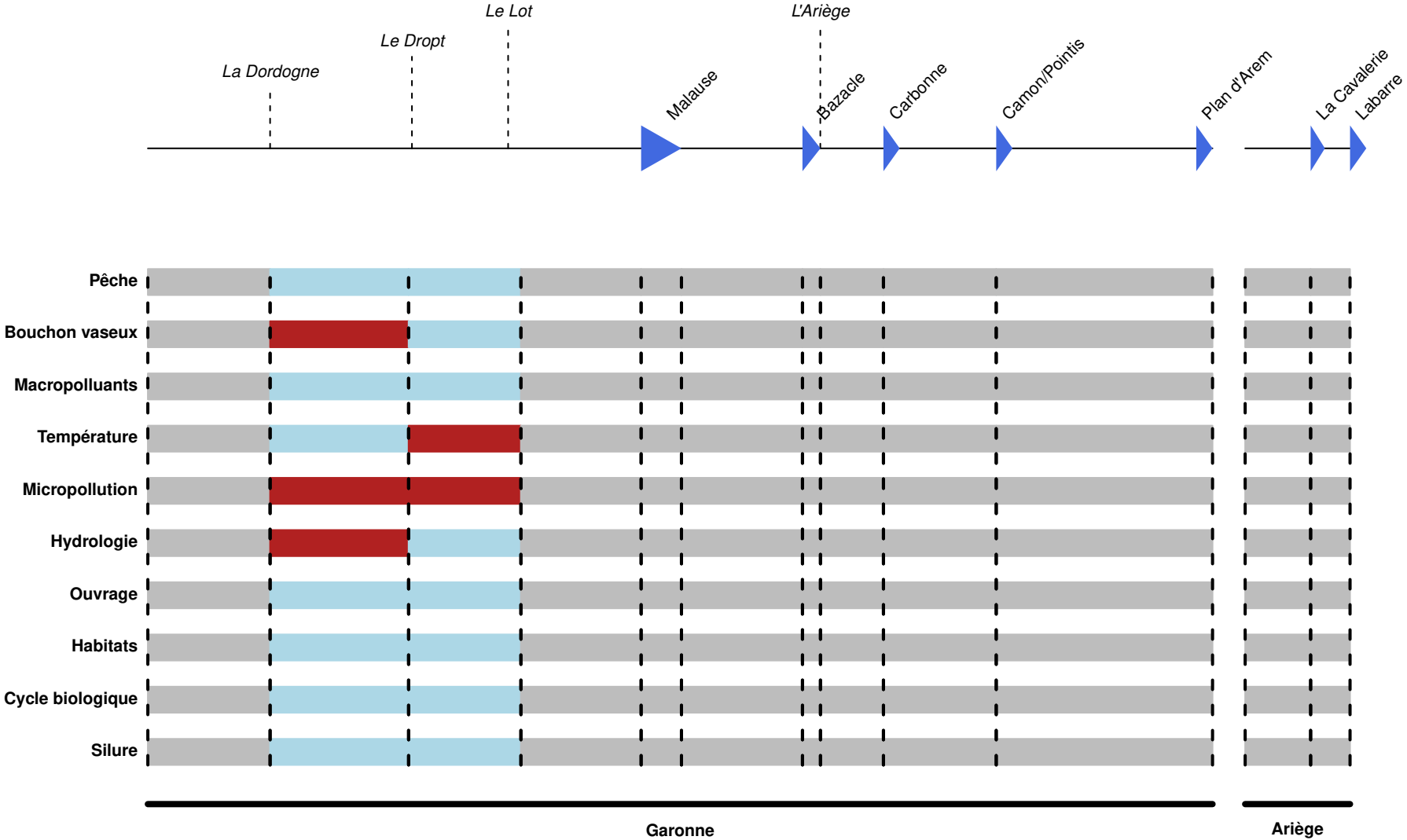
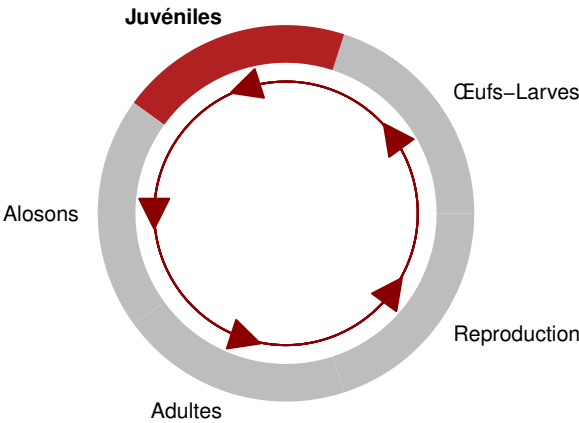
Alose feinte

Juveniles

Calendrier



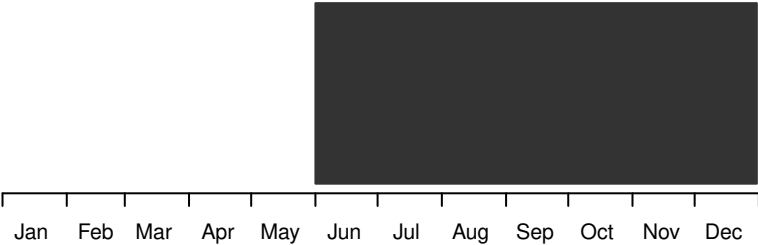
Cycle biologique



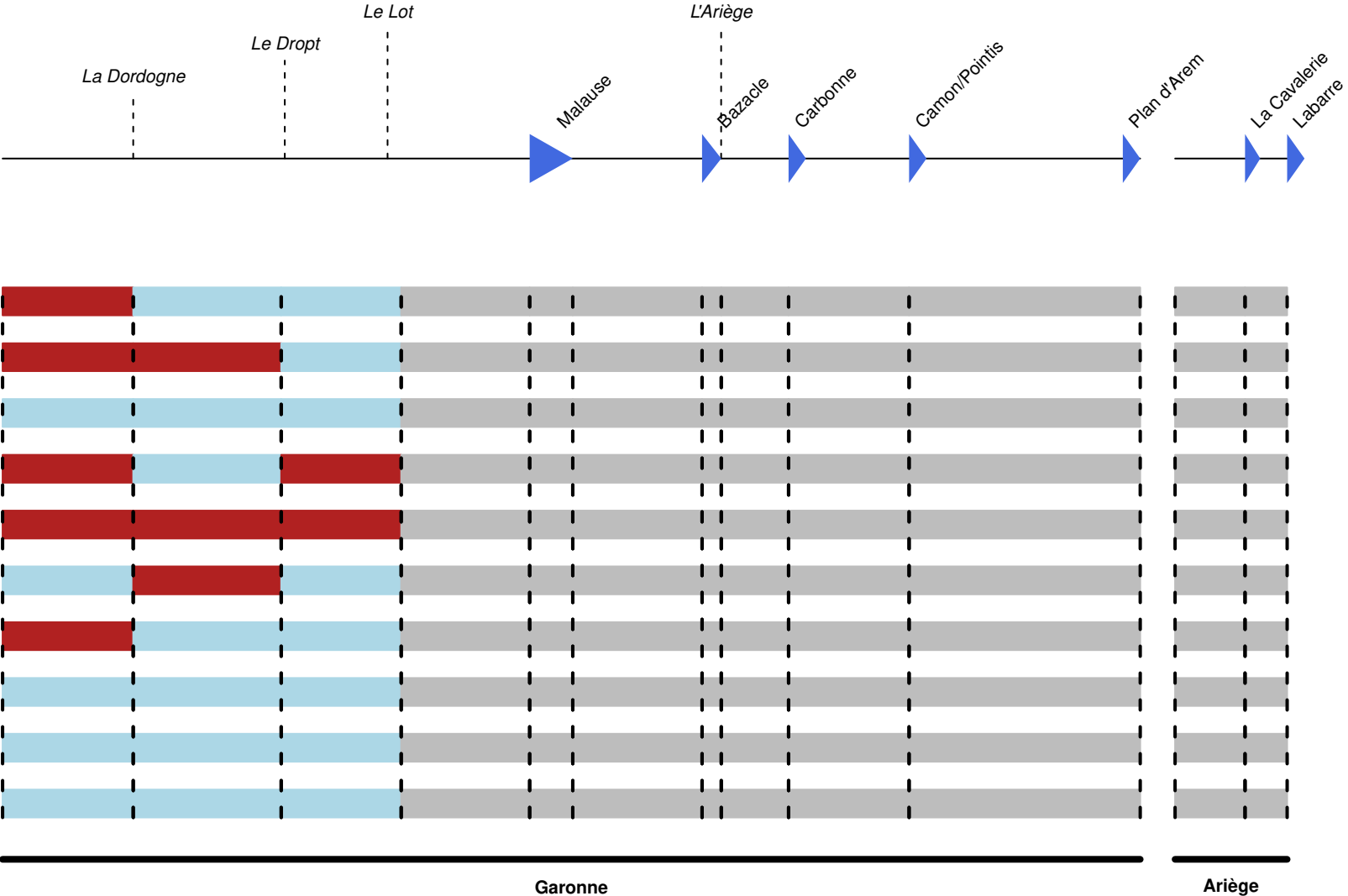
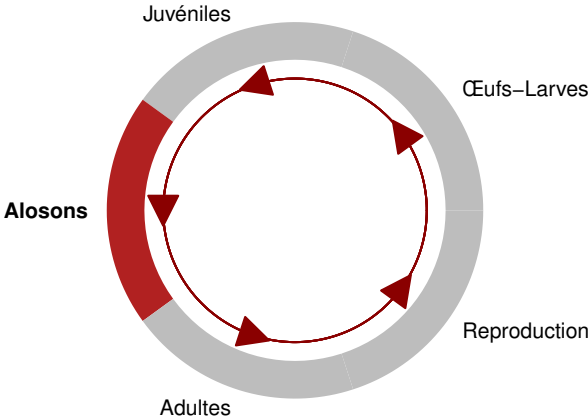
Alose feinte

Alosons

Calendrier



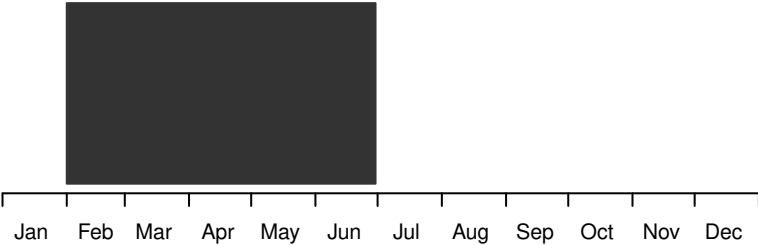
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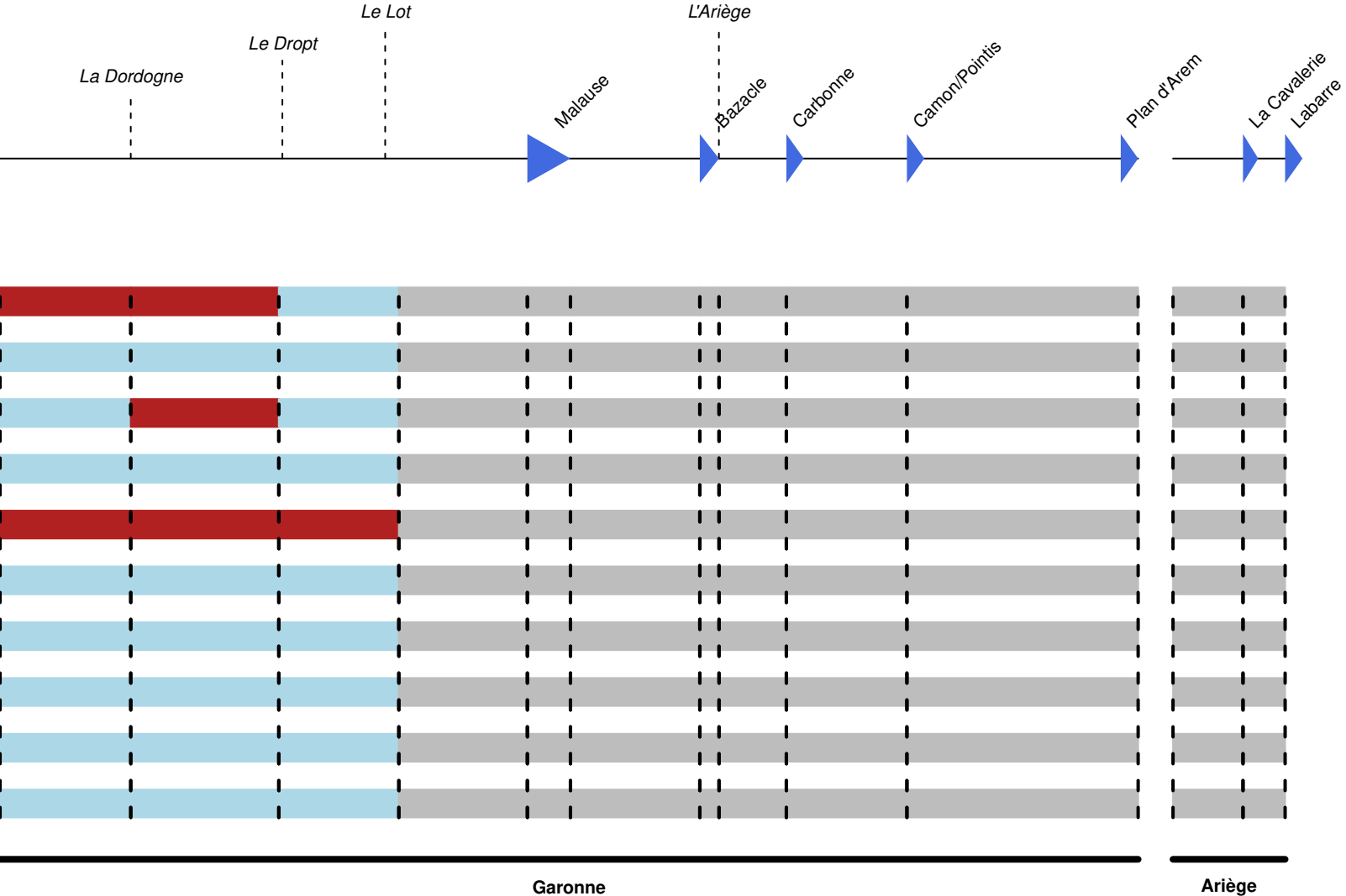
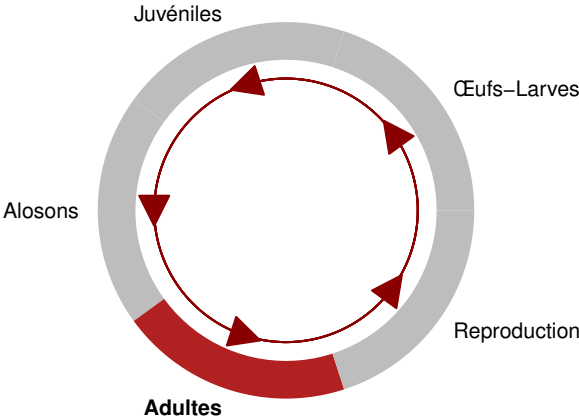
Alose feinte

Adultes

Calendrier

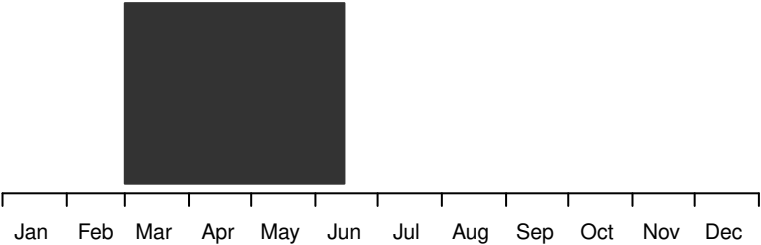


Cycle biologique

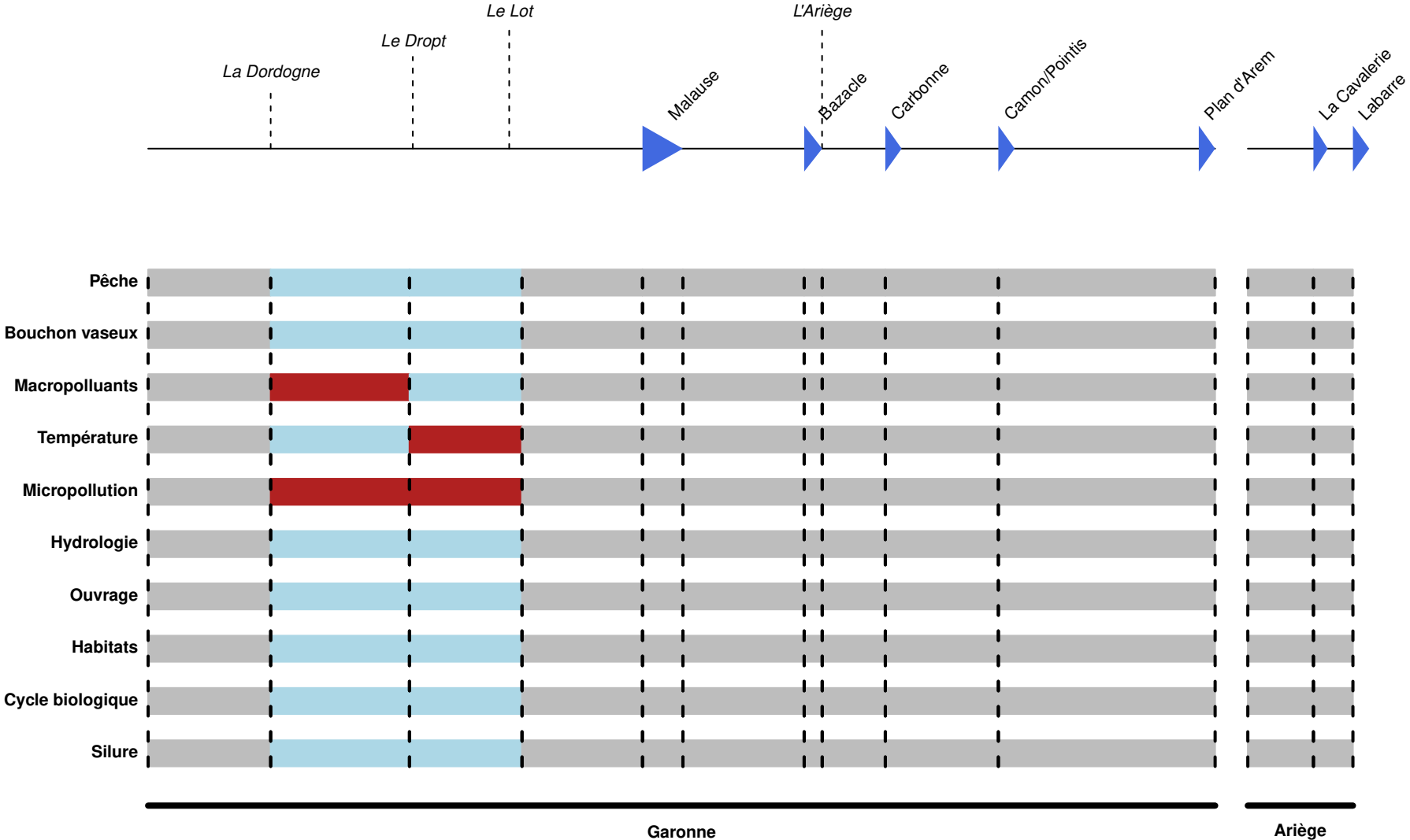
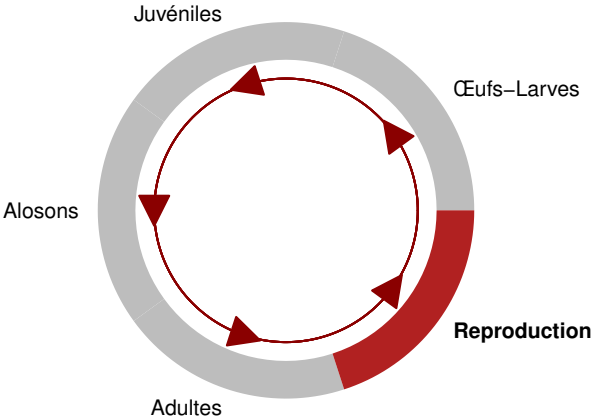


Alose feinte
Reproduction

Calendrier



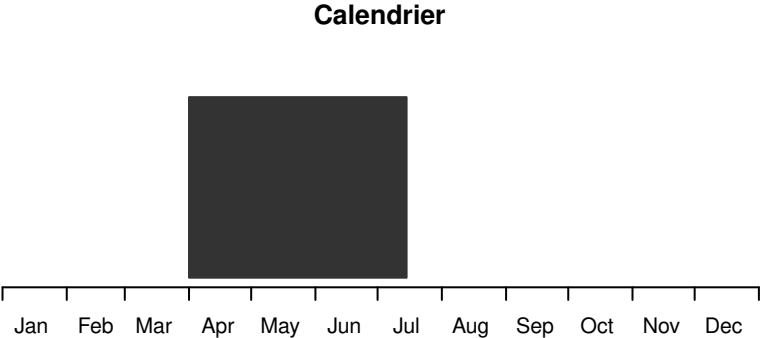
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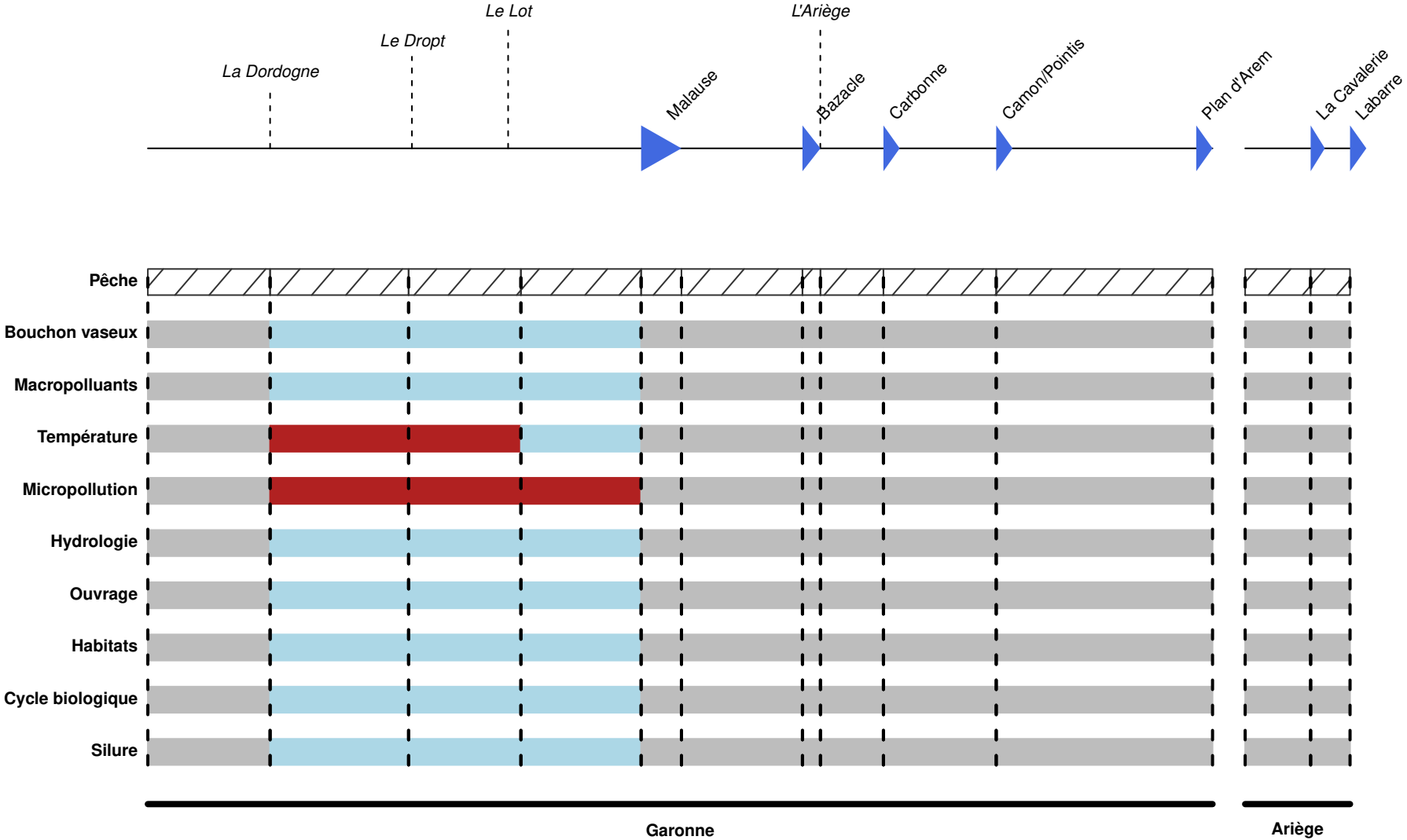
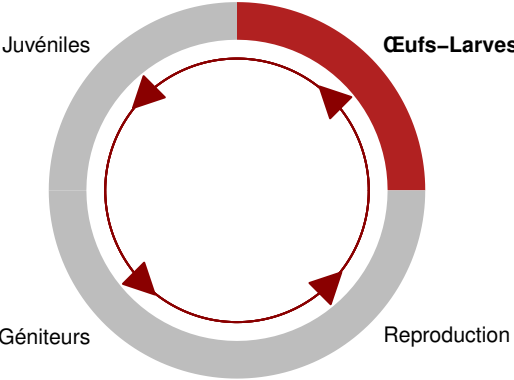
Esturgeon européen

Esturgeon européen

Œufs-Larves

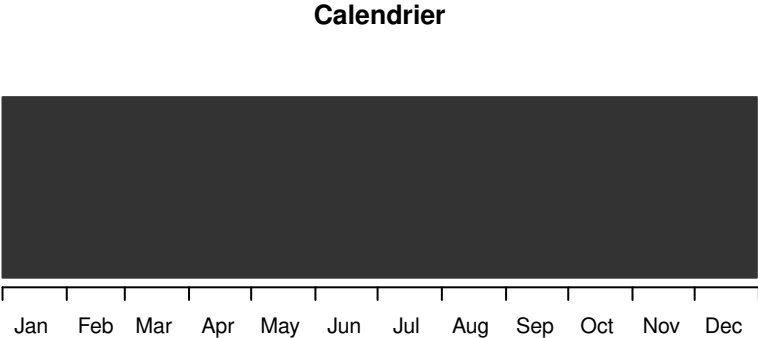


Cycle biologique

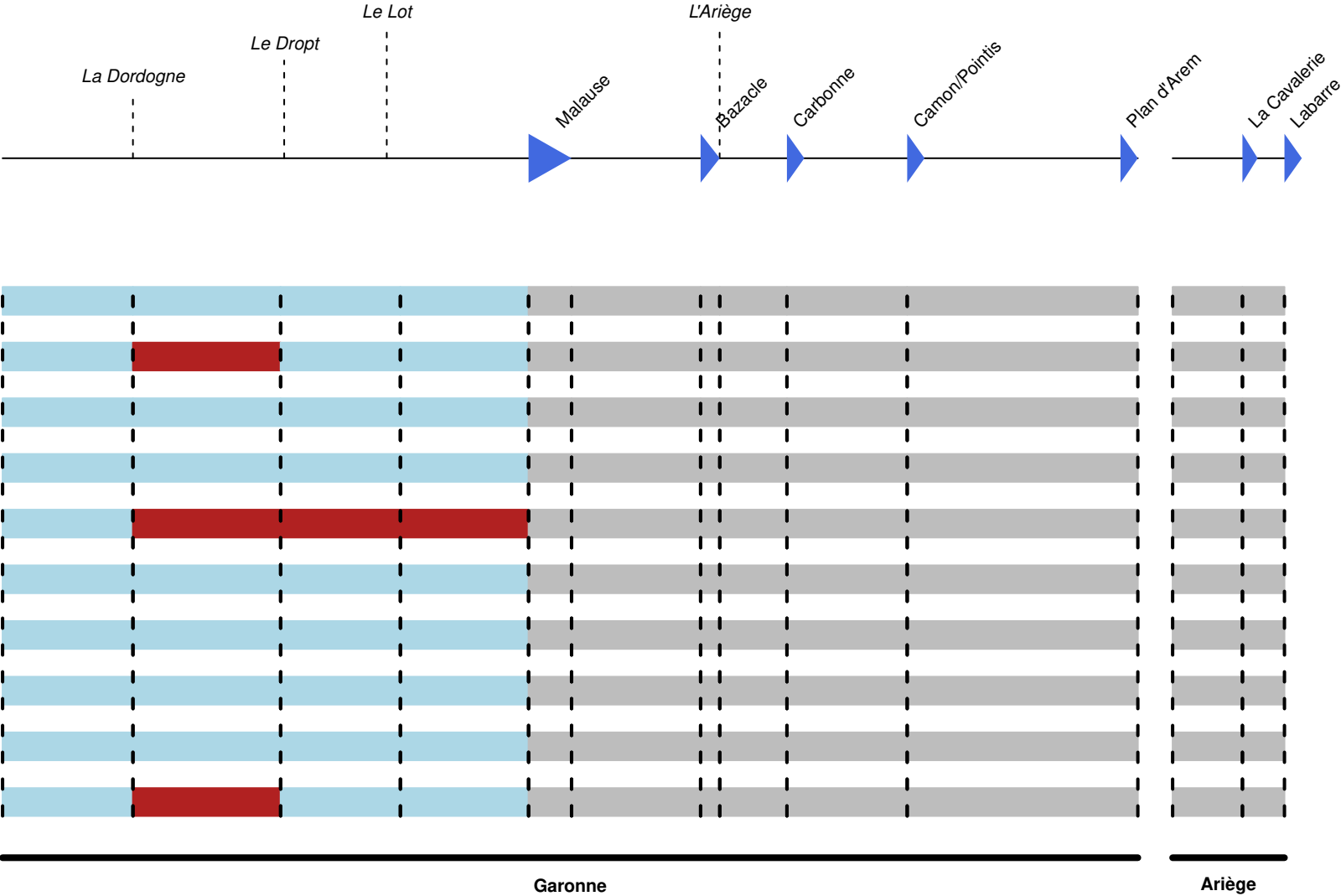
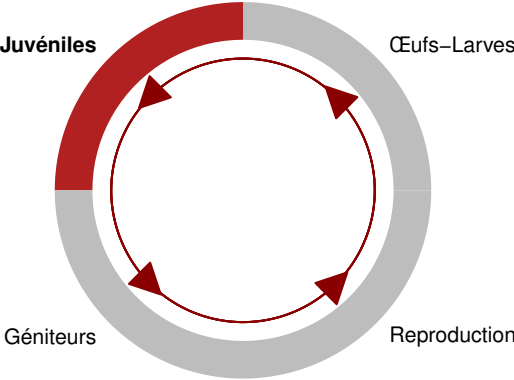


Esturgeon européen

Juveniles



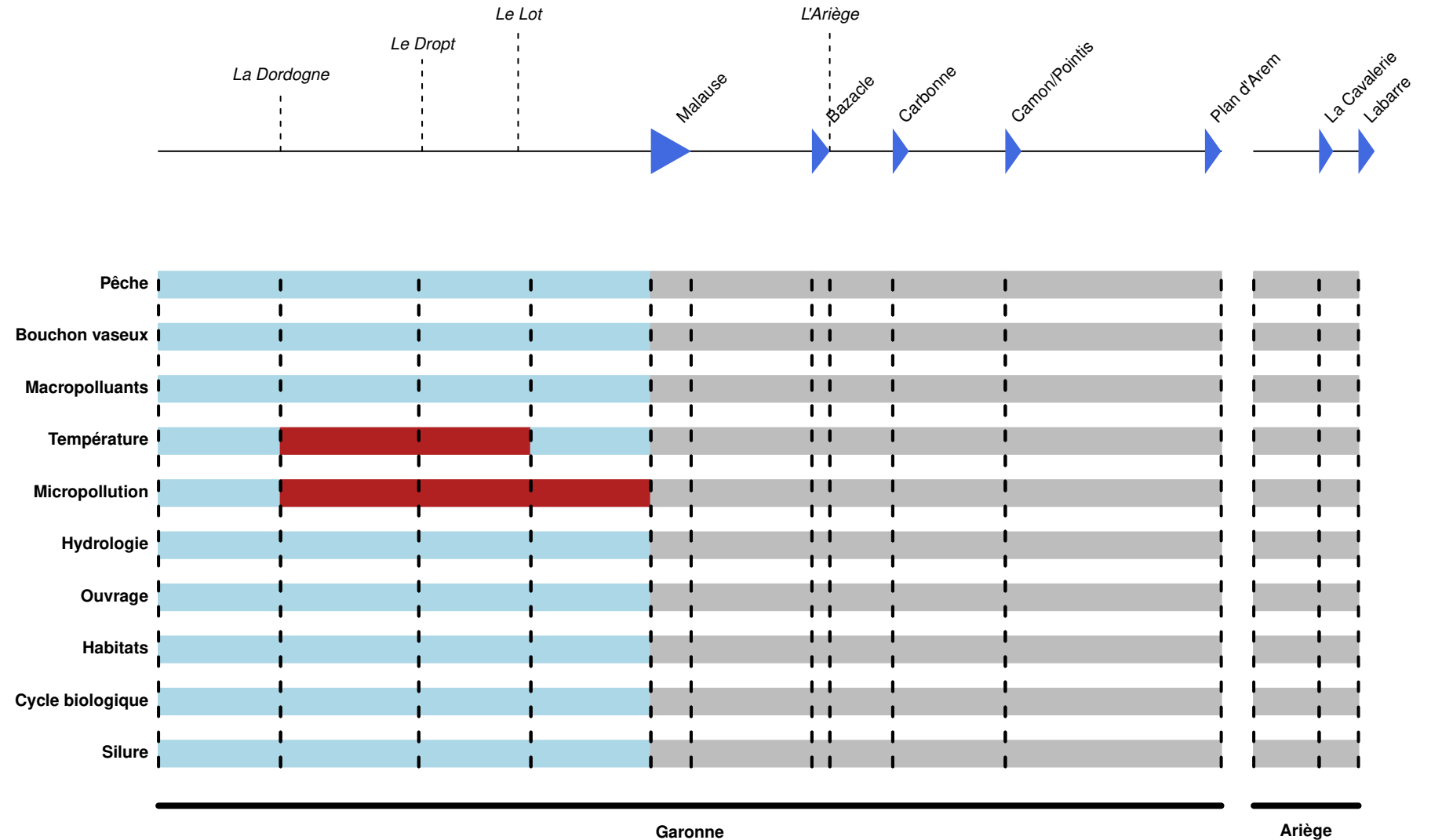
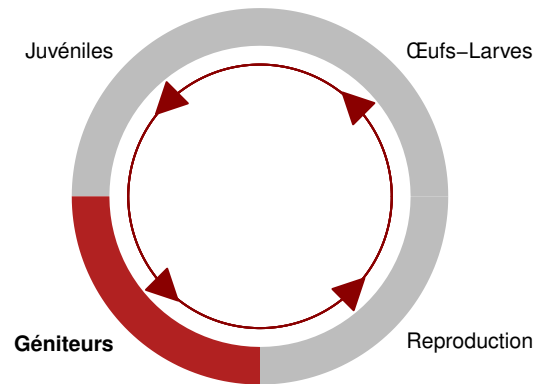
Cycle biologique



Géniteurs

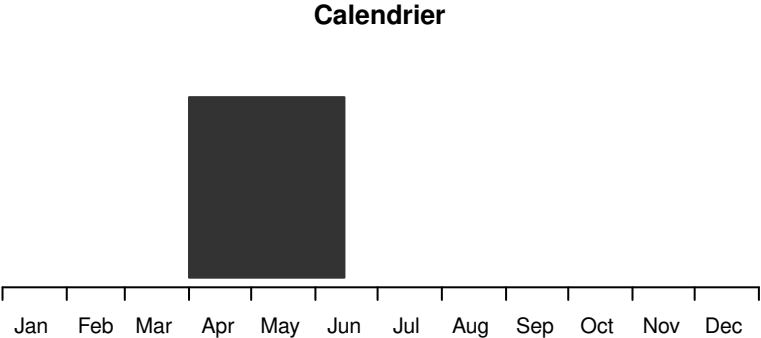
Month	Number of people (millions)
Jan	2.5
Feb	3.5
Mar	4.5
Apr	5.5
May	6.5
Jun	8.5
Jul	9.5
Aug	8.5
Sep	7.5
Oct	6.5
Nov	5.5
Dec	4.5

Cycle biologique

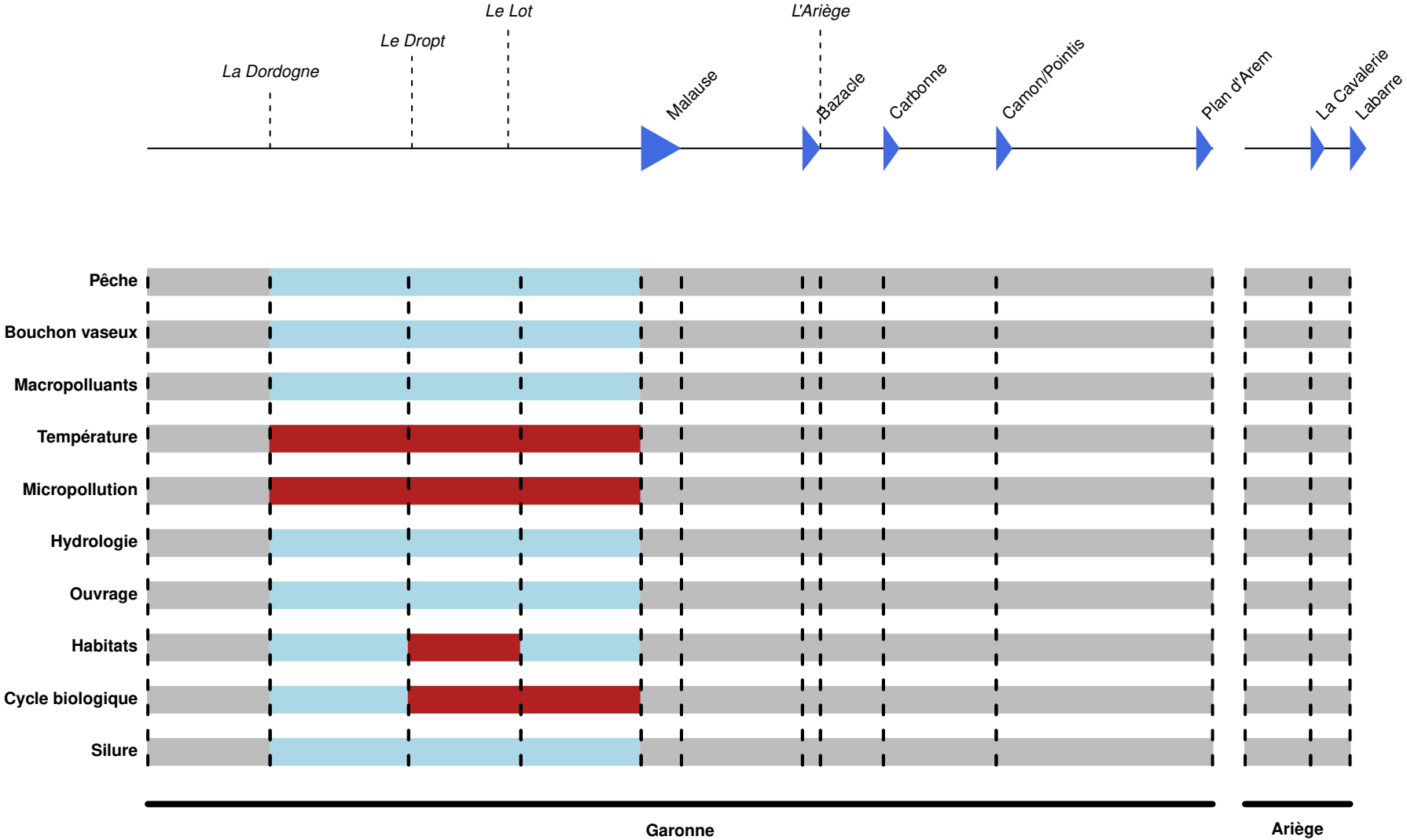
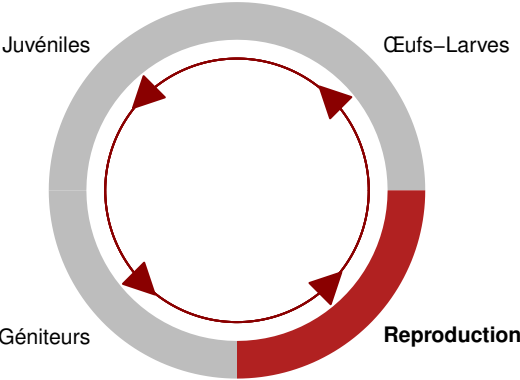


Esturgeon européen

Reproduction



Cycle biologique



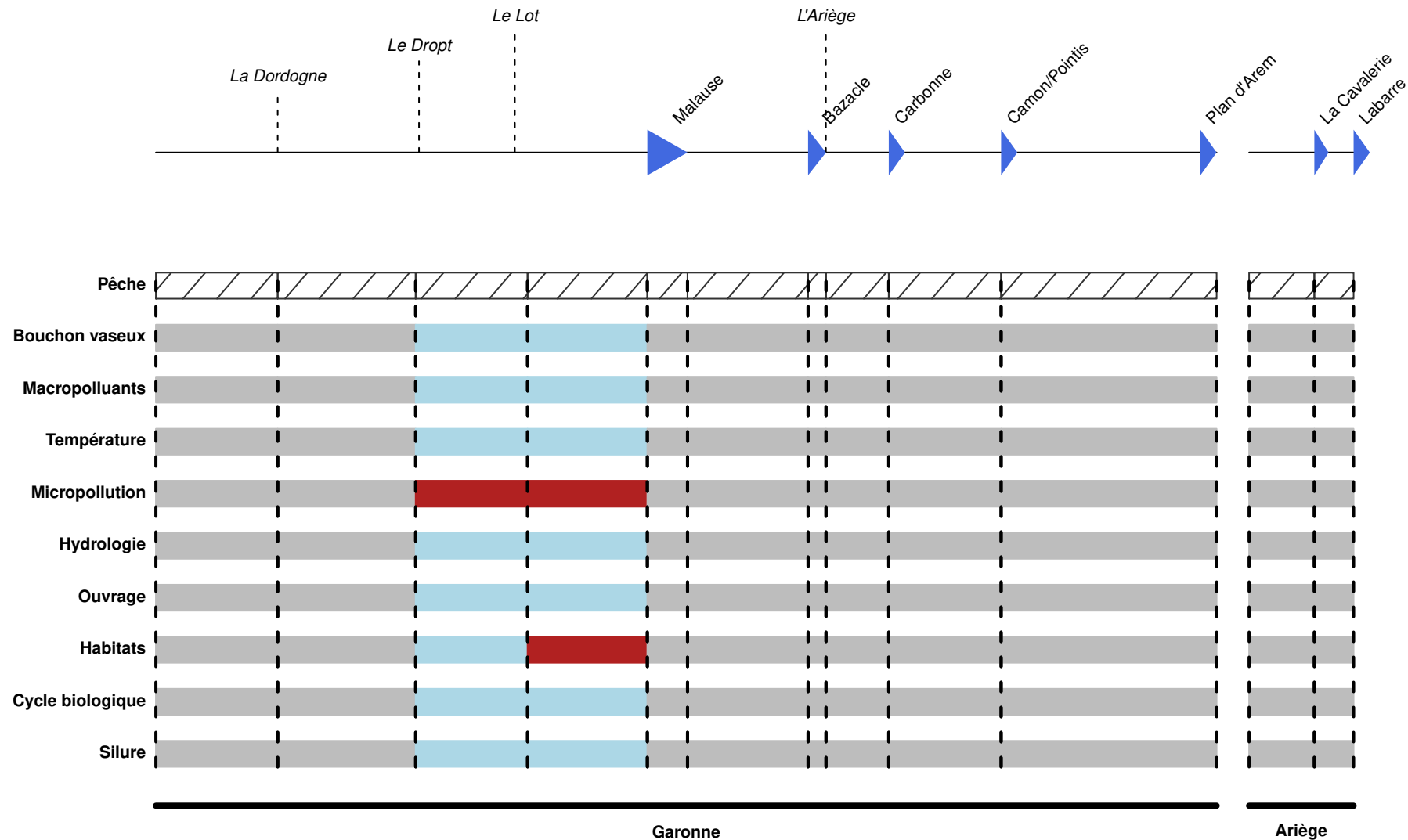
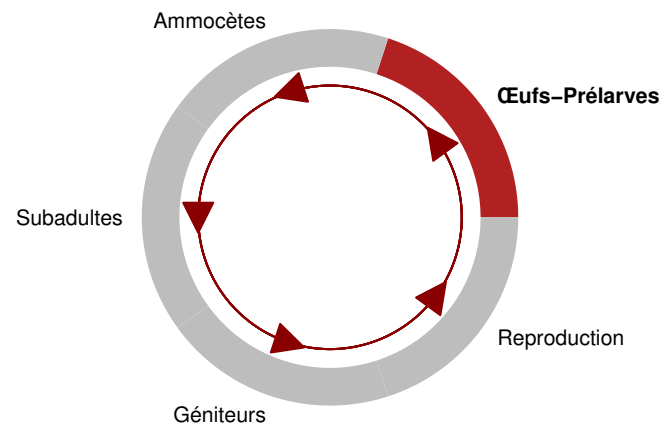
Lamproie fluviatile

Œufs-Prélarves

5

Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec

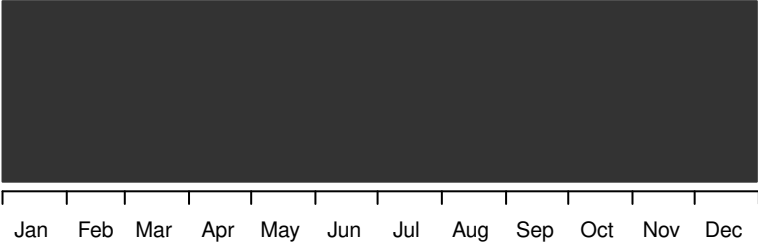
Cycle biologique



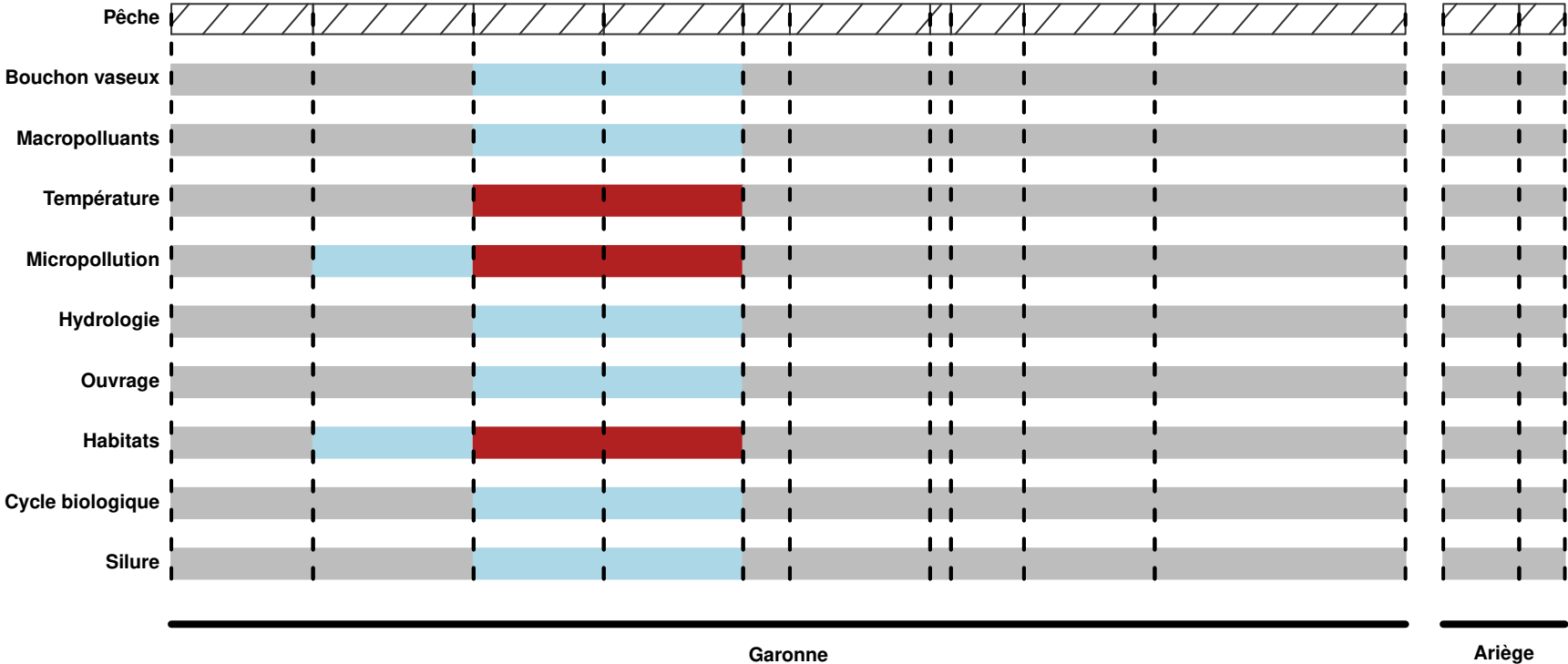
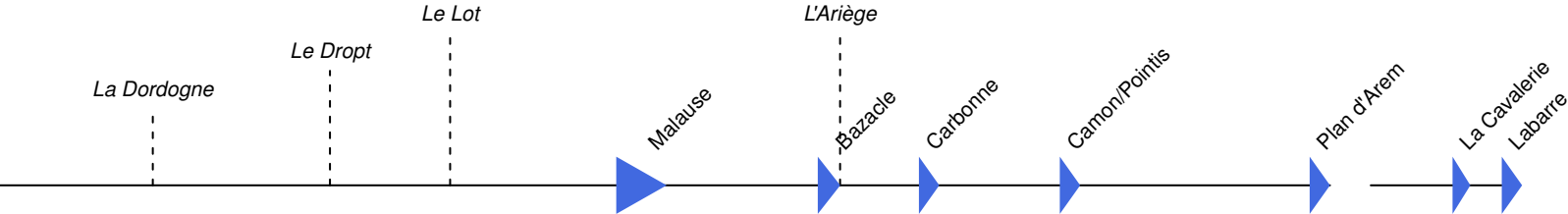
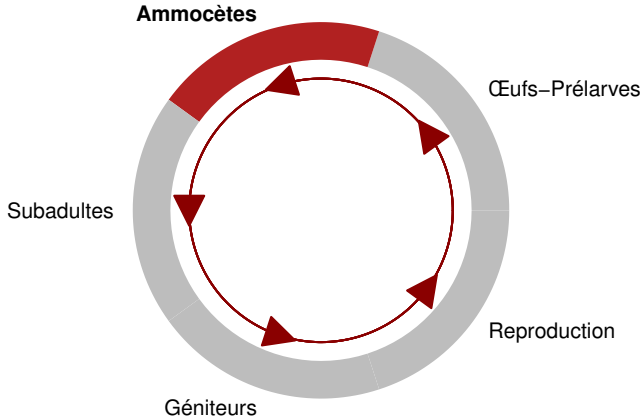
Lamproie fluviatile

Ammocètes

Calendrier

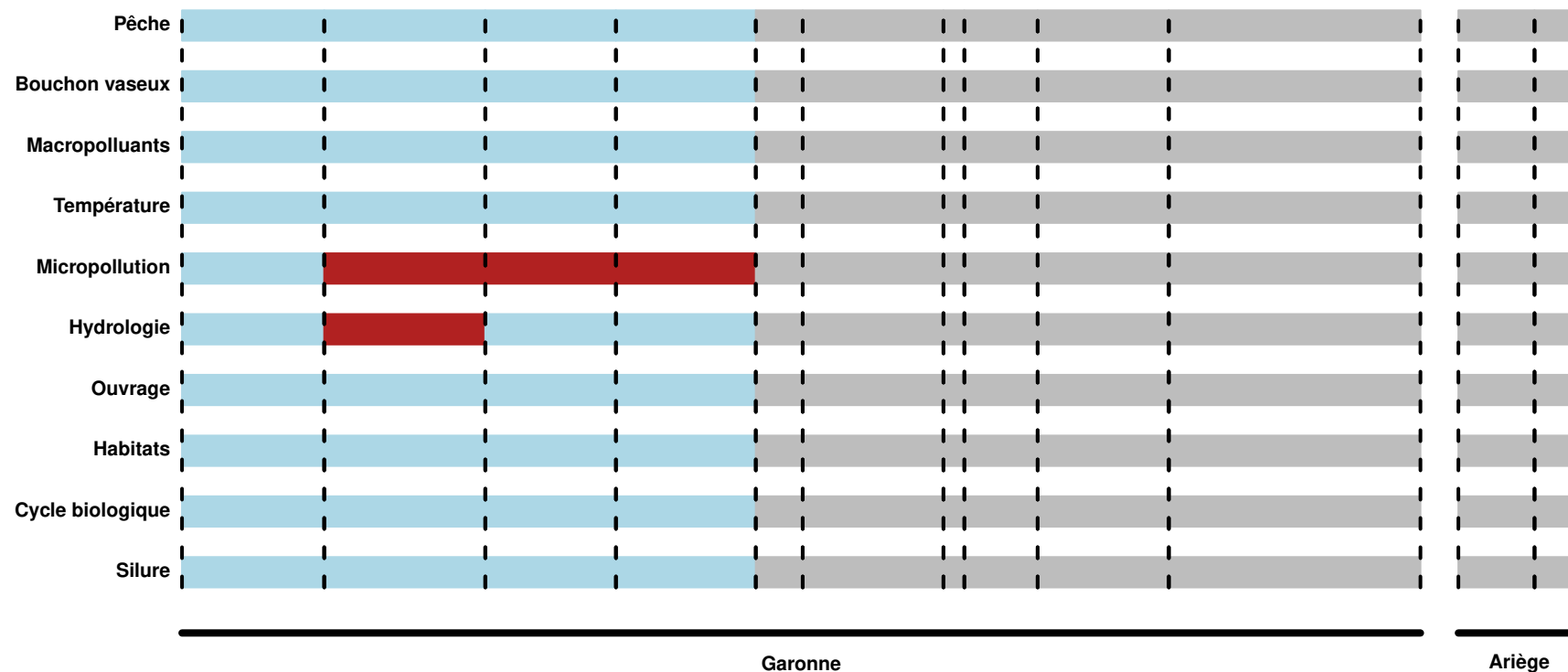
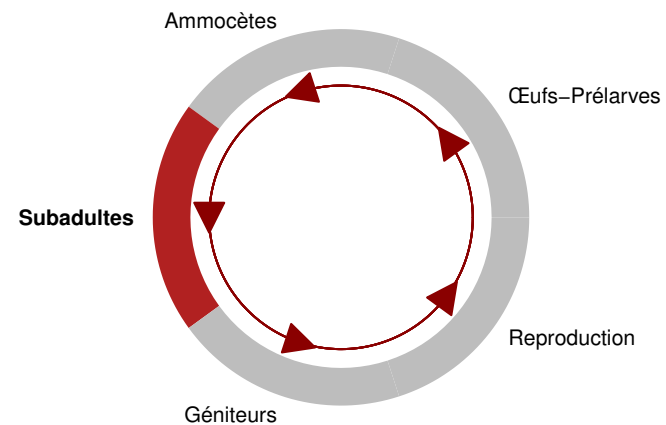
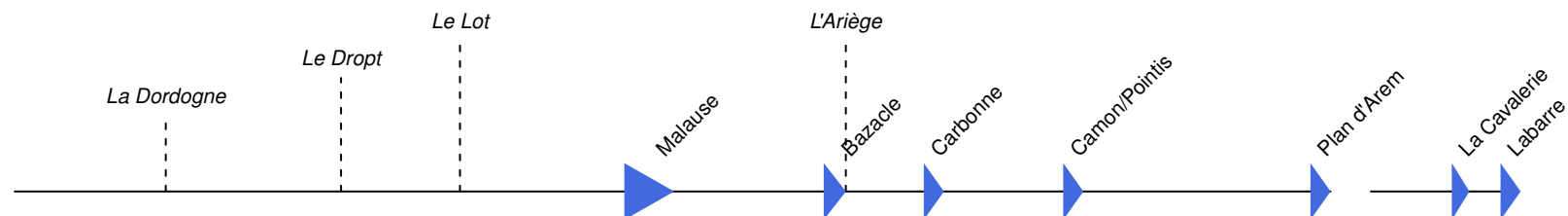
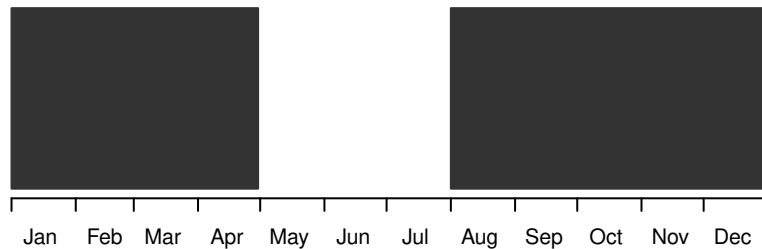


Cycle biologique



Subadultes

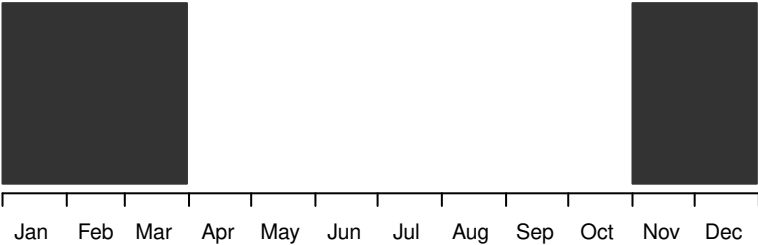
Cycle biologique



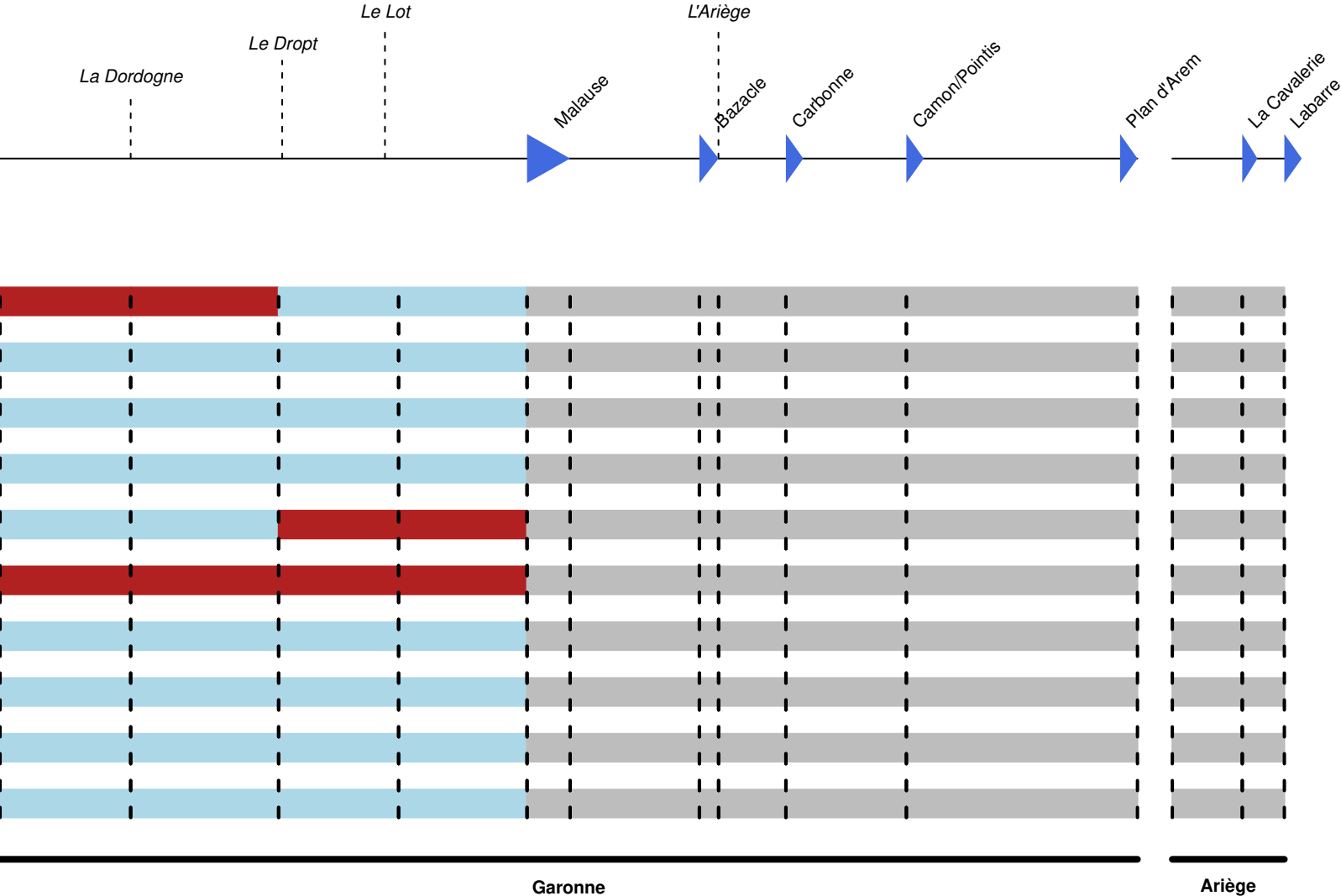
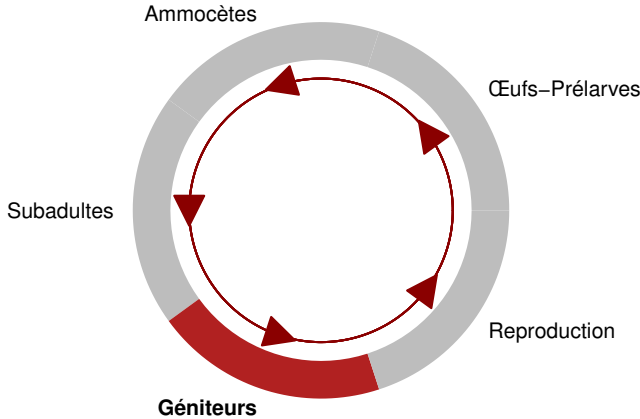
Lamproie fluviatile

Géniteurs

Calendrier



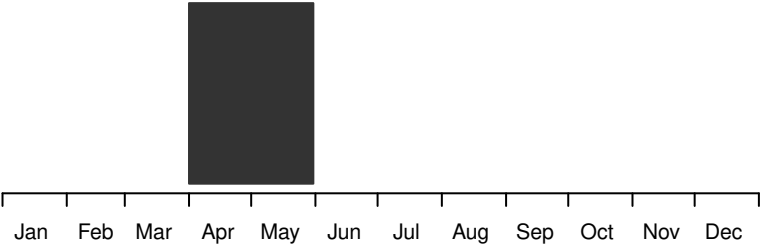
Cycle biologique



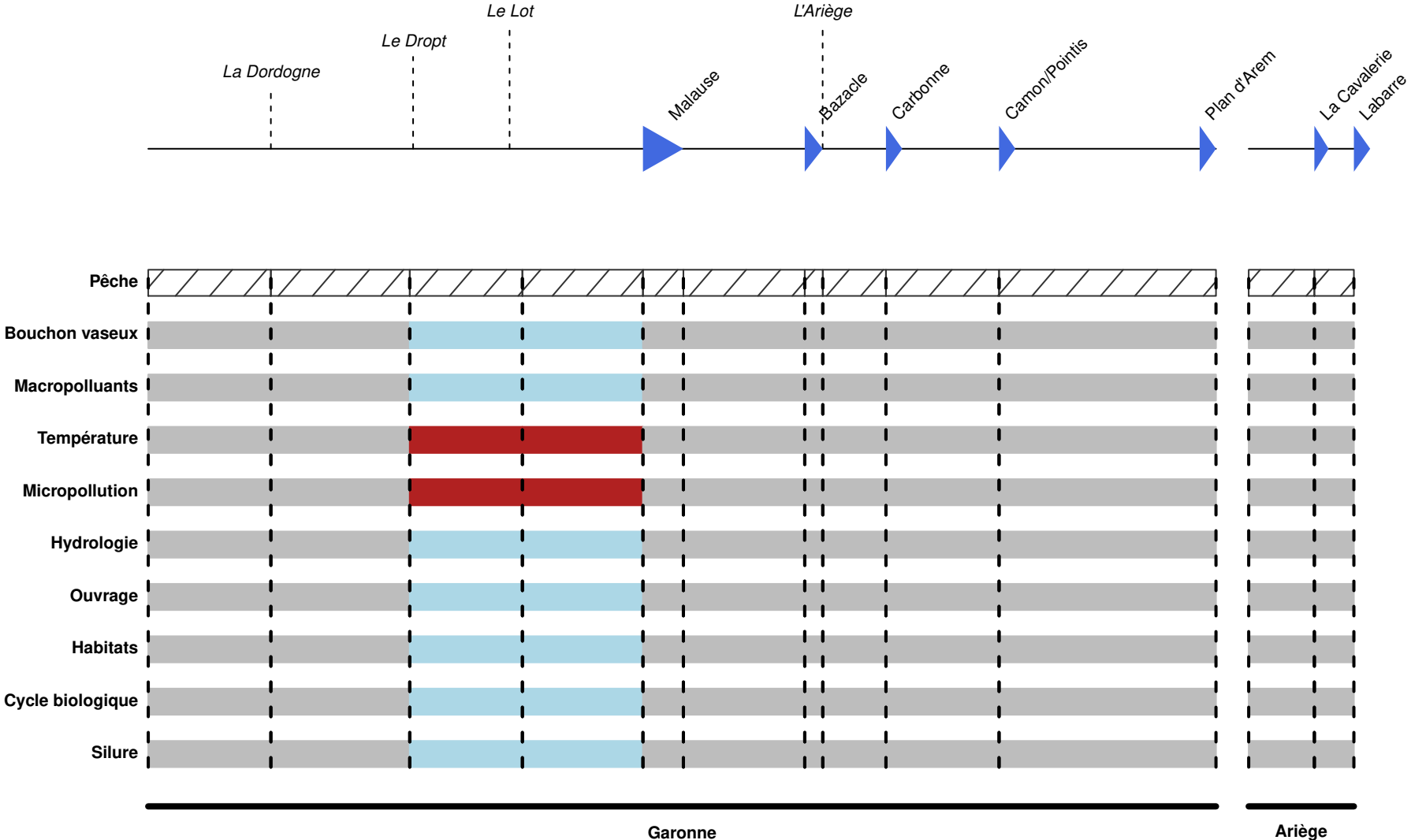
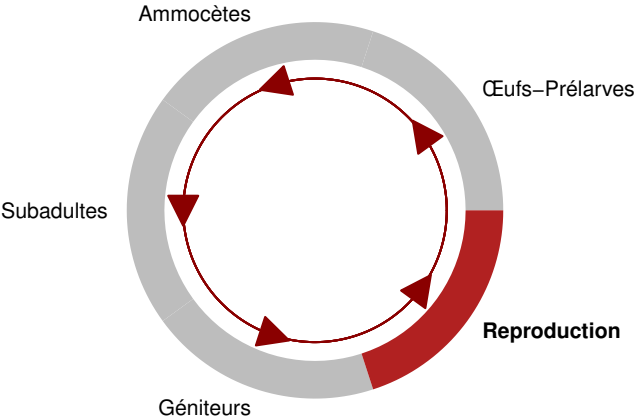
Lamproie fluviatile

Reproduction

Calendrier



Cycle biologique



Lamproie marine

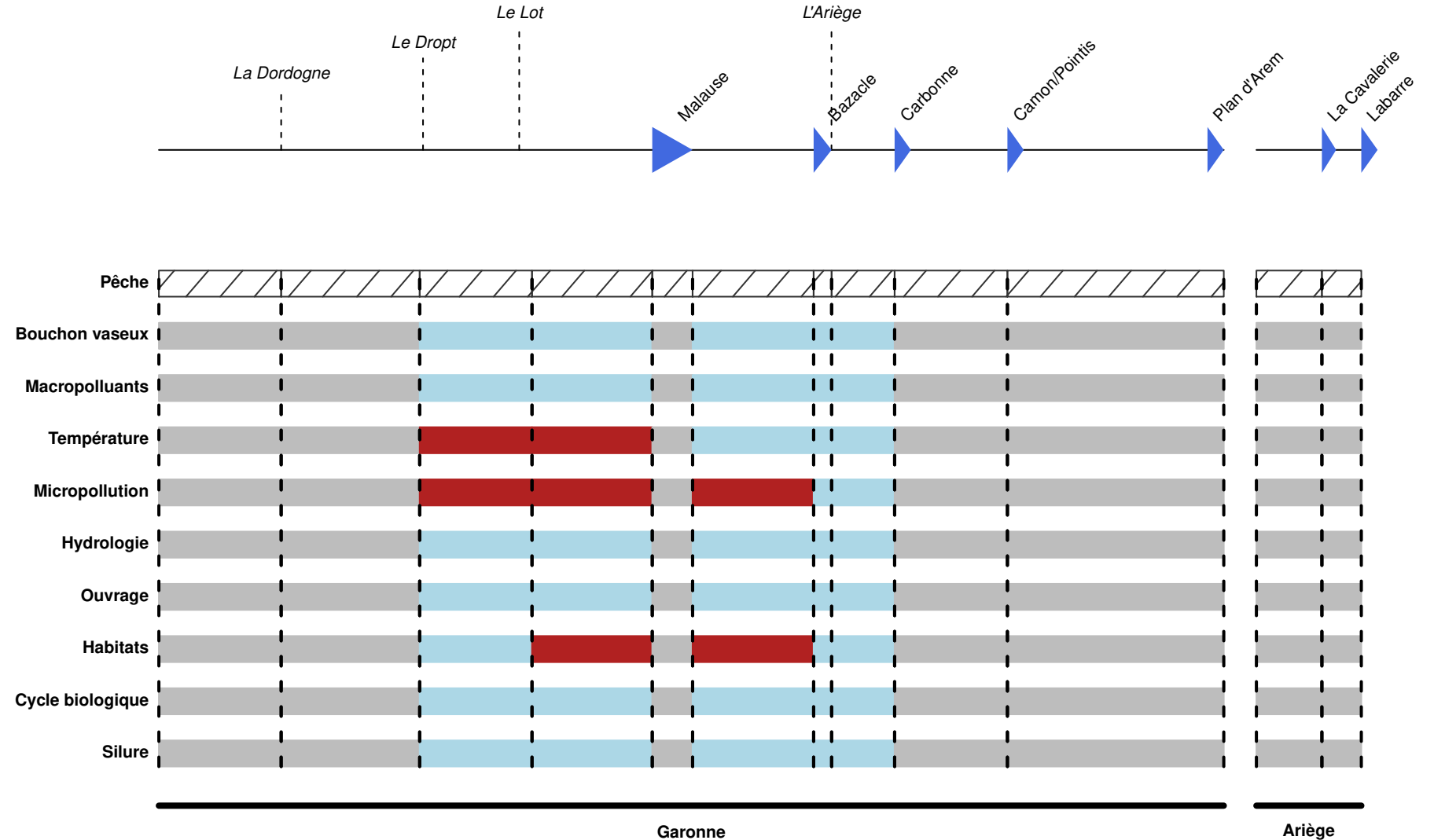
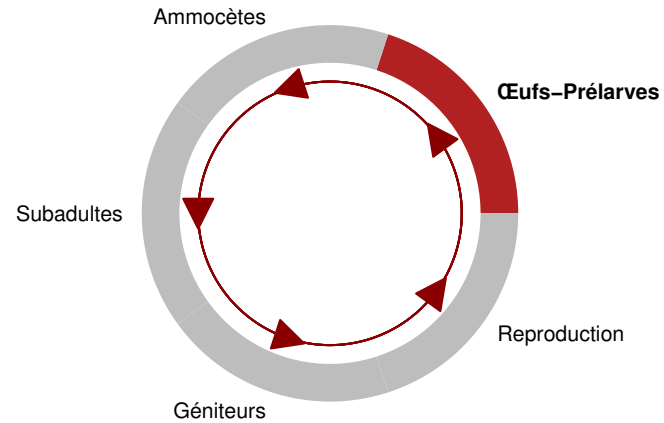
Lamproie marine

Œufs-Prélarves

Calendrier

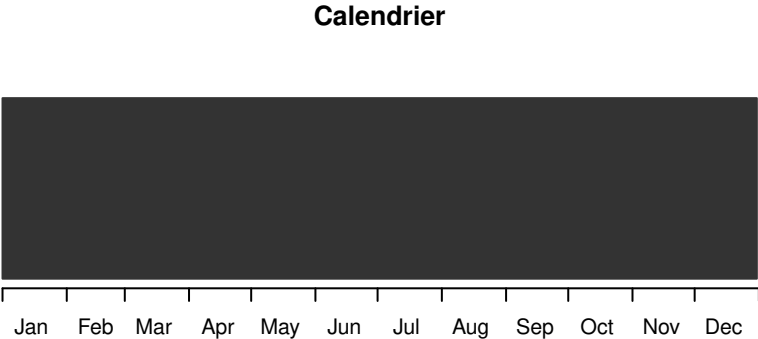


Cycle biologique

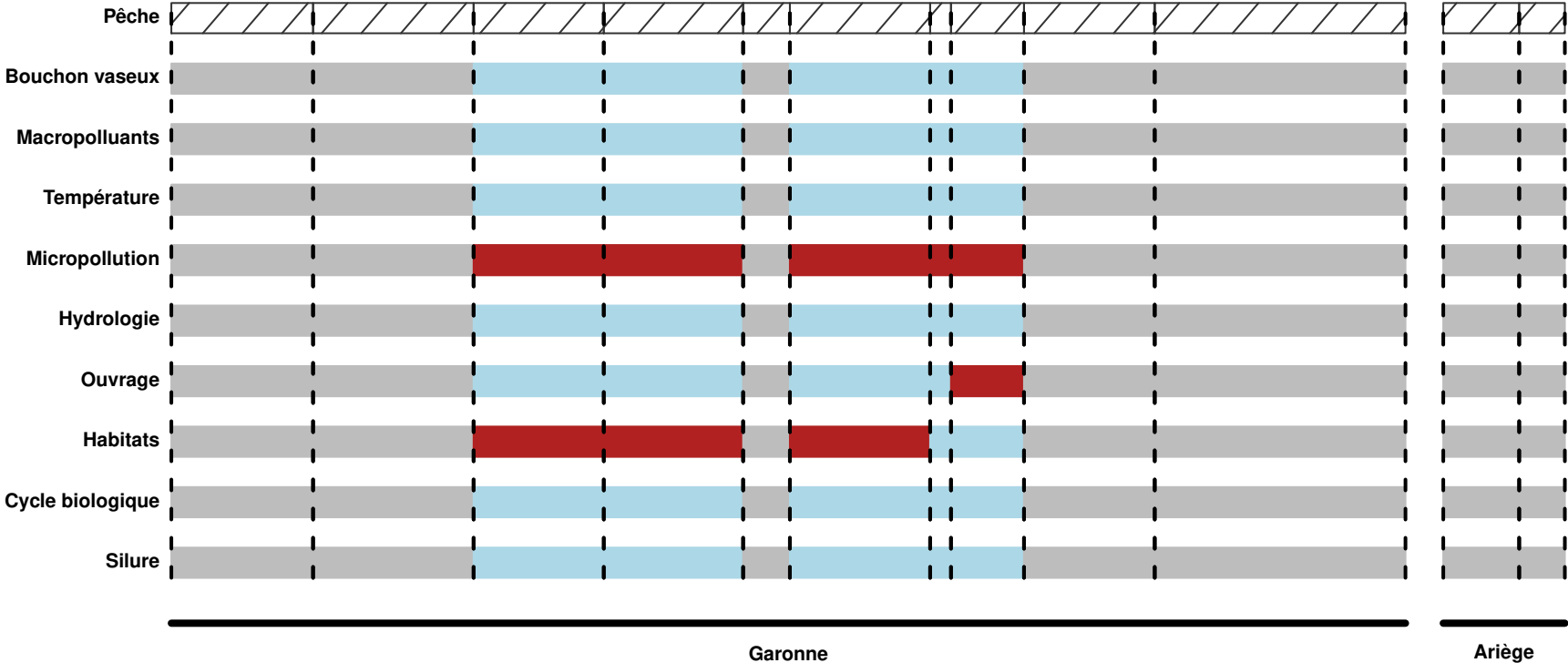
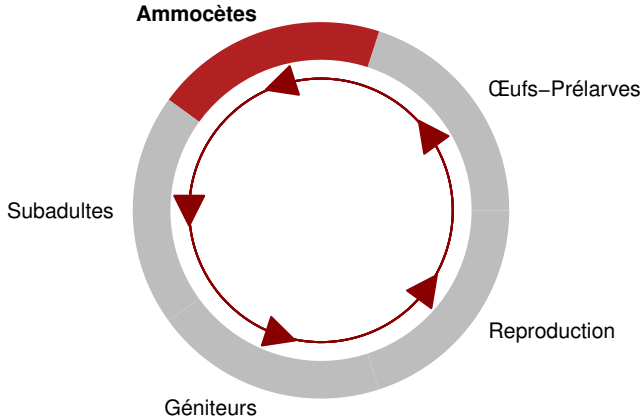
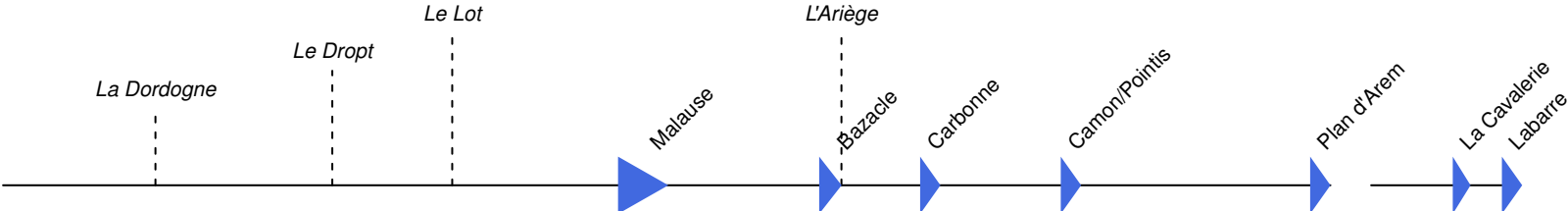


Lamproie marine

Ammocètes



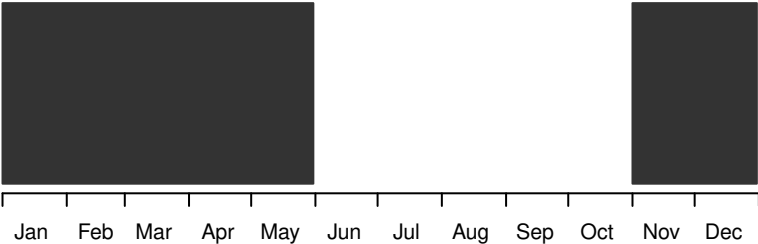
Cycle biologique



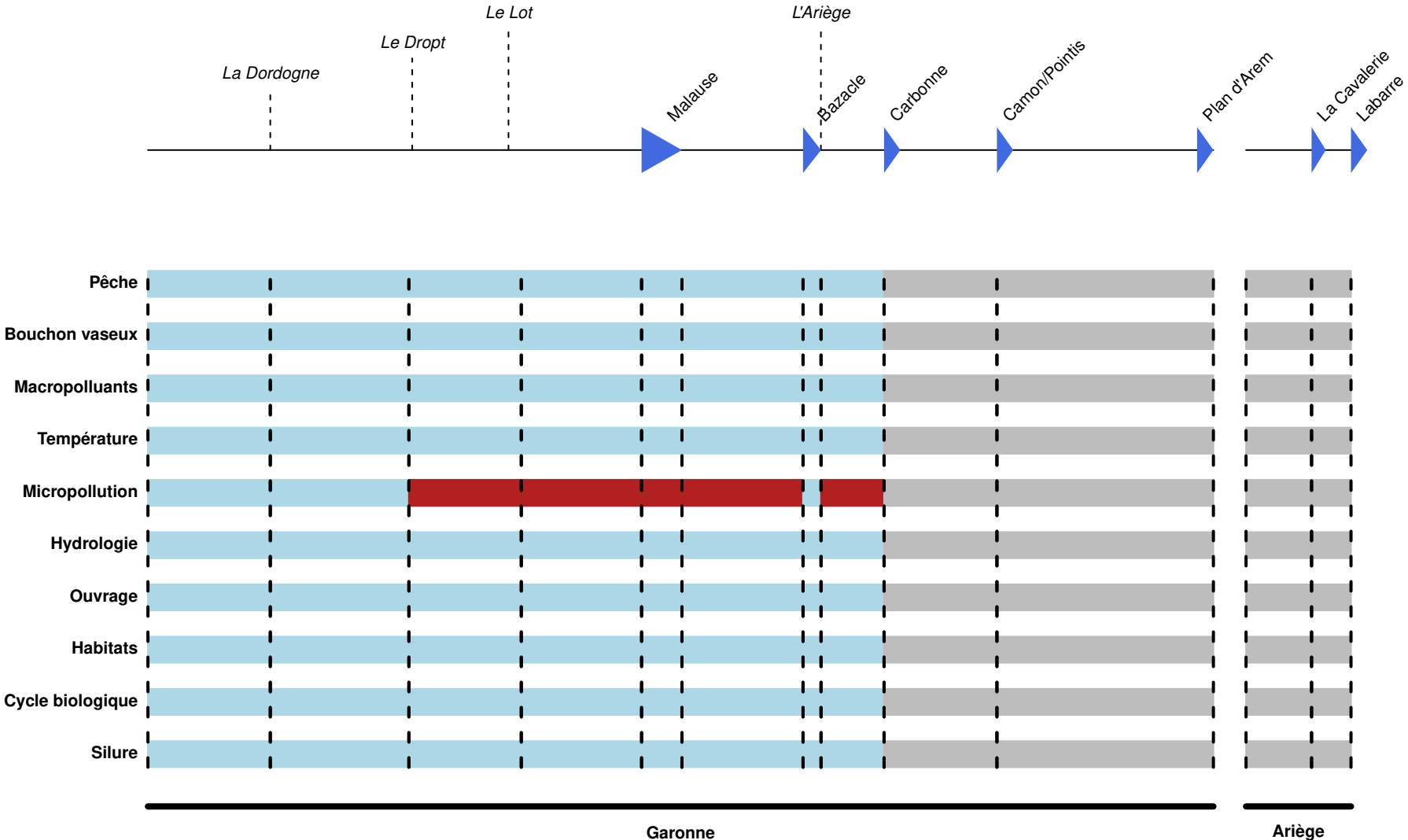
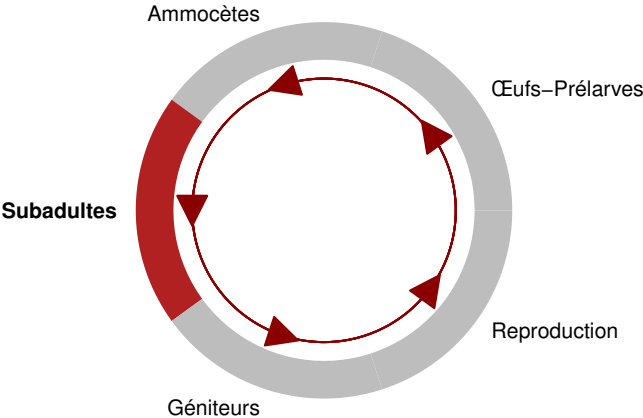
Lamproie marine

Subadultes

Calendrier

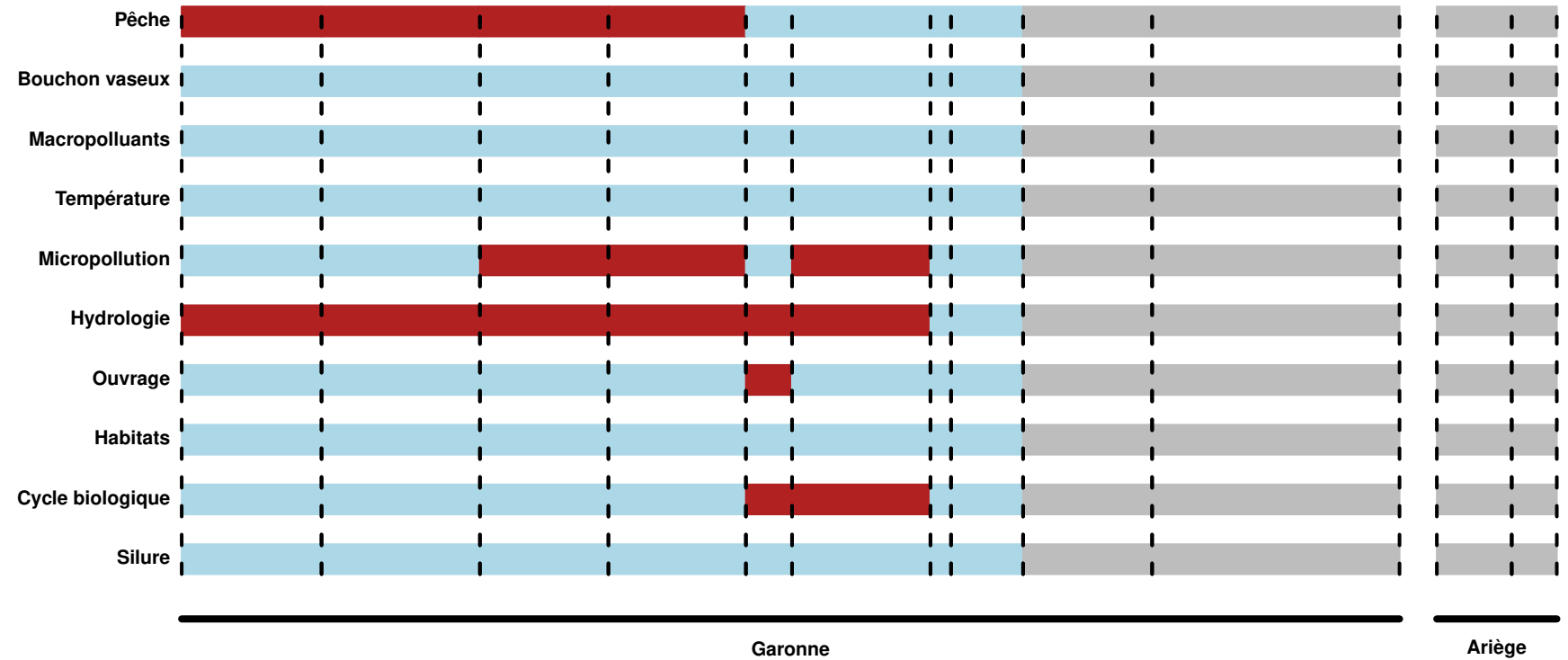


Cycle biologique



Géniteurs

Month	Number of People
Jan	20
Feb	30
Mar	40
Apr	50
May	60
Jun	70
Jul	80
Aug	70
Sep	60
Oct	50
Nov	40
Dec	30



Lamproie marine

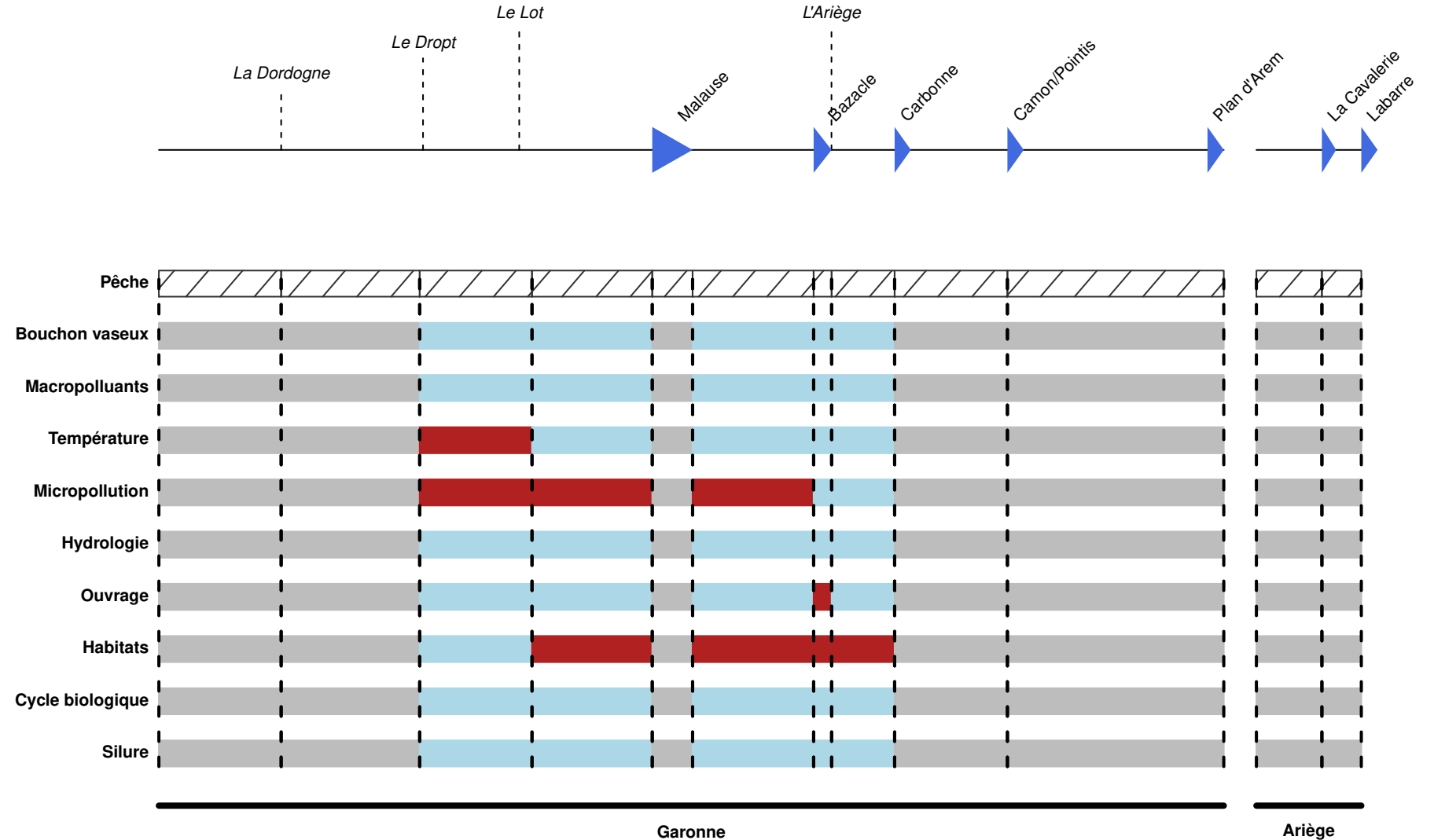
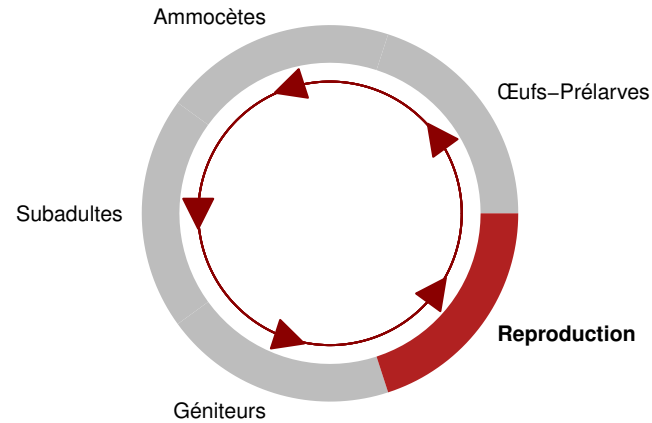
Reproduction

Calendrier



Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec

Cycle biologique

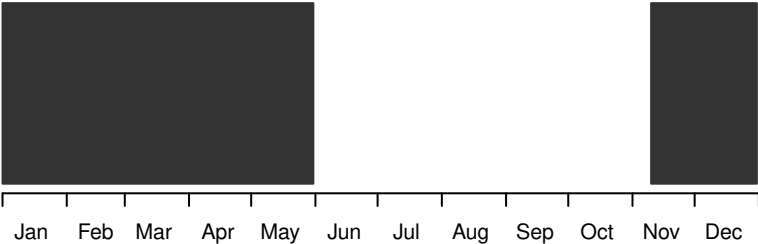


Saumon atlantique

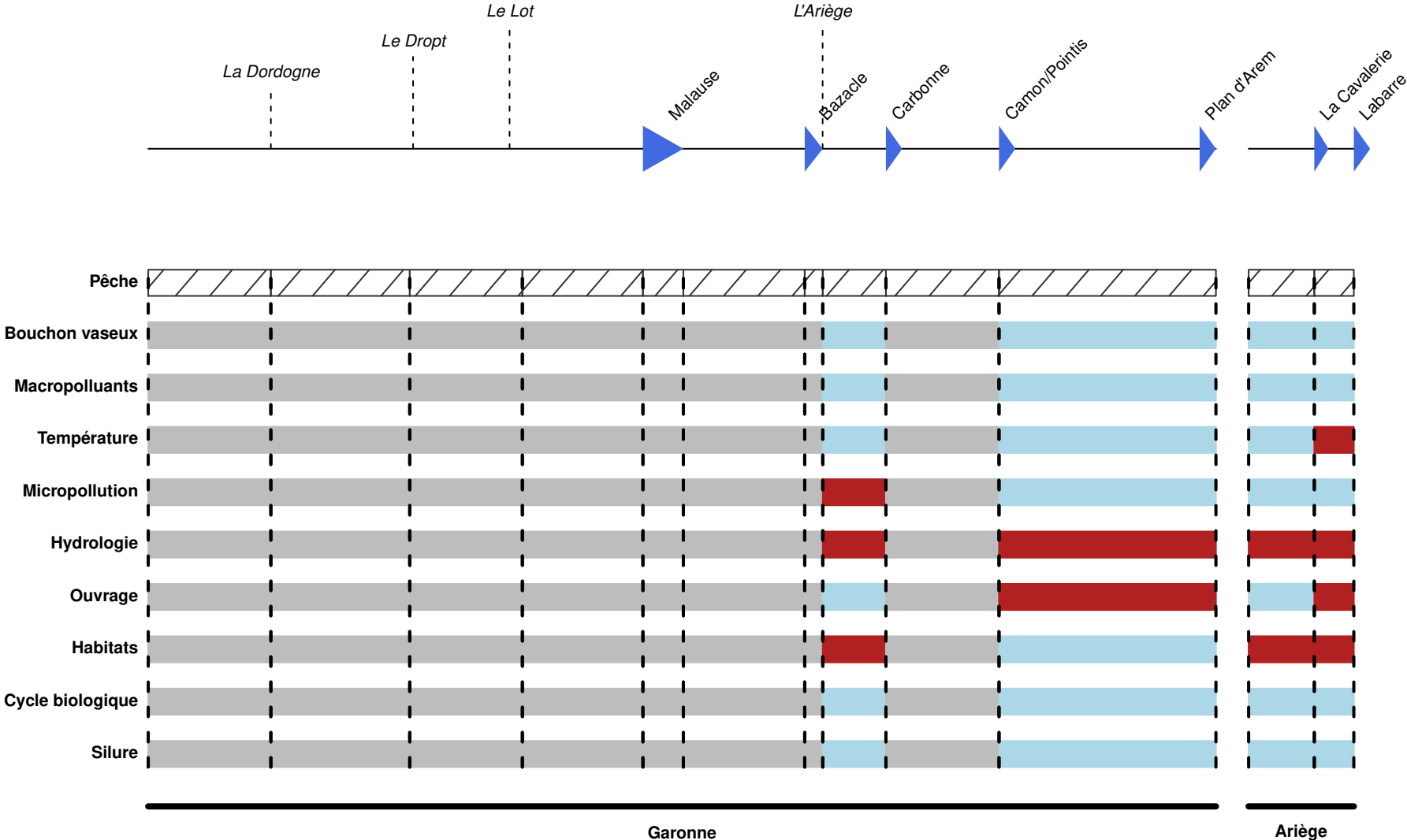
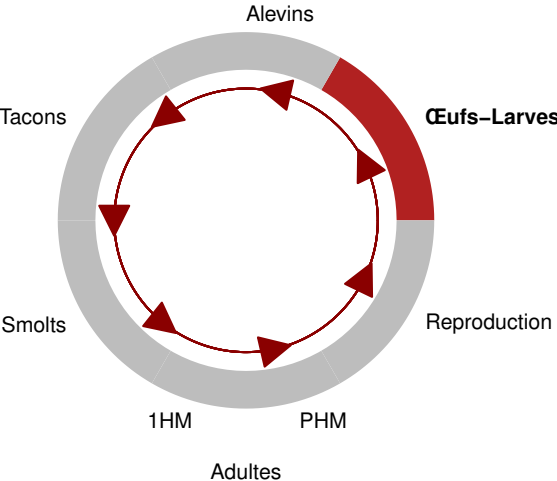
Saumon Atlantique

Œufs-Larves

Calendrier

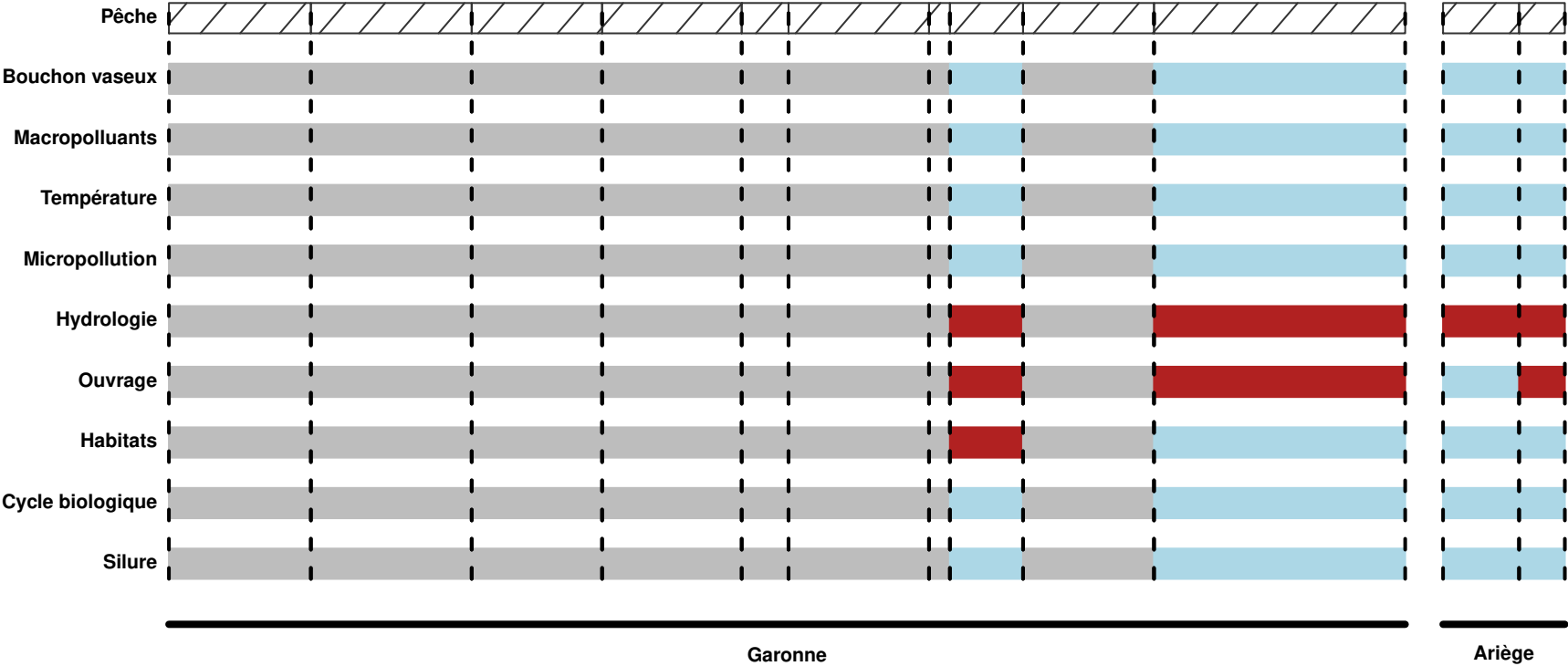
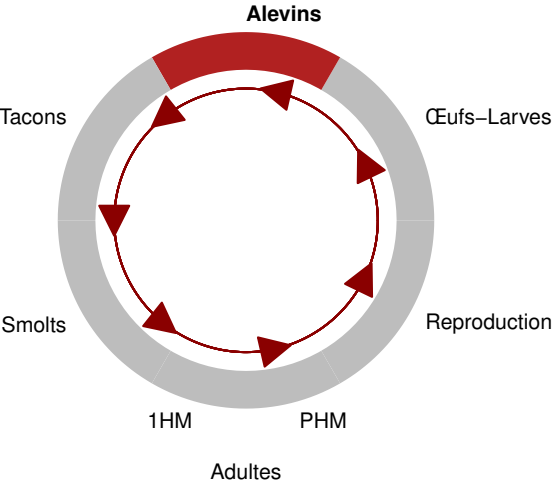
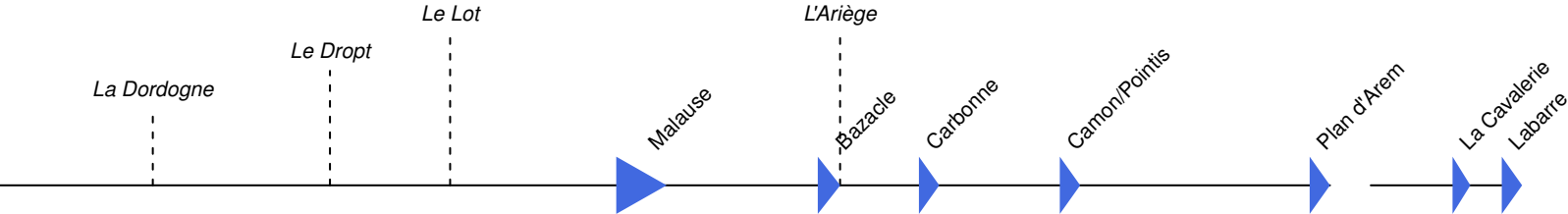
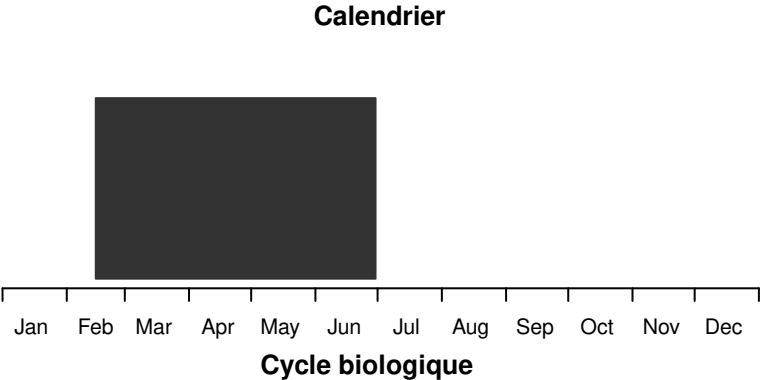


Cycle biologique



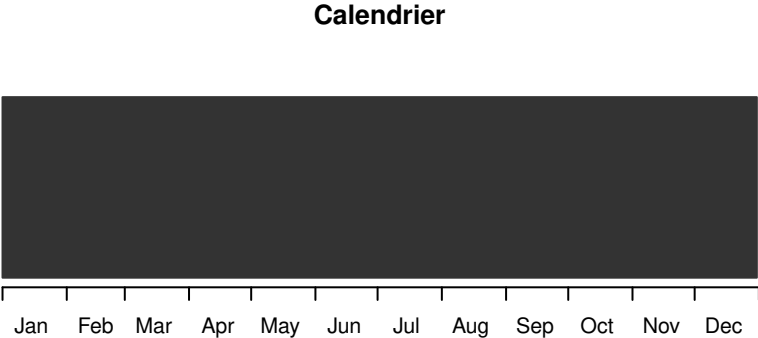
Saumon Atlantique

Alevins

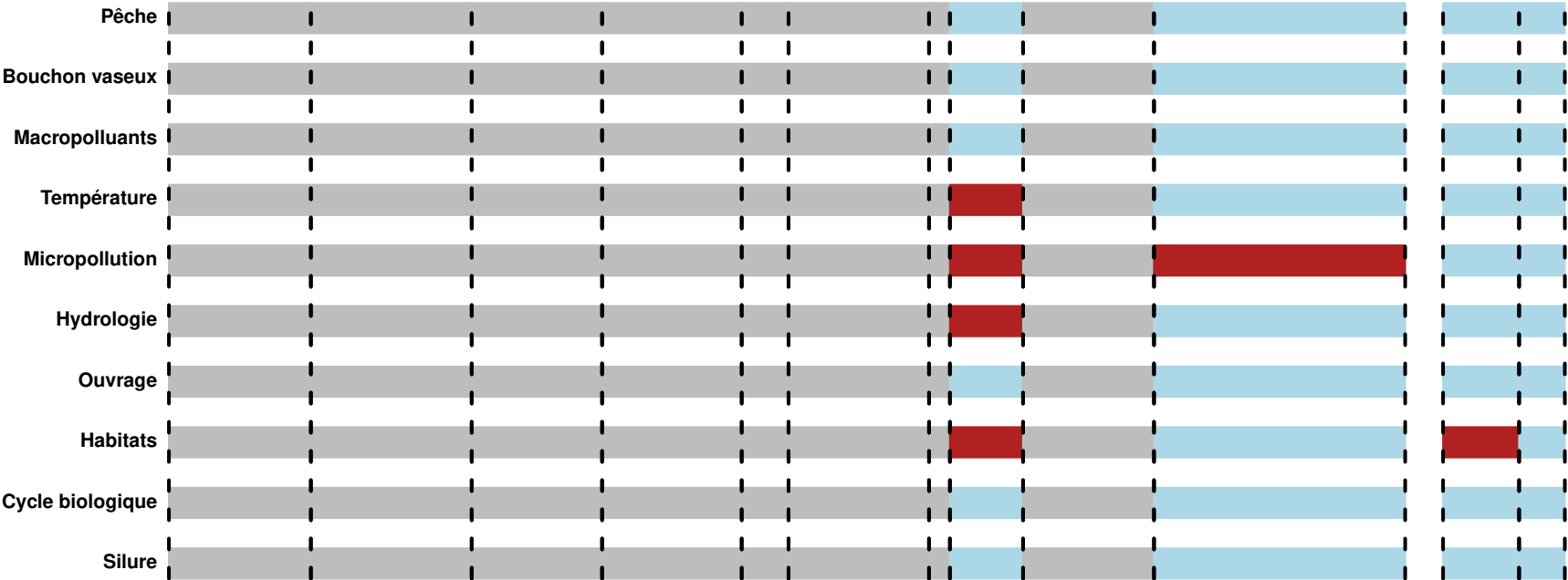
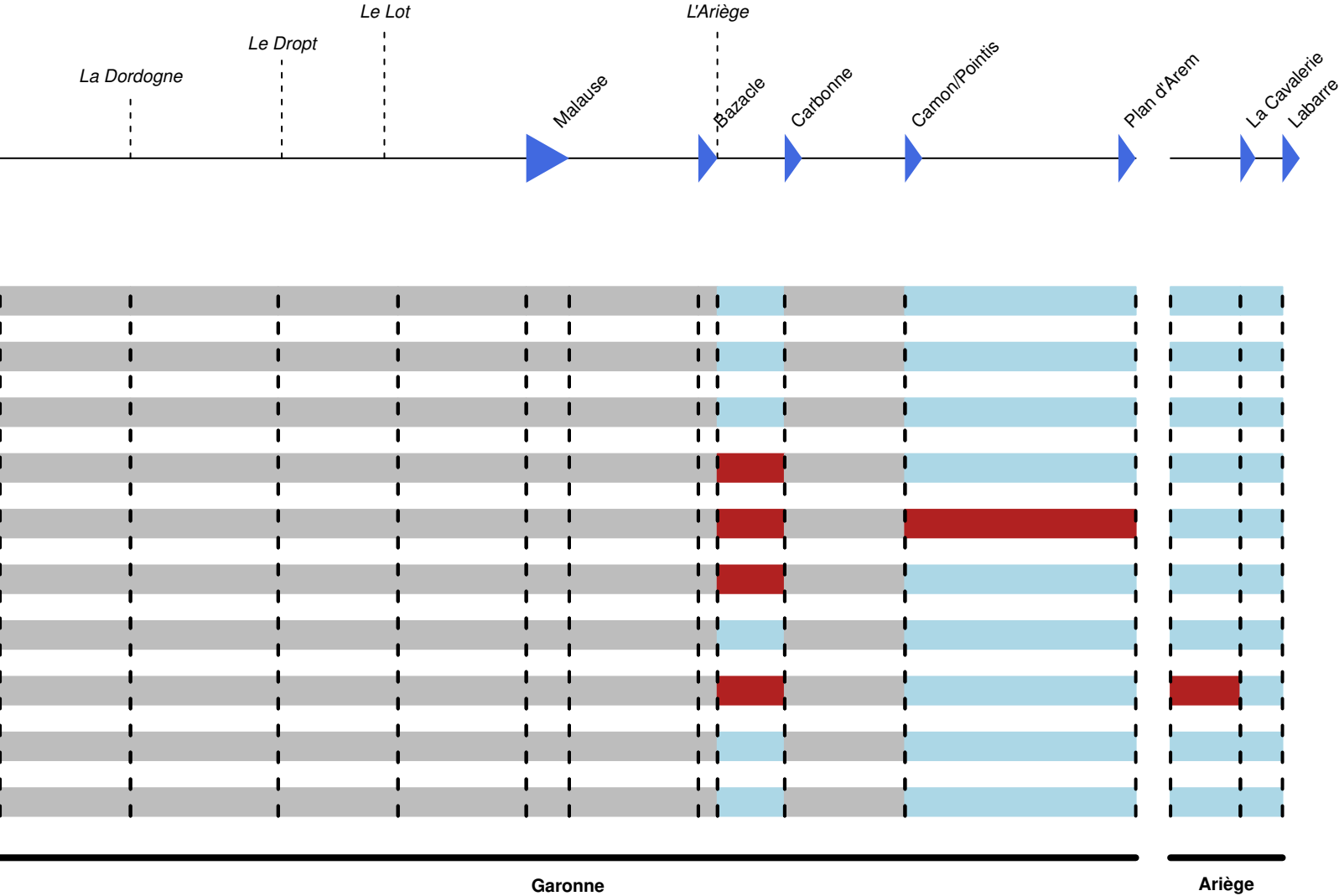
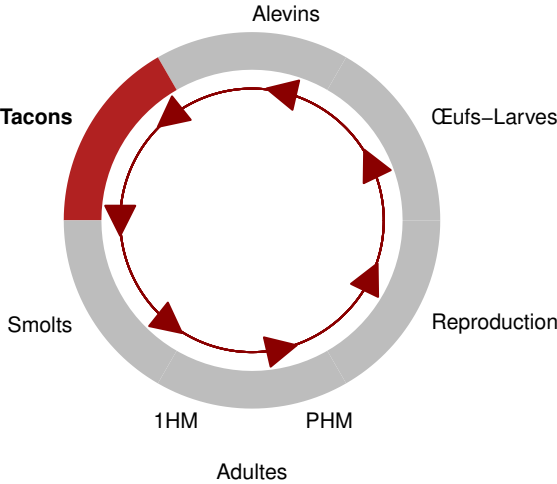


Saumon Atlantique

Tacons

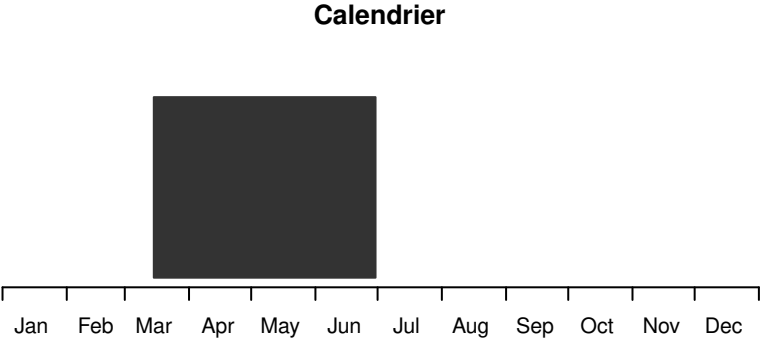


Cycle biologique

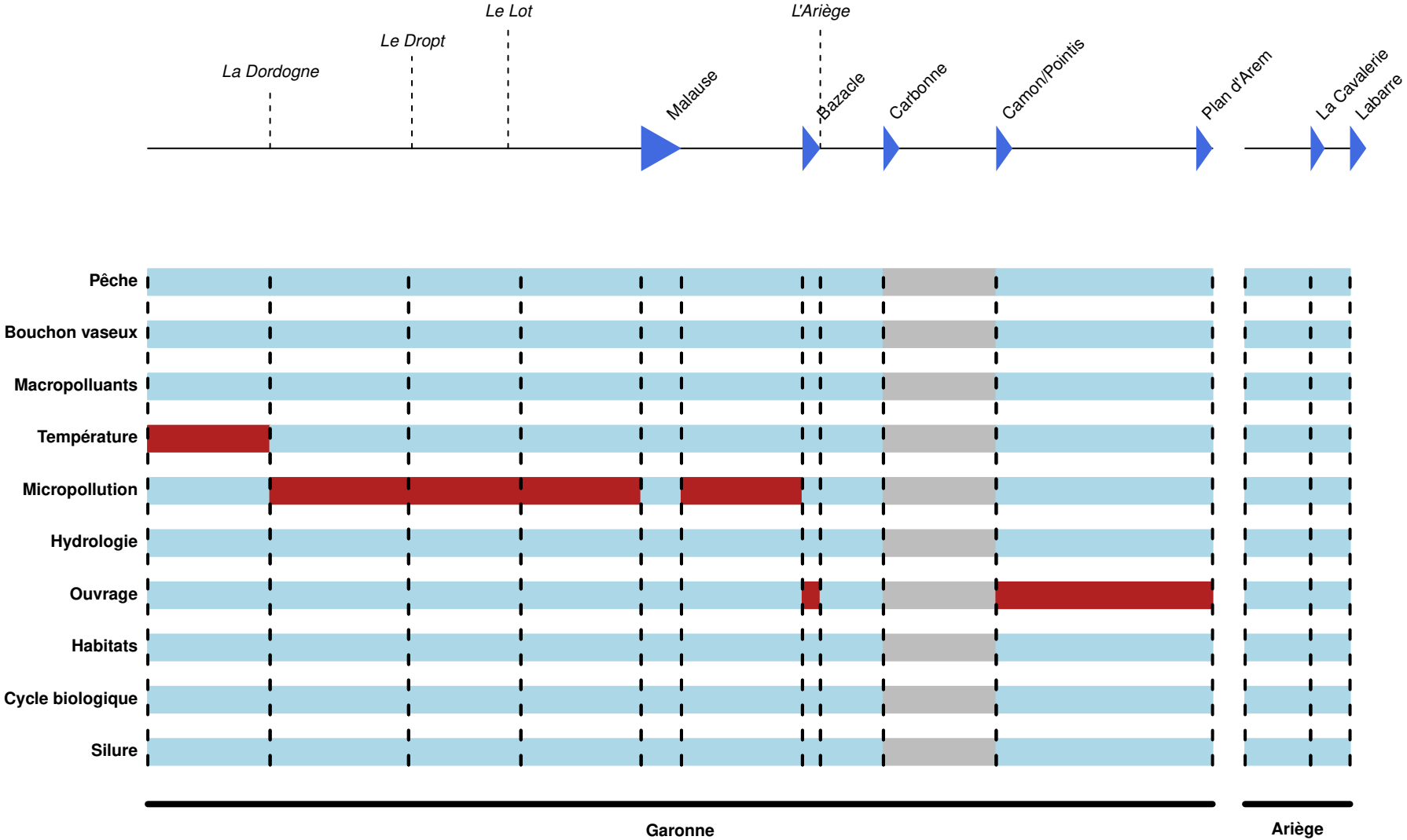
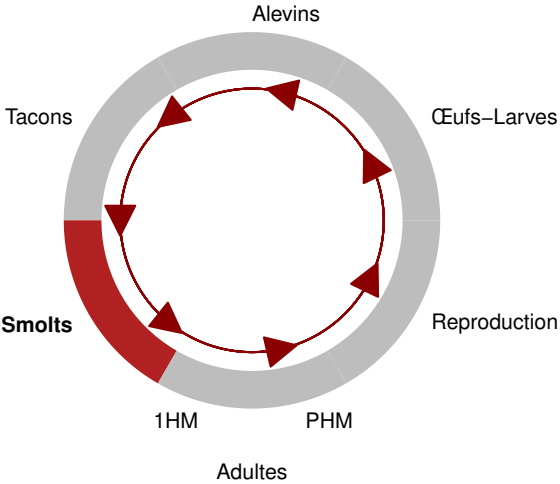


Saumon Atlantique

Smolts



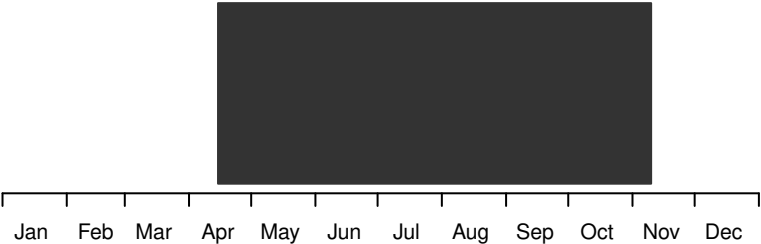
Cycle biologique



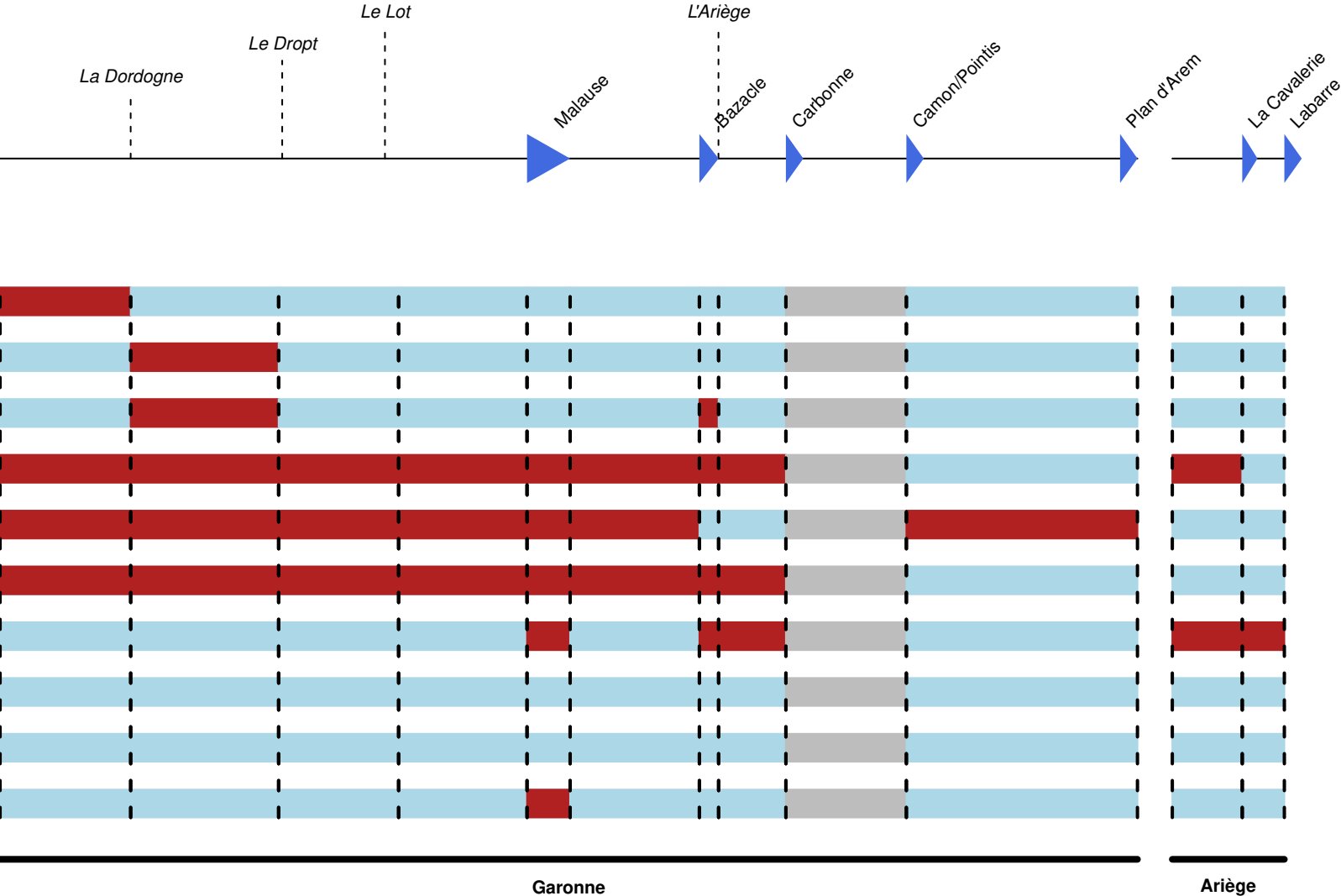
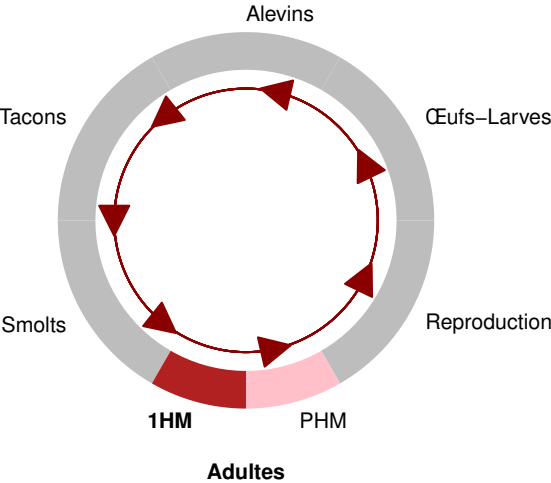
Saumon Atlantique

Adultes (1HM)

Calendrier



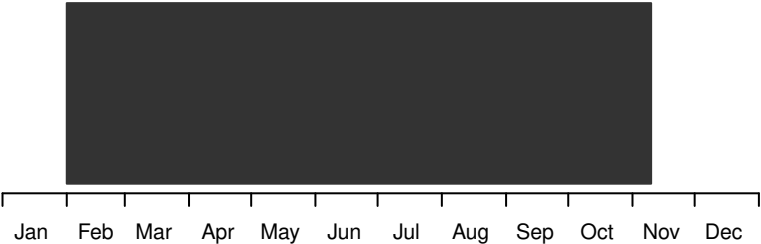
Cycle biologique



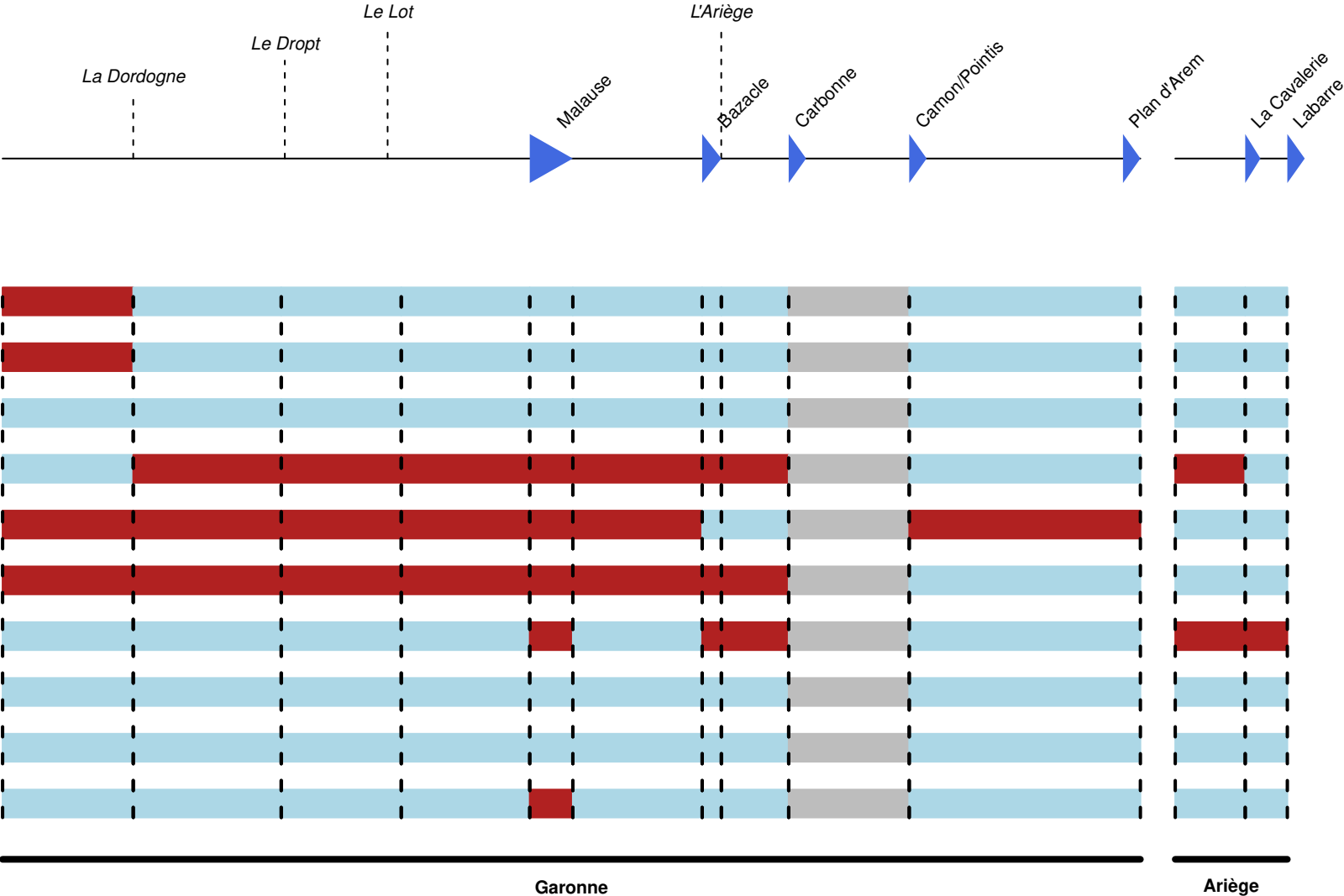
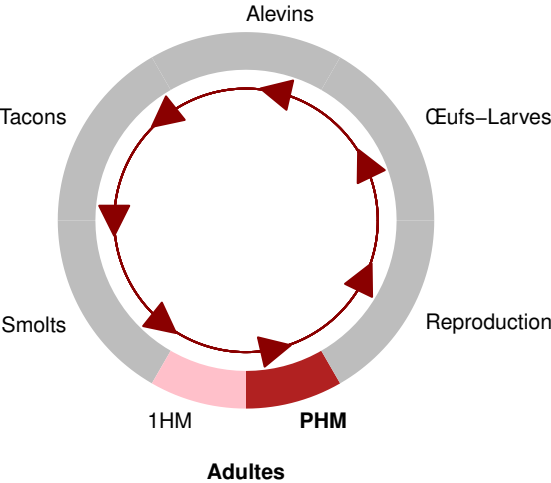
Saumon Atlantique

Adultes (PHM)

Calendrier



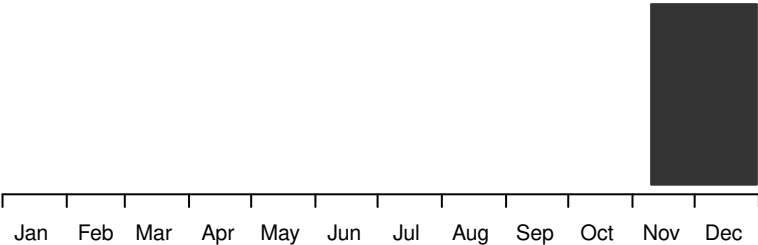
Cycle biologique



Saumon Atlantique

Reproduction

Calendrier



Cycle biologique

